A survey on Apoidea bees (Insecta: Hymenoptera) and their associated mites in Fars Province, Iran

Setare Kiani Bakiani1, Alireza Monfared2*, Hamidreza Hajiqanbar2 and Shahrzad Azhari1

1 Department of Plant Protection, Faculty of Agriculture, Yasouj University, P. O. Box: 75918-74831, Yasouj, Iran.
2 Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, 14115-336, Tehran, Iran.

ABSTRACT. In this research 52 species of bees (Hymenoptera: Apoidea) have been reported from the northeastern Fars province, of which the species of *Hylaetus punctus* Förster and *Hoplitis leucomelana* Kirby were new records for Iran fauna. Among the material examined, there were 11 species of Apidae, 19 species of Halictidae, 1 species of Andrenidae, 4 species of Colletidae and 17 species of Megachilidae. Phoretic mites belonging to four genera *Parapygmephorus*, *Vidia*, *Imparipes* and *Anoetus* were associated with halictid and meghachilid bees. Among associated mites with collected bees *Imparipes burgeri* Ebermann & Jagersbacher-Baumann belonging to the family Scutacaridae was new for Iran fauna and Asia. We also collected five new mite species for science. These species were belong to the genera *Parapygmephorus* (1 species), *Vidia* (1 species), and *Anoetus* (3 species) of the families Neopygmephoridae, Winterschmidtiidae and Anoetidae respectively that will be described elsewhere. All specimens are deposited in the Iranian Pollinator Insects Collection of Yasouj University.

Key words: Anoetidae, Neopygmephoridae, Phoretic mite, Pollinator bees, Scutacaridae, Winterschmidtiidae.

Introduction

Bees are the most important pollinators worldwide especially because of their foraging behavior and floral constancy (Almanza 2007). The province of Fars which is having an arid to semi-arid climate has a rich fauna of the bees on various agricultural crops. Izadi et al. (1997) have recorded 35 species of Apoidea bees from northern Fars province. Taghavi et al. (2008) studied *Bombus* species diversity in Tehran and Qazvin provinces in Central Elburz. They collected a total of 11 species of the genus *Bombus* and found that 8 species in two regions had ecological similarity. In a previous study in this province, Khodaparast and Monfared (2012) reported 177 bee species which mostly were wild bees’ species. Some researchers interested in crops pollination have been indicated that just about 15% of world’s crops are pollinated by a few
managed bee species, e.g. *A. mellifera* and *Bombus* spp., while the rest are pollinated by unmanaged solitary bees and other pollinator organisms and environmental factors (Almanza 2007). The superfamily Apoidea are the well-known pollinators mostly for their relationships with flowering plants. According to current usage Apoidea is a monophyletic group composed of both the sphecid wasps and the true bees called Apiformes or Anthophila (Michener 2007). This superfamily includes seven families which six families of Apidae, Andrenidae, Colletidae, Megachilidae, Halictidae and Melittidae are cosmopolitan and distributed in vast geographical regions while Stenotritidae restricted only to Australia. There are above mentioned six families of apoids in Iran. Previously, during examination of specimens of bees collected from this province sever infestation to mites was observed. Therefore it seemed that study of these mites would be resulted to find kinds of relationships between these two animals. Mites and bees have co-existed since the Cretaceous, and there is evidence of a close relationship between some taxa, probably resulting from a co-evolutionary process (Klimov *et al.* 2007). Numerous mite species use hymenopterous insects as phoretic hosts (e.g. Fain *et al.* 1999). 

Bee-mite associations are well known but poorly understood (e.g. Fain *et al.* 1999; Fain and Pauly 2001; Walter *et al.* 2002). The taxonomical and biological information about these mites are poorly studied in most parts of the world. There is a need for more investigations and taxonomical studies on these mites (Hajiqanbar 2011). In this survey, we collected bees and examined them for associated mites from northeastern Fars province. Also, we recorded floral choice of bees.

