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Research Article

A contribution to the knowledge of the Ichneumonidae (Hym.: Ichneumonoidea) from Neyriz county of Fars province, Iran

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Abstract: A survey was performed to investigate the fauna of Ichneumonidae in Fars province during 2012 to 2013. Totally, 14 species belonging to 13 genera and six subfamilies were collected and identified including: *Exetastes adpressorius* (Thunberg, 1822) (Banchinae); *Diadegma semiclausum* (Hellén, 1949) (Campopleginae); *Cryptus inculcator* (Linnaeus, 1758); *Dichrogaster saharator* (Aubert, 1964) (Cryptinae); *Diplazon laetatorius* (Fabricius, 1781); *Enizemum ornatum* (Gravenhorst, 1829); *Homotropus nigritarsus* (Gravenhorst, 1829); *Homotropus signatus* (Gravenhorst, 1829) (Diplazontinae); *Colpognathus celerator* (Gravenhorst, 1807); *Diadromus collaris* (Gravenhorst, 1829); *Ichneumon sarcitorius* Linnaeus, 1758; *Virgichneumon callicerus* (Gravenhorst, 1820) (Ichneumoninae); *Orthocentrus asper* (Gravenhorst, 1829); *Picrostigeus setiger* (Brischke, 1871) (Orthocentrinae), of which *Exetastes adpressorius* and *Picrostigeus setiger* are newly recorded for the fauna of Iran. In addition the male of the latter species is recorded for the first time and described. All species except *Dichrogaster saharator* are new for Fars province.

Keywords: *Exetastes adpressorius*, *Picrostigeus setiger*, *Medicago sativa*, field crop, new record, Iran.

Introduction

The family Ichneumonidae (Hymenoptera) is one of the most species-rich families of all organisms with an estimated 60,000 species in the world (Yu *et al*., 2012). It contains beneficial species, which parasitize several pests of different orders, including larvae and pupae of Coleoptera, Hymenoptera, Diptera and Lepidoptera (Townes, 1969; Gupta, 1987; Wahl and Sharkey, 1993). Ichneumonids rarely parasitize individual eggs, and a few are egg-larval parasitoids, laying an egg in the host egg but consuming the host in its larval stage (Gauld, 1988; Wahl and Sharkey, 1993). Until now, more than 572 species belonging to 24 subfamilies have been recorded from Iran (Ghahari and Schwarz, 2012; Abbasipour *et al*., 2012; Barahoei *et al*., 2012, 2014, 2015a, b; Mohammadi-khoramabadi and Talebi, 2013; Mohammadi-khoramabadi *et al*., 2011, 2013a, b, 2014; Hasanshahi *et al*., 2013; Ghahari, 2014; Ghahari *et al*., 2014; Kazemi *et al*., 2014), while only 53 species from Fars province (Barahoei *et al*., 2012). The aim of the present research was to study the Ichneumonid fauna of Fars province.

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Materials and Methods

The specimens were collected using standard sweeping net on various vegetations at different places consisting Estahban, Neyriz and Palangan located in Fars province during 2012 to 2013 (Fig. 1). They were preserved in 75% Ethanol and then transferred to the laboratory. The specimens were then mounted on triangular point cards.

The external morphology of specimens was examined using a Nikon SMZ800 stereomicroscope. Photographs were prepared using DinoEye camera attached to the stereomicroscope. All specimens were collected by the first author. Terminology of morphological characters follows Townes (1969). Duplicate series of new recorded species were sent to Matthias Riedel (Klinik Fallingbostel, Bad Fallingbostel, Germany) for confirmation of identification. The specimens were deposited in the Insect Collection of Department of Biology, Shahid Bahonar University of Kerman, Iran and Department of plant protection, University of Zabol, Iran.

Results

In total, fourteen species of Ichneumonidae are reported here of which two species belonging to two subfamilies are newly recorded for the fauna of Iran, indicated by an asterisk. In addition the male of *Picrostigeus setiger* is recorded for the first time and described. The list of the taxa is arranged alphabetically.

