

RESEARCH ON THE SUBFAMILY CHRYSIDINAE (HYMENOPTERA: CHRYSIDIDAE) FAUNA OF TURKEY WITH DISTRIBUTIONAL EVALUATION

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Abstract

The present study is based on chrysidid samples in the subfamily Chrysidinae collected from various parts of Turkey since the 1970s. A total of 90 species and subspecies are recognized in seven genera: *Chrysidea* (1), *Chrysis* (70), *Chrysura* (13), *Pseudochrysis* (2), *Spinolia* (2), *Spintharina* (1), and *Euchroeus* (1). Of these, *Chrysis verae* Semenov 1967 is new for the Turkish fauna. Moreover, *Chrysis cingulicornis* Förster 1853, *Ch. cylindrica* Eversmann 1857, *Ch. decora* Mocsáry 1889, *Ch. lepida* Mocsáry 1889, *Ch. marani centropunctata* Linsenmaier 1968, *Ch. viridissima fasciolata* Klug 1845, *Chrysura barbatula* Linsenmaier 1968, and *Pseudospinolia neglectoides* (Linsenmaier 1959) are recorded for the first time in the eastern Anatolian region. Those of *Chrysis confluens* (Dahlbom 1845) and *Euchroeus purpuratus consularis* Buysson 1896 are recorded from central and eastern Anatolia, *Chrysis bytinskii* Linsenmaier 1959 from the Mediterranean region, *Chrysis krueperi* Mocsáry 1897 from the Marmara region, *Ch. marginata* Mocsáry 1889 from central Anatolia and Mediterranean regions, *Ch. lateralis* Dahlbom, 1845 from central Anatolia, *Chrysura varicornis* (Spinola 1838) from the southeastern Anatolian region. New distributional data of most of the taxa are evaluated. The species show different distribution patterns; most of them have been rarely recorded, the rest of them are moderately and frequently recorded. Certain species are recorded from one or two provinces, even with a single sample. For instance, *Chrysis aeraria* (Mocsáry, 1914), *Ch. jucunda* Mocsáry, 1889 and *Ch. viridissima fasciolata* Klug, 1845 are known from one province each. They could be classified as endangered species and should be added to the IUCN red list.

KEY WORDS: Chrysididae, Chrysidinae, fauna, distributional data, distributional evaluation, Turkey.

Introduction

The family Chrysididae, known as cuckoo wasps or gold wasps, has the greatest diversity in the Palearctic region (Morgan, 1984). Many species of Chrysididae are characterized by colors with metallic glare, green, blue, copper, gold, or a combination of these colors. Chrysidids are parasitoids or kleptoparasites of other wasps, sawflies, bees and a few Lepidoptera species in various families (Kimsey & Bohart, 1991). The female chrysidid deposits her egg in the host cell, usually before provisioning has been completed. The emerging larva kills the egg or recently hatched larva of the host and then feeds on the stored provisions. Some species are more typical parasitoids in that the larvae feed on the mature larvae of the host within a cell or cocoon (Goulet & Hubner, 1993).

Chrysidids are usually thermophilous and prefer sandy sites, clay-brick walls, stone walls, wood steppes, rocky steppes, semideserts, deserts, but even forests and other places where their hosts live (Rosa, 2006; Tyrner, 2007). Chrysidids are included in Aculeata of the order Hymenoptera with usually reduced sting; but unlike other Aculeata groups, they have the same number of flagellomeres both in males and females. Unlike most groups of Hymenoptera, they have a reduced number of visible abdominal segments (Rosa *et al.*, 2013). Currently, Chrysididae comprises five subfamilies; Amiseginae, Chrysidinae, Cleptinae, Loboscelidinae, and Parnopinae (Kimsey & Bohar, 1991; Linsenmaier, 1959; Rosa, 2006). The family Chrysididae is considered to be one of the largest families of aculeate Hymenoptera within the superfamily Chrysoidea with more than 2500 species in 89 genera distributed over the world (Aguar *et al.*, 2013; Rosa *et al.*, 2016) and approximately 490 of these occur in Europe (Mitroiu *et al.*, 2015).

Studies of the Chrysididae family of Turkey go back to 19th century: Förster (1853), Dahlbom (1854) and Mocsáry (1889) described several new species from Anatolia. Later, Fahringer & Friese (1921), Balthasar (1952) and Bytinski-Salz (1956) organized collecting trips to Anatolia and described some new species. Comprehensive studies were conducted in different geographical regions of Turkey by Linsenmaier (1968, 1987, 1997), Schmidt (1977), Moczár (1997, 1998, 2001), Arens (2004, 2010) and Strumia and Yıldırım (2009), who described many new species, and new records and additional distribution records were documented for almost all of the species. Recently, several faunal studies have been carried out in Turkey by different researchers (Strumia & Yıldırım, 2001, 2009, 2011; Yıldırım & Strumia, 2006; Wisniewski & Strumia 2007). Based on the above-mentioned studies, Chrysididae currently comprises approximately 370 species and 42 subspecies in 22 genera and three subfamilies in Turkey. In the present study, the subfamily Chrysidinae is treated.

Materials and Methods

The material was collected in various parts of Turkey since the 1970s, but mainly comes from eastern Anatolia. Most of the specimens were collected from various habitats in different parts of the country by sweeping with an insect net, and occasionally aspirators. Some specimens were collected using Malaise traps that were installed in the Aras Valley, Karakurt, Sarıkamış (Kars) and Subatik, Oltu (Erzurum). Also, several specimens were captured on a vertical bank 22 km WSW of Oltu. In general, the wasp collections were made during the flowering periods of plants between April and September. Identification of the wasps was made by W. Linsenmaier (in 2000) and by F. Strumia (in 2017). The distributions of species are evaluated according to the number of collecting provinces (1-4: rarely recorded, 5-9: moderately recorded, 10-above: frequently recorded) based on present and previous records. Species are presented alphabetically according to the genera and provinces are listed in alphabetical order. Decimal latitude-longitude information is given if available. Distributions, distributional remarks, total distribution provinces of examined species are

given. The material is deposited in the Entomology Museum, Erzurum, Turkey (EMET). Some specimens were identified and named as new species and subspecies in the collection of W. Linsenmaier (unpublished); certain specimens are kept in the collection of F. Strumia.

Results

Tribe Chrysidini

Genus *Chrysidea* Bischoff, 1913

Chrysidea pumila (Klug, 1845)

Ch. persica Radoszkowski, 1881

Material examined: Ankara, Şereflikoçhisar, Beçenek deresi, 26.08.2003, 1 ♀, leg. C. Güçlü; Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 15.07.2001, 1 ♀, leg. H. Özbek; Şenkaya, Penek, 29.07.1991, 1 ♀, leg. E. Yıldırım.

Distribution: Afro-tropical and Palearctic region (Kimsey & Bohart 1991; Rosa *et al.*, 2013). In Turkey: Hatay, Isparta, Karaman, Konya (type locality), Mersin, Sivas, Şanlıurfa (Schmidt, 1977) as *Ch. persica*; Erzincan, Erzurum, Iğdır, Istanbul (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009; 2011).

Remark: Ankara is added to the distribution records of *Ch. pumila*. Although there is no record from the southeastern Anatolian region, it could be considered to be widespread in Turkey. Thus, this species is frequently recorded (12 provinces) from Turkey.

Genus *Chrysis* Linnaeus, 1761

It is the largest genus of cuckoo wasps, including over 1000 species, as large as the rest of the Chrysididae together (Kimsey & Bohart, 1990).

Chrysis aeraria (Mocsáry, 1914)

Material examined: Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♂, leg. E. Yıldırım, 18.07.1997, 1 ♂, leg. E. Yıldırım.

Remark: Schmidt (1977) gave "Klein Asian" as distribution area of *Ch. aeraria*. Previously, Strumia & Yıldırım (2009) recorded it from Erzincan. In the present study, it was collected from the same locality. Present data show that the distribution of this taxon is confined to Erzincan Province. *Chrysis aeraria* is a very rare species, and thus it is rarely recorded (1 province) from Turkey. This species could be assessed as endangered in Turkey and considered to be under threat of extinction.

Chrysis aestiva Dahlbom, 1854

Material examined: Erzurum, Ilıca, Konaklı, 2400 m, 22.07.2000, 1 ♀, leg. Ö. Çalmaşur; Kars, Kağızman, 24.07.1997, 1 ♀, leg. E. Yıldırım.

Distribution: Iran, Palestine, Greece (Rhodes), Turkey (Linsenmaier, 1959; Farhad *et al.*, 2015). In Turkey: Denizli, Hatay, Karaman, Konya, Mersin, Şanlıurfa (Schmidt, 1977); Mersin (Wisniowski & Strumia, 2007); Mersin, Erzurum, Kars, Tokat (Strumia & Yıldırım, 2011).

Remark: Although there is no record from the Marmara region this species is frequently recorded (10 provinces) from Turkey.

Chrysis albanica Trautmann, 1927

Material examined: Bilecik, 600 m, 15.07.1995, 2 ♂♂, leg. E. Yıldırım; Erzurum, Atatürk University Campus, 1900 m, 29.07.1992, 1 ♂, leg. E. Yıldırım; Pazaryolu, 1100 m, 09.07.1997, 1 ♂, leg. E. Kılıç.

Distribution: Iran (Rosa *et al.*, 2013). In Turkey: Konya (Linsenmaier, 1959); Ankara, Denizli, Isparta, Konya, Şanlıurfa (Schmidt, 1977); Bilecik, Bayburt, Erzincan, Erzurum, Kars, Tokat (Strumia & Yıldırım, 2009; 2011).

Remark: *Ch. albanica* is frequently recorded (12 provinces) from Turkey. Linsenmaier (1959) described *Ch. albanica alia* from Konya.

Chrysis ambigua Radoszkowski, 1891

Chrysis mutabilis du Buysson, 1887

Material examined. Erzurum, Tortum, Esendurak, 1500 m, 09.07.2001, 1 ♀, leg. S. Çoruh. Kars, Sarıkamış, 2000 m, 25.07.1997, 2 ♂♂, leg. H. Özbek.

Distribution: Southern Europe, southern former USSR, Transcaspia, Iran, Palestine, Rhodes, Middle East, Turkey, Turkmenistan (Linsenmaier, 1959, Kimsey & Bohart, 1991; Rosa *et al.*, 2013). In Turkey: Denizli, Isparta, Karaman, Konya, Mersin, Şanlıurfa (Schmidt, 1977); Erzincan, Erzurum, Kars (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009) as *Ch. mutabilis* du Buysson; Denizli, Hatay, Isparta, Karaman, Konya, Mersin, Şanlıurfa (Wisniewski & Strumia, 2007); Erzurum, Mersin (Strumia & Yıldırım, 2011).

Remark: *Ch. ambigua* is one of the most widespread and frequently recorded species from Turkey, although there are no records from the Black Sea and Marmara regions.

Chrysis analis Spinola, 1880

Material examined: Erzincan, Horticultural Research Center, 1250 m, 30.07.1991, 1 ♀, 1 ♂, leg. E. Yıldırım; Erzurum, İlica, Atlıkonak, 2000-2400 m, 29.06.2001, 1 ♀, leg. Ö. Çalmaşur, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 15.07.2001, 1 ♀, leg. H. Özbek, Tortum, Esendurak, 1500 m, 09.07.2001, 1 ♀, leg. S. Çoruh.

Distribution: Caucasus, southern former USSR, Iran, Palestine, Pakistan, Turkey, Algeria, (Linsenmaier, 1959; Rosa *et al.*, 2013). In Turkey: Erzincan, Erzurum, Tunceli (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009, 2011).

