

Study of the subfamily Ophioninae (Hymenoptera: Ichneumonidae) in southern Iran

A. Amiri¹, A. A. Talebi^{1*}, R. Jussila², E. Rakhshani³ and H. Hajiqanbar¹

1. Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran, 2. Zoological Museum, Section of Biodiversity and Environmental Sciences, University of Turku, Turku, Finland, 3. Department of Plant Protection, College of Agriculture, University of Zabol, Zabol, Iran.

*Corresponding author. E-mail: talebia@modares.ac.ir

Abstract

A survey was conducted to study the fauna of the subfamily Ophioninae (Hymenoptera: Ichneumonidae) in southern Iranian provinces of Fars and Hormozgan. The specimens were collected using Malaise traps, light traps and sweep nets from a variety different habitats between 2011 and 2013. A total of twelve species of three genera (*Enicospilus* Stephens; *Ophion* Fabricius and *Eremotylus* Forster) were identified, of which the five species *Enicospilus flavocephalus* (Kirby), *E. merdarius* (Holmgren), *E. monostigmata* (Vollenhoven), *E. ramidulus* (L.) and *Eremotylus sibiricus* Szépligeti are newly recorded from Iran. This work raise the number of ophionines of Iran to 26 species and four genera. A key to the Iranian genera and species of Ophioninae is provided.

Key words: Fars, Hormozgan, *Enicospilus*, *Ophion*, identification key, new record

چکیده

مطالعه زیرخانواده (Ophioninae (Hymenoptera: Ichneumonidae) در جنوب ایران

عباس امیری، علی اصغر طالبی، رجبو جوسیلدا، احسان رخشانی و حمیدرضا حاجی قنبر

تحقیق حاضر جهت تعیین گونه‌های زیرخانواده (Ophioninae (Hymenoptera: Ichneumonidae) در بعضی قسمت‌های جنوبی ایران (استان‌های فارس و هرمزگان) انجام شد. نمونه‌ها طی سال‌های ۱۳۹۱-۱۳۹۲ با استفاده از تله‌های مالیز، نوری و تور حشره‌گیری در زیست‌گاه‌های مختلف جمع‌آوری شدند. دوازده گونه متعلق به سه جنس *Ophion* (Enicospilus Stephens, 1835) و *Eremotylus* (Fabricius و Forster) شناسایی شدند که از بین آن‌ها پنج گونه *E. Enicospilus flavocephalus* (Kirby) و *E. merdarius* (Holmgren) و *E. monostigmata* (Vollenhoven) و *E. ramidulus* (L.) و *Eremotylus sibiricus* Szépligeti برای فون ایران جدید هستند. این تحقیق تعداد اعضای زیرخانواده Ophioninae ایران را به ۲۶ گونه و چهار جنس افزایش داد. کلید

واژگان کلیدی: فارس، هرمزگان، *Ophion*، *Enicospilus*، کلید شناسایی، گزارش جدید

Introduction

The subfamily Ophioninae is a moderately large and cosmopolitan group comprising 32 genera and over 1000 described species worldwide (Yu *et al.*, 2012). The females can deliver a mild sting, and males display the same behavioral characters referred to as pseudo stinging, which is a form of behavioral mimicry (Quicke, 2015). Some species of this subfamily play an important role in the biological control of Lepidoptera including the species *Ophion flavidus* Brullé, 1846 that has parasitized up to 79% of *Spodoptera frugiperda* (Smith, 1797) (Lepidoptera: Noctuidae) under experimental conditions (Rohlf & Mack, 1985). Several *Enicospilus* species are parasitoids of some of agricultural pests (Gauld, 1995); however most species appear to have a wider host range (Gauld, 1984). Ophioninae are mainly known as solitary koinobiont endoparasitoids on the immature stages of Lepidoptera including Arctidae, Lymantridae, Geometridae, Lasiocampidae, Noctuidae, Saturniidae and Sphingidae

(Townes, 1971). Despite their abundance, very little information is available on the biology of Ophioninae. The majority of hosts are exophagous and consequently these wasps have rather short ovipositors (Townes, 1971).

Species of Ophioninae can be morphologically distinguished from other subfamilies of Ichneumonidae by fore wing vein *2m-cu* proximal to *rs-m* cross vein and the lower section of the fore wing with a distinct adventitious vein paralleling the wing margin (Gauld, 1985). Taxonomy of Ophioninae has been studied by Shestakov (1926), Gauld (1973, 1977, 1979, 1988) and Gauld & Mitchell (1978, 1981). A phylogeny of the genera was proposed by Gauld (1985), who divided *Enicospilus* genus-group into five subgroups *Orientospilus*, *Ophiogastrella*, *Stauropoctonus*, *Leptophion* and *Enicospilus*. Recently, in Iran, some efforts has been made to deepen the understanding of the domestic fauna of Ichneumonidae subfamilies (Mohammadi-Khoramabadi & Talebi 2013; Mohammadi-Khoramabadi *et al.*, 2013 a,

b), including Ophioninae (Kolarov & Ghahari, 2005; Masnadi *et al.*, 2010; Barahoei *et al.*, 2012; Mohammadi-Khoramabadi *et al.*, 2016).

In this study, we report five species of the subfamily Ophioninae for the first time from southern Iran. We also provide a key to Iranian Ophioninae and diagnostic characters, photographs and distributional data for the newly recorded species.

Material and methods

The sampling was conducted using Malaise traps, sweeping nets and light traps at different locations in Fars and Hormozgan provinces from February 2011 through August 2013. These areas include different ecosystems such as forests, rangelands, deserts, mangroves (*Avicennia marina*) and fruit orchards. The captured specimens were treated with a mixture of ethanol (60%) /Xylene (40%) for two days, followed by Amyl acetate for two days (AXA method, van Achterberg, 2009) and finally placed on the filter paper to dry. The dried specimens were then card

mounted and labeled. Morphological terminology follows Townes (1969) and Yoder *et al.* (2010). Microsculpture terminology follows Eady (1968). The keys by Morley (1912), Viktorov (1957), Townes (1971), Kasparyan (1981), Horstmann (1981) and Brock (1982) were used for identification of the specimens. Illustrations were made by using an Olympus™ SZX9 stereomicroscope equipped with a Sony™ digital camera. A series of 7–10 captured images were merged into a single in-focus image using the image-stacking software Zerene Stacker *version 1.04*. All specimens are deposited in the Collection of Department of Entomology, Tarbiat Modares University (TMUC), Tehran, Iran.

Results

In present study, 11 species of three genera (*Enicospilus*, *Eremotylus* and *Ophion* of Ophioninae) were collected and identified, of which five species are new for the fauna of Iran. A key is provided to the genera and species of Iranian Ophioninae (Table 1).

Table 1. Updated list of Ophioninae of Iran.

