

New data on Braconidae (Hymenoptera: Ichneumonoidea) fauna of Turkey

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KORKMAZ Y. B. & KAPLAN, E.: *New data on Braconidae (Hymenoptera: Ichneumonoidea) fauna of Turkey.*

Abstract: Fifteen Braconidae species were collected from Bingöl, Diyarbakır, Iğdır and Kars provinces between 2016 and 2021. Collection localities, hosts, zoogeographic regions and distribution of the species are also provided.

Keywords: Hymenoptera, Braconidae, Fauna, Turkey

Introduction

After family Ichneumonidae, Braconidae is the second largest Hymenoptera family (JONES et al. 2009) except for instance, Anatolia, where their species richness seems relatively low. Braconidae species are known as parasitoid of several insect pest having strong significance in biological pest control (BEYARSLAN 2021). Therefore, several of the below listed species, could be used in biological plant protection by decreasing pests population densities (SHARKEY 1993, SHAW 1995, QUICKE 2015). The aim of the present study is to contribute to the knowledge of the Turkish Braconidae fauna with special focus for Bingöl, Diyarbakır, Iğdır and Kars provinces.

Material and methods

Braconidae imagos were collected from Bingöl, Diyarbakır, Iğdır, and Kars provinces of Turkey between 2016 and 2021 (Fig. 1). Sweep nets were used for collecting samples on flowering plants in agriculture, fruit orchards, and forest areas. Voucher specimens are deposited in the collection of Department of Plant Protection, Faculty of Agriculture, Atatürk and Bingöl University. The collected specimens were identified by Dr. Ahmet Beyarslan. For identification, the following books and monographs were consulted: ACHTERBERG 1978, 1988, 1993, 1994, ACHTERBERG and HAESELBARTH 2003, ACHTERBERG and QUICKE 2000, ACHTERBERG et al. 2020, BELOKOBYLSKIY 1992 and 2000, YU et al. 2012 and 2016 and TOBIAS 1986).



Fig. 1. Sampling stations of Braconidae in Bingöl, Diyarbakır, Iğdır and Kars provinces of Turkey in 2016-2021 (Anonymous, 2021).

Results

In this study, 15 species of nine genera and six subfamilies (Braconinae, Cheloninae, Doryctinae, Euphorinae, Hormiinae, and Rogadinae) were recorded. The list of species is given below alphabetically with collection localities completed with host data and their geographic distribution

Family: **Braconidae** Latreille, 1829

Subfamily: **Braconinae** Nees von Esenbeck, 1811

Genus: **Bracon** Fabricius, 1804

Bracon (Bracon) luteator Spinola, 1808

Material examined: Diyarbakır: Dicle, Meydan, N38°19'14.62", E40°13'54.99", 730 m, 24.VI.2021, ♀; Yokuşlu, N38°24'21.66", E40°00'56.08", 798 m, 28.III.2019, ♀.

Host: Diptera, Tephritidae: *Acanthiophilus helianthi*, *Urophora solstitialis*. Lepidoptera, Gelechiidae: *Metzneria aestivella*, *M. lappella* (BEYARSLAN et al. 2005).

Zoogeographic Region: Palaearctic (BEYARSLAN et al. 2005).

Distribution: Afghanistan, Albania, Austria, Azerbaijan, Bulgaria, Croatia, Cyprus, former Czechoslovakia, France, Georgia, Germany, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Latvia, Macedonia, Moldova, Mongolia, Russia, Slovenia, Spain, Sweden, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia (BEYARSLAN et al. 2005).

***Bracon (Cyanopterobracon) urinator* (Fabricius, 1798)**

Material examined: Bingöl: Genç, Derenköy, N 38°45'03.44", E 40°40'08.47", 1363 m, 8.V.2021, ♀.

Host: Coleoptera: *Larinus filiformis*, *L. flavescens*, *L. saussureae*, *L. sibiricus*, *L. sturnus*, *L. vulpes*, *Lixus obesus*, *Protearomyia nigra*, *Rhinocyllus conicus*, *R. latirostris*.
Diptera: *Tephritis pulchra* (BEYARSLAN et al. 2005).

