Original article (Orijinal araştırma)

Taxonomic and biogeographic evaluations of the subfamily Cryptinae (Hymenoptera: Ichneumonidae)

Türkiye Cryptinae (Hymenoptera: Ichneumonidae) altfamilyası üzerinde taksonomik ve biocoğrafik değerlendirmeler

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Abstract

The taxonomic and biogeographic data of specimens belonging to the subfamily Cyrptinae (Hymenoptera: Ichneumonidae) collected from different regions in Turkey between 1990 and 2018 were studied. An additional 13 samples collected before 1990 were also included. Three tribes, 61 genera and 187 species were identified. Most of the samples were collected during last 25 years or recorded in this time from seven different regions of Turkey by researchers. Among the species listed, Agrothereutes tiloidalis Kolarov & Beyaslan, 1994, Stilpnus adanaensis Kolarov & Beyaslan, 1994 and Aptesis cavigena Kolarov & Gürbüz, 2009 were described from Turkey. Also, these species are endemic to Anatolia. Detailed composition, biogeographic and zoogeographic data, vertical distribution, seasonal dynamics, individual diversity, available host data and plants visited by adults are given.

Keywords: Cryptinae, Hymenoptera, Ichneumonidae, Turkey

Öz

Türkiye’nin farklı bölgelerinden 1990 ve 2018 yılları arasında toplanan Cyrptinae (Hymenoptera: Ichneumonidae) altfamilyasına ait türleri içeren bu çalışma, taksonomik ve biocoğrafik değerlendirmeleri amaçlamıştır. Buna ek olarak 1990 yılından önce toplanmış olan 13 türü de içermektedir. Sonuçlar değerlendirildiğinde, üç tribus ve 61 cinsel bağlı 187 tür teşhis edilmiştir. Türlerin çoğu 25 yıl süresince toplanmış, Agrothereutes tiloidalis Kolarov & Beyaslan, Stilpnus adanaensis Kolarov & Beyaslan ve Aptesis cavigena Kolarov & Gürbüz türleri ilk kez ülkemizden bilim dünyasına kazandırılmıştır. Bu türler endemic durumdadır. Çalışmada her bir tür için tür kompozisyonu, biocoğrafik ve zoocoğrafik veriler, dikey dağılımlar, sezonal aktiviteler, konukçu ve ziyaret edilen bitkiler de verilmiştir.

Anahtar sözcükler: Cryptinae, Hymenoptera, Ichneumonidae, Türkiye

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Introduction

The order Hymenoptera includes well-known species, including bees, sawflies, wasps and ants, which are among the most common animals on earth. The order contains about 8% of all described species (Davis et al., 2010). Parasitic Hymenoptera have often been used for biological control and these programs demonstrate the great impact that they can have on host populations (Sharkey, 2007).

The Ichneumonidae Latreille, 1802 includes 45 subfamilies, 1601 genera and 25,285 described species (Yu et al., 2016). According to recent studies, number of Ichneumonidae of Turkey is 1257 species in 287 genera (Sarı & Çoruh, 2018).

The subfamily Cryptinae (Figure 1) is the largest subfamily of Ichneumonidae and can be encountered in virtually all terrestrial habitats. The nomenclature of this group is complex, also using the names Phygadeuontinae and Gelinae (Townes, 1969). The most common feature to distinguish a cryptine is the sternaulus. The second recurrent vein is always present in almost all species. First abdominal segment slender, or sometime of moderates proportion. Glymma always lacking (Azura & Idris, 2002).

Almost all Cryptinae have been described as idiobiont ectoparasitoids. The most common hosts of Cryptinae are endopterygote pupae or prepupae enclosed in cocoons or plant tissue. There are also some endoparasitic species in the Hedycryptina, Phygadeuontina and Stilpnina. A few species are koinobionts. Furthermore, some species parasitize the egg sacs of Pseudoscorpionida and Araneae and many can develop as secondary parasitoids (Goulet & Huber, 1993). Although there is considerable information on the host relationships of some Cryptinae, virtually nothing is known of their biology. Furthermore, as a consequence of the large size of this subfamily, it is structurally very diverse (Gauld & Gaston, 1995).

Lately, Santos (2017) restricted Cryptinae to the tribes Aptesini and Cryptini and elevated the Phygadeuontini and Ateleutina to subfamily status.

Worldwide the subfamily comprises about 403 genera and 5,080 species (Yu et al., 2016). In this case, Cryptinae has the most species in the Ichneumonidae. The catalog of Ichneumonidae of Turkey (Kolarov, 1995) listed 66 Cryptinae species. Since 1995, the number of cryptine fauna of Turkey has reached 187 species (Kolarov et al., 1997a, b; Jussila, 2001; Kolarov et al., 2002; Schwarz, 2005, 2007; Çoruh & Özæk, 2005; Kolarov & Bordera, 2007; Kolarov & Gürbüz, 2007; Kirtay, 2008; Çoruh & Çoruh, 2008; Çoruh & Kesdek, 2008, Gürbüz & Kolarov, 2008; Kolarov & Yurtcan, 2008; Kolarov & Gürbüz, 2009; Özdemir & Guler, 2009; Gürbüz et al., 2009a, b; Quicke et al., 2009; Çoruh & Özbek, 2011; Eroglu et al., 2011; Çoruh & Çoruh, 2012; Özdan, 2014; Çoruh et al., 2014a, b; Kolarov et al., 2014, Çoruh & Çalışmaș, 2016; Çoruh & Kolarov, 2016; Özdan & Gürbüz, 2016; Çoruh et al., 2016; Kolarov et al., 2016; Sarı & Çoruh, 2018; Çoruh et al., 2018).

The present study aimed to provide detailed information on the subfamily Cryptinae species in Turkey.
Materials and Methods

Samples were collected from 48 of the 81 provinces of Turkey in seven regions (Figure 2) of Anatolia. Adults were collected with an entomological sweep net (40 cm in diameter), aspirator, malaise and light trap. They were preserved in 75% alcohol in insect envelopes in the field and then pinned before drying. Some of the samples are also reared from host insects under laboratory conditions.

Plants visited by insects were also identified, pressed and stored in recent studies.

Fauna lists usually contain localities, altitude, collecting date, number and sex of each specimen examined. Information on world distribution for each species listed is based on Yu et al. (2016).

Results and Discussion

A total of 187 species belonging to subfamily Cryptinae are discussed with different evaluations.

Faunistic evaluations

A total of 187 species in 61 genera in three tribes of Cryptinae have been recorded in Turkey (Table 1). The total number of samples was 1485. However, the number of samples for 31 species is unclear.

Table 1. Data of collected species: Individual numbers (IN), vertical distribution (VD), seasonal dynamics (SD), geographical regions (GR), zoogeographic regions (ZR), host records (HR), plant visited records (PVR), first record of Turkey (FRT) of specimens

| Names of Taxa | IN | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|----|----|----|----|-----|-----|
| Acroricnus seductor (Scopoli, 1786) | 1 F Jul E, M | E, WP | | Fahringer & Frisee, 1921 |
| Acroricnus seductor elegans (Mocsary, 1883) | 1 F Jul E | WP | | Çoruh & Özbek, 2011 |
| Acroricnus seductor syriacus (Mocsary, 1883) | 1 D Jul M | R, EAR | | Gurbuz & Kolarov, 2008 |
| Acroricnus stylator (Thunberg, 1822) | 2 3 A,E Jul&Aug MR, EAR | E, WP, NEAR, WP | | Kolarov, 1987 |

Genus Agrothereutes Förster, 1850

| Names of Taxa | IN | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|----|----|----|----|-----|-----|
| Agrothereutes abbreviator (Fabricius, 1793) | 1 2 B,F Jul-Sep BSR, EAR, M | E, WP | | Fahringer, 1921 |
| Agrothereutes bomydi (Boudier, 1836) | 2 A Apr M | E, WP | | Beyarslan & Kolarov, 1994 |
| Agrothereutes famipennis (Gravenhorst, 1829) | 4 6 C,D,F,H Ap-May-Jun-Jul-Aug-Sep BSR, EAR, M | E, WP, | | Çoruh & Özbek, 2005 |
| Agrothereutes grossus (Gravenhorst, 1829) | 3 A Jun M | E, WP | | Beyarslan & Kolarov, 1994 |
| Agrothereutes hospes (Tach, 1871) | 2 2 A,C,D,F Jun-Jul&Oct BSR, EAR, M | E, WP, | | Beyarslan & Kolarov, 1994 |
| Agrothereutes leucorhaeus (Donovan, 1810) | ? ? ? ? | ? | ? | E, WP | Kolarov & Bordara, 2007 |
Table 1. Continued

