

Contribution on the knowledge of Sesiidae in the Thracian Region of Türkiye (Insecta: Lepidoptera)

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Abstract

Sesiidae (Lepidoptera) is an important family which includes economically pest species in a variety of agricultural products in the order. In this study it was aimed to contribute to the Sesiidae species in the Thracian region of Türkiye by using pheromone traps and netting in 2021. In the study 11 Sesiidae species belonging to seven genera were determined: *Microsphecia brosiiformis* (Hübner, [1813]), *M. tineiformis* (Esper, [1789]), *Negotinthia myrmosaeformis* (Herrich-Schäffer, [1846]), *Paranthrene tabaniformis* (Rottemburg, 1775), *Synanthedon myopaeformis* (Borkhausen, 1789), *S. vespiformis* (Linnaeus, 1761), *Bembecia ichneumoniformis* ([Denis & Schiffermüller], 1775), *B. scopigera* (Scopoli, 1763), *Pyropteron minianiformis* (Freyer, 1843), *P. triannuliformis* (Freyer, 1843) and *Chamaesphacia doryceraeformis* (Lederer, 1853). *M. tineiformis*, which is not common in Türkiye and was recorded for the first time from the Thracian region (European part) of Türkiye.

Keywords: Lepidoptera, Sesiidae, biodiversity, host plant, fauna, European Türkiye.

Contribución al conocimiento de los Sesiidae en la región de la Tracia de Türkiye (Insecta: Lepidoptera)

Resumen

Sesiidae (Lepidoptera) es una familia importante que incluye especies económicamente plaga en una variedad de productos agrícolas del orden. En este estudio se pretendía contribuir a las especies de Sesiidae en la región de la Tracia de Türkiye mediante el uso de trampas de feromonas y redes en 2021. En el estudio se determinaron 11 especies de Sesiidae pertenecientes a siete géneros: *Microsphecia brosiiformis* (Hübner, [1813]), *M. tineiformis* (Esper, [1789]), *Negotinthia myrmosaeformis* (Herrich-Schäffer, [1846]), *Paranthrene tabaniformis* (Rottemburg, 1775), *Synanthedon myopaeformis* (Borkhausen, 1789), *S. vespiformis* (Linnaeus, 1761), *Bembecia ichneumoniformis* ([Denis & Schiffermüller], 1775), *B. scopigera* (Scopoli, 1763), *Pyropteron minianiformis* (Freyer, 1843), *P. triannuliformis* (Freyer, 1843) y *Chamaesphacia doryceraeformis* (Lederer, 1853). *M. tineiformis*, que no es común en Türkiye y se registró por primera vez en la región de Tacia (parte europea) de Türkiye.

Palabras clave: Lepidoptera, Sesiidae, biodiversidad, planta nutricia, fauna, Türkiye europea.

Introduction

On all continents, with the exception of Antarctica, the family Sesiidae (Lepidoptera) contains several species that prefer a warm climate and, not infrequently, even arid or semi-arid environments. All European Sesiidae species are active during the daytime and are known for their characteristic “hymenopteriform” mimicry (Laštůvka & Laštůvka, 2001). Their larvae always reside inside the host

plants, whether it be in the roots, trunks, branches, or shoots, and they feed on the plant's sap. A variety of hostplants are infested by the Sesiidae family, including fruit trees, bushes, numerous cultivated plants and as many wild plants as well (Laštůvka & Laštůvka, 2001). The first study on Sesiidae appeared in the late 18th and early 19th century. It was first considered as a separate family by Boisduval (1828), then Stephens (1828) defined the family under the name Aegeriidae. Laspeyres (1801) was the first to discuss in detail the species present in Europe, followed by Herrich-Schäffer (1846- 1852) and Staudinger (1856) (Laštůvka & Laštůvka, 2001). This family has a wide geographic distribution, with 170 genera, 1552 species, and 46 subspecies worldwide (Laštůvka & Laštůvka, 2001; Pühringer & Kallies, 2004; Pühringer & Kallies, 2022).

