Journal of the HETEROPTERA of Turkey

e-ISSN 2287 - 3249

Vol. 3:2

Nov, 2021

Powered by peer review management
and editorial system
Heteropterists

"*Journal of the Heteroptera of Turkey***"** is a international journal, and publish scholarly heteropteran studies.
ISSN: 2687-3249 (only Online edition)

This journal is published semiannually (May and November) by Heteropterists of Turkey.

Description

"Journal of the Heteroptera of Turkey" publishes original research and review articles all key areas in Heteroptera (Insecta) of paleaearctic region. All work needs to have a clear and significant impact on palaearctic Heteroptera taxons.. Review studies considerations are only accepted in combination with new faunistic or taxonomic data in studies area. The journal focuses on research into systematic, taxonomic, ecologic, faunistic etc heteroptera and articles presenting innovative approaches.
Prospective review authors should read instruction for authors on the web page (**www.j-ht.org**) before submitting a manuscript.

Journal of the Heteroptera of Turkey (*JHT*)
c/o Gazi University, Sciences Faculty, Department of Biology, 06500 Teknikokullar-ANKARA / TURKEY
Phone: (+90) 312 202 11 79 Fax: (+90) 312 212 22 79 E-mail: editor_office@j-ht.org

Powered by peer review management and editorial system Heteropterists.

Publication Frequency: Semiannual [2 issues per year (November and May)]
JHT is indexed/abstracted in: Index Copernicus, CiteFactor-Academic Scientific Journals, Academic Research Index, DRJI, Google Scholar, ResearchGate, EZB-Electronic Journals Library, Worldcat, ASOS Index, ROAD, Biological Abstracts, BIOSIS Previews, Zoological Record.
Archived at: Internet Archive-Wayback machine – https://archive.org ; ZENODO (https://zenodo.org/deposit?page=1&size=20)
Journal web addresse: **www.j-ht.org**

J.Het.Turk.

"*Journal of the Heteroptera of Turkey*"

ISSN: 2687-3249

***J.Het.Turk.*, Volume 3, Issue 2, Nov, 2021**

Table of Contents

Thanks to Reviewers:

Editor in Chief of the "Journal of the Heteroptera of Turkey" would like to thanks the following scientists/experts for reviewing the articles to submitted and published in the journal in **2021 volume 3 (Issues 1 and 2).**

Prof. Dr. Meral Fent (Trakya Univ., Edirne/Turkey), Prof. Dr. Ahmet Dursun (Amasya Univ., Amasya/Turkey), Prof. Dr. Suat Kıyak (Gazi Univ., Ankara/Turkey), Prof. Dr. İnanç Özgen (Fırat Univ., Elazığ/Turkey), Dr Paride Dioli (Nat.Hist.Mus., Milan/Italy), Dr.Petr Kment (Nat.Mus. Cirkusova Praha/Czech Republic), Dr.İbrahim Küçükbasmacı (Kastamonu Univ.,Kastamonu Turkey), Prof.Dr. Reyhan ÇOLAK(Ankara Univ., Ankara/Turkey), Prof.Dr. Nesrin ÖZSOY(Ankara Univ., Ankara/ Turkey)Assoc. Prof.Dr.Çetin Mutlu(Harran Univ., Şanlı-urfa/Turkey), Dr. Damla Amutkan Mutlu (Gazi Univ., Ankara/ Turkey), Dr.Fatma Bayraktar (Ministry of Health, General Directorate of Public Health, Ankara/Turkey),

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

A rare and endemic species expanded to Northern Anatolia: *Grypocoris syriacus* Reuter, 1896 (Hem., Het., Miridae)

Suat Kıyak[1] Şeyma Yılmaz Şahin[2]

[1]Gazi Universty, Faculty of Arts and Sciences, Department of Biology, 06500 Teknikokullar, Ankara, TURKEY

E-mail: skiyak@gazi.edu.tr ORCID iD: 0000-0001-8167-8283 (SK)

[2]Gazi Universty, Institute of Sciences and Technology, Department of Biology, 06500 Teknikokullar, Ankara, TURKEY

ABSTRACT: In this paper, new record distributional data on a rare Heteroptera (Hemiptera) species, *Grypocoris syriacus* Reuter, 1896 from northern Anatolia (Gerede district, Bolu province) are given.

KEYWORDS: *Grypocoris syriacus* Reuter 1896, Hemiptera, rare endemic species, Turkey.

To cite this article: Kıyak, S., Yılmaz Şahin, Ş., 2021, The A rare and endemic species expanded to Northern Anatolia: *Grypocoris syriacus* Reuter, 1896 (Hem., Het., Miridae), *J.Het.Turk.*, 3 (2):84-86
DOI:10.5281/zenodo.5717152
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A1.pdf
Received: Aug 16, 2021; **Revised:** Sep 22, 2021; **Accepted:** Sep 27, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

New studies have been added over the years regarding the known number and distribution of Heteroptera in Turkey. In this way, while the number of newly recorded species from the fauna of Turkey increases, the distribution limits of the existing species in the fauna also expand.

In general, a species is considered rare if it lives and found in a geographically narrow naturally area.

On the other hand, the species found naturally in only one geographical area is an endemic species.

In this study, the literatures on the taxonomy and distribution of *Grypocoris syriacus* Reuter 1896 was reviewed (Aukema & Rieger, 1999; Carvalho,1959; Dursun & Fent, 2017; Hoberlandt, 1956;

Kerzhner, 1997; Kerzhner & Matocq,1994; Önder, et al., 2006; Reuter, 1896a,b; Stichel, 1957-1962; Wagner, 1966; Wagner, 1970/71).

Until now, the distribution of *G.syriacus* Reuter 1896 has been limited to a local geographical area only (Eastern Medi-terranean province of Anatolia). In which case this species is "locally endemic". The *G.syriacus* Reuter,1896 is also both rare and anatolian endemic species.

According to this study, the rare and endemic species *G.syriacus* Reuter, 1896, expanded its geographical distribution, and it was determined that this species expanded to Northern Anatolia.

MATERIAL AND METHODS

This study was conducted in Gerede surrounding of Bolu province, a total of 6 individual specimens of the species were collected from 2 locations in the study area in 2017 (Table 1).

The specimens were collected by sweep net on the herbaceous vegetation by first author. And killed in 70% alcohol jars and were prepared based on technical and standards of data collection of the zoology museum. These were determined using identification keys by Stichel (1957 -1962), and Wagner (1970/71, 1974) by second author.

Table 1. Sampling localities of specimens *G.syriacus* Reuter, 1896 from Gerede/Bolu.

Locality No	Sampling localities	Coordinates	Altitude
Loc.1-S10	Avcılar mahallesi	40°48'16"N 32°28'28"E	1261m
Loc.2-S12	Kayısopran Köyü	40°48'18"N 32°27'13"E	1344m

RESULTS

Family: Miridae Hahn, 1833

***Genus: Grypocoris* Douglas & Scott, 1868**

Type species by monotypy*: Grypocoris fieberi* Douglas & Scott, 1868. (Ref.: Wagner, 1966 (key).

Sub Genus: *Turciocoris* Wagner, 1966

Turciocoris Wagner, 1966:211 (as subgenus of *Grypocoris*).

Type species by original designation: *Grypocoris syriacus* Reuter, 1896. (Nomenclatural variant by Wagner (1974): *Grypocoris Turciocoris syriacus*)

***Grypocoris syriacus* Reuter, 1896**

Type locality*:* Akbez, (Hassa, Hatay)

1896 *Grypocoris syriacus* Reuter, Wien Ent. Zeit. 15:256 (n.sp) Asia Minor, Syria
1896 *Grypocoris syriacus* Reuter, Hem. Gymn. Eur. 5:150 (descr., key)
1910 *Grypocoris syriacus* Oshanin, Verz. Pal. Hem.: 703 (cat) (Ref.:Carvalho, 1959)

Habitat:

The individual specimens of this species was found in the scrub and meadow areas at an altitude of 1261-1344m.

Material examined: (Table 1)

Loc. 1, 3♀♀ 2♂♂, 29.06.2017; Loc. 2, 1♀, 30.06.2017.

Distribution in Turkey:

Adana, Osmaniye, Hatay, Kahramanmaraş (Reuter, 1896; Hoberlandt, 1956; Kezhner & Josifov, 1999; Aukema & Rieger, 1999; Önder et al., 2006).
With this study, this species was recorded for the first time from the north of Anatolia. This species is endemic to Anatolia

Distribution in Palaearctic

Turkey's Asian part (Anatolia), in the Palearctic catalog is in located Israel with a question mark (?) and it is a suspicious record (Aukema & Rieger, 1999).

Comments:

This species is an endemic species and

its type locality: Hatay (Hassa-Akbez).

According to Kerzner and Matocq (1994), this species was first found in the Hatay (Hassa: Akbez) type locality by Reuter (1896) and later by Hoberlandt (1955) around Akbez (Adana, Osmaniye, Kahramanmaraş) in the Eastern Mediterranean region of Anatolia has mentioned.

Kerzner & Matocq (1994), referring to 2 original specimens of the species *Grypocoris syriacus* Reuter,1896 state that: possibly male and female, almost completely destroyed, only some legs and the apical part of hemelytra remaining.

Until this study, *Grypocoris syriacus*, which was endemic to the eastern and South-west Mediterranean region of Turkey, appears to be limited to a small geographical area.

However, in the Palaeacrtic Catalougue, the distribution of this species in Anatolia, and in the as well as for Israel, is marked with a question mark and given as a suspicious record.

This study provides a better understanding of the distribution patterns of the species in the Turkish Heteroptera fauna and the spread of *G. syriacus* to a new settlement area. Six rare examples *G. syriacus* Reuter,1896 given in this study were obtained from Gerede (Bolu districts) in the Northern Anatolia Region of Turkey.

In order to understand the Turkish entomofauna, it helps to determine the entomgeographic features that affect the distribution of the fauna.

REFERENCES

Aukema, B. & Chr. Rieger, 1999, *Catalogue of the Heteroptera of the Palaearctic Region, Netherlands Entomological Society*, Amsterdam, volumes III, 100-102 pp

Carvalho, J. C. M., 1959, *A catalogue of the Miridae of the world.* Part IV. Arquivos do Museu Nacional, Rio de Janeiro 48: 384 pp

Dursun, A. & Fent, M., 2017, Type Localities of Heteroptera (Insecta: Hemiptera) from Turkey, *Zootaxa* 4227 (4), pp. 451-494: 460

Hoberlandt, L., 1956, Results of the Zoological Scientific Expedition of the National Museum in Praha to Turkey. 18. Hemiptera IV. Terrestrial Hemiptera -Heteroptera of Turkey. *Acta Entomologica Musei Nationalis Pragae 3* (suppl.): 1-264 (1955)

Kerzhner, I.M,, 1997, Type specimens of some Palaearctic Miridae in the Zoological Museum, Helsinki (Heteroptera). *Zoosystematica Rossica*, 6: l15-121.

Kerzhner, I.M. & Matocq, A.,1994, Type specimens of Palaearctic Miridae and Nabidae in the collection of the Museum National d'Histoire Naturelle, Paris (Heteroptera*). Zoosystematica Rossica*,3(1):55-68

Onder, F., Karsavuran, Y., Tezcan, S. & Fent, M., 2006, *Türkiye Heteroptera (Insecta) Katalogu.* Meta Basım Matbaacılık Hizmetleri, Izmir, 164 pp

Reuter, O. M., 1896a, Dispositio generum palaearcticorum divisionis Capsaria familiae Capsidae. *Ofversikt af Finska Vetenskskaps-Societetens Forhandlingar*, 38, 156-171.

Reuter, O. M., 1896b, Die Capsiden-Gattung Grypocoris. *Wiener Entomologische Zeitung* 15: 254-257

Stichel, W., 1956-1958, *Illustrierte Bestimmungstabellen der Wanzen II. Europa (Hemiptera - Heteroptera Europae) II*, Hermsdorf: Selbstverlag, 2: 170-907, Berlin

Wagner, E., 1966, Vier neue ostmediterrane Miridenarten (Hemiptera, Heteroptera). *Reichenbachia* 6: 209-219.

Wagner, E., 1970-1971, *Die Miridae Hahn, 1831, des Mitelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera).* Teil. 1. Entomologische Abhandlungen 37 Suppl. pp. iii:484.

JHT
J.Het.Turk.
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

A Preliminary List on the Host Plants of Lygaeoidea Species (Hemiptera: Heteroptera) in Turkey- II

Meral Fent[1] Ahmet Dursun[2] Suat Kıyak[3]

[1]Trakya University, Faculty of Science, Department of Biology, 22030, Edirne/Turkey. E-mail: m_fent@hotmail.com ORCID iD 0000-0001-5787-6714

[2]Amasya University, Faculty of Arts and Science, Department of Biology, 05100, Amasya/ Turkey
E-mail: ahmet.dursun@amasya.edu.tr ORCID iD: 0000-0002-5114-7470

[3]Gazi University, Faculty of Sciences, Department of Biology, 06500, Ankara/Turkey
E-mail: skiyak@gazi.edu.tr ORCID iD: 0000-0001-8167-8283

ABSTRACT: This study constitutes the second part of a preliminary list on the host plants of Lygaeoidea species in Turkey presented by Kıyak et al (2020).

In the first part of the study, Kıyak et al. (2020) presented and discussed the plant taxa belonging to 36 plant families and the related Lygaeoidea species list in alphabetical order.

In this study, 187 taxa belonging to 38 plant families, 67 at genera level and 120 at species level, were defined in relation to Lygaeoidea species. In addition, additional informations on the 10 plant families in the first study are presented.

KEYWORDS: Hemiptera, Lygaeoidea, host plant, relationship, Turkey.

To cite this article: Fent, M., Dursun, A., Kıyak, S., 2021, A Preliminary List on the Host Plants of Lygaeoidea Species (Hemiptera: Heteroptera) in Turkey- II, *J.Het.Turk.*, 3 (2):87-105
DOI:10.5281/zenodo.5717158
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A2.pdf
Received: Aug 31, 2021; **Revised:** Sep 16, 2021; **Accepted:** Sep 20, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

The species belonging to the Lygaeoidea superfamily are phytophagous, except for the species of Geocoridae family, which are predators on various insect species. Information about the feeding habits of these species is given in the first part of the study (Kıyak et al., 2020).

In the first part of the study and in the current study, a list of plants related to Lygaeoidea species was created on the literature data of previous years and studies conducted in Turkey in recent years.

In the first part of the study, a total of 222 taxa, 77 of which were defined at the genera level and 145 at the species level, belonging to 36 plant families were given between 1922 and 2020 (Kıyak et al., 2020).

In the last studies, it is seen that more animal and insect species have started to be seen outside their natural ranges due to many reasons such as increased human activation and global warming.

Some of these alien species increase excessively and reach a level that causes significant damage.

These alien and invasive species include Heteroptera and even Lygaeoidea species.

By making a list of plants related to Lygaeoidea species in Turkey, the both studies aim ***i)*** to provide data about the food preferences of Lygaeoidea species and the plant species and families to which they are more prone ***ii)*** to assist new studies on this group.

MATERIAL AND METHODS

The previous and recent studies on Lygaeoidea species in Turkey were reviewed, and host plant lists were created from these studies and listed according to plant families.

The literatures used in this study are; Fahringer (1922), Hoberlandt (1956), Seidenstücker (1958, 1963, 1965), Tuatay et al. (1972); Aysev (1974), Lodos et al. (1978, 1999), Çakır (1988), Özbek & Alaoğlu (1988), Çakır & Önder (1990), Kıyak (1990, 1993, 2019), Çağlar (1992) Stichel (1957-1962) Özsaraç & Kıyak (2001), Özsaraç et al. (2001); Beyaz & Tezcan (2002), Atlıhan et al. (2003), Gençer et al. (2004), Öncül Abacıgil et al. (2010), Tezcan et al. (2010), Matocq et al. (2014), Yıldırım & Eroğlu (2015), Dirik & Kıvan (2016), Kıyak & Özdamar (2017), Arslangündoğdu et al. (2018), Yücel & Kıvan (2018), Yazıcı (2019), Yazıcı & Sertkaya (2020), Çerçi & Tezcan (2020), Özgen et al. (2020).

As a result of the literature review, plant taxa associated with Lygaeoidea species in Turkey were listed according to families, and a total of 74 plant families were identified.

The first 36 of these plant families in alphabetical order and their related Lygaeoidea species were presented in the first part of the study.

The remaining 38 families and their related taxa and related Lygaeoidea species are presented in Table 1 in alphabetical order in the present part of the study.

In addition, the missing records belonging to the plant families in the first part of the study are added to the bottom of Table 1.

In Table 2 and Figure 1 plant families and the numbers of Lygaeoidea species related to them, and in Table 3 and Figure 2, plant families and plant taxon numbers belonging to these families are given.

Plant species are given with their valid names, and the synonymous names in the old literature are also indicated in parentheses.

RESULTS

In this part of the study, 187 plant taxa belonging to 38 plant families and related Lygaeoidea species are listed alphabetically in Table 1. In addition, the additional records that were overlooked in Part I are added to the under of the table.

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

Table 1. The plant relationships of Lygaeoidea species in Turkey.

