



Original article (Orijinal araştırma)

Contribution to the knowledge of Ichneumonidae (Hymenoptera) of Bursa Uludağ National Park area including new records¹

Bursa Uludağ Doğal Park alanı Ichneumonidae türlerine yeni kayıtlarla birlikte katkılar

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Abstract

In order to record species of the family Ichneumonidae (Hymenoptera) in Bursa Uludağ National Park area, this study was conducted between 2018-2019. Specimens belonging to the subfamily Campopleginae and Cryptinae were collected from three localities on natural vegetation, flowering plants and weeds. Determinations were made for 21 species, *Acrolyta rufocincta* (Gravenhorst, 1829), *Campoletis thomsoni* (Roman, 1915), *Diadegma glabriculum* (Holmgren, 1859), *Dichrogaster heteropus* (Thomson, 1896), *Mesoleptus congener* (Förster, 1876), *Phygadeuon hercynicus* Gravenhorst, 1829, *Phygadeuon lapponicus* Thomson, 1884, *Phygadeuon nitidus* Gravenhorst, 1829 and *Thaumatogelis audax* (Olivier, 1792) are recorded for the first time from Anatolia, Turkey.

Keywords: Campopleginae, Cryptinae, Ichneumonidae, natural park area, new records, Uludağ

Öz

Bu çalışma, Bursa Uludağ Doğal Park alanı'nın Ichneumonidae (Hymenoptera) türlerini tespit etmek amacıyla 2018-2019 yılları arasında yapılmıştır. Campopleginae ve Cryptinae altfamilyalarına ait türler doğal alanlar, çiçekli bitkiler ve yabancı otların hâkim olduğu üç farklı lokaliteden toplanmıştır. Teşhisi yapılan 21 türden, *Acrolyta rufocincta* (Gravenhorst, 1829), *Campoletis thomsoni* (Roman, 1915), *Diadegma glabriculum* (Holmgren, 1859), *Dichrogaster heteropus* (Thomson, 1896), *Mesoleptus congener* (Förster, 1876), *Phygadeuon hercynicus* Gravenhorst, 1829, *Phygadeuon lapponicus* Thomson, 1884, *Phygadeuon nitidus* Gravenhorst, 1829 ve *Thaumatogelis audax* (Olivier, 1792) türleri Anadolu, Türkiye için yeni kayıt durumundadır.

Anahtar sözcükler: Campopleginae, Cryptinae, Ichneumonidae, doğal park alanı, yeni kayıtlar, Uludağ

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Introduction

The family Ichneumonidae is an important group in the order Hymenoptera in terms of number of species, species diversity and potential for use on biological control.

Ichneumonidae is a rich family, with 1601 genera and 25 285 species (Yu et al., 2016). *A catalogue of the Turkish Ichneumonidae (Hymenoptera)* was the first comprehensive study in Turkey (Kolarov, 1995). With the contributions detailed below this has increased the known diversity of the family in Turkey to 1 282 species. (Çoruh, 2017, 2019a, b; Kolarov et al., 2017; Narmanlıoğlu & Çoruh, 2017; Çoruh et al., 2018, 2019; Riedel et al., 2018; Sarı & Çoruh, 2018; Özdan & Gürbüz, 2019; Vas, 2019a, b; Çaylak & Çoruh, 2020; Kiraç & Gürbüz, 2020; Kolarov et al., 2020).

The aim of this study was to collect and determine specimens from Bursa Uludağ National Park Area (BUNPA) that will contribute to the knowledge of the Ichneumonidae fauna of Turkey.

Materials and Methods

Uludağ, 36 km south of Bursa (Figure 1), is one of the Turkey's popular winter recreation areas. Uludağ has a natural park because it has a rich flora and fauna. Mount Uludağ (Great Mountain) is 2,543 m high (Table 1).

Uludağ National Park Area has extraordinary natural features, forests, flora and fauna. This flora has including specific endemic plants. Vegetation data from where the insects were collected are given in Table 3.

The study area sampled of three localities (Alaçam, 40°07'34.7"N, 29°17'31.2"E; Cevizdibi, 40°08'13.9"N, 29°17'35.1"E; and Gözede, 40°09'13.6"N, 29°17'26.1"E; Figure 2).

Adult specimens of Ichneumonidae were collected from various habitats that flowering plants, weeds and open areas of BUNPA by sweep net in the summers of 2018 and 2019. Some of the specimens were collected from blackberry gardens. Each locality had different altitude and vegetation. The most common plants were *Allium paniculatum* L., *Epilobium angustifolium* L., *Galium elongatum* C. Presl, *Hypericum perforatum* L., *Medicago polymorpha* L., *Mentha longifolia* (L.), *Polypodium vulgare* L., *Raphanus raphanistrum* L., *Trifolium repens* L. and *Vicia cracca* L.

Table 1. Data of collected species

Locality	Year	Date	Altitude (m.)
Alaçam	2018	20.VI.2018	1100
		21.VII.2018	1450
		08.VIII.2018	1700
	2019	08.VI.2019	1200
		20.VII.2019	1500
		19.VIII.2019	1600
Cevizdibi	2018	22.VI.2018	800
		15.VII.2018	830
		02.VIII.2018	850
	2019	29.VI.2019	820
		17.VII.2019	830
		24.VIII.2019	840
Gözede	2018	24.VI.2018	670
		17.VII.2018	650
		05.VIII.2018	610
	2019	28.V.2019	620
		18.VII.2019	640
		06.VIII.2019	630

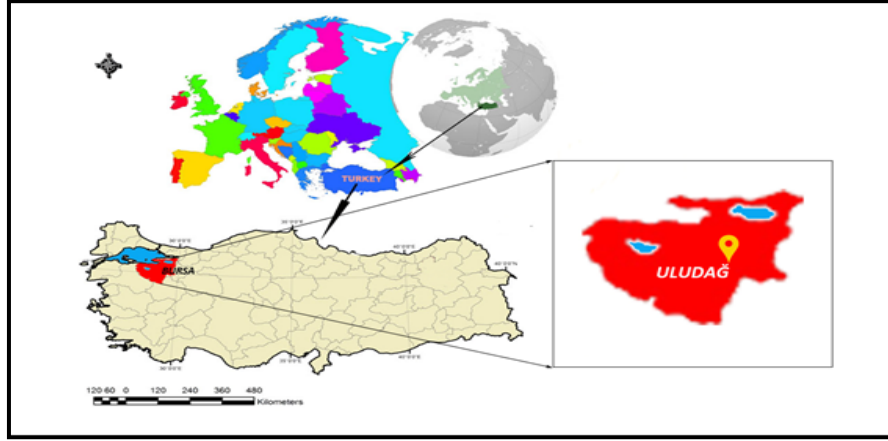


Figure 1. Map of study area.



