

## DISTRIBUTION OF THE GENUS GASTERUPTION LATREILLE (HYMENOPTERA: EVANIOIDEA: GASTERUPTIIDAE) IN TURKEY

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### Abstract

The present study is based on gasteruptiid samples collected in various parts of Turkey since the 1990s. Together with literature sources, a total of 36 species of the genus *Gasteruption* Latreille, 1797 are compiled for the country. In addition, the European species *Gasteruption boreale* (Thomson, 1883) is newly recorded for Turkey and Asia. Moreover, the recently described *G. brevibasale* van Achterberg & Saure, 2014, *G. ischnolaimum* van Achterberg, 2014, and *G. smitorum* van Achterberg, 2014, are recorded for the first time from Erzurum after the original description. *Gasteruption henseni* van Achterberg, 2014 is, together with the abovementioned four species, confined to eastern Anatolia. *Gasteruption hastator* (Fabricius, 1804), *G. merceti* Kieffer, 1904 and *G. tourneieri* Schletterer, 1885, are found to be the most widespread and abundant species throughout Turkey. On the contrary, *G. aciculatum* van Achterberg, 2014, *G. boreale* and *G. nigritarse* (Thomson, 1883) are so far rarely collected in Turkey, recorded from one province each. The first was described after a single female from Van and apart from the holotype no other specimens are known. The eastern part of Turkey proved to be an important center of diversity for *Gasteruption* species. Distribution maps are presented for the indigenous, rarely, sparsely, widely and frequently recorded species.

KEY WORDS: Gasteruptiinae, *Gasteruption*, fauna, new record, Turkey

### Introduction

The superfamily Evanioidea comprises three extant families: Aulacidae, Evaniiidae and Gasteruptiidae. The members of these families are parasitoids of the larvae of wood-boring wasps, and beetles, cockroach oothecae and predator-inquiline of various solitary bees and wasps, respectively (Gauld & Hanson, 1995; Jennings & Austin, 2000, 2004). The family Gasteruptiidae (Hymenoptera: Evanioidea) is a small family,

comprising about 500 described species in two subfamilies, Gasteruptiinae (four genera) (Macedo & Cruz, 2009, 2011; Zhao *et al.*, 2012) and Hyptiogastrinae (two genera) (Jennings & Austin 2002). The characteristic features of Gasteruptiidae are: the elongated neck (propleuron), the swollen hind tibiae and highly attached slender metasoma (van Achterberg & Talebi 2014). The mature larvae of *Gasteruption* typically have a dorsoventrally flattened body and lateral lobes; head is small with only slightly sclerotized mouthparts and tridentate mandibles (Bogusch *et al.*, 2018).

All known gasteruptiids from the Palaearctic Region are included in the subfamily Gasteruptiinae and belong to the genus *Gasteruption* Latreille, 1797, with about 400 valid described species (van Achterberg & Talebi, 2014). Adults are free-living and feed on the nectar of various flowering plants. Jennings and Austin (2004) noted that certain *Gasteruption* species feed on both pollen and nectar. The adults of the genus *Gasteruption* are predator-inquilines of solitary bees (Apidae) nesting in cavities in wood, stems, galls and vertical soil surfaces (Bogusch *et al.*, 2018). The female wasps gain access to a bee nest through the nest entrance, laying one egg per bee cell. The egg is laid in the bee cell or just outside the cell proper. After hatching, the larva first consumes the egg or larva of the bee and continues eating the larval food of its host. The fully grown larva constructs a cocoon in a section of the bee nest, in which it overwinters. The pupation occurs in the next spring or early summer (Malyshev, 1966). For species with a long flight period (e.g. *G. tournieri*: from May till begin of October), it is not unlikely that there is more than one generation per year, but so far nothing is known about this.

In the past, the family Gasteruptiidae was studied by various authors, such as Schletterer (1885), Semenov (1892), Šedivý (1958), and Madl (1987, 1988, 1989, 1990). Yıldırım *et al.* (2004) conducted a specific study on the Turkish *Gasteruption* fauna and listed 12 species, of which five under invalid names (van Achterberg & Talebi, 2014). Later, van Achterberg & Talebi (2014) recognized 34 species from Turkey, of which 13 species were new to science and 21 were newly recorded. Ceccolini (2016) reported *G. schlettereri* Magretti, 1890, from Muğla. Finally, Paşalı & Gürbüz (2017) listed 14 species, mainly from Isparta Province. The aim of the present study is to present the latest available knowledge about the Turkish species of the genus *Gasteruption*, their distribution and biogeographical affinities.

## Materials and Methods

The insect samples were collected in various parts of the country since the 1990s using insect nets, but mainly come from eastern Anatolia. All insect samples were pinned for long-term preservation. Species are listed alphabetically in this paper. For some species there were no specimens available; data on these species were taken from published sources to complete the list. The provinces and the name of the species are listed in alphabetically. All synonymy is given for each species. Collection data include collection site, date and altitude in meters above sea level (a.s.l.) and, if available, decimal latitude/longitude coordinates, number of male and female specimens and the collector. Remarks refer to distribution and biological data (habitat, flight season, host if available). Distribution maps are presented for the indigenous, rarely, sparsely, widely and frequently recorded species. The material is deposited in the Entomology Museum Erzurum (EMET), Turkey and very few samples in the American Natural History Museum, New York (AMNH), U.S.A.

Distribution of species in Turkey is evaluated according to the number of provinces from which they were collected: 1-2: rarely recorded; 3-5: sparsely recorded; 6-14: widely recorded; 15 and above: frequently recorded, based on present and previous records.

## Results

### List of species

#### *Gasteruption aciculatum* van Achterberg, 2014

Remarks: *Gasteruption aciculatum* was described after a single female from Van (Başkale, 2700 m) (van Achterberg & Talebi 2014), but apart from the holotype, no other specimen is known. Currently, it is indigenous for the country and rarely recorded (1 province) (Fig.1).

Distribution: Turkey (Van) (van Achterberg & Talebi 2014)

#### *Gasteruption agrenum* van Achterberg, 2014

Remarks: *Gasteruption agrenum* was described from Iran and at the same time recorded from various other countries, including Turkey. No specimens were collected during the present study. Previous records (van Achterberg & Talebi, 2014) showed that although *G. agrenum* has a sporadic distribution, it is more common in the eastern part of the country. The flight period is quite long; it extends from April to September with a peak in July, so that more than one generation is conceivable. It is widely recorded in Turkey (8 provinces) (Fig. 3).

Distribution: Iran, Greece, Jordan, Syria, Russia, Turkey. In Turkey known from Ağrı, Bitlis, Burdur, Hakkâri, Karaman, Konya, Nevşehir, Van (van Achterberg & Talebi, 2014).

#### *Gasteruption assectator* (Linnaeus, 1758)

Synonym: *Ichneumon annularis* Geoffroy in Fourcroy, 1785.

Material examined: Erzurum: Oltu, Başaklı-Tutmaç border, 2100 m a.s.l., 31.07.2001, 1 ♂, 1 ♀, leg. Ö. Çalmaşur; Çamlıbel, 1750 m a.s.l., 40.2818 N, 41.4640 E, 28.07.2003, 1 ♂, leg. H. Özbeğ; Pasinler, Çaliyazı, 2400 m a.s.l., 11.07.1997, 1 ♂, 1 ♀, leg. S. Çoruh (on *Cephalaria procera*).

