

New Taxonomic and Faunistic Data on the Subfamily Euphorinae Förster, 1862 of Turkey (Hymenoptera: Braconidae)

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ABSTRACT

In this study, taxonomic and faunistic data on Euphorinae (Hymenoptera: Braconidae) subfamily which can be used as a biological control agent of plant pest insects (especially Coleoptera, Lepidoptera and Hemiptera) were given. In addition to the Turkish and worldwide distributional data of 33 species, and two genera namely, *Neoneurus* Haliday and *Ecclitura* Kokujev were given as new records from Turkey. Moreover, ten species [*Leiophron* (*Peristenus*) *reclinator* (Ruthe), *Meteorus graciliventris* Muesebeck, *M. micropterus* (Haliday), *Elasmosoma calcaratum* Tobias, *Neoneurus auctus* (Thomson), *Ecclitura primoris* Kokujev, *P. (M.) apiophaga* (Loan), *P. (M.) moldavicus* (Tobias), *P. (M.) retusus* Thomson, *Streblocera* (*Streblocera*) *antennata* Jakimavicius] which have not previously found in Turkey and those are new records for the Turkish fauna. Zoogeographical remarks and chorotype information for each taxon were given. By this contribution, the number of the Euphorinae species increased to 81 in Turkey.

Key words: Hymenoptera, Braconidae, Euphorinae, chorotype, Turkey.

INTRODUCTION

The Euphorinae is one of the most interesting and diversified subfamily of Braconidae (Hymenoptera, Ichneumonidae) with about 1100 species distributed all around the world, of which 456 species are from Palaearctic region (Yu *et al.* 2012). This highly polymorphic and biologically peculiar subfamily is characterized by only one character, obligatory practically for all its members: the first brachial cell open apically (Tobias, 1986).

As a group, the subfamily Euphorinae has a host range substantially broader than other braconid subfamilies. The group is characterized by great diversity in host association matched by a similarly great morphological diversity. Euphorinae are solitary or gregarious koinobiont endoparasitoids, which parasitize the adult stages of holometabolous insects or nymphs and adults of hemimetabolous insects especially within the order Coleoptera, Hymenoptera, Lepidoptera, Neuroptera, Hemiptera, Psocoptera, and Orthoptera. Occasionally the parasitoids of holometabolous insects oviposit into larvae as well as adults, but this only occurs where larvae are ecologically coincident with adults, living and feeding on the same plants (Shaw, 1988, 1997; Yu *et al.*, 2012).

There exist different approaches on classification of the genera. For instance, Shaw (1985) reviewed the genera and recognized nine tribes and recognition of the subfamily

Meteorinae Cresson for the genera *Meteorus* Haliday and *Zele* Curtis. However, only four tribes, Euphorini, Cosmophorini, Centistini and Meteorini are recognised by van Achterberg (1993) while Yu *et al.* (2012) listed 14 tribes (Centistini, Cosmophorini, Cryptoxilonini, Dinocampini Euphorini, Helorimorphini, Meteorini, Myiocephalini, Neoneurini, Oncometeorini, Perilitini, Proclithrophorini, Syntretini and Tainitermini).

This study reports new data and records of Euphorinae from Turkey in addition to the already reported Euphorinae fauna of Turkey. The first information on the fauna of Turkey was given by Fahringer (1922) and 71 species were recorded so far (Shenefelt, 1969; Achterberg and Haeselbarth, 2003; Beyarslan *et al.*, 2004; Koldas *et al.*, 2007; Çıkman and Beyarslan, 2009; Efil *et al.*, 2009; Yılmaz *et al.*, 2010; Güçlü and Özbek, 2011).

MATERIAL AND METHODS

Following a sampling of the hymenopteran parasitoid fauna in Turkey and identification of the collected specimens, the taxonomical aspects of the subfamily Euphorinae (Hymenopteran, Braconidae) have been studied. *During* summer, from *May* till *September*, *Adult* Euphorinae wasps were *collected* by sweeping nets and light traps *from different* regions of *Turkey* (especially central and eastern parts of the country). The studied materials are deposited in the Zoological Museum of the Biology Department of Trakya University (ZMTU).

For the terminology used in this paper and for the identification of the subfamily, see van Achterberg, 1993; Shaw, 1985; Tobias, 1986; Belokobylskij 1992, 2004 and Goulet and Mason 2006. The faunistic and distributional data notes and zoogeographical remarks and chorotype information were given for each taxon (Taglianti *et al.*, 1999).

RESULTS

Thirty-three species belonging to 12 genera and 6 tribes of Euphorinae were identified of which two genera and ten species are new records for the fauna of Turkey. The taxa are presented alphabetically.

List of species

(Species new to Turkey are marked by an asterisk)

Subfamily Euphorinae Förster, 1862

Tribe Centistini Capek, 1970

Subtribe Centistina Capek, 1970

Allurus Förster, 1862

Allurus lituratus (Haliday, 1835)

Material examined: Ankara-Ayaş-Başbereket, 40°05'36N, 32°23'39E, 1058 m, poplar woodland and pasture, 08.VI.2007, 1♂; -Yenikent-Ilyakut, 40°04'19N, 32°28'16E, poplar woodland, willow grove and

