

A REVIEW ON SPHECIFORMES (HYMENOPTERA) OF TURKEY, WITH HISTORY OF THEIR RESEARCH

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ABSTRACT: A review was conducted of 188 papers treating the Spheciformes of Turkey between 1845 and 2022. Turkey's Spheciformes fauna has been updated to 633 species and 25 subspecies in 80 genera belonging to 10 families. Nine species of three genera of Ammoplanidae, four species of two genera of Ampulicidae, 20 species and two subspecies of two genera of Astatidae, 136 species of 19 genera Bembicidae, 254 species and seven subspecies of 27 genera of Crabronidae, two species of one genus of Mellinidae, 33 species of six genera of Pemphredonidae, 70 species and seven subspecies of three genera of Philanthidae, 26 species of five genera of Psenidae, 79 species and nine subspecies 12 genera of Sphecidae are recorded. Separately, distribution of Spheciformes in biogeographic regions in Turkey is also recorded. 451 species and subspecies of the Spheciformes have been recorded from Eastern Anatolia (68.5% of the total recorded species and subspecies), 251 species and subspecies from Southeastern Anatolia (38.1%), 351 species and subspecies from Black Sea (53.3 %), 420 species and subspecies from Central Anatolia (63.8%), 318 species and subspecies from Mediterranean (48.3%), 251 species and subspecies from Aegean (38.1%), 211 species and subspecies from Marmara region (32.1%). In addition, 69 genera of the Spheciformes have been recorded from Eastern Anatolia (86.3% of the total recorded genera), 51 genera from Southeastern Anatolia (63.8%), 63 genera from Black Sea (78.8%), 64 genera from Central Anatolia (80%), 68 genera from Mediterranean (85%), 60 genera from Aegean (75%) and, 57 genera from Marmara region (71.3%). The diversity of species (452), genera (69) and families (10) is highest in the Eastern Anatolia region.

KEY WORDS: Hymenoptera, Apoidea, Spheciformes, review, Turkey

Turkey occupies Asia Minor between the Mediterranean Sea and the Black Sea and stretches into continental Europe. It is a mountainous country averaging about 1000 meters in altitude. The topographic and climatic diversity of the region are important preconditions for the development of a rich and diverse fauna. Turkey is generally divided into seven biogeographical regions. These are the Marmara Region, the Aegean Region, the Mediterranean Region, the Black Sea Region, and the Central, Eastern and South Eastern Anatolian Regions (Fig. 1) (Yıldırım, 2012a,b).

The order Hymenoptera is one of the largest insect orders with more than 150 000 described living species (Aguiar et al., 2013). Spheciformes is a huge and diverse group of 10 families according to Sann et al. (2018) (Ammoplanidae, Ampulicidae, Astatidae, Bembicidae, Crabronidae, Mellinidae, Pemphredonidae, Philanthidae, Psenidae and Sphecidae) belonging to the superfamily Apoidea in the order Hymenoptera. They have a large number of feeding habitats and the

majority of species prey on multiple orders of insects and other arthropods as food for their larvae. Therefore they play an important role in biological control of pests in agriculture (Bohart & Menke, 1976). Spheciformes are distributed worldwide, but are most numerous in warm and more or less dry habitats (Gogala 2011). Spheciformes comprise more than 274 genera and 10 133 species worldwide (Pulawski, 2022). Turkey Spheciformes fauna consists of 629 species and 25 subspecies in 80 genera belonging to 10 families (Kaplan & Yildirim, 2022b).

Many faunistic and systematic studies on wasps have been published by Ataturk University Faculty of Agriculture Department of Plant Protection. In these studies, many new records were given for the fauna of Turkey and some new species were described (Gayubo et al., 2003; Kaltenpoth et al., 2012; Kaplan & Yildirim, 2020a,b, 2021, 2022a,b,c; Lelej & Yildirim, 2009; Ljubomirov & Yildirim, 2008; Mauss et al., 2005, 2010, 2022; Özbek et al., 1999a,b, 2000; Schmid-Egger et al., 2021; Strumia & Yildirim, 2009, 2011; Yildirim & Lelej, 2012, 2016; Yildirim & Strumia, 2000a,b, 2006a,b; Yildirim & Özbek, 1992, 1993, 1994, 1995, 1996a,b,c, 1997a,b, 1999, 2001; Yildirim & Gusenleitner, 2001, 2004, 2007, 2009, 2012, 2015; Yildirim & Kojima, 1999; Yildirim & Bartalucci, 2009; Yildirim & Wahis, 2010, 2011; Yildirim & Tezcan, 2018; Yildirim & Ljubomirov, 2007; Yildirim, 1998, 2003, 2006, 2008, 2011, 2012a,b, 2014a,b, 2015, 2016a,b; Yildirim et al., 2014, 2016).

This study is based on the review of 188 papers treating the Spheciformes in Turkey between 1845 and 2022. A review of 188 studies is recorded below in chronological order. The classification of Spheciformes in this publication follows Sann et al. (2018). In addition, distribution of Spheciformes in biogeographic regions in Turkey is recorded. Brief summaries about the biology of species belonging to Spheciformes are also given.

Informations About Bioecology of Spheciformes

Many species of Spheciformes are also called "digger wasp" because their legs are suitable for digging nests in the ground. However, there are also species that nest in tree trunks, branches or between stones, use galleries opened by other insects, or make mud nests in people's dwellings (Can, 2020). Spheciformes group contains predator, parasitoid and kleptoparasite species and thus they play an active role in the natural balance by limiting the populations of other arthropods. Most of the species belonging to Spheciformes are predators, and species belonging to the genera *Nysson*, *Brachystegeus* and *Stizoides* from the Crabronidae are kleptoparasites. A few wasp species, such as *Larra* from the Crabronidae and *Chlorion* from the Sphecidae, live as parasitoids (Bohart & Menke, 1976).

Spheciformes adults feed on pollen and nectar, while their larvae are carnivores. Adult females paralyze their prey by stinging and transport it to their nests to provide the larvae with food. The females can carry insects that are heavier than themselves while flying. They usually carry their prey by dragging them with their mandibles or by flying with their legs or parts of their abdomen that have taken the form of an apical clamp (Evans, 1962). They lay eggs on these prey, and the larvae emerging from eggs feed on paralyzed prey, become pupae and emerge as adults. They spend the winter in diapause. Many species have more than one generation per year. Among their prey are the larvae and adults of soft-bodied insects belonging to the orders Coleoptera, Diptera, Ephemeroptera,

Hemiptera, Homoptera, Hymenoptera, Lepidoptera, Mecoptera, Neuroptera, Odonata, Orthoptera, Psocoptera, Thysanoptera, Trichoptera (Bohart & Menke, 1976). Some of them are thief parasitoids. For example, *Philanthus triangulum triangulum* (Fabricius, 1775) feed on honeybees that collect nectar in flowers by catching the honey in flight and stealing the honey in their crops. Since most Spheciformes have short mouthparts, they feed on plants with short corollas belonging to the Compositae, Euphorbiaceae, Polygonaceae and Umbellifera families. Spheciformes adults make great contributions to pollination during their feeding. In addition, some species belonging to *Mellinus* and *Philanthus* feed on sweetish substances secreted by aphids (Bohart & Menke, 1976).

They are generally solitary species. Although the nests of individuals belonging to this family are close to each other, this does not mean that they are social insects (Kaplan, 2020). Mating can occur in different ways in Spheciformes. After the males start to fly in the mating areas before mating, they leave their mating scents on plant branches or other objects in order to gain an advantage over rival males. In addition, these species defend their territory by fighting each other by biting or fighting, and by flying in rapid staggered turns. On the other hand, female individuals make mating flights in areas where they will build nests. The male to mate is selected by the female. The female tends to mate with the best-looking, capable and healthy individuals. The reason for this is thought to be to pass on healthy genes to future generations. Mating can occur anywhere (in the air, on the ground, in the nest or on plants) (Bohart & Marsh, 1960).

Distributions in Biogeographical Regions of Spheciformes in Turkey

There are great differences between the biogeographic regions of Turkey in terms of species diversity and richness (Table 1, Fig. 2). In current study, 451 species and subspecies of the Spheciformes have been recorded from Eastern Anatolia (68.5% of the total recorded species and subspecies), 251 species and subspecies from Southeastern Anatolia (38.1%), 351 species and subspecies from Black Sea (53.3 %), 420 species and subspecies from Central Anatolia (63.8 %), 318 species and subspecies from Mediterranean (48.3%), 251 species and subspecies from Aegean (38.1%), 211 species and subspecies from Marmara region (32.1%). Moreover, 69 genera of the Spheciformes have been recorded from Eastern Anatolia (%86.3 of the total recorded genera), 51 genera from Southeastern Anatolia (63.8%), 63 genera from Black Sea (78.8%), 64 genera from Central Anatolia (80%), 68 genera from Mediterranean (85%), 60 genera from Aegean (75%), 57 genera from Marmara region (71.3%). The diversity of species (452), genera (69) and families (10) is highest in the Eastern Anatolia region.

The families of Ammoplanidae, Astatidae, Bembicidae, Pemphredonidae, Crabronidae, Philanthidae, Psenidae and Sphecidae were recorded in all seven regions of Turkey. However, Ampulicidae was recorded in regions of Eastern Anatolia, Black Sea, Mediterranean and Aegean, but not in Southeastern Anatolia, Central Anatolia, Marmara. Additionally, Mellinidae was recorded in Eastern Anatolia, Aegean and Marmara, but not Southeastern Anatolia, Central Anatolia, Black Sea and Mediterranean (Table 1).



Figure 1. Biogeographical map of Turkey (1/3.200.000) (Anonymous, 2022).

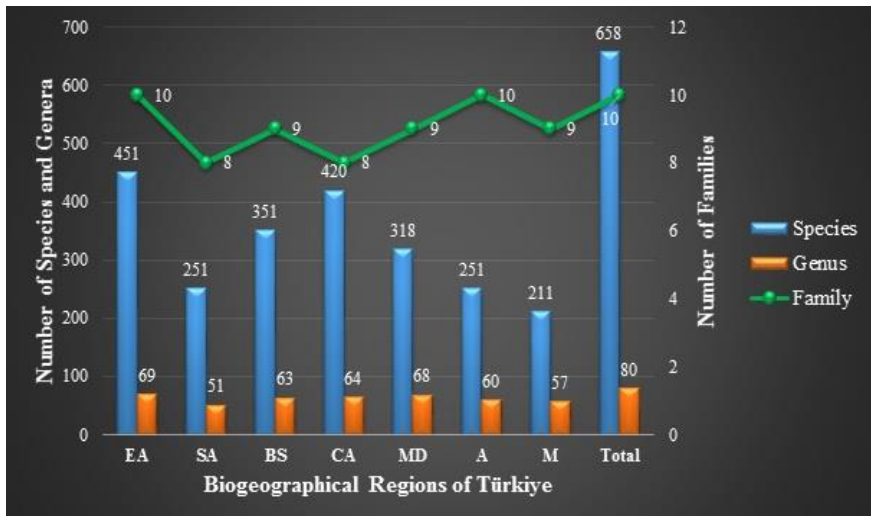


Figure 2. Number of species, genera, and families of Spheciformes in the biogeographical regions of Turkey (EA - Eastern Anatolia, SA - Southeastern Anatolia, BS - Black Sea, CA - Central Anatolia, MD -Mediterranean, A - Aegean, M - Marmara).

Table 1. Distribution of Spheciformes in Biogeographic Regions in Turkey (EA- Eastern Anatolia, SA- Southeastern Anatolia, BS- Black Sea, CA- Central Anatolia, MD- Mediterranean, A- Aegean, M- Marmara).

Names of taxa	EA	SA	BS	CA	MD	A	M
Family: Ammoplanidae							
Genus: Ammoplanellus Gussakovskij, 1931							
<i>Ammoplanellus simplex</i> Gussakovskij, 1952	-	-	-	-	+	-	-
Genus: Ammoplanus Giraud, 1869							
<i>Ammoplanus denesi</i> Bouček, 2001	-	+	-	-	-	-	-
<i>Ammoplanus hofferi</i> Šnoflák, 1943	+	-	-	+	-	-	-

<i>Ammoplanus kaszabi</i> Tsuneki, 1972	-	+	-	-	-	-	-
<i>Ammoplanus marathroicus</i> De Stefani Perez, 1887	+	+	-	-	+	-	-
<i>Ammoplanus minutus</i> Bouček, 2001	+	-	-	+	-	+	-
<i>Ammoplanus monticola</i> Gussakovskij, 1952	+	-	-	-	-	-	-
<i>Ammoplanus perrisi</i> Giraud, 1869	-	-	-	+	-	-	-
<i>Ammoplanus rjabovi</i> Gussakovskij, 1931	-	-	+	-	-	+	-
Genus: <i>Protostigmus</i> Turner, 1918							
<i>Protostigmus</i> sp.	-	-	-	-	-	-	+
Family: Ampulicidae Shuckard, 1840							
Genus: <i>Dolichurus</i> (Latreille, 1809)							
<i>Dolichurus bicolor</i> Lepeletier de Saint-Fargeau, 1845	-	-	-	-	+	-	-
<i>Dolichurus corniculus</i> (Spinola, 1807)	+	-	+	-	+	+	-
<i>Dolichurus haemorrhous</i> A. Costa, 1886	-	-	-	-	+	+	-
Genus: <i>Trirogma</i> Westwood, 1841							
<i>Trirogma caerulea</i> Westwood, 1841	-	-	-	-	+	-	-
Family: Astatidae Lepeletier de Saint-Fargeau, 1845							
Genus: <i>Astata</i> (Latreille 1796)							
<i>Astata affinis radoszkowskii</i> Pulawski, 1957	+	-	+	+	+	-	+
<i>Astata apostata</i> Mercet, 1910	+	+	-	+	+	+	-
<i>Astata boops</i> (Schränk, 1781)	+	-	+	+	+	+	+
<i>Astata brevitarsis</i> Pulawski, 1958	+	-	-	-	-	+	-
<i>Astata costae</i> A. Costa, 1867	+	+	+	+	+	-	+
<i>Astata diversipes</i> Pulawski, 1955	+	-	+	+	+	-	-
<i>Astata graeca</i> de Beaumont, 1965	+	-	+	+	-	-	-
<i>Astata jucunda</i> Pulawski, 1959	+	-	+	+	-	-	+
<i>Astata kashmirensis</i> Nurse, 1909	+	+	+	+	+	+	+
<i>Astata leila</i> Pulawski, 1967	-	-	-	+	-	-	-
<i>Astata miegii scapularis</i> Kohl, 1889	+	-	+	+	+	+	+
<i>Astata minor</i> Kohl, 1885	+	+	+	+	+	+	+
<i>Astata pontica</i> Pulawski, 1958	-	-	+	+	-	+	-
<i>Astata quettae</i> Nurse, 1903	+	-	-	-	-	-	-
<i>Astata rufipes</i> Mocsáry, 1883	+	-	+	-	-	-	-
Genus: <i>Dryudella</i> (Spinola, 1843)							
<i>Dryudella amenartais</i> Pulawski, 1967	+	-	-	-	-	-	-
<i>Dryudella esterinae</i> Pagliano, 2001	+	-	-	-	-	-	-
<i>Dryudella freygessneri</i> Carl, 1920	+	-	-	+	-	+	-
<i>Dryudella picticornis</i> Gussakovskij, 1927	+	-	-	+	-	-	-
<i>Dryudella tricolor anatolica</i> Pulawski, 1967	+	-	+	+	-	-	-
<i>Dryudella tricolor eurygnatha</i> Pulawski, 1967	+	+	+	+	+	+	+
<i>Dryudella tricolor tricolor</i> (Vander Linden, 1829)	-	-	+	+	-	-	-
Family: Bembicidae Latreille, 1802							
Genus: <i>Alysson</i> Panzer, 1806							
<i>Alysson ocellatus</i> de Beaumont, 1967	-	-	+	-	-	-	-
<i>Alysson ratzeburgi</i> Dahlbom, 1843	-	-	+	+	-	-	-
<i>Alysson spinosus</i> (Panzer, 1801)	-	-	+	-	+	+	+
<i>Alysson tricolor</i> Lepeletier de Saint-Fargeau & Audinet-Serville, 1825	-	-	-	+	-	-	-
Genus: <i>Ammatomus</i> A. Costa, 1859							
<i>Ammatomus coarctatus</i> (Spinola, 1808)	+	+	+	+	+	+	+
<i>Ammatomus rogenhoferi</i> Handlirsch, 1888	+	+	+	+	+	+	+
<i>Ammatomus rufonodis</i> Radoszkovsky, 1877	-	+	-	-	+	-	-

