

## Research Article

## Encyrtidae (Hymenoptera: Chalcidoidea) in southern area of Kerman province with some new generic and specific records

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**Abstract:** The present study provides information about parasitoid wasps of the family Encyrtidae (Hymenoptera: Chalcidoidea) collected from south of Kerman province. The specimens were caught using Malaise traps during April to September 2017. Totally 16 species belonging to 10 genera of encyrtid wasps were collected and identified. Among them, *Cerchysiella* Girault, 1914 and *Charitopus* Foerster, 1856 are new generic records for the fauna of Iran. Four species viz. *Charitopus manukyani* Sakhnov, 1993; *Cheiloneurus submuticus* Thomson, 1876; *Mayridia myrlea* (Walker, 1838) and *Prionomitus tiliaris* (Dalman, 1820) were recorded for the first time from Iran. Diagnostic characteristics are mentioned for the newly recorded species. In addition, biological associations as well as geographical distribution for all reported species are presented. An updated list of encyrtid wasps of Kerman province is also cataloged.

**Keywords:** encyrtid wasp, new record, Iran, fauna, Kerman province

### Introduction

Encyrtidae (Hymenoptera: Chalcidoidea) with 506 genera and over 4000 known species worldwide is a large family which contains two subfamilies, Encyrtinae and Tetracneminae (Noyes, 2020). Some species are considered as primary endoparasitoids and hyperparasitoids of wide variety of hosts, including species of Arachnida and many insect orders (Noyes and Hayat, 1994). They have been successfully used as biological control agents in some parts of the world (Dahlsten *et al.*, 2005; Bauer *et al.*, 2008; Noyes, 2020). Encyrtids are the most efficient parasitoids of the scale insects pest species in the

families Coccidae, Diaspididae and Pseudococcidae, and less frequently, Aphidoidea and Psylloidea (Hemiptera) (Guerrieri and Noyes, 2000, 2005, 2009; Guerrieri and Viggiani, 2005; Evans and Abd-Rabou, 2013). They are distributed successfully in nearly all agroecosystems but their greatest diversity is in the tropical and subtropical areas (Grissell and Schauff, 1990; Noyes *et al.*, 1997).

Despite the fact that Iran has various geographical regions and diverse types of vegetation, the fauna of Iranian Encyrtidae is poorly known. The first reliable checklist of Iranian Encyrtidae was published by Fallahzadeh and Japoshvili (2010) who reported 93 species in 32 genera from different parts of Iran. Since then more contributions were made to the encyrtids fauna of Iran (Lotfalizadeh *et al.*, 2010a, b; Golpayegani *et al.*, 2010; Fallahzadeh *et al.*, 2011, 2014; Hesami *et al.*, 2012; Fallahzadeh

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and Japoshvili, 2013; Moghbeli-Gharaei *et al.*, 2013; Ebrahimi *et al.*, 2014; Lotfalizadeh and Bab-Morad, 2015; Japoshvili *et al.*, 2015, 2016; Lotfalizadeh *et al.*, 2016; Mohammadpour *et al.*, 2016; Feli kohikheili *et al.*, 2016; Fallahzadeh and Japoshvili, 2017; Fallahzadeh *et al.*, 2018; Japoshvili and Fallahzadeh, 2018; Morravej *et al.*, 2018; Yousefi *et al.*, 2018) that increased the number of species and genera to 173 and 51, respectively.

The aim of this work was to increase the knowledge on encyrtids fauna of Iran, as a part of our ongoing project on taxonomy and biodiversity of Iranian Chalcidoidea.

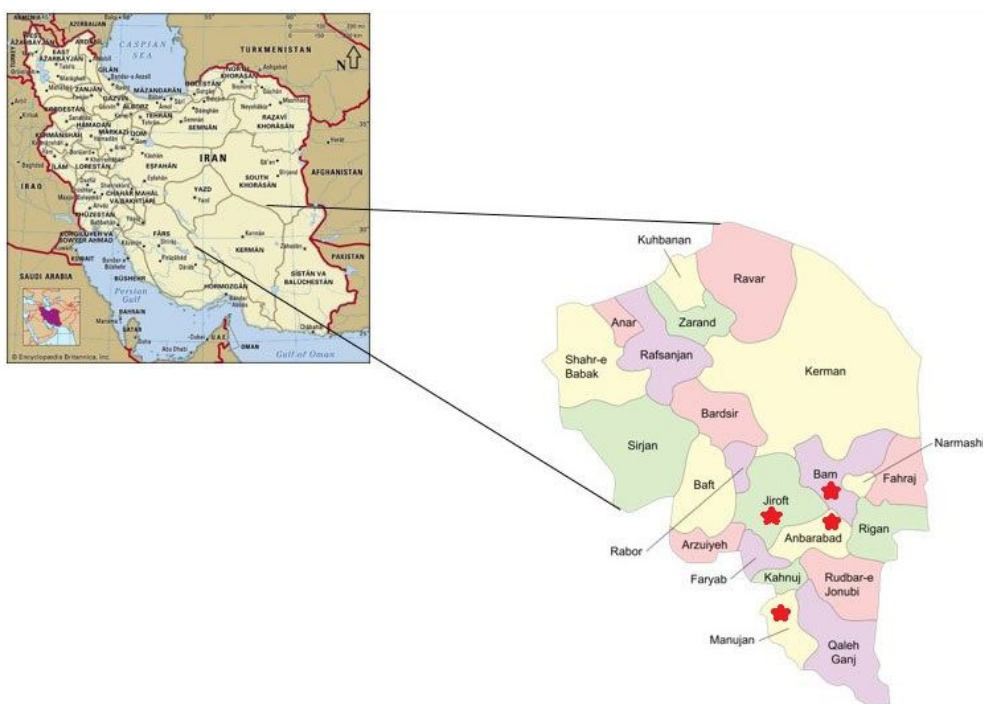
**Materials and Methods**

The sampling was carried out in south of Kerman province, southeast of Iran during April to September 2017 (Fig. 1). Wasps were collected using Malaise traps in different habitats and were preserved in 75% Ethanol until they were mounted on cards and identified. Prior to mounting the specimens were treated with Acetic

acid' vapor in order to avoid collapsing (Noyes, 1982). The identifications were made using Noyes and Hayat (1984), Noyes *et al.* (1997) and Zhang and Huang (2004). The morphological terminology and classification follows Grissell and Schauff (1990, 1997). External morphology was illustrated using an Olympus™ SZH, equipped with an Omax (18Mp) A35180U3 digital camera. The images were then processed using Combine ZM and Adobe Photoshop® CS6 programs. The voucher specimens are deposited in Zoological Museum of Shahid Bahonar University of Kerman, Kerman, Iran (ZMSBUK).

**Results**

Totally, 65 specimens of Encyrtidae belonging to the subfamily, Encyrtinae representing 10 genera and 16 species were collected and identified, of which two genera and five species are new records for Iranian fauna. The genera and species are listed alphabetically. Short description of characteristics is presented for the newly recorded species.



**Figure 1** Geographic map of Kerman province in southeast of Iran. Red star indicates the sampling sites in south of Kerman province.

**Family: Encyrtidae Walker, 1837**

**Subfamily: Encyrtinae Walker, 1837**

**Genus: *Blastothrix* Mayr, 1876**

***Blastothrix* sp.** (Fig. 2)

**Material examined:** Iran: Kerman province: Jiroft, Dalfard, Bondar (29°01'31.4" N, 57°36'56.1" E, 2390m), 17.VII-27.VIII.2017, 1♀, Malaise trap, leg.: S.M. Madjzadeh.

**Short description:** Body dark blue (Fig. 2A); antennal formula 1, 1, 6, 3 (scape, pedicel, funicle, clava), basal antennal segment about 3.5 times longer than width, pedicel longer than first funicular segment, clava rounded to apex (Fig. 2B), ventral margin of torulus lower than ventral margin of eye (Fig. 2C); mesoscutum without notauli and scutellum without apical tuft of setae (Fig. 2D), mesopleuron enlarged posteriorly and more or less touching base of metasoma, forewing with dark spot on the anterior margin, marginal vein longer than wide and as long as stigmal vein (Fig. 2E).