Only a few studies have been conducted in Türkiye about Sesiidae species that are damaging economically important hosts, such as *Synanthedon myopaeformis* (Borkhausen, 1789), which is a member of this family and infests apple trees (Altay, 1968). Tamer & Özer (1990) performed bioecology and control on *Bembecia scopigera* (Scopoli, 1763) on sainfoin (*Onobrychis viciifolia* Scop.) in the province of Ankara. Gültekin & Güçlü (1997) investigated the biology, infestation rates and natural enemies of *Bembecia scopigera* (Scopoli, 1763) on the same host plant in the province of Erzurum. Population development of *S. myopaeformis* was investigated in the province of Çanakkale in the Marmara Region and it was determined that the damage it caused on apple trees was significant (Özpinar et al. 2009). The same species was also reported, at varying population densities in apple orchards in the province Hatay in the eastern Mediterranean Region (İldır, 2014). *Synanthedon pamphyla* Kallies, 2003 was described as a new species from Alanya, southern Türkiye. Sesiidae specimens collected from different regions of Türkiye, especially the Eastern Anatolia Region, in the summer of 2003 and kept in the Atatürk University Entomology Museum, Türkiye (EMET) were examined and 36 species belonging to 11 genera were identified (Garrevoet et al. 2005).

Gorbunov & Efetov (2018) used pheromones in a study and generated identification keys for all species in the genus *Bembecia*, defined their genital characteristics, and reported a new species for science from Crimea. In the province of Hatay, *Synanthedon syriaca* Špatenka, 2001 was determined as a new record for the fauna of Türkiye (Can et al. 2010). In a study, *Tinthia brosisformis* (Hübner, [1813]), *S. syriaca* and *B. scopigera* were observed in Hatay, using different pheromone combinations, and the effectiveness of these pheromones for these species was investigated (Sağıroğlu & Can Cengiz, 2011).

In this study, it was aimed to determine and provide information on the species of the Sesiidae family, which have different host plants, contain economically important pests and whose species were rarely studied in Türkiye. This study is the first one focussing on the Sesiidae family in the Thracian region of Türkiye.

Material and methods

The Sesiidae species of the Thracian region of Türkiye were studied by using pheromone traps and by netting in different biotopes in 2021. Field observations were undertaken in 80 different localities in five provinces namely Edirne, Kırklareli and Tekirdağ and also the European parts of Istanbul and Çanakkale (Table 1, Figure 1).

The pheromones used in this study originated from Pherobank (Wijk-bij-Duurstede, The Netherlands). The following compositions were used:

HYL: target species *Pennisetia hylaeiformis* (Laspeyres, 1801)

API: target species *Sesia apiformis* (Clerck, 1759)

MYO: target species *Synanthedon myopaeformis* (Borkhausen, 1789)

VES: target species *Synanthedon vespiformis* (Linnaeus, 1761)