Genus: Argogorytes Ashmead, 1899							
<i>Argogorytes fargeii</i> (Shuckard, 1837)	+	-	+	+	+	+	+
<i>Argogorytes mystaceus</i> (Linnaeus, 1761)	+	+	+	+	-	-	+
Genus: Bembecinus A. Costa, 1859							
<i>Bembecinus acanthomerus</i> Morice, 1911	+	+	-	+	+	-	-
<i>Bembecinus anatolicus</i> de Beaumont, 1968	+	-	+	+	+	+	-
<i>Bembecinus asiaticus iranicus</i> Schmid-Egger, 2004	+	+	-	-	+	-	-
<i>Bembecinus birecikensis</i> Schmid-Egger, 2004	-	+	-	-	-	-	-
<i>Bembecinus cyprius</i> de Beaumont, 1954	-	+	+	+	+	-	-
<i>Bembecinus gracilicornis</i> Handlirsch, 1892	-	-	-	-	-	+	-
<i>Bembecinus guichardi</i> Schmid-Egger, 2004	+	+	-	-	-	-	-
<i>Bembecinus gusenleitneri</i> de Beaumont, 1967	-	+	-	+	+	+	-
<i>Bembecinus gynandromorphus</i> Handlirsch, 1892	+	-	-	+	+	+	-
<i>Bembecinus heinrichi</i> Schmid-Egger, 2004	+	-	-	-	+	-	-
<i>Bembecinus henseni</i> Schmid-Egger, 2004	+	-	-	-	-	-	-
<i>Bembecinus hungaricus</i> Frivaldszky, 1877	-	-	+	-	-	+	+
<i>Bembecinus innocens</i> de Beaumont, 1967	+	+	+	+	+	-	-
<i>Bembecinus meridionalis</i> A. Costa, 1859	-	+	+	+	+	+	+
<i>Bembecinus nigrolabrum</i> Schmid-Egger, 2004	+	-	+	+	-	-	-
<i>Bembecinus peregrinus</i> (F. Smith, 1856)	+	+	+	+	+	+	+
<i>Bembecinus rhodius</i> de Beaumont, 1960	+	-	+	+	+	+	-
<i>Bembecinus schwarzi</i> de Beaumont, 1967	-	-	-	-	+	+	-
<i>Bembecinus tridens</i> (Fabricius, 1781)	+	+	+	+	+	+	+
<i>Bembecinus urfanensis</i> Schmid-Egger, 2004	-	+	-	-	-	-	-
<i>Bembecinus validior</i> Gussakovskij, 1952	+	+	-	-	+	-	-
Genus: Bembix (Fabricius, 1775)							
<i>Bembix arenaria</i> Handlirsch, 1893	-	-	-	-	+	-	-
<i>Bembix bicolor</i> Radoszkovsky, 1877	+	-	+	+	+	-	-
<i>Bembix bidentata</i> Vander Linden, 1829	+	-	+	+	+	+	+
<i>Bembix ciliciensis</i> de Beaumont, 1967	-	-	-	-	+	-	-
<i>Bembix cinctella</i> Handlirsch, 1893	+	-	+	+	+	-	-
<i>Bembix diversipes</i> F. Morawitz, 1889	+	-	+	+	-	-	+
<i>Bembix eburnea</i> Radoszkovsky, 1877	+	-	-	-	-	-	-
<i>Bembix gracilis</i> Handlirsch, 1893	+	-	-	-	-	+	-
<i>Bembix megerlei</i> Dahlbom, 1845	+	-	-	-	-	-	+
<i>Bembix oculata</i> Panzer, 1801	+	+	+	+	+	+	+
<i>Bembix olivacea</i> Fabricius, 1787	+	+	+	+	+	+	-
<i>Bembix pallida</i> Radoszkovsky, 1877	+	-	+	+	+	+	+
<i>Bembix portchinskii</i> Radoszkowsky, 1884	+	-	-	-	-	-	-
<i>Bembix rostrata</i> (Linnaeus, 1758)	+	-	+	+	-	+	+
<i>Bembix sinuata</i> Panzer, 1804	+	-	+	+	-	+	+
<i>Bembix tarsata</i> Latreille, 1809	-	-	+	+	-	-	-
<i>Bembix turca</i> Dahlbom, 1845	-	-	-	-	+	-	-
<i>Bembix zonata</i> Klug, 1835	+	-	+	+	-	-	-
Genus: Brachystegus A. Costa, 1859							
<i>Brachystegus incertus</i> Radoszkovsky, 1877	+	-	+	+	+	-	-
<i>Brachystegus scalaris</i> (Illiger, 1807)	+	-	+	+	-	-	-
Genus: Didineis Wesmael, 1852							
<i>Didineis clavimana</i> Gussakovskij, 1937	+	-	-	-	-	-	-
<i>Didineis crassicornis</i> Handlirsch, 1888	+	-	-	-	-	-	-
<i>Didineis latro</i> de Beaumont, 1967	+	-	-	+	+	-	-
<i>Didineis pannonica</i> Handlirsch, 1888	+	-	-	+	-	-	-
<i>Didineis wuestneii</i> Handlirsch, 1888	-	-	+	-	-	-	-

Genus: <i>Gorytes</i> Latreille, 1805							
<i>Gorytes albidulus</i> Lepeletier de Saint-Fargeau, 1832	+	+	+	+	-	-	-
<i>Gorytes foveolatus</i> Handlirsch, 1888	+	+	+	+	+	+	+
<i>Gorytes hebraeus</i> de Beaumont, 1953	+	-	-	+	-	+	-
<i>Gorytes kohli</i> Handlirsch, 1888	-	-	-	-	+	-	-
<i>Gorytes laticinctus</i> Lepeletier de Saint-Fargeau, 1832	+	-	+	+	-	-	-
<i>Gorytes neglectus</i> Handlirsch, 1895	-	-	+	-	-	-	-
<i>Gorytes nigrifacies</i> Mocsáry, 1879	+	-	+	+	+	+	-
<i>Gorytes pleuripunctatus</i> A. Costa, 1859	+	+	+	+	+	+	+
<i>Gorytes procrustes</i> Handlirsch, 1888	+	-	-	-	-	-	+
<i>Gorytes quadrifasciatus</i> (Fabricius, 1804)	+	-	+	-	-	-	+
<i>Gorytes quinquecinctus</i> (Fabricius, 1793)	+	+	+	+	+	+	+
<i>Gorytes quinquefasciatus</i> (Panzer, 1798)	+	-	+	+	+	+	-
<i>Gorytes schlettereri ponticus</i> de Beaumont, 1967	+	-	+	-	-	-	-
<i>Gorytes schmidti</i> Schmid-Egger, 2002	-	+	-	-	-	-	-
<i>Gorytes schmiedeknechti</i> Handlirsch, 1888	+	+	+	+	+	+	+
<i>Gorytes sulcifrons</i> A. Costa, 1867	+	+	+	+	-	-	-
Genus: <i>Harpactus</i> Shuckard, 1837							
<i>Harpactus adventicus</i> de Beaumont, 1967	-	-	-	+	-	-	+
<i>Harpactus affinis</i> (Spinola, 1808)	+	+	+	+	+	-	-
<i>Harpactus coccineus</i> Balthasar, 1954	-	-	-	-	+	-	-
<i>Harpactus dimorphus</i> Pulawski, 1979	-	+	-	-	-	-	-
<i>Harpactus elegans</i> (Lepeletier de Saint-Fargeau, 1832)	+	-	+	+	+	+	-
<i>Harpactus formosus</i> (Jurine, 1807)	+	+	+	+	+	+	-
<i>Harpactus immaculatus</i> Pulawski, 1979	-	+	-	-	-	-	-
<i>Harpactus laevis</i> (Latreille, 1792)	+	-	-	+	-	+	-
<i>Harpactus morawitzi</i> Radoszkowsky, 1884	-	-	+	+	+	-	+
<i>Harpactus obscurus</i> de Beaumont, 1969	+	-	+	+	-	-	-
<i>Harpactus osdroene</i> de Beaumont, 1969	-	-	-	+	-	-	-
<i>Harpactus pulchellus</i> A. Costa, 1859	+	+	-	-	-	-	-
<i>Harpactus tauricus</i> Radoszkowski, 1884	-	-	+	+	-	-	-
<i>Harpactus transcaucasicus</i> Nemkov, 1994	-	+	+	-	-	-	-
<i>Harpactus transiens</i> A. Costa, 1887	+	+	+	+	+	-	-
<i>Harpactus tumidus</i> (Panzer, 1801)	-	-	+	-	-	-	-
<i>Harpactus walteri</i> Handlirsch, 1888	+	+	-	-	-	-	-
Genus: <i>Hoplisoides</i> Gribodo, 1884							
<i>Hoplisoides craverii</i> (A. Costa, 1867)	+	+	+	+	+	-	-
<i>Hoplisoides latifrons</i> (Spinola, 1808)	+	+	-	+	-	-	-
<i>Hoplisoides punctuosus</i> (Eversmann, 1849)	+	+	+	+	+	+	-
Genus: <i>Lestiphorus</i> Lepeletier de Saint-Fargeau, 1832							
<i>Lestiphorus bicinctus</i> (Rossi, 1794)	+	-	-	-	-	-	-
<i>Lestiphorus egregius</i> Handlirsch, 1893	+	-	-	-	-	-	-
Genus: <i>Nippononysson</i> Yasumatsu & Moidl, 1936							
<i>Nippononysson inexpectatus</i> de Beaumont, 1967	-	-	+	-	-	-	-
Genus: <i>Nysson</i> Latreille, 1802							
<i>Nysson dimidiatus</i> Jurine, 1807	+	-	+	+	-	+	-
<i>Nysson fulvipes</i> A. Costa, 1859	+	+	+	+	-	-	-
<i>Nysson gerstaeckeri</i> Handlirsch, 1887	+	+	+	+	-	-	-
<i>Nysson guichardi</i> de Beaumont, 1967	-	-	-	+	-	-	-

<i>Nysson inornatus</i> de Beaumont, 1967	-	-	-	+	+	-	-
<i>Nysson interruptus</i> (Fabricius, 1798)	+	+	+	+	-	+	-
<i>Nysson lapillus</i> de Beaumont, 1965	+	-	-	+	-	-	-
<i>Nysson maculosus</i> (Gmelin, 1790)	+	-	+	+	-	-	-
<i>Nysson mimulus</i> Valkeila, 1964	+	+	-	-	-	-	-
<i>Nysson pratensis</i> Mercet, 1909	+	-	-	-	-	-	-
<i>Nysson spinosus</i> (J. Förster, 1771)	+	-	+	-	-	-	+
<i>Nysson trichopygus</i> de Beaumont, 1967	-	-	-	-	+	-	-
<i>Nysson tridens</i> Gerstaecker, 1867	+	-	-	+	-	-	-
<i>Nysson trimaculatus</i> (Rossi, 1790)	+	+	-	+	-	-	+
<i>Nysson variabilis</i> Chevrier, 1867	+	+	-	+	-	-	-
<i>Nysson</i> (<i>Synnevrus</i>) <i>decemmaculatus</i> Spinola, 1807	+	-	+	+	-	-	-
<i>Nysson</i> (<i>S.</i>) <i>epeoliformis</i> F. Smith, 1856	+	-	-	+	-	-	-
<i>Nysson</i> (<i>S.</i>) <i>harveyi</i> de Beaumont, 1967	-	-	-	+	-	-	-
<i>Nysson</i> (<i>S.</i>) <i>militaris</i> Gerstaecker, 1867	+	-	+	+	-	-	-
Genus: <i>Olgia</i> Radoszkovsky, 1877							
<i>Olgia helena</i> de Beaumont, 1953	+	+	+	+	+	+	+
<i>Olgia spinulosa</i> de Beaumont, 1953	+	-	-	+	+	-	-
Genus: <i>Oryttus</i> Spinola, 1836							
<i>Oryttus concinnus paradisiacus</i> de Beaumont, 1967	+	-	+	-	-	+	-
<i>Oryttus infernalis</i> Handlirsch, 1888	-	-	-	+	+	+	+
Genus: <i>Psammaecius</i> Lapeletier de Saint-Fargeau, 1832							
<i>Psammaecius punctulatus</i> (Vander Linden, 1829)	+	-	+	+	+	+	+
Genus: <i>Sphecius</i> Dahlbom, 1843							
<i>Sphecius antennatus</i> Klug, 1845	+	-	+	+	+	-	+
<i>Sphecius conicus</i> (Germar, 1817)	+	-	-	+	-	-	-
<i>Sphecius nigricornis</i> (Dufour, 1838)	+	-	+	+	+	-	+
Genus: <i>Stizoides</i> Guérin-Méneville, 1844							
<i>Stizoides crassicornis</i> (Fabricius, 1787)	+	-	-	-	-	-	+
<i>Stizoides melanopterus</i> Dahlbom, 1845	+	-	-	+	+	+	+
<i>Stizoides tridentatus</i> (Fabricius, 1775)	+	+	+	+	+	+	+
Genus: <i>Stizus</i> Latreille, 1802							
<i>Stizus annulatus</i> Klug, 1845	+	-	-	+	+	-	+
<i>Stizus bipunctatus</i> F. Smith, 1856	-	-	-	+	+	+	+
<i>Stizus combustus</i> F. Smith, 1856	-	-	+	-	-	-	-
<i>Stizus continuus</i> (Klug, 1835)	-	-	-	+	-	-	-
<i>Stizus fasciatus</i> (Fabricius, 1781)	+	-	-	+	+	+	+
<i>Stizus handlirschi</i> Radoszkowski, 1893	-	-	-	-	+	-	-
<i>Stizus kohlii</i> Mocsáry, 1883	-	-	-	-	+	-	-
<i>Stizus perrisi</i> Dufour, 1838	+	-	-	-	+	-	-
<i>Stizus pubescens</i> Klug, 1835	-	+	+	+	+	+	-
<i>Stizus ruficornis</i> (J. Förster, 1771)	+	+	+	+	+	+	+
<i>Stizus rufiventris</i> Radoszkowski, 1877	-	-	-	-	+	-	-
<i>Stizus tricolor</i> Handlirsch, 1892	-	-	-	-	+	-	-
Family: Crabronidae Latreille, 1802							
Genus: <i>Belomicrus</i> A. Costa, 1871							
<i>Belomicrus italicus</i> A. Costa, 1871	-	+	-	+	+	+	-
<i>Belomicrus lucifer</i> Guichard, 1991	-	+	-	+	-	-	-
<i>Belomicrus modestus</i> Kohl, 1892	-	+	-	-	-	-	-
<i>Belomicrus odontophorus</i> Kohl, 1892	+	-	-	-	-	-	-
<i>Belomicrus ottomanus</i> Guichard, 1991	-	-	-	+	-	-	-