| Names of Taxa | IN | VD (m.) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|--------|----|----|----|----|-----|-----|
| Agrotheurus parvulus (Habermehl, 1926) | 3 | A,D | Jun | BSR, MIR | E, EP, WP | Gürbüz & Kolarov, 2008 |
| Agrotheurus ilicidialis Kolarov & Beyarslan, 1994 | 2 | A | Apr,Aug | MR, MIR | WP | Kolarov & Beyarslan, 1994 |
| **Genus Antranis Förster, 1889** | | | | | | | |
| Antranis buccatus (Tschek, 1872) | ? | ? | A | Aug | MIR | E, WP | Sedivy, 1959 |
| Antranis claviventris (Klechbaumer, 1894) | 1 | D | May | MIR | E, EP, WP | Beyarslan & Kolarov, 1994 |
| Antranis croator Tschek, 1871 | 1 | A | Aug | MIR | E, WP | Kolarov et al., 1997a |
| Antranis director (Thomson, 1896) | 6 | C.D,E,F | May-Jun-Jul | BSR, EAR, MIR | E, EP, NEAR, WP | Gürbüz & Kolarov, 2008 |
| Antranis femoralis Gravenhorst, 1829 | 2 | A | May | EAR, MIR | E, WP, X | Beyarslan & Kolarov, 1994 |
| Antranis grased Thomson, 1896 | ? | ? | A | ? | AR | E, WP | X X | Özçelik, 1991 |
| Antranis helicophilus (Tschek, 1871) | 2 | A | Jun-Jul-Aug-Sep | MR, MIR | E, EP, WP | Beyarslan & Kolarov, 1994 |
| Antranis longicauda (Klechbaumer, 1873) | 34 | 11 | C,D,E | Apr-May-Jun | MIR | E, WP | Gürbüz & Kolarov, 2008 |
| Antranis nigrofemur (Fabricius, 1804) | 2 | D,E | Jun-Jul | Anatolia, MIR | E, WP, WP | Sedivy, 1959 |
| Antranis nigripes (Gravenhorst, 1829) | ? | ? | B | Aug | MIR | E, WP | Sedivy, 1959 |
| Antranis occisor (Gravenhorst, 1829) | 1 | C | Jun | Anatolia, MIR | E, WP | Schwarz, 2005 |
| Antranis quadrirugifemur (Gravenhorst, 1829) | 1 | B | Aug | MIR | E, WP, WP | Kolarov et al., 1997a |
| Antranis signata Fabricius, 1703 | 1 | A | Aug | MIR | E, WP | Kolarov et al., 1997a |
| **Genus Buathra Cameron, 1903** | | | | | | | |
| Buathra laborator (Thomson, 1829) | 9 | 11 | D,G,H | May-Jun-Aug-Sep | BSR, EAR, MIR | E, EP, NEAR, WP X X | Gürbüz & Kolarov, 2008 |
| Buathra tarsoleucos (Schrank, 1781) | 2 | 3 | D,G | May&Jul&Aug | EAR, MR, MIR | E, EP, WP | Faehniger, 1922 |
| **Genus Caenocryptus Thomson, 1873** | | | | | | | |
| Caenocryptus culviventris (Gravenhorst, 1829) | ? | ? | A | Jun | MIR | E, EP, WP | Sedivy, 1959 |
| **Genus Cryptus Fabricius, 1804** | | | | | | | |
| Cryptus armator Fabricius, 1804 | ? | ? | D | Jul | Anatolia | E, EP, WP | X Faehniger, 1922 |
| Cryptus dienae Gravenhorst, 1829 | 3 | D | May-Jun-Jul | MIR | E, EP, WP | Gürbüz & Kolarov, 2008 |
| Cryptus leucocheir (Ratzeburg, 1844) | ? | ? | D | ? | CAR | E, WP, WP | Kolarov, 1995 |
| Cryptus melator Gravenhorn, 1829 | ? | ? | C | ? | AR | E, WP | X Kolarov, 1987 |
| Cryptus moschator (Fabricius, 1787) | 1 | C | May | EAR | MIR | E, NEAR, WP | Kolarov et al., 2014a |
| Cryptus spinosus Gravenhorn, 1829 | 3 | 1 | D | Jun-Aug | MIR | E, WP, WP | Sedivy, 1959 |
| Cryptus spiralis (Geoffroy, 1785) | 10 | 12 | E,F,H | May-Jun-Jul&Sep | CAR, EAR, MIR | E, EP, WP | X Çoruh & Özbek, 2005 |
| Cryptus subspinosus Smith van Burgst, 1913 | 1 | D | May | Anatolia, MIR | E, EP, WP | Schwarz, 2005 |
| Cryptus triguttatus Gravenhorn, 1829 | 4 | 4 | A,D | May-Jun-Jul-Aug | AR, MR | E, WP, WP | Beyarslan & Kolarov, 1994 |
| Cryptus tuberculatus Gravenhorn, 1829 | 1 | 2 | B,E | May-Jun-Jul | MIR, MIR | E, WP, WP | Sedivy, 1959 |
| Cryptus vittatus Fabricius, 1804 | 76 | 30 | A,E,F,G | Apr-May-Jun-Aug | EAR, BSR, MIR, MIR | E, EP, WP | X Kolarov, 1987 |
| **Genus Enclossis Townes, 1970** | | | | | | | |
| Enclossis omacrias (Thomson, 1885) | ? | ? | ? | ? | Anatolia | E, WP | Schwarz, 1989 |
| **Genus Gambras Förster, 1869** | | | | | | | |
| Gambras carmifex (Gravenhorn, 1829) | 1 | 7 | A,C,D | May-Jun-Jul | MIR | E, EP, WP | Beyarslan & Kolarov, 1994 |
| Gambras incubilior Linnaeus, 1758 | 3 | 1 | A,D,E | May-May-Jun | BSR, MIR | AFR, E, EP, WP | Beyarslan & Kolarov, 1994 |
| Gambras inferus Thomson, 1896 | 1 | 5 | A | Apr&Aug | MIR, MIR | E, WP, WP | Kolarov, 1987 |
| Gambras opacus Szaepigeti, 1916 | 4 | G,H | Jun-Jul | EAR | E, WP | X Çoruh & Özbek, 2005 |
| Gambras omatius (Thomson, 1873) | 3 | A | Sep | MIR | E, EP, WP | Kolarov et al., 1997a |
| Gambras tricolor (Gravenhorn, 1829) | 2 | B,D | Jun&Sep | BSR | E, EP, WP | Kolarov & Yurtcan, 2008 |
Table 1. Continued

| Names of Taxa | IN | VD (m.) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|---------|----|----|----|----|-----|-----|
| **Genus Hidryta Förster, 1869** | | | | | | | | |
| Hidryta flase (Cresson, 1864) | 1 | A | Sep | MR | E, NEAR, WP | | | |
| Hidryta soildra (Tachek, 1871) | 3 | D | May | MR | E, EP, WP | | | |
| **Genus Hoplocryptus Thomson, 1873** | | | | | | | | |
| Hoplocryptus constrictor (Gravenhorst, 1829) | 1 | D | Jun | Anatolia, MIR | E, EP, WP | | | |
| Hoplocryptus feroxalis (Gravenhorst, 1829) | 8 | 6 | D, E, F | May-Jun & Aug | Anadolu, BSR, EAR | E, EP, WP | | |
| Hoplocryptus fagiarius (Gravenhorst, 1829) | 1 | 6 | F, G | Jun | EAR, MIR | E, WP | | |
| Hoplocryptus murinus (Börner, 1782) | 2 | A, B | Jun | Anatolia, BSR | E, EP, WP | | | |
| **Genus Ischnus Lattillius Gislet, 1848** | | | | | | | | |
| Ischnus analis (Gravenhorst, 1867) | 11 | B, C, D, F | May-Jul | EAR, MIR, SAR | E, EP, NEAR, ORR, WP | | | |
| **Genus Ischnus Gravenhorst, 1829** | | | | | | | | |
| Ischnus actualator (Oliver, 1790) | 5 | 6 | A, C, D, G | May-Jun-Jul-Aug | AR, EAR, MIR | E, EP, WP | X | Gürbüz & Kolarov, 2008 |
| Ischnus alternator Gravenhorst, 1829 | 2 | 3 | A, D | Jun-Aug | BSR, MIR | E, EP, WP | | Kolarov et al., 1997a |
| Ischnus inquisitorus (Müller, 1776) | 2 | E | Aug-Sep | BSR, EAR | E, EP, NEAR, NTR, WP | | | Kolarov & Yurtcan, 2008 |
| Ischnus migrator (Fabricius, 1775) | 4 | B, E | Jun-Jul | MIR | E, EP, WP | X | | Fahlenger, 1922 |
| Ischnus minutorius (Fabricius, 1804) | 7 | A | May-Jun | MIR | E, WP | | | Gürbüz & Kolarov, 1994 |
| **Genus Listrocryptus Braun, 1905** | | | | | | | | |
| Listrocryptus spalatus Braun, 1905 | 1 | A | May-Jun | MIR | E, WP | | | |
| **Genus Listrognathus Tachek 1871** | | | | | | | | |
| Listrognathus (Listrognathus) furax (Tachek, 1871) | 4 | D | May | MIR | E, EP, WP | | | Gürbüz & Kolarov, 2008 |
| Listrognathus ligator Gravenhorst, 1829 | ? | ? | ? | ? | Anatolia | E, WP | | Horsmann, 1996 |
| Listrognathus obinosus (Gravenhorst, 1829) | 4 | A | May-Jun | MIR | E, WP | | | Gürbüz & Kolarov, 1904 |
| **Genus Meningopus Förster, 1869** | | | | | | | | |
| Meningopus calexens (Gravenhorst, 1829) | 73 | 226 | D, G, H | Jul | AR, EAR | E, EP, NEAR, ORR, WP | X | Gürbüz & Kolarov, 1994 |
| Meningopus calexens calexens (Gravenhorst, 1829) | 3 | H | Jun | EAR | E, EP, NEAR, ORR, WP | X | | Kolarov et al., 2016 |
| Meningopus calexens persicus Heinrich, 1937 | 4 | 1 | D, H | Jun-Jul | EAR | E, WP | | Kolarov & Yurtcan, 2008 |
| Meningopus oyanator (Gravenhorst, 1829) | 21 | 30 | G, H | Jun-Jul | EAR | E, EP, WP | X | | Çoruh & Özak, 2005 |
| Meningopus nigerimimus (Forscolorbime, 1850) | 1 | G | Jul | EAR | E, EP, NEAR, WP | | | Çoruh & Özak, 2005 |
| Meningopus pseudonymus (Tachek, 1872) | 6 | C, D | May-Jun-Aug | EAR, MIR, MIR | E, EP, WP | X | | Kolarov, 1987 |
| Meningopus tillator (Limaiaus, 1758) | 24 | 2 | E, F, G, H | May-Jun-Jul-Aug | CAR, EAR, MIR | E, EP, WP | X | Szepelgeli, 1916 |
| Meningopus tillator rhodius (Dalila Tora, 1902) | 2 | 4 | D, H | Sep | EAR, MIR | E, EP, WP | X | Gürbüz & Kolarov, 2008 |
| **Genus Mesostenus Gravenhorst, 1829** | | | | | | | | |
| Mesostenus albimoratus Gravenhorst, 1829 | 11 | 14 | B, E, F, H | Jun-Jul-Aug | BSR, EAR MIR | E, EP, NEAR, WP | X | Sedoiv, 1959 |
| Mesostenus grammicus (Gravenhorst, 1829) | 3 | 7 | A, D, E | Jun-Jul-Sep | EAR, MIR, MIR | E, EP, WP | | Kolarov, 1987 |
| Mesostenus transfuga Gravenhorst, 1829 | 13 | 11 | A, E, F, H | May-Jun-Jul-Aug | AR, MIR, EAR | E, EP, OCC, WP | X | Gürbüz & Kolarov, 1994 |
| **Genus Myrmeleonostenus Uhland 1936** | | | | | | | | |
| Myrmeleonostenus italicus (Gravenhorst, 1829) | 4 | 14 | A, C, D, F | May-Jun-Jul | BSR, EAR, MIR, MIR | E, EP, WP | X | van Rossum, 1969 |

