

Study of the tribe Anthidiini (Hymenoptera: Megachilidae) in northern Iran, with the description of a new species

Ahmad NADIMI¹, Ali Asghar TALEBI^{1,*}, Chao-Dong ZHU² and Yaghoub FATHIPOUR¹

1. Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P. O. Box 1415-336, Tehran, Iran.

2. Key Laboratory of Zoological Systematics and Evolution (CAS), Institute of Zoology, Chinese Academy of Sciences, Beijing, 100101, P. R. China.

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

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Abstract. Twenty six species of Anthidiini (Hymenoptera: Megachilidae) belonging to the genera *Anthidiellum* (1 species), *Anthidium* (13 species), *Eoanthidium* (2 species), *Icteranthis* (6 species), *Pseudoanthidium* (2 species), *Rhodanthidium* (1 species) and *Stelis* (1 species) are recorded from northern Iran. Of these, a new species, *Anthidium (Anthidium) akanthurum* sp. nov., is described and illustrated and five species are recorded for the first time from Iran. Information on host plants, distribution and an updated list of Iranian Anthidiini fauna are provided.

Key words: Anthidiini, bee, fauna, new species, Iran.

Introduction

Bees provide key pollination services because of their high dependence on floral resources throughout their life histories (Michener 2007). Consequently, they play a crucial role in ecosystem function and sustainability, not only in agricultural environments, but also in natural ecosystems.

Iran, located in the south-western Palearctic, supports a particularly rich bee fauna (Warncke 1979, 1980, 1981, 1985). Despite the investigations of several apidologists in the last six decades (Popov 1967, Esmaili & Rastegar 1974, Warncke 1979, 1980, 1981, 1985, Talebi et al. 1995, Izadi et al. 2004, Engel 2004, 2006, Monfared et al. 2009, Tavakoli et al. 2010, Khaghaninia et al. 2010, Khaghaninia et al. 2011, Khodaparast & Monfared 2012, Nadimi et al. 2013a,b), it appears that the faunistic composition of wild bees in Iran is still largely unknown. Therefore, there is an urgent need for identifying and introducing alternative, reliable and up-to-date information about Iranian bee pollinators.

The occurrences of about 700 wild bee species (Hymenoptera, Apoidea) from 69 genera are documented for Iran including 67 anthidiine bees (Popov 1967, Warncke 1980, 1981, Ascher & Pickering 2012, Khodaparast & Monfared 2012, Nadimi et al. 2013a,b). The tribe currently which comprises 38 genera, 95 subgenera and roughly 842 species worldwide occur on all continents (Ornosa et al. 2008, Michener 2007, Ascher & Pickering 2012).

In the present work we document faunal information of pollen collecting bees of Anthidiini

(nonparasitic Anthidiini) of Iran, plant associations and their distributions. Keys for the identification of collected bees are provided and a description of a new species is given.

Materials and Methods

The faunistic and taxonomic study of anthidiine bees in Iran were investigated with specimens collected from the northern of Iran (Guilan, Mazandaran, Qazvin, Alborz and Tehran provinces) during 2009-2011. Data were collected by setting up 32 Malaise traps and netting on plants. The position of capture locations was determined by a Global Positioning System (GPS). Specimens from Malaise traps were preserved in 70% ethyl alcohol. Bees were caught by nets were killed in jars containing ethyl acetate. Identifications were guided by the keys of Warncke (1980), Amiet et al. (2004) and Michener (2007). The morphological terminology used in the descriptions follows Michener (2007). We have used the abbreviations T1, T2, T3, etc., to denote the first, second, third, etc., metasomal terga, and S1, S2, S3, etc., to denote the first, second, third, etc., metasomal sterna. All specimens are deposited in the collection of the Department of Entomology, Tarbiat Modares University, Tehran, Iran.

Results

Twenty six species of the anthidiine bees were found for a total of 144 specimens. The majority of species (13) belonged to genus *Anthidium* (Table 1). In addition to the discovery a new species for science, five species were found for the first time in Iran, which can be added to the 67 species of Anthidiini previously recorded (Table 2). The

newly recorded taxa are indicated by an asterisk (*).

Table 1. Genera and subgenera of the tribe Anthidiini identified in study areas (*: no subgenus developed, Michener, 2007)

Genera	Subgenera	No. of species
<i>Anthidiellum</i>	<i>Anthidiellum</i>	1
<i>Anthidium</i>	<i>Anthidium</i>	9
	<i>Gulanthidium</i>	1
	<i>Proanthidium</i>	3
<i>Eoanthidium</i>	<i>Eoanthidium</i>	1
	<i>Clistanthidium</i>	1
<i>Icteranthidium</i>	-*	6
<i>Pseudoanthidium</i>	<i>Pseudoanthidium</i>	1
	<i>Royanthidium</i>	1
<i>Rhodanthidium</i>	<i>Asianthidium</i>	1
<i>Stelis</i>	<i>Protostelis</i>	1

Anthidium (Anthidium) akanthurum

Nadimi et Talebi sp. nov.

Type material: Holotype ♀, Iran, Tehran Province, Tehran, Tehran-Qom express way, 70 kilometres south of Tehran (N= 35°07' E= 50°57', 1110 m), 25.V.2009, leg. A. A. Talebi. **Paratypes:** 2♀♀, same data as Holotype, The Holotype and paratypes are deposited in the collection of the Department of Entomology, Tarbiat Modares University, Tehran, Iran.

Diagnosis. The new species (*Anthidium (Anthidium) akanthurum* sp. nov.) differs from all previously described species of the subgenus *Anthidium* by the front coxa with spine posteriorly and depression of T3 and T4 with white pubescence; T5 and T6 completely with dense felt-like white pubescence.

Description

Measurements. Approximate total body length 9.0 mm (Fig.1); forewing length 6.0 mm; head width 3.2 mm; head length 2.5 mm; interocellar distance 0.5 mm; ocellular distance 0.53 mm; length of eye 2.25 mm; interantennal distance 0.43 mm; clypeoantennal distance 0.35 mm; clypeocular distance 0.2 mm; antennocular distance 0.52 mm; antennocellar distance 0.8 mm.