<i>Belomicrus wouroukatte</i> de Beaumont, 1967	-	-	-	+	-	-	-
Genus: Crabro (Fabricius, 1775)							
<i>Crabro alpinus</i> Imhoff, 1863	-	-	+	-	-	-	-
<i>Crabro cribrarius</i> (Linnaeus, 1758)	+	-	+	+	-	+	+
<i>Crabro peltarius</i> Schreber, 1784	+	-	+	+	-	+	+
<i>Crabro pugillator</i> A. Costa, 1871	+	-	+	-	-	+	+
Genus: Crossocerus Le Peletier-de-Saint-Fargeau & Brullé, 1835							
<i>Crossocerus (Ablepharipus) assimilis</i> F. Smith, 1856	+	-	+	+	-	-	-
<i>Crossocerus (A.) podagricus</i> (Vander Linden, 1829)	+	+	+	+	+	+	-
<i>Crossocerus (Acanthocrabro) vagabundus</i> (Panzer, 1798)	+	-	+	+	-	+	+
<i>Crossocerus (Blepharipus) annulipes</i> Le Peletier-de-Saint-Fargeau & Brullé, 1835	-	-	+	-	-	-	-
<i>Crossocerus (B.) barbipes</i> Dahlbom, 1845	-	-	+	-	-	-	-
<i>Crossocerus (B.) cetratus</i> Shuckard, 1837	+	-	+	-	-	-	+
<i>Crossocerus (B.) heydeni</i> Kohl, 1880	+	-	-	-	-	-	-
<i>Crossocerus (B.) leucostoma</i> (Linnaeus, 1758)	+	-	+	-	-	-	-
<i>Crossocerus (B.) megacephalus</i> (Rossi, 1790)	+	-	+	+	-	-	+
<i>Crossocerus (Crossocerus) adhaesus</i> Kohl, 1915	-	-	-	-	+	-	-
<i>Crossocerus (C.) bispinosus</i> de Beaumont, 1967	-	-	+	+	-	-	-
<i>Crossocerus (C.) denticrus</i> Herrich-Schaeffer, 1841	+	-	-	-	+	-	-
<i>Crossocerus (C.) elongatulus annulatus</i> Le Peletier-de-Saint-Fargeau & Brullé, 1835	-	+	+	-	-	-	-
<i>Crossocerus (C.) elongatulus elongatulus</i> (Vander Linden, 1829)	+	+	+	+	+	+	+
<i>Crossocerus (C.) esau</i> de Beaumont, 1967	+	+	+	+	-	-	-
<i>Crossocerus (C.) exiguus</i> (Vander Linden, 1829)	-	-	+	-	-	-	-
<i>Crossocerus (C.) ovalis</i> Le Peletier-de-Saint-Fargeau & Brullé, 1835	-	-	+	-	-	-	-
<i>Crossocerus (C.) palmipes</i> (Linnaeus, 1767)	+	-	-	-	-	-	-
<i>Crossocerus (C.) pullulus</i> A. Morawitz, 1866	-	+	-	-	-	-	-
<i>Crossocerus (C.) tarsatus</i> Shuckard, 1837	+	+	+	+	+	+	-
<i>Crossocerus (C.) varus</i> Le Peletier-de-Saint-Fargeau & Brullé, 1835	+	-	+	+	-	-	-
<i>Crossocerus (C.) wesmaeli</i> (Vander Linden, 1829)	+	+	-	-	-	+	-
<i>Crossocerus (Cuphopterus) dimidiatus</i> (Fabricius, 1781)	+	-	-	-	-	-	+
<i>Crossocerus (Hoplocrabro) quadrimaculatus</i> (Fabricius, 1793)	+	+	+	+	+	+	+
<i>Crossocerus (Oxycrabro) acanthophorus</i> Kohl, 1892	+	+	+	+	+	-	-
<i>Crossocerus (O.) taru</i> de Beaumont, 1967	-	-	-	+	-	-	-
Genus: Dinetus Panzer, 1806							
<i>Dinetus pictus</i> (Fabricius, 1793)	+	-	+	+	-	+	+
Genus: Ectemnius Dahlbom, 1845							
<i>Ectemnius (Cameronitus) nigritarsus</i> (Herrich-Schaeffer, 1841)	-	-	-	-	-	-	+
<i>Ectemnius (Clytochrysus) cavifrons</i> Thomson, 1870	-	-	+	-	-	-	-
<i>Ectemnius (C.) lapidarius</i> (Panzer, 1804)	+	-	+	-	-	-	+

<i>Ectemnius (C.) ruficornis</i> (Zetterstedt, 1838)	+	-	+	-	-	-	-
<i>Ectemnius (C.) sexcinctus</i> (Fabricius, 1775)	+	+	+	+	-	+	+
<i>Ectemnius (Ectemnius) borealis</i> (Zetterstedt, 1838)	-	-	+	-	-	-	-
<i>Ectemnius (E.) dives</i> (Le Peletier-de-Saint-Fargeau & Brullé, 1835)	+	-	+	+	-	+	+
<i>Ectemnius (E.) rugifer</i> Dahlbom, 1845	+	+	+	+	+	+	+
<i>Ectemnius (Hypocrabro) confinis</i> Walker, 1871	+	+	+	+	+	+	+
<i>Ectemnius (H.) continuus continuus</i> (Fabricius, 1804)	+	+	+	+	+	+	+
<i>Ectemnius (H.) continuus punctatus</i> (Le-Peletier-de-Saint-Fargeau & Brullé, 1835)	-	-	+	+	-	+	-
<i>Ectemnius (H.) hypsae</i> De Stefani, 1884	+	-	-	+	-	-	-
<i>Ectemnius (H.) meridionalis</i> A. Costa, 1871	+	+	+	+	+	+	+
<i>Ectemnius (H.) persicus</i> (Kohl, 1888)	+	+	-	+	-	-	-
<i>Ectemnius (H.) rubicola</i> (Dufour & Perris, 1840)	+	+	+	+	-	-	+
<i>Ectemnius (H.) schlettereri</i> Kohl, 1888	+	-	-	-	-	-	-
<i>Ectemnius (Metacrabro) cephalotes</i> (Olivier, 1792)	+	-	+	+	+	-	+
<i>Ectemnius (M.) fossorius</i> (Linnaeus, 1758)	+	-	+	+	+	-	+
<i>Ectemnius (M.) kriechbaumeri</i> Kohl, 1879	+	+	+	-	+	-	-
<i>Ectemnius (M.) lituratus</i> (Panzer, 1805)	+	-	+	+	-	-	+
<i>Ectemnius (Thyreocerus) crassicornis</i> (Spinola, 1808)	+	+	+	+	+	+	+
<i>Ectemnius (T.) massiliensis</i> Kohl, 1883	+	+	+	+	+	+	-
<i>Ectemnius (T.) zonsteini</i> Jacobs, 2006	+	-	-	-	-	-	-
Genus: Entomognathus Dahlbom, 1844							
<i>Entomognathus brevis</i> (Vander Linden, 1829)	+	+	+	+	+	+	+
<i>Entomognathus dentifer</i> Noskiewicz, 1929	+	-	+	+	+	-	-
<i>Entomognathus schmidti</i> de Beaumont, 1967	-	-	-	+	-	+	+
<i>Entomognathus schmiedeknechti</i> Kohl, 1905	+	-	+	+	+	-	-
Genus: Gastrosericus Spinola, 1839							
<i>Gastrosericus funereus</i> Gussakovskij, 1931	-	+	-	-	+	-	-
<i>Gastrosericus waltlii</i> Spinola, 1839	+	+	+	+	+	-	-
Genus: Holotachysphex de Beaumont, 1940							
<i>Holotachysphex mochii</i> de Beaumont, 1947	+	+	-	-	+	-	-
Genus: Larra (Fabricius, 1793)							
<i>Larra anathema</i> (Rossi, 1790)	+	-	+	+	+	+	+
<i>Larra transcaspica</i> F. Morawitz, 1894	+	-	+	+	-	-	-
Genus: Larropsis Patton, 1892							
<i>Larropsis (Ancistromma) asiatica</i> Gussakovskij, 1935	+	-	-	-	+	-	-
<i>Larropsis (A.) punctulata melanaria</i> (Kohl, 1888)	+	-	-	-	-	-	-
Genus: Lestica Billberg, 1820							
<i>Lestica (Lestica) alata</i> (Panzer, 1797)	-	-	+	-	-	-	+
<i>Lestica (L.) pluschtschewskiyi</i> F. Morawitz, 1891	+	-	-	-	-	-	-
<i>Lestica (L.) subterranea</i> (Fabricius, 1775)	+	+	+	+	+	-	-
<i>Lestica (Ptyx) eurypus</i> Kohl, 1898	+	-	-	-	-	-	-
<i>Lestica (Solenius) anatolica</i> Can and Gülmez, 2022	-	-	-	+	-	-	-
<i>Lestica (S.) camelus</i> Eversmann, 1849	-	-	-	+	-	-	-
<i>Lestica (S.) clypeata</i> (Schreber, 1759)	+	+	+	+	+	+	+
Genus: Lindenius Le Peletier-de-Saint-							

Fargeau & Brullé, 1835							
<i>Lindenius abditus</i> Kohl, 1898	-	+	-	-	-	-	-
<i>Lindenius albilabris</i> (Fabricius, 1793)	+	-	+	+	+	-	+
<i>Lindenius anatolicus</i> de Beaumont, 1967	-	+	+	+	+	-	-
<i>Lindenius aptus</i> Marshakov, 1973	+	-	-	-	-	-	-
<i>Lindenius crenulifer</i> Kohl, 1905	-	-	-	-	+	-	-
<i>Lindenius fastidiosus</i> de Beaumont, 1967	+	+	-	+	-	-	-
<i>Lindenius helleri</i> Kohl, 1915	+	-	-	-	-	-	-
<i>Lindenius ibex ibex</i> Kohl, 1883	+	+	-	+	+	+	-
<i>Lindenius ibex syriacus</i> Kohl, 1905	+	-	-	+	+	-	-
<i>Lindenius iranius</i> Leclercq, 1975	+	+	-	+	+	-	-
<i>Lindenius laevis</i> A. Costa, 1871	+	-	+	-	-	-	+
<i>Lindenius latitarsis</i> Marshakov, 1973	+	-	-	+	-	-	-
<i>Lindenius major</i> de Beaumont, 1956	-	-	-	+	-	-	-
<i>Lindenius mesopleuralis</i> F. Morawitz, 1890	+	-	-	-	-	-	-
<i>Lindenius nitidus</i> de Beaumont, 1967	-	-	-	+	-	-	-
<i>Lindenius panzeri</i> (Vander Linden, 1829)	+	-	+	-	+	+	+
<i>Lindenius parkanensis</i> Zavadil, 1948	-	-	-	+	-	-	-
<i>Lindenius pygmaeus armatus</i> (Vander Linden, 1829)	+	+	+	+	+	-	+
<i>Lindenius pygmaeus pygmaeus</i> (Rossi, 1794)	+	-	-	+	-	-	-
<i>Lindenius sardashti</i> Leclercq, 1975	+	+	-	-	-	-	-
<i>Lindenius satschouanus</i> Kohl, 1915	+	-	-	-	-	-	-
<i>Lindenius subaeneus</i> Le Peletier-de-Saint-Fargeau & Brullé, 1835	+	+	+	+	-	-	-
Genus: Liris Fabricius, 1804							
<i>Liris atratus</i> Spinola, 1805	-	-	+	+	-	-	-
<i>Liris festinans praetermissus</i> Richards, 1928	-	-	-	-	+	+	-
<i>Liris inopinatus</i> de Beaumont, 1961	-	-	+	-	-	-	-
<i>Liris micans</i> Spinola, 1806	-	-	+	+	-	-	-
<i>Liris niger</i> (Fabricius, 1775)	+	+	+	+	+	+	+
<i>Liris nigricans</i> Walker, 1871	+	-	-	+	+	-	-
Genus: Miscophus Jurine, 1807							
<i>Miscophus albufeirae</i> de Andrade, 1952 (= <i>M. albufeirae anatolicus</i> de Beaumont, 1967)	-	-	-	-	+	+	-
<i>Miscophus ater</i> Lepeletier de Saint-Fargeau, 1845	+	-	+	+	-	-	+
<i>Miscophus bicolor</i> Jurine, 1807	+	-	+	+	+	+	-
<i>Miscophus caninus</i> de Andrade, 1953	+	+	+	+	+	+	+
<i>Miscophus eatoni</i> E. Saunders, 1903	+	-	+	+	-	-	-
<i>Miscophus helveticus</i> Kohl, 1883	-	-	+	+	-	-	-
<i>Miscophus insolitus</i> de Andrade, 1953	+	-	-	-	-	-	-
<i>Miscophus luctuosus</i> de Andrade, 1960	-	-	-	-	+	-	-
<i>Miscophus lusitanicus</i> de Andrade, 1952	-	-	+	+	+	-	-
<i>Miscophus mavromoustakisi cappadocicus</i> de Beaumont, 1967	-	-	+	+	-	+	-
<i>Miscophus merceti orientalis</i> de Beaumont, 1967	-	-	+	+	-	+	-
<i>Miscophus minutus</i> de Andrade, 1953	-	-	+	+	+	-	-
<i>Miscophus niger</i> Dahlbom, 1844	+	-	+	+	-	+	-
<i>Miscophus pretiosus</i> Kohl, 1884	+	-	+	+	+	-	-
<i>Miscophus pulcher</i> de Andrade, 1953	-	-	-	+	-	-	-
<i>Miscophus venustus</i> de Beaumont, 1969	-	+	-	-	-	-	-
Genus: Nitela Latreille, 1809							
<i>Nitela borealis</i> Valkeila, 1974	-	-	-	+	-	-	+
<i>Nitela fallax</i> Kohl, 1884	-	-	-	-	-	-	+