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| Names of Taxa | IN | VD (m.) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|---------|----|----|----|-----|------|-----|
| **Genus Nematopodius** Gravenhorst, 1829 | | | | | | | | |
| Nematopodius formosus Gravenhorst, 1829 | 1 | D | Jul | BSR | E, WP | | | Çoruh et al., 2016 |
| **Genus Polystirbis Förster, 1869** | | | | | | | | |
| Polystirbis peraplicullar (Gravenhorst, 1807) | 7 | 2 | A | May & Aug | MIR | E, EP, WP | | Beyarslan & Kolarov, 1994 |
| **Genus Pycnocryptus Thomson, 1873** | | | | | | | | |
| Pycnocryptus claviventris Krichbaum, 1894 | 1 | D | Jun | MIR, SAR | E, EP, WP | | | Beyarslan & Kolarov, 1994 |
| Pycnocryptus director (Thunberg, 1822) | 5 | 3 | A, D | May–Jun–Jul | MIR, MR | E, EP, NEAR, WP | | Beyarslan & Kolarov, 1994 |
| Pycnocryptus rarus (Hebermehl, 1920) | ? | ? | A | Jun | BSR | E, WP | | Sediç, 1959 |
| **Genus Pycnocryptodes Aubert, 1971** | | | | | | | | |
| Pycnocryptodes reticulator Aubert, 1971 | 1 | C | Jul | MIR | EP, WP | | | Gürbüz & Kolarov, 2008 |
| **Genus Schreineria Schreiner, 1905** | | | | | | | | |
| Schreineria populnea (Giraud, 1872) | 2 | A, D | Jul | BSR | E, EP, WP | | | Çoruh et al., 2014a |
| **Genus Stenarella Szépligeti, 1916** | | | | | | | | |
| Stenarella domator (Pado, 1761) | 1 | 3 | D | May & Jul | MIR, MR | E, EP, WP | X | Fahringer, 1922 |
| **Genus Synechopterus Schmiedechnect, 1904** | | | | | | | | |
| Synechopterus mactator (Tschek, 1870) | 3 | C | May | AR, MIR | E, EP, WP | | | Kolarov, 1987 |
| **Genus Thrybius Townes, 1965** | | | | | | | | |
| Thrybius praedator (Rossi, 1792) | 3 | 1 | D, E | Jun & May | MIR, MR | E, EP, WP | | Fahringer, 1922 |
| **Genus Trychosis Förster, 1869** | | | | | | | | |
| Trychosis atripes (Gravenhorst, 1829) | 2 | A, D | Jun–Jul | MIR, MR | E, EP, WP | | | Beyarslan & Kolarov, 1994 |
| Trychosis legator (Thunberg, 1822) | 28 | 12 | A, B, C, D | Apr–May–Jun–Jul–Aug | BSR, EAR, MIR, MR, SAR | E, EP, WP | | Kolarov, 1987 |
| Trychosis neglecta (Tschek, 1870) | 3 | D, E | Jun & Aug | MIR, MR | E, EP, WP | X | Fahringer, 1922 |
| Trychosis mesocastana (Tschek, 1871) | 1 | A | Jul | MIR | E, WP | | | Kolarov et al., 1997b |
| Trychosis pauper (Tschek, 1871) | 13 | 2 | D | May–Jun–Jul–Aug | EAR, MIR, MR, | E, EP, WP | | Kolarov et al., 1997b |
| Trychosis praelei Rossm, 1971 | 1 | 1 | D, E | M | CAR, MIR | E, EP, WP | | van Rossem, 1971 |
| Trychosis dimandia Rossm, 1990 | 8 | 1 | A | May & Aug | MIR, MR | E, WP | | Beyarslan & Kolarov, 1994 |
| Trychosis tigrator (Tschek, 1871) | 8 | 8 | A, C | May–Jun–Jul–Aug | EAR, MIR, MR | E, EP, WP | | Beyarslan & Kolarov, 1994 |
| **Genus Xylophrurus Förster, 1869** | | | | | | | | |
| Xylophrurus augustus (Dalman, 1823) | 1 | 9 | C, E | Apr–May–Jun | AR, CAR, EAR, MIR | E, WP | | Odemir & Güler, 2009 |
| Xylophrurus lancifer (Gravenhorst, 1829) | 1 | G | Jun | EAR | E, EP, WP | | | Kolarov et al., 2016 |
| **TRIBE HEMIGASTERINI ASHMEAD, 1900** | | | | | | | | |
| **Genus Aptesis Förster, 1850** | | | | | | | | |
| Aptesis assimilis (Gravenhorst, 1829) | 7 | 2 | E, H | Jun–Jul | EAR | E, WP | | Kolarov et al., 2016 |
| Aptesis canigera Kolarov & Gürbüz, 2009 | 1 | E | Jun | MIR | WP | | | Kolarov & Gürbüz, 2009 |
| Aptesis cretata (Gravenhorst, 1829) | 1 | B | Aug | MIR | E, WP | | | Kolarov et al., 1997a |
| Aptesis nigrocincta (Gravenhorst, 1815) | 1 | D | Jul | EAR | E, EP, WP | | | Kolarov et al., 2014a |
| Aptesis senicula (Krichbaum, 1893) | 5 | 1 | C, D, E, F | May | EAR | E, WP | | | Kolarov & Gürbüz, 1994 |
| **Genus Giraudia Förster, 1869** | | | | | | | | |
| Giraudia gynastoria (Thunberg, 1824) | ? | ? | B | Aug | MIR | E, EP, WP | X | Fahringer, 1922 |
Table 1. Continued

| Genus | Names of Taxa | IN | VD (m) | SD | GR | ZR | HR | PVR | FRT |
|-------|---------------|----|--------|----|----|----|----|-----|-----|
| **Polythrida Forster, 1869** | | | | | | | | | |
| | Polythrida niger (Gravenhorst, 1829) | ? ? | C | Jul-Aug | AR | E | WP | X | Fahlgren, 1821 |
| **Genus Aclastus Förster, 1869** | | | | | | | | | |
| Aclastus gracilis (Thomson, 1884) | 21 | 3 | D,E | May-Jun-Jul&Sep | MR, MIR | E | EP, NEAR, WP | Kolarov et al., 1997b |
| Aclastus micator (Gravenhorst, 1807) | 19 | 5 | A,D | May-Jun-Jul&Sep | AR, MIR | E | EP, NEAR, WP | Beyarslan & Kolarov, 1994 |
| Aclastus solutus (Thomson, 1864) | 3 | 3 | A,D | May-Jun-Jul | AR, MIR | E | EP, WP | Beyarslan & Kolarov, 1994 |
| Aclastus transversalis Horstman, 1980 | 1 | D | May | MIR | E | WP | Kolarov & Gülbüz, 2007 |
| **Genus Atractodes Gravenhorst, 1829** | | | | | | | | | |
| Atractodes (Atractodes) pusillus (Thomson, 1873) | 10 | 1 | C,D | May-Jun-Jul&Sep | BSR, MIR | E | WP | BSR, MR, MtR, SAR, EAR, MtR, AR, MtR, EAR | Kolarov et al., 2014a |
| Atractodes (Atractodes) foveolatus (Gravenhorst, 1829) | 4 | A | Jun | MIR | BSR, MIR | E | WP | BEYARSLAN & KOLAROV, 1994 |
| **Genus Bathysphex Förster, 1869** | | | | | | | | | |
| Bathysphex claviger (Taschenberg, 1865) | ? ? | A | May | MIR | EP, E, NEAR, ORR WP | X | Schimitschek, 1944 |
| Bathysphex collaris (Thomson, 1866) | 4 | D | Jul | BSR | E | WP | Çoruh et al., 2016 |
| Bathysphex discipiens (Gravenhorst, 1829) | 2 | D | May-Jul&Sep | BSR, MIR | E | WP | Kolarov & Gülbüz, 2007 |
| Bathysphex fragilis (Gravenhorst, 1829) | 1 | A | Jul | BSR | E | WP | Çoruh et al., 2016 |
| Bathysphex ionia (Thomson 1884) | 5 | 5 | A,C,F | Jun-Jul&Sep | BSR, MIR, E | WP | E, WP | Beyarslan & Kolarov, 1997a |
| Bathysphex linea (Gravenhorst, 1829) | 1 | B | Jun | BSR | E | WP | Çoruh et al., 2014a |
| Bathysphex pellucidator (Gravenhorst, 1829) | 4 | A | Jun | BSR | E | WP | Çoruh et al., 2014a |
| **Genus Blapsidotes Förster, 1869** | | | | | | | | | |
| Blapsidotes viribus (Gravenhorst 1829) | 10 | 1 | C,D | May-Jun-Jul&Sep | BSR, MIR | E | WP | Kolarov & Gülbüz, 2007 |

**Subgenus Atractodea (Atractodes) Forster, 1869**

| Names of Taxa | IN | VD (m) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|--------|----|----|----|----|-----|-----|
| Atractodes (Atractodes) assimilis Förster, 1876 | 2 | D,F | May-Jul&Sep | MIR, SAR | E | WP | Beyarslan & Kolarov, 1994 |
| Atractodes (Atractodes) foveolatus (Gravenhorst, 1829) | 1 | H | May-June | BSR | E | WP | Beyarslan & Kolarov, 1994 |
| Atractodes (Atractodes) foveolatus (Gravenhorst, 1829) | 1 | D | Jul | MIR | E | WP | Beyarslan & Kolarov, 1994 |

**Subgenus Atractodea (Atractodes) Gravenhorst, 1829**

| Names of Taxa | IN | VD (m) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|--------|----|----|----|----|-----|-----|
| Atractodes (Atractodes) fulvatus Haliday, 1838 | 1 | D | Jul | MIR | E | WP | Beyarslan & Kolarov, 1994 |
| Atractodes (Atractodes) pusillus Förster, 1876 | 1 | E | Oct | MIR | E | WP | Beyarslan & Kolarov, 1994 |

**Genus Ctenophytagus Viereck, 1924**

| Names of Taxa | IN | VD (m) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|--------|----|----|----|----|-----|-----|
| *Ctenophytagus anurus* (Thomson, 1884) | ? ? | F | Aug | EAR | E | WP | Horstmann, 1993 |

**Genus Chlorofa Förster, 1869**

| Names of Taxa | IN | VD (m) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|--------|----|----|----|----|-----|-----|
| Chlorofa decorata (Milne, 1789) | ? ? | A | Jun | MIR | EP, E, WP | Kolarov, 1987 |
| Chlorofa insignis (Gravenhorst 1829) | 1 | E | Aug | EAR | E | WP | Çoruh & Kolarov, 2016 |
| Chlorofa orientalis Horstmann, 1983 | 1 | B | Apr | SAR | WP | X | Kolarov & Erkin, 1987 |
| Chlorofa radiata Horstmann, 1983 | ? ? | H | Aug | EAR | E | WP | Horstmann, 1993 |
| Chlorofa tubularis Horstmann, 1983 | 1 | B | May | SAR | EP, E, WP | X | Kolarov & Erkin, 1987 |

**Genus Diaphytlane Horstmann, 1976**

| Names of Taxa | IN | VD (m) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|--------|----|----|----|----|-----|-----|
| *Diaphytlane punctatus* (Holmgren, 1857) | ? ? | C | Jul | CAR | E | WP | Sedivy, 1959 |
Table 1. Continued

| Names of Taxa | IN | VD (m.) | SD | GR | ZR | HR | PVR | FRT |
|---------------|----|---------|----|----|----|----|-----|-----|
| Genus Diaglyptellodes Aubert, 1993 |     |         |    |    |    |    |     |     |
| Diaglyptellodes sculpturator (Aubert, 1977) | 1 | D | May | Anatolia, MIR | EP, E, WP |     |     |     |
| Genus Dichrogaster Doumenc, 1855 |     |         |    |    |    |    |     |     |
| Dichrogaster aestivalis (Gravenhorst, 1829) | 36 | 13 | A,B,D,F | May-Jun-Jul | CAR, EAR, MIR, MIR, SAR | EP, E, WP |     |     |
| Dichrogaster diatropus Townes, 1983 | 1 | 1 | A | May & Sep | CAR, MIR | E, NEAR, WP |     |     |
| Dichrogaster lissastylus Thomson, 1885 | 3 | B | Jun | BSR | E, WP |     | X | Kolarov, 1995 |
| Dichrogaster longicaudata (Thomson 1885) | 21 | 1 | D,E,G | May-Jul | EAR, CAR, MIR | EP, E, NEAR WP |     |     |
| Dichrogaster modesta (Gravenhorst, 1829) | 6 | E,F | Sep | BSR, MIR | E, WP |     | X | Kolarov et al., 1997a |
| Dichrogaster parsei (Doumenc, 1855) | 1 | D | Jun | MIR | E, WP |     |     |     |
| Dichrogaster saharator (Aubert, 1964) | 2 | D | May | MIR | EP, E, WP |     |     |     |
| Dichrogaster schmittschelki (Fahringer, 1955) | 8 | 3 | D,E | May-Jun | MIR | E, NEAR, WP |     |     |
| Genus Echthrus Gravenhorst, 1829 |     |         |    |    |    |    |     |     |
| Echthrus reluctator (Linnaeus, 1758) | ? | ? | A | Aug | MIR | EP, E, WP | X | X | Fahringer, 1922 |
| Genus Encrateola Strand, 1917 |     |         |    |    |    |    |     |     |
| Encrateola lavingaeta (Raiborg, 1848) | 2 | A,G | Jun-Jul | BSR, EAR, MIR | AFR, E, NEAR, WP | X |     |     |
| Genus Eniiasys Förster, 1889 |     |         |    |    |    |    |     |     |
| Eniiasys brevis (Gravenhorst, 1829) | 2 | D,E | May | Anatolia, MIR | EP, E, WP |     |     |     |
| Eniiasys erythrogastrus (Gravenhorst, 1829) | ? | ? | C | May | CAR | EP, E, WP | X | Kolarov, 1987 |
| Eniiasys femoralis (Habermehl 1912) | 1 | D | Jul | MIR | E, WP |     |     |     |
| Eniiasys minutus (Thomson 1883) | 8 | E | Jun | MIR | E, NEAR, WP |     |     |     |
| Eniiasys parviventris (Gravenhorst, 1929) | ? | ? | ? | ? | Anatolia | EP, E, ORR, WP |     |     |
| Eniiasys plagiator (Gravenhorst, 1829) | 5 | E,G,H | Jun | Anatolia, EAR, MIR | E, WP |     |     |     |
| Eniiasys rubricator (Thunberg, 1822) | ? | ? | D | May | CAR | E, WP |     |     |
| Eniiasys senilis (Gmelin, 1790) | 1 | D | Jun | MIR | E, WP |     |     |     |
| Genus Eudelus Förster, 1889 |     |         |    |    |    |    |     |     |
| Eudelus similimus Taschenberg, 1885 | ? | ? | D | Jul | CAR | E, WP |     |     |
| Genus Gelis Thunberg, 1827 |     |         |    |    |    |    |     |     |
| Gelis agilis (Fabricius, 1775) | 3 | A,G | Jun-Jul | Anatolia, BSR, EAR | EP, E, WP |     |     |     |
| Gelis curattii (Fabricius, 1775) | 1 | A | Jun | BSR | E, WP |     |     |     |
| Gelis cyanurus (Förster, 1851) | ? | ? | E | Apr | Anatolia, CAR | E, WP |     |     |
| Gelis exaracnatus (Förster, 1850) | ? | ? | D | Jun | CAR | EP, E, WP |     |     |
| Gelis formicarius (Linneaus, 1758) | 1 | B | Jul | BSR | EP, E, WP |     |     |     |
| Gelis instabilis (Förster, 1851) | 8 | A,D | May-Jun-Jul-Aug | Anatolia, EAR, MIR, MIR | EP, E, WP |     |     |     |
| Gelis micans (Förster, 1850) | 1 | A | Jul | MIR | E, WP |     |     |     |
| Gelis multilatus (Gmelin, 1790) | 1 | G | Jun | EAR | EP, E, WP |     |     |     |
| Gelis nudipes (Förster, 1876) | 2 | 2 | B,C,F | May-Jun-Jul | AR, SAR | E, WP |     |     |
| Gelis sculpturatus Aubert, 1977 | ? | ? | B | Mar & Jun | CAR | EP, E, WP |     |     |
| Gelis trux (Förster, 1850) | 3 | A,G | Jun | BSR, EAR | EP, E, WP |     |     |     |
### Table 1. Continued