Lamiaceae		
Lamiaceae	*Horvathiolus guttatus* (Rambur, 1839) *Metopoplax origani* (Kolenati, 1845)	Kıyak, 1993 Lodos et al., 1999
Ajuga sp.	*Pionosomus varius* (Wolff, 1804)	Stichel, 1957
Ballota sp.	*Beosus quadripunctatus* (Müller, 1766) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Plinthisus longicollis* Fieber, 1861	Lodos et al.,1999
Calamintha sp.	*Ortholomus punctipennis* (Herrich-Schaeffer, 1838)	Stichel,1957
Lavandula multifida L.	*Heterogaster artemisiae* Schilling, 1829	Stichel,1957
Lycopus europaeus L.	*Heterogaster cathariae* (Geoffroy, 1785)	Stichel,1957
Marrubium parviflorum Fish & Mey.	*Melanocoryphus albomaculatus* (Goeze, 1778)	Kıyak 1990
Melissa officinalis L.	*Heterogaster cathariae* (Geoffroy, 1785)	Stichel,1957
Mentha sp.	*Geocoris arenarius* (Jakovlev, 1867) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Heterogaster artemisiae* Schilling, 1829 *Microplax interrupta* (Fieber, 1837) *Nysius cymoides* (Spinola, 1837) *Nysius ericae ericae* (Schilling, 1829) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius thymi thymi* (Wolff, 1804) *Scolopostethus affinis* (Schilling, 1829)	Stichel,1957 Çakır,1988 Lodos et al., 1978, 1999
Mentha arvensis L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Çakır,1988
Mentha piperita L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Çakır,1988
Mentha rotundifolia (L.) Huds.	*Oxycarenus pallens* (Herrich-Schaeffer, 1850)	Aysev, 1974
Micromeria varia Benth.	*Heterogaster artemisiae* Schilling, 1829	Stichel, 1957
Nepeta sp.	*Scolopostethus affinis* (Schilling, 1829)	Stichel, 1957
Nepeta troodi Holmboe	*Heterogaster cathariae* (Geoffroy, 1785)	Stichel, 1957
Origanum sp.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Nysius cymoides* (Spinola, 1837) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius ericae ericae* (Schilling, 1829) *Nysius thymi thymi* (Wolff, 1804)	Beyaz & Tezcan, 2002
Origanum syriacum L.	*Geocoris luridus luridus* (Fieber, 1844)	Çakır,1988
Origanum vulgare L.	*Metopoplax origani* (Kolenati, 1845)	Stichel 1957; Aysev, 1974
Phlomis sp.	*Artheneis foveolata* Spinola, 1837 *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Metopoplax origani* (Kolenati, 1845) *Nysius ericae ericae* (Schilling, 1829) *Nysius thymi thymi* (Wolff, 1804) *Oxycarenus pallens* (Herrich-Schaeffer, 1850)	Çakır,1988; Lodos et al.,1999
Rosmarinus officinalis L.	*Tropidothorax leucopterus* (Goeze, 1778)	Stichel, 1957; Aysev, 1974
Salvia sp.	*Emblethis ciliatus* Horváth, 1875 *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Graptopeltus lynceus* (Fabricius, 1775) *Heterogaster artemisiae* Schilling, 1829 *Microplax interrupta* (Fieber, 1837) *Nysius cymoides* (Spinola, 1837) *Nysius ericae ericae* (Schilling, 1829) *Nysius thymi thymi* (Wolff, 1804) *Platyplax salviae* (Schilling, 1829)	Stichel, 1957; Çakır,1988; Lodos et al.,1999
Salvia glutinosa L.	*Spilostethus saxatilis* (Scopoli, 1763)	Stichel, 1957; Aysev,1974
Salvia pratensis L.	*Platyplax salviae* (Schilling, 1829)	Stichel, 1957
Salvia verticillata L.	*Emblethis verbasci* (Fabricius, 1803) *Platyplax salviae* (Schilling, 1829)	Stichel, 1957
Sideritis sp.	*Geocoris ater* (Fabricius, 1787)	Çakır,1988
Sideritis hyssopifolia L.	*Cymus claviculus* (Fallén, 1807) *Ischnopeza hirticornis* (Herrich-Schaeffer, 1850) *Platyplax inermis* (Rambur, 1839)	Lodos et al., 1978

Stachys cretica L.	*Spilostethus saxatilis* (Scopoli, 1763)	Özsaraç et al., 2001
Teucrium sp.	*Emblethis verbasci* (Fabricius, 1803)	Stichel, 1957
Teucrium polium L.	*Geocoris erythrocephalus*	Özsaraç & Kıyak, 2001
Thymus sp.	*Cymus claviculus* (Fallén, 1807) *Emblethis verbasci* (Fabricius, 1803) *Microplax interrupta* (Fieber, 1837) *Nysius graminicola graminicola* (Kolenati, 1845) *Ortholomus punctipennis* (Herrich-Schaeffer, 1838) *Pionosomus varius* (Wolff, 1804)	Stichel, 1957; Aysev, 1974
Thymus serpyllum L.	*Tropistethus holosericus* (Scholtz, 1846)	Stichel, 1957
Thymus vulgaris L.	*Nysius graminicola graminicola* (Kolenati, 1845) *Nysius thymi thymi* (Wolff, 1804)	Lodos et al., 1978, 1999
Lauraceae		
Laurus sp.	*Heterogaster urticae* (Fabricius, 1775) *Metopoplax origani* (Kolenati, 1845)	Lodos et al., 1999
Laurus nobilis L.	*Spilostethus pandurus* (Scopoli, 1763)	Lodos et al., 1999
Linaceae		
Linum sp.	*Nysius ericae ericae* (Schilling, 1829)	Stichel, 1957
Lythraceae		
Lythrum portula (L.) D. A. Webb (Syn. *Peplis portula* L.)	*Cymus claviculus* (Fallén, 1807)	Stichel, 1957; Aysev, 1974
Punica sp.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Çakır, 1988
Punica granatum L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844)	Çakır, 1988; Lodos et al., 1999
Malvaceae		
Abelmoschus esculentus (L.) Moench. (Syn. *Hibiscus esculentus*)	*Oxycarenus hyalinipennis* (A. Costa, 1843)	Lodos et al., 1999
Abutilon sp.	*Oxycarenus hyalinipennis* (A. Costa, 1843)	Stichel, 1957, Aysev, 1974
Althaea sp.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Oxycarenus hyalinipennis* (A. Costa, 1843)	Aysev, 1974 ; Lodos et al., 1999
Althaea rosea Hohen. ex Boiss.	*Oxycarenus hyalinipennis* (A. Costa, 1843) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Metopoplax origani* (Kolenati, 1845) *Spilostethus pandurus* (Scopoli, 1763)	Lodos et al., 1999
Gossypium sp.	*Cymus melanocephalus* Fieber, 1861 *Geocoris arenarius* (Jakovlev, 1867) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris lineola lineola* (Rambur, 1839) *Geocoris megacephalus* (Rossi, 1790) Geocoris sp. *Graptostetlzus servus* (Fabricius, 1787) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius thymi thymi* (Wolff, 1804) *Oxycarenus hyalinipennis* (A. Costa, 1843)	Stichel, 1957; Tuatay et al., 1972; Aysev, 1974 ;Çakır, 1988; Çakır & Önder, 1990; Lodos et al.,1999; Yazıcı, 2019
Gossypium hirsutum L.	*Leptodemus minutus* Jakovlev 1876	Yazıcı & Sertkaya, 2020
Hibiscus sp.	*Oxycarenus hyalinipennis* (A. Costa, 1843)	Aysev, 1974
Malva sp.	*Oxycarenus hyalinipennis* (A. Costa, 1843)	Lodos et al., 1999
Malva multiflora (Cav.) Soldano, Banfi & Galasso (Syn. *Lavatera cretica* L.)	*Oxycarenus hyalinipennis* (A. Costa, 1843)	Stichel 1957; Aysev, 1974
Urena lobata L.	*Graptostetlzus servus* (Fabricius, 1787)	Stichel, 1957
Moraceae		
Morus sp.	*Spilostethus pandurus* (Scopoli, 1763)	Lodos et al.,1999
Morus alba L.	*Megalonotus praetextatus* (Herrich-Schaeffer, 1835) *Spilostethus pandurus* (Scopoli, 1763)	Kıyak, 1990; Lodos et al.,1999
Myrtaceae		
Eucalyptus sp.	*Horvathiolus superbus* (Pollich, 1781)	Aysev, 1974
Nitrariaceae		
Peganum harmala L.	*Emblethis ciliatus* Horváth, 1875 *Lygaeus equestris* (Linnaeus, 1758) *Tropidothorax leucopterus* (Goeze, 1778)	Lodos et al., 1999

Oleaceae		
Fraxinus sp.	*Caenocoris nerii* (Germar, 1847) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Aysev,1974; Çakır, 1988; Lodos et al.,1999
Fraxinus excelsior L.	*Kleidocerys resedae resedae* (Panzer, 1797) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Aysev,1974; Çakır, 1988; Lodos et al., 1999
Jasminum fructicans L.	*Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Xanthochilus quadratus* (Fabricius, 1798)	Çağlar, 1992
Ligustrum sp.	*Geocoris luridus luridus* (Fieber, 1844)	Çakır, 1988; Lodos et al.,1999
Olea europaea L.	*Aphanus rolandri* (Linnaeus, 1758) *Arlheneis foveolata* Spinola, 1837 *Caenocoris nerii* (Germar, 1847) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris lineola* (Rambur, 1839) Geocoris megacephalus (Rossi, 1790) *Graptostethus servus* (Fabricius, 1787) *Heterogaster urticae* (Fabricius, 1775) *Horvathiolus superbus* (Pollich, 1781) *Kleidocerys ericae* (Horváth, 1908) *Lamprodema maura* (Fabricius, 1803) *Lygaeus creticus* (Lucas, 1854) *Lygaeus equestris* (Linnaeus, 1758) *Macropternella inermis* (Fieber, 1851) *Metopoplax origani* (Kolenati, 1845) *Microplax albofasciata* (A. Costa, 1847) *Microplax limbata* Fieber, 1864 *Nysius cymoides* (Spinola, 1837) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Peritrechus meridionalis* Puton, 1877 *Plinthisus longicollis* Fieber, 1861 *Proderus belloveyei* Puton, 1874 *Raglius alboacuminatus* (Goeze, 1778) *Remaudiereana annulipes* (Bärensprung, 1859) *Scolopostethus pictus* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763) *Taphropeltus nervosus* (Fieber, 1861) *Xanthochilus quadratus* (Fabricius, 1798)	Lodos et al.,1978, 1999; Çakır, 1988; Öncül Abacıgil et al., 2010
Onagraceae		
Epilobium hirsutum L.	*Geocoris megacephalus* (Rossi, 1790)	Stichel,1957; Aysev, 1974
Papaveraceae		
Papaveraceae	*Brachyplax tenuis* (Mulsant & Rey, 1852)	Matocq et al., 2014
Eschscholzia sp.	*Spilostethus pandurus* (Scopoli, 1763)	Lodos et al.,1999
Fumaria asapela Boiss.	*Spilostethus pandurus* (Scopoli, 1763)	Kıyak,1990
Fumaria judaica Boiss	*Splilostethus pandurus* (Scopoli, 1763)	Özsaraç & Kıyak, 2001
Papaver sp.	*Brachyplax tenuis* (Mulsant & Rey, 1852)	Seidenstücker, 1958
Pedaliaceae		
Sesamum indicum L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius senecionis senecionis* (Schilling, 1829)	Lodos et al., 1978, 1999; Çakır,1988
Pinaceae		
Abies sp.	*Spilostethus pandurus* (Scopoli, 1763)	Lodos et al., 1999
Abies alba Mill.	*Kleidocerys resedae resedae* (Panzer, 1797)	Aysev, 1974
Cedrus sp.	*Caenocoris nerii* (Germar, 1847) *Gastrodes grossipes* (De Geer,1773) *Geocoris ater* (Fabricius, 1787) *Geocoris luridus luridus* (Fieber, 1844) *Heterogaster artemisiae* Schilling, 1829 *Lasiocoris crassicornis* (Lucas, 1849) *Lygaeosoma sardeum erythropterum* (Puton, 1876) *Microplax limbata* Fieber, 1864 *Orsillodes longirostris* Puton, 1884	Çakır, 1988; Lodos Önder et al 1999; Çerçi & Tezcan, 2020
Pinus sp.	*Emblethis ciliatus* Horváth, 1875 *Gastrodes grossipes* (De Geer,1773) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Graptopeltus lynceus* (Fabricius, 1775) *Heterogaster affinis* Herrich-Schaeffer, 1835 *Ischnopeza hirticornis* (Herrich-Schaeffer, 1850)	Stichel, 1957; Çakır, 1988; Lodos et al., 1978, 1999

	Ischnodemus suturalis Horváth, 1883 *Lygaeus equestris* (Linnaeus, 1758) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Megalonotus longipilis* (Puton, 1884) *Metopoplax fuscinervis* Stål, 1872 *Metopoplax origani* (Kolenati, 1845) *Nysius graminicola graminicola* (Kolenati, 1845) *Orsillus depressus* (Mulsant & Rey, 1852) *Orsillus reyi* Puton, 1871 *Plinthisus longicollis* Fieber, 1861 *Rhyparochromus vulgaris* (Schilling, 1829) *Scolopostethus affinis* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763) *Spilostethus saxatilis* (Scopoli, 1763)	
Pinus nigra J.F. Arnold	*Graptopeltus validus* (Horváth, 1875) *Heterogaster affinis* Herrich-Schaeffer, 1835 *Lygaeus equestris* (Linnaeus, 1758) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Ortholomus punctipennis* (Herrich-Schaeffer, 1838) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Rhyparochromus phoeniceus* (Rossi, 1794) *Spilostethus saxatilis* (Scopoli, 1763)	Hoberlandt, 1956; Çağlar, 1992;
Pinus strobus L.	*Eremocoris plebejus* (Fallén, 1807) *Gastrodes grossipes* (De Geer,1773)	Stichel, 1957
Pinus sylvestris L.	*Eremocoris plebejus* (Fallén, 1807) *Gastrodes grossipes* (De Geer,1773)	Stichel, 1957; Yıldırım & Eroğlu, 2015
Plantaginaceae		
Antirrhinum majus L.	*Nysius ericae ericae* (Schilling, 1829)	Lodos et al.,1999
Misopates orontium (L.) Raf. (Syn. *Antirrhinum orontium*)	*Rhyparochromus phoeniceus* (Rossi, 1794)	Özsaraç et al., 2001
Plantago coronopus L.	*Henestaris laticeps laticeps* (Curtis, 1836) *Henestaris halophilus* (Burmeister, 1835)	Stichel, 1957; Wagner, 1967; Aysev, 1974
Plantago indica L.	*Henestaris halophilus* (Burmeister, 1835)	Özsaraç et al., 2001
Plantago maritima L.	*Henestaris halophilus* (Burmeister, 1835)	Wagner, 1967
Veronica sp.	*Beosus quadripunctatus* (Müller, 1766) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835)	Çakır, 1988; Lodos et al.,1999
Platanaceae		
Platanus sp.	*Geocoris luridus luridus* (Fieber, 1844) *Lygaeus equestris* (Linnaeus, 1758) *Megalonotus sabulicola* (Thomson, 1870)	Hoberlandt, 1956; Çakır, 1988; Lodos, Önder et al.,1999
Platanus orientalis L.	*Arocatus longiceps* Stål, 1872 *Emblethis ciliatus* Horváth, 1875 *Geocoris luridus luridus* (Fieber, 1844) *Spilostethus pandurus* (Scopoli, 1763)	Lodos et al., 1978, 1999
Plumbaginaceae		
Acantholimon sp.	*Xanthochilus quadratus* (Fabricius, 1798)	Kıyak, 1990
Poaceae		
Poaceae	*Cymophyes ochroleuca* Fieber, 1870 *Emblethis angustus* Montandon, 1890 *Emblethis ciliatus* Horváth, 1875 *Geocoris ater* (Fabricius, 1787) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Henestaris halophilus* (Burmeister, 1835) *Metopoplax origani* (Kolenati, 1845) *Nysius ericae ericae* (Schilling, 1829) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius thymi thymi* (Wolff, 1804) *Oxycarenus hyalinipennis* (A. Costa, 1843) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Paromius gracilis* (Rambur, 1839) *Rhyparochromus pini* (Unnaeus, 1758) *Spilostethus pandurus* (Scopoli, 1763) *Spilostethus saxatilis* (Scopoli, 1763)	Hoberlandt,1956; Stichel, 1957; Aysev,1974; Lodos Önder et al., 1978, 1999; Çakır, 1988
Aegilops caudata L.	*Beosus maritimus* (Scopoli, 1763)	Özsaraç et al., 2001
Agropyron sp.	*Nysius cymoides* (Spinola, 1837)	Lodos et al.,1999

Andropogon dystachius L.	*Paromius gracilis* (Rambur, 1839)	Stichel, 1957
Avena barbata Pott ex Link	*Oxycarenus pallens* (Herrich-Schaeffer, 1850)	Aysev, 1974
Bromus arvensis L.	*Beosus maritimus* (Scopoli, 1763)	Özsaraç et al., 2001
Bromus madritensis L.	*Metopoplax fuscinervis* Stål, 1872	Özsaraç et al., 2001
Elytrigia repens (L.) Newski (Syn. *Agropyron repens*)	*Paromius gracilis* (Rambur, 1839)	Lodos et al., 1999
Glyceria sp.	*Ischnodemus suturalis* Horváth, 1883	Seidenstücker, 1958
Imperata arundinacea Cirillio	*Paromius gracilis* (Rambur, 1839)	Stichel, 1957
Hordeum sp.	*Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Spilostethus saxatilis* (Scopoli, 1763)	Lodos et al., 1999
Hordeum vulgare L.	*Spilostethus pandurus* (Scopoli, 1763)	Lodos et al.,1999
Lolium sp.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Çakır, 1988
Oryza sativa L.	*Geocoris megacephalus* (Rossi, 1790)	Çakır, 1988
Panicum turgidum Forrsk.	*Cymophyes ochroleuca* Fieber, 1870	Stichel, 1957
Phragmites sp.	*Cymus melanocephalus* Fieber, 1861 *Dimorphopterus blissoides* (Baerensprung, 1859)	Stichel, 1957; Lodos et al., 1999
Poa bulbosa var. *vivipara* Koeler	*Spilostethus pandurus* (Scopoli, 1763)	Kıyak, 1990
Saccharum revanne L. (Syn. *Erianthus ravennae*)	*Paromius gracilis* (Rambur, 1839)	Stichel, 1957
Secale cereale L.	*Aphanus rolandri* (Linnaeus, 1758)	Lodos et al., 1999
Sorghum halepense (L.) Pers.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Çakır, 1988
Triticum sp.	*Beosus maritimus* (Scopoli, 1763) *Cymus claviculus* (Fallén, 1807) *Emblethis denticollis* Horváth, 1878 *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Heterogaster urticae* (Fabricius, 1775) *Lygaeus equestris* (Linnaeus, 1758) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Megalonotus praetextatus* (Herrich-Schaeffer, 1835) *Metopoplax origani* (Kolenati, 1845) *Nysius ericae ericae* (Schilling, 1829) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius thymi thymi* (Wolff, 1804) *Oxycarenus modestus* (Fallén, 1829) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Rhyparochromus phoeniceus* (Rossi, 1794) *Rhyparochromus vulgaris* (Schilling, 1829) *Tropidothorax leucopterus* (Goeze, 1778) *Xanthochilus satumius* (Rossi, 1790)	Lodos et al., 1978,1999; Çakır, 1988; Dirik & Kıvan, 2016
Triticum aestivum L. (Syn. *Triticum vulgare, Triticum sativum)*	*Spilostethus pandurus* (Scopoli, 1763) *Spilostethus saxatilis* (Scopoli, 1763) *Metopoplax fuscinervis* Stål, 1872	Alkan, 1948; Lodos et al., 1999; Özsaraç et al., 2001
Zea mays L.	*Nysius cymoides* (Spinola, 1837) *Scolopostethus pictus* (Schilling, 1829)	Lodos et al., 1978; Özgen et al., 2020
Polygonaceae		
Atraphaxis sp.	*Emblethis setifer* Seidenstücker, 1966	Seidenstücker, 1967
Polygonum sp.	*Metopoplax origani* (Kolenati, 1845) *Oxycarenus pallens* (Herrich-Schaeffer, 1850)	Aysev, 1974
Rumex sp.	*Geocoris megacephalus* (Rossi, 1790) *Heterogaster artemisiae* Schilling, 1829 *Lygaeus equestris* (Linnaeus, 1758) *Xanthochilus minusculus* (Reuter, 1885)	Kıyak, 1993; Çakır, 1988; Lodos et al., 1999
Rumex acetosella L.	*Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Metopoplax origani* (Kolenati, 1845)	Lodos et al., 1978
Rumex scutatus L.	*Horvathiolus superbus* (Pollich, 1781)	Stichel, 1957
Portulacaceae		
Portulaca sp.	*Geocoris megacephalus* (Rossi, 1790) *Geocoris lineola lineola* (Rambur, 1839)	Aysev, 1974
Portulaca oleracea L.	*Nysius senecionis senecionis* (Schilling, 1829)	Fahringer, 1922; Hoberlandt, 1956; Stichel, 1957