Zoogeographic Region: Afrotropical, Oriental, Palearctic (Beyarslan et al. 2005).

Distribution: Afghanistan, Albania, Algeria, Azerbaijan, Belgium, Canary Islands, China, Croatia, Cyprus, former Czechoslovakia, Egypt, Finland, France, Georgia, Germany, Greece, Hungary, India, Iran, Israel, Italy, Kazakhstan, Macedonia, Malta, Moldova, Mongolia, Netherlands, Poland, Portugal, Romania, Russia Saudi Arabia, Spain, Sweden, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan, Yugoslavia (BEYARSLAN et al. 2005).

***Bracon (Habrobracon) concolorans* Marshall, 1900**

Material examined: Kars: Kağızman, Denizgözü, N 40°05.172', E 042°56.663', 1284 m, 29.IX.2017, ♂.

Host: Coleoptera: *Anobiidae*, *Lepidoptera: Gelechiidae, Tortricidae, Pyralidae* (ZARGAR et al. 2019).

Zoogeographic Region: Palearctic, Oriental (YU ET al. 2016).

Distribution: Armenia, Azerbaijan, Bulgaria, China, Croatia, Cyprus, Czech Republic, Denmark, Egypt, France, Georgia, Greece, Hungary, Iran, Ireland, Italy, Jordan, Kazakhstan, Kyrgyzstan, Lithuania, Moldova, Mongolia, Poland, Romania, Russia, Russia, Slovakia, Spain, Sudan, Sweden, Tunisia, Turkey, Turkmenistan, United Kingdom (LONI et al. 2016).

***Bracon (Habrobracon) didemie* Beyarslan, 2002**

Material examined: Iğdır: Tuzluca, Eğrekdere, N 39°59.614', E 043°38.803', 1373 m, 20.VIII.2017, ♀, Üçkaya, N 39°95.328', E 043°3265.901', 1498 m, 16.VIII.2018, ♀.

Host: *Lepidoptera: Tuta absoluta* (DOĞANLAR and YİĞİT 2011).

Zoogeographic Region: Western Palearctic (BEYARSLAN 2014).

Distribution: Iran, Turkey (AMERI et al. 2015).

Genus: *Iphiaulax* Förster, 1862

***Iphiaulax (Euglyptobracon) bicolor* (TELENGA, 1936)**

Material examined: Diyarbakır: Hani, Gürbüz, N38°23'50.20", E 40°21'27.00", 902 m, 14.V.2017, ♀.

Zoogeographic region: Palearctic (BEYARSLAN 2014).

Distribution: Russia, Turkey (BEYARSLAN 2014).

***Iphiaulax (Iphiaulax) jacobsoni* SHESTAKOV, 1927**

Material examined: Bingöl: Adaklı, N 39°12'59.81", E 40°28' 09.21", 1360 m, 12.VI.2019, ♂.

Zoogeographic region: Palearctic (GHAHARI and BEYARSLAN 2019).

Distribution: Israel, Malta, Turkey, Uzbekistan (GHAHARI and BEYARSLAN 2019).

***Iphiaulax (Iphiaulax) potanini* (KOKUJEV, 1898)**

Material examined: Bingöl: Kiğı, Nacaklı, N 39°10'03.31", E 40°20'40.59", 1569 m, 13.VI.2019, ♀.

Host: *Cleroclytus banghaasi* (GHAHARI and BEYARSLAN 2019).

Zoogeographic region: Eastern Palearctic, Western Palearctic (GHAHARI and BEYARSLAN 2019).

Distribution: Mongolia, Tajikistan, Turkey, Turkmenistan (GHAHARI and BEYARSLAN 2019).

Genus: **Pigeria** van Achterberg, 1985

Pigeria pigier (WESMAEL, 1838)

Material examined: Iğdır: Tuzluca, Üçkaya, N 39°75.327', E 043°966.870', 1503 m, 31.VIII.2018, ♀.

Host: Lepidoptera, Phycitidae: *Etiella zinckenella*. Tortricidae: *Cochylis epilinana*, *Cnephasia longana* Hw. (BEYARSLAN 2005).