Ophioninae species	Distribution in Iran (provinces)	References
<i>Enicospilus ahngerii</i> (Kokujev, 1907)	Fars Not defined	(Current study) (Kolarov & Ghahari, 2005)
<i>Enicospilus cruciator</i> Victorov, 1957	Not defined	(Kolarov & Ghahari, 2005)
<i>Enicospilus flavocephalus</i> (Kirby, 1900)	Fars, Kerman	(Current study)
<i>Enicospilus kokujevi</i> Victorov, 1957	Fars, Kerman	(Current study, Mohammadi-khoramabadi <i>et al.</i> , 2016)
<i>Enicospilus merdarius</i> (Holmgren, 1860)	Fars	(Current study)
<i>Enicospilus monostigmata</i> (Vollenhoven, 1879)	Fars	(Current study)
<i>Enicospilus ocellatus</i> Shestakov, 1926	Not defined	(Kolarov & Ghahari, 2005)
<i>Enicospilus perlatus</i> Shestakov, 1926	Not defined	(Kolarov & Ghahari, 2005)
<i>Enicospilus ramidulus</i> (Linnaeus, 1758)	Fars	(Current study)
<i>Enicospilus tenopsis</i> (Kohl, 1905)	Sistan & Baluchestan	(Barahoei <i>et al.</i> , 2012)
<i>Enicospilus tournieri</i> (Vollenhoven, 1879)	Fars	(Masnadi <i>et al.</i> , 2010)
<i>Enicospilus varücarpus</i> Kokujev, 1907	Sistan & Baluchestan	(Kolarov & Ghahari, 2005; Barahoei <i>et al.</i> , 2012)
<i>Eremotylus boguschi</i> (Meyer, 1935)	Tehran	(Masnadi <i>et al.</i> , 2010)
<i>Eremotylus intermedius</i> (Hedwig, 1957)	Sistan & Baluchestan	(Kolarov & Ghahari, 2005)
<i>Eremotylus punilus</i> (Hedwig, 1957)	Sistan & Baluchestan	(Kolarov & Ghahari, 2005)
<i>Eremotylus sibiricus</i> Szépligeti 1905	Fars	(Current study)
<i>Ophion luteus</i> (Linnaeus, 1758)	Yazd, Golestan	(Zarepour <i>et al.</i> , 2008), (Masnadi <i>et al.</i> , 2010).
<i>Ophion minutus</i> Kriechbaumer, 1879	Sistan & Baluchestan; Hormozgan	(Kolarov & Ghahari, 2005), (current study)
<i>Ophion mirsa</i> (Shestakov, 1926)	Not defined	(Kolarov & Ghahari, 2005)
<i>Ophion mocsaryi</i> Brauns, 1889	Not defined	(Kolarov & Ghahari, 2005).
<i>Ophion obscuratus</i> Fabricius, 1798	Tehran, Golestan, Hormozgan, Kerman, Fars, Yazd	(Zarepour <i>et al.</i> , 2008), (Masnadi <i>et al.</i> , 2010), (current study)
<i>Ophion muscari</i> Kriechbaumer, 1879	Sistan & Baluchestan; Fars, Hormozgan	(Kolarov & Ghahari, 2005), (current study)
<i>Ophion turcomanicus</i> Szépligeti, 1905	Kordestan	(Kolarov & Ghahari, 2005)
<i>Ophion ventricosus</i> Gravenhorst, 1829	Yazd	(Zarepour <i>et al.</i> , 2008, 2009)

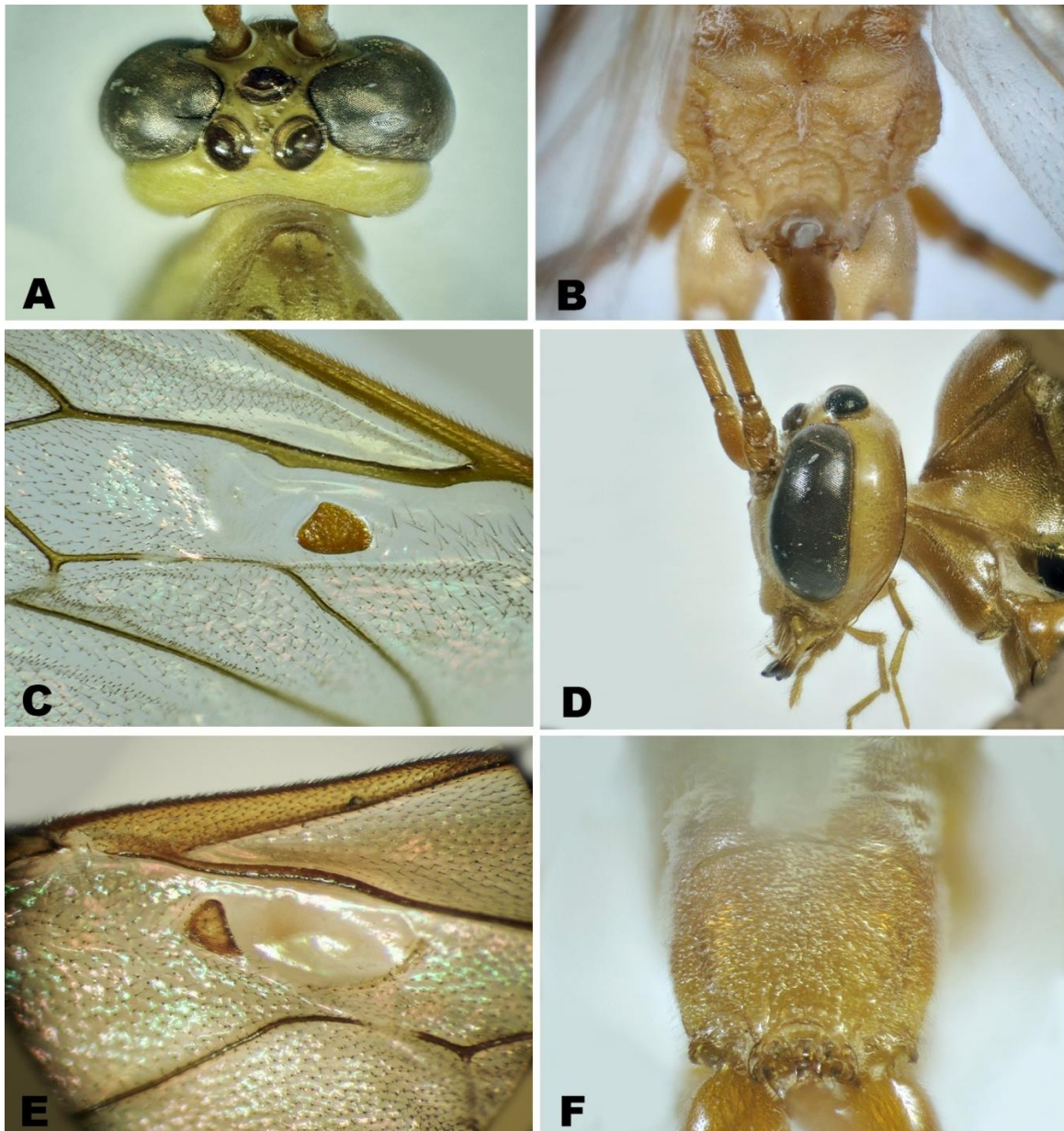
List of the species**Tribe Enicospilini** Townes, 1971**Genus *Enicospilus*** Stephens, 1835***Enicospilus ahngeri*** (Kokujev, 1907) (Fig. 1, A–C)**Material examined:** Iran, Fars province, Jahrom, Goldamcheh (28°40'28.52" N, 53°33'47.79" E, 1031 m a.s.l.), 27.iv.2013, light trap, 1♂, leg. A. Amiri.**General distribution:** Palearctic (Yu *et al.*, 2012).**Distribution in Iran:** Fars province (current study), north of Iran (Kolarov & Ghahari, 2005).***Enicospilus flavocephalus*** (Kirby, 1900) (Fig. 2, A–F)**Material examined:** Iran, Hormozgan province, Zakin (27°28'53.23" N, 56°18'27.03" E, 680 m a.s.l.), 11.iv.2013, light trap, 1♀, leg. A. Ameri.

Fig. 1. A–C. *Enicospilus ahngeri*, male; A. Head, dorsal view; B. Propodeum, dorsal view; C. Fore wing, disco-submarginal cell; D–F. *Enicospilus tournieri*, female; D. Head, lateral view; E. Fore wing, disco-submarginal cell; F. Propodeum, dorsal view.

