Acta Entomologica Serbica, 2022, 27(1): 25-34

UDC: 595.792.4(560)
DOI: 10.5281/zenodo.6334642

AN OVERVIEW ON THE SUBFAMILY CREMASTINAE FÖRSTER, 1869 (HYMENOPTERA: ICHNEUMONIDAE) FROM TURKEY

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Abstract

Fauna of the subfamily Cremastinae Förster, 1869 (Ichneumonidae: Hymenoptera) on the territory of Turkey was investigated. The survey was conducted during the period 1995-2020. A total of 54 species belonging to eight genera have been listed. Among the material collected in the past 25 years, the species *Cremastus brevicornis* Kolarov & Beyarslan, 1999; *C. kasparyani* Kolarov Gürbüz & Birol, 2014; *C. petiolaris* Kolarov & Beyarslan; 1999; *C. tristator* Aubert, 1970; *Nothocremastus beyarslani* Kolarov, 1997 and *Temelucha turcata* Kolarov & Beyarslan, 1999 were listed as endemic to the investigated teritorry. Additionally, a male of *Eucreamastus priebei* Kolarov, 1999 is recorded for the first time from Turkey. Turkish species of the subfamily Cremastinae have been analyzed according to biogeographical and zoogeographical features.

KEY WORDS: Cremastinae, diversity, survey, Turkey

Introduction

Hymenoptera is one of the four largest orders of insects, with over 152,677 described species in the world (Aguiar *et al*., 2013). They are found all over the world but are more abundant and diverse in tropical and temperate regions. Ichneumonidae is the biggest hymenopteran family with 1,601 genera and 25,285 described species (Yu *et al*., 2016).

Turkey has rich faunistic and floristic features due to its geographic and topographic position. After 1995, many studies (Çoruh, 2017; Kolarov *et al*., 2017; Narmanlıoğlu & Çoruh, 2017; Çoruh *et al*., 2018; Sarı & Çoruh, 2018; Riedel *et al*., 2018; Çoruh, 2019a,b; Çoruh et al., 2019; Özdan & Gürbüz, 2019; Çaylak, 2019; Çaylak & Çoruh, 2020 a,b; Kolarov *et al*., 2020; Kıraç & Gürbüz, 2020; Kolarov *et al*., 2021; Yurtcan *et al*., 2021) have been done on the Ichneumonidae family, but it is still inadequate, since many of these studies were carried out in Eastern Anatolia, Marmara and the Mediterranean regions. Research in other regions of

Turkey is scarce. Today, Ichneumonidae species in Turkey number 1,309 species from 289 genera (Teymuroğlu & Çoruh, 2021; Kolarov *et al*., 2021, Yurtcan *et al*. 2021).

The subfamily Cremastinae is a moderately large subfamily in the family Ichneumonidae and contains about 828 described species in 35 genera from throughout the world (Yu *et al*., 2016). Cremastinae occur mainly in arid regions (Amiri *et al.,* 2019). Cremastines are distinguished from other Ichneumonidae by a sclerotized bridge separating the membranous sockets of the tibial spurs and the basitarsus of all tibiae (Townes, 1958). The Cremastinae, along with the subfamilies Campopleginae Foerster, 1869, Tersilochinae Schmiedeknecht, 1910, Anomaloninae Viereck, 1918, and Ophioninae Shuckard, 1840, are included in the so-called "ophionoid complex". Inclusion is broadly based on common similarities among the mentioned groups. Usually, Cremastinae can be distinguished from other members of the "ophionoid complex" with the naked eye because of certain specific features: the slender body and legs, small head, the long, thin and straight ovipositor and the "tender" wings (Narolsky, 2002).