<i>Nitela spinolae</i> Latreille, 1809	-	-	+	-	-	-	-
<i>Nitela truncata</i> Gayubo & Felton, 2000	-	-	+	+	-	+	-
Genus: <i>Odontocrabro</i> Tsuneki, 1971							
<i>Odontocrabro orthodoxus</i> Hensen, 1989	-	+	-	-	-	-	-
Genus: <i>Oxybelus</i> (Latreille, 1796)							
<i>Oxybelus aurantiacus</i> Mocsáry, 1883	+	+	+	+	+	+	-
<i>Oxybelus bipunctatus</i> Olivier, 1812	+	+	+	+	+	+	+
<i>Oxybelus citrinus</i> Radoszkowski, 1893	+	-	-	-	-	-	-
<i>Oxybelus dissectus dissectus</i> Dahlbom, 1845	+	-	+	+	+	+	+
<i>Oxybelus dissectus elegans</i> Mocsáry, 1879	+	-	+	+	+	-	-
<i>Oxybelus fischeri</i> Spinola, 1839	-	-	-	+	-	-	-
<i>Oxybelus haemorrhoidalis</i> Olivier, 1812	+	+	+	+	+	+	-
<i>Oxybelus lamellatus</i> Olivier, 1812	-	+	-	-	+	+	+
<i>Oxybelus latifrons</i> Kohl, 1892	-	-	-	+	-	-	-
<i>Oxybelus latro</i> Olivier, 1812	+	-	+	+	+	+	-
<i>Oxybelus lineatus</i> (Fabricius, 1787)	+	+	+	+	-	+	-
<i>Oxybelus maculipes</i> F. Smith, 1856	+	+	+	+	+	+	+
<i>Oxybelus mandibularis</i> Dahlbom, 1845	+	-	+	+	+	-	-
<i>Oxybelus mucronatus</i> (Fabricius, 1793)	+	+	+	+	+	+	+
<i>Oxybelus quatuordecimnotatus</i> Jurine, 1807	+	+	+	+	+	+	+
<i>Oxybelus spectabilis</i> Gerstaecker, 1867	+	+	-	-	-	-	-
<i>Oxybelus subspinosus</i> Klug, 1835	+	+	+	+	+	+	+
<i>Oxybelus trispinosus</i> (Fabricius, 1787)	+	-	+	+	-	-	-
<i>Oxybelus uniglumis</i> (Linnaeus, 1758)	+	+	+	+	-	+	-
<i>Oxybelus variegatus</i> Wesmael, 1852	+	+	+	+	+	+	+
Genus: <i>Palarus</i> Latreille, 1802							
<i>Palarus ambustus</i> Klug, 1845	+	-	-	-	-	-	-
<i>Palarus funerarius</i> F. Morawitz, 1889	+	+	+	+	+	-	-
<i>Palarus laetus</i> Klug, 1845	-	+	-	-	-	-	-
<i>Palarus variegatus</i> (Fabricius, 1781)	+	+	+	+	-	+	+
Genus: <i>Parapiagetia</i> Kohl, 1896							
<i>Parapiagetia genicularis</i> (F. Morawitz, 1890)	+	-	-	-	-	-	-
<i>Parapiagetia goeksuensis</i> Schmid-Egger, 2014	-	-	-	-	+	-	-
<i>Parapiagetia tridentata</i> Tsuneki, 1972	+	-	+	+	-	-	-
Genus: <i>Pison</i> Jurine, 1808							
<i>Pison atrum</i> Spinola, 1808	+	-	+	+	-	-	-
<i>Pison fasciatum</i> Radoszkovsky, 1876	-	-	-	+	+	+	-
<i>Pison sericeum</i> Kohl, 1888	+	-	+	+	+	+	+
Genus: <i>Prosopigastra</i> A. Costa, 1867							
<i>Prosopigastra bulgarica</i> Pulawski, 1958	+	+	+	+	-	+	-
<i>Prosopigastra fumipennis</i> Gussakovskij, 1952	-	+	+	+	+	+	-
<i>Prosopigastra handlirschi</i> Morice, 1897	-	-	+	-	+	-	-
<i>Prosopigastra orientalis</i> de Beaumont, 1947	+	-	+	+	+	-	+
<i>Prosopigastra zalinda</i> de Beaumont, 1955	-	-	+	+	+	+	-
Genus: <i>Rhopalum</i> Stephens, 1829							
<i>Rhopalum</i> (<i>Corynopus</i>) <i>coarctatum</i> (Scopoli, 1763)	+	-	+	-	-	-	-
<i>Rhopalum</i> (<i>Rhopalum</i>) <i>austriacum</i> Kohl, 1899	-	-	-	-	-	-	+
<i>Rhopalum</i> (<i>R.</i>) <i>beaumonti</i> Móczár, 1957	+	-	-	-	-	-	-
<i>Rhopalum</i> (<i>R.</i>) <i>gracile</i> Wesmael, 1852	+	-	+	-	-	-	-
Genus: <i>Solierella</i> Spinola, 1851							
<i>Solierella compedita</i> Piccioli, 1869	+	+	+	+	+	+	-
<i>Solierella pisonoides</i> S. Saunders, 1873	+	+	+	+	+	-	-
<i>Solierella verhoeffi</i> de Beaumont, 1964	-	-	-	+	+	-	-

Genus: <i>Tachysphex</i> Kohl, 1883							
<i>Tachysphex agnus</i> Pulawski, 1971	-	-	-	+	-	-	-
<i>Tachysphex albocinctus</i> (Lucas, 1849)	+	-	-	-	+	+	-
<i>Tachysphex angustatus</i> Pulawski, 1967	+	+	+	+	-	-	-
<i>Tachysphex argentatus</i> Gussakovskij, 1952	-	+	-	+	+	-	-
<i>Tachysphex bouceki</i> Straka, 2005	-	+	+	+	-	-	-
<i>Tachysphex brevipennis</i> Mercet, 1909	-	-	+	+	+	-	+
<i>Tachysphex brullii brullii</i> (F. Smith, 1856)	+	+	+	+	+	+	-
<i>Tachysphex brullii galileus</i> de Beaumont, 1947	+	-	-	+	+	+	-
<i>Tachysphex consocius</i> Kohl, 1894	+	+	+	+	+	+	+
<i>Tachysphex cortaceus</i> (A. Costa, 1867)	+	+	+	+	+	+	+
<i>Tachysphex costae</i> (De Stefani, 1882)	+	-	+	+	+	+	+
<i>Tachysphex ctenophorus</i> Pulawski, 1971	-	-	+	-	-	-	-
<i>Tachysphex dignus</i> Kohl, 1889	+	-	+	+	+	+	-
<i>Tachysphex erythropus</i> (Spinola, 1839)	-	-	+	-	+	+	+
<i>Tachysphex euxinus</i> Pulawski, 1958	-	+	+	+	-	+	+
<i>Tachysphex excelsus</i> R. Turner, 1917	+	-	-	-	-	-	-
<i>Tachysphex ferrugineus</i> Pulawski, 1967	+	-	+	-	-	-	-
<i>Tachysphex fugax</i> (Radoszkovsky, 1877)	+	+	+	+	-	-	+
<i>Tachysphex fulvitaris</i> (A. Costa, 1867)	+	+	+	+	+	+	+
<i>Tachysphex graecus</i> Kohl, 1883	+	+	+	+	+	+	+
<i>Tachysphex grandii</i> de Beaumont, 1965	+	+	-	+	+	+	+
<i>Tachysphex helveticus</i> Kohl, 1885	+	-	+	+	+	-	+
<i>Tachysphex humilis</i> Straka, 2005	+	+	-	+	+	+	-
<i>Tachysphex incertus</i> (Radoszkovsky, 1877)	+	+	+	+	+	+	+
<i>Tachysphex julliani</i> Kohl, 1883	+	-	+	+	+	+	-
<i>Tachysphex karasi</i> Straka, 2005	-	-	-	+	-	+	-
<i>Tachysphex latifrons</i> Kohl, 1884	+	+	+	+	+	+	-
<i>Tachysphex liriformis</i> Pulawski, 1967	-	+	-	+	+	-	-
<i>Tachysphex magnaemontis</i> Hensen, 1987	-	-	-	-	-	-	+
<i>Tachysphex mediterraneus</i> Kohl, 1883	-	-	+	+	+	+	+
<i>Tachysphex melas</i> Kohl, 1898	+	-	-	-	-	-	-
<i>Tachysphex mocsaryi</i> Kohl, 1884	+	-	+	+	-	-	+
<i>Tachysphex morawitzi</i> Pullawski, 1971	+	-	+	-	-	-	-
<i>Tachysphex nasalis</i> F. Morawitz, 1893	+	-	-	-	-	-	-
<i>Tachysphex nigripennis</i> (Spinola, 1808)	+	+	-	-	-	-	-
<i>Tachysphex nitidior</i> de Beaumont, 1940	+	+	+	+	+	+	-
<i>Tachysphex nitidissimus</i> de Beaumont, 1952	+	+	+	+	+	+	-
<i>Tachysphex nitidus</i> (Spinola, 1806)	+	-	+	+	-	-	+
<i>Tachysphex nobilis</i> Straka, 2016	+	-	-	+	-	-	-
<i>Tachysphex obscuripennis</i> (Schenck, 1857)	+	-	+	+	-	-	-
<i>Tachysphex opacus</i> F. Morawitz, 1893	+	-	+	+	-	-	-
<i>Tachysphex panzeri</i> (Vander Linden, 1829)	+	+	+	+	+	-	+
<i>Tachysphex persa nigripes</i> Pulawski, 1967	+	-	+	+	-	+	-
<i>Tachysphex persa persa</i> Gussakovskij, 1933	+	+	+	+	+	-	-
<i>Tachysphex picnic</i> Van Ooijen, 1987	-	-	-	-	-	+	-
<i>Tachysphex plicosus</i> (A. Costa, 1867)	-	+	-	-	+	-	-
<i>Tachysphex pompiliiformis</i> (Panzer, 1805)	+	+	+	+	+	+	+
<i>Tachysphex prismaticus</i> Straka, 2005	-	-	-	-	-	-	+
<i>Tachysphex psammobius</i> (Kohl, 1880)	+	+	+	+	+	+	+
<i>Tachysphex pseudopanzeri</i> Beaumont, 1955	-	-	+	-	-	-	-
<i>Tachysphex pulcher</i> Pulawski, 1967	+	-	+	+	-	-	-
<i>Tachysphex punctipes</i> Pulawski, 1967	+	-	-	-	-	-	-

<i>Tachysphex punctipleuris</i> Straka, 2016	-	-	-	+	-	-	-
<i>Tachysphex pusulosus</i> de Beaumont, 1955	-	+	+	+	-	-	-
<i>Tachysphex radoszkowskiji</i> F. Morawitz, 1893	+	-	-	-	-	-	-
<i>Tachysphex selectus</i> Nurse, 1909	-	+	-	+	+	-	+
<i>Tachysphex schmiedeknehti</i> Kohl, 1883	-	-	-	-	+	-	-
<i>Tachysphex smissenae</i> Straka, 2016	-	-	-	-	-	+	-
<i>Tachysphex sordidus</i> (Dahlbom, 1845)	-	-	-	+	+	+	+
<i>Tachysphex stachi</i> de Beaumont, 1936	+	+	-	-	-	-	-
<i>Tachysphex subdentatus</i> F. Morawitz, 1893	+	+	+	+	+	+	-
<i>Tachysphex tarsinus</i> (Lepeletier de Saint-Fargeau, 1845)	+	-	+	+	+	-	-
<i>Tachysphex tessellatus</i> (Dahlbom, 1845)	+	+	+	+	+	-	-
<i>Tachysphex unicolor</i> (Panzer, 1809)	+	+	-	+	+	-	+
<i>Tachysphex vulneratus</i> R. Turner, 1917	-	-	-	-	+	-	-
Genus: Tachytes Panzer, 1806							
<i>Tachytes ambidens</i> Kohl, 1884	-	-	-	+	-	-	-
<i>Tachytes argenteus</i> Gussakovskij, 1933	-	-	+	-	+	-	-
<i>Tachytes argyreus</i> F. Smith, 1856	+	-	-	-	-	-	-
<i>Tachytes etruscus</i> (Rossi, 1790)	+	-	+	+	+	-	+
<i>Tachytes freygessneri</i> Kohl, 1881	+	-	+	+	+	+	-
<i>Tachytes integer</i> Gussakovskij, 1933	+	-	-	-	-	-	-
<i>Tachytes levantinus</i> Pulawski, 1962	-	-	-	+	-	-	-
<i>Tachytes matronalis</i> Dahlbom, 1845	+	-	-	+	+	+	+
<i>Tachytes obsoletus</i> (Rossi, 1792)	+	-	+	+	-	+	-
<i>Tachytes panzeri</i> Dufour, 1841	+	-	-	+	+	+	+
<i>Tachytes tarsalis</i> Spinola, 1839	-	-	-	-	+	-	-
Genus: Tracheliodes A. Morawitz, 1866							
<i>Tracheliodes quinquenotatus</i> (Jurine, 1807)	+	-	-	-	-	+	-
Genus: Trypoxylon (Latreille, 1796)							
<i>Trypoxylon albipes</i> F. Smith, 1856	+	+	-	-	+	-	-
<i>Trypoxylon attenuatum</i> F. Smith, 1851	+	-	+	+	+	+	+
<i>Trypoxylon clavicerum</i> Lepeletier de Saint-Fargeau & Audinet-Serville, 1828 (= <i>Trypoxylon kostylevi</i> Antropov, 1985)	+	-	+	+	+	+	+
<i>Trypoxylon deceptorium</i> Antropov, 1991	+	+	+	+	+	+	+
<i>Trypoxylon figulus</i> (Linnaeus, 1758)	+	+	+	+	-	+	+
<i>Trypoxylon fronticorne</i> Gussakovskij, 1936	-	-	+	-	-	+	-
<i>Trypoxylon guichardi</i> Antropov, 1995	-	-	-	+	+	-	-
<i>Trypoxylon kolaziji</i> Kohl, 1883	+	-	+	+	-	+	-
<i>Trypoxylon latilobatum</i> Antropov, 1991	+	-	-	-	-	-	+
<i>Trypoxylon medium</i> de Beaumont, 1945	+	+	+	+	+	+	+
<i>Trypoxylon megriense</i> Antropov, 1985	+	+	+	-	-	-	-
<i>Trypoxylon minus</i> de Beaumont, 1945	+	-	+	+	-	+	+
<i>Trypoxylon scutatum</i> Chevrier, 1867	+	+	+	+	+	-	+
<i>Trypoxylon splendidum</i> Antropov, 2011	-	+	-	-	-	-	-
<i>Trypoxylon syriacum</i> Mercet, 1906	+	-	-	-	-	-	-
Family: Mellinidae Latreille, 1802							
Genus: Mellinus (Fabricius, 1790)							
<i>Mellinus arvensis</i> (Linnaeus, 1758)	+	-	-	-	-	-	+
<i>Mellinus crabroneus</i> Thunberg, 1791	-	-	-	-	-	+	+
Family: Pemphredonidae Dahlbom, 1835							
Genus: Diodontus (Curtis, 1834)							
<i>Diodontus brevilabris</i> de Beaumont, 1967	+	+	+	+	+	+	-
<i>Diodontus insidiosus</i> Spooner, 1938	-	+	+	+	-	-	-

