

Orijinal araştırma (Original article)

Distribution of Scoliidae (Hymenoptera: Aculeata) of Turkey with their zoogeographic characterization

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Summary

In the present study, 18 species in the family Scoliidae (Hymenoptera) are reported from various parts of Turkey. Based on a review of the literature it was found that 22 species and subspecies in seven genera belonging to two subfamilies, which are connected with Scoliidae family from Turkey, have been presented. Additionally, a checklist is provided for the Turkish scoliids. The plants visited by the recorded scoliids are also indicated. The main chorological categories of Turkish Scoliidae species are represented as follows: Palearctic (2 species), Centralasiatic-European (6), Centralasiatic-Mediterranean (1), Turano-Mediterranean (4), Turano-E-Mediterranean (1), Turanian (6), SW-Asiatic (1), E-Mediterranean (1).

Key words: Hymenoptera, Scoliidae, additional records, chorotype, checklist, Turkey

Anahtar sözcükler: Hymenoptera, Scoliidae, ek kayıtlar, korotip, kontrol listesi, Türkiye

Introduction

The family Scoliidae, is a widespread and rather small family of Hymenoptera, belongs to the super family Vespoidea and contains about 560 valid species worldwide in 43 valid genera and in two subfamilies (Osten, 2005b). In the West Palaearctic Region, the family Scoliidae is represented by 69 species (Osten, 2000), of which 22 taxa occur in Turkey. Scoliid wasps are generally large; body size may vary from 5 mm to 35 mm, and rarely up to 50 mm. Adults are often predominantly black, hairy and shiny, commonly marked with yellow, white or red. Both sexes are fully winged usually dark with metallic reflections. Sexual dimorphism is slightly present; sexually dimorphic for antennal segment number, often also for wing venation, body form, and for color pattern, with extensive modification to a fossorial habit; often strongly pubescent,

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with more or less deep punctuation of integument. Pronotum closely coadapted to mesothorax, posterolaterally reaching to tegula; meso- and metathoracic sterna flattened. Forecoxae contiguous, mid- and hindcoxae widely separated, foretarsus with combspines, mid- and hind tibiae externally with strong posteriorly-directed spines. Wings beyond closed cells with radiating close striolations in lamina. Propodeum longitudinally tripartite, claws simple, edentate. Male lacks cerci, smaller and more slender than females (Day et al., 1981).

The majorities are tropical but many occur in the warmer temperate zones. The group exhibits great uniformity of morphology, with the females extensively adapted to their fossorial existence. All the larvae of the scoliid species are ectoparasitoids of the larvae of Coleoptera, usually Scarabaeoidea and rarely Curculionoidea, inhabiting in the soil. In most cases, the host larvae are sought and paralyzed in the soil, though some are found in decaying wood or in rotting vegetation. They complete their development within the cells of the hosts. For this reason, scoliid wasps have importance in biological balance of scarabaeid and curculionid pests of the field crops (Day et al., 1981; Osten, 2005a, b). Additionally, scoliids are pollinators of various wild plants.

Studies on the Scoliidae fauna of Turkey have been conducted by some foreign scientists (Fahringer, 1922; Betrem, 1935; Bradley, 1950; Rasnitsyn, 1977; Tkalcu, 1987; Madl, 1997; Osten et al., 2003; Osten, 1999, 2000, 2004). First comprehensive faunistic study of the Turkish scoliid wasps was conducted by Osten & Özbek (1999) and they recorded 20 species and subspecies in Turkey. Later, Tüzün & Bağrıaçık (2000) listed 5 species from Balıkesir, İzmir, Manisa and Muğla provinces. Tüzün (2004) recorded 9 species and subspecies in Ankara Province. Anlaş & Çevik (2004) found 10 species and subspecies occurring in Manisa Province. Tezcan et al. (2004) gave the list of 10 species in the collection of LEMT (Lodos Entomological Museum, Turkey). Recently, Özbek & Anlaş (2007) added two new species for Turkish fauna and many records from different parts of the country. More recently, Japoshvili & Karaca (2010) listed a few species from Gölcük Natural Park in Isparta. Despite these contributions there are still some provinces, especially in eastern and southeastern Turkey, no material has been collected so far. The present contribution is a compilation of previous records from the literature and some new ones in various provinces of the country. In addition of authors view the zoogeographical characterization is based on mainly the chorotype classification of the Near East fauna, which was revised from Vigna Taglianti et al. (1999).

