

An Evaluation of the Tersilochinae (Hymenoptera: Ichneumonidae) Fauna of Türkiye and the New Record of *Aneuclis incidens* (Thomson, 1889) for the Province of Bingöl (Karlhova)*

Türkiye Tersilochinae (Hymenoptera: Ichneumonidae) Faunası Hakkında Bir Değerlendirme ve *Aneuclis incidens* (Thomson, 1889) Türünün Bingöl (Karlhova) İli İçin Yeni Kaydı


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Abstract

The present study was undertaken to examine of the subfamily Tersilochinae (Hymenoptera: Ichneumonidae) in Türkiye. The Tersilochinae, one of the 47 subfamilies are a worldwide subfamily of the parasitoid wasp family Ichneumonidae. This subfamily, are koinobiont endoparasitoids of Coleoptera larvae, (although Symphyta larvae are recorded as hosts of one genus). Hosts include Curculionidae and Chrysomelidae so Tersilochinae are used for biological control. Tersilochinae species constituting the study were collected from parts of Türkiye between 1995-2022. At the same time, the study also added before 1995 literature information. 42 species from genera of *Aneuclis*, *Barycnemis*, *Diaparsis* (*Diaparsis*), *Diaparsis* (*Nanodiaparsis*), *Gelanes*, *Heterocola* (*Heterocola*), *Heterocola* (*Heterocoloides*), *Phradis*, *Probles* (*Euporizon*), *Probles* (*Microdiaparpis*), *Probles* (*Probles*), *Tersilochus* (*Gonolochus*) and *Tersilochus* (*Tersilochus*) have been identified from Türkiye so far. The study consist of 217 samples. Among these species, *Heterocola* (*Heterocola*) *longipalpis* Kolarov & Beyarslan is endemic for Türkiye at now. With this, *Heterocola* (*Heterocola*) *nigrotibialis* Horstmann and Kolarov, *Tersilochus* (*Gonolochus*) *rugulosus* Horstmann, *Tersilochus* (*Gonolochus*) *nitens* Horstmann & Kolarov and *Tersilochus* (*Tersilochus*) *cognatus* Holmgren are rare species for Türkiye. Again, *Probles* (*Microdiaparpis*) Horstmann is dense in terms of number samples, *Phradis* Förster and *Tersilochus* (*Tersilochus*) Holmgren are dense in terms of number species. Among the species determined, *Probles* (*Microdiaparpis*) *anatolicus* Horstmann, *Aneuclis incidens* (Thomson) and *Barycnemis harpura* (Schrank) were recorded the most abundant species in research areas. In addition to all this, species composition has created for each species and new location information of this subfamily has been added. Bingöl (Karlhova) provinces is the new locality for this subfamily.

Keywords: Hymenoptera, Ichneumonidae, Tersilochinae, Türkiye, Species composition

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Öz

Bu çalışma, Türkiye’de Tersilochinae (Hymenoptera: Ichneumonidae) altfamilyasının incelenmesi amacıyla yapılmıştır. Bu altfamilya, parazitoid bir arı grubu olan Ichneumonidae familyasının 47 altfamilyasından biridir. Coleoptera (Symphyta bir cinsin konukçusu olarak kaydedilmiştir) larvalarının koinobiont endoparazitoiti durumundadır. Çalışmayı oluşturan tersilochineler 1995-2022 yılları arasında toplanmış, 1995 yılından önceki literatür bilgileri de çalışmaya dahil edilmiştir. Toplamda tespit edilen 42 tür *Aneuclis*, *Barycnemis*, *Diaparsis* (*Diaparsis*), *Diaparsis* (*Nanodiaparsis*), *Gelanes*, *Heterocola* (*Heterocola*), *Heterocola* (*Heterocoloides*), *Phradis*, *Probles* (*Euporizon*), *Probles* (*Microdiaparpis*), *Probles* (*Probles*), *Tersilochus* (*Gonolochus*) ve *Tersilochus* (*Tersilochus*) cinslerine aittir. Çalışma toplam 217 örnekten oluşmaktadır. Bunların içerisinde, *Heterocola* (*Heterocola*) *longipalpis* Kolarov & Beyarslan türü şimdilik Türkiye için endemiktir. Bununla beraber, *Heterocola* (*Heterocola*) *nigrotibialis* Horstmann and Kolarov, *Tersilochus* (*Gonolochus*) *rugulosus* Horstmann, *Tersilochus* (*Gonolochus*) *nitens* Horstmann & Kolarov ve *Tersilochus* (*Tersilochus*) *cognatus* Holmgren 1860 türleri nadir türler arasındadır. *Probles* (*Microdiaparpis*) Horstmann cinsi örnek sayısı bakımından, *Phradis* Förster ve *Tersilochus* (*Tersilochus*) Holmgren cinsleri de tür sayısı bakımından en çok rastlanılan gruplardır. Teşhis edilen türler arasında, *Probles* (*Microdiaparpis*) *anatolicus* Horstmann, *Aneuclis* *incidens* (Thomson) ve *Barycnemis* *harpura* (Schrank) en çok sayıya sahip türler olarak tespit edilmiştir. Bütün bunlara ek olarak çalışmada, her bir türe ait tür kompozisyonu oluşturulmuş ve yeni lokalite verileri eklenmiştir. Bingöl (Karlıova), bu altfamilya için yeni lokalite durumundadır.

Anahtar kelimeler: Hymenoptera, Ichneumonidae, Tersilochinae, Türkiye, Tür kompozisyonu.

1. Introduction

The order Hymenoptera includes insects commonly known as ants, bees and wasps. Most authors believe that the name has been derived from the Greek hymen, meaning ‘membrane’ and referring to the parchment-like transparent wings, without any scales or hair, and which often may be clouded (Gupta, 2005).

