

Zygaenidae (Lepidoptera) of Thrace Region of Turkey

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Abstract. The Zygaenidae fauna of the Thrace Region (European Turkey) was studied by using attractant traps as well as by netting specimens in biotopes. Esters of 2-dodecenoic acid and stereoisomers of 2-butanol were used as sex attractants. Sixteen Zygaenidae species from five genera were found: *Theresimima* Strand, 1917 (1 species), *Rhagades* Wallengren, 1863 (2 species), *Adscita* Retzius, 1783 (3 species), *Jordanita* Verity, 1946 (4 species), and *Zygaena* Fabricius, 1775 (6 species). *Rhagades* (*Rhagades*) *pruni* (Denis & Schiffermüller, 1775) and *Jordanita* (*Jordanita*) *globulariae* (Hübner, 1793) were found as new for Turkey. The two species of the same genus *Rh.* (*Rh.*) *pruni* and *Rh.* (*Wiegelia*) *amasina* (Herrich-Schäffer, 1851) were discovered in proximity to each other in different localities of the same Province Tekirdağ.

Introduction

The Thrace Region is the European part of Turkey that covers 3% of the whole territory of the country. It comprises the provinces Edirne, Kırklareli and Tekirdağ and some parts of İstanbul and Çanakkale. Turkey, extending from Asia to Europe, is one of the most species-rich countries in the Western Palaearctic (Karaçetin and Welch 2011). A study on the biodiversity of the local lepidopteran fauna can be a useful tool for environment protection. Moths of the family Zygaenidae (Lepidoptera) are excellent indicators of environmental conditions (Efetov 2005). A decline in their number in populations is often a consequence of degradation of suitable habitats because of land-use, intensification of agriculture, and climate change (Hofmann and Tremewan 2017).

Based on recent revisions, the family Zygaenidae includes five subfamilies: Inouelinae Efetov & Tarmann, 2017; Procridinae Boisduval, 1828 (with tribes Artonini and Procridini); Chalcosiinae Hampson, 1892 (with tribes Chalcosiini, Cyclosiini, Agalopini, Aglaopini and Heteropanini); Calizygaeninae Alberti, 1954; and Zygaeninae Latreille, 1809 (with tribes Pryeriini and Zygaenini) (Efetov 1996, 1997a, 1997b, 1998, 1999, 2001b, 2001c, 2006, 2010; Efetov and Tarmann 2000,

2012, 2013a, 2013b, 2014a, 2014b, 2016a, 2016b, 2017; Efetov *et al.* 2004, 2006, 2011, 2014b, 2015a; Efetov and Hayashi 2008; Efetov and Savchuk 2013; Efetov and Knyazev 2014; Knyazev *et al.* 2015a, 2015b; Mutanen *et al.* 2016; Hofmann and Tremewan 2017). According to previous publications, the Zygaenidae fauna of Turkey is represented by two subfamilies: Procridinae (22 species) and Zygaeninae (31 species) (Mollet 1995; Efetov and Tarmann 1999; Naumann *et al.* 1999; Efetov 2001a, 2004, 2005; Kemal and Koçak 2010). Five species of Zygaenidae are so far known from the territory of Turkey only: *Jordanita (Jordanita) chloronata* (Staudinger, 1871), *Zygaena (Mesembrynus) lydia* Staudinger, 1887, *Z. (Agrumenia) formosa* (Herrich-Schäffer, 1852), *Z. (A.) peschmerga* Eckweiler & Görgner, 1981, and *Z. (Zygaena) problematica* Naumann, 1966.

To date, the fauna of Zygaenidae of the Thrace Region has not been sufficiently studied. Some information can be found in the works of Mathew (1881), Rebel (1913), Buresch (1915), Graves (1914, 1925, 1926), de Lattin (1944, 1950), Reiss and Tremewan (1967), Baraniak *et al.* (1994), Seven (1991, 1993, 1995), Okyar and Aktaç (1997), Yurtsever *et al.* (2010), and de Freina (2012). However, these publications lack detailed information on the zygaenid moths of Thrace.

Materials and methods

The Zygaenidae fauna of the Thrace Region was studied by using attractant traps, by netting specimens in different biotopes in 2016, as well as by the investigation of material collected in previous years and deposited in the collection of Mustafa Kemal University (Antakya, Hatay, Turkey).

