

A contribution to the kleptoparasitic bees of Turkey: Part I., the genus *Sphecodes* Latreille (Hymenoptera: Halictidae)

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Received: 20.01.2015

Accepted/Published Online: 05.08.2015

Printed: 30.11.2015

Abstract: The present study was carried out to determine the occurrence and distribution of the kleptoparasitic bee genus *Sphecodes* Latreille (Hymenoptera: Halictidae) of Turkey. The material comprises samples collected from various parts of Turkey since the 1960s and certain private collections in Europe. The examination of the material and an overview of the published sources allowed us to reach the conclusion that *Sphecodes* of Turkey is represented by 33 species. Of these, *Sphecodes crassanus* Warncke, 1992 and *S. majalis* Pérez, 1903 are new records for Turkey as well the Asian continent. *Sphecodes alternatus* Smith 1853, *S. ephippius* (Linnaeus, 1767), *S. gibbus* (Linnaeus, 1758), *S. albilabris* (Fabricius, 1793), and *S. puncticeps* Thomson, 1870 were found to be the most widespread and abundant species occurring throughout the country. On the contrary, *S. armeniacus* Warncke 1992, *S. majalis* Pérez 1903, *S. niger* Hagens 1874, and *S. scabricollis* Wesmael 1835 were considered to be the rarest species, recorded from just one locality each. New localities for the inspected material are given to make a contribution to the knowledge about the distribution patterns of the species. As a kleptoparasitic genus, the known host records of *Sphecodes* were also included. Although species of the genus *Sphecodes* only forage for nectar on flowers and do not collect pollen, the plant species visited were also added if available.

Key words: *Sphecodes*, kleptoparasitic, Halictidae, new records, fauna, hosts, Turkey

1. Introduction

The bees (Hymenoptera: Apoidea: Apiformes) represent one of the richest groups of Aculeata with approximately 20,000 described species (Michener, 2007; Ascher and Pickering, 2015). They occur in most ecosystems where they are usually the most important pollinators of wild and cultivated plant species (Costanza et al., 1997; Buchmann and Ascher, 2005; Losey and Vaughan, 2006; Waser and Ollerton, 2006; Özbek, 2008a, 2008b, 2011). Halictidae is one of the largest bee families with about 3500 species (Pesenko, 2007) in 72 genera and 4 subfamilies (Rophitinae, Nomiinae, Halictinae, and Nomioidinae), known as sweat bees, a very diverse group found worldwide but especially abundant in temperate regions (Engel, 2005; Michener, 2007). The subfamily Halictinae, with approximately 2900 species (Ascher and Pickering, 2015), is divided into 2 tribes, Augochlorini and Halictini; the first one occurs in the western hemisphere, while Halictini has worldwide distribution (Michener, 2007). Among the 49 genera in the tribe Halictini the genus *Sphecodes* Latreille, 1804 is

the only common and widespread kleptoparasitic taxon (Michener, 2007; Bogusch and Straka, 2012).

The members of *Sphecodes* are usually black with a partially or wholly red metasoma, but in some species the metasoma can be all black. Mainly, the thorax is coarsely pitted and the dorsal surface of the propodeum is marked by coarse, often irregular longitudinal rugae, often delimiting shining spaces. The head is usually much wider than long (Michener, 2007; Bogusch and Straka, 2012). They are minute to moderate in size, ranging from 4.5 to 15 mm long.

Sphecodes is common on all continents except Australia, where it is known only from the northeast. In the Palearctic region it occurs from the Canary Islands and Britain to Japan, as far north as Finland, and in the southeast to India (Michener, 2007; Bogusch and Straka, 2012). Currently *Sphecodes* has 319 described species worldwide (Ascher and Pickering, 2015; Astafurova and Proshchalykin, 2015); about 50 species are known from the Palearctic Region (Pesenko, 2007) and 33 species from Central Europe (Bogusch and Straka, 2012).

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Sphecodes is a kleptoparasitic genus, commonly referred to “cuckoo bees”; the female destroys the egg of the host and replaces it with its own. Interestingly, the *Sphecodes* egg is not noticeably different from that of other halictine bees (Michener, 2007). Bogusch and Straka (2012) noted that the biology of *Sphecodes* was studied by a few authors. Blüthgen (1923, 1934) provided the first review of the biology of *Sphecodes*, including determination of the hosts. The hosts of *Sphecodes* were also studied by Vegter (1985, 1993) and Sick et al. (1994). Additionally, the hosts of *S. cristatus* Hagens, 1882; *S. majalis* Pérez, 1903; and *S. ruficrus* Erichson, 1852 were studied by different authors (Svensson, 1982; Herrmann et al., 2003; Herrmann, 2006). Moreover, Bogusch et al. (2006) studied the host specificity of *S. ephippius* (Linnaeus, 1767) and *S. monilicornis* (Kirby, 1802). Concerning plant association, Westrich (1989) and Celary (1991) studied the flower visiting of *Sphecodes* species and demonstrated that all species have polylectic behavior. Bogusch and Schlaghamerský (2010) supposed that *Sphecodes* bees also forage on aphid honeydew. However, in general, they only forage for nectar on flowers and do not collect pollen (Michener, 2007).

Studies on the *Sphecodes* fauna of Turkey are very limited; several species of *Sphecodes* were recorded at the beginning of the last century by Fahringer and Friese (1921), Fahringer (1922), Meyer (1925), Pfeiffer (1927), and Alfken (1935) in Anatolia. Özbek (1979) listed 6 *Sphecodes* species from different provinces of East Anatolia. Warncke (1992) studied the West Palearctic *Sphecodes* bees and recognized approximately 40 taxa, of which 26 species were detected in Turkey. Additionally, Warncke

(1992) described *Sphecodes anatolicus*, *S. armeniacus*, *S. geoffrellus hakkariensis*, and *S. rufiventris hethiticus* from Anatolia.

The aim of the present paper is to enhance the knowledge of the distribution and diversity of Turkish *Sphecodes* bees and briefly discuss their biogeographical affinities, as well as their hosts as parasitic bees and their visited plants.

2. Materials and methods

The material was generally collected in various parts of Turkey since the 1960s, but comes mainly from East Anatolia. All the bee specimens were collected via insect nets, and rarely by aspirators and Malaise traps placed in various habitats. Additionally, some *Sphecodes* samples, which were previously collected in Turkey by foreign scientists and deposited in various private collections, were examined by the second and third authors of this paper in Europe in addition to their own collection materials. Meanwhile, the plants visited by bees were also recorded or collected for diagnosis. All captured bee samples and collected plants were properly prepared for collections. A distribution map (Figure) was prepared for the species described from Turkey and rare species by using Google Earth.

The species are presented alphabetically and those that could not be inspected in this work are quoted from published sources. Provinces are presented in alphabetical order and the names of provinces are given in bold type. Decimal latitude-longitude information is given for certain species if available. If not mentioned otherwise, all material is deposited at EMET.



Figure. *Sphecodes* species that were described from Turkey (*S. anatolicus* Warncke, 1992 and *S. armeniacus* Warncke, 1992) and rare species (from Google Earth).

2.1. Abbreviations

AMNH: American Museum of Natural History, New York City, NY, USA.

EMET: Atatürk University, Faculty of Agriculture, Entomology Museum, Erzurum, Turkey.

E: East, S: South, SW: Southwest, WSW: West-southwest.

3. Results

Examination of the specimens collected from various parts of Turkey and from published sources yielded the conclusion that currently the *Sphecodes* fauna of Turkey is represented by 33 species.

3.1. *Sphecodes albilabris* (Fabricius, 1793)

Distribution: Almost all of Europe, except Norway and British Isles; extends to Asia (Russian Far East) including Turkey, present in North Africa (Morocco, Tunisia) (Westrich, 1989; Warncke, 1992; Lönnell and Cederberg, 2007; Astafurova and Proshchalykin, 2014). Probably accidentally introduced to Australia and USA (Ascher and Pickering, 2015). In Turkey: Ankara, Bilecik, Bursa, Eskişehir, İstanbul, (Fahringer, 1922; Meyer, 1925; Alfken, 1935); Ağrı, Ankara, Bilecik, Bitlis, Erzincan, Erzurum, Hakkari, İstanbul, Kayseri, Konya, Nevşehir, Niğde, Van (Warncke, 1992).

Material examined: Elazığ: Lake Hazar, 26.VI.1991, 2 ♀♀, leg. K. M. Guichard (in M. Schwarz coll.). **Erzincan:** Işıkpınarı, 1500 m, 27.IX.1979, ♂, ♀, leg. H. Özbek. **Erzurum:** Olur, Süngübayır, 40.84875 - 42.11520, 1700 m, 25.VI.2001, ♀, leg. J. G. Rozen and H. Özbek; Oltu, Başaklı, Ahırtap, 1600 m, ♀, 09.VII.2009, leg. J. S. Ascher, H. Özbek and J. G. Rozen; Pasinler, 5 km NE of Pasinler, 40.01400 - 41.72460, 04.VII.2007, ♀, leg. S. Ascher, H. Özbek and J. G. Rozen (in AMNH); Atatürk University Campus, 1900 m, 01.IX.1971, 2 ♀♀, leg. M. Doğanlar (on *Eryngium creticum* Lam.), 09.IX.1973, ♂, leg. M. Doğanlar; Şenyurt, 2300 m, 22.VIII.1991, ♂, leg. H. Özbek; Palandöken, 2300 m, 20–23.VIII.1987, 2 ♂♂, leg. R. Hayat (on *E. creticum*); Oltu, 18 km WSW of Oltu, Başaklı, 40.48722 - 41.80444, 27.VI.2001, ♀, leg. J. G. Rozen and H. Özbek (in AMNH); Başaklı, 1800 m, 01.VIII.1978, ♂, leg. H. Özbek (on *E. creticum*); Olur, Süngübayır, 40.84875 - 42.11520, 25.06.2001, ♀, leg. J. G. Rozen and H. Özbek (in AMNH); Şenkaya, Turnalı, 09.IX.1990, 3 ♂♂, leg. E. Yıldırım; Tortum, Esendurak, 1500 m, 11.IX.2001, ♂, leg. Ö. Çalmaşur; Yukarı Meydanlar, 2200 m, 09.VIII.2001, ♂, ♀, S. Çoruh. **Hatay:** Yayladağı, Kışlak, 14 km N from Yayladağı, 23.VII.1998, ♂, ♀, leg. T. Osten (in M. Schwarz coll.). **Konya:** Lake Beyşehir, 16.VI.1966, ♀, leg. K. Kusdas (in M. Schwarz coll.); Sille, 06.VI.1972, ♀, leg. K. Kusdas; 17.VI.1975, ♀, leg. J. Heinrich (in M. Schwarz coll.). **Mersin:** Gülnar, 36.33920 - 33.39970, 29.IV.1995, ♀, leg. ? (in AMNH). **Sivas:** Gürün, 04.VI.1970, ♀, leg. J.