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pasture, 969 m, 08.VI.2007, 1♂; Çankırı-Korgun, 40°44'00N, 33°31'25E, poplar woodland and pasture, clover field, 898 m, 28.V.2007, 1♀; Eskişehir AÖF Ormanı, 39°46'36N, 30°31'14E, pine forest, pasture, 907 m, 28.VI.2009, 1♂; Eskişehir-Bilecik yolu 26. km, 39°46'36N, 29°30'14E, pasture, 789 m, 29.VI.2009, 1♀, 2♂♂; Kayseri-Bünyan-Ekrek, 38°39'42N, 36°03'30E, crop field, 1424 m, 12.VII.2007, 1♂; -Erciyes, 38°34'41N, 35°30'33E, pasture, 2056 m, 25.VI.2009, 1♀, 1♂; -Hisarcık, 38°37'48N, 35°30'48E, pasture, 1517m, 25.VI.2009, 2♀♀, 3♂♂; -Pınarbaşı-Aşağıkızılçevik, 38°40'20N, 36°15'27E, crop field, 1635 m, 23.VI.2009, 1♂; Nevşehir-Avanos-Saruhan, 38°42'47N, 34°54'47E, poplar woodland and pasture, 958 m, 06.VI.2007, 1♂; Sivas-Hafik-Durulmuş, 39°50'18N, 37°18'53E, poplar woodland and pasture, clover field, 1275 m, 31.V.2007, 1♀; Zara-Bulakbaşı, 39°52'46N, 37°33'31E, poplar woodland and pasture, 1297 m, 31.V.2007, 1♀; -Ulaş-Yağdonduran, 39°20'28N, 37°08'43E, crop field, 1630 m, 01.VI.2007, 1♂; Tunceli-Marçık, 39°08'25N, 39°38'12E, crop field, 938 m, 14.VI.2008, 1♀, 2♂♂; -Pertek, 38°51'37N, 38°17'56E, orchard, 914 m, 13.VI.2008, 1♀, 1♂; -Pertek-Cankurtaran, 38°52'38N, 38°25'19E, 13.VI.2008, pasture, 1534 m, 1♀, 3♂♂; -Pertek-Tozkoparan, 38°54'58N, 39°27'40E, 13.VI.2008, pasture, 1296 m, 1♂; -Pülümür-Kangallı, 39°27'10N, 39°51'43E, crop field and pasture, 1343 m, 14.VI.2008, 4♂♂.

Distribution: Nearctic, Oriental, Palaearctic (Belgium, Bulgaria, Canary Islands, China, Finland, France, Georgia, Germany, Greece, Ireland, Kazakhstan, Lithuania, Poland, Sweden, Turkey, United Kingdom).

Turkey distribution: Amasya, Ankara, Diyarbakır, Elazığ, Erzincan, Erzurum, Kars, Samsun, Sivas, Edirne (Güçlü and Özbek, 2011, Yılmaz *et al.*, 2010).

Chorotype: Holarctic.

***Allurus muricatus* (Haliday, 1833)**

Material examined: Elazığ-Baskil-Yalındam, 38°34'26N, 38°43'55E, orchard, 1400 m, 10.VI.2008, 1♀, 1♂; -Cip barajı, 38°40'48N, 39°03'59E, pasture, 1006 m, 12.VI.2008, 1♀; -Keban-Ulupınar, 38°44'59N, 38°51'57E, pasture, 1267 m, 11.VI.2008, 3♀♀; -Kovancılar-Pınartepe, 38°42'37N, 39°53'06E, crop field and pasture, 916 m, 29.VIII.2008, 1♀; -Sün, 38°40'27N, 38°58'13E, pasture, 1247 m, 12.VI.2008, 2♀♀; Eskişehir-Bilecik yolu 26. km, 39°46'36N, 29°30'14E, pasture, 789 m, 07.V.2007, 1♀; Kayseri-Hisarcık, 38°37'48N, 35°30'48E, pasture, 1517m, 25.VI.2009; 1♀; Niğde-Sultanpınarı, 38°09'52N, 34°31'19E, orchard, 1629 m, 18.V.2007, 1♀; Sivas-Zara-Kılıçlar, 39°51'19N, 37°51'47E, pasture, 1355 m, 22.VIII.2008, 1♀; Sivas-Tepeönü, 39°39'32N, 37°08'01E, poplar woodland and pasture, 1306 m, 01.VI.2007, 1♂; Tunceli-Pertek, 38°51'37N, 38°17'56E, orchard, 914 m, 13.VI.2008, 3♀♀; -Pülümür-Kangallı, 39°27'10N, 39°51'43E, clover field and pasture, 1343 m, 14.VI.2008, 1♀.

Distribution: Palaearctic (Armenia, Azerbaijan, Belgium, Bulgaria, Croatia, former Czechoslovakia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Moldova, Poland, Spain, Sweden, Switzerland, Turkey, United Kingdom, former Yugoslavia).

Turkey distribution: Afyon, Amasya, Ardahan, Bilecik, Bursa, Çankırı, Çorum, Edirne, Elazığ, Erzurum, Denizli, Isparta, Kırklareli, Malatya, Ordu, Tokat (Güçlü and Özbek, 2011, Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

***Centistes* Haliday, 1835**

***Centistes (Centistes) cuspidatus* (Haliday, 1833)**

Material examined: Çorum-Alacalı-Kıcılı, 40°10'6N, 34°50'33E, pasture, 987 m, 28.V.2002, 1♀; Edirne-Hacıumur (light trap), 41°43'0N, 26°48'0E, pasture, 40 m, 27.VII.1991, 1♀; Eskişehir-Türkmenadağı-

Yörükhirka, 39°36'00N, 30°25'12E, poplar woodland, clover field and pasture, 862 m, 08.VII.2007, 1♀; Malatya-Akçadağ-Sarihacı, 32°22'32N, 37°53'17E, orchard, 1367 m, 22.VI.2009, 1♀.