The sex attractants had been produced at the Crimean Federal University (Efetov *et al.* 2014c) and were esters of 2-dodecenoic acid and isomers of 2-butanol: EFETOV-2 (racemic mixture of *R*- and *S*-enantiomers) and EFETOV-S-2 (*R*-enantiomer). The attractiveness of 2-butyl 2-dodecenoate for males of some Procridinae species had been proved earlier in field observations undertaken in the Crimea (Efetov *et al.* 2016).

For preparing lures, the rubber caps impregnated with the attractants (100 microliters per cap without solvent) were placed in Delta traps containing removable sticky layers. The baits were hung on bushes or trees at a height of 1.0–1.5 m above the ground. In all sites that were prospected we also placed control traps without attractant. The distance between traps was not less than 10 m.

Field observations were undertaken in 61 localities in five provinces of the Thrace Region (Can Cengiz *et al.* 2016, 2017): Edirne, Kırklareli and Tekirdağ and also in the European parts of İstanbul and Çanakkale. Traps with attractants EFETOV-2, EFETOV-S-2 and control traps were set up in ten localities: 02, 07, 09, 29, 32, 36, 38, 51, 53, 60 (see below). The baits were placed on 18–23.v.2016 and inspected on 8–10.vi.2016 and 24–29.vi.2016.

The material that we collected is deposited in the collection of Mustafa Kemal University (Antakya, Hatay, Turkey). All maps are compiled from the BioOffice database of the Tiroler Landesmuseum, Innsbruck, Austria.

List of localities studied in the Thrace Region of Turkey (Fig. 1)

Province Edirne

01. Havsa-Osmanlı, 41°34'22"N, 26°49'55"E, 78 m.
02. Süloğlu Büyükgerdelli, 41°44'21"N, 26°56'47"E, 153 m.
03. Süloğlu, Gökçetepe, 41°46'16"N, 26°52'52"E, 204 m.
04. Musabeyli, 41°41'54"N, 26°41'26"E, 99 m.

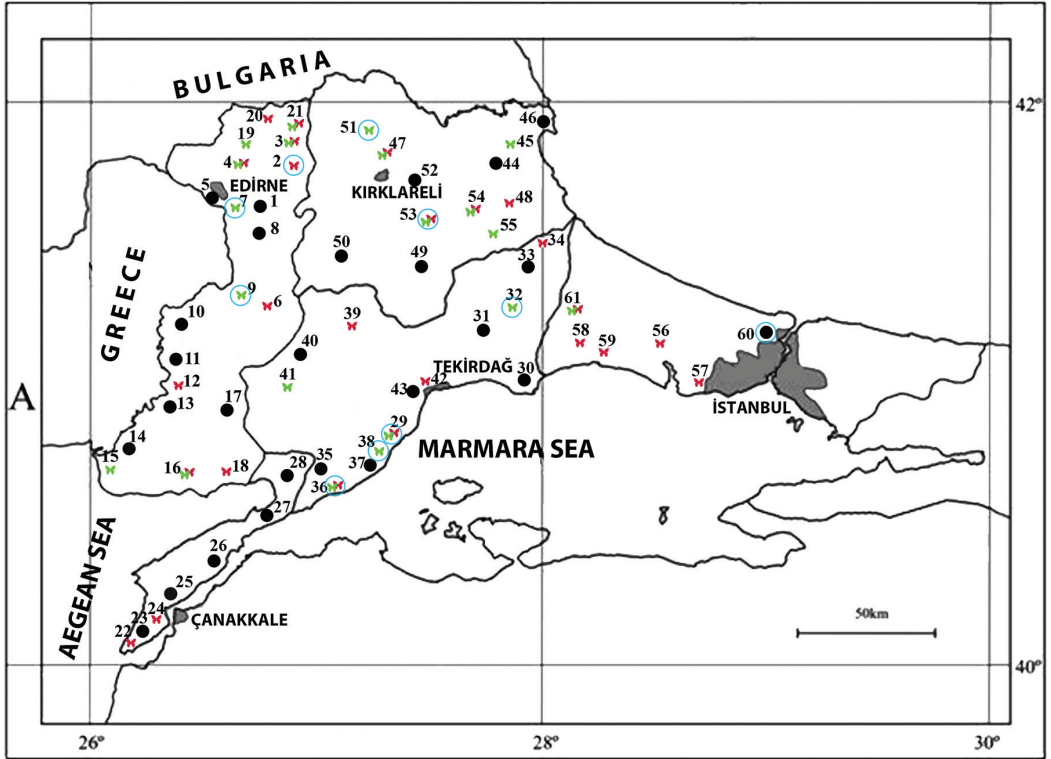


Figure 1. Map of the Thrace Region with studied localities. Moth symbols show sites where Zygaenidae were caught (green: Procridinae; red: Zygaeninae); black dots: sites where Zygaenidae were not found; blue circles: sites where traps with attractants were placed.