Cremastinae of Turkey was investigated up to 1995 by several researchers (Kohl, 1905; Schmiedeknecht, 1908; Altay, 1966; Thompson, 1957; Sedivy, 1959, Aubert, 1970; Sedivy, 1971; Tuatay *et al*., 1972; Aubert; 1977; Soydanbay, 1978; Aubert 1981; Doğanlar, 1987; Horstmann, 1990; Özdemir & Kılınçer, 1990; Öncüer, 1991; Kolarov, 1992). Kolarov (1995) prepared a catalogue of the Turkish Ichneumonidae. In this catalogue, the subfamily Cremastinae is represented by 5 genera and 11 species. Today, this number has reached 8 genera and 54 species (Kolarov, 1997, 2007, 2016; Kolarov & Beyarslan, 1999; Kolarov *et al*., 2002a,b, 2014, 2016, 2017; Kolarov & Yurtcan, 2009; Kolarov & Çalmaşur, 2011; Çoruh *et al*., 2013; 2014; Çoruh & Kolarov, 2016; Pekel, 1998; Pekel (Çoruh) & Özbek, 2000; Narolsky, 2001; Özdemir & Özdemir, 2002; Gürbüz, 2005; Gürbüz & Aksoylar, 2005; Beyarslan *et al*., 2006; Anlaş *et al*., 2009; Eroğlu *et al*., 2011; Özdan, 2014; Özdan & Gürbüz, 2016; Sarı & Çoruh, 2018).

Our aim was to provide the first comprehensive and validated species list of the subfamily Cremastinae in Turkey. The list is based on both an extensive literature research and a review of all reliably identified specimens present in the Entomological Museum, Erzurum, Turkey (EMET).

Materials and Methods

The subfamily Cremastinae from Anatolia was systematically studied in various biotopes between 1995-2020. The research area is shown in the Fig. 1. Furthermore, some samples collected before 1995 were also evaluated. Sampling was mostly carried out with an entomological sweep net on flowering plants and a Malaise trap was also used. Collected samples were placed in 70% alcohol and brought to the laboratory. All specimens were pinned and labelled and thus prepared for identification.

The samples collected by different researchers before 1995 have been added. All taxa in tables are listed in alphabetical order. Distribution of species in Turkey and the world is taken from the Catalogue of World Ichneumonidae (Yu *et al*., 2016). Different data on the species are summarized in the tables.

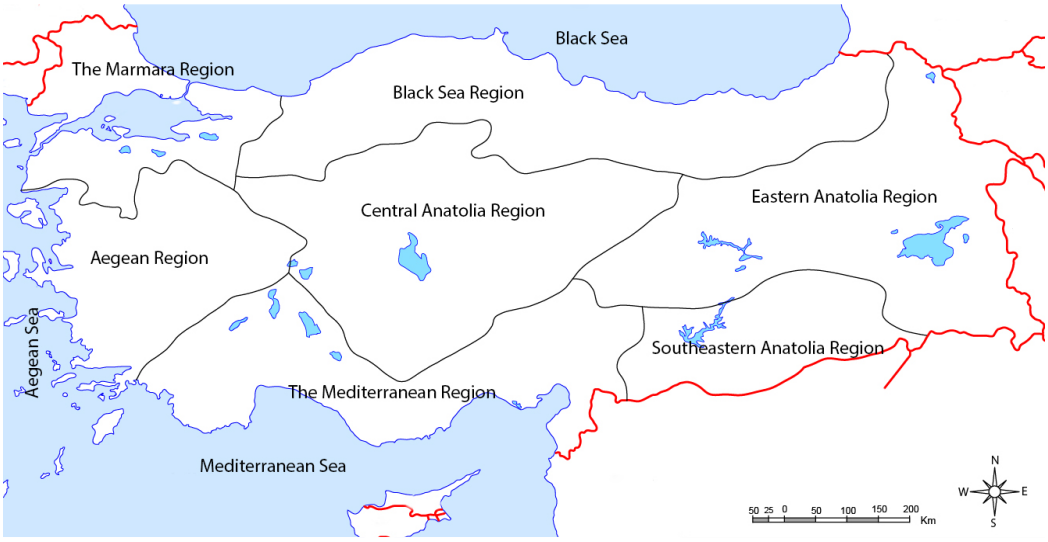

Figure 1. Study area. Geographical regions: Aegean Region (AR), Black Sea Region (BSR), Central Anatolia Region (CAR), Eastern Anatolia Region (EAR), Marmara Region (MR) Mediterranean Region (MtR), Southeastern Anatolia (SAR).

Results and Discussion

A total of 54 species belonging to eight genera from the subfamily Cremastinae are presented and discussed (Table I).

