



A contribution to the knowledge of the encyrtid wasps (Hymenoptera: Chalcidoidea, Encyrtidae) from southern Iran, with four new records

Majid Fallahzadeh^{1*}, George Japoshvili^{2,3} and Nazila Saghaei⁴

¹ Department of Entomology, Jahrom branch, Islamic Azad University, Jahrom, Iran.

² Institute of Entomology, Agricultural University of Georgia, Tbilisi, Georgia.

³ Invertebrate Research Center, Tbilisi, Georgia.

⁴ Department of Entomology, Marvdasht branch, Islamic Azad University, Marvdasht, Iran.

Received:
10 September, 2016

Accepted:
24 September, 2016

Published:
25 September, 2016

Subject Editor:
Hossein Lotfalizadeh

ABSTRACT. Fifteen species belonging to ten genera of the encyrtid wasps (Hymenoptera: Chalcidoidea, Encyrtidae) were collected in southern Iran and are presented here with the host records. Four species are newly recorded for the Iranian fauna: *Blastothrix aprica* Sugonjaev, 1964; *Psyllaephagus belanensis* (Hoffer, 1963); *Psyllaephagus pulchellus* (Mercet, 1921) and *Anagyrus archangelskayae* Trjapitzin, 1972. Some new host associations were found for 10 encyrtid species. Two misidentifications were corrected. Available biological data as well as geographical distribution for each species are also included.

Key words: Parasitoids, Fauna, new host associations, new records, Iran.

Citation: Fallahzadeh, M., Japoshvili, G. and Saghaei, N. 2016. A contribution to the knowledge of the encyrtid wasps (Hymenoptera: Chalcidoidea, Encyrtidae) from southern Iran, with four new records. *Journal of Insect Biodiversity and Systematics*, 2(3): 309–319.

Introduction

The Encyrtidae is one of the largest and most abundant families of parasitoid wasps, with over 4000 described species in about 490 genera (Noyes 2016). Members of the family are biologically diverse and widespread in nearly all habitats, and are extremely important as biological control agents (Noyes and Hayat 1994; Japoshvili and Noyes 2006). They attack a wide range of hosts including spiders, ticks, and several orders of insects (Trjapitzin 1989; Noyes 2016). Some species are primary parasitoids while several species are also hyperparasitoids on a wide range of other

parasitoids (Trjapitzin 1989). Recently, Fallahzadeh and Japoshvili (2010) summarized data on the Iranian fauna of Encyrtidae. Since then several works on Encyrtidae of Iran have been published and further species recorded or described (e.g. Lotfalizadeh 2010a, b; Golpayegani *et al.* 2010; Fallahzadeh *et al.* 2011; 2014; Fallahzadeh and Japoshvili 2013; Ebrahimi *et al.* 2014, Lotfalizadeh and Bab-Morad 2015, Japoshvili *et al.* 2015, 2016; Lotfalizadeh *et al.* 2016). However, the encyrtid fauna of Iran is still poorly studied. Here, we document the presence of four additional

Corresponding author: Majid Fallahzadeh, E-mail: mfallahm@yahoo.com

Copyright © 2016, Fallahzadeh *et al.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

species in Iran, and provide some new biological associations for 10 encyrtid species.

Material and methods

Surveys for encyrtid parasitoids were conducted on cultivated and non-cultivated plants in different area of Fars, Hormozgan, and Kohgiluyeh and Boyer-Ahmad provinces, in southern Iran, during the period 2004 to 2012. Shoots and leaves of plants infested mainly with scale insects and psyllids were collected after visual examination. All individual of parasitized materials were counted under a stereomicroscope and were placed in Petri dishes and covered with a layer of filter paper and held at room conditions (25 ± 3 °C, 30–40% RH, and 16:8 L:D) for 30 days. Parasitoid adults that emerged were transferred to 70% ethyl alcohol and later mounted on slides (as described in Noyes 1982) and identified (mainly using keys by Sugonjaev 1976; Trjapitzin 1981, 1989; Myartseva 1987; Guerrieri and Noyes 2000). Voucher specimens were deposited in the Entomology Department of the Agriculture Faculty, Jahrom Branch, Islamic Azad University, Iran (JIAU) and Institute of Entomology, Agricultural University of Georgia, Tbilisi, Georgia. The subfamilies, genera and species are listed in alphabetic order. Nomenclature follows that used in the Universal Chalcidoidea Database (Noyes 2016).

Results

Subfamily Encyrtinae

Genus *Blastothrix* Mayr, 1876

Blastothrix aprica Sugonjaev, 1964

Material examined: 4♀♀, IRAN, Fars province, Kherameh, 16.v.2012, ex. *Eulecanium rugulosum* (Archangelskaya) (Hemiptera: Coccidae) on *Pistacia atlantica* (Anacardiaceae), leg. M. Fallahzadeh.

Distribution: Palaearctic: Transcaucasia (Armenia, Azerbaijan) (Sugonjaev 1964; Trjapitzin 1989; Japoshvili and Noyes 2005).

Hosts: *Eulecanium ficiphilum* Borchsenius, 1955 (Hemiptera: Coccidae) (Babayan 1963; Trjapitzin 1989); *Eulecanium* sp. (Japoshvili and Noyes 2005).