Gusenleitner (in M. Schwarz coll.); Yeni Çubuk, 14.07.1996, ♀, (on *Allium cepa*), Leg. Flagothier (in P. Bogusch coll.). **Şanlıurfa:** Siverek, Karabahçe, 800 m, 05.IX.2002, ♀, leg. H. Özbek. **Van:** Muradiye, 38.99490 - 43.76800, 16.VI.1988, ♀, leg. C. Schmid-Egger (in AMNH).

Remark: *S. albilabris* is one of the most widespread and abundant species in Turkey.

Biology: Bogusch and Straka (2012) noted that *S. albilabris* is usually found in sand dunes, river banks, and semideserts. Usually, it occurs in warmer regions and is locally highly abundant. The present study confirmed their findings of it being an abundant species. However, the locations mentioned by Warncke (1992) and our findings suggest that its distribution range is wider than had been mentioned (cooler regions, ranging between 1500 and 2300 m in altitude). *Colletes cunicularius* (L.) is the main host (Malyshev, 1927; Blüthgen, 1934; Westrich, 1989). Bogusch and Straka (2012) noted that it has only one generation during the year and it is highly probable that females can be active for a long time and fly in the early summer, when primary host *C. cunicularius* is not available. In this situation, *S. albilabris* can accept another (secondary) host. Rozen (1965) observed old, worn females entering the nests of *Melitturga clavicornis* (Latreille) and larvae of *S. albilabris* were excavated and obtained from its nest. Blüthgen (1934) also gave *Halictus quadricinctus* (Fabricius) as an unconfirmed host. Bogusch and Straka (2012) observed the females of *S. albilabris* invading nests of *Halictus quadricinctus* Latreille.

3.2. *Sphecodes alternatus* Smith, 1853

Distribution: Almost all of Europe through Turkey, Iran to Turkestan; North Africa (Tunisia) (Warncke, 1992; Amiet et al., 1999; Ascher and Pickering, 2015). In Turkey: Muş (Özbek, 1979); Ağrı, Adana, Adıyaman, Ankara, Artvin, Bitlis, Denizli, Eskişehir, Hakkari, İstanbul, İzmir, Kars, Kayseri, Kırıkkale, Konya, Mersin, Nevşehir, Ordu, Samsun, Siirt, Şırnak, Van (Warncke, 1992).

Material examined: Ankara: 16.VII.1997, ♂, leg. S. Aşar. **Bitlis:** Tatvan, 30.VII.1978, ♂, leg. H. Özbek. **Burdur:** 20 km SW from Burdur, 07.VII.2006, ♂, ♀, leg. J. Halada, (in M. Schwarz coll.). **Erzincan:** Kemah, 39.60100 - 39.83800, 07.VII.2001, ♀, leg. J. G. Rozen, H. Özbek (in AMNH). **Erzurum:** Atatürk University Campus, 2000 m, 03.VIII.2004, ♂, leg. H. Özbek (on *E. creticum*); 17.VIII.2003, ♀, leg. H. Özbek, 29.VIII.1987, ♂, leg. H. Özbek (on *E. creticum*); Palandöken, 2300 m, 23.VII.1987, ♂, leg. H. Özbek; Horasan, Aras valley, 04.VI.2000, ♀, leg. H. Özbek; Oltu, 22 km WSW of Oltu, 40.47166 - 41.77777, 1700 m, 25.VI.2001, ♀, leg. J. G. Rozen and H. Özbek (in AMNH); Çamlıbel, 26.VII.2000, 1600 m, ♂, leg. H. Özbek; Subatık, 1300 m, 13.VIII.2004, ♂, leg. H. Özbek; Tortum, Derekapı, 20.09.2000, ♂, leg. H. Özbek. **Hatay:** Antakya, 02.VI.1965, ♀, leg. M. Schwarz (in Schwarz

coll.); Arsuz, 2 km SW from Hatay, 19.VII.1998, ♀, leg. T. Osten (in M. Schwarz coll.). **Isparta:** Central, 09.VII.2006, ♀, leg. M. Kadlecová (in M. Schwarz coll.). **Konya:** Central 15.VI.1965, ♀, leg. M. Schwarz (in M. Schwarz coll.); Eflatun Pınar, 15.VII.1998, 7♂♂, ♀, leg. C. Schmid-Egger (in C. Schmid-Egger coll.). **Nevşehir:** Göreme, 17.VII.1998, 3♂♂, leg. C. Schmid-Egger (in C. Schmid-Egger coll.). **Niğde:** Karakışlakçı, 07.VII.1995, ♂, leg. Y. Barbier (in P. Bogusch coll.). **Mersin:** Mut, 08.VI.1965, ♀, leg. Schmidt, 13.VI.1965, ♀, leg. J. Gusenleitner (in M. Schwarz coll.); Silifke, Boğusak, 10 m, 03.IX.1987, ♂, leg. H. Özbek. **Muş:** Central, 09.X.1972, ♀, leg. M. Doğanlar. **Sinop:** 25.VII.1977, 2 ♂♂, leg. H. Özbek. **Şanlıurfa:** Central, 28.V.1970, ♂, leg. J. Gusenleitner (in M. Schwarz coll.).

Remark: *S. alternatus* is one of the most widespread and abundant species in Turkey.

Biology: Samples were found mostly in open areas at altitude ranges between 10 and 2300 m. Bogusch and Straka (2012) indicated that *S. alternatus* is a species of warm sites, especially sand dunes, and quite common in various warm biotopes. Bogusch and Straka (2012) observed it in association with *Halictus compressus* (Walckener) in Hungary and noted that *H. langobardicus* Blüthgen is another likely host.

3.3. *Sphecodes anatolicus* Warncke, 1992

Distribution: Turkey (Warncke, 1992); Italy (Sicilia) (Nobile and Campadelli, 1998). In Turkey: Konya (type locality), Niğde (Warncke, 1992).

Material examined: **Erzurum:** Çat, Çirişli, 2100 m, 22.VI.1987, ♀, leg. H. Özbek; Horasan, Aras Valley, 16.VI.1973, ♀, leg. K. Warncke (in M. Schwarz coll.). **Isparta:** Central, 09.VII.2006, ♂, leg. M. Kadlecová (in M. Schwarz coll.). **Konya:** Madenşehir, 07.VIII.1972, 2 ♂♂, 20.VI.1973, ♀, leg. K. Warncke (in M. Schwarz coll.). **Mersin:** Mut, Çömelek, 29.V.1996, ♀, leg. M. Halada (in P. Bogusch coll.). **Niğde:** Ulukışla, 29.V.1972, ♀, leg. K. Warncke (in M. Schwarz coll.). **Sivas:** Gürün, 04.VI.1972, ♀, leg. K. Kusdas (in M. Schwarz coll.).

Remark: *S. anatolicus* was described from Konya and Niğde; later it was recorded outside of Turkey in Italy and Spain. Erzurum is found to be the easternmost record of this species (Figure).

3.4. *Sphecodes armeniacus* Warncke, 1992

Distribution: Tajikistan (Ascher and Pickering, 2015), Turkey (Warncke, 1992; Ascher and Pickering, 2015). It was described from Kars (Warncke, 1992). In spite of intensive collection efforts since the 1970s in Kars, Erzurum, and other neighboring provinces, it has not been encountered; it is probably extinct or on the verge of extinction in Turkey (Figure). However, interestingly, Ascher and Pickering (2015) indicated that it has a record from Tajikistan.

3.5. *Sphecodes barbatus* Blüthgen, 1923

Distribution: Greece and Turkey (Ascher and Pickering, 2015). In Turkey: Ankara, Antalya, Erzurum, İstanbul, Kahramanmaraş, Kars, Van (Warncke, 1992; as *S. majalis barbatus* Blüthgen, 1923).

Material examined: **Adana:** between Kamışlı and Fındıklı, 29.VI.2011, ♀, leg. J. Straka (in J. Straka coll.). **Ankara:** 10.VI.1973, ♂, leg. K. Warncke (in M. Schwarz coll.). **Erzurum:** Pasinler, Hamamderesi, 16 km E of Erzurum, 39.93830 - 41.45190, 01.VII.2007, ♂, leg. J. S. Ascher, H. Özbek and J. G. Rozen (in AMNH). **Konya:** 26.V.1965, ♂, leg. K. Kusdas; 05.VI.1967, ♀, leg. J. Gusenleitner (in M. Schwarz coll.), 15.VI.1968, ♀, leg. K. Kusdas (in P. Bogusch coll.). **Nevşehir:** Ürgüp, 07.VI.1975, ♀, leg. J. Heinrich (in M. Schwarz coll.). **Sivas:** Gürün, 04.06.1970, ♂, leg. K. Kusdas; 02.06.1978, ♂, leg. M. Schwarz (in M. Schwarz coll.).

3.6. *Sphecodes crassanus* Warncke, 1992

Distribution: Mainly South Europe; Portugal, Spain, France (+Corsica), Italy (+Sardinia and Sicily), Greece (Warncke, 1992), Switzerland (Amiet et al., 1999), Algeria (Bogusch and Straka, 2012).

Material examined: **Aydın:** Davutlar National Park, 30.VI.1997, ♂, leg. H. Özbek. **Erzurum:** Oltu, 14.IX.1978, ♀, leg. H. Özbek; Subatık, 1300 m, 13.VIII.2004, ♂, leg. H. Özbek; Pasinler, 08.VIII.1997, ♂, leg. S. Aşar; Uzundere, 20.IX.2000, ♀, leg. Ö. Çalmaşur. **Hatay:** Reyhanlı, 28.V.1991, ♂, leg. H. Özbek. New for the Turkish fauna and the Asian continent as well.

