A survey of the Ichneumonidae (Hymenoptera, Ichneumoidea) of Kerman province, south-east Iran

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ABSTRACT. The Ichneumonidae fauna of Kerman province, Iran, was surveyed in April 2013 to June 2014. In total, 35 species belonging to 22 genera and eight subfamilies were collected and identified, of which Cryptus armator Fabricius, 1804; Enizemum schwarzi Diller, 1987 and Barichneumon gaullei Berthoumieu, 1903 are new records for the fauna of Iran. An updated list of Ichneumonid species for Kerman province is presented. These data can be useful for biological control programs.

Key words: Ichneumonidae, Iran, distribution, new records, catalog

Introduction

The Ichneumonidae (Insecta, Hymenoptera) is one of the largest families of insects, with about 24481 described species (Yu et al. 2012) and 38 extant subfamilies (Quicke 2015). This family contains important parasitoids of insects and spiders but common hosts are larvae and pupae of Coleoptera, Hymenoptera, Diptera and Lepidoptera (Wahl and Sharkey 1993). Prior to this study 615 species have been recorded from Iran (Amiri et al. 2015a, b, 2016; Mohammadi-Khoramabadi et al. 2013a, b, c; Mohammadi-Khoramabadi and Talebi, 2013; Barahoei et al. 2013a,b, 2014, 2015a, b; Hasanshahi et al. 2013, 2014a,b; Firouzi-Jahantighi et al. 2013; Gharaei et al. 2014; Bakhtiarynasab et al. 2014; Hooshyar et al. 2014; Mohebban et al. 2015, of which 70 species were collected and identified from Kerman province (Bakhtiarynasab et al. 2014, 2015; Hasanshahi et al. 2014a; Mohebban et al. 2015; Mahyabadi et al. 2014, 2016; Mohammadi-Khoramabadi et al. 2016).

This paper provides additional records of ichneumonids from Kerman province, south-east Iran, and presents their distribution within this region. It also refers to all previously recorded species collected from Kerman province. The aim of this paper is to improve our understanding of and to provide more information about the fauna and distribution of ichneumonid wasps of the subfamilies Banchinae, Collyriinae, Cryptinae, Diplazontinae, Ichneumoninae,
Metopiinae, Orthocentrinae and Pimplinae in Kerman province, south-east Iran. These data can be useful for biological control programs.

Material and methods
The ichneumonid specimens were collected using standard sweep net and Malaise traps at different localities (Baft, Bardsir and Kerman counties) in Kerman province during 2013-2014. Twelve Malaise traps were installed in eight localities in different ecosystems (temperate and alpine, cold mountain, mild and dry), latitudes and altitudes: Chatrood (2), Kereshk (2), KooPAYN (1), Lalehzar (1), Miannahr (1), Rayen (2), SImK (1) and Sirch (2) and used for collecting of samples (Fig. 1). The specimens were extracted from the traps and sorted weekly. In addition some specimens were collected by sweep net at ten localities: Baft, Baghabar, Bezenjan, Qal-e-Askar, Gughar, Kofnoeiiye, Kiskan, Rabor, Rayen and Sirch. The collected specimens were subsequently dried and mounted on cards. The external morphology of specimens was studied using a NIKON™ SMZ-645 stereomicroscope. Illustrations were taken using a BMZ-04-DZ™ digital imaging system (Behin Pajouhesh Co., Iran). Terminology of morphological characters follows Gauld (1991). Nomenclature and distributional data are mainly taken from Yu et al. (2012). We provided a diagnosis for species new to Iran. The specimens were deposited in the Zoological Museum of Shahid Bahonar University of Kerman, Kerman, Iran (ZMSBUK), also two series of new record species were kept in the Department of plant protection, University of Zabol, Iran (DPPZ) and the personal collection of the last author (M. Riedel). Identification of new records was confirmed by last author. All specimens were collected by the first author.

<table>
<thead>
<tr>
<th>Location</th>
<th>position</th>
<th>Elevation</th>
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<tbody>
<tr>
<td>1 Baft</td>
<td>29°44' N, 56°45' E</td>
<td>2197</td>
</tr>
<tr>
<td>2 Baghabar</td>
<td>29°31' N, 56°45' E</td>
<td>2679</td>
</tr>
<tr>
<td>3 Bezenjan</td>
<td>29°16' N, 56°41' E</td>
<td>2419</td>
</tr>
<tr>
<td>4 Chatrood</td>
<td>30°36' N, 56°55' E</td>
<td>1874</td>
</tr>
<tr>
<td>5 Qal-e-Askar</td>
<td>29°31' N, 56°39' E</td>
<td>2633</td>
</tr>
<tr>
<td>6 Gughar</td>
<td>29°27' N, 56°24' E</td>
<td>2545</td>
</tr>
<tr>
<td>7 Kereshk</td>
<td>30°26' N, 56°35' E</td>
<td>2407</td>
</tr>
<tr>
<td>8 Kofnooeiiye</td>
<td>29°27' N, 56°37' E</td>
<td>2811</td>
</tr>
<tr>
<td>9 Kiskan</td>
<td>29°22' N, 56°38' E</td>
<td>2591</td>
</tr>
<tr>
<td>10 KooPAYN</td>
<td>30°28' N, 57°18' E</td>
<td>1822</td>
</tr>
<tr>
<td>11 Lalehzar</td>
<td>30°26' N, 56°49' E</td>
<td>2857</td>
</tr>
<tr>
<td>12 Miannahr</td>
<td>30°28' N, 57°19' E</td>
<td>1820</td>
</tr>
<tr>
<td>13 Rabor</td>
<td>29°18' N, 56°52' E</td>
<td>2440</td>
</tr>
<tr>
<td>14 Rayen</td>
<td>29°35' N, 57°19' E</td>
<td>2557</td>
</tr>
<tr>
<td>15 SimK</td>
<td>30°29' N, 57°11' E</td>
<td>2280</td>
</tr>
<tr>
<td>16 Sirch</td>
<td>30°11' N, 57°34' E</td>
<td>2545</td>
</tr>
</tbody>
</table>

Figure 1. Sampling localities in Kerman province (elevation is mentioned by meter).
Results

In total, 545 specimens belonging to eight subfamilies: Banchinae (two species, 30 specimens), Collyriinae (one species, 6 specimens), Cryptinae (seven species, 39 specimens), Diplazontinae (seven species, 349 specimens), Ichneumoninae (eleven species, 40 specimens), Metopiinae (two species, 30 specimens), Orthocentrinae (two species, 25 specimens) and Pimplinae (three species, 26 specimens) are reported here of which three species are newly recorded for the fauna of Iran, indicated by an asterisk (*). The list of taxa is arranged alphabetically by subfamily, genus, and then species.