05. Bosnaköy, 41°37'16"N, 26°34'01"E, 34 m.
 06. Uzunköprü-Çöpköy, 41°13'45"N, 26°48'25"E, 69 m.
 07. Trakya University Balkan Campus, 41°38'44"N, 26°37'14"E, 80 m.
 08. Çukurköy, 41°27'32"N, 26°49'15"E, 50 m.
 09. Uzunköprü Yeniköy, 41°22'21"N, 26°46'43"E, 121 m.
 10. Meriç, 41°12'32"N, 26°27'18"E, 63 m.
 11. Meriç Küplü, 41°06'51"N, 26°21'22"E, 21 m.
 12. Meriç Balabancık, 41°02'07"N, 26°24'05"E, 13 m.
 13. İpsala, 40°55'44"N, 26°23'50"E, 30 m.
 14. Gala Lake Enez natural park, 40°44'51"N, 26°10'30"E, 15 m.
 15. Enez, 40°43'23"N, 26°05'38"E, 5 m.
 16. Enez-Büyükevren, 40°38'51"N, 26°14'22"E, 39 m.
 17. Keşan, 40°48'29"N, 26°39'30"E, 100 m.
 18. Keşan Gökçetepe, 40°38'16"N, 26°53'53"E, 13 m.
 19. Hacidanisment, 41°52'38"N, 26°41'12"E, 259 m.
 20. Lalapaşa Çallidere, 41°57'14"N, 26°42'48"E, 432 m.
 21. Lalapaşa Süleymandanisment, 41°53'23"N, 26°53'53"E, 388 m.

Province Çanakkale

22. Eceabat Şehitlik, 40°03'22"N, 26°13'31"E, 55 m.
23. Eceabat Alçıtepe, 40°07'32"N, 26°17'17"E, 56 m.
24. Behramlı Kilitbahir, 40°07'45"N, 26°21'09"E, 1 m.
25. Eceabat, 40°12'44"N, 26°23'09"E, 3 m.
26. Burhanlı, 40°17'47"N, 26°31'51"E, 13 m.
27. Koruköy, 40°33'43"N, 26°49'15"E, 44 m.
28. Evreşe, 40°39'30"N, 26°52'28"E, 20 m.

Province Tekirdağ

29. Uçmakdere, 40°47'51"N, 27°21'50"E, 115 m.
30. Marmara Ereğlisi, 41°03'00"N, 27°44'05"E, 9 m.
31. Çorlu, 41°14'55"N, 27°52'32"E, 128 m.
32. Çorlu Velimeşe, 41°14'18"N, 27°53'07"E, 132 m.
33. Saray, 41°24'42"N, 27°55'22"E, 185 m.
34. Saray-Güngörmez, 41°31'09"N, 28°00'53"E, 270 m.
35. Şarköy Yeniköy, 40°38'36"N, 26°59'15"E, 170 m.
36. Şarköy, 40°37'27"N, 27°05'39"E, 18 m.
37. Şarköy Mürefte, 40°39'44"N, 27°14'02"E, 3 m.
38. Mürefte Liman, 40°40'47"N, 27°16'00"E, 16 m.
39. Hayrabolu, 41°13'18"N, 27°00'59"E, 169 m.
40. Hayrabolu-Karababa, 41°07'22"N, 27°00'27"E, 101 m.
41. Malkara-Kiremitlik, 40°59'33"N, 26°56'32"E, 183 m.
42. Tekirdağ, 40°47'21"N, 27°22'10"E, 176 m.
43. Tekirdağ, 41°00'14"N, 27°30'42"E, 185 m.

Province Kırklareli

44. Yenice, 41°45'19"N, 27°41'05"E, 810 m.
45. Demirköy, 41°50'27"N, 27°33'23"E, 358 m.
46. İğneada, 41°52'33"N, 27°54'41"E, 34 m.
47. Karakoç, 41°47'40"N, 27°11'58"E, 326 m.
48. Vize-Akpınar, 41°36'14"N, 27°52'13"E, 302 m.
49. Lüleburgaz Evrensekiz, 41°21'28"N, 27°28'39"E, 66 m.
50. Babaeski, 41°24'30"N, 27°15'35"E, 68 m.
51. Kofcaz, 41°49'53"N, 27°10'56"E, 259 m.
52. Üsküpdere, 41°41'25"N, 27°22'07"E, 197 m.
53. Karıncak, 41°40'05"N, 27°26'58"E, 231 m.
54. Vize-Çavuşköy, 41°35'15"N, 27°44'40"E, 180 m.
55. Vize, 41°35'00"N, 27°47'45"E, 325 m.