Remarks: Until now, the *Blastothrix* species recorded from Iran were *Blastothrix brittanica* Girault, 1917, *B. longipennis* Howard, 1881, *B. ilicicola* Mercet, 1921, *B. hungarica* Erdős, 1959, *B. sericea* (Dalman, 1820) and *B. turanica* Sugonjaev, 1964 (Fallahzadeh and Japoshvili 2013). *Blastothrix aprica* is a new record for Iran.

In the Palaearctic region, members of *Blastothrix* Mayr, 1876 are normally primary parasitoids of the genus *Eulecanium* Cockerell, 1929 (Hemiptera: Coccidae), however some attack species of the genus *Kermes* Boitard, 1828, (Hemiptera: Kermesidae) (Prinsloo 1997). Here, *B. aprica* is recorded in association with *Eulecanium rugulosum* on *Pistacia atlantica* for the first time.

Blastothrix longipennis Howard, 1881

Material examined: 2♀♀, 2♂♂, IRAN, Kohgiluyeh and Boyer-Ahmad province, Dena, 25.vi.2010, ex *Eulecaniumtiliae* (Linnaeus) (Hemiptera: Coccidae) on *Prunus domestica* (Rosaceae), leg. M. Fallahzadeh.

Distribution: Palaearctic and Nearctic regions (Noyes 2016).

Host: This species is a common parasitoid of various Coccidae including *Eulecanium*, *Lecanium* and *Parthenolecanium* (Noyes 2016).

Remarks: *Blastothrix longipennis* has previously been reported from East Azerbaijan province (Fallahzadeh and Japoshvili 2013) and new material extend its distribution to southern Iran.

Genus *Cheiloneurus* Westwood, 1833

Cheiloneurus claviger Thomson, 1876

Material examined: 2♀♀, IRAN, Fars province, Neyriz, 20.v.2012, ex. *Eulecaniumtiliae* (Linnaeus) (Hemiptera: Coccidae) on

Prunus amygdalus (Rosaceae), leg. M. Fallahzadeh; 2♀♀, IRAN, Fars province, Kherameh, 29.v.2012, ex. *Eulecanium rugulosum* (Archangelskaya) (Hemiptera: Coccidae) on *Pistacia atlantica* (Anacardiaceae), leg. M. Fallahzadeh.

Distribution: Palaearctic and Oriental regions (Noyes 2016).

Host: In Iran, it was already reared from *Sphaerolecanium prunastri* (Boyer de Fonscolombe) (Hemiptera: Cocidae) on Rosaceous trees in Khorasan-e-Razavi province (Talebi *et al.* 2009) and Fars province (Fallahzadeh and Japoshvili 2010).

Remarks: *Cheiloneurus* is a moderately large, cosmopolitan genus, with 142 known species, that only 28 species have been reported from Palaearctic region (Noyes 2016). Up to now, 7 species have been reported from Iran (Fallahzadeh and Japoshvili 2013). Several species of the genus have been reared from a wide range of scale insects and the some species are regarded as hyperparasitoids of other chalcidoid parasitoids (Prinsloo 1997).

Genus *Homalotylus* Mayr, 1876

Homalotylus turkmenicus Myartseva, 1981

Material examined: 1♀; IRAN, Hormozgan province, Bandar Abbas, 25.x.2008, ex. *Nephus (Sidis) hiekei* Fürsch (Coleoptera: Coccinellidae) on *Sesamum indicum* L. (Pedaliaceae), leg. M. Fallahzadeh; 5♀♀, 2♂♂, Hormozgan province, Bandar Abbas, 9.ix.2009, ex. *Menochilus sexmaculatus* (Fabricius) (Coleoptera: Coccinellidae) on *Hibiscus rosa-sinensis* (Malvaceae), leg. M. Fallahzadeh; 9♀♀; Hormozgan province, Bandar Abbas, 3.iv.2010, ex. *Hyperaspis polita* Weise (Coleoptera: Coccinellidae) on *Solanum nigrum* (Solanaceae), leg. M. Fallahzadeh.

Distribution: Palaearctic (Turkmenistan, Iran) and Oriental regions (India) (Noyes 2016).

Hosts: In Iran, It has hitherto been reported from several coccinellid species, *Exochomus quadripustulatus* L. and *E. nigromaculatus* Goeze (Ameri *et al.* 2007); *Nephus bipunctatus* (Kugelann) and *E. quadripustulatus* (Fallahzadeh *et al.* 2006a; Fallahzadeh and Japoshvili 2010); *Hyperaspis polita* Weise and *N. bipunctatus* (Lotfalizadeh *et al.* 2010b; Fallahzadeh *et al.* 2011).

Remarks: *Homalotylus* is a cosmopolitan genus contains over 64 described species while more than 20 species were recorded from Palaearctic (Noyes 2016). The species are solitary or gregarious larval parasitoids of lady beetles (Coleoptera: Coccinellidae) feeding on sternorrhynch hemipterans (Trjapitzin 1989; Noyes 2016). The previous report of *Homalotylus sinensis* Xu & He (Fallahzadeh *et al.* 2006a) from southern Iran is misidentification of *H. turkmenicus*. In the present study, these biological associations between *H. turkmenicus* and two lady beetles *Nephus (Sidis) hiekei* and *Menochilus sexmaculatus* are new.