Figure 2. Study area (Alaçam, Cevizdibi and Gözede).

Collected insect specimens were pinned, labeled and deposited in the Entomological Museum, Erzurum, Turkey (EMET). Photographs were taken of the specimens by the Leica CLS stereomicroscope connected computer at 50x magnification.

All ichneumonid specimens were collected by first author. Specimens were identified by Dr. Janko Kolarov and the second author. Plant species were pressed and identified by Dr. İrfan Çoruh according to Davis (1965-1988) and deposited in the herbarium of Atatürk University, Faculty of Agriculture, and Department of Plant Protection.

Turkey distribution data for the species was obtained from the literature. Global distribution and associated plants data mainly followed Taxapad (Yu et al., 2016).

The newly recorded species are indicated with an asterisk (*) in the text.

Results

Two hundred and sixty-three specimens belonging to 21 species in 12 genera in two subfamilies were collected in BUNPA. Nine of these are reported here for the first time for Ichneumonidae fauna of Turkey. With these additions, 1 291 species are now recorded for Turkey.

Subfamily Campopleginae Förster, 1869

Campoletis agilis (Holmgren, 1860) (Figure 3a)

Material examined. BUNPA: Cevizdibi, 830 m, 15.VII.2018, 6 ♂♂; Gözede, 17.VII.2018, 650 m, 4 ♂♂, 06.VIII.2019, 630 m, 7 ♂♂.

Associated plants. *Peucedanum oreoselinum* (L.).

Distribution in Turkey. Giresun (Kolarov et al., 2016) (Figure 6a).

Global distribution. European and Western Palearctic Region.

Remarks. This species was collected from Giresun Province. Previously, it had only been reported from the Black Sea Region (Giresun).

Campoletis crassicornis (Tschek, 1871) (Figure 3b)

Material examined. BUNPA: Cevizdibi, 850 m, 02.VIII.2018, 5 ♂♂; Gözede, 620 m, 28.V.2019, 7 ♂♂.

Associated plants. *Peucedanum oreoselinum* (L.).

Distribution in Turkey. Adana, Burdur, Erzurum and Giresun (Kolarov & Beyarslan, 1995; Çoruh et al., 2013; Çoruh et al., 2016; Çoruh et al., 2018) (Figure 6b).

Global distribution. European and Western Palearctic Region.

**Campoletis thomsoni* (Roman, 1915) (Figure 3c)

Material examined. BUNPA: Cevizdibi, 800 m, 22.VI.2018, 3 ♀♀, 830 m, 17.VII.2019, ♀; Gözede, 610 m, 05.VIII.2018, 7 ♂♂.

Global distribution. Palearctic Region.

Remarks. This is new species record for Turkey.



Figure 3. Collected species: a) *Campoletis agilis*; b) *Campoletis crassicornis*; c) *Campoletis thomsoni*; d) *Casinaria albipalpis*; e) *Diadegma glabriculum*; f) *Diadegma mediterraneum*; g) *Hyposoter didymator*; h) *Acrolyta rufocincta*.

Casinaria albipalpis (Gravenhorst, 1829) (Figure 3d)

Material examined. BUNPA: Alaçam, 1100 m, 20.VI.2018, 5 ♂♂, 1500 m, 20.VII.2019, 9 ♂♂.

Associated plants. *Picea* sp. and *Quercus robur* L.

Distribution in Turkey. Anatolia (locality name unknown) (Riedel et al., 2010).

Global distribution. Palearctic Region.

**Diadegma glabriculum* (Holmgren, 1859) (Figure 3e)

Material examined. BUNPA: Uludağ: Alaçam, 1450 m, 21.VII.2018, 5 ♀♀; Cevizdibi, 830 m, 15.VII.2018, ♀; Gözede, 610 m, 05.VIII.2018, 4 ♀♀, 630 m, 06.VIII.2019, ♀.

Global distribution. European, Western Palearctic and Nearctic Region.

Remarks. This is new species record for Turkey.

Diadegma mediterraneum (Constantineanu, 1930) (Figure 3f)

Material examined. BUNPA: Uludağ: Alaçam, 1200 m, 08.VI.2019, 8 ♀♀; Gözede, 610 m, 05.VIII.2018, 4 ♀♀.

Distribution in Turkey. Erzincan, Erzurum and Kahramanmaraş (Kolarov & Beyarslan 1995; Çoruh et al., 2005, 2014a, 2016) (Figure 6c).

Global distribution. European and Western Palearctic Region.

Remarks. This species was collected from Kahramanmaraş (Marat) Province in 1995 and Erzurum Palandöken Mountain in 1987 as a female. It has not been recorded again.

Hyposoter didymator (Thunberg, 1822) (Figure 3g)

Material examined. BUNPA: Uludağ: Alaçam, 1500 m, 20.VII.2019, 8 ♀♀; Gözede, 650 m, 17.VII.2018, 5 ♂♂.

Associated plants. *Angelica sylvestris* L., *Heracleum sphondylium* L. and *Peucedanum oreoselinum* (L.).

Distribution in Turkey. Adana, Ankara, Aydın, Çankırı, Eskişehir, Hatay and Istanbul (Kolarov 1989, 1995; Yaşarakıncı & Kornoşor, 1990; Özdemir & Kılınçer, 1990; Sertkaya et al., 2004; Sertkaya & Bayram 2005; Kaya & Kornoşor, 2008; Şimşek et al., 2015; Shaw et al., 2016) (Figure 6d).

Global distribution. Australasian and Palearctic Region.

Remarks. The species was obtained from 89 hosts, mostly in the Noctuidae (Lepidoptera).

