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A contribution to the knowledge of Encyrtidae (Hymenoptera: Chalcidoidea) of Khuzestan in southwestern Iran

Seyed Abbas Moravvej^{1*}, Hossein Lotfalizadeh² and Parviz Shishehbor¹

¹ Department of Plant Protection, College of Agriculture, Shahid Chamran University of Ahvaz, Iran.

² Department of Plant Protection, East-Azerbaijan Agricultural and Natural Resources Research Center, AREEO, Tabriz, Iran.

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ABSTRACT. This contribution reports 15 species of Encyrtidae (Hymenoptera: Chalcidoidea) belonging to 12 genera from Khuzestan province of Iran of which 11 species were determined to species level. Five genera and seven species are new for the fauna of Khuzestan province. Three genera viz. *Apoleptomastix*, *Rhopus* and *Thomsonisca*, and three species viz. *Apoleptomastix bicoloricornis* (Girault, 1915), *Leptomastidea bifasciata* (Mayr, 1876) and *Rhopus nigroclavatus* (Ashmead, 1902) are new for the Iranian fauna.

Key words: fauna, Iran, Khuzestan, Encyrtidae, new records

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Introduction

The insect order Hymenoptera contains several superfamilies including Chalcidoidea encompassing 23 families, one of which is the cosmopolitan Encyrtidae, which currently contains ca. 490 genera and ca. 4000 species (Noyes, 2017). Members of the family Encyrtidae can be distinguished by combination of the following characters: both sexes with mesopleuron very enlarged, undivided, bulging, often occupying more than half the thorax in lateral view; mid coxae level with middle of mesopleuron in lateral view; mesoscutum transverse and without notauli, or with very shallow and curved ones, never deep and straight; cercal plates advanced, not at apex of metasoma and frequently in

anterior two-thirds; and linea calva present and distinct in most winged species. They parasitize various arthropods including a wide range of economically important, particularly agricultural, pests, therefore some encyrtids have been utilized commercially as significant introduced and/or mass-produced bio-controllers in the worldwide biological control programs of pests. Various references published on morphology, diagnosis, taxonomy and identification keys, of which Trjapitsin (1989) discusses the encyrtid's biology as well, and Noyes and Hayat (1994) additionally reviews the worldwide use of this family in the pest biocontrol programs though now is outdated.

Corresponding author: Seyed Abbas Moravvej, E-mail: samoravvej@gmail.com

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Contrary to 159 encyrtid species listed from Iran by Fallahzadeh and Japoshvili (2017), the encyrtid fauna of Iran, and particularly, certain provinces including the southwestern Khuzestan from which, to date, fourteen species of Encyrtidae are known, requires much investigation as emphasized by Fallahzadeh *et al.* (2016). Consequently a survey which was introduced by Moravvej *et al.* (2016) was conducted to discover the chalcid fauna of Khuzestan province and this contribution announces the collected encyrtid species of this province.

Material and methods

Material was collected by sweeping and yellow pan trap as explained by Moravvej *et al.* (2016) and host rearing as described by Forouzan (2014) and are preserved in vials containing ethanol 75% at the Insect Collection of Chamran University. These literatures were utilized for determination of material: Timberlake (1919), Mercet (1921 & 1929), Tachikawa (1956), Kerrich (1967), Jensen and Sharkov (1989), Noyes and Hayat (1994), Anga and Noyes (1999), Noyes (2000), Zhang and Huang (2004), Hayat (2006 & 2009), Trjapitzin (1989), Trjapitzin and Triapitsyn (2008), Noyes (2010), Liu *et al.* (2013) and Wang *et al.* (2014).

Results

Fifteen encyrtid species belonging to 12 genera were collected and 11 of which were determined to species level; 5 and 3 genera, and 7 and 5 species are new records for the faunas of Khuzestan and Iran, respectively. New taxa for Khuzestan, Iran and undescribed species are marked with *, ** and ***, respectively.

Family Encyrtidae Walker 1837

Subfamily Encyrtinae Ashmead, 1904

Genus *Cheiloneurus* Westwood, 1833*

Distribution: Cosmopolitan (Trjapitzin & Triapitsyn, 2008) and Iran in East and West Azerbaijan, Fars, Guilan, Kerman, Lorestan, Markazi, North and Razavi Khorassans (Fallahzadeh & Japoshvili, 2017) and Khuzestan (present study) provinces.

Cheiloneurus sp.*

Material examined: 1♀, Aghajari, November 2015, by sweeping, *leg.* S.A. Moravvej; damaged body prevents species determination.

Genus *Homalotylus* Mayr, 1876

Distribution: Cosmopolitan (Noyes, 2010) and Iran in Alborz, Ardebil, East Azerbaijan, Fars, Hormozgan, Kermanshah, Lorestan, Markazi, Mazandaran, North and Razavi Khorassans, Khuzestan and Qavin provinces (Fallahzadeh & Japoshvili, 2017).

Homalotylus flaminius (Dalman, 1820)*

Material examined: 1♀, 1♂, Ahwaz, autumn 2014, by host rearing, *leg.* A. Forouzan. 1♀, Shush, September 2014, by sweeping, *leg.* S.A. Moravvej.