Hymenopterans include famous examples of social insects, like bees and ants, with regimented social systems in which members are divided into castes. They are also important pollinators of flowering plants, some species of which have flowers specially adapted to attract and receive the attention of specific hymenopteran (Palma, 2010).

Ichneumons (family Ichneumonidae), any of a large and widely distributed insect group (order Hymenoptera) of considerable economic importance. Ichneumons parasitize many insect groups, especially Lepidoptera (moths and butterflies), Coleoptera (beetles) and other Hymenoptera. Some utilize spiders as hosts. Thus, the group as a whole is beneficial to humans because it parasitizes many insect pests. A relatively small number of species parasitize beneficial insects (Viet, 2017)

Tersilochinae, one of the 47 subfamilies are a worldwide subfamily of the parasitic wasp family Ichneumonidae (Townes, 1971). Clypeus wide, separated from face by a groove, the apical margin with a fringe of long parallel setae. Mesopleuron with foveate groove extending from about mid height to metacoxa. Fore wing with areolet minute and open, pterostigma large and triangular. Metasoma laterally compressed. Metasomal tergite I slender, spiracle near apex. Ovipositor upcurved, short to very long, with dorsal subapical notch in this subfamily.

There are currently 34 genera and 524 species (Yu et al., 2016) in the world. Up to 1995 (Kolarov, 1995) only six species belonging to four genera have been documented in Türkiye (Sedivy, 1959; Horstmann, 1971, 1981; Kasparyan, 1981; Kolarov, 1989; Öncüler, 1991; Kolarov and Beyarslan, 1994). After 1995, with the contributions (Özdan, 2014; İnciklioğlu, 2022; Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2002; Gürbüz et al., 2008; 2011; Eroğlu et al., 2011; Çoruh et al., 2014a, b) the numbers of Tersilochinae fauna of Türkiye reached to 42 species and 14 genera.

The aim of this study is to analyze studies related to the Tersilochinae (Ichneumonidae) species collected so far from Türkiye by taxonomical and biogeographical. It is also to update the location data with Bingöl (Karlıova) added as a new location. In this way, our goal is to make this subfamily available with all its data to researchers and science volunteers interested in this subject and to contribute to biological diversity.

2. Materials and Methods

2.1. Material

Ichneumonid species detected in Türkiye are classified in Table 1 according to the research data of the years 1995-2014. As stated in these literatures, samples were generally collected using a standart sweeping net and were collected from various regions of Türkiye (Figure 1). In addition, *Aneuclis incidens* (Thomson, 1889) collected from Bingöl (Karlıova) in the summer of 2022. The species is newly registered for Bingöl and has been added to the existing species in a new locality.

2.2. Method

The ichneumonid specimens have been obtained in different researches. The genera and species are listed in the alphabetic order according the recent Interactive Catalogue of World Ichneumonidae (Yu et al., 2016). The distributional records were also used from this catalogue. In table 1, are included valid taxa names, individual numbers, zoogeographical distribution and reference data.

3. Results

In this study, all Tersilochinae samples that were previously collected from different locations in Anatolia after 1995 have been evaluated from different perspectives.

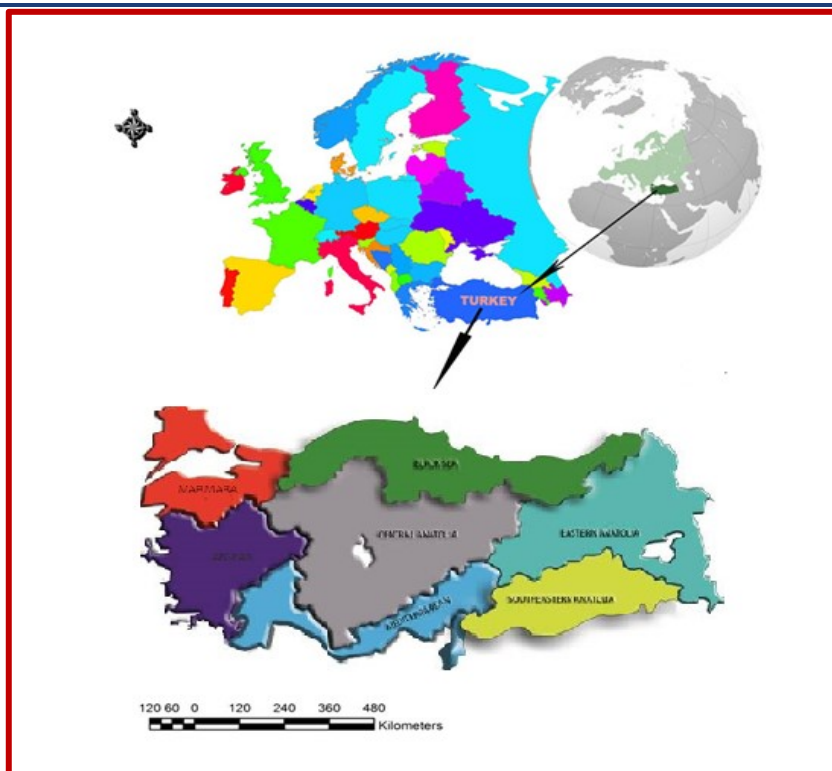


Figure 1. Research area

3.1. Faunistic Data

Evaluation was made according to the number of species and individuals of the existing genera. Accordingly it was recorded as one species and one samples belong to the genus *Allophroides*, three species and forty-seven samples belong to genus *Aneuclis*, two species and twenty samples belong to *Barycnemis*, five species and seven samples belong to *Diaparsis* (*Diaparsis*), two species and six samples belong to *Diaparsis* (*Nanodiaparsis*), two species and five samples belong to *Gelanes*, two species and seven samples belong to *Heterocola* (*Heterocola*), one species and one sample belong to *Heterocola* (*Heterocoloides*), six species and nine samples belong to *Phradis*, two species four samples belong to *Probles* (*Euporizon*), five species seventy-eight samples belong to *Probles* (*Microdiaparpis*), two species and two samples belong to *Probles* (*Probles*), three species and fourteen samples belong to *Tersilochus* (*Gonolochus*) and six species and fourteen samples belong to *Tersilochus* (*Tersilochus*).