Remark: *S. crassanus* was described from Spain by Warncke (1992) and detected from neighboring countries, France, Portugal, and Italy. This is the first record from Turkey (Figure). Currently Erzurum (Turkey) is the easternmost distribution record of this species.

Biology: Bogusch and Straka (2012) claimed that *S. crassanus* is a poorly known species of open warm habitats with unknown host and its biology is probably similar to that of *S. alternatus*. Medium-sized species of the genus *Halictus* Latreille might be the hosts of this species.

3.7. *Sphecodes crassus* Thomson, 1870

Distribution: Europe including British Isles, north to 64°N, Sweden, Finland, and Norway; Asian Russia to far East Russia and Japan, Mongolia (Astafurova and Proshchalykin, 2014, 2015); Turkey, Iran, and North Africa (Warncke, 1992; Ascher and Pickering, 2015). In Turkey: Ardahan, Bayburt, Erzincan, Hakkari, Kayseri (Warncke, 1992).

Material examined: **Artvin:** Yusufeli, Kinalıçam, 21.05.2002, 600 m, ♀, leg. H. Özbek.

Biology: Bogusch and Straka (2012) mentioned that *S. crassus* is a common species that usually occurs in semiopen biotopes with shrubs, steppes, and forest margins. They indicated that smaller species of Halictidae could be the

hosts of this species. *Lasioglossum pauxillum* (Schenck) and *L. punctatissimum* (Schenck) were mentioned as confirmed hosts (Westrich, 1989; Vegter, 1993; Sick et al., 1994). *Lasioglossum quadrinotatum* (Schenck), *L. nitidiusculum* (Kirby), and *L. prasinum* (Smith) were recorded as likely hosts (Alfken, 1912; Stoeckhert, 1933; Vegter 1993).

3.8. *Sphecodes cristatus* Hagens, 1882

Distribution: Europe to 54°N, including Sweden (not present in Portugal, Spain, and the British Isles). Distribution range extends to Turkey, South Kazakhstan, Tajikistan, China, Mongolia, and East Russia (Warncke, 1992; Ascher and Pickering, 2015; Astafurova and Proshchalykin, 2015). In Turkey: Ardahan, Bayburt, Nevşehir, Niğde (Warncke, 1992).

Material: Hakkari: Akçalı, 21.06.2010, ♀, leg. P. Tyrner (in P. Tyrner coll.). Kars: Sarıkamış, Karakurt, 1500 m, 40.07543°N, 42.20941°E, 16–23.VIII.2002, ♀ (Malaise trap).

Biology: *Lasioglossum nigripes* (Lepeletier) is the host of *S. cristatus* (Blüthgen, 1934).

3.9. *Sphecodes croaticus* Meyer, 1922

Distribution: Bogusch and Straka (2012) examined material from Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Portugal, Slovakia, Spain, and Turkey. Warncke (1992), as a first record for Turkey, collected 13 samples from Erzurum, Hakkari, Konya, and Niğde provinces; the determination of these samples could be incorrect.

Material examined: Konya: Sille, 04.VII.1977, ♀, leg. J. Heinrich (in M. Schwarz coll.).

Biology: Bogusch and Straka (2012) indicated that *S. croaticus* is a rare species of warm open habitats. According to Blüthgen (1934), *Lasioglossum interruptum* (Panzer) is the only known host of *S. croaticus*, but it is unconfirmed.

3.10. *Sphecodes dusmeti* Blüthgen, 1924

Distribution: Spain, France, Greece, Bulgaria, Switzerland, Morocco, Algeria, Dubai, United Arab Emirates, Tajikistan, and Turkey (Warncke, 1992; Bogusch and Straka, 2012; Ascher and Pickering, 2015). In Turkey: Bitlis, Hakkari, Kars, Konya (Warncke, 1992).

Material examined: Hakkari: Suvari-Halil Pass, 27.06.1985, ♀, leg. M. Schwarz (in M. Schwarz coll.).

3.11. *Sphecodes ephippius* (Linnaeus, 1767)

Distribution: Generally in southern Europe (Spain, France, Greece, Italy, Serbia, Slovenia, Switzerland, Bulgaria, Belorussia, Ukraine), Britain, Scandinavia Morocco, Algeria, Dubai, United Arab Emirates, Turkey, through Asia including Kyrgyzstan to Japan (Warncke, 1992; Bogusch and Straka, 2012; Ascher and Pickering, 2015). In Turkey: Eskişehir, Isparta, Kayseri, Bursa (Fahringer, 1922; Meyer, 1925; Pfeiffer, 1927); Ardahan, Erzurum (Özbek,

1979); Ağrı, Antalya, Artvin, Aydın, Bitlis, Bolu, Erzincan, Hakkari, Kars, Konya, Van (Warncke, 1992).

Material examined: Ardahan: Central, 30.V.1995, ♀, leg. M. Doğanlar. Artvin: Kafkasör, 1300 m, 41.0954 - 41.4740, ♀, leg. Ö. Çalmaşur. Bingöl: Ilıcalar, 17 km to Bingöl, 1250 m, 07.V.2002, 2 ♀♀, leg. H. Özbek. Burdur: 07.VII.2006, ♀, leg. M. Kadlecová (in M. Schwarz coll.). Erzurum: Atatürk University Campus, 33.90.290 N - 41.25.284 E, 2000 m, 06.VII.2004, ♀, leg. H. Özbek and J. G. Rozen, 04.VI.1971, ♀, leg. H. Özbek; 08.VI.1971, ♀, leg. H. Özbek; 17.VII.1974, ♂, leg. H. Özbek (on *Onobrychis viciifolia* Scop.); Çat, 25 km Erzurum, 2000 m, 11.VII.2001, ♀, leg. Ö. Çalmaşur; Hınıs, Söylemez, 1850 m, 19.VII.2001, ♂, leg. S. Çoruh (on *E. creticum*); Ilıca, 20.VI.2003, ♀, leg. J. Hájek, (in National Museum Praha coll.); Palandöken, 23.VIII.1987, 3 ♂♂, 3 ♀♀, leg. H. Özbek and R. Hayat; Horasan, Karaçuha, 21.V.1980, ♀, leg. H. Özbek, Köprüköy, İncesu, 2340 m, ♂, leg. S. Çoruh and C. Güçlü; Oltu, Başaklı, 01.IX.1978, 2 ♂♂, leg. H. Özbek; Timrek, 2300 m, 14.VII.2004, ♂, leg. H. Özbek (on *Cephalaria procera* Fisch. and Lall.); Başaklı-Tutmaç border, 1900 m, 01.VII.2000, 2 ♀♀, leg. Ö. Çalmaşur (on *C. procera*); Uzunoluk, Köroğlu, 2200 m, 40.3846 - 41.5647, ♂, leg. H. Özbek; Palandöken, 23.VIII.1987, 18 ♀♀, 9 ♂♂, leg. H. Özbek and R. Hayat; Tortum, Aşağı Meydanlar, 21.V.1995, ♀, leg. İ. Aslan; Pasinler, 5 km NE of Pasinler, 40.01400 - 41.72460, 10.VII.2007, ♀, leg. J. S. Ascher, H. Özbek and J. G. Rozen; Oltu, Başaklı, 18 km WSW of Oltu, 40.48722 - 41.80444, 27.06.2001, ♀, leg. H. Özbek and J. G. Rozen; Başaklı, 20 km WSW of Oltu, 40.48722 - 41.80444, 1500 m, 03.VII.2001, ♀, leg. H. Özbek and J. G. Rozen; 5–25 km SSW of Oltu, 18.V.2002, ♀, leg. H. Özbek and J. G. Rozen. Muş: Devlet Üretme Çiftliği, 01.VI.1972, ♂, ♀, leg. H. Özbek and M. Doğanlar. Sinop: Central, 25.VII.1977, ♂, leg. H. Özbek (on *Carduus nutans* L.).

Biology: Previous and present records show that *S. ephippius* is numerous and widespread throughout Turkey. It is active from April to October and occurs from sea level (Antalya) to about 2500 m (Erzurum). Probably it has more than one generation per year. Bogusch and Straka (2012) emphasized that it is a dominant species in Central and common in South Europe. Concerning its hosts, Bogusch et al. (2006) recorded the following species as confirmed hosts: *Halictus tumulorum* (Linnaeus), *Lasioglossum laticeps* (Schenck), *L. leucozonium* (Schränk), *L. malachurum* (Kirby), *L. pauxillum*, and *L. quadrinotatum*. The same authors listed the likely unconfirmed hosts as *Andrena barbilabris* (Kirby), *A. flavipes* Panzer, *A. chrysopyga* Schenck, *A. labialis* (Kirby), *A. minutula* (Kirby), *A. wilkella* (Kirby), *Halictus maculatus* Smith, *H. rubicundus* (Christ), *Lasioglossum fratellum* (Pérez), *L. lativentre* (Schenck), and *L. prasinum*. Additionally, *Andrena argentata* Smith was observed as a host of *S. ephippius*.

3.12. *Sphecodes ferruginatus* Hagens, 1882

Distribution: All of Europe including Scandinavia and Britain, Turkey, Far East, Asian Russia (Warncke, 1992; Astafurova and Proshchalykin, 2014, 2015; Ascher and Pickering, 2015). In Turkey: İstanbul, Konya (Meyer, 1925); Antalya, Kars, Hakkari (Warncke, 1992).

Material examined: **Erzurum:** Ilıca, Ağzıaçık Geçidi, 2300 m, 19.VII.2008, ♂, leg. H. Özbek; Subatık, 1300 m, 13.VIII.2004, ♂, leg. H. Özbek. **Kars:** Sarıkamış, Karakurt, 40.07543°N, 42.20941°E, 1500 m, 16.VII–04.VIII.2005, ♀, Malaise trap.

Biology: Bogusch and Straka (2012) indicated that it is species of midlands, usually found in grasslands or on sunny slopes, but not in warm areas. However, our findings show that *S. ferruginatus* lives both in warmer and cooler regions. Stoeckhert (1933) recorded *Lasioglossum fulvicorne* (Kirby) as the only documented host. Similar species such as *L. laticeps* and *L. pauxillum* have been mentioned as likely hosts of this species (Stoeckhert, 1933; Westrich, 1989). Bogusch and Straka (2012) emphasized that surveys on localities with these species present did not support this as the females of *S. ferruginatus* were invading only nests of *L. fulvicorne*.

