



A preliminary list of *Andrena* subgenera (Hymenoptera: Andrenidae) of Iran, with five new records

Safoora Allahverdi¹, Ahmad Nadimi¹, Ali Afshari¹ and Khalid Aliyev²

¹ Department of Plant Protection, Faculty of Plant Production, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran

² Institute of Zoology, National Academy of Sciences of Azerbaijan, Passaj 1128, block 504, Baku, Azerbaijan

Received:
07 December 2015

Accepted:
08 January 2016

Published:
09 January 2016

Subject Editor:
Ali Asghar Talebi

ABSTRACT. The list of 41 subgenera of the genus *Andrena* Fabricius, 1775 from Iran is given. The list provided here is based on a detailed study of all available published data and current study. Four subgenera and five species are recorded for the first time from Iran, including *Andrena* (*Cnemidandrena*) *fuscipes* (Kirby, 1802), *Andrena* (*Lepidandrena*) *curvungula* (Thomson, 1870), *Andrena* (*Lepidandrena*) *pandellei* (Pérez, 1895), *Andrena* (*Parandrena*) *sericata* (Imhoff, 1868) and *Andrena* (*Platygalandrena*) *tecta* (Radoszkowski, 1876). Ecological notes on the newly recorded species are briefly discussed.

Key words: *Andrena*, Apoidea, Iran, Sand bees

Citation: Allahverdi, S., Nadimi, A., Afshari, A. and Aliyev, K. 2015. A preliminary list of *Andrena* subgenera (Hymenoptera: Andrenidae) of Iran, with five new records. *Journal of Insect Biodiversity and Systematics*, 1(1): 61–75.

Introduction

The Andrenidae is one of the largest families of bees, widely distributed (excluding Australia) and with greatest diversity in arid western North America, South America, and the Palearctic region (Danforth *et al.* 2013). It belongs together with the Halictidae, Colletidae, Melittidae and Stenotritidae to the short-tongued bees, which are characterized generally by labial palpi with four similar segments (Michener 2007). The Andrenidae is a challenging group from the prospective of the classification and phylogeny (Danforth *et al.* 2013; Michener 2007). Andrenidae consists of three subfamilies (Andreninae, Panurginae, and Oxaeinae) and eight tribes (Danforth *et*

al. 2013). The subfamily Andreninae was divided into two tribes, the Andrenini and Euherbstiini, the latter is found only in Chile (Danforth *et al.* 2013; Michener 2007). Ascher and Pickering (2015) divided the tribe Andrenini into four genera, including *Alocandrena* Michener, 1986, *Ancylandrena* Cockerell, 1930, *Megandrena* Cockerell, 1927, and *Andrena* Fabricius, 1775. Among the genera, only genus *Andrena* has a Holarctic distribution and is abundant in the temperate regions of the Northern continents of both hemispheres (Michener 2007; Dubitzky *et al.* 2010). They are among the important pollinators of natural vegetation and crop plants (Osytshnjuk *et al.* 2005). For *Andrena* genus, there are 101 (17 Holarctic, 32 Nearctic, 1 Oriental and 51 Palearctic)

Corresponding author: Ahmad Nadimi, E-mail: nadimi@gau.ac.ir

Copyright © 2015, Allahverdi et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY NC 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

and 37 subgenera in the world and Iran, respectively (Dubitzky *et al.* 2010; Ascher and Pickering 2015). Among the all Iranian bees, little information is available on the fauna, taxonomy and the geographic distribution of Andrenidae, particularly genus *Andrena* and many records are restricted to the old literature.

Before 1974, there were some faunistic or taxonomic works by non-native researchers that have considered elements of the Iranian bee fauna including the genus *Andrena*. Notable examples of taxonomic works supplied material of genus *Andrena* from Iran before 1974 are those by Morice (1921, seven species), Strand (1921, one species), Alfken (1927, two species), Alfken (1935, 15 species), Alfken and Blüthgen (1937, three species), Popov (1940, 1949, 1958, 1967, 3, 4, 4 and 23 species, respectively). Esmaili and Rastegar (1974), as the first native researcher, found three species of the genus *Andrena* belonging to three different subgenera during a survey on Aculeata of Iran. Afterward, there was generally a 20 year gap on studying bees of Iran. Telebi *et al.* (1995) reported 33 bees visiting alfalfa flowers in Karadj County, including two species of different subgenera of *Andrena*. Tavakoli *et al.* (2010) collected three different subgenera on flowers of legume crops from Guilan province. In addition, there are some important published taxonomic studies on the genus *Andrena* in Iran (Ariana *et al.*, 2009a; Ariana *et al.*, 2009b). The most important faunistic work of bees, including the genus *Andrena* in recent years is presented by Khodaparast and Monfared (2012). They introduced 31 species of nineteen subgenera in studied areas in south of Iran (Fars province). Ascher and Pickering (2015) totally listed about 125 Iranian andrenid species belonging to 37 subgenera in "Discover Life's bee species guide and world checklist". Herein we attempt to provide a list of the formerly and currently recorded subgenera of *Andrena*

known to occur in Iran. This study was prompted by the absence of a comprehensive work on this important genus in Iran.

Materials and Methods

Information sources are based both from literatures and collecting bees from different localities in Gorgan County, Golestan Province (Iran), in 2014 using sweeping nets. Information for each specimen caught, such as location and altitude of the collection site, were recorded with a GPS device (Garmin GPS map 62s). Bees were killed in jars containing ethyl acetate. Bees were later pinned, prepared according to the standard methods and stored until their identification to species level. For studying male genitalia, we brought it out with a fine forceps, while sticking to end of abdomen. Specimens were examined under a binocular microscope by using valid related sources (Gusenleitner and Schwarz, 2002; Osytsnjuk, *et al.* 2005; Michener 2007). The morphological terminology used in the descriptions follows Osytsnjuk *et al.* 2005. The photographs were taken using an Olympus SZ stereo-microscope equipped with a Sony digital camera. All specimens are deposited in collection woody boxes in entomology laboratory of Gorgan University of Agricultural Sciences and Natural Resources. The vegetation cover of this area consists mainly of broad-leaved trees, bushes and shrubbery often with Loess soil. All visited flower plants by bees were collected and then identified by help of botanist experts of Golestan Agricultural and Natural Resources Research and Education Center.

Results

Herein we reported four newly subgenera *Cnemidandrena*, *Lepidandrena*, *Parandrena* and *Platygalandrena* with five new recorded species for Iranian bee fauna. Subgenera are arranged herein alphabetically within genus *Andrena* (Table 1).

Table 1. List of *Andrena* subgenera (Hymenoptera: Andrenidae) from Iran.