Remark: *Ch. analis* has been known only from eastern Anatolia. It is rarely recorded (3 provinces) from Turkey.

Chrysis angustifrons Abeille de Perrin, 1878

Material examined: Bayburt, Demirözü, 17.07.1991, 1 ♀, leg. H. Bostan; Erzincan, Horticultural Research Center, 30.07.1991, 15 ♀♀, 8 ♂♂, leg. E. Yıldırım; Erzurum, Aşkale, 09.07.1994, 1 ♀, leg. G. Tozlu; Olur, Süngübayır, 20.07.1992, 1 ♀, leg. I. Aslan; Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 02.07.1997, 1 ♂, leg. E. Yıldırım; İnanmış, 1700 m, 26.07.2000, 1 ♀, leg. H. Özbek; Şenkaya, Turnalı, 1400 m, 08.07.1997, 1 ♀, leg. E. Yıldırım.

Distribution: Southern Europe, Middle East including Iran and Turkey (Linsenmaier, 1959). In Turkey: Afyon (Linsenmaier, 1959) as *Chrysis angustifrons agitata* Linsenmaier, 1959; Hatay, Karaman, Konya,

Neveşehir, Sivas, Şanlıurfa (Schmidt, 1977); Artvin, Erzincan, Erzurum, (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: Bayburt is added to the distribution records of *Ch. angustifrons*. It is frequently recorded (12 provinces) from Turkey.

Chrysis angustula Schenck, 1856

Material examined. Erzurum, Oltu, Subatık, West 2 km Oltu, roadside, 1300 m, 14.06.2001, 1 ♀, 1 ♂, leg. H. Özbek.

Distribution: Norway, Finland, Denmark, the Netherlands, Belgium, Luxembourg, France, Spain, Germany, Switzerland, Italy, Poland, Czech Republic, Slovakia, Austria, Croatia, Turkey and China (Manchuria) Niehuis (2000). In Turkey: Artvin, Erzurum (Yıldırım & Strumia, 2006).

Remark: Although *Ch. angustula* has a large distribution range, in Europe it is currently only known from the northeastern part of Turkey (Artvin and Erzurum). It is a rarely recorded (2 provinces) species from Turkey.

Chrysis aurotecta continentalis Linsenmaier, 1959

Material examined: Bilecik, 600 m, 15.06.1995, 1 ♂, leg. E. Yıldırım; Erzurum, Pasinler, Çalıyazı, 2400 m, 10.07.1997, 1 ♂, leg. H. Özbek.

Distribution: France, Italy, Sicily, Greece, Spain, Portugal, Corsica Morocco (Linsenmaier, 1959, Agnoli & Rosa, 2019). In Turkey: Balıkesir, Erzincan, Erzurum, Kars (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011) as *Ch. continentalis* Linsenmaier, 1959.

Remark: Bilecik is added to the distribution records of *Ch. aurotecta continentalis*. There are no records from the Aegean, central Anatolia and Mediterranean regions. It is moderately recorded (5 provinces) from Turkey.

Chrysis bytinskii Linsenmaier, 1959

Ch. kremastiana Linsenmaier, 1959, *Ch. bytinskii kremastiana* Linsenmaier, 1959.

Material examined: Antalya, Beydağları, Saklıkent yolu, Alimınpınarı, 1000 m, 05.07.1994, 1 ♀, leg. H. Özbek (on *Mentha longifolia* (L.) Hudson).

Distribution: Rhodes, Iran, Israel, Palestine, Saudi Arabia, southern Russia, North Africa, Turkey (Linsenmaier, 1959, 1994; Kimsey & Bohart, 1991; Strumia & Fallahzadeh, 2015). In Turkey: Konya (Schmidt, 1977).

Remark: Probably after Schmidt's record (1977), Antalya is the second locality recorded for this species. Thus, it is a new record for the Mediterranean region. Currently, it is only known from Antalya and Konya. This species is rarely recorded (2 provinces) from Turkey.

Chrysis cerastes Abeille, 1877

Material examined: Erzurum, Olur, Süngübayır, 20.07.1994, 1 ♀, leg. I. Aslan; Oltu, Anzavderesi, 31.07.1996, 1 ♀, leg. G. Tozlu.

Distribution: Southwestern Palearctic. In Turkey: Erzurum, Kars, Tokat (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009).

Remark: *Ch. cerastes* has sporadic distribution; currently known from three provinces. It is a rarely recorded (3 provinces) species from Turkey.

Chrysis cingulicornis Förster, 1853

Material examined: Erzurum, Dereboğazi, 2100 m, 11.07.1994, 1 ♀, leg. E. Yıldırım, Güzelyayla, 29.07.1992, 1 ♀, leg. I. Aslan, Çat, 2260 m, 2 ♀♀, leg. E. Yıldırım.

Distribution: Iran, central and southern Europe, former Yugoslavia, Kyrgyzstan, Lebanon, Turkey (Linsenmaier, 1959, 1968, 1987; Kimsey & Bohart, 1991; Rosa *et al.*, 2013). In Turkey: Sivas (Schmidt, 1977); Bayburt (Strumia & Yıldırım, 2011).

Remark: Erzurum is added to the distribution records of *Ch. cingulicornis*. Although a large number of specimens were collected during present and previous studies in Erzurum and neighboring provinces, it is the first report from Erzurum as well the eastern Anatolian region. It is rarely recorded (3 Province) species from Turkey.

Chrysis coeruleiventris Abeille de Perrin 1878*Pseudospinolia coeruleiventris* Abeille de Perrin 1878

Material examined: Antalya, Beydağları, Saklıkent yolu, Aliminpınarı, 1000 m, 05.07.1994, 1 ♀, leg. H. Özbek (on *Mentha longifolia* (L.) Hudson).

Distribution: Palearctic, from southern Europe to southern USSR (Kimsey & Bohart, 1991). In Turkey: Sivas, Şanlıurfa (Schmidt 1977); Antalya, Erzurum (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009).

Remark: It is a rarely recorded (4 provinces) species from Turkey and has a sporadic distribution. There is no record from the Black Sea, Marmara and Aegean regions.

Chrysis comparata Lepeletier, 1806

Material examined: Antalya, Serik, Aspendos, 03.07.1994, 1 ♂, leg. H. Özbek (on *Vintex agnus castus* L.); Erzincan, Horticultural Research Center, 18.07.1997, 1 ♂, leg. E. Yıldırım; 30.07.1991, 2 ♂♂, leg. E. Yıldırım, Tercan, 09.07.1994, 1 ♀, leg. G. Tozlu; Erzurum, İspir, 24.07.1991, 1 ♂, leg. E. Yıldırım, Olur, Süngübayır, 2007.1994, 1 ♂, leg. I. Aslan; Şenkaya, Turnalı, 1750 m, 25.07.1996, 1 ♂, leg. E. Yıldırım; Tokat, 1500 m, 17.07.1992, 1 ♂, leg. H. Özbek.

Distribution: Europe and Near East (Kimsey & Bohart, 1991). In Turkey: Denizli, Hatay, Karaman, Konya, Mersin, Sivas, Şanlıurfa (Schmidt, 1977); İzmir (Linsenmaier, 1959) as *Ch. comparata orientica* Linsenmaier, 1959; Adana, Antalya, Artvin, Erzincan, Erzurum, Kars, Konya (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: Tokat is added to the distribution records of *Ch. Comparata*. It is frequently recorded (15 provinces) from Turkey. Moreover, we suspect *Ch. Comparata* is represented by *Ch. comparata orientica* Linsenmaier, 1959 in Turkey.

Chrysis compta Förster, 1853*Chrysis uncifera* Abeille de Perrin, 1878

Material examined: Antalya, Serik, Aspendos, 03.07.1994, 1 ♀, leg. H. Özbek (on *Vintex agnus castus*); Erzurum, Köşk köyü, 1900 m, 20.06.1996, 1 ♀, leg. I. Aslan; Kars, Sarıkamış, Akkurt, Çeşme, 25.07.1997, 1 ♂, leg. H. Özbek.

Distribution: Palearctic; Spain, France, Corsica, Switzerland, Italy, Austria, Hungary, Balkans, S. Russia, China, Cyprus, Iran, Turkey (type locality European Turkey) (Rosa *et al.*, 2013). In Turkey: Antalya, Artvin,

Erzincan, Erzurum, Kars, Eskişehir, Tokat (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009); Adana (Wisniowski & Strumia, 2007).

Remark: Although there is no record from the Aegean and Southeast Anatolia regions, it is moderately recorded (8 provinces) from Turkey.

Chrysis concolor schwarzi Linsenmaier, 1968

Material examined: Erzincan, Horticultural Research Center, 14.06.1994, 1 ♀, leg. E Yıldırım; Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 22.07.2001, 4 ♀♀, leg. H. Özbek.

Distribution: Azerbaijan, Iran, Palestine, Turkey (Linsenmaier, 1968; Rosa *et al.*, 2013). In Turkey: Ankara, Denizli, Hatay, Mersin (type locality), Sivas, Konya, Şanlıurfa (Linsenmaier, 1968; Schmidt, 1977) as *Chrysis concolor schwarzi*; Erzincan, Erzurum (Yıldırım & Strumia, 2006) as *Ch. concolor* Mocsáry, 1893.

Remark: *Ch. concolor schwarzi* currently has sporadic distribution. No record from the Black Sea region. It is moderately recorded (9 provinces) from Turkey.

Chrysis confluens (Dahlbom, 1845)

Chrysis elegans interrogate Linsenmaier, 1959

Material examined: Ankara, Şereflikoçhisar, Hotalı, 14.07.1998, 1 ♀, leg. C. Güçlü; Erzurum, İspir, Maden, Köprübaşı, 28.07.1992, 1 ♂, leg. E. Yıldırım, Pazaryolu, 1100 m, 09.07.1997, 1 ♂, leg. E. Kılıç.

Distribution: Rhodes, Iran, Turkey (Linsenmaier 1959, Rosa *et al.*, 2013). In Turkey: Bilecik, İstanbul (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011) as *Ch. elegans interrogate*.

Remark: It is significant that in the present study the Ankara and Erzurum provinces are added to the distribution records of *Ch. confluens*. It is a new record for the eastern and central Anatolia regions, and there are no records from the Aegean and Mediterranean regions. It is rarely recorded (4 provinces) from Turkey.

Chrysis consanguinea Mocsáry, 1889

Material examined: Erzurum, Köşk köyü, 1900 m, 20.06.1996, 1 ♀, leg. I. Aslan, Oltu, Başaklı, 1700 m, 28.07.1992, 1 ♀, leg. H. Özbek. Pasinler, Çalıyazı, 2400 m, 10.07.1997, 1 ♀, leg. H. Özbek.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Balıkesir, Bayburt, Bilecik, Diyarbakır, Erzincan, Erzurum, Kars, Tokat (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011); Adana, Afyonkarahisar, Kırklareli (Wisniowski & Strumia, 2007).

Remark: Although there is no record from the Aegean region, it could be considered to be frequently recorded (11 provinces) from Turkey.

Chrysis cylindrica Eversmann, 1857

Material examined: Kars, Digor, 1700 m, 22.07.1997, 1 ♀, leg. E. Yıldırım.

Distribution: Western Palearctic, South Russia, Crimea, Dalmatia, Greece, Syria, Turkey (Linsenmaier 1968).

Remark: Linsenmaier (1968) indicated the presence of *Ch. cylindrica* in Turkey (as Klein Asian) but gave no locality. Nevertheless, it is first recorded from eastern Anatolia. It is rarely recorded (1 or 2 provinces) from Turkey.

