

# Bees of the genera *Anthidium*, *Anthocopa*, *Hoplitis* and *Megachile* (Hymenoptera: Apoidea; Megachilidae) in some parts of Eastern Anatolia

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## Summary

This is a faunal study of some genera of Megachilidae in some parts of Eastern Anatolia. In this study 16 species of *Anthidium*, 8 species of *Anthocopa*, 10 species of *Hoplitis*, and 14 species of *Megachile* has been found and their host plants recorded.

All the species are new for the Turkish fauna. On the other hand *Anthocopa yermasoyiae asiae*, *A. bidentata pallens*, *A. apriaca bayburtensis*, *Hoplitis mollis*, *H. erzurumensis*, *H. pyrenaea ardahanensis*, *Megachile circumcincta ozbeki*, *M. genalis tortumensis*, *M. bicoloriventris erzurumensis*, and *M. sexmaculata thracia* are new species and subspecies. Holotypes and paratypes are in the Museum of Plant Protection, Agriculture Faculty, Atatürk University, Erzurum, Turkey.

At the result of this study, it has been found that *Megachile analis* and *M. circumcincta ozbeki* are good pollinators of sainfoin (*Onobrychis sativa* L.). *Anthidium eblongatum*, *A. punctatum*, *A. cingulatum*, *Hoplitis mollis*, and *H. erzurumensis* are also good pollinators of alfalfa, red clover and as well as sainfoin.

In this study it is found that *Megachile pacifica* that is the most important pollinator of alfalfa and succesfully managed in artificial nesting sites, naturally occurs in the Eastern Anatolia.

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## **Introduction**

Bees (Apoidea) are valuable pollinators of certain crops. More than half of the world's diet of fats and oils comes from oilseeds such as coconuts, cotton, oil palm, olives, peanuts, rape, soybeans, and sunflowers (Guidry, 1964). Many of these plants are dependent upon or benefited by insect pollination. On the other hand pollination is the principal limiting factor in the growing of alfalfa, several clovers, and sainfoin (Bohart, 1957). Another value of pollination lies in its effect on quality and efficiency of crop production. Inadequate pollination can result not only in reduced yields but also in delayed yield and a high percentage of culls of inferior fruits (McGregor, 1976). Bees have a relation not only to agriculture, but to the conservation of wildlife and game management, and constitute an important element in the various ecologic factors that combine to form our environment (Mitchell, 1960).

For the effective use of pollinator bees in agriculture and for determining the basic measurers for maintaining and increasing the numbers of bees, a thorough knowledge is needed of their species composition, site distribution and trophic associations with cultivated and wild plants. Megachilidae of Turkey has not been accurately studied.

## **Material and methods**

The collection of the bees were made during the years of 1970-1978 in the provinces of Erzurum, Erzincan, Kars and Muş. However, there are very few specimens that were collected earlier than that. In this period more than 3500 specimens of Megachilidae were collected; their feeding associations were recorded with species of some flowering plants.

In collecting bees, nets and killing bottles were essential items of equipment. Two types of net were used. The first one was the short-handled net, the other was long-handled one. A smaller net with the shorter handle can be swung more rapidly than a larger one, an essential feature in catching many of the bees that have rapid flight. Long-handled net were used collecting bees on trees or high bushes. In collecting bees; collector watched the plants in bloom, and collected the bees alighting on the flowers. Sometimes collector swept the net on the flower heads of relatively dense patches of flowering plants.

In pinning of the specimens, the pin was placed to the right side of the scutum, thus avoided in destroying the sculpture of the central area of the scutum. The specimens labelled with the data of locality, date of collection and name of collector. All of the specimens were collected by the writer.

The determination of the specimens were made by Dr. B. Tkalcu. The specimens were deposited in the Museum of Plant Protection Department at Atatürk University in Erzurum, Turkey.

## Results and discussion

### *Anthidium* Fabricius

*Anthidium* Fabricius 1804, *Systema Piezatorum*. p. 364.

Type: *Apis manicata* Linnaeus

Body black with yellow or whitish maculations; mandibles in the female multi-dentate with from 5-7 or more small teeth along the expanded margin; maxillar palpi 2-4 segmented; prothoracic tubercles not carinate; pleura net vertically carinate; front wing with very short stigma; in males 5-8 sterna retracted and modified.