**Genus: *Cerchysiella* Girault, 1914**

***Cerchysiella* sp.** (Fig. 3)

**Material examined:** Iran: Kerman province: Jiroft, Bahram Abad (28°18'54.4" N, 57°37'1.5" E, 682m), 09-29.IV.2017, 1♀, Malaise trap, leg.: S.M. Madjzadeh.

**Short description:** Body dark blue (Fig. 3A); antennal formula 1, 1, 6, 3, all funicular segments longer than broad, clava apically rounded (Fig. 3B), ventral margin of torulus lower than ventral margin of eye (Fig. 3C); mesoscutum without notauli and scutellum without apical tuft of setae, mesoscutum and scutellum with coarse silvery hairs, scutellum nearly entirely smooth (Fig. 3D), forewing hyaline, linea calva of forewing posteriorly open, marginal vein as long as postmarginal vein, stigmal vein longer than marginal vein (Fig. 3E), ovipositor distinctly protrudes.

**Comment:** The genus *Cerchysiella* is recorded for the first time from Iran. This species seems to be an undescribed species but for its description, further specimens are needed.

**Genus: *Charitopus* Foerster, 1856**

***Charitopus manukyani* Sakhnov, 1993** (Fig. 4)

**Material examined:** Iran: Kerman province: Bam, Hemat Abad (29°08'19.6" N, 57°58'05.1" E, 1673m), 26.VIII-21.IX.2017, 1♀, Malaise trap, leg.: M. Purrezaali.

**Short description:** Head and mesosoma dark green (Fig. 4A); antennal formula 1, 1, 6, 3, all funicular segments longer than broad, some segments of antennal funicle more than 2 times longer than wide, clava apically rounded (Fig. 4B), torulus lower on head, its dorsal margin well below ventral margin of eye (Fig. 4C); notauli present (Fig. 4D), mesopleuron clearly separated from base of metasoma by propodeum, the propodeum touching metacoxa, metacoxa entirely yellow, marginal vein longer than postmarginal vein and stigmal vein longer than marginal vein (Fig. 4E); metasoma yellow with two dark lines in lateral margins; hypopygium extending to apex of metasoma (Fig. 4F).

**Distribution in Iran:** Kerman province.

**General distribution:** Palaearctic region (Noyes, 2020; Iran- New record).

**Comment:** This is the second report of this species from the Palaearctic region.

**Genus: *Cheiloneurus* Westwood, 1833**

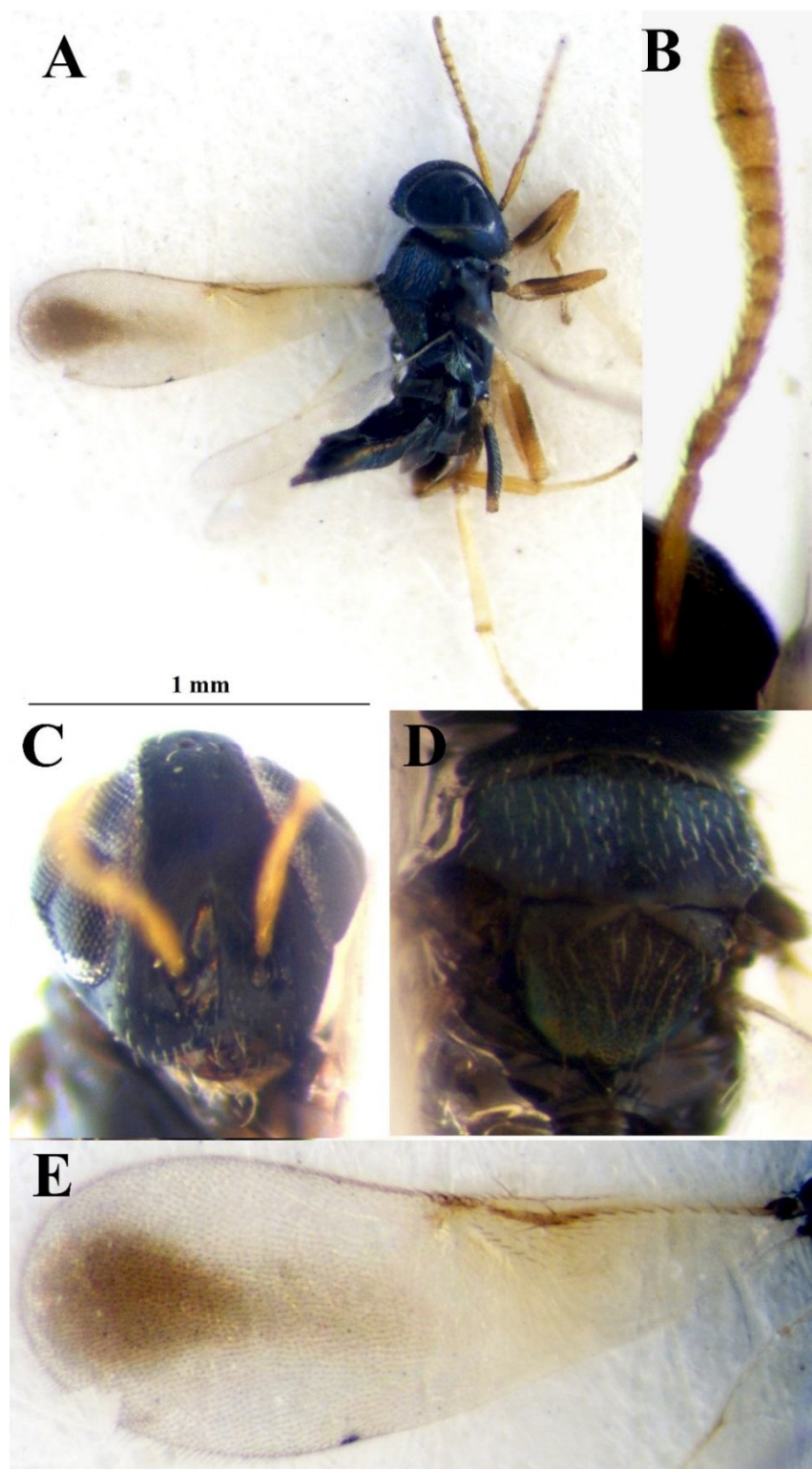
***Cheiloneurus submuticus* Thomson, 1876** (Fig. 5)

**Material examined:** Iran: Kerman province: Bam (29°06'01.7" N, 58°19'44" E, 1111m), 22.V-04.VII.2017, 1♀, Malaise trap, leg.: M. Purrezaali.

**Short description:** Body dark blue (Fig. 5A); antennal formula 1, 1, 6, 3, all funicular segments not longer than broad, clava strongly obliquely truncate (Fig. 5B), dorsal margin of torulus well below ventral margin of eye (Fig. 5C); mesoscutum without notauli, scutellum apically without tuft of setae (Fig. 5D), mesopleuron enlarged posteriorly and more or less touching base of metasoma; forewing infusate (except base of forewing), marginal vein much longer than postmarginal vein and stigmal vein (Fig. 5E); hypopygium not extending to apex of metasoma.

