Bitki Koruma Bülteni / Plant Protection Bulletin

http://dergipark.gov.tr/bitkorb

Original article

New data on the tribe Osmiini (Hymenoptera: Megachilidae) fauna of Türkiye

Türkiye Osmiini (Hymenoptera: Megachilidae) faunası hakkında yeni bilgiler

Emin KAPLAN[a*]

[a]*Bingöl University, Faculty of Agriculture, Department of Plant Protection, 12000, Bingöl, Türkiye*

ARTICLE INFO

Article history:

DOI: 10.16955/bitkorb.1053813

Received : 05-01-2022

Accepted : 21-02-2022

Keywords:

Hymenoptera, Megachilidae, Osmiini, distribution, fauna, systematics, Türkiye

* Corresponding author: Emin KAPLAN

eminkaplan021@gmail.com

ABSTRACT

Ten species belonging to the tribe Osmiini were collected and identified from the east of Türkiye during 2017-2021. The specimens were identifed as *Chelostoma emarginatum* (Nylander, 1856), *Heriades rubicola* Pérez, 1890, *Hoplitis leucomelana* (Kirby, 1802), *Hoplitis tridentata* (Dufour and Perris, 1840, *Hoplitis* (Anthocopa) *serainae* Müller, 2012, *Hoplitis (Hoplitis*) sp., *Osmia aurulenta* (Panzer, 1799), *Osmia gallarum* Spinola, 1808, *Osmia* (*Helicosmia*) *signata* Erichson, 1835 and *Osmia viridana* Morawitz, 1874. Distributions, illustrations and brief descriptions of all species are added to the study. No new records were obtained but new localities for some species have been reported.

INTRODUCTION

Megachilidae comprises approximately 4000 species classified into seven tribes and more than 70 genera (Ascher and Pickering 2020, Michener 2007). This group is a large family with specialized characteristics but they possess morphologically uniformity, as well. They can be found in a wide diversity of habitats on all continents except Antarctica, ranging from lowland tropical rain forests to deserts to alpine environments (Litman et al. 2011). There has been an unique pollen-collecting adaptation in which the scopa (the pollen collecting hairs) of a female is located on the ventral side of the metasoma in the family Megachilidae (Banaszak and Romasenko 1998). It has been reported that some species belonging to the Megachilidae are effective pollinators in some plants (Bosch and Blas 1994, Vicens and Bosch 2000). The osmiine bees constitute a tribe Osmiini within the family Megachilidae (Hymenoptera), which is one of the nine currently recognized families of bees (Engel 2005, Michener 2007). The tribe Osmiini Newman, 1834 which comprise 15 genera and roughly 1200 species worldwide, occur in North America, Africa and Eurasia (Müller 2019). They are especially diverse in Mediterranean and xeric climates of southern Africa, southwestern North America and the Palaearctic region. The Palaearctic Osmiine bee fauna is quite diverse with 10 genera and about 700 species (Proshchalykin and Maharramov 2020). In Türkiye, the tribe Osmiini comprises approximately 247 taxa from eight genera (Özbek 2013, Proshchalykin and Maharramov 2020). The osmiine bees have special importance for their often spectacular and very diverse nest-building behaviors as well as for their close relationships with flowering plants (Cane et al. 2007, Müller et al. 1997, Sedivy et al. 2008). Some Osmia species such as O. cornuta in Europe, O. cornifrons in Asia and Osmia lignaria in North America are commercially used to pollinate the flowers of fruit trees (Bosch and Kemp 2002).

In this study, we tried to assess the specimens belonging to this tribe from eastern Türkiye.

MATERIALS AND METHODS

The study was conducted in Diyarbakır and Bingöl provinces of eastern Türkiye (Figure 1). Osmiine bees were collected using insect net in the different flowering seasons during 2017-2021. Determinations of all species were made by Andreas Müller. Photographs of morphological characters and male genitalia of adults were taken by using a digital camera attached to a stereomicroscope. All collected specimens are deposited in the individual collection of Department of Plant Protection, Faculty of Agriculture, Bingöl University (Bingöl, Türkiye).

Figure 1. Map of the investigated area in Türkiye

RESULTS

Totally ten species from four genera (*Chelostoma Latreille*, 1809, *Heriades Spinola*, 1808, *Hoplitis* Klug, 1807, *Osmia* Panzer, 1806) of tribe Osmiini were listed. The list of species, distributional data and brief description are given below alphabetically.