Province İstanbul

56. Çatalca, 41°04'42"N, 28°30'29"E, 33 m.
57. Avcılar İstanbul University Campus, 40°59'30"N, 28°43'23"E, 74 m.
58. Yolçatı, 41°12'30"N, 27°59'58"E, 176 m.

59. Silivri, 41°05'48"N, 28°21'11"E, 83 m.

60. Bahçeköy Belgrad Forest, 41°10'30"N, 28°59'23"E, 95 m.

61. Silivri-Beyciler, 41°15'11"N, 28°06'53"E, 222 m.

We studied the collection deposited in Mustafa Kemal University to see if more material of Zygaenidae from the Thrace Region could be found. The nineteen specimens that we found were identified and are also included in the list of the Zygaenidae fauna of the Thrace Region. The pin-label data are provided in Table 4. When citing the labels, the symbol ‘/’ denotes the end of a line. In two cases handwritten labels with species’ names were corrected after examination.

Results

A total of 16 species of Zygaenidae are now known for the Thrace Region. Five Procrinae species were attracted to pheromone traps (Table 1). In spite of syntopic occurrences of Procrinae with *Zygaena* species, our traps were not attractive for burnets (*Zygaena* spp.). The males of *Theresimma ampellophaga* (Bayle-Barelle, 1808) and *Rhagades (Rhagades) pruni* (Denis & Schiffermüller, 1775) were attracted only to EFETOV-S-2. However, the males of *Adscita (Adscita) statures drenowskii* (Alberti, 1939) and *Jordanita (Solaniterna) subsolana* (Staudinger, 1862) were found in traps with EFETOV-S-2 as well as with EFETOV-2. The males of *J. (Jordanita) globulariae* (Hübner, 1793) were caught by trap with EFETOV-2. Among the species attracted, males of *A. (A.) statures drenowskii* and *Th. ampellophaga* were the most numerous: more than 30 specimens could be found in one trap (Fig. 2). The control traps were empty in all localities.

In addition to the five Procrinae species attracted to pheromone traps, we collected another five species of Procrinae by netting during our fieldwork (Table 2), as well as five species of Zygaeninae (Table 3).

By examination of material from the Thrace Region in the collection of Mustafa Kemal University, we discovered six species (Table 4), one of which was not collected by us in 2016 – *Zygaena (Mesembrynus) purpuralis* (Brünnich, 1763). For all specimens we provide data from the handwritten pin-labels.

Table 1. Males of attracted Procrinae species.

Attracted species	8–10.vi.2016		24–29.vi.2016	
	EFETOV–2	EFETOV–S–2	EFETOV–2	EFETOV–S–2
<i>Th. ampellophaga</i>	–	–	–	1 ♂ – loc. 36 33 ♂ – loc. 38 3 ♂ – loc. 29
<i>Rh. (Rh.) pruni</i>	–	1 ♂ – loc. 32	–	1 ♂ – loc. 32
<i>A. (A.) statures drenowskii</i>	9 ♂ – loc. 53 12 ♂ – loc. 51 5 ♂ – loc. 07 10 ♂ – loc. 09 1 ♂ – loc. 36 1 ♂ – loc. 29 34 ♂ – loc. 32	2 ♂ – loc. 51 7 ♂ – loc. 07 4 ♂ – loc. 09 14 ♂ – loc. 32	3 ♂ – loc. 53 4 ♂ – loc. 51 8 ♂ – loc. 32	1 ♂ – loc. 36 3 ♂ – loc. 32
<i>J. (J.) globulariae</i>	2 ♂ – loc. 53	–	–	–
<i>J. (S.) subsolana</i>	1 ♂ – loc. 36	1 ♂ – loc. 36	–	1 ♂ – loc. 09 1 ♂ – loc. 32



Figure 2. Sticky trap baited with EFETOV-2 with 34 males of *Adscita statures drenowskii*, Province Tekirdağ, Çorlu Velimeşe, 8–10.vi.2016.

Thus, the checklist of Zygaenidae of the Thrace Region based on our fieldwork in 2016, as well as the material in the collection of Mustafa Kemal University includes 16 species:

Theresimima ampellophaga (Bayle-Barelle, 1808) – 37 males attracted to EFETOV-S-2 (Tekirdağ).