Chrysis daphnis syriensis Linsenmaier, 1959

Material examined: Elazığ: Keban, 38° 45' 40" N 38° 46' 52" E ", 900 m, 16.V.2002, 1 ♀, leg. H. Özbek; Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♀, leg. E. Yıldırım, 07.07.1993, 1 ♂, leg. E. Yıldırım, 30.07.1991, 1 ♀, leg. E. Yıldırım; Erzurum, Köşk köyü, 20.06.1996, 1 ♀, leg. I. Aslan, Hınıs, 1800 m, 14.06.2002, 1 ♂, leg. Ö. Çalmaşur, Ilıca, Atlıkonak, 2000-2400 m, 1 ♂, leg. Ö. Çalmaşur, Oltu, on the border of Tutmaç and Başaklı villages, 1700-2100 m, 31.07.2001, 2 ♀♀, leg. Ö. Çalmaşur, Sütkans, 18.07.1996, 1 ♀, leg. G. Tozlu, Pazaryolu, 1100 m, 09.07.1997, 1 ♀, leg. E. Kılıç, Şenkaya, Turnalı, 10.07.1997, 1 ♀, leg. E. Yıldırım.

Distribution: Iran, Palestine, Syria, Turkey (Linsenmaier, 1959; Rosa *et al.*, 2013). In Turkey; Niğde (Linsenmaier, 1959); Konya, Sivas, Mersin, Nevşehir, Şanlıurfa (Schmid, 1977) as *Ch. daphnis syriensis* Linsenmaier, 1959; Adana, Adıyaman, Bitlis, Mardin, Şanlıurfa, Tunceli (Wisniowski & Strumia, 2007); Adana, Adıyaman, Bayburt, Bitlis, Erzincan, Erzurum, İstanbul, Mardin, Şanlıurfa, Tunceli, (Strumia & Yıldırım, 2009; 2011) as *Ch. daphnis* Mocsáry, 1889.

Remark: Elazığ is added to the distribution area of *Ch. daphnis syriensis*. Although there is no record from the Aegean region, it could be considered frequently recorded (17 provinces) from Turkey.

Chrysis decora Mocsáry, 1889*Chrysis insperata mesasiatica* Semenov, 1912

Material Examined: Erzurum, Tortum, Aşağı Meydanlar, 24.07.1993, 1 ♂, leg. E. Yıldırım. Kars, Sarıkamış, 2000 m, 25.07.1997, 2 ♂♂, leg. H. Özbek.

Distribution: Turkistan, Transcaspia, Palestine, Turkey (Schmidt, 1977). In Turkey: Denizli, Hatay, Konya, Mersin, Sivas, Şanlıurfa (Schmidt, 1977) as *Ch. insperata mesasiatica*.

Remark: Since Schmidt's study (1977), *Ch. decora* is recorded from Turkey for the first time although several studies were conducted over the last 10 years. Moreover, this is the first record for the east Anatolia region. It is moderately recorded (6 provinces) from Turkey.

Chrysis diacantha Mocsáry, 1889

Material Examined: Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 02.07.1997, 1 ♀, leg. H. Özbek.

Distribution: Palearctic (Kimsey Bohart 1991). In Turkey: Sivas (Schmidt, 1977); Erzurum (Strumia & Yıldırım, 2009).

Remark: *Ch. diacantha* has a large distribution range in the world though it is rare in Turkey; currently known from the Erzurum and Sivas provinces only. It is rarely recorded (2 provinces) from Turkey.

Chrysis distincta (Mocsáry, 1887)

Material examined: Erzurum, Oltu, Subatık, 1300 m, 28.06.2000, 1 ♀, 1 ♂, leg. H. Özbek.

Distribution: southern Palearctic region (Kimsey & Bohart, 1991). In Turkey: Erzincan, Erzurum, Tunceli (Strumia & Yıldırım, 2007) as *Ch. distinct thalhammer* (Mocsáry, 1889); Bilecik, Mersin, Tunceli (Wisniowski & Strumia, 2007) as *Ch. distinct thalhammer*; Erzurum (Strumia & Yıldırım 2011) as *Ch. distincta*.

Remark: No record from the Black Sea and Aegean regions. It is moderately recorded (5 provinces) from Turkey.

Chrysis elegans Lepeletier, 1806

Material examined: Ankara, Şereflikoçhisar, Hotalı, 14.07.1998, 1 ♀, leg. C. Güçlü.

Distribution: Southern Europe, Middle East (Kimsey & Bohart, 1991). In Turkey: Ankara, Bilecik, Erzurum, Kars (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2007); İstanbul, Erzurum as *Ch. elegans interrogata* Linsenmaier, 1959 (Strumia & Yıldırım, 2007); Erzurum as *Ch. elegans transcaspica* Mocsáry 1889 (Strumia & Yıldırım, 2007).

Remark: Currently, both of *Ch. elegans interrogata* and *Ch. elegans transcaspica* are considered invalid subspecies. *Ch. elegans* is moderately recorded (5 provinces) from Turkey.

Chrysis erythromelas Dahlbom, 1845*Chrysis pyrrhina* Dahlbom, 1845

Material examined: Kars, Sarıkamış, 1700 m, 25.07.1997, 1 ♂, leg. H. Özbek; 25.07.1997, 2 ♀♀, leg. Ö. Çalmaşur.

Distribution: Western Palearctic including Turkey (Linsenmaier, 1968). In Turkey: Denizli, Hatay, Konya, Mersin, Nevşehir, Sivas (Schmidt, 1977); Erzincan, Erzurum, Iğdır, Kars, Konya (Strumia & Yıldırım, 2009, 2011) as *Ch. pyrrhina* Dahlbom, 1845.

Remark: Although there is no record from the Aegean, Black Sea and Marmara regions, it is considered frequently recorded (11 provinces) from Turkey.

Chrysis facialis du Buysson, 1887

Material examined: Erzurum, Atatürk University Research field, 1900 m, 06.06.1989, 1 ♀, leg. H. Özbek.

Distribution: Greece, Lebanon, Palestine, Syria, Turkey (Linsenmaier, 1959). In Turkey: Erzurum, Kars (Strumia & Yıldırım, 2009).

Remark: Currently, distribution of *Ch. facialis* is confined to the eastern Anatolia region. It is rarely recorded (2 provinces) from Turkey.

Chrysis frivaldszkyi sparsepunctata du Buysson, 1895

Material examined: Bilecik, 600 m, 15.07.1995, 1 ♂, leg. E. Yıldırım; Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♂, leg. E. Yıldırım; Erzurum, Atatürk University Campus, 1900 m, 23.07.1992, 1 ♀, leg. H. Özbek, Palandöken, 2200 m, 25.07.1992, 1 ♂, leg. E. Yıldırım, 19.07.1993, 1 ♀, leg. E. Yıldırım, Olur, Süngübayır, 1750 m, 01.09.1993, 1 ♂, leg. I. Aslan, Oltu, Kurupınar, 1250 m, 30.07.1992, 1 ♀, leg. H. Özbek, Pazaryolu, 27.07.1992, 1 ♂, leg. E. Yıldırım, Şenkaya, Turnalı, 1750 m, 10.07.1997, 1 ♂, leg. E. Yıldırım.

Distribution: Iran, Palestine, Syria, Transcaspia, Turkey, Turkmenistan (Linsenmaier, 1959; Rosa *et al.*, 2017). In Turkey: Bayburt, Erzincan, Erzurum, İstanbul, Kars, Konya, Tokat (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: Bilecik is added to the distribution records of *Ch. frivaldszkyi sparsepunctata*. Although there are no records from the Aegean, Mediterranean and southeastern regions it is moderately recorded (8 provinces) from Turkey.

Chrysis gracillima Förster, 1853

Material examined: Erzurum, Oltu, the border of Tutmaç and Başaklı, 1700-2100 m, 31.07.2001, 1 ♂, leg. Ö. Çalmaşur.

Distribution: Western Palearctic (Europe, North Africa, Middle East, Iran, Turkey, Morocco) (Linsenmaier 1997, Rosa *et al.*, 2013). In Turkey: Mersin, Sivas (Schmidt, 1977); Kırklareli (Wisniowski & Strumia, 2007); Erzurum, İstanbul, Kırklareli (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: *Ch. gracillima* has a sporadic distribution, there is no record from the Aegean region; it is moderately recorded (5 provinces) from Turkey.

Chrysis graelsii Guérin, 1842

Material examined: Artvin, Şavşat, Karagöl, 1800 m, 08.07.1998, 1 ♀, leg. H. Özbek; Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 18.06.2003, 1 ♀, leg. H. Özbek; İstanbul, 12.06.1872, Rumeli Kavağı, 1 ♀, leg. H. Özbek.

Distribution: Western Palearctic (Linsenmaier 1959, 1968). In Turkey: Artvin, Bayburt, Erzurum, Konya (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: İstanbul is added to the distribution range of *Ch. graelsii*. No record from the Aegean and Mediterranean regions. It is moderately recorded (5 provinces) from Turkey.

Chrysis grohmanni Dahlbom, 1854

Material examined: Kars, Digor, Karaköy, 1700 m, 1 ♂, 1 ♀, leg. H. Özbek.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Erzincan, Erzurum, Kars (Yıldırım and Strumia, 2006); İstanbul (Strumia & Yıldırım, 2007) as *Ch. grohmanni krkiana* Linsenmaier, 1959; Bitlis, Erzurum, Konya (Strumia & Yıldırım, 2007) as *Ch. grohmanni bolivari* Mercet 1902, which is in valid currently.

Remark: No record from the Aegean and Mediterranean regions. It is moderately recorded (6 provinces) from Turkey.

Chrysis ignita (Linnaeus, 1758)

Material examined: Kars, Sarıkamış, Karakurt, near Karayolları fountain, 40° 07' 543" N 42° 20 ' 941" E, 1500 m, 15.07.2005, 1 ♀, leg. S. Çoruh.

Distribution: Widespread in the Palearctic region (Rosa *et al.*, 2013). In Turkey: Denizli, Konya, Mersin (Schmidt, 1977); Bayburt, Erzincan, Erzurum, Kars (Strumia & Yıldırım, 2011; Yıldırım & Strumia, 2006).

Remark: No record from the Black Sea and southeastern Anatolia regions. It is moderately recorded (7 provinces) from Turkey.

Chrysis inaequalis Dahlbom, 1845

Material Examined: Erzurum, Çat, 2000 m, 11.07.2002, 1 ♀, leg. Ö. Çalmaşur; Şenkaya, Akşar, 29.07.1991, 1 ♀, leg. E. Yıldırım, Tortum, Pehlivanlı, 13.07.1991, 1 ♀, leg. E. Yıldırım; Rize, İkizdere, Ovit Dağı, 2400 m, 11.07.2000, 1 ♂, leg. Ö. Çalmaşur.

Distribution: Central and southern Europe, Kyrgyzstan, Iran, Tajikistan, Transcaucasia, Turkey, Uzbekistan (Kurzenko & Lelej, 2007; Rosa *et al.*, 2013; Farzaneh *et al.*, 2017). In Turkey: İstanbul (type locality); Erzurum, Kars, Mersin, Rize (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: No record from central Anatolian, southeastern and Aegean regions. It is moderately recorded (5 provinces) from Turkey.

Chrysis inambitiosa Linsenmaier, 1959

Material Examined: Kars, Sarıkamış, Karakurt, 1500 m, 12.07.2003, 1 ♀, leg. S. Çoruh.