**Material and methods**

Bees and associated mites were collected from suburban areas and mountainous regions of northeastern Fars Province from last June 2013 to early July 2014. We considered all specimens of Apoidea except honeybees. Sampling locations were recorded by Garmin eTrix Hc GPS. Bees were collected by insect net. Following sampling bees were killed with ethyl acetate and later pinned in laboratory. Mites were collected from their bees’ hosts under an Olympus SZX 10 stereo-microscope, cleared in Nesbitt’s fluid and mounted in Fauremedium. All identified species were deposited in the “Iranian pollinator Insects - Collection”, of Plant Protection Department at the Faculty of Agriculture, Yasouj University, Yasouj, Iran (IPIC-YU). Also, floral choice visited by bee species from each locality were collected and identified. New record of bees for Iranian fauna is indicated with an asterisk.

**Results**

Collected bees species, floral choice families and associated mites species are mentioned in Tables 1 to 2.

**Collected bees:** Bees collected represent five families, eight subfamilies, nine tribes and 20 genera. The number of related species is shown in Table 1. The most frequent and diverse bee’s genera with nine, six, six and three species, respectively, were belonged to *Halictus, Lasioglossum, Osmia* and *Bombus*. Among families, Halictidae, with 19 collected species had the highest frequency of bees species in this study.

**Family: Andrenidae,**

**Subfamily: Andreninae**

*Andrena fuscosa* Erichson, 1835

**Material examined:** Fars province, Sepidan, Sarbast, 2043m, 25.IV.2014, 1 ♀, pinned (IPIC-YU).

Host plant associations: *Vicia* sp. (Fabaceae), *Medicago sativa* (Fabaceae), *Lepidium draba* (Brassicaceae).

Family: Apidae  
Subfamily: Apinae, Tribe: Ancylini  
*Tarsalia ancylichoriformis* Popov, 1935

Material examined: Fars province, Shiraz, Ghasar ghomse, 1860m, 21.VII.2013, 1 ♀, pinned (IPIC-YU).

General distribution: Sardinia, Turkey, Iran, Tajikistan, Turkmenistan and Israel (Ascher and Pickering 2016).

Host plant associations: *Astragalus* sp. (Fabaceae).

*Tarsalia hirtipes* Morawitz, 1895

Material examined: Fars province, Shiraz, Ghasar ghomse, 1860m, 21.VII.2013, 1 ♀, pinned (IPIC-YU).

General distribution: Central Asia (Turkmenistan, Uzbekistan, Tajikistan) but occurs westward to Iran, Turkey, and the islands of Cyprus and Sardinia, and southward to Sudan (Michener 2007; Ascher and Pickering 2016).

Host plant associations: *Astragalus* sp. (Fabaceae).

Family: Apidae  
Subfamily: Apinae, Tribe: Bombini  
*Bombus* (Thoracobombus) *armeniacus*  
Radoszkowski, 1877

Material examined: Fars province, Sepidan, Poladkaf complex, 2500m, 17.VI.2013, 6 ♀♀, pinned (IPIC-YU).

General distribution: Bulgaria, Yugoslavia, Greece, Poland, Russia and Iran (Aytekin et al. 2002; Ascher and Pickering 2016).

Host plant associations: *Sophora* sp. (Fabaceae), *Euphorbia* sp. (Euphorbiaceae), *Salvia* sp. (Lamiaceae), *Vicia* sp. (Fabaceae), *Silybum* sp. (Asteraceae).

Table 1. List of bees collected in northeastern Fars Province, Iran.

<table>
<thead>
<tr>
<th>Family</th>
<th>Subfamily</th>
<th>Tribe</th>
<th>Genus</th>
<th>Number of Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apidae</td>
<td>Apinae</td>
<td>Bombini</td>
<td><em>Bombus</em></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eucerini</td>
<td><em>Eucera</em></td>
<td>3</td>
</tr>
<tr>
<td>Andrenidae</td>
<td>Nomadinae</td>
<td>Ancylini</td>
<td><em>Tetraloniella</em></td>
<td>3</td>
</tr>
<tr>
<td>Colletidae</td>
<td>Andreninae</td>
<td>Colletini</td>
<td><em>Tarsalia</em></td>
<td>2</td>
</tr>
<tr>
<td>Halictidae</td>
<td>Halictinae</td>
<td>Halictini</td>
<td><em>Andrena</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Colletes</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Hylaeus</em></td>
<td>2</td>
</tr>
<tr>
<td>Megachilidae</td>
<td>Megachilinae</td>
<td>Nomiinae</td>
<td><em>Lasioglossum</em></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Nomiapis</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Pseudapis</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Heriades</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Hoplitis</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Osmia</em></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Lithurgini</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Lithurgus</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Megachilini</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Coelioxys</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Afranthidium</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Anthidium</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Anthidiellum</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Pseudoanthidium</em></td>
<td>1</td>
</tr>
</tbody>
</table>
Bombus (Sibiricobombus) niveatus Kriechbaumer, 1870

Material examined: Fars province, Sepidan, Dasthe Saran, 2420m, 10.VII.2013, 6 ♀♀, pinned (IPIC-YU).