Remarks: The Palaearctic species of the *G. assectator* aggregate were revised by Johansson & van Achterberg (2016) and three species were recognized: *Gasteruption boreale* and *G. nigritarse* were excluded from the synonymy with *G. assectator* (Linnaeus, 1758). Previous and present records show that *G. assectator* is a widespread species occurring in all the geographical regions of Turkey from sea level to 2400 m a.s.l. or more in various habitats, mostly open areas. In addition, Johansson & van Achterberg (2016) noted *G. assectator* is the most widespread and common species of the *assector* aggregate in Europe. They also emphasized that *G. assectator* occurs in a wide variety of habitats, varying from agricultural landscape to deciduous forests and gardens. In the present study, the samples were collected from agricultural land and bush land in July. Its flight season was reported as June-August for Turkey (van Achterberg & Talebi 2014); *G. assectator* has been reared as predator-inquiline of *Hylaeus* spp. and small Megachilinae bees. It is frequently recorded (20 provinces) in Turkey (Fig. 4).

Distribution. Holarctic, Turkey, Iran. In Turkey known from Erzincan, Erzurum (Yıldırım et al., 2004); Ağrı, Antalya, Bursa, Denizli, Erzincan, Hakkâri, Gümüşhane Kars, Konya, Manisa, Mersin, Muğla, Nevşehir, Sakarya, Trabzon, Van (van Achterberg & Talebi, 2014); Isparta, Osmaniye (Paşalı & Gürbüz, 2017).

#### *Gasteruption boreale* (Thomson, 1883)

Synonyms: *Foenus fumipennis* Thomson, 1883; *Gasteruption margotae* Madl, 1987.

Material examined: Erzurum: Oltu, Subatık, 1300 m a.s.l., 11.07.1999, 2 ♂♂, leg. H. Özbeğ.

Remarks: *G. boreale* was synonymized with *G. assectator* (Linnaeus) by Schletterer (1889) and with *G. minutum* (Tournier) by van Achterberg & Talebi (2014). Johansson & van Achterberg (2016) treated it as a separate species and noted that it occurs in landscapes dominated by coniferous forests where it can be locally common. In the present study, the samples were collected in agricultural land with deciduous trees and bushes distributed sporadically. Erzurum is the easternmost distribution point of *G. boreale*. Johansson & van Achterberg (2016) suggested that it is probably a predator-inquiline of *Hylaeus* species. Currently, it is rarely recorded (1 province) in Turkey and the record is provisional, because males cannot be reliably identified (Fig. 1).

Distribution: Austria, Bulgaria, Finland, Germany, Netherlands (Johansson & van Achterberg, 2016). It is newly recorded for Turkey as well as for Asia.

#### *Gasteruption brevibasale* van Achterberg & Saure, 2014

Material examined: Erzurum: Oltu, Subatik, 1300 m a.s.l., 11.07.1999, 1 ♂, leg. H. Özbek.

Remarks: *G. brevibasale* was recently described from Nevşehir and Erzincan (van Achterberg & Talebi, 2014). After the original description it is recorded for the first time from Erzurum in the present study. It is mainly localized to the eastern Anatolian region and is indigenous to Turkey (Fig. 1). *G. brevibasale* is sparsely recorded in Turkey (3 provinces) (Fig. 2).

Distribution: Turkey (van Achterberg & Talebi, 2014).

#### *Gasteruption caucasicum* (Guérin-Méneville, 1844)

Synonyms: *Faenus pedemontanus* Abeille de Perrin, 1879; *Foenus terrestris* Tournier, 1877; *Gasteruption trifossulatum* Kieffer, 1904; *Gasteruption ignoratum* Kieffer, 1912.

Material examined: Antalya: Arapsuyu, 5 m a.s.l., 04.07.2002, 1 ♂, leg. H. Özbek (on *Mentha longifolia*). Erzurum: Aşkale, Kopdağı, 2100 m a.s.l., 29.05.2001, 1 ♂, leg. C. Güçlü.

Remarks: Erzurum is added to the distribution range of *G. caucasicum*. Present and previous records show that it occurs from sea level to more than 2100 m a.s.l., almost all over the country, except the Black Sea and Central Anatolia regions. *Gasteruption caucasicum* was listed by van Achterberg & Talebi (2014) as a predator-inquiline of *Colletes* and *Hylaeus* species. Available records show that the flying season runs from May to September and the species is widely recorded in Turkey (11 provinces) (Fig.3).

Distribution: Europe, Caucasus, Iran, Turkey. In Turkey known from Adana, Antalya, Bursa, Burdur, Denizli, Hakkâri, Isparta, Malatya, Mersin, Muğla, Şanlıurfa (van Achterberg & Talebi, 2014).

#### *Gasteruption coriacoxale* van Achterberg, 2014

Material examined: Kars: Sarıkamış, Aras Valley, Karakurt, TCK Çeşmesi, 1600 m a.s.l., 21.08.2003, 1 ♂, leg. Ö. Çalışmaşur.

Remarks: *G. coriacoxale* was recently described from Iran and also recorded from Turkey (van Achterberg & Talebi, 2014). It is an Asian species. With the present study Kars is added to its distribution range. Currently, distribution of *G. coriacoxale* is confined to eastern Anatolia. It might be considered as a species preferring a continental climate at 1000-2000 m a.s.l. Present and previous records reveal that the flight period is from June to the end of July. It is sparsely recorded from Turkey (3 provinces) (Fig. 2).

Distribution: It has a narrow distribution range, in Turkey as well abroad, only known from Iran and Turkey. In Turkey from Malatya and Van (van Achterberg & Talebi, 2014), Kars.



Figure 1. Rarely recorded (1-2 provinces) and indigenous *Gasteruption* species of Turkey.

### *Gasteruption diversipes* (Abeille de Perrin, 1879)

Synonyms: *Gasteruption distinguendum* Schletterer, 1885; *Gasteruption dusmeti* Kieffer, 1904; *Gasteruption kriechbaumeri* var. *striaticeps* Kieffer, 1904.

Remarks: In the present study, no specimens belonging to *G. diversipes* were discovered. The presence of this species in Turkey was noted by Madl (1988a) without indication of locality. According to van Achterberg & Talebi (2014), it could be the similar and more common *G. schlettereri* Magretti. So far, *G. diversipes* is collected rarely in Turkey (2 provinces) (Fig. 1).

Distribution: Europe, Iran, Turkey (van Achterberg & Talebi, 2014). In Turkey known in Konya and Şanlıurfa (van Achterberg & Talebi, 2014).

### *Gasteruption dolichoderum* Schletterer, 1889

Synonym: *Gasteruption daisyi* Alekseev, 1993.

Remarks: *Gasteruption dolichoderum* was recorded by van Achterberg & Talebi (2014) from 14 provinces mentioned below. Unfortunately, no additional material has been collected since then. The available data show that, apart from the Black Sea region, *G. dolichoderum* occurs in all geographic regions and the flight period is from May to September. It is widely recorded (14 provinces) in Turkey (Fig. 3).