Subgenera	Resources
<i>Aciandrena</i>	Popov (1967); Alfken (1927); Ascher and Pickering (2015).
<i>Aenandrena</i>	Alfken (1927); Ariana <i>et al.</i> (2009a); Ascher and Pickering (2015).
<i>Brachyandrena</i>	Popov (1967); Ascher and Pickering (2015).
<i>Campylogaster</i>	Khodaparast and Monfared (2012); Alfken (1935); Popov (1967); Ascher and Pickering (2015).
<i>Carandrena</i>	Khodaparast and Monfared (2012); Ascher and Pickering (2015).
<i>Chlorandrena</i>	Khodaparast and Monfared (2012); Popov (1967); Ascher and Pickering (2015).
<i>Chrysandrena</i>	Ascher and Pickering (2015).
<i>Cnemidandrena</i> *	Current study.
<i>Cordandrena</i>	Khodaparast and Monfared (2012); Morice (1921); Ascher and Pickering (2015).
<i>Cryptandrena</i>	Ascher and Pickering (2015).
<i>Euandrena</i>	Khodaparast and Monfared (2012); Morice (1921); Ascher and Pickering (2015).
<i>Graecandrena</i>	Ascher and Pickering (2015).
<i>Holandrena</i>	Khodaparast and Monfared (2012); Esmaili and Rastegar (1974); Alfken (1935); Popov (1967); Ascher and Pickering (2015).
<i>Hoplendrena</i>	Alfken (1935). Popov (1967); Ascher and Pickering (2015).
<i>Lepidandrena</i> *	Current study.
<i>Leucandrena</i>	Ascher and Pickering (2015).
<i>Melanapis</i>	Khodaparast and Monfared (2012); Tavakoli <i>et al.</i> (2010); Popov (1967); Ascher and Pickering (2015).
<i>Melandrena</i>	Alfken (1935); Morice (1921); Popov (1967); Strand (1921); Ascher and Pickering (2015).
<i>Melittoides</i>	Khodaparast and Monfared (2012); Ascher and Pickering (2015).
<i>Micrandrena</i>	Khodaparast and Monfared (2012); Ascher and Pickering (2015).
<i>Nobandrena</i>	Khodaparast and Monfared (2012); Popov (1967); Ascher and Pickering (2015).
<i>Notandrena</i>	Morice (1921); Ascher and Pickering (2015).
<i>Orandrena</i>	Khodaparast and Monfared (2012); Ascher and Pickering (2015).
<i>Osychnyukandrena</i>	Ariana <i>et al.</i> (2009b); Ascher and Pickering (2015).
<i>Pallandrena</i>	Ascher and Pickering (2015).
<i>Parandrena</i> *	Current study.
<i>Parandrenella</i>	Khodaparast and Monfared (2012); Popov (1957,1967);
<i>Plastandrena</i>	Khodaparast and Monfared (2012); Alfken (1935); Morice (1921). Popov (1967, 1949); Ascher and Pickering (2015).
<i>Platygalandrena</i> *	Current study.
<i>Poecilandrena</i> .	Popov (1967); Ascher and Pickering (2015).
<i>Poliandrena</i>	Ascher and Pickering (2015).
<i>Ptilandrena</i>	Khodaparast and Monfared (2012); Morice (1921); Ascher and Pickering (2015).
<i>Scitandrena</i>	Popov (1967); Ascher and Pickering (2015).
<i>Simandrena</i>	Khodaparast and Monfared (2012); Alfken (1935); Morice (1921); Ascher and Pickering (2015).
<i>Suandrena</i>	Khodaparast and Monfared (2012); Ascher and Pickering (2015).
<i>Taeniandrena</i>	Khodaparast and Monfared (2012); Tavakoli <i>et al.</i> (2010); Esmaili and Rastegar (1974); Alfken (1935). Popov (1967); Talebi <i>et al.</i> (1995); Ascher and Pickering (2015).
<i>Thysandrena</i>	Morice (1921); Ascher and Pickering (2015).
<i>Trachandrena</i>	Alfken (1935); Ascher and Pickering (2015).
<i>Trunchandrena</i>	Khodaparast and Monfared (2012); Popov (1967); Ascher and Pickering (2015).
<i>Ullandrena</i>	Ascher and Pickering (2015).
<i>Zonandrena</i>	Khodaparast and Monfared (2012); Tavakoli <i>et al.</i> (2010); Esmaili and Rastegar (1974); Alfken (1935). Morice (1921); Talebi <i>et al.</i> (1995); Ascher and Pickering (2015).

The asterisk beside subgenera indicates new records.

Subgenus *Cnemidandrena* Hedicke 1933

Diagnosis: Basal area of labrum large, trapezoidal, usually thickened; first flagellar segment in males usually shorter than combined length 2nd and 3rd segments; ocellocipital distance 2 times as wide as ocellar diameter (Fig. 1).

***Andrena (Cnemidandrena) fuscipes* (Kirby, 1802)**

Synonyms: *Melitta fuscipes* Kirby, 1802; *Melitta pubescens_homonym* Kirby, 1802; *Andrena cincta_homonym* Nylander, 1852; *Andrena germanica* Verhoeff, 1890 (Ascher and Pickering 2015).

Material examined: Gorgan County, Between Shastkalate and Alofen village (36° 41'N, 54° 20' E, 155 m, a.s.l.), 17.v.2014, 1♂, Floral resources: *Paliurus spina-christi* Mill. (Rhamnaceae), leg. S. Allahverdi.

General distribution: Bohemia, Bulgaria, Croatia, Czech Republic, Denmark, European Russia, Finland, France, Germany, Hungary, Italy, Kazakhstan, Latvia, Lithuania, Moravia, Norway, Poland, Portugal, Romania, Slovakia, Ukraine, United Kingdom (Ascher and Pickering 2015).

Diagnosis: Body length 8–10 mm in males (Fig. 2); metasomal terga 1–2 with long and terga 3–5 with short yellowish-grey hairs (Fig. 3); genital capsule with a well-developed dorsal lobe of gonocoxites, aedeagus dilated proximally (Fig. 4).

Subgenus *Lepidandrena* Hedicke 1933

Diagnosis: Labrum anteriorly divided into medial and lateral parts (Fig. 5); basal area of labrum usually trapezoidal, large; facial foveae long, occupying more than 1/2 ocellocular distance, extending to below antennal sockets or clypeal base; inner side of hind femur with a strong carina and dense short spines (Fig. 6).

***Andrena (Lepidandrena) curvungula* Thomson, 1870**

Synonym: *Andrena squamigera* Schenck, 1874 (Ascher and Pickering 2015).

Material examined: Gorgan County, Chahar bagh village (36° 36' N, 54° 34' E, 2147 m, a.s.l.), 24.v.2014, 1♀, Floral resources: *Lepidium draba* L. (Brassicaceae), leg. S. Allahverdi.

General distribution: Azerbaijan, Croatia, Denmark, France, Georgia, Greece, Italy, Kazakhstan, Latvia, Netherlands, Romania, Spain, Slovakia, Sweden, Turkey, Ukraine (Ascher and Pickering 2015).

Diagnosis: Body length 12–13 mm in females (Fig. 7); Facial foveae occupying 2/3 ocellocular distance, extending to level of clypeus base, narrowed (Fig. 8); the last segment of metatarsus with an arched appearance (Fig. 9).