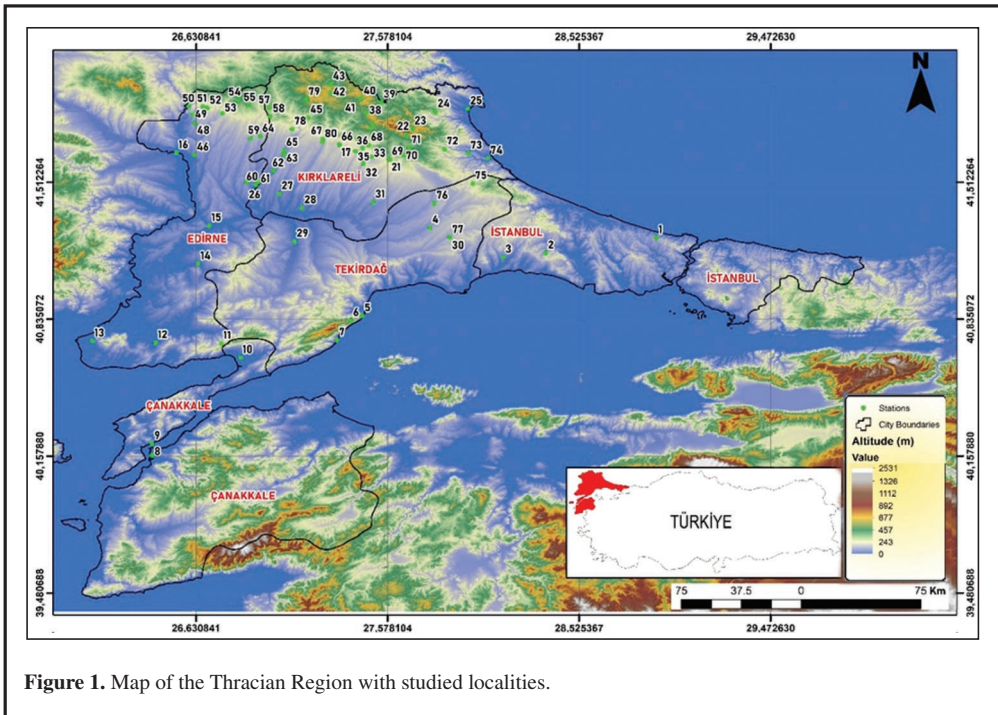


Figure 1. Map of the Thracian Region with studied localities.

The components of the pheromones, used to compose the lures to attract Sesiidae species, are aliphatic carbon chains consisting of 18 carbon atoms, 2 double bonds, and an alcohol, acetate, or aldehyde at the end of the chain. And because of the double bonds, there are also enantiomers and the purity of these plays an important role in the efficacy of the pheromone (Priesner et al. 1986). In most cases, an artificially constituted pheromone consists of two of these components. These molecules are impregnated into a plastic vial or rubber stopper. The pheromones are stored individually in well-sealed plastic containers. When not in use, they are kept at -20 C to maintain their efficiency for a long time. Before use, the lures were allowed to reach room temperature without opening the containers to avoid condensation on the lures. During transport, the pheromones were stored in a cooling box. The Sesiidae fauna of the Thrace Region was studied by using pheromones and by netting in different biotopes in 2021. The pheromone lures were hung from trees or lower plants, a gap of at least a few meters was left between each pheromone. The lures were contained in a small bag of curtain material, tied with a string, and attached to the branch or plant with a paper clip (Figure 2). Sesiidae attracted to pheromones were recorded or collected for at least half an hour at each sampling locality. Additionally, sampling was done with a net outside the sites where the pheromones were hung.

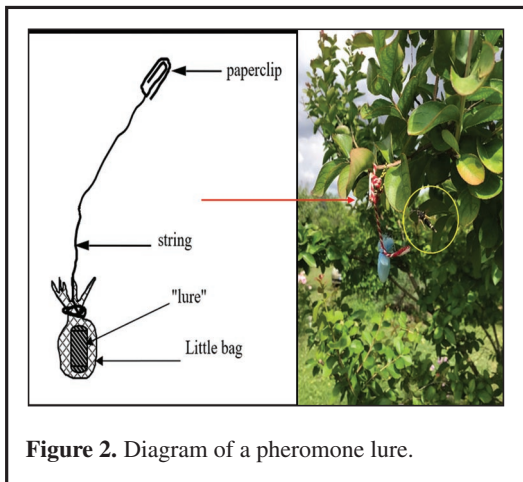


Figure 2. Diagram of a pheromone lure.

Some sesiid species were observed and photographed in the field. The identification of the specimens, terminology, classification, and nomenclature of morphological structures are based on Laštůvka & Laštůvka 2001 and Pühringer F. 2023. Collected specimens were dissected in the laboratory, with the genitalia embedded in entellan on slides, following standard procedures.

Results and discussion

Males of 10 Sesiidae species were attracted: *Microsphecia brosisiformis* (Hübner, [1813]), *M. tineiformis* (Esper, [1789]), *Negotinthia myrmosaeformis* (Herrich-Schäffer, [1846]), *Paranthrene tabaniformis* (Rottemburg, 1775), *Synanthedon myopaeformis* (Borkhausen, 1789), *Bembecia ichneumoniformis* ([Denis & Schiffermüller], 1775), *Bembecia scopigera* (Scopoli, 1763), *Pyropteron minianiformis* (Freyer, 1843), *Pyropteron triannuliformis* (Freyer, 1843) and *Chamaesphacia doryceraeformis* (Lederer, 1853).