| Genus | Names of Taxa | IN ♂ | VD (m.) | SD | GR | ZR | HR | PVR | FRT |
|-------|---------------|------|---------|----|----|----|----|-----|-----|
| Genus Grasseiteles Aubert, 1965 | Grasseiteles ciliator Aubert, 1968 | ? ? | B | Jun | MIR | EP, E, WP | X | Aubert, 1968 |
| Genus Glyphicnemis Förster, 1869 | Glyphicnemis probatagirt (Fabricius, 1775) | 13 2 | A,B,D,G | May-Jun-Jul | BSR, EAR, MTR | EP, E, WP | Çoruh & Özak, 2005 |
| | Glyphicnemis vagabunda (Gravenhorst, 1820) | 49 28 | D,E,G,H | Apr-Jun-Jul-Aug | EAR, MIR, MR | EP, E, WP | X | Sawoniewicz, 1985 |
| Genus Helcostizus Förster, 1869 | Helcostizus restaurator (Fabricius, 1775) | ? ? | A | Mar | MIR | EP, E, NEAR, WP | X | Schmitzschek, 1944 |
| Genus Isadelphus Förster, 1869 | Isadelphus armatus (Gravenhorst, 1829) | 1 1 | A | Jun | MIR | E, WP | Kolarov & Gürbüz, 2007 |
| Genus Locheta Kriechbaumer, 1892 | Locheta westoni (Bridgman, 1880) | 1 1 | A | May | MIR | EP, E, WP | Kolarov & Gürbüz, 2007 |
| Genus Lysibia Förster, 1869 | Lysibia nana (Gravenhorst, 1829) | 6 6 | A,F,E | Apr-Jun-Jul-Aug | AR, MIR, MR | EP, E, NEAR, OCC, ORR, WP | X | X | Fahring, 1922 |
| Genus Mesoleptus Gravenhorst, 1829 | Mesoleptus filicornis (Thomson, 1884) | 2 2 | A | Aug | Anatolia, MIR | EP, E, WP | Kohl, 1905 |
| | Mesoleptus incassor (Haliday, 1838) | ? ? | ? | ? | Anatolia | Jusufa, 2010 |
| | Mesoleptus leviatrus (Gravenhorst, 1820) | 2 2 | A | Aug | Anatolia, EAR | EP, E, WP | Fahring, 1922 |
| | Mesoleptus laticinctus (Walker, 1874) | 1 1 | A,B | Jun | Anatolia, BSR | EP, E, ORR, WP | Kolarov, 1987 |
| | Mesoleptus marginatus (Thomson, 1884) | 4 4 | A,F | May-Jul-Aug-Sep | MIR, MR | E, WP | X | Kolarov, 1987 |
| | Mesoleptus acutator (Haliday, 1838) | 8 7 | A,D | May-Jul-Aug | AR, MIR, MR | EP, E, WP | Beyarslan & Kolarov, 1994 |
| | Mesoleptus transversor Thunberg, 1822 | 2 2 | B | Aug | MIR | E, WP | Kolarov et al., 1997a |
| Genus Phygadeuon Gravenhorst, 1829 | Phygadeuon trichops Thomson, 1894 | 1 1 | E | April | MIR | EP, E, WP | Kolarov & Gürbüz, 2007 |
| | Phygadeuon vexator (Thunberg, 1822) | 2 2 | E | May | MIR | E, WP | Kolarov & Gürbüz, 2007 |
| Genus Rhembobius Förster, 1869 | Rhembobius perscutator (Thunberg, 1822) | 1 1 | E | Jun | MIR | EP, E, WP | Çoruh et al., 2016 |
| | Rhembobius quadrilaminus (Gravenhorst, 1829) | 3 3 | A,D | May-Jun-Jul | BSR, MIR, MR | E, WP | Kolarov et al., 1997b |
| Genus Stilpnus Gravenhorst, 1829 | Stilpnus adanaensis Kolarov & Beyarslan, 1994 | 1 1 | A | May | MIR | WP | Kolarov & Beyarslan, 1994 |
| | Stilpnus gagei (Gravenhorst, 1807) | 3 3 | A,E | Jun-Sep | AR | EP, E, NEAR, NTR, OCC, WP | Beyarslan & Kolarov, 1994 |
| Genus Thaumatogelis Schwarz, 1995 | Thaumatogelis femoralis (Brischka, 1881) | 2 2 | G | Jul | EAR | E, WP | X | Çoruh et al., 2016 |
| Genus Terscoscapus Förster, 1869 | Terscoscapus hemipterus (Fabricius, 1793) | ? ? | G | Sep | AR | E, ORR, WP | Sedivy, 1959 |
| | Terscoscapus subzonatus (Gravenhorst, 1829) | ? ? | C | Jul | CAR | E, WP | Sedivy, 1959 |
| Genus Zoophthorus Förster 1869 | Zoophthor us austriacus (Thomson, 1865) | 1 1 | D | May | MIR | E, WP | Kolarov & Gürbüz, 2007 |
| | Zoophthor us gracilis (Gravenhorst, 1829) | 21 1 | A | Jun | MIR | EP, E, NEAR, NTR, WP | Kolarov & Beyarslan, 1994 |

Vertival distribution (VD) (m): A: 0-500 m, B: 501-750 m, C: 751-1000 m, D: 1001-1250 m, E: 1251-1500 m, F: 1501-1750 m, G: 1751-2000 m, H: 2001-2500 m. Seasonal dynamics (SD): March; March; Ap; April, M-May, J-June, Jl-July, A-August, S-September, O-October. Geographical regions (GR): AR: Aegean Region, BSR: Black Sea Region, CAR: Central Anatolia Region, EAR: Eastern Anatolia Region, MR: Marmara Region, MiR: Mediterranean Region, SAR: Southeastern Anatolia, Zoogeographic regions (ZR): AFR: Afrotropical Region, E: Europe, NEAR: Nearctic Region, NTR: Neotropical, ORR: Oriental, WP: Western Palearctic.
Taxonomic and biogeographic evaluations of the Subfamily Cryptinae (Hymenoptera: Ichneumonidae)

Table 2. Provinces and references of species collected in Turkey

| Taxa                                      | Distribution in Turkey | References                                                                 |
|-------------------------------------------|------------------------|----------------------------------------------------------------------------|
| TRIBE CRYPTINI KIRBY, 1837                |                        |                                                                            |
| Acroricnus seductor (Scopoli, 1786)       | Erzurum, Isparta        | Fahringer & Friese, 1921; Fahringer, 1922; Schimitschek, 1944; Schmidt, 1954; Sedivy, 1959; Kolarov, 1995; Schwarz, 2005; Gürbüz & Kolarov, 2008; Çoruh & Özbek, 2011; Çoruh et al., 2014b |
| Acrotriconus seductor elegans Mocsary, 1883 | Erzurum                | Çoruh & Özbek, 2011; Çoruh et al., 2014b                                   |
| Acrotriconus stylovar (Thunberg, 1822)    | Isparta                | Fahringer, 1922; Schimitschek, 1944; Schmidt, 1954; Sedivy, 1959; Kolarov, 1995; Schwarz, 2005; Gürbüz & Kolarov, 2008; Çoruh & Özbek, 2011; Çoruh et al., 2014b |
| Agrothereutes abbreviari (Fabricius, 1793) | Erzurum, Hatay, Kastamonu | Fahringer, 1921; Kolarov & Beyarslan, 1994; Kolarov, 1995; Kolarov & Yurtcan, 2008 |
| Agrothereutes bombycic (Boudier, 1836)    | Edime                  | Beyarslan & Kolarov, 1994                                                  |
| Agrothereutes fumipennisi (Gravenhorst, 1829) | Erzurum, Isparta, Kastamonu | Çoruh & Özbek, 2005; Gürbüz & Kolarov, 2008; Kolarov & Yurtcan, 2008; Gürbüz & al., 2009a; Çoruh et al., 2014b |
| Agrothereutes grossi (Gravenhorst, 1829)  | Kirklaireli            | Beyarslan & Kolarov, 1994                                                  |
| Agrothereutes hospes (Tscheek, 1871)      | Isparta, Giresun, Van  | Beyarslan & Kolarov, 1994; Gürbüz et al., 2006; Gürbüz & Kolarov, 2008; Çoruh et al., 2014a |
| Agrothereutes leucorheaeus (Donovan, 1810) | Anatolia               | Kolarov & Bordera, 2007                                                    |
| Agrothereutes parvulus (Habermehl, 1826)  | Isparta, Giresun, Ordu | Gürbüz & Kolarov, 2008; Çoruh et al., 2014b                               |
| Agrothereutes tildisidias Kolarov & Beyarslan, 1994 Antalya, Edime Kolarov & Beyarslan, 1994; Kolarov, 1995 |
| Antitris buccatus (Tscheek, 1872)         | Adana                  | Sedivy, 1959; Öncüer, 1991; Kolarov, 1995                                 |
| Antitris claviventris (Kriechbaumer, 1894) | Antalya, Antalya       | Beyarslan & Kolarov, 1994; Gürbüz & Kolarov, 2008                         |
| Antitris coxator (Tscheek, 1871)          | Bilecik               | Kolarov et al., 1997a                                                     |
| Antitris femoralis (Gravenhorst, 1829)    | Antalya, Burdur, Trabzon, Rize Eszurnum, Isparta, Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a; Çoruh et al., 2014a, Özdın, 2014, Sarı & Çoruh, 2018, Çoruh et al., 2018 |
| Antitris greaefi Thomson, 1896            | İzmir                 | Öncüer, 1991; Kolarov, 1995                                               |
| Antitris helophilus (Tscheek, 1871)       | Bursa, Edime, Hatay, Kirklaireli Beyarslan & Kolarov, 1994; Kolarov, 1995, Özdın, 2014, Sarı & Çoruh, 2018, Çoruh et al., 2018 |
| Antitris longicauda (Kriechbaumer, 1873)  | Isparta               | Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a,b; Özdın, 2014              |
| Antitris nigremur (Szepligeti, 1916)      | Anatolia, Isparta      | Sedivy, 1959, Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a                |
| Antitris nigripes (Gravenhorst, 1829)     | Adana                 | Sedivy, 1959; Öncüer, 1991; Kolarov, 1995; Schwarz, 2005                 |
| Antitris occisor (Gravenhorst, 1829)      | Anatolia, Isparta      | Schwarz, 2005; Gürbüz & Kolarov, 2008                                    |
| Antitris quadriguttata (Gravenhorst, 1829) | Bursa                  | Kolarov et al., 1997a; Schwarz, 2007                                       |
| Antitris signatoria Fabricius, 1793       | Bursa                  | Kolarov et al., 1997a                                                     |
| Buathra laborator (Thunberg, 1824)        | Burdur, Erzurum, Isparta, Trabzon Gürbüz & Kolarov, 2008; Çoruh & Çoruh, 2012; Çoruh et al., 2014a; Çoruh & Çalmaşur, 2016, Çoruh et al., 2016, Kolarov et al., 2016 |
| Buathra tarsoleucos (Schrank, 1781)       | Bursa, Isparta Erzurum Fahringer, 1922; Kolarov, 1995; Gürbüz & Kolarov, 2008; Özdın 2014; Çoruh et al., 2014b, Kolarov et al., 2014 |
| Caenocryptus rufiventris (Gravenhorst, 1829) | Edime            Sedivy, 1959; Kolarov, 1995                                   |
| Cryptus armator Fabricius, 1804           | Anatolia              | Fahringer, 1922; Kolarov, 1995                                            |
| Cryptus dianae Gravenhorst, 1829          | Isparta               | Gürbüz & Kolarov, 2008                                                    |
| Cryptus leucocheir (Ratzburg, 1844)       | Konya                 | Kolarov, 1995; Schwarz, 2015                                              |
Table 2. Continued