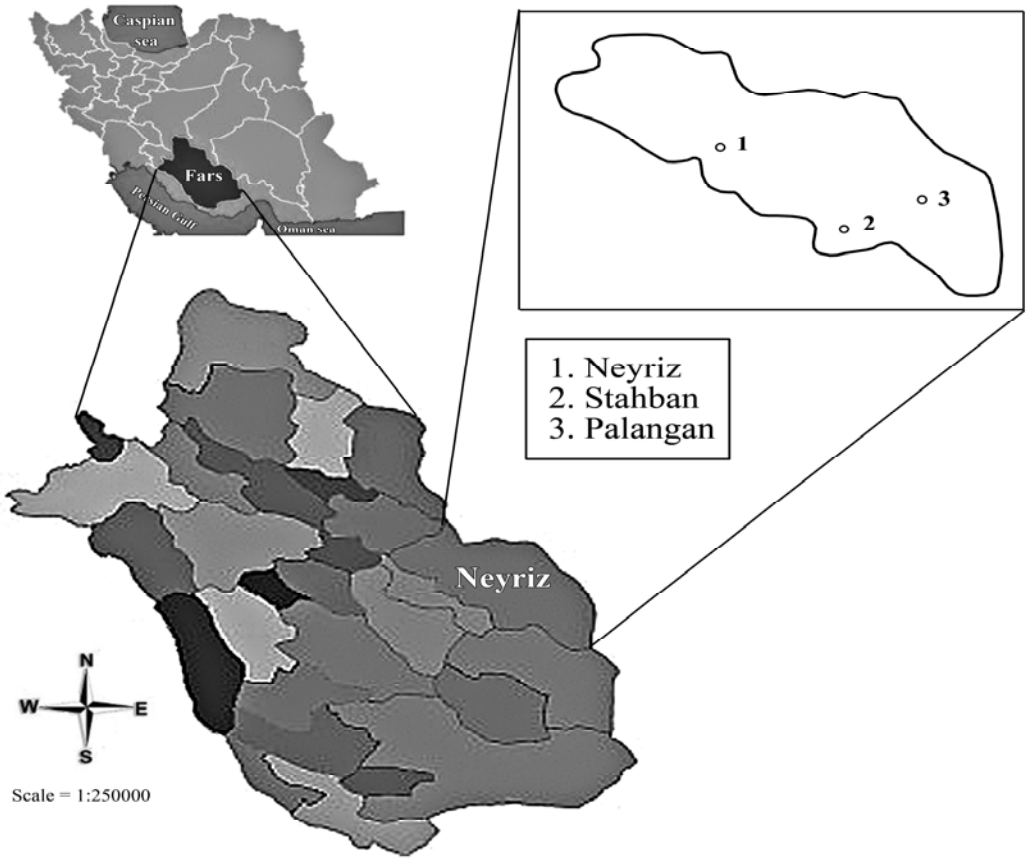

Figure 1 Map of the sampling localities at Fars province.

Subfamily Banchinae Wesmael, 1845
Tribe Banchini Wesmael, 1845
Exetastes adpressorius* (Thunberg, 1822)
(Figs. 2, 3)
Material examined: 2♀, swept on *Medicago sativa* L., Iran, Fars-Palangan, 10-VI-2013.
Diagnosis: Width of face less than the height of the eye, length of cheek considerably narrower than the base of mandibles, hairs on the head short, eye orbits parallel, clypeus narrow, mandible with two equal teeth (Fig. 2A), propodeum with rogue sculpture, only with lateral carinae in hind part (Fig. 2B), petiole smooth, spiracles near middle of segment (Fig. 2C), femur and tibia brown, hind of tibia and tarsus black (Fig. 3), ovipositor sheath short, equal or little longer than petiole, with an apical notch (Fig. 2D, 3), forewing with long areolet, 2m-cu with one long bulla (Fig. 2E).
Distribution in Iran: Fars province. This species is recorded from Iran for the first time.
General distribution: Palaearctic (Yu *et al*., 2012).