Host plant associations: Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae), Vicia sp. (Fabaceae), Silybum sp. (Asteraceae).

Bombus (Thoracobombus) zonatus Smith, 1854

Material examined: Fars province, Sepidan, 2250m, 27.VII.2013, 3 ♀♀, pinned (IPIC-YU).

General distribution: Russia, Iran, Turkey, Romania, Ukraine and Germany (Aytekin and Cagatay 2003; Ascher and Pickering 2016).

Host plant associations: Sophora sp. (Fabaceae), Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae), Vicia sp. (Fabaceae), Silybum sp. (Asteraceae).

Family: Apidae
Subfamily: Apinae, Tribe: Eucerini
Eucera (Heteroeucera) clypeata Erichson, 1835

Material examined: Fars province, Shiraz, Golestan town, 1937m, 30.VI.2013, 1♂; Sepidan, Sarbast, 2043m, 19.VI. 2013, 2♀♀, pinned (IPIC-YU).

General distribution: Croatia, Tunisia, Algeria, Europe and Eastern Asia (Ascher and Pickering 2016).

Host plant associations: Lepidium draba (Brassicaceae), Astragalus sp. (Fabaceae), Taraxacum officinale (Asteraceae), Carthamus lanatus (Asteraceae), Cichorium sp. (Asteraceae).

Eucera (Ptenoeucera) nigrifacies Lepeletier, 1841

Material examined: Fars province, Sepidan, Sarbast, 2043m, 21.VI.2013, 3 ♂♂, pinned (IPIC-YU).

General distribution: Jordan, Iran, Azerbaijan, Turkey, Tunisia, Morocco and Europe (Michener 2007; Ascher and Pickering 2016).

Host plant associations: Lepidium draba (Brassicaceae), Taraxacum officinale (Asteraceae), Medicago sativa (Fabaceae) and Cichorium sp. (Asteraceae).

Tetraloniella glauca Fabricius, 1775

Material examined: Fars province, Shiraz, Ghasreghomshe, 1860m, 21.VII.2013, 6♀♀, pinned (IPIC-YU).

General distribution: Iran, Iraq, Turkey, Cyprus and Bergama (Ascher and Pickering 2016).

Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae).

Tetraloniella menthae Risch, 1997

Material examined: Fars province, Sepidan, 2250m, 27.VII.2013, 5♀♀, pinned (IPIC-YU).

General distribution: Iran, Iraq and Turkey (Ascher and Pickering 2016).

Host plant associations: Sophora sp. (Fabaceae), Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae), Vicia sp. (Fabaceae), Silybum sp. (Asteraceae).
Tetraloniella (Glazunovia) nigriceps (Morawitz, 1895)

Material examined: Fars province, Sepidan, Dashte Saran, 2420m, 10.VII.2013, 6 ♀♂, pinned (IPIC-YU).

General distribution: Afghanistan, Turkey, Iran, Tajikistan and Turkmenistan (Michener 2007; Ascher and Pickering 2016).

Host plant associations: Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae), Vicia sp. (Fabaceae), Silybum sp. (Asteraceae).

Family: Colletidae
Subfamily: Colletinae, Tribe: Colletini
Colletes bidentulus Noskiewicz, 1936

Material examined: Fars province, Shiraz, Sarmor, 1900m, 28.VII.2013, 2 ♂♂, pinned (IPIC-YU).

General distribution: Azerbaijan, Turkey, Iran, Uzbekistan and Tajikistan (Ascher and Pickering 2016).

Host plant associations: Astragalus sp. (Fabaceae), Vicia sp. (Fabaceae), Medicago sativa (Fabaceae).