Rhagades (Wiegelia) amasina (Herrich-Schäffer, 1851) – 1 male collected by net (Tekirdağ).

Rhagades (Rhagades) pruni (Denis & Schiffermüller, 1775) – 2 males attracted to EFETOV-S-2 (Tekirdağ); 1 male collected by net (İstanbul).

Adscita (Adscita) statures drenowskii (Alberti, 1939) – 87 males attracted to EFETOV-2 (Edirne, Kırklareli, Tekirdağ) and 31 males attracted to EFETOV-S-2 (Edirne, Kırklareli, Tekirdağ); 45 males and 10 females collected by net (Edirne, Kırklareli, Tekirdağ, İstanbul).

Adscita (Adscita) obscura (Zeller, 1847) – 8 males collected by net (Kırklareli, İstanbul).

Adscita (Tarmannita) manni (Lederer, 1853) – 3 males and 3 females collected by net (Kırklareli).

Jordanita (Tremewanita) notata (Zeller, 1847) – 2 males collected by net (Edirne, Kırklareli).

Table 2. Procridinae species caught in the Thrace Region in 2016. Specimens attracted to EFETOV-2 are marked with one asterisk; specimens attracted to EFETOV-S-2 are marked with two asterisks; specimens collected by net are not marked.

Localities No	03	04	07	09	15	16	19	21	29	32	36	38	41	45	47	51	53	54	55	61
<i>Th. ampellophaga</i>									3**♂		1**♂	33**♂								
<i>Rh. (W.) amasina</i>													1♂							
<i>Rh. (Rh.) pruni</i>										2**♂										1♂
<i>A. (A.) statices drenowskii</i>	2♂ 1♀		5*♂ 7**♂ 1♂	10*♂ 4**♂ 5♂ 2♀		2♂	1♀		1*♂	42*♂ 17**♂ 13♂ 4♀	1*♂ 1**♂			1♂	1♀	16*♂ 2**♂ 12♂	12*♂			1♂
<i>A. (A.) obscura</i>																3♂	2♂	1♂		2♂
<i>A. (T.) manni</i>																1♂	2♂ 3♀			
<i>J. (T.) notata</i>																				1♂
<i>J. (J.) graeca</i>		1♂	2♂		1♂ 1♀			1♂							2♂ 3♀		1♂ 1♀			
<i>J. (J.) globulariae</i>																	2*♂			
<i>J. (S.) subsolana</i>	1♂			1**♂						1**♂	1*♂ 1**♂						1♂	1♂		

Table 3. Zygaeninae species caught in the Thrace Region in 2016.

Localities No	02	03	04	06	12	16	18	20	21	22	24	29	34	36	39	42	47	48	53	54	56	57	58	59	61
<i>Z. (M.) diaphana</i>														3♂											
<i>Z. (M.) punctum</i>	1♂	2♂ 3♀	1♂	1♂	2♂	1♂			2♀	3♂					1♂	1♀	3♂			1♂				1♀	1♂
<i>Z. (A.) carniolica</i>							1♀	1♂							8♂ 4♀			2♂ 1♀					1♂ 3♀		
<i>Z. (A.) loti</i>								1♂ 1♀															3♂ 3♀		
<i>Z. (Z.) filipendulae</i>									1♂	1♀	1♂	1♂	11♂ 1♀	2♂ 1♀			2♂ 1♀			1♀	4♂ 1♀				1♂

Table 4. Zygaenidae species from the Thrace Region in the collection of Mustafa Kemal University (Antakya, Hatay, Turkey) collected before 2016.

Species	Label data
<i>A. (A.) statices drenowskii</i>	5♂ 'TURKEY / EDIRNE / Leg. Z. Göbekçioğlu', '6-6-1987 / Lalapaşa'; 1♀ '21.5.1992 / Hamzabeyli – / Lalapaşa'; 1♂ '14.6.1992 / Saray / 160 m'; 1♂ '14.6.1993 / Velika deresi / Demirköy / 500 m'; 1♂ '23.5.1998 / Hamzabeyli / 400 m'.
<i>J. (T.) notata</i>	1♂ 'TURKEY / EDIRNE / Leg. Z. Göbekçioğlu', '6-6-1987 / Donköy – / Lalapaşa'.
<i>Z. (M.) purpuralis</i>	1♂ 'TR-EDIRNE / Güllapoğlu / 06.10.2001 / Leg. Z. OKYAR'.
<i>Z. (M.) punctum</i>	1♂ '13.6.1988 / Hadımağa / EDIRNE / Leg. C. Çakmak', 'Zygaena purpuralis [sic!]; 1♀ '13.6.1988 / Hadımağa / EDIRNE / Leg. C. Çakmak', 'Trakya Univ. / Entom. Collect. / leg. C. Çakmak'.
<i>Z. (A.) carniolica</i>	1♀ '6.7.1991 / Koru dağ / 350 m', 'Zygaena fausta [sic!]'.
<i>Z. (Z.) filipendulae</i>	1♂ 'TURKEY / KIRKLARELİ / Leg. Z. Göbekçioğlu', '17-6-1987 / Limanköy – / İğneada / 50 m'; 1♂ '4-6-1988 / Yılanlıkaya / mevkii / Tatarlar'; 2♂ '4.7.1992 / Kocayazı – / Kofçaz / 300 m'; 1♂ '24.6.1993 / Bahçeköy / Sarıyer'.