#### 1. *Anthidium oblongatum* Latreille

It is frequent species, found at all localities that this study conducted, flies from the beginning of June to the end of September. *A.oblongatum* visits *O.sativa*, *M.sativa*, *T.pratense*, *Melilotus officinalis*, *Lotus corniculatus*, *Onopordon* sp., *Centaurea* sp., *Salvia* sp., *Cirsium* sp., *Cichorium* sp., and *Lythrum* sp..

#### 2. *Anthidium laterale* Latreille

1 female, Erzurum 17.VIII.1966, on *Carduus* sp.,

#### 3. *Anthidium limbiferum* Morawitzia

2 females, Erzurum 20.VIII.1966, on *Onopordon* sp.,

#### 4. *Anthidium grohmanni* Spinola

2 males, Erzurum 28.VIII.1977, on *O. sativa*.

#### 5. *Anthidium punctatum* Latreille

It is a common species, flies from June to the end of September and visits *O.sativa*, *M.sativa*, *T.pratense*, *T.repens*, *M.officinalis*, *L.corniculatus*, *Caronilla* sp., *Stachys* sp., *Salvia* sp., and *Onopordon* sp..

**6. *Anthidium punctatum amanunes* Popov**

1 female, Erzurum 15.VI.1970; 1 female, Erzurum 2.VIII.1970, on **O. sativa**.

**7. *Anthidium diadema* Latreille**

2 males, Erzurum 8.VII.1974; 1 male, Erzurum 28.VII.1972; 1 male, Oltu (Erzurum) 20.VII.1970 on **Carduus** sp., and **Onopordon** sp..

**8. *Anthidium dalmaticum* Mocsary**

1 female, 1 male, Kân-İspir (Erzurum) 20.VIII.1970, on **Salvia** sp..

**9. *Anthidium manicatum* (Linnaeus)**

1 female, Ardahan (Kars) 5.VIII.1977; 1 female, Başaklı-Oltu (Erzurum) 17.IX.1977; 2 males, Bağbaşı - Tortum (Erzurum) 20.IX.1977, on **Stachys** sp., **Ballata** sp., **Salvia** sp., **Onopordon** sp., **Caronilla** sp., and **Linaria** sp..

**10. *Anthidium eximium* Giraud**

1 female, 2 males, Oltu (Erzurum) 18.IX.1977, on **Onopordon** sp., and **Lythrum** sp..

**11. *Anthidium septemspinosum* Le Peletier**

1 female, Erzurum 28.VII.1977, on **Carduus** sp..

**12. *Anthidium cingulatum* Latreille**

It is a common species, flies from the end of May to the end of September, visits **O.sativa**, **M.sativa**, **T.pratense**, **M.officinalis**, **L.corniculatus**, **Convolvulus arvensis**, **Salvia** sp., **Carduus** sp., **Onopordon** sp., **Cirsium** sp., **Stachys** sp., and **Linaria** sp..

**13. *Anthidium taeniatum* Latreille**

1 female, Narman (Erzurum) 14.VII.1972; 1 male, Kân-İspir (Erzurum) 20.VIII.1970, on **Carduus** sp.

**14. *Anthidium loti* Perris**

1 female, Kân-İspir (Erzurum) 20.VIII.1970, on **Onopordon** sp..

15. **Anthidium malacopygum** Griboda

1 male, Erzurum 20.VIII.1966 on **T.pratense**.

16. **Anthidium lituratum** Pérez

1 female, Başaklı-Oltu (Erzurum) 13.VIII.1977, on **Carduus** sp..

**Anthocopa** LePeletier and Serville

**Anthocopa** LePeletier and Serville 1825, *Encyclopedie Methodique, Histoire Naturelle* 10: 314.

Type: **Apis papaveris** Latreille

**Anthocopa** consists of mostly robust, black (rarely metallic) bees shaped as in **Osmia**. Head punctate; mandibles dentate in females, 2-dentate in males; maxillar palps 4 segmented; thorax coarsely punctate; posterior lobe of pronotum generally separated by a vertical idge; parapsidal lines linear; inner ventral margin of each hind coxa marked by a longitudinal carina, sometimes weak, or at least by a feeble, shining line; anterior surface of the first metasomal tergum broadly concave, separated from the dorsal surface by an impressed line or feeble carina, dorsal surface coarcer sculptured.