Family: Megachilidae

Subfamily: Megachilinae

Tribe: Osmiini

Genus: *Chelostoma* Latreille, 1809

Chelostoma (*Chelostoma*) *emarginatum* (Nylander, 1856)

Material examined: Bingöl: Çayağzı, N 38º 47' 57.65", E 40º 33' 40.63", 999 m, 19.V.2021, ♀; Ekinyolu, N 38o 54' 00.00", E 40º 34' 17.58", 1036 m, 22.V.2021, ♀; Adaklı, Kamışgülü, N 39º 13' 04.16", E 40º 25' 56.89", 1215 m, 29.V.2021, ♀; Diyarbakır: Eğil, Yatır, N 38º 48' 21.94", E 40º 33' 16.56", 721 m, 24.IV.2021, ♀.

Description. Female: *Length*: 8–9 mm. *Colour*: Black. *Head*: Mandible long with two apical teeth and inner margin brownish hairy; labrum short; face slight white hairy (Figure 2b, d). *Thorax*: Pronotal lobes dense hairy; scutum and scutellum moderately punctuated; propodeum completely dull and punctuated (Figure 2a). *Metasoma*: Apical margin of terga 1–5 with white hair bands; pygidial plate V-shaped; sterna with dense grayish hairy (Figure 2a, c, e).

Previous records: Adıyaman, Afyonkarahisar, Amasya, Ankara, Antalya, Aydın, Bingöl, Bursa, Bilecik, Çanakkale, Çorum, İstanbul, Konya, Mersin, Muğla, Şanlıurfa, Şırnak, Yozgat (Özbek 2011, Güler et al. 2014).

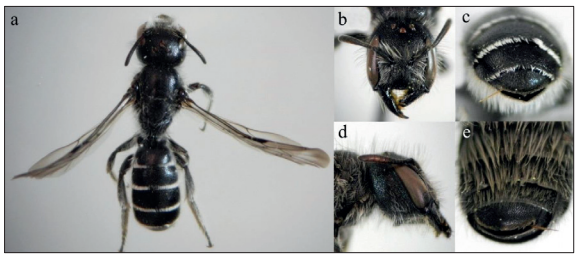

Figure 2. *Chelostoma emarginatum*, ♀; a) Dorsal view, b) Face, c) Pydigial plate, d) Lateral view of head, e) Sterna

Genus: *Heriades* Spinola, 1808

Heriades (*Heriades*) *rubicola* Pérez, 1890

Material examined: Bingöl: Büyükterkören, N 38o 49' 54.31", E 40o 34' 21.97", 1008 m, 05.VI.2021, ♂.

Description. Male: *Length*: 6 mm. *Colour*: Black. *Head*: Mandible long and slender; labrum short; face dense white hairy (Figure 3b). *Thorax*: Pronotal lobes dense hairy; scutum and scutellum punctuated; propodeum completely dull (Figure 3a). *Metasoma*: Apical margin of terga 1–2 with white hair bands laterally; terga dense deep punctuated; pygidial plate V-shaped; sterna with slight whitish hairy in places (Figure 3a, c, d). *Genitalia*: Length 0.9 mm, brownish, paramere narrow and broad on the upper and inferior sides respectively; aedeagus slender, penis valve dilated and with a widely central entrance (Figure 3e).

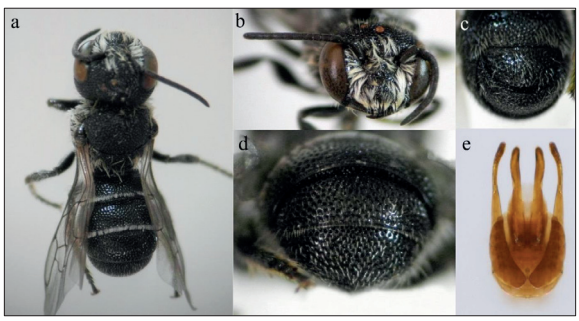

Figure 3. *Heriades* (*Heriades*) *rubicola*, ♂; a) Dorsal view, b) Face, c) Sterna, d) Pydigial plate, e) Male genitalia

Previous records: Antalya, İçel (Özbek and Zanden 1992b, Özbek 2013).