The species belong to the following genera: *Cremastus* Gravenhorst, 1829; *Dimophora* Förster, 1869; *Eucremastoides* Kolarov, 1980; *Eucremastus* Szépligeti, 1905; *Nothocremastus* Dasch, 1979; *Pristomerus* Curtis, 1836; *Trathala* Cameron, 1899 and *Temelucha* Förster, 1869.

A total of 424 samples are available in the EMET. Regarding the distribution of species according to genus, 14 species and 53 samples belong to the genus *Cremastus*, two species and nine samples to the genus *Dimophora*, one species and three samples to the genus *Eucremastoides*, three species and two samples to the genus *Eucremastus*, one species and two samples to *Nothocremastus,* nine species and 91 samples to *Pristomerus*, one species and 17 samples to *Trathala*, 23 species and 247 samples samples to *Temelucha*.

It is obvious that *Temelucha* is the richest genus for both species and samples according to presented genera in Table I, whereas *Cremastus* is the most numerous species in the world (Yu *et al*., 2016).

Table I. Data of collected species: Individual numbers (IN), vertical distribution (VD), seasonal dynamics (SD), geographical regions (GR), zoogeographical regions (ZR), first record of Turkey (FRT) of specimens. Vertical distribution (VD) (in meters above sea level): 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): Ap: April, M: May, J: June, Jl: July, Aug: August, S: September. Geographical regions are displayed in Fig. 1. Zoogeographical regions (ZR): AFR: Afrotropical Region, E: Europe, EP: Eastern Palaearctic, NEAR: Nearctic Region, OCN: Oceanic; ORR: Oriental, WP: Western Palearctic.

Names of Taxa	IN	VD	SD	GR	ZR	FRT
Cremastus aegyptiacus Szépligeti,1905	1	A	Ap	MtR	E, WP	Çoruh *et al*., 2013
Cremastus bellicosus Gravenhorst, 1829	8	F	Jl	EAR	EP, E, WP	Kolarov & Beyarslan, 1999
Cremastus brevicornis Kolarov & Beyarslan, 1999	1	D	Jl	CAR	WP	Kolarov & Beyarslan, 1999
Cremastus crassicornis Thomson, 1880	1	H	Aug	MtR	E, WP	Sedivy, 1959
Cremastus geminus Gravenhorst, 1829	4	A, H	J, Jl	EAR, MR	AFR, EP, E, WP	Kolarov & Beyarslan, 1999
Cremastus gigas Heinrich, 1953	2	G, H	J, Jl	EAR	EP, E, WP	Kolarov *et al*., 2002b
Cremastus inflatipes Roman,1939	4	A	?	MR	E, WP	Kolarov & Beyarslan, 1999
Cremastus kasparyani Kolarov, Gürbüz & Birol, 2014	1	D	J	MtR	WP	Kolarov *et al*., 2014
Cremastus lineatus Gravenhorst, 1829	3	A	Ap, J	AR, MtR	E, WP	Kolarov & Beyarslan, 1999
Cremastus petiolaris Kolarov & Beyarslan, 1999	1	B	S	MtR	WP	Kolarov & Beyarslan, 1999
Cremastus puberulus (Szépligeti,1899)	9	E	J	EAR	E, WP	Kolarov & Yurtcan, 2009
Cremastus pungens Gravenhorst,1829	12	A, E, F, H	Ap, M, J, Jl, Aug	AR, CAR, EAR, MR, MtR	EP, E, WP	Kolarov, 1997
Cremastus spectator Gravenhorst,1829	2	A, B	M, Aug	MR, MtR	EP, E, WP	Kolarov, 1997
Cremastus tristator Aubert, 1970	4	E	M, J, Jl, Aug	Anatolia, MtR	WP	Aubert, 1970
Dimophora nitens (Gravenhorst, 1829)	4	A, B, D	M, S	CAR, MR, MtR	AUS, EP, E, WP	Kolarov & Beyarslan, 1999
Dimophora robusta Brischke, 1880	5	E, F, G	J, Jl	EAR	EP, E, WP	Kolarov *et al*., 2002b
Eucremastoides angelovi Kolarov, 1980	3	F, G, H	Jl, Jl	EAR, BSR	E, WP	Kolarov, 1992
Eucremastus collaris Narolsky, 1990)	2	A, F	M, J	AR, EAR	EP, E, WP	Kolarov & Beyarslan, 1999
Eucremastus priebei Kolarov, 1999	1	E	M	EAR	E, WP	Kolarov *et al*., 2002b
Nothocremastus beyarslani Kolarov,1997	2	A, B	M	MtR, SAR	WP	Kolarov,1997
Pristomerus armatus Lucas, 1894	44	A, D, E, F G, H	M, J, Jl, Aug	CAR, EAR, MtR	EP, E, WP	Horstmann, 1990
Pristomerus hebraicator Aubert,1979	1	D	J	MtR	WP	Çoruh *et al*., 2013
Pristomerus luridus Kokujev,1905	2	F	S	EAR	EP, E, WP	Kolarov, 2007
Pristomerus kasparyani Narolsky, 1886	1	D	M	AR	E, WP	Kolarov & Beyarslan, 1999
Pristomerus mesapotamicus Horstmann, 1990	1	C	Jl	CAR	E, WP	Kolarov & Yurtcan, 2009
Pristomerus orbitalis Holmgren, 1860	2	G	Aug	EAR	EP, E, NEAR, WP	Kolarov, 2016
Pristomerus pallidus Thomson, 1890	4	D, H	M, Jl	EAR, MtR	EP, E, WP	Pekel, 1998