1. **Anthocopa perezii** (Ferton)

1 female, Erzurum 9.VI.1970; 1 female, Erzurum 11.VIII.1970; 1 male, Erzurum 4.VI.1970; 1 male, Iğdır (Kars) 26.VI.1971, on **O.sativa**, **M.sativa**, **M.officinalis**, and **Lythrum** sp..

2. **Anthocopa distinguenda** Tkalcu

1 female, Yeşildere (Erzurum) 14.VIII.1977; 1 male, Tafta (Erzurum) 20.VI.1970, on **Onopordon** sp..

3. **Anthocopa spinulosa** (Kirby)

1 female, Oltu (Erzurum) 25.VII.1971; 1 female Başaklı-Oltu (Erzurum) 1.VIII.1977; 1 female, Başaklı-Oltu (Erzurum) 17.IX.1977, on **Carduus** sp., and **Onopordon** sp..

**4. *Anthocopa jakovlevi* (Radoszkowski)**

1 female, Hasankale (Erzurum) 25.VIII.1977; 1 male, Erzurum 8.VII.1974, on *Carduus* sp., and *Cirsium* sp..

**5. *Anthocopa cristata* Fonscolombe**

1 male, Hasankale (Erzurum) 25.VII.1977, on *Carduus* sp..

**6. *Anthocopa yermasoyiae asiae* Tkalcu**

Holotype: Female, Erzurum 13.VII.1972, H. Özbek

Paratypes: 1 female, Erzurum 23.VI.1974; 1 female, Erzurum 29.VI.1974; 1 female Erzurum, 18.VII.1972, H. Özbek. It visits *O.sativa*, and *M. officinalis*. 1 female, Erzurum 23.VI.1974 in Dr. Tkalcu's collection.

**7. *Anthocopa bidentata pallens* Tkalcu**

Holotype: female Erzurum 20.VIII.1966, H. Özbek.

Paratypes: 2 females, Yeşildere (Erzurum) 14.VIII.1977; 1 female, Bayburt (Gümüşhane) 15.VIII.1970; 1 female, Serçeme (Erzurum) 15.VIII.1970 2 males, Ardahan (Kars) 5.VIII.1977; 1 male, Başaklı-Oltu (Erzurum) 13.VIII.1977; 1 male, Yeşildere (Erzurum) 14.VIII.1977, H. Özbek, on *Carduus* sp., *Onopordon* sp., and *Centaurea* sp..

**8. *Anthocopa apriaca bayburtensis* Tkalcu**

Holotype: Female, Bayburt (Gümüşhane) 30.VII.1970, H. Özbek. on *Carduus* sp..

Holotypes and paratypes of *A.yermasoyiae asiae*, *A.bidentata pallens* and *A.apriaca bayburtensis* were deposited in the Museum of Plant Protection Department, Agriculture Faculty, Atatürk University, Erzurum, Turkey.

**Hoplitis Klug**

*Hoplitis* Klug, 1807 Mag. Insectenk. 6: 225.

Type: *Apis odunca* Panzer

*Hoplitis* consists of rather small, slender bees, usually entirely black in color, but sometimes brilliantly metallic. Maxillary palp usually 5 segmented: in the females the mandibles 3-4 dentates, in the males 2 den-

tates; parapsidal lines of scutum linear; axillae very small and inconspicuous; the posterior coxae lack carinae on their inner ventral angles, or rarely inconspicuous lines; arolia present; the anterior face of basal abdominal tergum has a longitudinal sulcus, anterior face usually longer than dorsal face; in the males the sixth tergum bears a tooth on both sides.

### 1. *Hoplitis recticauda* (Stanek)

1 female, Erzurum 9.VI.1970; 1 female, Erzurum 15.VI.1970; 1 male, Erzurum 4.VI.1970, on *O. sativa*.

### 2. *Hoplitis mollis* Tkalcu

Holotype: In Dr. Tkalcu's collection.