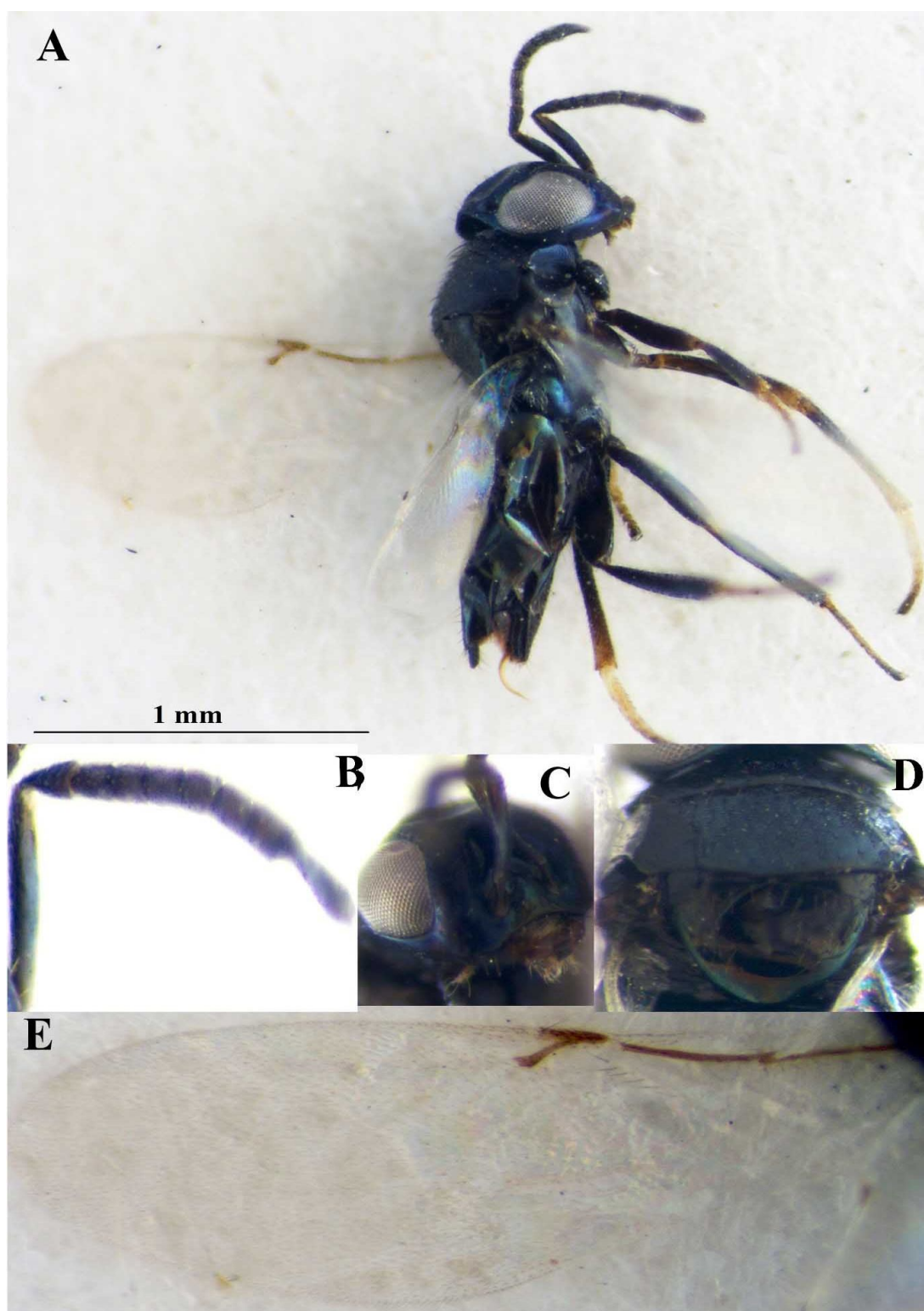
**Distribution in Iran:** Kerman province.

**General distribution:** Palaearctic region (Noyes, 2020; Iran- New record).



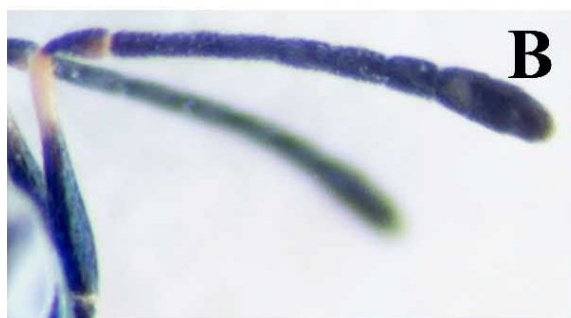
**Figure 2** *Blastothrix* sp., Female: A. Lateral view, B. Antenna, C. Head (frontal view), D. Mesosoma in dorsal view, E. Forewing.





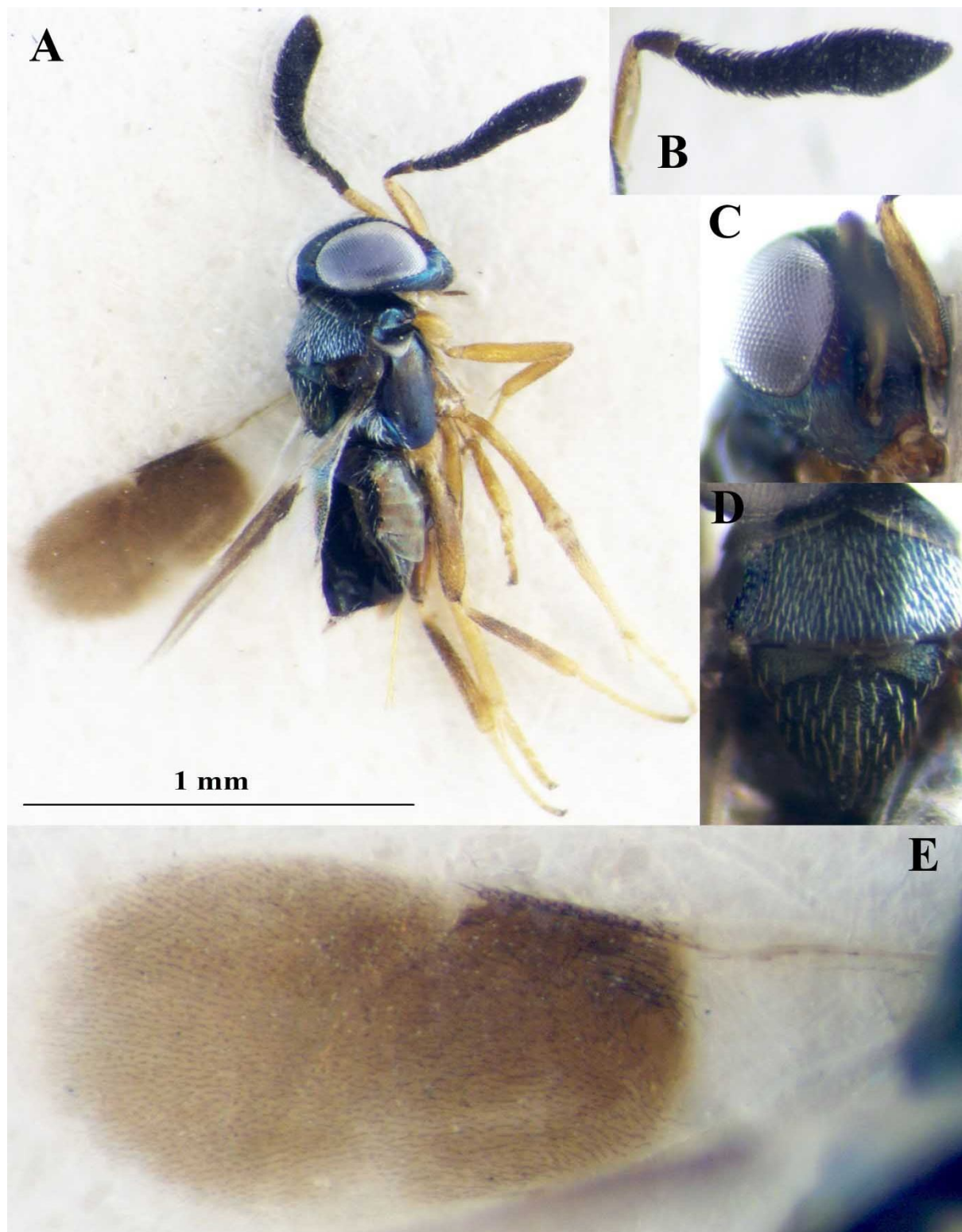
**Figure 3** *Cerchysiella* sp., Female: A. Lateral view, B. Antenna, C. Head (frontal view), D. Mesosoma in dorsal view, E. Forewing.

A



**Figure 4** *Charitopus manukyani* Sakhnov, 1993, Female: A. Lateral view, B. Antenna, C. Head in frontal view, D. Mesosoma in dorsal view, E. Forewing, F. Metasoma in lateral view.