| Taxa                        | Distribution in Turkey | References                                                                 |
|-----------------------------|------------------------|-----------------------------------------------------------------------------|
| Cryptus minator Gravenhorst, 1829 | Kütahya                | Kolarov, 1987; Öncüer, 1991; Kolarov, 1995                                 |
| Cryptus moschator (Fabricius, 1787) | Tunceli              | Kolarov et al., 2014; Çoruh et al., 2014b                                  |
| Cryptus spinosus Gravenhorst, 1829 | Adana, Isparta    | Sedivy, 1959; Öncüer, 1991; Kolarov, 1995; Gürbüz & Kolarov, 2008; Enoğlu et al., 2011 |
| Cryptus spiralis (Geoffroy, 1785) | Erzurum, Isparta, Karabük, Kars | Çoruh & Özbek, 2005; Çoruh & Çoruh 2008; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a; Çoruh et al., 2014b |
| Cryptus subspinulosus Smith van Burgst, 1913 | Anatolia, Isparta | Schwarz, 2005; Gürbüz & Kolarov, 2008                                  |
| Cryptus triguttatus Gravenhorst, 1829 | Afyon, Bursa, Edirne, Mugla | Beyarslan & Kolarov, 1984; Kolarov et al., 1997a; Kolarov et al., 2002; Schwarz, 2015 |
| Cryptus tuberculatus Gravenhorst, 1829 | Edirne, Isparta, Tekirdağ | Sedivy, 1959; Kolarov, 1995; Kolarov & Yurtcan 2008; Özdan 2014; Schwarz, 2015 |
| Cryptus viduatorius Fabricius, 1804 | Bilecik, Bursa, Erzurum, Isparta, İçel, Kırklareli, Rize, Trabzon | Kolarov, 1987; Beyarslan & Kolarov, 1994; Kolarov, 1995; Kolarov et al., 1997a; Çoruh & Çoruh, 2008; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009b; Çoruh & Çoruh, 2012; Özdan, 2014; Çoruh et al., 2014a, b; Çoruh & Kolarov, 2016; Özdan & Gürbüz, 2016; Çoruh et al., 2016; Kolarov et al., 2016; Karabük & Çoruh, 2018; Çoruh et al., 2018 |
| Enckisais ornaticeps (Thomson, 1885) | Anatolia              | Schwarz, 1989; Kolarov, 1995; Kolarov & Bordera, 2007                     |
| Gambrus camifex (Gravenhorst, 1829) | Adana, Afyon, Denizli | Beyarslan & Kolarov, 1984; Kolarov et al., 2002                           |
| Gambrus incubitor (Linnaeus, 1758) | Isparta, Rize, Kahramanmarş | Beyarslan & Kolarov, 1994; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a; Çoruh et al., 2014a |
| Gambrus inferus Thomson, 1896 | Antalya, Bilecik, Bursa, Erzurum, Isparta, İçel | Kolarov, 1987; Kolarov, 1995; Öncüer, 1991; Beyarslan & Kolarov 1994; Kolarov et al., 1997a |
| Gambrus opacus Szepligeti, 1916 | Erzurum               | Çoruh & Özbek, 2005; Çoruh et al., 2014b                                  |
| Gambrus omalis Thomotson, 1873) | Bilecik, Bursa      | Kolarov et al., 1997a                                                     |
| Gambrus tricolor (Gravenhorst, 1829) | Kastamonu, Rize | Çoruh & Özbek, 2005; Kolarov & Yurtcan, 2008; Çoruh et al., 2014a,b       |
| Hidryta frater (Cresson, 1864) | Çanakkale             | Kolarov et al., 1997a                                                     |
| Hidryta sordida (Tschech, 1871) | Isparta               | Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a                             |
| Hoplocryptus confector (Gravenhorst, 1829) | Anatolia, Isparta | Schwarz, 2007; Gürbüz & Kolarov, 2008                                   |
| Hoplocryptus femoralis (Gravenhorst, 1829) | Anatolia, Artvin, Erzurum, Isparta | Schwarz, 2007; Çoruh & Özbek, 2011, Kolarov et al., 2014; Çoruh et al., 2014b |
| Hoplocryptus fucitriscus (Gravenhorst, 1829) | Erzurum, Isparta | Çoruh & Özbek, 2005; Gürbüz & Kolarov, 2008; Çoruh et al., 2014b          |
| Hoplocryptus murarius (Börner, 1782) | Anatolia, Rize      | Schwarz, 2007; Çoruh et al., 2014a,b                                      |
| Hoplocryptus odoriferator (Dufour & Perris, 1840) | Isparta             | Schwarz, 2007; Gürbüz & Kolarov, 2008                                   |
| Hoplocryptus quadriguttatus (Gravenhorst, 1829) | Isparta            | Schwarz, 2007; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a             |
| Idiolsapsa analis (Gravenhorst, 1807) | Isparta, Gaziantep, Tunceli | Beyarslan & Kolarov, 1994; Gürbüz & Kolarov, 2008; Çoruh et al., 2014b; Kolarov et al., 2014 |
| Ischnus agitator (Oliver, 1792) | Afyon, Denizli, Erzurum, Isparta, İzmir, Uşak | Kolarov et al., 2002; Gürbüz & Kolarov, 2008; Çoruh et al., 2016 |
| Ischnus alternator Gravenhorst, 1829 | Bursa, Giresun, Ordu, Rize, Trabzon | Kolarov et al., 1997a, Çoruh et al., 2014a, Kolarov et al., 2016           |
| Ischnus inquisitorius (Müller, 1776) | Sinop, Tunceli   | Kolarov & Yurtcan, 2008; Çoruh et al., 2014b, Kolarov et al., 2014        |
| Ischnus migrator (Fabricius, 1775) | Adana, Isparta    | Fahringer, 1922; Kolarov, 1995; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a |
| Ischnus minutorius (Fabricius, 1804) | Bilecik, Edirne, Kırkareli | Beyarslan & Kolarov, 1984                                                |
| Latibusus argiolus (Rossi, 1790) | Amasya, Ankara, Erzincan, Erzurum, Konya | Fahringer, 1922, Kolarov, 1995; Kolarov & Çalmasur, 2011; Kolarov & Yurtcan, 2008; Çoruh et al., 2014b, Kolarov et al., 2014 |
Table 2. Continued