Ranunculaceae		
Adonis sp.	*Lygaeus equestris* (Linnaeus, 1758)	Stichel, 1957; Aysev, 1974
Nigella arvensis L.	*Apterola lowni* (Saunders, 1876)	Kıyak & Özdamar, 2017
Nigella sativa L.	*Lygaeus equestris* (Linnaeus, 1758)	Stichel, 1957; Aysev, 1974
Rhamnaceae		
Paliurus sp.	*Orsillus depressus* (Mulsant & Rey, 1852)	Lodos et al.,1999
Paliurus spina-christi Mill.	*Caenocoris nerii* (Germar, 1847) *Lygaeus creticus* Lucas, 1854 *Lygaeus equestris* (Linnaeus, 1758)	Lodos et al., 1978
Rosaceae		
Amygdalus sp.	*Brachyplax tenuis* (Mulsant & Rey, 1852) *Oxycarenus pallens* (Herrich-Schaeffer, 1850)	Lodos et al., 1999
Amygdalus communis L. (Syn. *Prunus amygdalus*)	*Emblethis denticollis* Horváth, 1878 *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Kleidocerys ericae* (Horváth, 1908) *Lygaeus creticus* Lucas, 1854 *Lygaeus equestris* (Linnaeus, 1758) *Megalonotus sabulicola* (Thomson, 1870) *Metopoplax origani* (Kolenati, 1845) *Spilostethus pandurus* (Scopoli, 1763)	Lodos et al., 1978, 1999; Çakır, 1988
Aruncus sylvester Kostel ex Mexim	*Spilostethus saxatilis* (Scopoli, 1763)	Stichel, 1957
Cotoneaster integerrimus Medik.	*Horvathiolus superbus* (Pollich, 1781)	Stichel, 1957; Aysev, 1974
Crataegus sp.	*Arocatus melanocephalus* (Fabricius, 1798) *Artheneis alutacea* Fieber, 1861 *Emblethis denticollis* Horváth, 1878 *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Heterogaster urticae* (Fabricius, 1775) *Metopoplax origani* (Kolenati, 1845) *Nysius graminicola graminicola* (Kolenati, 1845) *Spilostethus pandurus* (Scopoli, 1763)	Stichel, 1957; Çakır, 1988; Lodos et al.,1999
Cydonia oblanga Mill. (Syn. *Cydonia vulgaris*)	*Beosus maritimus* (Scopoli, 1763) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Lygaeus equestris* (Linnaeus,1758) *Metopoplax origani* (Kolenati, 1845) *Raglius zarudnyi* (Jakovlev, 1905) *Rhyparochromus vulgaris* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763)	Lodos et al.,1978, 1999; Gençer et al., 2004
Fragaria sp.	*Nysius ericae ericae* (Schilling, 1829)	Stichel, 1957
Fragaria vesca L.	*Emblethis angustus* Montandon, 1890 *Geocoris megacephalus* (Rossi, 1790)	Lodos et al., 1978; Yazıcı, 2019
Malus angustifolia (Aiton) Michx. (Syn. *Pyrus angustifolia*)	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Lodos et al., 1999
Malus domestica Borkh. (Syn. *Malus communis*, *Pyrus malus*)	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Kleidocerys resedae resedae* (Panzer, 1797) *Lygaeus creticus* Lucas, 1854 *Lygaeus equestris* (Linnaeus, 1758) *Metopoplax fuscinervis* Stål, 1872 *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Peritrechus meridionalis* Puton, 1877 *Scolopostethus affinis* (Schilling, 1829) *Spilostethus saxatilis* (Scopoli, 1763)	Aysev, 1978; Lodos et al., 1978, 1999
Malus sylvestris (L.) Mill.	*Emblethis griseus* {Wolff, 1802) *Heterogaster affinis* Herrich-Schaeffer, 1835 *Heterogaster urticae* (Fabricius, 1775) *Lygaeus creticus* Lucas, 1854 *Lygaeus equestris* (Linnaeus, 1758) *Nysius graminicola graminicola* (Kolenati, 1845) *Spilostethus pandurus* (Scopoli, 1763)	Yiğit & Uygun, 1982
Mespilus germanica L.	*Heterogaster urticae* (Fabricius, 1775) *Lygaeus creticus* Lucas, 1854	Lodos et al., 1978
Pirus elaeagrifolia Pall.	*Geocoris ater* (Fabricius, 1787) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Taphropeltus nervosus* (Fieber, 1861) *Xanthochilus minusculus* (Reuter, 1885)	Lodos et al., 1978

Potentilla sp.	*Tropistethus holosericus* (Scholtz, 1846)	Stichel, 1957
Potentilla neumanniana Rchb. (Syn. *Potentilla verna*)	*Ortholomus punctipennis* (Herrich-Schaeffer, 1838)	Stichel, 1957; Aysev, 1974
Prunus sp.	*Leptodemus minutus* (Jakovlev, 1874) *Stygnocoris rusticus* (Fallén, 1807)	Lodos et al., 1978, 1999
Prunus armeniaca L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Heterogaster artemisiae* Schilling, 1829 *Heterogaster urticae* (Fabricius, 1775) *Lygaeus equestris* (Linnaeus, 1758) *Peritrechus meridionalis* Puton, 1877 *Spilostethus saxatilis* (Scopoli, 1763)	Çakır, 1988; Lodos et al., 1999
Prunus avium L.	*Aphanus rolandri* (Linnaeus, 1758) *Taphropeltus nervosus* (Fieber, 1861) *Beosus quadripunctatus* (Müller 1766) *Eremocoris fenestratus* (Herrich & Schaeffer 1839) *Graptostethus servus* (Fabricius 1787) *Icus angularis* Fieber 1861 *Lamprodema maura* (Fabricius 1803) *Nysius graminicola* graminicola (Kolenatı 1845) *Nysius helveticus* (Herrich & Schaeffer 1850) *Paromius gracilis* (Rambur 1839) *Remaudiereana annulipes* (Barensprung 1859) *Scolopostethus pictus* (Schilling 1829)	Lodos et al., 1978, 1999; Tezcan et al., 2010
Prunus cerasus L.	*Metopoplax origani* (Kolenati, 1845)	Lodos et al.,1978
Prunus domestica L.	*Beosus maritimus* (Scopoli, 1763) *Geocoris luridus luridus* (Fieber, 1844) *Heterogaster urticae* (Fabricius, 1775) *Kleidocerys ericae* (Horváth, 1908) *Lygaeus equestris* (Linnaeus, 1758) *Megalonotus sabulicola* (Thomson, 1870) *Metopoplax origani* (Kolenati, 1845)	Lodos et al., 1978, 1999; Çakır, 1988
Prunus mahaleb L.	*Lygaeus creticus* Lucas, 1854	Lodos, Önder et al., 1978
Prunus persica (L.) Batsh.	*Beosus maritimus* (Scopoli, 1763) *Lygaeosoma anatolicum* Seidenstücker, 1960 *Lygaeus creticus* Lucas, 1854 *Lygaeus equestris* (Linnaeus, 1758)	Lodos et al., 1978, 1999
Pyrus communis L.	*Lygaeus equestris* (Linnaeus, 1758) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Metopoplax origani* (Kolenati, 1845) *Nysius cymoides* (Spinola, 1837) *Peritrechus meridionalis* Puton, 1877	Lodos et al., 1978, 1999
Pyrus elaeagrifolia Pall.	*Geocoris ater* (Fabricius, 1787) *Heterogaster affinis* Herrich-Schaeffer, 1835 *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Megalonotus praetextatus* (Herrich-Schaeffer, 1835) *Taphropeltus nervosus* (Fieber, 1861) *Xanthochilus minusculus* (Reuter, 1885)	Lodos et al., 1978, 1999
Rosa sp.	*Beosus maritimus* (Scopoli, 1763) *Engistus salinus* (Jakovlev, 1874) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Lygaeus creticus* Lucas, 1854 *Lygaeus equestris* (Linnaeus, 1758) *Metopoplax origani* (Kolenati, 1845) *Oxycarenus hyalinipennis* (A. Costa, 1843) *Spilostethus pandurus* (Scopoli, 1763) *Stygnocoris rusticus* (Fallén, 1807)	Lodos et al.,1978, 1999; Çakır, 1988; Yücel & Kıvan, 2018
Rosa canina L.	*Eremocoris praenotatus* Seidenstücker, 1965	Seidenstücker, 1965
Rubus sp.	*Arocatus longiceps* Stål, 1872 *Beosus maritimus* (Scopoli, 1763) *Cymus melanocephalus* Fieber, 1861 *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Kleidocerys ericae* (Horváth, 1908) *Lygaeus equestris* (Linnaeus, 1758) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Scolopostethus pictus* (Schilling, 1829)	Lodos, Önder et al., 1978, 1999; Çakır, 1988
Rubus ideaus L.	*Spilostethus pandurus* (Scopoli, 1763)	Kıyak, 1990

Sanguisorba minor Scop.	*Emblethis dilaticollis* (Jakovlev, 1874) *Ortholomus jordani* Hoberlandt, 1953 *Raglius confusus* (Reuter, 1886)	Kıyak, 1990; Lodos et al., 1999
Sanguisorba officinalis L.	*Spilostethus saxatilis* (Scopoli, 1763)	Stichel, 1957; Aysev, 1974
Sarcopterium spinosum (L.) Spach.	*Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835)	Özsaraç et al., 2001
Sorbus aria (L.) Crantz.	*Lygaeus creticus* Lucas, 1854	Stichel, 1957; Aysev, 1974
Rubiaceae		
Galium sp.	*Cymus claviculus* (Fallén, 1807)	Stichel, 1957; Aysev, 1974
Galium mollugo L.	*Spilostethus saxatilis* (Scopoli, 1763)	Stichel, 1957; Aysev, 1974
Rutaceae		
Citrus sp.	*Metopoplax fuscinervis* Stål, 1872 *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Heterogaster urticae* (Fabricius, 1775)	Lodos et al., 1978,1999
Citrus unshui Marc.	*Lygaeus creticus* Lucas, 1854	Lodos et al., 1978
Salicaceae		
Populus sp.	*Arlheneis foveolata* Spinola, 1837 *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Gonianotus galactodennus* Fieber, 1861 *Graptopeltus validus* (Horváth, 1875) *Homoscelis ruficollis* Horváth, 1884 *Leptodemus minutus* (Jakovlev, 1874) *Lygaeus equestris* (Linnaeus, 1758) *Ortholomus carinatus* (Lindberg, 1932) *Spilostethus pandurus* (Scopoli, 1763)	Stichel,1957; Seidenstücker, 1960; Lodos et al.,1978, 1999; Çakır, 1988
Populus alba L.	*Leptodemus minutus* (Jakovlev, 1874)	Lodos et al., 1978
Populus nigra L.	*Kleidocerys resedae resedae* (Panzer, 1797)	Aysev, 1974; Yıldırım & Eroğlu, 2015
Populus tremula L.	*Artheneis alutacea* Fieber, 1861	Lodos et al., 1978
Salix sp.	*Artheneis alutacea* Fieber, 1861 *Arlheneis foveolata* Spinola, 1837 *Arlheneis hyrcanica* (Kolenati, 1845) *Artheneis balcanica* (Kormilev, 1938) *Beosus maritimus* (Scopoli, 1763) *Caenocoris nerii* (Germar, 1847) *Camptocera glaberrima* (Walker, 1872) *Cymus glandicolor* Hahn, 1832 *Geocoris ater* (Fabricius, 1787) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Horvathiolus superbus* (Pollich, 1781) *Leptodemus minutus* (Jakovlev, 1874) *Lygaeus equestris* (Linnaeus, 1758) *Metopoplax origani* (Kolenati, 1845) *Microplax limbata* Fieber, 1864 *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Peritrechus meridionalis* Puton, 1877 *Scolopostethus decoratus* (Hahn, 1833) *Spilostethus saxatilis* (Scopoli, 1763)	Stichel, 1957; Aysev, 1974; Lodos et al., 1978, 1999; Çakır, 1988; Matocq et al., 2014; Kıyak, 2019
Salix aurita L.	*Kleidocerys resedae resedae* (Panzer, 1797)	Aysev, 1974
Salix babylonica L.	*Kleidocerys resedae resedae* (Panzer, 1797)	Yıldırım & Eroğlu, 2015
Santalaceae		
Viscum album L.	*Spilostethus saxatilis* (Scopoli, 1763)	Lodos et al., 1999
Scrophulariaceae		
Scrophularia sp.	*Heterogaster artemisiae* Schilling, 1829 *Nysius graminicola graminicola* (Kolenati, 1845) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Spilostethus pandurus* (Scopoli, 1763)	Aysev, 1974; Kıyak, 1990; Lodos et al., 1999
Verbascum sp.	*Aphanus rolandri* (Linnaeus, 1758) *Arlheneis foveolata* Spinola, 1837 *Cymus melanocephalus* Fieber, 1861 *Emblethis angustus* Montandon, 1890 *Emblethis ciliatus* Horváth, 1875 *Emblethis verbasci* (Fabricius, 1803) *Eremocoris fenestratus* (Herrich-Schaeffer, 1839)	Stichel, 1957; Lodos et al., 1978, 1999; Aysev, 1974; Kıyak, 1993; Çakır, 1988; Çakır, & Önder, 1990;

Verbascum sp.	*Gastrodes grossipes* (De Geer,1773) *Geocoris arenarius* (Jakovlev, 1867) *Geocoris ater* (Fabricius, 1787) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Geocoris megacephalus* (Rossi, 1790) *Heterogaster urticae* (Fabricius, 1775) *Horvathiolus superbus* (Pollich, 1781) *Lamprodema maura* (Fabricius, 1803) *Lygaeosoma anatolicum* Seidenstücker, 1960 *Lygaeosoma sardeum sardeum* Spinola, 1837 *Lygaeus equestris* (Linnaeus, 1758) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Megalonotus emarginatus* (Rey, 1888) *Megalonotus sabulicola* (Thomson, 1870) *Metopoplax fuscinervis* Stål, 1872 *Metopoplax origani* (Kolenati, 1845) *Microplax interrupta* (Fieber, 1837) *Nvsius senecionis senecionis* (Schilling, 1829) *Nysius ericae ericae* (Schilling, 1829) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius thymi thymi* (Wolff, 1804) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Plinthisus longicollis* Fieber, 1861 *Rhyparochromus phoeniceus* (Rossi, 1794) *Scolopostethus cognatus* Fieber, 1861 *Spilostethus pandurus* (Scopoli, 1763) *Spilostethus saxatilis* (Scopoli, 1763) *Xanthochilus minusculus* (Reuter, 1885)	Stichel, 1957; Lodos et al., 1978, 1999; Aysev, 1974; Kıyak, 1993; Çakır, 1988; Çakır, & Önder, 1990;
Verbascum sinuatum L.	*Emblethis angustus* Montandon, 1890	Özsaraç et al., 2001
Solanaceae		
Capsicum sp.	*Nysius cymoides* (Spinola, 1837)	Özgen et al., 2020
Solanum lycopersicum L.	*Lygaeus equestris* (Linnaeus, 1758) *Nysius cymoides* (Spinola, 1837) *Nysius ericae ericae* (Schilling, 1829)	Stichel, 1957; Kıyak, 1990
Solanum melongena L.	*Nysius cymoides* (Spinola, 1837)	Özgen et al., 2020
Solanum nigrum L.	*Nysius cymoides* (Spinola, 1837)	Özgen et al., 2020
Solanum tuberosum L.	*Geocoris pallidipennis pallidipennis* (A. Costa, 1843) *Emblethis griseus* ¦Wolff, 1802) *Lygaeus equestris* (Linnaeus, 1758) *Nysius cymoides* (Spinola, 1837) *Nysius ericae ericae* (Schilling, 1829) *Oxycarenus pallens* (Herrich-Schaeffer, 1850)	Stichel, 1957; Aysev, 1974; Özbek & Alaoğlu, 1988; Atlıhan et al., 2003; Özgen et al., 2020
Sapindaceae		
Acer sp.	*Lygaeosoma sardeum sardeum* Spinola, 1837	Lodos et al., 1999
Styracaceae		
Styrax sp.	*Arocatus melanocephalus* (Fabricius, 1798) *Caenocoris nerii* (Germar, 1847) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Spilostethus pandurus* (Scopoli, 1763)	Çakır, 1988; Lodos et al., 1999
Styrax officinalis L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Beosus maritimus* (Scopoli, 1763) *Lygaeus creticus* Lucas, 1854	Lodos et al., 1978
Tamaricaceae		
Myricaria sp.	*Artheneis alutacea* Fieber, 1861	Lodos, Önder et al., 1999
Reaumuria sp.	*Henestaris laticeps laticeps* (Curtis, 1836)	Seidenstücker, 1958
Tamarix sp.	*Artheneis alutacea* Fieber, 1861 *Artheneis balcanica* (Kormilev, 1938) *Arlheneis foveolata* Spinola, 1837 *Arlheneis hyrcanica* (Kolenati, 1845) *Beosus quadripunctatus* (Müller, 1766) *Caenocoris nerii* (Germar, 1847) *Cymus melanocephalus* Fieber, 1861 *Emblethis brachynotus* Horváth, 1897 *Emblethis griseus* ¦Wolff, 1802) *Emblethis verbasci* (Fabricius, 1803) *Geocoris arenarius* (Jakovlev, 1867)	Hoberlandt, 1956; Stichel, 1957; Seidenstücker, 1958; Lodos et al., 1978, 1999; Çakır & Önder, 1990; Çakır,1988; Lodos et al., Matocq et al., 2014