Subfamily Cryptinae Kirby, 1837

**Acrolyta rufocincta* (Gravenhorst, 1829) (Figure 3h)

Material examined. BUNPA: Uludağ: Alaçam, 1600 m, 19.VIII.2019, 7 ♀♀; Cevizdibi, 850 m, 02.VIII.2018, 5 ♀♀.

Associated plants. *Daucus carota* L., *Euphorbia nicaeensis* All. and *Senecio jacobaea* L.

Global distribution. European and West Palearctic Region.

Remarks. This is new species record for Turkey.

Agrothereutes fumipennis (Gravenhorst, 1829) (Figure 4a)

Material examined. BUNPA: Uludağ: Cevizdibi, 830 m, 15.VII.2018, 7 ♂♂, 830 m, 17.VII.2019, 3 ♀♀, 12 ♂♂, 840 m, 24.VIII.2019, 6 ♀♀.

Associated plants. *Peucedanum oreoselinum* (L.)

Distribution in Turkey. Erzurum, Isparta and Kastamonu (Çoruh & Özbek, 2005; Gürbüz & Kolarov, 2008; Kolarov & Yurtcan, 2008; Gürbüz et al., 2009a; Çoruh et al., 2014b) (Figure 6e).

Global distribution. Palearctic Region.

Aptesis senicula (Kriechbaumer, 1893) (Figure 4b)

Material examined. BUNPA: Uludağ: Alaçam, 1600 m, 19.VIII.2019, 9 ♀♀; Cevizdibi, 800 m, 22.VI.2018, 3 ♂♂, 840 m, 24.VIII.2019, 5 ♀♀, 4 ♂♂.

Distribution in Turkey. Adana, Mersin, Rize and Tunceli (Bayarslan & Kolarov, 1994; Kolarov et al., 2014, 2016; Çoruh et al., 2014b) (Figure 6f).

Global distribution. European and West Palearctic Region.

Bathythrix pellucidator (Gravenhorst, 1829) (Figure 4c)

Material examined. BUNPA: Uludağ: Alaçam, 1450 m, 21.VII.2018, 3 ♀♀, 1200 m, 08.VI.2019, 3 ♀♀, 5 ♂♂.

Associated plants. *Picea* spp.

Distribution in Turkey. Ordu and Rize (Çoruh et al., 2014a) (Figure 6g).

Global distribution. Palearctic Region.

**Dichrogaster heteropus* (Thomson, 1896) (Figure 4d)

Material examined. BUNPA: Uludağ: Cevizdibi, 850 m, 02.VIII.2018, 2 ♂♂, 820 m, 29.VI.2019, 2 ♂♂.

Associated plants. *Cornus* sp.

Global distribution. European and West Palearctic Region.

Remarks. This is new species record for Turkey.

Dichrogaster schimitscheki (Fahringer, 1935) (Figure 3e)

Material examined. BUNPA: Uludağ: Gözede, 610 m, 05.VIII.2018, 4 ♂♂, 640 m, 18.VII.2019, 5 ♂♂.

Distribution in Turkey. Isparta (Kolarov & Gürbüz, 2007; Gürbüz et al., 2009b) (Figure 6h).

Global distribution. European, Nearctic and West Palearctic Region.

Gelis agilis (Fabricius, 1775) (Figure 4f)

Material examined. BUNPA: Uludağ: Alaçam, 1100 m, 20.VI.2018, 2 ♂♂; Cevizdibi, 800 m, 22.VI.2018, 4 ♂♂, 820 m, 29.VI.2019, ♂.

Associated plants. *Lonicera* sp., *Mentha longifolia* (L.), *Picea excelsa* (Lam.), *Prunus* sp., *Quercus robur* L. and *Salix* sp.

Distribution in Turkey. Trabzon (Kolarov et al., 2016) (Figure 6i).

Global distribution. Palearctic Region.

Remarks. This species has 137 known hosts (Yu et al., 2016).