3.13. *Sphecodes geoffrellus* (Kirby, 1802)

Distribution: Most of the European countries (present in Britain and Scandinavia), North Africa (Morocco, Tunisia), Turkey, Near East, Siberia (Warncke, 1992); Russian Far East, Mongolia, and Japan (Astafurova and Proshchalykin, 2015). Bogusch and Straka (2012) indicated that it is highly abundant in southern Europe. In Turkey: İstanbul (Meyer, 1925); Konya, Niğde (Warncke, 1992).

Material examined: **Ankara:** Kızılcahamam, 26.V.1978, ♀, leg. M. Schwarz (in M. Schwarz coll.). **Erzurum:** Palandöken Mountain, about 2200 m, 05.VII.2007, ♀, leg. J. S. Ascher, H. Özbek and J. G. Rozen; 25 km NE Erzurum, 30.VI.2001, ♀, leg. J. G. Rozen and H. Özbek (in AMNH).

Remark: Warncke (1992) described *S. geoffrellus hakkariensis* Warncke, 1992 from Hakkari and recorded it from Artvin, Bitlis, and Erzurum.

Biology: According to Bogusch and Straka (2012) it is a common species both in warmer and cooler regions. However, present and previous records revealed that it is quite widespread but not an abundant species in Turkey. *Lasioglossum leucopus* (Kirby), *L. morio* (F.), *L. nitidiusculum* (Kirby), and *L. pauxillum* (Schenck) are confirmed hosts (Westrich, 1989; Bogusch, 2003). *L. fratellum*, *L. rufitarse* (Zetterstedt), *L. sexstrigatum* (Schenck), and *L. marginellum* (Schenck) are likely hosts (Vegter, 1993; Field, 1996; Neumeyer and Obrist, 2000; Westrich, 2006). It is possible that this species invades nests of various smaller *Lasioglossum* species, and the females are individually specialized, as Bogusch et al. (2006) confirmed in *S. ephippius* and *S. monilicornis*.

3.14. *Sphecodes gibbus* (Linnaeus, 1758)

Distribution: Nearly all of Europe (north to 63°N), goes far into the Asian mainland to Mongolia, China, India, Pakistan (Astafurova and Proshchalykin, 2015), and North Africa (Warncke, 1992; Ascher and Pickering, 2015). In Turkey: Bursa, İstanbul, Osmaniye (Fahringer and Friese, 1921; Fahringer, 1922; Meyer, 1925); Erzurum, Muş (Özbek, 1979) (on *Eryngium* sp., *Euphorbium* sp., *Brassica* sp.); Ağrı, Ankara, Artvin, Erzincan, Eskişehir, Hakkari, Kars, Kayseri, Konya, Niğde, Sivas, Şanlıurfa, and Van (Warncke, 1992).

Material examined: **Ağrı:** Eleşkirt, Sarıköy, 1900 m, 26.VII.2003, ♂, leg. H. Özbek; Balıklı Göl, 24.VI.1987, ♀, leg. Ö. Alaoğlu. **Ankara:** Haymana, 29.VII.1977, 2 ♂♂, leg. S. Aşar. **Artvin:** Yusufeli, Kınalıçam, 700 m, 21.V.2002, ♀, leg. H. Özbek. **Bingöl:** Buğlan Geçidi, 24.VI.2010, ♂, leg. P. Tyrner (in P. Tyrner coll.). **Bitlis:** Tatvan, 10.VII.1984, ♀, leg. A. W. Ebmer (in M. Schwarz coll.). **Erzurum:** 5 km NE of Pasinler, 10.VII.2007, 40.01400 - 41.72460, 10.VII.2007, ♀, leg. J. S. Ascher, H. Özbek and J. G. Rozen; Atatürk University Campus, 2000 m, 39.90250 - 41.23500, 09.07.2007, ♀, leg. J. S. Ascher, H. Özbek and J. G. Rozen (in AMNH); 18.VI.1966, ♀, leg. H. Özbek, 02.VII.1970, ♀, leg. H. Özbek, 06.VII.1992, ♀, leg. E. Yıldırım, 17.VII.2003, 2 ♂♂, leg. H. Özbek; Kargapazarı Mt., 2500 m, 31.VIII.2005, ♀, ♂, leg. H. Özbek; Ilıca, Atlıkonak, 13.VI.2002, 2000 m, ♀, leg. Ö. Çalmaşur; Palandöken, 2300 m, 23.VIII.1987, 7 ♂♂, leg. H. Özbek and R. Hayat; Muratgeldi, 03.VIII.1997, ♀, 9 ♂♂, leg. S. Aşar; Şenyurt: 2300 m, 22.VI.1991, 4 ♂♂, leg. H. Özbek; Oltu, Başaklı, 1700 m, 01.IX.1987, 2 ♀♀, 2 ♂♂, leg. H. Özbek, 17.IX.1977, 2 ♂♂, leg. H. Özbek; Çamlıbel, 1600 m, 26.VII.2000, ♂, leg. H. Özbek; Karakol, 1600 m, 01.VII.2000, ♀, leg. Ö. Çalmaşur; Şenkaya, Turnalı, 01–05.VII.1990, 3 ♂♂, leg. E. Yıldırım; Tortum, Yukarı Meydanlar, 09.VIII.2001, ♂, leg. S. Çoruh; Esendurak, 1500 m, 11.IX.2001, ♀, ♂, leg. Ö. Çalmaşur; Uzundere, Altınçanak, 1150 m, 08.IX.2005, ♀, leg. H. Özbek. **Hakkari:** Akçalı, 21.VI.2010, ♀, leg. P. Tyrner (in P. Tyrner coll.). **Isparta:** Central, 09.VII.2006, ♀, leg. M. Kadlecová, (in M. Schwarz coll.). **Kars:** Sarıkamış, 1700 m, 09.VIII.2000, ♀, leg. Ö. Çalmaşur; 26.VIII.1995, ♀, leg. E. Yıldırım; Karakurt, 1500 m, 40.07543°N, 42.20941°E, 20.V.2005, ♀, leg. H. Özbek, 10–18.VI.2003, ♀, leg. H. Özbek, 13.VII.2006, ♀, leg. H. Özbek, 22.VII.2002, ♂, leg. H. Özbek. **Kayseri:** Central, 01.VI.1964, ♀, leg. J. Gusenleitner (in M. Schwarz coll.). **Konya:** Güneysınır, Karagüney, 03.IX.2000, 5 ♂♂, 2 ♀♀, leg. M. Kesdek, 04.VIII.2002, ♂, leg. M. Kesdek; Sille, 10.VI.1966, ♀, leg. H. F. Hamann (in M. Schwarz coll.). **Neveşehir:** Zelve, Avanos, 18.VII.1984, ♂, leg. A. W. Ebmer (in M. Schwarz coll.). **Niğde:** Karakışlakçı, 07.VII.1995, 2 ♂♂, ♀, leg. Y. Barbier (in P. Bogusch coll.). **Sivas:** Gürün, 03.VI.1970, 2 ♀♀, leg. J. Gusenleitner (in M. Schwarz coll.). **Şanlıurfa:**

02.VI.1968, ♀, leg. J. Gusenleitner (in M. Schwarz coll.).
Rize: Çamlıhemşin, 500–1200 m, 2 ♂♂, leg. E. Yıldırım.

Biology: Previous and present records revealed that *S. gibbus* is one of the most widespread and abundant species throughout Anatolia and it was recorded mainly above 700 m to 2500 m. Similarly, Bogusch and Straka (2012) mentioned that it is one of the most common species of *Sphecodes* and it is more common in South and Central Europe. They also emphasized that this species is very variable in appearance and in host spectrum. *Halictus quadricinctus*, *H. rubicundus*, and *H. sexcinctus* were mentioned by Westrich (1989) as the hosts and *H. maculatus* as a likely host. Bogusch (2003) confirmed *H. simplex* Blüthgen as a host and indicated *Lasioglossum malachurum* as a likely host.

3.15. *Sphecodes intermedius* Blüthgen, 1923

Distribution: Czech Republic, Slovakia, Hungary, Spain, Russia, Ukraine, Turkey, Caucasus, Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, and Algeria (Warncke, 1992; Bogusch and Straka, 2012; Ascher and Pickering, 2015). In Turkey: Ağrı, Ankara, Erzurum, Eskişehir, Hakkari, Iğdır, Kilis, Konya, Mardin, Nevşehir, Van (Warncke, 1992).

Material examined: **Bitlis:** Aşağı Kolbaşı, 1700 m, 22.VII.2003, ♂, leg. H. Özbek. **Erzurum:** Atatürk University Campus, 2000 m, 14.06.1974, 2 ♂♂, leg. H. Özbek, 02.VII.1972, ♂, leg. H. Özbek (on *E. creticum* Lam.); 29.VI.1992, ♂, leg. E. Yıldırım; 01.XI.1971, ♀, leg. M. Doğanlar; 30 km W of Erzurum, Daphan, 20.VI.1987, ♂, leg. T. Osten. **Konya:** Güneysınır, Karagüney, 03.IX.2000, ♀, leg. M. Kesdek. **Mersin:** Mut, Çömelek, 29.V.1996, ♂, leg. M. Halada (in P. Bogusch coll.).

Biology: According to Bogusch and Straka (2012), the biology of this species is not well known; probably a species of warm and dry biotopes, they think that *Halictus kessleri* Bramson can be a host of this species, too.

Remark: Bogusch and Straka (2012) noted that *S. intermedius* is a rare species, known in all countries from only one to several records, most of which are very old. It is important to point out that *S. intermedius* is rather abundant in Turkey; in addition to the samples collected in the present study, Warncke (1992) collected 102 samples from 11 provinces.

3.16. *Sphecodes longulus* Hagens, 1882

Distribution: Europe, including southern Finland, Sweden, Denmark, and England. In Asia it reaches through Turkey to Tajikistan and the Russian Far East (Westrich, 1989; Warncke, 1992; Bogusch, 2003; Madsen and Calabuig, 2011; Astafurova and Proshchalykin, 2014). In Turkey: Adıyaman, Antalya, Aydın, Bursa, Erzurum, Hakkari, Kars, Konya, Şanlıurfa (Warncke, 1992).