**Figure 5** *Cheiloneurus submuticus* Thomson, 1876, Female: A. Lateral view, B. Antenna, C. Head in latero-frontal view, D. Mesosoma in dorsal view, E. Forewing.

**Genus: *Homalotylus* Mayr, 1876**

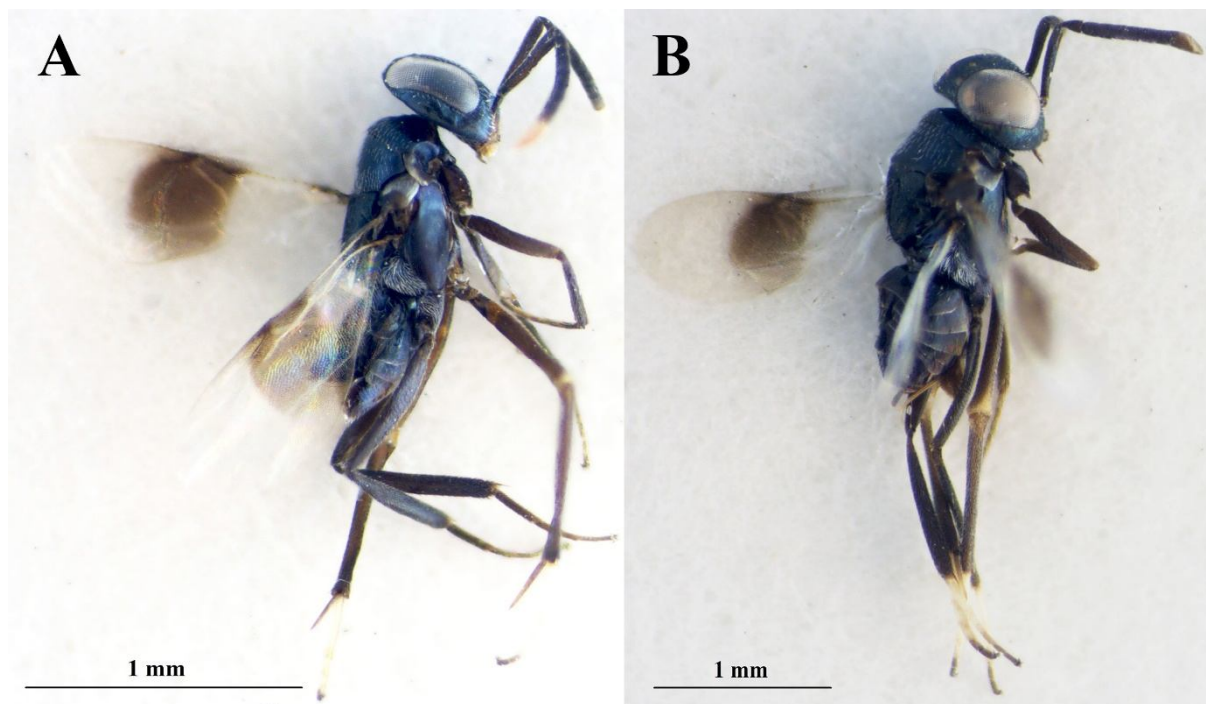
***Homalotylus flaminus* (Dalman, 1820)** (Fig. 6A)

**Material examined:** Iran: Kerman province: Bam (29°06'01.7" N, 58°19'44" E, 1111m), 04.VII-26.VIII.2017, 1♀, Malaise trap, leg.: M. Purrezaali; Bam, Dehbakri, Bidkhun (29°07'22.6" N, 57°52'56.8" E, 2220m), 04-16.VII.2017, Malaise trap, leg.: M. Purrezaali; Bam, Hemat Abad (29°08'19.6" N, 57°58'05.1" E, 1673m), 22.V-04.VII.2017, 1♀, Malaise trap, leg.: M.

Purrezaali; Anbar Abad, Rudfargh (28°29'41" N, 58°09'56.2" E, 1429m), 26.VIII-21.IX.2017, 1♀, Malaise trap, leg.: M. Purrezaali.

**Distribution in Iran:** Fars (Fallahzadeh *et al.*, 2006), Kermanshah (Ghahari *et al.*, 2010), Qazvin (Rastegar *et al.*, 2017), Khuzestan (Moravvej *et al.*, 2018) and Kerman provinces (Present study).

**General distribution:** Afrotropical, Australasia, Nearctic, Neotropical, Oriental and Palaearctic regions (Noyes, 2020).



**Figure 6** Lateral view of collected female species of Encyrtidae in south of Kerman province. A. *Homalotylus flaminus* (Dalman, 1820), B. *Homalotylus nigricornis* Mercet, 1921.

***Homalotylus nigricornis* Mercet, 1921** (Fig. 6B).

**Material examined:** Iran: Kerman province: Bam (29°06'01.7" N, 58°19'44" E, 1111m), 22.V-04.VII.2017, 1♀ & 04.VII-26.VIII.2017, 1♀, Malaise trap, leg.: M. Purrezaali; Anbar Abad, Bardeh, 05.VI-05.VII.2017, 1♀, Malaise trap, leg.: M. Purrezaali.

**Distribution in Iran:** Ardabil (Lotfalizadeh and Ebrahimi, 2001) and Kerman provinces (Present study).

**General distribution:** Palaearctic region (Noyes, 2020).

***Homalotylus near platynaspidis* Hoffer, 1963** (Fig. 7)

**Material examined:** Iran: Kerman province: Bam (29°06'01.7" N, 58°19'44" E, 1111m), 04.VII-26.VIII.2017, 2♀, Malaise trap, leg.: M. Purrezaali; Bam, Hemat Abad (29°08'19.6" N, 57°58'05.1" E, 1673m), 26.VIII-21.IX.2017, 1♀, Malaise trap, leg.: M. Purrezaali.

**Short description:** Body dark blue (Fig. 7A); antennal formula 1, 1, 6, 1, the second funicular segment and clava white (Fig. 7B), ventral margin of torulus lower than ventral margin of eye (Fig. 7C); pronotum, mesoscutum and scutellum with coarse silvery hairs, notauli present (Fig. 7D), mesopleuron clearly separated from base of metasoma by propodeum; forewing infusate and



with two hyaline areas, one hyaline area extending across entire breadth of wing in distal half of first third and the other hyaline area joining the outer side of large median dark spot, submarginal vein in distal third broadened and curved, marginal vein as long as postmarginal vein (Fig. 7E); hypopygium extending to apex of metasoma.

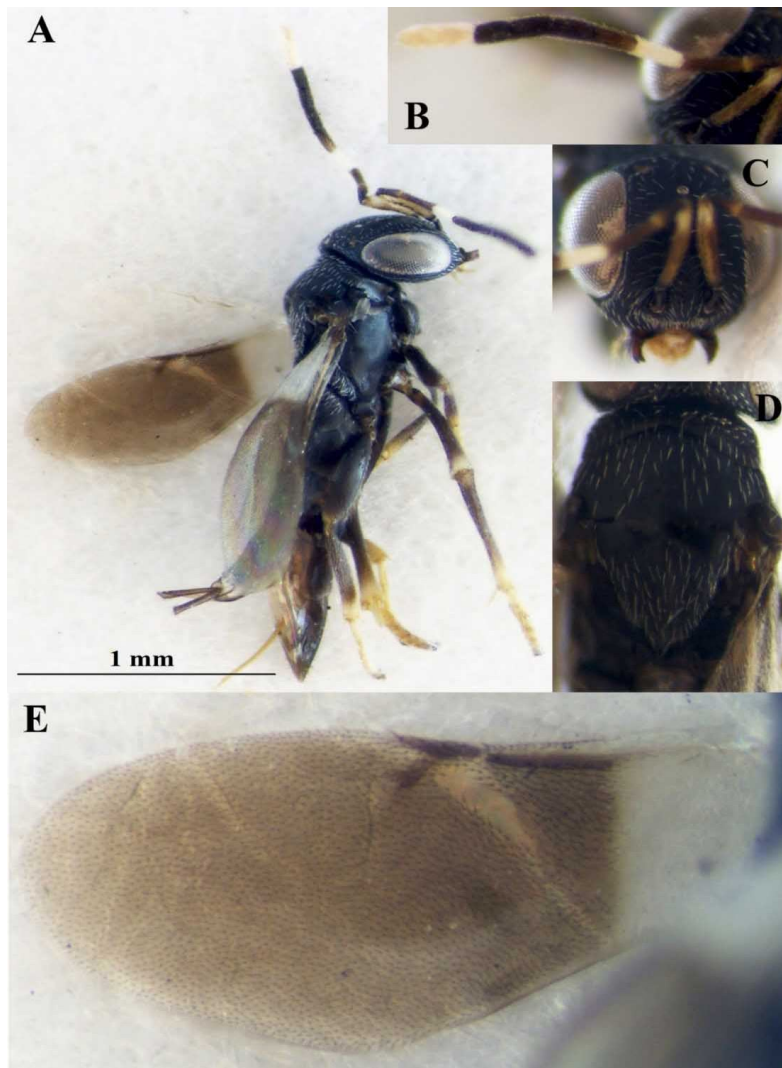
**Distribution in Iran:** Kerman province (Present study).