Subfamily Banchinae Wesmael, 1845

1. *Exetastes adpressorius* (Thunberg, 1822)

Material examined: 1♂, Malaise trap, Kerman-Koohpayeh, Miannahr (30º28′ N, 57º19′ E), 24-VII-2013; 3♀♀, 3♂♂, Malaise trap, Kerman-Sirch (30º11′ N, 57º34′ E), 18-VII-2013; 2♂♂, Malaise trap, Kerman-Chatrood (30º36′ N, 57º24′ E), 03-VII-2013; 4♀♀, 4♂♂, Malaise trap, Kerman-Rayen (29º36′ N, 57º34′ E), 07-VII-2013.

Distribution in Iran: Fars (Sarafi et al. 2015; Amiri et al. 2016) and Kerman provinces (Current study).

General distribution: Palaeartic, Nearctic (Yu et al. 2012).

2. *Exetastes syriacus* Schmiedeknecht, 1910

Material examined: 7♀♀ and 6♂♂, Malaise trap, Kerman-Koohpayeh (30º28′ N, 57º18′ E), 02-V-2013.

Distribution in Iran: Khorasan-e-Razavi (Barahoei et al. 2014) and Kerman provinces (Kolarov and Ghahari, 2005).

General distribution: Palaeartic, Nearctic (Yu et al. 2012).

Subfamily Collyriinae Cushman, 1924

3. *Collyria coxator* (Villers, 1789)

Material examined: 1♂, swept from *Hordeum vulgare* L., Kerman-Rayen (29º38′ N, 57º25′ E), 15-V-2014; 3♀♀, 2♂♂, swept from *Medicago sativa* L. Kerman-Rabor (29º19′ N, 56º51′ E), 09-V-2014.

Distribution in Iran: Khorasan-e-Razavi (Barahoei et al. 2014) and Kerman provinces (Kolarov and Ghahari, 2005).

General distribution: Palaeartic, Nearctic (Yu et al. 2012).

Subfamily Cryptinae Kirby, 1837

4. *Cryptus armator* Fabricius, 1804 (Fig. 2)

Material examined: 4♀♀, Malaise trap, Kerman-Sirch (30º11′ N, 57º34′ E), 02-V-2014.

General distribution: Palaeartic, new for Iran.

Diagnosis: Ovipositor sheath 1.2-1.4 times as long as hind tibia (Fig. 2F); postpetiole black or with orange patches at posterior margin, but sometimes with an orange transverse band medioapically not reaching lateral margin (Fig. 2H); antroventral part of frons with transverse striation (Fig. 2B) (Schwarz, 2015).

5. *Cryptus inculcator* Linnaeus, 1758

Material examined: 1♀, Malaise trap, Kerman-Sirch (30º11′ N, 57º34′ E), 18-VII-2013.

Distribution in Iran: Alborz (Masnadi-Yazdinejad and Jussila, 2008a), Fars (Sarafi et al. 2015), Isfahan (Barahoei et al. 2015b), Kerman (Mohebban et al. 2015), Khorasan-e-Razavi (Barahoei et al. 2014), Sistan-o Baluchistan (Firuzi Jahantighi et al. 2012; Barahoei et al. 2013a) and Yazd provinces (Zarepour et al. 2008).

6. Dichrogaster longicaudata (Thomson, 1884)


Distribution in Iran: Kerman (Mohebban et al. 2015), Khurasan-e-Razavi (Barahoei et al. 2014), Fars and Mazanderan (Kolarov and Gahari, 2007) provinces.


7. Dichrogaster saharator (Aubert, 1964)

Material examined: 1♂, Malaise trap, Kerman-Koohpayeh, Miannahr (30º28’ N, 57º19’ N), 19-IV-2014.

Distribution in Iran: Ardabil, Fars (Kolarov and Gahari, 2007; Sarafi et al. 2015), Isfahan (Barahoei et al. 2015b), Kerman (Mohebban et al. 2015), Khurasan-e-Razavi (Barahoei et al. 2014), Khuzestan, Mazandaran (Kolarov and Gahari, 2007), Sistan-o-Baluchestan (Kolarov and Gahari, 2007, Firuzi Jahantighi et al. 2012; Barahoei et al. 2013a), Tehran and Zanjan (Kolarov and Gahari, 2007) provinces.

General distribution: Algeria; Bulgaria; Iran; Israel; Turkey (Yu et al. 2012).

8. Lysibia nana (Gravenhorst, 1829)


Distribution in Iran: Isfahan (Barahoei et al. 2015b), Kerman (Mohebban et al. 2015), Mazandaran (Kolarov and Gahari, 2007) and Qazvin (Gahari and Schwarz, 2012) provinces.


9. Mesostenus albinotatus Gravenhorst, 1829

Material examined: 2♀♀, swept from Mentha pulegium, Kerman-Sirch (30º11’ N, 57º33’ E), 22-V-2014; 1♀, Malaise trap, Kerman-Sirch (30º11’ N, 57º34’ E), 02-V-2014; 1♂, swept from Hordeum vulgare L., Kerman-Rayen (29º38’ N, 57º25’ E), 15-V-2013; 1♂, swept from M. sativa, Kerman-Rayen (29º32’ N, 57º31’ E), 06-VI-2013; 1♂, Malaise trap, Kerman-Chatrood(30º36’ N, 56º55’ E), 02-V-2014.