Zoogeographic region: Nearctic, Western Palearctic (YU et al. 2016).

Distribution: Austria, Azerbaijan, Belgium, Canary Islands, Croatia, Cyprus, Czech Republic, England, France, Germany, Greece, Hungary, Iran, Italy, Japan, Kazakhstan, Macedonia, Mongolia, Montenegro, Netherlands, Poland, Romania, Russia, Serbia, Spain, Switzerland, Tunisia, Turkey, Turkmenistan, Ukraine (YU et al. 2012).

Genus: **Vipio** Latreille, 1804

Vipio mlokoszewiczi KOKUJEV, 1898

Material examined: Bingöl: Büyükköröken, N38°49'49.46", E 40°34'28.59", 1009 m, 15.IX.2019, ♀; Diyarbakır: Dicle, Yokuşlu, N 38°24'21.66", E 40°00'56.08", 798 m, 28.III.2019, ♀.

Zoogeographic region: Eastern Palearctic, Europe, Western Palearctic (YU et al. 2012).

Distribution: Afghanistan, Azerbaijan, Cyprus, Georgia, Iran, Israel, Romania, Tajikistan, Turkey, Turkmenistan, Uzbekistan (ZARGAR et al. 2014).

Subfamily: **Cheloninae** Förster, 1862

Genus: **Chelonus** Panzer, 1806

Chelonus (Chelonus) obscuratus HERRICH-SCHÄFFER, 1838

Material examined: Bingöl: Çeltiksuyu, N38°52'57.59", E 40°35'21.66", 1045 m, 19.V.2019, ♀.

Host: Lepidoptera, Noctuidae: *Spodoptera exigua*. Tortricidae: *Rhyacionia buoliana* (AYDOĞDU 2017).

Zoogeographic region: Palearctic (AYDOĞDU 2017).

Distribution: Bulgaria, China, China-Xinjiang, Czech Republic, former Czechoslovakia, Egypt, Finland, France, Germany, Greece, Hungary, Israel, Italy, Kazakhstan, Moldova, Mongolia, Poland, Russia, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, Ukraine, United Kingdom (AYDOĞDU 2017).

Subfamily: **Doryctinae** (Förster, 1862)

Genus: **Doryctes** Haliday, 1836

Doryctes (Doryctes) leucogaster (NEES, 1834)

Material examined: Iğdır: Tuzluca, Üçkaya, N39°75.327', E043°966.870', 1503 m, 31.VIII.2018, 2♀♀.

Host: Coleoptera, Anobiidae: *Coelostethus pertinax*; *Anobium punctatum*; *Anthaxia* sp. Bostrichidae: *Bostrichus capucinus*. Buprestidae: *Agrilus (Anambus) biguttatus*, *Buprestis aurulenta*, *Anthaxia (Anthaxia) manca*, *Lampra mirifica*. Cerambycidae: *Acanthocinus aedilis*, *Acanthoderes cinereus*, *Chlorophorus pilosus*, *Chrysobothris salieri*, *Exocentrus lusitanus*, *Hesperophanes cinereus*, *Hylotrupes bajulus*, *Penichroa fasciata*, *Phymatodes testaceus*, *Plagionotus arcuatus*, *Rhagium (Hagrium) bifasciatum*, *Rhagium (Rhagium) inquisitor*, *Rhagium mordax*, *Tetropium castaneum*. Chrysomelidae: *Agelastica alni*. Crambidae: *Loxostege sticticalis*. Lepidoptera, Lymantriidae: *Lymantria dispar*. Araneae: Theridiidae: *Opilo domesticus* (BEYARSLAN 2015).

Zoogeographic region: Nearctic, Eastern and Western Palearctic (YU et al. 2012); Palearctic, Oriental (BEYARSLAN 2015).

Distribution: Algeria, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, China, Croatia, Czech Republic, France, Georgia, Germany, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Latvia, Lithuania, Macedonia, Moldova, Netherlands, Poland, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Tunisia, Ukraine, United Kingdom, Uzbekistan, Yugoslavia, YugoslaviaMontenegro, Yugoslavia-Serbia (BEYARSLAN 2017).