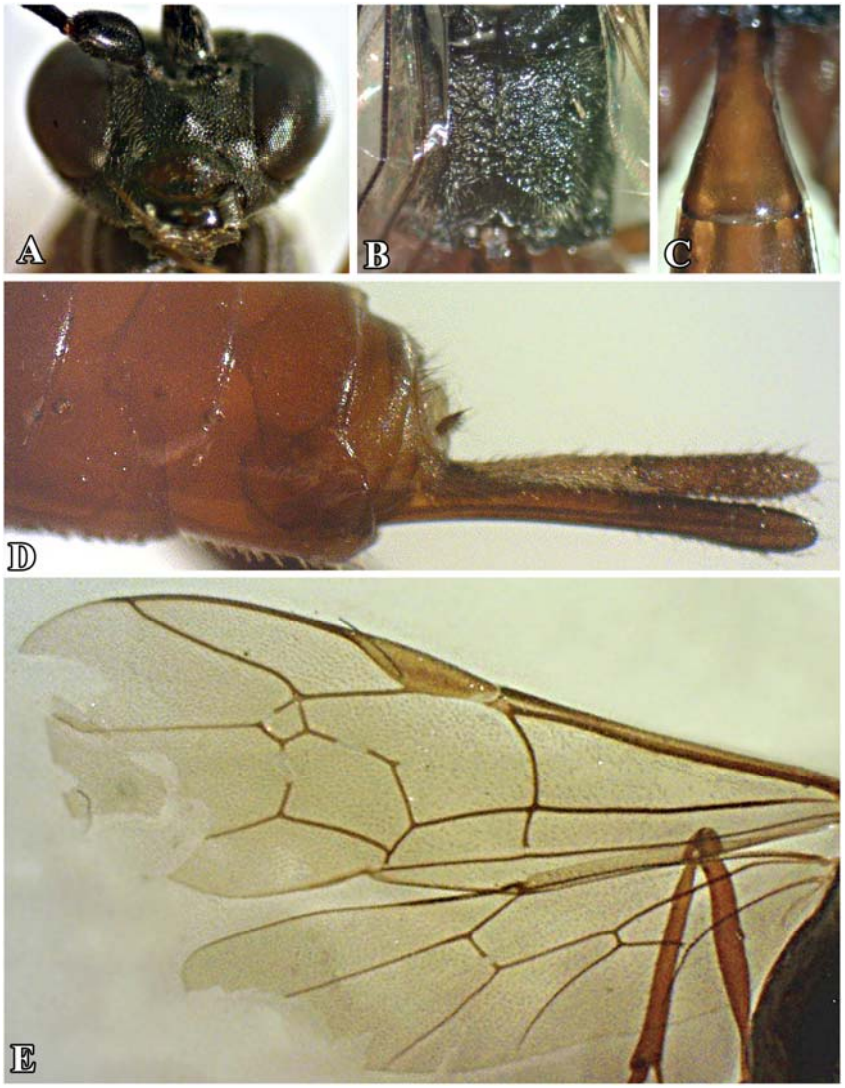

Figure 2 *Exetastes adpressorius*-Female: (A) face in frontal view, (B) propodeum, (C) petiole, (D) Ovipositor sheath, (E) fore and hind wings.

Figure 3 Lateral view of *Exetastes adpressorius* (female).

Subfamily Campopleginae Förster, 1869
Tribe Campoplegini Förster, 1869
***Diadegma semiclausum* (Hellén, 1949)**
Material examined: 1♂, swept on *Amygdalus communis* L., Iran, Fars-Neyriz, 27-V-2013; 1♀, swept on *Descurainia sophia* L., Neyriz, 30-III-2013; 2♀♀ and 3♂♂, swept on *Medicago sativa* L., Palangan, 18-IV-2013; 1♀, swept on *Raphanus sativus* L., Neyriz, 24-III-2013; 1♀ and 1♂, swept on *Triticum monococcum* L., Neyriz, 27-V-2013.
Distribution in Iran: Isfahan (Kolarov and Ghahari, 2005; Ghahari *et al*., 2012), Sistan and Baluchistan (Barahoei *et al*., 2013).
General distribution: Worldwide (Yu *et al*., 2012).

Subfamily Cryptinae Kirby, 1837
Tribe Cryptini Kirby, 1837
***Cryptus inculcator* (Linnaeus, 1758)**
Material examined: 1♂, swept on *Amygdalus lycioides* Spach, Iran, Fars-Estahban, 23-III-2013; 1♂ and 1♀, swept on *Medicago sativa* L., Palangan, 15-VI-2013.
Distribution in Iran: Alborz (Masnadi and Jussila, 2008a), Sistan and Baluchistan (Firuzi Jahantighi *et al*., 2012; Barahoei *et al*., 2013), Yazd (Zarepour *et al*., 2008), Khorasan Razavi (Barahoei *et al*., 2012).
General distribution: Palaearctic (Yu *et al*., 2012).