Five Sesiidae species, which were attracted to pheromone traps, were directly collected by netting: *Microsphecia tineiformis* (Esper, [1789]), *Negotinthia myrmosaeformis* (Herrich-Schäffer, [1846]), *Paranthrene tabaniformis* (Rottemburg, 1775) (Figure 3), *Pyropteron minianiformis* (Freyer, 1843) and *P. triannuliformis* (Freyer, 1843). *Synanthedon vespiformis* (Linnaeus, 1761) was caught with a net without using pheromones.

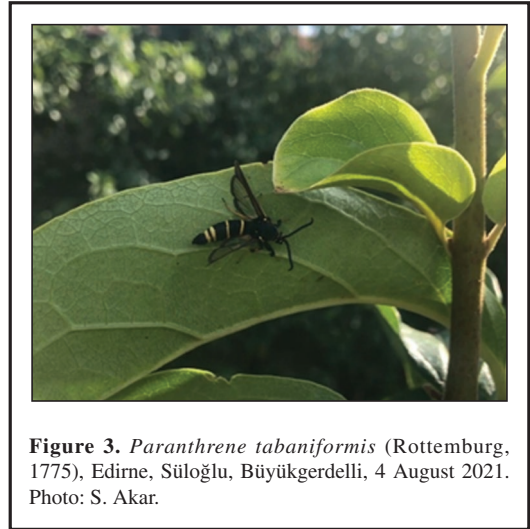


Figure 3. *Paranthrene tabaniformis* (Rottemburg, 1775), Edirne, Süloğlu, Büyükgerdelli, 4 August 2021. Photo: S. Akar.

Microsphecia tineiformis (Esper, [1789])

Material examined. 34, 23-VIII-2021, coll. S. Akar, 1 ♀ collected by net; 64, 07-VII- 2021, coll. S. Akar, 10 ♂ attracted to Pheromone VES; 68, 23-VIII-2021, coll. S. Akar, 1 ♀ collected by net; 69, 10-VII-2021, coll. S. Akar, 1 ♀ collected by net; 71, 10- VII-2021, coll. S. Akar, 1 ♂ collected by net; 79, 15-VII-2021, coll. S. Akar, 1 ♀ collected by net; 80, 17-VIII-2021, coll. S. Akar, 1 ♂ collected by net.

Distribution: The species occurs in Southern Europe (holomediterranean), the Balkans and Türkiye (Laštůvka & Laštůvka, 2001; Garrevoet et al. 2007); Portugal, Spain (including the Balearic Islands), France (including Corsica), Italy (including Sardinia and Sicily), Malta, Croatia, Slovenia, Hungary, Bosnia-Herzegovina, North Macedonia, Serbia, Albania, Bulgaria, Greece (including Crete) (Lepiforum e.V. 2023; Pühringer, 2023).

The caterpillar feeds in or alongside the root of *Convolvulus* sp. (Laštůvka & Laštůvka 2001). It is a small species that is not common in Türkiye. The third author never encountered this species in de central or eastern regions of the country. The adult has a well- developed proboscis. The life cycle is annual.

Microsphecia brosisiformis (Hübner, [1813])

Material examined. 64, 13-VII-2021, coll. S. Akar, 7 ♂ attracted to Pheromon VES.

Distribution: Slovakia, Hungary, Croatia, Montenegro, southern Serbia, Romania, Albania, Bosnia-Herzegovina, Bulgaria, Greece, southern Russia, Türkiye, Iran, Turkmenistan, Uzbekistan, Kazakhstan, Kyrgyzstan (Garrevoet et al. 2007).

The caterpillar feeds in or alongside the root of *Convolvulus* sp. (Laštůvka & Laštůvka, 2001). It is

a small species that is common in the whole of Türkiye (Garrevoet et al. 2007). The adult has a reduced and non-functional proboscis. The life cycle is annual.

Negotinthia myrmosaeformis (Herrich-Schäffer, [1846])

Material examined. 5, 28-VI-2021, coll. F. Can, 7 ♂ attracted to Pheromone HYL; 12, 29-VI-2021, coll. F. Can, 2 ♂ attracted to Pheromone HYL and coll. S. Akar, 2 ♂ collected by net; 17, 30-VI-2021, coll. F. Can, 2 ♂ collected by net; 21, 30-VI-2021, coll. F. Can, 2 ♂ attracted to Pheromone VES and coll. S. Akar, 1 ♂ collected by net; 34, 02-VII-2021, coll. F. Can, 1 ♂ attracted to Pheromone VES; 36, 02-VII-2021, coll. F. Can, 1 ♂ attracted to Pheromone VES; 44, 02-VII-2021, coll. S. Akar, 1 ♂ collected by net; 71, 23-VIII-2021, coll. S. Akar, 1 ♂ collected by net.