Distribution: Palestine (Linsenmaier, 1959), Near East (Wisniowski & Strumia 2007). In Turkey: Adıyaman, Hatay, Mersin (Wisniowski & Strumia, 2007); Erzincan, Erzurum, Kars, Konya, Malatya, Mersin (Strumia & Yıldırım, 2009).

Remark: It is moderately recorded (8 provinces) from Turkey.

Chrysis indigotea Dufour & Perris, 1840

Chrysis indica Schrank, 1804

Material Examined: Erzurum, Oltu, Subatik, 4 km W Oltu, 16.09.2002, 1 ♀, leg. H. Özbek.

Distribution: Europe, North Africa, Iran, Kyrgyzstan, Tian-Shan, Turkey (Linsenmaier, 1959; Rosa *et al.*, 2013). In Turkey: Erzincan (Yıldırım & Strumia 2006)

Remark: Erzurum is added to the distribution record of *Ch. indigotea*. Although in recent years, many studies have been conducted on the Chrysididae fauna of Turkey and a great number of specimens have been collected in Erzurum Province, this is the first record of *Ch. indigotea* from Erzurum Province. This species is mainly localized in Erzincan and Erzurum provinces (eastern Anatolia). It is rarely recorded (2 provinces) from Turkey

Chrysis interjecta hemichlora Linsenmaier, 1951

Material examined: Erzurum, Atatürk University Campus, 1900 m, 11.07.1993, 1 ♂, leg. E. Yıldırım.

Distribution: Cyprus, Rhodes (Linsenmaier 1951), Europe, Russia and Middle East (Vinokurov, 2013). In Turkey: Bilecik, Kars (Strumia & Yıldırım, 2009).

Remark: Erzurum is added to the distribution records of *Ch. interjecta hemichlora*. As previous species this taxon is first recorded from Erzurum Province. It is rarely recorded (3 provinces) from Turkey.

Chrysis jaxartis Semenov, 1909

Material examined: Erzurum, Ilıca, Atlıkonak, 12.07.1997, 1 ♀, leg. Ö. Çalmaşur, Olur, Süngübayır, 23.07.1992, 1 ♂, leg. I. Aslan.

Distribution: Greece Iran, Kazakhstan, Turkestan, Turkey (Linsenmaier, 1968; Rosa *et al.*, 2013). In Turkey: Konya, Şanlıurfa (Schmidt, 1977); Erzurum, Iğdır (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009, 2011).

Remark: *Ch. jaxartis* has a sporadic distribution; no record from the Black Sea, Marmara, Mediterranean and Aegean regions. It is rarely recorded (4 provinces) from Turkey.

Chrysis joppensis du Buysson, 1887

Material examined: Erzurum, Atatürk University research field no 6-kuyu, 07.06.1992, 1 ♀, leg. H. Özbek, Ilıca, Atlıkonak, 2000 m, 29.06.1999, 1 ♀, leg. Ö. Çalmaşur.

Distribution: Europe, Middle East (Kimsey & Bohart, 1991). In Turkey: Bilecik, Erzincan, Erzurum (Yıldırım & Strumia 2006; Strumia & Yıldırım 2009).

Remark: It is known from the eastern Anatolian and Marmara regions only, rarely recorded (3 provinces) from Turkey.

Chrysis jucunda Mocsáry, 1889

Material examined: Erzurum, Oltu, Sütkans, 18.06.1996, 1 ♀, leg. G. Tozlu.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Erzurum (Strumia & Yıldırım, 2009).

Remark: *Ch. jucunda* is a very rare species, only known from Erzurum Province. It is rarely recorded (1 province) from Turkey. This species could be assessed to be endangered in Turkey and considered under threat of extinction.

Chrysis krueperi Mocsáry, 1897

Material examined: Bilecik, 600 m, 15.07.1995, 1 ♂, leg. E. Yıldırım.

Distribution: Central and southeastern Europe, Iran, Turkey (Linsenmaier 1968, Rosa *et al.*, 2013). In Turkey: Hatay, Mersin (Schmidt 1977) as *Ch. millenaris bilobata* Balthasar, 1953.

Remark: *Ch. krueperi* is a rare species. Since Schmidt's (1977) contribution, probably Bilecik is the first record, although in the last 10 years several studies have been conducted in the country. It has a sporadic distribution. Interestingly, there is no record from the eastern part of Turkey, whereas it is present in Iran (Rosa *et al.*, 2013). It is rarely recorded (3 provinces) from Turkey.

Chrysis lateralis Dahlbom, 1845

Chrysis separata Trautmann, 1926

Material examined: Erzincan, Horticultural Research Center, 1250 m, 30.07.1991, 1 ♀, leg. E. Yıldırım; Konya, Hadım, Göksu Termik Santrali, 1200 m, 06.07.2002, 1 ♀, leg. M. Kesdek.

Distribution: Europe, Russia and Middle East (Vinokurov, 2013). In Turkey: Erzincan, Erzurum (Yıldırım & Strumia, 2006) as *Chrysis separata* Trautmann, 1926.

Remark: Konya is added to the distribution records of *Ch. lateralis*. It is a new record for central Anatolia and rarely recorded (3 provinces) from Turkey.

Chrysis leachii Shuckard, 1837

Material examined: Erzurum, Oltu, Subatik, 4 km W Oltu, 1300 m, 08.09.2002, 1 ♂, leg. H. Özbek; Kars, Sarıkamış, Karakurt, 1500 m, near Karayolları fountain, 40° 07' 543" N 42° 20 ' 941" E, 16.07.2002, 1 ♀, leg. H. Özbek.

Distribution: Western Palearctic (Europe, North Africa, Middle East) (Linsenmaier, 1977, 1979). In Turkey: Erzincan (Strumia & Yıldırım, 2009).

Remark: Erzurum and Kars provinces are added to the distribution records of *Ch. leachii*. Although in recent years several studies have been conducted on the Chrysididae fauna of Turkey and a great number of specimens have been collected in the Erzurum and Kars provinces, this is the first record of the species from Erzurum and Kars provinces in the present study. So far it has been reported from the eastern Anatolian region only. It is rarely recorded (3 provinces) from Turkey.

Chrysis lepida Mocsáry, 1889

Material examined: Erzurum, Atatürk University Campus, 1900 m, 29.07.1992, 1 ♂, leg. H. Özbek, 29.07.1992, 3 ♀♀, leg. E. Yıldırım, 17.07.1992, 1 ♂, leg. I. Aslan, Kirkgözeler, 1900 m, 12.07.1992, 1 ♂, leg. E. Yıldırım.

Distribution: Caucasus (type locality Yerevan) Isparta, Karaman, Konya, Sivas, Şanlıurfa (Schmidt, 1977).

Remark: We suspect that after Schmidt's (1977) record, *Ch. lepida* is first recorded from Turkey as well the eastern Anatolian region, although the type locality is Yerevan. It is moderately recorded (6 provinces) from Turkey.

Chrysis leptomandibularis Niehuis, 2000

Material examined: Erzurum, Olur, Süngübayır, 1750 m, 17.07.1994, 1 ♀, leg. I. Aslan.

Distribution: Armenia, Austria, France, Germany, Netherlands, Switzerland, Turkey, Ukraine (Niehuis, 2000). In Turkey: Artvin (Niehuis, 2000): Erzurum (Strumia & Yıldırım, 2007).

Remark: Present records show that distribution of *Ch. leptomandibularis* is confined to the northeastern part of the country. It is rarely recorded (2 provinces) from Turkey.

Chrysis longula Abeille de Perrin, 1879

Material examined: Artvin, Kafkasör, 1800 m, 05.07.2005, 2 ♀♀, leg. H. Özbek; Erzurum; Oltu, Başaklı, 1700 m, 28.07.1992, 1 ♀, leg. H. Özbek, Çamlıbel, 24 km WSW Oltu, 1700 m, 23.06.2001, 4 ♀♀, leg. H. Özbek, 28.06.2001, 1 ♀, leg. H. Özbek, 15.07.2001, 3 ♀♀, leg. H. Özbek.

Distribution: Palearctic, from western Europe to central Asia, Siberia and China (Linsenmaier, 1959, 1997). In Turkey: Artvin, Erzurum, Konya (Yıldırım & Strumia, 2006).

Remark: Although *Ch. longula* has a large distribution range abroad, here in Turkey it has a sporadic distribution and is recorded from the northeastern and central Anatolian regions only. It is rarely recorded (3 provinces) from Turkey.

Chrysis lydiae Mocsáry, 1889

Material examined: Bilecik, 600 m, 15.06.1995, 1 ♀, leg. E. Yıldırım; Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♀, leg. E. Yıldırım.

Distribution: Bulgaria, Greece, Italy, Crete, former Yugoslavia, Near East including Anatolia (Linsenmaier 1968). In Turkey: Karaman, Erzincan, Erzurum (Yıldırım & Strumia 2006).

Remark: Bilecik is added to the distribution records of *Ch. lydiae*, which has sporadic distribution in the country. No record from the Black Sea, Aegean and Mediterranean regions. It is rarely recorded (4 provinces) from Turkey.

Chrysis maculicornis Klug, 1865

Material examined: Erzurum, Oltu, Subatik, 1300 m, 28.06.2000, 1 ♂, leg. H. Özbek; Kars, Sarıkamış, Karakurt, 1500 m, near Karayolları fountain, 40° 07' 543" N 42° 20 ' 941" E, 13.07.2003, 1 ♂, leg. S. Çoruh.

Distribution: Palearctic, Oriental and Afrotropical regions (Rosa *et al.*, 2017). In Turkey: Erzincan, Erzurum, Kars, Mersin (Strumia & Yıldırım, 2007).

Remark: Currently, *Ch. maculicornis* is known from the eastern Anatolian and Mediterranean regions. It is rarely recorded (4 provinces) from Turkey.

Chrysis manicata Dahlbom, 1854

Material examined: Antalya, Serik, Aspendos, 03.07.1994, 1 ♀, leg. H. Özbek (on *Vintex agnus castus* L.); Erzincan, Üzümlü, 1300 m, 16.06.1994, 1 ♂, leg. E. Yıldırım.

Distribution: Greece (Rhodes) (Rosa & Vardal 2015). In Turkey: Ankara (Schmidt, 1977); Adana (Wisniewski & Strumia, 2007); Gaziantep (Strumia & Yıldırım, 2009).

Remark: Antalya and Erzincan provinces are added to the distribution range of *Ch. manicata*. It is remarkable to note that although hundreds of samples have been collected during previous studies in Erzurum and Erzincan, no sample has been found from Erzincan until the present study. It has a sporadic distribution in the country. It is moderately recorded (5 provinces) from Turkey.

Chrysis marani centropunctata Linsenmaier, 1968

Material examined: Erzurum, Olur, Süngübayır, 1700 m, 20.07.1994, 1 ♀, leg. I. Aslan.

Distribution: *Ch. marani* Balthasar 1953 is known from Israel, Iran, Palestine, Turkey and North Africa (Linsenmaier, 1959, 1968; Rosa *et al.*, 2013).

Remark: Linsenmaier (1968) described *Ch. marani centropunctata* from Kayseri and Denizli. With the present study, this taxon first recorded from Turkey after description. Moreover, it is first reported from Erzurum Province as well eastern Anatolia. It is rarely recorded (3 provinces) from Turkey. Moreover, Strumia & Yıldırım (2006) recorded *Ch. marani cupricolor* Linsenmaier, 1968 from Artvin.