Distribution: Cosmopolitan (Noyes, 2017) and Iran in Fars, Kermanshah, Qazvin (Fallahzadeh & Japoshvili, 2017) and Khuzestan (present study) provinces.

Host records: Iran: *Nephus bipunctatus* (Kugelann) (Coleoptera: Coccinellidae) on *Lactuca serriola* L. (Asteraceae) associated with *Peliococcus kimmericus* (Kiritshenko) (Hemiptera: Pseudococcidae) (Fallahzadeh *et al.*, 2006). Worldwide: one species of Chrysomelidae and 62 species of Coccinellidae (Coleoptera) and 2 species of Coccidae and 3 species of Pseudococcidae (Hemiptera) (Noyes, 2017).

Homalotylus nigricornis Mercet, 1921*

Material examined: 1♀, Ahwaz, autumn 2014, by host rearing, *leg.* A. Forouzan.

Distribution: Europe, Turkey, ex USSR (Noyes, 2017) and Iran in Ardabil

(Lotfalizadeh & Ebrahimi, 2001) and Khuzestan (present study) provinces.

Host records: Iran: *Scymnus* sp. (Coleoptera: Coccinellidae) associated with *Aphis gossypii* (Glover) (Hemiptera: Aphididae) (Lotfalizadeh & Ebrahimi, 2001). Worldwide: ca. three species of *Scymnus* (Noyes, 2017).

Genus *Prochiloneurus* Silvestri, 1915

Distribution: Cosmopolitan (Wang *et al.*, 2014) and Iran in Fars, Hormozgan, Kerman, Kermanshah, Khuzestan and Markazi provinces (Fallahzadeh & Japoshvili, 2017).

Prochiloneurus aegyptiacus (Mercet, 1929)

Material examined: 1♀, Ahwaz, autumn 2014, by host rearing, *leg.* A. Forouzan.

Distribution: Africa, Asia, Italy (Noyes, 2017) and Iran (OILB, 1971) in Fars (Hesami & Fallahzadeh, 2004; Fallahzadeh *et al.*, 2007) and Khuzestan provinces (Asadeh & Mossadegh, 1991 [as *Prochiloneurus indicus* Shafee, Alam & Agarwal, 1975]; Alizadeh *et al.*, 2013).

Host records: Iran: *Homalotylus quaylei* Timberlake (OILB, 1971) and *Anagyrus* sp. (Hymenoptera: Encyrtidae) (Hesami & Fallahzadeh, 2004), hyperparasitoid (as *Prochiloneurus indicus* Shafee, Alam & Agarwal, 1975) of *Nipaecoccus viridis* (Newstead) (Hemiptera: Pseudococcidae) on *Citrus* sp. (Rutaceae) and *Morus alba* L. (Moraceae) (Asadeh & Mossadegh, 1991), hyperparasitoid of *Maconellicoccus hirsutus* (Green) (Hemiptera: Pseudococcidae) on *M. alba* L. (Moraceae) (Fallahzadeh *et al.*, 2007). Worldwide: three species of Coccinellidae, 2 species of Coccidae and 21 species of Pseudococcidae (Noyes, 2017).

Genus *Thomsonisca* Ghesquière, 1946**

Distribution: Oriental, Palearctic (Zhang & Huang, 2004) and Iran in Khuzestan province (present study).

Thomsonisca sp.**

Material examined: 1♀, Khorramshahr, May 2015, by yellow pan trap, *leg.* S.A. Moravvej; damaged body prevents species determination.

Distribution: Iran in Khuzestan province (present study).

Genus *Trichomasthus* Thomson, 1876*

Distribution: Cosmopolitan (Noyes, 2010) and Iran in Isfahan, Mazandaran (Fallahzadeh & Japoshvili, 2017) and Khuzestan (present study) provinces.

Trichomasthus albimanus Thomson, 1876*

Material examined: 2♀, Karoun city, the Small Ghazawiyeh, April 2017, by sweeping, *leg.* S.A. Moravvej. 1♀, Howeyzeh, April 2017, by sweeping, *leg.* S.A. Moravvej.

Distribution: America, Asia, Europe (Noyes, 2017) and Iran in Isfahan (Fallahzadeh & Japoshvili, 2017) and Khuzestan (present study) provinces.

Host records: Iran: *Coccus hesperidum* L. (Coccidae) (Ghahari *et al.*, 2010). Outside: over 20 species of Asterolecaniidae, Coccidae and Eriococcidae (Noyes, 2017).

Subfamily Tetracneminae Howard, 1892

Genus *Aenasius* Walker, 1846

Distribution: Nearly cosmopolitan (Noyes, 2000) and Iran in Bushahr, Fars, Hormozgan, Kerman, Kohgiluyeh-va-Boyerahmad and Khuzestan provinces (Mossadegh *et al.* 2015).

Aenasius arizonensis (Girault, 1915)

Material examined: 1♀, 1♂, Ahwaz, autumn 2014, by host rearing, *leg.* A. Forouzan.