Homalotylus vicinus Silvestri, 1915

Material examined: 4♀♀, IRAN, Hormozgan province, Bandar Abbas, 5.viii.2009, ex. *Menochilus sexmaculatus* (Fabricius) (Coleoptera: Coccinellidae) on *Hibiscus rosa-sinensis* (Malvaceae), leg. M. Fallahzadeh; 3♀♀, 1♂, Hormozgan province, Bandar Abbas, 25.x.2008, ex. *Nephus (Sidis) hiekei* Fürsch (Coleoptera: Coccinellidae) on *Sesamum indicum* L. (Pedaliaceae), leg. M. Fallahzadeh.

Distribution: Afrotropical and Palaearctic regions (Iran, Egypt) (Noyes 2016).

Hosts: *Hyperaspis marmottani* Fairm. (Trjapitzin 1989); *Nephus vetustus* (Thompson 1955; Prinsloo 1983; Trjapitzin 1989); *Scymnus* sp. (Trjapitzin 1989); *Nephus bipunctatus* (Kugelann) (Fallahzadeh and Japoshvili 2010); *Exochomus quadripustulatus*

(L.) and *Hyperaspis polita* Weise (Fallahzadeh *et al.* 2011).

Remarks: Here, these biological associations between *H. turkmenicus* and two lady beetles *Nephus (Sidis) hiekei* and *Menochilus sexmaculatus* are new.

Up to now, the *Homalotylus* species recorded from Iran were *Homalotylus albiclavatus* (Agarwal, 1970), *H. eytelweinii* (Ratzeburg, 1844), *H. flaminius* (Dalman, 1820), *H. hemipterinus* (De Stefani, 1898), *H. nigricornis* Mercet, 1921, *H. quaylei* Timberlake, 1919, *H. turkmenicus* Myartseva, 1981, and *H. vicinus* Silvestri, 1915 (Fallahzadeh and Japoshvili 2013).

Genus *Leptomastix* Förster, 1856
***Leptomastix flava* Mercet, 1921**

Material examined: 2♀♀; IRAN, Hormozgan province, Bandar Abbas, 5.viii.2009, ex. *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) on *Solanum tuberosum* (Solanaceae), leg. M. Fallahzadeh; 10♀♀, 3♂♂, Hormozgan province, Bandar Abbas, 3.vi.2009, ex. *Ph. solenopsis* on *Hibiscus rosa-sinensis* (Malvaceae), Bandar Abbas, leg. M. Fallahzadeh; 4♀♀; Hormozgan province, Bandar Abbas, 17.x.2008, ex. *Ph. solenopsis* on *Sesamum indicum*, leg. M. Fallahzadeh; 3♀♀; Hormozgan province, Bandar Abbas, 16.iv.2010, ex. *Ph. solenopsis* on *Abutilon indicum* (Malvaceae), leg. M. Fallahzadeh.

Distribution: Afrotropical and Palaearctic regions (Noyes 2016).

Hosts: This species is a solitary primary parasitoid that attacks numerous mealybugs genera including *Dysmicoccus*, *Nipaecoccus*, *Peliococcus*, *Phenacoccus*, *Planococcus*, *Pseudococcus* and *Trionymus* (Noyes 2016).

Remarks: In Iran, *L. flava* has already been recorded as associated with *Phenacoccus aceris* (Signoret) on Roseous fruit trees (Rosaceae) and *Eulecanium rugulosum* (Archangelskaya) on *Pistacia vera*

(Anacardiceae) (Fallahzadeh and Japoshvili 2010) and is also associated with *Planococcus ficus* (Signoret) on grape (Fallahzadeh *et al.* 2011) and *Peliococcus kimmericus* (Kiritshenko) on *Lactuca serriola* (Nazari *et al.* 2014). In the present study, *L. flava* is recorded in associated with *Phenacoccus solenopsis* for the first time.

Genus *Metaphycus* Mercet, 1917
***Metaphycus parthenolecanii* Japoshvili, 2015**

Material examined: 2♀♀, IRAN, Fars province, Neyriz, 12.v.2012, ex. *Eulecanium tiliae* (Linnaeus) (Hemiptera: Coccidae) on *Prunus amygdalus* (Rosaceae), leg. M. Fallahzadeh.

Distribution: Iran (Kermanshah province, western Iran) (Japoshvili *et al.* 2015).

Hosts: *Parthenolecanium corni* (Bouché) (Hemiptera: Coccidae) on *Juglans regia* (Juglandaceae) and *Prunus* spp. (Rosaceae) (Japoshvili *et al.* 2015).

Remarks: Recently, *M. parthenolecanii* has been originally described from western Iran (Japoshvili *et al.* 2015). The record of this species from southern Iran shows the wider distribution of this species in the Iranian plateau. In addition, *M. parthenolecanii* is recorded in association with *Eulecanium tiliae* for the first time.

Genus *Microterys* Thomson, 1876
***Microterys cuprinus* (Nikol'skaya, 1952)**

Material examined: 4♀♀, IRAN, Fars province, Neyriz, 18.v.2012, ex. *Sphaerolecanium prunastri* (Boyer de Fonscolombe) (Hemiptera: Coccidae) on *Prunus amygdalus* (Rosaceae), leg. M. Fallahzadeh.