Distribution: Southeast Europe, Iran, Jordan, Central Asia, Turkey. In Turkey known from Antalya, Burdur, Çanakkale, Elazığ, Eskişehir, Denizli, Hatay, Kahramanmaraş, Konya, Malatya, Manisa, Mersin, Nevşehir, Van (van Achterberg & Talebi, 2014).

### *Gasteruption flavimarginatum* van Achterberg, 2014

Remarks: *Gasteruption flavimarginatum* was described from Jordan (van Achterberg & Talebi, 2014, with paratypes from Turkey as well from some other countries. Since the first description no specimens have been collected. This species is documented hitherto from four provinces, with a sporadic distribution. Mersin is the

westernmost distribution record in its range. The flight period is from April to the end of August (van Achterberg & Talebi, 2014). It is collected sparsely (4 provinces) in Turkey (Fig. 2).

**Distribution:** *Gasteruption flavimarginatum* is an Asian species; Jordan, China, Mongolia, Uzbekistan, Turkey. In Turkey known from Kars, Mersin, Şanlıurfa, Van (van Achterberg & Talebi, 2014).

#### *Gasteruption freyi* (Tournier, 1877)

**Synonyms:** *Foenus nigripes* Tournier, 1877; *Faenus rugulosus* Abeille de Perrin, 1879; *Gasteruption nigripes* var. *annulatum* Kieffer, 1912; *Gasteruption assectator* var. *nitidulum* Schletterer, 1885; *Gasteruption kohlii* Schletterer, 1885.

**Material examined:** Erzurum: Oltu, Çamlıbel, 1750 m a.s.l., 04.07.2004, 1 ♀, leg. H. Özbek.

**Remarks:** *Gasteruption freyi* is a predominantly European species that was first recorded from Turkey by Yıldırım et al. (2004). In Asia it is known only from Turkey. Erzurum is the easternmost distribution point. Apparently, it has a sporadic distribution and is known both from warm, dry, steppe-like areas as well as from mountainous habitats between 900-2400 m a.s.l. The flight season extends from the end of May to September, with a peak in July. It is listed as predator-inquiline of *Hylaeus* spp. by van Achterberg & Talebi (2014). The female mentioned above was collected on a soil bank with nests of *Hylaeus* spp. and some other bees. It is sparsely recorded (3 provinces) (Fig. 2).

**Distribution:** Europe, Turkey. In Turkey known from Erzurum, Nevşehir (Yıldırım et al., 2004); Isparta (van Achterberg & Talebi, 2014; Paşalı & Gürbüz, 2017).

#### *Gasteruption goberti* (Tournier, 1877)

**Synonym:** *Gasteruption sowae* Schletterer, 1901.

**Remarks:** Up to now, *G. goberti* is mainly known from Europe; it was first recorded from Turkey by van Achterberg & Talebi (2014). It is an uncommon species and in the present study no specimens were found. It has a sporadic distribution, and Hakkâri is the easternmost distribution point. It is sparsely collected in Turkey (5 provinces) (Fig. 2).

**Distribution:** France, Italy, Balkan, Turkey, Caucasus. In Turkey known from Burdur, Eskişehir, Hakkâri, İstanbul, Şanlıurfa (van Achterberg & Talebi, 2014).

#### *Gasteruption hastator* (Fabricius, 1804)

**Synonyms:** *Foenus dorsalis* Westwood, 1841; *Foenus esenbeckii* Westwood, 1841; *Foenus rubricans* Guérin-Méneville, 1844; *Gasteruption tibiale* Schletterer, 1885; *Gasteruption graecum* Schletterer, 1885; *Gasteruption schossmannae* Madl, 1987; *Gasteruption formilis* Alekseev, 1995.

**Material examined:** Erzurum: Atatürk University Campus, 1900 m a.s.l., 30.08.2009, 1 ♀, leg. H. Özbek; Hinis, Akören, 1750 m a.s.l., 21.07.2003, 1 ♀, leg. H. Özbek.

**Remarks:** Present and previous records show that *G. hastator* is the most common and abundant species in Turkey, it occurs at sea level (Çanakkale, İzmir, Muğla) up to 2200 m a.s.l. (Erzurum, Hakkâri, Van) in mountainous areas in a wide variety of habitats, but mainly open areas. The flight season is from May to August. It has been reared as predator-inquiline of *Osmia* and *Hylaeus* species in *Rubus* stems and of *Systropha* nests (van Achterberg & Talebi, 2014). The species is frequently recorded (28 provinces) in Turkey (Fig. 4).

**Distribution:** Europe, N. Africa, Iran, Turkey, Russia (including Far East). In Turkey known from Bursa and Erzurum (Semenov, 1892) as *Foenus rubricans*; Adiyaman, Aksaray, Bilecik, Bitlis, Bolu, Burdur, Bursa, Çanakkale, Denizli, Elazığ, Eskişehir, Hakkâri, İğdır, Isparta, İzmir, Kars, Konya, Kütahya, Malatya, Manisa, Mersin, Muğla, Nevşehir, Sakarya, Sivas, Van (van Achterberg & Talebi, 2014); Isparta (Paşalı & Gürbüz, 2017).



Figure 2. Sparsely recorded (3-5 provinces) *Gasteruption* species of Turkey.

### *Gasteruption henseni* van Achterberg, 2014

Remarks: *Gasteruption henseni* was described from Ağrı, with paratypes from Erzurum and Kars provinces (van Achterberg & Talebi, 2014). Since then, no additional specimens have been collected. Currently, it is indigenous to Turkey and its distribution is confined to the eastern Anatolian region. *G. henseni* is a species from mountainous habitats between 1700-2200 m a.s.l. All material was collected in July. It is sparsely recorded in Turkey (3 provinces) (Fig. 2).

### *Gasteruption insidiosum* Semenov, 1892

Synonyms: *Gasteruption fallaciosum* Semenov, 1892; *Gasteruption dubiosum* Semenov, 1892; *Gasteruption obsoletum* Semenov, 1892.

Material examined: Erzurum: Olur, Yeşilbağlar, 1200 m a.s.l., 25.06.2001, 1 ♀, leg. H. Özbek; Oltu, Çamlıbel, 1750 m a.s.l., 04.07.2004, 1 ♀, leg. H. Özbek; 1700 m a.s.l., 15.07.2001, 1 ♀; 22 km WSW Oltu, 23-24.07.2001, 1700 m a.s.l., 1 ♂, leg. J.G. Rozen, H. Özbek (AMNH); Subatık, 1300 m a.s.l., 11.07.1999, 1 ♀, leg. H. Özbek; Pasinler, Çalıyazı, 2400 m a.s.l., 17.07.1997, 1 ♀, leg. S. Çoruh; 14 km ENE Pasinler, 1700 m a.s.l., 04-10.07.2007, 2 ♂♂, leg. J.S. Ascher, J.G. Rozen, H. Özbek (AMNH).