Jordanita (Jordanita) graeca (Jordan, 1907) – 8 males and 5 females collected by net (Edirne, Kırklareli).

Jordanita (Jordanita) globulariae (Hübner, 1793) – 2 males attracted to EFETOV-2 (Kırklareli).

Jordanita (Solaniterna) subsolana (Staudinger, 1862) – 1 male attracted to EFETOV-2 (Tekirdağ) and 3 males to EFETOV-S-2 (Edirne, Tekirdağ); 3 males collected by net (Edirne, Kırklareli).

Zygaena (Mesembrynus) diaphana Staudinger, 1887 (bona species, see Nahirnić 2016) – 3 males collected by net (Tekirdağ).

Zygaena (Mesembrynus) purpuralis (Brünnich, 1763) – 1 male collected by net (Edirne).

Zygaena (Mesembrynus) punctum Ochsenheimer, 1808 – 18 males and 8 females collected by net (Çanakkale, Edirne, Kırklareli, Tekirdağ, İstanbul).

Zygaena (Agrumenia) carniolica (Scopoli, 1763) – 12 males and 10 females collected by net (Edirne, Kırklareli, Tekirdağ, İstanbul).

Zygaena (Agrumenia) loti (Denis & Schiffermüller, 1775) – 4 males and 4 females collected by net (Edirne, İstanbul).

Zygaena (Zygaena) filipendulae (Linnaeus, 1758) – 27 males and 6 females collected by net (Çanakkale, Edirne, Kırklareli, Tekirdağ, İstanbul).

Discussion

Two compounds named as ‘EFETOV-S-2’ (*R*-enantiomer of 2-butyl 2-dodecenoate) and ‘EFETOV-2’ (racemic mixture of *R*- and *S*-enantiomers of 2-butyl 2-dodecenoate) were used in sticky traps. *A. (A.) statices drenowskii* was the most numerous attracted species (118 males were caught). This subspecies is distributed from the southern Balkans to the central and southern Turkey (Efetov and Tarmann 1999; Efetov 2001a, 2004). The large numbers of specimens caught during our study in different localities (Fig. 3) prove that *A. (A.) statices drenowskii* is widely distributed and abundant in the region investigated. Moreover, this is the first record of a sex attractant for *A. (A.) statices drenowskii*. The number of specimens (males) was significantly higher in traps baited with the racemic mixture of (2*R*)-butyl 2-dodecenoate and (2*S*)-butyl 2-dodecenoate than the number in traps baited only with (2*R*)-butyl 2-dodecenoate.

Experiments with other sex attractants of similar structure (*R*- and *S*-enantiomers of 2-butyl (7*Z*)-dodecenoate and 2-butyl (9*Z*)-tetradecenoate) in Crimea, Bulgaria, Hungary, Italy, Croatia, Armenia, and Turkey have shown that species of the genera *Rhagades* Wallengren, 1863, *Zygaenoprocris* Hampson, 1900, *Adscita* Retzius, 1783, and *Jordanita* Verity, 1946, also react differently to stereoisomers of the attractants and their various combinations (Efetov *et al.* 2010, 2011, 2014a, 2015b; Subchev *et al.* 2010, 2012, 2013, 2016; Subchev 2014; Razov *et al.* 2017).

In 2013 in the Crimea we attracted the males of *Th. ampellophaga* to the racemic mixture of (2*R*)-butyl 2-dodecenoate and (2*S*)-butyl 2-dodecenoate (Efetov *et al.* 2014c). In the field experiments (presented here) in the Thrace Region (Fig. 4) the males of *Th. ampellophaga* were attracted to (2*R*)-butyl 2-dodecenoate. Earlier the main sex pheromone component of *Th. ampellophaga* females was identified as (2*R*)-butyl (7*Z*)-tetradecenoate (Subchev *et al.* 1998). It is noteworthy that all above mentioned substances are esters of 2-butanol and fatty unsaturated acids with a long carbohydrate chain. Thus, the males can be attracted not only by the natural female pheromone but also by substance with a similar structure.