	Geocoris erythrocephalus (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Heterogaster affinis* Herrich-Schaeffer, 1835 *Holcocranum saturejae* (Kolenati, 1845) *Hyalochilus dolosus* Horváth, 1897 *Lygaeosoma sardeum erythropterum* (Puton, 1876) *Lygaeus equestris* (Linnaeus, 1758) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Metopoplax origani* (Kolenati, 1845) *Nysius ericae ericae* (Schilling, 1829) *Nysius graminicola graminicola* (Kolenati, 1845) *Nysius thymi thymi* (Wolff, 1804) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Paromius gracilis* (Rambur, 1839) *Rhyparochromus vulgaris* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763)	
Thymelaeaceae		
Daphne gnidioides L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Çakır, 1988
Tiliaceae		
Tilia sp.	*Kleidocerys resedae resedae* (Panzer, 1797) *Arocatus melanocephalus* (Fabricius, 1798)	Stichel, 1957; Aysev, 1974
Tilia tomentosa Moench	*Oxycarenus lavaterae* (Fabricius, 1787)	Arslangündoğdu et al., 2018
Typhaceae		
Typha sp.	*Ischnodemus caspius* Jakovlev, 1871	Lodos et al.,1999
Ulmaceae		
Ulmus minor Mill. (Syn. *Ulmus campestris*)	*Caenocoris nerii* (Germar, 1847)	Lodos et al.,1978
Ulmus sp.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Heterogaster affinis* Herrich-Schaeffer, 1835 *Metopoplax origani* (Kolenati, 1845) *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Spilostethus saxatilis* (Scopoli, 1763)	Çakır, 1988; Lodos et al.,1999
Ulmus glabra Huds.	*Arocatus melanocephalus* (Fabricius, 1798)	Stichel, 1957
Urticaceae		
Parietaria debilis G. Forst	*Hyalochilus ovatulus* (A. Costa, 1853)	Stichel, 1957
Parietaria vulgaris Hill	*Hyalochilus dolosus* Horváth, 1897	Stichel, 1957
Urtica sp.	*Beosus maritimus* (Scopoli, 1763) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Heterogaster affinis* Herrich-Schaeffer, 1835 *Heterogaster urticae* (Fabricius, 1775) *Kleidocerys ericae* (Horváth, 1908) *Metopoplax fuscinervis* Stål, 1872 *Orsillus depressus* (Mulsant & Rey, 1852) *Raglius pineti* (Herrich-Schaeffer, 1835) *Rhyparochromus phoeniceus* (Rossi, 1794) *Scolopostethus affinis* (Schilling, 1829) *Scolopostethus cognatus* Fieber, 1861 *Scolopostethus pictus* (Schilling, 1829) *Tropidothorax leucopterus* (Goeze, 1778)	Hoberlandt, 1956; Stichel, 1957; Çakır, 1988; Lodos, Önder et al., 1999
Urtica dioeca L.	*Heterogaster urticae* (Fabricius, 1775) *Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835) *Metopoplax origani* (Kolenati, 1845) *Microplax albofasciata* (A. Costa, 1847) *Nysius graminicola graminicola* (Kolenati, 1845) *Rhyparochromus vulgaris* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763)	Stichel, 1957; Aysev, 1974; Lodos et al., 1978
Urtica morifolia Poir.	*Heterogaster urticae* (Fabricius, 1775)	Stichel, 1957; Aysev, 1974
Urtica urens L.	*Heterogaster urticae* (Fabricius, 1775)	Stichel, 1957; Aysev, 1974
Verbanaceae		
Verbana officinalis L.	*Platyplax inermis* (Rambur, 1839)	Stichel, 1957; Aysev, 1974
Vitex sp.	*Lygaeus equestris* (Linnaeus, 1758)	Lodos et al., 1999

Vitex agnus-castus L	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Xanthochilus saturnius* (Rossi, 1790)	Çakır, 1988, Lodos et al., 1999; Özsaraç et al., 2001
Vitaceae		
Vitis vinifera L.	*Heterogaster urticae* (Fabricius, 1775) *Lygaeus equestris* (Linnaeus, 1758) *Megalonotus sabulicola* (Thomson, 1870) *Metopoplax origani* (Kolenati, 1845) *Nysius cymoides* (Spinola, 1837) *Nysius senecionis senecionis* (Schilling, 1829) *Nysius ericae ericae* (Schilling, 1829) *Platyplax salviae* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763)	Stichel, 1957; Lodos et al., 1978, 1999
Additional Information for Part I (Kıyak et al, 2020).		
Apiaceae		
Apiaceae (Umbelliferae)	*Beosus maritimus* (Scopoli, 1763) *Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Geocoris luridus luridus* (Fieber, 1844) *Lygaeus equestris* (Linnaeus, 1758) *Nysius graminicola graminicola* (Kolenati, 1845)	Lodos et al., 1978, 1999; Çakır, 1988
Conium maculatum L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Yazıcı, 2019
Apocynaceae		
Nerium oleander L.	*Arocatus longiceps* Stål, 1872 *Caenocoris nerii* (Germar, 1847) *Lygaeus creticus* Lucas, 1854 *Lygaeus equestris* (Linnaeus, 1758) *Metopoplax origani* (Kolenati, 1845) *Scolopostethus pictus* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763) *Tropidothorax leucopterus* (Goeze, 1778)	Stichel, 1957; Aysev, 1974; Lodos et al., 1978, 1999
Asparagaceae		
Asparagus sp.	*Geocoris megacephalus* (Rossi, 1790)	Aysev, 1974
Asphodelaceae		
Asphodelus sp.	*Beosus maritimus* (Scopoli, 1763) *Rhyparochromus vulgaris* (Schilling, 1829) *Spilostethus pandurus* (Scopoli, 1763)	Lodos et al., 1999
Asphodelus microcarpus Viv.	*Macroplax fasciata fasciata* (Herrich-Schaeffer, 1835)	Lodos et al, 1978
Asteraceae		
Asteraceae (Compositae)	*Plinthisus longicollis* Fieber, 1861	Lodos et al., 1999
Echinops sp.	*Pionosomus persimilis* Horváth, 1895	Hoberlandt, 1956
Cannabaceae		
Cannabis sp.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Çakır, 1988; Lodos et al., 1999
Cannabis sativa L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825) *Kleidocerys ericae* (Horváth, 1908) *Spilostethus saxatilis* (Scopoli, 1763)	Lodos et al., 1978, 1999
Colchicaceae		
Colchicum autumnale L.	*Spilostethus saxatilis* (Scopoli, 1763)	Stichel, 1957; Aysev, 1974
Cupressaceae		
Thuja sp.	*Orsillus maculatus* (Fieber, 1861) *Orsillus depressus* (Mulsant & Rey, 1852)	Lodos et al.,1999
Platycladus orientalis L. (Syn. *Thuja orientalis*)	*Orsillus depressus* (Mulsant & Rey, 1852)	Stichel, 1957
Ericaceae		
Rhododendron tomentosum Harmaja (Syn. *Ledum palustre*)	*Kleidocerys resedae resedae* (Panzer, 1797)	Aysev, 1974
Fabaceae		
Fabaceae (Leguminosae)	*Cymus melanocephalus* Fieber, 1861 *Oxycarenus pallens* (Herrich-Schaeffer, 1850) *Rhyparochromus phoeniceus* (Rossi, 1794) *Stygnocoris sabulosus* (Schilling, 1829)	Lodos et al., 1999
Acacia sp.	*Geocoris luridus luridus* (Fieber, 1844) *Nysius cymoides* (Spinola, 1837) *Plinthisus mehadiensis* Horvath, 1881	Lodos et al.,1999; Çakır & Önder, 1990
Medicago sativa L.	*Geocoris erythrocephalus* (Lepeletier & Serville, 1825)	Yazıcı, 2019

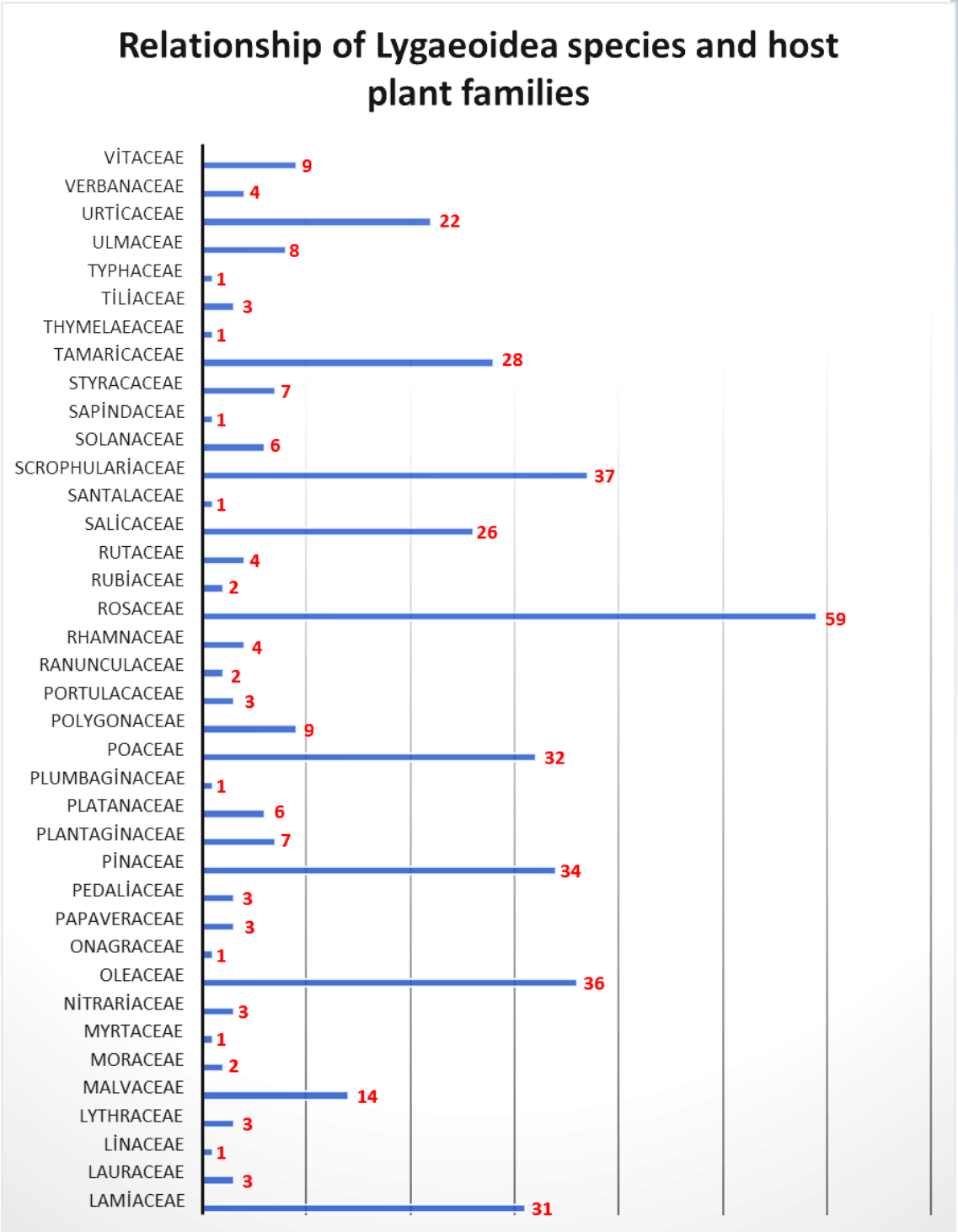


Figure 1. Distribution of Lygaeoidea species numbers according to families of host plants in Turkey.

Table 2. The number of Lygaeoidea species on hostplants family in Turkey

Host plant Family	Number of Lygaeoidea species on the host	Host plant Family	Number of Lygaeoidea species on the host
Lamiaceae	31	Ranunculaceae	2
Lauraceae	3	Rhamnaceae	4
Linaceae	1	Rosaceae	59
Lythraceae	3	Rubiaceae	2
Malvaceae	14	Rutaceae	4
Moraceae	2	Salicaceae	26
Myrtaceae	1	Santalaceae	1
Nitrariaceae	3	Scrophulariaceae	37
Oleaceae	36	Solanaceae	6
Onagraceae	1	Sapindaceae	1
Papaveraceae	3	Styracaceae	7
Pedaliaceae	3	Tamaricaceae	28
Pinaceae	34	Thymelaeaceae	1
Plantaginaceae	7	Tiliaceae	3
Platanaceae	6	Typhaceae	1
Plumbaginaceae	1	Ulmaceae	8
Poaceae	32	Urticaceae	22
Polygonaceae	9	Verbanaceae	4
Portulacaceae	3	Vitaceae	9

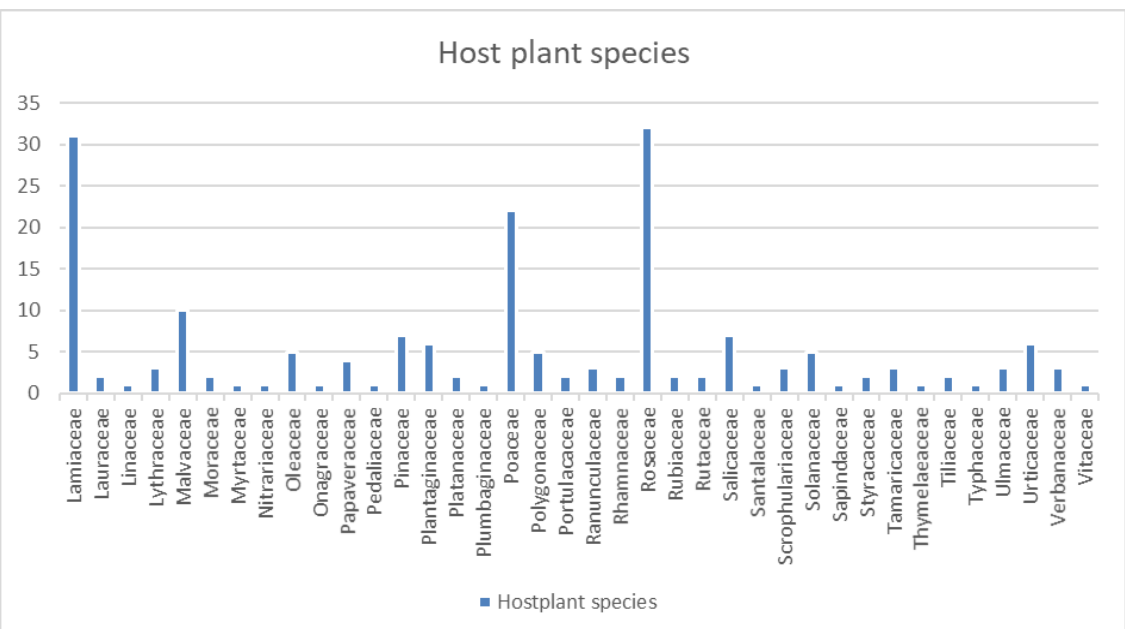


Figure 2. Host plants species of Lygaeoidea species in Turkey.

Table 3. The number of host plant species in Turkey

Host plant Family		Number of Host plant species	Host plant Family		Number of Host plant species
37	Lamiaceae	31	56	Ranunculaceae	3
38	Lauraceae	2	57	Rhamnaceae	2
39	Linaceae	1	58	Rosaceae	32
40	Lythraceae	3	59	Rubiaceae	2
41	Malvaceae	10	60	Rutaceae	2
42	Moraceae	2	61	Salicaceae	7
43	Myrtaceae	1	62	Santalaceae	1
44	Nitrariaceae	1	63	Scrophulariaceae	3
45	Oleaceae	5	64	Solanaceae	5
46	Onagraceae	1	65	Sapindaceae	1
47	Papaveraceae	4	66	Styracaceae	2
48	Pedaliaceae	1	67	Tamaricaceae	3
49	Pinaceae	7	68	Thymelaeaceae	1
50	Plantaginaceae	6	69	Tiliaceae	2
51	Platanaceae	2	70	Typhaceae	1
52	Plumbaginaceae	1	71	Ulmaceae	3
53	Poaceae	22	72	Urticaceae	6
54	Polygonaceae	5	73	Verbanaceae	3
55	Portulacaceae	2	74	Vitaceae	1

CONCLUSION AND DISCUSSION

In this study, as a result of the literature review between the years 1922-2021, a total of 187 taxa from 38 plant families (67 taxon at genera level, 120 taxon at species level) were identified in association with Lygaeoidea species.

Among these families, Rosaceae has the highest number of host plants, followed by Lamiaceae with 31 taxa number, Poaceae with 22 taxa number and Malvaceae with 10 taxa number (Table 3; Figure 2).

Considering the preference of Lygaeoidea species in these families, 59 species were associated with Rosaceae, 34 species with Pinaceae, 32 species with Poaceae and Scrophulariaceae, 31 species with Lamiaceae and Oleaceae, 28 species with Tamaricaceae, 26 species with Salicaceae, 22 species with Urticaceae and 15 species with Malvaceae.

When the number of Lygaeoidea species is compared with the plant taxa, the most conspicuous family is the Scrophulariaceae with 32 Lygaeoidea species, related to 3 plant taxa.

It is followed by Tamaricaceae with 28 Lygaeid species related to 3 plant taxa, Oleaceae with 31 Lygaeid species related

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

to 5 plant taxa, Pinaecae with 34 Lygaeid species related to 7 plant taxa, Urticaceae with 22 Lygaeid species related to 6 plant taxa, and Salicaceae with 26 Lygaeid species related to 7 plant taxa.