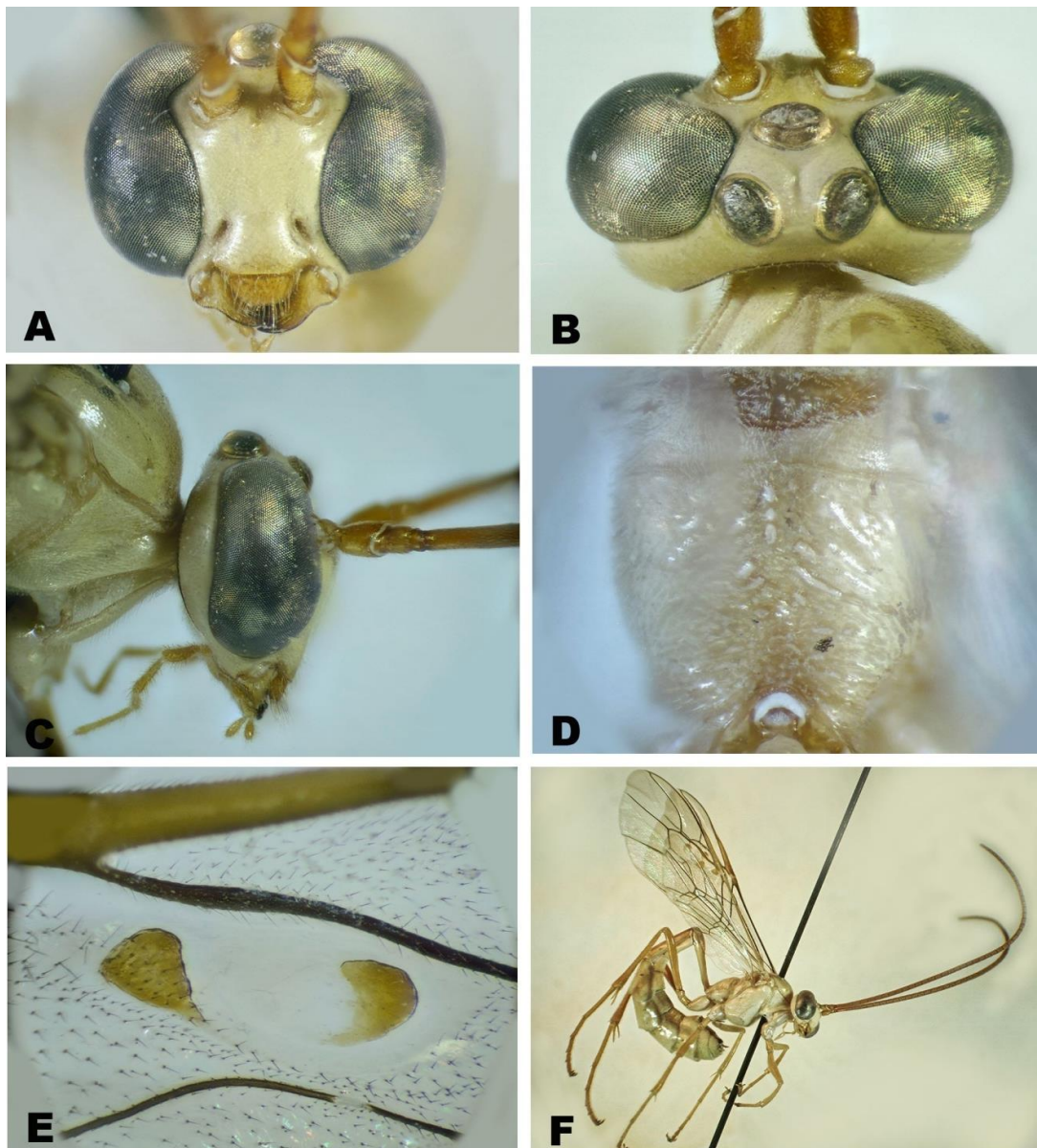


Fig. 2. *Enicospilus flavocephalus*, female; A. Head, frontal view; B. Head, dorsal view; C. Head, lateral view; D. Propodeum, dorsal view; E. Fore wing, disco-submarginal cell; F. Adult, habitus.

Diagnosis – female: Body length 17 mm, fore wing length 11 mm, antenna with 47 segment, first flagellomere 1.83 x as long as second; clypeus 1.8 x as wide as long (fig. 2, A); labrum 2.5 x as wide as long; face 0.74 x as long as wide (fig. 2, A), malar space 0.5 x as long as basal width of mandible; ocelli adjacent or nearly adjacent to the compound eye (separated only by width of lateral and posterior sulcus of stemmaticum) (fig. 2, B), temple 0.36 x as wide as transverse diameter of the eye in lateral view (fig. 2, C), occipital carina complete and rounded in upper part (fig. 2, B); propodeum

with strong anterior transverse carina (fig. 2, D); fore wing with 2 distinct sclerites in glabrous area of discosubmarginal cell (fig. 2, E), hind wing with 2 basal and 6 distal hamuli; hind coxa 1.65 x as long as wide, hind trochantellus 1.4 x as long as wide, hind basitarsus 11.1 x as long as wide.

Coloration: Body generally yellowish white, antenna pale brown, clypeus reddish yellow with apical teeth dark brown to black, postpetiol and second abdominal tergite reddish, middle and hind femur and tibia reddish brown, hind tarsi brownish.

General distribution: Australian and Oriental (Yu *et al.*, 2012).

Distribution in Iran: Hormozgan provinces (current study). New record for Iran.

Enicospilus kokujevi Victorov, 1957 (Fig. 3, A-F)

Material examined: Iran, Hormozgan province, Minab, Chelo (27°10'30.39" N, 57°01'09.79" E, 16 m a.s.l.), 27.xi.2012, Malaise trap, 2♀, leg. A. Ameri.

Diagnosis – female: Body length 14– 16 mm, fore wings length 9–11 mm, antenna with 53–54 segment, first flagellomere 2 x as long as second; clypeus 1.3 x as wide as long (fig. 3, A); labrum 4 x as wide as long; face 0.8 x as

long as wide, malar space 0.53 x as long as basal width of mandible; ocelli adjacent or nearly adjacent to the compound eye (separated only by width of lateral and posterior sulcus of stemmaticum) (fig. 3, B), temple 0.44 x as wide as transverse diameter of the eye in lateral view (fig. 3, C), occipital carina complete; propodeum with strong v-shape anterior transverse carina (fig. 3, D); fore wings with three sclerites in glabrous area of discosubmarginal cell (fig. 3, E), proximal sclerite attached to distal (fig. 3, E), hind wing with 2-3 basal and 7 distal hamuli; hind coxa 2.1 x as long as wide, hind trochantellus 1.36 x as long as wide, hind basitarsus 16.8 x as long as wide.