Head. Mandible slender, base yellow, apex dark, with 5 sharp teeth, separated by acute notches; lower tooth longest, strong outer ridge (Fig.2); labrum cream, with two basal tubercles (Fig.3); maxillary palpus minute, two-segmented; clypeus cream, broader than long (Fig.4), (length 1 mm, width 1.25 mm), convex with impunctate midline, crenulated marginally; antenna dark brown dorsally, scape and flagella yellow brown,

pedicel dark brown ventrally, second to fourth flagellum broader than long (Fig.5); subantennal suture straight; face without longitudinal median ridge; supraclypeal area with small cream apicomedia marking; gena narrower than compound eye in profile (Fig.6); gena and vertex with a complete cream band; ocelloccipital distance as long as two ocelli (Fig.7); preoccipital carina absent.

Mesosoma. Pronotal lobe cream with a dorsal-anterior carina, covered with long white hairs (Fig.8); omaulus rounded; scutum with recumbent short dense hairs, almost totally black and with reversed J-shaped cream marking along anterior and lateral edges (Fig.11); axilla rounded, largely cream and not produced posteriorly (Fig.9); scutellum with cream subapical band (Fig.9); tegulae reddish brown, with cream spot anteriorly; triangular area of propodeum large, impunctate, shining; mesepisternum and metepisternum with small cream spots (Fig.10); front coxa with spine posteriorly (Fig.11), front and hind coxa black with cream markings apically, middle coxa, trochanter, femur and tibia orange-red, outer surfaces with cream markings, ventral surfaces of hind and middle tibia dark brown; tarsi orange-red; front and middle tibia with one spine on outer side, hind tibia without spine; outer surface of hind tibiae with carina; arolia absent

Metasoma. Terga brown (Fig.12); basal margin of T1 with weak carina; scopa white (Fig.13); T1-T5 with broad complete cream bands; T6 cream; S1-S4 orange with cream spots laterally; S6 brown.

Pilosity. Pilosity predominantly white; clypeus with sparsely white hairs; supraclypeal area, upper half of paraocular areas, frons, scape, mesepisternum and metepisternum with white shaggy hairs; pilosity of vertex and dorsal area of thorax with fox-colour; basal area of propodeum with white hairs; terga with white hairs laterally, depression of T3 and T4 with white pubescence; T5 and T6 completely with dense felt-like white pubescence (Fig. 12).

Punctures. Clypeus coarsely and sparsely punctate; vertex, scutum, scutellum, T1, T2 and T3 densely fine punctate (Fig.14).

Etymology. The species name, *akanthurum*, is a Greek word for a spine, referring to the longitudinal spine on the front coxa.

Male. Unknown.

Anthidiellum (Anthidiellum) strigatum

(Panzer, 1805)

Material examined: Iran, Tehran province,

Table 2. An updated list of the tribe Anthidiini of Iran.

No.Species name	References
1 <i>Afranthisdium</i> (<i>Mesanthidium</i>) <i>alaemon</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
2 <i>Afranthisdium</i> (<i>Mesanthidium</i>) <i>carduele</i> Morawitz, 1876	Warncke (1981), Grace (2010)
3 <i>Afranthisdium</i> (<i>Mesanthidium</i>) <i>pusillum</i> (Morawitz, 1895)	Warncke (1980, 1981), Grace (2010)
4 <i>Anthidiellum</i> (<i>Anthidiellum</i>) <i>breviusculum</i> (Perez, 1890)	Warncke (1981)
5 <i>Anthidiellum</i> (<i>Anthidiellum</i>) <i>crenulatum</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
6 <i>Anthidiellum</i> (<i>Anthidiellum</i>) <i>strigatum</i> (Panzer, 1805)	Popov (1935), Warncke (1981), current study
7 <i>Anthidium</i> (<i>Anthidium</i>) <i>bischoffi</i> Mavromoustakis, 1954	Popov (1967), Warncke (1980, 1981), Grace (2010), Khodaparast & Monfared (2012)
8 <i>Anthidium</i> (<i>Anthidium</i>) <i>caspicum</i> Morawitz, 1880	Mavromoustakis (1968), Warncke (1980, 1981), Grace (2010)
9 <i>Anthidium</i> (<i>Anthidium</i>) <i>cingulatum</i> Latreille, 1809	Alfken (1935), Popov (1967), Esmaili & Rastegar (1974), Warncke (1981), Grace (2010)
10 <i>Anthidium</i> (<i>Anthidium</i>) <i>christianseni</i> Mavromoustakis, 1956	Mavromoustakis (1968), Warncke (1981)
11 <i>Anthidium</i> (<i>Anthidium</i>) <i>dalmaticum</i> Mocsáry, 1884	Esmaili & Rastegar (1974), Warncke (1981)
12 <i>Anthidium</i> (<i>Anthidium</i>) <i>diadema</i> Latreille, 1809	Warncke (1981), Grace (2010), Rasekh-Adel et al. (2012).
13 <i>Anthidium</i> (<i>Anthidium</i>) <i>florentinum</i> (Fabricius, 1775)	Morice (1921), Alfken (1935), Alfken & Blüthgen (1937), Popov (1967), Esmaili & Rastegar (1974), Warncke (1981), Talebi et al. (1995), Karimpour et al. (2002), Izadi et al. (1998), Izadi et al. (2004), Khaghaninia et al. (2010), Tavakoli et al. (2010), Keshtkar et al. (2012), Khodaparast & Monfared (2012), Monfared et al. (2012), current study
14 <i>Anthidium</i> (<i>Anthidium</i>) <i>gussakovskiji</i> Mavromoustakis, 1939	Warncke (1981), Monfared et al. (2012), current study
15 <i>Anthidium</i> (<i>Anthidium</i>) <i>loti</i> Perris, 1852	Esmaili & Rastegar (1974), Warncke (1981), current study
16 <i>Anthidium</i> (<i>Anthidium</i>) <i>manicatum</i> Linnaeus, 1758	Warncke (1981), current study
17 <i>Anthidium</i> (<i>Anthidium</i>) <i>philorum</i> Cockerell, 1910	current study
18 <i>Anthidium</i> (<i>Anthidium</i>) <i>punctatum</i> Latreille, 1809	Warncke (1981), current study
19 <i>Anthidium</i> (<i>Anthidium</i>) cf. <i>spiniventre</i> Friese, 1899	Warncke (1981), current study
20 <i>Anthidium</i> (<i>Anthidium</i>) <i>soikai</i> Mavromoustakis, 1968	Mavromoustakis (1968), Warncke (1980, 1981), Grace (2010)
21 <i>Anthidium</i> (<i>Anthidium</i>) <i>sublustre</i> Warncke, 1981	Warncke (1981), Grace (2010)
22 <i>Anthidium</i> (<i>Anthidium</i>) <i>syriacum</i> Pérez, 1911	Warncke (1981), Grace (2010)
23 <i>Anthidium</i> (<i>Anthidium</i>) <i>taeniatum</i> Latrielle, 1809	Esmaili & Rastegar (1974), Warncke (1981), Grace (2010), Monfared et al. (2012)
24 <i>Anthidium</i> (<i>Anthidium</i>) <i>taschenbergii</i> Morawitz, 1894	Warncke (1980, 1981), Grace (2010)
25 <i>Anthidium</i> (<i>Anthidium</i>) <i>tesselatum</i> Spinosa, 1838	Warncke (1981)
26 <i>Anthidium</i> (<i>Anthidium</i>) <i>wüstneii</i> Mocsáry, 1887	Warncke (1981), Grace (2010)
27 <i>Anthidium</i> (<i>Gulanthisdium</i>) <i>anguliventre</i> Morawitz, 1888	Warncke (1981), Monfared et al. (2012), current study
28 <i>Anthidium</i> (<i>Proanthidium</i>) <i>amabile</i> Alfken, 1932	Warncke (1981), Grace (2010)
29 <i>Anthidium</i> (<i>Proanthidium</i>) <i>oblongatum</i> (Illiger, 1806)	Esmaili & Rastegar (1974), Warncke (1981)
30 <i>Anthidium</i> (<i>Proanthidium</i>) cf. <i>rotundum</i> Warncke, 1980	Warncke (1981), current study
31 <i>Anthidium</i> (<i>Proanthidium</i>) <i>undulatum</i> Dours, 1873	Warncke (1981), Khodaparast & Monfared (2012), current study
32 <i>Anthidium</i> (<i>Turkanthidium</i>) <i>brevithorace</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
33 <i>Eoanthidium</i> (<i>Cistanthisdium</i>) <i>nasicum</i> (Friese, 1917)	Warncke (1981), Grace (2010); current study
34 <i>Eoanthidium</i> (<i>Eoanthidium</i>) <i>insulare</i> (Morawitz, 1874)	Mavromoustakis (1937), Warncke (1980, 1981), Grace (2010), current study
35 <i>Eoanthidium</i> (<i>Eoanthidium</i>) aff. <i>judaense</i> (Mavromoustakis, 1945)	Khodaparast & Monfared (2012)
36 <i>Icteranthisdium</i> <i>abbasi</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
37 <i>Icteranthisdium</i> <i>angulosum</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
38 <i>Icteranthisdium</i> <i>capitum</i> (Warncke, 1981)	Warncke (1981), Grace (2010)