Distribution in Iran: Kerman province (Mohebban et al. 2015).


10. Trychosis legator (Thunberg, 1824)

Material examined: 1♀, 1♂, swept from M. sativa, Kerman-Sirch (30º11’ N, 57º33’ E), 22-V-2014; 2♀♀, swept from M. sativa, Kerman-Sirch (30º11’ N, 57º34’ E), 19-VI-2013; 2♀♀, swept from M. sativa, Kerman-Rayen (29º38’ N, 57º25’ E), 27-IV-2014; 1♂, swept from M. sativa, Kerman-Sirch (29º38’ N, 57º25’ E), 02-V-2014; 1♀, Malaise trap, Kerman-Koohpayeh, Simk (30º29’ N, 57º11’ E), 02-V-2013.

Distribution in Iran: Azarbajian-e-Gharbi, Sistan-o-Baluchestan (Kolarov and Gahari, 2007), Fars (Masnadi-Yazdinejad, 2005; Masnadi-Yazdinejad and Jussila, 2008a), Khurasan-e-Razavi (Barahoei et al. 2014) and Qazvin (Gahari and Schwarz, 2012) provinces.

Subfamily Diplazontinae Viereck, 1918
11. Diplazon lactatorius (Fabricius, 1781)


Distribution in Iran: Alborz, Guilan, Tehran (Mohammadi-khoramabadi et al. 2013c); Fars (Sarafi et al. 2015), Khorasan-e-Razavi (Barahoei et al. 2014), Kerman (Kolarov and Gahhari, 2005; Bakhtiyarinasab et al. 2014), Khorasan-e-Shomali, Azarbaijan-e-Gharbi (Malkeshi and Kheiabani, 1997), Isfahan (Barahoei et al. 2015a), Mazanderan (Kolarov and Gahhari, 2005; Mohammadi-khoramabadi et al. 2013c), Chaharmahal-o-Bakhtiari (Nourbakhsh et al. 2008), Qazvin (Gahhari and Schwarz, 2012; Mohammadi-khoramabadi et al. 2013c), Sistan-o-Baluchestan (Barahoei et al. 2013a), Yazd (Zarepour et al. 2008, 2009).


Hosts: The known host of this species in Iran is Scaeva albomaculata (Macquart, 1842) (Dip.: Syrphidae) (Nourbakhsh et al. 2008; Barahoei et al. 2013a).

12. Enizenum ornatum (Gravenhorst, 1829)

Figure 2. Female of Cryptus armator Fabricius: A. Head, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma; E. Mesoscutum and propodeum; F. Ovipositor; G. Fore wing; H. Metasoma, dorsal view.
M. sativa, Kerman-Rayen (29°35′ N, 57°19′ E), 22-IV-2014; 1♂, Malaise trap, Kerman-Chatrood (30°36′ N, 56°55′ E), 02-VI-2014; 1♀, swept from M. sativa, Kerman-Gughar (29°30′ N, 56°30′ E), 14-VI-2014.

**Distribution in Iran:** Fars (Sarafi et al. 2015), Isfahan (Barahoei et al. 2015a), Kerman (Bakhtiarynasab et al. 2015), Khorasan-e Razavi (Barahoei et al. 2014), Qazvin (Mohammadi-khoramabadi et al. 2013c), Sistan-o- Baluchestan (Barahoei et al. 2013a) provinces.

**General distribution:** Holarctic and Oriental (Klopfstein 2014).

**Hosts:** It is regarded as a parasitoid of Scaeva albomaculata (Macquart, 1842) (Dip.: Syrphidae) in Iran (Barahoei et al. 2013a).

13. *Enizemum schwarzi* Diller, 1987 (Fig. 3)

**Material examined:** 3♂♂, swept from *M. sativa*, Kerman-Kiskan (29°22′ N, 56°38′ E), 28-XI-2013.

**Distribution in Iran:** Kerman province (new for Iran).

**General distribution:** Greece; Israel; Italy; Spain (Klopfstein 2014), new for Iran.

**Diagnosis (male):** Length of fore wing 4.7 mm (Fig. 3G); linear and narrow tyloids on flagellomeres 7 to 14; large punctures on smooth and shining mesoscutum and mesopleuron (Figs. 3D, E); pleural and lateral longitudinal carinae on propodeum (Figs. 3D, E); median longitudinal and transverse carinae absent or present only as traces; with median dorsal carinae on basal half of first tergite; strong basal carinae on second tergite (Figs. 3F, H) (Klopfstein 2014).

14. *Homotropus elegans* Gravenhorst, 1829

**Material examined:** 2♀♀, Malaise trap, Kerman-Rayen (29°36′ N, 57°24′ E), 11-VI-2013; 1♂, swept from *M. sativa*, Kerman-Kiskan (29°22′ N, 56°38′ E), 28-XI-2013; 1♀, swept from *M. sativa*, Kerman-Rayen (29°38′ N, 57°28′ E), 27-IV-2014; 3♀♀, Malaise trap, Kerman-Rayen (29°35′ N, 57°19′ E), 04-V-2014; 1♂, swept from *M. sativa*, Kerman-Negar (29°51′ N, 56°48′ E), 09-V-2013.