Table I – continued

Names of Taxa	IN	VD	SD	GR	ZR	FRT
Pristomerus rivalis Narolsky,1987	7	F, H	Jl, Aug	EAR	EP, E, WP	Pekel (Çoruh) & Özbek, 2000
Pristomerus vulnerator (Panzer, 1799)	29	A, B, C, E, F, H	Ap, M, J,Jl, Aug	BSR, CAR, EAR, MR, MtR	EP, E, NEAR, OCN, ORR, WP	Kohl, 1905
Trathala hierochontica (Schmiedeknecht, 1910)	17	A, B, D, E	J, Jl, S	EAR, MR, MtR	EP, E, WP	Kolarov & Beyarslan, 1999
Temelucha albipennis (Zetterstedt,1838)	2	E	J	EAR	E, WP	Kolarov & Yurtcan, 2009
Temelucha anatolica (Sedivy,1959)	13	A, G	J,Jl, Aug, S	AR, EAR, MtR	EP, E, WP	Sedivy, 1971
Temelucha annulata (Szépligeti,1899)	7	A, G	J, Jl, Aug	EAR, MR	E, WP	Kolarov & Beyarslan, 1999
Temelucha arenosa (Szépligeti,1899)	24	A, D, F, G, H	M, J, Jl, Aug	AR, EAR, MtR, SAR	EP, E, WP	Kolarov & Beyarslan, 1999
Temelucha brevipetiolata Kolarov,1989	3	A	J	MR	E, WP	Kolarov & Beyarslan, 1999
Temelucha caudata (Szépligeti,1900)	9	A, E, G, H	Ap, J, Jl	EAR, MR, MtR	EP, E, WP	Kolarov & Beyarslan, 1999
Temelucha confluens (Gravenhorst, 1829)	6	D, E	M, J, Jl, Aug	CAR, EAR	E, WP	Kohl, 1905
Temelucha decorata (Gravenhorst, 1829)	17	A, D, F, G, H	J, Jl, Aug, S	CAR, EAR, MtR, MR	EP, E, NEAR, WP	Thompson, 1957
Temelucha discoidalis (Szépligeti,1899)	11	A, C, D, F, G	Ap, J, Jl, Aug	CAR, EAR, MtR	EP, E, WP	Pekel, 1998
Temelucha genalis (Szépligeti,1900)	11	A, D, E	M, J, Jl	EAR, MR, MtR	E, WP	Kolarov *et al*., 1997
Temelucha guttifer (Thomson, 1896)	1	A	Aug	MtR	EP, E, WP	Kolarov, 1997
Temelucha interruptor (Gravenhorst, 1829)	28	A, D, G, F, H	J, Jl, Aug	CAR, EAR, MR	EP, E, WP	Kolarov *et al*., 1997
Temelucha lucida (Szépligeti,1900)	7	E, H	M, Jl, Aug	AR, CAR, EAR	EP, E, WP	Pekel, 1998
Temelucha meridionellator Aubert, 1981	4	A, H	M, Ap, J,	EAR, SAR	E, WP	Aubert, 1981
Temelucha observator Aubert, 1966	7	A	M, J	AR	EP, E, WP	Aubert, 1977
Temelucha ophthalmica (Holmgren, 1858)	2	A	Aug	MR	E, WP	Kolarov & Beyarslan, 1999
Temelucha pseudocaudata Kolarov, 1982	5	F	Jl	EAR	E, WP	Pekel (Çoruh) & Özbek, 2000
Temelucha signata (Holmgren,1860)	2	D	S	CAR	EP, E, WP	Kolarov & Beyarslan, 1999
Temelucha schoenobia (Thomson, 1890)	21	A, D, E	J, Jl, Aug, S	AR, MtR, SAR	EP, E, WP	Kolarov & Beyarslan, 1999
Temelucha tricolorata Sedivy,1968	8	A, D, E	Ap, J, Jl	CAR, MtR, SAR	E, WP	Gürbüz & Aksoylar, 2005
Temelucha tuberculata Kolarov & Beyarslan, 1999	1	D	?	EAR	NEAR	Kolarov & Beyarslan, 1999
Temelucha turcata Kolarov & Beyarslan, 1999	54	A, B, C, D, E, F	Ap, M, J, Jl	CAR, EAR, MR, MtR, SAR	WP	Kolarov & Beyarslan, 1999
Temelucha variipes (Szépligeti,1900)	4	A, G, H	J, Jl, Aug	EAR, MtR	EP, E, WP	Kolarov, 1997