Distribution: China, India, Pakistan, USA and Iran in Khuzestan, Fars, Hormozgan, Bushahr, Kerman, and Kohgiluyeh-va-Boyerahmad provinces (Mossadegh *et al.* 2013, 2015 [as *Aenasius bambawalei* Hayat, 2009]; Fallahzadeh *et al.* 2014).

Host records: Iran: *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) on various plants (Mossadegh *et al.*, 2013, 2015; Fallahzadeh *et al.* 2014, 2016). Worldwide: *Phenacoccus solenopsis* and *Pseudococcus longispinus* (Targioni Tozzetti) (Pseudococcidae) (Noyes, 2017).

Genus *Anagyrus* Howard, 1896

Distribution: Cosmopolitan (Noyes, 2000) and Iran in East Azerbaijan, Fars, Guilan, Hamadan, Kerman, Kermanshah, Markazi, Mazandaran, Khuzestan, Razavi Khorassan and Tehran provinces (Fallahzadeh & Japoshvili, 2017).

Anagyrus aligarhensis Agarwal & Alam, 1959 (= *Anagyrus diversicornis* Mercet, 1921 non Howard)

Material examined: 1♀, Hamidieh, the Great Gamboueh, September 2015, by sweeping, *leg.* S.A. Moravvej.

Distribution: Asia, Europe, North America (Noyes, 2017) and Iran (as *Anagyrus diversicornis* Mercet, 1921) in Khuzestan (Asadeh & Mosadegh, 1991, 1993; Novin *et al.*, 2000), Tehran (Noyes & Hayat, 1994) and Fars (Hesami & Fallahzadeh, 2004, 2005) provinces.

Host records: Iran: *Nipaecoccus viridis* (Hemiptera: Pseudococcidae) on *Citrus* sp. (Rutaceae) and *Morus alba* (Moraceae) (Asadeh & Mosadegh, 1991, 1993; Noyes & Hayat, 1994; Novin *et al.*, 2000; Hesami & Fallahzadeh, 2004, 2005). Worldwide: sixteen species of Pseudococcidae (Noyes, 2017).

Anagyrus diversicornis (Howard, 1894)*

Material examined: 1♀, 1♂, Lali, Taraz, fall 2014, by sweeping, *leg.* S.A. Moravvej. 1♀, Masjed-Soleyman, fall 2014, by sweeping, *leg.* S.A. Moravvej. 1♀, Ahwaz University campus, 5.2014, by yellow pan trap, *leg.* S.A. Moravvej.

Distribution: Cosmopolitan except Australia (Noyes, 2000) and Iran in Guilan (Lotfalizadeh *et al.*, 2016) and Khuzestan (present study) provinces.

Host records: Iran: unknown. Worldwide: five species of Pseudococcidae (Noyes, 2017).

Genus *Ericydnus* Haliday, 1832*

Distribution: Cosmopolitan (Noyes, 2000) and Iran in East Azerbaijan, South Khorassan (Fallahzadeh & Japoshvili, 2017) and Khuzestan (present study) provinces.

Ericydnus robustior Mercet, 1921*

Material examined: 1♀, Ahwaz, 5.2014, by yellow pan trap, *leg.* S.A. Moravvej.

Distribution: Asia, Europe (Noyes, 2017) and Iran in East Azerbaijan, South Khorassan (Fallahzadeh & Japoshvili, 2017) and Khuzestan (present study) provinces.

Host records: Iran: *Peliococcopsis* sp. (Pseudococcidae) on *Convuloulus arvensis* (Abd-Rabou *et al.*, 2011). Worldwide: five species of Pseudococcidae (Noyes, 2017).

Genus *Apoleptomastix* Kerrich, 1982**

Distribution: Australia, Old World (Noyes & Hayat, 1994) and Iran in Khuzestan province (present study).

Apoleptomastix bicoloricornis (Girault, 1915)**

Material examined: 2♀, Aghajari, November, 2015, by sweeping, *leg.* S.A. Moravvej. 2♀, 6♂, Andimeshk, Mongereh, September 2014, by sweeping, *leg.* S.A. Moravvej (Fig. 1).

Distribution: Australia, Old World (Noyes & Hayat, 1994) and Iran in Khuzestan province (present study).

Host records: Iran: unknown. Worldwide: *Brevennia rehi* (Lindinger), *Coccidohystrix insolita* (Green) and *Heterococcus nigeriensis* Williams (Pseudococcidae) (Noyes, 2017).