Chrysis marginata Mocsáry, 1889

Material examined: Ankara, Beytepe, 20.07.1994, 1 ♀, leg. H. Özbek (on *Onopordum* sp.); Antalya, Beydağları, Saklıkent yolu, Alimipınarı, 1000 m, 05.07.1994, 1 ♀, leg. H. Özbek (on *Mentha longifolia* (L.) Hudson); Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♂, leg. E. Yıldırım, 23.06.1994, 1 ♂, leg. E. Yıldırım; Iğdır, Köy Hizmetleri Araştırma Enstitüsü, 900 m, 31.07.2002, 1 ♂, leg. M. Kesdek; Kars, Sarıkamış, Karakurt, 1500 m, near Karayolları fountain, 40° 07' 543" N 42° 20 ' 941" E, 15.07.2005, 1 ♀, leg. S. Çoruh.

Distribution: Southeastern Europe, Cyprus, Greece, Palestine, Turkey, Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Transcaucasia, Turkmenistan, Uzbekistan (Linsenmaier, 1959, Rosa *et al.*, 2013). In Turkey: Bilecik, Elazığ, Erzincan, Erzurum, Malatya, Samsun (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009).

Remark: It is significant to note that Ankara, Antalya, Iğdır and Kars provinces are added to the distribution records of *Ch. marginata*. It is a new record for the central Anatolia and Mediterranean regions. So far it has not been recorded from the Aegean region. It is frequently recorded (11 provinces) from Turkey.

Chrysis mediata Linsenmaier, 1951

Material examined: Erzurum, Olur, Süngübayır, 1900 m, 07.07.1991, 2 ♀♀, leg. I. Aslan; Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 15.07. 2001, 1 ♀, leg. H. Özbek.

Distribution: Palearctic excluding Japan (Linsenmaier, 1997). In Turkey: Artvin, Erzurum, Kars (Yıldırım & Strumia, 2006).

Remark: So far, *Ch. mediata* has been reported from the northeastern part (Artvin, Erzurum, Kars) of the country only. We assume it is confined to this region. It is rarely recorded (3 provinces) from Turkey.

Chrysis mirabilis Radoszkowski, 1876

Material examined: Erzurum, Atatürk University Campus, 1900 m, 22.06.1994, 1 ♂, leg. E. Yıldırım; 08.07.1997, 1 ♀, 1 ♂, leg. E. Yıldırım, 20.07.1997, 1 ♂, leg. E. Yıldırım, Atatürk University Research Field, 17.07.1970, 1 ♀, leg. H. Özbek; Kars, Sarıkamış, İssisu, 13.07.1991, 1 ♂, leg. E. Yıldırım.

Distribution: Caucasus (type locality), Georgia, Greece, Turkey (Rosa *et al.*, 2017). In Turkey: Elazığ, Karaman, Konya, Mersin, Sivas, Şanlıurfa (Schmidt, 1977); Erzurum, Rize (Yıldırım & Strumia, 2006).

Remark: Kars is added to the distribution records of *Ch. mirabilis*. It is remarkable to note that although hundreds of samples have been collected during previous studies in Kars Province, no sample of the species has been found from there until the present study. It has not been recorded from the Aegean and Marmara regions. It is moderately recorded (9 provinces) from Turkey.

Chrysis obtusidens Dufour and Perris, 1840

Material examined: Erzurum, Atatürk University research field, 1900 m, 05.07.1995, 1 ♀, leg. H. Özbek, Köşk Köyü, 2000 m, 25.06.1996, 1 ♀, leg. I. Aslan, Oltu, Sütkans, 1500 m, 25.06.1996, 1700 m, 1 ♀, leg. L. Gültekin.

Distribution: Palearctic (Kimsey & Linsenmaier, 1991). In Turkey: Adana (Linsenmaier, 1959) as *Ch. obtusidens taurusiensis*; Erzincan, Erzurum, Samsun (Yıldırım & Strumia, 2006).

Remark: No record from central, Aegean and Marmara regions. It is rarely recorded (4 provinces) from Turkey.

Chrysis provenceana Linsenmaier, 1959

Material examined. Antalya, Beydağları, Saklıkent yolu, Alimınpınarı, 1000 m, 05.07.1994, 1 ♀, leg. H. Özbek (on *Mentha longifolia* (L.) Hudson); Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 19.06.2003, 1 ♀, leg. H. Özbek; Kars, Sarıkamış, Karakurt, 1500, near Karayolları fountain, 40° 07' 543" N 42° 20 ' 941" E, 10.06.2003, 1 ♂, leg. H. Özbek.

Distribution: France, Greece, Italy, Spain (Strumia, 2005). In Turkey: Bilecik, Erzincan, Erzurum, Kars, Konya, Tokat (Yıldırım & Strumia, 2006).

Remark: Antalya is added to the distribution records of *Ch. provenceana*. No record from the Aegean region. It is moderately recorded (7 provinces) from Turkey.

Chrysis pseudoincisa Balthasar, 1953

Material examined: Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 3 ♂♂, leg. E. Yıldırım, 07.07.1993, 1 ♂, leg. E. Yıldırım, 11.07.1994, 1 ♂, leg. E. Yıldırım; Erzurum, Atatürk University Campus, 1900 m, 23.07.1992, 1 ♂, leg. H. Özbek.

Distribution: Cyprus, Israel, Palestine, Near East, Turkey (Linsenmaier, 1969). In Turkey: Ankara, Erzincan Erzurum (Yıldırım & Strumia 2006).

Remark: Currently, *Ch. pseudoincisa* is known from central and eastern Anatolian regions. It is rarely recorded (3 provinces) from Turkey.

Chrysis pulchella Spinola, 1808

Material examined: Bitlis, Tatvan, Nemrut Mountain, 2000 m, 23.07.2003, 1 ♂, leg. H. Özbek; Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♀, leg. E. Yıldırım; Erzurum, Atatürk University Campus, 1900 m, 06.07.1992, 2 ♂♂, leg. E. Yıldırım, 29.07.1992, 1 ♀, leg. E. Yıldırım, 10.07.1992, 1 ♀, leg. E. Yıldırım; Gümüşhane, Köse, 1600 m, 10.07.1995, 1 ♀, leg. H. Özbek.

Distribution: Southern Europe, Iraq, Iran, Kazakhstan, Turkey (Rosa *et al.*, 2013). In Turkey: Artvin, Bilecik, Erzincan, Erzurum, Gümüşhane, Kars, Konya (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009).

Remark: Bitlis is added to the distribution records of *Ch. pulchella*. No record from the Aegean and Mediterranean regions; it is moderately recorded (8 provinces) from Turkey.

Chrysis ragusae De-Stefani, 1888*Chrysis taurica* Mocsáry, 1889

Material examined: Antalya, Arapsuyu, Azmak, 5 m, 04.07.2002, 1 ♂, leg. H. Özbek (on *Mentha longifolia* (L.) Hudson); Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 11.07.2004, 2 ♀♀, leg. H. Özbek, 15.07.2001, 4 ♂♂, 2 ♀♀, leg. H. Özbek, 22.07.2001, 2 ♀♀, 1 ♂, leg. H. Özbek, 28.07.2002, 2 ♀♀, leg. H. Özbek, Subatik, 1300 m, 07.06.2001, 1 ♀, leg. H. Özbek, 14.06.2001, 4 ♀♀, 2 ♂♂, leg. H. Özbek; Isparta, Eğirdir, Yukarıgökdere, 1000 m, 25.05.2004, 1 ♂, leg. H. Özbek.

Distribution: Palearctic (southern Europe, West Asia) (Kimsey & Bohart, 1991). In Turkey: Mersin (Wisniewski & Strumia, 2007); Antalya, Erzincan, Erzurum, Mersin (Strumia & Yıldırım, 2009, 2011).

Remark: Strumia & Yıldırım (2009) treated *Ch. ragusae* and *Ch. taurica* as a separate species, noting them as synonyms (Rosa *et al.*, 2015). Isparta is added to the distribution records of *Ch. ragusae*. Currently known from eastern Anatolian and Mediterranean regions, it has a sporadic distribution. It is moderately recorded (5 provinces) from Turkey.

Chrysis ruddii Shuckard, 1836

Material examined: Erzurum, Oltu, Anzav Vadisi, 03.07.1996, 1 ♂, leg. G. Tozlu.

Distribution: Europe including England, Turkey (Linsenmaier 1959, 1968; Kimsey & Bohart, 1991). In Turkey: Erzurum, Kars (Yıldırım & Strumia, 2006).

Remark: Distribution of *Ch. ruddii* is confined to the eastern Anatolian region. It is rarely recorded (2 provinces) from Turkey.

Chrysis rutilans Olivier, 1790

Material examined: Erzurum, Atatürk University Campus, 1900 m, 17.07.1994, 1 ♀, leg. I. Aslan.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Karaman, Adana, Adıyaman, Artvin, Bilecik, Erzincan, Erzurum, Mersin (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: Rosa and Xu (2015) noted current status of *Ch. rutilans* as *Ch. chrysoprasina* Förster, 1853. *Ch. rutilans* has not been recorded from the Aegean, Black Sea and central Anatolian regions. It is moderately recorded (8 provinces) from Turkey.

Chrysis rutiliventris Abeille de Perrin, 1879

Material examined: Kars, Sarıkamış, Karakurt, 1500 m, near Karayolları fountain, 40° 07' 543" N 42° 20' 941" E, 14.06.2004, 1 ♀, leg. S. Çoruh.

Distribution: Europe, Korea, Turkey (Linsenmaier, 1997). In Turkey: Mersin (Linsenmaier, 1968), Bitlis (Linsenmaier, 1997) Erzurum (Strumia & Yıldırım, 2009) as *Chrysis rutiliventris sertavulensis* Linsenmaier, 1968; Erzurum, Rize (Yıldırım & Strumia, 2006).

Remark: Kars is added to the distribution records of *Ch. rutiliventris*. It is noteworthy that although hundreds of samples have been collected during previous studies in Kars Province (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009, 2011), no sample of the species has been found from there until the present study. It is moderately recorded (5 provinces) from Turkey.

Chrysis scutellaris Fabricius, 1794

Material examined: Erzincan, Horticultural Research Center, 1250 m, 30.07.1991, 1 ♀, leg. E. Yıldırım; Erzurum, Atatürk University research field, 1900 m, 04.07.1990, 1 ♀, leg. H. Özbek.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Hatay, Sivas (Schmidt, 1977) as *Ch. scutellaris gurunensis* Linsenmaier, 1987; Ankara, Erzincan, Erzurum, Kars, Konya, Tokat (Yıldırım & Strumia, 2006).

Remark: No record from the Aegean and Marmara regions. It is moderately recorded (8 provinces) from Turkey.

Chrysis sexdentata Christ, 1791*Chrysis caucasica* Radoszkowsky, 1877

Material examined: Artvin, Yusufeli, 500 m, 15.07.1991, 1 ♀, leg. G. Tozlu.

Distribution: Southern Europe, western and central Asia, Iran, Kyrgyzstan, Turkey (Linsenmaier, 1999, Rosa *et al.*, 2013). In Turkey: Çanakkale, Isparta, Karaman, Konya, Şanlıurfa (Schmidt, 1977); Erzurum, Kars (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009).

Remark: Artvin is added to the distribution records of *Ch. sexdentata*. No record from the Aegean and Mediterranean regions. It is moderately recorded (8 provinces) from Turkey.