Material and Methods

Material has been collected on flowering plants by sweep net or by sweeping of vegetation in different parts of the country (Figure 1) during the years of 2000-2010, few specimens obtained on Malaysia trap in Aras Valley, Erzurum. A "Checklist of Turkish Scoliidae" was prepared with their Chorotypes

and plants visited. The material was deposited in EMET (Entomology Museum of Atatürk University, Erzurum, Turkey) and the second author's private collections. Classification and nomenclature of the Scoliidae suggested by Betrem (1935) and Osten (2000) have been followed in this study. The formerly known distribution of the Scoliidae for world is given by Osten (2000).



Figure 1. Map of the provinces Scoliidae material collected in Turkey. Symbols: ▲ Material collected in the present study, ● Material has been collected previously.

Results

Scoliidae species

Colpa klugii (Vander Linden, 1827)

Material studied: Artvin: 1♂ 1♀, 15.VIII.2006, Deriner Barajı, 500 m, on *Echinops orientalis* Trautv, leg. Özbek. **Isparta:** 1♀, 10.VIII.2010, Aksu 10 km NE, Çayır yayla road, 1458 m, 37°48'06"N, 31°09'34"E, leg. Anlaş.

Colpa quinquecincta (Fabricius, 1793)

Material studied: Adıyaman: 1♂, 08.VII.2006, Besni, Üçgöz, Değirmenci river banks, leg. Anlaş. **Antalya:** 4♀♀ 28♂♂, 20-30.VI.2002; 3♂♂, 16.VII.2002; 4♂♂, 24.VII.2002, Arapsuyu, Azmak, 5 m, on *Teucrium polium* L., leg. Özbek. **Erzurum:** 2♂♂, 9.VIII.2004; 1♀, 12.IX.2002, Campus of Atatürk University, 1850 m, on *Eryngium billardieri* Delar, leg. Özbek; 1♀, 3♂♂, 27.VII.2003, Horasan, Karaorgan, 1750 m, on *Eryngium billardieri* Delar, leg. Özbek. **Mersin:** 2♂♂, 22.VII.2010, Çamlıyayla, Korucak 1 km E, 715 m, 37°08'56"N, 34°42'51"E, leg. Anlaş. **Muğla:** 1♂, 18.VI.2005, Milas, Konak ca. 600 m, 37°04'N, 27°54'E, leg. S. Anlaş.

Remarks: *Colpa q. quinquecincta* f. *abdominalis* (Spinola, 1808) was recorded from Ankara, Hatay and İzmir provinces (Madl, 1997, Osten & Özbek,

1999). However, this form was considered the synonyms of *C. q. armeniaca* Steinberg, 1962 and *C. q. rudaba* (Kirby, 1889) by (Osten, 2000, 2005b).

***Colpa sexmaculata* (Fabricius, 1782)**

Material studied: **Antalya:** 1♂, 20.VI.2004, Arapsuyu, Azmak, 5 m, leg. Özbek, *Teucrium polium* L. **Artvin:** 5♀♀, 3♂♂, 20.VIII.2006, Deriner Barajı, 500 m, on *Echinops orientalis* Trautv and *Vitex agnus-castus* L., leg. Özbek, **Erzurum:** 1♂, 17.VI.2001, Oltu, Çamlıbel, 1750 m, leg. Yıldırım. **İzmir:** 2♂♂, 04.X.2008, Aliağa, Karakuzu, 350 m, ca. 38°44'N, 27°10'E, leg. Anlaş. **Kars:** 1♂, 08.VIII.2000, Karakurt, Aras Valley, 1500 m, leg. Çalmaşur. **Mersin:** 2♀♀, 1♂, 18.VII.2010, Central province 20 km N, Aladağ 1,5 km W, 640 m., 36°56'21"N, 34°29'09"E, leg. Anlaş; 1♀, 22.VII.2010, Çamlıyayla, Korucak 1 km E, 715 m, 37°08'56"N, 34°42'51"E, leg. Anlaş. **Tunceli:** 1♂, 13.IX.2007, Central province, Halvoru Kaynağı, Karşılar 2 km E, Munzur river banks, 965 m, 39°10'42"N, 39°27'41"E, leg. Anlaş.

***Campsomeriella thoracica* (Fabricius, 1787)**

Material studied: **Mersin:** 2♀♀, 22.VII.2010, Çamlıyayla, Korucak 1 km E, 715 m, 37°08'56"N, 34°42'51"E, leg. Anlaş.

***Micromeriella hyalina angulata* (Morawitz, 1888)**

Material studied: **İğdir:** 1♀, 17.VIII.2005, Bayraktutan, 890 m, leg. Özbek.