**Comment:** This specimen is similar to *Homalotylus platynaspidis*. But in *H. platynaspidis*, scape, pedicel and funicular

segments 1-5 black; segment 6 and club yellowish brown, in some specimen yellowish white; scape as long as pedicel and three and one-half basal funicular segments together; funicular segments quadrate, the basal three being a trifle elongate, remaining three segments as long as wide; postmarginal distinctly longer than stigmal vein (Hoffer, 1963). Therefore, this species maybe an undescribed species.

***Homalotylus quaylei* Timberlake, 1919** (Fig. 8).

**Material examined:** Iran: Kerman province: Bam (29°06'01.7" N, 58°19'44" E, 1111m), 04.VII-26.VIII.2017, 1♀, Malaise trap, leg.: M. Purrezaali.



**Figure 7** *Homalotylus* near *platynaspidis* Hoffer, 1963, Female: A. Lateral view, B. Antenna, C. Head in frontal view, D. Mesosoma in dorsal view, E. Forewing.



**Figure 8** Lateral view of collected female *Homalotylus quaylei* Timberlake, 1919 in south of Kerman province.

**Distribution in Iran:** Tehran (OILB, 1971), Khuzestan (Asadeh and Mossadegh, 1991; Novin *et al.*, 2000), Mazandaran (Maafi *et al.*, 1998) Fars (Lotfalizadeh, 2010), East Azarbaijan (Ghahari *et al.*, 2010) and Kerman provinces (Present study).

**General distribution:** Afrotropical, Oriental and Palearctic regions (Noyes, 2020).

**Genus: *Leptomastix* Foerster, 1856**

*Leptomastix* sp. (Fig. 9)

**Material examined:** Iran: Kerman province: Jiroft, Dalfard (29°00'33" N, 57°35' 32.4" E, 2121m), 13-30.VIII.2016, 1♀, Malaise trap, leg.: M. Changizi.

**Short description:** Head and mesosoma dark blue (Fig. 9A); antennal formula 1, 1, 6, 3, all funicular segments longer than broad, first

funicular segment longer than pedicel (Fig. 9B), ventral margin of torulus lower than ventral margin of eye (Fig. 9C); tegula dark, scutellum apically without tuft of setae, mesopleuron enlarged posteriorly and more or less touching base of metasoma, wings not reduced, forewing hyaline and extended beyond tip of metasoma, marginal vein longer than stigma, postmarginal vein longer than marginal vein, glabrous oblique stripe on disk of forewing more or less broadly interrupted (Fig. 9D); metasoma dark brown, hypopygium extending to apex of metasoma.

**Genus: *Mayridia* Mercet, 1921**

*Mayridia myrlea* (Walker, 1838) (Fig. 10)

**Material examined:** Iran: Kerman province: Bam, Hemat Abad (29°08'19.6 "N, 57°58'05.1 "E, 1673m), 13-22.V.2017, 1♀, Malaise trap, leg.: M. Purrezaali.

**Short description:** Body metallic green (Fig. 10A); antennal formula 1, 1, 6, 3, all funicular segments not longer than broad, two last funicular segments squared, clava obliquely truncate and equal last three funicular segments (Fig. 10B), ventral margin of torulus lower than ventral margin of eye (Fig. 10C); mesosutum without notauli (Fig. 10D), scutellum with sculpturing same as that of mesoscutum, mesopleuron clearly separated from base of metasoma by propodeum, forewing with 2 longitudinal infusate rays, apex of forewings pale, marginal vein longer than postmarginal vein (Fig. 10E); hypopygium not extending to apex of metasoma.

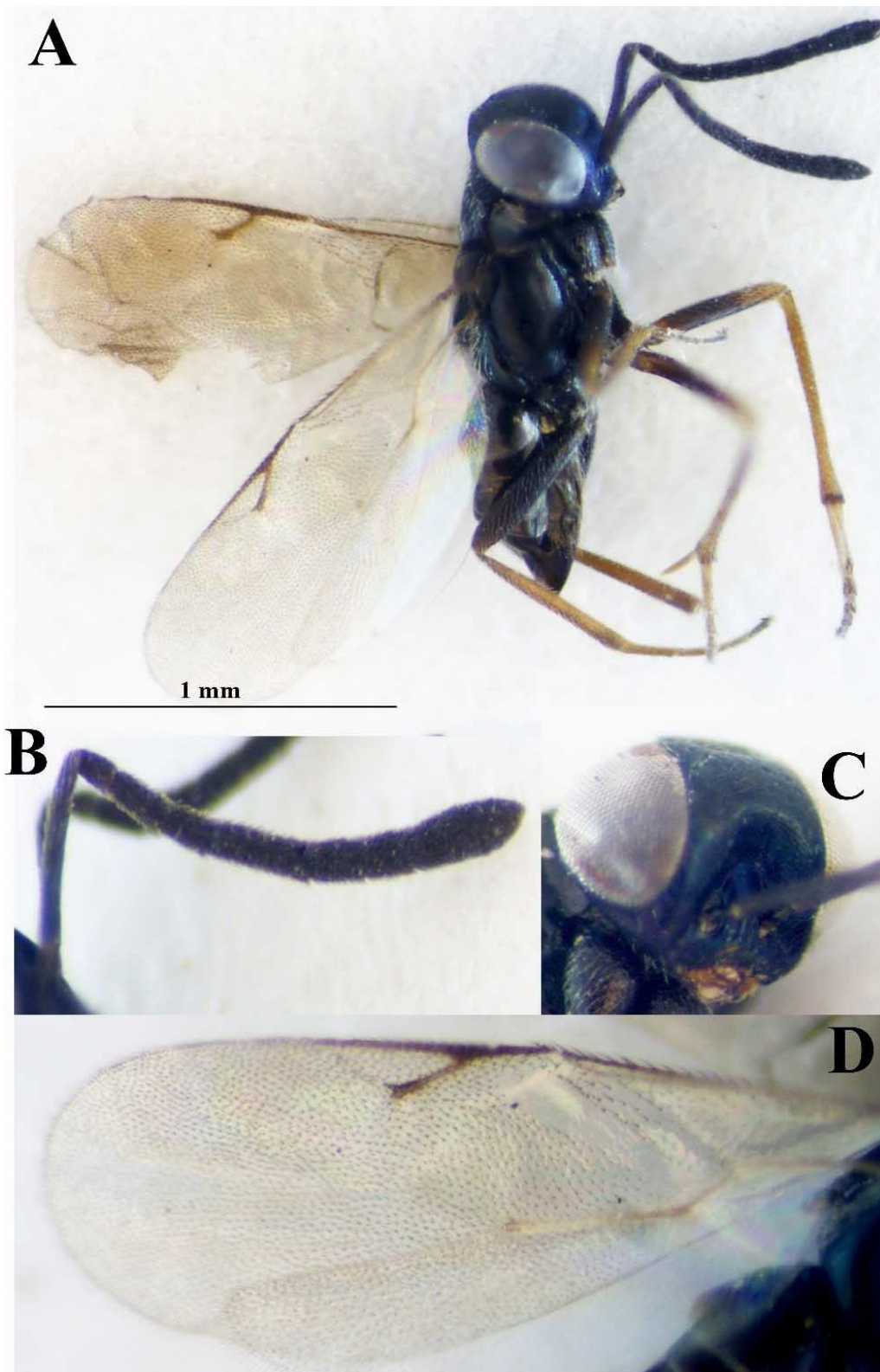
**Distribution in Iran:** Kerman province.