Figure 3. *Heriades* (*Heriades*) *rubicola*, ♂; a) Dorsal view, b) Face, c) Sterna, d) Pydigial plate, e) Male genitalia

Genus: *Hoplitis* Klug, 1807

Hoplitis (*Alcidamea*) *leucomelana* (Kirby, 1802)

Material examined: Bingöl: Ekinyolu, N 38o 54' 00.00", E 40o 34' 17.58", 1036 m, 01.VI.2021, ♂; Diyarbakır: Dicle, Meydan, N 38o 19' 14.62", E 40o 13' 54.99", 730 m, 24.IV.2021, ♂; Eğil, Yatır, N 38o 48' 21.94", E 40o 33' 16.56", 721 m, 24.IV.2021, ♂.

Description. Male: *Length*: 6–8 mm. *Colour*: Black. Head: Mandible and labrum short; face dense yellowish hairy (Figure 4b). *Thorax*: Pronotal lobes yellowish hairy; scutum and scutellum punctuated; propodeum completely dull (Figure 4a). *Metasoma*: Apical margin of terga 1–5 with white hair bands laterally; terga slight shallow punctuated; pygidial plate V-shaped; Apical margin of sterna 2–4 with brownish hairy (Figure 4a, c, d). *Genitalia*: Length 1.2 mm, yellowish, paramere narrow on the upper and inferior sides; aedeagus slender, penis valve dilated and with a slight central entrance (Figure 4e).

Previous records: Artvin, Bilecik, Erzincan, Erzurum, Hakkâri, Iğdır, Kars, Konya, Nevşehir (Özbek 1979a, Özbek and Zanden 1992a, Özbek 2013).

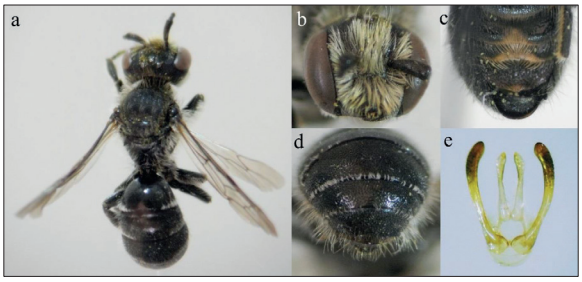

Figure 4. *Hoplitis* (*Alcidamea*) *leucomelana*, ♂; a) Dorsal view, b) Face, c) Sterna, d) Pydigial plate, e) Male genitalia

Hoplitis (*Alcidamea*) *tridentata* (Dufour and Perris, 1840)

Material examined: Bingöl: Genç, Dilektaşı, N 38o 46' 06.45", E 40o 46' 27.64", 1653 m, 09.V.2021, ♂.

Description. Male: *Length*: 11 mm. *Colour*: Black. Head: Mandible and labrum short; face dense long brownish hairy (Figure 5b). *Thorax*: Pronotal lobes and pleuron long brownish hairy; scutum shallow punctuated; scutellum, metanotum and propodeum long brownish hairy (Figure 5a). *Metasoma*: terga and sterna with long brownish hairy in places; basal margin of terga dense shallow punctuated; pygidial plate groove-shaped (Figure 5c).

Previous records: Amasya, Artvin, Bilecik, Bitlis, Erzurum, Kars, Konya, Nevşehir, Tunceli (Özbek 1979a, Zanden 1980, Özbek and Zanden 1992a, Özbek 2013).

Figure 5. *Hoplitis* (*Alcidamea*) *tridentata*, ♂; a) Dorsal view, b) Face, c) Pydigial plate Hoplitis (Anthocopa) serainae Müller, 2012

Material examined: Diyarbakır: Dicle, Sergenli, N 38o 19' 30.64", E 40o 13' 38.46", 750 m, 24.IV.2021, ♂.

Description. Male: *Length*: 7 mm. *Colour*: Black. Head: Mandible and labrum short; face dense yellowish hairy (Figure 6b). *Thorax*: Pronotal lobes yellowish hairy; scutum and scutellum shallow punctuated; propodeum completely dull and long whitish hairy (Figure 6a). *Metasoma*: Apical margin of terga with white short hair bands; terga dense shallow punctuated; pygidial plate with two teeth; sterna with whitish hairy in places (Figure 6a, c, d). Genitalia: Length 1.1 mm; brownish, paramere narrow and broad on the upper and inferior sides respectively, apically pointed; aedeagus slender, penis valve dilated and with a slight central entrance (Figure 6e).

