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ORIGINAL ARTICLE

A CHECKLIST OF MEGACHILID BEES (HYMENOPTERA, MEGACHILIDAE), WITH A NEW RECORD GENUS FROM IRAQ

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ABSTRACT

An updated checklist of the Megachilid bees of Iraq is presented in this paper. The current list includes 31 species belonging to 10 genera, under the tribes Lithurgini, Osmiini, Anthidiini, and Megachilini within the Megachilinae subfamily. The basionyms, synonyms, and distribution of species in the world are also given. Based on the specimens, which obtained during this study, a diagnostic key was designed to identify the tribes and genera; the genus *Heriades* Spinola, 1808 (Tribe, Osmiini) is recorded for the first time in the Iraqi entomofauna.

Keywords: Hymenoptera, Iraq, *Heriades*, Bees, Megachilid.

INTRODUCTION

Megachilidae was divided into two families, Fideliinae and Megachilinae, as the latter is larger than the first subfamily as it includes most of the family species, and the most widespread in the world. It includes five tribes: Lithurgini, Osmiini, Anthidiini, Megachilini, and Dioxyini; while the first family includes two tribes, Fidelini and Parahophitini (Roig-Alsina and Michener, 1993). Megachilidae is a primitive bee that is called the long tongued bees' because they have relatively elongated mouthparts (Danforth *et al*., 2006; Michener, 2007).

Megachilid bees are the second highest members among the related families (Michener, 2007); this family belongs to the superfamily Apoidea within the order Apocrita, along with six other families, including Apidae, Halictidae, Andrenidae, Colletidae, Stenotritidae, and Melittidae, in the order Hymenoptera (Aguiar *et al*., 2013). It includes about 4399 species distributed throughout the world (GBIF Secretariat, 2023).

Most species of the family have nest-building behavior for the purpose of laying eggs and feeding brood, as many different materials are used to build the nest, including the cutting of the edge of plant leaves that they lend in a circular manner, hence the name of the family

leaf-cutting bees (Goulet and Huber, 1993). Bees are considered one of the most beneficial insects to humans as they play a major role in the sexual reproduction of many crops, which constitute 65% of the world's food production (Klein *et al*., 2007). Females have a tuft of hair to hold pollen called scopa located below the abdomen (Eardley *et al*., 2010; Gardener, 2013); except for the species which called cleptoparasitic, as in species of *Coelioxys* Latreille, 1809 that larvae kill larvae of the species of *Megachile* Latreille, 1802 they do not have this structure (Al-Ali, 1977; Michener, 2007; Rowson and Pavett, 2008).

In Iraq, some studies were conducted on this family, including a taxonomic study based on the mouth parts (Abbas, 2015); then Ahmed (2015) conducted a study on the species of wild bees from the northern of Iraq, and Augul (2018) surveyed the species of pollinators from some regions of Iraq, including species affiliated to Megachilidae. There were other studies focused on honey bees, for example: Al-Hujaimi and Taher (2012), AL- Kafage and AL – Bedrey (2016), Al-Badri (2017), Shaher and Nasrallah (2018), Awwad and Shaher (2023), Dagher and Shaher (2023), while wild bees didn't find sufficient attention by researchers despite their great importance as pollinators, in addition to the possibility of being environmental evidence of biodiversity health.

As above, the current study was suggested to prepare a list of the megachild species, including their basionym and synonym names, to be an updated database for future studies.

MATERIALS AND METHODS

Samplings: Totally, 587 specimens were obtained for the period from May 1 2022 to March 4 2023, the specimens were collected at different regions of Iraq, which included: Baghdad, Babylon, Karbala, Wasit, Diyala, Salahaddin, and Duhok Provinces. Surveys were conducted in the cultivated and wild fields, using aerial and sweeping nets. The collections involved searching through plants, the ground, and the expected places for nesting, like dry tree branches (Pl. 1). As well, we also relied on the specimens that were preserved and diagnosed in the previous studies at the Iraq Natural History Research Center and Museum, University of Baghdad.

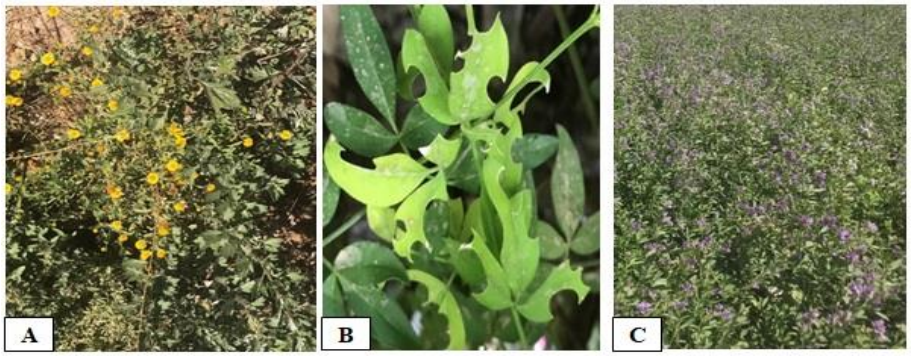

Plate (1): (A) Wild plants, (B) Damage of leaves by leaf cutting bees, (C) Alfalfa plant field.

Examination of materials: Specimens were preserved by drying and pinning, supported by locality information. Morphological features and insects' images were done using a digital microscope camera with RF4 microscope, Camera Lucida to draw, and Samsung A52 mobile camera. Scale bars were given for all the images. Metasoma was dissected to study the tergites and sternites morphological features.

Identification: The keys of Michener (2007), Stephen (1969), and Gupta (1990) are utilized to determine the genera, and reformulated to be suitable to identify with our specimens that we obtained them throughout this study. The study documented and updated the scientific nomenclature and explained synonyms according to Ungricht *et al.* (2008), Grace (2010), Özbek and Schwarz (2016), Salem and EL- Azab (2017), Augul (2018), Praz and Benon (2023), and GBIF Secretariat (2023).