Table 2. (continued)

No.Species name	References
39 <i>Icteranthidium cimbiciforme</i> (Smith, 1854)	Friese (1898), Alfken & Blüthgen (1937), Mavromoustakis (1968), Popov (1967), Esmaili & Rastegar (1974), Warncke (1980, 1981), Grace (2010)
40 <i>Icteranthidium decoloratum</i> Alfken, 1932	Popov (1967), Warncke (1980, 1981), Grace (2010)
41 <i>Icteranthidium fedtschenkoi</i> (Morawitz, 1875)	Warncke (1981), Grace (2010), current study
42 <i>Icteranthidium ferrugineum</i> (Fabricius, 1787)	Warncke (1981), Grace (2010)
43 <i>Icteranthidium grohmanni</i> (Spinola, 1838)	Esmaili & Rastegar (1974), Grace (2010), current study
44 <i>Icteranthidium laterale</i> (Latreille, 1809)	Warncke (1981), Grace (2010), current study
45 <i>Icteranthidium limbiferum</i> (Morawitz, 1875)	Popov (1967), Esmaili & Rastegar (1974), Warncke (1981), Grace (2010), current study
46 <i>Icteranthidium obsoletum</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
47 <i>Icteranthidium ruficorne</i> (Morawitz, 1875)	current study
48 <i>Icteranthidium subangulosum</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
49 <i>Icteranthidium urfanum</i> (Warncke, 1980)	Warncke (1980, 1981), Grace (2010)
50 <i>Icteranthidium venustum</i> Morawitz, 1877	current study
51 <i>Plesianthidium</i> (<i>Spinanthidium</i>) <i>trachusiforme</i> (Friese, 1913)	Monfared et al. (2012)
52 <i>Pseudoanthidium</i> (<i>Exanthidium</i>) <i>eximium</i> (Giraud, 1863)	Warncke (1981), Grace (2010)
53 <i>Pseudoanthidium</i> (<i>Pseudoanthidium</i>) <i>arenosum</i> (Warncke, 1981)	Warncke (1981), Grace (2010)
54 <i>Pseudoanthidium</i> (<i>Pseudoanthidium</i>) <i>cribratum</i> (Morawitz, 1875)	Warncke (1981), Grace (2010)
55 <i>Pseudoanthidium</i> (<i>Pseudoanthidium</i>) <i>puncticolle</i> (Morawitz, 1888)	Warncke (1981), Grace (2010)
56 <i>Pseudoanthidium</i> (<i>Pseudoanthidium</i>) <i>scapulare</i> (Latreille, 1809)	Khodaparast & Monfared (2012), current study
57 <i>Pseudoanthidium</i> (<i>Royanthidium</i>) <i>melanurum</i> (Klug, 1832)	current study
58 <i>Pseudoanthidium</i> (<i>Royanthidium</i>) <i>reticulatum</i> (Mocsáry, 1884)	Warncke (1981), Grace (2010)
59 <i>Rhodanthidium</i> (<i>Asianthidium</i>) <i>aculeatum</i> (Klug, 1832)	Warncke (1981), Grace (2010)
60 <i>Rhodanthidium</i> (<i>Asianthidium</i>) <i>caturigense</i> (Giraud, 1863)	current study
61 <i>Rhodanthidium</i> (<i>Meganthidium</i>) <i>superbum</i> Morawitz, 1884	Esmaili & Rastegar (1974)
62 <i>Rhodanthidium</i> (<i>Rhodanthidium</i>) <i>exsectum</i> (Pasteels, 1969)	Warncke (1981), Grace (2010)
63 <i>Rhodanthidium</i> (<i>Rhodanthidium</i>) <i>septemdentatum</i> (Lepelletier, 1841)	Khaghaninia et al. (2010)
64 <i>Stelis</i> (<i>Heterostelis</i>) <i>gigantea</i> Friese, 1921	Warncke (1985), Grace (2010)
65 <i>Stelis</i> (<i>Protostelis</i>) <i>signata</i> (Latreille, 1809)	Warncke (1985), current study
66 <i>Stelis</i> (<i>Stelidomorpha</i>) <i>nasuta</i> (Latreille, 1809)	Warncke (1985)
67 <i>Stelis</i> (<i>Stelidomorpha</i>) <i>pentelica</i> Mavromoustakis, 1963	Warncke (1985)
68 <i>Stelis</i> (<i>Stelis</i>) <i>orientalis</i> Warncke, 1992	Warncke (1992), Grace (2010)
69 <i>Stelis</i> (<i>Stelis</i>) <i>ornatula</i> (Klug, 1807)	Warncke (1985)
70 <i>Stelis</i> (<i>Stelis</i>) <i>phaeoptera</i> (Kirby, 1802)	Warncke (1985)
71 <i>Stelis</i> (<i>Stelis</i>) <i>scutellaris</i> Morawitz, 1894	Warncke (1985, 1992), Grace (2010)
72 <i>Stelis</i> (<i>Stelis</i>) <i>simillima</i> Morawitz, 1876	Warncke (1985), Grace (2010)
73 <i>Trachusa</i> (<i>Archianthidium</i>) <i>pubescens</i> (Morawitz, 1872)	Esmaili & Rastegar (1974), Warncke (1980), Monfared et al. (2012)