Material examined: **Erzurum:** Atatürk University Campus, 2000 m, 01.VII.2004, ♀, leg. J. G. Rozen and H.

Özbek (in AMNH). **Hakkari:** Güzeldere, 22.VI.2010, 2 ♂♂, leg. M. Halada (in M. Schwarz coll.). **Kars:** Sarıkamış, 17 km east of Karakurt, 40.12722 - 42.73611, 19.05.2002, ♀, leg. J. G. Rozen and H. Özbek (in AMNH).

Biology: *Lasioglossum minutissimum* (Kirby) was detected as confirmed host of *S. longulus* (Alfken, 1912). Vegter (1993) indicated *L. leucopus* and *L. zonulum* (Smith) as additional hosts, which is possible. *Lasioglossum lucidulum* (Schenck) and *L. sexstrigatum* were mentioned by Vegter (1993) and *L. morio* by Westrich (1989) as likely hosts. Bogusch and Straka (2012) observed that nests of *L. punctatissimum* and *L. semilucens* (Alfken) were invaded by females of this species.

3.17. *Sphecodes majalis* Pérez, 1903

Distribution: Spain, France, Belgium, Germany, Switzerland, Austria, Italy, Slovenia, Czech Republic, Slovakia, Hungary, European Russia, Iran, Ukraine, Algeria (Warncke, 1992; Ascher and Pickering, 2015).

Material examined: **Osmaniye:** Aslanlı Beli, 970 m, 13.V.2002, ♀, leg. H. Özbek. It is a new record for Turkey.

Biology: It is a very rare species, currently represented by a single sample in the country (Figure). Likewise, Bogusch and Straka (2012) pointed out that *S. majalis* is a very rare species and occurs in steppes and at sunny sites, and *Lasioglossum pallens* (Brullé) is its host. Herrmann et al. (2003) described the biology both of the host and the parasite.

3.18. *Sphecodes monilicornis* (Kirby, 1802)

Distribution: Most of Europe, north to 64°N, in the east through Turkey, Kashmir, and Pakistan to Russia (Amur, Khabarovsk, Primor'ye) and Japan and Mongolia; North Africa (Morocco) (Westrich, 1989; Warncke, 1992; Ascher and Pickering, 2015; Astafurova and Proshchalykin, 2015). In Turkey: Bilecik, Bursa, İstanbul (Fahringer, 1922; Meyer, 1925); Erzurum (Özbek, 1979); Antalya, Bitlis, Erzincan, Erzurum, Eskişehir, Hakkari, Konya, Malatya, Mardin, Mersin, Nevşehir, Şanlıurfa as *S. monilicornis cephalotes* Meyer, 1920 (Warncke, 1992).

Material examined: **Adana:** Karanfil, 09.VII.1995, ♀, leg. P. Rasmont (in P. Bogusch coll.). **Ağrı:** 10 km S, 1650 m, 26.VII.2003, 3 ♂♂, leg. H. Özbek. **Ankara:** 16.VII.1997, ♂, leg. S. Aşar. **Bitlis:** Tatvan, 30.VII.1978, ♂, leg. H. Özbek (on *E. creticum* Lam.). **Burdur:** 07.VII.2006, ♂, leg. M. Kadlecová (in M. Schwarz coll.). **Erzurum:** Central, 01.07.2004, 2 ♀♀, leg. G. Rozen and H. Özbek; 02.VII.2007, 2 ♀♀, leg. G. Rozen and H. Özbek, 06.VII.2004, ♀, leg. G. Rozen and H. Özbek; Atatürk University Campus, 39.90250 - 41.23500, 30.VI.2007, ♀, leg. G. Rozen and H. Özbek (in AMNH); 09.VI.1970, ♀, leg. H. Özbek; 03.VIII.2004, ♂, leg. H. Özbek, 22.VIII.1987, ♂, leg. R. Hayat; Çatıolu, Gölet, 39.78888 - 41.14888, 09.VII.2004, ♀, leg. G. Rozen and H. Özbek (in AMNH), 03.VIII.2004, ♂, leg. H. Özbek; Ilıca, Ağzıaçık, 2200 m, ♀, leg. Ö.

Çalmaşur; Çat, 08.V.1989, ♂, leg. H. Özbek; Palandöken, 23.VIII.1987, 28 ♀♀, 4 ♂♂, leg. H. Özbek and R. Hayat (on *Carduus nutans* L.); Şenyurt, 22.VIII.1991, ♀, leg. H. Özbek; Oltu, Çamlıbel, 1600 m, 26.VII.2000, ♂, leg. H. Özbek. **Konya:** Central, 15.VI.1965, 5 ♀♀, leg. M. Schwarz; 15.VI.1968, 4 ♀♀, leg. J. Gusenleitner (in M. Schwarz coll.); Beyşehir, 15.VI.1966, ♀, leg. K. Kusdas (in M. Schwarz coll.); Eflatun Pınar, 15.VII.1998, 6 ♂♂, leg. C. Schmid-Egger (in C. Schmid-Egger coll.). **Nevşehir:** Göreme, 17.VII.1998, 5 ♂♂, leg. C. Schmid-Egger (in C. Schmid-Egger coll.). **Şanlıurfa:** 08.VI.1968, ♀, leg. J. Gusenleitner (in M. Schwarz coll.). **Şırnak:** 23.VI.2010, 3 ♀♀, leg. P. Tyrner (in J. Straka coll.).

Biology: Present and previous records reveal that *S. monilicornis* is a rather widespread and abundant species in Turkey. Likewise, Bogusch and Straka (2012) mentioned that *S. monilicornis* is a common species, especially in warm habitats, and occurs mainly on steppes and at sandy sites. Confirmed hosts are the following: *Halictus rubicundus*, *Lasioglossum albipes* (F.), *L. calceatum* (Scopoli), *L. leucozonium*, *L. quadrinotatum*, *L. zonulum*, and *L. malachurum*. Possible parasitization in nests of *Andrena flavipes*, *Halictus maculatus*, *H. tumulorum*, *Lasioglossum laticeps*, *L. pauxillum*, *L. prasinum*, and *L. villosulum* (Kirby) was indicated by Vegter (1993) and Bogusch (2003). Bogusch and Straka (2012) also thought that the number of hosts of this species is high and the females are individually specialized. Legewie (1925) and Radchenko and Pesenko (1994) mentioned that females of *S. monilicornis* can kill the workers before laying eggs in all cells.

3.19. *Sphecodes niger* Hagens, 1874

Distribution: Nearly all of Europe, present in Turkey (Westrich, 1989; Warncke, 1992; Bogusch and Straka, 2012; Ascher and Pickering, 2015). As Turkish material, Warncke (1992) found only one male as a new record, in Ankara (Figure). In the present study no sample was encountered. Thus, *S. niger* might be a very rare species in Turkey. Maybe this is the only specimen that has been collected so far from Turkey. Among the Asian countries *S. niger* was found only in Turkey, and with the present knowledge, Ankara is the easternmost and southernmost distribution record of this species.

Biology: According to Bogusch and Straka (2012), *S. niger* occurs in warm biotopes, and *Lasioglossum morio* is the only confirmed host.

3.20. *Sphecodes nomioidis* Pesenko, 1979

Distribution: Austria, Bulgaria, Czech Republic, Greece, Hungary, Jordan, Romania, Slovakia, Turkey, and Ukraine (Pesenko, 1979; Radchenko, 1979; Bogusch and Straka, 2012). Özbek (1979) recorded it in Erzurum as *S. marginatus* on *Medicago sativa* L., *Eryngium* sp., and *Euphorbia* sp. In the present study these samples were redetermined as *S. nomioidis*.

Material examined: **Adana:** Çatalan, 04.IV.2002, ♀, leg. P. Bogusch (in P. Bogusch coll.). **Ağrı:** Tutak, 28.V.1980, ♀, leg. M. Schwarz (in M. Schwarz coll.). **Ankara:** 24.VI.1984, ♂, leg. K. Warncke (in M. Schwarz coll.). **Antalya:** Beldibi, 05.V.1988, ♀, leg. Leg. H. Wolf (in M. Schwarz coll.); Belek, 11.VII.2000, ♂, leg. J. Straka (in J. Straka coll.); Side, 20.VI.1985, ♂, ♀, leg. Mohr (in M. Schwarz coll.); 27.IV.1973, ♂, ♀, leg. K. Warncke (in M. Schwarz coll.). **Denizli:** Pamukkale, 25.III.1977, 2 ♀♀, leg. J. Heinrich (in M. Schwarz coll.). **Erzurum:** Atatürk University Campus, 2000 m, 17.VII.1974, 2 ♂♂, leg. H. Özbek (on *O. viciifolia*), 26.VII.1974, 3 ♂♂, leg. H. Özbek (on *M. sativa* L.); 29.VI.1974, ♂, leg. H. Özbek; 01.IX.1971, ♀, leg. M. Doğanlar; Tortum, Esendurak, 11.IX.2001, 1500 m, ♂, leg. Ö. Çalmaşur. **Hakkari:** Oramar, 29.VI.1985, 2 ♀♀, leg. M. Schwarz (in M. Schwarz coll.). **Hatay:** Antakya, 02.VI.1965, ?, leg. M. Schwarz (in M. Schwarz coll.). **Iğdır:** 30.VI.1997, ♀, leg. M. Halada (in M. Schwarz coll.). **Kayseri:** Yeşilhisar, 26.V.1975, ♀, leg. K. Warncke (in M. Schwarz coll.). **Konya:** Central, 27.V.1965, 2 ♀♀, 05.VI.1967, ♀, leg. J. Gusenleitner (in M. Schwarz coll.); Beyşehir, 06.VI.1964, ♀, leg. J. Gusenleitner (in M. Schwarz coll.); Erenköy, 07.IV.1977, 2 ♀♀, leg. J. Heinrich (in M. Schwarz coll.); Sille, 29.VI.1976, ♂, leg. J. Heinrich (in M. Schwarz coll.). **Mersin:** Mut, Sertavul, 20.V.1970, ♀, leg. J. Gusenleitner; 01.VI.1976, 4 ♀♀; 08.06.1966, ♀, (in M. Schwarz coll.). **Muğla:** Milas, Derince, Bafa Lake, 15.IV.1966, ♀, leg. P. Hartmann (in M. Schwarz coll.). **Nevşehir:** Ürgüp, 02.VI.1964, ♀, leg. J. Gusenleitner; 21.VII.1971, ♂, leg. K. Warncke (in M. Schwarz coll.); Topaklı, 30.V.1964, ♀, leg. J. Gusenleitner (in M. Schwarz coll.). **Sivas:** Gürün, 05.06.1970, ♀, leg. J. Gusenleitner (in M. Schwarz coll.). **Şanlıurfa:** Birecik, 04.IV.1977, 4 ♀♀, leg. J. Heinrich (in M. Schwarz coll.); Halfeti, 05.V.1994, 5 ♂♂, leg. M. Halada (in M. Schwarz coll.). **Van:** Başkale, 30.V.1980, ♀, leg. M. Schwarz (in M. Schwarz coll.); Erciş, 27.V.1983, ♀, leg. K. Warncke (in M. Schwarz coll.).