***Dasyscolia ciliata araratıca* (Radoskovsky, 1890)**

Material studied: **Erzincan:** 6♀♀, 25.V.2001, Dumanlı. 1200m, leg. Özbek & Hayat; 25.V.2001, 3♀♀, Gülkaymak, 1250 m, on *Vitex agnus-castus* L., *Carduus nutans* L. and *Teucrium polium* L., leg. Hayat & Güçlü. **Muğla:** 1♀, 18.VI.2005, Milas, Konak ca. 600 m, 37°04'N, 27°54'E, on *Vitex agnus-castus* L., leg. Anlaş.

***Megascolia maculata maculata* (Drury, 1773)**

Material studied: **Adıyaman:** 1♂, 17.IV.2008, Gerger 24 km W, 38°01'45"N, 39°01'40"E, leg. Yağmur. **Bingöl:** 1♂, 03.VI.2003, Yenibaşlar, 1400 m, on *Onopordum turcicum* Danin, leg. Çalmaşur; 7♂♂, 21-22 and 24.VI.2000, Solhan, leg. Kesdek; 1♂, 02.VI.2001, Bilaloğlu, 1300 m, leg. Güçlü. **Erzurum:** 1♀, 22.VII.2003, Ispir, Bademli, 1440 m, leg. Kesdek. **Gaziantep:** 3♀♀, 25.V.2007, Islahiye, Hanağzı, ca. 800 m, 37°03'33"N, 36°36'24"E, leg. Yağmur. **İğdir:** 10♀♀, 30.VII.2002, Melekli, 900 m, on *Onopordum turcicum*, leg. Kesdek. **İzmir:** 1♂, 28.V.2010, Buca, Kaynaklar, 365 m, 38°21'43"N, 27°17'19"E, leg. Anlaş. **Kahramanmaraş:** 1♂, 01.V.2008, Göksun, Değirmendere 4 km E, ca 1000 m, 38°26'39"N, 36°54'55"E, leg. Yağmur. **Konya:** 4♀♀, 3♂♂, 02.VI.2002, Güneysınır, Gurağaç, 1020 m leg. Kesdek; 1♀, 2♂♂, 09.VII.2000, Çumra, Kuzucu, 1030 m, on *Echinops* sp., leg. Kesdek. **Kütahya:** 2♂♂, 16.IV.2006, Simav, Samat 2 km SW, leg. Anlaş; 1♂,

24.IV.2010, Şaphane, Üçbaş 2 km N, 900 m, 38°59'57"N, 29°54'22"E, leg. Anlaş. **Manisa:** 1♂, 08.IV.2007, Soma, Hamidiye, 827 m, 39°16'39"N, 27°45'50"E, leg. Anlaş; 1♂, 27.IV.2008, Central province, Spil Dağı, 1000 m, 38°33'45"N, 27°23'07"E, , leg. Anlaş. **Mersin:** 3♀♀, 20.VII.2010, Erdemli 17 km NW, Aydınlar 8 km SE, Sorgun çayı, 880 m., 36°45'41"N, 34°11'41"E, leg. Anlaş. **Uşak:** 1♂, 23.IV.2010, Eşme, Kısık 2 km NE, 470 m, 38°38'06"N, 28°57'19"E, leg. Anlaş.

Scolia anatoliae Osten, 2004

Material studied: Antalya: 1♀, 15.X.2000; 7♀♀, 14♂♂, 20.VI.2002, Arapsuyu, Azmak, 5 m, on *Teucrium polium* L. and *Vitex agnus-castus* L., leg. Özbek. **Mersin:** 2♀♀, 18.VII.2010, Central province 20 km N, Aladağ 1,5 km W, 640 m., 36°56'21"N, 34°29'09"E, leg. Anlaş.

Scolia asiella Betrem, 1935

Material studied: Antalya: 1♀, 20:VI.2002, Arapsuyu, Azmak, 5 m, on *Teucrium polium* L. leg. Özbek. **Erzurum:** 1♀, 20.VII.2001, Pasinler, Arıbahçe, leg. Çalmaşur; 2♂♂, 17.VII.2003, Campus of Atatürk University, 1850 m, leg. Özbek; 1♀, 15.VIII.2004, same locality, leg. Özbek; 1♀, 19.VII.2003, Hınıs, Mescitli, 1700 m, leg. Özbek, on *Eryngium billardieri* Delar, *Teucrium polium* L., and *Vitex agnus-castus* L. **İzmir:** 1♂, 24.VII.2007, Kemalpaşa, Halilbeyli, leg. Anlaş.