Chrysis soror Dahlbom, 1854

Material examined: Antalya: Arapsuyu, Azmak, 10 m, 24.09.2004, 1 ♂, leg. H. Özbek (on *Mentha longifolia* (L.) Hudson), Serik, Aspendos, 03.07.1994, 1 ♂, leg. H. Özbek (on *Vintex agnus castus* L.), Düzlerçam, 200 m, 30.05.2004, 1 ♂, leg. H. Özbek (on *V. agnus castus*); Bilecik, 600 m, 15.07.1995, ♂, leg. E. Yıldırım; Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♂, leg. E. Yıldırım; 30.07.1991, 1 ♀, 3 ♂♂, leg. E. Yıldırım; Erzurum, Atatürk University Campus, 1900 m, 02.07.1992, 1 ♂, leg. E. Yıldırım, 20.07.1993, 1 ♂, leg. E. Yıldırım; 23.07.1992, 2 ♂♂, leg. H. Özbek, 29.07.1992, 2 ♂♂, leg. E. Yıldırım, 02.09.1988, 1 ♂, leg. H. Özbek, Palandöken, 2400 m, 13.07.1994, 1 ♀, leg. G. Tozlu, 23.07.1997, 1 ♂, leg. E. Yıldırım, İspir, 24.07.1991, 1 ♂, leg. E. Yıldırım; Kars, Karaköy, Digor, 1700 m, 22.07.1997, 1 ♀, leg. Ö. Çalmaşur, Sarıkamış, 25.07.1997, 1 ♀, leg. E. Yıldırım; Tokat, 1500 m, 19.07.1992, 1 ♀, leg. H. Özbek.

Distribution: Greece, Hungary, Former Yugoslavia, Iran, Palestine, Turkey (Linsenmaier, 1959). In Turkey: Denizli, Hatay, Konya, Mersin, Sivas, Şanlıurfa (Schmidt, 1977); Aksaray, Balıkesir, Bayburt, Bilecik, Erzincan, Erzurum, Kars, Konya (Yıldırım & Strumia, 2006, Strumia & Yıldırım, 2011).

Remark: Tokat is added to the distribution records of *Ch. soror*, which is a widespread and abundant species of Turkey. *Ch. soror gracilia* was described from Konya by Linsenmaier (1959) that of *Ch. soror calandra* described from Georgia by Semenov-Tian-Shanskij (1967). It needs to be clarified which subspecies mainly occurs in Turkey. *Ch. soror* is frequently recorded (15 provinces) from Turkey.

Chrysis splendidula Rossi, 1790

Material examined: Erzincan, Horticultural Research Center, 1250 m, 23.06.1994, 1 ♀, leg. E Yıldırım; Kars, Sarıkamış, Kalebaş, 25.07.1997, 1 ♂, leg. Ö. Çalmaşur.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Erzincan, Erzurum (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2009).

Remark: Kars is added to the distribution records of *Ch. splendidula*. Although in the last ten years several studies have been conducted on the Chrysididae Fauna of Turkey and a great number of specimens have been collected in Kars Province, *Ch. splendidula* is first recorded from this province. Distribution of this species is confined to the eastern Anatolia region. It is rarely recorded (3 provinces) from Turkey.

Chrysis subsinuata fallax Mocsáry, 1882

Material examined: Erzincan, Horticultural Research Center, 1250 m, 11.07.1994, 1 ♀, leg. E Yıldırım; Erzurum, Olur, Süngübayır, 20.07.1994, 1 ♀, leg. I. Aslan, Uzundere, Gölbaşı, 13.07.1991, 1 ♀, leg. E. Yıldırım, Aksukapı, 1250 m, 29.06.2003, 1 ♀, leg. H. Özbek; Kars, Sarıkamış, Karakurt, 1500 m, 40° 07' 543" N 42° 20 ' 941" E, 23.06.2005, 1 ♀, leg. S. Çoruh.

Distribution: Southern Europe, Middle East (Linsenmaier, 1959; Schmidt, 1977). In Turkey: Artvin, Konya (Schmidt, 1977); Erzincan, Erzurum, Kars (Yıldırım & Strumia, 2006); Strumia & Yıldırım, 2011).

Remark: *Ch. subsinuata fallax* has sporadic distribution and it is moderately recorded (5 provinces) from Turkey.

Chrysis succincta Linnaeus, 1767

Material examined: Erzurum, Ilıca, Atlıkonak, 2000 m, 23.06.1997, 1 ♀, leg. Ö. Çalmaşur.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Erzincan, Erzurum, Kars, Kırşehir, Mersin (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2007); Mardin (Wisniowski & Strumia, 2007).

Remark: No record from the Black Sea, Aegean and Marmara regions. It is moderately recorded (6 provinces) from Turkey.

Chrysis transcaspica Mocsáry, 1889

Material examined: Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 1 ♂, leg. E. Yıldırım, 23.06.1994, 1 ♀, leg. E. Yıldırım; Erzurum, İspir, Madenköprübaşı, 28.07.1992, 1 ♂, leg. E. Yıldırım, Pazaryolu, 1100 m, 09.07.1997, 1 ♂, leg. E. Kılıç.

Distribution: Iran, Transcaспia, Middle East, Palestine, central Asia (Linsenmaier, 1968; Rosa *et al.*, 2013). In Turkey: Erzincan, Erzurum (Strumia & Yıldırım, 2011) as *Ch. elegans transcaspica* Mocsáry, 1889, which is currently invalid.

Remark: Distribution of *Ch. transcaspica* is confined to the eastern Anatolian region. It is rarely recorded (2 provinces) from Turkey.

Chrysis turceyana Linsenmaier, 1959

Material examined: Erzurum, Aşkale, Pirnakapan, 08.07.1994, 1 ♀, leg. G. Tozlu.

Distribution: Bursa (type locality), Hatay (Schmidt, 1977); Bayburt, Erzurum (Strumia & Yıldırım, 2009, 2011).

Remark: Linsenmaier (1959) described *Ch. turceyana* from Turkey (Bursa). It has sporadic distribution and is rarely recorded (4 provinces) from Turkey. We suspect it is currently endemic to Turkey.

Chrysis valida Mocsáry, 1912

Material examined: Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 15.07.2001, 1 ♂, leg. H. Özbek.

Distribution: Central-eastern Europe (Linsenmaier, 1959; Yıldırım & Strumia, 2000). In Turkey: Artvin, Erzurum (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2007).

Remark: Present data show that *Ch. valida* is only known from northeastern part of the country. It is rarely recorded (2 provinces) from Turkey.

Chrysis verae Semenov, 1967

Material examined: Erzincan, Horticultural Research Center, 14.06.1994, 1 ♂, 23.06.1994, 1 ♀, 11.07.1994, 1 ♀, leg. E. Yıldırım; Erzurum, Atatürk University Campus, 1900 m, 08.07.1997, 1 ♂, 12.07.1993, 2 ♂♂, 15.07.1997, 1 ♂, 19.07.1993, 29.07.1992, 1 ♂, leg. E. Yıldırım, Dutçu, 2800 m, 11.07.1994, 1 ♂, leg. I Aslan, Pazaryolu, 27.07.1992, 1 ♀, leg. E. Kılıç.

Distribution: Southwest Asia (Strumia and Fallahzadeh, 2017).

Remark: *Chrysis verae* is new for the eastern Anatolia region as well as for Turkey. Probably Erzincan is the westernmost distribution point of *Ch. verae*. It is rarely recorded (2 provinces) from Turkey.

Chrysis viridissima fasciolata Klug, 1845

Material examined: Iğdır, Field Crops Research Station, 900 m, 19.07.1997, 1 ♀, 1 ♂, leg. B. Gül.

Distribution: Middle East including Turkey, Saudi Arabia (Linsenmaier 1959, 1999; Strumia & Dawah 2010). In Turkey: Iğdır (Yıldırım & Strumia, 2006).

Remark: Although many samples have been collected mainly from the eastern Anatolian region, *Ch. viridissima fasciolata* is only recorded from Iğdır Province. We suspect Iğdır is the northernmost distribution record of this taxon in its distribution range. The taxon could be assessed as endangered in Turkey and considered under threat of extinction. It is rarely recorded (1 province) from Turkey.

Chrysis zobeida du Buysson, 1896

Material examined: Erzincan, Horticultural Research Center, 30.07.1991, 11 ♀♀, 14 ♂♂, leg. E. Yıldırım.

Distribution: Iran, Palestine, Saudi Arabia, Egypt (Linsenmaier, 1959, 1999). In Turkey: Bilecik, Erzincan, Tunceli (Strumia & Yıldırım, 2009).

Remark: *Ch. zobeida* has a sporadic distribution. It is rarely recorded (3 provinces) from Turkey

Genus *Chrysura* Dahlbom 1845

Chrysura is the second largest genus in the tribe Chrysidini and the third in the family Chrysididae. It comprises 117 valid species in the world, of which 106 inhabit the Palearctic region and known hosts are bees from the family Megachilidae (Kimsey & Bohart, 1991; Rosa, 2009; Rosa *et al.*, 2013; Strumia, 2009).

Chrysura austriaca (Fabricius, 1804)

Material examined: Muş, 04.07.1970, 1 ♂, leg. H. Özbek

Distribution: Palearctic, including Japan (Yıldırım & Strumia, 2006). In Turkey: Erzincan (Yıldırım & Strumia, 2006).

Remark: Muş is added to the distribution record of *C. austriaca*. Currently, it is only known from eastern Anatolia. It is rarely recorded (2 provinces) from Turkey.

Chrysura barbata (Buysson, 1900)

Material examined: Erzurum, Köşkköyü, 20.06.1996, 1 ♂, leg. I. Aslan.

Distribution: Syria (type locality), Iran, Israel (Linsenmaier, 1959). In Turkey: Erzurum, Kars (Strumia & Yıldırım, 2009).

Remark: Currently, *Ch. barbata* is only known from eastern Anatolia. It is rarely recorded (2 provinces) from Turkey.

Chrysura barbatula Linsenmaier, 1968*Chrysura barbatica* Bohart, 1991

Material examined: Erzurum, Atatürk University Campus, 1900 m, 02.07.1970, 1 ♂, leg. H. Özbek.

Distribution: Iran, Turkey (Linsenmaier, 1968; Rosa *et al.*, 2013).

Remark: *Ch. barbatula* was described from Turkey (Mersin) by Linsenmaier (1968). Thus, Erzurum is the second locality after its primary description. Moreover, although so many samples have been collected from Erzurum and neighboring provinces, this is the first record from eastern Anatolia. It is rarely recorded (2 provinces) from Turkey.

Chrysura cuprea Rossi, 1790

Material examined: Bilecik, 600 m, 15.06.1995, 2 ♀♀, leg. E. Yıldırım; Erzurum, İspir, Madenköprübaşı, 1100 m, 08.06.1994, 1 ♀, leg. I. Aslan; Pazaryolu, 1200 m, 03.07.1997, 1 ♀, leg. E. Kılıç.

Distribution: Iran, Turkey (Linsenmaier, 1987; Rosa *et al.*, 2013). In Turkey: Adana, Afyonkarahisar (Wisniowski & Strumia, 2007); Konya (type locality), Kütahya (Linsenmaier, 1987) as *Ch. cuprea demelti* Linsenmaier, Erzincan (Strumia & Yıldırım, 2011).

Remark: Bilecik and Erzurum are added to the distribution records of *Ch. cuprea*. Although several studies have been conducted in the last ten years on the Chrysididae fauna of Turkey, and many samples have been collected from Erzurum Province, the present study records *Ch. cuprea* from Erzurum for the first time. It is moderately recorded (7 provinces) from Turkey.

Chrysura declinialis Linsenmaier, 1968

Material examined: Eskişehir, 700 m, 15.06.2016, 1 ♀, leg. H. Özbek.