**Distribution in Iran:** Kerman province (Bakhtiarynasab et al. 2014).

**General distribution:** Palaeartic (Klopfstein 2014).

15. *Homotropus pictus* (Gravenhorst, 1829)

**Material examined:** 4♀♀, swept from *M. sativa*, Kerman-Kiskan (29°22′ N, 56°38′ E), 28-XI-2013.

**Distribution in Iran:** Mazandaran (Mohammadi-khoramabadi et al. 2013c) and Kerman provinces (current study).

**General distribution:** Palaeartic (Klopfstein 2014).

16. *Homotropus signatus* (Gravenhorst, 1829)

**Material examined:** ; 1♀ and 2♂♂, swept from *M. sativa*, Kerman-Kishan (29°22′ N, 56°38′ E), 09-XI-2013; 3♀♀ and 2♂♂, swept from *M. sativa*, Kerman-Sirch (30°11′ N, 57°33′E), 22-V-2014; 3♀♀, Malaise trap, Kerman-Sirch (30°11′ N, 57°34′ E), 02-V-2014; 2♀, swept from *M. sativa*, Kerman-Rayen (29°38′ N, 57°25′ E), 08-VI-2014; 1♂, swept from *Hordeum vulgare* L., Kerman-Rayen (29°38′ N, 57°25′ E), 15-V-2014; 5♀♀, swept from *M. sativa*, Kerman-Rayen (29°32′ N, 57°31′ E), 16-VI-2014; 10♂♂, swept from *M. sativa*, Kerman-Rayen (29°35′ N, 57°19′ E), 22-IV-2014; 1♂, Malaise trap, Kerman-Simk (30°29′ N, 57°11′ E), 24-VII-2013; 1♀, Malaise trap, Kerman-Chatrood (30°36′ N, 56°55′ E), 02-V-2013; 2♀♀ and 5♂♂, swept from *M. sativa*, Kerman-Gughar (29°26′ N, 56°24′ E), 14-VI-2014; 2♂♂, swept from *M. sativa*, Kerman-Gughar (29°29′ N, 56°33′ E), 20-VI-2014; 5♀♀ and 1♂, swept from *M. sativa*, Kerman-Rabor (29°18′ N, 56°53′ E), 20-VI-2014; 1♀ and 1♂, swept from *M. sativa*, Kerman-
Ichneumonidae of Kerman province

Rabor (29º19’ N, 56º51’ E), 09-V-2014; 4♀♀ and 1♂, swept from *M. sativa*, Kerman-Rabor (29º19’ N, 56º52’ E), 09-V-2014; 2♀♀, swept from *M. sativa*, Kerman-Negar (29º51’ N, 56º48’ E), 09-V-2014; 1♀ and 1♂, swept from *M. sativa*, Kerman-Rabor (29º18’ N, 56º53’ E), 20-VI-2014.

**Distribution in Iran:** Fars (Sarafi et al. 2015), Kerman (Barahoei et al. 2012; Bakhtiarynasab et al. 2014), Khorasan-e-Razavi (Barahoei et al. 2014) and Isfahan (Barahoei et al. 2015a) provinces.

**General distribution:** Holarctic (Klopfstein 2014).

17. **Promethes sulcator** (Gravenhorst, 1829)

**Material examined:** 2♀♀ and 2♂♂, swept from *M. sativa*, Kerman-Qal-eh-Askar (29º31’ N, 56º39’ E), 20-XI-2013; 6♀♀ and 1♂, swept from *M. sativa*, Kerman-Qal-eh-Askar (29º31’ N, 56º39’ E), 14-XI-2013; 1♂, swept from *M. sativa*, Kerman-Negar (29º44’ N, 56º45’ E), 29-VIII-2013; 1♀, swept from *M. sativa*, Kerman-Gughar (29º26’ N, 56º24’ E), 07-XI-2013; 1♀, swept from *M. sativa*, Kerman-Kofnoeyeh (29º27’ N, 56º37’ E), 14-XI-2013; 1♂, swept from *M. sativa*, Kerman-Bezenjan (29º16’ N, 56º41’ E), 14-XI-2013; 1♀ and 1♂, swept from *M. sativa*, Kerman-Bezenjan (29º16’ N, 56º41’ E); 14-XI-2013; 4♀♀ and 4♂♂, swept from *M. sativa*, Kerman-Rabor (29º18’ N, 56º52’ E), 14-XI-2013; 1♀, Malaise trap, Kerman-Kookpayeh, Miannahr (30º28’ N, 57º19’ E), 19-VI-2013; 1♀ and 1♂, swept from *M. sativa*, Kerman-Baghbor (29º31’ N, 56º45’ E), 29-VIII-2013; 12♀♀ and 9♀♀, swept from *M. sativa*, Kerman-Kiskan (29º22’ N, 56º38’ E); 09-XI-2013; 47♀♀ and 48♂♂, swept from *M. sativa*, Kerman-Kiskan (29º22’ N, 56º38’ E), 28-XI-2013; 1♂, swept from *M. sativa*, Kerman-Sirch (30º11’ N, 57º34’ E), 06-VI-2014; 1♂, swept from *M. sativa*, Kerman-Rayen (29º32’ N, 57º31’ E), 16-VI-2014; 1♂, swept from *M. sativa*, Kerman-Rayen (29º35’ N, 57º19’ E), 22-IV-2014; 1♀, Malaise trap, Kerman-Kooophayeh, Simk (30º29’ N, 57º11’ E), 19-VI-2013; 3♀♀, swept from *M. sativa*, Kerman-Kiskan (29º22’ N, 56º38’ E), 20-VI-2014; 1♂, swept from *M. sativa*, Kerman-Gughar (29º27’ N, 56º24’ E), 14-VI-2014.

**Distribution in Iran:** Isfahan (Barahoei et al. 2015a), Khorasan-e-Razavi (Barahoei et al. 2014), Alborz, Gilan, Tehran (Mohammadi-khoramabadi et al. 2013c), Sistan-o- Baluchistand (Barahoei et al. 2013a) and Kerman (current study) provinces.

**General distribution:** Holarctic and Oriental (Klopfstein 2014).

18. **Apaeleticus bellicosus** Wesmeal, 1845

**Material examined:** 1♀, Malaise trap, Kerman-Sirch (30º11’ N, 57º34’ E), 02-V-2014; 1♀, swept from *M. sativa*, Kerman-Sirch (30º11’ N, 57º34’ E), 28-XI-2013; 1♀, Malaise trap, Kerman-Chatrood (30º36’ N, 56º55’ E), 02-V-2014; 1♂, swept from *M. sativa*, Kerman-Gughar (29º26’ N, 56º24’ E), 14-VI-2014.