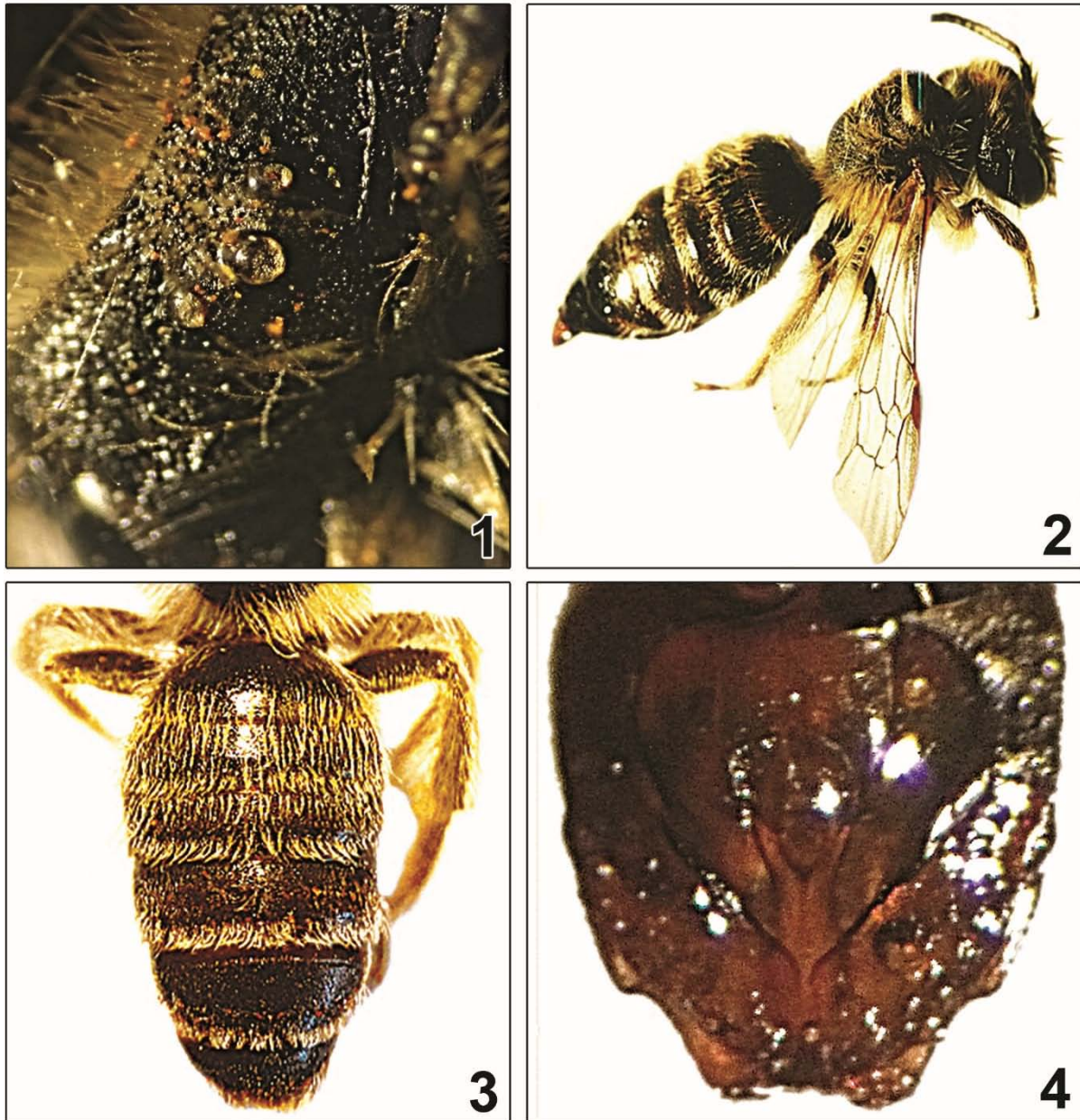
***Andrena (Lepidandrena) pandellei* Pérez, 1895**

Synonyms: *Andrena anceyi* Pérez, 1895; *Andrena pandellei europaea* Warncke, 1967 (Ascher and Pickering 2015).

Material examined: Gorgan County, Between Shastkalate and Alofen village (36° 41' N, 54° 20' E), 17.v.2014, 4♀♀, Floral resources: *Lepidium draba* L. (Brassicaceae), leg. S. Allahverdi.

General distribution: Algeria, Austria, Bosnia and Herzegovina, Bulgaria, Corsica, Croatia, France, Germany, Greece, Hungary, Italy, Luxembourg, Morocco, Moravia, Netherlands, Poland, Portugal, Romania, Sicily, Slovakia, Turkey, Ukraine (Ascher and Pickering 2015).

Diagnosis: Body length 10–12 mm in females (Fig. 10); Basal area of labrum longer and narrower than *A. curvungula*; Pubescence of facial foveae brownish-grey; mesoscutum, scutellum and metanotum with brownish-yellow squamous hairs; facial foveae narrower, occupying 1/3 ocellocular distance (Fig. 11); the last segment of metatarsus with a rectilinear appearance (Fig. 12).



Figures 1–4. Morphological characteristics of *Andrena (Cnemidandrena) fuscipes* (Kirby, 1802): 1. Ocelloccipital distance, 2. General habitus in lateral view, 3. Metasomal terga in dorsal view, 4. Genitalia.

Subgenus *Parandrena* Robertson, 1897

Diagnosis: Genal area narrow; ocelloccipital distance more than one ocellar diameter (in *A. sericata* over 2 times as wide as ocellar diameter) (Fig. 13); the female labrum is transversely sulcate, and the male

sixth sternum is reflexed with apicolateral teeth.

***Andrena (Parandrena) sericata* Imhoff, 1868**

Synonym: *Andrena favosa* Morawitz, 1872 (Ascher and Pickering 2015).

Material examined: Gorgan County, Near to Chahar bagh village (36° 36.755' N, 54° 29.969' E, 2127 m, a.s.l), 09.vi.2014, 1♂, Floral resources: *Centaurea* sp. (Asteraceae); Chahar bagh-Jahannam road (36° 34.095' N, 54° 25.593' E, 2130 m, a.s.l), 24.v.2014 1♀1♂, Floral resources: *Ixiolirion tataricum* (Pall.) (Ixioliriaceae) and *Tragopogon* sp. (Asteraceae), leg. S. Allahverdi.

General distribution: Armenia, Austria, Croatia, Czech Republic, France, Georgia, Germany, Greece, Hungary, Italy, Poland, Russia, Romania, Serbia, Slovakia, Spain, Switzerland, Turkey, Ukraine (Ascher and Pickering 2015).

Diagnosis: Body length 12–13 mm in females and 11–12 mm in males (Fig. 14 and 15); clypeus yellow with five black spots in females and with two black spots in males (Fig. 16 and 17); genitalia has distinct dorsal gonocoxite which vesicular swollen aedeagus valve is visible on the base (Fig. 18).

Subgenus *Platygalandrena* Dubitzky, 2006

Diagnosis: Facial fovea flat, weakly depressed (Fig. 19), more than one ocellar diameter; galea strongly punctate and flattened dorsoventrally (Fig. 20).