<i>Diodontus luperus</i> Shuckard, 1837	+	+	+	+	+	+	-
<i>Diodontus major</i> Kohl, 1901	-	-	-	+	-	-	-
<i>Diodontus medius</i> Dahlbom, 1844	-	-	-	-	-	-	+
<i>Diodontus minutus</i> (Fabricius, 1793)	+	+	+	+	+	+	+
<i>Diodontus temporalis</i> Kohl, 1901	-	+	-	+	-	-	-
<i>Diodontus tristis</i> (Vander Linden, 1829)	+	-	+	+	-	-	+
Genus: Entomosericus Dahlbom, 1845							
<i>Entomosericus concinnus</i> Dahlbom, 1845	+	+	+	+	+	+	+
<i>Entomosericus hauseri</i> Schmid-Egger, 2000	-	+	-	+	+	-	-
Genus: Passaloeocus Shuckard, 1837							
<i>Passaloeocus australis</i> Merisuo, 1976	+	-	-	-	-	-	-
<i>Passaloeocus borealis</i> Dahlbom, 1844	+	-	-	-	-	-	-
<i>Passaloeocus corniger</i> Shuckard, 1837	+	-	+	+	-	+	-
<i>Passaloeocus eremita</i> Kohl, 1893	-	-	+	+	-	-	-
<i>Passaloeocus gracilis</i> (Curtis, 1834)	+	+	+	+	-	+	-
<i>Passaloeocus insignis</i> (Vander Linden, 1829)	-	-	+	-	-	-	-
<i>Passaloeocus pictus</i> Ribaut, 1952	+	+	+	+	+	-	-
<i>Passaloeocus ribauti</i> Merisuo, 1974	-	+	+	-	+	-	-
<i>Passaloeocus singularis</i> Dahlbom, 1844	+	-	+	+	-	+	-
<i>Passaloeocus turionum</i> Dahlbom, 1844	-	-	+	+	-	-	+
<i>Passaloeocus vandeli</i> Ribaut, 1952	-	+	-	-	-	+	+
Genus: Pemphredon (Latreille, 1796)							
<i>Pemphredon austriaca</i> Kohl, 1888	+	+	+	+	+	+	+
<i>Pemphredon inornata</i> Say, 1824	+	+	+	+	-	+	+
<i>Pemphredon lethifer</i> Shuckard, 1837	+	+	+	+	+	+	+
<i>Pemphredon lugens</i> Dahlbom, 1842	-	-	-	+	-	+	+
<i>Pemphredon lugubris</i> (Fabricius, 1793)	+	+	+	+	-	-	+
<i>Pemphredon morio</i> Vander Linden, 1829	+	+	-	-	-	-	-
<i>Pemphredon mortifer</i> Valkeila, 1972	-	-	-	-	+	-	-
<i>Pemphredon rugifer</i> Dahlbom, 1844	+	+	+	+	+	+	+
Genus: Spilomena Shuckard, 1838							
<i>Spilomena mocsarji</i> Kohl, 1898	-	+	-	+	-	+	+
<i>Spilomena punctatissima</i> Blüthgen, 1953	-	-	-	-	-	+	-
<i>Spilomena troglodytes</i> (Vander Linden, 1829)	-	-	+	+	-	+	+
Genus: Stigmus (Panzer, 1804)							
<i>Stigmus (Stigmus) solskyi</i> A. Morawitz, 1864	+	-	+	+	-	-	-
Family: Philanthidae Latreille, 1802							
Genus: Cerceris Latreille, 1802							
<i>Cerceris aerata</i> Kazenas, 1972	+	-	-	-	-	-	-
<i>Cerceris albicolor</i> Shestakov, 1918	+	-	-	+	+	+	+
<i>Cerceris albofasciata</i> (Rossius, 1790)	+	-	-	-	-	-	-
<i>Cerceris angustata</i> F. Morawitz, 1893	+	+	-	+	+	-	-
<i>Cerceris arenaria</i> (Linnaeus, 1758)	+	+	+	+	+	+	+
<i>Cerceris bicincta</i> Klug, 1835	+	+	+	+	+	+	+
<i>Cerceris bracteata</i> Eversmann, 1849	+	-	+	-	-	-	-
<i>Cerceris bupresticida</i> Dufour, 1841	+	+	+	+	+	+	+
<i>Cerceris cheskesiana</i> Giner Mari, 1945	+	+	-	-	+	-	-
<i>Cerceris circularis dacica</i> Schletterer, 1887	+	+	+	+	+	+	+
<i>Cerceris colorata</i> Schletterer, 1889	+	-	-	-	-	-	-
<i>Cerceris conica</i> Shestakov, 1918	+	+	-	+	-	-	-
<i>Cerceris cupes</i> Shestakov, 1918	+	+	-	-	-	-	-
<i>Cerceris deserticola</i> F. Morawitz, 1890	+	-	-	-	-	-	-
<i>Cerceris dispar</i> Dahlbom, 1845	+	+	+	+	+	+	+
<i>Cerceris dorsalis</i> Eversmann, 1849	+	-	-	-	+	-	-

<i>Cerceris eryngii</i> Marquet, 1875	+	+	+	+	+	+	+
<i>Cerceris eucharis</i> Schletterer, 1887	+	+	-	+	+	+	-
<i>Cerceris euryanthe euryanthe</i> Kohl, 1888	+	+	+	+	+	-	+
<i>Cerceris euryanthe palaestina</i> de Beaumont, 1959	+	+	-	+	+	+	-
<i>Cerceris eversmanni caucasica</i> Shestakov, 1915	+	-	+	+	-	-	-
<i>Cerceris eversmanni warnckeii</i> K. Schmidt, 2000	+	+	-	-	-	-	-
<i>Cerceris fimbriata</i> (Rossi, 1790)	+	+	+	+	+	+	+
<i>Cerceris flavicornis</i> Brullé, 1833	+	+	+	+	+	+	+
<i>Cerceris flavilabris flavilabris</i> (Fabricius, 1793)	+	+	+	+	+	+	+
<i>Cerceris flavilabris laminata</i> Eversmann, 1849	+	-	-	-	-	-	-
<i>Cerceris galathea</i> de Beaumont, 1959	+	+	-	-	-	-	-
<i>Cerceris gusenleitneri</i> K. Schmidt, 2000	+	+	-	-	-	-	-
<i>Cerceris hortivaga</i> Kohl, 1880	-	-	-	+	-	-	-
<i>Cerceris inara</i> de Beaumont, 1967	+	-	+	+	+	-	-
<i>Cerceris interrupta</i> (Panzer, 1799)	+	-	+	+	-	+	+
<i>Cerceris kohlii</i> Schletterer, 1887	+	-	-	-	-	-	-
<i>Cerceris lunata</i> A. Costa, 1867	+	+	+	+	+	+	+
<i>Cerceris maculicrus</i> de Beaumont, 1967	-	+	+	+	-	+	-
<i>Cerceris media</i> Klug, 1835	+	+	+	+	-	+	-
<i>Cerceris odontophora</i> Schletterer, 1887	+	+	+	+	+	+	+
<i>Cerceris pleurispina</i> de Beaumont, 1959	-	+	-	-	-	-	-
<i>Cerceris quadricincta</i> (Panzer, 1799)	+	+	+	+	+	+	+
<i>Cerceris quadrifasciata</i> (Panzer, 1799)	+	-	+	+	+	+	+
<i>Cerceris quinquefasciata</i> (Rossi, 1792)	+	+	+	+	+	+	+
<i>Cerceris rhinoceros</i> Kohl, 1888	+	-	-	-	+	-	-
<i>Cerceris rubida pumilio</i> Giner Marí, 1945	+	+	-	+	+	-	-
<i>Cerceris rubida rubida</i> Jurine, 1807	+	+	+	+	+	+	+
<i>Cerceris ruficornis</i> (Fabricius, 1793)	+	+	+	+	-	+	+
<i>Cerceris rutila mavromoustakisi</i> Giner Marí, 1945	+	-	-	-	+	-	-
<i>Cerceris rybyensis</i> (Linnaeus, 1771)	+	-	+	+	+	+	+
<i>Cerceris sabulosa</i> (Panzer, 1799)	+	+	+	+	+	+	+
<i>Cerceris seleukos</i> K. Schmidt, 2000	+	+	+	+	-	-	+
<i>Cerceris spectabilis</i> Radoszkowski, 1886	-	+	-	-	-	-	-
<i>Cerceris specularis fergusonii</i> de Beaumont, 1959	+	+	-	-	+	-	-
<i>Cerceris specularis specularis</i> A. Costa, 1867	+	+	+	+	+	+	+
<i>Cerceris spinaea</i> de Beaumont, 1970	-	+	-	-	-	-	-
<i>Cerceris spinifera haladai</i> K. Schmidt, 2000	-	+	-	-	-	-	-
<i>Cerceris spinipectus spinipectus</i> F. Smith, 1856	+	+	+	-	+	-	-
<i>Cerceris spinipectus spinolica</i> Schletterer, 1887	-	+	-	-	-	-	-
<i>Cerceris straminea hebraea</i> de Beaumont, 1959	+	+	-	-	+	-	-
<i>Cerceris stratiotes</i> Schletterer, 1887	+	+	+	+	+	+	+
<i>Cerceris stratonike</i> K. Schmidt, 2000	+	+	-	+	+	-	-
<i>Cerceris tenuivittata</i> Dufour, 1849	+	+	-	-	-	+	-
<i>Cerceris tetradonta</i> Cameron, 1890	+	+	-	-	-	+	-
<i>Cerceris tricolorata</i> Spinola, 1839	+	-	-	-	-	-	-
<i>Cerceris tuberculata gemmina</i> Shestakov, 1927	+	+	-	+	-	-	-
<i>Cerceris tuberculata tuberculata</i> (de Villers, 1789)	+	+	+	+	+	+	+
<i>Cerceris vagans</i> Radoszkovsky, 1877	+	+	-	+	+	+	-
Genus: <i>Philanthus</i> (Fabricius, 1790)							
<i>Philanthus coarctatus</i> Spinola, 1839	+	+	+	-	+	-	-
<i>Philanthus coronatus coronatus</i> (Thunberg, 1784)	+	-	+	+	+	-	-
<i>Philanthus coronatus orientalis</i> Bytinski-Salz, 1959	+	-	-	-	-	-	-
<i>Philanthus decemmaculatus</i> Eversmann, 1849	-	-	-	-	-	+	-

<i>Philanthus desertorum</i> F. Morawitz, 1890	+	-	-	-	-	-	-
<i>Philanthus dufouri</i> Lucas, 1849	+	-	-	+	-	-	-
<i>Philanthus kohlii</i> F. Morawitz, 1890	+	+	-	-	+	-	-
<i>Philanthus kokandicus</i> Radoszkovsky, 1877	+	-	-	-	-	-	-
<i>Philanthus reinigi</i> Bischoff, 1930	+	-	-	-	-	-	-
<i>Philanthus triangulum</i> (Fabricius, 1775)	+	+	+	+	+	+	+
<i>Philanthus variegatus</i> Spinola, 1839	+	-	-	-	-	-	-
<i>Philanthus venustus</i> Rossi, 1790	+	+	+	+	+	+	+
Genus: <i>Philanthinus</i> de Beaumont, 1949							
<i>Philanthinus quattuordecimpunctatus</i> (F. Morawitz, 1888)	+	-	+	+	+	-	-
Family: Psenidae A. Costa, 1858							
Genus: <i>Lithium</i> Finnamore, 1987							
<i>Lithium haladai</i> Schmid-Egger, 2007	+	-	-	-	+	-	-
<i>Lithium jacobsi</i> Schmid-Egger, 2007	-	+	-	-	+	-	-
Genus: <i>Mimesa</i> Shuckard, 1937							
<i>Mimesa bicolor</i> (Jurine, 1804)	-	-	+	-	-	-	-
<i>Mimesa bruxellensis</i> (Bondroit, 1934)	+	-	-	+	-	-	-
<i>Mimesa crassipes</i> (A. Costa, 1871)	+	-	+	+	+	+	+
<i>Mimesa equestris</i> (Fabricius, 1804)	+	-	+	-	-	-	-
<i>Mimesa grandii</i> (Maidl, 1933)	+	-	+	+	+	+	-
<i>Mimesa lutaria</i> (Fabricius, 1787)	+	-	-	+	-	-	-
<i>Mimesa nasuta</i> Budrys, 1985	+	-	-	+	-	-	-
<i>Mimesa nigrita</i> (Eversmann, 1849)	-	+	-	-	+	-	+
<i>Mimesa tenuis</i> Oehlke, 1965	-	-	+	-	-	-	-
<i>Mimesa vindobonensis</i> (Maidl, 1914)	+	-	-	-	-	-	-
Genus: <i>Mimumesa</i> Malloch, 1933							
<i>Mimumesa atratina</i> (F. Morawitz, 1891)	+	-	+	-	-	-	-
<i>Mimumesa dahlbomi</i> (Wesmael, 1852)	+	-	-	-	-	-	-
<i>Mimumesa unicolor</i> (Vander Linden, 1829)	+	-	+	+	+	+	-
Genus: <i>Psen</i> (Latreille, 1796)							
<i>Psen ater</i> (Olivier, 1792)	-	-	+	-	+	-	+
Genus: <i>Psenulus</i> Kohl, 1897							
<i>Psenulus carinifrons</i> Cameron, 1902	-	-	-	-	+	-	-
<i>Psenulus chevrieri</i> (Tournier, 1889)	-	-	+	+	-	-	-
<i>Psenulus concolor</i> (Dahlbom, 1843)	-	-	+	+	-	-	-
<i>Psenulus fulvicornis</i> (Schenck, 1857)	-	+	-	-	+	+	-
<i>Psenulus fuscipennis</i> (Dahlbom, 1843)	-	-	+	+	-	-	+
<i>Psenulus laevigatus</i> (Schenck, 1857)	+	+	-	-	-	-	-
<i>Psenulus meridionalis</i> de Beaumont, 1937	+	+	+	+	+	-	+
<i>Psenulus pallipes</i> (Panzer, 1798)	+	+	+	+	+	+	+
<i>Psenulus pan</i> de Beaumont, 1967	+	+	-	+	+	-	-
<i>Psenulus schencki</i> (Tournier, 1889)	+	+	+	+	-	+	-
Family: Sphecidae Latreille, 1802							
Genus: <i>Ammophila</i> (W. Kirby, 1798)							
<i>Ammophila assimilis</i> Kohl, 1901	-	-	-	-	+	-	-
<i>Ammophila barbara</i> Lepeletier de Saint-Fargeau, 1845	+	-	+	+	+	-	-
<i>Ammophila barbara judaeorum</i> Kolh, 1901	-	-	-	+	-	-	-
<i>Ammophila barbara semota</i> de Beaumont, 1967	-	-	-	+	-	-	-
<i>Ammophila campestris</i> Latreille, 1809	+	-	+	+	+	-	+
<i>Ammophila elongata</i> Fischer de Waldheim, 1843	+	-	-	-	-	-	-
<i>Ammophila gracillima</i> Taschenberg, 1869	+	-	-	-	-	-	-
<i>Ammophila gussakovskii</i> Dollfuss, 2013	+	-	-	-	-	-	-