**Distribution in Iran:** Kerman province (Mohebban et al. 2015).

**General distribution:** Palaearctic (Yu et al. 2012).

19. **Barichneumon derogator** (Wesmeal, 1845)

**Material examined:** 1♂, swept from *M. sativa*, Kerman-Kiskan (29º22’ N, 56º38’ E), 20-VI-2014.

**Distribution in Iran:** Kerman province (Mohebban et al. 2015).

**General distribution:** Palaearctic (Yu et al. 2012).

20. **Barichneumon gaullei** Berthoumieu, 1903 (Fig. 4)

**Material examined:** 1♀, Malaise trap, Kerman-Simk (30º29’ N, 57º11’ E), 02-V-2014; 1♀, swept from *M. sativa*, Kerman-Rayen (29º35’ N, 57º19’ E), 16-VI-2014; 1♀, Malaise trap, Kerman-Simk (30º29’ N, 57º11’ E), 16-V-2014.
Figure 3. Male of *Enizenum schwarzi* Diller: A. Head, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma; E. Mesoscutum and propodeum; F. Metasoma, lateral view; G. Fore wing; H. Metasoma, dorsal view.
Figure 4. Female of *Barichneumon gaullei* Berthoumieu: A. Head, lateral view of; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma; E. Mesoscutum and propodeum; F. Metasoma, lateral view; G. Fore wing; H. Metasoma, dorsal view.
General distribution: France; Spain (Yu et al. 2012), new for Iran.

Diagnosis: Flagellum with 33 segments, widest flagellomeres about 1.3x wider than long; postpetiole densely punctuate (Figs. 4F, H); hind coxa without scopa, hind femur punctate; flagellomeres 8-13 with dentine stripes; spots on vertex (Figs. 4A, C), subtegular ridge (Fig. 4D), scutellum (Fig. 4E) and wide spots on tergites 6-7 ivory (Figs. 4F, H); tergites 1-3 reddish (Figs. 4F, H); hind legs except coxae and trochanters red, tarsi brownish (Diller and Horstmann, 1997).


Material examined: 2♂♂, swept from *M. sativa*, Kerman-Sirch (30º11′ N, 57º28′ E), 22-V-2014; 1♀, Malaise trap, Kerman-Koohpayeh (30º28′ N, 57º18′ E), 02-V-2014.

Distribution in Iran: Kerman province (Diller and Riedel, 2015).

General distribution: Azerbaijan, Turkey and Iran (Diller and Riedel, 1997).

22. *Ctenichneumon devylderi* (Holmgren, 1871)

Material examined: 2♂♂, Malaise trap, Kerman-Sirch (30º11′ N, 57º34′ E), 02-V-2014; 1♀, Malaise trap, Kerman-Koohpayeh (30º28′ N, 57º18′ E), 02-V-2014.

Distribution in Iran: Qom (Masnadi-Yazdinejad and Jussila, 2008b) and Kerman provinces (Mohebban et al. 2015).

General distribution: Palaearctic (Yu et al. 2012).

23. *Ctenichneumon edictorius* (Linnaeus, 1758)

Material examined: 1♀, swept from *M. sativa*, Kerman- Kiskan (29º22′ N, 56º38′ E), 20-VI-2014.

Distribution in Iran: Guilan and Golestan (Kolarov and Ghahari, 2005) and Kerman provinces (Mohebban et al. 2015).

24. *Diadromus collaris* (Gravenhorst, 1829)

Material examined: 1♂, swept from *M. sativa*, Kerman-Rayen (30º11′ N, 57º33′ E), 22-VI-2014; 1♀, swept from *M. sativa*, Kerman-Rayen (29º38′ N, 57º25′ E), 27-IV-2014; 1♀, swept from *M. sativa*, Kerman-Rayen (29º32′ N, 57º31′ E), 16-VI-2014; 5♀♀; swept from *M. sativa*, Kerman-Gughar (29º36′ N, 56º24′ E), 14-VI-2014.

Distribution in Iran: Fars (Sarafi et al. 2015), Golestan (Kolarov and Ghahari, 2008; Ghahari and Jussila, 2011d), Isfahan (Afiunizadeh and Karimzadeh, 2010; Barahoei et al. 2015a), Kerman (Mohebban et al. 2015), Khorasan-e-Razavi (Barahoei et al. 2014), Sistan-o-Baluchistan (Firuzi Jahantighi et al. 2012; Barahoei et al. 2013a) and Semnan (Ghahari 2012) provinces.


25. *Heterischmus filiformis* (Gravenhorst, 1829)

Material examined: 2♂♂, Malaise trap, Kerman- Sirch (30º11′ N, 57º34′ E), 02-V-2014; 1♀, Malaise trap, Kerman-Koohpayeh (30º28′ N, 57º18′ E), 02-V-2014.

Distribution in Iran: Isfahan (Barahoei et al. 2015a), Kerman (Mohebban et al. 2015) and Khorasan-e-Razavi provinces (Barahoei et al. 2014).

General distribution: Palaearctic (Yu et al. 2012).

26. *Ichneumon sarcitorius* Linnaeus, 1758

Material examined: 1♂, Malaise trap, Kerman-Sirch (30º11′ N, 57º34′ E), 02-V-2014;
1♂, swept from *M. sativa*, Kerman-Kiskan (29°22′ N, 56°38′ N), 20-VI-2014; 1♀, swept from *M. sativa*, Kerman-Gughar (29°26′ N, 56°24′ E), 14-VI-2013.

**Distribution in Iran:** Azarbaijan-e-Sharghi (Masnadi-Yazdinejad and Jussila, 2008b), Fars (Sarafi et al. 2015), Golestan (Mojeni and Sedivy, 2001; Kolarov and Gahari, 2005) and Semnan provinces (Kolarov and Gahari, 2008).