RESULTS AND DISCUSSION

Based on the collected specimens, a total of 31 species within 9 genera of Megachilidae were recorded from Iraq, all of them belonging to the subfamily of Megachilinae. Most of the genera belong to the tribes Megachilini, Anthidiini and Osmiini, whereas the lowest species belong to Lithurgini .These genera and are species as follows:

Family, Megachilidae
Subfamily, Megachilinae Latreille, 1802
Tribe, Anthidiini Ashmed, 1899
Genus, *Anthidium* Fabricius, 1804
Material Examined (7specimens)**:** Duhok, Ashawa, 26.ix.2022, on *Mentha* sp. flowers.

Anthidium florentinum (Fabricius, 1775)
Basionym: *Apis florentina* Fabricius, 1775
Synonyms: *Anthidium caucasicum* Radoszkowski, 1862
A. florentinum subsp. *caucasicum* Radoszkowski, 1862
A. florentinum subsp. *cypriacum* Mavromoustakis, 1949
A. florentinum subsp. *florentinum* (Fabricius, 1775)
A. florentinum subsp. *hispanicum* Mocsáry, 1884
A. florentinum subsp. *rufescente* Alfken, 1935
A.florentinum subsp. *rufescente* Dusmet y Alonso, 1908
A. florentinum subsp. *subspinosum* Klug, 1832
A. helianthinum Wu, 2004
Distribution: Iraq (Khalaf and Al–Omar, 1974). Grace (2010) listed this species in the countries: Greece, Macedonia, Crete, Iran, and Turkey.

Anthidium tesselatum Klug, 1832
Synonyms*: A. helvolum* Klug, 1832
A. lanitarse Friese, 1917
A. lanitarse Mavromoustakis, 1936
A. signiferum Walker, 1871

A. tesselatum subsp. *aegyptiacum* Friese, 1897
A. tesselatum subsp. *zebra* Benoist, 1950
A. villosulum Smith, 1854
A. waltlii Spinola, 1838

Distribution: Iraq Derwesh (1965). Warncke (1980) recorded this species in Egypt. Grace (2010) listed it in Jordon, and Lebanon.

Genus, *Anthidiellum* Cockerell, 1904
Material Examined (7 specimens)**:** Wasit, Aziziyah, Al Zalja Village, 26.vii.2022; Diyala, Al 'Abara District, Qasiba Village, 8.ix.2022, on *Medicago* sp. flowers.

Anthidiellum strigatum (Panzer, 1804)
Basionym: *Trachusa strigata* Panzer, 1804
Synonyms**:** *A. pauperculum* Cockerell, 1928
A. strigatum subsp. *rhodium* Tkalcu, 2006
Anthidium coronatum Dufour, 1853
A. decoratum Chevrier, 1872
A. minusculum Nylander, 1852
A. quadristrigatum Germar, 1815
A. scapulare Schenck, 1851
A. strigatum (Panzer, 1804)
A. strigatum subsp. *humerale* Alfken, 1936
A. strigatum subsp. *ibericum* Alfken, 1936
A. strigatum subsp. *judaicum* Alfken, 1936
A. strigatum subsp. *palaestinense* Alfken, 1935
Dianthidium leucorhinum Cockerell, 1924

Distribution: Derwesh (1965) listed this species in Iraq under the synonym name *Anthidium strigatum* Panzer. Warncke (1980) indicated the presence of *Anthidiellum strigatum* in Iran, Lebanon, Palestine, North Africa, Cyprus, Europe, Greece, Central Asia, Russia, Syria, and Turkey. Libya (Grace, 2010). To addition, the subspecies of *A. s. crassepunctatum* Popov, 1935 was recorded in Iraq by Grace (2010).

Genus, *Icteranthidium* Michener, 1948
Icteranthidium sp.
Distribution: Iraq (Abbas, 2015). Ranges of *Icteranthidium*: Portugal and Morocco to Mongolia; although this genus primarily found in Asia's xeric regions, also can be found in Northern Africa, Senegal, Kenya, Chad, Mali, and Pakistan (Michener, 2007).

Genus, *Stelis* Panzer, 1806
Stelis annulata (Lepeletier, 1841)
Basionym: *Anthidium annulatum* Lepeletier, 1841
Synonyms: *Stelis freygessneri* Friese, 1885
Distribution: Iraq (Proshchalykin and Fateryga, 2017). Greece, and Turkey (Grace, 2010).

Stelis nasuta (Latreille, 1809)
Basionym: *Anthidium nasutum* Latreille, 1809
Synonyms: *Anthidium nasale* Latreille, 1809
Stelidomorpha nasuta (Latreille, 1809)
Distribution: Iraq (Proshchalykin and Fateryga, 2017). Grace (2010) listed this species in Syria, Jordan, Lebanon, Palestine, Greece, and Turkey.

Stelis phaeoptera (Kirby, 1802)
Basionym: *Apis phaeoptera* Kirby, 1802
Synonyms: *Apis aterrima* Christ, 1791
A. stigma Christ, 1791
Stelis phaeoptera subsp. *meridionalis* Popov, 1933
S. phaeoptera subsp. *phaeoptera* (Kirby, 1802)
Distribution: In Iraq listed by Derwesh (1965). Grace (2010) listed this species to, Egypt, Libya, and Greece.

Stelis signata (Latreille, 1809)
Basionym: *Anthidium signata* Latreille, 1809
Synonym: *Anthidium parvulum* Lepeletier, 1841
Stelis strigata Kriechbaumer, 1874
Distribution: Iraq (Derwesh, 1965). (Grace, 2010) listed this species to Greece, Cyprus, Israel, Lebanon, and Turkey. The subspecies of S. *s. eremica* Alfken, 1938 is recorded in Iraq by Grace (2010).