| Taxa                                                                 | Distribution in Turkey                  | References                                        |
|----------------------------------------------------------------------|----------------------------------------|---------------------------------------------------|
| Listrocryptus spatulatus Brauns, 1905                                | Tekirdağ                               | Beyarslan & Kolarov, 1994                         |
| Listrognathus (Listrognathus) furax (Tscheck, 1871)                   | Isparta                                | Gürbüz & Kolarov, 2008                           |
| Listrognathus ligator Gravenhorst, 1829                              | Anatolia                               | Horstmann, 1990; Kolarov, 1995                   |
| Listrognathus obnoxius (Gravenhorst, 1829)                           | Kirkareli                              | Beyarslan & Kolarov, 1994                         |
| Meringopus calescens (Gravenhorst, 1829)                             | Erzurum, İzmir, Van                    | Beyarslan & Kolarov, 1994; Schwarz, 2005; Anlaş et al., 2009; Çoruh & Çoruh, 2008; Çoruh & Çoruh, 2012; Çoruh et al., 2014b |
| Meringopus calescens calescens (Gravenhorst, 1829)                   | Erzurum                                | Kolarov et al., 2016                             |
| Meringopus calescens persicus Heinrich, 1937                         | Erzurum                                | Kolarov & Yurtcan, 2008; Çoruh & Özbebek, 2011; Çoruh et al., 2014b, Kolarov et al., 2016 |
| Meringopus cyanator (Gravenhorst, 1829)                              | Erzurum                                | Çoruh & Kesked, 2008; Çoruh & Çoruh, 2008; Çoruh et al., 2014b |
| Meringopus nigerrimus (Fonscolombe, 1850)                            | Erzurum                                | Çoruh & Özbebek, 2011; Çoruh & Çoruh, 2012; Çoruh et al., 2014b, Kolarov et al., 2014 |
| Meringopus pseudonymus (Tscheck, 1872)                               | Erzurum, Isparta, Erzurum, Tunçeli     | Kolarov, 1987; Kolarov, 1995; Gürbüz & Kolarov, 2008; Çoruh & Çoruh, 2012; Çoruh et al., 2014b, Kolarov et al., 2014 |
| Meringopus titillator (Linnaeus, 1758)                               | Antalya, Erzurum, Isparta, Karaman, Kars | Szepligeti, 1916; Kolarov, 1995; Gürbüz & Gürbüz, 2007; Çoruh & Çoruh, 2002; Çoruh & Özbebek, 2011; Çoruh et al., 2014b, Kolarov et al., 2016 |
| Meringopus titillator rhodius (Dalla Torre, 1902)                     | Erzurum, Isparta                       | Gürbüz & Kolarov, 2008; Çoruh & Çoruh, 2012; Gürbüz et al., 2009a |
| Mesostenus albinotatus Gravenhorst, 1829                             | Adana, Elazığ, Erzurum, Isparta, Rize  | Sediy, 1959; Aubert, 1972; Kolarov, 1995; Gürbüz & Kolarov, 2008; Çoruh & Çoruh, 2008; Gürbüz et al., 2009a; Çoruh et al., 2014a, Kolarov et al., 2016 |
| Mesostenus grammicus Gravenhorst, 1829                               | Çanakkale, Elazığ, Erzurum, Isparta, İstanbul, Kirkareli | Kolarov, 1987; Kolarov & Beyarslan, 1994; Kolarov, 1995; Kolarov et al., 1997b; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a, Çoruh et al., 2018 |
| Mesostenus transfuga Gravenhorst, 1829                               | Adana, Antalya, Aydın, Burdur, Bursa, Edime, Erzurum, Hatay, Isparta, Kirkareli, Mersin, Tekirdağ | Kolarov & Beyarslan, 1994; Kolarov, 1995; Kolarov et al., 1997a; Çoruh & Çoruh, 2008; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a |
| Myrmelenostenus italicus (Gravenhorst, 1829)                         | Antalya, Erzincan, Isparta, Kirkareli, Tunçeli, Zonguldak | van Rossem, 1969, Beyarslan & Kolarov, 1994; Kolarov, 1995; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a; Özdàn, 2014; Çoruh et al., 2014b, Kolarov et al., 2014; Çoruh et al., 2016 |
| Nematopodius formosus Gravenhorst, 1829                              | Rize                                   | Çoruh et al., 2016                                |
| Polytibax perspicillator (Gravenhorst, 1807)                         | Balikesir, Edime                       | Beyarslan & Kolarov, 1994                         |
| Pycnocryptus claviventris Kirchbaumer, 1894                          | Adana, Urfa                            | Beyarslan & Kolarov, 1994                         |
| Pycnocryptus director (Thunberg, 1822)                               | Edime, Isparta, Kirkareli, Tekirdağ    | Beyarslan & Kolarov, 1994; Gürbüz et al., 2009a |
| Pycnocryptus rarus (Hebermehl, 1920)                                 | Bolu                                   | Sedivy, 1959, Öncüer, 1991; Kolarov, 1995        |
| Pycnocryptodes reticulator Aubert, 1971                              | Isparta                                | Gürbüz & Kolarov, 2008                           |
| Schreineria populnea (Giraud, 1872)                                  | Giresun, Rize                          | Çoruh et al., 2014a; Kolarov et al., 2016        |
| Stenarella domator (Pado, 1761)                                      | İstanbul, Isparta                      | Fahringer, 1922, Kolarov, 1995; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a; Özdan, 2014 |
| Synexochycryptus maclactator (Tscheck, 1870)                         | Aİyôn, İstanbul                        | Kolarov, 1987; Kolarov, 1995; Öncüer, 1991; Schwarz, 1997; Özdemir & Güler, 2009 |
| Thrybius praedator (Rossi, 1792)                                     | İstanbul                               | Fahringer, 1922, Kolarov, 1995                    |
| Trychosis atripes (Gravenhorst, 1829)                                | Isparta, Kirkareli                     | Beyarslan & Kolarov, 1994; Gürbüz & Kolarov, 2008 |
| Trychosis legator (Thunberg, 1822)                                   | Adana, Burdur, Çanakkale, Edime, Erzurum, Gaziantep, Gümüşhane, Isparta, Kirkareli, Tekirdağ, Tunçeli, Rize | Kolarov, 1987; Beyarslan & Kolarov, 1994; Kolarov et al., 1997b, Gürbüz & Kolarov, 2008; Çoruh et al., 2014b, Kolarov et al., 2014; Çoruh et al., 2016 |
Table 2. Continued

| Taxa                  | Distribution in Turkey | References                                      |
|-----------------------|------------------------|-------------------------------------------------|
| Trychosis neglecta (Tschech, 1870) | Adana, Istanbul, Isparta | Fahringer, 1922; Sedivy, 1959; Öncüer, 1991; Gürbüz & Kolarov; 2008; Gürbüz et al., 2009a |
| Trychosis mesocastana (Tschech, 1871) | Çanakkale | Kolarov et al., 1997b |
| Trychosis pauper (Tschech, 1871) | Çanakkale, Erzurum, Isparta, Tunceli | Kolarov et al., 1997b; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a; Çoruh et al., 2014b; Kolarov et al., 2014a |
| Trychosis priesneri Rossem, 1971 | Antalya, Konya, Isparta | van Rossem, 1971; Kolarov, 1995; Gürbüz & Kolarov, 2008 |
| Trychosis simenda Rossem, 1990 | Adana, Antalya, Edime, Tekirdağ | Beyarslan & Kolarov, 1994 |
| Trychosis Tristator (Tschech, 1871) | Çanakkale, Edime, Isparta, Kirkkalek, Tunceli | Kolarov et al., 1997b; Gürbüz & Kolarov, 2008; Gürbüz et al., 2009a; Çoruh et al., 2014b; Kolarov et al., 2014 |
| Xylophrurus augustus (Dalman, 1823) | Afyon, Isparta, Konya, Tunceli, Erzurum | Özdemir & Güler, 2009; Özdan, 2014; Çoruh et al., 2014b; Kolarov et al., 2014 |
| Xylophrurus lancifer (Gravenhorst, 1829) | Erzurum | Kolarov et al., 2016 |

TRIBE HEMIGASTERINI ASHMEAD, 1900

| Taxa                  | Distribution in Turkey | References                                      |
|-----------------------|------------------------|-------------------------------------------------|
| Aptesis assimilis (Gravenhorst, 1829) | Erzurum | Kolarov et al., 2016; Çoruh et al., 2018 |
| Aptesis cavigena Kolarov & Gürbüz, 2009 | Isparta | Kolarov & Gürbüz, 2009 |
| Aptesis cretata (Gravenhorst, 1829) | Bilecik | Kolarov et al., 1997a |
| Aptesis nigrocincta (Gravenhorst, 1815) | Tunceli | Kolarov et al., 2014; Çoruh et al., 2014b |
| Aptesis semicincta (Kriechbaumer, 1893) | Adana, Mersin, Tunceli, Rize | Beyarslan & Kolarov, 1994; Kolarov et al., 2014; Çoruh et al., 2014b, Kolarov et al., 2016 |
| Giraudia gyrationa (Thunberg, 1824) | İstanbul | Fahringer, 1922, Kolarov, 1995 |
| Pararhina pleuralis (Thomson, 1873) | Bilecik | Kolarov et al., 1997a |
| Pleolophus brachyporus (Gravenhorst, 1815) | İstanbul, Tunceli | Fahringer, 1922, Kolarov, 1995; Çoruh et al., 2014b, Kolarov et al., 2016 |
| Polytibax rufipes (Gravenhorst, 1829) | İzmir | Fahringer, 1921, Kolarov, 1995 |

TRIBE PHYGADEUONTINI FORSTER, 1869

| Taxa                  | Distribution in Turkey | References                                      |
|-----------------------|------------------------|-------------------------------------------------|
| Aclastus gracilis (Thomson, 1884) | Bilecik, Çanakkale, Isparta | Kolarov et al., 1997a, b, Kolarov & Gürbüz, 2007; Gürbüz et al., 2009a |
| Aclastus micator (Gravenhorst, 1807) | Adana, Afyon, Antalya, Hatay, Isparta, Muğla | Beyarslan & Kolarov, 1994; Kolarov et al., 2002 |
| Aclastus solutus (Thomson, 1884) | Adana, Afyon, Muğla | Beyarslan & Kolarov, 1994; Kolarov et al., 2002 |
| Aclastus transversalis Horstman, 1980 | Isparta | Kolarov & Gürbüz, 2007 |
| Acrolyta distincta Bridgman, 1883 | Bilecik, Bursa | Kolarov et al., 1997a |
| Acrolyta semistrigosa (Schmiedeknecht, 1897) | Isparta | Kolarov & Gürbüz, 2007 |
| Atractodes (Asynctita) assimilis Förster, 1876 | Adana, Kahramanmaraş | Beyarslan & Kolarov, 1994; Jussila, 2001 |
| Atractodes (Asynctita) foveolatus (Gravenhorst, 1829) | Rize | Beyarslan & Kolarov, 1994; Jussila, 2001 |
| Atractodes (Atractodes) fumatus Haliday, 1838 | Antalya | Beyarslan & Kolarov, 1994 |
| Atractodes (Atractodes) pusillus Förster, 1876 | Adana | Beyarslan & Kolarov, 1994; Jussila, 2001 |
| Bathyrhynchus claviger (Taschenberg, 1865) | İstanbul | Schimitschek, 1944; Kolarov, 1995 |
| Bathyrhynchus collaris (Thomson, 1896) | Rize | Çoruh et al., 2016 |
| Bathyrhynchus decipiens (Gravenhorst, 1829) | Isparta, Sinop | Kolarov & Gürbüz, 2007; Kolarov & Yurtcan, 2008 |
| Bathyrhynchus fragilis (Gravenhorst, 1829) | Ordu | Çoruh et al., 2016 |
Table 2. Continued

| Taxa                        | Distribution in Turkey                  | References                                                                 |
|-----------------------------|----------------------------------------|-----------------------------------------------------------------------------|
| **Bathyris jamaica** (Thomson, 1884) | Çanakkale, Isparta, Kastamonu, Rize    | Kolarov et al., 1997a; Kolarov & Gürbüz 2007; Kolarov & Yurtcan 2008; Gürbüz et al., 2009a; Çoruh et al., 2014a |
| **Bathyris linears** (Gravenhorst, 1829) | Rize                        | Çoruh et al., 2014a                                                          |
| **Bathyris pellucidator** (Gravenhorst, 1829) | Rize, Ordu                   | Çoruh et al., 2014a                                                          |
| **Blapsidotes vicinus** (Gravenhorst 1829) | Antalya, Burdur, Kastamonu, Isparta  | Kolarov & Gürbüz, 2007; Kolarov & Yurtcan, 2008                             |
| **Ceratophygadeuon anurus** (Thomson, 1884) | Van                          | Horstmann, 1993; Kolarov, 1995                                              |
| **Chirotica decorator** (Villers, 1789) | İstanbul                    | Kolarov, 1987; Kolarov, 1995                                                |
| **Chirotica insignis** (Gravenhorst, 1829) | Kars                        | Çoruh & Kolarov, 2016                                                        |
| **Chirotica orientalis** Horstmann, 1983 | Diyarbakır                   | Kolarov & Erkin, 1987; Kolarov, 1995                                        |
| **Chirotica ruficeps** Horstmann, 1983 | Kars                        | Horstmann, 1993; Kolarov, 1995                                              |
| **Dichrogaster aestivalis** (Gravenhorst, 1829) | Adana, Afyon, Çanakkale, Demirtzili, Gaziantep, Isparta, Şanlıurfa, Tekirdağ | Beyarslan & Kolarov, 1994; Kolarov et al., 1997b, Kolarov et al., 2002; Kolarov & Gürbüz 2007; Gürbüz et al., 2009a; Kolarov et al., 2014a |
| **Dichrogaster diatropus** Townes, 1983 | Bursa, Çanakkale, Konya        | Townes, 1983; Kolarov, 1995; Kolarov et al., 1997a                         |
| **Dichrogaster modesta** (Gravenhorst, 1829) | Bursa, Kastamonu, Sinop       | Kolarov et al., 1997a; Kolarov & Yurtcan 2008                               |
| **Dichrogaster ostiopolis** (Dounmerc, 1855) | Isparta                      | Kolarov, 1995; Çoruh et al., 2014a                                          |
| **Dichrogaster saharator** (Aubert, 1964) | Çanakkale, Isparta            | Kolarov et al., 1997b; Kolarov & Gürbüz 2007                               |
| **Dichrogaster schimitscheki** (Fahringer, 1935) | Isparta                      | Kolarov & Gürbüz, 2007; Gürbüz et al., 2009a                               |
| **Echthrus reluctator** (Linnaeus, 1758) | İstanbul                     | Fahringer, 1922; Kolarov, 1995                                              |
| **Encrateola laevigata** (Ratteburg, 1848) | Adana, Giresun, Erzunum, Hatay | Beyarslan & Kolarov, 1994; Çoruh et al., 2014a; Çoruh et al., 2016          |
| **Endasys brevis** (Gravenhorst, 1829) | Anatolia, Isparta             | Sawoniewicz, & Luhman, 1992; Kolarov & Gürbüz 2007; Gürbüz et al., 2009a   |
| **Endasys euryturator** (Gravenhorst, 1829) | Ankara                       | Kolarov, 1987; Kolarov, 1995                                                |
| **Endasys femoralis** (Habermehl 1912) | Isparta                      | Kolarov & Gürbüz 2007; Gürbüz et al., 2009a                               |
| **Endasys minutulus** (Thomson 1883) | Isparta                      | Kolarov & Gürbüz 2007; Gürbüz et al., 2009a                               |
| **Endasys plagiator** (Gravenhorst, 1829) | Anatolia, Erzunum, Isparta     | Sawoniewicz, & Luhman, 1992; Kolarov, 1995; Kolarov & Bordera, 2007; Kolarov & Gürbüz 2007; Gürbüz et al., 2009a; Çoruh et al., 2014a; Kolarov et al., 2016 |
| **Endasys rubricator** (Thunberg, 1822) | Ankara                       | Kolarov, 1987; Kolarov, 1995                                                |
| **Endasys sensilis** (Gmelin 1790) | Isparta                      | Kolarov & Gürbüz, 2007                                                      |
| **Eudelus similimus** Taschenberg, 1865 | Ankara                       | Sedivy, 1959; Kolarov, 1995                                                 |
| **Gelis agilis** (Fabricius, 1775) | Anatolia, Giresun, Trabzon      | Fahringer, 1922; Kolarov et al., 2016                                      |
| **Gelis curtisana** (Fabricius, 1775) | Rize                         | Çoruh et al., 2014a                                                          |
| **Gelis cyanurus** ( Förster, 1851) | Ankara                       | Diller, 1969; Kolarov, 1995; Schwarz, 1998                                 |
Table 2. Continued