Remarks: Present and previous sources show that this species occurs mainly in areas above 500 m up to 2400 m with a continental climate. The samples above were collected from agricultural land, with deciduous trees and bushes distributed sporadically. One sample was collected in a wooded area (Pasinler, Çalıyazı). The occurrence of *G. erythrostomum* (Dahlbom, 1834) in Turkey and Iran is questionable according to van Achterberg & Talebi (2014). The reported specimens by Yıldırım et al. (2004) most likely belong to the very similar *G. insidiosum*. The listed specimens support this, because they were collected from similar localities to those reported by Yıldırım et al. (2004). The flight period is in June and July. Except for the Black Sea region, from which no samples are available, the species is considered to be common in Turkey and it is widely recorded (14 provinces) in the country (Fig. 3).

Distribution: East Europe, Iran, Turkey. In Turkey, known from Balıkesir, Erzurum (Yıldırım et al., 2004) as *G. erythrostomum* (Dahlbom, 1834); Burdur, Adiyaman, Hakkâri, Isparta, Kahramanmaraş, Kars, Konya, Malatya, Manisa, Nevşehir, Van (van Achterberg & Talebi, 2014); Isparta, Hatay (Paşalı & Gürbüz, 2017).

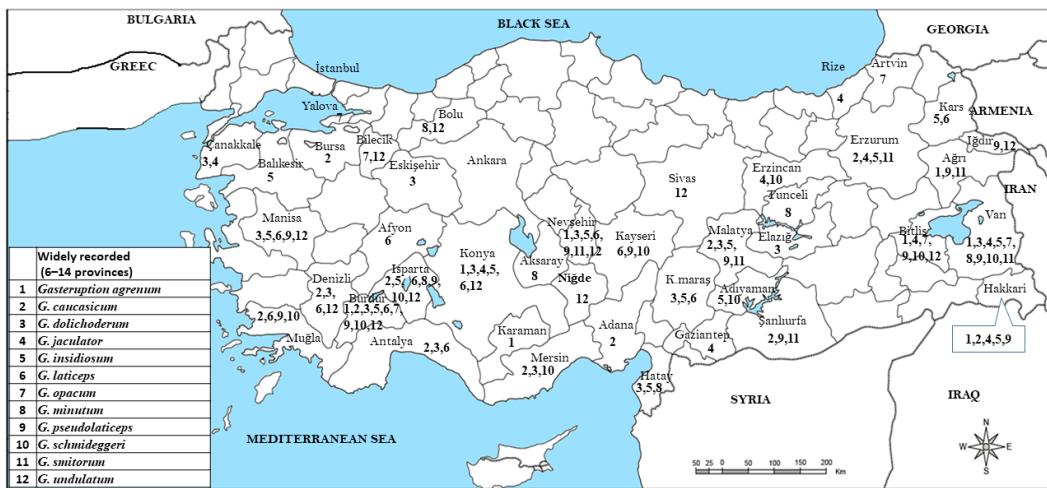


Figure 3. Widely recorded (6-14 provinces) *Gasteruption* species of Turkey.

#### *Gasteruption ischnolaimum* van Achterberg, 2014

Material examined: Erzurum: Oltu, Çamlıbel, 1750 m a.s.l., 40.2818 N, 41.4640 E, 28.07.2003, 1 ♂, leg. H. Özbek.

Remarks: *Gasteruption ischnolaimum* was recently described from Hakkâri and at the same time recorded from Iran (van Achterberg & Talebi, 2014). It is an Asian species. It is here recorded from Erzurum as the second known locality. Its distribution is confined to eastern Anatolia (Hakkâri and Erzurum), and represented by 5 specimens. It occurs in mountainous habitats between 1650-1750 m a.s.l. and is rarely recorded (2 provinces) in Turkey (Fig. 1).

Distribution: Iran and Turkey. In Turkey it is known from Hakkâri (van Achterberg & Talebi, 2014), Erzurum.

#### *Gasteruption jaculator* (Linnaeus, 1758)

Synonyms: *Foenus granulithorax* Tournier, 1877; *Faenus oblitteratus* Abeille de Perrin, 1879; *Foenus rugidorsus* Costa, 1885.

Material examined: Erzurum: Olur, Süngübayır, 1850 m, 20.08.1994, 1 ♀, leg. İ. Aslan.

Remarks: Available records show that *G. jaculator* occurs in various habitats from sea level (Çanakkale) up to 2400 m in cool areas (Erzurum, Hakkâri), mainly in continental climates and in mountainous habitats. Samples were mostly collected in July and August. Reported as a predator-inquiline of the *Colletes* and *Hylaeus* species (Colletidae) by van Achterberg & Talebi (2014). It is a widely recorded in Turkey (10 provinces) (Fig. 3).

Distribution: Europe, N. Africa, Iran, Turkey. In Turkey known from Erzurum, Rize, Konya (Yıldırım et al., 2004); Bitlis, Çanakkale, Erzincan, Gaziantep, Hakkâri, Konya, Van (van Achterberg & Talebi, 2014).

#### *Gasteruption laticeps* (Tournier, 1877)

Synonyms: *Gasteruption foveolatum* Schletterer, 1889; *Gasteruption foveolum* Szépligeti, 1903.

Material examined: Kars: Sarıkamış, Aras Valley, Karakurt, 1500 m a.s.l., 40.07543 N, 42.20941 E, 08-14.09.2002, 1 ♀, leg. H. Özbeğ; 13.06.2003, 1 ♂, leg. Ö. Çalmaşur. Konya: Çumra, 1017 m a.s.l., 12.07.2000, 1 ♀, leg. M. Kesdeğ.

Remarks: Kars is added to the distribution range of *G. laticeps*. Thus, it is the first record from the eastern Anatolian region. Previous and present records show that it occurs from sea level up to more than 1500 m a.s.l. in various biotopes. The flight period is quite long; it extends from May to mid-September with a peak in July, so that more than one generation is likely. According to Malyshev (1965), *G. laticeps* is predator-inquiline in *Hylaeus* nests. It is collected widely in Turkey (12 provinces) (Fig. 3). Related to this, Özbeğ & Dathe (2020) noted that “Turkey, in particular the eastern part, proved to be an important center for the *Hylaeus* species”.

Distribution: Europe, Iran, Turkey. In Turkey known from Afyon, Antalya, Burdur, Denizli, Isparta, Kahramanmaraş, Kayseri, Konya, Manisa, Muğla, Nevşehir (van Achterberg & Talebi, 2014).

#### *Gasteruption lugubre* Schletterer, 1889

Remarks: *Gasteruption lugubre* is a rarely collected species in Europe and was first recorded from Turkey (Kars and Nevşehir) by van Achterberg & Talebi (2014). No specimens were encountered during this study. Currently, Kars is the easternmost distribution point of this species. It is rarely collected in Turkey (2 provinces) (Fig. 1).

Distribution: Mountainous parts of C. Europe and Turkey. In Turkey: Kars, Nevşehir (van Achterberg & Talebi, 2014).

#### *Gasteruption merceti* Kieffer, 1904

Synonyms: *Gasteruption trichotomma* Kieffer, 1904; *Gasteruption pyrenaicum* Guerin, 1844; *Gasteruption palaestinum* Pic, 1916; *Gasteruption jekylljaechi* Madl, 1987.