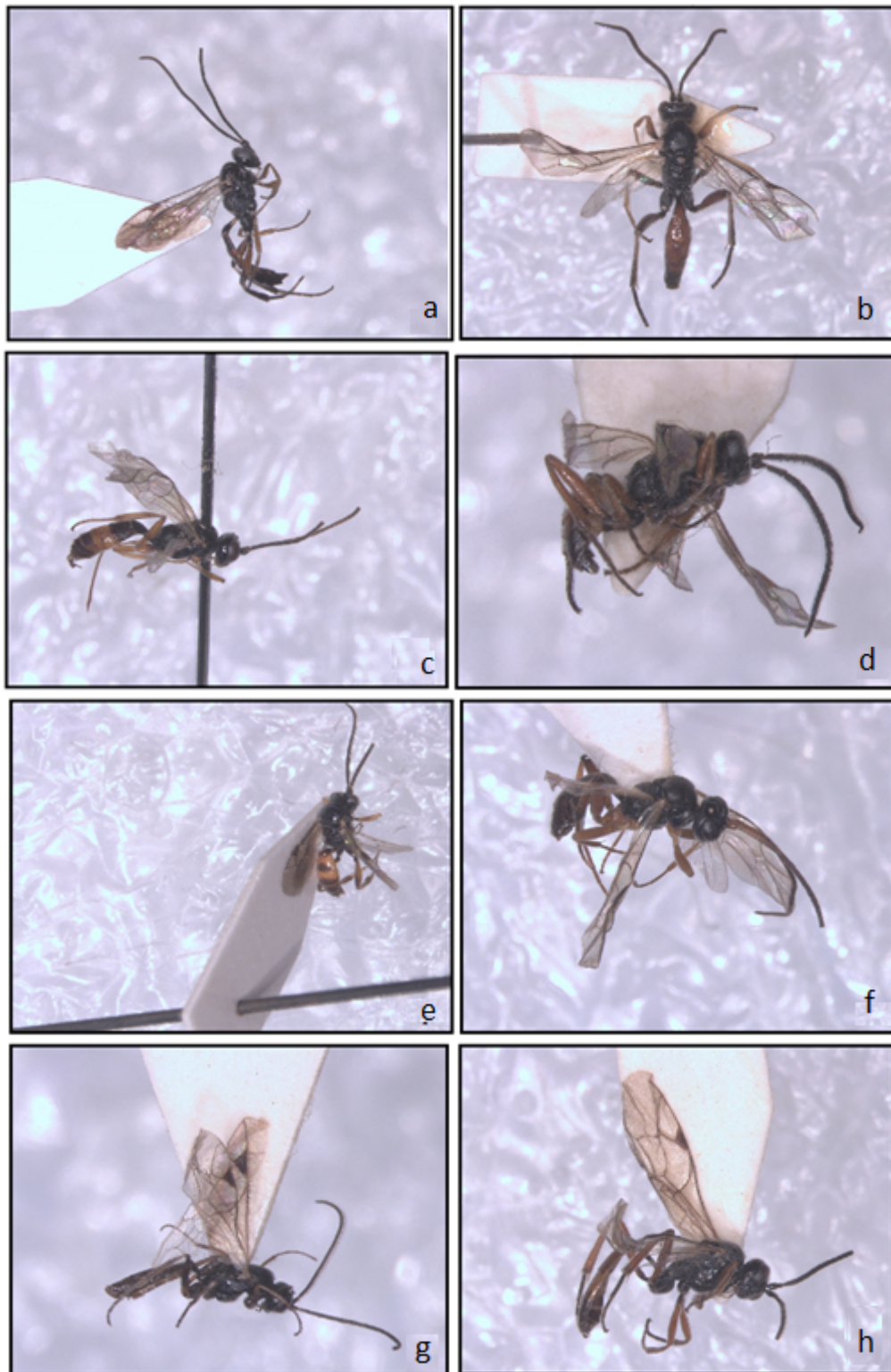


Figure 4. Collected species: a) *Agrothereutes fumipennis*; b) *Aptesis senicula*; c) *Bathytrix pellucidator*; d) *Dichrogaster heteropus*; e) *Dichrogaster schimitscheki*; f) *Gelis agilis*; g) *Gelis exareolatus*; h) *Mesoleptus congener*.

Gelis exareolatus (Förster, 1850) (Figure 4g)

Material examined. BUNPA: Uludağ: Alaçam, 1700 m, 08.VIII.2018, 4 ♂♂; Gözede, 640 m, 18.VII.2019, 14 ♂♂.

Distribution in Turkey. Ankara (Kolarov, 1987; Öncüer, 1991; Kolarov, 1995) (Figure 6j).

Global distribution. Palearctic Region.

Remarks. This species was recorded from Ankara in 1925 by Kolarov (1987).

**Mesoleptus congener* (Förster, 1876) (Figure 4h)

Material examined. BUNPA: Uludağ: Alaçam, 1500 m, 20.VII.2019, 4 ♀♀, 5 ♂♂; Gözede, 670 m, 24.VI.2018, 5 ♂♂, 630 m, 06.VIII.2019, 3 ♀♀, 4 ♂♂.

Global distribution. European and West Palearctic Region.

Remarks. This is new species record for Turkey.

Mesoleptus incessor (Haliday, 1838) (Figure 5a)

Material examined. BUNPA: Alaçam, 1600 m, 19.VIII.2019, 4 ♂♂; Cevizdibi, 830 m, 17.VII.2019, 4 ♂♂; Gözede, 670 m, 24.VI.2018, ♂.

Associated plants. *Angelica sylvestris* L., *Euphorbia nicaeensis* All., *E. virgata* Waldst, *Heracleum sphondylium* L. ve *Picea excelsa* (Lam.).

Distribution in Turkey. Anatolia (locality name unknown) (Jussila et al., 2010).

Global distribution. Palearctic Region.



Figure 5. Collected species: a) *Mesoleptus incessor*; b) *Phygadeuon hercynicus*; c) *Phygadeuon nitidus*; d) *Phygadeuon lapponicus*; e) *Thaumatogelis audax*.