Tribe Phygadeuontini Förster, 1869
***Dichrogaster saharator* (Aubert, 1964)**
Material examined: 1♂, swept on *Amygdalus lycioides* Spach, Iran, Fars-Estahban, 23- III-2013; 1♂, swept on *Medicago sativa* L., Palangan, 30-VIII-2013; 1♀ and 1♂, swept on *Triticum monococcum* L., Palangan, 25-V-2013.
Distribution in Iran: Ardabil, Fars, Khuzestan, Mazandaran, Tehran, Zanjan (Kolarov and Ghahari, 2006), Sistan and Baluchistan (Kolarov and Ghahari, 2006, Firuzi Jahantighi *et al*., 2012; Barahoei *et al*., 2013).
General distribution: Western Palaearctic, Ethiopian (Yu *et al*., 2012).

Subfamily Diplazontinae Viereck, 1918
Tribe Diplazontini Viereck, 1918
***Diplazon laetatorius* (Fabricius, 1781)**
Material examined: 1♀, swept on *Amygdalus communis* L., Iran, Fars-Neyriz, 27-V-2013; 3♀♀, swept on *Medicago sativa* L., Palangan, 07-VI-2013; 1♀, swept on *Triticum monococcum* L., Neyriz, 17-IV-2013.

Distribution in Iran: West Azerbaijan, Khorasan-e-Shomali (Malkeshi and Kheiabani, 1997), Guilan, Mazandaran, Qazvin, Tehran (Mohammadi-Khoramabadi *et al*., 2013b), Kerman (Kolarov and Ghahari, 2005; Mohammadi-Khoramabadi *et al*., 2014), Chaharmahal-o-Bakhtiari (Nourbakhsh *et al*., 2008), Mazandaran (Kolarov and Ghahari, 2005; Mohammadi-Khoramabadi *et al*., 2013b), Sistan and Baluchistan (Barahoei *et al*., 2013), Yazd (Zarepour *et al*., 2008, 2009).
General distribution: Worldwide (Yu *et al*., 2012).

***Enizemum ornatum* (Gravenhorst, 1829)**
Material examined: 3♂♂, swept on *Medicago sativa* L., Iran, Fars-Palangan, 12-VI-2013; 1♂, swept on *Medicago sativa* L., Palangan, 30-VIII-2013; 2♂♂, swept on *Triticum monococcum* L., Palangan, 25-V-2013.
Distribution in Iran: Kerman (Mohammadi-Khoramabadi *et al*., 2014), Qazvin (Mohammadi-Khoramabadi *et al*., 2013b), Sistan and Baluchistan (Barahoei *et al*., 2013).
General distribution: Nearctic, Palaearctic, Oriental (Yu *et al*., 2012).

***Homotropus nigritarsus* (Gravenhorst, 1829)**
Material examined: 1♀, swept on *Medicago sativa* L., Iran, Fars-Palangan, 11-VI-2013.
Distribution in Iran: Guilan, Mazandaran, Qazvin, Tehran (Mohammadi-Khoramabadi *et al*., 2013b).
General distribution: Nearctic, Palaearctic (Yu *et al*., 2012).

***Homotropus signatus* (Gravenhorst, 1829)**
Material examined: 1♀, swept on *Amygdalus lycioides* Spach, Iran, Fars-Estahban, 23-III-2013; 4♀♀ and 4♂♂, swept on *Medicago sativa* L., Palangan, 7-VI-2013; 1♂, swept on *Triticum monococcum* L., Neyriz, 27-V-2013.
Distribution in Iran: Kerman (Sarafi *et al*., 2014).
General distribution: Nearctic, Palaearctic (Yu *et al*., 2012).

Subfamily Ichneumoninae Latreille, 1802
Tribe Ichneumonini Latreille, 1802
***Ichneumon sarcitorius* Linnaeus, 1758**
Material examined: 1♂, swept on *Medicago sativa* L., Iran, Fars-Palangan, 28-V-2013.
Distribution in Iran: Golestan (Mojeni and Sedivy, 2001; Kolarov and Ghahari, 2005), Semnan (Kolarov and Ghahari, 2008), East-Azarbaijan (Masnadi and Jussila, 2008b).
General distribution: Palaearctic (Yu *et al*., 2012).

***Virgichneumon callicerus* (Gravenhorst, 1820)**
Material examined: 3♂, swept on *Medicago sativa* L., Iran, Fars-Palangan, 15-VI-2013.
Distribution in Iran: East-Azarbaijan (Kolarov and Ghahari, 2008), Ardabil (Masnadi and Jussila, 2008b), Sistan and Baluchistan (Barahoei *et al*., 2012).
General distribution: Palaearctic (Yu *et al*., 2012).