Biology: Present records showed that it is a widespread species in Turkey and active from about the end of April to the middle of September. It occurs at sea level and in warm climates to above 2000 m in cool areas.

3.21. *Sphecodes olivieri* Lepeletier, 1825

Distribution: France, Spain, Italy, Caucasus, Iran, Israel, Turkey, Pakistan, Turkmenistan, Dubai, Egypt, Ethiopia, Qatar, United Arab Emirates, Morocco (Warncke, 1992; Ascher and Pickering, 2015). In Turkey: Iğdır, Kayseri, Nevşehir, Şanlıurfa (Warncke, 1992).

Biology: The distribution area shows that it occurs in warm semidesert habitats. The hosts of this rare species are not well known (Bogusch and Straka, 2012). Blüthgen (1934) mentioned *Lasioglossum aegyptiellum* (Strand) and *L. vagans* (Smith) as likely hosts.

3.22. *Sphecodes pellucidus* Smith, 1845

Distribution: Europe from Spain including Britain, north to 66°N, Sweden and Finland to European Russia. In Asia from Turkey through Iran, Turkmenistan, Kyrgyzstan to Russian Far East (Amur, Khabarovsk, Primor'ye) Mongolia, and China; North Africa (Algeria, Morocco, Tunisia) (Westrich, 1989; Warncke, 1992; Ascher and Pickering, 2015; Astafurova and Proshchalykin, 2015). In Turkey: Bursa, İstanbul (Fahringer, 1922; Meyer, 1925); Aydın, Diyarbakır, Erzurum, Hakkari, Kars, Kayseri, Konya, Nevşehir, Niğde (Warncke, 1992).

Material examined: **Ardahan:** Central, 2100 m, 30.V.1983, ♂, leg. M. Doğanlar. **Erzurum:** Atatürk University Campus, 1950 m, 28.V.1970, ♀, leg. H. Özbek; 06–09.VI.1970, 2 ♀♀, leg. H. Özbek; 26.VI.1972, 2 ♀♀, leg. H. Özbek, 18.VII.1975, 2 ♀♀, leg. H. Özbek (on *E. creticum*); 14.VIII.1971, ♀, leg. M. Doğanlar; Horasan, Orman Fidanlığı, 06.VII.1991, ♀, leg. E. Yıldırım; Palandöken, 23.VIII.1987, 14 ♀♀, 8 ♂♂, leg. H. Özbek and R. Hayat, 30.VIII.1987, ♂, leg. R. Hayat; Narman, 1950 m, 17.VIII.2004, ♂, leg. S. Çoruh and C. Güçlü; Uzundere, 900 m, 25.VI.1992, ♀, leg. M. Atamanalp; Balıklı, 1040 m, 29.VI.2003, ♀, leg. S. Çoruh; Altınçanak, 08.IX.2005, leg. H. Özbek. **Kars:** Sarıkamış, Akkurt, 40.0738 - 42.4410, 18.05.2002, 2 ♀♀, leg. Ö. Çalmaşur. **Konya:** Eflatun Pınar, 15.VII.1998, ♀, leg. C. Schmid-Egger (in C. Schmid-Egger coll.).

Biology: Most of the above mentioned samples were collected in meadows and pastures with scattered bushes. However, Bogusch and Straka (2012) pointed out that *S. pellucidus* is a species of sandy sites and semidesert biotopes. The hosts of *S. pellucidus* are *Andrena barbilabris* (Alfken, 1913), *A. nycthemera* Imhoff (Schönitzer and Klinsik, 1990), and *Lasioglossum leucozonium* (Schränk, 1781) (Sick et al., 1994). Several other bee species were listed as likely hosts: *Andrena argentata* Smith, *A. bicolor* Fabricius, *A. humilis* Imhoff, *A. ventralis* Imhoff, *A. wilkella*, and *L. prasinum* (Vegter, 1993; Bogusch and Straka, 2012). Bogusch and Straka (2012) observed the association of *S. pellucidus* with *A. barbilabris* and *S. ephippius* from the same localities as invaded nests of *A. argentata*.

3.23. *Sphecodes pinguiculus* Pérez, 1903

Distribution: Cape Verde, Spain, Hungary, Slovakia, Italy (Sicilia), Iran, Russia, Ukraine, Cyprus, Turkey, Tajikistan, Turkmenistan, United Arab Emirates, Mongolia, and North Africa (Algeria, Egypt, Libya) (Warncke, 1992; Bogusch and Straka, 2012; Astafurova and Proshchalykin, 2014). In Turkey: Ankara, Eskişehir, Erzincan, Hakkari, Iğdır, Kayseri, Konya, Mersin, Nevşehir, Niğde, Sivas, and Van (Warncke, 1992).

Biology: Bogusch and Straka (2012) indicated that *S. pinguiculus* prefers warm, usually sandy habitats. Possibly, *Halictus lucidipennis* Smith is the main host. They suggest

H. smaragdulus Vachal as a possible host for the Central European region, where the similar *H. lucidipennis* does not occur.

Remark: Although *S. pinguiculus* has large distribution ranges outside of Turkey and Warncke (1992) recorded it from 12 provinces in various regions of the country, in the present study, no material was collected. Therefore, it could currently be treated as a rare species.

3.24. *Sphecodes pseudofasciatus* Blüthgen, 1925

Distribution: Austria, Czech Republic, France, Hungary, Italy, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Morocco, Turkey, and Ukraine (Bogusch and Straka, 2012). No material was found in the present study. Bogusch and Straka (2012) indicated that this species is collected in low numbers and only a few records are known from each country. Thus, it could be treated as a rare species in Turkey.

3.25. *Sphecodes puncticeps* Thomson, 1870

Distribution: Almost all of Europe from the Canary Islands, Portugal, United Kingdom, Finland, Sweden, European Russia, Greece, Bulgaria. In Asia: Cyprus, Turkey, Armenia, Iran, Israel, Central Asia, Russian Far East (Primor'ye), Mongolia. North Africa (Morocco, Egypt) (Westrich, 1989; Warncke, 1992; Bogusch and Straka, 2012; Astafurova and Proshchalykin, 2015). In Turkey: Adıyaman, Ankara, Artvin, Aydın, Bitlis, Gaziantep, Hakkari, İstanbul, Kars, Konya, Nevşehir, Niğde, Samsun, Şanlıurfa (Warncke, 1992).

Material examined: **Antalya:** Arapsuyu, 5 m, 30.VI.2002, ♂, leg. H. Özbek. **Artvin:** Yusufeli, Zeytinlik, 600 m, 22.V.2002, ♀, leg. Ö. Çalmaşur. **Erzincan:** Muti Bridge, 26.IX.1979, 4 ♂♂, leg. H. Özbek (on *E. creticum*); Işıkpınar, 27.IX.1979, ♀, leg. H. Özbek. **Erzurum:** Oltu, 22 km WSW of Oltu, Çamlıbel, 40.47166 - 41.77777, 08.07.2007, ♀, leg. J. S. Ascher, H. Özbek and J. G. Rozen; 4 km WSW of Oltu, Subatık, 40.53305 - 41.98527, 03.VII.2001; ♀, leg. J. G. Rozen and H. Özbek (in AMNH); Kaleboğazı, 1450 m, 18.IX.2001, ♂, leg. S. Çoruh; Pasinler, 25.VIII.1971, ♂, leg. H. Özbek. **Kars:** Sarıkamış, Karakurt, 40.07543°N, 42.20941°E, 16–23.VIII.2002, ♀ (Malaise trap).

Biology: Although Bogusch and Straka (2012) indicated that *S. puncticeps* prefers sandy biotopes, in the present study material was collected mainly in pastures and meadows. *Lasioglossum villosulum* is the only confirmed host (Alfken, 1913). Bischoff (1927) gave *L. brevicorne* (Schenck) as a likely host. Bogusch and Straka (2012) confirmed both hosts and also observed *S. puncticeps* in an association with *L. politum* and *L. sabulosum*.

3.26. *Sphecodes reticulatus* Thomson, 1870

Distribution: Mainly North Europe including Sweden and Finland, British Isles, Lithuania, in the south very rare

except Bulgaria, Greece, Ukraine to Russia, Turkey, Iran, Kyrgyzstan, and Turkestan (Westrich, 1989; Warncke, 1992; Bogusch and Straka, 2012). In Turkey: İstanbul (Meyer, 1925); Ardahan, Erzurum, Hakkari, Konya, Mersin, Samsun (Warncke, 1992).

Material examined: Kars: Sarıkamış, 1900 m, 09.VIII.2000, ♂, leg. Ö. Çalmaşur. Niğde: Karakışlakçı, 07.VII.1995 (on *Euphorbia altissima*), ♂, leg. Y. Barbier (in P. Bogusch coll.).

Biology: Bogusch and Straka (2012) noted that *S. reticulatus* is a rare species that occurs in various biotopes, generally in sandy sites and other open habitats. Present and previous records (Meyer, 1925; Warncke, 1992) revealed that it is a common species in Turkey. *Andrena barbilabris* was a confirmed host (Stoeckhert, 1933; Blüthgen, 1934). Moreover, *Andrena argentata*, *A. wilkella*, *Lasioglossum prasinum*, and *L. leucozonium cedri* Ebmer were mentioned as likely hosts (Blüthgen, 1934; Vegter, 1993).