Tribe, Lithurgini
Genus, *Lithurgus* Berthold, 1827
Material Examined (13specimens**):** Baghdad, Jadriyah District, 6.vii.2022, on flowers of *Glycyrrhiza* sp.; Wasit, Aziziyah, Zawiyat Al Zaraa Village, 26.vii.2022, on flowers of *Medicago* sp.; Babylon, Mashro'a Al-Musayib, Abu-Sha'eer, 6.ix.2022, on plant of *Sesamum* sp.

Lithurgus tibialis Morawitz, 1875
Distribution: Iraq Derwesh (1965). Greece, Cyprus, Turkey, Syria, Palestine, Jordan, Iran, and Egypt (Grace, 2010).

Tribe, Megachilini
Genus, *Coelioxys* Latreille, 1809
Material Examined (9 specimens**):** Baghdad, Jadriyah District, 6.vii.2022, on plant *Glycyrrhiza* sp.; Wasit, Aziziyah, Zawiyat Al Zaraa Village, 26.vii.2022, on *Medicago* sp.

Coelioxys afra Lepeletier, 1841
Synonyms: *Coelioxita afra* (Lepeletier, 1841
Coelioxys afer Lepeletier, 1941
C. afra subsp. *melanafra* Cockerell, 1935

C. afra subsp. *tunensis* Gribodo, 1894
C. coronata Förster, 1853
C. mandibularis Chevrier, 1872
C. pusilla Gerstäcker, 1858

Distribution: Iraq (Derwesh, 1965). Africa (Pasteels, 1977). Algeria, Egypt, Kyrgyzstan, Morocco, Russia, Tunisia, Turkmenistan, and Uzbekistan (Warncke, 1992). South, Eastern and Central Europe, the UK, Asia Minor (Banaszak and Romasenko, 1998). Range from Western Europe to China, and Indonesia (Proshchalykn and Lelej, 2004. Greece, Cyprus, Turkey, and Egypt (Grace, 2010). Iran (Khaghaninia *et al*., 2010).

Coelioxys coturnix Pérez, 1884
Synonyms**:** *C. ruficaudis* Cameron, 1913
C. taurus Nurse, 1902
Distribution: Iraq (Derwesh, 1965). Palaearctic (Ortiz-Sánchez, 2014).

Coelioxys circumscriptus Schulz, 1906
Synonyms: *Coelioxys circumscripta* Schulz, 1906
C. circumscriptus Friese, 1905
C. decipiens subsp. *circumscriptus* Schulz, 1906
C. decipiens subsp. *rufipes* Friese, 1904
C. lanosa Friese, 1922
C. latidens Friese, 1922
C. pachyura Cockerell, 1920
Liothryapis circumscripta (Schulz, 1906)
L. circumscripta (Schulz)
Distribution: According to Derwesh (1965). This species is known as *Coelioxys decipiens* Spinola in Iraq. Moreover, according to Ornosa *et al.* (2007), Ortiz-Sánchez *et al*. (2009), and Grace (2010) this species spread from North Africa to Asia Minor, Central Asia, and the Himalayas to Crete, Cyprus, Turkey, and Asia Minor.

Coelioxys haemorrhoa Forster, 1853
Synonyms: *C. pulchella* Morawitz, 1874
C. rhodacantha Cockereli, 1931
Distribution: Iraq listed by Derwesh (1965). Grace (2010) listed it to Israel, Egypt, Greece, Cyprus, Aegean and Turkey. Based on GBIF Secretariat (2023), its have distributes in France, Italy, Spine, France, India, Slovakia, and Morocco.

Coelioxys obtusus Pérez, 1884
Synonym: *C. obtusa* Pérez, 1884
Distribution: According to Derwesh (1965). This species is known as *Coelioxys obtusa* Pérez in Iraq. Turkey (Özbek and van der Zanden, 1994). Based on Ascher and Pickering (2020), it's recorded in France, Greece, Croatia, Egypt, Morocco, Spain, Caucasus Italy, Poland, Iran, and Turkmenistan.

Genus, *Megachile* Latreille, 1802

Material Examined (545 specimens)**:** Baghdad, Bismayah City, 2.vii.2022 on flowers of *Medicago* sp. Wasit, Aziziyah, Zawiyat Al-Zara'e, 26.vii.2022, on flowers of *Medicago* sp., *Vigna* sp. and *Alhagi* sp.; Babylon, Abu-Shaer and Dulaimi 6.xii.2022 on flowers of *Medicago* sp. and *Alhagi* sp. Karbala, Alshariea, 2.v.2022 on flowers of *Alhagi* sp. Diyala, Khimara, Badina, Kasiba and Khan bani saed, 8.ix.2022 on flowers of *Medicago* sp. and *Alhagi* sp. Duhok, Veen, Gali Shirana and Ashawh, 24.ix.2022 on flowers of *Mentha* sp.

Megachile apicalis Spinola, 1808

Synonyms: *Megachile dimidiativentris* Dours, 1873
M. massiliensis Pérez, 1902
M. mixta Costa, 1863
M. virginiana Mitchell, 1926

Distribution: Iraq (Khalaf and Al–Omar, 1974). Eurasia and United States (James and Pitts-Singer, 2008). Egypt and Libya were not mentioned, although there were reports for Cyprus, Turkey, Israel, Greece, Rhodes, and North Africa (Grace, 2010).