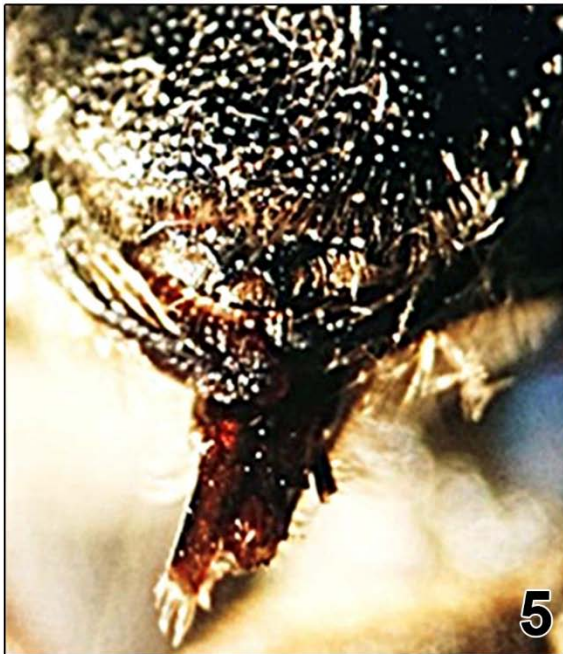
Andrena (*Platygalandrena*) *tecta* Radoszkowski, 1876

Synonym: *Andrena* (*Ulandrena*) *tecta* Radoszkowski, 1876 (Ascher and Pickering 2015).

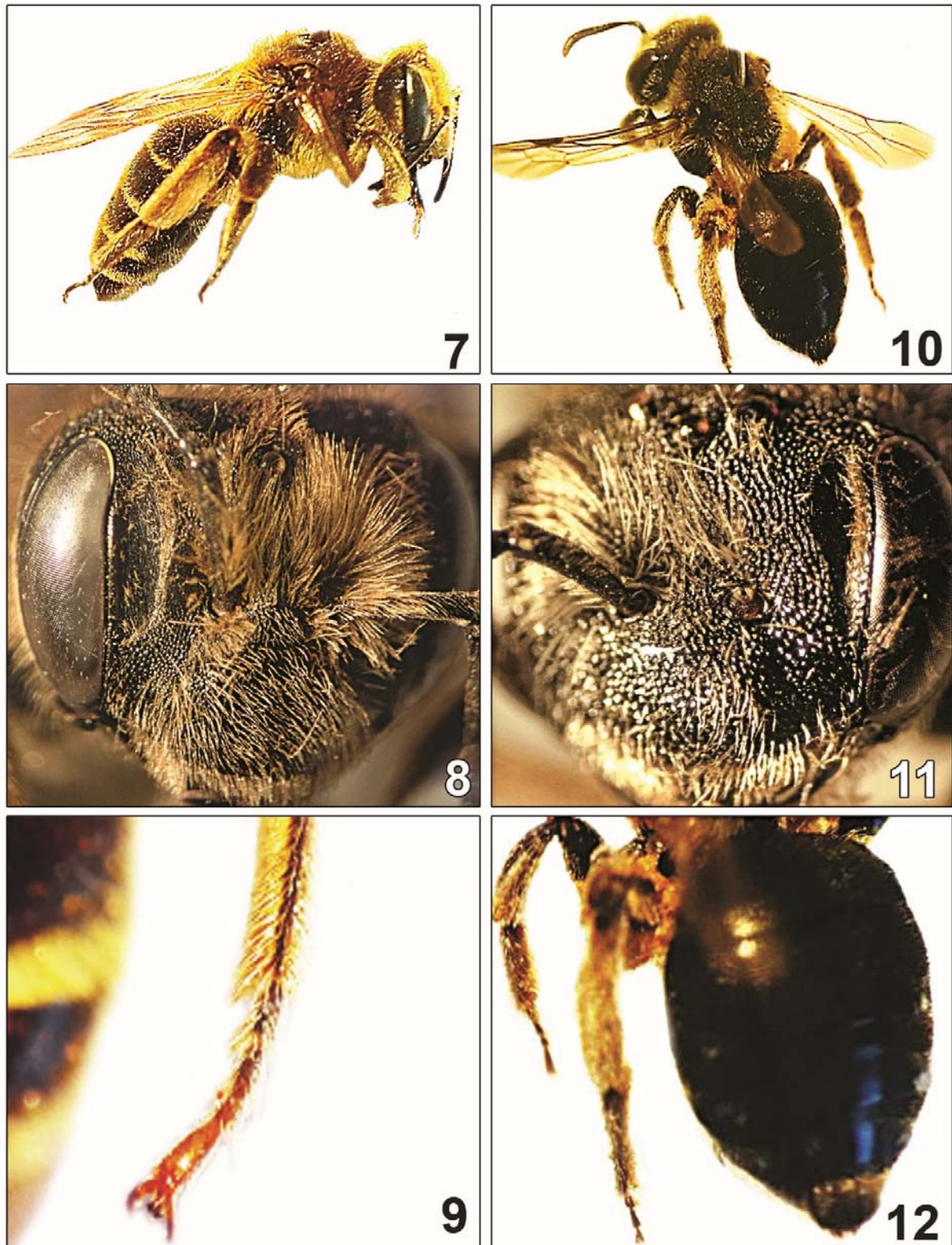
Material examined: Gorgan County, Near to Chahar bagh village (36° 36.75' N, 54° 29.96' E, 2127 m, a.s.l), 24.v.2014, 1♀, Floral resources: *Acanthophyllum* sp. (Caryophyllaceae), leg. S. Allahverdi.

General distribution: Georgia, Turkey (Ascher and Pickering 2015; Özbek 1976).

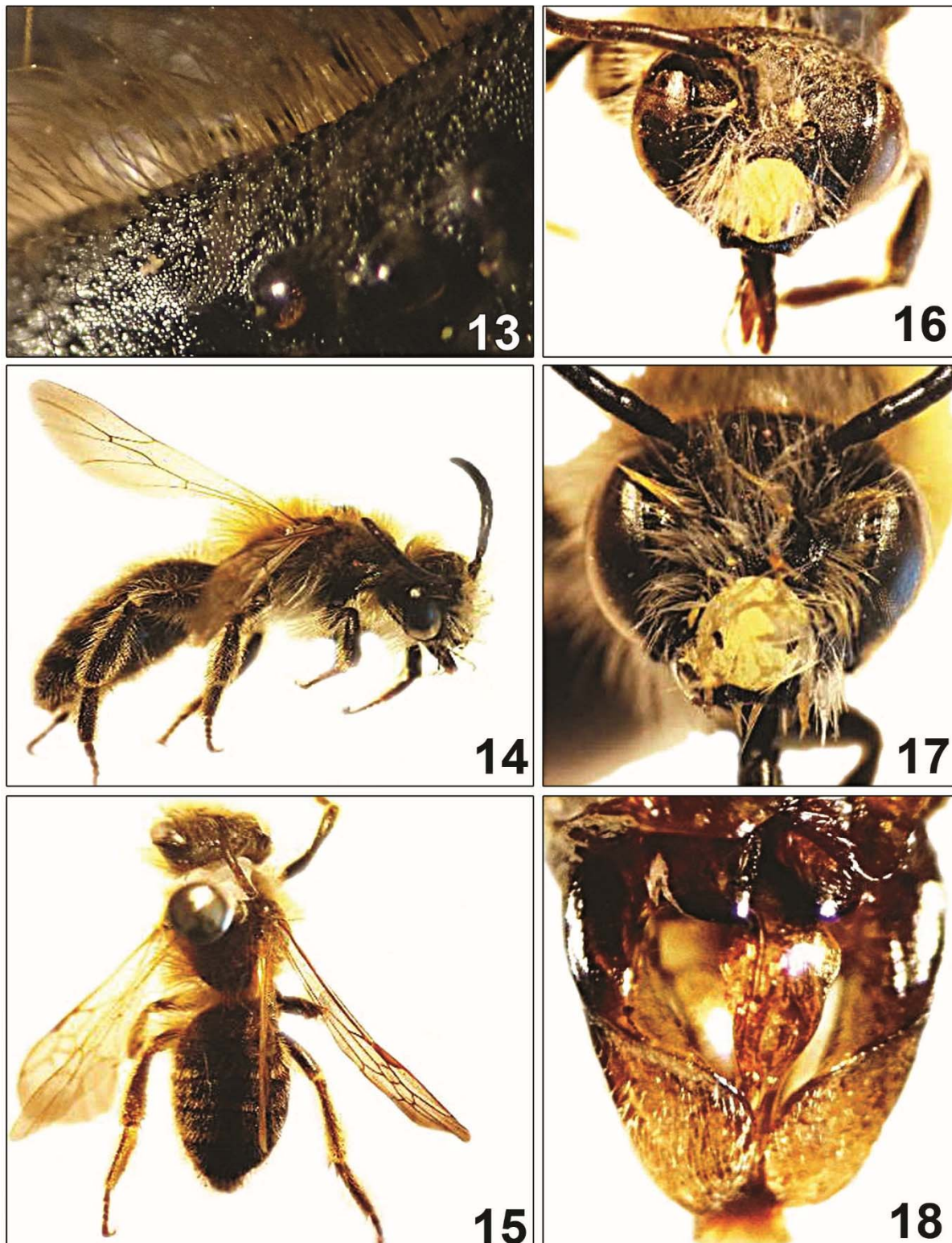
Diagnosis: Body length 11 mm in females (Fig. 21); ocelloccipital distance one and half times as wide as ocellar diameter (Fig. 22); with long and curve light trochanteral flocculus in hind leg (Fig. 23).