Distribution: Armenia (Nikol'skaya 1952); Hungary (Herting 1972) Armenia and Azerbaijan (Japoshvili and Noyes 2005); Iran (Lorestan and Markazi provinces) (Golpayegani *et al.* 2010).

Hosts: *Eulecanium persicae* (Fabricius) (Herting 1972) and *Didesmococcus unifasciatus* (Archangelskaya) (Hemiptera: Coccidae)

(Trjapitzin 1989; Japoshvili and Noyes 2005; Golpayegani *et al.* 2010).

Remarks: The genus *Microterys* is very well-known primary parasitoids of a wide range of economically important coccid pests and it has been the subject of interest in biological control worldwide for many years (Noyes 2016). In our study, *M. cuprinus* is recorded in associated with *S. prunastri* for the first time. It has hitherto been reported from central of Iran (Golpayegani *et al.* 2010). The record of this species from southern Iran shows the wider distribution of this species in the Iranian plateau.

Microterys hortulanus Erdős, 1956

Material examined: 2♀♀, IRAN, Fars province, Neyriz, 8.v.2012, ex. *Eulecanium tiliae* (Linnaeus) (Hemiptera: Coccidae) on *Prunus amygdalus* (Rosaceae), leg. M. Fallahzadeh.

Distribution: Palaearctic (Noyes 2016).

Hosts: *Didesmococcus unifasciatus* (Archangelskaya), *Eulecanium* spp., and *Sphaerolecanium prunastri* (Boyer de Fonscolombe) on Rosaceae (Noyes 2016).

Remarks: *Microterys hortulanus* has previously been reported from East Azerbaijan, Tehran and Markazi provinces (Davoodi *et al.* 2004; Lotfalizadeh *et al.* 2010b; Golpayegani *et al.* 2010) and new material extend its distribution to southern Iran.

Genus *Prochiloneurus* Silvestri, 1915

Prochiloneurus aegyptiacus (Mercet, 1929)

Material examined: 2♀♀, IRAN, Hormozgan province, Bandar Abbas, 15.xi.2009, ex. *Nephus (Sidis) hiekei* (Coleoptera, Coccinellidae) on *Sesamum indicum*, leg. M. Fallahzadeh; 5♀♀, Bandar Abbas, 6.x.2008, ex. *Homalotylus turkmenicus* (Hymenoptera, Encyrtidae), leg. M. Fallahzadeh.

Distribution: Afrotropical, Palaearctic and Oriental regions (Noyes 2016).

Hosts: Similar to *Cheiloneurus*, members of *Prochiloneurus* includes both primary and secondary parasitoids. Hosts are mainly species of mealybugs, beetles of the family Coccinellidae as well as encyrtid wasps (Noyes 2016).

Remarks: The genus *Prochiloneurus* contains 33 species and is well represented in the Indo-Pacific region (Noyes 2016). In Iran, *P. aegyptiacus* was reared on *H. quaylei* Timberlake, *Anagyrus* spp. and *M. hirsutus* (Green) (Fallahzadeh and Japoshvili 2010). Here, *P. aegyptiacus* is recorded in associated with *N. (Sidis) hiekei* (Coleoptera: Coccinellidae) and *H. turkmenicus* (Hymenoptera: Encyrtidae) for the first time.

Prochiloneurus bolivari Mercet, 1919

Material examined: 1♀, IRAN, Hormozgan province, Qeshm, 15.xi.2009, ex. *Maconellicoccus hirsutus* (Green) (Hemiptera: Pseudococcidae) on *Vachellia nilotica* (Fabaceae), leg. M. Fallahzadeh; 2♀♀; Hormozgan province, Bandar Abbas, 15.iv.2010, ex. *Phenacoccus solenopsis* (Hemiptera: Pseudococcidae) on *Abutilon indicum* (Malvaceae), leg. M. Fallahzadeh.

Distribution: Afrotropical and Palaearctic regions (Noyes 2016).

Hosts: This species is a common primary/secondary parasitoid of various species of Coccidae, Pseudococcidae and Encyrtidae (Noyes 2016).

Remarks: In Iran, *P. bolivari* was reared on *P. ficus* (Hem.: Pseudococcidae) on grape (Fallahzadeh and Japoshvili 2010) and Coccidae on Almond (Lotfalizadeh 2010b). In our study, *Phenacoccus solenopsis* is a new host record for this parasitoid.

Genus *Psyllaephagus* Ashmead, 1900

Psyllaephagus belanensis (Hoffer, 1963)

Material examined: 4♀♀, IRAN, Hormozgan province, Bandar Abbas, 28.v.2010, ex. *Diaphorinacitri* Kuwayama (Hemiptera:

Psyllidae) on *Citruslimon* (Rutaceae), leg. M. Fallahzadeh.

Distribution: Azerbaijan (Trjapitzin 1989; Japoshvili and Noyes 2005), Czechoslovakia, Kazakhstan, Mongolia, Russia (Trjapitzin 1989), Slovakia (Kalina 1989).

Host: *Eumetoecus kochiae* (Horvath 1897) (Hemiptera: Psyllidae) (Trjapitzin 1989).

Remarks: *Psyllaephagus* is a worldwide, large genus contains about 241 nominal species with parasitoid species of psyllids which are often important pest on various fruit and forest trees and other economic important trees (Noyes 2016).