It is understood that, while *Probles* (*Microdiaparpis*) is higher in number in terms of samples (*Figure 2a*), *Phradis* and *Tersilochus* (*Tersilochus*) are higher in number in terms of species (*Figure 2b*). Among the species detected, *Probles* (*Microdiaparpis*) *anatolicus* (with 70 samples), *Aneuclis incidens* (37), and *Barycnemis harpura* (18) were found to be the most ones in the research areas (*Table 1*). In contrast, the findings have shown that *Allophroides boops*, *Diaparsis* (*Diaparsis*) *carinifer*, *D. (D.) multiplicator*, *D. (D.) rara*, *D. (D.) temporalis*, *D. (Nanodiaparsis) frontella*, *Heterocola* (*Heterocola*) *longipalpis*, *H. (H.) inguaria*, *Phradis decrescens*, *P. minutus*, *P. morionellus*, *P. nigrutilus*, *Probles* (*Euporizon*) *exilis*, *P. (Microdiaparpis) caudiculatus*, *P. (Microdiaparpis) microcephalus*, *Probles* (*Microdiaparpis*) *neoversutus*, *Tersilochus* (*Gonolochus*) *rugulosus*, *Tersilochus* (*Tersilochus*) *cognatus*, *Tersilochus* *jocator* and *Tersilochus* (*Tersilochus*) *heterocerus* (with 1 individual) were rarely found in Anatolia (*Table 1*). The rate of the species collected as a single individual is 52%.

Table 1. Data of collected species

Names of Taxa	IN	VD	SD	GR	ZR	FRT
SUBFAMILY TERSILOCHINAE Schmiedeknecht, 1910						
Genus <i>Allophroides</i> Förster, 1869						
<i>Allophroides boops</i> (Gravenhorst, 1829)	1	A	Ap	CAR	E, WP	Gürbüz et al., 2011
Genus <i>Aneuclis</i> Förster, 1869						
<i>Aneuclis anterior</i> Horstmann, 1971	3	A	J, Aug, S	AR, MtR	EP, E, WP	Kolarov and Beyarslan, 1994
<i>Aneuclis incidens</i> (Thomson, 1889)	37	B, D, E, G	M, J, Jl, Aug, S, O	AR, BSR, EAR, MtR, MR, SAR	EP, E, WP	Sedivy, 1959
<i>Aneuclis melanaria</i> (Holmgren, 1860)	7	A, B	M, J, Jl	CAR, MtR	EP, E, WP	Horstmann, 1971
Genus <i>Barycnemis</i> Förster, 1869						
<i>Barycnemis alpina</i> (Strobl, 1901)	2	H	Jl	EAR	EP, E, WP	Çoruh et al., 2002
<i>Barycnemis harpura</i> (Schrank, 1802)	18	C, G, H	Jl, Aug	BSR, EAR	EP, E, NEAR, WP	Kolarov, 1989
Genus <i>Diaparsis</i> (<i>Diaparsis</i>) Förster, 1869						
<i>Diaparsis</i> (<i>Diaparsis</i>) <i>carinifer</i> (Thomson, 1889)	1	A	M	BSR	EP, E, NEAR, WP	Khalaim and Yurtcan, 2011
<i>Diaparsis</i> (<i>Diaparsis</i>) <i>multiplicator</i> Aubert, 1869	1	D	M	EAR	E, WP	Gürbüz et al., 2011
<i>Diaparsis</i> (<i>Diaparsis</i>) <i>nitida</i> Horstmann, 1981	3	A	Ap, M	BSR, MtR	EP, E, WP	Gürbüz et al., 2011
<i>Diaparsis</i> (<i>Diaparsis</i>) <i>rara</i> (Horstmann, 1971)	1	E	M	BSR	EP, E, WP	Khalaim and Yurtcan, 2011
<i>Diaparsis</i> (<i>Diaparsis</i>) <i>temporalis</i> Horstmann, 1979	1	A	A	MtR	EP, E, NEAR, WP	Khalaim and Yurtcan, 2011
Genus <i>Diaparsis</i> (<i>Nanodiaparsis</i>) Horstmann, 1971						
<i>Diaparsis</i> (<i>Nanodiaparsis</i>) <i>aperta</i> (Thomson, 1889)	5	E, F	J, Jl	AR, BSR, MtR	EP, E, WP	Horstmann, 1971
<i>Diaparsis</i> (<i>Nanodiaparsis</i>) <i>frontella</i> (Holmgren, 1860)	1	D	S	BSR	EP, E, WP	Çoruh and Khalaim, 2012
Genus <i>Gelanes</i> Horstmann, 1981						
<i>Gelanes fuscus</i> Holmgren, 1860	3	A, E	Mrc, J	MtR	EP, E, WP	Gürbüz et al., 2008
<i>Gelanes simillimus</i> Horstmann, 1981	2	A	Mrc, Ap	MtR	EP, E, WP	Gürbüz et al., 2011
Genus <i>Heterocola</i> (<i>Heterocola</i>) Horstmann, 1971						
<i>Heterocola</i> (<i>Heterocola</i>) <i>longipalpis</i> Kolarov & Beyarslan, 1994	1	G	Jl	EAR	WP	Kolarov and Beyarslan, 1994
<i>Heterocola</i> (<i>Heterocola</i>) <i>nigrotibialis</i> Horstmann & Kolarov, 1988	6	E	J, Jl	CAR	WP	Khalaim and Yurtcan, 2011
Genus <i>Heterocola</i> (<i>Heterocoloides</i>) Horstmann, 1971						
<i>Heterocola</i> (<i>Heterocoloides</i>) <i>inguaria</i> (Haliday, 1838)	1	G	Jl	EAR	E, WP	Kolarov and Beyarslan, 1994
Genus <i>Phradis</i> Förster, 1868						
<i>Phradis brevis</i> (Brischke, 1880)	3	A, E	Mrc, J	CAR, MtR	EP, E, WP	Gürbüz et al., 2011
<i>Phradis decrescens</i> (Thomson, 1889)	1	H	J	EAR	EP, E, WP	Khalaim and Yurtcan, 2011
<i>Phradis minutus</i> (Bridgman, 1889)	1	E	Jl	MtR	E, WP	Kolarov and Beyarslan, 1994
<i>Phradis morionellus</i> (Holmgren, 1860)	1	?	?	Anatolia	EP, E, WP	Horstmann, 1981
<i>Phradis nigrifolius</i> (Gravenhorst, 1829)	1	E	M	AR	EP, E, WP	Kolarov and Beyarslan, 1994
<i>Phradis rufiventris</i> Horstmann, 1981	2	H	J	EAR	EP, E, WP	Khalaim and Yurtcan, 2011