Previous records: Antalya, Kütahya, Nevşehir, Siirt, Hakkâri (Müller 2012)

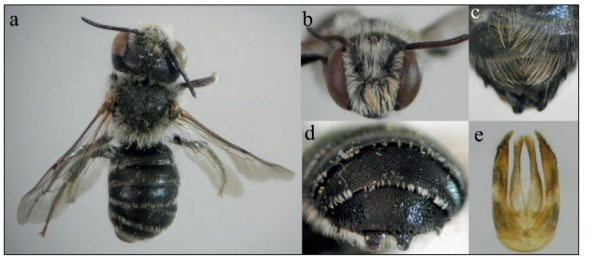

Figure 6. *Hoplitis* (*Anthocopa*) *serainae*, ♂; a) Dorsal view, b) Face, c) Sterna, d) Pydigial plate, e) Male genitalia

Hoplitis (*Hoplitis*) species

Material examined: Diyarbakır: Hani, Çardaklı, N 38o 18' 56.31", E 40o 24' 06.29", 1057 m, 12.V.2017, ♂.

Description. Male: *Length*: 8 mm. *Colour*: Brownish black. *Head*: Mandible short and labrum long; face dense whitish hairy (Figure 7b). *Thorax*: Pronotal lobes whitish hairy; scutum and scutellum shallow punctuated and dull; propodeum completely dull and long whitish hairy (Figure 7a). *Metasoma*: Apical margin of terga with white hair bands; terga dense shallow punctuated; pygidial plate

U-shaped; apical margin of sterna brownish (Figure 7a, c, d). *Genitalia*: Length 1.3 mm; brownish, paramere very slender on upper sides and broad on the inferior; aedeagus robust and wide, penis valve dilated and with a slight central entrance (Figure 7e).

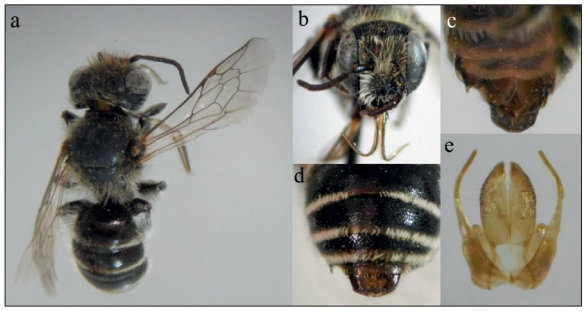

Figure 7. *Hoplitis* (*Hoplitis*) species, ♂; a) Dorsal view, b) Face, c) Sterna, d) Pydigial plate, e) Male genitalia

Genus: *Osmia* Panzer, 1806

Osmia (*Helicosmia*) *aurulenta* (Panzer, 1799)

Material examined: Bingöl: Adaklı, Kamışgülü, N 39o 13' 04.16", E 40o 25' 56.89", 1215 m, 29.V.2021, ♂; Yayladere, Yaylabağ, N 39o 10' 42.04", E 40o 05' 45.14", 1170 m, 30.V.2021, ♂.

Description. Male: *Length*: 11-12 mm. *Colour*: Black. Head: Mandible and labrum short; face dense yellowish hairy (Figure 8b). *Thorax*: Pronotal lobes yellowish hairy; scutum, scutellum and propodeum brownish hairy and completely dull (Figure 8a). *Metasoma*: Apical margin of terga and sterna 2–5 with white brownish hairy; pygidial plate flat and wide (Figure 8a, c, d). *Genitalia*: Length 1.6 mm; brownish black paramere narrow and broad on the upper and inferior sides respectively; aedeagus slender, penis valve dilated and with a widely central entrance (Figure 8e).

Previous records: Ağrı, Ankara, Artvin, Bayburt, Bilecik, Bitlis, Burdur, Erzincan, Erzurum, Eskişehir, Hakkâri, Hatay, Karaman, Kayseri, Konya, Mersin, Nevşehir, Siirt, Tokat, Tunceli (Friese 1921, Özbek 1979b, Özbek and Zanden 1992a, Güler and Çağatay 2006, Özbek 2014).