Among the plant taxa, *Verbascum* is taxon most associated with the Lygaeid species, and 37 Lygaeid species have been identified on the species of this genera. *Olea europea* with 28 species, *Tamarix* sp. with 27 species, *Pinus* sp. with 20 species. and *Salix* sp., *Triticum* sp. with 18 species and *Urtica* sp. follow it.

When looking at this list, it can be seen that various species are present on one or more hosts.

For example, *Lygaeus equestris* (Linnaeus, 1758) and *Spilostethus pandurus* in 28, *Metopoplax origani* (Kolenati, 1845) 24, *Oxycarenus pallens* (Herrich-Schaeffer, 1850) 20, *Nysius graminicola graminicola* (Kolenati, 1845) and *Spilostethus saxatilis* (Scopoli, 1763) 16 different hosts were detected.

This study (Part-II), some overlooked records that should be included in the part I presented by Kıyak et al (2020) presents as an addition.

With these additional records, the number of families in the Part-I was increased to 39 families with the addition of Asparagaceae, Asphodelaceae and Colchicaceae families, consequently it include 232 taxa with the addition of 10 taxa (4 of at the genera level and 6 at the species level) which were not mentioned in the first study.

As a result of both studies, a total of 409 plant taxa were obtained from 77 plant families associated with Lygaeoidea species in Turkey.

REFERENCES

Arslangündoğdu, Z., Hızal, E. & Acer, S., 2018, First record of *Oxycarenus lavaterae* (Fabricius, 1787) (Heteroptera, Lygaeidae) in Turkey. *Applied Ecology and Environmental Research* 16(2): 1305-1311.

Atlıhan, R., Yardım, N., Özgökçe, S., Kaydan, B., 2003, Van İli ve Çevresinde Patates Ekiliş Alanlarındaki Zararlı Böcek Türleri ve Doğal Düşmanları. *Tarım Bilimleri Dergisi*, 9 (3) 291-295.

Aysev, N., 1974, *Ege Bölgesinde Lygaeidae Familyası Üzerinde Sistematik Çalışmalar*, Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü Nebat Koruma Müzesi, Ankara, 149 pp.

Beyaz, G., & Tezcan, S., 2002. Studies on the determination of Heteroptera fauna on *Origanum* spp. (Lamiaceae). *Türkiye Entomoloji Dergisi, 26* (1): 3-10.

Çağlar, S., 1992, Beynam ormanı ve çevresiyle Çubuk ve çevresi Hemiptera kommunitesi üzerinde çalışmalar, Doktora Tezi, H. Ü. Fen Bil. Enst.

Çakır, S., 1988, Türkiye Geocorinae (Heteroptera: Lygaeidae) faunası üzerinde sistematik çalışmalar', Yüksek Lisans Tezi, E.Ü. Fen Bil. Enst., İzmir: 1-81.

Çakır, S., Önder, F.,1990, Turkey Geocorinae (Heteroptera: Lygaeidae) alt familyası üzerin-de sistematik ve faunistik araştırmalar, *Türk Entomol. Derg.,* 1990, 14 (1):37-52,1990.

Fahringer, J., 1922, Eine Rynchotenausbeute aus der Türkei, Kleinasien und benachbarten Gebieten. *Konowia*, 1: 137-144.

Gençer, N.S, Kovancı, O. B., Kovancı, B., Akgül, H. C., 2004, Bursa İli Çilek Üretim Alanlarıda Bulunan Heteroptera Takım Türleri. Türk. Entomol. Derg., 28 (1): 69-80.

Hoberlandt, L., 1956, Results of the Zoological Scientific Expedition of the National Museum in Praha to Turkey-18: Hemiptera IV: Terrestriale Hemiptera-Heteroptera of Turkey, *Acta Ent. Mus. Nat. Pragae*, 3: 274., Prag.

Kıyak, S., 1990**,** Systematisch- Oekologische Untersuchungen Ueber Die Wanzen (Insecta: Heteroptera) Aus dem Gebiet Hazar- See, Maden und Ergani (Prov.Elazig)-I, *J. Biol. Fac. Sci. Arts Gazi Univ.* 1:43-95; II. *J. Biol. Fac. Sci. Arts Gazi Univ.* 1:97-144.

Kıyak, S., 1993, Über terrestrische Wanzenarten Von Soğuksu National Park, *Priamus*. 6 (3/4): 131-156.

Kıyak, S., 2019. A List of Heteroptera Species Reported from *Salix* spp. in Turkey. *Mun. Ent. Zool.* 14(2): 475-477.

Kıyak, S., Fent, M., Dursun, A., 2020, A Preliminary List on the Host Plants of Lygaeoidea Species (Hemiptera: Heteroptera) in Turkey- I., *J.Het.Turk.,* 2 (2):114-133

Kıyak, S., Özdamar, H., 2017, Contribution to the Knowledge of the Genera *Apterola* (Heteroptera: Lygaeidae) in Turkey. *Mun. Ent. Zool.,* 12 (2): 653-654.

Lodos, N., Önder, F., Pehlivan, E., Atalay, R., 1978, *Ege ve Marmara Bölgesi Zararlı Böcek Faunasının Tespiti Üzerine Çalışmalar, Curculionidae, Scarabeidae (Coleoptera); Pentatomidae, Lygaeidae, Miridae (Heteroptera)*, T. C. Gıda-Tarım ve Hayv. Bklığı Zir.Müc. ve Kar.G. Müd. Basımevi, 301, Ankara.

Lodos, N., Önder, F., Pehlivan, E., Atalay, R., Erkin, E., Karsavuran, Y., Tezcan, S., Aksoy, S., 1999, *Faunistic studies on Lygaeidae (Heteroptera) of Western Black Sea, Central Anatolia and Mediterranean Regions of Turkey*, E. Ü. Basımevi, İzmir, IX:1-58.

Matocq, A., Pluot-Sigwalt, D., Özgen, İ., 2014, Terrestrial Hemiptera (Heteroptera) Collected In South-East Anatolia (Diyarbakır, Mardin And Elazığ Provinces) (Turkey): Second List. *Mun. Ent. Zool.,* 9(2), 884-930.

Özgen, İ., Kaymak, Kara, B., Miroğlu, S., Koç, İ., Dioli, P. 2020. A New Potential Pest of East and Southeastern Anatolia in Turkey: *Nysius cymoides* (Spinola, 1837) (Heteroptera, Lygaeidae). *Munis Entomology & Zoology,* 15 (1): 265-268

Özsaraç, Ö. Kıyak, S., 2001, A Study on the Heteroptera Fauna of Bozcaada (Çanakkale Province). *Turk J Zool.,* 25: 313-322.

Özsaraç, H., Kıyak, S., Özsaraç, Ö. 2001, A Study on the Fauna of Heteroptera of Gökçeada (Çanakkale)-I. *Journal of the Institute of Science and Technology of Gazi University,* 14(3): 841-855.

Tezcan, S., Gülperçin, N**.,** Fent, M. (2010), Contribution to the knowledge of the light trap collected Heteroptera fauna occurring in cherry orchards in western Turkey", *Linzer biologische Beiträge* **42**/1, 817-823

Tuatay, N. Kalkandelen A., Aysev (Çağatay), N., 1972, *Nebat Koruma Müzesi Böcek Kataloğu (1961-1971).* Tarım Bakanlığı, Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü Yayınları, Mesleki Kitaplar Serisi, 66 pp.

Öncül Abacıgil, T., Varlı, S.V. Tezcan, S. (2010) Edremit (Balıkesir) Körfezi çevresindeki zeytin bahçelerinde kışlak tuzaklarla saptanan Heteroptera türleri", *Türkiye entomoloji dergisi*, 34 (1): 105-115

Özbek, H., Alaoğlu, Ö., 1988, Erzurum Ve Çevresinde Patates Bitkisinde Bulunan Fitofag Heteroptera Türleri. *Bitki Koruma Bülteni,* 27: 3-4

Seidenstücker, G., 1958, Anadolu'dan Heteropterler II., İst. *Ünv. Fen Fak. Mec., Seri B*, C. XXIII, (1-2): 119-129.

Seidenstücker G., 1963, Über *Emblethis*-Arten Kleinasiens (Heteroptera, Lygaeidae). *Acta Entomologica Musei Nationalis Pragae,* 35, 649-665.

Seidenstücker, G., 1965, Zwei neue *Eremocoris* aus Anatolien (Heteroptera, Lygaeidae). *Reichenbachia*, 5 (17), 161–171.

Seidenstücker, G., 1967, Untersuchungen an *Emblethis* (Heteroptera, Lygaeidae). *Reichenbachia.* 8. 31 : 249-266

Stichel, W., 1957-1962, *Illustrierte Bestimmungstabellen der Wanzen II. Europa (Hemiptera – Heteroptera Europae),* Vol. IV:1-830, Berlin.

Yazıcı, G., 2019, Host relationships and Heteropterans as aphid predators in Turkey. *Bitki Koruma Bülteni*, 2019, 59 (4) : 85-92

Yazıcı, G., Sertkaya, E., 2020, A new pest of *Gossypium hirsutum* in Turkey: *Leptodemus minutus* Jakovlev 1876 (Hemiptera: Heteroptera: Lygaeidae: Oxycareninae). *MKU. Tar. Bil. Derg.* 25 (2) : 256-261.

Yıldırım, E., Eroğlu, Z., 2015, Atatürk Üniversitesi (Erzurum) Yerleşkesinde Odunsu Bitkilerde Bulunan ZararlıBöcek Türleri. *Atatürk Üniv. Ziraat Fak. Derg.*, 46(1): 29-37

Yiğit A., Uygun, N., 1982, Studies on the determination of beneficial and injurious fauna of apple orchards in Adana, İçel and Kahramanmaraş provinces. *Bitki Koruma Bülteni*. 22(4): 163-178.

Yücel, S. A., Kıvan, M., 2018., İstanbul Göztepe Parkı Gül Bahçesinde bulunan zararlı Hemiptera ve Hymenoptera türleri. *Tekirdağ Ziraat Fakültesi Dergisi*, 15 (02): 95-100.

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

First record of Sycamore Seed Bug *Belonochilus numenius* (Say, 1832) (Hemiptera: Heteroptera: Lygaeidae) in Turkish Thrace

Ahmet Dursun[1] Meral Fent[2]

[1]Amasya University, Faculty of Arts and Science, Department of Biology, 05100, Amasya/ Turkey
E-mail: ahmet.dursun@amasya.edu.tr ORCID ID: 0000-0002-5114-7470

[2]Trakya University, Faculty of Science, Department of Biology, 22030, Edirne/Turkey
E-mail: m_fent@hotmail.com ORCID ID 0000-0001-5787-6714

ABSTRACT: In this study, an alien invasive species, *Belonochilus numenius* (Say, 1832), was recorded in two localities in Edirne province during field studies in the Thrace Region between 2019-2021. These findings are the first record of this species, which entered from Spain to Europe in 2008 and then spread to other European countries, in the Thrace Region and the second record in Turkey. In addition, the latest distribution of this species in Europe and Turkey is shown on the map.

KEYWORDS: *Belonochilus numenius,* fist record, Lygaeidae, Turkish Thrace.

To cite this article: Dursun, A., Fent, M., 2021, First record of Sycamore Seed Bug *Belonochilus numenius* (Say, 1832) (Hemiptera: Heteroptera: Lygaeidae) in Turkish Thrace, *J.Het.Turk.,* 3 (2):106-110
DOI:10.5281/zenodo.5717182
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A1.pdf
Received: Sep 29, 2021; **Revised:** Oct 12, 2021; **Accepted:** Oct 13, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

Belonochilus numenius (Say, 1832) is called the sycamore seed bug, and the natural distribution of this Nearctic species is in Canada, the United States, and Mexico (Slater, 1964; Ashlock & Slater, 1988).

After this alien and invasive species was identified firstly in Spain in 2008 (Gessé et al., 2009 the species has spread rapidly in Central and Southern European countries. *Belonochilus numenius*, which has been detected in 20 European countries and Madeira (Aukema, 2020) has been identified by Çerçi & Oruz (2021) in İzmir Province, which is located in the western Anatolia (Asian part) in Turkey so far.

RESULTS

Belonochilus numenius (Say, 1832)

Material examined: EDİRNE: Uzunköprü-Kırkkavak (41°11'893N; 26°47'591E), 25.05.2019, 1♂; Edirne-Centrum(41°39'597N; 26°35'789E), 01.07.2021, on *Platanus orientalis* L, 1♀.

The identification was made taking into consideration the descriptions and the characteristics of the male genitalia indicated by Baena & Torres (2012). In the photographs were given dorsal and ventral views of the species, and its paramera (Fig. 1). Specimens are deposited in the Trakya University zoology collection.

Distrubution in Turkey: İzmir (Selçuk) (Çerçi & Oruz, 2021).

General Distrubution: **Europe:** Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Macedonia, Montenegro, Serbia, Sicily, Slovakia, Slovenia, Spain, Switzerland. **North Africa:** Madeira. **Asia:** Turkey (Asian part). Extralimital: North America (Canada, Mexico, USA) (Aukema, 2020; Çerçi & Oruz, 2021)

In the present study, *Belonochilus numenius* was recorded in two localities in Edirne province in Thrace Region. When taking into account the rapid spread of the species, which was also recorded in Bulgaria and Greece, it is an expected result that it was found in the Thrace Region near the borders of both countries. The species is recorded for the first time in the Thrace Region, and this finding is the second record in Turkey. It seems that this alien invasive species would continue to spread eastward and it would be possible to encounter it in other parts of Anatolia in the future.

Belonochilus numenius, is an arboreal seed predator, which its adults and nymphs feeding on mature and immature fruits of *Platanus* spp., but it was also occasionally recorded on other deciduous trees in its native area (Wheeler, 1984). In this study, the specimen found in Edirne (Center) was also caught from *Platanus* sp.

Chronological distribution of *Belonochilus numenius* (Say, 1832) in Palaearctic (Fig.2)

– 2008 France (Matocq, 2008; Baena & Torres, 2012; Dusoulier et al., 2013)
– 2009 Spain (Gessé et al., 2009; Riba et al., 2015)
– 2010 Italy (Küchler & Strauß, 2010)
– 2011 Austria (Rabitsch at al., 2011)
– 2011 Czech Republic (Hradil, 2011; Kment et al., 2013)
– 2012 Hungary (Torma, 2012)
– 2013 Bulgaria (Aukema et al., 2013)
– 2013 Germany (Küchler & Kehl, 2013; Werner et al., 2013; Werner, 2014)
– 2013 Slovakia, (Kment & Cunev, 2013)
– 2015 Madeira (Rabitsch & Heiss, 2015)
– 2016 Bosnia and Herzegovina (Kulijer & Miljevic, 2016)
– 2016 Serbia (Protić & Šeat, 2016)
– 2016 Slovenia (Gogala et al., 2016)
– 2018 Albania (Rabitsch 2018)
– 2018 Greece (Davranoglou & Koutsoukos, 2018)
– 2019 Croatia (Martinović et al., 2019)
– 2019 Macedonia (Srebrova et al., 2019)
– 2020 Belgium (Claerebout et al., 2020)
– 2020 Montenegro (Martinović, 2020)
– 2021 Turkey (Asain part) (Çerçi & Oruz, 2021)
– 2021 Turkey (European part) (this study)

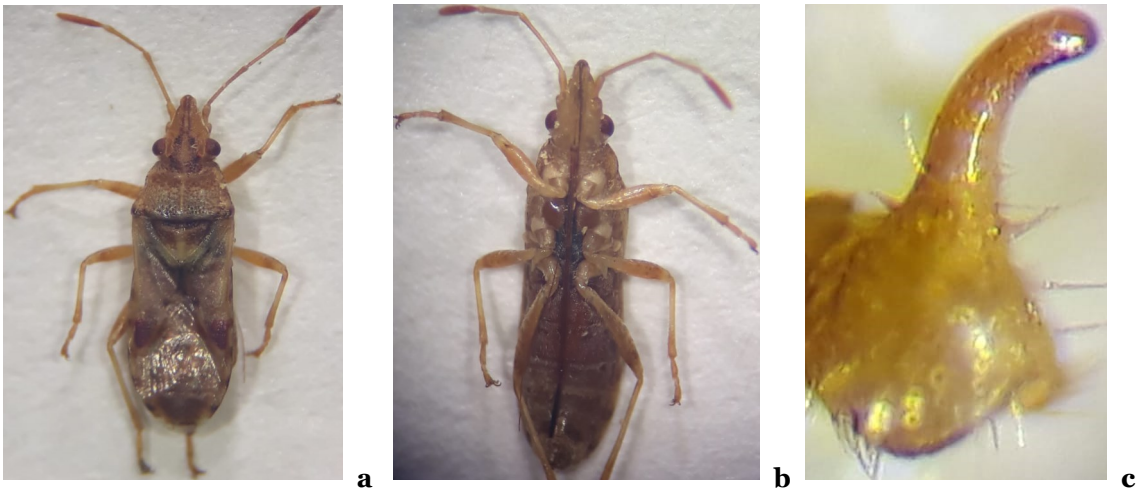


Figure 1. *Belonochilus numenius* (Say, 1832) a.Dorsal view b. Ventral view c. Paramere

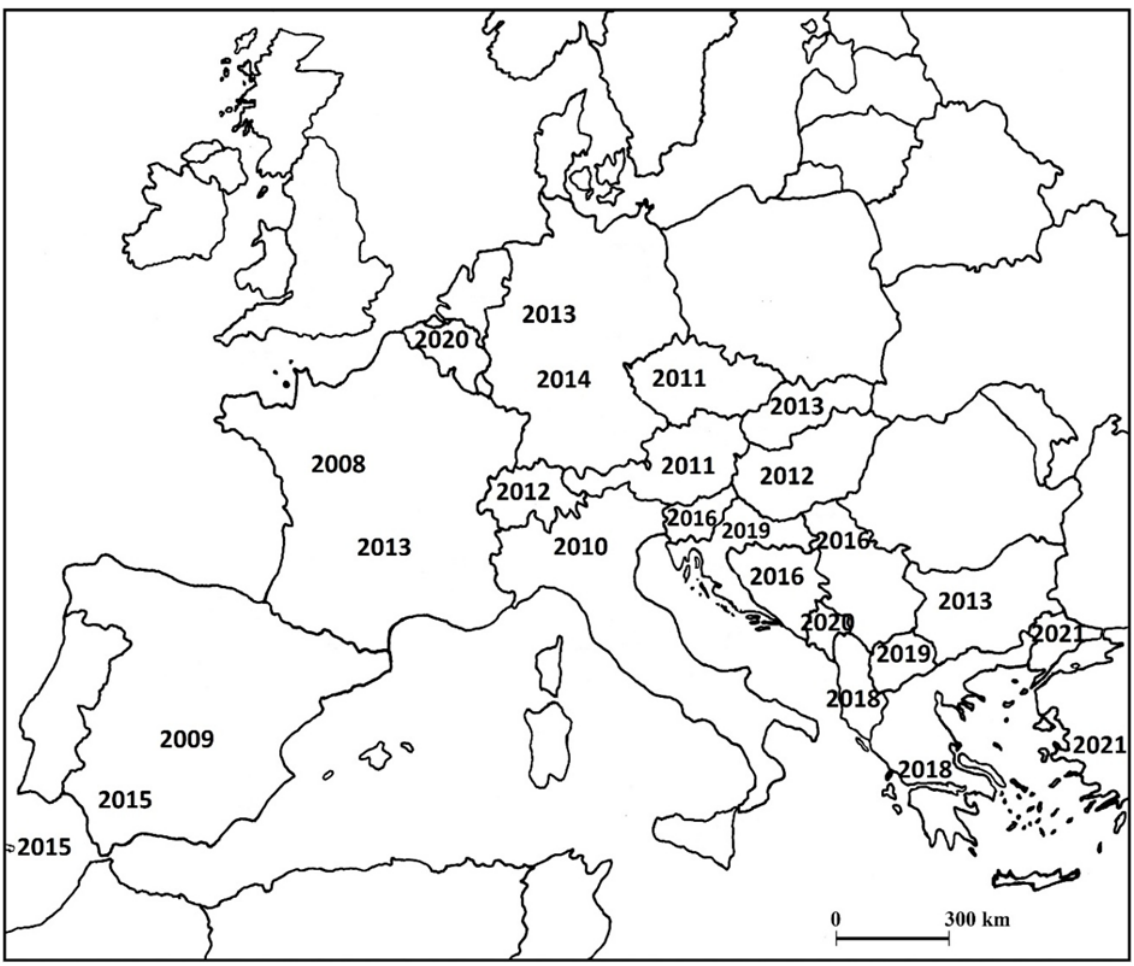


Figure 2. The distribution of *Belonochilus numenius* (Say, 1832) in Europe.