Scolia erythrocephala barbariae Betrem, 1935

Material studied: Mersin: 1♂, 18.VII.2010, Central province 20 km N, Aladağ 1,5 km W, 640 m., 36°56'21"N, 34°29'09"E, leg. Anlaş.

Scolia erythrocephala erythrocephala Fabricius, 1781

Material studied: Adana: 2♀♀, 19.VII.2010, Karataş 7 km NW, environs of Akyatan seasonal lake, leg. Anlaş.

Scolia fallax Eversmann, 1849

Material studied: Erzurum: 2♂♂, 17.VII.2003; 2♂♂, 20.VII.2003; 1♂, 01.VIII.2003, Campus of Atatürk University, 1850 m, on *Eryngium billardieri* Delar, leg. Özbek; 1♂, 11.IX.2001, Tortum, Esendurak, 1500 m leg. Çalmaşur; 1♂, 15.VIII.2000, Pazaryolu, Rizekent, 1700 m, leg. Çalmaşur. **Gaziantep:** 1♀, 25.V.2007, İslahiye, Hanağzı, ca. 800 m, 37°03'33"N, 36°36'24"E, leg. Yağmur.

Scolia flaviceps flaviceps Eversmann, 1846

Material studied: Iğdır: 1♀, 1♂, 29.VII.2002, Köy Hizmetleri Araştırma Merkezi arazisi, 900 m; 1♀, 30.VII.2002, Melekli, leg. Özbek.

Scolia fuciformis Scopoli, 1786

Material studied: **Antalya:** 1♀, 30.VI.2002, Arapsuyu, Azmak, 5 m, on *Teucrium polium* L., leg. Özbek. **Balıkesir:** 1♂, 17.X.2010, Havran, Avcılar, leg. Yağmur. **Erzurum:** 1♂, 15.VIII.2004, Campus of Atatürk University, 1850 m, on *Onopordum turcicum* Danin, leg. Özbek. **Konya:** 1♂, 12.VII.1997, Beyşehir, Gökçimen, 1000 m, leg. Özbek.

Scolia galbula (Pallas, 1771)

Material studied: **Afyonkarahisar:** 1♀, 11.VIII.2010, Şuhut, Dadak 2 km N, 1320 m, 38°36'18"N, 30°26'59"E, leg. Anlaş. **Erzurum:** 2♂♂, 25.VI.2001, Olur, Köprübaşı, 1000 m, leg. Özbek. **Konya:** 2♂♂, 09.VII.2000; 1♂, 03.IX.2000, Güneysınır, Gurağaç, 1120 m, on *Vitex agnus-castus* L., leg. Kesdek. **Manisa:** 2♂♂, 31.VII.2007, Turgutlu, Çıkrıkçı, 134 m, 38°28'24"N, 27°49'30"E, leg. Anlaş. **Mersin:** 1♀, 18.VII.2010, Central province 20 km N, Aladağ 1,5 km W, 640 m., 36°56'21"N, 34°29'09"E, leg. Anlaş.

Scolia hirta (Schrank, 1781)

Material studied: **Aydın:** 1♀, 19.VI.2006, Karpuzlu, Ova, 85 m, 37°41'25"N, 27°55'36"E, leg. Anlaş. **Denizli:** 1♀, 18.X.2009, Babadağ, Baba Dağı, 954 m, 37°48'37"N, 28°48'40"E, leg. Yağmur. **Erzurum:** 1♂, 26.VII.2000, Oltu, İnanmış, 1700 m, on *Eryngium billardieri* Delar, leg. Özbek. **Kars:** 1♂, 08.VIII.2000, Sarıkamış, Karakurt, Aras Valley, 1500 m, on *Onopordum turcicum* Danin, leg. Çalmaşur.

Scolia sexmaculata (Müller, 1766)

Material studied: **Erzurum:** 2♂♂, 05.VI.2001, Campus of Atatürk University, 1850 m; 1♂, 21.VII.2003, Hınıs, 1750 m, on *Eryngium billardieri* Delar., leg. Özbek; 12♀♀, 02.VII.2000, Narman, Kireçli Dağı, 2100 m, leg. Güçlü; 3♂♂, 20.VII.2001, Pasinler, Arıbahçe, 2400 m, leg. Yıldırım. **Kars:** 1♂, 19.VIII.2003, Sarıkamış, Karakurt, Aras Valley, 1500 m, on *Onopordum turcicum*, leg. Özbek. **Konya:** 3♂♂, 04.VII.2000, Güneysınır, Gurağaç, 1020 m; 1♂, 25.VII.2000, Güneysınır, Örenboyalı, leg. , Kesdek.