Megachile argentata (Fabricius, 1793)

Basionym: *Apis argentata* Fabricius, 1793

Synonyms: *Anthophora albiventris* Panzer, 1806
Apis albiventris, Panzer, 1898
Megachile argentata spinola, 1806
M. crassula Perez, 1896
M. leachella Curtis, 1828
M. argyrea Cockerell, 1931
Perezia maura Ferton, 1914
Trachusa argentata Lurine, 1807

Distribution: Iraq (Derwesh, 1965). Europe (Özbek and van der Zanden, 1994). North-Eastern China, Caucasus, North Africa, and North America (Proshchalykin, 2007). Grace (2010) listed it in Syria. Balzan *et al.* (2016) recorded it in Algeria, and Hungary.

Megachile babylonica Rebmann, 1970

Distribution: Iraq (Grace, 2010).

Megachile concinna Smith, 1879

Synonyms: *M. atratula* Rebmann, 1968
M. privigna Rebmann, 1968
M. sudai Ikudome, 1999
M. variscopa Pérez, 1895

Distribution: Iraq (GBIF Secretariat, 2023). Holarctic Region (Ascher and Pickering, 2020).

Megachile farinosa Smith, 1853

Synonyms: *Chalicodoma derasa* (Gerstäcker, 1869)
C. farinosa (Smith, 1853)

Megachile derasa Gerstäcker, 1869
Distribution: *Chalicodoma farinosa* (Smith, 1853) is the name Grace (2010) gave this species in Iraq. Turkey and Egypt (Ascher and Pickering, 2020).

Megachile flavipes Spinola, 1838
Synonym: *Megachile marginata* Smith, 1833
Distribution: Iraq (Derwesh, 1965). Turkey (Warncke, 1992), and Iran (Grace, 2010).

Megachile minutissima Radoszkowski 1876
Distribution: Iraq (Derwesh, 1965). Egypt and Turkey (Grace, 2010).

Megachile rotundata (Fabricius, 1787)
Basionym: *Apis rotundata* Fabricius, 1787
Synonyms: *Apis pacifica* Panzer, 1798
Megachile imbecilla Gerstäcker, 1869
M. nadia Nurse, 1903
M. pruinosa Pérez, 1897
M. rotundata (Fabricius, 1793)
Distribution: Iraq (Derwesh, 1965). Greece, Cyprus, Turkey, and Aegean (Grace, 2010).

Megachile schnabli Radoszkowski, 1893
Synonyms: *Chalicodoma schnabli* (Radoszkowski, 1893)
Megachile schnablii Radoszkowski, 1893
Distribution: In Iraq registered by Derwesh (1965). Ascher and Pickering (2020) listed it in Turkmenistan, Iran, and Tajikistan.

Megachile squamosa Rebmann, 1970
Distribution: In Iraq, it listed by Grace (2010).

Megachile striatella Rebmann, 1968
Distribution: Egypt, Iraq, Iran, Greece and Libya (Grace, 2010).

Tribe, Osmiini
Genus, *Heriades* Spinola, 1808
Heriades sp.
Material Examined (5 specimens)**:** They collected from Duhok Province, Great Zab River, nearby the Veen Waterfall, Duhok Prov. (37°02'05.2"N 43°44'36.5"E), 25.ix.2022 on flowers of *Mentha* sp.
Note: The genus of *Heriades* is newly record from Iraq.

Genus, *Osmia* Panzer, 1806
Material Examined **(**1specimen**):** Salahaddin, Tikrit, 4.iii.2023 on flowers of *Raphanus* sp.

Osmia atrocaerulea Schilling, 1849

Synonym: *Osmia brevicornis* (Fabricius, 1798)
Distribution: Derwesh (1965) listed this species in Iraq under the name of *Osmia brevicornis* (Fabricius, 1798). Romania (Ban-Calefariu, 2009).

Osmia gutturalis Warnke, 1988
Synonym: *Osmia milenae* Tkalcu, 1992
Distribution: Iraq (Ahmed, 2015); East Mediterranean (Müller, 2021).

Osmia indigotea Morawitz, 1875
Distribution: Iraq (Derwesh, 1965). Afghanistan (GBIF Secretariat, 2023).

Osmia leaiana (Kirby, 1802)
Basionym: *Apis leaiana* Kirby, 1802
Synonyms: *Apis hirta* Geoffroy, 1785
A. melodes Harris, 1776
A. tacitus Harris, 1776
A. ventralis Panzer, 1798
Osmia atra Schenck, 1853
O. confusa Morawitz, 1870
O. forsii Alfken, 1924
O. fulviventris Smith, 1855
O. hirta Smith, 1844
O. leiana (Kirby, 1802)
O. solskyi Morawitz, 1870
O. truncatula Thomson, 1872
O. ventralis (Panzer, 1798)
O. ventralis subsp. *schachti* Warncke, 1988
Distribution: World-wide distribution (GBIF Secretariat, 2023).

Genus, *Protosmia* Ducke, 1900
Protosmia paradoxa (Friese 1899)
Basionym: *Osmia paradoxa* Friese, 1899
Distribution: *Osmia paradoxa* Fr. is recorded in fauna of Iraq under this name by Khalaf and Al–Omar (1974). Grace (2010) listed it in Greece, Cyprus, Turkey, Lebanon, Palestine, Jordan, and Syria.