Paratypes: 1 female, Erzurum 9.VI.1970; 1 female, Erzurum 12.VI.1970; 1 female, Erzurum 26.VI.1974; 1 female, Erzurum 2.VII.1974; 1 female, Tafta (Erzurum) 5.VII.1970; 1 female, Erzurum 6.VII.1971; 1 female, Erzurum 29.VII.1974; 1 male, Erzurum 4.VI.1974; 1 male, Erzurum 17.VI.1970; 1 male, Erzurum 2.VII.1970, H. Özbek, on *M. sativa* and *O. sativa* (Plant Protection Museum, Agriculture Faculty Atatürk University, Erzurum, Turkey).

Paratypes in Dr. Tkalcu's collection: 1 female, Erzurum 15.VI.1970; 1 female, Bayburt (Gümüşhane) 20.VI.1976; 1 male, Erzurum 17.VI.1971; 1 male Erzurum 26.VI.1976; 1 male, Erzurum 8.VII.1972, H. Özbek.

This species is very common on the Farm of Agriculture Faculty. It is a good pollinator of *O. sativa* and *M. sativa*.

### 3. *Hoplitis erzurumensis* Tkalcu

Holotype: In Dr. Tkalcu's collection

Paratypes: 1 female, Erzurum 16.VI.1974; 2 females, Erzurum 9.VII.1970; 1 female, Erzurum 10.VII.1970; 1 female, Erzurum 13.VII.1972; 1 female, Erzurum 15.VII.1971; 4 females, Erzurum 20.VII.1971; 2 females, Erzurum 24.VII.1970; 1 male, Erzurum 12.VII.1970; 1 male, Erzurum 16.VII.1966, H. Özbek (Plant Protection Museum, Agriculture Faculty, Atatürk University, Erzurum, Turkey).

Paratypes in Dr. Tkalcu's collection: 1 female, Erzurum 12.VI.1970; 1 female, Erzurum 17.VI.1970; 1 female, Erzurum 20.VI.1974; 1 female, Erzurum 27.VI.1972; 2 females, Erzurum 2.VII.1970; 1 female, Erzurum 6.VII.1977; 1 male, Erzurum 13.VI.1972; 1 male, Erzurum 17.VI.1970, H. Özbek.

**H. erzurumensis** visits **O.sativa**, **M.sativa**, and **T.pratense**.

**4. *Hoplitis acuticornis* Dufour et Perris**

1 female, Erzurum 14.VII.1971; 1 male, Erzurum 7.VI.1972; 1 male, Erzurum 12.VI.1970, on **O.sativa** and **Lathyrus** sp..

**5. *Hoplitis leucomelaena* (Kirby)**

1 female, Erzurum 30.VI.1970; 1 female, Erzurum 6.VII.1971; 1 male, Iğdır (Kars) 25.V.1971; 1 male, Tuzluca (Kars) 26.V.1971; 1 male, Oltu (Erzurum) 25.VI.1971 on **L.corniculatus**, **M.officinalis**, **Lathyrus** sp., and **Convolvulus** sp..

**6. *Hoplitis carinata* (Staneek)**

It is very common especially on the Farm of Agriculture Faculty, visits **O.sativa**, **M.sativa**, **M.officinalis**, **L.corniculatus**, **Vicia** sp., **Astragalus** sp., and **Ajuga** sp.. This species flies from the end of May to the end of July.

**7. *Hoplitis caucasica* Friese**

1 female, Erzurum 15.VI.1970; 1 female, Erzurum 23.VI.1974, on **O.sativa**, and **M.officinalis**.

**8. *Hoplitis tridentata* Dufour et Perris**

1 female, Erzurum 29.VI.1974; 1 female, Erzurum 29.VII.1974, on **O.sativa**, and **M.sativa**.

**9. *Hoplitis laevifrons* Morawitz**

1 female, Erzurum 1.VI.1974; 1 female, Tafta (Erzurum) 20.VI.1970; 1 female, Narman (Erzurum) 14.VII.1972; 1 female, Erzurum 24.VII.1970; 2 males, Tafta (Erzurum) 20.VI.1970, on **Salix** sp., **Cirsium** sp., **Anchusa** sp., and **Carduus** sp..