<i>Ammophila haladai</i> Dollfuss, 2013	+	-	+	+	+	-	-
<i>Ammophila heydeni</i> Dahlbom, 1845	+	+	+	+	+	+	+
<i>Ammophila hungarica</i> Mocsáry, 1883	+	+	+	+	+	+	+
<i>Ammophila mongolensis</i> Tsuneki, 1979	-	-	+	-	-	+	-
<i>Ammophila pubescens</i> Curtis, 1836	+	-	-	+	-	-	-
<i>Ammophila sabulosa</i> (Linnaeus, 1758)	+	-	+	+	+	+	+
<i>Ammophila sareptana</i> Kohl, 1884	+	-	-	+	+	+	+
<i>Ammophila sinensis</i> Sickmann, 1894	+	-	-	-	-	-	-
<i>Ammophila striata</i> Mocsáry, 1878	+	-	-	+	-	+	-
<i>Ammophila terminata terminata</i> F. Smith, 1856	+	-	+	+	+	-	+
<i>Ammophila terminata mocsaryi</i> Frivaldsky, 1877	+	-	+	+	+	-	+
<i>Ammophila theryi</i> Gribodo, 1894	-	-	-	-	+	-	-
<i>Ammophila vagabunda</i> F. Smith, 1856	-	-	-	-	+	-	-
Genus: Chalybion Dahlbom, 1843							
<i>Chalybion femoratum</i> (Fabricius, 1781)	+	+	+	+	+	+	+
<i>Chalybion flebile</i> Lepeletier de Saint-Fargeau, 1845	+	+	-	+	+	+	-
<i>Chalybion klapperichi</i> Balthasar, 1957	-	-	-	-	-	+	-
<i>Chalybion minos</i> de Beaumont, 1965	+	-	-	-	+	+	-
<i>Chalybion omisum</i> Kohl, 1889	+	+	-	+	+	+	+
<i>Chalybion turanicum</i> Gussakovskij, 1935	-	+	-	+	+	+	-
<i>Chalybion walteri</i> Kohl, 1889	+	+	-	+	+	+	-
Genus: Chilosphex Menke, 1976							
<i>Chilosphex argyrius</i> (Brullé, 1833)	+	-	-	-	+	+	+
<i>Chilosphex pseudargyrius</i> (Roth, 1967)	-	+	-	+	+	-	-
Genus: Eremochares Gribodo, 1883							
<i>Eremochares dives</i> (Brullé, 1833)	-	-	-	+	+	+	-
Genus: Hoplammophila de Beaumont 1960							
<i>Hoplammophila aemulans</i> (Kohl, 1901)	-	-	-	-	-	+	-
<i>Hoplammophila anatolica</i> de Beaumont, 1960	-	-	-	-	+	-	-
<i>Hoplammophila armata</i> (Illiger, 1807)	-	+	+	+	+	-	-
<i>Hoplammophila clupeata</i> (Mocsáry, 1883)	+	-	+	-	+	-	+
Genus: Isodontia Patton, 1880							
<i>Isodontia paludosa</i> (Rossi, 1790)	+	+	+	+	+	+	+
<i>Isodontia splendidula</i> (Costa, 1858)	+	-	+	+	+	+	+
Genus: Palmodes Kohl, 1890							
<i>Palmodes melanarius</i> (Mocsáry, 1883)	-	-	-	+	-	+	-
<i>Palmodes minor</i> Morawitz, 1890	-	-	+	+	-	-	-
<i>Palmodes occitanicus</i> (Le Peletier & Serville, 1828)	+	+	+	+	+	+	+
<i>Palmodes occitanicus puncticollis</i> (Kolh, 1888)	+	-	-	+	+	-	-
<i>Palmodes occitanicus syriacus</i> (Mocsary, 1881)	+	+	+	+	+	+	-
<i>Palmodes orientalis</i> (Mocsáry, 1883)	+	-	-	-	-	+	-
<i>Palmodes parvulus</i> Roth, 1967	-	-	-	+	-	-	-
<i>Palmodes strigulosus</i> (Costa, 1861)	+	+	+	+	+	+	+
Genus: Parapsammophila Taschenberg, 1869							
<i>Parapsammophila caspica</i> Gussakovskij, 1930	-	-	-	-	+	-	-
Genus: Podalonia Fernald, 1927							
<i>Podalonia affinis</i> (Kirby, 1798)	+	-	+	+	+	+	+
<i>Podalonia alpina</i> (Kohl, 1888)	+	-	+	+	+	-	-
<i>Podalonia ebenina</i> (Spinola, 1839)	+	-	+	+	-	-	-
<i>Podalonia fera</i> (Lepeletier de Saint-Fargeau, 1845)	+	+	+	+	+	+	+

<i>Podalonia flavida</i> (Kohl, 1901)	-	-	-	+	-	+	-
<i>Podalonia harveyi</i> de Beaumont, 1967	-	-	-	+	-	-	-
<i>Podalonia hirsuta</i> (Scopoli, 1763)	+	+	+	+	+	+	+
<i>Podalonia luffii</i> (Saunders, 1903)	+	-	-	+	-	-	-
<i>Podalonia nigrohirta</i> (Kohl, 1888)	+	-	-	-	-	-	-
<i>Podalonia rothi</i> de Beaumont, 1951	-	-	-	+	-	+	-
<i>Podalonia tydei tydei</i> (Le Guillou, 1841)	+	+	+	+	+	+	+
Genus: Prionyx Vander Linden, 1827							
<i>Prionyx crudelis</i> Smith, 1856	-	-	-	+	+	+	-
<i>Prionyx guichardi</i> de Beaumont, 1967	-	-	-	+	-	-	-
<i>Prionyx haberhaueri</i> Radoszkowski, 1871	-	-	-	+	-	-	-
<i>Prionyx kirbii</i> Vander Linden, 1829	+	-	+	+	+	+	+
<i>Prionyx lividocinctus</i> Costa, 1861	+	+	+	+	+	+	+
<i>Prionyx niveatus</i> Dufour, 1854	+	-	-	+	-	-	-
<i>Prionyx nudatus</i> Kohl, 1885	+	-	+	+	+	-	+
<i>Prionyx radoszkowskyi</i> Kohl, 1888	+	-	-	-	-	-	-
<i>Prionyx songaricus</i> Eversmann, 1849	+	+	-	+	+	-	+
<i>Prionyx subfuscatus</i> Dahlbom, 1845	+	-	-	+	+	-	+
<i>Prionyx vittatus</i> Kolh, 1884	-	-	+	-	-	-	-
<i>Prionyx viduatus argentatus</i> Mocsary, 1883	+	-	-	-	+	-	-
<i>Prionyx viduatus mocsaryi</i> Kohl, 1883	+	-	-	-	-	+	-
<i>Prionyx viduatus pollens</i> Kohl, 1885	-	-	-	+	-	-	-
<i>Prionyx viduatus viduatus</i> (Christ, 1791)	-	-	+	+	+	+	-
Genus: Sceliphron (Klug, 1801)							
<i>Sceliphron arabs</i> Lepeletier de Saint-Fargeau, 1845	+	+	+	+	+	-	-
<i>Sceliphron curvatum</i> Smith, 1870	+	-	+	-	-	-	+
<i>Sceliphron destillatorium</i> Illiger, 1807	+	+	+	+	+	+	+
<i>Sceliphron funestum</i> Kohl, 1918	-	+	-	+	+	+	-
<i>Sceliphron madraspatanum madraspatanum</i> (Fabricius, 1781)	-	-	-	+	+	+	+
<i>Sceliphron madraspatanum tubifex</i> Latreille, 1809	+	-	+	+	+	+	+
<i>Sceliphron spirifex</i> (Linnaeus, 1758)	-	+	+	+	+	+	+
Genus: Sphex (Linnaeus, 1758)							
<i>Sphex afer</i> Lepeletier de Saint-Fargeau, 1845	-	-	-	+	-	-	-
<i>Sphex atropilosus</i> Kohl, 1885	+	-	-	-	-	-	-
<i>Sphex flavipennis</i> Fabricius, 1793	+	-	+	+	+	+	+
<i>Sphex fomicatus</i> Christ, 1791	+	-	-	+	+	-	-
<i>Sphex funerarius</i> Gussakovskij, 1934	+	-	+	+	+	+	+
<i>Sphex leuconotus</i> Bullé, 1833	+	+	+	+	+	-	-
<i>Sphex melanocnemis</i> Kohl, 1885	+	+	-	+	+	+	+
<i>Sphex oxianus</i> Gussakovsky, 1928	-	+	+	+	-	-	-
<i>Sphex pruinosus</i> Germar, 1817	+	+	+	+	+	+	+

Publications on Speciformes in Turkey

Turkey's Hymenoptera have been studied and continues to be studied by native and foreign researchers, especially in the 19th and 20th centuries (Kaplan 2020). The first known data about the Speciformes of Turkey is in Lepeletier de Saint-Fargeau (1845). Later, samples were recorded and published by various scientists in some regions of Turkey. These studies are summarized and listed below.

Lepeletier de Saint-Fargeau (1845) reported *Chalybion (Chalybion) flebile* (Lepeletier de Saint-Fargeau, 1845) (Sphecidae) from the Izmir province. This species was the first record in the Turkey's Spheciformes fauna. Smith (1856) cited *Chalybion (Chalybion) flebile* (Lepeletier de Saint-Fargeau, 1845) (Sphecidae) from the provinces of Istanbul and Izmir, *Cerceris spinipectus spinipectus* F. Smith, 1856 (Philanthidae) and *Stizus combustus* (F. Smith, 1856) (Bembicidae) from the Trabzon province. *Stizus combustus* (F. Smith, 1856) and *Cerceris spinipectus spinipectus* F. Smith, 1856 were described as new in the same paper. Mocsáry (1883) recorded *Ammophila hungarica* Mocsáry, 1883 (new species), and *Bembecinus peregrinus* (F. Smith, 1856) (as new record for Turkey) in Sphecidae and Bembicidae from the Bursa province. Kohl (1884a) recorded *Ammophila hungarica* Mocsáry, 1883 (Sphecidae) from the Amasya province, *Tachysphex latifrons* Kohl, 1884 and *T. panzeri* (Vander Linden, 1829) (Crabronidae) from the Bursa province. *T. latifrons* Kohl, 1884 was also described as new in that paper. Kohl (1884b) recorded *Oxybelus subspinosus* Klug, 1835 and *O. maculipes* F. Smith, 1856 (Crabronidae) from the Bursa province. Kohl (1885a) recorded six taxa in Astatidae and Crabronidae families from the Amasya and Bursa provinces. Among them, five species were new records from Turkey: *Astata boops boops* (Schränk, 1781), *Palarus variegatus variegatus* (Fabricius, 1781), *Larra (Larra) anathema anathema* (Rossi, 1790), *Tachysphex nitidus* (Spinola, 1806) and *Tachytes etruscus etruscus* (Rossi, 1790). Kohl (1885b) recorded ten species from Sphecidae in the Amasya and Bursa provinces. All of these species were new records for the fauna of Turkey. *Sphex (Fernaldina) melanocnemis* Kohl, 1885 and *Prionyx nudatus* (Kohl, 1885) were described as new species. André (1886) reported as an additional record *Ammophila hungarica* Mocsáry, 1883 (Sphecidae) from the Bursa province. Handlirsch (1887) described *Nysson interruptus* (Fabricius, 1798) for the first time for Turkish Spheciformes fauna from the Bursa province. Schletterer (1887) recorded seven taxa in Philanthidae from the Amasya and Bursa provinces. Among them six species (*Cerceris arenaria arenaria* (Linnaeus, 1758), *C. bicincta* Klug, 1835, *C. bupresticida bupresticida* Dufour, 1841, *C. rubida rubida* (Jurine, 1807), *C. sabulosa sabulosa* (Panzer, 1799) and *C. tuberculata tuberculata* (de Villers, 1789)) were new to the Turkish Spheciformes fauna. Handlirsch (1888) recorded five taxa of which *Ammatomus rogenhoferi* (Handlirsch, 1888) and *Gorytes schmiedeknechtii* Handlirsch, 1888 (Bembicidae) were new to science. Kohl (1888) recorded *Palmodes melanarius* (Mocsáry, 1883) (Sphecidae) from the Izmir province. This species was the first record for the fauna of Turkey. André (1889) recorded as an additional record *Cerceris spinipectus spinipectus* F. Smith, 1856 in Philanthidae from the Bursa province. Handlirsch (1889) recorded *Sphecius antennatus* (Klug, 1845) (Bembicidae) from the Bursa province. Kohl & Handlirsch (1889) recorded *Podalonia hirsuta hirsuta* (Scopoli, 1763) (new record for Turkey) in Sphecidae from the Amasya and Bursa provinces. Kohl (1890) listed 12 species in Sphecidae from the Amasya, Bursa and Izmir provinces. Of these, *Sphex (Sphex) funerarius* Gussakovsky, 1934 were newly recorded for Turkey. Moreover, the genus *Palmodes* Kohl, 1890 was described as a new genus in that paper. Handlirsch (1892) recorded six taxa (Bembicidae) from some provinces of Turkey. Of these, *Bembecinus tridens tridens* (Fabricius, 1781), *Stizoides melanopterus* (Dahlbom, 1845), *S. tridentatus tridentatus* (Fabricius, 1775), *Stizus bipunctatus* (F. Smith, 1856) were new to the Turkish fauna. Handlirsch (1893) recorded *Bembix bidentata* Vander Linden, 1829 as new to the

Turkish Bembicidae fauna from the Amasya province. Handlirsch (1895) recorded *Olgia helena* de Beaumont, 1953 (as first record for Turkey) from the Antalya province. Fifty eight years before the *Olgia helena* species was identified, Handlirsch described this species from Antalya under the name *Gorytes marandicus*.

Schulz (1904) recorded 12 species of which seven were first records to the Turkey's Spheciformes fauna. Kohl (1905) recorded 17 taxa (Astatidae, Bembicidae, Crabronidae, Sphecidae, Philanthidae and Psenidae) from the provinces of Kayseri, Konya and Niğde. Among them, 12 taxa were first records for the Turkish Spheciformes fauna. Kohl (1906) recorded five species about Sphecidae from the provinces of Amasya, Bursa, Erzurum and Kayseri. Among them, *Podalonia fera* (Lepeletier de Saint-Fargeau, 1845) was new record for Turkey. Maidl (1914) recorded *Mimesa nigrita* Eversmann, 1849 (as new taxon for Turkey) (Psenidae) from the Bursa province. Kohl (1915) recorded seven species in Crabronidae from the Bursa, Istanbul and Kayseri provinces. Of these, one species were additional record, while six species were new records for Turkey. Kohl (1918) recorded eight species (Sphecidae) from some provinces of Turkey. All species were first records for Turkey. *Sceliphron (Hensenia) funestum* Kohl, 1918 was described as a new species. Fahringer & Friese (1921) recorded 15 species (nine species were new records) in Spheciformes from Turkey. Fahringer (1922) listed 67 species in Spheciformes of which 37 were new records for Turkey. Coulon (1925) recorded four taxa (Bembicidae, Crabronidae and Sphecidae) from Istanbul. Of these, *Liris (Leptolarra) niger niger* (Fabricius, 1775) was new record from Turkey. Berland (1926) reported three taxa in Sphecidae from the Amasya, Hatay and Istanbul provinces. These taxa are: *Chilosphex argyrius* (Brullé, 1833), *Palmodes occitanicus occitanicus* (Le Peletier de Saint-Fargeau & Audinet-Serville, 1828), *P. strigulosus* (A. Costa, 1861). Berland (1927) recorded *Sphex flavipennis* Fabricius, 1793 (Sphecidae) from the Hatay province. Berland (1928) recorded *Sphex melanocnemis* Kohl, 1885 (Sphecidae) from the Ankara province. de Beaumont (1937) recorded *Mimesa nigrita* Eversmann, 1849 (as additional record for Turkey) in Psenidae from the Bursa province. de Beaumont (1947) recorded *Tachysphex graecus* Kohl, 1883 (as new record for Turkey) in Crabronidae from the Çanakkale province. de Beaumont (1953a) described *Olgia helena* de Beaumont, 1953 (new species) in Bembicidae from the Antalya province. de Beaumont (1953b) recorded two species (Bembicidae) from the provinces of Ankara and Bursa. Of these, *Gorytes schmiedeknechtii* Handlirsch, 1888 was an additional record, while *G. hebraeus* de Beaumont, 1953 was a new record for Turkey. de Beaumont (1954) recorded *Bembecinus hungaricus* (Frivaldszky, 1877) (Bembicidae) (as new record for Turkey) from the Antalya and Aydın provinces. Grandi (1954) recorded *Alysson spinosus* (Panzer, 1801) (Bembicidae) from the Hatay province. Leclercq (1954) recorded three species of Crabronidae, namely: *Ectemnius (Clytochrysus) sexcinctus* (Fabricius, 1775) from the Istanbul province, *E. (Ectemnius) rugifer* (Dahlbom, 1845) from the Kayseri province, *E. (Hypocrabro) confinis* (Walker, 1871) from the Bursa province. Atanassov (1955) recorded additional records of *Bembecinus tridens tridens* (Fabricius, 1781) (Bembicidae) *Ectemnius (Metacrabro) cephalotes* (Olivier, 1792) (Crabronidae) from the Tekirdağ province. Puławski (1955) described *Astata diversipes* (Astatidae) as new to science from the province of Sivas. Bytinski-Salz (1956) recorded the first record of *Nysson epeoliformis* F. Smith, 1856 (Bembecidae) in Turkey. de Beaumont et al. (1956) recorded 80 taxa