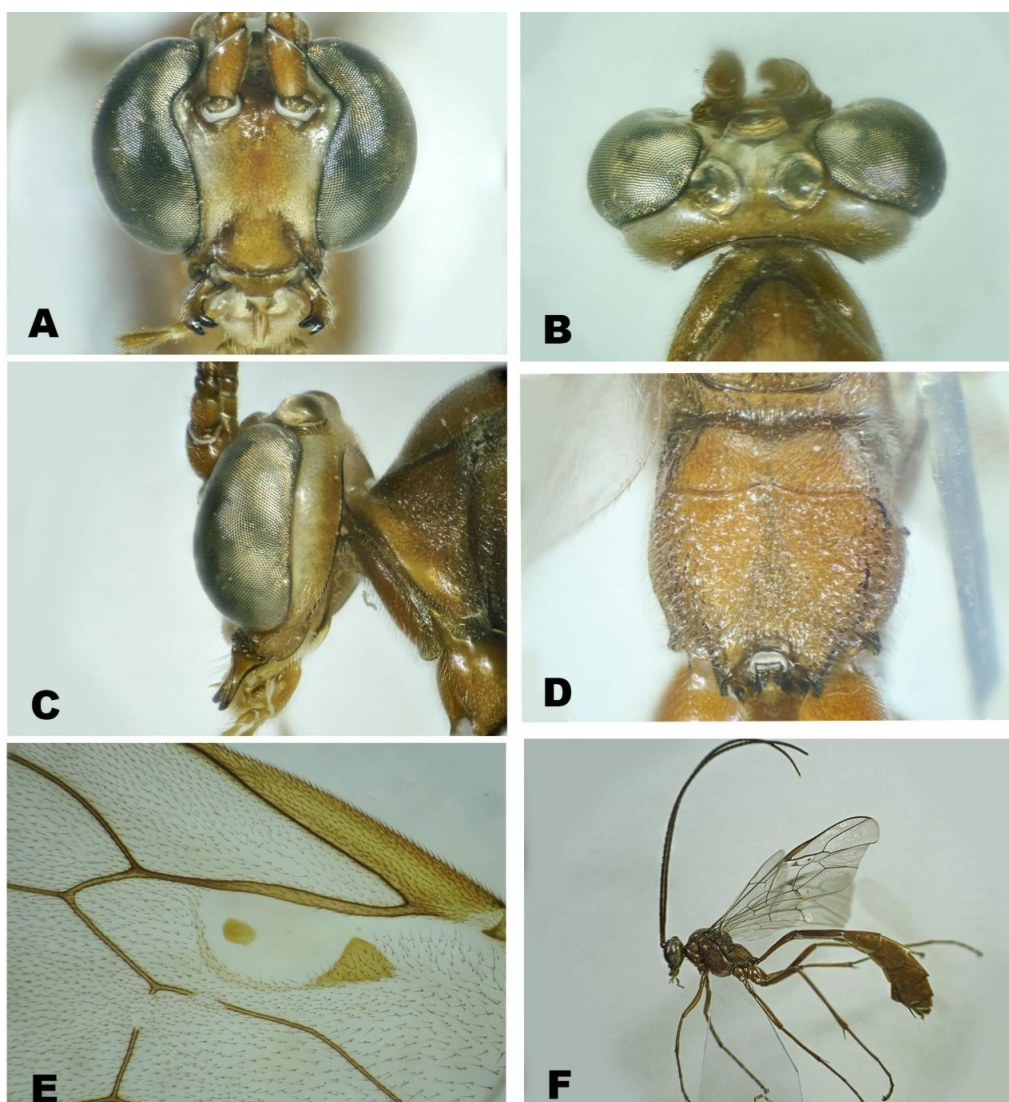


Fig. 3. *Enicospilus kokujevi*, female; A. Head, frontal view; B. Head, dorsal view; C. Head, lateral view; D. propodeum, dorsal view; E. Fore wing, disco-submarginal cell; F. Adult, habitus.

Coloration: Body reddish brown, antenna reddish brown, teeth of mandibles black.

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

Distribution in Iran: Hormozgan province (Current study), Kerman province (Mohammadi-Khoramabadi *et al.*, 2016).

Enicospilus merdarius (Holmgren, 1860) (Fig. 4, A-F)

Material examined: Iran, Fars province, Seddeh (30°41'2.99" N, 52°08'13.46" E, 2140 m a.s.l.), 07.x.2012, Malaise trap, 2♀, Dejekord (30°43'58.91" N, 51°56'55.10" E, 2171 m a.s.l.), 10.vi. 2012, 2♀, Shahrman (30° 54' 39.07" N, 52°28'16.82" E, 2120 m a.s.l.), 07.x.2013, light trap, 1♀, leg. A. Amiri.

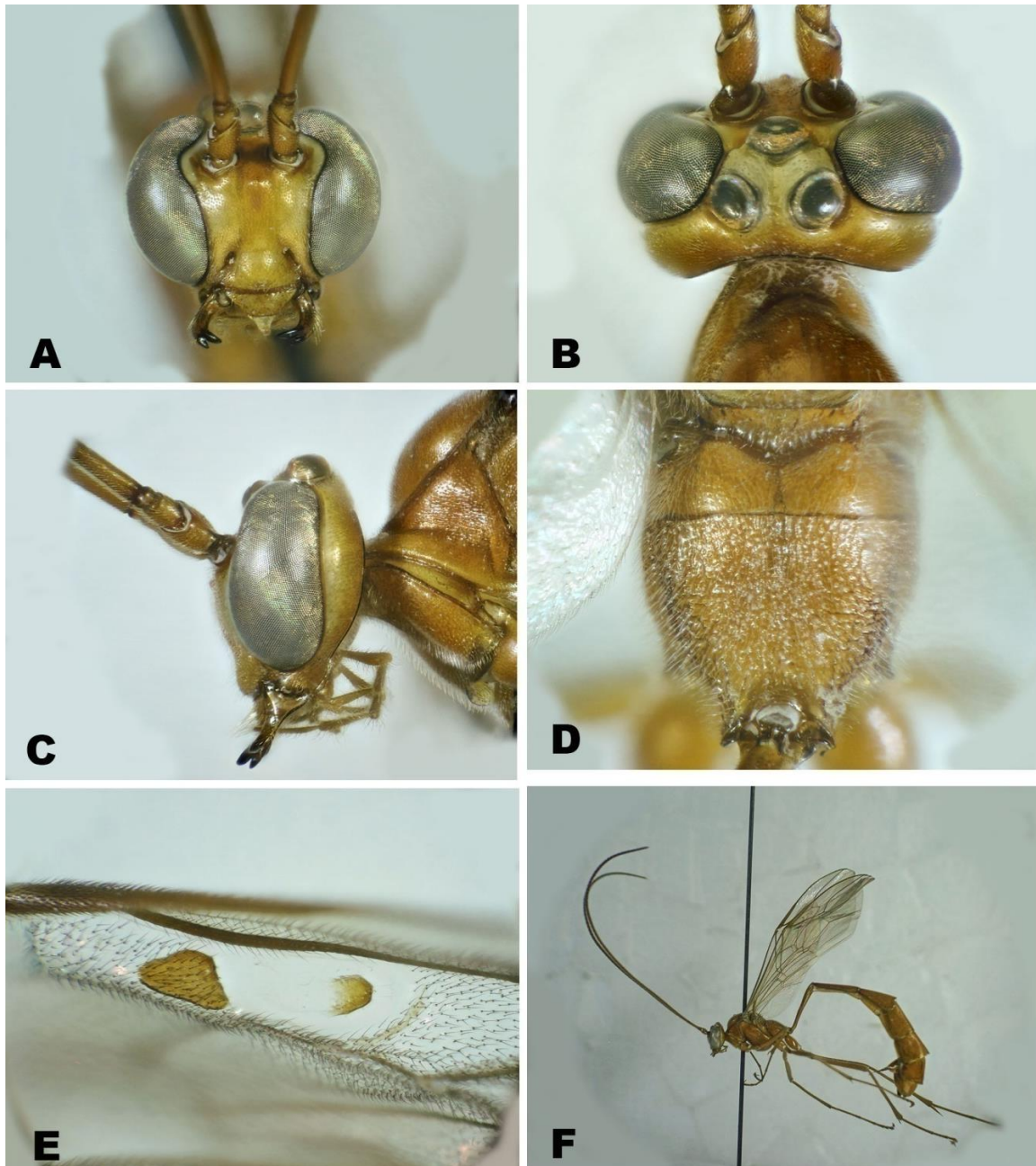


Fig. 4. *Enicospilus merdarius*, female; A. Head, frontal view; B. Head, dorsal view; C. Head, lateral view; D. Propodeum, dorsal view; E. fore wing, disco-submarginal cell; F. Adult, habitus.

Diagnosis–female: Body length 21–23 mm, fore wing length 12–13.5mm, antenna with 61–63 segment, first flagellomere 1.87 x as long as second; clypeus 1.7 x as wide as long (fig. 4, A); labrum 3.1 x as wide as long, face 0.66 x as long as wide, malar space 0.4 x as long as basal width of mandible; ocelli adjacent or nearly adjacent to the compound eye (separated only by width of lateral and posterior sulcus of stemmaticum) (fig. 4, B), temple 0.48 x as wide as transverse diameter of the eye in lateral view (fig. 4, C), occipital carina complete; propodeum with strong anterior transverse carina (fig. 4, D); fore wing with

three sclerites in glabrous area of discosubmarginal cell (fig. 4, E), hind wing with 3–5 basaland 8 distal hamuli; hind coxa 2.04 x as long as wide, hind trochantellus 1.66 x as long as wide, hind basitarsus 18.1 x as long as wide.

Coloration: Body reddish yellow, teeth of mandible black.

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

Distribution in Iran: Fars province (current study). New record for Iran.