Distribution: Bulgaria, Greece, Macedonia, Montenegro, eastern Romania, Serbia, Türkiye, Ukraine (Crimea) (Garrevoet et al. 2007; Lepiforum e.V. 2023).

The caterpillar feeds in the root of *Potentilla recta* L. (Laštůvka & Laštůvka, 2001; Ksmal & Turanl, 2002; Garrevoet et al. 2005). It is a small species that is common in the whole of Türkiye. The adult has a well-developed proboscis. The life cycle is annual.

Paranthrene tabaniformis (Rottemburg, 1775)

Material examined. 18, 30-VI-2021, coll. S. Akar, 1 ♂ collected by net; 30, 01-VII-2021, coll. F. Can, 3 ♂ collected by net; 60, 07-VII-2021, coll. S. Akar, 1 ♂ attracted to Pheromone VES; 63, 07-VII-2021, coll. S. Akar, 5 ♂ attracted to Pheromone VES; 64, 09-VII-2021, coll. S. Akar, 1 ♂ attracted to Pheromone VES; 64, 22-VII-2021, coll. S. Akar, 2 ♂ collected by net; 64, 04-VIII-2021, coll. S. Akar, 1 ♂ collected by net.

Distribution: Holarctic species. In the Palaearctic region throughout Europe, northern Africa and Asia to north-western India and China, also Japan (Garrevoet et al. 2007).

The caterpillar feeds in the branches and trunks of *Populus* sp. (Laštůvka & Laštůvka, 2001; Garrevoet et al. 2005) and rarely in *Salix* sp. (Laštůvka & Laštůvka, 2001). It is a rather large species that is present in the whole of Türkiye where the hostplants occur (Garrevoet et al. 2005). The adult has a well-developed proboscis. The life cycle is biennial, rarely annual.

Synanthedon myopaeformis (Borkhausen, 1789)

Material examined. 64, 13-VII-2021, 3 ♂ coll. S. Akar, attracted to Pheromone MYO.

Distribution: throughout Europe (including Scandinavia), European Russia (north to St. Petersburg), Spain, northern Italy, Türkiye, Cyprus as *Synanthedon myopaeformis luctuosa* (Lederer, 1853) (Bartsch, 2004), northern Egypt, Transcaucasia, Kyrgyzstan (Špatenka & Kallies, 2006) (Garrevoet et al. 2007).

The caterpillar feeds under the bark of *Malus* sp. trees but also other representatives of the Maloidea are infested (Altay 1968; Laštůvka & Laštůvka, 2001). It is a medium sized species that is present in the whole of Türkiye where the hostplants occur (Garrevoet et al. 2007). The adult has, as all representatives of this genus, a well-developed proboscis. The life cycle is annual.

Synanthedon vespiformis (Linnaeus, 1761)

Material examined. 64, 13-VIII-2021, coll. S. Akar, 1 ♂ collected by net.

Distribution: throughout Europe (to 60° N), European Russia (north to St. Petersburg), Türkiye, Lebanon, Transcaucasia (Garrevoet et al. 2007).

This species is very polyphagous, but the caterpillar mainly feeds under the bark of *Quercus* sp. trees (Laštůvka & Laštůvka, 2001). It is a medium sized species that is present in the whole of Türkiye (Garrevoet et al. 2007). The life cycle is biennial or sometimes annual.

Bembecia ichneumoniformis ([Denis & Schiffermüller], 1775)

Material examined. 71, 10-VII-2021, coll. S. Akar, 1 ♂ attracted to Pheromone API.

Distribution: England, Europe (except the extreme northern part), Cyprus, Ukraine, European Russia, Caucasus, Transcaucasia, Türkiye, northern Iran (Garrevoet et al. 2007).