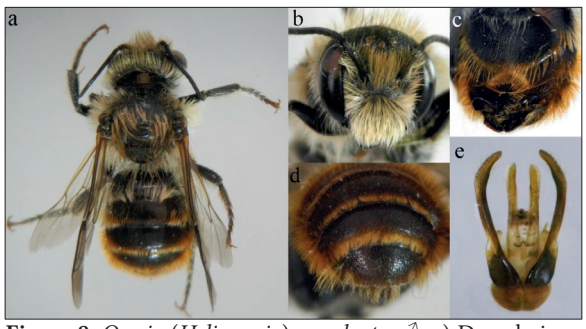

Figure 8. *Osmia* (*Helicosmia*) *aurulenta*, ♂; a) Dorsal view, b) Face, c) Sterna, d) Pydigial plate, e) Male genitalia

Osmia (*Pyrosmia*) *gallarum* Spinola, 1808

Material examined: Bingöl: Çayağzı, N 38o 47' 57.65", E 40o 33' 40.63", 999 m, 05.VI.2021, ♀.

Description. Female: *Length*: 6 mm. *Colour*: Black. *Head*: Mandible and labrum short; face slight whitish hairy (Figure 9b, d). *Thorax*: Pronotal lobes whitish hairy; scutum and scutellum shallow punctuated; propodeum shiny and slightly hairy (Figure 9a). *Metasoma*: First abdominal tergite with white hair in laterally; terga dense shallow punctuated; pygidial plate V-shaped and hairy; sterna with whitish long hairy in places (Figure 9a, c, e).

Previous records: Ankara, Antalya, Artvin, Aydın, Bilecik, Erzincan, Erzurum, Eskişehir, Gümüşhane, Hakkâri, Isparta, İstanbul, İzmir, Kars, Konya, Mersin, Muğla, Muş, Nevşehir, Niğde, Siirt, Şanlıurfa (Özbek 1979a, Warncke 1992, Güler et al. 2014, Özbek 2014).

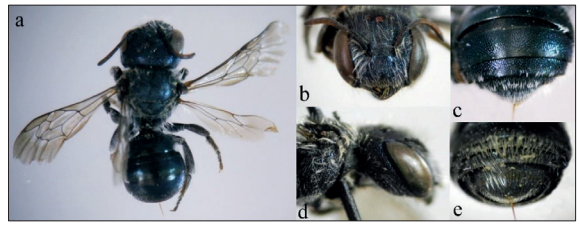

Figure 9. *Osmia (Pyrosmia) gallarum*, ♀; a) Dorsal view, b) Face, c) Pydigial plate, d) Lateral view of head, e) Sterna

Osmia (*Helicosmia*) *signata* Erichson, 1835

Material examined: Diyarbakır: Dicle, Meydan, N 38o 19' 14.62", E 40o 13' 54.99", 730 m, 24.IV.2021, ♀.

Description. Male: *Length*: 11 mm. *Colour*: Black. *Head*: Mandible long with three apical teeth and labrum short; apical margin of clypeus dense brownish hairy; face dense whitish hairy (Figure 10b, c). *Thorax*: Pronotal lobes yellowish hairy; scutum and scutellum punctuated with dense brownish hairy; propodeum completely dull (Figure 10a). *Metasoma*: Apical margin of terga with white hair bands; terga dense deep punctuated; pygidial plate flat; sterna with dense blackish hairy (Figure 10a, c, e)

Previous records: Adana, Afyonkarahisar, Aksaray, Ankara, Antalya, Aydın, Bayburt, Bingöl, Birecik, Bitlis, Bursa, Çanakkale, Diyarbakır, Erzincan, Erzurum, Eskişehir, Hakkâri, Hatay, İstanbul, Iğdır, Kahramanmaraş, Karaman, Kars, Kayseri, Kilis, Konya, Mardin, Mersin, Muş, Nevşehir, Şanlıurfa, Şırnak, Uşak, Van, Yalova (Friese 1921, Alfken 1935, Zanden 1980, Warncke 1988, Özbek and Zanden 1992a, Özbek 2014).

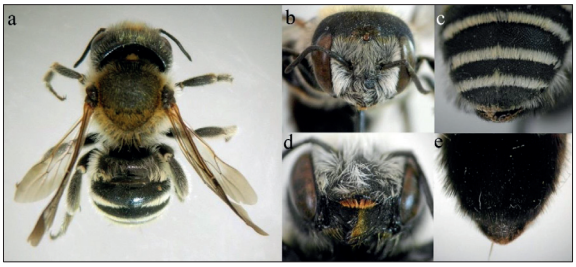

Figure 10. *Osmia* (*Helicosmia*) *signata*, ♀; a) Dorsal view, b) Face, c) Pydigial plate, d) Mouth parts, e) Sterna

Osmia (*Pyrosmia*) *viridana* Morawitz, 1874

Material examined: Bingöl: Solhan, Arakonak, N 38o 56' 49.39", E 41o 07' 40.76", 1639 m, 20.VII.2017, ♂; Diyarbakır: Lice, Angül, N 38o 24' 23.81", E 40o 33' 50.23", 866 m, 25.IV.2021, ♂.