Tribe Phaeogenini Förster, 1869
***Colpognathus celerator* (Gravenhorst, 1807)**
Material examined: 4♂♂, swept on *Medicago sativa* L., Iran, Fars-Palangan, 11-VI-2013.
Distribution in Iran: Not exactly defined (Diller and Schönitzer, 2003), Guilan (Kolarov and Ghahari, 2005), Mazandaran (Kolarov and Ghahari, 2008).
General distribution: Palaearctic (Yu *et al*., 2012).

***Diadromus collaris* (Gravenhorst, 1829)**
Material examined: 122♀♀, swept on *Medicago sativa* L., Iran, Fars-Palangan, 06-IX-2013.; 1♀ and 1♂, swept on *Triticum monococcum* L., Palangan, 25-V-2013.
Distribution in Iran: Golestan (Kolarov and Ghahari, 2008; Ghahari and Jussila, 2011), Semnan (Ghahari, 2012), Sistan and Baluchistan (Firuzi Jahantighi *et al*., 2012; Barahoei *et al*., 2013).
General distribution: Neotropical, Ethiopian, Palaearctic, Australasian (Yu *et al*., 2012).

Subfamily Orthocentrinae Forster, 1869
***Orthocentrus asper* (Gravenhorst, 1829)**
Material examined: 2♀, swept on *Triticum monococcum* L., Iran, Fars-Palangan, 25-V-2013.
Distribution in Iran: Guilan, Tehran (Mohammadi-Khoramabadi and Talebi, 2013).
General distribution: Nearctic, Western Palaearctic (Yu *et al*., 2012).

Picrostigeus setiger* (Brischke, 1871) (Figs. 4, 5)
Material examined: 2♀♀ and 5♂♂, swept on *Triticum monococcum* L., Iran, Fars-Palangan, 25-V-2013.
Diagnosis (Female): Scape of antenna cylindrical, about 3X as long as wide, malar space long, clypeus not separated from the face, whole surface strongly convex (Fig. 4A), mandibles small, thin, narrowed apically, lower tooth shorter than upper tooth, towards the apex, propodeum smooth, with one lateral carinae in end part (Fig. 4B), forewing without areolet, the vein 2m-cu with a large bulla (Fig. 4C), petiole without glymma, spiracles at middle of segment (Fig. 4F), ovipositor sheath longer than one-third of abdomen length (Fig. 4E).