Enicospilus monostigmata (Vollenhoven, 1879) (Fig. 5, A-F)

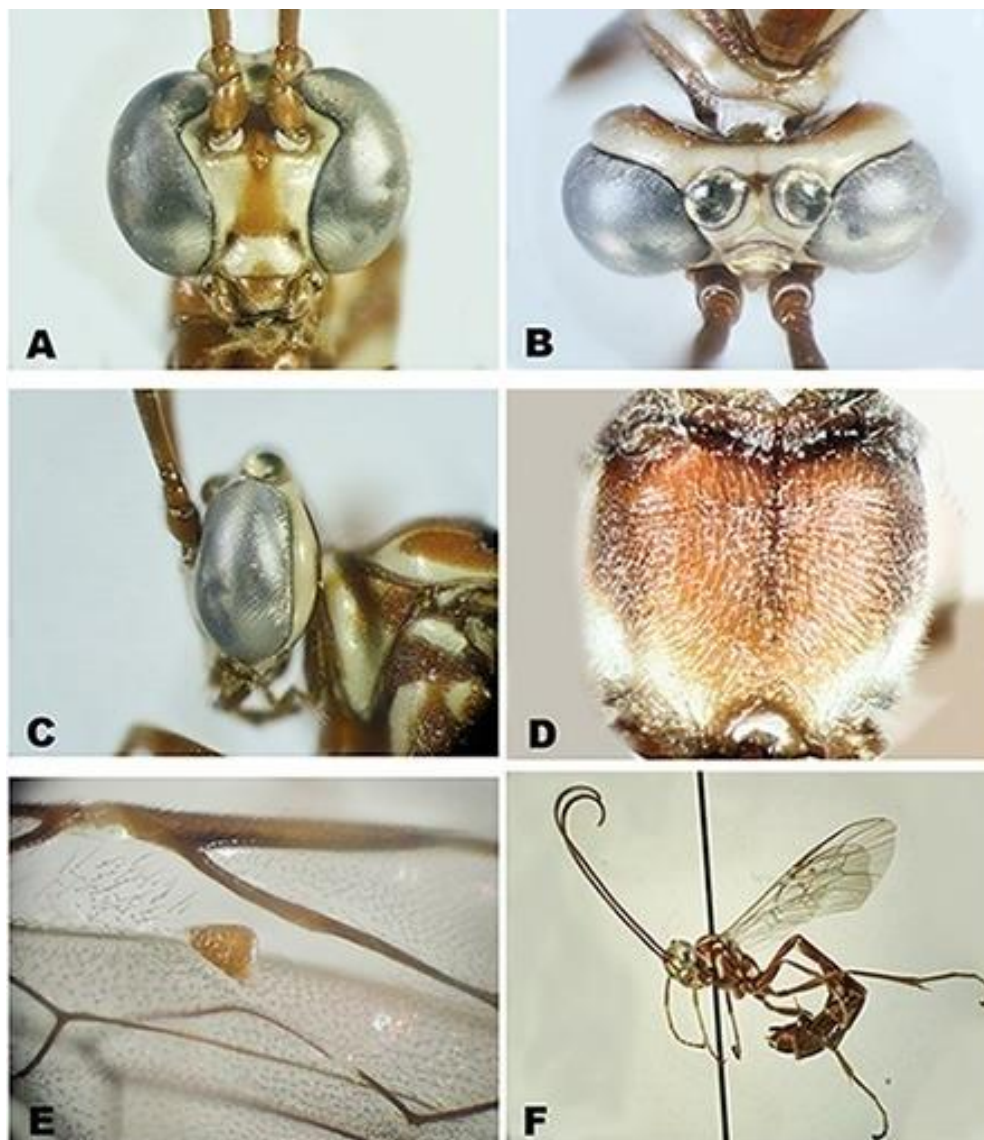


Fig. 5. *Enicospilus monostigma*, female; A. Head, frontal view; B. Head, dorsal view; C. Head, lateral view; D. Propodeum, dorsal view; E. Fore wing, disco-submarginal cell; F. Adult, habitus.

Material examined: Iran, Hormozgan province, Geno (27°24'16.16" N, 56°08'51.80" E, 1274 m.s.l.), 11.iv.2013, light trap, 2♀, leg. A. Ameri.

Diagnosis – female: Body length 16 – 18 mm, fore wing length 11–12 mm, antenna with 45 - 46 segments, first flagellomere 1.52 x as long as second; clypeus 2.1 x as wide as long (fig. 5, A); labrum 2.1 x as wide as long; face 0.86 x as long as wide, malar space 0.3 x as long as basal width of mandible; ocelli adjacent to the eye (separated only by width of lateral and posterior sulcus of stemmaticum) (fig. 5, B), temple 0.5 x as wide as transverse diameter of the eye in lateral view (fig. 5, C), occipital carina complete and sinuated in upper part; propodeum with transverse striation and with weak anterior transverse carina (fig. 5, D); fore

wing with one triangle brown sclerites in glabrous area of disco-submarginal cell (fig. 5, E), hind wing with 2 basal and 6–7 distal hamuli; hind coxa 1.6 x as long as wide, hind trochantellus 1.57 x as long as wide, hind basitarsus 10 x as long as wide.

Coloration: Head brown with yellow spots, antennal segments brown, mandible yellowish red with black apical teeth, clypeus white with yellow semicircle spot at the middle lower edge, eye orbits whitish, vertex and temple white; thorax brown with whitish yellow spots, abdomen brown, legs brown.

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

Distribution in Iran: Hormozgan province (current study). New record for Iran.

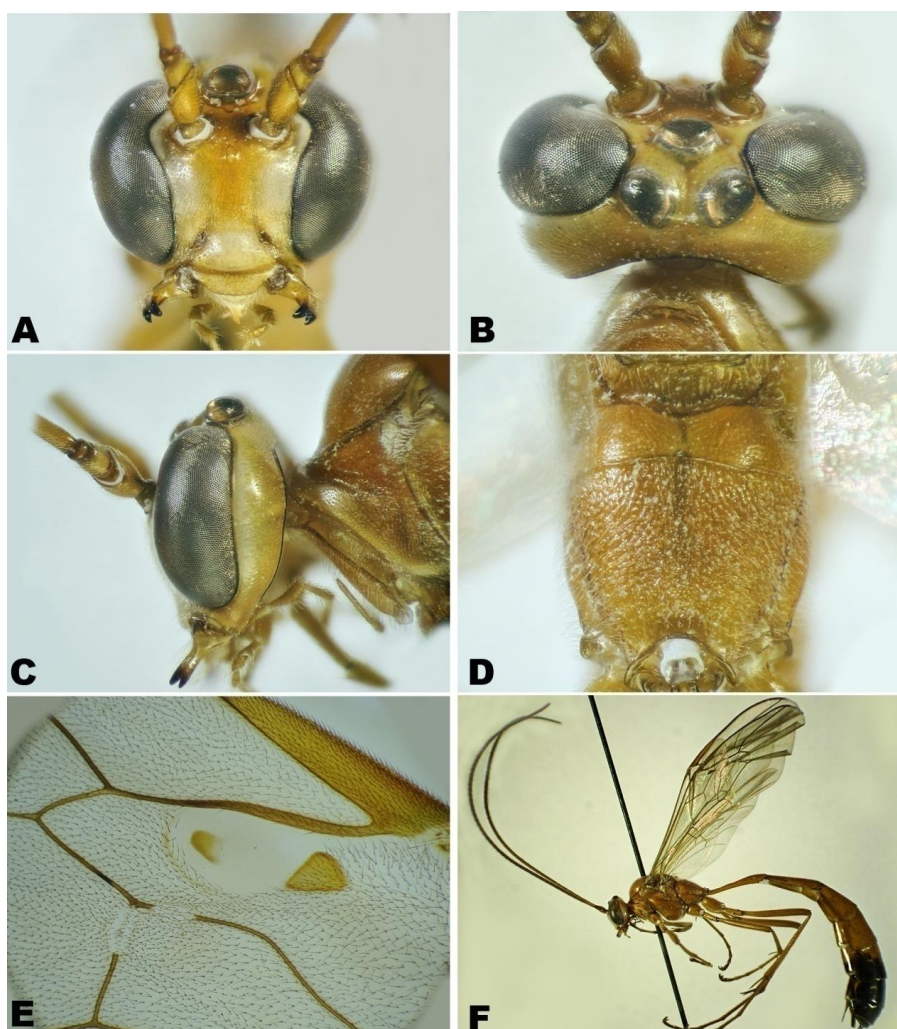


Fig. 6. *Enicospilus ramidulus*, female; A. Head, frontal view; B. Head, dorsal view; C. Head, lateral view; D. Propodeum, dorsal view; E. Fore wing, disco-submarginal cell; F. Female habitus.