This species lives as a caterpillar inside the root of various species of Fabaceae but is mostly found in *Lotus* species (Laštůvka & Laštůvka, 2001). It is a medium sized species that is present in the whole of Türkiye. The life cycle is annual, occasionally biennial.

Bembecia scopigera (Scopoli, 1763)

Material examined. 67, 23-VIII-2021, coll. S. Akar, 2 ♂ attracted to Pheromone MYO.

Distribution: from central Spain over most of south-western and central Europe, Balkans, Greece, southern Russia, Ukraine, Türkiye (Garrevoet et al. 2007).

The caterpillar of this species lives inside the root of Fabaceae but mainly in species belonging to *Onobrychis* (Tamer & Özer, 1990; Gültekin & Güçlü, 1997; Laštůvka & Laštůvka, 2001). It is a medium sized species that is present in the whole of Türkiye (Garrevoet et al. 2007). The life cycle is annual, occasionally biennial.

Pyropteron minianiformis (Freyer, 1843)

Material examined. 3, 28-VI-2021, 8 ♂ coll. S. Akar & F. Can, collected by net; 65, 09-VII-2021, coll. S. Akar, 1 ♂ attracted to Pheromone VES.

Distribution: The Balkans, Crete, Cyprus and Türkiye (Lepiforum e.V. 2023).

This species lives as a caterpillar inside the root of various species of *Rumex* (Laštůvka & Laštůvka, 2001). It is a medium sized species. The life cycle is annual.

Pyropteron triannuliformis (Freyer, 1843)

Material examined. 8, 29-VI-2021, coll. F. Can, 2 ♂ attracted to Pheromone API; 11, 29-VI-2021, coll. F. Can, 1 ♂ attracted to Pheromone API; 21, 30-VI-2021, coll. F. Can, 2 ♂ attracted to Pheromone VES and coll. S. Akar, 1 ♂ collected by net; 43, 07-VII-2021, coll. S. Akar, 4 ♂ attracted to Pheromone MYO; 54, 04-VII-2021, coll. F. Can, 1 ♂ collected by net; 64, 07-VII-2021, coll. S. Akar, 1 ♂ attracted to Pheromone API; 71, 23-VIII-2021, coll. S. Akar, 1 ♂ collected by net; 77, 15-VII-2021, coll. S. Akar, 3 ♂ attracted to Pheromone API.

Distribution: Central, eastern and south-eastern Europe, through the Balkans, Ukraine, Belarus, the Baltic states, southern and central European part of Russia, the Caucasus region, Caspian Sea coast Türkiye to the Middle East, northern Iran, northern Syria, Lebanon (Garrevoet et al. 2007; Bartsch et al. 2021).

As a caterpillar, this species lives inside the root of *Rumex* sp. (Laštůvka & Laštůvka, 2001; Garrevoet et al. 2005). It is a medium sized species. Widespread and common where *Rumex* sp. grows (Garrevoet et al. 2005). The life cycle is annual.

Chamaesphecia doryceraeformis (Lederer, 1853)

Material examined. 70, 10-VII-2021, coll. S. Akar, 1 ♂ attracted to Pheromone MYO.

Distribution: Türkiye, southern Transcaucasia, northern Iran (Garrevoet et al. 2007).

This species lives as a caterpillar inside the root of *Phlomis* species (Garrevoet et al. 2005). It is a medium sized species that seems to be more common in central and eastern Türkiye (Garrevoet et al. 2007).

Türkiye, extending from Asia to Europe, is one of the most species-rich countries in the Western Palaearctic (Çıplak, 2003; Karaçetin & Welch, 2011). Faunistic studies on the Sesiidae family in Türkiye are quite limited. Twelve genera and 74 species of Sesiidae were reported in Türkiye in 2007 (Garrevoet et al. 2007). In the present study, the identification results of sesiid moth samples collected at 80 different localities in the European part of Türkiye - that covers 3% of the whole territory of the country - were presented. So far, no research has been conducted in the Thracian region focussing on the Sesiidae family. The species observed most likely are only a fraction of the species present, but this

article provides a good starting point for further research to investigate the presence of this intriguing family.