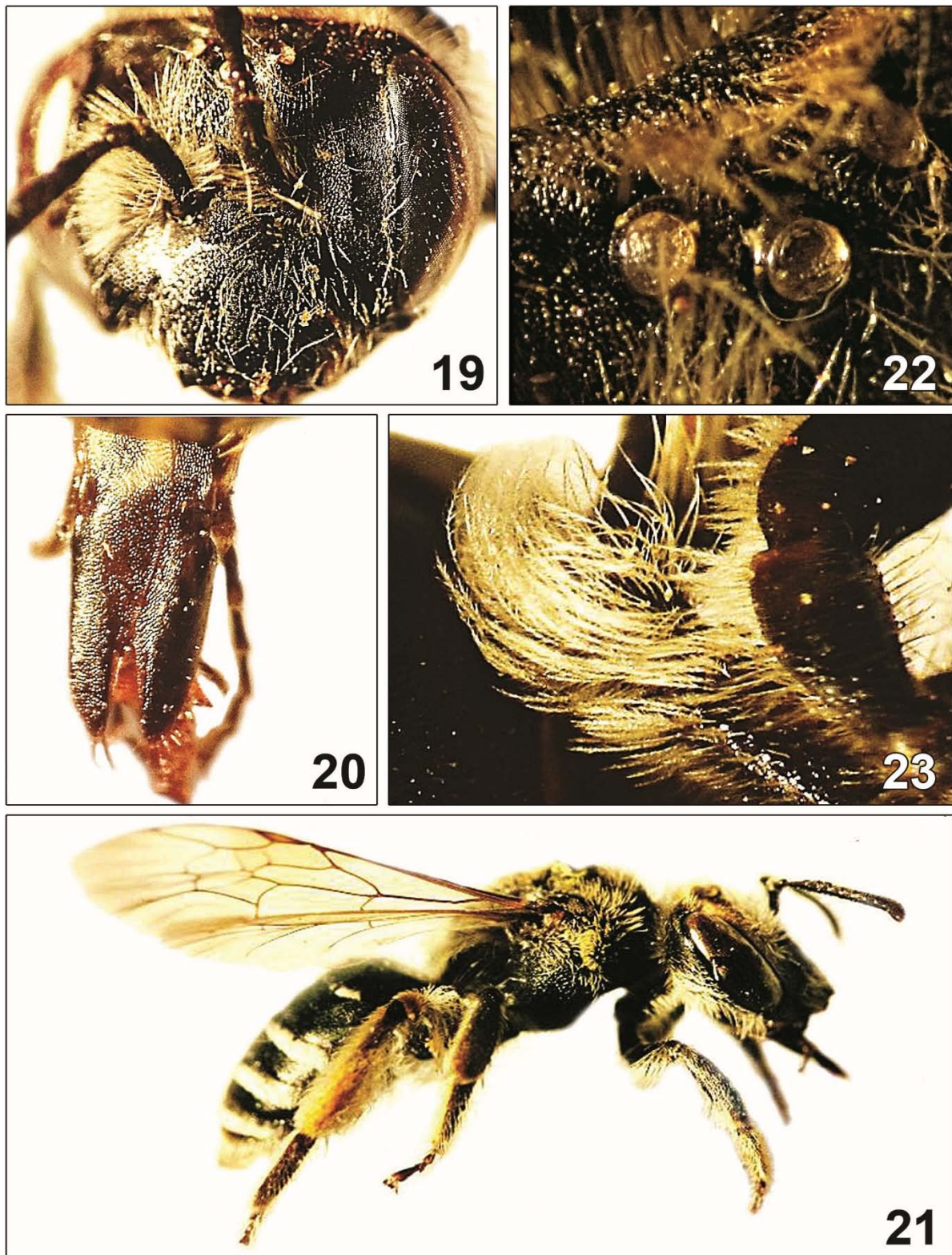
Figures 5–6. Morphological characteristics of subgenus *Lepidandrena*: 5. labrum, 6. Carina in hind femur.



Figures 7-12. Morphological characteristics of *Andrena (Lepidandrena)* species: **7.** General habitus in lateral view of *Andrena (Lepidandrena) curvungula* Thomson, 1870, **8.** Facial foveae in *A. curvungula*, **9.** Last segment of metatarsus in *A. curvungula*, **10.** General habitus in dorsal view of *Andrena (Lepidandrena) pandellei* Pérez, 1895, **11.** Facial foveae in *A. pandellei*, **12.** Last segment of metatarsus in *A. pandellei*.



Figures 13–18. Morphological characteristics of *Andrena (Parandrena) sericata* (Imhoff, 1868): **13.** Ocelloccipital distance, **14.** General habitus in lateral view (male), **15.** General habitus in lateral view (female), **16.** Female Clypeus, **17.** Male clypeus, **18.** Genitalia.



Figures 19–23. Morphological characteristics of subgenus *Platygalandrena*: **19.** Facial foveae, **20.** Punctated galea, **21.** General habitus in lateral view of *Andrena (Platygalandrena) tecta* (Radoszkowski, 1876), **22.** Ocelloccipital distance of *A. tecta*, **23.** Trochanteral flocculus in *A. tecta*.

Discussion

According to the results of this research, the number of recorded *Andrena* subgenera of Iran increased to 41 (Table 1).