Table 1. Continued

Genus <i>Probles</i> (<i>Euporizon</i>) Horstmann, 1971							
<i>Probles</i> (<i>Euporizon</i>) <i>exilis</i> (Holmgren, 1860)	1	A	Aug	MtR	EP, E, WP	Sedivy, 1959	
<i>Probles</i> (<i>Euporizon</i>) <i>rufipes</i> (Holmgren, 1860)	3	H	Aug	BSR	E, WP	Horstmann, 1981	
Genus <i>Probles</i> (<i>Microdiarparis</i>) Horstmann, 1971							
<i>Probles</i> (<i>Microdiarparis</i>) <i>anatolicus</i> Horstmann, 1981	70	A, D, E	M, J, Jl, S, O	BSR, MR, MtR	WP	Horsmann, 1981	
<i>Probles</i> (<i>Microdiarparis</i>) <i>caudiculatus</i> Khalaim, 2007	1	G	O	EAR	EP, E, WP	Çoruh and Khalaim, 2012	
<i>Probles</i> (<i>Microdiarparis</i>) <i>microcephalus</i> (Gravenhorst, 1829)	1	A	J	BSR	E, WP	Çoruh et al., 2014b	
<i>Probles</i> (<i>Microdiarparis</i>) <i>neoversutus</i> (Horstmann, 1967)	1	E	S	BSR	EP, E, WP	Khalaim and Yurtcan, 2011	
<i>Probles</i> (<i>Microdiarparis</i>) <i>versutus</i> (Holmgren, 1860)	5	E	A	MtR	EP, E, WP	Eroğlu et al., 2011	
Genus <i>Probles</i> (<i>Probles</i>) Förster, 1868							
<i>Probles</i> (<i>Probles</i>) <i>erythrostomus</i> (Gravenhorst, 1829)	2	A	Ap, J	MtR	E, WP	Khalaim and Yurtcan, 2011	
<i>Probles</i> (<i>Probles</i>) <i>flavipes</i> (Szépligeti, 1899)	2	H	Jl	BSR	E, WP	Khalaim & Yurtcan, 2011	
Genus <i>Tersilochus</i> (<i>Gonolochus</i>) Holmgren, 1859							
<i>Tersilochus</i> (<i>Gonolochus</i>) <i>caudatus</i> (Holmgren, 1860)	4	A, F, G	M	EAR, MR	EP, E, WP	Khalaim and Yurtcan, 2011	
<i>Tersilochus</i> (<i>Gonolochus</i>) <i>rugulosus</i> Horstmann, 1981	1	D	Ap	AR	E, WP	Khalaim and Yurtcan, 2011	
<i>Tersilochus</i> (<i>Gonolochus</i>) <i>nitens</i> Horstmann & Kolarov, 1988	9	G, E	Ap, M, J	BSR, EAR	E, WP	Gürbüz et al., 2011	
Genus <i>Tersilochus</i> (<i>Tersilochus</i>) Holmgren, 1859							
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>cognatus</i> Holmgren, 1860	1	A	Ap	MtR	E, WP	Khalaim and Yurtcan, 2011	
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>jocator</i> Holmgren, 1859	1	F	Ap	MtR	E, WP	Gürbüz et al., 2011	
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>heterocerus</i> (Thomson, 1889)	1	A	J	MtR	E, WP	Khalaim and Yurtcan, 2011	
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>obscurator</i> (Aubert, 1959)	4	A, E, G	A, M	CAR, EAR, MR	E, WP	Khalaim and Yurtcan, 2011	
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>triangularis</i> (Gravenhorst, 1807)	3	A, E	A, M	AR, MR, MtR	E, WP	Gürbüz et al., 2011	
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>tripartitus</i> (Brischke, 1880)	4	A, D, E	A, M	AR, EAR, MR	E, WP	Khalaim and Yurtcan, 2011	

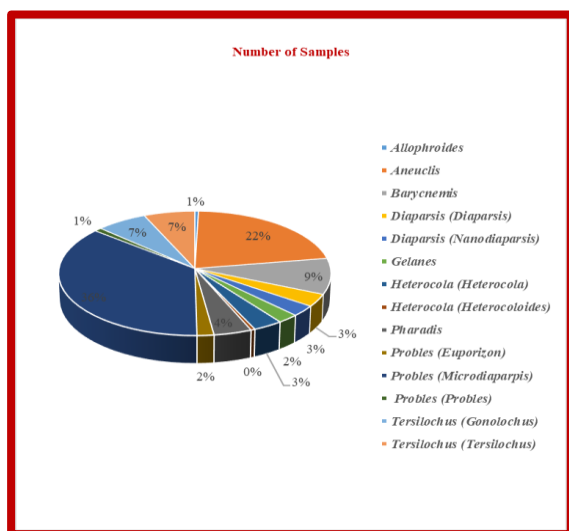
Individual numbers (IN), vertical distribution (VD), seasonal dynamics (SD), geographical regions (GR), zoogeographical regions (ZR), first record of Türkiye (FRT) of specimens. Vertical distribution (VD) (metre): A: 0-500 m, B: 501-750 m, C: 751-1000 m, D: 1001-1250 m, E: 1251- 1500 m, F: 1501-1750 m, G: 1751-2000 m, H: 2001-2700 m. Seasonal dynamics (SD): Mrc: March, A: 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, MtR: Mediterranean Region, SAR: Southeastern Anatolia. Zoogeographical regions (ZR): E: Europe, EP: Eastern Palaearctic, NEAR: Nearctic Region, WP: Western Palaearctic.