Distribution: Europe, Near East (Linsenmaier, 1968). In Turkey: İstanbul (type locality) (Linsenmaier, 1968).

Remark: *Ch. declinanalis* is only known from central Anatolian and Marmara regions. It is rarely recorded (2 provinces) from Turkey.

Chrysura dichroa (Dahlbom, 1854)

Material examined: Artvin, Ardanuç, Akarsu, 900 m, 0707.1994, 1 ♀, leg. E. Yıldırım; Erzurum, Atatürk University Campus, 1900 m, 09.06.1994, 1 ♀, leg. E. Yıldırım; Olur, Süngübayır, 20.07.1994, 1 ♀, leg. I. Aslan, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 15.07.2001, 2 ♀♀, leg. H. Özbek.

Distribution: Palearctic (Kimsey and Bohart, 1991). In Turkey: Bilecik, Erzincan, Erzurum (Yıldırım & Strumia, 2006); Antalya, Çanakkale, Mersin, Kırklareli, Isparta, Konya, Sivas, Şanlıurfa (Wisniowski & Strumia, 2007) as *Ch. dichroa socia* Dahlbom, 1854; Izmir (Rosa & Xu, 2015).

Remark: Artvin is added to the distribution records of *Ch. dichroa*, which has a sporadic distribution in the country. It is frequently recorded (12 provinces) from Turkey.

Chrysura erigone (Mocsáry, 1889)

Material examined: Erzincan, Horticultural Research Center, 1250 m, 14.06.1994, 2 ♀♀, leg. E. Yıldırım.

Distribution: Caucasus, Cyprus, Iran, Israel (Linsenmaier, 1959, 1968; Rosa *et al.*, 2013). In Turkey: Erzincan, Erzurum, Mardin, Kayseri, Şanlıurfa (Strumia & Yıldırım, 2009).

Remark: Present data show that *Ch. erigone* occurs in east, Southeast and central Anatolia regions. It is moderately recorded (5 provinces) from Turkey.

Chrysura ignifrons Brullé, 1832

Chrysura anatolica Trautmann, 1926

Material examined: Erzurum, Atatürk University Campus, 1900 m, 04.06.1970, 1 ♀, leg. H. Özbek, 07.06.1994, 1 ♂, 12.06.1994, 1 ♀, 25.06.1992, 1 ♂, leg. E. Yıldırım, 01.07.1995, 1 ♀, leg. H. Özbek, Olur, Süngübayır, 1750 m, 20.07.1994, 1 ♀, 23.07.1992, 1 ♀, leg. I. Aslan, Oltu, Subatık, 3 km W Oltu, 1250 m, 15.07.2001, 1 ♂, leg. H. Özbek, Pasinler, Çalıyazi, 2400 m, 1 ♀, leg. H. Özbek.

Distribution: Palearctic (Linsenmaier, 1959; Kimsey & Bohart, 1990). In Turkey: Karaman, Konya, Mersin, Sivas, Şanlıurfa (Schmidt, 1977); Erzurum, Şanlıurfa (Strumia & Yıldırım, 2009) as *Chrysura anatolica* Trautmann, 1926; Mardin (Wisniowski & Strumia, 2007).

Remark: Although during the present and previous studies (Yıldırım & Strumia, 2006) many chrysidid samples have been collected from the eastern Anatolian region, *Ch. ignifrons* has been only recorded from Erzurum Province. Interestingly, it is rather abundant in Erzurum, found at altitudes of 1250-2400 m from the beginning of June to the end of July. It is moderately recorded (8 provinces) from Turkey.

Chrysura isabella (Trautmann, 1926)

Chrysura prodichroa Linsenmaier, 1959

Material examined: Artvin, Yusufeli, 2-8 km SW Altıparmak, 1300 m, 25.07.2005, 1 ♀, leg. H. Özbek; Erzurum, Atatürk University Campus, 1900 m, 17.06.1970, 1 ♀, leg. H. Özbek, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 15.07.2001, 1 ♀, leg. H. Özbek; Kars, Sarıkamış, Karakurt, 1500 m, near Karayolları fountain, 40° 07' 543" N 42° 20 ' 941" E 14.06.2005, 2 ♀♀, leg. S. Çoruh.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Erzurum (Strumia & Yıldırım, 2007).

Remark: *Ch. isabella* was hitherto known from the Erzurum Province only. It is pleasing that Artvin and Kars provinces are added to the distribution record of this species. Its distribution is confined to the northeastern part of the country. It is rarely recorded (3 provinces) from Turkey.

Chrysura pyrogaster (Brullé, 1832)

Material examined: Diyarbakır, Silvan, 17.04.1995, 1 ♀, leg. E. Yıldırım; Erzurum, Oltu, Çamlıbel, 24 km WSW Oltu, 1700 m, 02.07.1997, 1 ♂, leg. H. Özbek; Sütkans, 1900 m, 18.06.1996, 2 ♀♀, leg. E. Yıldırım; Uzundere, Dikyar, 02.07.1994, 1 ♂, leg. I. Aslan.

Distribution: Southeastern Europe, Iran, Palestine (Linsenmaier 1959, Rosa *et al.*, 2013). In Turkey: Adana, Erzincan, Erzurum, İzmir, Malatya (type locality), Nevşehir, Tunceli (Strumia & Yıldırım, 2009, 2011).

Remark: Diyarbakır is added to the distribution records of *Ch. pyrogaster*, which has not been recorded from the Marmara and Black Sea regions so far. Moreover, Linsenmaier (1997) described *Ch. pyrogaster turca* from Konya and recorded from Ankara and Sivas Provinces. We think that *Ch. pyrogaster* is represented by *Ch. pyrogaster turca* in Turkey. It is frequently recorded (11 provinces) from Turkey.

Chrysura radians (Harris, 1776)

Chrysis pustulosa Abeille de Perrin

Material examined: Erzurum, Ilıca, Atlıkonak, 2000 m, 20.06.2000, 1 ♀, leg. Ö. Çalmaşur; Olur, Sungübayır, 1750 m, 17.07.1997, 1 ♂, leg. I. Aslan.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Artvin, Erzurum, Hatay, Kars (Yıldırım & Strumia, 2006)

Remark: Currently, *Ch. radians* is known from the northeastern Anatolian and Mediterranean regions. It is rarely recorded (4 provinces) from Turkey.

Chrysura refulgens (Spinola, 1806)

Material examined: Artvin: Ardanuç, Akarsu, 900 m, 07.07.1994, 1 ♀, leg. E. Yıldırım; Erzurum, Pazaryolu, 1200 m, 18.06.1994, 1 ♀, leg. H. Özbek.

Distribution: Southern Europe, Cyprus, Anatolia, Caucasus, Palestine, Syria, North Africa, China (Hong Kong). In Turkey: Artvin, Diyarbakır, Erzurum (Yıldırım & Strumia, 2006).

Remark: No record from central Anatolian, Mediterranean, Aegean and Marmara regions. It is rarely recorded (3 provinces) from Turkey.

Chrysura varicornis (Spinola, 1838)

Chrysura cyanocoelia Mocsáry, 1889

Material examined: Diyarbakır, Prinçlik, 07.05.2002, 1 ♂, leg. H. Özbek; Erzincan, Horticultural Research Center, 14.06.1994, 1 ♂, leg. E. Yıldırım; 23.06.1994, 1 ♀, leg. E. Yıldırım; Erzurum, Aşkale, Kopdağı, 2200 m, 16.06.2000, 1 ♂, leg. Ö. Çalmaşur; Şanlıurfa, Siverek, Karabağçe, 800 m, 09.05.2002, 1 ♂, leg. H. Özbek.

Distribution: Europe, North Africa, Middle East and Turkey (Kimsey & Bohart, 1991; Linsenmaier, 1999). In Turkey: Adiyaman, Muş (Wisniewski & Strumia, 2007); Erzincan, Eskişehir (Strumia & Yıldırım, 2011).

Remark: Diyarbakır, Erzurum and Şanlıurfa are added to the distribution records of *Ch. varicornis*, which has sporadic distribution in the country. No record from the Black Sea, Aegean and Mediterranean regions. It is moderately recorded (7 provinces) from Turkey.

Genus *Pseudochrysis* Semenov, 1891*Pseudochrysis neglectoides* (Linsenmaier, 1959)*Pseudospinolia neglectoides* Linsenmaier, 1959

Material examined: Ardahan: 10.07.1976, 1 ♀, leg. H. Özbek.

Distribution: Syria, Turkey (Schmidt, 1977). In Turkey: Şanlıurfa (Schmidt, 1977) as *Pseudospinolia neglectoides* Linsenmaier, 1959.Remark: *P. neglectoides* was described from Syria (Linsenmaier, 1959). Later, Schmidt (1977) reported it from Şanlıurfa. Since then, although many chrysidid samples have been collected, mainly from the eastern Anatolian region, the present and previous studies found only one sample from Ardahan. Thus, it is new record for the eastern Anatolia and is known from Ardahan and Şanlıurfa Provinces only. It is rarely recorded (2 provinces) from Turkey.*Pseudochrysis uniformis* (Dahlbom, 1854)

Material examined: Bayburt, Kop Dağı, 2300 m, 06.07.2003, 1 ♂, leg. S. Çoruh; Elazığ, Keban, 38° 45' 40" N 38° 46' 52" E, 900 m, 16.05.2002, 1 ♂, leg. H. Özbek; Erzurum, Atatürk University research field, 6. Kuyu, 1900 m, 18.06.2002, 1 ♀, leg. M. Kesdek, Atatürk University Campus, 1900 m, 11.06.2004, 1 ♀, leg. S. Çoruh; 13.06.1994, 1 ♀, 30.06.1992, 1 ♀, leg. E. Yıldırım, 16.07.1983, 1 ♂, leg. S. Çoruh, Ilıca, Atlıkonak, 08.07.1997, 2000 m, 1 ♂, leg. Ö. Çalmaşur, Oltu, Başaklı, 1700 m, 18.07.1992, 1 ♀, leg. H. Özbek; Sarısaz, 1350 m, 17.05.2003, 1 ♂, leg. H. Özbek.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Bilecik, Erzurum, Iğdır (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: Bayburt and Elazığ provinces are added to the distribution records of *P. uniformis*. Thus, this is a new record for the Black Sea region. No record from the Aegean, central and Mediterranean regions. It is moderately recorded (5 provinces) from Turkey.Genus *Spinolia* Dahlbom, 1854*Spinolia dallatorreana* (Mocsáry, 1896)*Chrysis pulchra* Radoszkovsky, 1880

Material examined: Erzurum, pleasant Atatürk University Campus, 1900 m, 15.07.1983, 1 ♂, leg. H. Özbek, 10.07.1992, 1 ♀, leg. E. Yıldırım, Palandöken, 2200 m, 13.07.1994, 1 ♀, leg. S. Çoruh.

Distribution: Austria, France, Greece, Hungary, Slovakia, Spain, Near East (Linsenmaier, 1959). In Turkey: pleasant Amasya, Konya (type locality) (Linsenmaier, 1987) as *S. dallatorreanus taurusiacus* (Linsenmaier); Kırklareli, Tunceli (Strumia & Yıldırım, 2009)Remark: Although previously many chrysidid specimens have been collected from Erzurum and neighboring provinces (Strumia & Yıldırım, 2000, 2001, 2009, 2011; Yıldırım & Strumia 2006), *S. dallatorreana* is first recorded from Erzurum. No record from the Aegean and Mediterranean regions. It has sporadic distribution and moderately recorded (5 provinces) from Turkey.*Spinolia dournovii* (Radoszkowsky, 1866)

Material examined: Muş: 06.07.1970, 2 ♀♀, leg. H. Özbek.