Description. Male: *Length*: 6–7 mm. *Colour*: Metallic greenish. Head: Mandible with two apical teeth and labrum short; face long yellowish hairy (Figure 11b). *Thorax*: Pronotal lobes yellowish hairy; scutum and scutellum deep punctuated; propodeum shiny (Figure 11a). *Metasoma*: First abdominal tergite with white hair in laterally; pygidial plate with two teeth; sterna with slight whitish hairy in places (Figure 11a, c, d). *Genitalia*: Length 1.1 mm; brownish; paramere narrow and broad on the upper and inferior sides respectively; upper part of paramere notched; aedeagus slender, penis valve dilated and with a widely central entrance (Figure 11e).

Previous records: Adana, Adıyaman, Ankara, Antalya, Aydın, Diyarbakır, Erzurum, Hakkâri, Kahramanmaraş, Mardin, Mersin, Muğla, Nevşehir, Siirt, Şanlıurfa (Zanden 1984, Özbek and Zanden 1992a, Warncke 1992, Güler et al. 2014, Özbek 2014).

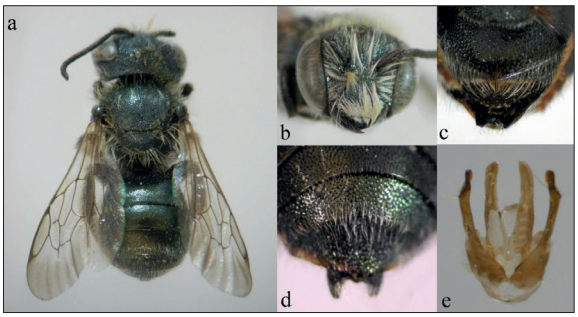

Figure 11. Osmia (*Pyrosmia*) *viridana*, ♂; a) Dorsal view, b) Face, c) Sterna, d) Pydigial plate, e) Male genitalia

DISCUSSION

In the present publication, Osmiine bees collected from eastern Türkiye are morphologically diagnosed, and the male genitalia was explained. Among the identified species, six species are the first record for the study area: *Heriades rubicola* Pérez, 1890, *Hoplitis leucomelana* (Kirby, 1802), *H. tridentata* (Dufour and Perris, 1840), H. *serainae* Müller, 2012, *Osmia aurulenta* (Panzer, 1799), *O. gallarum* Spinola, 1808. Other species (*Chelostoma emarginatum* (Nylander, 1856), *O. signata Erichson*, 1835 *O. viridana Morawitz*, 1874) are an additional record for the study area. The results of this research (with ten species) together with other works on tribe Osmiine of Türkiye (e.g. Özbek 2013, Proshchalykin and Maharramov 2020) indicate that eastern Türkiye is quite rich in terms of insect diversity. Although the fauna of Osmiine of Türkiye was studied rather well (see references), the fauna of provinces Bingöl and Diyarbakır eastern of Türkiye was poorly studied. With the diverse flora in eastern Türkiye, we expect much more species of Osmiine in this area. Osmiine bees are both ecologically and economically important; they include many pollinators of natural, urban and agricultural vegetation (Gonzalez et al. 2012). It has also been reported in previous studies that these species can be used commercially as first pollinators in some cases. (Güler and Çağatay 2006, Richards 1997,). However, many osmiin species are still unidentified, as the identification and classification of many important pollinator groups is inadequate. Consequently, identifying these bees which are quite considerable in plant pollination from the study area will guide future studies.

ACKNOWLEDGEMENTS

I would like to thank Dr. Andreas Müller (Zürich, Switzerland) for the identification of all species.