Family: Colletidae
Subfamily: Colletinae, Tribe: Colletini
Colletes ottomanus Noskiewicz, 1958

Material examined: Fars province, Shiraz, Golestan town, 1937m, 30.VI.2013 and Shiraz, Ghasreghomshe, 1860m, 21.VII.2013, 1 ♂, 1 ♀, pinned (IPIC-YU).

General distribution: Azerbaijan, Turkey, Iran, Uzbekistan and Tajikistan (Ascher and Pickering 2016).

Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae).

Family: Colletidae
Subfamily: Hylaeinae
Hylaeus (Dentigera) intermedius Förster, 1871

Material examined: Fars province, Sepidan, Tarbiat badani complex, 2500m, 17.VI.2013, 1♂, pinned (IPIC-YU).

General distribution: Lebanon, Greece, Croatia, Italy and Turkey (Ascher and Pickering 2016).

Host plant associations: Sophora sp. (Fabaceae), Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae).

Family: Halictidae
Subfamily: Halictinae, Tribe: Halictini
Halictus (Halictus) brunnescens Eversmann, 1852

Material examined: Fars province, Sepidan, Dashte Saran, 2420m, 10.VII.2013 and Sepidan, Sarbast, 2043m, 19.VII.2013, 2♀♀, pinned (IPIC-YU).

General distribution: Europe to Eastern Asia (Nadimi 2016; Ascher and Pickering 2016).

Host plant associations: Sophora sp. (Fabaceae), Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae).

Halictus (Seladonia) cephalicus Morawitz, 1873

Material examined: Fars province, Sepidan, 2250m, 27.VII.2013, Kamfiroz, 1850m, 31.VIII.2013, Shiraz Golestan town, 1937m, 29.VIII.2013 and Sepidan, Sarbast, 2043m, 2.IX.2013, 8♀♀, pinned (IPIC-YU).


Host plant associations: Astragalus sp. (Fabaceae), Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae), Mentha pulegium (Lamiaceae), Taraxacum officinale (Asteraceae), Oryza sp. (Poaceae), Silybum sp. (Asteraceae), Cichorium sp.
Apoidea in Fars Province

Halictus (Seladonia) lucidipennis Smith, 1853
Material examined: Fars province, Sepidan, Sarbast, 2043m, 4.VIII.2013 and Shiraz, Golestan town, 1937m, 29.VIII.2013, 5 ♀♀, pinned (IPIC-YU).
Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae), Astragalus sp. (Fabaceae), Cichorium sp. (Asteraceae), Portulaca sp. (Portulacaceae), Capsicum sp. (Solanaceae).

Halictus (Halictus) patellatus Morawitz, 1873
Material examined: Fars province, Sepidan, 2250m, 27.VII.2013, 2 ♀♀, pinned (IPIC-YU).
General distribution: Eastern and South of Europe and Eastern of Asia.
Host plant associations: Vicia sp. (Fabaceae), Mentha pulegium (Lamiaceae), Silybum sp. (Asteraceae).

Halictus (Halictus) resurgens Nurse, 1903
Material examined: Fars province, Kamfiroz, 1850m, 31.VIII.2013 and Shiraz, Sarmor, 1900m, 28.VII.2013, 3 ♂♂, 1 ♀, pinned (IPIC-YU).
General distribution: Europe to eastern Asia (Nadimi 2016 Ascher and Pickering 2016).
Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae), Cichorium sp. (Asteraceae).

Halictus (Seladonia) subauratoides Blüthgen, 1926
Material examined: Fars province, Sepidan, Sarbast, 2043m, 2.IX.2013, 1 ♀, pinned (IPIC-YU).
General distribution: Europe to East Asia (Ascher and Pickering 2016).
Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae).

Halictus (Halictus) submodernus Blüthgen, 1936
Material examined: Fars province, Shiraz, Ghasreghomshe, 1860m, 21.VII.2013 and Sepidan, 2250m, 27.VII.2013, 3 ♀♀, pinned (IPIC-YU).
General distribution: Turkey and Iran (Ascher and Pickering 2016).
Host plant associations: Vicia sp. (Fabaceae), Mentha pulegium (Lamiaceae), Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae), Silybum sp. (Asteraceae).