(Spheciformes) from some provinces of Turkey. Among them, 34 taxa were first records from Turkey. Bytinski-Salz (1957) described *Palarus beaumonti* (as new species) (Crabronidae) from the Malatya province. de Beaumont (1957) recorded *Cerceris vagans* Radoszkovsky, 1877 (as new record for Turkey) in Philanthidae from the Adana province. de Beaumont (1958) recorded three additional taxa in Philanthidae from the Adana province: *Cerceris eryngii eryngii* Marquet, 1875, *C. spinipectus spinipectus* F. Smith, 1856 and *C. tuberculata tuberculata* (de Villers, 1789). Puławski (1959) recorded *Astata affinis radoszkowskii* Puławski, 1957 (Astatidae) from the Konya province, which was new for Turkey. Roth (1959) recorded *Sphecius nigricornis* (Dufour, 1838) in Bembicidae from the Konya province. de Andrade (1960) described a new species *Miscophus (Miscophus) luctuosus* de in Crabronidae from the Antalya province. de Beaumont (1960) recorded *Ammophila barbara judaeorum* Kohl, 1901, *A. striata striata* Mocsary, 1878 and *Hoplammophila anatolica* (de Beaumont, 1960) in Sphecidae from the provinces of Antalya, Kahramanmaraş and Konya. All species were new records for the Turkey fauna. Moreover, *H. anatolica* (de Beaumont, 1960) was described as a new species. de Beaumont (1961) recorded *Philanthus venustus* (Rossi, 1790) (as additional record for Turkey) in Philanthidae from the Antalya province. Puławski (1962) recorded two species namely *Tachytes etruscus etruscus* (Rossi, 1790), *T. matronalis* Dahlbom, 1845 (Crabronidae) from the Bursa and Istanbul provinces. Roth (1963) recorded two species namely *Palmodes minor* (F. Morawitz, 1890) (as first record) and *Chilosphex argyrius* (Brullé, 1833) (as additional record) from the Denizli, Hatay and Konya provinces. Atanassov (1964) reported additional records of *Bembecinus peregrinus* (F. Smith, 1856) (Bembicidae) and *Cerceris eryngii eryngii* Marquet, 1875 (Philanthidae) from the Bursa and Konya provinces. de Beaumont (1967) listed 317 taxa (Spheciformes) from some provinces of Turkey. Among them, 30 species and six subspecies were described as new to science. Puławski (1967) listed Turkish specimens from the British Museum (Natural History). He recorded 58 species of which eight were new species and three new subspecies (Astatidae and Crabronidae). de Beaumont (1968) recorded *Bembecinus anaticus* de Beaumont, 1968 (Bembicidae) and *Sphex (Sphex) oxianus* Gussakovsky, 1928 (Sphecidae) from the Artvin and Konya provinces. Also, *B. anaticus* de Beaumont, 1968 was described as a new species. de Beaumont (1969) recorded 112 species of which *Harpactus obscurus* (de Beaumont, 1969), *H. osdroene* (de Beaumont, 1969) and *Miscophus (Miscophus) venustus* de Beaumont, 1969 were described as new to science. Puławski (1971) listed 40 taxa in Crabronidae from some provinces of Turkey. *Tachysphex agnus* Puławski, 1971 and *Tachysphex morawitzi* Puławski, 1971 were described as new to science. Valkeila & Leclercq (1972) listed *Pemphredon mortifer* Valkeila, 1972 (Pemphredonidae) as first record from Turkey. Leclercq (1973) recorded *Sphex (Sphex) fumicatus fumicatus* Christ, 1791 as new for Turkey from the Antalya and İçel provinces. Puławski (1973) recorded *Ammatomus coarctatus* (Spinola, 1808), *A. rogenhoferi* (Handlirsch, 1888) and *A. rufonodis rufonodis* (Radoszkovsky, 1877) (as additional records) in Bembicidae from some provinces of Turkey. Puławski (1974) listed *Astata graeca* de Beaumont, 1965 as an additional record for Turkey from the Ankara and Artvin provinces. Leclercq (1975) reported *Lindeniuss laevis* A. Costa, 1871 (as new record) and *L. pygmaeus armatus* (Vander Linden, 1829) (as additional record) from some provinces of Turkey. Puławski (1977) recorded *Parapiagetia genicularis* (F. Morawitz, 1890) (Crabronidae) from the Iğdır province. Puławski

(1979a) recorded five species of *Prosopigastra* A. Costa, 1867 (Crabronidae) from different provinces of Turkey. Puławski (1979b) recorded three species of Crabronidae as first records from different provinces of Turkey. These species are *Harpactus coccineus* (Balthasar, 1954), *H. dimorphus* (Puławski, 1979) and *H. immaculatus* (Puławski, 1979). Casolari & Casolari Moreno (1980) recorded *Chalybion (Chalybion) flebile* (Lepeletier de Saint-Fargeau, 1845) (Sphecidae) and *Oryttus concinnus paradisiacus* (de Beaumont, 1967) (Bembicidae) from the Izmir province. Both species were additional records for Turkey. Puławski (1984) recorded *Trypoxylon figulus figulus* (Linnaeus, 1758), *T. medium* de Beaumont, 1945 and *T. minus* de Beaumont, 1945 (Crabronidae) (as additional records) from different provinces of Turkey. Dollfuss (1986) recorded *Spilomena mocsaryi* Kohl, 1898 in Pemphredonidae from the İstanbul province. Hensen (1987) recorded *Sceliphron (Hensenia) funestum* Kohl, 1918 (as additional records) from the Bolu and Içel provinces of Turkey. Hensen & van Ooijen (1987) listed nine taxa from Turkey, of which *Tachysphex magnaemontis* Hensen, 1987 and *T. picnic* Van Ooijen, 1987 were new to science. Hensen (1988) recorded three species, *Chalybion (Chalybion) flebile* (Lepeletier de Saint-Fargeau, 1845) *C. minos* (de Beaumont, 1965) and *C. walteri* (Kohl, 1889) (Sphecidae), from some provinces of Turkey. Antropov (1989) recorded *Pison (Pison) fasciatum* (Radoszkovsky, 1876) in Crabronidae from the provinces Denizli and Içel. This species was newly recorded for Turkey. Hensen (1989) described *Odontocrabro orthodoxus* Hensen, 1989 as new to science from the Mardin and Şanlıurfa provinces. Leclercq (1989) recorded *Lindenius iranius* Leclercq, 1975 from Konya. This species was the first record for the Turkish Spheciformes fauna.

Antropov (1991) recorded *Trypoxylon deceptorium* Antropov, 1991 (as new species) and *T. megriense* Antropov, 1985 (as the first record) in Crabronidae from some provinces of Turkey. Guichard (1991) recorded *Belomicrus lucifer* Guichard, 1991, *B. odontophorus* (Kohl, 1892) and *B. ottomanus* Guichard, 1991 for the first time from Turkey. Gayubo et al. (1992) recorded 21 taxa (Spheciformes) from some provinces of Turkey. Leclercq (1993) listed 24 taxa (Crabronidae) from Turkey. Among them, *Crossocerus (Crossocerus) elongatulus annulatus* Le Peletier-de-Saint-Fargeau & Brullé, 1835, *Ectemnius (Clytochrysus) ruficornis ruficornis* (Zetterstedt, 1838) and *E. (Hypocrabro) continuus punctatus* (Le Peletier-de-Saint-Fargeau & Brullé, 1835) were new records from Turkey. Uygun (1994) listed four species, namely *Philanthus triangulum triangulum* (Fabricius, 1775), *Podalonia hirsuta hirsuta* (Scopoli, 1763), *Larra (Larra) anathema anathema* (Rossi, 1790) and *Sceliphron (Sceliphron) spirifex* (Linnaeus, 1758) (Spheciformes), from the Adana province. Antropov (1995) recorded *Trypoxylon albipes* F. Smith, 1856 (as new record for Turkey) and *T. guichardi* Antropov, 1995 (a new species) in Crabronidae from some provinces of Turkey. Dollfuss (1995) recorded seven species in Pemphredonidae of which *Pemphredon morio* Vander Linden, 1829 were described as new for Turkey. Nemkov (1995) reported additional record of *Ammatomus rogenhoferi* Handlirsch, 1888 (Bembicidae) from Turkey. Puławski (1995) recorded two taxa, namely *Gastrosericus funereus* Gussakovskij, 1931 and *G. waltlii* Spinola, 1839 (Crabronidae) from Turkey. Schmidt (1997) recorded *Rhopalum (Rhopalum) beaumonti* Móczár, 1957 (an additional taxon) from the Van province. Budrys (1998) recorded *Diodontus (Diodontus) brevilabris* de Beaumont, 1967 (as additional record) (Psenidae) from Turkey. Leclercq (1999) recorded *Ectemnius (Hypocrabro) persicus* (Kohl, 1888) (Crabronidae) from the Hakkari province.

Ohl (1999) recorded three additional taxa in Bembicidae for Turkey. These taxa are: *Stizoides crassicornis* (Fabricius, 1787), *S. melanopterus* (Dahlbom, 1845) and *S. tridentatus tridentatus* (Fabricius, 1775). Tüzün et al. (1999) listed 23 species in Spheciformes from some provinces of Turkey. Among them *Bembix sinuata sinuata* Panzer, 1804 was the first record for the country.

Budrys (2000) recorded *Psenulus pan* de Beaumont, 1967 (as additional record for Turkey) in Psenidae from the Konya province. Menke & Puławski (2000) recorded *Sphex (Sphex) oxianus* Gussakovsky, 1928 (as additional taxon for Turkey) in Sphecidae from the Şanlıurfa province. Schmid-Egger (2000) described *Entomosericus hauseri* in Pemphredonidae as a new species. Schmidt (2000) listed 35 taxa (Philanthidae) from different provinces of Turkey. Of these, *Cerceris eversmanni warnckei*, *C. gusenleitneri*, *C. seleukos*, *C. spinifera haladai* and *C. stratonike* were new to science. Bouček (2001) reported five species in Ammoplanidae from some provinces of Turkey. All of these species were new records for the fauna of Turkey. Among them, *Ammoplanus (Ammoplanus) denesi* and *A. (Ammoplanus) minutus* were new species. Dollfuss (2001) recorded *Pemphredon rugifer* (Dahlbom, 1844) and *P. lethifer* (Shuckard, 1837) in Pemphredonidae from Turkey. Nemkov (2001) recorded *Synnevrus epeoliformis* (F. Smith, 1856) (as an additional taxon for Turkey) in Bembicidae from the Ankara, İçel and Konya provinces. Schmid-Egger & Bitsch (2001a, 2007a) recorded *Palarus beaumonti* Bytinski-Salz, 1957 (an additional taxon) (Crabronidae) from the Adana, Diyarbakır and İçel provinces. Schmid-Egger & Bitsch (2001b, 2007b) recorded *Solierella pisonoides* (S. Saunders, 1873) (an additional taxon) in Crabronidae from the Ankara and Kayseri provinces. Schmid-Egger & Bitsch (2001c, 2007c) reported *Miscophus (Miscophus) luctuosus* de Andrade, 1960 (an additional taxon) in Crabronidae from the Antalya province. The same researchers recorded *Prosopigastra bulgarica* Puławski, 1958 (an additional record) (Crabronidae) from the Hakkari province. Schmid-Egger (2002a) recorded *Psenulus fulvicornis* (Schenck, 1857) (Psenidae) as new to Turkey's Spheciformes fauna. Schmid-Egger (2002b) recorded 12 species of *Gorytes* Latreille, 1805 (Bembicidae). Of these, three species (*Gorytes kohli* Handlirsch, 1888, *G. schmidti* Schmid-Egger, 2002 and *G. sulcifrons sulcifrons* (A. Costa, 1867)) were first records for Turkey. Nemkov (2003) recorded two species: *Brachystegus incertus* (Radoszkovsky, 1877) and *B. scalaris* (Illiger, 1807) (Bembicidae) from Turkey. Gayubo et al. (2003) recorded a total of 48 species of Spheciformes. Among them, five species were new to the Turkish fauna: *Astata apostata* Mercet, *A. gallica* de Beaumont, *Ancistromma asiaticum* Gussakovskij, *Trypoxylon latilobatum* Antropov and *T. syriacum* Mercet. Dollfuss (2004a) listed 26 species of which six species were recorded as new to Turkey. Dollfuss (2004b) recorded 21 taxa of Turkish Spheciformes. Among them, three species were first recorded from Turkey: *Lestica (Ptyx) eurypus* (Kohl, 1898), *Rhopalum (Rhopalum) beaumonti* Móczár, 1957 and *R. (Rhopalum) gracile* (Wesmael, 1852). Schmid-Egger (2004) listed 20 species in Bembicidae from different provinces of Turkey. Among them, seven species, namely *Bembecinus asiaticus iranicus*, *B. birecikensis*, *B. guichardi* Schmid-Egger, 2004, *B. heinrichi*, *B. henseni*, *B. nigrolabrum* and *B. urfanensis* were described as new to science. Tezcan & Yıldırım (2004) recorded three species (Spheciformes) from the Manisa province. They are: *Astata miegii scapularis* Kohl, 1889, *Oxybelus latro* Olivier, 1812 and *Ectemnius (Thyreocerus) massiliensis* (Kohl, 1883). Gayubo & Özbek (2005) listed 160 species of which the following were new

records for the Turkey's Spheciformes fauna: *Bembix sinuata* Panzer, 1804, *Didineis crassicornis* Handlirsch, 1888, *Lestiphorus bicinctus* (Rossi, 1794), *Mellinus arvensis* (L., 1758), *Nysson pratensis* Mercet, 1909, *N. tridens* Gerstaecker, 1867, *N. variabilis* Chevri er, 1867, *Stizus perrisi* Dufour, 1838. Besides, *N. pratensis*, *N. variabilis*, *B. sinuata*, and *M. arvensis* were also first record for the Asian continent. *Bembecinus innocens* (de Beaumont, 1967) has been reported to be an endemic species for Turkey. G ulmez (2005) recorded four species (*Dryudella picticornis* (Gussakovskij, 1927), *Miscophus eatoni* Saunders, 1903, *Tachytes ambidens* Kohl, 1884 and *Pison atrum* (Spinola, 1808)) of Spheciformes for the first time for Turkey. G ulmez & T uz un (2005) described a total of 49 taxa (Astatidae, Pemphredonidae and Sphecidae) from the Ankara province between 1998 and 2001. Jacobs (2005) reported an additional record of *Lindenius anatolicus* de Beaumont, 1967 (Crabronidae) from Turkey. Nemkov (2005) recorded *Palarus funerarius* F. Morawitz, 1889 (as a new taxon for Turkey) in Crabronidae from the Diyarbakır province. Schmid-Egger (2005a) recorded *Sceliphron (Sceliphron) arabs* (Lepeletier de Saint-Fargeau, 1845) (Sphecidae) as an additional taxon from the Adana province. Schmid-Egger (2005b) recorded two species namely *Olga helena* de Beaumont, 1953 and *O. spinulosa* de Beaumont, 1953 (Bembicidae) from different provinces of Turkey. Straka (2005) recorded previously published data by Czech entomologists, and a review of the genus *Tachysphex* Kohl, 1883 in Turkey. In this paper, a total of 52 taxa were reported from Turkey. Of these, *Tachysphex prismaticus*, *T. bouceki*, *T. humilis*, *T. karasi* were new to science. Moreover, the male of *T. punctipes* Pulawski, 1967 was described for the first time. Six other species were recorded from Turkey for the first time. Yildırım & Ljubomirov (2005) listed 179 species and subspecies from 49 genera (Spheciformes) from Turkey. Of these, 21 species were first records for the Turkish fauna. Additionally, a description of the female of *Bembix eburnea* Radoszkowski was provided. Dollfuss (2006) reported 26 species in Crabronidae from some provinces of Turkey. Of these, nine species were first records from Turkey. Jacobs (2006) recorded two species: *Ectemnius (Thyreocerus) crassicornis* (Spinola, 1808) and *E. massiliensis* (Kohl, 1883) (Crabronidae) from some provinces of Turkey. Tezcan et al. (2006) recorded seven additional taxa (Spheciformes) from the Manisa province. Hepdurgun et al. (2007) recorded nine species in Spheciformes from the Balıkesir and  anakkale provinces. Of them, *Rhopalum (Rhopalum) austriacum* Kohl, 1899, *Miscophus ater* Lepeletier de Saint Fargeau, 1845 and *Nitela borealis* Valkeila, 1974 were new records for Turkey. Pulawski (2007) listed 20 species (additional records) of *Tachysphex* Kohl, 1883 (Crabronidae) from different provinces of Turkey. Schmid-Egger (2007) described *Lithium haladai* Schmid-Egger, 2007 and *L. jacobsi* Schmid-Egger, 2007 (Psenidae) as new to science. Yildırım & Ljubomirov (2007) reported 92 species from 31 genera in Spheciformes. Among them six species were new record for the Turkish fauna: *Ammophila pubescens* Curtis, 1836, *Astata quettae* Nurse, 1903, *Bembix arenaria* Handlirsch, 1893, *B. gracilis* Handlirsch, 1893, *Cerceris dorsalis* Eversmann, 1849 and *Mimesa jacobsoni transiliensis* Budrys, 1985. Dollfuss (2008) recorded 15 taxa in a study of *Oxybelus* Latreille, 1796 (Crabronidae). He listed *Oxybelus citrinus* Radoszkowski, 1893 and *O. fischeri* Spinola, 1839 as new records from Turkey. Ljubomirov & Yildırım (2008) prepared a catalog of Turkish Spheciformes for the years 1845–2007. They listed 715 nominal names for the 530 species and 19 subspecies in 78 genera. Pulawski & Prentice (2008) listed three species of