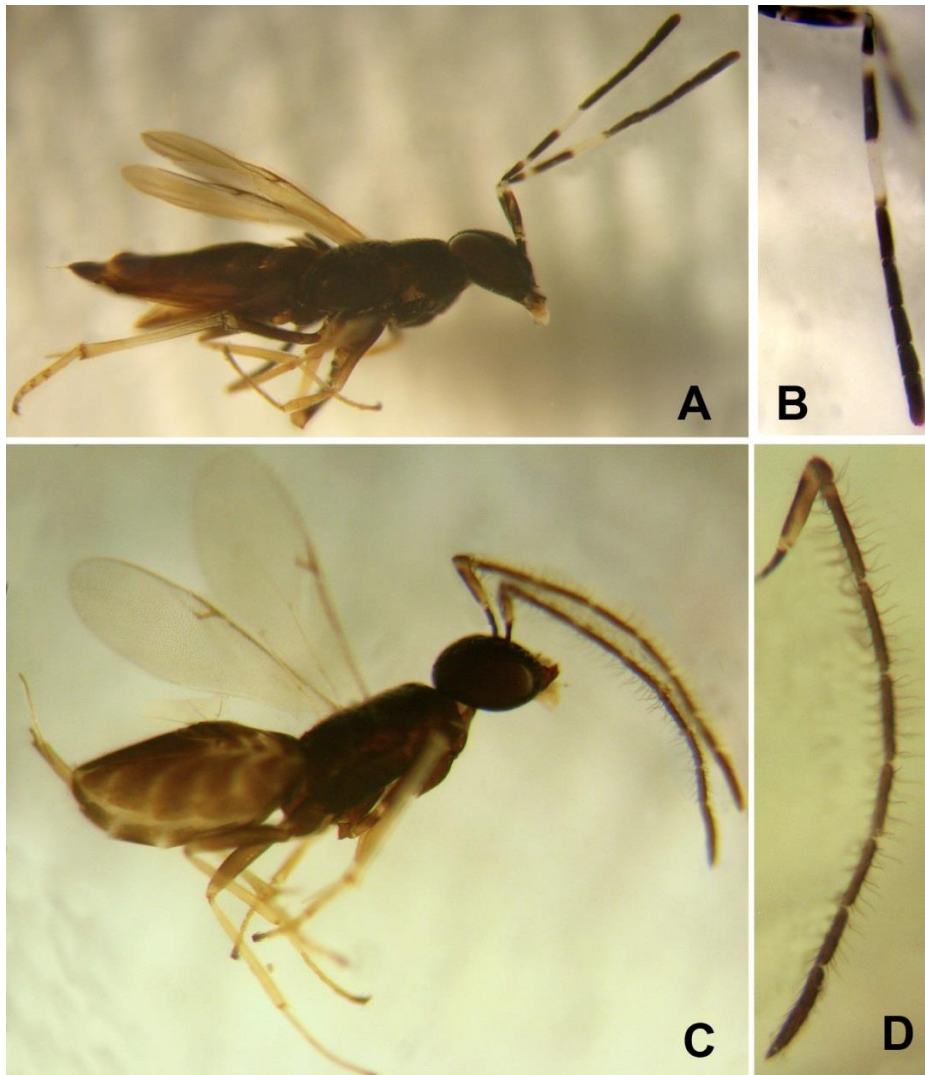


Figure 1. *Apoleptomastix bicoloricornis*. **A.** Female, lateral view; **B.** Male, lateral view; **C.** Antenna of female; **D.** Antennae of male.

Apoleptomastix* sp.**

Material examined: 3♀, Aghajari, November 2015, by sweeping, *leg.* S.A. Moravvej; these specimens are distinctly a new species which we prefer to describe by comparing with types of similar species.

Distribution: Iran in Khuzestan province (present study).

Host records: unknown.

Genus *Leptomastidea* Mercet, 1916*

Distribution: Old World, introduced to New World (Noyes, 2000) and Iran in Fars,

Golestan, Kermanshah, West Azerbaijan (Fallahzadeh & Japoshvili, 2017) and Khuzestan provinces (present study).

Leptomastidea bifasciata* (Mayr, 1876)*

Material examined: 1♀, 2♂, Ahwaz, University campus, 5.2014, by yellow pan trap, *leg.* S.A. Moravvej.

Distribution: Asia, Europe (Noyes, 2017) and Iran in Khuzestan province (present study).

Host records: Iran: unknown. Worldwide: 21 species of Pseudococcidae (Noyes, 2017).

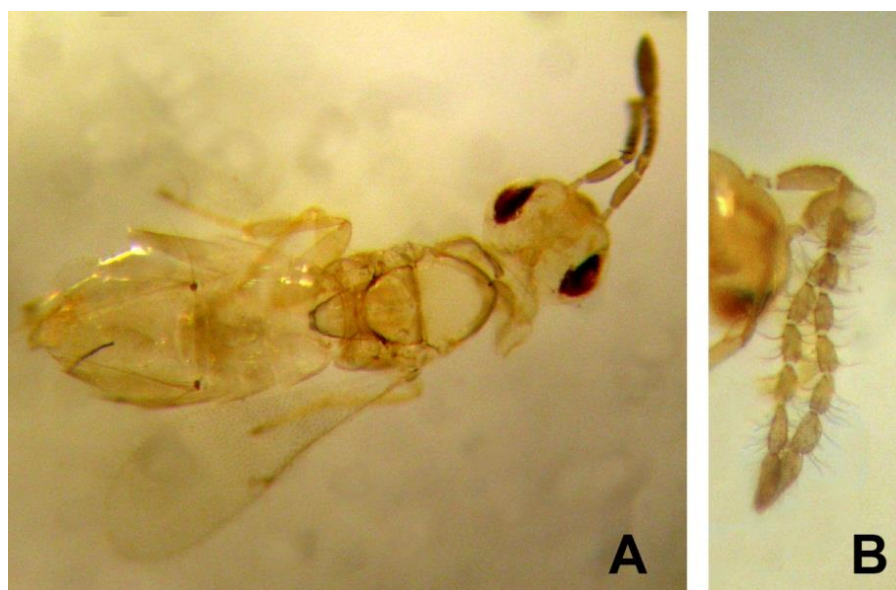


Figure 2. *Rhopus nigroclavatus*. **A.** Dorsal aspect of female; **B.** Antennae of male.