Remarks: Madl (1987, 1988) indicated the presence of *G. jekylljaechi* in Turkey, but no locality was mentioned. Later, Yıldırım et al. (2004) recorded this species as “*G. pyrenaicum* Guerin” from Erzincan, Erzurum and Mersin provinces. Obviously, *G. merceti* is a widespread species; it was previously collected in all geographical regions of the country, with the exception of the Black sea and Marmara regions. Unfortunately, in the present study no specimens were encountered. Known data suggest that it occurs from sea level up to 2700 m in various biotopes. It has been found in warm, dry, steppe-like areas as well as in cooler mountainous habitats. The flight period is from April to September. This species was listed as predator-inquiline of *Ceratina* species by van Achterberg & Talebi (2014). Related to this, Özbeğ & Terzo (2016) mentioned that “Turkey, in particular the eastern part, proved to be an important center for the *Ceratina* species”. *Gasteruption merceti* is one of the most frequently recorded species in Turkey (25 provinces) (Fig. 4).

Distribution: Central and South Europe, N. Africa, Israel, Iran, Turkey. In Turkey known from Erzincan, Erzurum, Mersin (Yıldırım et al., 2004) as *G. pyrenaicum* Guerin, 1844; Ağrı, Ankara, Bilecik, Burdur, Denizli, Diyarbakır, Hakkâri, Hatay, İğdır, Isparta, Kahramanmaraş, Kars, Kayseri, Konya, Malatya, Manisa, Mersin, Muğla, Nevşehir, Sivas, Şanlıurfa, Van (van Achterberg & Talebi, 2014); Isparta (Paşalı & Gürbüz, 2017).



### *Gasteruption minutum* (Tournier, 1877)

Synonym: *Foenus longigena* Thomson, 1883.

Remarks: *Gasteruption minutum* was first recorded from Turkey by van Achterberg & Talebi (2014). During the present study, no specimen was encountered. The available data show that it has a sporadic distribution and the flight period is from the end of May to early August. It is sparsely collected in the country (6 provinces) (Fig. 2). Wall (1994) listed it as a probable predator-inquiline of *Hylaeus* nests.

Distribution: Europe, Iran, Turkey. In Turkey known from Aksaray, Bolu, Tunceli, Van (van Achterberg & Talebi, 2014); Hatay, Isparta (Paşalı & Gürbüz, 2017).

### *Gasteruption nigrescens* Schletterer, 1885

Synonym: *Gasteruption foveiceps* Semenov, 1892.

Material examined: Erzurum: Olur, Yeşilbağlar, 1200 m, 25.06.2001, 1 ♂, leg. H. Özbe. İğdır: Çalpala, 950 m, 16.06.2001, 1 ♂, leg. C. Güçlü.

Remarks: İğdır is added to the distribution range of *G. nigrescens*. The available records suggest that, apart from the Black Sea Region, it is present in all geographical regions of the country from sea level to above 2000 m in various biotopes, but mostly in open areas. The flight season is from June to August. Bogusch et al. (2018) noted that *G. nigrescens* is a predator-inquiline of bees of the family Megachilidae, using *Hoplitis leucomelana* (Kirby, 1802) as the main host. This is a common species in Turkey (Özbek, 2013b) and it is not surprising that *G. nigrescens* is also frequently recorded in Turkey (19 provinces) (Fig. 4).

Distribution: C and SE Europe, Turkey (Schmid-Egger & Saure, 2010) and Iran (van Achterberg & Talebi, 2014). In Turkey known from Adiyaman, Ağrı, Ankara, Bolu, Burdur, Bursa, Erzincan, Erzurum, Hakkâri, Isparta, Kars, Konya, Kütahya, Malatya, Manisa, Nevşehir, Sivas, Van (van Achterberg & Talebi, 2014); Isparta (Paşalı & Gürbüz, 2017); İğdır.

### *Gasteruption nigritarse* (Thomson, 1883)

Material examined: Erzurum: Atatürk University Research field, 1900 m a.s.l., 29.06.2001, 2 ♂♂, 4 ♀♀, leg. H. Özbeğ; Olur, Yeşilbağlar, 1000 m a.s.l., 25.06.2001; 4 ♂♂, 1 ♀, leg. H. Özbeğ; Oltu, Başaklı, Çamurunsuyu, 1850 m a.s.l., 04.07.2004, 1 ♂, leg. H. Özbeğ (Fig. 5); Çamlıbel, 24 km WSW Oltu, 1700 m a.s.l., 28.06.2001, 3 ♀♀; 04.07.2004, 2 ♂♂, leg. H. Özbeğ, 11.07.2004, 1 ♂, leg. H. Özbeğ; 15.07.2001, 1 ♂, 3 ♀♀, leg. H. Özbeğ; 22.07.2001, 3 ♂♂, 2 ♀♀, leg. H. Özbeğ; 08.07.2007, 1 ♂, 5 ♀♀, leg. J.S. Ascher, J.G. Rozen, H. Özbeğ (AMNH); Subatık, 1300 m a.s.l., 07.06.2001, 2 ♂♂, 11.07.1999, 3 ♂♂, 1 ♀, leg. H. Özbeğ.

Remarks: As previously indicated, *G. nigritarse* was excluded from the synonymy with *G. assectator* by Johansson and & Achterberg (2016). They noted that this species primarily occurs in small-scale agricultural landscapes where it is to be found, especially on the walls of wooden barns. Likewise, in the present study some samples were collected from agricultural land and locally it can be quite abundant. The collecting sites of Oltu-Çamlıbel, Başaklı, Subatık and Olur-Yeşilbağlar are located along a narrow valley at 1200-1850 m a.s.l., consisting of agricultural and pastureland with sporadically distributed broad-leaved trees. Moreover, almost all of the specimens in the locality Çamlıbel were collected from a soil bank, where various bees were nesting, among them *Osmia*, *Anthophora* and *Hylaeus* spp. Despite being locally abundant, it is known from Erzurum only and rarely recorded (1 province) in Turkey (Fig. 1). It is remarkable to note that *G. nigritarse* is a European species and occurs only in Turkey among Asian countries, and currently Erzurum is the easternmost distribution record in its range. According to Johansson and van Achterberg (2016), an association with the bees *Hylaeus difformis* and/or *H. pictipes* is highly probable, at least in Scandinavia and is based on observed behavior of the wasps. With this in mind, both *Hylaeus* species are present in Turkey, particularly *H. pictipes* is quite abundant in the country, also recorded from Erzurum (Özbeğ & Dathe, 2020).

Distribution: Austria, Germany, Czech Republic, Netherlands, Serbia, Sweden and Turkey (no locality) (Johansson & van Achterberg, 2016). In Turkey known from Erzurum.

### *Gasteruption opacum* (Tournier, 1877)

Remarks: No specimens have been encountered during this study. Previous records show that *G. opacum* has a sporadic distribution and can be found in low and warm land (Yalova) as well as in cooler mountainous habitats (Van). The flight period is from April to September. It is widely recorded (6 provinces) in Turkey (Fig. 3).

Distribution: Central and South Europe, Iran, Turkey. In Turkey known from Bilecik, Bitlis (Yıldırım et al., 2004), Artvin, Burdur, Yalova, and Van (van Achterberg & Talebi, 2014).