| Taxa                                | Distribution in Turkey | References                                                                 |
|-------------------------------------|------------------------|-----------------------------------------------------------------------------|
| Gelis exareolatus (Förster, 1851)   | Ankara                 | Kolarov, 1987; Öncüer, 1991; Kolarov, 1995                                 |
| Gelis fommicarius (Linnaeus, 1758)  | Rize                   | Çoruh et al., 2014a                                                         |
| Gelis instabilis (Foerster, 1851)   | Anatolia, Adana, Antalya, Burdur, Çanakkale, Edime, Elazığ, Kırklareli    | Fahringer, 1922, Kolarov, 1995, Beyarslan & Kolarov 1994; Kolarov et al., 1997b |
| Gelis micrurus (Förster, 1850)      | Antalya                | Beyarslan & Kolarov, 1994                                                  |
| Gelis mutillatus (Gmelin, 1790)     | Erzurum                | Çoruh et al., 2014a                                                         |
| Gelis rufipes (Förster, 1876)       | Afyon, Denizli, Kahramanmaraş | Beyarslan & Kolarov, 1994; Kolarov et al., 2002                             |
| Gelis sculptator Aubert, 1977       | Ankara, Kırıkkale      | Aubert, 1977; Kolarov, 1995                                                |
| Gelis trux (Förster, 1850)          | Erzurum, Rize          | Çoruh et al., 2014a                                                         |
| Grasseiteles ciliator Aubert, 1968  | Adana, Hatay           | Aubert, 1968; Kolarov, 1995                                                |
| Glyphicnemis profligator (Fabricius, 1775) | Isparta, Erzurum, Trabzon | Çoruh & Özbek, 2005; Kolarov & Gürbüz 2007; Çoruh et al., 2014a,b; Kolarov et al., 2016 |
| Glyphicnemis vagabunda (Gravenhorst, 1829) | Adana, Edime, Erzurum, Isparta | Sawoniewicz, 1985; Beyarslan & Kolarov, 1994; Kolarov & Gürbüz 2007; Kolarov et al., 1997a; Çoruh et al., 2008; Çoruh et al., 2014a; Kolarov et al., 2016; Çoruh et al., 2018 |
| Helcostizus restaurator (Fabricius, 1775) | Istanbul               | Schimitschek, 1944; Kolarov, 1995                                           |
| Isadelphus armatus (Gravenhorst, 1829) | Isparta               | Kolarov & Gürbüz, 2007                                                     |
| Lochetica westoni (Bridgman, 1880)  | Antalya                | Kolarov & Gürbüz, 2007                                                     |
| Lyschia nana (Gravenhorst, 1829)    | Adana, Aydın, Balikesir, Bursa, Edime, Isparta, Istanbul, İzmir | Fahringer, 1922; Kolarov & Beyarslan, 1994; Kolarov, 1995; Kolarov et al., 1997a; Kolarov et al., 2002; Kolarov & Gürbüz 2007; Çoruh et al., 2014b |
| Mesoleptus filicornis (Thomson, 1884) | Antalya, Hatay       | Kohi, 1905; Beyarslan & Kolarov, 1994                                     |
| Mesoleptus insetor (Haliday, 1838)  | Anatolia               | Jussila, 2010                                                              |
| Mesoleptus laevigatus (Gravenhorst, 1820) | Anatolia, Erzurum   | Fahringer, 1922; Kolarov et al., 2014; Çoruh et al., 2014b                  |
| Mesoleptus laticinctus (Walker, 1874) | Anatolia, Rize        | Kolarov, 1987; Çoruh et al., 2014a                                         |
| Mesoleptus marginatus (Thomson, 1884) | Edime, Hatay, İstanbul, Tekirdağ | Kolarov, 1987; Beyarslan & Kolarov, 1994                                  |
| Mesoleptus scrutator (Haliday, 1838) | Afyon, Antalya, Balikesir, Denizli, Isparta, İzmir, Upak | Beyarslan & Kolarov, 1994; Kolarov et al., 2002                             |
| Mesoleptus transversor Thunberg, 1822 | Bilecik               | Kolarov et al., 1997a                                                      |
| Phygadeuon trichops Thomson, 1884   | Isparta                | Kolarov & Gürbüz, 2007                                                     |
| Phygadeuon vexator (Thunberg, 1822) | Isparta                | Kolarov & Gürbüz, 2007; Gürbüz et al., 2009a                               |
| Rheombobius peracutator (Thunberg, 1822) | Erzurum               | Çoruh et al., 2016                                                         |
| Rhembobius quadrispinus (Gravenhorst, 1829) | Çanakkale, Giresun, Isparta | Kolarov et al., 1997b; Kolarov & Gürbüz, 2007; Kolarov et al., 2016         |
| Stilpnus adanaensis Kolarov & Beyarslan, 1994 | Ankara               | Kolarov & Beyarslan, 1994; Kolarov, 1995                                  |
| Stilpnus gagates (Gravenhorst, 1807) | Mersin                 | Beyarslan & Kolarov, 1994                                                  |
| Thaumatomelis femoralis (Brischke, 1881) | Erzincan, Erzurum | Çoruh et al., 2016                                                         |
| Theroscopus hemipterus (Fabricius, 1793) | Afyonkarahisar       | Sedivy, 1959; Kolarov, 1995                                                |
| Theroscopus subzonatus (Gravenhorst, 1829) | Ankara               | Sedivy, 1959; Kolarov, 1995                                                |
| Zoophthorus australis (Thomson, 1885) | Isparta                | Kolarov & Gürbüz, 2007                                                     |
| Zoophthorus graculus (Gravenhorst, 1829) | Çanakkale, Edime, Kırklareli | Kolarov & Beyarslan, 1994; Kolarov et al., 1997b                             |
### Table 3. Parasitoids Cryptinae species reared from different hosts in Turkey

| Names of Taxa | Hosts Name | Order and Family of Hosts | Reference(s) |
|--------------|------------|---------------------------|--------------|
| **TRIBE CRYPTINI KIRBY, 1837** | | | |
| Agrothereutes hospes (Tachek, 1871) | Galleria mellonella (L.) | Lepidoptera: Pyralida | Gürbüz et al., 2006 |
| Aritranis graefei Thomson, 1896 | Agapanthia villasovinidescens Deg. | Coleoptera: Cerambycidae. | Öncüer, 1991 |
| Buathra laborator (Thunberg, 1824) | Malacosoma neustria L. | Lepidoptera: Lasiocampidae | Çoruh & Çalmaşur, 2016 |
| Cryptus minator Gravenhorst, 1829 | Tarpa sp. | Lepidoptera | Kolarov, 1987 |
| Gambrus opaque Szepigeli, 1916 | Malacosoma neustria L. | Lepidoptera: Lasiocampidae | Çoruh & Özbek, 2005 |
| Meningopus cyanator (Gravenhorst, 1829) | Lymantria dispar L. | Lepidoptera: Lymantriidae | Çoruh & Özbek, 2005 |
| Mesostenus transfuga Gravenhorst, 1829 | Malacosoma neustria L. | Lepidoptera: Lasiocampidae | Kolarov, 1995 |
| **TRIBE PHYGADEUONTINI FORSTER, 1869** | | | |
| Bathythrix claviger (Taschenberg, 1865) | Phymatodes alni L. | Coleoptera: Cerambycidae | Kolarov, 1995 |
| Chirotica orientalis Horstmann, 1983 | Psychidae sp. | Lepidoptera: Psychidae | Kolarov, 1995 |
| Chirotica terebrator Horstmann, 1983 | Amicta oberti Hey. | Lepidoptera: Psychidae | Kolarov, 1995 |
| Echthrus reluctator (Linnaeus, 1758) | Ergates faber (L.) | Coleoptera: Cerambycidae | Kolarov, 1995 |
| Endasys erythrogaster (Gravenhorst, 1829) | Sociaras pyricola Wocke | Lepidoptera: Nepticulidae | Kolarov, 1995 |
| Grasseiteles ciliator Aubert, 1968 | Aoniella auranti (Maskell) | Hemiptera: Diapriidae | Kolarov, 1995 |
| Helcostizus restaurator (Fabricius, 1775) | Phymatodes pusillus var. humeralis Com. | Coleoptera: Cerambycidae | Kolarov, 1995 |
| Lysbia nana (Gravenhorst, 1829) | Vanessa sp. | Lepidoptera: Nymphalidae | Kolarov, 1995 |
| | Apanteles glomeratus L. | Hymenoptera: Braconidae | | |