REFERENCES

Ashlock, P. D. & Slater, A., 1988, *The seed bugs and chinch bugs. 167–245 pp.* In: *Catalog of the Heteroptera, or true bugs, of Canada and the continental United States* (*Eds. T. J. Henry, R. C. Froeschner*). E.J. Brill, Leiden, 958 pp.

Aukema, B., 2020, *Catalogue of Palaearctic Heteroptera. Naturalis Biodiversity Center.* Available from https://catpalhet.linnaeus.naturalis.nl/ (Accessed on 06- 01-2021).

Aukema, B., Rieger, Chr., Rabitsch, W., 2013, *Catalogue of the Heteroptera of the Palaearctic Region.* Volume 6. The Netherlands Entomological Society, Supplement: i-xxiii, 1-629.

Baena, M., Torres, J. L., 2012, Nuevos datos sobre heterópteros exóticos en España y Francia: *Tempyra biguttula* STÅL, 1874, *Belonochilus numenius* (SAY, 1832) y *Zelus renardii* (KOLENATI, 1856) (Heteroptera: Rhyparochromidae, Orsillidae, Reduviidae), *Boletín de la Asociación española de Entomología*, 36 (3-4): 351-360.

Claerebout, S., Bronne, L., Baugnée, J.-Y., 2020, Premier signalement de *Belonochilus numenius* (Say, 1832) pour la Belgique (Hemiptera: Heteroptera: Lygaeidae). *Bulletin de la Société Royale Belge d'Entomologie*, 155: 105-112.

Çerçi, B., Oruz, T., 2021, First Record of Sycamore Seed Bug *Belonochilus numenius* (Say, 1831) (Hemiptera: Heteroptera: Lygaeidae) in Turkey, *J.Het.Turk.,* 3 (1): 40-45

Davranoglou L.R., Koutsoukos V., 2018, First record of the Nearctic sycamore seed bug *Belonochilus numenius* (Hemiptera: Heteroptera: Lygaeidae) from Greece, *Ecologica Montenegrina*, 16: 32–33.

Dusoulier, F., Maillot, R., Derreumax, V., 2013, *Belonochilus numenius* (Say, 1832): état de la progression de l'espèce et nouvelles localités dans le Sud de la France (Hemiptera Lygaeidae). *Entomologiste,* 69 (3): 185-190.

Gessé, F., Ribes, J., Goula, M., 2009, *Belonochilus numenius*, the sycamore seed bug, new record for the Iberian fauna, *Bulletin of Insectology*, 62(1): 121–123.

Gogala, A., Kamin, J., Zdešar, M., 2016, Three new records of Heteroptera in Slovenia, *Acta Entomologica Slovenica*, 24 (1): 55–58.

Hradil, K., 2011, Faunistic Records from the Czech Republic – 315, Heteroptera: Lygaeidae, *Belonochilus numenius* (SAY, 1831), *Klapalekiana*, 47: 261–262.

Kment, P., Cunev, J., 2013, First record of the alien seed bug *Belonochilus numenius* (Hemiptera: Heteroptera: Lygaeidae) in Slovakia, *Entomofauna Carpathica*, 25 (2): 15–20.

Kment, P., Hradil, K., Bařař, P., Balvín, O., Cunev, J., Ditrich, T., Jindra, Z., Roháčová, M., Straka, M., Sychra, J., 2013, New and interesting records of true bugs (Hemiptera: Heteroptera) from the Czech Republic and Slovakia V, *Acta Musei Moraviae Scientiae Biologicae*, 98 (2): 495–541.

Kulijer, D., Miljevic, I., 2016, First report of *Belonochilus numenius* (Say, 1832) in Bosnia and Herzegovina (Heteroptera, Lygaeidae), *Folia Historico-Naturalia Musei Matraensis*, 40: 61–63.

Küchler, S., Strauß, G., 2010, *Belonochilus numenius* (Say, 1832) (Heteroptera: Lygaeidae)—bald auch in Mitteleuropa?, *Beiträge zur Entomofaunistik*, 11: 27–33.

Küchler, S,. & Kehl, S., 2013, Erstfund von *Belonochilus numenius* Say, 1932 [sic!] in Deutschland (Heteroptera: Lygaeidae) *Mitteilungen des Internationalen Entomologischen Vereins,* 48: 89-90.

Martinović, M., Gjeldum, A., Koren, T., 2019, *Belonochilus numenius* (Say, 1832) (Heteroptera: Lygaeidae), a new invasive species in Croatia, *Natura Croatica: Periodicum Musei Historiae Naturalis Croatici*, 28(2): 481–484. DOI: 10.20302/NC.2019.28.34.

Martinović, M., 2020, First Record of *Belonochilus numenius* (Say, 1832) (Hemiptera: Heteroptera: Lygaeidae) From Montenegro, *Acta Entomologica Serbica*, 25(2): 97-99.

Matocq, A., 2008, Présence en France et en Corse d'un Hétéroptère nord-américain, *Belonochilus numenius*

(Say, 1831) (Hemiptera, Lygaeidae, Orsillinae), *Bulletin de la Société entomologique de France*, 113(4): 533–534.

Protić, L., Šeat, J., 2016, First records of the alien sycamore seed bug *Belonochilus numenius* in Serbia (Heteroptera: Lygaeidae), *Acta Entomologica Serbica*, 21: 13–19.

Rabitsch, W., Bräu, M., Friess, T., 2011, *Belonochilus numenius* (Say, 1832) (Heteroptera: Lygaeidae) has reached Austria, *Beiträge zur Entomofaunistik*, 12: 148–149.

Rabitsch, W. & Heiss, E., 2015. *Belonochilus numenius* (Say, 1832), the sycamore seed-bug (Hemiptera: Heteroptera: Lygaeidae), new to Madeira 15 (1): 83-86. *Heteropterus Revista de Entomología.*

Rabitsch, W., 2018, Snapshot of the terrestrial true bug fauna of the Pocem floodplains (Insecta: Hemiptera: Heteroptera), *Acta ZooBot Austria*, 155: 251–256.

Riba, J.M., Martí I., Goula, M., 2015, Updating data on the sycamore seed bug, *Belonochilus numenius* (Say, 1832) (Hemiptera: Lygaeidae) in Spain. *Bulleti de la Institució Catalana d'Història Natural*, 79: 157-163.

Srebrova, K., Nacheski, S., Sotirovski, K., 2019, Widespread Distribution of the Sycamore Seed Bug *Belonochilus numenius* (Hemiptera: Heteroptera: Lygaeidae) Throughout the Republic of North Macedonia, *South-east European Forestry*, 10(2): 145–149.

Slater, J. A., 1964, *A Catalogue of the Lygaeidae of the World* Storrs, 1668 pp., Connecticut, USA.

Torma, A. 2012, First record of the alien sycamore seed bug *Belonochilus numenius* (Heteroptera: Lygaeidae) in Hungary, *Növényvédelem*, 48 (10): 467–468.

Werner, D. J., Brandner, J., Muller, A., Zapf, M., 2013, Ein Fund von *Belonochilus numenius* (Say, 1831) in Deutschland (Heteroptera: Lygaeidae) mit Diskussion zum Jahr der Erstbeschreibung der Art, *Heteropteron*, 39: 37–39.

Werner, D., 2014, Die amerikanische Platanen-Samen-Wanze *Belonochilus numenius* (Say, 1831) (Heteroptera: Lygaeidae, Orsillinae) als Neozoon in Europa und in Deutschland: Verbreitung und Biologie, *Andrias*, 20: 245– 250.

Wheeler, A.G. Jr., 1984, Seasonal history, habits, and immature stages of *Belonochilus numenius* (Hemiptera: Lygaeidae). *Pro-ceedings of The Entomological Society of Washington*, 86 (4): 790–796.

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Short Note

Confirmation of the presence of *Solenosthedium bilunatum* (Lefèbvre, 1827) (Hemiptera: Heteroptera: Scutelleridae) in Albania

Torsten van der Heyden

Immenweide 83, D-22523 Hamburg, Germany.
E-mail: tmvdh@web.de ORCID iD: 0000-0003-4138-7160

ABSTRACT: Reporting the second record of *Solenosthedium bilunatum* (Lefèbvre, 1827) in Albania, the presence of the species in the country is confirmed. Information on the known distribution of *S. bilunatum* in Europe is summarized.

KEYWORDS: *Solenosthedium bilunatum*, distribution, Albania.

To cite this article: van der Heyden, T., 2021, Confirmation of the presence of *Solenosthedium bilunatum* (Lefèbvre,1827) (Hemiptera: Heteroptera: Scutelleridae) in Albania, *J.Het.Turk.*, 3 (2):111-113
DOI:10.5281/zenodo.5717188
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A4.pdf
Received: Oct 04, 2021; **Revised:** Oct 12,2021; **Accepted:** Oct 12, 2021; **Published online:** Nov 30, 2021

So far, *Solenosthedium bilunatum* (Lefèbvre, 1827) (Hemiptera: Heteroptera: Scutelleridae), a Mediterranean scutellerid belonging to the subfamily Elvisurinae, has been reported from the following European countries: Albania, Croatia (mainland, Korčula), Cyprus, France (mainland, Corsica), Greece, Italy (mainland, Sardinia, Sicily, Ustica), Malta, Portugal and Spain (mainland, Ibiza, Mallorca) (Misja, 1973; Josifov, 1986; Matocq & Pluot-Sigwalt, 2002; Göllner-Scheiding, 2006; Gogala, 2008; Aukema et al., 2013; Dusoulier et al., 2016; Škorput et al., 2019; van der Heyden, 2020).

The only known record of *S. bilunatum* from Albania so far, which was found in Kokome (Sarandë) on 31.10.1970, was reported by Misja (1973).

Now, the presence of *S. bilunatum* in Albania can be confirmed: On 29.09.2021, a nymph was photographed by Théalie Dhellemmes on *Paliurus spina-christi* Mill. (Rhamnaceae) near the city of Sarandë, located at the Ionian Sea (Fig. 1). The photograph was uploaded to the online database iNaturalist (under the pseudonym thealie) (2021).

ACKNOWLEDGEMENTS

I would like to thank Théalie Dhellemmes for allowing me to use her photo of *S. bilunatum* to illustrate this note.

REFERENCES

Aukema, B., Rieger, C., Rabitsch, W. (Eds.), 2013, *Catalogue of the Heteroptera of the Palaearctic Region*, Volume 6, Suppl. The Netherlands Entomological Society, Amsterdam, 629 pp.

Dhellemmes, T., 2021, *Solenosthedium bilunatum*. Photograph to be found on iNaturalist [Online database]. Available from:https://www.inaturalist.org/observations/97122009. (Accessed: 04.10.2021).

Dusoulier, F., Claerebout, S., Mroczo, C., 2016, Deux espèces nouvelles pour la faune de la France continentale: *Eyprepocnemis plorans* (Charpentier, 1825) et *Solenosthedium bilunatum* (Lefèbvre, 1827) (Orthoptera Acrididae et Hemiptera Scutelleridae), *L'Entomologiste*, 72 (2): 121-126.

Göllner-Scheiding, U., 2006, Family SCUTELLERIDAE Leach, 1815 - shield bugs, 190-227 pp. In: *Catalogue of the Heteroptera of the Palaearctic Region*, Volume 5, Pentatomomorpha II. (Eds. B. Aukema, C. Rieger). The Netherlands Entomological Society, Amsterdam, 550 pp.

Gogala, A., 2008, First record of *Solenosthedium bilunatum* (Lefebvre) (Heteroptera: Scutelleridae) for Croatia, *Entomologia Croatica*, 12 (1): 81-82.

Josifov, M., 1986, Verzeichnis der von der Balkanhalbinsel bekannten Heteropterenarten (Insecta, Heteroptera), *Faunistische Abhandlungen Staatliches Museum für Tierkunde Dresden*, 14 (6): 61-93.

Matocq, A., Pluot-Sigwalt, D., 2002, Notes sur *Solenosthedium bilunatum* (Lefebvre, 1827) (Heteroptera, Scutelleridae), *Bulletin mensuel de la Société linnéenne de Lyon*, 71 (7): 277-284.

Misja, K., 1973, Rezultate të studimit të gjysmëkrahëfortëve (Hemiptera) të vëndit tonë, *Buletin i Shkencave të Natyrës*, 1-2: 131-151.

Škorput, J., Novak Morić, A., Martinović, M., van der Heyden, T., Skejo, J., 2019, *Solenosthedium bilunatum* (Heteroptera: Scutelleridae) at the Adriatic Coast of Croatia, *Entomologie heute*, 31: 25-29.

van der Heyden, T., 2020, Records of *Solenosthedium bilunatum* (Lefèbvre, 1827) on the Italian island of Ustica and the Spanish island of Ibiza (Hemiptera: Heteroptera: Scutelleridae), *Arquivos Entomolóxicos*, 22: 289-291.

Figure 1. Nymph of *Solenosthedium bilunatum* (Lefèbvre, 1827), near Sarandë, Albania, 29.09.2021. (Photo: Théalie Dhellemmes).

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

An Additional Locality Record for the Rare Distributed *Pasira marinadolina* P.V. Putshkov & Moulet, 2004 (Hemiptera: Heteroptera: Reduviidae) in Turkey with Description of Macropterous Female

Meral Fent[1] Ahmet Dursun[2]

[1] Trakya University, Faculty of Science, Department of Biology, 22030, Edirne/Turkey
E-mail: m_fent@hotmail.com ORCID ID 0000-0001-5787-6714

[2] Amasya University, Faculty of Arts and Science, Department of Biology, 05100, Amasya/ Turkey
E-mail: ahmet.dursun@amasya.edu.tr ORCID ID: 0000-0002-5114-7470

ABSTRACT: In this study, a macropter female specimen of *Pasira marinadolina* P.V. Putshkov & Moulet, 2004 was determined in Edirne province in 2021. This finding is the second locality record of this species in Turkey. In this study, the description of the macropter form is given and the differences between it and the related species *Pasira basiptera* Stål, 1859 are discussed.

KEYWORDS: *Pasira marinadolina*, macropterous female, description, Turkey.

To cite this article: Fent, M., Dursun, A., 2021, An Additional Locality Record for the Rare Distributed *Pasira marinadolina* P.V. Putshkov & Moulet, 2004 (Hemiptera: Heteroptera: Reduviidae) in Turkey with Description of Macropterous Female, *J.Het.Turk.*, 3 (2):114– 117
DOI:10.5281/zenodo.5717195
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A5.pdf
Received: Sep 20, 2021; **Revised:** Oct 12, 2021; **Accepted:** Oct 15, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

There are 4 species of the genus *Pasira* Stål, 1859 (Heteroptera: Reduviidae: Reduviinae) in the Palearctic Region, and 3 of them are distributed in the Western Palearctic (Aukema, 2020). Of these species, *Pasira perpusilla* (Walker, 1873) is distributed in the southwestern part of China in the Eastern Palearctic. *Pasira basiptera* Stål, 1859, one of the species distributed in the Western Palearctic, is the most widely distributed species of the genus, and its distribution is known from southern Europe and especially in the Balkans, in North Africa and in the Middle East, Arabian Peninsula, Caucasus

in western Asia and in central Asia. *Pasira lewisi* (Miller, 1951) is distributed only in the Canary Islands in the Palearctic Region. The presence of *Pasira marinadolina* P.V. Putshkov & Moulet, 2004 has been known until now from Ukraine and the European part of Turkey in Europe and from Azerbaijan and Armenia in Asia (Aukema, 2020).

Pasira Stål, 1859 is represented by two species in Turkey. Of these, *Pasira basiptera* has only been given from Anatolia so far (Dursun & Salur, 2013).

Pasira marinadolina P.V. Putshkov & Moulet, 2004 was recorded for the first time by Çerçi & Koçak (2016) from Esenyurt in the European side of Istanbul province in Turkey.

Pasira marinadolina P.V. Putshkov & Moulet, 2004

Material: Edirne: Center (Trakya University-Balkan Campus), 20.05.2021, 1 macropterous female.

Distribution in Turkey: İstanbul-Esenyurt (Çerçi & Koçak, 2016), Edirne (the present study)

General Distribution: Europe: Turkey (European part), Ukraine. Asia: Azerbaijan, Armenia, Turkey (Asian part) (Aukema, 2020).