Scolia turkestanica Betrem, 1935

Material studied: **Adana:** 1♀, 22.VII.2001, Central province, Balcalı, 45 m, leg. Özbek.

Checklist of the Scoliidae species of Turkey

Checklist of the Scoliidae of Turkey with their Chorotypes and plants visited were given in Table 1.

Table1. Checklist of the Scoliidae of Turkey with their Chorotypes and plants visited

Taxon and its Chorotype Distribution in Turkey	References	Plants visited
Subfamily Proscoliinae Rasnitsyn, 1977		
<i>Proscolia spectator</i> Day, Ankara 1981 E-Mediterranean	Day et al., 1981; Osten, Not cited 1987; Osten & Özbek, 1999	
Subfamily Scoliinae Latreille, 1802 Tribe Campsomerini Betrem, 1971		
<i>Colpa klugii</i> (Vander Linden, 1827) Centralasiatic-European	Amasya, Antalya, Artvin, Balıkesir, Bilecik, Burdur, Çanakkale, Elazığ, Erzurum, Gaziantep, Isparta, İstanbul, İzmir, Malatya, Manisa, Mersin, Muş, Samsun and Tekirdağ	Madl, 1997; Osten & Özbek, 1999; Anlaş & Çevik, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper
		<i>Rubus canescens</i> DC. <i>Vitex agnus-castus</i> L. <i>Echinops orientalis</i> Trautv
<i>Colpa quinquecincta</i> (Fabricius, 1793) Centralasiatic-European	Adiyaman, Ağrı, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bursa, Erzincan, Erzurum, Hakkari, Hatay, Iğdır, Isparta, İzmir, Kars, Konya, Malatya, Manisa, Mersin, Muğla, Muş, Nevşehir, Şanlıurfa, Tokat, Van and Uşak	Madl, 1997; Osten & Özbek, 1999; Tüzün & Bağrıaçık, 2000; Tüzün, 2004; Anlaş & Çevik, 2004; Tezcan et al., 2004; Japoshvili & Karaca, 2010; Özbek & Anlaş, 2007 and present paper
		<i>Carduus nutans</i> L. <i>Eryngium billardieri</i> Delar <i>R. canescens</i> <i>V. agnus-castus</i> <i>Mentha</i> sp. <i>Teucrium polium</i> L.
<i>Colpa sexmaculata</i> (Fabricius, 1782) Centralasiatic-European	Adana, Ankara, Antalya, Artvin, Aydın, Balıkesir, Çanakkale, Diyarbakır, Edirne, Elazığ, Erzincan, Erzurum, Iğdır, İzmir, Kars, Kırıkkale, Konya, Malatya, Manisa, Mersin, Muğla, Muş, Nevşehir, Tokat, Tunceli and Uşak	Madl, 1997; Osten & Özbek, 1999; Tüzün & Bağrıaçık, 2000; Tüzün, 2004; Anlaş & Çevik, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper
		<i>Cardopatum corymbosum</i> L. <i>C. nutans</i> <i>Coridothymus capitatus</i> L. <i>Echium plantagineum</i> L. <i>Echinops orientalis</i> <i>Lythrum salicaria</i> L. <i>Mentha</i> sp. <i>R. canescens</i> , <i>T. polium</i> L., <i>V. agnus-castus</i>
<i>Campsomeriella thoracica</i> (Fabricius, 1787) Centralasiatic-Mediterranean	Adana, Antalya, Mersin, Muğla	Osten & Özbek, 1999; Özbek & Anlaş, 2007
		<i>Vitex agnus-castus</i>
<i>Micromeriella hyalina angulata</i> (Morawitz, 1888) Turano-E-Mediterranean	Diyarbakır, Hatay, Iğdır, Şanlıurfa	Osten & Özbek, 1999 and present paper
		<i>Vitex agnus-castus</i>
<i>Dasyscolia ciliata araratica</i> (Radoskovsky, 1890) SW-Asiatic	Adana, Ağrı,, Antalya, Aydın, Balıkesir, Diyarbakır, Erzincan, Hatay, İzmir, Kars, Malatya, Manisa, Mersin, Muğla, Muş and Sivas	Bradley, 1950; Osten & Özbek, 1999; Anlaş & Çevik, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper
		<i>C. nutans</i> <i>Notobasis syriaca</i> (L.) <i>T. polium</i> <i>V. agnus-castus</i>