**10. *Hoplitis pyrenaea ardahanensis* Tkalcu**

Holotype: Female, Ardahan (Kars) 10.VIII.1976, on **Pisium arvense**, H. Özbek (Plant Protection Museum, Agriculture Faculty, Atatürk University, Erzurum, Turkey).



## **Megachile Latreille**

**Megachile** Latreille, 1802. Histoire Naturelle der Fourmis. p. 434.

Type: **Apis centuncularis** Linnaeus

**Megachile** includes black, non-metallic, usually robust bees. The maxillary palpi 3 segmented; mandibles 3-5 dentate; the scutellum broad, its hind margin nearly straight; axillae not conspicuously protuberant and never acute; notaulices linear; arolia absent; basal abdominal tergum concave anteriorly, but not carinate; in the males the front coxae usually spinose and front tarsi often much dilated and modified.

### 1. **Megachile analis** Nylander

Syn.: **M.apicalis** Nylander

**M.alicilla** Eversman

**M.künnemanni** Alfken

**M.analis** is a common species especially in the vicinity of Erzurum. It flies from the beginning of June to the end of August. Abdominal scopae of most of the females were loaded with pollens of sainfoin flowers. Besides that it visits **Carduus** sp., and **Onopordon** sp..

### 2. **Megachile circumcincta ozbeki** Tkalcu

Holotype: Female, Erzurum 20.VI.1974, H. Özbek (Plant Protection Museum, Agriculture Faculty Atatürk University Erzurum Turkey).

Paratypes: 1 female, Tortum (Erzurum) 20.VI.1975; 1 female, Erzurum 23.VI.1974, 1 male, Erzurum 11.VI.1974, on **O.sativa** H.Özbek (Plant Protection Museum, Agriculture Faculty, Erzurum, Turkey).

### 3. **Megachile lagopoda** (Linnaeus)

It is very common species, occurs at all of the localities that this study conducted, flies from the beginning of June to the end of September. It visits **Carduus** sp., **Centaurea** sp., **Onopordon** sp., **Salvia** sp., and **Trifolium** spp..

### 4. **Megachile maritima** (Kirby)

2 females, Erzurum 12.IX.1976, on **Onopordon** sp., Pesenko (1971) indicated that it was a common species found at all sites, most rarely in

meadows and cultivated fields, flied from 31 May to 31 August in the Lower Don region of Russia.

5. *Megachile willughbiella* (Kirby)

Syn.: *M. atriventris* Schenck

1 female, Başaklı-Oltu (Erzurum) 1.VIII.1977, on *Coronilla* sp..

6. *Megachile genalis tortumensis* Tkalcu

Holotype: Female, Erzurum 16.VII.1976, H.Özbek (Plant Protection Museum, Agriculture Faculty, Atatürk University, Erzurum, Turkey).

Paratypes: 1 male Bağbaşı - Tortum (Erzurum) 20.IX.1977, on *Salvia* sp., (at the same place that holotype deposited).

7. *Megachile centuncularis* (Linnaeus)

1 male, Hasankale (Erzurum) 25.VII.1977, on *Carduus* sp..

8. *Megachile bicoloriventris erzurumensis* Tkalcu

Holotype: Female, Erzurum 29.VI.1974, on *O. sativa*.

9. *Megachile pacifica* Pérez

Syn.: *M. rotundata* Fabricius

*M. imbecilla* Gerstaecker

1 female, Ardahan (Kars) 10.VII.1973; 1 female, Erzurum 9.VIII.1970; 1 male, Erzurum 12.VI.1970; 1 male, Erzurum 29.VI.1974; 1 male, Erzurum 22.VII.1972; 1 male, Erzurum 9.VIII.1976; 1 male, Erzurum 17.VIII.1970, on *O. sativa*, and *M. sativa*.

In many parts of the world *M. pacifica* is the most important pollinator of *Medicago sativa* (Free, 1970). Bohart (1962) stated that *M. pacifica* was found about 30 years ago in the vicinity of Washington, D.C. possible brought over from eastern Europe or western Asia. Bohart (1972) indicated that it occupied roughly the northern three fourths of the contiguous United States. The culture and utilization of this bee has been studied and promoted by many workers (Stephen, 1961; Bohart, 1962, 1967, 1970, 1972; Hobbs, 1964, 1967; Nye and Bohart, 1964; Williams, 1968; Wilson, 1968).