Key to tribes and genera that collected in the current study:

1-Pygidial plates present (Pl.2 A); in female, it represented by apical spine..... **Lithurgini**
-Pygidial plate absent ……..…….……..…..…2

2-Pterostigma less than twice as long as broad (Pl.2 B); prestigma usually short. Body with yellow marks…… **Anthidiini** ……..……..…….4
-Pterostigma longer than broad by more than twice (Pl.2 C). Body color without yellow marks ……..……..... 3

3- Pretarsi without arolia (Pl.2 D); especially in hind legs……..... **Megachilini** ……...…5
-Arolia present (Pl.2 E)……...……...…….. **Osmiini** 6

4-Subantennal sutures more or less strongly arched outward (Pl.2 F)…..... ***Anthidiellum***
-Subantennal sutures direct (Pl.2 G)……...…….…..... ***Anthidium***

5- Metasoma rounded distally (Pl.2 H)……..…….…..…...…….....… ***Megachile***
-Metasoma pointed distally (Pl.2 I)…...……..…….…….... ***Coelioxys***

6- Parapsidal line liner (Fig. 1. A) …...……..…….... ***Heriades***
- Parapsidal line punctiform (Fig. 1. B) …….....***Osmia***

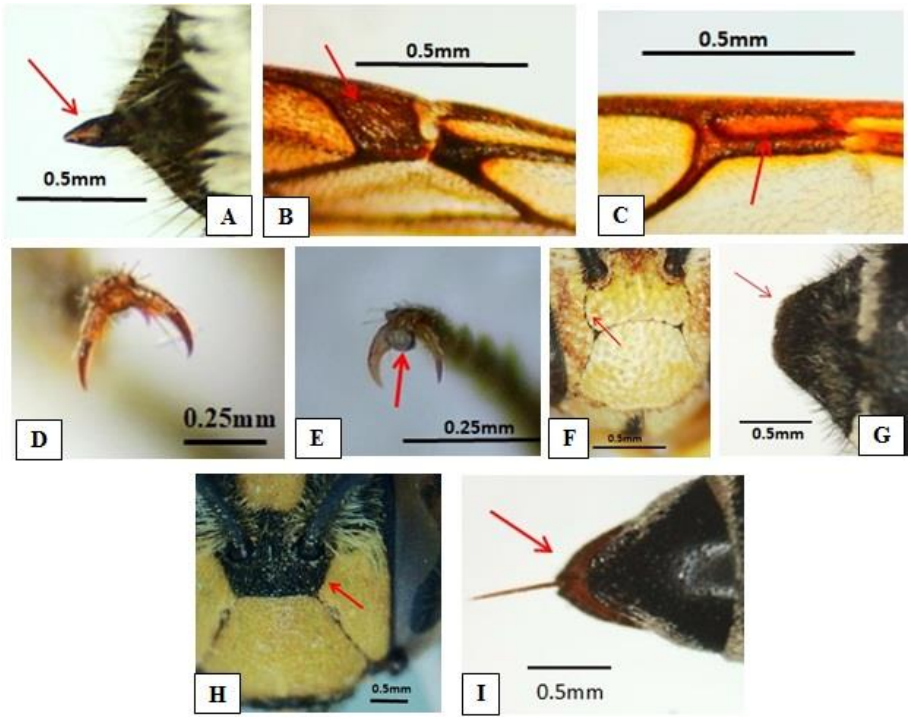

Plate (2): (A) Pygidial plate, *Lithurgus* sp., (B) Pterostigma, Anthidiini, (C) Pterostigma, Megachilini, (D) Claws without arolia, Megachilini, (E**)** Claws with arolia, Osmiini, (F) Subantennal suture, *Anthidiellum*, (G) Subantennal suture, *Anthidium* sp., (H) *Megachile* sp., terminal segments of metasoma, (I) *Coelioxys* sp., terminal segments of metasoma.

Description of male *Heriades* Spinola, 1808

Members of *Heriades* have a small body, length 4-5 mm; sparsely- haired, black bees, and an integument with very coarsely punctured and thin, pale hair bands on the metasoma (Pl. 3 A, B). Head rounded, width and height 1-1.5 mm, vertex contains three ocelli triangular,

distance between ocelli smaller than distance between them and occiput. Front with white hair upwards. Clypeus with white hair on sideways, anterior ridge truncate beneath little density pubescence, lateral ridge with projection (Pl. 3 C). Gena pubescence; mandibles black, tridentate three, apical tooth radish–brown. Mouthparts short, not/ or rarely exceeding proboscidial fossa in rust (Pl. 3 D). Flagellomeres dark-brown, scape and pedicel black, first flagellomeres smaller than second.

Thorax: width 1-1.5 mm, length 1-2mm.Tegula dark- brown except for the ridges hyaline. Scutum punctured with a parapsidal line. Scutellum with tapered side edges extending to the back, posterior margin pubescence. Metanoutum with anterior margin carinate and projected upwards. Propodeal dorsum with horizontal basal area consisting of a series of large punctures, separated by a carina from posterior declivous surface (Fig. 1. A). Fore wing length 2.5- 3mm, hyaline except basal dark- brown, veins darker brown, basal vein (M) straight, with two submarginal cells (SMC), SMC1 a little bigger than SMC2, and prestigma more than twice as long as broad. Hind wing shorter than fore wing, hyaline, veins darker brown, jugal lobe less than venal lobe.

Coxae: black, rounded with dorsal carinate absent punctate on front coxa, little dense pubescence, trochanter rectangular, narrow basally, wider apically with white setae; femora black, slender in shape, wider basally, narrow apically, with densely and whitish hairs dorsally. Tibiae black, narrow at basally, wider apically, with dense and white hairs dorsally, fore and mid tibiae with one spur (Pl. 3. E), hind tibia with two spurs; tarsi black, five segments, with reddish- brown setae, length of all basitarsus three times more than width, fore basitarsus with an apical notch; claws bifid, reddish- brown, arolia present.

Metasoma curved under so that (Pl. 2. F), apex almost touching first or second sterna, anterior surface of T1 concave with a distance carina between dorsal and anterior surfaces, posterior margin with short setae laterally so that T2, while T3 with apical transverse carinate, T5 with short white setae straight, T6 helmet like with lateral dents (Fig. 1. G), T7 completely hidden by sixth, sternites hidden except S1and, S2.