Trjapitzin (1981, 1989) revised and keyed out all Palaearctic species. Over 66 species are known from this region (Trjapitzin 1989; Noyes, 2016). So far, six species of the genus *Psyllaephagus* have been reported from Iran: *Psyllaephagus cellulatus* Waterston, 1922, *P. claripes* Trjapitzin, 1967, *P. pistaciae* Ferrière, 1961, *P. procerus* Mercet, 1921, *P. stenopsyllae* Tachikawa, 1963 and *P. zdeneki* Noyes and Fallahzadeh, 2005 (Rounagh *et al.* 2016). In the present study, *P. belanensis* is a new species record for Iran. Prior to our study, two *Psyllaephagus* species namely *P. stenopsyllae* (Tachikawa, 1963) and *P. procerus* Mercet, 1921 reared on *Diaphorina citri* from southern Iran (Ameri *et al.*, 2006; Moghbeli-Gharaei *et al.* 2013). Here, *P. belanensis* is recorded in association with *D. citri* for the first time.

***Psyllaephagus pulchellus* (Mercet, 1921)**

Material examined: 6♀♀, IRAN, Fars province, Neyriz, 2.v.2012, ex. unknown host on *Pistacia atlantica* (Anacardiaceae), leg. M. Fallahzadeh.

Distribution: Croatia, Montenegro (Bouček 1977); Spain (Mercet 1921; Trjapitzin 1989; Japoshvili & Noyes 2006); Greece (Japoshvili & Noyes 2006); Turkey and former Yugoslavia (Trjapitzin 1989; Japoshvili & Noyes 2006).

Hosts: *Anapulvinaria pistaciae* (Bodenheimer) (Hemiptera: Coccidae) (Bouček 1977; Japoshvili and Noyes 2006).

Remarks: *Psyllaephagus pulchellus* is a new species record for Iran.

Subfamily Tetracneminae

Genus *Aenasius* Walker, 1846

***Aenasius arizonensis* (Girault, 1915)**

Material examined: 2♀♀, 4♂♂, IRAN, Hormozgan province, Bandar Abbas, 7.x.2008. ex *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) on *Lantana* sp. (Verbenaceae), leg. M. Fallahzadeh.

Distribution: China, India, Pakistan, Iran, USA (Girault 1915; Hayat 2009; Chen *et al.* 2011; Zainul-Abdin *et al.* 2012; Fallahzadeh *et al.* 2014).

Hosts: *Phenacoccus solenopsis* Tinsley, 1898 (Hemiptera: Pseudococcidae) on *Gossypium hirsutum* (Malvaceae) and many weed species (Hayat 2009; Nalini and Manickavasagam 2011; Fallahzadeh *et al.* 2014).

Remarks: Recently, the synonymy of *Aenasius bambawalei* Hayat and *A. arizonensis* (Girault) was discussed by Fallahzadeh *et al.* (2014).

Genus *Anagyrus* Howard, 1896

***Anagyrus archangelskayae* Trjapitzin, 1972**

Material examined: 3♀♀, 1♂, IRAN, Fars province, Shiraz, 19.v.2004. ex *Peliococcus kimmericus* (Kiritshenko) (Hemiptera: Pseudococcidae) on *Lactuca serriola* (Asteraceae), leg. M. Fallahzadeh.

Distribution: Turkmenistan and Uzbekistan (Trjapitzin 1972, 1989, Noyes and Hayat 1994).

Hosts: *Peliococcus mesasiaticus* Borchsenius & Kozarzhevskaya, 1966 [= *P. kimmericus*] (Trjapitzin 1989; Noyes & Hayat 1994); *Phenacoccus zillae* Archangelskaya, 1937 [= *P. kimmericus*] (Trjapitzin 1972)

Remarks: *Anagyrus archangelskayae* is a new species record for Iran. The previous report

of *Anagyrus matritensis* (Mercet, 1921) (Fallahzadeh *et al.* 2006b) from southern Iran is misidentification of *A. archangelskayae*. Nazari *et al.* (2014) reared *Anagyrus securicornis* (Domenichini) on *P. kimmericus* on *L. serriola* from northeastern Iran.

Discussion

A total of 15 species belonging to 10 genera of encyrtid wasps were collected in southern Iran. Four species are considered as new records for Iranian Encyrtidae fauna. Despite numerous studies in the recent years (Lotfalizadeh 2010a, b; Golpayegani *et al.* 2010; Fallahzadeh and Japoshvil 2013; Ebrahimi *et al.* 2014; Jafari *et al.*, 2015; Japoshvili *et al.* 2015, 2016), our knowledge of the encyrtid wasps of Iran is still limited. Thus, we expect that a large number of species remain to be discovered.