### *Gasteruption paglianoii* van Achterberg & Saure, 2014

Remarks: *Gasteruption paglianoii* was recently described from Greece, Cyprus and Turkey (van Achterberg & Talebi, 2014). No additional specimens were found during the present study. It is an eastern Mediterranean species and has a limited distribution range in Turkey. This species occurs mainly along the coastal area from Hatay to Bursa. For the moment, Hatay is its easternmost distribution record. The flight period is from April to August. It is sparsely recorded (5 provinces) (Fig. 2).

Distribution: Cyprus, Greece, Turkey. In Turkey known from Antalya, Bursa, Hatay, Manisa, Şanlıurfa (van Achterberg & Talebi, 2014).

### *Gasteruption phragmiticola* Saure, 2006

Remarks: van Achterberg & Talebi (2014) first recorded *G. phragmiticola* from Adiyaman and Denizli. Unfortunately, no additional material has been collected since then. Bogusch et al. (2018) noted that

*G. phragmiticola* is a specialized predator-inquiline of a wetland bee, *Hylaeus pectoralis* Förster, 1871 (Colletidae), which was only very recently recorded from Turkey (Özbek & Dathe, 2020). Bogusch et al. (2018) reared *G. phragmiticola* between March and August but collected from the late May to early August the adult wasps. It is rarely recorded (2 provinces) in Turkey (Fig. 1).

Distribution: Europe, Iran, Turkey. In Turkey known from Adiyaman and Denizli (van Achterberg & Talebi, 2014).

#### *Gasteruption pseudolaticeps* van Achterberg, 2014

Remarks: *Gasteruption pseudolaticeps* was described from Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, and Uzbekistan, and recorded from Morocco. Although it is rather common, no specimen was encountered in the present study. Known localities show that it can be found in warm, dry, steppe-like areas, as well as in cooler mountain biotopes from about 900 to 2000 m a.s.l. in Turkey. The flying season is quite long, from April to September, with a peak in June and July; the species is widely recorded in Turkey (13 provinces) (Fig. 3).

Distribution: Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Morocco, Turkey. In Turkey known from Ağrı, Bitlis, Burdur, Hakkâri, İğdir, Isparta, Kayseri, Malatya, Manisa, Muğla, Nevşehir, Şanlıurfa, Van (van Achterberg & Talebi, 2014).

#### *Gasteruption punctifrons* van Achterberg, 2014

Remarks: *Gasteruption punctifrons* was described from Cyprus, Iran, Jordan, Syria and Turkey. Like previous species, currently *G. punctifrons* is an Asian species. More recently, Paşalı & Gürbüz (2017) added Adana to its distribution range. No specimen was found during the present study. Current records show that it occurs in the eastern Mediterranean region, mainly in the coastal area. It is a thermophilic species mostly in lowlands, but is also collected about 1000 m a.s.l. in Burdur. The flight period extends from May to September. It is sparsely collected in Turkey (4 provinces) (Fig. 2).

Distribution: Cyprus, Iran, Jordan, Syria, Turkey. In Turkey known from Antalya, Burdur, Muğla (van Achterberg & Talebi, 2014) and Adana (Paşalı & Gürbüz, 2017).

#### *Gasteruption schlettereri* Magretti, 1890

Material examined: Antalya: Arapsuyu, 5 m a.s.l., 04.07.2002, 1 ♂, leg. H. Özbek (on *Mentha longifolia*).

Remarks: According to the literature *G. schlettereri* may occur from sea level (Antalya, Muğla, İzmir) as well as in cooler mountainous habitats up to 2700-3000 m (Van) in various kinds of biotopes. With the exception of the Black Sea and Marmara regions, from which no records are available, the species is common and frequently occurs in the country. The flight period extends from May to September with a peak in June and July. Although described more than 100 years ago, no biological data are available. It is a frequently recorded species in Turkey (20 provinces) (Fig. 4).

Distribution: SE Europe, Syria, Iran, Turkey. In Turkey known from Adana, Adiyaman, Ağrı, Antalya, Aydın, Burdur, Denizli, Gaziantep, Hakkâri, Kars, Isparta, İzmir, Malatya, Mardin, Manisa, Mersin, Nevşehir, Van (van Achterberg & Talebi, 2014); Muğla (Ceccolini, 2016); and Isparta (Paşalı & Gürbüz, 2017).

#### *Gasteruption schmideggeri* van Achterberg & Saure, 2014

Remarks: *Gasteruption schmideggeri* was described from Greece, Jordan, Syria, and Turkey (van Achterberg & Talebi, 2014). It is an eastern Mediterranean species; during this study, no additional specimens were collected. The available records suggest that it occurs from sea level (Muğla) up to 2200 m (Van) in

different habitats. It has a sporadic distribution. The flying period is from May to September. It is collected widely in Turkey (9 provinces) (Fig. 3).

Distribution: Greece, Jordan, Syria, Turkey. In Turkey known from Adiyaman, Bitlis, Burdur, Erzincan, Isparta, Kayseri, Mersin, Muğla, and Van (van Achterberg & Talebi, 2014).



Figure 5. Erzurum, Oltu, Başaklı, Çamurunsuyu (the author's hometown), several samples were collected.

#### *Gasteruption scoreum* van Achterberg, 2014

Remarks: *Gasteruption scoreum* was described from Erzincan, Konya and Mersin (van Achterberg & Talebi, 2014). It is an Asian species and has a very narrow distribution range (Turkey and Jordan). After its description, no additional specimens have been collected. Current knowledge shows that it could be treated as a thermophilic species but it has also been collected about 1000 m a.s.l. Apparently, it has a sporadic distribution and the flight period is from April to the early July. It is collected only sparsely (3 provinces) in Turkey (Fig. 2).

Distribution: Jordan, Turkey. In Turkey known from Erzincan, Konya, Mersin (van Achterberg & Talebi, 2014).

#### *Gasteruption smitorum* van Achterberg, 2014

Material examined: Erzurum: Atatürk University Research Field, 1900 m a.s.l., 21-29.06.2001, 1 ♂, 1 ♀, leg. H. Özbek; Olur, Yeşilbağlar, 1000 m a.s.l., 25.06.2001, 1 ♂, 1 ♀, leg. H. Özbek; Oltu, Başaklı, Çamurunsuyu, 1850 m a.s.l., 04.07.2004, 2 ♂♂, 1 ♀, leg. H. Özbek (Fig. 5); Çamlıbel, 22 km WSW Oltu, 40.2818 N, 41.4640 E, 1700 m a.s.l., 04.07.2004, 2 ♂♂, leg. H. Özbek; 15.07.2001, 4 ♂♂, 1 ♀, leg. H. Özbek; 1750 m

a.s.l., 22.07.2001, 3 ♂♂, 1 ♀, leg. H. Özbek; 28.07.2003, 3 ♂♂, 2 ♀♀, leg. H. Özbek; 11.07.1999, 1 ♂, 1 ♀, leg. H. Özbek; 23-24.07.2001/29-30.07.2003/03.07.2004/08-07.2007/07.07.2008, 12 ♂♂, 1 ♀, leg. J.G. Rozen, H. Özbek (AMNH); Subatık, 1300 m, a.s.l. 07.06.2001, 1 ♂; 14.06.2001, 1 ♂, leg. H. Özbek.