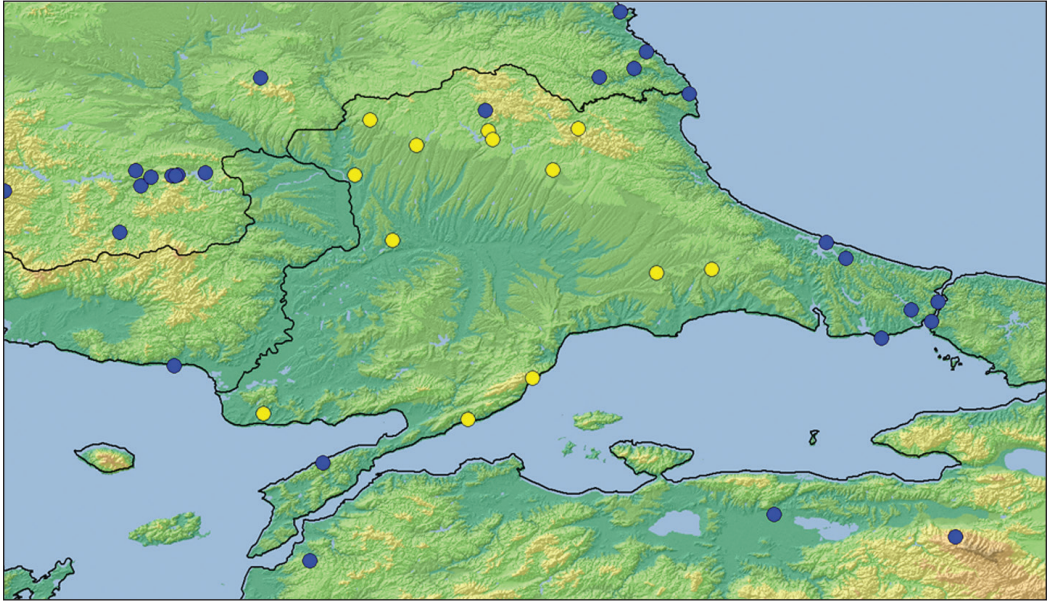


Figure 3. Distribution map of *Adscita stacies drenowskii* in the Thrace Region with new data (yellow dots).

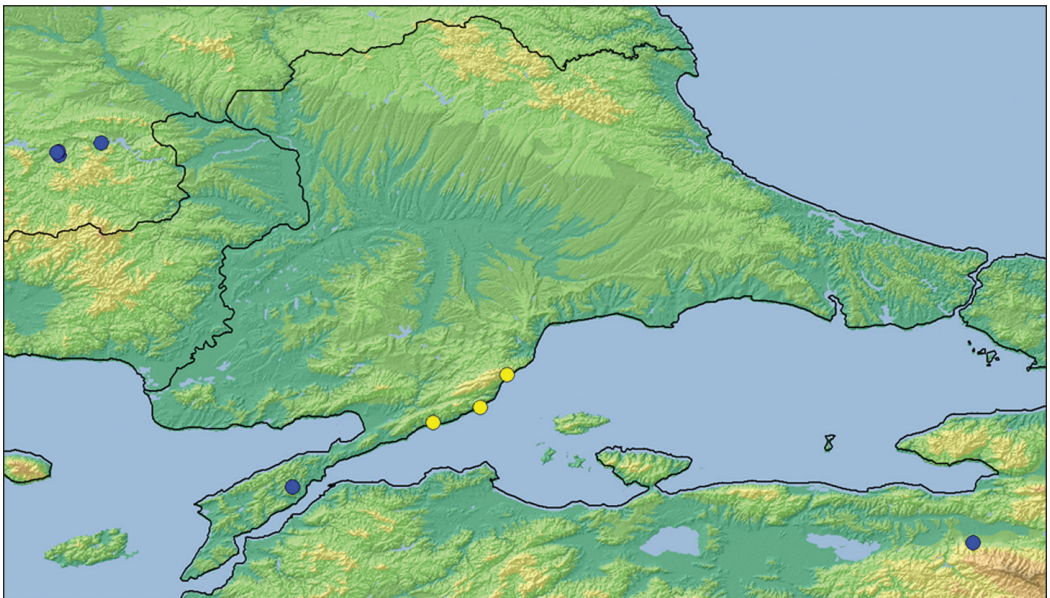


Figure 4. Distribution map of *Theresimima ampellophaga* in the Thrace Region with new data (yellow dots).