Iran is the 18th largest country in the world (Hakimzadeh Khoei *et al.* 2011), located on the crossroad of different biogeographic regions Afrotropical, Oriental and Caucasus, has a rich and diverse insect fauna. Among the species recorded herein, *Metaphycus parthenolecanii* is an endemic species in Iran. An interesting result of our investigation is presence of four species *Blastothrix aprica*, *Anagyrus archangelskayae*, *Microterys cuprinus* and *Psyllaephagus belanensis* in Iran. It seems that these species well distributed in Irano-Anatolian region (Trjapitzin 1989; Japoshvili and Noyes 2005; Noyes 2016). Two species *Microterys hortulanus* and *Psyllaephagus pulchellus* are distributed only in Palaearctic region while *Prochiloneurus aegyptiacus* and *Aenasius arizonensis* are virtually cosmopolitan (Noyes 2016). *Blastothrix longipennis* has Holarctic distribution. *Cheiloneurus claviger* and *Homalotylus turkmenicus* reported from Palearctic-Oriental regions. The rest of the species are mainly distributed in Palaearctic-Afrotropical regions (Noyes 2016).

Lotfalizadeh (2010b) has been corrected five misidentifications. Here, we corrected two other misidentifications. We assumed several reports of encyrtid species in Iran needs confirmation and maybe are misidentifications.

The host associations of Iranian encyrtid wasps are poorly known. In the present study, several new host associations were found for 10 encyrtid species. It is clear that the Iranian encyrtid fauna needs further study, especially in relation to host associations and diversity.

Acknowledgments

This research was supported by Islamic Azad University, Jahrom Branch, Iran, and the Institute of Entomology, Agricultural University of Georgia, Georgia.

References

- Ameri, A., Talebi, A.A., Xu, Z.H. and Rakhshani, E. 2006. Report of *Psyllaephagus stenopsyllae* (Hym., Encyrtidae) from Iran. *Journal of Entomological Society of Iran*, 25(2): 83-84.
- Ameri, A., Talebi, A.A., Fathipour, Y., Rakhshani, E. and Xu, Z.H. 2007. New host records of the ladybeetle parasitoid species *Homalotylus sinensis* in Iran (Hymenoptera: Encyrtidae). *Entomologia Generalis*, 30(4): 307-310.
- Babayan, G.A. 1963. *Eulecanium ficiphilum* Borchs. (Homoptera, Coccidae) and measures for its control in Armenia. *Entomologicheskoe Obozrenie*, 42(1): 77-84.
- Bouček, Z. 1977. A faunistic review of the Yugoslavian Chalcidoidea (Parasitic Hymenoptera). *Acta Entomologica Jugoslavica*, 13(Supplement): 1-145.
- Chen, H.Y., He, L.F., Zheng, C.H., Li, P., Yi, Q.H. and Xu, Z.F. 2011. Survey on the natural enemies of mealybug, *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) from Guangdong and Hainan, China. *Journal of Environmental Entomology*, 33: 269-272.

- Davoodi, A., Talebi, A.A., Rajabi, Gh. and Fathipour, Y. 2002. The first report of *Microterys hortulanus* (Hym.: Encyrtidae) from Iran. *Journal of Entomological Society of Iran*, 22(1): 85–86.
- Ebrahimi, E., Tavakoli-Korghond, G.R., Mianbandi, K., Mahmoodi, H., Mohammadipour, K. and Noyes, J. 2014. *Ooencyrtus ferdowsii* sp. n. (Hymenoptera: Encyrtidae), an egg parasitoid of *Osphranteria coerulescens* (Coleoptera: Cerambycidae) in Iran. *Zoology in the Middle East*, 61(1): 45–49. DOI: <http://dx.doi.org/10.1080/09397140.2014.985503>
- Fallahzadeh, M. and Japoshvili, G., 2010. Checklist of Iranian Encyrtids (Hymenoptera: Chalcidoidea) with descriptions of new species. *Journal of Insect Science*, 10: 1–24.
- Fallahzadeh, M. and Japoshvili, G. 2013. Corrections to the list of Encyrtidae (Hymenoptera: Chalcidoidea) from Iran. *Journal of the Entomological Research Society*, 15(2):117–121.
- Fallahzadeh, M., Japoshvili, G., Abdmaleki, R. and Saghaei, N. 2014. New records of Tetracnemininae (Hymenoptera, Chalcidoidea, Encyrtidae) from Iran. *Turkish Journal of Zoology*, 38: 515–518.
- Fallahzadeh, M., Japoshvili, G., Saghaei, N. and Daane, K.M. 2011. Natural enemies of *Planococcus ficus* (Hemiptera: Pseudococcidae) in Fars province vineyards, Iran. *Biocontrol Science and Technology*, 21(4): 427–433.
- Fallahzadeh, M., Shojaei, M., Ostovan, H. and Kamali, K., 2006a. The first report of two parasitoid wasps on the larvae of *Nephus bipunctatus* (Col.: Coccinellidae) from Iran. *Journal of Entomological Society of Iran*, 26(1): 95–96.
- Fallahzadeh, M., Shojaei, M., Ostovan, H. and Kamali, K., 2006b. The first report of four parasitoid wasps on *Peliococcus kimmericus* (Hem.: Pseudococcidae) from Iran. *Journal of Entomological Society of Iran*, 26(1): 97–98.
- Girault, A.A. 1915. New chalcidoid Hymenoptera. *Annals of the Entomological Society of America*, 8(3): 279–284.
- Guerrieri, E., and Noyes, J.S. 2000. Revision of European species of genus *Metaphycus* Mercet (Hymenoptera: Encyrtidae), parasitoids of scale insects. *Systematic Entomology*, 25: 147–222.
- Hakimzadeh Khoei, M., Kaya, M. and Altindag, A. 2011. New records of Rotifers from Iran with biogeographic considerations. *Turkish Journal of Zoology*, 35: 395–402.
- Herting, B. 1972. *Hymenoptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy*. Commonwealth Agricultural Bureaux, Slough, England, 210pp.
- Hayat, M. 2009. Description of a new species of *Aenasius* Walker) Hymenoptera: Encyrtidae, parasitoid of the mealybug, *Phenacoccus solenopsis* Tinsley (Homoptera: Pseudococcidae) in India. *Biosystematica*, 3: 21–25.
- Jafari, N., Lotfalizadeh, H., Karimpour, Y. and Gharali, B. 2015. Natural enemies of the Comstock mealybug, *Pseudococcus comstocki* (Hem.: Pseudococcidae) as an important pest of mulberries in Tabriz, Iran. *Applied Entomology and Phytopathology*, 83 (2): 87–96.
- Japoshvili, G. and Noyes, J.S. 2005. Checklist and new data on Encyrtidae of Transcaucasia and Turkey (Hymenoptera: Chalcidoidea). *Zoosystematica Rossica*, 14(1): 135–145.
- Japoshvili, G. and Noyes, J.S. 2006. New records of Encyrtids (Hymenoptera: Chalcidoidea) from Europe. *Entomology Review* 81(1): 218–225.
- Japoshvili, G., Rakhshani, H. & Khajehali, J. 2016. A new species of *Copidosoma* (Hymenoptera: Encyrtidae) from Iran. *Zoology in the Middle East*, 62 (3):261–264. <http://dx.doi.org/10.1080/09397140.2016.1202909>
- Japoshvili, G., Jalilvand, K., Vahedi, H.A. and Fallahzadeh, M. 2015. *Metaphycus parthenolecanii* sp. n. (Hymenoptera: Encyrtidae), a parasitoid of *Parthenolecanium corni* (Hemiptera: Coccidae) in Iran. *Zoology in the Middle East*, 61(2): 161–165. DOI: <http://dx.doi.org/10.1080/09397140.2015.1020610>
- Kalina, V. 1989. Checklist of Czechoslovak Insects III (Hymenoptera). Chalcidoidea. *Acta Faunistica Entomologica Musei Nationalis Pragae*, 19: 97–127.