Table 2. Provinces and references of collected species in Türkiye

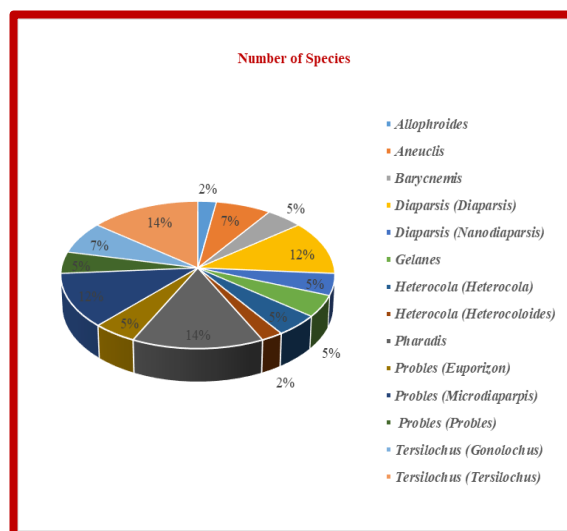
Names of Taxa	Distributions in Türkiye	Reference (s)
SUBFAMILY TERSILOCHINAE Schmiedeknecht, 1910		
Genus <i>Allophroides</i> Förster, 1869		
<i>Allophroides boops</i> (Gravenhorst, 1829)	Karaman	Gürbüz et al., 2011
Genus <i>Aneuclis</i> Förster, 1869		
<i>Aneuclis anterior</i> Horstmann, 1971	Adana, Antalya, İzmir	Kolarov & Beyarslan, 1994; Khalaim and Yurtcan, 2011
<i>Aneuclis incidens</i> (Thomson, 1889)	Adana, Adıyaman, Afyon, Antalya, Burdur, Edirne, Gaziantep, İçel, Osmaniye, Kastamonu, Kütahya, Van	Sedivy, 1959; Horstmann, 1971; Kasparyan, 1981; Öncüer, 1991; Kolarov, 1989; Kolarov, 1995; Kolarov and Beyarslan, 1994; Khalaim and Yurtcan, 2011
<i>Aneuclis melanaria</i> (Holmgren, 1860)	Ankara, Çanakkale, Çankırı	Horstmann, 1971; Kolarov, 1989; Kolarov, 1995
Genus <i>Barycnemis</i> Förster, 1869		
<i>Barycnemis alpina</i> (Strobl, 1901)	Bayburt	Çoruh et al., 2002; Khalaim and Yurtcan, 2011; Çoruh et al., 2014a
<i>Barycnemis harpura</i> (Schrank, 1802)	Ardahan, Artvin, Erzurum, Rize, Van	Kolarov, 1989; Kolarov and Beyarslan, 1994; Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a
Genus <i>Diaparsis (Diaparsis)</i> Förster, 1869		
<i>Diaparsis (Diaparsis) carinifer</i> (Thomson, 1889)	Samsun	Khalaim and Yurtcan, 2011
<i>Diaparsis (Diaparsis) multiplicator</i> Aubert, 1969	Erzincan	Gürbüz et al., 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a
<i>Diaparsis (Diaparsis) nitida</i> Horstmann, 1981	Hatay, Kars, Samsun	Gürbüz et al., 2011; Khalaim and Yurtcan, 2011; Çoruh et al., 2014a
<i>Diaparsis (Diaparsis) rara</i> (Horstmann, 1971)	Kastamonu	Khalaim and Yurtcan, 2011
<i>Diaparsis (Diaparsis) temporalis</i> Horstmann, 1979	Edirne	Khalaim and Yurtcan, 2011
Genus <i>Diaparsis (Nanodiaparsis)</i> Horstmann, 1971		
<i>Diaparsis (Nanodiaparsis) aperta</i> (Thomson, 1889)	West Türkiye, Artvin, Hatay, Osmaniye	Horstmann, 1971; Kasparyan, 1981; Kolarov, 1995; Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Gürbüz et al., 2011; Çoruh et al., 2014a
<i>Diaparsis (Nanodiaparsis) frontella</i> (Holmgren, 1860)	Kastamonu	Khalaim and Yurtcan, 2011
Genus <i>Gelanes</i> Horstmann, 1981		
<i>Gelanes fuscus</i> Holmgren, 1860	Hatay, Isparta	Özdan, 2014; Gürbüz et al., 2008; Gürbüz et al., 2011
<i>Gelanes simillimus</i> Horstmann, 1981	Hatay	Gürbüz et al., 2011
Genus <i>Heterocola (Heterocola)</i> Horstmann, 1971		
<i>Heterocola (Heterocola) longipalpis</i> Kolarov & Beyarslan, 1994	Erzurum	Kolarov and Beyarslan, 1994; Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a
<i>Heterocola (Heterocola) nigrotibialis</i> Horstmann and Kolarov, 1988	Sivas	Khalaim and Yurtcan, 2011
Genus <i>Heterocola (Heterocoloides)</i> Horstmann, 1971		
<i>Heterocola (Heterocoloides) inguaria</i> (Haliday, 1838)	Erzurum	Kolarov and Beyarslan, 1994
Genus <i>Phradis</i> Förster, 1868		
<i>Phradis brevis</i> (Brischke, 1880)	Hatay, Sivas	Khalaim and Yurtcan, 2011; Gürbüz et al., 2011
<i>Phradis decrescens</i> (Thomson, 1889)	Van	Khalaim and Yurtcan, 2011
<i>Phradis minutus</i> (Bridgman, 1889)	Isparta	Kolarov and Beyarslan, 1994; Khalaim and Yurtcan, 2011
<i>Phradis morionellus</i> (Holmgren, 1860)	Anatolia	Horstmann, 1981; Kolarov, 1995; Khalaim and Yurtcan, 2011
<i>Phradis nigritulus</i> (Gravenhorst, 1829)	İçel	Kolarov and Beyarslan, 1994; Khalaim and Yurtcan, 2011
<i>Phradis rufiventris</i> Horstmann, 1981	Van	Khalaim and Yurtcan, 2011