Enicospilus ramidulus (Linnaeus, 1758) (Fig. 6, A-F)

Material examined: Iran, Fars province, Dejekord (30°43'58.91" N, 51°56'55.10" E, 2171 m a.s.l.), 16.vi.2012, sweeping net, 2♀, 1♂, 04.ix.2013, 1♂, Seddeh (30°41'2.99" N, 52°08'13.46" E, 2140 m a.s.l.), 07.vi.2012, sweeping net, 1♀, leg. A. Amiri.

Diagnosis – female: Female: Body length 17.5–22 mm, fore wing length 12–13 mm, antenna with 56–59 segments, first flagellomere 2 x as long as second; clypeus 1.44 x as wide as long (fig. 6, A); labrum 4.1 x as wide as long; face 0.59 x as long as wide, malar space 0.4 x as long as basal width of mandible; ocelli adjacent or nearly adjacent to the compound eye (separated only by width of lateral and posterior sulcus of stemmaticum) (fig. 6, B), temple 0.66 x as wide as transverse diameter of the eye in lateral view (fig. 6, C), occipital carina complete; propodeum with strong anterior transverse carina (fig. 6, D); fore wing with three sclerites in glabrous area of disco-submarginal cell (fig. 6, E), hind wing with 3 basal and 7-8 distal hamuli; hind coxa 2 x as long as its maximum width, hind trochantellus 1.75 x as long as wide, hind basitarsus 16 x as long as wide.

Male: similar to female but antenna with 62 – 64 flagellomeres.

Coloration (female): Body reddish yellow, frontal orbits white (fig. 6, A), teeth of mandible black, metasomal tergites 5 – 8 black.

General distribution: Afrotropical, Oriental, Palearctic (Yu *et al.*, 2012).

Distribution in Iran: Fars province (current study). New record for Iran.

Enicospilus tournieri (Vollenhoven, 1879) (Fig. 1, D-F).

Material examined Iran, Fars province, Shahrman (30°54'41.39" N, 52°28'14.66" E, 2561 m a.s.l.), 12.vii.2013, 2♀, Seddeh (30°44'09.31" N, 52°09'06.73" E, 2307 m a.s.l.), 11.vii.2012, 1♀, leg. A. Amiri.

General distribution: Palearctic (Yu *et al.*, 2012)

Distribution in Iran: Fars province (Masnadi *et al.*, 2010).

Tribe Ophionini Shuckard, 1840

Genus *Eremotylus* Forster, 1869

Eremotylus sibiricus Szépliget, 1905 (Fig. 7, A-F)

Material examined: Iran, Fars province, Jahrom (28°34'20.87" N, 53°41'28.50" E, 1104 m a.s.l.), 22.iv.2012, Malaise trap, 1♂, leg. A. Amiri.

Diagnosis –male: Body length 1.8 mm, antenna with 56 segment, fore wing length 10 mm, first flagellomere 1.7 x as long as second; clypeus 1.38 x as wide as long (fig. 7, A); labrum 2.5 x as wide as long; face 0.5 x as long as wide, malar space 0.4 x as long as basal width of mandible; ocelli separated from compound eye by 0.25 its diameter (fig. 7, B), temple 0.54 x as wide as transverse diameter of the eye in lateral view (fig. 7, C), occipital carina complete, with sharp angle in upper part (fig. 7, B); propodeum without any carina (fig. 7, D); hind wing with 3 basal and 6 distal hamuli; hind coxa 1.6 x as long as wide, hind trochantellus 1.66 x as long as wide, hind basitarsus 15 x as long as wide.

Coloration: Body generally brownish black, Head and antenna brown, mandible with dark apical teeth, second, third and fourth abdominal tergites red, the rest brownish black, wing venation brown, all tarsi brown.

General distribution: Palearctic (Yu *et al.*, 2012).

Distribution in Iran: Fars province (current study). New record for Iran.

Genus *Ophion* Fabricius, 1798

Ophion minutus Kriechbaumer, 1879 (Fig. 8, A-C)

Material examined: Iran, Hormozgan province, Hajiabbad, Tezerj (27°17'51.81" N, 55°45'14.76" E, 867 m a.s.l.), 13.–iv.2013, light trap, 1♀, leg. A. Amiri.

General distribution: Palearctic (Yu *et al.*, 2012).

Distribution in Iran: Sistan and Baluchestan province (Kolarov & Ghahari, 2005), Hormozgan province (current study).

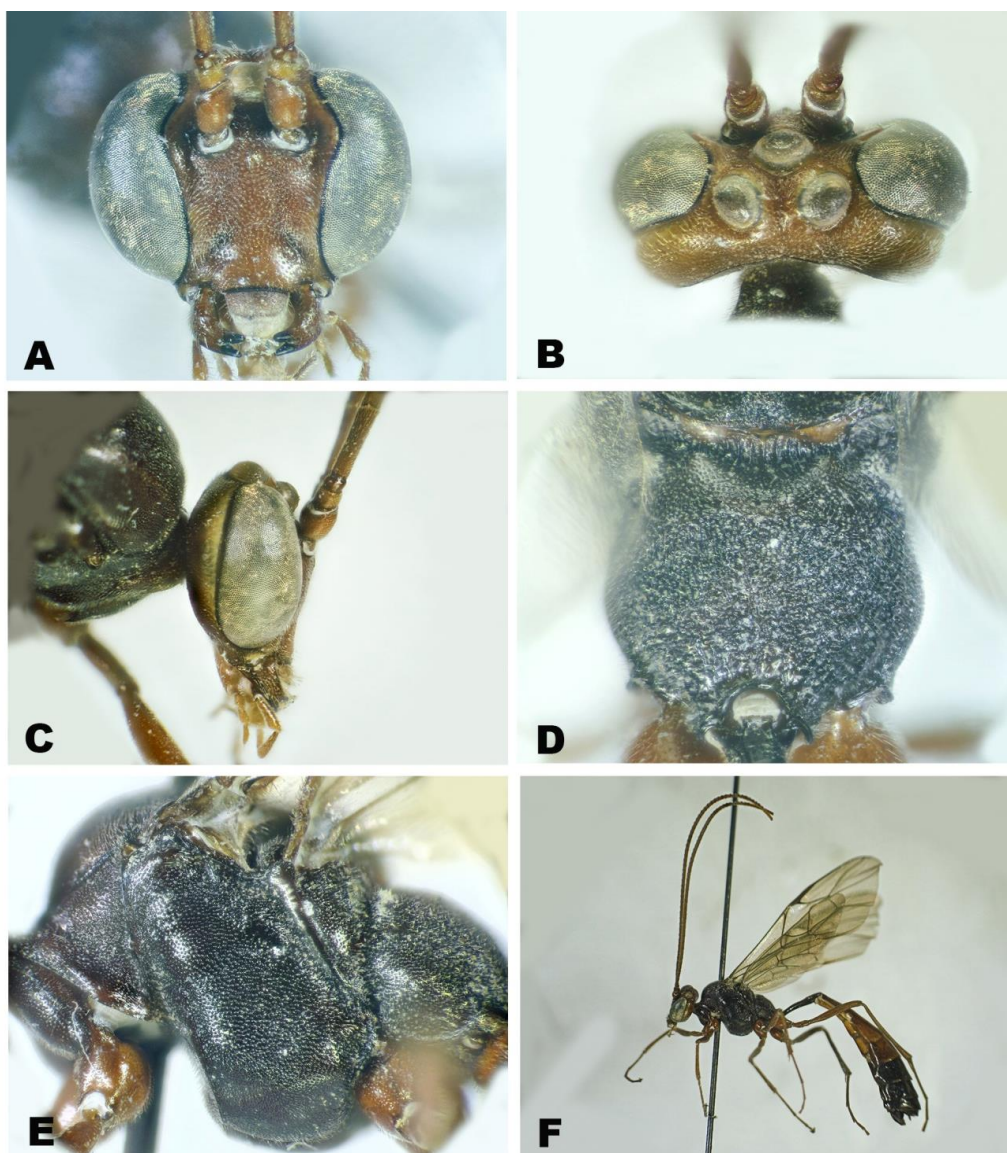


Fig. 7. *Eremotylus sibiricus*, male; A. Head, frontal view; B. Head, dorsal view; C. Head, lateral view; D. Propodeum, dorsal view; E. Mesopleuron, ventro-lateral view; F. Female habitus.