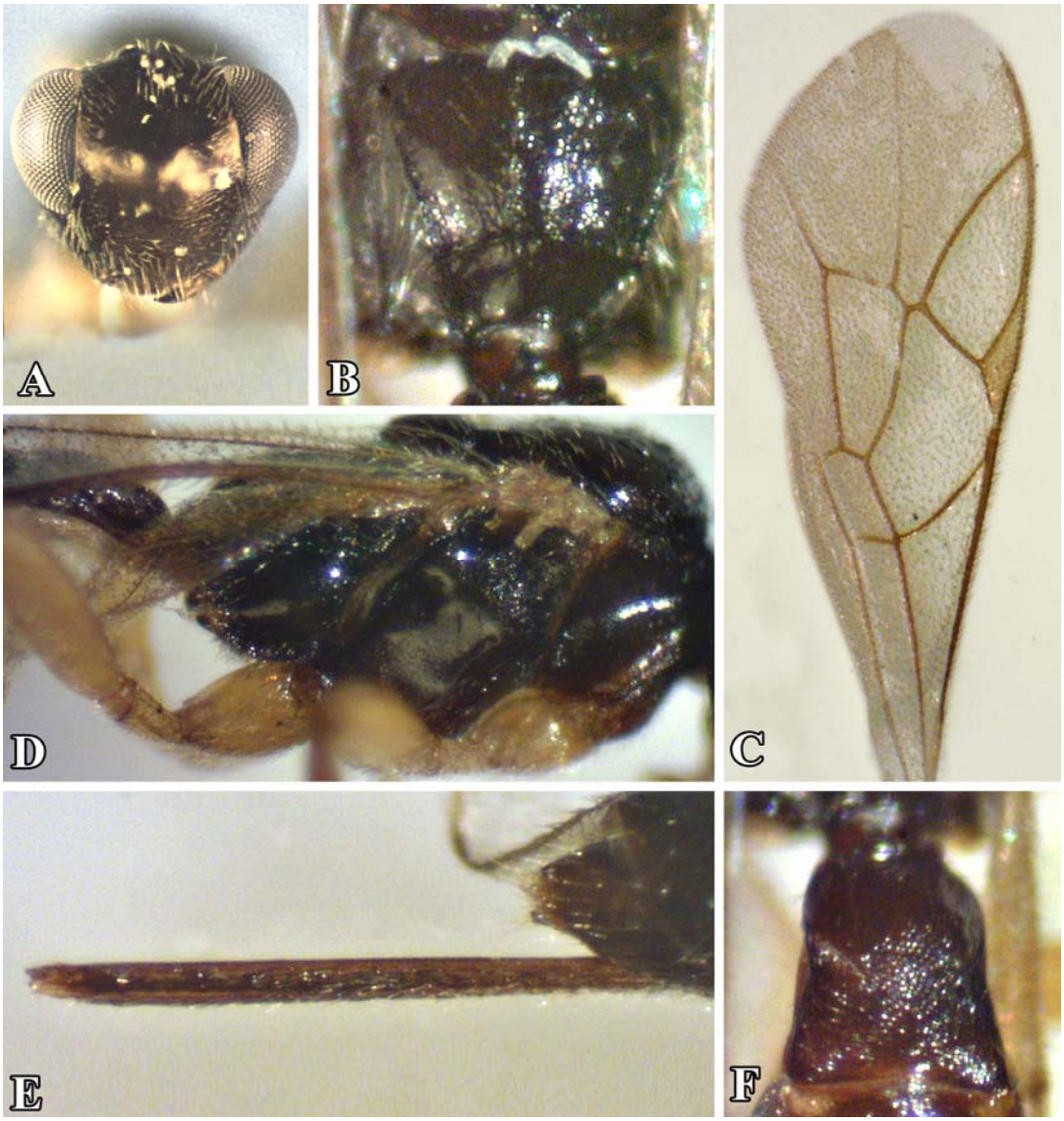

Figure 4 *Picrostigeus setiger*-Female: (A) face in lateral view, (B) propodeum, (C) forewing, (D) mesoscutum in lateral view, (E) ovipositor sheath, (F) petiole.