Table 2. continued

Genus <i>Probles</i> (<i>Euporizon</i>) Horstmann, 1971		
<i>Probles</i> (<i>Euporizon</i>) <i>exilis</i> (Holmgren, 1860)	Adana	Sedivy, 1959; Öncüer, 1991; Kolarov, 1995; Khalaim and Yurtcan, 2011
<i>Probles</i> (<i>Euporizon</i>) <i>rufipes</i> (Holmgren, 1860)	Trabzon	Horstmann, 1981; Kolarov, 1995; Khalaim and Yurtcan, 2011
Genus <i>Probles</i> (<i>Microdiaparsis</i>) Horstmann, 1971		
<i>Probles</i> (<i>Microdiaparsis</i>) <i>anatolicus</i> Horstmann, 1981	Isparta, Rize, Tekirdağ, Trabzon	Özdan, 2014; Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a
<i>Probles</i> (<i>Microdiaparsis</i>) <i>caudiculatus</i> Khalaim, 2007	Erzurum	Çoruh and Khalaim, 2012; Çoruh et al., 2014a
<i>Probles</i> (<i>Microdiaparsis</i>) <i>microcephalus</i> (Gravenhorst, 1829)	Rize	Çoruh et al., 2014b, Çoruh et al., 2014a
<i>Probles</i> (<i>Microdiaparsis</i>) <i>neoversutus</i> (Horstmann, 1967)	Kastamonu	Khalaim and Yurtcan, 2011
<i>Probles</i> <i>versutus</i> (Holmgren, 1860)	Isparta	Eroğlu et al., 2011
Genus <i>Probles</i> (<i>Probles</i>) Förster, 1868		
<i>Probles</i> (<i>Probles</i>) <i>erythrostomus</i> (Gravenhorst, 1829)	Afyon, Antalya	Khalaim and Yurtcan, 2011
<i>Probles</i> (<i>Probles</i>) <i>flavipes</i> (Szépligeti, 1899)	Trabzon	Khalaim and Yurtcan, 2011
Genus <i>Tersilochus</i> (<i>Gonolochus</i>) Holmgren, 1859		
<i>Tersilochus</i> (<i>Gonolochus</i>) <i>caudatus</i> (Holmgren, 1860)	Edirne, Erzurum	Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a
<i>Tersilochus</i> (<i>Gonolochus</i>) <i>rugulosus</i> Horstmann, 1981	Afyon	Khalaim and Yurtcan, 2011
<i>Tersilochus</i> (<i>Gonolochus</i>) <i>nitens</i> Horstmann & Kolarov, 1988	Erzincan, Hatay, Osmaniye, Kastamonu	Gürbz et al., 2011; Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a
Genus <i>Tersilochus</i> (<i>Tersilochus</i>) Holmgren, 1859		
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>cognatus</i> Holmgren, 1860	Edirne	Khalaim and Yurtcan, 2011
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>jocator</i> Holmgren, 1859	Hatay	Gürbüz et al., 2011
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>heterocerus</i> (Thomson, 1889)	Bursa	Khalaim and Yurtcan, 2011
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>obscurator</i> (Aubert, 1959)	Ankara, Edirne, Erzurum, Konya	Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>triangularis</i> (Gravenhorst, 1807)	Afyon, Edirne, Hatay	Gürbüz et al., 2011; Khalaim and Yurtcan, 2011
<i>Tersilochus</i> (<i>Tersilochus</i>) <i>tripartitus</i> (Brischke, 1880)	Afyon, Edirne, Erzurum	Khalaim and Yurtcan, 2011; Çoruh and Khalaim, 2012; Çoruh et al., 2014a



a



b

Figure 2. Distribution of species: a) according to number samples, b) according to number species

3.2. Ecological Data

Both a-biotic (temperature, humidity, light) and biotic (host, vegetative biodiversity, crowding and diets) stresses significantly influence the insects and their population dynamics (Khaliq et al., 2014). In this study, Tersilochine specimens were collected from different altitudes in collection areas.

The insects to be examined in this study were collected from an altitude range of 0-2700 m. As shown in Table 1, nineteen species have formed habitats in the range of 0-500 (A) m, two species in the range of 501-750 (B) m, only one species in the range of 751-1000 (C) m, six species in the range of 1001-1250 (D) m, 15 species in the range of 1251-1500 (E) m, three species in the range of 1501-1750 (F) m, eight species in the range of 1751-2000 (G) m and six species in the range of 2001-2700 (H) m (Figure 3a). Based on the findings, we can say that the range of 0-500 m is mainly preferred by tersilochines.