Ophion muscari Kriechbaumer, 1879 (Fig. 8, G-I)

Material examined: Iran, Fars province, Seddeh (30°41'2.99" N, 52°08'13.46" E, 2140 m a.s.l.), 06.vi.2013, sweeping net, 1♀, leg. A. Amiri.

General distribution Nearctic, Palearctic (Yu *et al.*, 2012).

Distribution in Iran: Sistan and Baluchestan province (Kolarov & Ghahari, 2005), Fars province (current study).

Ophion obscuratus Fabricius, 1798 (Fig. 8, D-F)

Material examined: Iran, Fars province, Seddeh (30°41'2.99" N, 52°08'13.46" E, 2140 m a.s.l.), 23.v.2012, 1♀, 14.vi.2012, sweeping net, 2♀, leg. A. Amiri; Hormozgan province, Zakin (27°28'53.23" N, 56°18'27.03" E, 680 m a.s.l.), 02.ii.2011, Malaise trap, 2♀, leg. A. Amiri.

General distribution: Nearctic, Oriental, Palearctic (Yu *et al.*, 2012).

Distribution in Iran: Yazd (Zarepour *et al.*, 2008), Tehran, Golestan, Hormozgan, Kerman, Fars (Masnadi *et al.*, 2010), Fars and Hormozgan provinces (current study).

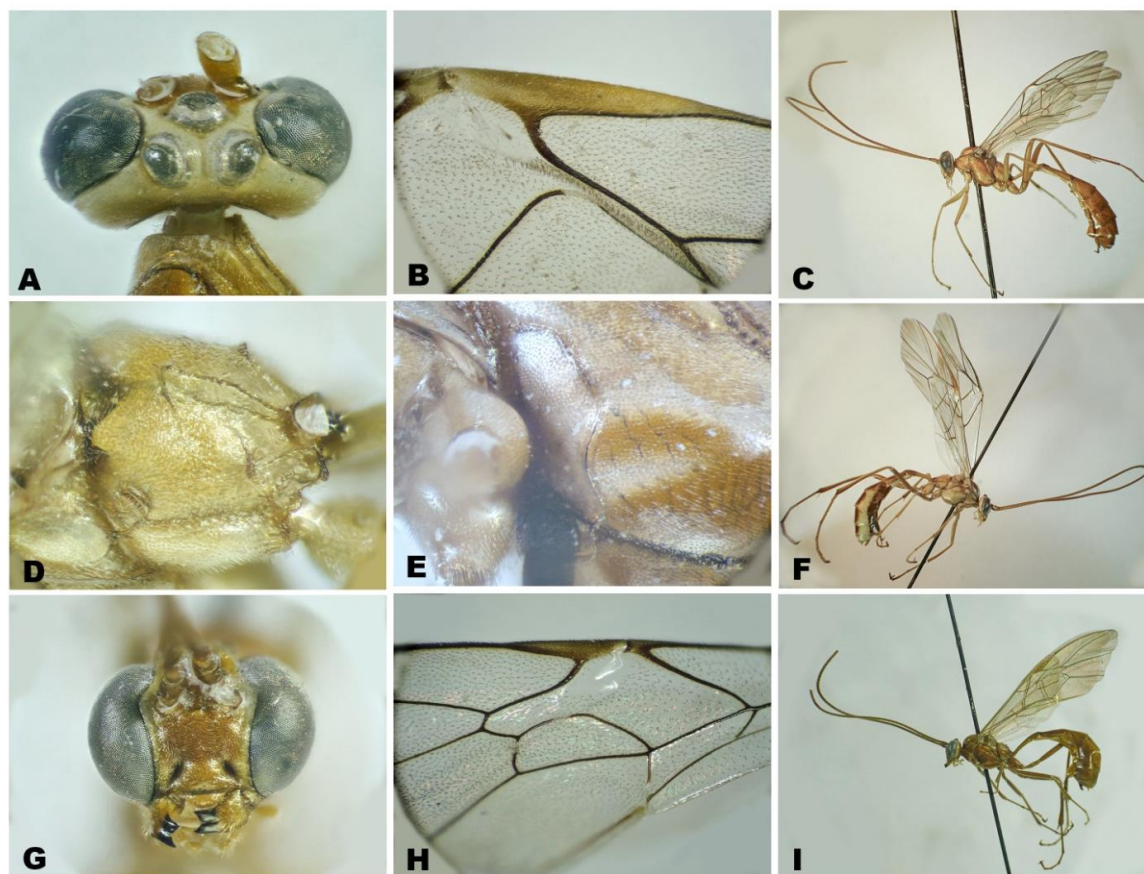


Fig. 8. A–C. *Ophion minutus*, female A. Hind wing, nervellus; B. Fore wing, radius junction to stigma; C. Female habitus; D–F. *Ophion obs curatus* female, D. Propodeum, lateral view; E. Mesosternum, epicnemialcarina; F. Female habitus; G–H. *Ophion mus cari* female, G. Propodeum, dorsal view; H. Fore wing, radius; I. Female habitus.

Key to Iranian genera and species of Ophioninae

1. Fore tibial spur without a membranous flange along its mesal face; base of second abdominal tergite with median elevated semicircular or subtriangular area (tribe **Ophionini** Shuckard, 1840).....2
 - Fore tibial spur with a membranous flange along its mesal face; base of second abdominal tergite without median elevated semicircular or subtriangular area (tribe **Enicospilini** Townes, 1971).....13
 2. Notaulus moderately long and distinct, reaching about 0.4 distance to centre of mesoscutum; base of radius not distinctly thickened and curved; lower margin of mesopleuron without a tubercle behind middle (genus *Ophion* Fabricius, 1798)3
 -Notaulus absent or short; base of radius thickened and curved; lower margin of mesopleuron with a tubercle

behind middle (fig. 7, E) (genus *Eremotylus* Forster, 1869).....10
 3. Fore wing length less than 11mm, nervellus somewhat reclivous (fig. 8, A), radius somewhat thickened at its junction with stigma (fig. 8, B); antennal flagellum with 40–49 segments; lateral ocelli separated from eye by distance equal to or a little more than width of posterior stemmaticum sulcus.....*Ophion minutus* **Kriechbaumer, 1879**
 - Fore wing length more than 11 mm; nervellus not reclivous; radius not or seldom thickened towards stigma; antenna with more than 50 flagellomeres; lateral ocelli separated from eye by distance, distinctly more than width of posterior stemmaticum sulcus.....4
 4. Body with black pattern, thorax with large punctures, radius thickened toward stigma.....*Ophion ventricosus* **Gravenhorst, 1829**