ÖZET

Türkiye'nin doğusundan 2017-2021 yılları arasında Osmiini tribüsüne ait on tür toplanmış ve tanımlanmıştır. Örnekler *Chelostoma emarginatum* (Nylander, 1856), *Heriades rubicola* Pérez, 1890, *Hoplitis leucomelana* (Kirby, 1802), *Hoplitis tridentata* (Dufour and Perris, 1840, *Hoplitis* (*Anthocopa*) *serainae* Müller, 2012, *Hoplitis* (*Hoplitis*) sp., *Osmia aurulenta* (Panzer, 1799), *Osmia gallarum* Spinola, 1808, *Osmia* (*Helicosmia*) *signata* Erichson, 1835 ve *Osmia viridana* Morawitz, 1874 olarak tanımlandı. Çalışmaya tüm türlerin dağılımları, illüstrasyonları ve kısa tanımları eklenmiştir. Yeni kayıt elde edilmemiş ancak bazı türler için yeni lokaliteler bildirilmiştir.

Anahtar kelimeler: Hymenoptera, Megachilidae, Osmiini, dağılım, fauna, sistematik, Türkiye

REFERENCES

Alfken J.D., 1935. Beitrag zur kenntnis der bienenfauna von Kleinasian. Entomologische Rundschau, 52, 110-111.

Ascher J., Pickering J., 2020. Bee species guide (Hymenoptera: Apoidea: Anthophila). http:// www. discoverlife.org/ mp/20q?guide=Apoidea_species (Date accessed 24.12.2021).

Banaszak J., Romasenko L., 1998. Megachilid bees of Europe. Pedagogical University of Bydgoszcz, Poland, 239 p.

Bosch J., Blas M., 1994. Foraging behaviour and pollinating efficiency of *Osmia cornuta* and *Apis mellifera* on almond (Hymenoptera, Megachilidae and Apidae). Applied Entomology and Zoology, 29, 1-9.

Bosch J., Kemp W.P., 2002. Developing and establishing bee species as crop pollinators: the example of Osmia spp. (Hymenoptera: Megachilidae) and fruit trees. Bulletin of Entomological Research, 92, 3-16.

Cane J.H., Griswold T.L., Parker F.D., 2007. Substrates and materials used for nesting by North American Osmia bees (Apiformes: Megachilidae). Annals of the Entomological Society of America, 100, 350-358. https://doi.org/10.1603/0013-8746(2007)100[350:SAMUFN]2.0.CO;2

Engel M.S., 2005. Family-group names for bees (Hymenoptera: Apoidea). American Museum Novitates, 3476, 1-33.

Friese H., 1921. Apidae. In: Fahringer, J. and Friese, H., Eine Hymenopteren-Ausbeute aus dem Amanusgebirge (Kleinasien und Nord-Syrien südl. Armenien). Archiv für Naturgeschichte (Berlin), Abteilung, A, 161-176 p.

Gonzalez V.H., Griswold T., Praz C.J., Danforth B.N., 2012. Phylogeny of the bee family Megachilidae (Hymenoptera: Apoidea) based on adult morphology. Systematic Entomology, 37, 261-286.

Güler Y., Çağatay N., 2006. Faunistic study on Megachilini, Osmiini and Anthidiini tribes (Hymenoptera: Megachilidae) in Central Anatolia. Journal of the Entomological Research Society, 8, 15-34.

Güler Y., Töre D., Dikmen F., Aytekin A.M., 2014. Contributions on the current knowledge of the diversity of the Megachilidae (Apoidea: Hymenoptera) fauna in the Mediterranean Region of Turkey. Türkiye Entomoloji Dergisi, 38 (3), 255-278.

Litman J.R., Danforth B.N., Eardley C.D., Praz C.J., 2011. Why do leafcutter bees cut leaves? New insights into the early evolution of bees. Proceedings of the Royal Society, Series B: Biological Sciences, 278, 3593-3600. doi: 10.1098/rspb.2011.0365

Michener C.D., 2007. The bees of the world, 2nd ed. Johns Hopkins University Press, Baltimore and London, 953 p.

Müller A., 2012. New European bee species of the tribe Osmiini (Hymenoptera: Apoidea: Megachilidae). Zootaxa, 3355, 29-50.

Müller A., 2019. Palaearctic Osmiine bees, ETH Zürich. http://blogs.ethz.ch/osmiini (Date accessed 24.12.2021).

Müller A., Krebs A., Amiet F., 1997. Bienen: Mitteleuropäische gattungen, lebensweise, beobachtung. Augsburg: Naturbuch Verlag, 384 p.