Peykanschahr (N= 35°44'30.80" E= 51°09' 57.70", 1273 m), 1♂ 7.IX.2009, sweeping net, *M. sativa*, 1♀ 3.VI.2010, sweeping net, *L. sativus*, 2♂♂ 26.VI.2010, sweeping net, *Allagi* sp.; Tehran province, Mal-lard (N= 35° 40' 051" E= 50° 56' 869", 1168 m), 1♀ 8.VI.2010; 1♂; 1♂ 17.VIII.2010; 1♂ 24.VIII.2010; 1♂ 7.IX.2010, Malaise trap, leg. A. Nadimi.

Published records: Popov (1935) [as *Anthidium strigatum* ssp. *luteum* Friese 1897], Warncke (1981)

[as *Anthidium strigatum* ssp. *luteum* Friese 1897 and *Anthidium strigatum* ssp. *crassepunctatum* Popov (1935)].

Distribution in Iran: Alborz province, East Azarbaijan province, Fars province, Kerman province, Kermanshah province, Khuzestan province, Lorestan province, Tehran province.

General distribution: Europe, Caucasus, Turkey, Iran, Central Asia, Siberia, Russian Far East,



Figures 1-6. *Anthidium (A.) akanthurum* sp. nov. (female). 1- dorsal view; 2- details of mandible; 3- details of base of labrum; 4- clypeus; 5- antenna; 6- head in lateral view.

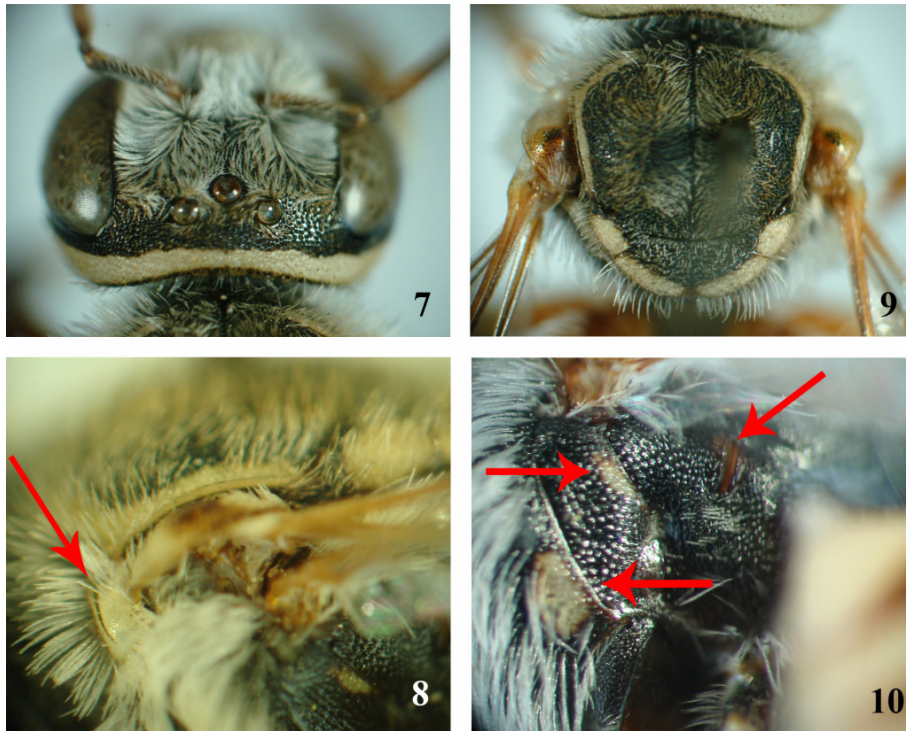
Korea, North Africa (Warncke 1980, Banaszak & Romasenko 1998, Stöckl 2000, Amiet et al. 2004, Proshchalykin 2007, Ornos et al. 2008, Grace 2010).

Flower preferences: Polylectic, with a strong preference for Papilionoideae (Fabaceae) (Müller

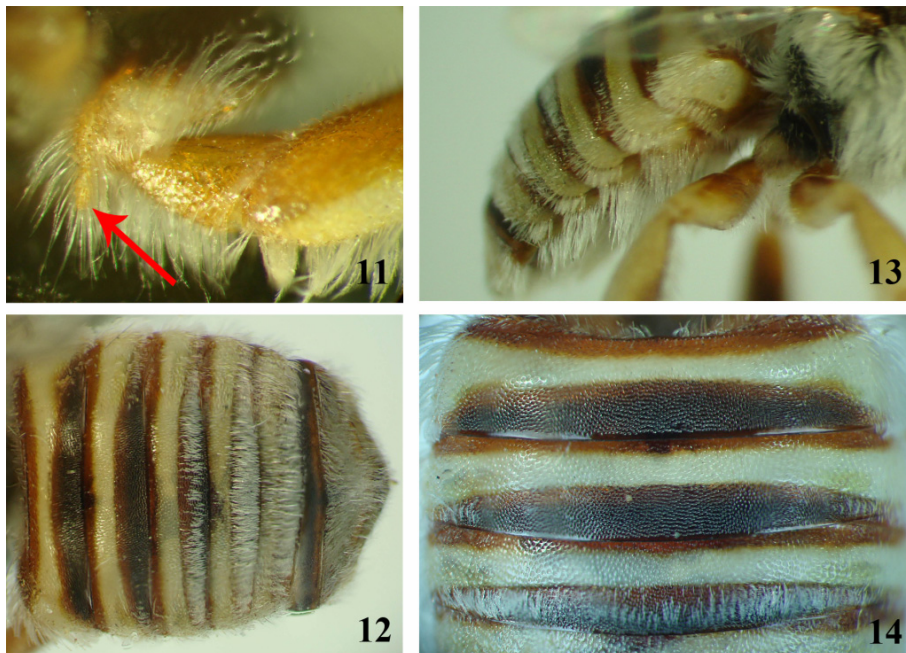
1996).