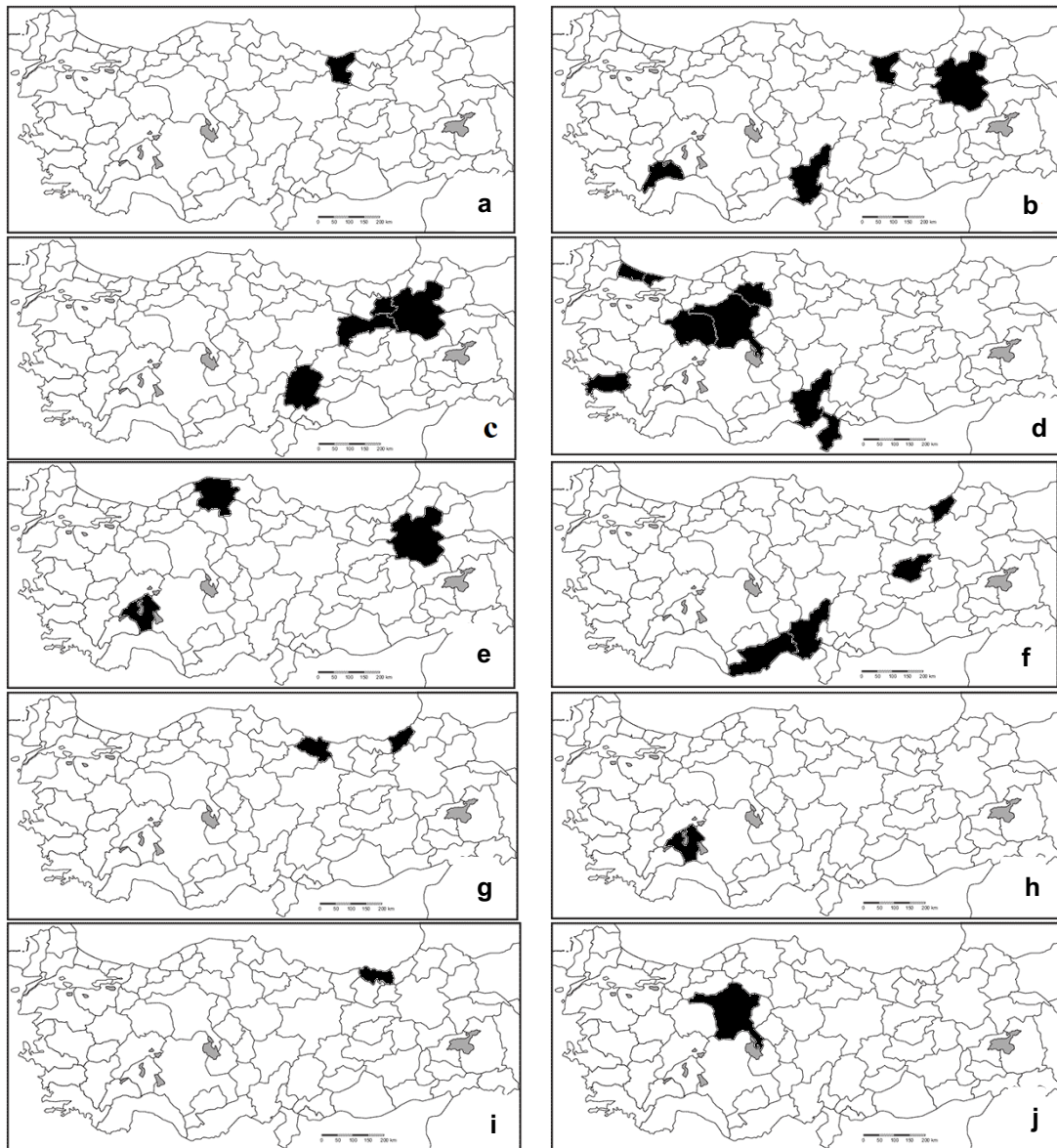


Figure 6. Distribution in Turkey of species: a) *Campoletis agilis*; b) *Campoletis crassicornis*; c) *Diadegma mediterraneum*; d) *Hyposoter didymator*; e) *Agrothereutes fumipennis*; f) *Aptesis senicula*; g) *Bathytrix pellucidator*; h) *Dichrogaster schimitscheki*; i) *Gelis agilis*; j) *Gelis exareolatus*.

**Phygadeuon hercynicus* Gravenhorst, 1829 (Figure 5b)

Material examined. BUNPA: Alaçam, 1100 m, 20.VI.2018, 2 ♂♂, 1200 m, 08.VI.2019, 3 ♂♂; Gözede, 630 m, 06.VIII.2019, 3 ♂♂.

Associated plants. *Angelica sylvestris* L.

Global distribution. European and West Palearctic Region.

Remarks. This is new species record for Turkey.

**Phygadeuon nitidus* Gravenhorst, 1829 (Figure 5c)

Material examined. BUNPA: Alaçam, 1600 m, 19.VIII.2019, 4 ♂♂; Cevizdibi, 850 m, 02.VIII.2018, 5 ♂♂; Gözede, 650 m, 17.VII.2018, 2 ♂♂, 640 m, 18.VII.2019, 5 ♀♀.

Global distribution. European and West Palearctic Region.

Remarks. This is new species record for Turkey.

**Phygadeuon lapponicus* Thomson, 1884 (Figure 5d)

Material examined. BUNPA: Alaçam, 1700 m, 08.VIII.2018, 7 ♂♂.

Associated plants. *Salix* sp.

Global distribution. Palearctic Region.

Remarks. This is new species record for Turkey.

**Thaumatogelis audax* (Olivier, 1792) (Figure 5e)

Material examined. BUNPA: Gözede, 610 m, 05.VIII.2018, 2 ♂♂.

Associated plants. *Deschampsia cespitosa* (L.)

Global distribution. European and West Palearctic Region.

Remarks. This is new species record for Turkey.

Discussion

In Turkey, there was no detailed information available on Ichneumonidae until 1995. Three hundred and eighty-three Ichneumonid species are listed in catalog for Turkey compiled by Kolarov (1995). Most of studies have been conducted in Thrace, Eastern Anatolia and Mediterranean Regions of Turkey. With the new records reported here, this number is now 1 291. Previous studies have shown that 124 of the 1,288 species were obtained from economic pests in different orders (Figure 7) (Sari, 2017).



Figure 7. Ichneumonidae species obtained from different pests.

In total, 263 specimens were collected during the summers of 2018 and 2019. Among these, *A. rufocincta*, *C. thomsoni*, *D. glabriculum*, *D. heteropus*, *M. congener* (Förster, 1876), *P. hercynicus*, *P. lapponicus*, *P. nitidus*, and *T. audax* are new record for the Turkish fauna.

At the end of the study 21 species were identified. Among these, seven species belonging to Campopleginae with 90 individuals and 14 species Cryptinae with 173 individuals were recorded. Cryptinae showed (Table 2) a higher density in terms of both number of species and number of individuals. Species were collected at three different altitudes from 610 to 1700 m with most specimens being collected between 610 and 700 m. Specimens were collected from May to August, with most being collected in July. *Agrothereutes fumipennis* was the most commonly trapped species in net and *D. heteropus* the least captured.

Table 2. Data of species: Individual numbers (IN), vertical distribution (VD), seasonal dynamics (SD), geographical regions (GR), zoogeographical regions (ZR), host records (HR), first record of Turkey (FRT) of specimens