Distribution: Iran, Caucasus (type locality), Southeastern Europe, Palestine, Syria, North Africa (Linsenmaier, 1959, 1968), Kazakhstan (Kimsey & Bohart, 1991). In Turkey: Erzurum, Tunceli, Iğdır (Yıldırım & Strumia, 2006; Strumia & Yıldırım, 2011).

Remark: Muş is added to the distribution records of *S. dournovii*. Present data show that the distribution of this taxon is confined to eastern Anatolia and is rarely recorded (4 provinces) from Turkey.

Genus *Spintharina* Semenov, 1892

Spintharina versicolor (Spinola, 1808)

Material examined: Erzurum, Atatürk University Campus, 1900 m, 19.07.1993, 1 ♀, leg. E. Yıldırım.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Erzurum, Kars (Strumia & Yıldırım, 2009).

Remark: Currently, *S. versicolor* is known from eastern Anatolia only. It is rarely recorded (2 provinces) from Turkey.

Genus *Euchroeus* Latreille, 1809

Euchroeus purpuratus consularis Buysson, 1896

Material examined: Erzurum, Atatürk University Campus, 1900 m, 23.07.1992, 1 ♂, leg. H. Özbek; Palandöken, 2300 m, 13.07.1994, 1 ♂, leg. G. Tozlu, İspir, Zeyrek, 18.07.1995, 1 ♀, leg. I. Aslan, Şenyurt, 2300 m, 22.07.1991, 1 ♀, leg. E. Yıldırım, Oltu, Subatık, West 2 km Oltu, roadside, 1300 m, 14.06.2001, 1 ♀, leg. H. Özbek.

Distribution: Palearctic (Kimsey & Bohart, 1991). In Turkey: Konya and Sivas (Linsenmaier, 1987) as *E. purpuratus turceyanus* Linsenmaier, 1987; Erzurum (Yıldırım & Strumia, 2006).

Remark: Although in the present and previous studies many chrysidid specimens have been collected from eastern Anatolia, *E. purpuratus consularis* is recorded from Erzurum Province only. Moreover, it is currently known from the central and eastern Anatolian regions only. It is rarely recorded (3 provinces) from Turkey.

Discussion

An examination of the chrysidid samples collected from various parts of Turkey showed a total of 90 species and subspecies that are recognized in seven genera (*Chrysidea* (1), *Chrysis* (70), *Chrysura* (13), *Pseudochrysis* (2), *Spinolia* (2), *Spintharina* (1), and *Euchroeus* (1 species)). Among them, *Chrysis verae* is new for the Turkish fauna. Moreover, there are some taxa that are first records for different geographical regions of Turkey, for example, *Chrysis cingulicornis*, *Ch. cylindrica*, *Ch. decora*, *Ch. lepida*, *Ch. marani centropunctata*, *Ch. viridissima fasciolata*, *Chrysura barbatula* and *Pseudospinolia neglectoides* from the eastern Anatolian region, *Chrysis confluens* and *Euchroeus purpuratus consularis* from central and eastern Anatolian regions, *Chrysis bytinskii* from the Mediterranean region, *Chrysis krueperi* from the Marmara region, *Ch. marginata* from central Anatolia and Mediterranean regions, *Ch. lateralis* from central Anatolia, *Chrysura varicornis* from the southeastern Anatolian region, *Pseudochrysis uniformis* for the Black Sea region.

Additionally, various species and subspecies are currently localized in certain regions of the country. These are *Chrysis analis*, *Ch. facialis*, *Ch. jucunda*, *Ch. indigotea*, *Ch. leachii*, *Ch. ruddii*, *Ch. splendida*, *Ch. subsinuata fallax*, *Ch. transcaspica*, *Ch. verae*, *Ch. viridissima fasciolata*, *Chrysura austriaca*, *Ch. barbata*,

Spinolia dournovii and *Spintharina versicolor* in eastern Anatolia, *Chrysis angustula*, *Ch. leptomandibularis*, *Ch. mediate*, *Ch. rutiliventris*, *Ch. valida* and *Chrysura isabella* in the northeastern part of the country, *Chrysis maculicornis* and *Ch. ragusae* in the east Anatolia and Mediterranean regions, *Chrysis pseudoincisa* and *Euchroeus purpuratus consularis* in central and eastern Anatolia, *Chrysura declinanalis* in the Marmara region, *Pseudospinolia neglectoides* in eastern and southeastern Anatolia. Additionally, we suspect that *Chrysis turceyana* is endemic to Turkey.

On the basis of present data and literature sources, the examined species are placed in three distributional record groups. The first one is the "frequently recorded species" group (12 species and subspecies), which includes *Chrysidea pumila*, *Chrysis aestiva*, *Ch. albanica*, *Ch. ambigua*, *Ch. angustifrons*, *Ch. comparata*, *Ch. consanguinea*, *Ch. daphnis syriensis*, *Ch. erythromelas*, *Ch. marginata*, *Ch. soror* and *Chrysura dichroa*. The second one is the "moderately recorded species" group (31 species and subspecies), and most of the examined species (more than 50%) are placed in the "rarely recorded species" group (47 species and subspecies), of which certain taxa are very rare and known from only one or two provinces: Linsenmaier (1959) and (Schmidt (1977) noted the presence of *Chrysis aeraria* in Klein Asia without locality. Strumia and Yıldırım (2009) recorded it from Erzincan. In the present study, it was collected from the same locality. Similarly, Linsenmaier (1968) mentioned the presence of *Ch. cylindrica* in Klein Asia, but no locality. Since that time, it is first recorded from Kars Province (eastern Anatolian region). In the present and previous study (Strumia & Yıldırım 2009), *Ch. jucunda* is only recorded from Erzurum Province. Although in recent years several studies have been conducted on the Chrysididae fauna of Turkey and a great number of specimens have been collected in Erzurum Province, following taxa are first recorded from that province: *Chrysis indigotea*, *Ch. interjecta hemichlora*, *Chrysura barbatula*, *Ch. cuprea*, *Spinolia dallatorreana* and *Euchroeus purpuratus consularis*. Similarly, *Ch. leachii* is first recorded from Erzurum and Kars Provinces, currently known from Erzincan, Erzurum and Kars Provinces. Likewise, after Schmidt's (1977) record, we suspect *Ch. lepida* is pleasant first recorded from Turkey as well the eastern Anatolian region (Erzurum), although the type locality is Yerevan (Armenia). Among the rarely recorded species and subspecies, there are some that are known from one or two provinces. For example, *Chrysis jucunda* is recorded from Erzurum, whereas *Ch. viridissima fasciolata* and *Ch. cylindrica* from Iğdır and Kars Provinces, respectively. All these taxa could be treated as rare species and subspecies. Thus, we suggest it is necessary to enter these species into the list of specially protected species of Turkey as especially endangered.

Moreover, *Chrysidea pumila*, *Chrysis analis*, *Ch. angustifrons*, *Ch. concolor schwarzi*, *Ch. diacantha*, *Ch. graelsii*, *Ch. longula*, *Ch. valida*, *Chrysura dichroa*, *Ch. isabella* and *Ch. pyrogaster* were collected from a vertical bank (Oltu, Erzurum) where numerous burrows of bees and wasps penetrated the face of the bank (Fig. 1). The complexity of the anastomosing of fresh and old tunnels suggested that the bank had provided the nesting requirements of these hymenopters for many years. Nonparasitic bee genera nesting there included: *Hylaeus* (Colletidae), *Osmia*, *Protosmia*, *Megachile* (Megachilidae), and *Xylocopa* and *Anthophora* (Apidae). Various Eumenidae species were also present. We think that theoretically there might be host-kleptoparasitic relations between these hymenopters.

Current literature sources show that the Chrysididae fauna of Turkey is very rich, being comprised of approximately 410 described species and subspecies. However, when we take into account the geographic position, climate and topographic structures of the country, the chrysidid fauna of Turkey should be richer than has been documented thus far. In general, the central part of the country is rather well studied, compared with the other parts. We emphasize that the eastern portion of the country has special importance: in the present study eight species and subspecies were recorded for the first time in the eastern Anatolian region of Turkey although a great number of specimens were collected from mainly Erzincan, Erzurum and Kars Provinces during previous studies (Strumia & Yıldırım, 2000, 2001, 2007, 2011; Yıldırım & Strumia 2006). On the other hand, there are some provinces in this region where no material has been collected so

far, such as Ağrı, Bingöl, Bitlis, Hakkari, Şırnak and Van. Here, the elevation of mountains exceeds 2500-3000 m with narrow valleys and plains, which are the main reasons for the high biodiversity in the eastern part of Turkey. For instance, Terzo (1998) noted that eastern Turkey, which is part of the western Palearctic region, is a very important distribution center, with all the species of some bees occurring in the Near East are present in east Turkey and not the reverse. This is the case for bumblebees (Reinig & Rasmont, 1983) and some of the other bees, such as Osmiini, Ceratinini and Melittidae (Özbek, 2013a, 2013b, 2014; Özbek & Terzo, 2016). We hypothesize that this is the case for chrysidids as well. Additional studies in the country would be helpful in determining the true richness of the chrysidid fauna of Turkey.



Figure 1. Photo of the vertical bank at 22 km WSW of Oltu, Erzurum Province.

In conclusion, although much has been published on the chrysidid fauna of Turkey to date, the fauna of the country still requires further study as there are certain regions from which very few specimens have been collected. Also, there are many provinces from which no samples have been collected. Likewise, certain species, which are recorded from one locality, one sex and their descriptions based solely on a single specimen. All in all, the Turkish Chrysididae is rich and diverse, but requires further study.

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ИСТРАЖИВАЊА ПОДФАМИЛИЈЕ CHRYSIDINAE (HYMENOPTERA: CHRYSIDIDAE: CHRYSIDIDAE) У ФАУНИ ТУРСКЕ И ПРОЦЕНЕ РАСПРОСТРАЊЕЊА

ХИКМЕТ ЕЗБЕК И ФРАНКО СТРУМИА

Извод

Истраживања су се базирала на проучавању сакупљеног материјала подфамилије Chrysidinae у различитим деловима Турске од 1970-тих година. Утврђено је 90 врста и подврста, из седам родова: *Chrysidea* (1), *Chrysis* (70), *Chrysura* (13), *Pseudochrysis* (2), *Spinolia* (2), *Spintharina* (1), and *Euchroeus* (1).

Chrysis verae Semenov 1967 је нова за фауну Турске. Врсте: *Chrysis cingulicornis* Förster 1853, *Ch. cylindrica* Eversmann 1857, *Ch. decora* Mocsáry 1889, *Ch. lepida* Mocsáry 1889, *Ch. marani centropunctata* Linsenmaier 1968, *Ch. viridissima fasciolata* Klug 1845, *Chrysura barbatula* Linsenmaier 1968 и *Pseudospinolia neglectoides* (Linsenmaier 1959) нове су за Анатолију.

За многе врсте су објављени нови подаци о распрострањењу. Врсте се разликују по типу распрострањења, неке су ретко ловљене, док су друге честе. Један број врста је сакупљан само у једној или две провинције и то само по један примерак. На пример: *Chrysis aeraria* (Mocsáry, 1914), *Ch. jucunda* Mocsáry, 1889 и *Ch. viridissima fasciolata* Klug, 1845 нађене су само у једној провинцији. Оне би требало да се означе као угрожене и да се додају црвеној листи IUCN.

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