Genus *Leptomastix* Förster, 1856*

Distribution: Old World, introduced to New World (Noyes, 2000) and Iran in Fars, Hormozgan, Isfahan, Kerman, Tehran (Fallahzadeh & Japoshvili, 2017) and Khuzestan (present study) provinces.

Leptomastix sp.*

Material examined: 1♂, Mahshar, Meshrageh, April 2015, by sweeping, leg. S.A. Moravvej. Female is required for species level determination.

Genus *Rhopus* Förster, 1856**

Distribution: Cosmopolitan (Noyes, 2000) and Iran in Khuzestan province (present study).

Rhopus nigroclavatus (Ashmead, 1902)**

Material examined: 3♀, 1♂, Aghajari, November 2015, by sweeping, leg. S.A. Moravvej (Fig. 2).

Distribution: Asia, Australia, Egypt, Europe (Noyes, 2017) and Iran in Khuzestan province (present study).

Host records: Iran: unknown. Worldwide: 17 species of Diaspididae, Margarodidae and Pseudococcidae (Noyes, 2017).

Discussion

To date, at least 25 encyrtid species belonging to 13 genera are from Khuzestan (Table 1), which show a diverse morphology, taxonomy, ecology (zoogeography and biology) and economic importance. Morphologically, a broad range of features present in the collected species; see key literatures for details. Taxonomically, 13 well distinguishable genera are known, among which *Anagyrus* with 282 species and *Apoleptomastix* with 6 species are the most and the least speciose genera, respectively.

Zoogeographically, the collected taxa are known to occur mainly in the Palaearctic; however, Oriental (e. g. *Anagyrus agraensis*) and Nearctic (e. g. *Aenasius arizonensis*) species are distributed as well. Biologically, the known hosts of Encyrtidae of Khuzestan are Coleoptera (e.g. Coccinellidae parasitized by *Homalotylus*) and specially Hemiptera (e.g. Pseudococcidae parasitized by *Aenasius* and *Anagyrus*, Aphididae parasitized by *Syrphophagus*). Economically, both destructive (e. g. *Homalotylus*) and beneficial species (e.g. *Aenasius arizonensis*, *Anagyrus* spp.) appear in Khuzestan, though the later

contains most species which probably can be used commercially for pest control. At the end, we recommend further studies to find encyrtid species and their hosts in Khuzestan and also Iran to utilize them for practical biocontrol plans against pests.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

Table 1. Updated list of Encyrtidae (Chalcidoidea) known from Khuzestan province of Iran

| Species | Reference |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Aenasius arizonensis</i> (Girault, 1915) (= <i>bambawalei</i> Hayat) | Mossadegh <i>et al.</i> (2013, 2015) |
| <i>Anagyrus</i> sp. | Alizadeh <i>et al.</i> (2013) |
| <i>Anagyrus agragensis</i> Saraswat, 1975 (= <i>indicus</i>) | Asadeh and Mossadegh (1991, 1993), Noyes and Hayat, (1994), Baniameri and Mossadegh (1998a,b), Novin <i>et al.</i> (2000), Mossadegh <i>et al.</i> (2015) |
| <i>Anagyrus aligarhensis</i> Agarwal & Alam, 1959 (= <i>diversicornis</i> Mercet) | Asadeh and Mossadegh (1991, 1993), Novin <i>et al.</i> (2000), Mossadegh <i>et al.</i> (2015), present study |
| <i>Anagyrus dactylopii</i> (Howard, 1898) | Asadeh and Mossadegh (1991, 1993), Noyes and Hayat, (1994), Mossadegh and Baniameri (1996), Baniameri and Mossadegh (1998a), Novin <i>et al.</i> (2000), Dezhakam and Soleyman Nejadian (2000), Mossadegh <i>et al.</i> (2015) |
| <i>Anagyrus diversicornis</i> (Howard, 1894) | present study |
| <i>Anagyrus</i> cf. <i>kamali</i> | Mossadegh <i>et al.</i> (2015) |
| <i>Anagyrus mirzai</i> Agarwal & Alam, 1959 | Novin (2000), Mossadegh <i>et al.</i> (2015) |
| <i>Apoleptomastix bicoloricornis</i> (Girault, 1915) | present study |
| <i>Apoleptomastix</i> sp. | present study |
| <i>Cheiloneurus</i> sp. | present study |
| <i>Ericydnus robustior</i> Mercet, 1921 | present study |
| <i>Homalotylus albiclavatus</i> (Agarwal, 1970) | Novin (2000) |
| <i>Homalotylus flaminius</i> (Dalman, 1820) | present study |
| <i>Homalotylus nigricornis</i> Mercet, 1921 | present study |
| <i>Homalotylus quaylei</i> Timberlake, 1919 | Asadeh and Mossadegh (1991), Novin (2000), Novin <i>et al.</i> (2000) |
| <i>Leptomastidea bifasciata</i> (Mayr, 1876) | present study |
| <i>Lepidomastix</i> sp. | present study |
| <i>Rhopus nigroclavatus</i> (Ashmead, 1902) | present study |
| <i>Prochiloneurus aegyptiacus</i> (Mercet, 1929) | Asadeh and Mossadegh (1991), Alizadeh <i>et al.</i> (2013), present study |
| <i>Prochiloneurus bolivari</i> Mercet, 1919 | Alizadeh <i>et al.</i> (2013) |
| <i>Prochiloneurus pulchellus</i> Silvestri, 1915 | Japoshvili and Noyes (2005) |
| <i>Syrphophagus aphidivorus</i> (Mayr, 1876) | Rezaei <i>et al.</i> (2006) |
| <i>Syrphophagus arundinicola</i> Hoffer, 1965 | Rezaei <i>et al.</i> (2006) |
| <i>Thomsonisca</i> sp. | present study |
| <i>Trichomasthus albimanus</i> Thomson, 1876 | present study |