The subgenus *Cnemidandrena* with 48 recorded species in the world (Ascher and Pickering 2015), is relatively poorly represented in Eurasia (LaBerge, 1986). A staple food for the oligolectic solitary bee, *Andrena fuscipes*, is *Calluna* genus (Ericaceae) (Ruszkowski *et al.* 1999; Dupont and Olesen 2009; Exeler *et al.* 2010; Hodges and Cane 1949; Morón *et al.* 2008; Gusenleitner 1985) and also is one of the most important pollinators of *Calluna vulgaris* side by side with the honey bee (Hodges and Cane 1949). We collected *A. fuscipes* from the yellow flowers of *Paliurus spina-christi* (Rhamnaceae). At present, heathland habitats are listed as critically endangered in Germany and other parts of Europe and are protected by the EU Habitats Directive and *A. fuscipes* in Central Europe is specialized on heather pollen (Exeler *et al.* 2010). Although *A. fuscipes* widely distributed species in Central Europe (Exeler *et al.* 2010) but has become rare and is listed as vulnerable in following countries where red lists for Hymenoptera exist, such as Switzerland (Regionally extinct), Germany (Near Threatened), Slovenia (Endangered), Netherlands (Critically Endangered) (Peeters and Reemers 2003) and threatened and rare in other European countries like Ireland.

The subgenus *Lepidandrena* with 16 species in the world, restricted to the Palaearctic region (Xu and Cui 2007). According to Data from the Swedish Species Information Centre (ArtDatabanken), *Andrena curvungula* is oligolectic, specialized on *Campanula* spp. (Campanulaceae) (Naylor 2006; Lara Ruiz 2012; Zettel *et al.* 2003; Schindwein *et al.* 2005; Monsevičius 2004; Westrich 1996) and also sometimes as pollinator of Malvaceae, Apiaceae, Ranunculaceae (Westrich and Schmidt 1987). Also *A. curvungula* is a rare

species in Central Europe and on the red list of highly threatened in Germany (Feitz *et al.* 2003; Westrich 1996). *Andrena pandellei* is extremely rare in Germany and Central Europe (Westrich 2000; Flechtner *et al.* 2000) and oligolectic on bellflower (*Campanula*) and *Geranium* spp. (Geraniaceae) (Naylor 2006; Zettel *et al.* 2002; Gusenleitner 1985; Schindwein *et al.* 2005; Monsevičius 2004; Westrich 1996; Münze *et al.* 2006). Recently, *A. pandellei* has been used for meadow management and used in the commercial grassland in Germany (Westrich *et al.* 2008). Neumayer (2010) showed that *A. fuscipes*, *A. curvungula* and *A. pandellei* are solitary nesting bee species.

The subgenus *Parandrena* with 15 species in the world (Ascher and Pickering 2015) is developed from the subgenus *Opandrena* (Robertson 1902). *Andrena sericata* rarely found in Central Europe and in Germany and limited to the Alpine region (Westrich *et al.* 1998; Westrich and Dathe 1997) and according to Neumayer (2010) is oligolectic on *Salix* spp. (Salicaceae).

The subgenus *Platygalandrena* with 11 species in the world is most likely plesiomorphic. Based on the research results of the Dubitzky *et al.* (2010) members of *Platygalandrena* were separated from the subgenus *Ulandrena*, where they were placed originally by Warncke (1968) and *Ulandrena* is the sister taxon to *Platygalandrena*. *Andrena tecta* belongs to the subgenus *Platygalandrena* that the adult bees of this subgenus are active from the end of March to July. (Dubitzky *et al.* 2010; Ascher and Pickering 2015).

According to Figure 24, about 77% of Andrenid bees of Iran belong to Andrenini tribe (*Andrena* genus), followed by Panurgini (12%) and Melitturgini (11%). In the genus *Andrena*, the maximum species percentage belongs to the subgenus *Melandrena* with 12.5%.

Given that Iranian bee fauna is rich so continuing faunal samplings is necessary in

Iran, especially in un-sampled regions to discover more new endemic threatened and rare species and subgenera.

Acknowledgments

We are indebted to Dr. Alireza Monfared for allowing us to access the Museum of Iranian

Pollinating Insects of Yasouj University, Yasouj, Iran. We are also grateful to Dr. Ardeshir Ariana and Dr. Fritz Gusenleitner for providing some literatures. This project was supported by Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran.

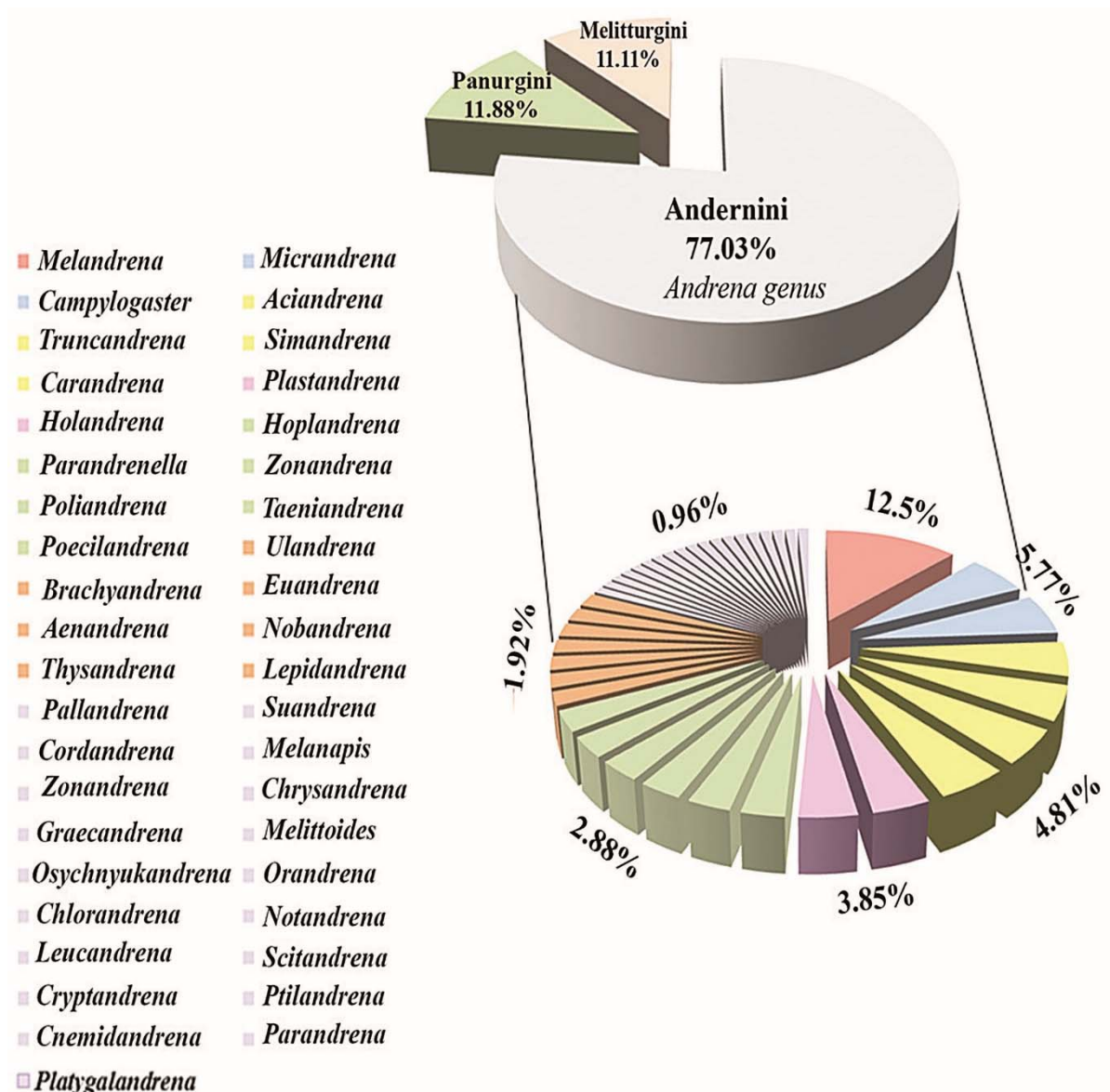


Figure 24. Composition of Andrenidae of Iran. Same color indicates the same percentage of subgenera of genus *Andrena*.