Distribution: Palaearctic (Austria, Belgium, Bulgaria, former Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Poland, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Adıyaman, Bursa, Elazığ, Eskişehir, Kırklareli, Malatya, Niğde, Tekirdağ (Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

***Centistes (Centistes) fuscipes* (Nees, 1834)**

Material examined: Bilecik-Pazaryeri, 40°00'0N, 29°53'60E, crop field, 700 m, 10.VII.1993, 1♂; Tunceli-Pertek, 38°51'37N, 38°17'56E, orchard, 914 m, 13.VI.2001, 1♀.

Distribution: Palaearctic (Azerbaijan, Belgium, Bulgaria, Canary Islands, former Czechoslovakia, Finland, France, Georgia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Moldova, Poland, Russia, Slovakia, Sweden, Switzerland, Turkey, United Kingdom).

Turkey distribution: Amasya, Bilecik, Edirne, Tekirdağ, Tokat (Yılmaz *et al.*, 2010).

Chorotype: Palearctic.

Tribe Dinocampini Shaw, 1985

***Dinocampus* Förster, 1862**

***Dinocampus coccinellae* (Schrank, 1802)**

Material examined: Ankara-Ayaş-Başbereket, 40°05'36N, 32°23'39E, poplar woodland and pasture, 1058 m, 08.VI.2008, 1♀; Kazan-Aydın, 40°09'56N, 32°40'09E, pasture, 865 m, 17.IX.2006, 2♀♀; Elazığ-Cip barajı, 38°40'48N, 39°03'59E, pasture, 1006 m, 12.VI.2008, 1♀; -Keban-Birivan, 38°45'0N, 38°51'0E, pasture, 1255 m, 11.VI.2008, 1♀; -Keban-Ulupınar, 38°44'59N, 38°51'57E, pasture, 1267 m, 11.VI.2008, 1♀; Erzincan-Tercan-Mercan, 39°46'08N, 40°18'21E, pasture, 1398 m, 24.VIII.2008, 1♀; -Üzümlü, 39°41'04N, 39°39'32E, clover field and pasture, 1162 m, 28.VIII.2008, 1♀; Kırıkkale-Karakeçili, 39°34'35N, 33°21'25E, poplar woodland and pasture, 839 m, 11.VII.2007, 1♀; Konya-Akşehir-Ulupınar, 38°26'24N, 31°19'51E, orchard, 978 m, 07.IX.2006, 1♀; Malatya-Battalgazi, 38°27'50N, 38°25'14E, orchard, 707 m, 10.VI.2008, 1♀; -Akçadağ-Sarihacı, 32°22'32N, 37°53'17E, orchard, 1367 m, 22.VI.2009, 6♀♀; Malatya-Akçadağ-Gürkaynak, 38°20'44N, 37°49'39E, pasture, 1593 m, 24.VI.2009, 2♀♀, 1♂; Sivas-Gürün-Incesu, 38°45'54N, 37°06'24E, pasture, 1470 m, 23.VI.2009, 2♂♂; Tunceli-Pertek, 38°51'37N, 38°17'56E, orchard, 914 m, 13.VI.2008, 1♀.

Distribution: Australasian, Nearctic, Neotropical, Oceanic, Oriental, Palaearctic (Albania, Algeria, Azerbaijan, Armenia, Bulgaria, China, Cyprus, Czech Republic, former Czechoslovakia, Egypt, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Russia, Slovakia, Switzerland, Syria, Turkey, United Kingdom, former Yugoslavia).

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Turkey distribution: Amasya, Balıkesir, Bilecik, Bursa, Edirne, Elazığ, Erzurum, Kastamonu, Kahramanmaraş, Kayseri, Kırklareli, Malatya, Tekirdağ (Güçlü and Özbek, 2011, Yılmaz *et al.*, 2010).

Chorotype: Holarctic.

Tribe Euphorini Förster, 1862

***Leiophron* Nees, 1819**

***Leiophron (Peristenus) pallipes* (Curtis, 1833)**

Material examined: Sivas-Yıldızeli-Ekecik, 39°48'34N, 36°08'23E, crop field, 1152 m, 30.V.2007, 1♀; -Zara-Bulakbaşı, 39°52'46N, 37°33'31E, poplar woodland and pasture, 1297 m, 31.V.2007, 1♀.

Distribution: Nearctic, Oriental, Palaearctic (Albania, Armenia, Azerbaijan, Belgium, Bosna Hercegovina, Bulgaria, Canary Islands, China, Croatia, former Czechoslovakia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Korea, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovenia, Spain, Switzerland, Turkey, United Kingdom, former Yugoslavia).

Turkey distribution: Artvin, Edirne, Kırklareli, Isparta, Rize, Trabzon (Yılmaz *et al.* 2010).

Chorotype: Holarctic.

***Leiophron (Peristenus) picipes* (Curtis, 1833)**

Material examined: Eskişehir-Bilecik yolu 26. km, 39°46'36N, 29°30'14E, pasture, 789 m, 29.VI.2009, 1♀, 1♂; Eskişehir-Türkmendağı-Kavacık, 39°31'59N, 30°20'28E, *Pinus nigra*, oak grove and pasture, 08.VII.2007, 1♀, 1♂; Konya-Çumra-Avdul, 37°25'26N, 32°44'51E, crop field, 1073m 23.VI.2009, 1♀; Malatya-Battalgazi, 38°27'50N, 38°25'14E, 10.VI.2008, orchard, 707 m, 1♀, -Çiftlik, 38°20'01N, 38°27'31E, orchard, 909 m, 18.VII.2007, 1♀.

Distribution: Palaearctic (Azerbaijan, China, former Czechoslovakia, Finland, Germany, Hungary, Ireland, Italy, Kazakhstan, Lithuania, Moldova, Norway, Poland, Russia, Sweden, Switzerland, Turkey, United Kingdom, former Yugoslavia).