**Remarks:** *Gasteruption smitorum* was recently described from several provinces in Turkey (van Achterberg and Talebi, 2014). With the present study, Erzurum is added to the distribution range of this species. Present and previous records show that it occurs in areas with a terrestrial climate from 500 (Şanlıurfa) to 2200 m a.s.l. (Ağrı). All of the specimens in the locality Çamlıbel (Oltu) were collected from a soil bank where various bees were nesting, among them *Osmia*, *Anthophora* and *Hylaeus* spp. In general, it is more common in the eastern part of the country. Interestingly, it is quite abundant locally in Erzurum, particularly along the narrow valley from Yeşilbağlar (1000 m) to Çamlıbel and Başaklı (1850 m). The flight season is from May to July. So far, it is indigenous, known only from Turkey (Fig. 1), where it is widely recorded (6 provinces) (Fig. 3).

**Distribution.** Known from Ağrı, Malatya, Nevşehir, Şanlıurfa, Van (van Achterberg and Talebi, 2014) and Erzurum.

#### *Gasteruption syriacum* Szépligeti, 1903

**Remarks:** *Gasteruption syriacum* was first recorded from Turkey by van Achterberg and Talebi (2014) and there are no more recent data. Available records show that *G. syriacum* is a Mediterranean species, occurring in various biotopes throughout Turkey, from sea level (Mersin, Muğla) up to 2200 m (Van) a.s.l. The flight period is from July to September. It is collected frequently in Turkey (21 provinces) (Fig. 4).

**Distribution:** SE Europe, Lebanon, Syria, Turkey. In Turkey known from Adıyaman, Artvin, Burdur, Bursa, Elazığ, Eskişehir, Denizli, Hakkâri, İğdır, Isparta, Kahramanmaraş, Kars, Konya, Malatya, Manisa, Mersin, Muğla, Nevşehir, Sıirt, Şanlıurfa, Van (van Achterberg & Talebi, 2014).

#### *Gasteruption tournieri* Schletterer, 1885

**Synonyms:** *Gasteruption austriacum* Schletterer, 1885; *Gasteruption nitidum* Schletterer, 1885.

**Material examined:** Erzurum: Tortum, Esendurak, 1500 m, 11.09.2001, 1 ♂, S. Çoruh. Kars: Sarıkamış, Aras Valley, Karakurt, 1600 m a.s.l., 21.07.2003, 1 ♂, leg. Ö. Çalmaşur.

**Remarks:** Kars is added to the distribution range of *G. tournieri*. Judging from its distribution this common species occurs in warm, dry, steppe-like areas as well as mountainous areas from sea level (Antalya, Muğla) to about 2000 m (Erzurum) all over the country, except the Black Sea region. Flight season is from June to the late September. It is frequently recorded from the country (22 provinces) (Fig. 4).

**Distribution:** Europe, Turkey, Iran. In Turkey known from Erzurum, Hatay, Konya (Yıldırım et al., 2004); Adana, Antalya, Burdur, Bursa, Çanakkale, Denizli, Erzincan, Eskişehir, Gaziantep, Hakkâri, Isparta, Kahramanmaraş, Kilis, Konya, Manisa, Mersin, Muğla (van Achterberg & Talebi, 2014); Osmaniye (Paşa & Gürbüz, 2017), Kars.

#### *Gasteruption undulatum* (Abeille de Perrin, 1879)

**Synonym:** *Foenus bidentulus* Thomson, 1883.

**Remarks:** Madl (1988) first recorded this species from Turkey, without providing a locality. Although, *G. undulatum* was not recorded in the present study, the available records show that with the exception of the Black Sea and Marmara regions, it occurs in all geographical regions of the country. This species prefers warm and dry habitats in steppes and open areas with continental climate at altitudes from 150 to 1200 m.

The flight period extends from June till September. In South Europe, adults are present from May onwards according to van Achterberg and Talebi (2014). It is collected widely in Turkey (12 provinces) (Fig. 3).

Distribution: Europe, Turkey. In Turkey known from Bilecik, Bitlis, Bolu, Burdur, Denizli, İğdır, Isparta, Konya, Manisa, Nevşehir, Niğde, Sivas (van Achterberg & Talebi, 2014); Isparta (Paşalı & Gürbüz, 2017).

#### *Gasteruption variolosum* (Abeille de Perrin, 1879)

Synonym: *Gasteruption laeviceps* Schletterer, 1885.

Material examined: Erzurum: Oltu, Çamlıbel, 28.07.2003, 40.2818 N, 41.4640 E, 1 ♂, leg. H. Özbek; Tortum, Tortumkale, 1350 m a.s.l., 08.08.2004, 1 ♀, leg. O. Kaya. Kars: Sarıkamış, Karakurt, Aras Valley, 1600 m a.s.l., 21.08.2003, 1 ♂, leg. H. Özbek.

Remarks: Erzurum and Kars provinces are added to the distribution range of *G. variolosum*. It occurs almost all over the country (with the exception of the Marmara region) from sea level (Antalya) to about 2000 m (Hakkâri, Van) in various biotopes. The flight season ranges from May to the end of August. It is frequently recorded in Turkey (16 provinces) (Fig. 4).

Distribution: South Europe, Iran, Turkey. In Turkey known from Ağrı, Antalya, Burdur, Gümüşane, Hakkâri, İğdır, Isparta, Konya, Manisa, Mersin, Nevşehir, Niğde, Sivas, Van (van Achterberg & Talebi, 2014), Erzurum, and Kars.

## Discussion

In the present study, 17 species of the genus *Gasteruption* are reported from various parts of Turkey, but mainly from eastern Anatolia. In total, 34 species have been detected from Turkey (Achterberg & Talebi, 2014). With the present study, two species of *Gasteruption* are added and the total number for Turkey increased from 34 to 36. In the Palearctic Region, over 400 species of *Gasteruption* are known (van Achterberg & Talebi, 2014). Thus, almost 10% of the Palearctic species are known to currently occur in Turkey. The European species *G. boreale* and *G. nigritarse* were recorded from Erzurum Province. *Gasteruption boreale* is new for the Turkish fauna as well as the Asian Continent, whereas *G. nigritarse* was previously known from Turkey but no locality was indicated (Johansson & van Achterberg 2016). It is quite abundant locally in Erzurum. Currently, four species are indigenous, known from Turkey only (*G. aciculatum*, *G. brevibasale*, *G. henseni*, and *G. smitorum*) (Fig. 1). Distribution of *G. aciculatum* and *G. henseni* are confined to the eastern Anatolia. Although *G. brevibasale* and *G. smitorum* mainly occur in the eastern Anatolia, they were recorded in other parts of the country too. Similarly, two species with a wider distribution (*G. ischnolaimum* and *G. coriacoxale*) are known only from the eastern Anatolian region in Turkey, and in this study are recorded for the first time from Erzurum and Kars provinces.