Taxa name	IN	VD	SD	GR	ZR	H	FRT
Subfamily: Campopleginae Förster, 1869							
Genus: <i>Campoletis</i> Förster, 1869							
<i>Campoletis agilis</i> (Holmgren, 1860)	17	A, B	Jl, A	BSR	BP, E, WP	x	Kolarov et al., 2016
<i>Campoletis crassicornis</i> (Tschek, 1871)	12	A, B	M, A	BSR, EAR, MtR	BP, E, WP	x	Kolarov & Beyarslan, 1995
* <i>Campoletis thomsoni</i> (Roman, 1915)	11	A, B	J, A	*	E, EP, WP		New record
Genus: <i>Casinarina</i> Holmgren, 1859							
<i>Casinarina albipalpis</i> (Gravenhorst, 1829)	14	C, D	J, Jl	?	BP, E, WP	x	Riedel, 2018
Genus: <i>Diadegma</i> Förster, 1869							
* <i>Diadegma glabriculum</i> (Holmgren, 1859)	11	A, B, D	Jl, A	*	BP, E, NEAR		New record
<i>Diadegma mediterraneum</i> (Constantineanu, 1930)	12	A, C	J, A	EAR, MtR	BP, E		Kolarov & Beyarslan, 1995
Genus: <i>Hyposoter</i> Förster, 1869							
<i>Hyposoter didymator</i> (Thunberg, 1822)	13	A, D	J	CAR, MR, MtR	AUS, BP, E, WP	x	Steiner, 1936
Subfamily: Cryptinae Kirby, 1837							
Genus: <i>Acrolyta</i> Förster, 1869							
* <i>Acrolyta rufocincta</i> (Gravenhorst, 1829)	12	B, E	A	*	E, WP	x	New record
Genus: <i>Agrothereutes</i> Förster, 1850							
<i>Agrothereutes fumipennis</i> (Gravenhorst, 1829)	28	B	Jl, A	BSR, EAR, MtR	E, EP, WP	x	Çoruh & Özbek, 2005
Genus: <i>Aptesis</i> Förster, 1850							
<i>Aptesis senicula</i> (Kriechbaumer, 1893)	21	B, E	J, A	BSR, EAR, MtR	E, WP		Beyarslan & Kolarov, 1994
Cins: <i>Bathythrix</i> Förster, 1869							
<i>Bathythrix pellucidator</i> (Gravenhorst, 1829)	11	C, D	J, Jl	BSR	E, EP, WP	x	Çoruh et al., 2014b
Genus: <i>Dichrogaster</i> Doumerc, 1855							
* <i>Dichrogaster heteropus</i> (Thomson, 1896)	4	B	J, A	*	E, WP	x	New record
<i>Dichrogaster schimitscheki</i> (Fahringer, 1935)	9	A	Jl, A	MtR	E, NEAR, WP		Kolarov & Gürbüz, 2007
Genus: <i>Gelis</i> Thunberg, 1827							
<i>Gelis agilis</i> (Fabricius, 1775)	7	B, C	J	BSR	E, EP, WP	x	Fahringer, 1922
<i>Gelis exareolatus</i> (Förster, 1850)	18	A, E	Jl, A	CAR	E, EP, WP	x	Kolarov, 1987
Genus: <i>Mesoleptus</i> Gravenhost, 1829							
* <i>Mesoleptus congener</i> (Förster, 1876)	21	A, D	J, Jl, A	*	E, WP		New record
<i>Mesoleptus incessor</i> (Haliday, 1838)	9	A, B, E	J, Jl, A	?	E, EP, WP	x	Jussila et al., 2010
Genus: <i>Phygadeuon</i> Gravenhorst, 1829							
* <i>Phygadeuon hercynicus</i> Gravenhorst, 1829	8	A, C	J, A	*	E, WP	x	New record
* <i>Phygadeuon nitidus</i> Gravenhorst, 1829	16	A, B, E	Jl, A	*	E, WP		New record
* <i>Phygadeuon lapponicus</i> Thomson, 1884	7	E	A	*	E, EP, WP	x	New record
* <i>Thaumatogelis audax</i> (Olivier, 1792)	2	A	A	*	E, WP	x	New record

Vertical distribution: A, 0-750 m; B, 751-1000 m; C, 1001-1250 m; D, 1251-1500 m; and E, 1501-1750 m. Seasonal dynamics: M, May, J, June; Jl, July; and A, August. Geographical regions: AR, Aegean Region; BSR, Black Sea Region; CAR, Central Anatolia Region; EAR, Eastern Anatolia Region; MR, Marmara Region; and MtR, Mediterranean Region. Zoogeographical regions: AUS, Australasian; E, Europe; EP, Eastern Palearctic; NEAR, Nearctic Region; and WP, Western Palearctic.

Considering distribution by regions, it was found that the species were collected mostly from Mediterranean Region and at least from the Marmara Region. While *A. fumipennis*, *A. senicula*, *C. crassicornis* and *H. didymator* and were collected three different regions, *C. agilis*, *D. schimitscheki*, *G. agilis* and *G. exareolatus* were collected only one region in previous studies. When considering previous records, *H. didymator* has been collected from seven cities, *A. senicula* and *C. crassicornis* from four cities, and *C. agilis*, *D. schimitscheki*, *G. agilis* and *G. exareolatus* from collected only one city. In contrast, *H. didymator* has been recorded in 50 countries worldwide. With this study, Bursa has been added to list of localities each species. Although *C. thomsoni* and *P. lapponicus* occur in the Palearctic region, they were recorded for the first time in Turkey with this study. *Campoletis agilis*, *D. schimitscheki*, *G. agilis* and *G. exareolatus* have been collected from only one province in Turkey and Bursa became the second known locality for these species with this study. Weeds were also detected in study areas and these weeds are shown in Table 3. Based on all these data, we can say that results of study provide new information and scientific value to scientists who work and want to work in this field.

Table 3. Weeds species in study area

Name of weed	Localities		
	Alaçam	Cevizdibi	Gözede
<i>Prunella vulgaris</i> L.		✓	
<i>Polypodium vulgare</i> L.		✓	✓
<i>Epilobium angustifolium</i> L.	✓		
<i>Sonchus asper</i> (L.) Hill		✓	✓
<i>Nepeta nuda</i> L.		✓	
<i>Globularia trichosantha</i> Fisch. & C.A.Mey.	✓		
<i>Medicago polymorpha</i> L.			✓
<i>Galium elongatum</i> C. Presl	✓		
<i>Mentha longifolia</i> (L.) L.	✓	✓	✓
<i>Dactylis glomerata</i> L.			✓
<i>Malva sylvestris</i> L.			✓
<i>Silene vulgaris</i> (Moench) Garcke	✓		
<i>Onobrychis gracilis</i> Besser	✓		
<i>Securigera varia</i> (L.) Lassen		✓	✓
<i>Matricaria chamomilla</i> L.	✓		
<i>Hypericum perforatum</i> L.		✓	✓
<i>Anthemis cretica</i> L.		✓	✓
<i>Trifolium repens</i> L.	✓	✓	✓
<i>Plantago lanceolata</i> L.			✓
<i>Raphanus raphanistrum</i> L.			✓
<i>Vicia cracca</i> L.	✓		
<i>Allium paniculatum</i> L.			✓