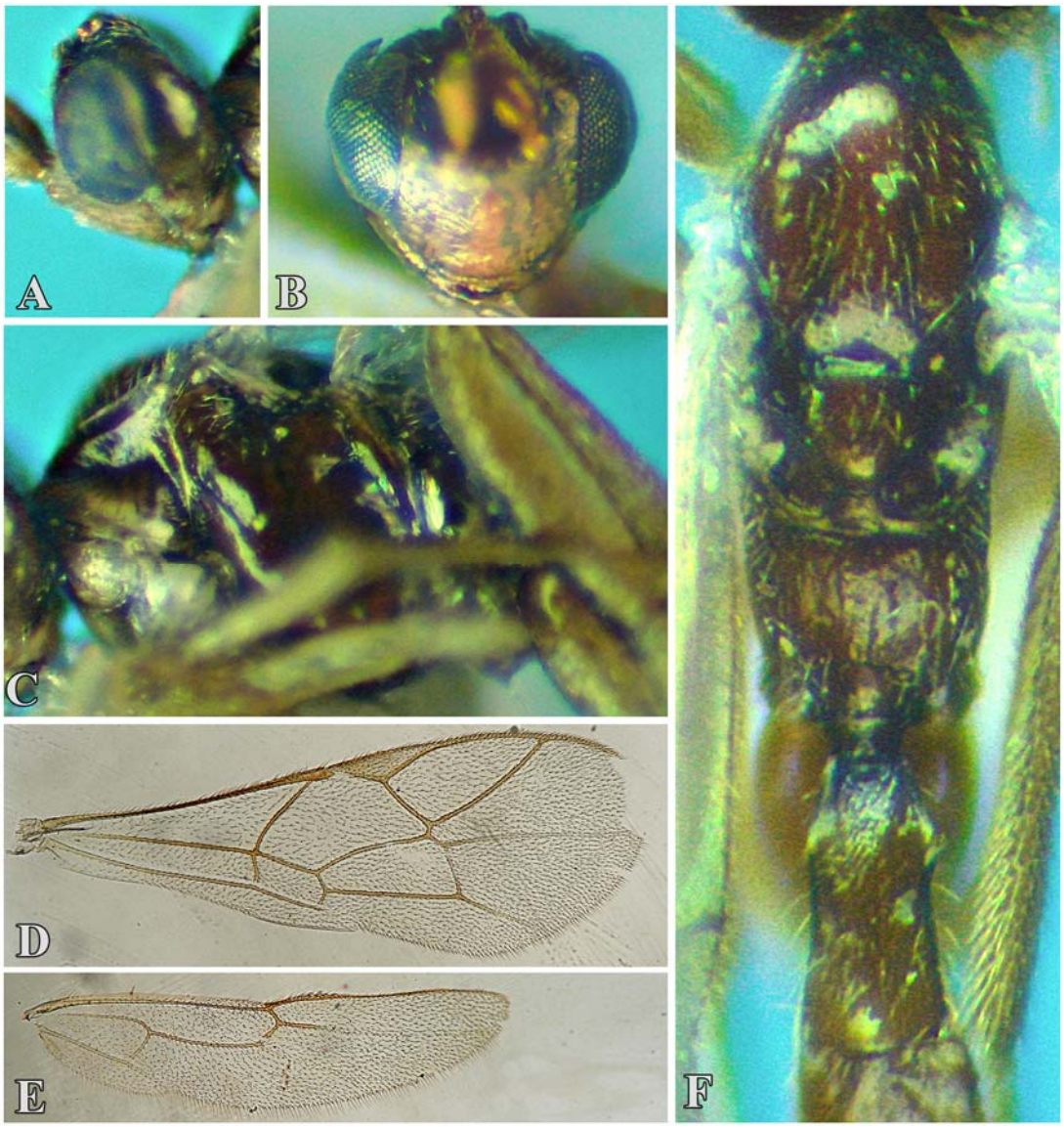

Figure 5 *Picrostigeus setiger*- Male: (A) face in lateral view, (B) face in frontal view, (C) mesoscutum in lateral view, (D) forewing, (E) hindwing, (F) dorsal aspect of mesoscutum, propodeum and petiole.

Description of male specimen:

Head: Antenna with 23-24 flagellomeres, scape oval, 2-2.1 times as long as wide, pedicle small, circular, 1.1 times as long as wide, first flagellar segment 1.2 times longer than second flagellar segment (Fig. 6A), face smooth, with long sparse setae, clypeus convex, with long sparse setae (Fig. 5B), mandibles narrow apically, lower tooth smaller than upper tooth, maxillary palpi 5-segmented, labial palpi 4-segmented.

Mesosoma: Mesoscutum polished, smooth, notaulus small, mesoscutum and scutellum covered with long setae, mesopleuron polished, epicnemial carina present laterally (Fig. 5C), propodeum polished, with small central areola, with long sparse setae in lateral parts (Fig. 5F), fore wing without

areolet, vein 2rs-m smaller than upper abscissa of 2m-cu and 2m-cu with one long bulla (Fig. 5D), hind wing with vein cu-a not intercepted (Fig. 5E).

Metasoma: Petiole shiny, smooth, 3.0-3.1 times as long as wide in spiracle area, twice as long as second metasomal segment (Fig. 5F).

Length: About 6-7 mm.

Coloration: Face and mouth parts whitish yellow, antenna brown, thorax and petiole dark brown, other metasomal tergites brown, wing venation brown (Figs. 5, 6A).

Distribution in Iran: Fars province. This species is recorded from Iran for the first time.

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

Discussion

A total of six subfamilies, 13 genera and 14 species were identified and recorded from eastern part of Fars province as representative of a lowland area at southwestern part of Iran. Two species are newly recorded for the fauna of Iran. In table 1 number of collected species of Ichneumonidae in Fars province is compared with the number of previously recorded species from Iran and Fars province. The geographical distribution of some collected species is confined to one geographical region: *Exetastes adpressorius*, *Cryptus inculcator*, *Ichneumon sarcitorius*, *Virgichneumon callicerus* and *Colpognathus celerator* are distributed in the Palaearctic region. *Picrostigeus setiger* is distributed only in the Europe. A few species are distributed in two geographical regions: *Dicrogaster saharator* is distributed in the Western Palaearctic and Ethiopian regions while *H. nigritarsus* and *H. signatus* are distributed in the Nearctic and Palaearctic regions. A few other species are distributed in three or four geographical regions. Finally a few species have worldwide distribution such as *D. semiclausum* and *D. laetatorius*.