Anthidium (Anthidium) christianseni
Mavromoustakis, 1956

Material examined: Iran, Alborz province, Sarziarat-Chalus road (N= 35°55'173" E= 51°06'854",



Figures 7-10. *Anthidium* (*A.*) *akanthurum* sp. nov. (female). 7- head in dorsal view; 8- pronotal lobe; 9- mesoscutum; 10- mesepisternum, metepisternum, propodeum and propodeal spiracle in lateral view.



Figures 11-14. *Anthidium* (*A.*) *akanthurum* sp. nov. (female). 11- Spine of front coxa; 12- metasoma in dorsal view; 13- metasoma in lateral view; 14- details of T1-T3.

1980 m), 1♀ 22.VI.2010, Malaise trap; Tehran province, Malard (N= 35°40'051" E= 50°56' 869", 1168 m), 1♂ 24.VIII.2010, Malaise trap, Leg. A. Nadimi

Published records: Mavromoustakis (1968), Warncke (1981).

Distribution in Iran: Alborz province, Tehran province.

General distribution: Lebanon, Iran (Warncke 1980, 1981, Grace 2010).

Flower preference: polylectic (Müller 1996).

Anthidium (Anthidium) florentinum

(Fabricius, 1775)

Material examined: Iran, Guilan province, Astaneh Ashrafieh (N= 37°15' E= 49°56', -13 m) 1♀ 6.VI.2010, sweeping net; Guilan province, Astaneh Ashrafieh-Eshmankomachal (N= 37° 22' 061" E= 49° 57' 964", -16 m), 5♀ 1♂ 9.VI.2009, 1♂ 3♀ 7.VI.2010, sweeping net, *Punica granatum* Linnaeus, 11♀ 3♂♂ 19.VII.2010, sweeping net, *Rubus* sp.; Guilan province, Ghazichak-Rudsar, 4♀♀ 7.VI.2010, sweeping net, *Onopordon* sp.; Mazandaran province, Kalardasht, 2♀♀ 1♂ 13.VI.2010, sweeping net, *Medicago sativa* Linnaeus; Mazandaran province, Mashala Abad-Kalardasht-Abbas Abad road, 2♀♀ 1♂ 13.VI.2010, sweeping net, *P. granatum*; Tehran province, Mohammad Abad-Pishva, 2♀♀ 3♂♂ 15.VI.2011, sweeping net, *Allagi* sp., leg. A. Nadimi.

Published records: Morice (1921), Alfken (1935), Alfken & Blüthgen (1937), Popov (1967), Esmaili & Rastegar (1974), Warncke (1981), Talebi et al. (1995), Karimpour et al. (2002), Izadi et al. (1998), Izadi et al. (2004), Khaghaninia et al. (2010), Tavakoli et al. (2010), Keshtkar et al. (2012), Khodaparast & Monfared (2012), Monfared et al. (2012).

Distribution in Iran: East Azarbaijan province, Fars province, Golestan province, Hamadan province; Guilan province, Kerman Province, Kohgiluyeh and Boyer-Ahmad province, Lorestan Province, Mazandaran province, Qazvin province, Semnan province, Sistan and Baluchestan province, South Khorasan, Tehran province, West Azarbaijan province, Zanjan province.

General distribution: south and central Europe, Caucasus, Turkey, Iran, Palestine, Syria, Central Asia, Siberia, China (Popov 1967, Warncke 1980, Banaszak & Romasenko 1998, Stöckl 2000, Amiet et al. 2004, Wu 2006, Ornos et al. 2008, Grace 2010).

Flower preference: Polylectic, prefer Fabaceae and Lamiaceae (Banaszak & Romasenko 1998, Amiet et al. 2004, Grace 2010).

Anthidium (Anthidium) gussakovskiji

Mavromoustakis, 1939

Material examined: Iran, Alborz province, Chalus road-Hasankdar (N= 35°57' E= 51°22', 2300 m), 1♀ 18.VII, 2010, sweeping net, *Centaurea* sp.; Qazvin province, Zereshk (N= 36° 25'398" E= 50°06'628" 1926 m), 1♀ 6.VI.2011, sweeping net, *Centaurea* sp., leg. A. Nadimi.

Published records: Warncke (1981) [as *Anthidium gussakovskiji* spp. *gussakovskiji* and *Anthidium gussakovskiji* spp. *neosyriacum* Mavromoustakis 1956], Monfared et al. (2012).

Distribution in Iran: Alborz province, Khuzestan province, Kohgiluyeh and Boyer-Ahmad province, Qazvin province, Sistan and Baluchestan province.

General distribution: Turkey, Syria, Iran, Tajikistan (Warncke 1980, 1981, Grace 2010).

Flower preference: mostly probably oligolectic on thistles (Cardueae) (Müller 1996).

Anthidium (Anthidium) loti Perris, 1852

Material examined: Iran, Qazvin province, Barajin (N= 36°21'717" E= 50°03' 887" 1541 m), 1♂ 22.VI.2011; Zereshk (N= 36°25'398" E= 50°06'628" 1926 m), 1♀ 26.VII.2011; Tehran province, Firuzkoh-Semnan road, 1♀ 13.VII.2011, sweeping net, *M. sativa*, leg. A. Nadimi.

Published records: Esmaili & Rastegar (1974) [as *Anthidium variegatum* Fabricius, 1781], Warncke (1981).

Distribution in Iran: Alborz province, Guilan province, Hamadan province, Razavi Khorasan province, Qazvin province, Tehran province.

General distribution: south and central Europe, Caucasus, Turkey, Cyprus, Lebanon, Palestine, Iran, Central Asia (Warncke 1980, Banaszak & Romasenko 1998, Amiet et al. 2004, Ornos et al. 2008, Grace 2010).