Table 1 Continued

Taxon and its Chorotype Distribution in Turkey	References	Plants visited
Tribe Scoliini Latreille, 1802		
<i>Megascolia maculata maculata</i> (Drury, 1773) Centralasiatic-European	Adana, Adıyaman, Ankara, Antalya, Aydın, Balıkesir, Bilecik, Bingöl, Bitlis, Çanakkale, Denizli, Edirne, Elazığ, Erzincan, Erzurum, Gaziantep, Gümüşhane, Hatay, Iğdır, Isparta, İstanbul, İzmir, Kahramanmaraş, Konya, Kütahya, Malatya, Manisa, Mardin, Mersin, Muğla, Şırnak, Tokat, Tunceli, Uşak, Van and Yalova	Tkalcu, 1987; Madl, 1997; Osten & Özbek, 1999; Anlaş & Çevik, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper
		<i>Anchusa</i> sp. <i>Capparis ovata</i> Desf. <i>C. nutans</i> <i>E. plantagineum</i> <i>Echinops</i> sp <i>L. salicaria</i> <i>Onopordum turcicum</i> Danin <i>Opopanax hispidus</i> (Friv.) <i>N. syriaca</i> <i>R. canescens</i> <i>V. agnus-castus</i>
<i>Scolia aenigmatica</i> Betrem, 1928 Turanian	Muş	Özbek & Anlaş, 2007
		<i>Centaurea solstitialis</i> L.
<i>Scolia anatoliae</i> Osten, 2004 Centralasiatic-European	Adana, Antalya, Artvin, Aydın, Erzurum, Iğdır, Kars, Kilis, Konya, Mersin, Muğla, Rize	Osten & Özbek, 1999, Osten, 2004; Özbek & Anlaş, 2007 and present paper
		<i>Teucrium polium</i> <i>Vitex agnus-castus</i>
<i>Scolia asiella</i> Betrem, 1935 Turanian	Afyon, Ağrı, Ankara, Antalya, Artvin, Aydın, Bingöl, Diyarbakır, Erzincan, Erzurum, Hakkari, Iğdır, Isparta, İzmir, Kars, Manisa, İçel and Van	Betrem, 1935; Osten & Özbek, 1999; Anlaş & Çevik, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper
		<i>E. billardieri</i> <i>T. polium</i> <i>V. agnus-castus</i>
<i>Scolia concolor</i> Eversmann, 1849 Turanian	Hakkari	Özbek & Anlaş, 2007
		Not cited
<i>Scolia erivanensis</i> (Radoskovsky, 1876) Turanian	Kars (Aras Valley)	Osten & Özbek, 1999
		Not cited
<i>Scolia erythrocephala barbariae</i> Betrem, 1935 Turano-Mediterranean	Adana, Artvin, Hatay, İçel and Tunceli	Osten & Özbek, 1999; Özbek & Anlaş, 2007 and present paper
		<i>Onopordum</i> sp.
<i>Scolia erythrocephala erythrocephala</i> Fabricius, 1781 Turano-Mediterranean	Antalya, Konya, Mersin	Osten & Özbek, 1999 and present paper
		<i>V. agnus-castus</i>
<i>Scolia fallax</i> Eversmann, 1849 Centralasiatic-European	Ankara, Adana, Artvin, Elazığ, Erzurum, Gaziantep, Hatay, İstanbul, İzmir, Kars, Kütahya, Muğla and Tokat	Madl, 1997; Osten & Özbek, 1999; Tüzün, 2004; Anlaş & Çevik, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper
		<i>C. nutans</i> <i>E. billardieri</i> <i>V. agnus-castus</i>