Turkey distribution: Afyon, Adapazarı, Amasya, Antalya, Balıkesir, Bilecik, Bursa, Edirne, Eskişehir, İçel, Kahramanmaraş, Kırklareli, Malatya, Tekirdağ, Yozgat (Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

Leiophron (Peristenus) reclinator* (Ruthe, 1856)

Material examined: Nevşehir-Gülşehir-Gümüşkent, 38°51'12N, 34°33'44E, crop field and pasture, 1286 m, 07.VII.2007, 1♂; Kayseri-Bünyan-Ekrek, 38°39'42N, 36°03'30E, crop field, 1424 m, 12.VII.2007, 2♀♀, 1♂; Sivas-Tepeönü, 39°39'32N, 37°08'01E, poplar woodland and pasture, 01.VI.2007, 2♀♀.

Distribution: Palaearctic (Azerbaijan, Germany, Hungary, Italy, Kazakhstan, Poland, Russia).

Chorotype: Asiatic-European.

Wesmaelia Förster, 1862**Wesmaelia petiolata (Wollaston, 1858)**

Material examined: Ankara-Kazan-Aydın, 40°09'56N, 32°40'09E, pasture, 865 m, 17.IX.2006, 1♂; Eskişehir-Sivrihisar-Babatat, 39°31'42N, 31°37'36E, poplar woodland and pasture, 868 m, 17.VII.2007, 1♀; Erzincan-Kemah-Soğukpınar, 39°36'14N, 39°04'47E, pasture, 1271 m, 26.VIII.2008, 1♂; -Tercan-Mercan, 39°46'08N, 40°18'21E, pasture, 1398 m, 24. VIII.2008, 2♀♀, 1♂; -Üzümlü, 39°41'04N, 39°39'32E, clover field and pasture, 1162 m, 28.VIII.2008, 2♀♀, 1♂; Malatya-Darende-Gümüşdere, 38°35'52N, 37°27'50E, orchard ve pasture, 1377 m, 30.VIII.2008, 1♂; -Doğanşehir-Takaz, 38°00'35N, 37°59'28E, orchard, 1286 m, 08.VI.2008, 2♀♀.

Distribution: Nearctic, Neotropical, Oceanic, Oriental, Palaearctic (Afganistan, Azerbaijan, Bulgaria, China, Czech Republic, former Czechoslovakia, France, Germany, Hungary, Iran, Israel, Italy, Moldova, Poland, Russia, Spain, Switzerland, Turkmenistan, Turkey, Ukraine, United Kingdom, Uzbekistan).

Turkey distribution: Adıyaman, Elazığ, Erzurum, Kahramanmaraş, Kayseri, Kırklareli, Malatya (Güçlü and Özbek, 2011, Yılmaz *et al.*, 2010).

Chorotype: Holarctic.

Tribe Meteorini Cresson, 1887**Meteorus Haliday, 1835****Meteorus abdominalis (Nees, 1811)**

Material examined: Konya-Dineksaray, 37°24'21N, 32°36'29E, pasture, 1030 m, 09.09.2006, 1♂; -Ilgın, 38°17'11N, 31°51'03E, orchard, 1091m, 08.IX.2006, 1♂; Nevşehir-Ürgüp, 38°36'33N, 34°54'46E, vegetable garden and pasture, 1082 m, 13.IX.2006, 1♂.

Distribution: Palaearctic (Armenia, Azerbaijan, Belgium, Bosnia Hercegovina, Bulgaria, Croatia, former Czechoslovakia, Finland, France, Germany, Hungary, Ireland; Italy, Italy, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania; Russia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Adapazarı, Amasya, Artvin, Gümüşhane, Rize (Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

Meteorus graciliventris Muesebeck, 1956*

Material examined: Aksaray-Ihlara-Yaprakhisar, 38°13'18N, 34°17'14E, poplar woodland and pasture, 1354 m, 11.IX.2006, 1♀.

Distribution: Oriental, Palaearctic (China, Japan).

Chorotype: Asiatic-European.

Meteorus ictericus (Nees, 1811)

Material examined: Erzincan-Kemah-Soğukpınar, 39°36'14N, 39°04'47E, pasture, 1271 m, 26.VIII.2008, 1♀; Kayseri-Yahyalı-Mustafabeyli, 38°09'21N, 35°22'05E, orchard, clover field and pasture, 15.IX.2006, 2♂♂.

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Distribution: Australasian, Oceanic, Oriental, Palaearctic (Armenia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Czech Republic, former Czechoslovakia, China, Croatia, Finland, France, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Adana, Afyon, Artvin, Samsun, Trabzon (Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

Meteorus micropterus* (Haliday, 1835)

Material examined: Eskişehir-Sündiken-Geyikalanı, 39°58'36N, 31°06'22E, *Pinus nigra* forest, 1676 m, 05.IX.2006, 1♀.

Distribution: Palaearctic (former Czechoslovakia, Finland, Germany, Ireland, Japan, Slovakia, Sweden, United Kingdom).

Chorotype: Asiatic-European.

***Meteorus obsoletus* (Wesmael, 1835)**

Material examined: Eskişehir-Mihalıççık-Çatacık, 39°58'07N, 31°10'38E, *Pinus nigra* forest, 1332 m, 09.VII.2007, 1♀.

Distribution: Palaearctic (Austria, Belgium, Bulgaria, former Czechoslovakia, France, Germany, Ireland, Italy, Japan, Korea, Moldova, Netherlands, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Malatya, Ordu, Samsun, Sivas, Tokat (Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

***Meteorus pendulus* (Müller, 1776)**

Material examined: Çanakkale-Kazdağı, 39°48'46N, 26°36'36E, mixed forest, 500 m, 16.IX.1992, 1♀.