Halictus (Halictus) tetrazonianellus Strand, 1909
Material examined: Fars province, Sepidan, Sarbast, 2043m, 4.VIII.2013, 2 ♀♀, pinned (IPIC-YU).
General distribution: South of Europe and Eastern of Asia(Ascher and Pickering, 2016).
Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae), Cichorium sp. (Asteraceae).

Halictus (Vestitohalictus) tuberculatus Blüthgen, 1925
Material examined: Fars province, Sepidan, Tarbiatbadani complex, 2500m, 17.VI.2013 and Sepidan, 2250m, 27.VII.2013, 1 ♀, 1 ♂, pinned (IPIC-YU).
General distribution: Iran, Turkey and Ukraine (Ascher and Pickering 2016).
Host plant associations: Sophora sp. (Fabaceae), Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae), Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae), Silybum sp. (Asteraceae).
Lasioglossum (Lasioglossum) aegyptiellum Strand, 1909

Material examined: Fars province, Shiraz Golestan town, 1937m, 30.VI.2013, Sepidan, 2250m, 27.VII.2013 and Shiraz, Ghasreghomshe, 1860m, 21.VII.2013, 3 ♀♀, pinned (IPIC-YU).


Host plant associations: Vicia sp. (Fabaceae), Mentha pulegium (Lamiaceae), Astragalus sp. (Fabaceae), M. sativa (Fabaceae), Lepidium draba (Brassicaceae), Carthamus lanatus (Asteraceae).

Lasioglossum (Lasioglossum) discum Smith, 1853

Material examined: Fars province, Shiraz, Sarmor, 1900m, 28.VII.2013, 2 ♀♀, pinned (IPIC-YU).


Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae), Vicia sp. (Fabaceae), M. sativa (Fabaceae).

Lasioglossum (Evylaeus) clypeiferellum Strand, 1909

Material examined: Fars province, Shiraz, Sepidan, Sarbast, 2043m, 12.IV.2013, 4.VII.2013 and Shiraz, Sarmor, 1900m, 28.VII.2013, 2 ♀♀, 2 ♂♂, pinned (IPIC-YU).

General distribution: Europe to Eastern and South of Asia (Ascher and Pickering 2016).

Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae).

Lasioglossum (Evylaeus) mesosclerum Pérez, 1903

Material examined: Fars province, Sepidan, Sarbast, 2043m, 16.IX.2013, 1 ♀, pinned (IPIC-YU).


Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae).

Lasioglossum (Evylaeus) villosulum Kirby, 1802

Material examined: Fars province, Sepidan, Sarbast, 2043m, 12.IV.2013 and 4.VII.2013, 2 ♀♀, pinned (IPIC-YU).

General distribution: Europe and Eastern and South of Asia (Ascher and Pickering 2016).

Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae).

Family: Halictidae
Subfamily: Nomiinae
Nomia sp. (Nomia) bispinosa Brullé, 1832

Material examined: Fars province, Shiraz, Ghasreghomshe, 1860m, 21.VII.2013 and Shiraz, Sarmor, 1900m, 28.VII.2013, 3 ♂♂, 1 ♀, pinned (IPIC-YU).


Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae), Vicia sp. (Fabaceae), M. sativa (Fabaceae).
Nomiapis (Nomiapis) diversipes Latreille, 1806

Material examined: Fars province, Sepidan, Sarbast, 2043m, 21.VI.2013, 4.VIII.2013, 2.IX.2013 and 16.IX.2013, Shiraz, Sarmor, 1900m, 28.VII.2013, Shiraz Golestan town, 1937m, 30.VI.2013, Sepidan, Dashte Saran, 2420m, 10.VII.2013 and Sepidan, 2250m, 27.VII.2013, 6 ♀♂, 10 ♀♀, pinned (IPIC-YU).

General distribution: Europe to Eastern Asia (Nadimi 2016; Ascher and Pickering 2016).

Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae), Silybum sp. (Asteraceae), Cichorium sp. (Asteraceae).

Pseudapis (Pseudapis) sp. A

Material examined: Fars province, Shiraz, Ghasrehgomshe, 1860m, 21.VII.2013, 1 ♀, pinned (IPIC-YU).

Host plant associations: Astragalus sp. (Fabaceae).