**General distribution:** Palaearctic (Selfa 1996; Yu et al. 2012).

**Known host in Iran:** The known host of this species in Iran is *Helicoverpa armigera* (Hubner, 1808) (Lep.: Noctuidae) (Mojeni and Sedivy, 2001).

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27. *Platylabus iridipennis* Gravenhorst, 1829

**Material examined:** 1♀, swept from *M. sativa*, Kerman-Sirch (30°11′ N, 57°34′ E), 19-IV-2014; 1♀, swept from *M. sativa*, Kerman-Sirch (30°11′ N, 57°34′ E), 07-V-2014; 1♀, Malaise trap, Kerman-Koohpayeh (30°28′ N, 57°18′ E), 02-V-2014; 1♀, Malaise trap, Kerman-Simk (30°29′ N, 57°11′ E), 02-V-2014; 1♀, swept from *M. sativa*, Kerman-Sirch (30°11′ N, 57°34′ E), 22-V-2014.

**Distribution in Iran:** Qazvin province (Ghahari and Schwarz, 2012).

**General distribution:** Palaearctic (Yu et al. 2012).

28. *Spilothyrateles illuminatorius* (Gravenhorst, 1820)

**Material examined:** 2♂♂, swept from *M. sativa*, Kerman-Sirch (30°11′ N, 57°34′ E), 19-IV-2014; 1♀, swept from *M. sativa*, Kerman-Sirch (30°11′ N, 57°34′ E), 07-V-2014; 1♀, Malaise trap, Kerman-Koohpayeh (30°28′ N, 57°18′ E), 02-V-2014; 1♀, Malaise trap, Kerman-Simk (30°29′ N, 57°11′ E), 02-V-2014; 1♀, swept from *M. sativa*, Kerman-Sirch (30°11′ N, 57°34′ E), 22-V-2014.

**Distribution in Iran:** Qazvin province (Ghahari and Schwarz, 2012).

**General distribution:** Palaearctic (Yu et al. 2012).

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29. *Exochus castaniventris* Brauns, 1896

**Material examined:** 1♀, Malaise trap, Kerman-Kereshk (30°26′ N, 57°18′ E), 03-VII-2013; 7♀♀ and 13♂♂, Malaise trap, Kerman-Chatrood (30°36′ N, 56°55′ E), 03-VII-2013.

**Distribution in Iran:** Isfahan (Masnadi-Yazdinejad and Jussila, 2009; Barahoei et al. 2015a), Tehran (Masnadi-Yazdinejad and Jussila, 2009), Qazvin (Ghahari and Schwarz, 2012) and Semnan (Ghahari 2012) provinces.

**General distribution:** Palaearctic (Yu et al. 2012).

30. *Exochus mitratus* Gravenhorst, 1829

**Material examined:** 1♂, swept from *M. sativa*, Kerman-Rayen (29°35′ N, 57°18′ E), 22-IV-2014; 4♂♂, swept from *M. sativa*, Kerman-Kiskan (29°22′ N, 56°38′ E), 20-VI-2013.

**Distribution in Iran:** Tehran (Masnadi-Yazdinejad and Jussila, 2009) and Kerman provinces (current study).

**General distribution:** Holarctic (Yu et al. 2012).

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31. *Orthocentrus asper* Gravenhorst, 1829

**Material examined:** 1♀, Malaise trap, Kerman-Miannahr (30°28′ N, 57°19′ E), 03-VII-2013; 2♀♀, Malaise trap, Kerman-Sirch (30°11′ N, 57°34′ E), 19-V-2014.

**Distribution in Iran:** Fars (Sarafi et al. 2015), Guilan and Tehran (Mohammadi-khoramabadi and Talebi, 2013a) provinces.

**General distribution:** Palaearctic (Yu et al. 2012).

32. *Orthocentrus castellanus* Ceballos, 1963

**Material examined:** 1♀, swept from *M. sativa*, Kerman-Kiskan (29°22′ N, 56°38′ E), 09-XI-2013.
Distribution in Iran: Tehran province (Mohammadi-khoramabadi and Talebi, 2013a).

General distribution: Bulgaria; Spain (Yu et al. 2012).

Subfamily Pimplinae Wesmael, 1845
33. Itoplectis alternans (Gravenhorst, 1829)
Material examined: 1♀, swept from M. sativa, Kerman-Kiskan (29°22′ N, 56°38′ E), 28-XI-2013.

Distribution in Iran: Fars (Lotfalizadeh et al. 2012), Guilan (Mohammadi-khoramabadi et al. 2013b), Isfahan (Barahoei et al. 2015a), Khorasan-e-Razavi (Ghahari et al. 2014) and Kerman (current study) provinces.

General distribution: Palaearctic (Yu et al. 2012).

Hosts: Reared from Lobesia botrana (Denis and Schiffermüller, 1775) (Lep.: Tortricidae) in Iran (Lotfalizadeh et al. 2012).

34. Itoplectis tunetana (Schmiedeknecht, 1914)
Material examined: 1♀, Malaise trap, Kerman-Kiskan (29°22′ N, 56°38′ E), 28-XI-2013.

Distribution in Iran: Guilan, Tehran (Mohammadi-khoramabadi et al. 2013b), Isfahan (Barahoei et al. 2015a), Khorasan-e-Razavi (Barahoei et al. 2014), Qazvin (Ghahari and Schwarz, 2012), Sistan-o-Baluchestan (Barahoei et al. 2013a) and West-Azerbaijan (Akbarzadeh, 2011) provinces.

General distribution: Palaearctic (Yu et al. 2012).