Distribution: Oriental, Palaearctic (Austria, Azerbaijan, Belgium, Bulgaria, China, Croatia, Cyprus, former Czechoslovakia, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Iran, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Moldova, Mongolia, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Adana (Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

***Meteorus rubens* (Nees von Esenbeck, 1811)**

Material examined: Konya-Akşehir-Doğrugöz, 38°21'12N, 31°28'42E, orchard, 996 m, 08.IX.2006, 2♀, 1♂; Konya-Ilgın, 38°17'11N, 31°51'03E, orchard, 1091m, 28.VI.2009, 1♂.

Distribution: Nearctic, Neotropical, Oriental, Palaearctic (Algeria, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, former Czechoslovakia, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Iran,

Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Roamnia, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Adana, Adapazarı, Adıyaman, Afyon, Ağrı, Amasya, Antalya, Ankara, Artvin, Balıkesir, Bayburt, Bilecil, Bolu, Bursa, Çanakkale, Çorum, Denizli, Edirne, Kırklareli, Elazığ, Erzurum, Gaziantep, Giresun, Gümüşhane, Isparta, İçel, Kastamonu, Kayseri, Kırklareli, Kırşehir, Konya, Malatya, Muğla, Niğde, Ordu, Osmaniye, Rize, Samsun, Sinop, Sivas, Şanlıurfa, Tekirdağ, Tokat, Trabzon, Van (Yılmaz *et al.*, 2010).

Chorotype: Holarctic.

***Meteorus rufus* (DeGeer, 1778)**

Material examined: Karaman-Çakırbağ, 37°11'55N, 33°07'44E, orchard, 1025 m, 27.VI.2009, 1♀; Niğde Üniversitesi Kampüsü, 37°58' 9N, 34° 40' 57E, pasture, 1205 m, 26.VI.2009, 1 ♀.

Distribution: Oceanic, Oriental, Palaearctic (Austria, Belgium, Croatia, Cyprus, former Czechoslovakia, France, Germany, Hungary, Ireland, Israel, Italy, Poland, Romania, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Adana, Adıyaman, Bayburt, Bolu, Hatay, İçel, Isparta, Kayseri, Tekirdağ (Yılmaz *et al.* 2010).

Chorotype: Asiatic-European.

***Meteorus versicolor* (Wesmael, 1835)**

Material examined: Çanakkale-Gökçeada TİGEM, 40°11' 38N, 25°54' 13E, orchard, 65 m, 06.VII.1996, 2♀♀; Kayseri-Bağpınar, 38°49'12N, 35°37'56E, clover field, 1097 m, 14.IX.2006, 3♀♀; -Gömeç, 38°52'17N, 35°39'43E, orchard, 1094 m, 14.IX.2006, 3♂♂, 1♀.

Distribution: Nearctic, Oriental, Palaearctic (Armenia, Austria, Azerbaijan, Belgium, Bulgaria, China, Croatia, Czech Republic, former Czechoslovakia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Madeira Islands, Moldova, Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia).

Turkey distribution: Adana, Adıyaman, Afyon, Aydın, Amasya, Edirne, Hatay, Elazığ, İçel, Malatya, Muğla, Tekirdağ, Van, Zonguldak (Yılmaz *et al.*, 2010).

Chorotype: Holarctic.

***Zelee Curtis*, 1832**

***Zelee deceptor* (Wesmael, 1835)**

Material examined: Tunceli-Pertek-Cankurtaran, 38°52'38N, 38°25'19E, pasture, 1534 m, 13.VI.2008, 1♀.

Distribution: Oriental, Nearctic, Neotropical, Palaearctic (Albania, Austria, Belgium, Bulgaria, China, Croatia, Czech Republic, former Czechoslovakia, Denmark, Finland,

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France, Georgia, Germany, Hungary, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia).

Turkey distribution: Erzurum (Güçlü and Özbek, 2011).

Chorotype: Holoarctic.

Tribe Neoneurini Bengtsson, 1918

***Elasmosoma* Ruthe, 1858**

Elasmosoma calcaratum* Tobias, 1986

Material examined: Elazığ-Keban-Yukarıçakmak, 38°43'03N, 38°54'31E, oak grove and pasture, 1286 m, 14.VI.2008, 1♂; Sivas-Gürün-Osmandede, 38°45'29N, 37°02'51E, poplar woodland and pasture, 1638 m, 01.VIII.2008, 1♂.

Distribution: Palearctic (Moldova).

Chorotype: Turano-European.

Neoneurus* Haliday, 1838

Neoneurus auctus* (Thomson, 1895)

Material examined: Eskişehir-Mihalıççık-Çatacık, 39°58'07N, 31°10'38E, *Pinus nigra* forest, 1332 m, 09.VII.2007, 1♀.

Distribution: Palaearctic (Austria, Bulgaria, Czech Republic, former Czechoslovakia, Finland, Germany, Hungary, Kazakhstan, Lithuania, Mongolia, Netherlands, Norway, Poland, Russia, Slovakia, Sweden; Ukraine, United Kingdom).

Chorotype: Asiatic-European.

Tribe Perilitini Förster, 1862

Ecclitura* Kokujev, 1902

Ecclitura primoris* Kokujev, 1902

Material examined: Edirne-Trakya University-Balkan Campus, 41°37'46N, 26°40'17E, pasture, 41 m, 16.IX.1999, 1♂; Malatya-Çiftlik, 38°20'01N, 38°27'31E, orchard, 909 m, 18.VII.2007, 1♀.