**General distribution:** Palearctic region (Noyes, 2020; Iran- New record).

**Genus: *Ooencyrtus* Ashmead, 1900**

*Ooencyrtus masii* (Mercet, 1921) (Fig. 11A)

**Material examined:** Iran: Kerman province: Bam, Dehbakri, Bidkhun (29°07'22.6" N, 57°52'56.8" E, 2220m), 22.V-04.VII.2017, 1♀, Malaise trap, leg.: M. Purrezaali; Bam, Hemat Abad (29°08'19.6" N, 57°58'05.1" E, 1673m), 26.VIII-21.IX.2017, 1♀, Malaise trap, leg.: M. Purrezaali.



**Figure 9** *Leptomastix* sp., Female: A. Lateral view, B. Antenna, C. Head in frontal view, D. Forewing.





**Figure 10** *Mayridia myrlea* (Walker, 1838). Female: A. Lateral view, B. Antenna, C. Head in latero-frontal view, D. Mesosoma in dorsal view, E. Forewing.

**Distribution in Iran:** Fars as *Ooencyrtus cf. masii* (Sabahi et al., 1998, 1999), Khojir protected area (Omid et al., 2005) and Kerman provinces (Present study).

**General distribution:** Palaearctic region (Noyes, 2020).

**Comment:** This species is similar to *Ooencyrtus ocnariae* Hayat and Mehrnejad, 2018. But in *O. ocnariae* scutellum with very fine, polygonal reticulate sculpture much shallower than that on the mesoscutum, and smooth in about apical third; mid tibia (also fore and hind tibiae) white, without a sub-basal dark band; and stigmal vein 1.2 times as long as combined length of the marginal and postmarginal veins (Hayat and Mehrnejad, 2018).

***Ooencyrtus telenomicida* (Vassiliev, 1904)** (Fig. 11B)

**Material examined:** Iran: Kerman province: Bam, Dehbakri, Bidkhun (29°07'22.6" N, 57°52'56.8" E, 2220m), 22.V-04.VII.2017, 6♀, 04-17.VII.2017, 9♀, 17.VII-26.VIII.2017, 14♀, Malaise trap, leg.: M. Purrezaali; Bam, Hemat Abad (29°08'19.6"

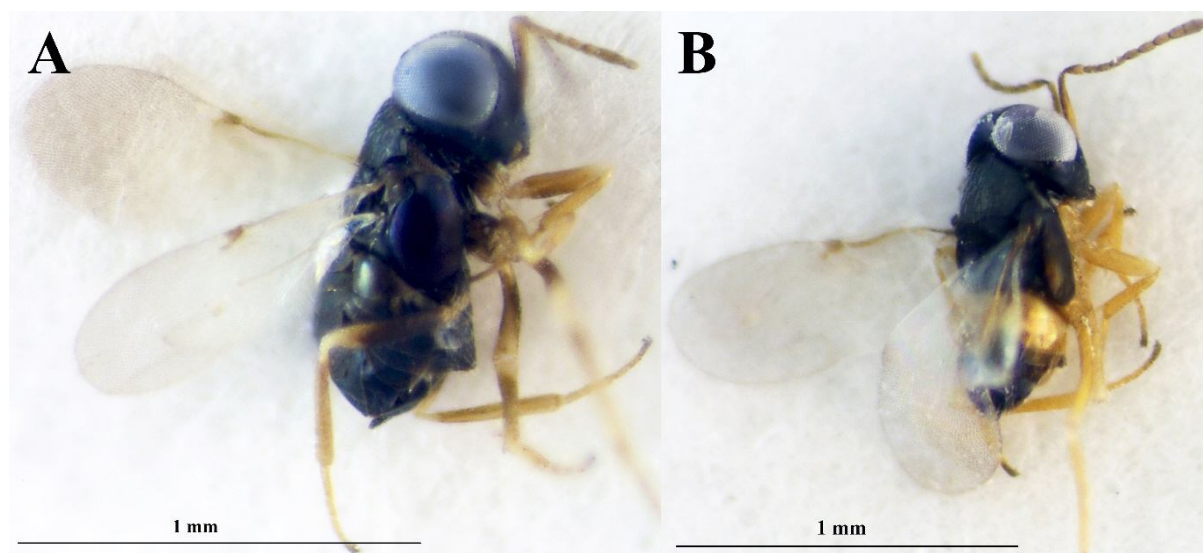
N, 57°58'05.1" E, 1673m), 22.V-04.VII.2017, 1♀, Malaise trap, leg.: M. Purrezaali; Jiroft, Dalfard, Bondar (29°01'31.4" N, 57°36'56.1" E, 2390m), 17.VII-27.VIII.2017, 7♀, Malaise trap, leg.: M. Purrezaali; Jiroft, Dalfard, Bondar (29°00'36" N, 57°36'39.1" E, 2232m), 07-17.VII.2017, 2♀, Malaise trap, leg.: M. Purrezaali.

**Distribution in Iran:** Alborz, Tehran, Hamadan, Lorestan, Mazandaran, Markazi (Chodjai, 1968, 1989; Davatchi and Chodjai, 1969; Radjabi and Amir-Nazari, 1989; Modarres Awal, 1997); East Azarbaijan (Iranipour et al., 1998), Kerman (Hashemi Rad et al., 2002), Qazvin (Noori et al., 2003), Kerman (Mohammadpour et al., 2015, 2016), Guilan (Lotfalizadeh et al., 2016).

**General distribution:** Oriental and Palaearctic regions (Noyes, 2020).

***Ooencyrtus* sp. 1** (Fig. 12)

**Material examined:** Iran: Kerman province: Bam, Hemat Abad (29°08'19.6"N, 57°58'05.1"E, 1673m), 22.V-04.VII.2017, 1♀, Malaise trap, leg.: M. Purrezaali.



**Figure 11** Lateral view of collected female species of Encyrtidae in south of Kerman province. A. *Ooencyrtus masii* (Mercet, 1921), B. *Ooencyrtus telenomicida* (Vassiliev, 1904).



Figure 12 *Ooencyrtus* sp. 1, Female: A. Lateral view, B. Antenna, C. Forewing.



**Short description:** Head and mesoscutum dark green (Fig. 12A); ventral margin of torulus lower than ventral margin of eye, antennal formula 1, 1, 6, 3, antennal scape subcylindrical, all funicular segments longer than broad (Fig. 12B), first funicular segment not longer than pedicel, clava apically rounded and its length equal to the last three segments of funicle; mesonotum without notauli, scutellum dark brown and nearly entirely smooth, mesopleuron well developed and more or less touching base of metasoma, forewing hyaline, all coxa dark green, postmarginal vein longer than marginal vein and stigma, linea calva not interrupted by setae (Fig. 12C); metasoma dark brown, hypopygium not extending to apex of metasoma.