35. Pimpla arcadica Kasparyan, 1973
Material examined: 1♀, swept from M. sativa, Kerman-Rabor (29°18′ N, 56°52′ E), 14-XI-2013; 2♀ and 3♂♂, Malaise trap, Kerman-Sirch (30°11′ N, 57°34′ E), 19-VI-2013; 1♂, Malaise trap, Kerman-Sirch (30°11′ N, 57°34′ E), 19-VI-2013; 1♂, Malaise trap, Kerman-Chatrood (30°36′ N, 56°55′ E), 03-VII-2013; 2♀ and 1♂, Malaise trap, Kerman-Chatrood (30°36′ N, 56°38′ E), 09-XI-2013; 3♂♂, swept from M. sativa, Kerman-Kiskan (29°22′ N, 56°38′ E), 28-XI-2013; 1♂, swept from Medicago sativa, Kerman-Simk (30°29′ N, 57°11′ E), 03-VII-2013; 2♂♂, swept from M. sativa, Kerman-Kiskan (29°22′ N, 56°38′ E), 28-XI-2013; 1♂, Malaise trap, Kerman-Simk (30°29′ N, 57°11′ E), 03-VII-2013.

Distribution in Iran: Khuzestan (Kolarov and Ghahari, 2006), West-Azerbaijan (Akbarzadeh 2011) and Kerman provinces (current study).

General distribution: Bulgaria; Iran; Norway; Sweden; Turkey; Ukraine (Yu et al. 2012).

Discussion
Iran is located in the western Palaearctic, at the crossroads between the Palaearctic, Oriental and Afrotropical regions, and thus its fauna has elements of all three regions. The distribution and biology of the majority of Iranian ichneumonid wasps are not well known (Masnadi-Yazdinejad et al. 2010).

In the present study a total of 35 species belonging to eight subfamilies were identified and recorded from Kerman province, among them three species were recorded for the first time for Iran fauna. Prior to this study, 70 species belonging to 11 subfamilies of Ichneumonidae were recorded from Kerman province (Barahoei et al. 2012; Mohebban et al. 2015; Bakhtiarynasab et al. 2015; Mahyabadi et al. 2016; Mohammadi-khoramabadi et al. 2016). In the present study 16 other species are added to previous records which increased the number of species from 70 to 86 for Kerman province.
### Table 1. Ichneumonidae species recorded from Kerman province

<table>
<thead>
<tr>
<th>Subfamily</th>
<th>Species</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acaenitinae</td>
<td>Coleoconitus caligatus (Gravenhorst, 1829)</td>
<td>Masnadi-Yazdinejad et al. (2010)</td>
</tr>
<tr>
<td>Anomaloninae</td>
<td>Heteropelma signatum (Gravenhorst 1829)</td>
<td>Schwarz (2009)</td>
</tr>
<tr>
<td>Banchinae</td>
<td>Exeustes adpressiorius (Thunberg, 1822)</td>
<td>New for Kerman (this study)</td>
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<td></td>
<td>Exeustes syriacus (Schmiedeknecht, 1910)</td>
<td>New for Kerman (this study)</td>
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<tr>
<td>Campopleginae</td>
<td>Bathycletes sp.</td>
<td>Mohammadi-Khoramabadi et al. (2016)</td>
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<td></td>
<td>Campopoetes raper (Gravenhorst, 1829)</td>
<td>Mohammadi-Khoramabadi et al. (2016)</td>
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<tr>
<td></td>
<td>Diadegma armillatum (Gravenhorst, 1829)</td>
<td>Mohammadi-Khoramabadi et al. (2016)</td>
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<tr>
<td></td>
<td>Diadegma majale (Gravenhorst, 1829)</td>
<td>Mohammadi-Khoramabadi et al. (2016)</td>
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<td></td>
<td>Diadegma semiclauis (Holmgren, 1871)</td>
<td>Mohammadi-Khoramabadi et al. (2016)</td>
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<td></td>
<td>Hyposoter sp.</td>
<td>Mohammadi-Khoramabadi et al. (2016)</td>
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<td></td>
<td>Venturia canescens (Gravenhorst, 1829)</td>
<td>Kolarov and Ghahari (2005)</td>
</tr>
<tr>
<td>Collyriinae</td>
<td>Collyria coxator (Villers, 1789)</td>
<td>Kolarov and Ghahari (2005)</td>
</tr>
<tr>
<td>Cremastinae</td>
<td>Temelucha decorate (Gravenhorst, 1829)</td>
<td>Mohammadi-Khoramabadi et al. (2016)</td>
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<td></td>
<td>Cryptus armator Fabricius, 1804</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Cryptus inculcator (Linnaeus, 1758)</td>
<td>Mohayabadi et al. (2015)</td>
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<td></td>
<td>Dichroaster longicaudata (Thomson, 1884)</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Dichroaster saharator (Aubert, 1964)</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Ghella bicolor (Villers, 1789)</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Gelis exarolatus (Fürster, 1850)</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Gelis esxarolatus (Schwarz, 2009)</td>
<td>Schwarz (2009)</td>
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<td></td>
<td>Gelis lipareae (Giurda, 1863)</td>
<td>van Achterberg and Mehrnejad (2002)</td>
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<td></td>
<td>Hoplocryptus heliophius (Tscheck, 1871)</td>
<td>van Achterberg and Mehrnejad (2002)</td>
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<td></td>
<td>Lysibia nana (Gravenhorst, 1829)</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Mesostenus albinotatus (Gravenhorst, 1829)</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Mesostenus grammicus (Gravenhorst, 1829)</td>
<td>Mohayabadi et al. (2016)</td>
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<td></td>
<td>Mesostenus transfuga (Gravenhorst, 1829)</td>
<td>Mohayabadi et al. (2016)</td>
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<tr>
<td></td>
<td>Phyrgadeulon sp.</td>
<td>Mohayabadi et al. (2016)</td>
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<tr>
<td></td>
<td>Trychos legator (Thunberg, 1824)</td>
<td>Mahayabadi et al. et al. (2016)</td>
</tr>
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<td>Diplazontinae</td>
<td>Diplazon laetatorius (Fabricius, 1781)</td>
<td>Bakhtiyarinasab et al. (2015)</td>
</tr>
<tr>
<td></td>
<td>Enizenum ornatum (Gravenhorst, 1829)</td>
<td>Bakhtiyarinasab et al. (2015)</td>
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<tr>
<td></td>
<td>Enizenum schwarzii (Diller, 1987)</td>
<td>New for Iran (this study)</td>
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<td></td>
<td>Homotropus elegans (Gravenhorst, 1829)</td>
<td>New for Iran (this study)</td>
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<td></td>
<td>Homotropus pictus (Gravenhorst, 1829)</td>
<td>New for Iran (this study)</td>
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<td></td>
<td>Homotropus signatus (Gravenhorst, 1829)</td>
<td>New for Iran (this study)</td>
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<td></td>
<td>Promethes sulcator (Gravenhorst, 1829)</td>
<td>New for Iran (this study)</td>
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<td></td>
<td>Arinotus cinquecostatus Horstmann, 1997</td>
<td>Mohayabadi et al. (2015)</td>
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<td></td>
<td>Apaletes kellicos (Wesmeal, 1845)</td>
<td>Mohayabadi et al. (2015)</td>
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<td>Barichneumon derogator (Wesmeal, 1845)</td>
<td>Mohayabadi et al. (2015)</td>
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<td></td>
<td>Barichneumon gauellae Berthoumieu, 1903</td>
<td>New for Iran (this study)</td>
</tr>
<tr>
<td></td>
<td>Colpognathus gondatus Diller &amp; Riedel, 2015</td>
<td>Diller and Riedel 2015</td>
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<td></td>
<td>Ctenichneum semirufus (Gravenhorst, 1820)</td>
<td>Kolarov and Ghahari (2008)</td>
</tr>
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<td></td>
<td>Ctenichneum deylderi (Holmgren, 1871)</td>
<td>Mohayabadi et al. (2015)</td>
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<td>Ctenichneum edictorius (Linnaeus, 1758)</td>
<td>Mohayabadi et al. (2015)</td>
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<td></td>
<td>Dicaelotes montanus (di Stefani, 1885)</td>
<td>Kazemi et al. (2014)</td>
</tr>
<tr>
<td></td>
<td>Diadromus collaris (Gravenhorst, 1829)</td>
<td>Mohayabadi et al. (2015)</td>
</tr>
<tr>
<td></td>
<td>Eutanyacra picta (Schrank, 1776)</td>
<td>Kolarov and Ghahari (2008)</td>
</tr>
<tr>
<td></td>
<td>Heterischnus filiformis (Gravenhorst, 1829)</td>
<td>Mohayabadi et al. (2015)</td>
</tr>
<tr>
<td></td>
<td>Ichneumon sarcitorius Linnaeus, 1758</td>
<td>New for Kerman (this study)</td>
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<tr>
<td></td>
<td>Platylabus iridipennis (Gravenhorst, 1829)</td>
<td>New for Kerman (this study)</td>
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<td></td>
<td>Spilothryates illuminatorius (Gravenhorst, 1820)</td>
<td>New for Kerman (this study)</td>
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<td>Mesochorinae</td>
<td>Mesochorus pictilis Holmgren, 1860</td>
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<td>Metopiinae</td>
<td>Exochus castaniventris Braun, 1896</td>
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<td>Exochus mitratus Gravenhorst, 1829</td>
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<td>Ophioninae</td>
<td>Enicospilus kokujii Viktorov, 1957</td>
<td>Mohayabadi-Khoramabadi et al. (2016)</td>
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<td>Opilion obscurationis Fabricius, 1798</td>
<td>Mansadi-Yazdinejad et al. (2010)</td>
</tr>
<tr>
<td></td>
<td>Megastylus orbitator Schiodte, 1839</td>
<td>Bakhtiyarinasab et al. (2015)</td>
</tr>
</tbody>
</table>
The recorded species of each subfamily in Kerman province (including the current study) are as follows: Acaenitina (one species), Anomaloninae (one species), Banchinae (two species), Campopleginae (seven species), Collyriinae (one species), Cremastinae (one species), Cryptinae (17 species), Diplazonitinae (seven species), Ichneumoninae (15 species), Mesochorinae (one species), Metopinae (two species), Ophioninae (two species), Orthocentrinae (seven species), Pimplinae (19 species), Tersilochinae (two species) and Tryphoninae (one species)(Table 1).