Sex pheromones are fast becoming key instruments in ecology-faunistic investigations to monitor distribution, seasonal flight and population density of Lepidoptera species as well as in agriculture for pest control (Can et al. 2019). During the field work, *S. myopaeformis*, which belongs to the Sesiidae family and is an economic pest of apple trees in Türkiye, was also determined. With the use of additional pheromone compositions and thorough fieldwork, from early spring to late autumn, more species can be expected and one of the objectives of this paper is to encourage entomologists to pay attention to these day-active moths and to stimulate further research on this peculiar and often neglected family.

In conclusion, the current study aimed to contribute to the knowledge about the fauna of the Sesiidae family in the Thracian region of Türkiye. As a result of this study, 11 species belonging to seven genera were identified. *Microsphecia tineiformis* (Esper, [1789]), which is not common in Türkiye and was known closest to the study area in Çanakkale in 2010 (Lepiforum e.V. 2023), was recorded for the first time from the Thrace region of Türkiye.

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Table 1. List of localities studied in the Thracian Region of Türkiye

No.	Collection sites	Coordinates	Altitude(m)
1	Istanbul Çiftalan	41°14'13"N 28° 54' 25"E	178
2	Istanbul Çatalca-Kadıköy	41°09'41"N 28° 21' 34"E	185
3	Istanbul Yolçatı	41°08'30"N 28° 08' 57"E	151
4	Tekirdağ Karamehmet	41°17'13"N 27° 47' 11"E	180
5	Tekirdağ Kumbağ	40°51'04"N 27° 27' 07"E	191
6	Tekirdağ Uçmakdere	40°49'40"N 27° 23' 46"E	382
7	Tekirdağ Mürefte	40°43'53"N 27° 19' 35"E	67
8	Çanakkale Gelibolu-Kilitbahir	40°09'40"N 26° 22' 22"E	75
9	Çanakkale Eceabat	40°13'09"N 26° 24' 46"E	55
10	Çanakkale Evreşe	40°38'39"N 26° 50' 58"E	60
11	Çanakkale Lapseki-Dişbudak	40°42'52"N 26° 45' 17"E	310
12	Edirne Keşan-Barağı	40°43'05"N 26° 25' 50"E	60
13	Edirne Enez	40°43'36"N 26° 07' 02"E	78
14	Edirne Karapınar (Uzunköprü)	41°06'30"N 26° 38' 26"E	77
15	Edirne Kırcaali	41°17'50"N 26° 41' 44"E	86
16	Edirne Karaağaç	41°39'28"N 26° 32' 00"E	99
17	Kırklareli Üsküp	41°41'52"N 27° 20' 19"E	268
18	Kırklareli Hacifakı-1	41°43'41"N 27° 25' 43"E	360
19	Kırklareli Hacifakı-2	41°43'31"N 27° 27' 04"E	336
20	Kırklareli Kaynarca	41°41'42"N 27° 28' 54"E	300
21	Kırklareli Hoyralı	41°37'32"N 27° 35' 05"E	304
22	Kırklareli Yenice-1	41°44'54"N 27° 40' 14"E	761
23	Kırklareli Yenice-2	41°46'33"N 27° 41' 58"E	650
24	Kırklareli Demirköy	41°51'40"N 27° 48' 49"E	421
25	Kırklareli İğneada	41°52'31"N 27° 58' 31"E	72
26	Edirne Havsa-Necatiye	41°30'40"N 26° 52' 48"E	175
27	Kırklareli Babaeski-taköprü	41°27'17"N 27° 02' 32"E	103
28	Kırklareli Alpullu	41°23'05"N 27° 09' 16"E	87
29	Tekirdağ Hayrabolu	41°13'08"N 27° 07' 01"E	70
30	Tekirdağ Velimeşe	41°14'22"N 27° 53' 06"E	181
31	Kırklareli Lüleburgaz-Sakızköy	41°24'48"N 27° 30' 21"E	90
32	Kırklareli Pınarhisar-Ataköy	41°36'16"N 27° 27' 23"E	150
33	Kırklareli Pınarhisar-	41°38'14"N 27° 29' 51"E	177
34	Kırklareli Pınarhisar- Kaynarca	41°40'51"N 27° 27' 14"E	207
35	Kırklareli Karıncak	41°39'54"N 27° 25' 05"E	225
36	Kırklareli Beypınar	41°46'44"N 27° 29' 39"E	580
37	Kırklareli Beypınar- II	41°47'45"N 27° 30' 21"E	565
38	Kırklareli Çukurpınar	41°51'22"N 27° 28' 31"E	620
39	Kırklareli Demirhan-Armutveren	41°54'25"N 27° 32' 47"E	408
40	Kırklareli Karadere	41°55'28"N 27° 26' 48"E	466
41	Kırklareli Dereköy	41°56'10"N 27° 21' 18"E	470
42	Kırklareli Geçitağzı	41°57'10"N 27° 17' 47"E	557
43	Kırklareli Kofçaz-Kula	41°59'50"N 27° 17' 44"E	531
44	Kırklareli Kofçaz-Kocayazı	41°58'12"N 27° 12' 40"E	670
45	Kırklareli Kofçaz- Kadıköy	41°49'53"N 27° 10' 57"E	260
46	Edirne Trak. Üniv. Kampüs	41°38'46"N 26° 37' 20"E	65