Topographic and climatic conditions are varied in Anatolia, with many mountainous regions but also low-lying plains and coastal strips. In particular, eastern Anatolia has a vast and biologically rich landscape, consisting of a mixture of high mountains (2500–3500 m a.s.l.), narrow valleys and small plains, which are the main reasons Anatolia, especially its eastern part, has high biodiversity. Terzo (1998) studied the genus *Ceratina* in the Near East and recorded 28 species including eight new species. He emphasized that “in the Western Palearctic region, the eastern part of Turkey is a very important distribution center; all species of the subgenus *Euceratina* occurring in the Near East are present in eastern Turkey and not the reverse”. This is the case for bumblebees (Reinig & Rasmont 1983), small carpenter bees (Terzo & Rasmont 1997) and some other bees, such as Osmiini, Xylocopini and Melittidae (Özbek, 2013a, 2013b, 2013c, 2014). More recently, Özbek & Dathe (2020) studied the bee genus *Hylaeus* of Turkey and emphasized that “The eastern part of

Turkey can be regarded as a special center for richness and diversity of *Hylaeus* species". Since most of the *Gasteruption* species are predator-inquiline of *Hylaeus* species (van Achterberg & Talebi, 2014; Johansson & van Achterberg, 2016; Bogusch *et al.*, 2018), this could be an important factor for the abundance of *Gasteruption* species in the eastern part of the country.

The present data show that the ranges of Turkish *Gasteruption* species are very variable; seven species are rarely recorded from one or two provinces (Fig. 1), nine species are sparsely (3-5 provinces) (Fig. 2), 12 species widely (6-14) (Fig. 3), and eight species are frequently recorded (15 and more) (Fig. 4).

The rarely collected *G. aciculatum* is known from one female only (its holotype). Two species are known from two localities in Turkey: *G. diversipes* from Konya and Şanlıurfa, and *G. phragmiticola* from Adiyaman and Denizli (van Achterberg & Talebi, 2014).

The frequently recorded species may be very common and abundant locally: *G. hastator* is the most common (28 provinces) species at sea level (Çanakkale, İzmir, Muğla) as well as in mountainous areas up to 2200 m (Erzurum, Hakkâri, Van) in a wide variety of habitats, but mainly in open areas. With 25 and 22 provinces *G. merceti* and *G. tournieri* are the next frequently recorded species; available data suggest that *G. merceti* occurs from sea level up to 2700 m in various biotopes. *Gasteruption tournieri* was recorded from Erzurum and Kars, and occurs from sea level (Antalya, Muğla) up to about 2000 m (Erzurum) in various biotopes in Turkey, except for the Black Sea region. In addition, three species were recorded from 20 or more provinces: *G. syriacum* from 21, *G. assectator* and *G. schlettereri* from 20 provinces each.

Several samples consisting of various species, such as *G. assectator*, *G. freyi*, *G. insidiosum*, *G. ischnolaimum*, *G. nigritarse*, *G. smitorum* and *G. variolosum*, were taken from a vertical soil bank (Çamlıbel, Oltu, Erzurum) where numerous burrows of bees and wasps penetrated the face of the bank. The complexity of the anastomosing of fresh and old tunnels suggested that the bank had provided the nesting requirements of these bees and wasps for many years. Non-parasitic bee genera nesting there included species of *Hylaeus* (Colletidae), *Osmia*, *Protosmia*, *Megachile* (Megachilidae), and *Anthophora* (Apidae). Considering that various *Gasteruption* species are known as predator-inquiline of *Hylaeus* spp. and small Megachilinae bees (Malyshev, 1965; van Achterberg & Talebi, 2014; Johansson & van Achterberg, 2016; Bogusch *et al.*, 2018), it is assumed that the bee species serve at least partly as host of the *Gasteruption* species encountered on the vertical soil bank.

Regarding zoogeographical distribution, the *Gasteruption* fauna of Turkey exhibits a big variation: *G. assectator* has Holarctic and *G. hastator* Palearctic distributions. *Gasteruption jaculator* and *G. merceti* occur in West Palearctic regions and *G. pseudolaticeps* in Africa and Asia. Seventeen species, namely *G. goberti*, *G. agrenum*, *G. paglianoi* (Greece, Cyprus, Turkey), *G. caucasicum*, *G. dolichoderum*, *G. schmideggeri*, *G. schlettereri*, *G. syriacum*, *G. diversipes*, *G. phragmiticola*, *G. insidiosum*, *G. laticeps*, *G. opacum*, *G. minutum*, *G. nigrescens*, *G. tournieri* and *G. variolosum*, live on the Europe and Asia continents, whereas five species, *G. boreale*, *G. lugubre*, *G. nigritarse*, *G. freyi* and *G. undulatum*, occur in Europe and Turkey. Another five species, *G. coriacoxale*, *G. ischnolaimum*, *G. flavigularium*, *G. punctifrons* (Middle East) and *G. scorteum* (Jordan, Turkey), occur only in Asia. As previously indicated, four species are currently indigenous to Turkey.

In conclusion, although several studies have been conducted on the *Gasteruption* fauna of Turkey so far, unfortunately the taxonomy and biology of its species in Turkey are still only fragmentarily known. The number of 36 species is low considering the very varied topographic and climatic conditions as well as the geographic location of Turkey. Extensive sampling and careful, targeted investigations throughout the country should result in new findings (new records, additional distributional data and probably new species). Concerning this point, unfortunately we do not have samples from the central part of the Black Sea region and Thrace. It is hoped that this study will stimulate studies of the genus *Gasteruption* in Turkey.

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# РАСПРОСТРАЊЕНОСТ РОДА *GASTERUPTION LATREILLE* (HYMENOPTERA: EVANIOIDEA: GASTERUPTIIDAE) У ТУРСКОЈ

ХИКМЕТ ОЗБЕК И КОРНЕЛИС ВАН АХТЕРБЕРГ

## Извод

Ова студија се заснива на узорцима гастеруптида прикупљених у различитим деловима Турске током 1990-их. Заједно са литературним изворима, укупно је прикупљено 36 врста рода *Gasteruption* Latreille, 1797. Поред тога, европска врста *Gasteruption boreale* (Thomson, 1883) је нови налаз за Турску и Азију. Штавише, недавно описани *G. brevibasale* van Achterberg & Saure, 2014, *G. ischnolaimum* van Achterberg, 2014 и *G. smitorum* van Achterberg, 2014, први пут су регистровани из Ерзурума након оригиналног описа. *Gasteruption hensei* van Achterberg, 2014 је, заједно са поменуте четири врсте, ограничен на источну Анатолију. За врсте *Gasteruption hastator* (Fabricius, 1804), *G. merceti* Kieffer, 1904 и *G. tourneieri* Schletterer, 1885, је утврђено да су најраспрострањенија и најчешћа врста широм Турске. Са друге стране, врсте *G. aciculatum* van Achterberg, 2014, *G. boreale* и *G. nigritarse* (Thomson, 1883) су до сада најређе у Турској, забележене су само из једне провинције. Прву врсту је описао ван Ахтерберг на основу само једне женке, а осим холотипа нису познати други примерци. Источни део Турске показао се важним центром диверзитета за врсте рода *Gasteruption*.

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