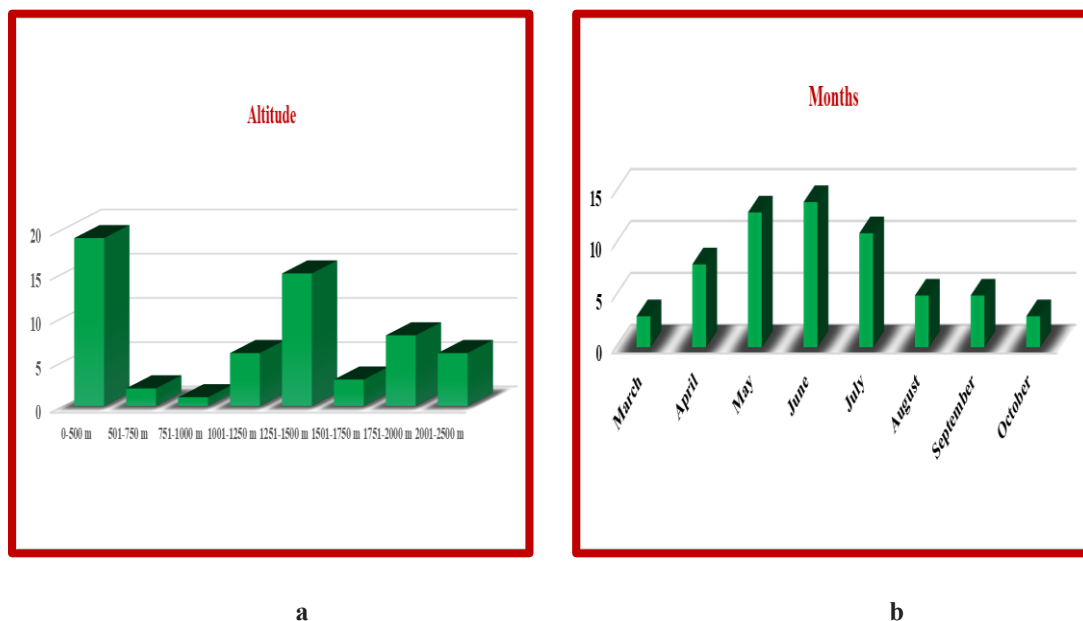


Figure 3. Distribution of species: a) according to altitude, b) according to months

Among them, twenty-nine species were collected from only one altitude. While *Aneuclis incidens* were collected from four different altitudes, *Barycnemis harpura*, *Probles (Microdiaparpis) anatolicus*, *Tersilochus (Gonolochus) caudatus*, *Tersilochus (Tersilochus) obscurator* and *Tersilochus (Tersilochus) tripartitus* were collected from three different altitudes.

An evaluation was also made about the months in which the tersilochines were collected. These species were generally collected from March to October (Figure 3b). However, in May and June, the population was denser. As seen in Table 1, twenty-five species were collected in a single month, *Aneuclis incidens* was collected in six different months in a year. Our findings have shown that *Aneuclis incidens* is highly adaptable to different altitudes and different climate conditions.

3.3. Zoogeographical Data

Türkiye has a rich biodiversity with over nine thousand natural and more than 30% endemic plant species in its geography (Teymuroğlu and Çoruh, 2022; Zeybek and Tozlu, 2022) and has seven geographical regions (Figure 1). In Table 1, the regions where the species are distributed are given in detail. As seen in Table 1, most of the samples were collected from the Mediterranean region (18), the Black Sea region, and the Eastern Anatolia region (13), and the least number of samples were collected from the Southeastern Anatolia region. The names of the provinces where the samples were collected are summarized in Table 2 (Figure 4a).

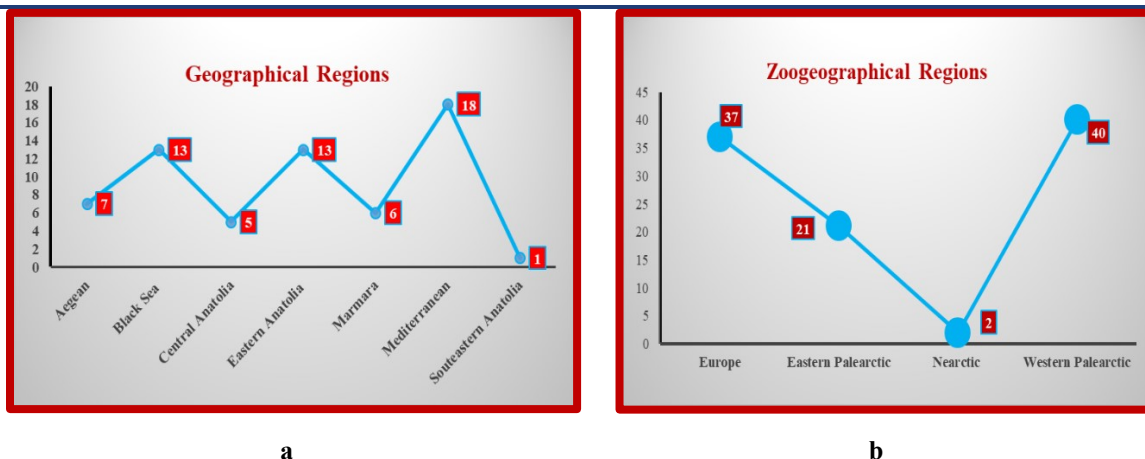


Figure 4. Distribution of species: a) according to geographic regions, b) according to zoogeographical regions

When Table 1 and Table 2 are analyzed in terms of the regions where the samples were collected, it shows that; *Aneuclis incidens* was collected from six regions, *Diaparsis (Nanodiaparsis) aperta*, *Probles (Microdiaparpis) anatolicus*, *Tersilochus (Tersilochus) obscurator*, *Tersilochus (Tersilochus) triangularis* and *Tersilochus (Tersilochus) tripartitus* were collected from three regions. However, *Allophroides boops*, *Barycnemis alpina*, *Diaparsis (Diaparsis) carinifer*, *D. (D.) multiplicator*, *D. (D.) rara*, *D. (D.) temporalis*, *D. (Nanodiaparsis) frontella*, *Gelanes fuscus*, *G. simillimus*, *Heterocola (Heterocola) longipalpis*, *H. (H.) nigrotibialis*, *H. (Heterocoloides) inguaria*, *Phradis decrescens*, *P. minutus*, *P. morionellus*, *P. nigritulus*, *P. rufiventris*, *Probles (Euporizon) exilis*, *P. (E.) rufipes*, *P. (Microdiaparpis) caudiculatus*, *P. (M.) microcephalus*, *P. (M.) neoversutus*, *P. (M.) versutus*, *P. (Probles) erythrostomus*, *P. (P.) flavipes*, *Tersilochus (Gonolochus) rugulosus*, *T. (T.) cognatus*, *T. (T.) jocator* and *T. (T.) heterocerus* were collected from one single region.