References

- Abd-Rabou, S., Ghahari, H., Hedqvist, K.-J. & Ostovan, H. (2011) Parasitoid-host relationship between *Comperiella bifasciata* Howard (Hymenoptera: Encyrtidae) and *Aonidiella orientalis* (Newstead) (Hemiptera: Diaspididae) with a list of Iranian Encyrtidae. *Journal of Entomological Research*, 35 (1), 1–8.
- Alizadeh, M.S., Mossadegh, M.S. & Esfandiari, M. (2013) Natural enemies of *Maconellicoccus hirsutus* (Green) (Hemiptera: Pseudococcidae) and their population fluctuations in Ahvaz, southwest of Iran. *Journal of Crop Protection*, 2, 13–21.
- Anga, J.-M. & Noyes, J.S. (1999) A revision of the African and Malagasy species of the genus *Leptomastix* (Hymenoptera, Encyrtidae), parasitoids of mealybugs (Homoptera: Pseudococcidae). *Bulletin of the Natural History Museum (Entomology Series)*, 68 (2), 93–128.
- Asadeh, G.A. & Mossadegh M.S. (1991) An investigation of the mealybug (*Pseudococcus* spp.) natural enemies fauna in the Khuzestan's province. *Proceedings of the 10th Iranian Plant Protection Congress*, p. 3.
- Asadeh, G.A. & Mossadegh M.S. (1993) Important natural enemies of mealybugs (*Pseudococcus* spp.) in the Khuzestan province Iran. *The Scientific Journal of Agriculture, Shahid Chamran University*, 16 (1-2), 46–52.
- Baniamiri, V. & Mossadegh, M.S. (1998a) Comparison of the efficiency of the two encyrtid parasitoids *Anagyrus dactylopii* and *Anagyrus agragensis* (Hym.: Encyrtidae) on *Nipaecoccus viridis* (Hom.: Pseudococcidae). *Proceedings of the 13th Iranian Plant Protection Congress*, 1, 115.
- Baniamiri, V. & Mossadegh, M.S. (1998b) The biology of encyrtid parasitoid *Anagyrus agragensis* (Hym.: Encyrtidae) on *Nipaecoccus viridis* (Hom.: Pseudococcidae). *Proceedings of the 13th Iranian Plant Protection Congress*, 1, 116.
- Dezhakam, M. & Soleyman Nejadian, E. (2000) Investigatin on the behavior of *Crematogaster antaris* (Hym.: Formicidae) from *Nipaecoccus viridis* (New.) against parasitism. *Proceedings of the 14th Iranian Plant Protection Congress*, 1, 91.
- Fallahzadeh, M. & Hesami, S. (2004) Study of the natural enemies of *Maconellicoccus hirsutus* (Homoptera: Pseudococcidae) in Jahrom region of Fars province. *Proceeding of the 16th Plant Protection Congress of Iran*, 1, 47.
- Fallahzadeh, M. & Japoshvili, G. (2017) An updated checklist of Iranian Encyrtidae (Hymenoptera, Chalcidoidea). *Zootaxa*, 4344, 1–46.
<https://doi.org/10.11646/zootaxa.4344.1.1>
- Fallahzadeh, M., Japoshvili, G., Abdimaleki, R. & Saghaei, N. (2014) New records of Tetracneminae (Hymenoptera, Chalcidoidea, Encyrtidae) from Iran. *Turkish Journal of Zoology*, 38, 515–518.
<https://doi.org/10.3906/zoo-1309/28>
- Fallahzadeh, M., Japoshvili, G. & 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.
- Fallahzadeh, M., Shojaei, M., Ostovan, H. & Kamali, K. (2006) 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. & Kamali, K. (2007) Study of the parasitoids and hyperparasitoids of *Maconellicoccus hirsutus* (Hem., Pseudococcidae) in Fars province. *Journal of Agricultural Sciences, Islamic Azad University*, 13 (3), 593–609.
- Forouzan, A. (2014) *Biology and Functional Response of Nephus arcuatus Kapur on Phenacoccus solenopsis Tinsley*. (Unpublished MSc thesis) Shahid Chamran University, Ahwaz.
- Ghahari, H., Abd-Rabou, S., Sakenin, H., Hedqvist, K.J. & Ostovan, H. (2010) A contribution to some Chalcidoidea wasps (Hymenoptera) from Iran. *Journal of Biological Control*, 24, 17–21.
- Hayat, M. (2006) *Indian Encyrtidae (Hymenoptera: Chalcidoidea)*. Department of Zoology, Aligarh Muslim University, Aligarh, 496 pp.
- 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 (1), 21–26.
- Hesami, S. & Fallahzadeh, M. (2004) Study of the natural enemies of the citrus mealybug *Nipaecoccus viridis* (Homoptera: Pseudococcidae) in Jahrom region of Fars province. *Proceeding of the 16th Plant Protection Congress of Iran*, 1, 50.