Subfamily: **Euphorinae** Förster, 1862

Genus: **Meteorus** Haliday, 1835

***Meteorus rubens* (NEES, 1811)**

Material examined: Iğdır: Çalpala, N40°00.734', E043°53.303', 394 m, 06.VIII.2017, 2♀♀.

Host: *Steinernema carpocapsae* (ZAKI et al. 1999).

Zoogeographic region: Neotropical, Oriental, Palaearctic (YILMAZ et al. 2010).

Distribution: Algeria, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Iran, Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia, Turkey, Turkmenistan, Ukraine, United Kingdom, former Yugoslavia (YU et al. 2012).

Subfamily: **Hormiinae** Förster, 1863

Genus: **Hormius** Nees, 1818

***Hormius moniliatus* (NEES, 1811)**

Material examined: Iğdır: Çalpala, N40°00.584', E043°13.486', 887 m, 03.X.2018, ♀, Tuzluca, İncesu, N40°06.855', E043°25.366', 1039 m, 29.XI.2018, 3♀♀, Aralık, Köprüler, N39°52.698', E044°30.710', 817 m, 10.X.2018, ♀, Karakoyunlu, Fatih, N39°58.856', E044°09.964', 844 m, 02.X.2018, 2♀♀; Kars: Kağızman, Denizgölü, N40°05.172', E042°56.563', 1284 m, 19.XI.2018, 2♀♀, Devedük, N40°50.371', E043°09.578', 1173 m, 13.X.2018, 2♀♀, Ürker, N40°04.332', E042°54.114', 1304 m, 19.XI.2018, 2♀♀, Zuvar, N40°10.235', E043°07.310', 1187 m, 13.X.2018, 2♀♀.

Host: Lepidoptera, Crambidae: *Achyra nudalis*, *Hellula undalis*, *Paratalanta hyalinella*, *Pyrausta aurata*, *P. purpuralis*, *P. sanguinalis*. Coleophoridae: *Coleophora trifariella*. Elachistidae: *Agonopterix assimilella*. Gelechiidae: *Dichomeris marginella*. Oecophoridae: *Agonopterix adpersella*, *Depressaria pulcherrimella*, *Pexicopia malvella*. Scythrididae: *Scythris inspersella*. Tortricidae: *Archips crataegana*. Tortricidae: *Pandemis corylana* (BEYARSLAN 2017).

Zoogeographic region: Holarctic, Nearctic, Oceanic, Oriental (BEYARSLAN 2017).

Distribution: Afghanistan, Armenia, Azerbaijan, Belarus, Belgium, Bulgaria, Canary Islands, Cape Verde Islands, China, Czech Republic, former Czechoslovakia, Finland, France, Germany, Greece, Greenland, Hungary, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Morocco, Netherlands, Norway, Poland, Russia, Slovakia, Spain, Sweden, Switzerland, Tajikistan, Turkmenistan, Ukraine, United Kingdom, Uzbekistan, Vietnam, Yugoslavia (BEYARSLAN 2017).

Subfamily: **Rogadinae** Förster, 1862

Genus: **Aleiodes** Wesmael, 1838

***Aleiodes (Aleiodes) gastritor* (THUNBERG, 1822)**

Material examined: Bingöl: Sancak, N39°58'46.96", E40°41' 05.14", 1142 m, 29.V.2016, ♂.

Host: Lepidoptera, Crambidae: *Ostrinia nubilalis*, *Phlyctaenia coronata*. Drepanidae:

Cilix glaucata. Elachistidae: *Depressaria absynthiella*. Geometridae: *Alsophila pometaria*, *Apocheima cinerarius*, *A. hispidaria*, *Chiasmia clathrata*, *Chloroclystis v-ata*, *Digrammia gnophosaria*, *Epirrita autumnata*, *Erannis defoliaria*, *Eupithecia alliararia*, *E. miserulata*, *E. pusillata*, *Glena cribrataria*, *Hylaea fasciaria*, *Hypagyrtis unipunctata*, *Isturgia limbaria*, *Lycia hirtaria*, *Lycia pomonaria*, *Operophtera brumata*, *Phthonveria atrilineata*, *Tephрина arenacearia*. Lasiocampidae: *Malacosoma neustria*. Lymantriidae: *Euproctis chrysorrhoea*, *E. similis*, *Hypena scabra*, *Leucoma salicis*. Noctuidae: *Agrapha agnata*, *Autographa gamma*, *Harpyia hermelina*, *Helicoverpa armigera*, *Pseudaletia unipuncta*, *Spodoptera exigua*, *Trichoplusia ni*. Notodontidae: *Cerura vinula*, *Thaumatopoea proceSSIONea*. Yponomeutidae: *Prays oleae*. Tortricidae: *Archips rosana*, *Lobesia botrana* (AYDOĞDU 2018).

Zoogeographic region: Nearctic; Oceanic; Oriental; Palaearctic (AYDOĞDU 2018).

Distribution: Austria, Azerbaijan, Belarus, Bulgaria, Canary Islands, Cape Verde Islands, China, Croatia, Czech Republic, Finland, Germany, Greece, Hungary, Iran, Israel, Italy, Japan, Korea, Madeira Islands, Moldova, Mongolia, Netherlands, Norway, Poland, Russia, Spain, Sweden, Switzerland, Turkey, Turkmenistan, U.S.A., Ukraine, United Kingdom, Uzbekistan, Vietnam, former Yugoslavia (AYDOĞDU 2018).

***Aleiodes (Neorhogas) ruficeps* (TELENGA, 1941)**

Material examined: Diyarbakır: Kırkkoyun, N37°47'01.85", E39°58'21.62", 1018 m, 30.IV.2017, ♂; Silvan, Ormandışı, 13.V.2017, ♂.

Zoogeographic region: Palaearctic (VAN ACHTERBERG et al. 2020).

Distribution: Bulgaria, Turkey, Russia, Ukraine (VAN ACHTERBERG et al. 2020).

Discussion

In spite of intensive 6 years collection (2016-2021) only 15 species were captured. It means: although Braconidae is the second largest parasitoid family generally, the high species richness of braconid wasps is not true for the Anatolian region, where their species richness is far behind even the smallest suborder, Symphyta (KAPLAN et al. 2018, KAPLAN and HARIS 2021 and 2022). The dominant species is *Hormius moniliatus* (NEES, 1811) with 16 collected exemplars makes 44% of the total collected material. Other species proved to be relatively rare with only 1 or 2 exemplars. For the nature conservation evaluation and to identify the real frequency and rarity of the species further intensive collections are necessary throughout the country, including Anatolia.

Finally, the distribution percentages of the species according to the provinces of Bingöl, Diyarbakır, Iğdır and Kars are given in Fig. 2.

Turkey is a country which located as a bridge between Europe and Asia with different climatic conditions. Both geographic position and climatic conditions have serious effects on the local flora and fauna. Turkey is a boundary of East Mediterranean, Euro-Siberian and Irano-Turanian provinces of Palaearctic region that caused high richness of the fauna. However, this high diversity of species is true only for certain groups, Braconidae proved to be poorly represented in the Anatolian region.

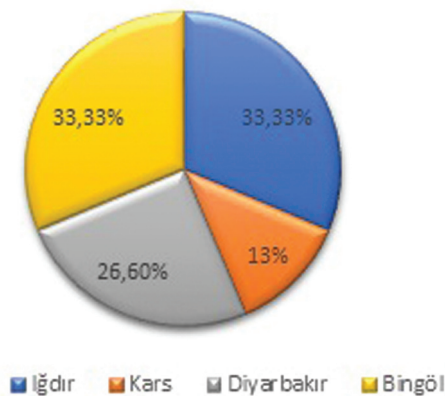


Fig: 2. Percentage of distribution of species by Bingöl, Diyarbakır, Iğdır and Kars Provinces

Acknowledgements

The authors wish to thank Prof. Dr. Ahmet Beyarslan for determining the collected materials.

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