47	Edirne	Kayapa	41°46'50"N	26° 40' 42"E	120
48	Edirne	Muratçalı	41°48'10"N	26° 37' 26"E	148
49	Edirne	Çömlek	41°50'44"N	26° 36' 44"E	116
50	Edirne	Saksağan	41°53'12"N	26° 35' 36"E	134
51	Edirne	Demirköy	41°53'12"N	26° 39' 50"E	321
52	Edirne	Hanlıyenice	41°52'39"N	26° 41' 06"E	255
53	Edirne	Lalapaşa	41°51'49"N	26° 45' 34"E	252
54	Edirne	Vaysal	41°55'06"N	26° 50' 25"E	511
55	Edirne	Süleymandanişment	41°53'33"N	26° 53' 24"E	38
56	Edirne	Ömeroba	41°54'28"N	26° 57' 22"E	335
57	Edirne	Çeşmeköy	41°52'46"N	26° 59' 28"E	320
58	Edirne	Karahamza	41°50'13"N	26° 59' 49"E	247
59	Edirne	Küküler-Süloğlu	41°43'44"N	26° 54' 01"E	134
60	Edirne	Necatiye-Havsa	41°29'57"N	26° 55' 32"E	57
61	Edirne	Yolageldi-Havsa	41°30'49"N	26° 56' 19"E	59
62	Kırklareli	Demirkap-Demircapı	41°34'05"N	27° 00' 45"E	69
63	Kırklareli	Dokuzhöyük	41°38'54"N	27° 03' 57"E	95
64	Edirne	Sülolu-Büyükgerdelli	41°44'21"N	26° 56' 47"E	153
65	Kırklareli	İnece	41°40'10"N	27° 03' 55"E	132
66	Kırklareli	Kızılkıdere	41°41'52"N	27° 20' 14"E	210
67	Kırklareli	Üsküp	41°43'35"N	27° 25' 56"E	305
68	Kırklareli	Pınarhisar-Hacıfaklı	41°41'43"N	27° 28' 59"E	258
69	Kırklareli	Pınarhisar-Poyralı	41°37'29"N	27° 35' 25"E	247
70	Kırklareli	Vize-Soğucak	41°38'49"N	27° 39' 23"E	307
71	Kırklareli	Vize-Sergen	41°40'57"N	27° 41' 03"E	384
72	Kırklareli	Vize-Kızılağaç	41°40'32"N	27° 51' 33"E	336
73	Kırklareli	Vize-Hamidiye	41°39'18"N	27° 58' 37"E	147
74	Kırklareli	Vize-Kıyıköy	41°37'46"N	28° 04' 30"E	73
75	Tekirdağ	Saray-Güngörmez	41°30'17"N	27° 59' 55"E	240
76	Tekirdağ	Saray-Kurtdereköy	41°24'27"N	27° 48' 27"E	152
77	Tekirdağ	Çorlu-Velimeşe	41°14'19"N	27° 53' 09"E	144
78	Kırklareli	Kayalı	41°46'28"N	27° 06' 18"E	255
79	Kırklareli	Eriklice	41°45'14"N	27° 10' 30"E	207
80	Kırklareli		41°42'44"N	27° 15' 20"E	169