- Hesami, S. & Fallahzadeh, M. (2005) Recorded species of mealybug parasitoids of the genus *Anagyrus* (Hymenoptera: Encyrtidae) from Fars province of Iran. *Caspian Journal of Environmental Sciences*, 3 (1), 63–68.
- Japoshvili, G. & Noyes, J.S. (2005) New record of Encyrtidae (Hymenoptera: Chalcidoidea). *Caucasian Entomological Bulletin*, 1 (2), 159–160.
- Jensen, P.B. & Sharkov, A.V. (1989) Revision of the genus *Trichomasthus* (Hymenoptera: Encyrtidae) in Europe and Soviet Asia. *Entomologica Scandinavica*, 20, 23–54.
<https://doi.org/10.1163/187631289X00483>
- Kerrich, G.J. (1967) On the classification of the anagyrine Encyrtidae, with a revision of some of the genera (Hymenoptera: Chalcidoidea). *Bulletin of the British Museum (Natural History) (Entomology)*, 20 (5), 143–250.
- Liu, X.-W., Wang, Y., Li, C.-D. & Zhang, Y.-Z. (2013) On the Chinese species of *Ericydnus Haliday* (Hymenoptera: Encyrtidae). *Oriental Insects*, 47, 23–40.
<https://doi.org/10.1080/00305316.2012.753766>
- Lotfalizadeh, H., Bayegan, Z.A. & Zargarani, M.R. (2016) Species diversity of Chalcidoidea (Hymenoptera) in the rice fields of Iran. *Journal of the Entomological Research Society*, 18 (1), 99–111.
- Lotfalizadeh, H. & Ebrahimi, E. (2001) New report of *Homalotylus nigricornis* Mercet (Hym.: Encyrtidae) in Iran. *Journal of Entomological Society of Iran*, 21 (1), 116.
- Mercet, R.G. (1921) *Fauna Iberica. Himenopteros Fam. Encirtidos*. Museo Nacional de Ciencias Naturales, Madrid, 732 pp.
<https://doi.org/10.5962/bhl.title.10362>
- Mercet, R.G. (1929) Los generos *Prochiloneurus* y *Achrysofophagus*. *Eos*, 5, 359–363.
- Moravvej, S.A., Shishehbor, P. & Lotfalizadeh, H. (2016) A checklist of Chalcidoidea (Insecta: Hymenoptera) of Khuzestan in southwestern Iran. *Journal of Insect Biodiversity and Systematics*, 2, 121–142.
- Mossadegh, M.S. & Baniamari, V. (1996) The biology of *Anagyrus dactylopii* (How.), (Hymenoptera: Encyrtidae) on *Nipaecoccus viridis* [sic] (Newstead), (Homo.: Pseudococcidae) in southwest Iran. *Proceedings of the XX International Congress of Entomology, Firenze, Italy, August 25-31, 1996*: p. 666.
- Mossadegh, M.S., Vafaei, S., Farsi, A., Zarghami, S., Esfandiari, M., Dehkordi, F. S., Fazelinejad, A., & Seyfollahi, F. (2015) *Phenacoccus solenopsis* Tinsley (Sternorrhyncha: Pseudococcidae), its natural enemies and host plants in Iran. *Proceedings of the 1st Iranian International Congress of Entomology*, pp. 159–167.
- Mossadegh, M.S., Vafaei, S., Zarghami, S., Farsi, A. & Alizadeh, M.S. (2013) *Aenasius bambawalei* Hayat a potential parasitoid for biological control of cotton mealybug *Phenacoccus solenopsis* Tinsley from Iran. *Proceedings of the Conference of Biological Control in Agriculture and Natural Resources, Karaj, Iran*, p. 30.
- Novin, M. (2000) *The biology and population fluctuations of Nipaecoccus viridis (News.) and its natural enemies in citrus orchards of Dezful*. (Unpublished MSc thesis) Shahid Chamran University, Ahwaz.
- Novin, M., Mossadegh, M.S., Karami Nejad, M. & Ghasemi Nejad, M. (2000) Natural enemy of *Nipaecoccus viridis* in the North of Khuzestan. *Proceedings of the 14th Iranian Plant Protection Congress*, 1, 264.
- Noyes, J.S. (2000) Encyrtidae of Costa Rica (Hymenoptera: Chalcidoidea), 1. The subfamily Tetracneminae, parasitoids of mealybugs (Homoptera: Pseudococcidae). *Memoirs of the American Entomological Institute*, 62, 1–355.
- Noyes, J.S. (2010) Encyrtidae of Costa Rica (Hymenoptera: Chalcidoidea), 3. The subfamily Encyrtinae: Encyrtini, Ectthroplexiellini, Discodini, Oobiini and Ixodiphagini, parasitoids associated with bugs (Hemiptera), insect eggs (Hemiptera, Lepidoptera, Coleoptera, Neuroptera) and ticks (Acari). *Memoirs of the American Entomological Institute*, 84, 1–848.