Distribution: Palearctic (Albania, Azerbaijan, Iran, Russia, Tajikistan, Turkmenistan).

Chorotype: Asiatic-European.

***Marshiella* Shaw, 1985**

***Marshiella plumicornis* (Ruthe, 1856)**

Material examined: Elazığ-Baskil-Hacımustafa, 38°38'34N, 38°51'07E, orchard, 1436 m, 04.VI.2007, 1♀.

Distribution: Nearctic, Palearctic (Germany, Greece, Hungary, Kazakhstan, Moldova, Turkey).

Turkey distribution: Eskişehir (Yılmaz *et al.* 2010).

Chorotype: Holarctic.

***Perilitus* Nees, 1819**

***Perilitus (Microctonus) aethiops* Nees, 1834**

Material examined: Adıyaman-Altınşehir, 37°24'26N, 38°20'12E, pasture, 780 m, 21.IV.2004, 1♂; -Besni-Şambayat, 37°41'34N, 37°51'40E, pasture, 889 m, 17.IV.2004, 3♂♂; -Kahta-Gözetaz, 37°41'04N, 38°23'36E, pasture, 876 m, 17.IV.2004, 1♂; -Yazıbeydili, 37°32'60N, 37°57'0E, pasture, 876 m, 21.IV.2004, 1♂; Aksaray-Hasan dağı-Yenipınar, 38°10'28N, 34°16'40E, pine forest, 1578 m, 11.IX.2006, 1♂; Ankara-Kazan-Aydın, 40°09'56N, 32°40'09E, pasture, 865 m, 17.IX.2006, 1♂; -Nallıhan-Sobran, 40°29'28N, 31°15'15E, crop field, 600 m 08.VI.2007, 1♂; -Yenikent-İlyakut, 39°59'15N, 32°31'36E, poplar woodland, willow grove and pasture, 969 m, 08.VI.2007, 1♀, 2♂♂; Balıkesir-Dursunbey-Saçayağı, 39°31'0N, 28°40'60E, pine forest, 500 m, 14.VII.1993, 1♂; Çankırı-Korgun, 40°44'00N, 33°31'25E, *Populus* sp., 898 m, 28.V.2007, 2♂♂; Denizli-Tavas-Tekkeköy, 38°01'00N, 28°43'00E, orchard, 1000 m, 27.VI.1998, 1♂; Diyarbakır-Bismil-Çukurbaşı, 37°50'55N, 40°39'57E, pasture, 567 m, 06.VI.2003, 1♂; -Ergani, 38°15'59N, 39°45'32E, orchard, 895 m, 12.V.2008, 1♂; Edirne-Lalapaşa-Bağlıkderesi, 41°49'60N, 26°43'60E, pasture, 05.VI.1988, 1♂; -Lalapaşa-Hamzabeyli, 41°57'50N, 26°38'39E, pasture, 26.V.1992, 1♂; Elazığ-Baskil-Kıran, 38°28'45N, 38°30'46E, orchard, 1398 m, 10.VI.2008, 1♂; -Baskil-Hacımustafa, 38°38'34N, 38°51'07E, orchard, 1436 m, 23.VI.2009, 1♂; -Keban-Aydınlı, 38°48'04N, 38°53'40E, orchard, 985 m, 10.VII.2007, 1♂; -Keban-Sağdıçlar, 38°44'04N, 38°49'40E, pasture, 1221 m, 11.VI.2008, 1♂; Erzincan-Üzümlü-Demirpınar, 39°37'38N, 39°47'34E, pasture, 1200 m, 24.VIII.2008, 23.VI.2009, 1♂; Eskişehir-Alpu, 39°28'10N, 31°27'58E, pasture, 768 m, 09.VII.2007, 1♂; Kayseri-Kalkancık, 38°53'03N, 35°07'31E, pasture, 1142 m, 12.VII.2007, 1♂; -İncesu, 38°37'50N, 35°11'38E, poplar woodland, 1046 m, 15.09.2006, 1♂; -Pınarbaşı-Aşagıkızılçevik, 38°40'20N, 36°15'27E, crop field, 1635 m, 31.VIII.2008, 1♂; Konya-Çumra-Avdul, 37°25'26N, 32°44'51E, crop field, 1073 m, 27.VI.2009, 1♂; -Karapınar, 37°42'59N, 33°34'47E, oak grove, 1000 m, 19.VII.2007, 1♂; İstanbul-Sarıyer-Kısırmandıra, 41°13'41N, 28°49'33E, pasture, 98 m, 25.VI.1993, 1♂; İzmit-Uzuntarla, 40°43'60N, 30°08'60E, pine forest, 100 m, 07.VII.1993, 1♂; Malatya-Doğanşehir-Takaz, 38°00'35N, 37°59'28E, orchard, 1286 m, 08.VI.2008, 1♂; -Doğanşehir-Reşadiye, 37°59'01N, 38°00'50E, *Populus* sp., 1346 m, 02.VI.2007, 1♂; Nevşehir-Çalış, 38°59'31N, 34°51'46E, crop field and pasture, 1233 m, 05.VI.2008, 1♂; -Gülşehir-Gümüşkent, 38°51'12N, 34°33'44E, crop field and pasture, 1286 m, 07.VII.2007, 1♂; Sivas-Gürün-İncesu, 38°45'54N, 37°06'24E, pasture, 1470 m, 23.VI.2009, 1♀, 1♂; Hafik-Durulmuş, 39°50'18N, 37°18'53E, poplar woodland and pasture, clover field, 1275 m, 31.V.2007, 2♂♂; Şanlıurfa-Hilvan, 37°30'0N, 38°58'0E, orchard, 563 m, 14.VI.2007, 1♂; Tunceli-Pülümür, 39°29'20N, 39°53'36E, pasture, 1322 m, 27.VIII.2008, 1♂; Yozgat-Akdağmadeni-Gökdere, 39°41'38N, 35°42'02E, poplar woodland, oak grove and pasture, 1194 m, 30.V.2007, 1♀, 3♂♂; -Kuşçu, 39°39'15N, 34°43'14E, poplar woodland and oak grove, 1202 m, 29.V.2007, 2♀♀.