- Lotfalizadeh, H., 2010a. The genus *Metaphycus* Mercet, 1917 (Hym.: Encyrtidae) of the Iranian fauna with description of a new species. *North-Western Journal of Zoology*, 6: (2): 255–261.
- Lotfalizadeh, H., 2010b. Some new data and corrections on Iranian encyrtid wasp (Hymenoptera: Chalcidoidea, Encyrtidae) fauna. *Biharean Biologist*, 4(2): 173–178.
- Lotfalizadeh, H., and Bab-Morad, M. 2014. *Copidosoma bouchenum* Ratzeburg (Hym.: Encyrtidae): new record from Iran. *Turkish Journal of Zoology*, 39, 185–187.
- Lotfalizadeh, H., Bayegan, Z.A. and Zargaran, M. R. 2016. Species diversity of Chalcidoidea (Hymenoptera) in the rice fields of Iran. *Journal of the Entomological Research Society*, 18(1): 99–111.
- Mercet, R.G. 1921. *Fauna Iberica. Himenopteros Fam. Encirtidos*. Museo Nacional de Ciencias Naturales, Madrid, 727 pp.
- Moghbeli-Gharaei, A., Ziaaddini, M., Jalali, M. A. and Lotfalizadeh, H. 2013. Report of *Psyllaephagus procerus* Mercet (Hym.: Encyrtidae) as parasitoid of the *Diaphorina citri* (Hem.: Psyllidae) from Iran. *Applied Entomology and Phytopathology*, 80(2): 185–186.
- Myartseva, S.N. 1987. Paraziticheskiye pereponchatokriliye roda *Metaphycus* Mercet (Hymenoptera, Encyrtidae) srednyey Azii. *Entomologicheskoe Obozrenie*, 66(2): 379–388.
- Nikol'skaya, M. 1952. *Chalcids of the fauna of the USSR (Chalcidoidea)*. Opredeliteli po Faune SSSR Zoologicheskim Institutom Akademii Nauk SSSR, Moscow and Leningrad. 44: 575pp.
- Nalini, T. and Manickavasagam, S. 2011. Records of Encyrtidae (Hymenoptera: Chalcidoidea) parasitoids on mealybugs (Hemiptera: Pseudococcidae) from Tamil Nadu, India. *Check List*, 7: 510–515.
- Nazari, Z., Moravvej, G. and Lotfalizadeh, H. 2014. Parasitoids of *Peliococcus kimmericus* (Hem.: Pseudococcidae) in Mashhad, Iran. 21st Iranian Plant Protection Congress. *Urmia University*, p 608.
- Noyes, J.S. 1982. Collecting and preserving chalcid wasps (Hymenoptera: Chalcidoidea). *Journal of Natural History*, 16:315–334.
- Noyes, J.S. 2016. Universal Chalcidoidea Database. World Wide Web electronic publication. Available from: www.nhm.ac.uk/entomology/chalcidoidea/index.html. Accessed in 22 August 2016)
- Noyes, J.S. and Hayat, M. 1994. *Oriental mealybug parasitoids of the Anagyrini (Hymenoptera: Encyrtidae)*. CAB International, Oxon, UK, viii+554pp.
- Prinsloo, G.L. 1997. Encyrtidae. pp: 69–109. In: Ben-Dov Y. and Hodgson C. J. (Eds.), *Soft Scale Insects – Their Biology, Natural Enemies and Control*. (Vol. 7B), Amsterdam, Elsevier.
- Prinsloo, G.L. 1983. A parasitoid-host index of Afrotropical Encyrtidae (Hymenoptera: Chalcidoidea). *Entomology Memoirs of the Department of Agriculture, Republic of South Africa* 60:iii+35pp.
- Rounagh, H., Lotfalizadeh, H., Mokhtari, A. and Tavakkoli, Gh. 2016. New record of *Psyllaephagus scellulatus* Waterston, 1922 (Hym.: Encyrtidae) from Iran. Proceeding of 22nd Iranian Plant Protection Congress, 27–30 August 2016, College of Agriculture and Natural Resources, University of Tehran, Karaj, IRAN, p. 422.
- Sugonjaev, E.S. 1964. Palaearctic species of the genus *Blastothrix* Mayr (Hymenoptera, Chalcidoidea) with remarks on their biology and economic importance. Part 1. *Entomologicheskoe Obozrenie*, 43(2): 368–390.
- Sugonjaev, E.S. 1976. Chalcidoids of the genus *Microterys* Thomson (Hymenoptera, Chalcidoidea, Encyrtidae)–parasites of soft scales (Homoptera, Coccoidea) in the USSR. *Entomologicheskoe Obozrenie* 55:912–927. [In Russian]
- Talebi, A.A., Hasanpour, F., Rakhshani, E., Goldasteh, S. and Stojanovic, A. 2009. Two new records of encyrtids as parasitoid of *Sphaerolecanium prunastri* (Hem.: Coccidae) in Iran. *Journal of Entomological Society of Iran*, 28(2):75–78.
- Thompson, W.R. 1955. *A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue, Part 3. Hosts of the Hymenoptera (Calliceratid to Evaniid)*. The Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada, 191–332.