***Ooencyrtus* sp. 2** (Fig. 13)

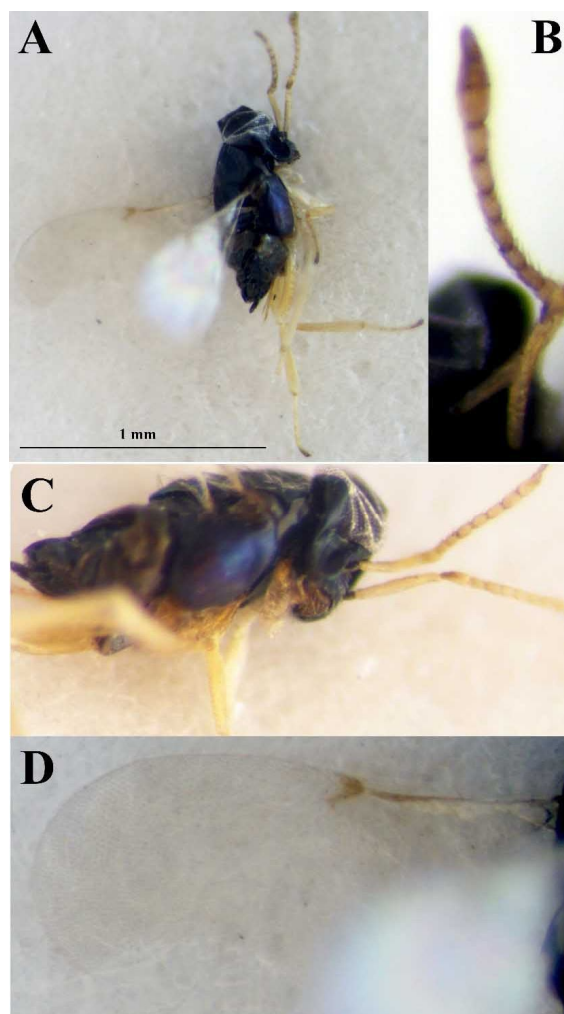
**Material examined:** Iran: Kerman province: Bam (29°06'01.7" N, 58°19'44" E, 1111m), 26.VIII-21.IX.2017, 1♀, Malaise trap, leg.: M. Purrezaali.

**Short description:** head and mesosoma dark blue (Fig. 13A); ventral margin of torulus lower than ventral margin of eye, antennal formula 1, 1, 6, 3, basal antennal segment more than 4 times longer than width, pedicel longer than first funicular segment, clava apically rounded (Fig. 13B); mesoscutum without notauli, scutellum with sculpturing barely same as that of mesoscutum, scutellum dark brown, mesopleuron well developed and more or less touching base of metasoma (Fig. 13C), forewing hyaline, linea calva of forewing posteriorly open, all coxa yellowish brown, postmarginal vein longer than marginal vein, stigmal vein longer than postmarginal vein (Fig. 13D); metasoma dark brown, hypopygium not extending to apex of metasoma.

**Genus:** *Prionomitus* Mayr, 1876

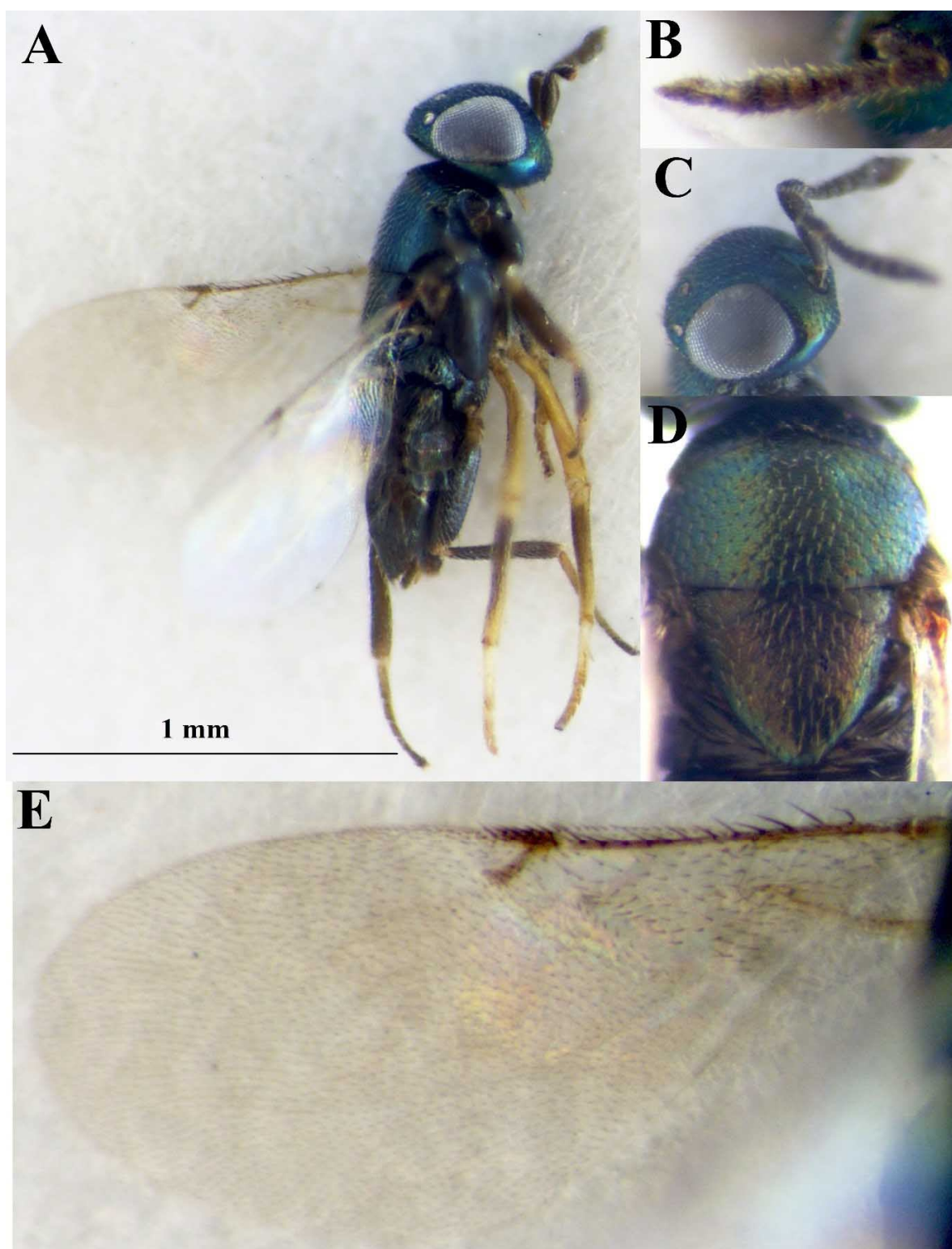
***Prionomitus tiliaris* (Dalman, 1820)** (Fig. 14)

**Material examined:** Iran: Kerman province: Anbar Abad, Rudfargh (28°29'41" N, 58°09'56.2" E, 1429m), 27.VI-16.VII.2017, 1♀, 26.VIII-21.IX.2017, 1♀, Malaise trap, leg.: M. Purrezaali; Manujan (27°29'53.1" N, 57°33'43.4" E, 358m), 07.IV-05.V.2017, 1♀, Malaise trap, leg.: M. Purrezaali.



**Figure 13** *Ooencyrtus* sp. 2, Female: A. Lateral view, B. Antenna, C. Body (lateral view), D. Forewing.

**Short description:** Head and mesosoma greenish blue (Fig. 14A); antennal formula 1, 1, 6, 3, first funicular segment shorter than pedicel, all funicular segments not longer than broad (Fig. 14B), ventral margin of torulus lower than ventral margin of eye (Fig. 14C); mesonotum without notauli (Fig. 14D), scutellum with sculpturing deeper than that of mesoscutum, mesopleuron clearly separated from base of metasoma by propodeum, forewings hyaline, linea calva of forewing posteriorly open, postmarginal vein longer than marginal vein and shorter than stigmal vein (Fig. 14E); metasoma dark brown.



**Figure 14** *Prionomitus tiliaris* (Dalman, 1820). Female: A. Lateral view, B. Antenna, C. Head in lateral view, D. Mesosoma in dorsal view, E. Forewing.

**Distribution in Iran:** Kerman province.

**General distribution:** Australasia, Nearctic and Palaearctic regions (Noyes, 2020; Iran- New record).

**Genus:** *Psyllaephagus* Ashmead, 1900

*Psyllaephagus claripes* Trjapitzin, 1967 (Fig. 15)

**Material examined:** Iran: Kerman province: Bam, Hemat Abad (29°08'19.6" N, 57°58'05.1" E, 1673m), 26.VIII-21.IX.2017, 2♀, Malaise trap, leg.: M. Purrezaali.

**Distribution in Iran:** Hamadan (Rajabi Mazhar and Sadeghi, 2006; Rajabi Mazhar *et al.*, 2007) and Kerman provinces (Present study).