Description of macropterous female: Head black, brownish in distal, with, golden bristles equal to the length of the diameter of the first segment of the antenna; and very deep transverse sulcus in dorsal; anterior part in front of the sulcus about twice as long as its posterior part; first two segments of antenna yellowish brown. Pronotum dark brown, posterior corners and posterior margin thinly lighter - reddish brown; anterior part about 1.2 times as long as posterior part; anterior lobe of the pronotum with two oblique lateral impressions, as in the micropter form of this species Scutellum brownish black, with rare and short bristles; the carina-shaped lateral edges joined distally and elongated and formed a "Y"-shaped structure, which is much better seen in the lateral view. Corium in proximal (up to the distal part of clavus) reddish yellow (lighter in distal of clavus) the rest (including membrane) brown, lateral margins and dorsal with short and golden bristles, veins prominent.

Connexivum unicolar, yellowish brown. Legs, reddish yellow with short golden bristles, tibiae slightly darker, tarsi pale yellow. Size 6,1mm. (Fig. 1).

Comments and remarks: This species was previously given only based on on brachypter specimens (P.V. Putshkov & Moulet, 2004, 2009; Çerçi & Koçak, 2016). The record given by Çerçi & Koçak (2016) from İstanbul in the European part of Turkey is based on 6 brachypyter specimens of *Pasira marinadolina*. While the authors listed the differences of this species from *Pasira basiptera*, they reported that *P. marinadolina* was always micropterous unlike *P. basiptera*. However, as later presented its photographs on the Doğal Hayat web-site by Barış Çerçi, and our study shows that *P. marinadolina* also has macropter forms.

Remarks: P.V. Puthkov & Moulet (2009) stated that the only known micropter form of *P. marinadolina* is very similar to *P. basiptera*, except for the male genitalia. Unfortunately, we were not able to compare the species in terms of male genitalia, as the only sample we have is female. Apart from male genitalia, another difference is that *P. marinadolina* has two oblique lateral impressions on anterior lobe of the pronotum. This diagnostic character given by P.V. Puthkov & Moulet (2009) for the pronotum of micropter form is also seen in the macropter form. Additionally, the pronotum is completely blackish-brown, only the proximal corners and margins are lighter reddish-brown (Fig. 1). However the pronotum in the macropter form of *P. basiptera* is chocalat brown, strangled in its middle, this hollow disc with a strong transverse groove seperated two sub-equal lobes. Pronotum bulging in the anterior, with a medio-longitudinal short furrow generally not reaching the posterior edge and delimiting two erased

Figure I. *Pasira marinadolina* P.V. Putshkov & Moulet, 2004. a. Habitus (dorsal view) b. Head, pronotum and scutellum (dorsal view)

bumps in the posterior; posterior margin convex and narrowly thinned (See P.V. Putshkov & Molulet, 2009 p. 514, Fig. 95 -a).

Other differences mentioned for the species of genus *Pasira* in the key given by P.V. Putshkov & Moulet (2009) are on the colorations of the connexivum. The connexivum in *P. basiptera* is bicolored and reddish or brownish with black spots, rarely completely yellow/yellowish. The pronotum in *P. marinadolina* is one colored and is given as yellow or yellowish by the authors (P.V. Putshkov & Moule, 2009). In our specimen, the connexivum is yellowish brown as one colored. Çerçi & Koçak (2016) stated that this character is not valuable because the connexivum coloration of microptereous specimens of *P. marinadolina* in their study is bicolored as in *P. basiptera*.

Ecology: *P. marinadolina* occurs on stony slopes covered by sparse vegetation. Adults are mostly found under stones from September to June, but they also live in plant debris, under bushes and overwinter as an adult (Puthkov & Moulet, 2009). Puthkov & Moulet (2009) reported that they collected specimens of *P. marinadolina* at the entrance of a fox hole. In this study, a single specimen was caught inside the building of Biology Department in the Trakya University Campus. Since it was cold and rainy in May and June of 2021, this individual was probably inside the building to protect from the cold.

REFERENCES

Aukema, B., 2020, Catalogue of Palaearctic Heteroptera. Naturalis Biodiversity Center. Available from https://catpalhet.linnaeus.naturalis.nl/ (Accessed on 15.09-2021).

Çerçi, B., Koçak, Ö., 2016, Contribution to the knowledge of Heteroptera (Hemiptera) fauna of Turkey. *Journal of Insect Biodiversity*, 4(15): 1-18.

Dursun A., Salur A. 2013. Presence of *Sphedanolestes sanguineus* (Fabricius, 1794) in Turkey, followed by an annotated checklist of Reduviidae (Hemiptera: Heteroptera), *Turkish Journal of Zoology* 37: 610-620.

Putshkov, P.V., Moulet, P., 2004, Un *Reduvius* Fabricius, 1775 et une *Pasira* Stål, 1859 nouveaux pour la faune d'Europe (Heteroptera, Reduviidae, Reduviinae). *Nouvelle Revue d'Entomologie,* 20(2003): 247-254.

Putshkov P. V., Moulet, P, 2009, *Hémiptères Reduviidae d'Europe occidentale*. Fédération Française des Sociétés de Sciences Naturelles, Faune de France 92: 688 pp.

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

The sensilla on head, antenna and mouth parts in *Aelia rostrata* Boh. (Hemiptera, Pentatomidae): A scanning electron microscopical study

Irmak Polat[1], Hanife Gözüpek, Suat Kıyak[2], Zekiye Suludere[2]

[1]Çankırı Karatekin University, Faculty of Science, Department of Biology, Çankırı, 18100, TURKEY
[2]Gazi University, Faculty of Science, Department of Biology, Ankara, 06500, TURKEY
E-mails: irmakyilmaz@gazi.edu.tr, skiyak@gazi.edu.tr, zekiyes@gazi.edu.tr

ORCID IDs: 0000-0001-7230-4589 (IP), 0000-0001-8167-8283 (SK), 0000-0002-1207-5814 (ZS)

ABSTRACT: The sensilla who act as thermohygroreceptor, chemoreceptor, or mechanoreceptor are the main sensory structures of insects. Insects carry different types, numbers and distributions of sensilla in body parts such as head, antenna, mouth parts, and leg segments. In this study, the sensilla types on the head, antenna and mouth parts of *Aelia rostrata* Boh. (Hemiptera, Pentatomidae) were invastigated with using scanning electron microscope. According to the results of the study, 4 major types of sensilla with different diameters and cone-shaped protrusions have been identified: sensilla basiconica, sensilla trichodea, sensilla peg, and sensilla campaniformia. These sensilla show different distributions in the examined structures of the insect. The results obtained from the study were also compared with other species in the literature, and similarities and differences were revealed.

KEYWORDS: Chemoreceptor, Heteroptera, insect, mechanoreceptor, morphology.

To cite this article: Polat, I., Gözüpek, H., Kıyak, S., Suludere, Z., 2021, The sensilla on head, antenna and mouth parts in *Aelia rostrata* Boh. (Hemiptera, Pentatomidae): A scanning electron microscopical study, *J.Het.Turk.*, 3 (2):118–139
DOI:10.5281/zenodo.5717206
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A1.pdf
Received: Oct 29, 2021; **Revised:** Nov 08, 2021; **Accepted:** Nov 10, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

Order Hemiptera is an extensive group that includes plant pests. The species belong to order Hemiptera have piercing-sucking mouth parts which gives insects an advantage in feeding on plant sap (Hao et al., 2016; Kanturski et al., 2017). *Aelia rostrata* Boh. (Hemiptera, Pentatomidae) which is known as wheat stink bug is a significant pest in Turkey.

The reason why it is called a wheat stink bug is mainly because it is a wheat pest. In addition, rye, barley, oats and some other graminaceous plants are also infested by this insect.

A. rostrata is a widely distributed and migratory species is located in Adıyaman, Batman, Diyarbakır, Gaziantep, Mardin, Şanlıurfa, and Şırnak provinces in Turkey. This species has also been found in Iran and Iraq (Brown, 1965; Lodos, 1981; Lodos et al., 1984; Önder et al., 1995; Özgen et al., 2005; Gözüaçık et al., 2011; Khaghaninia et al., 2013; Tarla, 2017; Bolu, 2020).

Insects have some structures called sensilla on their mouth parts and antenna which enter into crucial role in some functions such as feeding or mating [(e.g the sensilla on the mouth parts scan the surfaces of food (Chapman, 1998; Brozek & Zettel, 2014; Parveen et al., 2015) and antenna which is the main sensory organs of insects, detecting volatile chemicals in the air (Carey & Carlson, 2011; Rani et al., 2021)] (Isidoro et al., 2001; Fu et al., 2012; Cao & Huang, 2016; Seada & Hamza, 2018; Faucheux et al., 2020).

So, the insect recognizes plants at a distance (Brozek, 2013). Together with the different types of sensilla on the antenna, they function as chemoreceptors, thermohygrorecertors, and mechanoreceptors (Akent'eva, 2008; Fu et al., 2012; Brozek & Bourgoin, 2013; Freitas et al, 2020; Giglio et al., 2021; Zhang et al., 2021).

Many different types of classification can be made in sensilla in insects according to different criteria. For example, according to their perception ways, they are divided into 2 main groups as mechanoreceptors and chemoreceptors which are more common (Brozek & Chlond, 2010; Li et al., 2016). Sensilla can also be classified according to their morphological features, such as basiconic, placoid, trichoid, long hair-like, plate-like or coeloconic, etc. (Slifer 1970; Altner & Prillinger, 1980; Hallberg & Hansson, 1999; Shields 2010; Nowinska & Brozek, 2017).

Besides, insect sensilla can be classified according to their sensory modality, such as olfactory, gustatory, mechanosensory, and thermohygrosensory (Fernandes et al., 2008; Nowinska & Brozek, 2017; Li et al., 2018). Another classification is based on whether sensilla carry pores or not. According to this, they are collected in 3 groups as aporous, uniporous and multiporous (Nowinska & Brozek, 2017).

The morphological structure of the sensilla on the mouth parts and antenna varies among Hemiptera species (Brozek & Bourgoin, 2013; Nowinska & Brozek, 2017; Taszakowski et al., 2019; Amutkan Mutlu et al., 2021).

The main goal of this study is to disclose the morphological features of the cuticular structures of sensilla on the antenna and the mouth parts in wheat stink bug *A. rostrata*.

MATERIALS AND METHODS

The male and female individuals of *Aelia rostrata* (Figures 1A-B) were collected in Sinanlı and Oltan (Ayaş) and Çağa Village (Güdül) in Ankara province in July, 2018. All male and female individuals were adults.

First, the external surface of the integument of insects was cleaned. Then, the specimens were dried in the air and adhesive o the stubs.

Subsequently, the stubs were coated with gold with Polaron SC502 sputter coater, observed in JEOL JSM 6060 LV SEM, and photographed (at 10-15 kV accelerating voltage).

All studies were performed at Gazi University, Faculty of Science, Prof. Dr. Zekiye Suludere Electron Microscope Center.

RESULTS AND DISCUSSION

Insects have sensory organs called sensilla, which enable the detection of chemical substances in their environment in various parts of their bodies (Cao & Huang, 2016; Amutkan Mutlu et al., 2021). In this study, sensilla types found on the head, antennae and mouth parts of male and

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

female *A. rostrata* individuals were investigated with SEM. The diagrams of different types of sensilla on mouth parts, antenna, and head of *A. rostrata* are shown in Figure 2. As a result of the study, it was observed that the sensilla trichodea (St) and the sensilla basiconica (Sb) were more common than other sensilla types. In this context, the mean values of the sensilla trichodea and the sensilla basiconica lengths are given in Table 1 and Table 2. In addition to these types of sensilla, sensilla peg (Sp) and sensilla campaniformia (Sca) were also detected as a result of our study.

Table 1. Mean values of St lengths in both males and females (µm)

	Mouth parts				
	Labium 1	**Labium 2**	**Labium 3**	**Labium 4**	**Labrum**
Male	45,1 ± 19,6	55,0 ± 15,6	41,3 ± 21,8	-	46,8 ± 5,4
Female	61,0 ± 23,2	40,3 ± 10,4	53,4 ± 21,1	-	-
	Antenna				
	Scape	**Pedicel 1**	**Pedicel 2**	**Flagellum 1**	**Flagellum 2**
Male	-	33,0 ± 5,6	39,3 ± 13,8	21,1 ± 9,5	24,5 ± 8,4
Female	-	29,9 ± 6,6	-	28,3 ± 6,0	33,7 ± 3,0
	Head				
	1	**2**	**3**	**4**	
Male	78,9 ± 20,4	82,7 ± 26,6	71,0 ± 22,7	-	
Female	37,8 ± 24,6	83,9 ± 22,1	52,5 ± 20,6	-	

Table 2. Mean values of Sb lengths in both males and females (µm)

	Mouth parts				
	Labium 1	**Labium 2**	**Labium 3**	**Labium 4**	**Labrum**
Male	-	42,1 ± 6,2	-	2,9 ± 0,6 (short) 12,3 ± 2,9 (tall)	-
Female	-	-	-	3,8 ± 0,8 (short) 14,3 ± 1,6 (tall)	-
	Antenna				
	Scape	**Pedicel 1**	**Pedicel 2**	**Flagellum 1**	**Flagellum 2**
Male	-	-	-	50,4 ± 7,8	37,7 ± 12,4
Female	-	-	51 ± 11,1	11,2 ± 2,3	10,3 ± 1,9
	Head				
	1	**2**	**3**	**4**	
Male	-	-	-	-	
Female	-	-	-	-	

Sensilla types on the mouth parts

The mouth parts are generally consisted of the labrum (Lm), the labium (Lb), and a labial groove in hemipteran insects (Figures 3A-B). Although the general structure of these parts is very similar, differences can be observed in their detailed structure, number of segments, sensilla types and distributions among different species.

The mouth parts of *A. rostrata* males and females have a labrum with proximal and distal sides, four segmented labium, labial groove, and stylet fascicle which is the defining characteristic of hemipterans species (Wang et al., 2020a; Amutkan Mutlu et al., 2021).

In *Piezodorus hybneri* (Gmelin, 1790) (Hemiptera, Pentatomidae), *Perillus bioculatus* (F.)(Hemiptera,Pentatomidae), *Eocanthecona furcellata* (Wolff) (Hemiptera, Pentatomidae), *Dolycoris indicus* Stål, 1876 (Hemiptera, Pentatomidae), *Macrocheraia grandis* (Gray, 1832) (Hemiptera, Largidae), *Physopelta quadriguttata* Bergroth, 1894 (Hemiptera, Largidae), *Physopelta gutta* (Burmeister, 1834) (Hemiptera, Largidae), *Physopelta cincticollis* Stål, 1863 (Hemiptera, Largidae), and *Cheilocapsus nigrescens* (Liu and Wang) (Hemiptera, Miridae), the labium have four segmented as in *A. rostrata*, but *Eurygaster testudinaria* has three-segmented labium in its mouth parts (Parveen et al., 2015; Wang et al., 2019, 2020a; Amutkan Mutlu et al., 2021).

The labium (Lb) is long, thin, and four segmented in both male and female *A. rostrata*. The first segment is concave and the labrum (Lm) runs parallel to the first segment of the labium (Figures 3A-B).

Therefore, looking at the insect from the ventral side, the labrum is in the middle and the first segment of the labium (Lb1) lie on either side of it. The first segment of labium has many sensilla in different sizes such as sensilla trichodea and sensilla campaniformia (Sca) in both male and female insects.

But, sensilla campaniformia is more common in females than males (Figures 3C-F).

The second and third segments of the labium (Lb2 and Lb3) are seen very similar to each other.

But the second segment is thinner and longer than the third segment. In both sexes of *A. rostrata,* the second segment of the labium has sensilla trichodea, sensilla basiconica and sensilla campaniformia (Figures 4A-F).

The sensilla trichodea and sensilla campaniformia can be also observed on the third segment of labium in both sexes.

However, there are differences in the morphological structures of the sensilla trichodea and sensilla campaniformia in males and females (Figures 5A-F).

In the fourth segment of the labium (Lb4), sensilla density is higher than in other segments.

There are sensilla trichodea and sensilla basiconica on the fourth segment of the labium of females and males (Figures 6A-F).

The labrum (Lm) is the part of the mouth which attaches to the anterior region of the head and extends to first segment of labium (Figures 3A-B).

The labrum has two regions according to the surface patterns: proximal and distal regions.

The proximal region is the part that is close to the region where the labrum attaches to the head and has smooth surface.

Very few sensilla trichodea are seen on this area in both sexes (Figures 7A-B).

The distal region is the part near the free end with transverse crests and has no sensilla in both males and females (Figures 7C-D).

Sensilla types on the antenna

In *A. rostrata*, the antenna is divided into 5 segments in both sexes and each segment has sensilla of different types, density and distribution (Figures 8A-B).

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

On the surface of the scape, there are numerous one or two apex cone-shaped protrusions.

Also in this region there are only a few long sensilla peg (Sp) in males and females (Figures 8C-H).

Sensilla trichodea is found on pedicel 1, albeit rarely in males. There are also two different varieties of sensilla campaniformia in male individuals.

Although the sensilla in females are very similar to those in males, they have only 1 type of sensilla campaniformia (Figures 9A-F).

The density of sensilla on the pedicel 2 is much higher than the scape and pedicel 1.

Sensilla basiconica, sensilla trichodea, and two types of sensilla campaniformia were observed in both females and males, but sensilla basiconica is the predominant sensilla type in this segment (Figures 10A-B).

The highest number of sensilla is on the flagellum 1 and 2. In addition, sensilla variety is more in these segments. Different sizes of sensilla basiconica, sensilla peg and two types of sensilla trichodea were detected in the flagellum 1 in male and female individuals. In addition, in males there is also sensilla campaniformia (Figures 11A-D).

Flagellum 2 of male insects has sensilla basiconica, sensilla trichodea, sensilla peg, and sensilla campaniformia types.

In females, only sensilla basiconica, sensilla trichodea, and sensilla peg are found, and the bases of some sensilla basiconica appear swollen (Figures 12A-D).

Sensilla types on the head

As a result of the SEM analysis, it was determined that there are many different types of sensilla on the head regions of *A. rostrata* males and females.

The head can be divided into 4 regions, as in the figure, according to the sensilla on its surface (Figures 13A-B).