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References

- Beyarslan, A. & J. Kolarov, 1994. Investigations on Ichneumonidae (Hymenoptera) fauna of Turkey. II. Cryptinae. Turkish Journal of Zoology, 18 (4): 227-231.
- Çaylak, F. Z. & S. Çoruh, 2020. First record of *Woldstedtius citropectoralis* Schmiedeknecht, 1926 (Hymenoptera: Ichneumonidae: Diplazontinae) from Turkey. Munis Entomology & Zoology, 15 (2): 457-462.
- Çoruh, S., 2017. Taxonomical and biogeographical evaluation of the subfamily Ichneumoninae (Hymenoptera: Ichneumonidae) in Turkey. Entomofauna, 38 (21): 425-476.
- Çoruh, S., 2019a. Taxonomic and biogeographic evaluations of the subfamily Cryptinae (Hymenoptera: Ichneumonidae). Turkish Journal of Entomology, 43 (3): 313-337.
- Çoruh, S., 2019b. Taxonomical and biogeographical evaluation of the subfamily Tryphoninae (Hymenoptera: Ichneumonidae) in Turkey. Journal of the Entomological Research Society, 21 (3): 301-321.
- Çoruh, S., J. Kolarov & H. Özbek, 2014a. The fauna of Ichneumonidae (Hymenoptera) of eastern Turkey with zoogeographical remarks and host data. Journal of Insect Biodiversity, 2 (16): 1-21.
- Çoruh, S., J. Kolarov & İ. Çoruh, 2014b. Ichneumonidae (Hymenoptera) from Anatolia. II. Turkish Journal of Entomology, 38 (3): 279-290.
- Çoruh, S., J. Kolarov & İ. Çoruh, 2016. A study of Ichneumonidae (Hymenoptera) from northeastern Anatolia II, with new records. Turkish Journal of Entomology, 40 (3): 265-280.
- Çoruh, S., J. Kolarov & İ. Çoruh, 2018. Ichneumonidae (Hymenoptera) from Anatolia. II. Linzer Biologische Beiträge, 50 (1): 217-224.
- Çoruh, S., J. Kolarov & Ö. S. Ercelep, 2019. A Contribution to the Ichneumoninae (Hymenoptera: Ichneumonidae) of Trabzon, Turkey. Munis Entomology & Zoology, 14 (2): 584-590.
- Çoruh, S. & H. Özbek, 2005. New records of Cryptinae (Hymenoptera: Ichneumonidae) from Turkey with some hosts. Turkish Journal of Entomology, 29 (3): 183-186.
- Çoruh, S., H. Özbek & J. Kolarov, 2005. A contribution to the knowledge of Ichneumonidae (Hymenoptera) from Turkey. Journal of the Entomological Research Society, 7 (3): 53-57.
- Çoruh, S., M. F. Gürbüz, J. Kolarov, M. Yurtcan & A. Boncukçu Özdan, 2013. New and little-known species of Ichneumonidae (Hymenoptera) for the Turkish Fauna. Journal of the Entomological Research Society, 15 (3): 71-83.
- Davis, P. H., 1965-1988. Flora of Turkey and the East Aegean Islands. Edinburgh, UK: Edinburgh University Press, 1-10.
- Fahringer, J., 1922. Hymenopterologische Ergebnisse einer wissenschaftlichen Studienreise nach der Türkei und Kleinasien (mit Anschluss des Amanusgebirges). Archiv für Naturgeschichte, 88 A (9): 149-222.
- Gürbüz, M. F., Y. Aksoylar & A. Buncukçu, 2009a. A faunistic study on Ichneumonidae (Hymenoptera) in Isparta, Turkey, Linzer Biologische Beiträge, 41 (2): 1969-1984.
- Gürbüz, M. F., H. Kirtay & O. Birol, 2009b. A study of Ichneumonidae (Hymenoptera) of Kasnak Oak Forest Nature Reserve in Turkey with new records. Linzer Biologische Beiträge. 41 (2): 1985-2003.
- Gürbüz, M. F. & J. Kolarov, 2008. A study of the Ichneumonidae (Hymenoptera). IV. Cryptinae, Cryptini. Turkish Journal of Zoology, 32 (4): 373-377.
- Jussila, R., I. Sääksjärvi & S. Bodera, 2010. Revision of the western Palearctic *Mesoleptus* (Hymenoptera: Ichneumonidae). Annales de la Société Entomologique de France. (n.s.), 46 (3-4): 499-518.
- Kaya, K. & S. Korşonor, 2008. The lepidopterous pest species, their parasitoids and population dynamics of the important ones in winter vegetables areas in Hatay Province. Turkish Journal of Entomology, 32 (2): 195-209.
- Kıraç, A. & M. F. Gürbüz, 2020. Ichneumonidae (Insecta; Hymenoptera) Fauna of Honaz Mountain National Park. Bilge International Journal of Science and Technology and Research, 4 (2): 150-159.
- Kolarov, J., 1987. Ichneumonidae (Hymenoptera) from Balkan Peninsula and some adjacent regions. I. Pimplinae, Tryphoninae, Cryptinae. Turkish Journal of Entomology, 11 (1): 11-28.