Özbek H., 1979a. Bees of the genera *Osmia*, *Lithurgus* and *Coelioxys* (Hymenoptera: Apoidea; Megachilidae) in some parts of eastern Anatolia. Türkiye Bitki Koruma Dergisi, 3, 47-58.

Özbek H., 1979b. Bees of the genera *Anthidium*, *Anthocopa, Hoplitis* and *Megachile* (Hymenoptera: Apoidea; Megachilidae) in some parts of eastern Anatolia. Türkiye Bitki Koruma Dergisi. 3, 95-107.

Özbek H., Zanden G., 1992a. A preliminary review of the Megachilidae of Turkey, Part I. Osmiini (Hymenoptera: Apoidea). Türkiye Bitki Koruma Dergisi, 16, 13-32.

Özbek, H., Zanden G., 1992b. A preliminary review of the Megachilidae of Turkey, Part II. Heriadini (Hymenoptera: Apoidea). Türkiye Bitki Koruma Dergisi. 16, 129-134.

Özbek H., 2011. *Chelostoma Latreille* (Hymenoptera: Megachilidae, Osminii) species occurring in Turkey with their zoogeographic characterization. Turkish Bulletin of Entomology, 1 (3), 151-168.

Özbek H., 2013. Distribution of the Tribe Osmiini Bees (Hymenoptera: Megachilidae) of Turkey Part I: The Genera *Heriades*, *Stenoheriades*, *Hofferia* and *Hoplitis*. Atatürk University Journal of the Agricultural Faculty, 44 (1), 1-20.

Özbek H., 2014. Distribution of the tribe Osmiini bees (Hymenoptera: Megachilidae) of Turkey Part II: the genera *Haetosmia*, *Osmia* and *Protosmia*. Atatürk University Journal of the Agricultural Faculty, 44 (2), 121-143.

Proshchalykin M. Y., Maharramov M.M., 2020. Additional records of osmiine bees (Hymenoptera: Megachilidae: Osmiini) from Azerbaijan. Acta Biologica Sibirica, 6, 33–42. https://doi.org/10. 3897/abs.6.e53095.

Richards K.W., 1997. Potential of the alfalfa leafcutter bee, *Megachile rotundata* (F.) (Hym., Megachilidae) to pollinate hairy and winter vetches (*Vicia* spp.). Journal of Applied Entomology, 121, 225-229.

Sedivy C., Praz C.J., Müller A., Wildmer A., Dorn S., 2008. Patterns of host-plant choice in bees of the genus *Chelostoma*: the constraint hypothesis of host-range evolution in bees. Evolution: International Journal of Organic Evolution, 62, 2487-2507. https://doi.org/10.1111/j.1558-5646.2008.00465.x

Vicens N., Bosch J., 2000. Pollinating efficacy of *Osmia cornuta* and *Apis mellifera* (Hymenoptera: Megachilidae, Apidae) on 'Red Delicious' apple. Environmental Entomology, 29 (2), 235-240.

Warncke K., 1988. Die bienengattung Osmia Panzer, 1806, ihre systematik in der Westpaläarktis und ihre verbreitung in der Türkei. 1. Untergattung *Helicosmia* Thomson, 1872 (Hymenoptera, Apidae). Entomofauna (Ansfelden), 9, 1-45.

Warncke K., 1992. Die bienengattung *Osmia* Panzer, 1806 ihre systematik in der Westpaläarktis und ihre verbreitung in der Türkei. 11. Die Untergattung *Pyrosmia* Tkalcu, 1975. Linzer biologische Beiträge, 24, 893-921.

Zanden G., 1980. Beitrag zur kenntnis der türkischen bauchsammler (Hymenoptera, Aculeata, Megachilidae). Faunistische Abhandlungen (Dresden), 7, 229-235.

Zanden G., 1984. Neue paläarktische taxa der familie Megachilidae (Hymenoptera, Apoidea, Megachilidae). Reichenbachia (Dresden), 22, 175-191. Cite this article: Kaplan E. (2022). New data on the tribe Osmiini (Hymenoptera: Megachilidae) fauna of Türkiye. Plant Protection Bulletin, 62-2. DOI: 10.16955/bitkorb.1053813

Atıf için: Kaplan E. (2022 Türkiye Osmiini (Hymenoptera: Megachilidae) faunası hakkında yeni bilgiler. Bitki Koruma Bülteni, 62-2. DOI: 10.16955/bitkorb.1053813