Pseudapis (Pseudapis) sp. B

Material examined: Fars province, Sepidan, Kahkran, 2400m, 12.VII.2013, 1 ♀, pinned (IPIC-YU).

Host plant associations: Lepidium draba (Brassicaceae), Euphorbia L. (Euphorbiaceae).

Family: Megachilidae
Subfamily: Megachilinae, Tribe: Osmiini

Heriades clavicornis Morawitz, 1875

Material examined: Fars province, Shiraz, Sadra, 1800m, 18.V.2014, 1 ♀, pinned (IPIC-YU).

General distribution: Russia, Tajikistan, Iran, Armenia, Jordan, Turkey and Greece (Ascher and Pickering 2016).

Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae).

Osmia brevicornis Fabricius, 1798

Material examined: Fars province, Sepidan, Sarbast, 2043m, 25.IV.2014 and 2.V.2014, 6 ♀♀, pinned (IPIC-YU).


Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae).

Osmia caerulescens Linnaeus, 1758


General distribution: USA, Canada, Russia, New Zealand, India, Kazakhstan, Iran and Europe (Ascher and Pickering 2016).

Host plant associations: Vicia sp. (Fabaceae), Medicago sativa (Fabaceae), Lepidium draba (Brassicaceae).
Osmia difficilis Morawitz, 1875
Material examined: Fars province, Sepidan, Kahkran, 2400m, 16.V.2014, 1 ♀, pinned (IPIC-YU).
General distribution: Russia, Iran, Tajikistan, Turkey and Israel (Ascher and Pickering 2016).
Host plant associations: Lepidium draba (Brassicaceae), Euphorbia L. (Euphorbiaceae).

Osmia dives Mocsáry, 1877
Material examined: Fars province, Shiraz, Anjireh, 1800m, 21.V.2014, 2 ♀♀, pinned (IPIC-YU).
General distribution: Kyrgyzstan, Turkmenistan, Iran, Cyprus, Greece and Hungary (Ascher and Pickering 2016).
Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae).

Osmia fasciata Latreille, 1811
Material examined: Fars province, Shiraz, Derak, 2100m, 28.V.2014, 2 ♀♀, pinned (IPIC-YU).
General distribution: India, Pakistan, Afghanistan, Uzbekistan, Iran and Syria (Ascher and Pickering 2016).
Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae).

Osmia nigrohirta Friese, 1899
Material examined: Fars province, Sepidan, Tarbiat badani complex, 2500m, 17.VI.2013, 2 ♀♀, pinned (IPIC-YU).
General distribution: Iran, Lebanon, Turkey, Greece and Macedonia (Ascher and Pickering 2016).
Host plant associations: Sophora sp. (Fabaceae), Euphorbia L. (Euphorbiaceae), Salvia sp. (Lamiaceae).

Family: Megachilidae
Subfamily: Megachilinae, Tribe: Anthidiini

Afranthidium carduele Morawitz, 1876
Material examined: Fars province, Shiraz, Derak, 2100m, 28.V.2014, 1 ♀, 1 ♂, pinned (IPIC-YU).
General distribution: Spain, Greece, Turkey, Iran, Afghanistan and Tajikistan (Ascher and Pickering 2016).
Host plant associations: Astragalus sp. (Fabaceae), Carthamus lanatus (Asteraceae).
**Anthidium anguliventre Morawitz, 1888**

**Material examined:** Fars province, Shiraz, Ghasre ghomshe, 1860m, 21.VII.2013, 2 ♂♂, pinned (IPIC-YU).

**General distribution:** Oman, Jordan, Turkey, Iran, Pakistan, Turkmenistan, Kyrgyzstan and Kazakhstan (Ascher and Pickering 2016).

**Host plant associations:** *Astragalus* sp. (Fabaceae), *Carthamus lanatus* (Asteraceae).

---

**Anthidium taeniatum Latreille, 1809**

**Material examined:** Fars province, Sepidan, Sarbast, 2043m, 16.IX.2013, 1 ♂, pinned (IPIC-YU).

**General distribution:** Algeria, Spain, Tunisia, France, Croatia, Greece, Iran, Israel and Turkmenistan (Ascher and Pickering 2016).