- Kolarov, J., 1989. Ichneumonidae (Hym.) from Balkan Peninsula and some adjacent regions. III. Ophioninae, Anamaloninae, Metopiinae, Mesochorinae, Acaenitinae, Oxytorinae, Orthopelmatinae, Collyriinae, Orthocentrinae, Diplazontinae and Ichneumoninae. Turkish Journal of Entomology, 13 (3): 131-140.
- Kolarov, J., 1995. A catalogue of the Turkish Ichneumonidae (Hymenoptera). Entomofauna, 7 (7): 137-188.
- Kolarov, J. & A. Beyarslan, 1995. "New and little known Turkish Campopleginae (Hymenoptera, Ichneumonidae), 18-21" III. National Scientific Conference of Entomology (18-20 September 1995, Sofia, Bulgaria), 280 pp.
- Kolarov, J., S. Çoruh, E. Yıldırım & M. Yüksel, 2014. Contribution to the knowledge of the Ichneumonidae (Hymenoptera) fauna of Turkey. Zoology in the Middle East, 60 (2): 154-161.
- Kolarov, J., S. Çoruh & İ. Çoruh, 2016. Contribution to the knowledge of the Ichneumonidae (Hymenoptera) fauna of Turkey from northeastern Anatolia, Part I. Turkish Journal of Zoology, 40 (1): 40-56.
- Kolarov, J., S. Çoruh & İ. Çoruh, 2017. A study of Ichneumonidae (Hymenoptera) from Northeastern Anatolia III, with new records and description male of *Temelucha pseudocaudata* Kolarov, 1982. Turkish Journal of Entomology, 41 (2): 125-146.
- Kolarov, J., S. Çoruh & İ. Çoruh, 2020. Ichneumonidae (Hymenoptera) from Anatolia III. Atatürk University, Journal of Agricultural Faculty, 5 (2): 162-168.
- Kolarov, J. & M. F. Gürbüz, 2007. A study of the Turkish Ichneumonidae (Hymenoptera). V. Cryptinae, Phygadeuontini. Linzer Biologische Beiträge, 39 (2): 987-992.
- Kolarov, J. & M. Yurtcan, 2008. A study of the Ichneumonidae (Hymenoptera) of the North Anatolia (Turkey) I. Brachycyrtinae, Cryptinae and Xoridinae. Acta Entomologica Serbica, 13 (1/2): 89-91.
- Narmanlıoğlu, K. & S. Çoruh, 2017. Parasitoids of the apple ermine moth, *Yponomeuta malinellus* Zeller, 1838 (Lepidoptera: Yponomeutidae), in the Çoruh Valley, Erzurum Province, Turkey. Turkish Journal of Entomology, 41 (4): 357-365.
- Öncüer, C., 1991. Türkiye Bitki Zararlısı Böceklerinin Parazit ve Predatör Kataloğu. Ege Üniversitesi, Ziraat Fakültesi Yayınları, 505: 354 s.
- Özdan, A. & M. F. Gürbüz, 2019. Ichneumonidae (Hymenoptera) fauna of Kovada Lake National Park, Isparta, Turkey. Turkish Journal of Entomology, 43 (3): 301-312.
- Özdemir, Y. & N. Kılınçer, 1990. "İç Anadolu Bölgesinde saptanan Pimplinae ve Ophioninae (Hym: Ichneumonidae) türleri, 309-318". Türkiye II. Biyolojik Mücadele Kongresi (26-29 Eylül, Ankara), 330 s.
- Riedel, M., 2018. Revision of the Western Palearctic species of the genus *Casinaria* Holmgren (Hymenoptera, Ichneumonidae, Campopleginae). Linzer Biologische Beiträge, 50 (1): 723-763.
- Riedel, M., S. Çoruh & H. Özbek, 2010. Contribution to the Ichneumoninae (Hymenoptera, Ichneumonidae) fauna of Turkey, with description of three new species. Turkish Journal of Entomology, 34 (2): 133-156.
- Riedel, M., E. Diller & S. Çoruh, 2018. New contributions to the Ichneumoninae (Hymenoptera, Ichneumonidae) from Turkey. Journal of the Entomological Research Society, 20 (1): 57-70.
- Sarı, Ü. & S. Çoruh, 2018. Ichneumonidae (Hymenoptera) from Northeastern Anatolia Region (Erzurum, Aşkale). Turkish Journal of Entomology, 42 (3): 215-228.
- Sertkaya, E. & A. Bayram, 2005. Parasitoid community of the loreyi leafworm *Mythimna (Acantholeucania) loreyi*: Novel-host parasitoid associations and their efficiency in the Eastern Mediterranean region of Turkey. Phytoparasitica, 33 (5): 441-449.
- Sertkaya, E., A. Bayram & S. Korşonor, 2004. Egg and larval parasitoids of the beet armyworm *Spodoptera exigua* on maize in Turkey. Phytoparasitica, 32 (3): 305-312.
- Shaw, M. R., K. Horstmann & A. L. Whiffin, 2016. Two hundred and twenty-five species of reared western Palearctic Campopleginae (Hymenoptera: Ichneumonidae) in the National Museums of Scotland, with descriptions of new species of *Campoplex* and *Diadegma*, and records of fifty-five species new to Britain. Entomologist's Gazette, 67 (3): 177-222.
- Şimşek, M., Y. Kondur & C. Özkan, 2015. Besin Durumunun *Helicoverpa armigera* (Hüb.) (Lepidoptera: Noctuidae) Üzerinde Yetiştirilen Hyposoter didymator (Thun.) (Hymenoptera: Ichneumonidae) Erginlerinin Laboratuvar Koşullarında Yaşam Süresine Etkisi. Anadolu Orman Araştırma Dergisi, 1 (1-2): 50-55.

- Steiner, P., 1936. Beiträge zur Kenntnis der Schädlingfauna Kleinasien. III. *Laphygma exigua* Hb., ein Großschädling der Zuckerrübe in Anatolien. Zeitschrift für Angewandte Entomologie, 23 (2): 177-222.
- Vas, Z., 2019a. Contributions to the taxonomy, identification, and biogeography of the Western Palearctic species of *Campoletis* Förster (Ichneumonidae: Campopleginae). Zootaxa, 4565 (3): 373-382.
- Vas, Z., 2019b. New species and new records of Ichneumon wasps from the Eastern Mediterranean and the Black Sea Regions (Hymenoptera: Ichneumonidae). Acta Zoologica Academiae Scientiarum Hungaricae, 65 (1): 19-30.
- Yaşarakıncı, N. & S. Kornoşor, 1990. "Güneydoğu Anadolu Bölgesi'nde mercimek ve nohutta zarar yapan *Heliothis virescens* (Huf.)'nın doğal düşmanları ve parazitoidlerin etkinlikleri üzerinde araştırmalar, 83-89". Türkiye II. Biyolojik Mücadele Kongresi (26-29 Eylül 1990, Ankara), 330 s.
- Yu, D. S. K., C. van Achterberg & K. Horstmann, 2016. Taxapad 2016, Ichneumonidae 2015, Database on flash drive. Ottawa, Ontario, (Web page: www.taxapad.com) (Date accessed: 20 June 2019).