- Trjapitzin, V.A. 1972. New genera and species of parasitic Hymenoptera of the family Encyrtidae (Chalcidoidea) from the middle Asia and Kazakhstan. *Trudy Vsesoyuznogo Entomologicheskogo Obshchestva*, 55: 248–266.
- Trjapitzin, V.A. 1981. Key to Palaearctic species of the genus *Psyllaephagus* (Hym.: Encyrtidae), *Entomophaga* 26(4): 395–399.
- Trjapitzin, V.A. 1989. *Parasitic Hymenoptera of the Fam. Encyrtidae of Palaearctics. Opredeliteli po Faune SSSR. Zoologicheskim Institutom Akademii Nauk SSR, Leningrad, 158: 1–489.*[In Russian]
- Zain-ul-Abdin, M.J., Arif, M.D., Gogi, M.D., Arshad, M., Hussain, F., Abbas, S.K., Shaina, H. and Manzoor, A. 2012. Biological characteristics and host stage preference of mealybug parasitoid *Aenasius bambawalei* Hayat (Hymenoptera: Encyrtidae). *Pakistan Entomologist*, 34: 47–50.

معرفی بخشی از فون زنبورهای خانواده (Hymenoptera: Chalcidoidea) Encyrtidae در جنوب ایران با ثبت چهار گزارش جدید گونه

مجید فلاح زاده^{۱*}، جورج جاپوشویلی^۲ و نازیلا سقایی^۴

۱ گروه حشره شناسی، واحد جهرم، دانشگاه آزاد اسلامی، جهرم، ایران.

۲ موسسه حشره شناسی، دانشگاه کشاورزی گرجستان، تفلیس، گرجستان.

۳ مرکز تحقیقات بی مهرگان، تفلیس، گرجستان.

۴ گروه حشره شناسی، واحد مرودشت، دانشگاه آزاد اسلامی، مرودشت، ایران.

* پست الکترونیکی نویسنده مسئول مکاتبه: mfalahm@yahoo.com

تاریخ دریافت: ۲۰ شهریور ۱۳۹۵، تاریخ پذیرش: ۳ مهر ۱۳۹۵، تاریخ انتشار: ۴ مهر ۱۳۹۵

چکیده: در مقاله حاضر، پانزده گونه متعلق به ده جنس از زنبورهای خانواده (Hymenoptera: Chalcidoidea) Encyrtidae جمع‌آوری شده از جنوب ایران به همراه میزبان معرفی می‌شود. چهارگونه *Blastothrix aprica* Sugonjaev, *Psyllaephagus pulchellus* (Hoffer, 1963), *Psyllaephagus belanensis* (Mercet, 1921) و *Anagyrus archangelskayae* Trjapitzin, 1972 برای اولین بار از ایران گزارش شد. برخی روابط میزبانی جدید برای ۱۰ گونه Encyrtidae معرفی شد. دو تشخیص نادرست تصحیح گردید. اطلاعات زیستی در دسترس به همراه پراکنش جغرافیایی گونه‌ها ارائه شده است.

واژگان کلیدی: پارازیتوئیدها، فون، ارتباطات میزبانی جدید، گزارش‌های جدید، ایران.