Table 1 Continued

Taxon and its Chorotype Distribution in Turkey	References	Plants visited
<i>Scolia flaviceps</i> <i>flaviceps</i> Eversmann, 1846 Turanian	Antalya, Artvin, Erzurum, Iğdır, Konya and Mersin Madl, 1997; Osten & Özbek, 1999 and present paper	<i>V. agnus-castus</i>
<i>Scolia fuciformis</i> Scopoli, 1786 Turano-Mediterranean	Ankara, Antalya, Artvin, Aydın, Balıkesir, Bitlis, Diyarbakır, Erzincan, Erzurum, Hatay, İzmir, Kars, Konya, Manisa, Muş, Tunceli and Yozgat Osten & Özbek, 1999; Tüzün, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper	<i>E. billardieri</i> <i>O. turcicum</i> <i>T. polium</i>
<i>Scolia galbula</i> (Pallas, 1771) Turano-Mediterranean	Afyonkarahisar, Ankara, Antalya, Artvin, Aydın, Denizli, Erzincan, Erzurum, Hakkari, Hatay, İzmir, Kars, Konya, Manisa, Mersin, Muğla and Trabzon Osten & Özbek, 1999; Tüzün, 2004; Anlaş & Çevik, 2004; Tezcan et al., 2004; Özbek & Anlaş, 2007 and present paper	<i>Mentha</i> sp. <i>R. canescens</i> <i>V. agnus-castus</i>
<i>Scolia hirta</i> (Schrank, 1781) Palearctic	Ankara, Antalya, Artvin, Aydın, Burdur, Denizli, Elazığ, Erzincan, Erzurum, Hakkari, Hatay, Isparta, İzmir, Karabük, Kars, Kayseri, Konya, Mersin, Manisa, Muğla, Tokat and Rize Osten & Özbek, 1999; Tüzün & Bağrıaçık, 2000; Tüzün, 2004; Anlaş & Çevik, 2004; Tezcan et al., 2004; Japoshvili &, Karaca, 2010; Özbek & Anlaş, 2007 and present paper	<i>C. capitatus</i> <i>E. billardieri</i> <i>O. turcicum</i> <i>Origanum</i> sp., <i>V. agnus-castus</i>
<i>Scolia sexmaculata</i> (Müller, 1766) Palearctic	Adana, Adıyaman, Ankara, Antalya, Aydın, Bitlis, Burdur, Bursa, Diyarbakır, Erzincan, Erzurum, Gaziantep, Isparta, İstanbul, İzmir, Kars, Kayseri, Konya, Manisa, Mersin, Muğla, Muş, Nevşehir and Van Madl, 1997; Osten & Özbek, 1999 Tüzün & Bağrıaçık, 2000; Tüzün, 2004; Anlaş & Çevik, 2004; Tezcan et al., 2004; Japoshvili &, Karaca, 2010; Özbek & Anlaş, 2007 and present paper	<i>E. billardieri</i> <i>O. turcicum</i> <i>R. canescens</i> <i>V. agnus-castu</i>
<i>Scolia turkestanica</i> Betrem, 1935 Turanian	Adana, Bitlis, Denizli, Diyarbakır, Erzincan, Hatay, Gaziantep, İzmir, Kahramanmaraş, Kars and Konya Osten & Özbek, 1999; Özbek & Anlaş, 2007 and present paper	Not cited

Discussion

In the present study 18 species, which were previously known from Turkey, were recorded from various provinces. This study and literature data revealed that 22 species and subspecies in seven genera and two subfamilies of the family Scoliidae occur in Turkey. Some species are very rare; *Proscolia spectator* has been recorded only in Ankara Province. Its distribution range is also very narrow, occurs only in northwestern Greece and Turkey. It is well known that the diversities in climatic and ecological conditions, and also the geographical position of Anatolia have led to speciation events in Anatolia. Therefore, we suspect that *P. spectator* could be Anatolian origin. Similarly, *S. aenigmatica*, *S. concolor*, and *S. erivanensis* are known from only Muş, Hakkari and Kars provinces, respectively. Distribution range of both

S. aenigmatica and *S. concolor* roughly reach from Iran to Pakistan, Afghanistan, Turkmenistan and Tajikistan. There is a possibility that these species were origin of above mentioned countries, probably distributed westward to Anatolia, because eastern Anatolia is the western most distribution area of these species. *Scolia erivanensis* is known from Armenia and Turkey; therefore, it could be considered Armeno-E-Anatolian endemic. *Campsomeriella thoracica* is not a wide spread species, it has been recorded from a few Turkish provinces. It is a Mediterranean originated species, most probably spreaded through Turkey eastward to Iran and southward to Syria. Similarly, *Micromeriella hyalina angulata* is also not a wide spread taxon, it has been known to occur in Diyarbakır, Hatay, Iğdır, and Şanlıurfa provinces. It has been recorded from Israel to Iran and Turkey, Turkmenistan, Kazakhstan, Uzbekistan. Contrary to *C. thoracica*, its origin is countries east of Turkey, such as Turkmenistan, Kazakhstan and Uzbekistan. Probably, it was spread from east to west and reached through Iran to Anatolia. *Scolia erythrocephala erythrocephala* and *S. e. barbariae* are Mediterranean origin were spread toward east up to Iran. *Colpa klugii*, *C. quinquecincta*, *C. sexmaculata*, *S. hirta*, and *S. sexmaculata* are widespread species both in Turkey and in the palaeartic region. For their origin it is difficult to make any succession. However, *M. maculata maculata*, *S. flaviceps flaviceps*, *S. fallax*, *S. fuciformis*, *S. galbula*, *S. turkestanica*, *D. ciliata araratca*, and *S. asiella* are widespread in Turkey, but moderately distributed in abroad. In general, first six species have similar distribution ranges from Western Europe east to Central Asia. One of the possibilities; these species have north Mediterranean origin spread eastward to Central Asia or wise versa. Another possibility; they were Anatolian originated species spread both to east and to west. *D. ciliata araratca*, and *S. asiella* could be Anatolian origin and spread east and southward. Although the type locality of *S. anatoliae* is Anatolia and, recently described from Turkey (Osten, 2004), it is a quite widespread both in Turkey and in outside of Turkey. We assume that the origin of this species is the countries east of Turkey, such as Iran and Turkmenistan, spread toward west to Turkey and Greece.