Rh. (Rh.) pruni was found for the first time in Turkey. That was possible due to the application of the sex attractants. *Rh. (Rh.) pruni* and *Rh. (W.) amasina* were recorded in the same Province Tekirdağ: *Rh. (Rh.) pruni* – in Çorlu, and *Rh. (W.) amasina* – in Malkara (Fig. 5). The known dis-

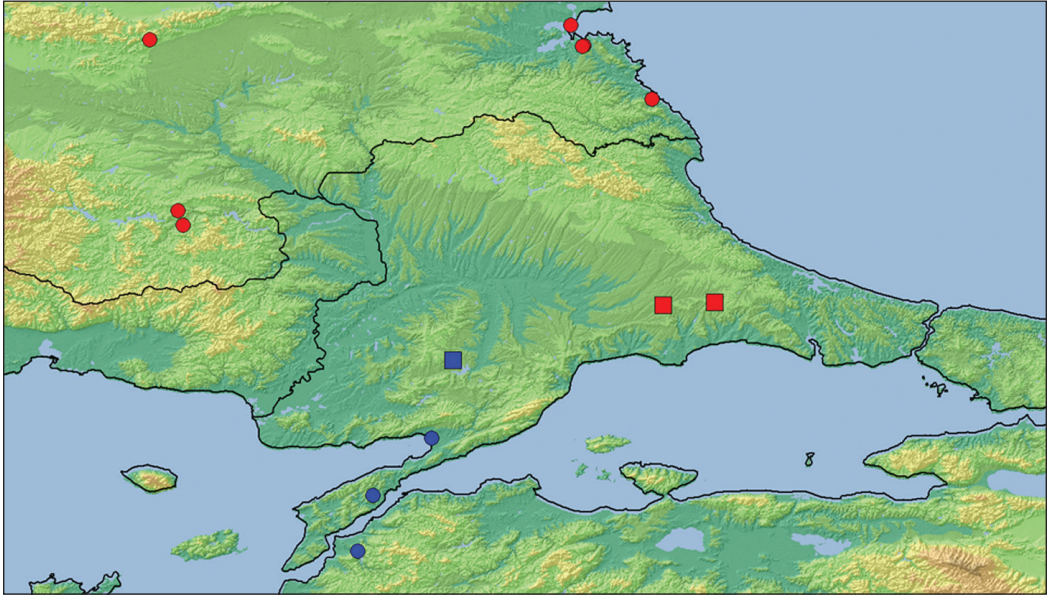


Figure 5. Distribution map of *Rhagades amasina* (blue) and *Rh. pruni* (red) in the Thrace Region. New data are marked as squares.

tribution of *Rh. (Rh.) pruni* outside of Turkey: north-eastern Spain, France, Belgium, Luxembourg, Netherlands, Denmark, Germany, Switzerland, Austria, northern Italy, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Albania, Macedonia, Greece, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Finland, Estonia, Latvia, Lithuania, Belarus, Ukraine, Moldova, Russia (northern, central and southern European part, Northern Caucasus, Siberia, Far East), Georgia, Azerbaijan, Kyrgyzstan, Kazakhstan, China, North Korea, and Japan (Efetov 2004).

J. (J.) globulariae is possibly also new for Turkey as the only literature data known so far originates from southern Turkey (Mollet 1995) and is doubtful because the mentioned locality is far away from the distributional range of this species. Old Rebel's (1934) record of '*Procris globulariae*' for Ankara must be attributed to another species, viz. *J. (T.) notata* (Zeller, 1847). Besides Turkey *J. (J.) globulariae* is known from central and northern Spain, Andorra, southern England, France, Belgium, Luxembourg, central and southern Germany, Switzerland, Austria, northern and central Italy, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Albania, Macedonia, Greece, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Belarus, Ukraine, and Russia (European part, Northern Caucasus) (Efetov 2004).

Conclusions

Sixteen Zygaenidae species from two subfamilies Procrinae (10 species) and Zygaeninae (6 species) have been recorded for the Thrace Region. Two species, *Rh. (Rh.) pruni* and *J. (J.) globulariae*, have been found for the first time in Turkey.

2-butyl 2-dodecenoate is a new sex attractant for the males of *A. (A.) statices drenowskii*.

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