Flower preferences: Polylectic, with a strong preference for Papilionoideae (Fabaceae) (Müller 1996, Amiet et al. 2004).

Anthidium (Anthidium) manicatum

(Linnaeus, 1758)

Material examined: Iran, Guilan province, Rudsar-Ziaz- (N= 36°52'547" E= 50°13'290", 537 m), 1♀

28.VI.2010, Malaise trap; Guilan province, Ghazichak-Rudsar, (N= 36°45'877" E= 50°20'018", 1787 m), 2♂♂ 14.VI.2010, 1♂ 12.VII.2010, Malaise trap; Mazandaran province, Chamestan- Gaznasara (N= 36°16'969" E= 52°10'927" 2031 m), 2♂♂ 29.VI.2011, 2♂♂ 13.VII.2011, 1♂ 27.VI.2011, 1♂ 25.VIII.2011, Malaise trap, leg. A. Nadimi.

Published records: Warncke (1981).

Distribution in Iran: Alborz province, Guilan province, Mazandaran province.

General distribution: south and central Europe, Caucasus, Turkey, Lebanon, Iran, Palestine, north Kazakhstan and Siberia, China, North Africa, North and South America (Warncke 1980, Banaszak & Romasenko 1998, Stöckl 2000, Amiet et al. 2004, Wu 2006, Proshchalykin 2007, Ornos et al. 2008, Grace 2010).

Flower preference: polylectic, prefer Fabaceae, Lamiaceae and Scrophulariaceae (Banaszak & Romasenko 1998, Amiet et al. 2004, Grace 2010).

***Anthidium (Anthidium) philorum*
Cockerell, 1910***

Material examined: Iran, Qazvin province, Barajin (N= 36°21'717" E= 50°03'887" 1541 m), 3♂♂ 22.VI.2011, sweeping net, *Lotus* sp.; Qazvin province, Zereshk (N= 36°25'398" E= 50°06'628" 1926 m), 1♂ 22.VI.2011, 1♂ 6.VII.2011, leg. A. Nadimi.

Published records: current study.

Distribution in Iran: Qazvin province.

General distribution: China (Wu 2006), Iran.

Flower preference: visiting *Lotus* sp. (Fabaceae).

***Anthidium (Anthidium) punctatum* Latreille, 1809**

Material examined: Iran, Alborz province, Chalus road-Shahrestanak (N= 35°57'583" E= 51°22'339", 2305 m), 1♂ 8.VI.2010, Malaise trap; Alborz province, Chalus road-Kandovan (N= 37°47'36.65" E= 46°14'52.35" 2240 m), 1♀, 1♂ 13.VI.2011, sweeping net, *Onopordon acanthium*, leg. A. Nadimi.

Published records: Warncke (1981).

Distribution in Iran: Alborz province, Fars province, Tehran province.

General distribution: Europe, Caucasus, Turkey, Iran, Central Asia, Mongolia, North China and Siberia, North Africa (Warncke 1980, Banaszak & Romasenko 1998, Stöckl, 2000, Amiet et al. 2004, Wu 2006, Proshchalykin 2007, Ornos et al. 2008, Grace 2010).

Flower preference: polylectic, with a strong preference for Papilionoideae (Fabaceae) (Müller 1996, Amiet et al. 2004).

Anthidium (Anthidium) cf. spiniventre

Friese, 1899

Material examined: Iran, Alborz province, Chalus road-Shahrestanak (N= 35°57'583" E= 51°22' 339", 2305 m), 1♀ 18.VII.2010, Malaise trap, leg. A. Nadimi.

Published records: Warncke (1981).

Distribution in Iran: Alborz province, Fars province, Tehran province.

General distribution: Greece, Turkey, Syria, Lebanon, Palestine, Iran (Warncke 1980, Grace 2010).

Flower preference: oligolectic on thistles (Cardueae) (Müller 1996).

Anthidium (Gulanthidium) anguliventre

Morawitz, 1888

Material examined: Iran, Qazvin province, Zereshk (N= 36°25'398" E= 50°06'628" 1926 m), 1♀ 26.VII.2011, sweeping net, *Centaurea* sp., leg. A. Nadimi.

Published records: Warncke (1981), Monfared et al. (2012).

Distribution in Iran: Fars province, Kohgiluyeh and Boyer-Ahmad province, Hormozgan province, Khuzestan province, Qazvin province, Tehran province.

General distribution: Turkey, Syria, Palestine, Oman, Iran, Turkmenistan, Pakistan (Warncke 1980, Grace 2010).

Flower preference: oligolectic on thistles (Cardueae) (Müller 1996).

Anthidium (Proanthidium) oblongatum

(Illiger, 1806)

Material examined: Iran, Guilan province, Rudsar-Orkom (N= 36°45'739" E= 50°18'198" 1245 m), 1♂ 10.VIII.2010, Malaise trap, leg. A. Nadimi.

Published records: Esmaili & Rastegar (1974), Warncke (1981).

Distribution in Iran: Alborz province, Guilan province, Tehran province.

General distribution: south, central and eastern Europe, Caucasus, Turkey, Iran, Central Asia, Russia, China and North Africa (Warncke 1980, Banaszak & Romasenko 1998, Stöckl 2000, Amiet et al. 2004, Wu 2006, Ornos et al. 2008, Grace 2010, Proshchalykin 2012).

Flower preference: polylectic (Müller 1996).

Anthidium (Proanthidium) cf. rotundum

Warncke, 1980

Material examined: Iran, Tehran province,

Peykanschahr (N= 35°44'30.80" E= 51°09' 57.70", 1273 m), 2♂♂ 25.VI.2010, sweeping net, *Agastache foeniculum* [Pursh] Kuntze; Pishva-Mohammad Abad (N= 35°15' E= 51°44' 873 m), 2♂♂ 15.VI.2011, sweeping net, *Centaurea* sp., leg. A. Nadimi.

Published records: Warncke (1981).

Distribution in Iran: Alborz province, Tehran province.

General distribution: Greece, Turkey, Lebanon, Egypt, Iran (Warncke 1980, 1981, Grace 2010).

Flower preference: mostly probably oligolectic on thistles (Cardueae) (Müller 1996).