**Host plant associations:** *Vicia* sp. (Fabaceae), *Medicago sativa* (Fabaceae), *Lepidium draba* (Brassicaceae).

---

**Anthidiellum strigatum Panzer, 1805**

**Material examined:** Fars province, Shiraz, Derak, 2100m, 28.V.2014, 1 ♂, pinned (IPIC-YU).

**General distribution:** Morocco, Tunisia, Europe, Iran, Turkmenistan, Tajikistan, Kazakhstan, Russia and Korea (Ascher and Pickering 2016).

**Host plant associations:** *Astragalus* sp. (Fabaceae), *Carthamus lanatus* (Asteraceae).

---

**Pseudoanthidium scapulare Latreille, 1809**

**Material examined:** Fars province, Shiraz, Ghasre ghomshe, 1860m, 21.VII.2013, 2 ♂♂, pinned (IPIC-YU).

**General distribution:** Algeria, Spain, France and Iran (Ascher and Pickering 2016).

**Host plant associations:** *Astragalus* sp. (Fabaceae), *Carthamus lanatus* (Asteraceae).

---

**Identified mites**

Phoretic mites collected on bees represent 2 orders, 4 families, 4 genera and 7 species. Five species are new to science that will be described elsewhere and *Imparipes burgeri* Ebermann & Jagersbacher-Baumann is new for Asia (Table 2). The family Halictidae showed highest amount of frequency of 7.3 Percent (Fig. 1). The genus *Halictus* had highest percent of frequency (Fig. 2).

---

**Table 2. List of phoretic mites on bees (Hymenoptera: Apoidea).**

<table>
<thead>
<tr>
<th>Order</th>
<th>Family</th>
<th>Species</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trombidiformes</td>
<td>Scutacaridae</td>
<td><em>Imparipes burgeri</em> Ebermann &amp; Jagersbacher-Baumann</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neopygmophoridea</td>
<td><em>Parapygmephorus magnisetosus</em> Khaustov &amp; Zaloznaya</td>
<td></td>
</tr>
<tr>
<td>Sarcoptiformes</td>
<td>Winterschmidtiiidae</td>
<td><em>Vidia</em> sp.</td>
<td><em>Megachile</em> sp.</td>
</tr>
<tr>
<td>Anoetidae</td>
<td>Anoetus sp. 1</td>
<td></td>
<td><em>H. patellatus</em></td>
</tr>
<tr>
<td></td>
<td>Anoetus sp. 2</td>
<td></td>
<td><em>H. resurgens</em></td>
</tr>
<tr>
<td></td>
<td>Anoetus sp. 3</td>
<td></td>
<td><em>N. diversipes</em></td>
</tr>
</tbody>
</table>
Figure 1. Total number of bees in different families and their contamination rate by mites (A). Frequency of different families of bees associated with mites (B).

Figure 2. Total number of bees in different genera and their contamination rate by mites, (A). Frequency percents of different bees’ genera associated with mites, (B).
Discussion

Among the bee families were collected from northern Fars, the most frequent species were respectively, belonging to Megachilidae, Apidae and Halictidae, but most frequent bees associated with mites was belong to halictid bees. There are considerable recorded halictid bees members associated with mites in different parts of the worlds (O’Connor, 2016). In Iran, Hajiqanbar et al. (2011), recorded a new species of the genus *Parapygmephorus* Cross, 1965 phoretic on *Halictus quadricinctus* (Fabricius, 1776) (Halictidae). In the present study, 1086 specimens of Apoidea from various parts of Northeastern Fars Province including cities, villages, and counties were collected. Species of five families were identified representing 52 species. Based on specialist of bees identifications and compare to Ascher and Pickering (2016), we found two new records for the Iranian fauna. During lately decade, studies on Iranian bees have been developed: for example, Monfared et al. (2007), by collecting specimens from 20 provinces in a more vast area than what previous researchers studied, revised and cleared that at least 34 species of the genus *Bombus* exist in Iran. Taghavi et al. (2008), studied *Bombus* species diversity in Tehran and Qazvin provinces in Central Elburz. They collected a total of 11 species of the genus *Bombus* and detected that at least 8 species in the two regions were similar.