- Noyes, J. S. (2017) *Universal Chalcidoidea Database*. The Natural History Museum, London. Available from: <http://www.nhm.ac.uk/chalcidooids> (Accessed September 2017).
- Noyes, J.S. & Hayat, M. (1994) *Oriental Mealybug Parasitoids of the Anagyrini (Hymenoptera: Encyrtidae)*. CAB International, Wallingford, 553 pp.
- OILB. (1971) *Liste d'identification des entomophages*, 8. Organisation internationale de lutte biologique, Geneva, 64 pp.
- Rezaei, N., Mossadegh, M.S. & Hodjat, H. (2006) Aphids and their natural enemies in wheat and barley fields in Khuzestan. *The Scientific Journal of Agriculture*, 29 (2), 127–137.
- Tachikawa, T. (1956) The encyrtid parasites of *Pseudococcus flavidus* Kanda, with a list of the known species and their hosts of the genera *Anagyrus*, *Leptomastidea*, and *Achrysothrips* of the world (Hymenoptera). *Memoirs of the Ehime University* (6), 1 (2), 137–155.
- Timberlake, P.H. (1919) Revision of the parasitic chalcidoid flies of the genera *Homalotylus* Mayr and *Isodromus* Howard, with descriptions of two closely related genera. *Proceedings of the United States National Museum*, 56, 133–194.
- Trjapitzin, V.A. (1989) Parasitic Hymenoptera of the Fam. Encyrtidae of Palaearctics. *Tableaux Analytiques de la Faune de l'URSS*, 157, 1–489
- Trjapitzin, V.A. & Triapitsyn, S.V. (2008) New species of *Cheiloneurus* Westwood, 1833 (Hymenoptera: Encyrtidae) from Alaska (USA), Mexico, and Cuba. *Russian Entomological Journal*, 16 (4), 465–473.
- Wang, Z.-H., Huang, J. & Xu, Z.-H. (2014) Chinese species of the genus *Prochiloneurus* Silvestri with description of a new species (Hymenoptera: Encyrtidae). *Zoological Systematics*, 39(3), 424–432. <https://doi.org/10.11865/zs20140309>
- Zhang, Y. & Huang, D. (2004) *A review and an illustrated key to genera of Encyrtidae (Hymenoptera: Chalcidoidea) from China*. Science Press, Beijing, 166 pp.

مشارکت در شناسایی زنبورهای خانواده Encyrtidae (Hymenoptera) در استان خوزستان، جنوب غرب ایران

سید عباس مروج^{۱*}، پرویز شیشه‌بر^۱ و حسین لطفعلی‌زاده^۲

۱ گروه گیاهپزشکی، دانشکده کشاورزی، دانشگاه شهید چمران، اهواز.
 ۲ بخش تحقیقات گیاهپزشکی، مرکز تحقیقات و آموزش کشاورزی و منابع طبیعی استان آذربایجان شرقی، سازمان تحقیقات، آموزش و ترویج کشاورزی، تبریز.

* پست الکترونیکی نویسنده مسئول مکاتبه: samoravvej@gmail.com

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چکیده: در این بررسی ۱۵ گونه زنبور از خانواده Encyrtidae از ۱۲ جنس از استان خوزستان گردآوری گردید که ۱۲ گونه از آنها شناسایی شد. پنج جنس برای استان خوزستان جدید هستند که از آنها جنس‌های *Rhopus*، *Apoleptomastix* و *Thomsonisca* برای نخستین بار از ایران گزارش می‌شوند و هفت گونه برای استان جدید هستند که از آنها یک گونه نام‌گذاری و شناسایی نشد. گونه‌های *Leptomastidea bifasciata* (Girault, 1915) و *Apoleptomastix bicoloricornis* (Mayr, 1876) و *Rhopus nigroclavatus* (Ashmead, 1902) برای نخستین بار از ایران گزارش می‌شوند.

واژگان کلیدی: Encyrtidae، فون، گزارش جدید، ایران، خوزستان