The distribution in the world regarding the areas of the insects was also analyzed and proportioned. According to this analysis, the West Palearctic has 95,2%, Europe has 88,0%, the East Palearctic has 46,20% and the Nearctic has 4,4%. The insects that were the subjects of our study were not found in the Afrotropical, Australian, Oceanic, and Neotropical regions (Figure 4b).

According to these results, Western Palearctic and Europe have the highest numbers of species. Among these species, *D. (D.) carinifer* and *D. (D.) temporalis* were found to be distributed in four different regions. Also, the research has shown that only three of them were distributed in a single zoogeographical region. As a result, it became apparent that *H. (H.) longipalpis* is an endemic species for Türkiye at the moment. At the same time, *H. (H.) nigrotibialis* was found in Bulgaria and Türkiye, *T. (G.) rugulosus* was found in Italy and Türkiye, *T. (G.) nitens* was found in Bulgaria, and Türkiye, *T. (T.) cognatus* was found in Germany, Sweden, and Türkiye. These species are considered rare species for Türkiye.

3.4. Data of host by adult:

Barichneumon sp. Thomson, 1893 was obtained from *Sesamia nonagrioides* which feed that *Zea mays* in Adana (Bayram et al., 2007).

3.5. New data for East Anatolia:

Aneuclis incidens (Thomson, 1889)

Material examined: Bingöl: Karlıova, 2013 m, 21.X.2022, Leg: M. Dalan; 1775 m, 11.XI.2022, Leg: M. Dalan.

Hosts: *Anobium fagi*, *Meligethes aeneus*, *Meligethes viridescens*.

This species is new for Bingöl (Karlıova) Province.

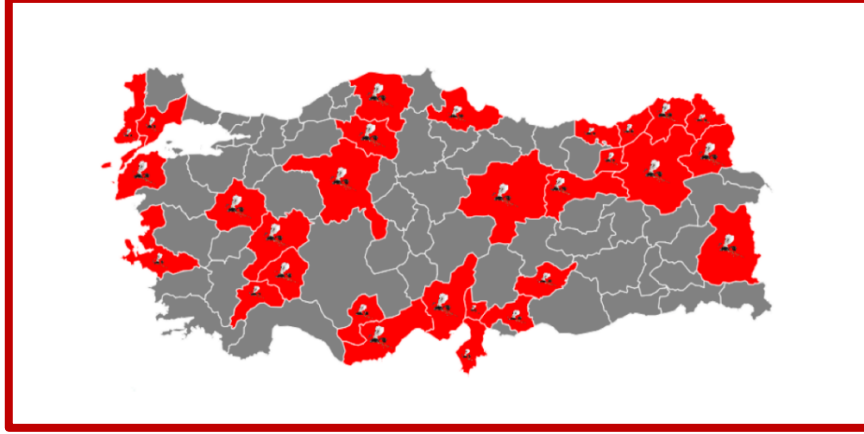


Figure 5. Distribution of species in Türkiye.

4. Conclusion

Tersilochinae species were detected in 30 provinces in our country (Figure 5). Türkiye has 81 provinces. In other words, this subfamily was detected in 24.3% of our country. With this study, the number of provinces increased by one to 31. Bingöl was recorded as a new locality for this subfamily (Figure 6).

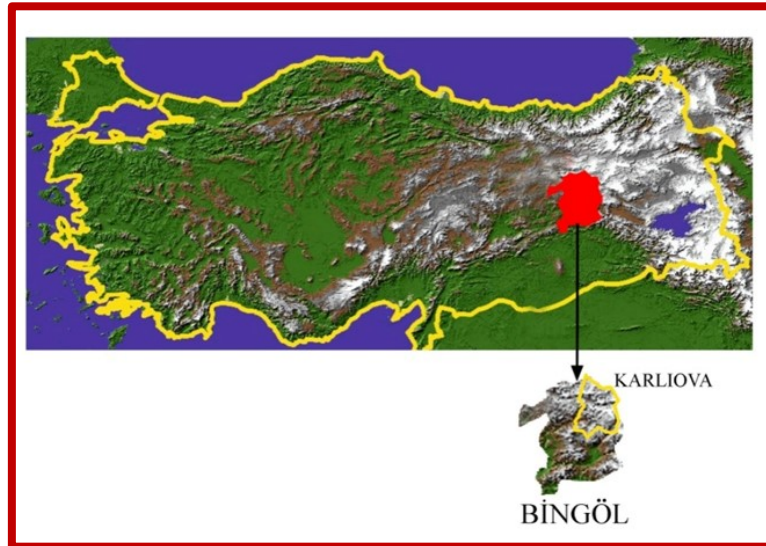


Figure 6. Distribution of species in new locality.

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Ethical Statement

There is no need to obtain permission from the ethics committee for this study.

Conflicts of Interest

We declare that there is no conflict of interest between us as the article authors.

Authorship Contribution Statement

Concept: Çoruh, S., Dalan, M.; Data Collection or Processing: Dalan, M.; Literature Search: Dalan, M.; Writing, Review and Editing: Çoruh, S., Dalan, M.

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