3.27. *Sphecodes rubicundus* Hagens, 1875

Distribution: Mainly in northern Europe, including England, Lithuania, Poland, Ukraine; Armenia and Turkey; Morocco, Egypt (Westrich, 1989; Warncke, 1992; Ascher and Pickering, 2015). In Turkey: Ağrı, Ankara, Hakkari, Konya, Mersin, Şırnak, Van (Warncke, 1992; as *S. ruficrus rubicundus* Hagens, 1875).

Material: Adana: Hamidiye, 26.VI.2011, ♀, leg. J. Straka (in J. Straka coll.). Burdur: Central, 08.VII.2006, ♀, leg. M. Kadlecová (in M. Schwarz coll.). Konya: Sille, 37.93330 - 32.38333, 09.VI.1975, ♀, leg. J. Heinrich. Nevşehir: Ürgüp, 38.63000 - 34.91000, 05.VI.1975, ♀, leg. J. Heinrich (in AMNH).

Biology: Bogusch and Straka (2012) claimed that *S. rubicundus* is a rare species, and older findings are from open habitats, usually sandy sites and steppes. *Andrena labialis* (Kirby) is a confirmed host of *S. rubicundus* (Blüthgen, 1934; Sowa and Mostowska, 1978; Radchenko, 1982) and *A. nigroaenea* (Kirby) is a likely host (Blüthgen, 1934).

3.28. *Sphecodes ruficrus* (Erichson, 1835)

Distribution: Spain, Portugal, France, Switzerland, Italy, Greece, Croatia, Austria, Germany, Hungary, Russia, Egypt, Algeria, Morocco, Tunisia, Armenia, India, Turkey (Westrich, 1989; Warncke, 1992; Ascher and Pickering, 2015). In Turkey: İzmir (Meyer, 1920); Ağrı, Ankara, Erzurum, Hakkari, Iğdır, and Van (Warncke, 1992).

Biology: In general, *S. ruficrus* prefers sandy sites (Bogusch and Straka, 2012). *Andrena humilis* and *A. decipiens* Schenck were detected as main hosts (Westrich, 1989; Herrmann, 2006). Moreover, Bogusch and Straka (2012) mentioned *S. ruficrus* in association with *A. livens* Pérez, 1895.

3.29. *Sphecodes rufiventris* (Panzer, 1798)

Distribution: Europe up to 57°N; absent from Portugal, Spain, Scandinavia, and Britain; present in European Russia, Ukraine, Turkey, Kazakhstan, Tajikistan, and Israel. Present in North Africa (Morocco, Algeria) (Warncke, 1992; Ascher and Pickering, 2015). In Turkey: Bursa, Eskişehir, Konya (Meyer, 1925); Ankara, Aydın, Bitlis, Erzincan, Hakkari, Niğde, Iğdır, Şanlıurfa, Van (type locality) (Warncke, 1992) as *Sphecodes rufiventris hethiticus* Warncke, 1992.

Material examined: Ağrı: Patnos, 29.V.1980, ♀, leg. M. Schwarz (in M. Schwarz coll.). Artvin: Yusufeli, 500 m, 27.VII.2004, 2 ♂♂, leg. S. Çoruh. Erzurum: Pasinler, 5 km NE of Pasinler, 40.01400 - 41.72460, 04.VII.2004, ♂, leg. S. Ascher, H. Özbek and J. G. Rozen (in AMNH). Erzincan: Central, 13.VII.1985, 3 ♂♂, leg. M. Schwarz (in M. Schwarz coll.). Konya: Central, 25.V.1965, 3 ♀♀, leg. M. Schwarz (in M. Schwarz coll.); Çumra, 1017 m, 13.VIII.2000, ♀, leg. M. Kesdek; Sille, 04.VI.1967, ♀, leg. J. Gusenleitner (in M. Schwarz coll.). Hakkari: Tanin pass, 03.VI.1980, ♀, leg. M. Schwarz (in M. Schwarz coll.). Nevşehir: Central, 04.VII.1984, ♂, leg. A. W. Ebmer (in M. Schwarz coll.); Ürgüp, 21.VII.1971, ♂, leg. K. Warncke (in M. Schwarz coll.). Sivas: Gürün, 05.VI.1970, ♀, leg. J. Gusenleitner (in M. Schwarz coll.).

Biology: Although Bogusch and Straka (2012) noted that *S. rufiventris* prefers warmer open or shrubby habitats, in the present study, samples were collected in cool areas, such as Ağrı and Erzurum at above 2000 m, in addition to the warm localities. *Halictus maculatus* is the only recorded host (Stoeckhert, 1933; Blüthgen, 1934). Bogusch and Straka (2012) also observed *S. rufiventris* in association with *H. maculatus*.

3.30. *Sphecodes scabricollis* Wesmael, 1835

Distribution: Northern Europe to Finland, present in England, European Russia; in Asia Turkey, Japan, Iran, India, South Korea, Siberia, Russian Far East (Khabarovsk) (Westrich, 1989; Warncke, 1992; Mitai and Tadauchi, 2013; Astafurova and Proshchalykin, 2014; Ascher and Pickering, 2015). In Turkey, more recently Astafurova and Proshchalykin (2014) listed several samples collected in August and September in 1978–1982 (localities were not indicated).

Material examined: Muğla: Akyaka, 06.V.2013, ♀, leg. ? (in J. Straka coll.).

Biology: Bogusch and Straka (2012) noted that *S. scabricollis* is a very rare species of sandy wetlands, endangered or extinct in most countries, and its populations are much weaker than in the past. However, the records of Astafurova and Proshchalykin (2014) show that it is quite common in the Russian Far East. *Lasioglossum zonulum* was recorded as the host of *S. scabricollis* (Blüthgen, 1934). Blüthgen also recorded *Halictus compressus*, *H. quadricinctus*, and *L. prasinum* as likely hosts.

3.31. *Sphecodes schenckii* Hagens, 1882

Distribution: Northeast Spain, France, Germany, Austria, Switzerland, Italy, Hungary, Austria, Slovakia, Germany, Russia, Turkey, and Iran (Warncke, 1992). In Turkey: Antalya, Erzurum, Gümüşhane, Hakkari, Kars, Konya, Malatya, Nevşehir (Warncke, 1992).

Material examined: **Ağrı:** Lake Balıklı 2000 m, 24.VI.1987, ♂, leg. Ö. Alaoğlu; Tutak, 11.VI.1977, ♀, leg. K. Warncke (in M. Schwarz coll.). **Aksaray:** Ihlara Valley, 10.VIII.2006, 3 ♂♂, J. Růžicka (in M. Schwarz coll.). **Ankara:** 16.VII.1997, ♀ ♂, 01.IX.1997, 2 ♂♂, leg. S. Aşar; Haymana, 19.VIII.1997, 2 ♂♂, leg. S. Aşar. **Antalya:** Finike, Arif Village, Arykanda, 11.VII.1998, ♂, leg. C. Schmid-Egger (in C. Schmid-Egger); Beldibi, 05.V.1988, ♀, leg. H. Wolf (in M. Schwarz coll.); Side, 04.VI.1977, ♀, leg. K. Warncke (in M. Schwarz coll.). **Burdur:** Yeşilova, 06.VII.2006, ♂, leg. M. Kadlecová (in M. Schwarz coll.). **Çankırı:** Kurşunlu, 14.VII.1985, ♀, leg. M. Schwarz (in M. Schwarz coll.). **Erzurum:** Atatürk University Campus, 1900 m, 04.VI.1970, ♂, leg. H. Özbek (on *O. viciifolia*), 11.VI.1991, ♂, 26.VI.1972, ♀, leg. H. Özbek (on *O. viciifolia*), 29.VI.1992, ♂, leg. E. Yıldırım, 17–26.07.VII.1974, 2 ♀♀, leg. H. Özbek, 08.IX.1971, ♀, leg. H. Özbek; Horasan, Orman Fidanlığı, 06.VII.1991, ♀, leg. E. Yıldırım; Palandöken, 23.VIII.1987, 4 ♀♀, ♂, leg. H. Özbek and R. Hayat; Ilıca, Ağzıaçık, 2300 m, 19.VII.2003, ♂, leg. H. Özbek; Oltu, 14.IX.1978, ♀, leg. H. Özbek; Çamlıbel, 1600 m, 26.VII.2000, ♂, leg. H. Özbek; Narman, Kireçli Dağı, 2300 m, 02.VII.2000, ♂, leg. C. Güçlü; Uzundere, 20.VI.1992, ♀, leg. M. Atamanalp; Balıklı, 1040 m, 29.VI.2003, ♂, leg. S. Çoruh; Çat, 08.V.1989, 2000 m, ♂, leg. H. Özbek; Şenyurt, 22.VIII.1991, ♀, leg. H. Özbek. **Kars:** Sarıkamış, 26.VIII.1991, ♀, leg. E. Yıldırım; Sarıkamış, Karakurt, 40.07543°N, 42.20941°E, 16–23.VI.2002, 2 ♂♂, ♀ (Malaise trap); 19.VIII.2003, 2 ♂♂, ♀, leg. Ö. Çalmaşur and S. Çoruh; Susuz, 26.VI.1989, ♂, leg. H. Özbek; **Hakkari:** Uludere, 06.VI.1977, ♀, leg. K. Warncke (in M. Schwarz coll.). **Hatay:** Reyhanlı, 20.V.1991, ♂, leg. H. Özbek; Samandağı, Nur Dağları, 06.VII.1996, ♂, leg. Brechtel and Ehrmann (in M. Schwarz coll.). **Isparta:** Şarkikaraağaç, 13.VI.1978, ♀, leg. M. Schwarz (in M. Schwarz coll.). **Konya:** 27.V.1965, 3 ♀♀, leg. M. Schwarz, 07.VI.1972, ♀, leg. K. Kusdas (in M. Schwarz coll.); Çumra, 1017 m, 13.VIII.2000 m, ♀, Leg. M. Kesdek; Güneysınır, Karagüney, 03.IX.2000, 9 ♂♂, leg. M. Kesdek (on *E. giganteum* M.Bieb.); Taşkent, 06.VIII.1991, ♂, leg. K. Warncke (in M. Schwarz coll.). **Mersin:** Mut, 27.V.1967, 3 ♂♂, leg. J. Gusenleitner, 06.IV.1977, ♀, leg. J. Heinrich (in M. Schwarz coll.); Göksu River, 11.VII.1996, ♂, leg. Brechtel and Ehrmann (in C. Schmid-Egger); Silifke, Boğusak, 10 m, 03.IX.1987, ♂, leg. H. Özbek, det. H. Özbek. **Muğla:** Köycegiz, 21.V.2000, ♀, leg. J. Smit (in J. Smit coll.) Milas, 28.VII.2002, ♀, leg. E. Kwast (in M.