Palarus Latreille, 1802 from Turkey: *Palarus funerarius* F. Morawitz, 1889, *P. laetus* Klug, 1845 and *P. variegatus* (Fabricius, 1781). Of these, *P. laetus* Klug, 1845 was new to the Turkish fauna. Anlaş et al. (2009) recorded *Ammophila sabulosa* and *Sphex flavipennis* Fabricius, 1793 (Sphecidae) from Bozdağ Mountains of western Turkey using pitfall traps.

Çubuk (2010) described 72 taxa in Spheciformes from the the Tokat province in her master's thesis. Dollfuss (2010) recorded first record of *Parapsammophila caspica* (Gussakovskij, 1930) and ten additional taxa (Sphecidae) from Turkey. Tüzün & Yüksel (2010) recorded 71 taxa in Spheciformes from the Niğde province. *Astata pontica* Pulawski, 1958 was the first record for Turkey. Furthermore 52 taxa were new for the Niğde province. Antropov (2011) examined samples of Spheciformes from some museums. He described the new species *Trypoxylon splendidum* from the Hakkâri provinces. Besler (2011) listed 78 taxa of Spheciformes from the Amasya province. Of these, 40 were new records for the fauna of Amasya. Yıldırım (2012a) recorded 140 species and subspecies from 45 genera (Spheciformes) from various areas of Turkey. Japoshvili & Ljubomirov (2012) listed 30 species from 17 genera of Spheciformes from the Gölcük Natural Park in the Isparta province. Koçak & Yalçın (2012) recorded *Bembix olivacea* Fabricius, 1787 (Bembecidae) from the Van province. Bayındır et al. (2013) reported a total of 56 species (Spheciformes) from the Isparta province eight species were new records for Turkey: *Dolichurus bicolor* (Lepelletier, 1845), *Palmodes orientalis* (Mocsáry, 1883), *Ammoplanus (A.) simplex* (Gussakovskij, 1952), *A. rjabovi* (Gussakovskij, 1931), *Miscophus niger* (Dahlbom, 1844), *Nitela truncata* (Gayubo & Felton, 2000), *Spilomena punctatissima* (Bluthgen, 1953) and *Trypoxylon fronticorne* (Gussakovskij, 1936). Çubuk & Gülmez (2013) recorded four species new to Turkey's Spheciformes fauna: *Alysson ratzeburgi* Dahlbom, 1843, *Harpactus tauricus* Radoszkowski, 1884, *Nitela truncata* Gayubo & Felton, 2000 and *Liris inopinatus* de Beaumont, 1961. Dollfuss (2013a) recorded *Ammophila elongata* Fischer de Waldheim, 1843 and *A. haladai* Dollfuss, 2013 (new record) (Sphecidae) from Turkey. Dollfuss (2013b) described 11 species (Sphecidae) of which *Ammophila mongolensis* Tsuneki, 1979 and *Ammophila vagabunda* F. Smith, 1856 were new to the Turkish fauna. Yüksel (2013) determined a total of 17 tribe, 31 genera, and 119 species and subspecies belonging to six families in Spheciformes from the Tunceli province in her master's thesis. Of these, 59 species were recorded for the first time in the Tunceli Province. Schmid-Egger (2014) described the new species *Parapiagetia goeksuensis* (Crabronidae) from the Mersin provinces. Yıldırım (2014) recorded a total of 61 species and 5 subspecies belonging to 12 genera of Sphecidae from Turkey. He also provided an analysis of distribution and biogeography of the Turkish sphecid fauna. Yıldırım et al. (2014) recorded 502 species and 15 subspecies belonging to 65 genera of Turkish Spheciformes. Of them 44 species and six subspecies were endemic. Furthermore, they recorded the type localities of 69 species and ten subspecies of Spheciformes located in Turkey. Dollfuss (2015) recorded *Ammophila assimilis* Kohl, 1901 (additional record) and *Hoplammophila aemulans* (Kohl, 1901) (new record) from Turkey. Gülmez & Can (2015a) provided the first record of *Sceliphron curvatum* (Smith, 1870) (Sphecidae) from Turkey. Gülmez & Can (2015b) described the nest characteristics and prey of *Sceliphron destillatorium* (Illiger, 1807) (Sphecidae). Dollfuss (2016) listed 12 taxa of Spheciformes in Türkiye. Gülmez & Dizer (2016) recorded 22 additional taxa of Sphecidae from some provinces of Turkey. Nemkov

(2016) gave additional records of *Bembix cinctella* Handlirsch, 1893 and *Bembix oculata* Panzer, 1801 (Bembicidae) from Turkey. Schmid-Egger et al. (2016) described additional localities of *Holotachyspex mochii* de Beaumont, 1947 (Crabronidae) from Turkey. Straka (2016) generated an identification key for the species in the subgroups of *Tachyspex austriacus* Kohl 1892 and *T. pompiliformis* (Panzer 1804) in Europe and Turkey. Yıldırım et al. (2016) listed 276 species and subspecies in 58 genera of Spheciformes from different provinces of Turkey. Of them, 22 species were first recorded from the country. Additionally, horological data, phenology, and geographical distribution for all species were recorded. Dollfuss (2017) listed seven taxa in Philanthidae from Turkey. *Philanthus desertorum* F. Morawitz, 1890 was newly record from Turkey. Gülmez & Can (2017) recorded 17 species (Spheciformes) from Turkey. Can & Gülmez (2018) recorded *Diodontus major* Kohl, 1901 (Pempredonidae) and *Parapiagetia tridentata* Tsuneki, 1972 (Crabronidae) from Turkey. Çubuk (2018) listed 155 species from the Amasya, Sivas and Tokat provinces in his PhD thesis. Among them, 42 species were first records for the studied region. *Lindenius major* de Beaumont, 1956; *Mimesa bicolor* (Jurine, 1804) and *Stizus continuus* (Klug, 1835) were new records for Turkey. Dollfuss (2018) reported 36 species of *Cerceris* Latreille, 1802 (Philanthidae) from different provinces of Turkey. Gülmez & Çubuk (2018) recorded 89 taxa (Spheciformes) of which 68 were first records for the provincial fauna of Tokat. Tezcan & Yıldırım (2018) listed 18 taxa (Spheciformes) from Turkey. Can & Gülmez (2019) recorded *Prionyx radoszkowskyi* Kohl, 1888 (Sphecidae) which was found for the first time in the Erzincan province. Also, they provided a key to Turkish *Prionyx*. Dollfuss (2019) recorded 25 species in a study of *Cerceris* Latreille 1802 (Philanthidae) from Turkey. Ertürk et al. (2019) determined some structural features of the mud nest materials of *Sceliphron curvatum* (Smith, 1870) (Sphecidae) in Turkey. Gülmez (2019) recorded 14 taxa (Sphecidae) from Turkey. Schmid Egger (2019) recorded *Ammatomus rufonodis* Radoszkowski 1877 from Turkey in in his revision of the Palearctic species of that genus. Schmid-Egger & Straka (2019) reported additional localities of *Miscophus albufeirae* de Andrade, 1952, *M. insolitus* de Andrade, 1953 and *M. mavromoustakisi cappadocicus* de Beaumont, 1967 (Crabronidae) from Turkey. Yalnız & Tüzün (2019) recorded nine taxa in Spheciformes from the Adana province.

Can (2020) listed 280 taxa (248 species in Crabronidae and 32 taxa in Sphecidae) from the Erzincan, Giresun, Gümüşhane and Sivas provinces in his PhD thesis. Among these, the following ten species: *Miscophus ater*, *Miscophus pulcher*, *Tachyspex ctenophorus*, *Nitela borealis*, *Diodontus insidiosus*, *Passaloecus borealis*, *Mimesa bruxellensis*, *Psenulus chevrieri*, *Ammophila gussakovskii* and *Podalonia nigrohirta* were new records to the Turkish Spheciformes fauna. Danilov & Byvaltsev (2020) additionally recorded *Palmodes melanarius* (Mocsáry, 1883), *P. minor* (Morawitz, 1890), *P. occitanicus* (Le Peletier & Serville, 1828) and *P. strigulosus* (Costa, 1861) (Sphecidae) from Turkey. Kaplan (2020) listed 120 species and subspecies belonging to 31 genera of 17 tribes of Spheciformes from the Diyarbakır and Bingöl provinces in his PhD thesis. Of these, *Dryudella esterinae* Pagliano 2001, *Nysson mimulus* Valkeila 1964, *Crossocerus pullulus* (A. Morawitz 1866), *Lindenius abditus* Kohl 1898, *Oxybelus spectabilis* Gerstaecker 1867 and *Diodontus insidiosus* Spooner 1938 were new records for Turkey Spheciformes fauna. Moreover, 109 species and subspecies from Bingöl and 112 species and subspecies from Diyarbakır were new

records. Kaplan & Yıldırım (2020) recorded *Lindenius abditus* Kohl, 1898 (new record) (Crabronidae) from the Diyarbakır province. Mokrousov et al. (2020) examined the materials-in the Zoological Institute, Russian Academy of Sciences. They added new records of *Hoplisoides craverii* (A. Costa, 1867), *H. latifrons* Spinola, 1808 and *H. punctuosus* (Eversmann, 1849) in Bembicidae from the Hakkâri and Kayseri provinces. Örgel et al. (2020) reported 14 species (Spheciformes) from some provinces of Turkey. Can & Gülmez (2021a) recorded 32 taxa (Sphecidae) from different habitats in the Erzincan, Giresun, Gümüşhane and Sivas provinces. Of these, *Ammophila gussakovskii* (Dollfuss, 2013) and *Podalonia nigrohirta* (Kohl, 1888) were new to Turkey. Furthermore, They provided a checklist of the Turkish Sphecidae. Can & Gülmez (2021b) recorded two species (Crabronidae) from Turkey: *Larra transcaspica* F. Morawitz, 1894 (new record) and *L. anathema* (Rossi, 1790) (additional record). Dollfuss (2021) reported 25 species of *Cerceris* Latreille, 1802 (Philanthidae) from different provinces of Turkey. Ertürk & Taş (2021) recorded distribution and a new locality record of *Sceliphron curvatum* (F. Smith, 1870) (Sphecidae) from Turkey. Kaplan & Yıldırım (2021) recorded an updated checklist of Spheciformes in Turkey. Their study was based on literature records and on newly recorded specimens. They listed 537 species and 16 subspecies in 65 genera. Of them, five species, namely *Dryudella esterinae* Pagliano, 2001, *Nysson mimulus* Valkeila, 1964, *Crossocerus pullulus* A. Morawitz, 1866, *Oxybelus spectabilis* Gerstaecker, 1867 and *Diodontus insidiosus* Spooner, 1938 were first records for Turkey. In addition new and additional records for 114 species were given from the Diyarbakır and Bingöl provinces. Kaplan (2022) illustrated for the first time the male genitalia of 60 species belonging to 25 genera of six families (Astatidae, Bembicidae, Crabronidae, Pemphredonidae, Philanthidae and Psenidae) of Spheciformes. He provided detailed descriptions of the genital structures and described the differences and similarities between genera and species. Kaplan & Yıldırım (2022a) recorded eight species and subspecies (as additional records) in five genera in Sphecidae from the Bingöl, Diyarbakır and Muş provinces. These species are: *Ammophila hungarica* Mocsary, 1883, *Hoplammophila clypeata* (Mocsary, 1883), *Podalonia fera* (Lepelletier de Saint Fargeau, 1845), *P. hirsuta* (Scopoli, 1763), *P. luffii* (E. Saunders, 1903), *Sceliphron arabs* (Lepelletier de Saint Fargeau, 1845), *S. destillatorium* (Illiger, 1807) and *S. madraspatanum tubifex* (Latreille, 1809). All species were new records for the provincial fauna. Kaplan & Yıldırım (2022b) recorded a current classification of Turkey's Spheciformes based on the literature records. They listed 629 species and 25 subspecies in 80 genera belonging to 10 families of Spheciformes: nine species of three genera (Ammoplanidae), four species of two genera (Ampulicidae), 21 species and two subspecies of two genera (Astatidae), 134 species of 19 genera (Bembicidae), 252 species and seven subspecies of 27 genera (Crabronidae), two species of one genus (Mellinidae), 33 species of six genera (Pemphredonidae), 70 species and seven subspecies of three genera (Philanthidae), 25 species of five genera (Psenidae), 79 species and nine subspecies of 12 genera (Sphecidae). Can (2022a) first recorded *Trirogma* (Ampulicidae) and recorded *Trirogma caerulea* Westwood, 1841 from the Antalya province. He also provided a preliminary list of Turkish. Can & Gülmez (2022) described *Lestica anatolica* Can & Gülmez as new for science. Furthermore, they recorded new localities of *L. clypeata* and *L. subterranea* (Fabricius, 1775) and an identification key for Turkish *Lestica*

Billberg, 1820. Can (2022b) recorded 27 taxa in nine genera of three subfamilies (Sphecidae) from different localities of Turkey.

As a result in this study, Turkey's Spheciformes fauna has been updated to 633 species and 25 subspecies in 80 genera belonging to 10 families: Nine species of three genera belonging to Ammoplanidae, four species of two genera belonging to Ampulicidae, 20 species and two subspecies of two genera belonging to Astatidae, 136 species of 19 genera belonging to Bembicidae, 254 species and seven subspecies of 27 genera belonging to Crabronidae, two species of one genus belonging to Mellinidae, 33 species of six genera belonging to Pemphredonidae, 70 species and seven subspecies of three genera belonging to Philanthidae, 26 species of five genera belonging to Psenidae, 79 species and nine subspecies of 12 genera belonging to Sphecidae.

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