Shipments of *M.pacifica* have been made from the United States of America to the other countries including Canada, Chile, France, etc. (Hobbs 1964; Tasei, 1975). Naturally occurring of this valuable alfalfa pollinator in Turkey that has high potential of alfalfa seed production is very important.

#### 10. *Megachile pilidens* Alfken

1 female, Erzurum 18.VII.1972; 1 female, Erzurum 28.VIII.1977; 1 female, Erzurum 7.IX.1976; 1 female, Başaklı-Oltu (Erzurum) 17.IX.1977; 1 female, Erzurum 17.IX. 1976; 1 male, Erzurum 19.VII.1974; 1 male, Erzurum 28.VIII.1977; on *Carduus* sp., *Onopordon* sp., and *Cirsium* sp..

#### 11. *Megachile sexmaculata thracia* Tkalcu

Holotype: Female, Erzurum 26.VI.1974, H. Özbek, (In Dr. Tkalcu's collection).

Paratypes: 1 female, Erzurum 26.VI.1974; 1 female, Erzurum 27.VII. 1976; 1 female, Erzurum 28.VIII.1977, on *Carduus* sp., *Stachys* sp., H.Özbek (Plant Protection Museum, Agriculture Faculty, Atatürk University, Erzurum, Turkey).

#### 12. *Megachile (Chalicodoma) saussurei* Radoszkowski

1 female, Erzurum 27.VII.1976; 2 females, Erzurum 28.VIII.1977; 1 female, Erzurum 20.IX.1977; 2 males, Başaklı-Oltu (Erzurum) 1.VIII.1977, on *Centaurea* sp.. *Carduus* sp..

#### 13. *Megachile (Chalicodoma) parietina nestorea* (Brullé)

It is a common species, found at all localities that this study conducted. It is a good pollinator of *O.sativa*, it also visits *L.corniculatus*, *Vicia* sp., *Potentilla* sp., and *Caronilla* sp.,

#### 14. *Megachile (Creightonella) albisecta* Klug

8 females, Bağbaşı-Tortum (Erzurum) 20.IX.1977, on *T.pratense*, and *Eryngium* sp..

## Özet

Doğu Anadolu'nun bazı yörelerindeki **Anthidium**, **Anthocopa**, **Hoplitis** ve **Megachile** (Hymenoptera: Apoidea; Megachilidae) cinslerine bağlı arı türleri

Bu çalışmada; Doğu Anadolu Bölgesinin Erzincan, Erzurum, Kars ve Muş illerinin değişik yörelerinden 1970-1978 yıllarında toplanmış olan Megachilidae familyasına giren bazı cinslere ait türler ele alınmıştır. Bu familyanın **Anthidium** cinsine ait 16, **Anthocopa** cinsine giren 8, **Hoplitis** cinsine mensup 10 ve **Megachile** cinsine ait 14 olmak üzere, toplam 48 yabancı türü saptanmış, bunların ziyaret ettiği bitkiler tesbit edilmiş ve mevsim içerisindeki faaliyetleri belirtilmiştir. Ancak toplanan örneklerin tamamının tanımı yapılamamıştır.

Bu çalışmada saptanan türlerin hemen tamamı Türkiye için yeni olduğu gibi; **Anthocopa yemasoyiae asiae**, **A. bidentata pallens**, **A. apriaca bayburtensis**, **Hoplitis mollis**, **H. erzurumensis**, **H. pyrenaea ardahanensis**, **Megachile circumcincta ozbeki**, **M. genalis tortumensis**, **M. bicoloriventris erzurumensis** ve **M. sexmaculata thracia** ilim dünyası için yeni olan tür ve alttürlerdir.

Bu araştırmayla **Megachile analis** ve **M. circumcincta ozbeki**'nin korunga (**Onobrychis sativa** L.)'da, **Anthidium oblongatum**, **A. punctatum**, **A. cingulatum**, **Hoplitis mollis** ve **H. erzurumensis** gibi türlerin ise korungaya ilâveten yonca (**Medicago sativa** L.) ve çayır üçgülü (**Trifolium pratense** L.)'nin tozlaşmasında önemli oldukları saptanmıştır.

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