Schwarz coll.). **Nevşehir:** Ürgüp, 10.VI.1970, ♀, leg. K. Kusdas (in M. Schwarz coll.). **Sivas:** Yıldızeli, Çamlıbel pass, 16.VII.1984, ♀, leg. A. W. Ebmer (in M. Schwarz coll.).

Biology: Bogusch and Straka (2012) noted that *S. schenckii* is a rare species of warm localities; in most of the countries there are only a few records. However, present data show that *S. schenckii* is a widespread and abundant species and has been recorded almost throughout the whole country, except the Black Sea Region. *Lasioglossum discum* (Smith) is supposed to be a host due to the similar distribution area, size, and appearance (Blüthgen, 1934). Grozdanić (1971) confirmed this species as a host of *S. schenckii*.

3.32. *Sphecodes spinulosus* Hagens, 1875

Distribution: Europe to 56°N, present in Sweden and England, Turkey, Iran, East Russia, Kyrgyzstan; present in North Africa (Warncke, 1992; Edwards and Telfer, 2001). In Turkey: Osmaniye (Meyer, 1925); Gümüşhane (Özbek, 1979); Ağrı, Ankara, Erzurum, Hakkari, Iğdır, Kars, and Van (Warncke, 1992).

Material examined: **Erzurum:** Horasan, Aras Valley, 1600 m, 04.VI.2000, 2000 m, ♀, ♂, leg. H. Özbek; Ilıca, Ağzıaçık, Bakımevi, 2300 m, 16.VI.2002, 2 ♂♂, leg. H. Özbek; Atlıkonak, 2000 m, 13.VI.2002, ♂, leg. Ö. Çalmaşur; Tafta, 20.VI.1970, ♂, leg. H. Özbek; Köprüköy, Kayabaşı, 1600 m, 14.VI.2004, ♂, leg. H. Özbek; Dumlulu, 20.VI.2000, ♂, leg. Leg. Ö. Çalmaşur (in P. Bogusch coll.).

Biology: Bogusch and Straka (2012) noted that it is a rare species of warm biotopes, usually steppes, in Central Europe with only a few records in recent years. However, the present study shows that it is widespread in the eastern part of the country and recorded at altitudes of 1600–2300 m. The only known host is *Lasioglossum xanthopus* (Kirby) (Stoeckhert, 1923; Blüthgen, 1934; Pesenko et al., 2000).

3.33. *Sphecodes zangherii* Noskiewicz, 1931

Distribution: France, Greece, Italy, Russia, Switzerland, Turkey, Ukraine (Warncke, 1992; Bogusch and Straka, 2012; Ascher and Pickering, 2015). No material was found during the present study. Bogusch and Straka (2012) examined the samples collected from Turkey by Warncke and claimed that the specimens of *S. zangherii* determined by Warncke were misidentified as *S. croaticus*.

4. Discussion

In the present study, we show records for 26 species of the genus *Sphecodes* from various localities in Turkey. Together with published records, 33 species were recognized occurring in Turkey. Two new records were added to the Turkish *Sphecodes* fauna in addition to many additional records for most of the known species. Currently, the genus *Sphecodes* has 319 described species worldwide (Ascher and Pickering, 2015; Astafurova and Proshchalykin,

2015); about 50 species are known from the Palearctic Region (Pesenko, 2007). Thus more than 10% of the world *Sphecodes* species and 66% of the Palearctic species occur in Turkey. Moreover, out of 33 Central European species (Bogusch and Straka, 2012), 30 species occur in Turkey. The occurrence of bees in nature depends mainly on various abiotic and biotic factors, but for parasitic bees, such as *Sphecodes*, host availability is an important factor. The tribe Halictini, which comprises around 230 species in Turkey (Ascher and Pickering, 2015), is a group of most *Sphecodes* hosts. This is an important reason why the *Sphecodes* fauna of Turkey is rich. Moreover, Turkey, and especially Anatolia, is a biologically diverse region mainly due to the variable topography and climate, which provide many macro- and microhabitats. Turkey also forms a natural bridge between Asia and Europe in the south and also links to the Ethiopian region via the Arabian peninsula, thus providing a natural pathway for the spread of species both north-south and east-west (Tchernov, 1992; Çıplak et al., 2002). It is remarkable that although Anatolia includes areas of great diversity of landscapes and habitats, there are no Anatolian endemic species among the Turkish *Sphecodes*. This could be related to the above-mentioned features of Turkey, many species having large distribution ranges extending far into Asia and Mediterranean countries. Another reason could be the insufficient or even complete lack of knowledge for some parts of the country.

Seven species previously known from Turkey (Warncke, 1992) were not detected in this study. Among them, certain species are very rare: *S. armeniacus* was described from Kars by Warncke (1992) (Figure), and since that time it has not been recorded in Turkey or abroad. *S. niger* has a distribution range from northeastern Spain to Ukraine, while Warncke (1992) found only a single male from Ankara (Figure); maybe this is the only sample collected so far in Turkey. *S. olivieri*, *S. pinguiculus*, and *S. ruficrus* have large distribution ranges outside of Turkey and they had been recorded from various provinces of the country (Warncke, 1992). Concerning *S. pseudofasciatus* and *S. zangherii*, Bogusch and Straka (2012) noted that the distributions of these species are poorly known because of former incorrect synonymization and misidentification of these species under *S. croaticus* by Warncke (1992).

Present data show that distributional ranges of Turkish *Sphecodes* species are variable: *S. alternatus*, *S. ephippius*, *S. gibbus*, *S. albilabris*, and *S. puncticeps* have been recorded from various provinces and are widespread and abundant throughout the country. *S. schenckii* and *S. monilicornis* have been collected from all geographical regions, except the Black Sea Region for the former and the Aegean Region for the latter. As Bogusch and Straka (2012) indicated, due to the confusion with *S. marginatus*, the distribution of *S. nomioideis* was unclear in Turkey and beyond. In the present

study, samples were collected from various provinces located in East, Central, Mediterranean, and Southeast Anatolian regions. *S. rufiventris* has been recorded from different provinces in the eastern, northern, and central parts; *S. pellucidus* occurs in all regions, except the Black Sea; and *S. intermedius* occurs in eastern, southeastern, central, and northwestern parts of Anatolia. All the above-mentioned species could be treated as widespread species. *S. anatolicus* has been recorded from the provinces located in eastern, central, and southern parts of the country (Figure). Concerning the new records, *S. crassanus* was recorded from 3 provinces located in the East Anatolia, Mediterranean, and Aegean regions (Figure). *S. majalis* was recorded from eastern Anatolia and it is a rare species. Present records show that *S. scabricollis* is a rare species and only one sample was collected from the western part of the Mediterranean Region (Figure). Astafurova and Proshchalykin (2014) listed several samples collected from Turkey. The remaining species could be treated as moderately distributed species.

The rare species (*S. armeniacus*, *S. majalis*, *S. niger*, *S. pseudofasciatus*, *S. scabricollis*, and *S. zangherii*) could be at risk of extinction. In “The European Red List of Bees”, out of nearly 2000 bee species occurring in Europe overall, 9.2% are considered threatened in all of Europe, while at the EU 27 (European Union) level, 9.1% are threatened with extinction due to habitat loss as a result of agriculture intensification (e.g., changes in agricultural practices including the use of pesticides and fertilizers), urban development, increased frequency of fires, and climate change (Nieto et al., 2014). The above-mentioned rare bees are present in this red list (Nieto et al., 2014).

In addition to these 33 species, *S. miniatus* Hagens, 1882 is present in Greece and Azerbaijan and *S. hyalinatus* Hagens, 1882 in Romania and Ukraine (Ascher and Pickering, 2015). We think that these 2 species could theoretically be found in Turkey, as well. Of course, field studies should be done intensively at the right time of the season.

As kleptoparasitic bees, *Sphecodes* mainly prefer the tribe Halictini as hosts. In the current contribution, all known host records of *Sphecodes* were summarized from Bogusch and Straka (2012). As pollinators of various cultivated and wild plants, *Sphecodes* species may not have significant importance due to being nest kleptoparasites and only foraging for nectar on flowers and not collecting pollen. Several species were collected from *Eryngium* spp. (Apiaceae), *Carduus* spp., *Centaurea* spp., *Echinops* spp., *Onopordum* spp. (Asteraceae), *Cephalaria* spp. (Dipsacaceae), and *Euphorbia* spp. (Euphorbiaceae). As a cultivated plant *O. viciifolia* was visited by *S. ephippius* and *S. nomioideis*. Westrich (1989) and Celary (1991) demonstrated that *Sphecodes* species visited various kinds of plant species of different plant families, thus showing

polylectic behavior. Our records and field observations let us point out that although *Sphecodes* species have polylectic behavior, they show preference to the family Apiaceae.

In conclusion, this is the first paper concerning specifically the genus *Sphecodes* of Turkey. With 33 species, the *Sphecodes* fauna of Turkey is very rich compared to world and Palearctic Region species. With the variable topography, climate, and other features we expect that there should be more species, so with further research in different parts of the country, the recorded Turkish *Sphecodes* fauna will be considerably increased.

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Acknowledgments

We are thankful to the following colleagues: Miktat Doğanlar, Özdemir Alaoğlu, Rüstem Hayat, Erol Yıldırım, İrfan Aslan, Önder Çalmaşur, Muhammed Atamanalp, Saliha Çoruh, Coşkun Güçlü, Memiş Kesdek, and Sibel Aşar, who helped to collect some bee samples in the field, and İrfan Çoruh for determining plant species. We also express our thanks to M Schwarz, C Schmid-Egger, J Hájek, J Smit, and P Tyrner, who kindly let us use their *Sphecodes* material in our study. We are also thankful to the 4 anonymous reviewers for their helpful comments.

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