Kerman province is the largest province of Iran and situated on Southern-east of country (11.15% of whole country). This region including Zagros Mountains, central mountains and lowland deserts and is located next to the Loot desert which is one of the hottest areas from Iran and the world. However, presence of mountains including Kuhbanan (3775m), Jaftan (3975m) and Pelvar (4233m) at the margin of the desert moderates its destroying effects on fauna and flora of the region. Kerman province is divided into two distinct sections by Zagros and central mountains, arid deserts and temperate valleys which meet together form three zones: desert and marginal desert, tropical zones and temperate mountain zones (Kerman Management and Planning Organization 2007). So with attention to this climatic characteristics it is possible that with more investigations, the number of species increased and other records for Kerman province and Iran may be added. Most of the species collected in the present study are lepidopteran parasitoids, which are important pests of agricultural plants. Further studies are necessary to reveal the potential of these species for biological control programs.
Acknowledgments

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References


مطالعه خانواده Ichneumonidae در استان کرمان، جنوب شرق ایران (Hym.: Ichneumonoidea) Ichneumonidae

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چکیده: فون خانواده Ichneumonidae استان کرمان از فروردين ماه سال ۱۳۹۲ تا تبریز ماه ۱۳۹۳ مورد بررسی قرار گرفت. در مجموع ۳۵ گونه متعلق به ۲۲ جنس و Cryptus هشت زیرخانواده جمع‌آوری شد که از بین آنها گونه‌های Enizemum schwarzi Diller، 1987 armator Fabricius، 1804 و Barichneumon gaullei Berthoumieu، 1903 اولین بار از ایران گزارش می‌شوند. لیست به روز شده گونه‌های این خانواده در استان کرمان اراپه شده است. این اطلاعات می‌تواند برای برنامه‌های مهار زیستی مفید باشد.

واژگان کلیدی: ایران، پراکنش، گزارش های جدید، کاتالوگ Ichneumonidae