Anthidium (Proanthidium) undulatum

Dours, 1873

Material examined: Iran, Tehran province, Peykanschahr (N= 35°44' 30.80" E= 51°09'57.70", 1273 m), 3♀♀ 4♂♂ 26.V.2010, sweeping net, *Lathyrus sativus* Linnaeus ; 1♂ 27.V.2010, sweeping net, *Lathyrus sativus*, 7♀♀ 2♂♂, 29.V.2010, sweeping net, *L. sativus*; 1♀ 2♂♂, 3.VI.2010, sweeping net, *L. sativus*; 1♀ 4.VI.2010, sweeping net, *L. sativus*; 3♂♂ 10.VI.2010, sweeping net, *L. sativus*; Qazvin province, Zereshk (N= 36°25'398" E= 50°06'628" 1926 m), 1♂ 22.VI.2011, Malaise trap, leg. A. Nadimi.

Published records: Warncke (1981) [as *Anthidium undulatum* ssp. *holozonicum* (Mavromoustakis 1939) and *Anthidium undulatum* ssp. *wahrmanni* (Mavromoustakis 1948)], Khodaparast & Monfared (2012).

Distribution in Iran: Fars province, Hamadan province, Qazvin province, Tehran province.

General distribution: France, Croatia, Greece, Turkey, Azerbaijan, Cyprus, Syria, Lebanon, Jordan, Palestine, Iran (Warncke 1980, 1981, Ornos et al. 2008, Grace 2010).

Flower preference: Polylectic, with a strong preference for Papilionoideae (Fabaceae) (Müller 1996).

Eoanthidium (Clistanthidium) nasicum

(Friese, 1917)

Material examined: Iran, Qazvin province, Zereshk (N= 36°25'398" E= 50°06'628" 1926 m), 1♀ 6.VII.2011, 1♀ 26.VII.2011, Malaise trap, leg. A. Nadimi.

Published records: Warncke (1981) [as *Anthidium nasicum* ssp. *nasiculum* (Pasteels 1969)], Grace (2010).

Distribution in Iran: Alborz province, Fars Province, Hormozgan province, Qazvin province, Razavi Khorasan province, West Azarbaijan province.

General distribution: Greece, Turkey, Syria, Palestine, Iran (Warncke 1980, 1981, Grace 2010).

Flower preference: polylectic (Müller 1996).

Eoanthidium (Eoanthidium) insulare

(Morawitz, 1874)

Material examined: Iran, Tehran province, Malard (N= 35°40'051" E= 50°56'869", 1168 m), 1♂ 8.VI.2010; 1♀ 2♂♂ 15.VI.2010; 1♀ 22.VI.2010; 1♀ 13.VII.2010; 1♂ 27.VII. 2010; 2♂♂ 7.IX.2010; 1♀ 14.IX.2010, Malaise trap, leg. A. Nadimi.

Published records: Mavromoustakis (1937) [as *Dianthidium insulare* ssp. *persicolum* Mavromoustakis 1937], Warncke (1980) [as *Anthidium insulare* Morawitz 1873], Warncke (1981) [as *Anthidium insulare* ssp. *persicolum* (Mavromoustakis 1937)], Grace (2010).

Distribution in Iran: south west of Iran, Tehran province.

General distribution: Greece, Syria, Turkey, Cyprus, Palestine, Iran, Tajikistan (Warncke 1980, Grace 2010).

Flower preference: polylectic (Müller 1996).

Icteranthidium fedtschenkoi (Morawitz, 1875)

Material examined: Iran, Guilan province, Loshan-Damash road (N= 36°40'20.51" E= 49°38'06.33" 1165 m), 2♀♀ 2♂♂ 6.VII.2011, sweeping net, *Centaurea* sp., leg. A. Nadimi.

Published records: Warncke (1981) [as *Anthidium fedtschenkoi* Morawitz 1875], Grace (2010).

Distribution in Iran: Guilan province, Mazandaran province, Fars province.

General distribution: Syria, Lebanon, Iran, Central Asia (Warncke 1980, 1981, Grace 2010).

Flower preference: oligolectic on thistles (Cardueae) (Müller 1996).

Icteranthidium grohmanni (Spinola, 1838)

Material examined: Iran, Alborz province, Chalus road-Sarziarat (N= 35°55'173" E= 51°06'854", 1980 m), 1♂ 7.IX.2010, Malaise trap, leg. A. Nadimi.

Published records: Esmaili & Rastegar (1974) [as *Anthidium latreillei* Lepelletier 1841], Grace (2010).

Distribution in Iran: Alborz province, Azarbaijan.

General distribution: south Europe, Greece, Egypt, Turkey, Cyprus, Syria, Lebanon, Iran (Esmaili & Rastegar 1974, Warncke 1980, Ornos et al. 2008, Grace 2010).

Flower preference: polylectic (Müller 1996).

***Icteranthidium laterale* (Latreille, 1809)**

Material examined: Iran, Guilan province, Rudsar-Ghazichak (N= 36°45'877" E= 50°20'018", 1787 m), 1♀ 1♂ 5.VII.2010, sweeping net, *Onopordum* sp., leg. A. Nadimi.

Published records: Warncke (1981) [as *Anthidium laterale* Latreille 1809], Grace (2010).

Distribution in Iran: Guilan province, Mazandaran province.

General distribution: south, eastern and central Europe, Caucasus, Turkey, Iran, Kazakhstan, Central Asia, Russia, China, North Africa (Warncke 1980, Schwarz et al. 1996, Banaszak & Romasenko 1998, Amiet et al. 2004, Wu 2006, Ornosa et al. 2008, Grace 2010).

Flower preferences: Polylectic, with a distinct preference for Cardueae (Asteraceae) (Müller 1996, Amiet et al. 2004, Proshchalykin 2012).

***Icteranthidium limbiferum* (Morawitz, 1875)**

Material examined: Iran, Alborz province, Chalus road-Sarziarat, 2♂♂ 7.IX.2010, Malaise trap, leg. A. Nadimi.

Published records: Popov (1967), Esmaili & Rastegar (1974) [as *Anthidium limbiferum* Morawitz 1875], Warncke (1981) [as *Anthidium limbiferum* Morawitz 1875], Grace (2010).

Distribution in Iran: Alborz province, Fars province, Golestan province, Isfahan province, Kerman province, Khuzestan province, North Khorasan province, Razavi Khorasan province, Sistan and Baluchestan province, South Khorasan province, Tehran province.

General distribution: Caucasus, Turkey, Iran, Central Asia (Popov 1967, Warncke 1980, Grace 2010).

Flower preference: polylectic (Müller 1996).