References

- Alfken, J.D. 1927. Zur Erforschung des Persischen Golfes. *Mitteilungen aus dem Entomologischen Verein in Bremen*, 16: 148–152.
- Alfken, J.D. 1935. Beitrag zur Kenntnis der Bienenfauna von Persien. *Mitteilungen aus dem Entomologischen Verein in Bremen*, 23: 21–24.
- Alfken, J.D. and Blütgen, P. 1937. Ergebnisse der österreichischen Demawend-Expedition 1836. Apidae, ausschliesslich *Bombus*-Arten. *Konowia*, 1: 97–106
- Ascher, J.S. and Pickering, J. 2015. Discoverlife, Discover Life's bee species guide and world checklist. Available from: http://www.discoverlife.org/mp/20q?guide=Apoidea_speciesandflags=HAS (Accessed 23 September 2015).
- Ariana, A., Scheuchl, E., Tadauchi, O. and Gusenleitner, F. 2009a. A taxonomic revision of the subgenus *Andrena* (Brachyandrena) (Hymenoptera: Andrenidae). *Zootaxa*, 2281: 21–39. DOI: <http://dx.doi.org/10.11646/%25x>
- Ariana, A., Tadauchi, O. and Shebl, M.A. 2009b. A Revision of the Subgenus *Osychnyukandrena* of the Genus *Andrena* (Hymenoptera, Andrenidae). *Esakia*, 49: 63–70.
- Danforth, B.N., Cardinal, S., Praz, C., Almeida, E.A. and Michez, D. 2013. The impact of molecular data on our understanding of bee phylogeny and evolution. *Annual review of Entomology*, 58: 57–78. DOI: 10.1146/annurev-ento-120811-153633
- Dubitzky, A., Plant, J. and Schönitzer, K. 2010. Phylogeny of the bee genus *Andrena* Fabricius based on morphology (Hymenoptera: Andrenidae). *Mitteilungen Münchener Entomologischen Gesellschaft*, 100: 137–202. DOI:10.14411/eje.2004.045
- Dupont, Y.L. and Olesen, J.M. 2009. Ecological modules and roles of species in heathland plant-insect flower visitor networks. *Journal of Animal Ecology*, 78(2): 346–353. DOI: 10.1111/j.1365-2656.2008.01501.x
- Esmaili, M. and Rastegar, R. 1974. Identified species of Aculeate Hymenoptera of Iran. *Journal of Entomological Society of Iran*, 2: 41–52.
- Exeler, N., Kratochwil, A. and Hochkirch, A. 2010. Does recent habitat fragmentation affect the population genetics of a heathland specialist, *Andrena fuscipes* (Hymenoptera: Andrenidae)? *Conservation genetics*, 11(5): 1679–1687. DOI: 10.1007/s10592-010-0060-5
- Feitz, F., Schneider, N. and Pauly, A. 2003. Hyménoptères Apocrites nouveaux ou intéressants pour la faune luxembourgeoise (Hymenoptera, Apocrita). *Bulletin-Société des Naturalistes Luxembourgeois*, 79–88.
- Flechtner, G., Dorow, W.H.O. and Kopelke, J.P. 2000. Naturwaldreservate in Hessen. Band 5/2.2. Niddahänge östlich Rudingshain. Zoologische Untersuchungen 1990–1992, Teil 2. *Mitteilungen der Hessischen Landesforstverwaltung*, 2: 1–550.
- Gusenleitner, F. 1985. Angaben zur Kenntnis der Bienengattung *Andrena* in Nordtirol (Österreich). *Berichte des Naturwissenschaftlich-Medizinischen Vereins in Innsbruck*, 72: 199–221.
- Gusenleitner, F. and Schwarz, M. 2002. Weltweite Checkliste der Bienengattung *Andrena*: mit Bemerkungen und Ergänzungen zu paläarktischen Arten (Hymenoptera, Apidae, Andreninae, *Andrena*). *Entomofauna (Supplement)*, 12: 1–1280.
- Hodges, D. and Crane, E.E. 1949. Bee Laboratory. *Bee World*, 2: 13–19.
- Khodaparast, R. and Monfared, A. 2012. A survey of bees (Hymenoptera: Apoidea) from Fars province, Iran. *Zootaxa*, 3445: 37–58.
- LaBerge, W.E. 1986. The zoogeography of *Andrena* Fabricius (Hymenoptera: Andrenidae) of the Western Hemisphere. Proceedings of the Ninth North American Prairie Conference, July 1968, Prairie: Vol. 110, p. 115.
- Lara Ruiz, J. 2012. Contribución al conocimiento de los insectos visitantes de Campanulaceae en la Península Ibérica (insecta). *Micobotánica-Jaén*, 7: 189–195.
- Michener, C.D. 2007. *The Bees of the World*. Second edition. Baltimore: Johns Hopkins University Press, 953 pp.
- Monsevičius, V. 2004. Comparison of three methods of sampling wild bees (Hymenoptera, Apoidea) in Čepkeliai Nature Reserve (South Lithuania). *Ekologija*, 4: 32–39.