### Table 4. Plants visited by Cryptinae species in Turkey

| Names of Taxa | Hosts Name | Order and Family of Hosts | Reference(s) |
|--------------|------------|---------------------------|--------------|
| **TRIBE CRYPTINI KIRBY, 1837** | | | |
| Agrothereutes abbreviator (Fabricius, 1793) | Zea mays L. | Family: Poaceae | Kolarov & Yurtcan, 2008 |
| | Beta vulgaris L. | Family: Chenopodiaceae | | |
| Agrothereutes fumipennis (Gravenhorst, 1829) | Zea mays L. | Family: Poaceae | Kolarov & Yurtcan, 2008 |
| | Beta vulgaris L. | Family: Chenopodiaceae | | |
| Aritranis femoralis (Gravenhorst, 1829) | Carum carvi L. | Family: Apiaceae | Çoruh & Çoruh, 2008 |
| Aritranis graefei Thomson, 1896 | Cynara sp. | Family: Asteraeae | Öncüer, 1991 |
| Buathra laborator (Thunberg, 1824) | Phragmites australis (Cav.) Steud. | Family: Poaceae | Çoruh & Çoruh, 2012 |
| | Polygonum bistorta L. Samp. | Family: Polygonaceae | | |
| | Mentha longifolia (L.) Huds. | Family: Lamiaceae | | |
| | Medicago sativa L. | Family: Fabaceae | Çoruh et al., 2016 |
| | Elaeagnus angustifolia L. | Family: Elaeagnaceae | Çoruh & Çalmaşur, 2016 |
| Cryptus armator Fabricius, 1804 | Eryngium campestre L. | Family: Apiaceae | Kolarov, 1995 |
Table 4. Continued

| Names of Taxa                  | Hosts Name              | Order and Family of Hosts       | Reference (s)                  |
|--------------------------------|-------------------------|---------------------------------|--------------------------------|
| Cryptus spiralis (Geoffroy, 1785) | Daucus carota L.        | Family: Apiaceae                | Çoruh & Çoruh, 2008            |
|                                | Ferula communis L.      |                                 |                                |
| Cryptus viduatusius Fabricius, 1804 | Daucus carota L.        | Family: Apiaceae                | Çoruh & Çoruh, 2008            |
|                                | Ferula communis L.      |                                 |                                |
|                                | Mentha longifolia (L.)  | Family: Lamiaceae               | Çoruh & Çoruh, 2012            |
|                                | Daucus carota L.        | Family: Apiaceae                | Çoruh & Kolarov, 2016          |
|                                | Medicago sativa L.      | Family: Fabaceae                | Çoruh et al., 2016             |
|                                | Ferula orientalis L.    | Family: Apiaceae                | Kolarov et al., 2016           |
| Ischnus agitator (Oliver, 1792) | Medicago sativa L.      | Family: Fabaceae                | Çoruh et al., 2016             |
| Ischnus migrator (Fabricius, 1775) | Styrrax officinalis L.  | Family: Styrracaceae            | Kolarov, 1995                  |
| Latibulus argiolus (Rossi, 1790)| Achillea microamna Th.  | Family: Asteraceae              | Kolarov, 1995                  |
| Meringopus calescens (Gravenhorst, 1829) | Carum carvi L.        | Family: Apiaceae                | Çoruh & Çoruh, 2008            |
|                                | Phragmites australis (Cav.) Trin. ex Steudel. | Family: Poaceae | Çoruh & Çoruh, 2012            |
|                                | Polygonum bistorta L.   | Family: Polygonaceae            | Çoruh & Çoruh, 2012            |
|                                | Mentha longifolia (L.)  | Family: Lamiaceae               |                                |
|                                | Myrricia germanica (L.) Desv. | Family: Tamaricaceae           |                                |
|                                | Salix triandra L. (Salicaceae) | Family: Salicaceae             |                                |
| Meringopus calescens calescens (Gravenhorst, 1829) | Ferula communis L.      | Family: Apiaceae                | Kolarov et al., 2016           |
| Meringopus cyanator (Gravenhorst, 1829) | Carum carvi L.        | Family: Apiaceae                | Çoruh & Çoruh, 2008            |
| Meringopus pseudonymus (Tschek, 1872) | Polygonum bistorta L. | Family: Polygonaceae            | Çoruh & Çoruh, 2012            |
| Meringopus tillitator (Linnaeus, 1758) | Carum carvi L.        | Family: Apiaceae                | Çoruh & Çoruh, 2008            |
|                                | Seselis libanotis (L.) W. Koch |                                |                                |
|                                | Ferula orientalis L.    | Family: Apiaceae                | Kolarov et al., 2016           |
| Meringopus tillitator rhodius (Dalia Torre, 1902) | Mentha longifolia (L.)  | Family: Lamiaceae               | Çoruh & Çoruh, 2012            |
| Mesostenus albinotatus Gravenhorst, 1829 | Pimpinella tragium VII. | Family: Apiaceae                | Çoruh & Çoruh, 2008            |
|                                | Euphorbia stricta L.    | Family: Euphorbiaceae           | Kolarov et al., 2016           |
| Mesostenus transfuga Gravenhorst, 1829 | Pimpinella tragium VII. | Family: Apiaceae                | Çoruh & Çoruh, 2008            |
|                                | Seselis libanotis (L.) W. Koch |                                |                                |
| Myrmeleonostenus italicus (Gravenhorst, 1829) | Medicago sativa L.      | Family: Fabaceae                | Çoruh et al., 2016             |
| Stenarella domator (Pado, 1761) | Sambucus ebulus L.      | Family: Adoxaceae               | Kolarov, 1995                  |
| Trychosis neglecta (Tschek, 1870) | Hypericum rodopoulos Fiv. | Family: Clusiaceae             | Kolarov, 1995                  |

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| Giraudia gyratoria (Thunberg, 1824) | Heracleum platyenium Boiss. | Family: Apiaceae                | Kolarov, 1995                  |
| Pleophlus brachypterus (Gravenhorst, 1815) | Heracleum platyenium Boiss. | Family: Apiaceae                | Kolarov, 1995                  |
| Polytribax rufipes (Gravenhorst, 1829) | Achillea santolonia L. | Family: Asteraceae               | Kolarov, 1995                  |
From Table 1 it can be seen that 97 species and 28 genera belonging to tribe Cryptini; nine species and five genera tribe Hemigasterini; 81 species and 28 genera tribe Phygaudeontini were recorded. Cryptini had the greatest number of species (Figure 3a).

In the Cryptini, *Meringopus calescens* (Figure 1a) was the most abundant species, with 299 individuals. This is followed by *Cryptus viduatorius* (106), *Aritranis director* (77), *Glyphicnemis vagabunda* (77) and *Dichrogaster aestivalis* (49), respectively.

Despite all this, many species were collected as a single individuals in the study area. These species were *Acroricnus seductor*, (Figure 1b) *A. seductor elegans*, *A. seductor syriacus*, *Aptesis cavigena*, *Aritranis occisor*, *A. quadriguttata*, *Cryptus moschator*, *C. subspinosus*, *Hidryta frater*, *Hoplocryptus confector*, *H. odoriferator*, *Listrocryptus spatulatus*, *Meringopus nigerrimus*, *Nematopodius formosus*, *Pycnocryptus claviventris*, *Pycnocratodes reticulator*, *Trychosis mesocastana*, *Xylophrurus lancifer*,
Aptesis cretata, A. nigrocincta, Pleolophus brachypterus, Acrolyta semistrigosa, A. (Ansyrtia) foveolatus, Atractodes (A.) fumatus, A. (A.) pusillus, Bathysitrix fragilis, Chirotica insignis, C. orientalis, C. terebrator, Diaglyptellodes sculpturator, Dichrogaster perlae, Endasys femoralis, E. senilis, Gelis cursitarus, G. formicarius, G. micrurus, G. mutillatus, Isadelphus armatus, Lochetica westoni, Phygadeuon trichops, Rhembobius perscrutator, Stilpnus adanaensis and Zoophthorus australis (Figure 3b).

Additionally, Table 2 shows distribution of each species according to province in the seven different regions.

Ecological evaluations

Numerous physical parameters that influence insect physiology vary substantially with altitude, including temperature, air density and oxygen partial pressure (Dillon et al., 2006).

Samples were collected eight altitude ranges (Table 1) with 68 species collected between 0-500 m (A), 25 species between 501-750 (B), 25 species between 751-1000 (C), 75 species between 1001-1250 (D), 40 species between 1251-1500 (E), 24 species between 1501-1750 (F), 22 species between 1751-2000 (G), 19 species between 2001-2500 (H) (Figure 4a).

Figure 4. Number of species: a) according to altitude range; b) according to months.

Figure 4a shows that most (40.1%) of the insects were collected between 1001-1250 m, and least (10.2%) samples were collected between 2001-2500 m. Also, 108 species were found one altitude range, and only 13 species were determined from four different range. Altitude was an important factor in species distribution.

Seasonal climatic conditions can exert a strong influence on insect abundance and activity (Vasconcellos et al., 2010). Figure 4b show that the insects were collected in 8 months of the year.

The most insect were collected in June, but on a few were collected in the first month of spring and the last month of autumn (March and October) (Figure 4b). Agrothereutes fumipennis was collected in six months, Cryptus viduatorius and Trychosis legator in five months (Table 1). Also 103 species were collected in only one month.

Zoogeographic evaluations

Geographic distribution is one of the major characteristics of any animal taxon, be it species, genus or family. A general comprehension of geographic distributions of major taxa is essential to understand natural environments, to recognize species diversity patterns and to plan conservation strategies (Gaston, 2000; Myers et al., 2000; Lamoreux et al., 2006).

The study area consisted of seven geographic different regions in Turkey. Most of the samples (110) were collected from the Mediterranean Region. Only eight species were collected from South East Anatolia
Taxonomic and biogeographic evaluations of the Subfamily Cryptinae (Hymenoptera: Ichneumonidae)

(Figure 5a). *Trychosis legator* and *Dichrogaster aestivalis* were collected five regions. However, 52% of species were collected from only a single region.

The Mediterranean Region is dominant region for the cryptine species, followed by Eastern Anatolia (57) and Marmara region (45).

![Figure 5. Number of species: a) according to geographic regions; b) according to zoogeographic region.](image)

There are seven global regions for zoogeographic distribution. The regional distribution of the species listed in Table 1 was 186 species Western Palearctic (99.4%), 179 species European (95.7%), 114 species Eastern Palearctic (60.9%), 27 species Nearctic (14.4%), nine species Oriental (4.8%), three species Neotropical (1.6%), two species Afrotropical (1.0%). In conclusion, Western Palearctic and European have the highest numbers of species (Figure 5b). All species were distributed in the Western Palearctic Region. Of this species, *Lysibia nana* and *Stilpnus gagates* were found six zoogeographic regions. Notably, while *Stilpnus gagates* has been found to have a wide global distribution, it was only found in one region of Turkey. Similarly, *Xylophrurus augustus* was found five different geographic regions of Turkey, but is only common in Europe and Western Palearctic Regions.

Some important observations are also given in Table 1 is examined. For example, although *A. seductor elegans* has a wide global distribution, only one specimen of it has been reported (Schimitschek, 1944) in Turkey and since 1944, this species has not been found in Turkey. Another example is *Agrothereutes tiloidalis*, which has only been found in Turkey. *Agrothereutes tiloidalis* is endemic to Turkey. It is notable that *Chirotica orientalis* is present only Israel, Syria and Turkey.

**Evaluations of hosts and plants visited by adults**

Cryptinae can be found in most kinds of habitats globally. Typically they are parasitic in cocoons of the Lepidoptera, sawflies, braconids, ichneumonids and Neuroptera. Some of them attack egg cocoons of spiders and pupae of Diptera (Azura & Idris, 2002).

In this study, a total of 15 Cryptinae (Figure 6a) species came from 17 different hosts (Table 3). At the same time, four species have got two different hosts. The order Lepidoptera were the most numerous of the hosts (Figure 6b).
Malacosoma neustria was a host of three different species. Of these, Buathra laborator was reared from M. neustria feeding on Elaeagnus angustifolia in Erzurum. Malacosoma neustria was recorded a new host for this species in Turkey (Çoruh & Çalmaşur, 2016). This species was previously reared from M. neustria (Meyer, 1929).

Moreover, Meringopus cyanator and Gambrus opacus reared from M. neustria as a result of this work also (Çoruh & Özbek, 2005). Gambrus opacus is only known to have one host anywhere in the world (Yu et al., 2016).

In addition, plant-insect relationships are of great importance in ecosystem (Petanidou & Lamborn, 2005). Table 4 shows that there were 27 species of plants visited by the 35 cryptine species (Figure 7a), with Medicago sativa being the most visited plant (Figure 7b).

The data presented here will help in the design of future studies and will assist taxonomists who are working on the subfamily Cyrptinae. These results will help to more comprehensively identify research needs and speed up the advancement of knowledge for this group of important insects.
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