Icteranthidium ruficorne* (Morawitz, 1875)

Material examined: Iran, Tehran province, Peykanshahr, 1♂ 8.IX.2009, sweeping net, *Heliotropium* sp., leg. A. Nadimi.

Published records: current study.

Distribution in Iran: Tehran province.

General distribution: Central Asia (Warncke 1980), Iran.

Flower preference: visiting *Heliotropium* sp. (Boraginaceae).

Icteranthidium venustum* Morawitz, 1877

Material examined: Iran, Alborz province, Chalus road-Sarziarat (N= 35°55'173" E= 51°06'854", 1980 m), sweeping net, 1♀ 7.IX.2010; Qazvin province,

Kuhin (N= 36°18' E= 49°39', 1455 m), 1♀ 26.VII.2011, sweeping net, *Alhagi* sp.; Qazvin province, Taarom Sofla (N= 36°40'152" E= 49°25'629", 291 m), 1♀ 7.VI.2011, sweeping net, *Centaurea* sp.; Tehran province, Peykanshahr (N= 35°44'30.80" E= 51°09'57.70", 1273 m), 1♀ 16.VI.2011, sweeping net, *Heliotropium* sp., leg. A. Nadimi.

Published records: current study.

Distribution in Iran: Alborz province, Qazvin province, Tehran province.

General distribution: Azerbaijan, Egypt, China (Ottó 1884, Warncke 1980, Wu 2006, Grace 2010), Iran.

Flower preference: visiting *Alhagi* sp. (Fabaceae) (Ottó 1884).

***Pseudoanthidium (Pseudoanthidium) scapulare* (Latreille, 1809)**

Material examined: Iran, Tehran province, Mallard (N= 35°40'051" E= 50°56'869", 1168 m), 1♂ 17.VIII.2010, Malaise trap, leg. A. Nadimi.

Published records: Khodaparast and Monfared (2012).

Distribution in Iran: Fars province, Tehran province.

General distribution: south and central Europe, Turkey and east to Tashkent, Iran (Warncke 1980, Stöckl 2000, Amiet et al. 2004, Ornosa et al. 2008, Khodaparast & Monfared 2012).

Flower preference: oligolectic on Asteraceae, particularly *Centaurea* and Thistle (Cardueae) (Amiet et al. 2004).

Pseudoanthidium (Royanthidium) melanurum* (Klug, 1832)

Material examined: Iran, Guilan province, Rudsar-Ghazichak (N= 36°45'877" E= 50°20'018", 1787 m), 1♂ 5.VII.2010, sweeping net, *Onopordon* sp., leg. A. Nadimi.

Published records: current study.

Distribution in Iran: Guilan province.

General distribution: south Europe, Aosta Valley (in north-western Italy), eastern central Europe, Turkey, Syria, Palestine, east to Central Asia, North Africa (Warncke 1980, Amiet et al. 2004, Ornosa et al. 2008, Grace 2010), Iran.

Flower preference: oligolectic on Asteraceae, particularly *Centaurea* and Thistle (Cardueae) (Müller 1996, Amiet et al. 2004).

Rhodanthidium (Asianthidium) caturigense* (Giraud, 1863)

Material examined: Iran, Alborz province, Chalus

road -Shahrestanak (N= 35°57'583" E= 51°22' 339", 2305 m), 1♀ 8.VII.2010, sweeping net, *Centaurea* sp., leg. A. Nadimi.

Published records: current study.

Distribution in Iran: Alborz province.

General distribution: Spain, France, Italy, Austria, Switzerland, Albania, Lebanon, Caucasus, Turkey, Palestine (Warncke 1980, Schwarz et al. 1996, Stöckl 2000, Amiet et al. 2004, Ormosa et al. 2008, Grace 2010), Iran.

Flower preference: polylectic, with a strong preference for Papilionoideae (Fabaceae) (Müller 1996, Amiet et al. 2004).

Stelis (*Protostelis*) *signata* (Latreille, 1809)

Material examined: Tehran province, Malard (N= 35°40'051" E= 50°56'869", 1168 m), 1♂ 25.V.2010, Malaise trap, leg. A. Nadimi.

Published records: Warncke (1985).

Distribution in Iran: Tehran province, Fars province.

General distribution: Europe, Iran (Warncke 1985, 1992, Grace 2010).

Host: cleptoparasite of *Anthidiellum strigatum* (Warncke 1992, Grace 2010).

Discussion

Based on present study, the number of Iranian anthidiine species has increased from 67 to 73 species within 10 genera and 20 subgenera, which show that the tribe Anthidiini is one of most diverse tribes within family Megachilidae in Iran and even south western of Palearctic. The genus *Anthidium* and subgenus *Anthidium* with 26 and 20 species, respectively, were the most diverse genus and subgenus of Anthidiini in Iran (Popov 1967, Warncke 1981, Grace 2010, Khodaparast & Monfared 2012).

Among northern provinces, Tehran and Alborz provinces totally with 36 and 20 species, respectively, had a most diverse of anthidiine fauna. These two provinces are located in southern slopes of Alborz Mountains with semi-dry steppes, where there are diverse flora of flowering plants (Zohari 1973, Kamrani et al. 2011) which is associated with diverse bee fauna.

There are both oligolecty and polylecty amongst collected anthidiine species. Considering the total number of species existing in Iran revealed that 38% and 30% the anthidiine bees were oligolectic and polylectic, respectively. Flower

preferences of about 32% the bees also were unknown. Müller (1996) indicated that oligolectic anthidiine species visit significantly fewer flower species for pollen during a single foraging bout than the polylectic species. Therefore, knowledge of plant preference behaviour may be important for pollination biology, their management and conservation. Parasitoids are known to be an important factor in some of the population declines of pollinator bees. *Monodontomerus obscurus* Westwood (Hymenoptera: Torymidae) has been recorded as a parasitoid of megachilid bees in the Palaearctic region include Iran (Madjdzadeh et al. 2013). *Leucospis bifasciata* Klug (Hymenoptera: Leucospidae) has been recorded as parasitoid of *Anthidiellum strigatum* (Panzer) (Hymenoptera: Megachilidae) in Iran (Lotfalizadeh & Fakhrzadeh 2012).

Iran, with a great richness of flower species and plant communities, undoubtedly supports a rich diversity of the bee species. Available data on the bees suggest that Iran may be a centre of diversity for the Anthidiini. Therefore, there is urgent need to perform more surveys to discover and clarify the composition of the Iranian anthidiine species for both their conservation issues and conducting new projects.

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