Table II. Parasitoid species found on hosts.

Parasitoid	Host	References
Pristomerus vulnerator	*Archips* sp. (Tortricidae)	Özdemir & Özdemir, 2002
	Cydia molesta Busck (Tortricidae)	Altay, 1966; Tuatay et al. 1972; Öncüer, 1991
	Cydia pomelle L. (Tortricidae)	Altay, 1966; Gürses *et al*., 1985; Önder & Zümreoğlu 1985; Soydanbay, 1978; Öncüer, 1991
	Gypsonoma dealbana Frölich (Tortricidae)	Tuatay *et al*., 1972; Soydanbay, 1978; Doğanlar, 1987; Özdemir & Kılınçer, 1991
	Hedya nubiferana Haworth (Tortricidae)	Doğanlar, 1987
	Nordmannia acaciae F. (Lycaenidae)	Bolu *et al*., 2007
Temelucha decorata	*Scrobipalpa ocellatella* Boyd. (Gelechiidae)	Öncüer, 1991
	Spodoptera exigua Hübner (Noctuidae)	Kolarov, 1995

Acknowledgements

I am most grateful to Professor Hikmet Özbek (retired), Professor Önder Çalmaşur and Professor Göksel Tozlu (University of Atatürk, Erzurum) for collecting the materials. I would also like to thank the staff of the University of Atatürk for their support through the Scientific Research Project (BAP) and for my work for almost 25 years. I thank Dr. Janko Kolarov (Bulgaria) for identifying the specimens.

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ПРЕГЛЕД ВРСТА ПОТФАМИЛИЈЕ CREMASTINAE FÖRSTER, 1869 (HYMENOPTERA: ICHNEUMONIDAE) У ТУРСКОЈ

САЛИХА ЧОРУХ

Извод

Истражена је фауна потфамилије Cremastinae Förster, 1869 (Ichneumonidae: Hymenoptera) на територији Турске. Истраживање је спроведено у периоду 1995-2020. Забележене су укупно 54 врсте из осам родова. Међу материјалом прикупљеним у последњих 25 година, врсте *Cremastus brevicornis* Kolarov & Beyarslan, 1999; *C. kasparyani* Kolarov Gürbüz & Birol, 2014; *C. petiolaris* Kolarov & Beyarslan; 1999; *C. tristator* Aubert, 1970; *Nothocremastus beyarslani* Kolarov, 1997 и *Temelucha turcata* Kolarov & Beyarslan, 1999 су ендемичне за истражену територију. Поред тога, први пут је забележен мужјак *Eucreamastus priebei* Kolarov, 1999 из Турске. Врсте потфамилије Cremastinae анализиране су према биогеографским и зоогеографским карактеристикама.

Received: August 5th, 2020
Accepted: February 18th, 2022