**General distribution:** Palaearctic region (Noyes, 2020).



**Figure 15** Lateral view of collected female *Psyllaephagus claripes* Trjapitzin, 1967 in south of Kerman province.

## Discussion

In the course of this survey of Encyrtidae in southern parts of Kerman province, 16

species belonging to one subfamily and 10 genera were identified. In total, 10 species were recorded for the first time from Kerman province. Two genera and five species were recorded for the first time for the fauna of Iran.

It seems *Homalotylus flaminus* is a cosmopolitan species and *Charitopus manukyani*, *Cheiloneurus submuticus*, *Homalotylus nigricornis*, *Mayridia myrlea*, *Ooencyrtus masii*, *Psyllaephagus claripes* are distributed only in the Palaearctic region. *Charitopus manukyani* is recorded only from Mongolia and this is the second record of this species from the Palaearctic region. Other species are distributed in the Palaearctic and other zoogeographic regions. Also *Charitopus manukyani* and *Psyllaephagus claripes* have not been recorded from neighbouring countries but other species have been reported from at least one of the neighbouring countries. The known hosts of Encyrtidae of Kerman province are species of the orders Hemiptera, Hymenoptera and Neuroptera (Fallahzadeh and Japoshvili, 2017). According to the literatures, most known species of Kerman province are parasitoids of Coccidae, Psyllidae and Diaspididae and some species are hyperparasitoid (Table. 1). The common species of this study were compared with neighboring countries and it was found that the study area has the largest number of common species with Turkey. Also, the number of common species reported from Kerman province to Turkey is higher than other neighbouring countries. The total number of encyrtids species reported from Iran including the present study increased to 179 species in 53 genera and from Kerman province including the present study increased to 29 species.



**Table 1** The species of Encyrtidae and their hosts in Kerman province.

Species	Hosts	Reference
<i>Adelencyrtus intersectus</i> (Fonscolombe, 1832)	Soft scale	Yazdani and Rajabi (1993)
<i>Anagyrus aligarhensis</i> Agarwal and Alam, 1959	<i>Phenacoccus</i> sp.	Abd-Rabou <i>et al.</i> (2011)
<i>Blastothrix sericea</i> (Dalman, 1820)	<i>Anapulvinaria pistaciae</i> (Bodenheimer, 1926)	Yazdani and Rajabi (1993)
<i>Cerapterocerus mirabilis</i> Westwood, 1833	<i>Aonidiella orientalis</i> Newstead, 1894	Chodjai (1968, 1989); Davatchi and Chodjai (1969); Behdad (1991); Modarres Awal (1997)
<i>Cerchysiella</i> sp.	Unknown	Present study
<i>Charitopus manukyani</i> Sakhnov, 1993	Unknown	Present study
<i>Cheiloneurus pistaciae</i> Manickavasagam and Mehrnejad, 2008	<i>Chelonus kermakiae</i> (Tobias, 2001)	Manickavasagam <i>et al.</i> (2008)
<i>Cheiloneurus submuticus</i> Thomson, 1876	Unknown	Present study
<i>Eupoecilopoda perpunctata</i> (Masi, 1942)	Chrysopidae	Yazdani and Mehrnejad (1993)
<i>Habrolepis dalmanni</i> (Westwood, 1837)	<i>Melanaspis inopinata</i> (Leonardi, 1913)	Yazdani and Rajabi (1993)
<i>Homalotylus flaminius</i> (Dalman, 1820)	Unknown	Present study
<i>Homalotylus nigricornis</i> Mercet, 1921	Unknown	Present study
<i>Homalotylus</i> near <i>platynaspidis</i> Hoffer, 1963	Unknown	Present study
<i>Homalotylus quaylei</i> Timberlake, 1919	Unknown	Present study
<i>Leptomastix flava</i> Mercet, 1921	<i>Eulecanium rugulosum</i> (Archangelskaya, 1937)	Yazdani and Rajabi (1993)
<i>Mayridia myrlea</i> (Walker, 1838)	Unknown	Present study
<i>Ooencyrtus egeria</i> Huang and Noyes, 1994	<i>Brachynema germarii</i> (Kolenati, 1846), <i>Acrosternum arabicum</i> Wagner, 1959 and <i>A. breviceps</i> (Jakovlev, 1889)	Mohammadpour <i>et al.</i> (2016)
<i>Ooencyrtus masii</i> (Mercet, 1921)	Unknown	Present study
<i>Ooencyrtus ocnariae</i> Hayat and Mehrnejad, 2018	<i>Ocnaria terebinthina</i> Strg.	Hayat and Mehrnejad (2018)
<i>Ooencyrtus pistaciae</i> Hayat and Mehrnejad, 2016	<i>Brachynema germarii</i>	Hayat and Mehrnejad (2016)
<i>Ooencyrtus pityocampae</i> (Mercet, 1921)	<i>Brachynema signatum</i>	Mohammadpour <i>et al.</i> (2013, 2014, 2015)
<i>Ooencyrtus telenomicida</i> (Vassiliev, 1904)	<i>Brachynema</i> spp., <i>Acrosternum arabicum</i> and <i>A. breviceps</i>	Hashemi Rad <i>et al.</i> (2002); Mohammadpour <i>et al.</i> (2016)
<i>Prionomitus tiliaris</i> (Dalman, 1820)	Unknown	Present study
<i>Prochiloneurus bolivari</i> Mercet, 1919	Unknown	Abd-Rabou <i>et al.</i> (2011)
<i>Psyllaephagus claripes</i> Trjapitzin, 1967	Unknown	Present study
<i>Psyllaephagus pistaciae</i> Ferrière, 1961	<i>Agonoscena pistaciae</i> Burckhardt and Lauterer, 1989	Ebrahimi <i>et al.</i> (1998); Emami and Mehrnejad (2002, 2004, 2006); Mehrnejad (2002a, b, c, 2008); Mehrnejad and Copland (2006, 2007)
<i>Psyllaephagus procerus</i> (Mercet, 1921)	<i>Diaphorina citri</i> Kuwayama, 1908	(Moghbeli-Gharaei <i>et al.</i> (2013)
<i>Psyllaphycus diaphorinae</i> Hayat, 1972	<i>Agonoscena pistaciae</i>	Mehrnejad and Emami (2005)
<i>Syrphophagus aphidivorus</i> (Mayr, 1876)	Hyperparasitoid of <i>Agonoscena pistaciae</i>	Yazdani and Mehrnejad (1993); Ebrahimi <i>et al.</i> (1998); Mehrnejad (2002b); Emami and Mehrnejad (2002, 2004, 2006); Mehrnejad and Emami (2005)

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## زنبورهای خانواده Encyrtidae (Hymenoptera: Chalcidoidea) در نواحی جنوبی استان کرمان به همراه گزارش جدید چند جنس و گونه

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**چکیده:** در این پژوهش، زنبورهای پارازیتوئید خانواده Encyrtidae (Hymenoptera: Chalcidoidea) از مناطق جنوبی استان کرمان جمع آوری و مورد بررسی قرار گرفته است. نمونه‌ها با استفاده از تله مالیز، طی ماه‌های فروردین تا شهریور ۱۳۹۶ جمع آوری گردید. در مجموع، ۱۶ گونه متعلق به ۱۰ جنس از خانواده Encyrtidae جمع آوری و شناسایی شد. جنس‌های *Charitopus* و *Cerchysiella* Girault, 1914 و *Chritopus manukyani* Foerster, 1856 برای فون ایران جدید می‌باشند. هم‌چنین چهار گونه *Chritopus manukyani* Foerster, 1856 و *Mayridia myrlea* Thomson, 1876، *Cheiloneurus submuticus* (Walker, 1838)، Sakhnov, 1993 و *Prionomitus tiliaris* (Dalman, 1820) برای فون ایران گزارش جدید می‌باشند. خصوصیات مرفولوژیک برای گونه‌های جدید و خصوصیات زیست‌شناسی و پراکنش جغرافیایی برای همه گونه‌ها ذکر شده است. هم‌چنین لیست به‌روز شده از گونه‌های خانواده Encyrtidae از استان کرمان ارائه شده است.

**واژگان کلیدی:** encyrtid wasp، گزارش جدید، ایران، فون، استان کرمان