In this study we found three species of the genus *Bombus* (i.e. *Bombus niveatus*, *Bombus zonatus* and *Bombus armeniacus*) from Sepidan. Khodaparast and Monfared (2012) reported 177 bee species from the Fars Province, Iran. In this survey, they reported 91 new records for Iran fauna, and seven new species for science. Among these, 56 species belonged to Apidae, 49 species of Halictidae, 39 species of Megachilidae, 31 species of Andrenidae, one species of Melittidae and one species from Colletidae. Four species of Apidae, 14 of Halictidae and five species of Megachilidae are similar with this study. Khodaparast & Monfared (2013) published a taxonomic study on 14 species of four genera of the tribe Osmiini in Fars province. We found nine species from this tribe that one species is similar to this study. Also, Khodaparast & Monfared (2013) in an independent work published a taxonomic study on 26 species of the tribe Eucerini from Fars province that 19 species were new for the fauna of Iran. We reported six species of this tribe that three species are similar. Nadimi et al. (2013) studied on cleptoparasite *Coelioxys* bees in northern Iran and recorded a total of 11 species of which 6 species were new for the fauna of Iran. We also found *Coelioxy caudate* in this study. Lately, Safi, et al. (2016) recorded some species of Halictidae (Hymenoptera: Apoidea) from Gorgan county, northern Iran. At present not any comprehensive study on bees associated mites in Iran. Khaustov and Zaloznaya (2011) found *Parapygmephorus magnisetosus* Khaustov et Zaloznaya phoretic on *Halictus sexcinctus* (Fabricius) and *Osmia rufa* (Linnaeus) from Ukraine. We collected this species on *Halictus resurgens.*
Ebermann et al. (2013) reported *Imparipes burgeri* of the 45 host species belonging to ground-nesting host's apoid bees from different parts of Europe. We found this species on *Lasioglossum clypeiferellum* that was new for Asia. Woodring (1970) separated five species of *Anoetus* on beetles of the family Scolytidae and also reported (1973) *Anoetus vexarus* associated with *Lasioglossum quadrinotatus* (Kirby). We found three new species of *Anoetus* on *Halictus patellatus*, *H. resurgens* and *Nomiaapis diversipes*.

**Acknowledgments**

The authors are very grateful to Andreas Ebmer, Alain Pauly, Stephan Risch, Micheal Kuhlmann, Dr. Holger Dathe and Dr. Pavel Klimov for their contribution to the identification of the specimens. We would like to thank Prof. Dr. Alireza Saboori and Dr. Ali Asghar Talebi for their precise comments on the first manuscript of this paper.

**References**


بررسی زنبورهای بالاخانواده (Insecta: Hymenoptera) Apoidea و کندهای مرتبط با آنها در استان فارس، ایران

سناره کبیایی بکیایی، چهاردهن، آوری، شیراز و شهرزاد از این‌که‌ها، هر یک از بازان، رزگرددان است. 

1 گرگرگی بی‌پیشکی، دانشگاه بانکوک، ص. ب. 1418-1419، تهران، ایران.

2 گرگرگی خارجی‌شناختی، گرگرگی درخشانی، دانشگاه کشاورزی، دانشگاه تربیت مدرس، ص. ب. 1415-1416، تهران، ایران.

پست الکترونیکی نویسندگان: amonfared@yu.ac.ir

تاریخ دریافت: 14 بهمن 1395، تاریخ پذیرش 6 شهریور 1395، تاریخ انتشار: 13 شهریور 1395

چکیده: در این تحقیق 52 گونه از زنبورهای گرده‌افشان بالاخانواده Apoidea و Hylaenus punctus Förster شامل شرکت این استان فارس گزارش شد که گونه‌های زکورده‌ای که جدید برای فون ایران بودند. در میان نمونه‌های آبی بررسی، 11 گونه از Apidae، 19 گونه Halictidae و 17 گونه از Megachilidae چهار گونه و 7 گونه از Andrenidae Imparipes، Vidia، Parapygmephorus کندهای پاتریکا متعلق به پاتریکا همره بودند. در Megachilidae و Halictidae و Anoetidae و Neopygmephoridae و Scutacaridae و Winterschmidtiidae و Anoetidae و Parapygmephorus و Scutacaridae و Neopygmephoridae و Winterschmidtiidae و Phoretic mites و...