- Morice, F.D. 1921. Annotated lists of Aculeate Hymenoptera (except Heterogyna) and Chrysidids recently collected in Mesopotamia and north-west Persia. II. *Journal of Bombay Natural History Society*, 28: 192–199.
- Moroń, D., Szentgyörgyi, H., Wantuch, M., Celary, W., Westphal, C., Settele, J. and Woyciechowski, M. 2008. Diversity of wild bees in wet meadows: implications for conservation. *Wetlands*, 4: 975–983.
- Münze, R., Langner, D. and Nuß, M. 2006. Die Bienenfauna des Botanischen Gartens Dresden (Hymenoptera: Apidae). *Sächsische Entomologische Zeitschrift*, 1: 45–69.
- Naylor, D. 2006. The evolution of pollen production in *Campanula persicifolia*. *Examensarbete i biologi*, 20 p.
- Neumayer, J. 2010. Aculeate Hymenopteren (ohne Ameisen) des Nationalparks Thayatal. *Wissenschaftliche Mitteilungen Niederösterreichisches Landesmuseum*, 21: 325–344.
- Osytsnjuk, A., Romasenko, L., Banaszak, J. and Cierzniak, T. 2005. *Andreninae of the Central and Eastern Palaearctic, Part 1*. Polish Entomological Society, Poznań, Bydgoszcz, 426 pp.
- Özbek, H. 1976. Doğu Anadolu Bölgesi Andrenidae (Hymenoptera: Apoidea) *Famiyasi Arilari Kisim I. Bitki Koruma Bülteni*, 3: 123–145.
- Peeters, T. and Reemers, M. 2003. Bedreigde en verdwenen bijen in Nederland. *Basisrapport met voorstel voor de Rode Lijst*, Stichting European Invertebrate Survey: Leiden.
- Popov, V.V. 1940. Contributions to the knowledge of the palaeartic species of the genus *Andrena* F. (Hymenoptera, Apoidea). *Trudy Zoologicheskogo Instituta. Akademiia nauk SSSR. Leningrad* 6: 252–262.
- Popov, V.V. 1949. Subgenus *Plastandrena* Hedicke and its new representatives (Hym., Apoidea). *Entomologicheskoye Obozreniye*, 30: 389–404.
- Popov, V.V. 1958. On three subgenera of the genus *Andrena* (Hymenoptera, Andrenidae). *Trudy Vsesoyeznogo Entomologicheskogo Obshchestva*. 46: 109–161.
- Popov, V.B. 1967. The bees (Hymenoptera: Apoidea) of Iran. *Trudy Zoologicheskogo Instituta Leningrad*, 43: 184–215.
- Robertson, C. 1902. Synopsis of Andreninae. *Transactions of the American Entomological Society*, 2: 187–194.
- Ruszkowski, A., Gosek, J. and Bilinski, M. 1999. Food plants and an economic importance *Andrena* species of subgenus *Cnemidandrena* Hedicke (Hymenoptera, Andrenidae). *Pszczelnicze Zeszyty Naukowe (Poland)*, 43(1): 346–353.
- Schlidwein, C., Wittmann, D., Martins, C.F., Hamm, A., Siqueira, J.A., Schiffler, D. and Machado, I.C. 2005. Pollination of *Campanula rapunculus* L. (Campanulaceae): How much pollen flows into pollination and into reproduction of oligolectic pollinators?. *Plant Systematics and Evolution*, 3–4: 147–156. DOI: 10.1007/s00606-004-0246-8
- Strand, E. 1921. Apidologisches, insbesondere über paläarktische Halictus-Arten, auf Grund von Material des Deutschen entomologischen Museums. *Archiv für Naturgeschichte A*, 87: 305–322.
- Talebi, A.A., Esmaili, M. and Tirgari, M.A. 1995. Bee fauna of Alfalfa. Proceedings of the 12th Iranian Plant Protection Congress, Karadj, 2–7 September. 93 p.
- Tavakoli Korghond, Gh., Hajizade, J., and Talebi, A.A. 2010. Introduction of 31 bee species on legums from Guilan province. Proceedings of the 19th Iranian Plant Protection Congress. Tehran. 120 p.
- Warncke, K. 1968. Die Untergattungen der westpaläarktischen Bienengattung *Andrena* F. *Memórias e Estudos do Museu Zoológico da Universidade de Coimbra*, 307: 1–111.
- Westrich, P. 1996. Habitat requirements of central European bees and the problems of partial habitats. *In: Linnean Society Symposium Series (Vol. 18, pp. 1–16)*. Academic Press Limited.
- Westrich, P. and Dathe, H.H. 1997. Die Bienenarten Deutschlands (Hymenoptera, Apidae). Ein aktualisiertes Verzeichnis mit kritischen Anmerkungen. *Mitteilungen des Entomologischen Vereins Stuttgart*, 32: 3–34.

- Westrich, P. and Linnenbach, M. 2000. Rote Liste der Bienen Baden-Württembergs. Landesanstalt für Umweltschutz Baden-Württemberg.
- Westrich, P. and Schmid, K. 1987. Pollenanalyse, ein hilfsmittle beim studium des Sammel Verhalten von wildbienen.
- Westrich, P., Frommer, U., Mandery, K., Riemann, H., Ruhnke, H., Saure, C. and Voith, J. 2008. Rote Liste der Bienen Deutschlands (Hymenoptera, Apidae)(4. Fassung, Dezember 2007). *Eucera*, 3: 33–87.
- Westrich, P., Schwenninger, H.R., Dathe, H., Riemann, H., Saure, C., Voith, J. and Weber, K. 1998. Rote Liste der Bienen (Hymenoptera: Apidae). *Bundesamt für Naturschutz*, 55: 119–129.
- Xu, H.L. and Cui, J.X. 2007. A Gynandromorphic Specimen of *Andrena* (*Lepidandrena*) *chengtehensis* Yasumatsu (Hymenoptera: Andrenidae) from China. *Journal of the Kansas Entomological Society*, 3: 252–254. DOI: [http://dx.doi.org/10.2317/0022-8567\(2007\)80\[252: AGSOAL\]2.0.CO;2](http://dx.doi.org/10.2317/0022-8567(2007)80[252: AGSOAL]2.0.CO;2)
- Zettel, H., Hölzler, G. and Mazzucco, K. 2002. Anmerkungen zu rezenten Vorkommen und Arealerweiterungen ausgewählter Wildbienen – Arten (Hymenoptera: Apidae) in Wien, Niederösterreich und dem Burgenland (Österreich). *Beiträge zur Entomofaunistik*, 3: 33–58.

فهرست مقدماتی زیر جنس‌های *Andrena* (Hymeniptera: Andrenidae) در ایران به همراه گزارش پنج رکورد جدید

صفورا الهوردی^۱، احمد ندیمی^۱، علی افشاری^۱ و خالد علیف^۲

۱ گروه گیاهپزشکی، دانشکده تولید گیاهی، دانشگاه علوم کشاورزی و منابع طبیعی گرگان، گرگان، ایران

۲ موسسه جانورشناسی، آکادمی ملی علوم آذربایجان، پاساژ ۱۱۲۸، بلوک ۵۰۴، باکو، آذربایجان

* پست الکترونیک نویسنده مسئول مکاتبه: nadimi@gau.ac.ir

تاریخ دریافت: ۲۲ آذر ۱۳۹۴، تاریخ پذیرش: ۱۸ دی ۱۳۹۴، تاریخ انتشار: ۱۹ دی ۱۳۹۴

چکیده: فهرست ۴۱ زیرجنس از جنس *Andrena* در ایران بر اساس اطلاعات موجود در منابع منتشر شده و پژوهش حاضر تهیه شد. چهار زیرجنس و پنج گونه شامل *Andrena* (*Cnemidandrena*) *fuscipes* (Kirby, 1802)، *Andrena* (*Lepidandrena*) *pandellei* (Pérez, 1870)، *Andrena* (*Lepidandrena*) *curvungula* (Thomson, 1870)، *Andrena* (*Parandrena*) *sericata* (Imhoff, 1868) و *Andrena* (*Platygalandrena*) *tecta* (Radoszkowski, 1876) برای اولین بار از ایران گزارش می‌شود. نکات اکولوژیک در مورد رکوردهای جدید بطور خلاصه بحث شده است.

واژگان کلیدی: *Andrena*، Apoidea، ایران، زنبورهای گرده‌افشان خاکزی