- Head and thorax without black pattern, thorax with superficial punctation, radius not noticeably thickened toward stigma.....5
- 5.** Face convex, densely wrinkly-punctured, with a small tubercle under the antennae.....*Ophion mirsa* (Shestakov, 1926)
- Face not convex, sparsely punctured, without tubercle below antenna.....6
- 6.** Ocellar-ocular interspace wider than the posterior sulcus of the stemmaticum.....7
- Ocellar-ocular interspace not exist, posterior ocelli touching eyes, or separated from them by width of posterior sulcus of the stemmaticum only.....8
- 7.** Occipital carina usually rounded, squared or sometimes weakly angled, mandibular gap usually acute, first flagellar segment more than 4 x longer than wide, lateral longitudinal carina of propodeum absent.....*Ophion luteus* (Linnaeus, 1758)
- Occipital carina weakly to very sharply angled in upper mid, mandibular gap obtuse to rectangular, first flagellar segment less than 3 x longer than wide, lateral longitudinal carina of propodeum complete and strong (fig. 8, D), sternopleural angle of epicnemium obtuse to weakly acute (fig. 8, E)*Ophion obscuratus* Fabricius, 1798
- 8.** First flagellar segment at least 3.4 x as long as wide, lateral longitudinal carina of propodeum usually as strong as dorsal propodeal carina (fig. 8, G), radius not sinuated but thickened toward base (fig. 8, H) membrane of petiolar segment approximately opposite of the spiracle, pleurosternal angle of epicnemium rounded and broadly obtuse.....*Ophio. parvulus* Kriechbaumer, 1879
- First flagellar segment often less than 3 x longer than wide, lateral longitudinal carina of propodeum usually weaker than dorsal propodeal carina.....9
- 9.** Lateral longitudinal carina of propodeum absent or weaker than dorsal propodeal carina, pleurosternal angle of epicnemium not broadly obtuse, radius sinuated toward bas...*Ophion mocsaryi* Brauns, 1889
- Lateral longitudinal carina of propodeum present and strong, radius not sinuated toward base*Ophion turcomanicus* Szepligeti, 1905
- 10.** Antenna with 56 segments; tarsal claws of hind legs in male with 12 teeth; mesopleuron with more or less distinct ventrolateral tubercles (fig. 7, E), malar space as wide as 0.4 length of basal width of mandible; body with dark pattern, mesoscutum and mesosternum drawn dark, antennae with three apical segments dark (fig. 7, E).....*Eremotylus sibiricus* Szepligeti, 1905
- Antenna with 40-55 segments; tarsal claws of hind legs in females with 10 teeth, and in males with more than 12 teeth; mesopleuren without ventrolateral tubercles...11
- 11.** Occipital carina interrupted in middle; malar space as wide as 0.25 length of basal width of mandible; anterior margin of clypeus weakly rounded.....*Eremotylus boguschi* (Meyer, 1935)
- Occipital carina complete, without median interruption; malar space wider; anterior margin of clypeus straight or emarginate in the middle.....12
- 12.** Anterior margin of clypeus straight; postpectal carina interrupted before midcoxae; propodeum without apical transverse carina.....*Eremotylus intermedius* (Hedwig, 1957)
- Anterior margin of clypeus emarginated in the middle; postpectal carina complete; propodeum with apical transverse carina.....*Eremotylus pumilus* (Hedwig, 1957)
- 13.** Postpectal carina absent except at lateral of middle coxae; temples slightly narrowed behind the eyes; basal part of radius somewhat thickened.....*Simophion calvus* Viktorov, 1961
- Postpectal carina complete; temple distinctly narrowed behind the eyes, basal part of radius distinctly thickened (figs. 1-6, E), disco-submarginal cell with large glabrous area extending over vein $R_s + 2r$, often with sclerites (figs 1-6, E) (genus *Enicospilus* Stephens, 1835).....14
- 14.** Fore wing with one distinct sclerite in glabrous area of discosubmarginal cell (figs. 1, C, 1, E, 5, E).....15
- Fore wing with 2 - 3 distinct sclerite in glabrous area of discosubmarginal cell (figs. 2, E, 3, E, 6, E)18
- 15.** Body brown with white spots, propodeum with brown color, transversely roundish striation (fig. 5, D); fore wing without central sclerite (fig. 5, E)....*Enicosp*

-*ilus monostigma* (Vollenhoven, 1879)
- Body red or yellowish white, propodeum without transverse striation but may be rugose (fig. 1, B).....16
- 16.** Body red, propodeum not strongly rugose, with normal length; proximal sclerite triangle or pyriform.....17
- Body yellowish white, propodeum strongly rugose and relatively short (fig. 1, B), proximal sclerite somewhat triangle (fig. 1, C).....*Enicospilus*
-*ahngeri* (Kokujev, 1907)
- 17.** Fore wing with almost pyriform proximal sclerite, propodeum weakly rugose, without longitudinal aciculation.....*Enicospilus stenopsis* (Kohl, 1905)
- Fore wing with triangle proximal sclerite (fig. 1, E), propodeum distinctly rugose, with longitudinal aciculation (fig. 1, F).....*Enicospilus*
-*tournieri* (Vollenhoven, 1879)
- 18.** Disco-submarginal cell in fore wing with two distinct and pigmented sclerites.....19
- Disco-submarginal cell in fore wing with three distinct and pigmented sclerites.....20
- 19.** Central sclerite in the fore wing distinct, comma-shaped and stretched (fig. 2, E), 1st part of the radial vein in the middle gradually narrowed to the apex
-*Enicospilus flavocephalus* (Kirby, 1900)
- Central sclerite in forewing transparent and not distinct, 1st part of the radial vein in the middle sharply narrowed to apex.....*Enicospilus*
-*ocellatus* Shestakov, 1926
- 20.** Wing surface with long and thick hairs.....21
- Wing surface with short and sparse hairs.....23
- 21.** Central sclerite of disco-submarginal cell round and unpigmented.....*Enicospilus cruciator* Viktorov, 1957
- Central sclerite of disco-submarginal cell pigmented and not completely rounded.....22
- 22.** Metasomal tergites 5 – 8 completely black (fig. 6, F).....*Enicospilus ramidulus* (Linnaeus, 1758)
- Metasomal tergites uniformly red to reddish yellow (fig. 4, F)*Enicospilus merdarius* (Holmgren, 1860)
- 23.** Posterior ocelli separated from margin of the eyes by 0.3-0.5 x diameter of ocellus; central sclerite distinctly pigmented (no paler than proximal sclerite).....*Enicospilus variicarpus* (Kokujev, 1907)

- Posterior ocelli contiguous to margin of eyes or nearly so; central sclerite stretched or rounded.....24
- 24.** Central sclerite of disco-submarginal cell stretched, abdomen 2 x longer than head and thorax combined.....*Enicospilus perlatus* Shestakov, 1926
- Central sclerite of disco-submarginal cell rounded, (fig. 3, E), abdomen 2.5 x longer than head and thorax together.....*Enicospilus kokujevi* Victorov, 1957

Discussion

In this study 11 species of subfamily Ophioninae were collected and identified. The results of this study and review of the previously recorded taxa by Zarepour *et al.* (2008), Barahoei *et al.* (2012), and Mohammadi-khoramabadi *et al.* (2016) revealed the existence of 26 species, two tribes (e.g. Ophionini, Enicospilini) and four genera (e.g. *Ophion* (8 species), *Enicospilus* (13 species), *Eremotylus* (4 species) and *Simophion* (1 species)) of which, 15 species are from southern provinces. Only two species *E. ahngeri* and *O. obscuratus* occur in both regions. The species *E. flavocephalus* previously reported from Australian and oriental regions (Yu *et al.*, 2012).

The number of Malaise trapped specimens of Ophioninae was less than those captured by light traps and sweeping method. It is likely due to nocturnal behavior of Ophioninae parasitic wasps. Despite the frequency of Ophioninae in the west and east Palaearctic (100 and 125 species respectively) and Oriental regions (243 species), diversity of these wasps was less than what we had expected. The greatest diversity of the Ophioninae exists in tropical area, where the wasps apparently are able to exploit the caterpillars as their hosts (Gauld & Janzen, 2004).

Southern region of Iran is characterized by a great diversity in vegetation, natural ecosystems and farmlands due to differences in the topography and the various climatic conditions (Ameri *et al.*, 2014) and can be searched as potential locations to collect Ophioninae and other ichneumonid wasps. The southern provinces of Iran such as Hormozgan, are the confluence of Oriental and Palaearctic geographic regions, but little information is known from the subfamily Ophioninae in this region. Majority of the Ophioninae members belong to

Enicospilus and *Ophion* genera (Quicke, 2015), that can be found almost everywhere.

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