It is worthy to emphasize that *Proscolia archaica* Rasnitsyn was described by Rasnitsyn (1977) on a single male from Armenia near Aras River and *Colpa moricei* (Saunders, 1901), was described from Algeria (Saunders, 1901), is distributed in South Israel, Iran and Turkmenistan, similarly, *Scolia f. mangichlakensis* (Radoskovsky, 1879) occur in Cyprus, Iran, Jordan, Israel and Caucasus (Osten, 2000; Osten et al., 2003). As Osten & Özbek (1999) and Osten (2000) indicated we have the same idea that these species theoretically could well be found in Turkey, but intensive collections have to be conducted in various places in right time of the year.

Furthermore, two records were considered doubtful and were not included in the checklist: *Megascolia bidens* (L.) is known from Italy, France, Spain, Algeria and Israel (Osten, 2000, 2005a). Tüzün & Bağrıaçık (2000),

noted that *M. bidens* occurring in İzmir Province of Aegean Region of Turkey. Records of *M. bidens* from other regions such as Turkey require confirmation; so far, all the examined specimens from there have proved to refer to *M. maculata*, which is very common in Turkey (Osten & Özbek, 1999). Records from Turkey are likely to be based on misidentification due to the fact that *M. bidens* and *M. maculata* are very similar species. Similarly, Japoshvili & Karaca (2010) reported *Scolia schrencki* (Eversmann, 1846) from Isparta Province. This species is known from Afghanistan, Kazakhstan, Kirgizhistan, Turkmenistan, Uzbekistan and western China (Osten et al., 2003; Osten, 2005b). This record should be confirmed. Additionally, Osten & Özbek (1999) indicated that *S. aenigmatica* might be subspecies of *S. sexmaculata* Müller. More material of these rarely collected species has to be found and studied to clarify the statuses of the Turkish records.

Finally, scoliid wasps are important group of insects due to the fact that adults are pollinators on various plant species, those of larvae are ectoparasitoids of the mostly Scarabaeidae (Coleoptera) species inhabiting in the soil (Day et al., 1981; Osten, 2005a, b). It is well-known that some of the scarabaeids are destructive and widespread pests, and among the most difficult group to control, because larvae feed in the soil on/in the roots or tubers. Therefore, natural enemies, such as parasitoids, play very important role in the regulating of the populations of these pests. Thus, by taking into consideration parasitoids of soil inhabiting pests we can emphasize that pest control strategies should poster the preservation of these and other natural enemies via the selection of judicious use of pesticides that have minimal impact on the natural enemy's complex and, where possible, provide suitable habitats in around fields to encourage natural enemies development and survival.

Özet

Türkiye'nin Scoliidae (Hymenoptera: Aculeata) türlerinin dağılışı ve zoocoğrafik özellikleri

Türkiye'nin Scoliidae faunası ile ilgili bu çalışmada değişik illerden toplanan 18 tür tespit edilmiştir. Literatür taraması sonucu, Türkiye'den yedi cins ve iki altfamilyaya ait 22 tür ve alttürün bulunduğu belirlenmiş olup Türkiye'deki scoliid türleri için bir kontrol listesi hazırlanmıştır. Bu türlerin ziyaret ettikleri bitki türleri verilmiştir. Türkiye'deki Scoliidae türleri için aşağıdaki temel korolojik kategoriler belirlenmiştir: Palearctic (2 tür), Centralasiatic-European (6), Centralasiatic-Mediterranean (1), Turano-Mediterranean (4), Turano-E-Mediterranean (1), Turanian (6), SW-Asiatic (1), E- Mediterranean (1).

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