Diagnostic characters: T1 with distinct concave anteriorly, anterior and dorsal surfaces with distinct transverse carina (Pl. 3 B). T7 hidden by un-toothed T6, metasoma usually curled, only exposing two sterna. S2 and S3 notched or steppe posteriorly – laterally (Pl. 3 F, G).

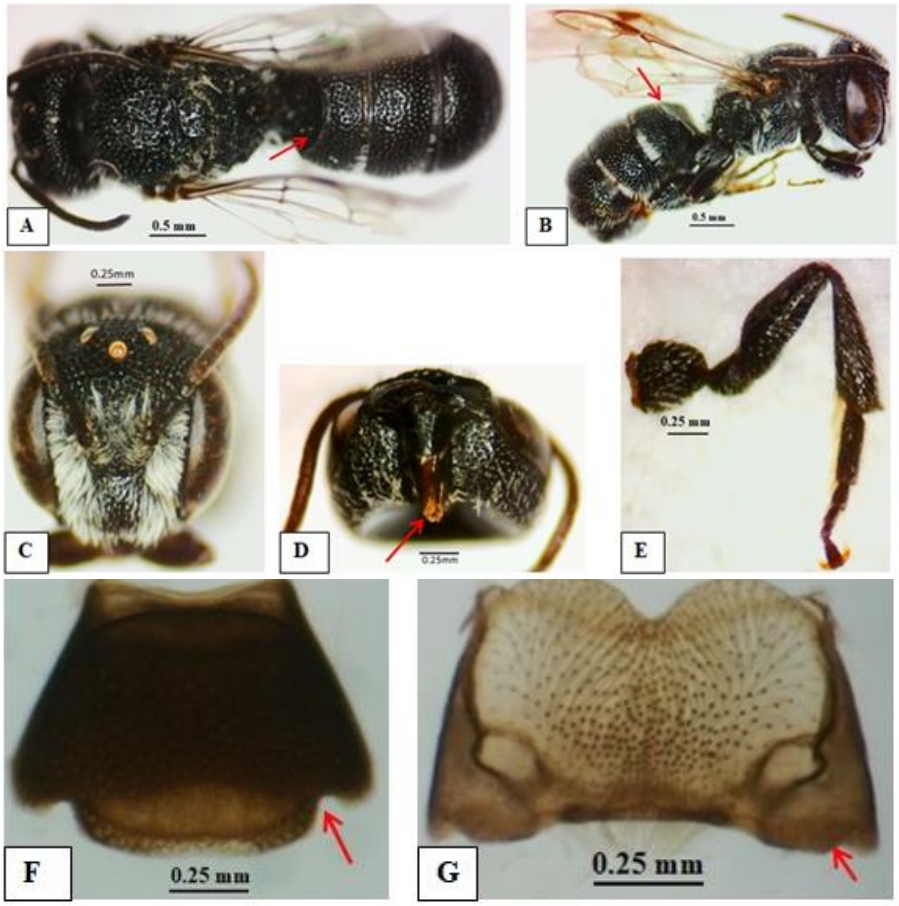

Plate (3): *Heriades* sp.; (A) Male, dorsal view, (B) Habitat, lateral view, (C) Front view of face, (D) Proboscidial fossa, (E) Mid leg, [fa] sixth terga, helmet like with lateral dents, Puncture, (F) Second sternite, notched, (G) Third sternite, notched.

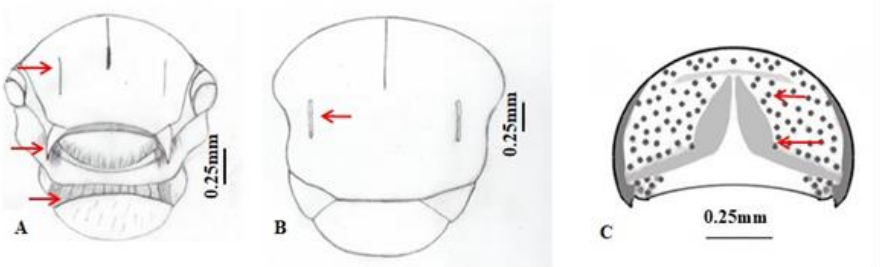

Figure (1): (A) Male, *Heriades* sp., dorsal view of thorax (Parapsidal line liner in Scutum, axilla and large pits on propodeum), (B) *Osmia* sp., parapsidal line punctiform, (C) Sixth terga, helmet like with lateral dents, and punctures.

CONCLUSIONS

According to our observation fields, the members of this family have a less active in the early morning; their activity begins to increase with the rise in temperatures, reaching its peak in the middle of the day. These bees divers on many flowers, including: *Medicago* sp., *Alhagi* sp., *Sesamum* sp., *Vigna* sp., *Glycyrrhiza* sp., *Mentha* sp. and *Capsicum* sp.; however, some of them prefer a particular plant, such as *Megachile* spp., we find in high density on alfalfa plant.

Finally, it is expected that new species will be recorded in Iraq when searching for them in other localities; as is the case for the new record genus *Heriades*, which we have not identified at the level of the species, this requires further specimens, in addition to the lack of recent keys, and we believe it to be a new species for science, since the genus is obscure and not widespread in the neighboring areas of Iraq.

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CONFLICT OF INTEREST STATEMENT

The results of the current study are part of the requirements of M.Sc. in Insects, Department of Plant Protection, College of Agriculture Engineering Sciences, University of Baghdad for the first author. Also, we confirm and declare the existence of any relationship or conflict of interest with any other party.

LITERATURE CITED

Al-Ali, A. S. 1977. Phytophagous and entomophagous insects and mites of Iraq. *Natural History Research Center Iraq, Publication*, 33: 1-142.

Al-Hujaimi, K. W. S. and Taher, I. J. 2012, Pollution of honey bees with lead and cadmium, *Iraqi Journal of Agricultural Science*, 43(15): 68-63.