Distribution: Australasian, Nearctic, Oceanic, Palaearctic (Armenia, Azerbaijan, Belarus, Belgium, Bulgaria, Canary Islands, China, Croatia, former Czechoslovakia, France, Germany, Greece, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia).

Turkey distribution: Adıyaman, Balıkesir, Bartın, Bursa, Edirne, Elazığ, Erzurum, Giresun, Kırklareli, Kars Malatya, Sivas, Trabzon (Güçlü and Özbek, 2011, Yılmaz *et al.*, 2010).

Chorotype: Holarctic.

Perilitus (Microctonus) apiophaga* (Loan, 1974)

Material examined: Kayseri-Pınarbaşı-Kızıldere, 38°40'20N, 36°15'27E, clover field and pasture, 1457 m, 06.VI.2007, 1♀.

Distribution: United Kingdom.

Chorotype: Sibero-European.

Perilitus (Microctonus) retusus* (Ruthe, 1856)

Material examined: Adıyaman-Çelikhan-Balıkburnu, 38°02'06N, 38°14'37E, pasture, 1284 m, 08.VI.2008, 1♀; Kayseri-Bağpınar, 38°49'12N, 35°37'56E, clover field, 1097 m, 14.IX.2006, Kırşehir-Kaman, 39°22'14N, 33°45'56E, crop field, 1020 m, 14.VII.2007, 1♀.

Distribution: Palaearctic (Finland, Ireland, Moldova, Sweden, Switzerland, United Kingdom, former Yugoslavia).

Chorotype: Sibero-European.

Perilitus (Microctonus) moldavicus* (Tobias, 1986)

Material examined: Erzincan-Üzümlü-Geyikli, 39°43'36N, 39°40'00E, orchard and pasture, 1635 m, 15.VI.2008, 1♀; Çankırı-Korgun, 40°44'00N, 33°31'25E, pasture, 898 m, 28.V.2007, 1♀; Sivas-Kangal-Yeşildere, 39°08'33N, 37°30'00E, crop field, 1600 m, 01.VI.2007, 1♀.

Distribution: Palaearctic (Moldova, former Yugoslavia).

Chorotype: Turano-European.

***Perilitus (Perilitus) falciger* (Ruthe, 1856)**

Material examined: Malatya-Akçadağ-Gürkaynak, 38°20'44N, 37°49'39E, pasture, 1593 m, 24.VI.2009, 2♀♀; -Akçadağ-Sarıhacı, 32°22'32N, 37°53'17E, orchard, 1367 m, 05.VI.2007, 1♀; Tunceli-Pülümür-Kangallı, 39°27'10N, 39°51'43E, pasture, 1343 m, 14.VI.2008, 1♀.

Distribution: Palaearctic (Austria, Belarus, Belgium, former Czechoslovakia, Denmark, France, Germany, Hungary, Kazakhstan, Moldova, Mongolia, Poland, Russia, Slovakia, Sweden, Switzerland, United Kingdom).

Turkey distribution: Antalya (Yılmaz *et al.* 2010).

Chorotype: Asiatic-European.

***Perilitus (Perilitus) kokujevi* Tobias, 1986**

Material examined: Elazığ-Keban-Ulupınar, 38°44'59N, 38°51'57E, pasture, 1267 m, 11.VI.2008, 1♀.

Distribution: Oriental, Palaearctic (China, Norway, Russia, Turkey).

Turkey distribution: Erzurum (Güçlü and Özbek, 2011).

Chorotype: Asiatic-European.

***Perilitus (Perilitus) rutilus* (Nees, 1811)**

Material examined: Elazığ-Cip barajı, 38°40'48N, 39°03'59E, pasture, 1006 m, 12.VI.2008, 4♀♀, 3♂♂; Keban-Ulupınar, 38°44'59N, 38°51'57E, pasture, 1267 m, 11.VI.2008, 1♂; Kayseri-Pınarbaşı-

Aşağıkızılçevik, 38°40'20N, 36°15'27E, crop field, 1635 m, 23.VI.2009, 1♀; Malatya-Akçadağ-Gürkaynak, 38°20'44N, 37°49'39E, pasture, 1100 m, 24.VI.2009, 1♀; Sivas-Hafik-Durulmuş, 39°50'18N, 37°18'53E, poplar woodland and pasture, clover field, 1275 m, 31.V.2007, 1♂; Tunceli-Marçık, 39°08'25N, 39°38'12E, crop field, 14.VI.2008, 1♀, 1♂; Yozgat-Akdağmadeni-Gökdere, 39°41'38N, 35°42'02E, poplar woodland, oak grove and pasture, 30.V.2007, 1♀.

Distribution: Nearctic, Palaearctic (Belgium, Bulgaria, Cyprus, former Czechoslovakia, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Kazakhstan, Korea, Lithuania, Moldova, Mongolia, Netherlands, Poland, Russia, Switzerland, Tunisia, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia)

Turkey distribution: Edirne, Balıkesir, Elazığ, Malatya (Yılmaz *et al.* 2010).

Chorotype: Holarctic.