Little is known about the host association of the collected species. *Plutella xylostella* (Linnaeus, 1758) (Lep.: Plutellidae) is already considered as a host for *D. semiclausum* (Ghahari, 2012). *Scaeva albomaculata* (Macquart, 1842) (Diptera: Syrphidae) is a host for two species, *D. laetatorius* and *E. ornatum* (Nourbakhsh *et al*., 2008; Barahoei *et al*., 2013). *Helicoverpa armigera* (Hubner, 1808) (Lep.: Noctuidae) is considered as a host for *I. sarcitorius* (Mojeni and Sedivy, 2001). *Callophrys rubi* (Linnaeus, 1758) (Lep.: Noctuidae) was already reported as a host for *V. callicerus* (Masnadi and Jussila, 2008). Some collected species were found in association with one host plant, *M. sativa*: *E. adpressorius*, *H. nigritarsus*, *I. sarcitorius*, *V. callicerus* and *C. celerator*, while *O. asper* and *P. setiger* are associated with *Triticum monococcum*. Other species were associated with two or more host plant species: *E. ornatum* and *D. collaris* were associated with *M. sativa* and *T. monococcum*. *Cryptus inculcator* was associated with *Amygdalus lycioides* and *M. sativa*. *Dicrogaster saharator* and *H. signatus* were associated with *A. lycioides*, *M. sativa* and *T. monococcum*, while *D. laetatorius* was associated with *A. communis* and the two latter host plant species. *Diadegma semiclausum* has wider host plant range so that it was associated with *A. communis*, *Descurainia Sophia*, *Raphanus sativus* and *T. monococcum*. Investigations on insect pests and also their distribution and abundance could be considered as initial steps for studying insect biodiversity. It is worth notice that almost all the recorded species in this paper are considered to be potentially useful in biological control programs. It seems that with more sampling in different parts of Fars province, the number of recorded species will increase. Further taxonomic studies together with information on host association are of considerable importance to understand the faunal diversity of this group of Ichneumon

wasps in Fars province and also other parts of Iran.

Figure 6 Lateral view of *Picrostigeus setiger*: (A) male, (B) female.

Table 1 Comparison of the number of recorded species belonging to collected subfamilies of Ichneumonidae in the present study with previous records from Iran and Fars province.

Subfamily	Previously recorded species	Collected species from Fars province	Newly recorded species	Total number of recorded species in Iran
Banchinae	10	0	1	11
Campopleginae	36	9	0	36
Cryptinae	94	18	0	94
Diplazontinae	8	1	0	8
Ichneumoninae	160	8	0	160
Orthocentrinae	1	0	1	2
Total	308	36	2	311

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اطلاعات زنبورهای Ichneumonidae (Hym.: Ichneumonoidea) از شهرستان نی‌ریز استان فارس، ایران

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چکیده: پژوهشی به‌منظور بررسی فون خانواده Ichneumonidae در استان فارس طی سال‌های ۱۳۹۱ تا ۱۳۹۲ صورت گرفت. در مجموع تعداد ۱۴ گونه متعلق به ۱۳ جنس و شش زیرخانواده شناسایی شد که عبارتند از: *Exetastes adpressorius* (Thunberg, 1822) (Banchinae); *Diadegma semiclausum* (Hellén, 1949) (Campopleginae); *Cryptus inculcator* (Linnaeus, 1758); *Dichrogaster saharator* (Aubert, 1964) (Cryptinae); *Diplazon laetatorius* (Fabricus, 1781); *Enizemum ornatum* (Gravenhorst, 1829); *Homotropus nigritarsus* (Gravenhorst, 1829); *Homotropus signatus* (Gravenhorst, 1829) (Diplazontinae); *Colpognathus celerator* (Gravenhorst, 1807); *Diadromus collaris* (Gravenhorst, 1829); *Ichneumon sarcitorius* Linnaeus, 1758; *Virgichneumon callicerus* (Gravenhorst, 1820) (Ichneumoninae); *Orthocentrus asper* (Gravenhorst, 1829); *Picrostigeus setiger* (Brischke, 1871) (Orthocentrinae).از بین این گونه ها، دو گونه*Exetastes adpressorius* و *Picrostigeus setiger* برای اولین بار از ایران گزارش می‌شوند. جنس نر گونه اخیر برای اولین بار جمع‌آوری و توصیف شد. همه گونه‌ها به‌جز *Dichrogaster saharator* برای فون استان فارس جدید می‌باشند.

واژگان کلیدی: *Exetastes adpressorius*، *Picrostigeus setiger*، *Medicago sativa* ، گیاه زراعی، گزارش جدید، ایران