Abbas, M. A. 2015. A taxonomic study of the mouth parts of the genera of the bee family Leaf cutting bees (Megachilidae: Hymenoptera) in some regions of Iraq. Master Thesis on Plant Protection, Agriculture College, University of Karbala, 90 pp. [Click here]

Aguiar, A. P., Deans, A. R ., Engel M.S., Forshage, M., Huber J.T., Jennings J.T., Johnson N. F., Lelej A. S., Longino T. J., Lohrmann V., Miko I., Ohl M., Rasmussen C., Taeger A. and Ki yu D. S. 2013. Order hymenoptera. *Zootaxa*, 3703(1):51-62. [Click here]

Ahmed, H. 2015. Taxonomic study of bees (Hymenoptera: Apoidea) in some localities of Kurdistan Region-Iraq. M.Sc. in Plant Protection, College of Agriculture, Salahaddin University, Erbil, Iraq, 151pp.

Al-Badri, B. H. 2017. Economies of bee keeping in Iraq. *The Iraqi Journal of Agricultural Scienc*es, 48 (Special Issue): 126-137. [Click here]

AL- Kafage, N. J. M. and AL – Bedrey, A. A. N. 2016. Extension agricultural innovation for bee keepers to develop and increase productivity in the central region of Iraq. *Iraqi Journal of Agricultural Sciences*, 63(5): 2121-2122. [CrossRef]

Ascher, J. S. and Pickering, J. 2020. Discover life bee species guide and world checklist (Hymenoptera: Apoidea: Anthophila. [Click here]

Augul, R.S. 2018. Study on diversity of bees (Hymenoptera, Apoidea) from different regions of Iraq. *Bulletin of Iraq Natural History Museum*, 15(1): 57-75. [Click here]

Awwad, I. H. and Shaher, K. W. 2023. Detection of *Varroa* spp. morphology, molecular, and estimation of infection rate in Baghdad Province. *Annals of Forest Research*, 66(1):1239-1249. [Click here]

Balzan, M. V., Rasmont, P., Kuhlmann, M., Dathe, H. H., Pauly, A., Patiny, S., Terzo, M. and Michez, D. 2016. The bees (Hymenoptera: Apoidea) of the Maltese Islands. *Zootaxa*, 4162(2): 225-244. [ResearchGate]

Ban-Calefariu, C. 2009. Checklist of Megachilidae (Hymenoptera: Apoidea) of the Romanian fauna. *Travaux du Muséum National d'Histoire Naturelle* "Grigore Antipa", 52: 303-311. [Click here]

Banaszak, J. and Romasenko, L. 1998. Megachilid bees of Europe (Hymenoptera, Apoidea, Megachilidae). Bydgoszcz University, Bydgoszcz, 239pp. [Click here]

Danforth, B. N., Sipes, S., Fang, J. and Brady, S. G. 2006. The history of early bee diversifi cation based on five genes plus morphology. *Proceedings of the National Academy of Sciences of the United States of America USA*, 103:15118-15123.[Click here]

Dagher, I. J. and Shaher, K. W. 2023. Isolation and identification of Lactobacillus bacteria in the stomach of honey bees and their effect as a probiotic in increasing the number of bacteria. *Annals of Forest Research*, 66(1):1250-1257. [Click here]

Derwesh, A. I. 1965. A preliminary list of identified insects and arachnids of Iraq. Director General Agriculture Research Projections Baghdad, Bulletin, no. 112, 123pp. [Click here]

Eardley, C., kuhlmann, M. and Pauly, A. 2010. The bee genera and Subgenera of Sub-Saharan Africa. *In*: Samyn, Y., Spiegle, D.V. and Degreef, J. (eds.), Abc Taxa: the Series of Manuals Dedicated to Capacity Building in Taxonomy and Collection Management. Vol. 7, The Belgian Development cooperation, 139 pp. [Click here]

Gardener, J. 2013. A survey and historical comparison of the Megachilidae (Insecta: Hymenoptera) of Itasca State Park, Minnesota. A thesis submitted to the Faculty of University of Minnestoa , 47pp. [Click here]

GBIF Secretariat 2023. GBIF Backbone Taxonomy. Checklist dataset. accessed via GBIF.org on 2023-5-12.[Click here]

Goulet, H. and Huber, J. T. 1993. Hymenoptera of world: An identification guide to families. Center for Land and Biological Resources Research Ottawa, Ontario. Research Branch Agriculture Canada Publication 1894/E, 688pp. [Click here]

Grace, A. 2010. Introduction biogeography to bees the Eastern Mediterranean and near East. Bexhill Museum.sussex, United kingdom. 284pp. [Click here]

Gupta, R.K. 1990. A key for the identification of Indian genera of family Megachilidae (Hymenoptera: Apoidea). *Natural History Society*, 89: 297- 301. [Click here]

James, R. R. and Pitts-Singer, T. L. 2008. Bee pollination in agricultural ecosystems. New York: Oxford University Press, 232 pp. [Click here]

Khaghaninia, S., Güler, Y. and Mousavi, M. 2010. Megachilids bees (Hymenoptera: Apoidea) of Aynali forests with four new records for Iran. *Munis Entomology and Zoology*, 5, suppl.: 890-895. [Click here]

Khalaf, A. N. and Al-Omar, A. 1974. A second list of insects from Iraq. Biological Research Centre, Publication no.2, 41pp. [Click here]

Klein, A. M., Vaissière, B. E. and Cane, J. H. 2007. Importance of pollinators in changing landscapes for world crops. *Proceedind of the Royal Society* B, 274(1608):303-313. [Click here]

Michener, C. D. 2007. The Bees of the World. Baltimore: The John Hopkins University Press,800pp. [Click here]

Müller, A. 2021. Palaearctic Osmiine Bees. [Click here]