Perilitus (Townesilitus) bicolor (Wesmael, 1835)

Material examined: Adıyaman-Kahta-Bölükyayla, 37°40'04N, 38°13'26E, pasture, 01.VI.2007, 1♀; -Besni-Şambayat, 37°41'34N, 37°51'40E, pasture, 17.04.2004, 1♀; Diyarbakır-Ergani, 38°15'59N, 39°45'32E, orchard, 12.V.2008, 3♀♀; Elazığ-Keban-Ulupınar, 38°44'59N, 38°51'57E, pasture, 1267 m, 11.VI.2008, 1♀; Malatya-Akçadağ-Gürkaynak, 38°20'44N, 37°49'39E, pasture, 1593 m, 24.VI.2009, 1♀; Nevşehir-Gölşehir-Gümüşkent, 38°51'12N, 34°33'44E, crop field and pasture, 1286 m, 07.VII.2007, 1♀; Sivas-Hafik-Durulmuş, 39°50'18N, 37°18'53E, poplar woodland and pasture, clover field, 1275 m, 31.V.2007, 2♀♀; Yozgat-Akdağmadeni-Gökdere, 39°41'38N, 35°42'02E, poplar woodland, oak grove and pasture, 1194 m, 30.VII.2007, 1♀.

Distribution: Palaearctic (Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, former Czechoslovakia, Denmark, France, Germany, Hungary, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Russia, Spain, Sweden, Switzerland, Turkey, United Kingdom, former Yugoslavia).

Turkey distribution: Adıyaman, Balıkesir, Bursa, Edirne, Hatay, Kastamonu (Yılmaz *et al.* 2010).

Chorotype: Asiatic-European.

Streblocera Westwood, 1833

Streblocera (Eutanycerus) macroscapus (Ruthe, 1856)

Material examined: Balıkesir-Dursunbey-Saçayağı, 39°31'0N, 28°40'60E, pine forest, 500 m, 14.VII.1993, 1♀.

Distribution: Palaearctic (Bulgaria, Czech Republic, former Czechoslovakia, Finland, Germany, Hungary, Kazakhstan, Korea, Lithuania, Mongolia, Netherlands, Poland, Russia, Sweden, Switzerland, Turkey, United Kingdom).

Turkey distribution: Malatya (Yılmaz *et al.*, 2010).

Chorotype: Asiatic-European.

Streblocera (Streblocera) antennata Jakimavicius, 1973*

Specimens examined: Tunceli-Pülümür-Hiver, 27.VIII.2008, 1♀, 1♂.

Distribution: Palaearctic (Lithuania).

Chorotype: Sibero-European.

DISCUSSION

Emerging from the present study, the new data seem to affect the taxonomy of the subfamily Euphorinae in Turkey. With this study, the number of Euphorinae in Turkey increased from 71 to 81. *Leiophron* (*Peristenus*) *reclinator* (Ruthe), *Meteorus graciliventris* Muesebeck, *M. micropterus* (Haliday), *Elasmosoma calcaratum* Tobias, *Neoneurus auctus* (Thomson), *Ecclitura primoris* Kokujev, *P. (M.) apiophaga* (Loan), *P. (M.) moldavicus* (Tobias), *P. (M.) retusus* Thomson, *Streblocera* (*Streblocera*) *antennata* Jakimavicius were not previously been identified from Turkey, and the genera *Neoneurus* and *Ecclitura* were recorded for the first time in Turkey.

Many scientists dealing with biogeography defined the term “chorotype” by synthetically grouping geographical distributions of plants and animals. Different chorotypes were put forward either by taking into account only the geographical distributions, species groups in a particular geographical region with specific ecological needs, species groups assumed to have the same biogeographical history, phylogenetically related species groups emerged within the same area or species groups restricted in a region defined by climatological and phytogeographical criteria. Taglianti *et al.* (1999) revised the current chorological models used for Western Palearctic fauna, suggested a new chorotype classification based on these criteria and grouped Holarctic region in 13 chorotypes.

The zoogeographical classification used in the present study follows the chorotype classification proposed by Taglianti *et al.*, (1999). The following groups can be recognized:

1. Multiregional species (8 species): *Dinocampus coccinellae*, *Wesmaelia petiolata*, *Meteorus ictericus*, *M. rubens*, *M. rufus*, *Perilitus* (*Microctonus*) *aethiops*, *Zelex deceptor*.

2. Species with ranges in two zoogeographical regions, usually Holarctic and Oriental (3 species): *Allurus lituratus*, *Leiophron* (*Peristenus*) *pallipes*, *Meteorus versicolor*.

3. Species with ranges in two zoogeographical regions, usually Palearctic and Oriental (3 species): *Meteorus graciliventris*, *M. pendulus*, *Perilitus* (*Perilitus*) *kokujevi*.

4. Species with Holarctic ranges (2 species): *Marshiella plumicornis*, *P. (Perilitus) rutilus*.

5. Palearctic range (1 species): *Centistes fuscipes*.

6. Asiatic-European range (12 species): *Allurus muricatus*, *Centistes cuspidatus*, *Leiophron* (*Peristenus*) *picipes*, *L. (P.) reclinator*, *Meteorus abductor*, *M. micropterus*, *M. obsoletus*, *Neoneurus auctus*, *Ecclitura primoris*, *Perilitus* (*Perilitus*) *falciger*, *P. (Townesilitus) bicolor*, *Streblocera* (*Eutanycerus*) *macroscapus*.

7. Sibero-European range (3 species): *Perilitus* (*Microctonus*) *apiophaga*, *P. (M.) retusus*, *Streblocera* (*Streblocera*) *antennata*.

8. Turano-European range (2 species): *Elasmosoma calcaratum*, *Perilitus* (*Microctonus*) *moldavicus*.

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