Ornosa, C., Ortiz-Sánchez, F. J. and Torres, F. 2007. Catálogo de los Megachilidae del Mediterráneo occidental (Hymenoptera, Apoidea). II. Lithurgini y Megachilini. *Graellsia*, 63(1):111-134. [Click here]

Ortiz-Sánchez, F. J. 2014. *Coelioxys coturnix*. The IUCN Red List of threatened species 2014: e.T19199794A21142579. (Downloaded on 07 February 2018). [Click here]

Ortiz-Sánchez, F. J., Torres, F. and Ornosa, C. 2009. Claves de identificación para las especies ibéricas del género *Coelioxys* Latreille, 1809 (Hymenoptera, Apoidea, Megachilidae). *Graellsia*, 65(2): 155-170. [Click here]

Özbek, H. and van der Zanden, G. 1994. A preliminary review of the Megachilidae of Turkey. Part IV. Megachilini and Lithurgini (Hymenoptera: Apoidea). *Turkiye Entomoloji Dergisi*, 18:157-174. [Click here]

Özbek, H. and Schwarz, M. 2016. Distribution data of the kleptoparasitic bees in Turkey: Part 2. Genera *Coelioxys* and *Radoszkowskiana* (Hymenoptera: Megachilidae: Megachilinae) whith their checklist. *Linzer biologische Beitrage*, 48(1): 1753-1771. [Click here]

Pasteels, J. J. 1977. Les Megachilini parasites (*Coelioxys* s. l.) d'Afrique noire. Subdivision générique et subgénérique. Descriptions d'espèces nouvelles et rectifications de nomenclature (Hymenoptera, Apoidea, Megachilidae). *Revue de Zoologie Africaine*, 91:161-197. [Click here]

Praz, C. J. and Benon, D. 2023. Revision of the *leachella* group of *Megachile* subgenus *Eutricharaea* in the western Palaearictic (Hymenoptera, Apoidea, Megachilidae): a renewed plea for DNA barcoding type material. *Journal of Hymenoptera Research*, 95: 143-198. [CrossRef]

Proshchalykin, M. Yu. and Lelej, A. S. 2004. New and little known bees (Hym; Apidae) from the Russian Far East. *Far Eastern Entomologist*, 136: 1-10. [ResearchGate]

Proshchalykin, M. Yu. 2007. The bees of family Megachilidae (Hymenoptera, Apoidea) of Transbaikalia. *Far Eastern Entomologist*, 175: 1-18. [Click here]

Proshchalykin, M. Yu. and Fateryga, A.V. 2017. Family Megachilidae, in Annotated Catalogue of the Hymenoptera of Russia, Vol. 1: Symphyta and Apocrita: Aculeata Proceedings of the Zoological Institute RAS, Supplement 6; Ed. by Lelej, A. S., Proshchalykin, M. Yu. and Loktionov, V. M. Zoological Institute RAS, St. Petersburg, p. 295-308.[ResearchGate]

Roig-Alsina, A. and Michener, C. D. 1993. Studies of the phylogeny and classification of long-tongued bees. *University of Kansas Science Bulletin*, 55(4): 124-162. [Click here]

Rowson, R. and Pavett, M. 2008. Avisual guide for the identification of British *Coelioxys* bees. Privately published, Cardiff, UK, 7pp. [Click here]

Salem, M. M. and El-Azab, S. A. 2017. A checklist with some taxonomic notes on species of the family Megachilidae (Hymenoptera: Apoidea) recorded in Egypt. *Egyptian Academic Journal of Biological Sciences Entomology*, 10(1): 41-54. [CrossRef]

Shaher, K. W. and Nasrallah, M. M. 2018. The use of brood pheromones and feeding substitutes in the stimulation of honey bee *Apis mellifera* L. (Hymenoptera: Apidae). *International Journal of Horticulture, Agriculture and Food Science*, 2(1): 41-45. [CrossRef]

Stephen, W. P., Bohart, G. E. and Torchio, P. F. 1969. The Biology and external morphology of bees. Agricultural Experiment Station and printed by Department of printing Oregon State Universitym Corvallis, 140pp. [Click here]

Ungricht, S., Müller, A. and Dorn, S. 2008. A taxonomic catalogue of the tribe Osmiini (Hymenoptera: Apoidea: Megachilidae). *Zootaxa*, 1865: 1-253. [CrossRef]

Warncke, K. 1980. Die Bienengattung *Anthidium* Fabricius, 1804 in der West palaarktis und im turkestanischen becken. *Entomofauna*, 1 (10): 119-210. [Click here]

Warncke, K. 1992. Die Westpalaarktischen Arten der Bienengattung *Coelioxys* Latr. (Hymenoptera, Apidae, Megachilinae), *Berlinische Gesellschaft Naturforschender Freunde*, 53: 31-73. [Click here]

Bull. Iraq nat. Hist. Mus.
(2023) 17(4): 571-588.

قائمة المرجعية لعائلة نحل قاطعات الاوراق
(Hymenoptera, Megachilidae)
مع تسجيل جنس جديد للعراق

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الخلاصة

قدمت قائمة مراجعة محدثة لنحل Megachilid في العراق، اذ شملت 31 نوعًا ينتمي إلى 10 أجناس، تحت قبائل Lithurgini و Osmiini و Anthidiini و Megachilini ضمن عويلة Megachilinae. كما ذكرت الاسماء المرادفة والاسماء الاصلية (الاساسية) مع توزيع الانواع في العالم.

بناءً على العينات التي تم الحصول عليها خلال هذه الدراسة ، تم تصميم مفتاح تشخيصي للقبائل والاجناس؛ حيث سجل الجنس *Heriades* Spinola, 1808 لأول مرة للمجموعة الحشرية العراقية.