Sensilla campaniformia and different types of sensilla trichodea are found in the first and the second regions of the head in both males and females (Figures 13C-F).

In both sexes, only sensilla trichodea was seen on the third region of the head (Figures 14A-B).

In the fourth part, there are numerous one or two pointed cone-shaped protrusions on the surface (Figures 14C-F).

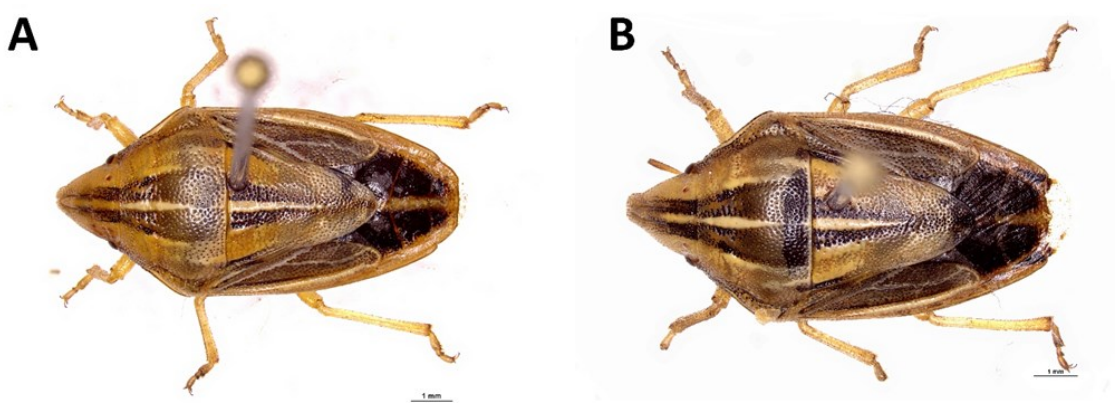


Figure 1. Stereomicroscope photograph of *A. rostrata*. A. Female individual, B. Male individual (Scale bar: 1 mm)

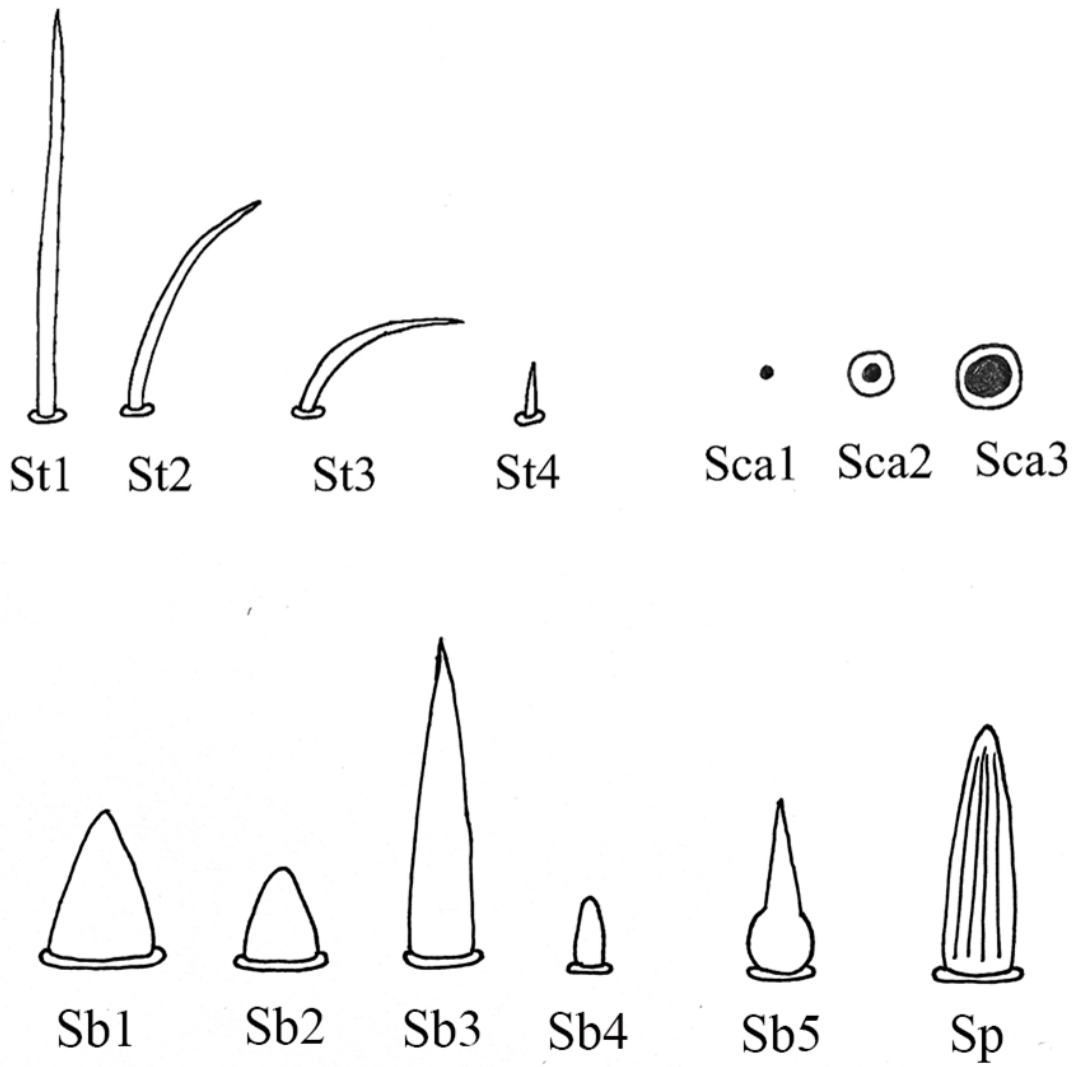


Figure 2. The schematic illustration of different types of sensilla on antenna, mouth parts and head of *A. rostrata*. St1: sensilla trichodea 1, St2: sensilla trichodea 2, St3: sensilla trichodea 3, St4: sensilla trichodea 4, Sb1: sensilla basiconica 1, Sb2: sensilla basiconica 2, Sb3: sensilla basiconica 3, Sb4: sensilla basiconica 4, Sb5: sensilla basiconica 5, Sp: sensilla peg, Sca1: sensilla campaniformia 1, Sca2: sensilla campaniformia 2, Sca3: sensilla campaniformia 3

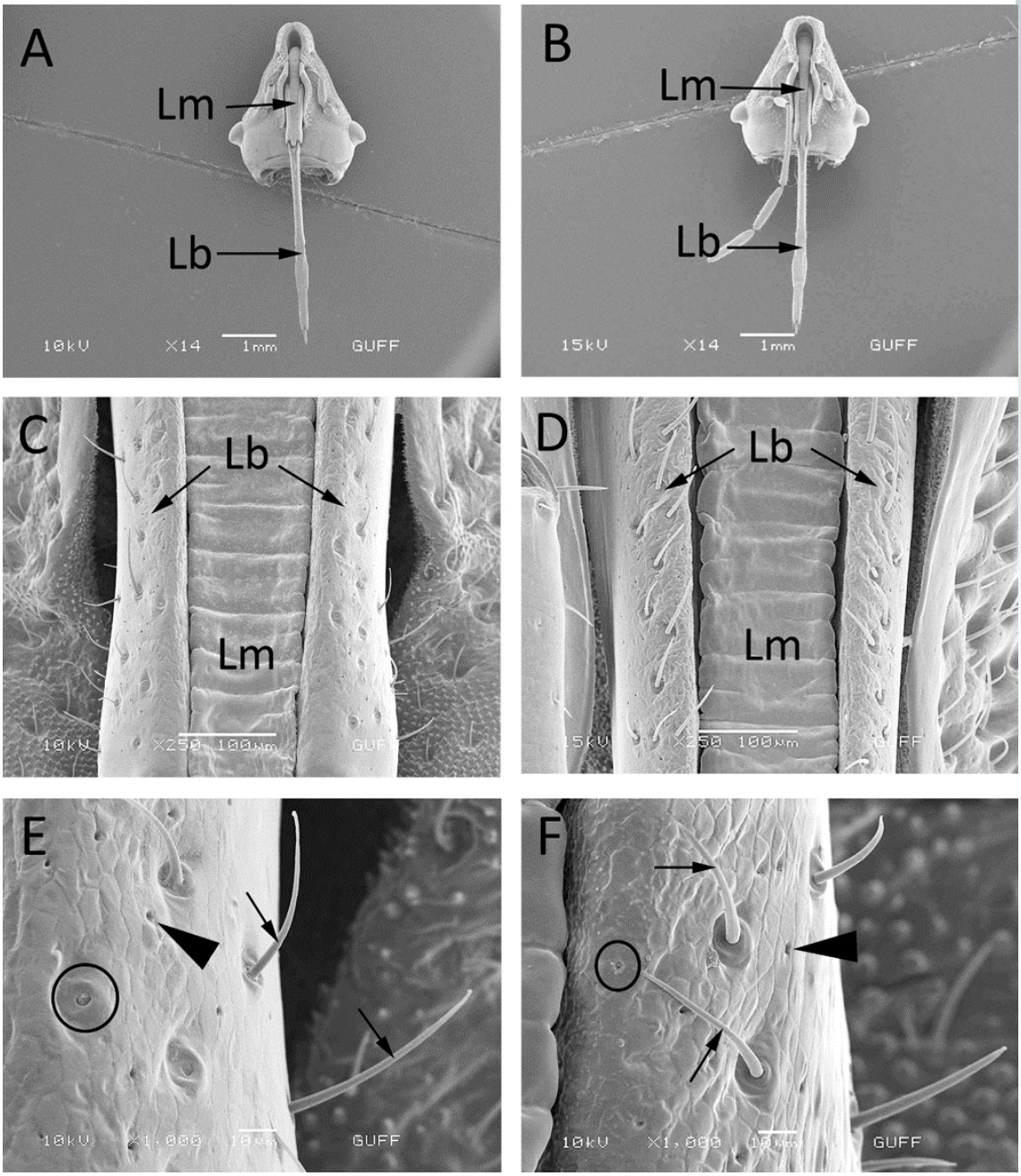


Figure 3. A-B. General view of the mouth parts, A: Female, B: Male. C-F. The first segment of the labium, C-E: Female, D-F: Male. Lb: labrum, Lm: labium, arrow: sensilla trichodea 2, arrowhead: sensilla campaniformia 1, encircled: sensilla campaniformia 2.

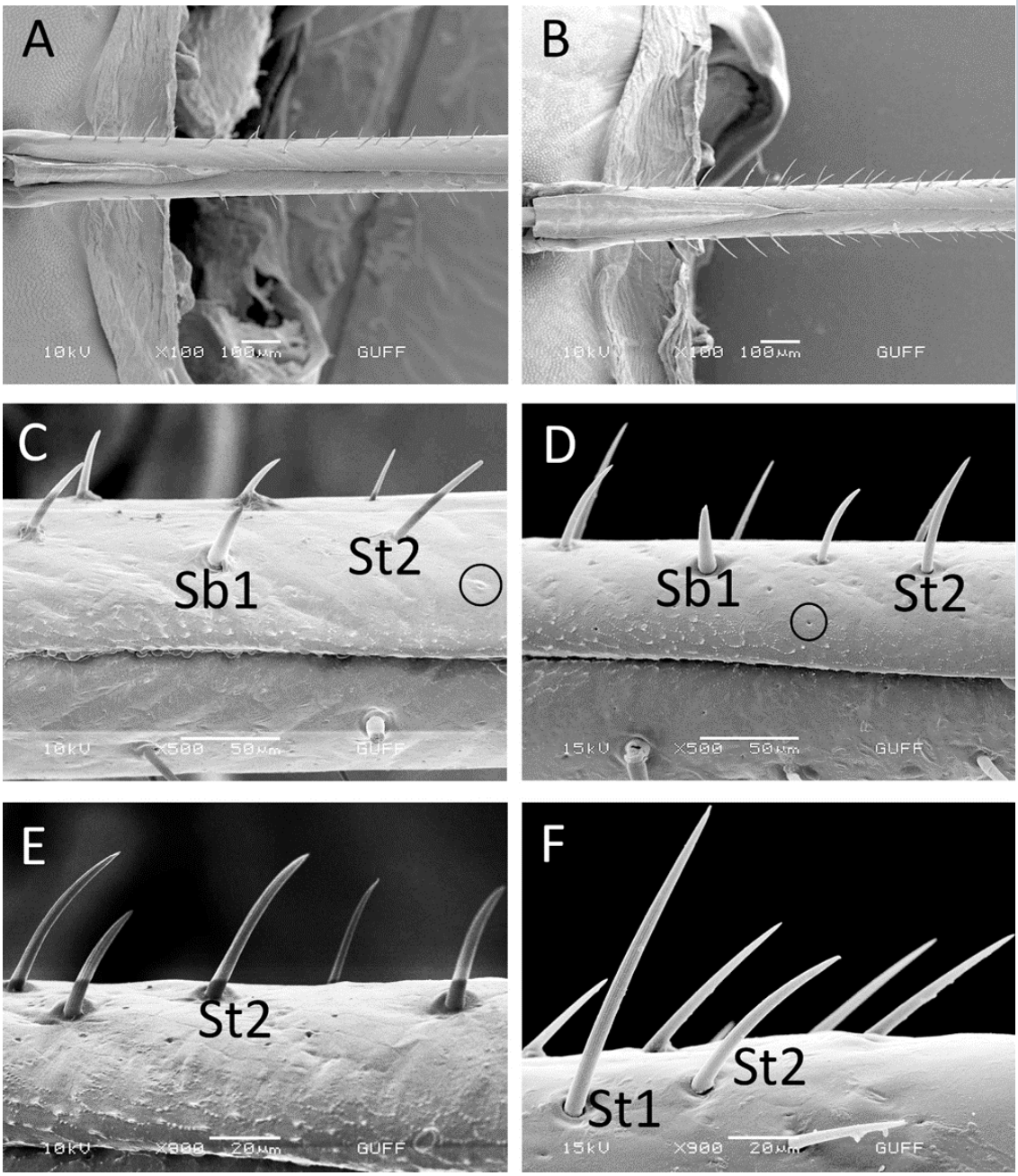


Figure 4. The second segment of the labium. A-C-E: Female, B-D-F: Male. Sb1: sensilla basiconica 1, St1: sensilla trichodea 1, St2: sensilla trichodea 2, encircled: sensilla campaniformia 1.

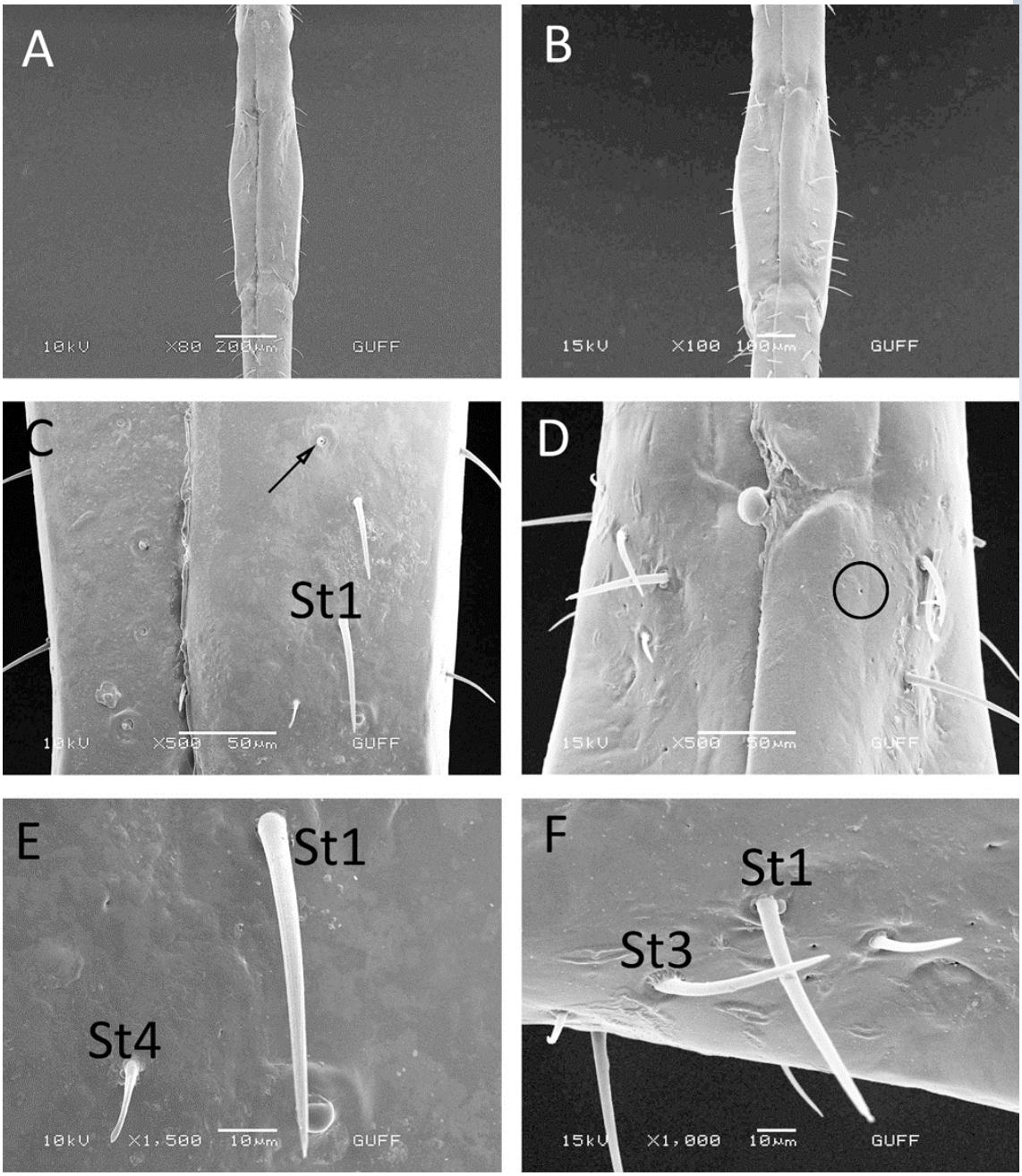


Figure 5. The third segment of the labium. A-C-E: Female, B-D-F: Male. St1: sensilla trichodea 1, St3: sensilla trichodea 3, St4: sensilla trichodea 4, encircled: sensilla campaniformia 1, arrow: sensilla campaniformia 2.

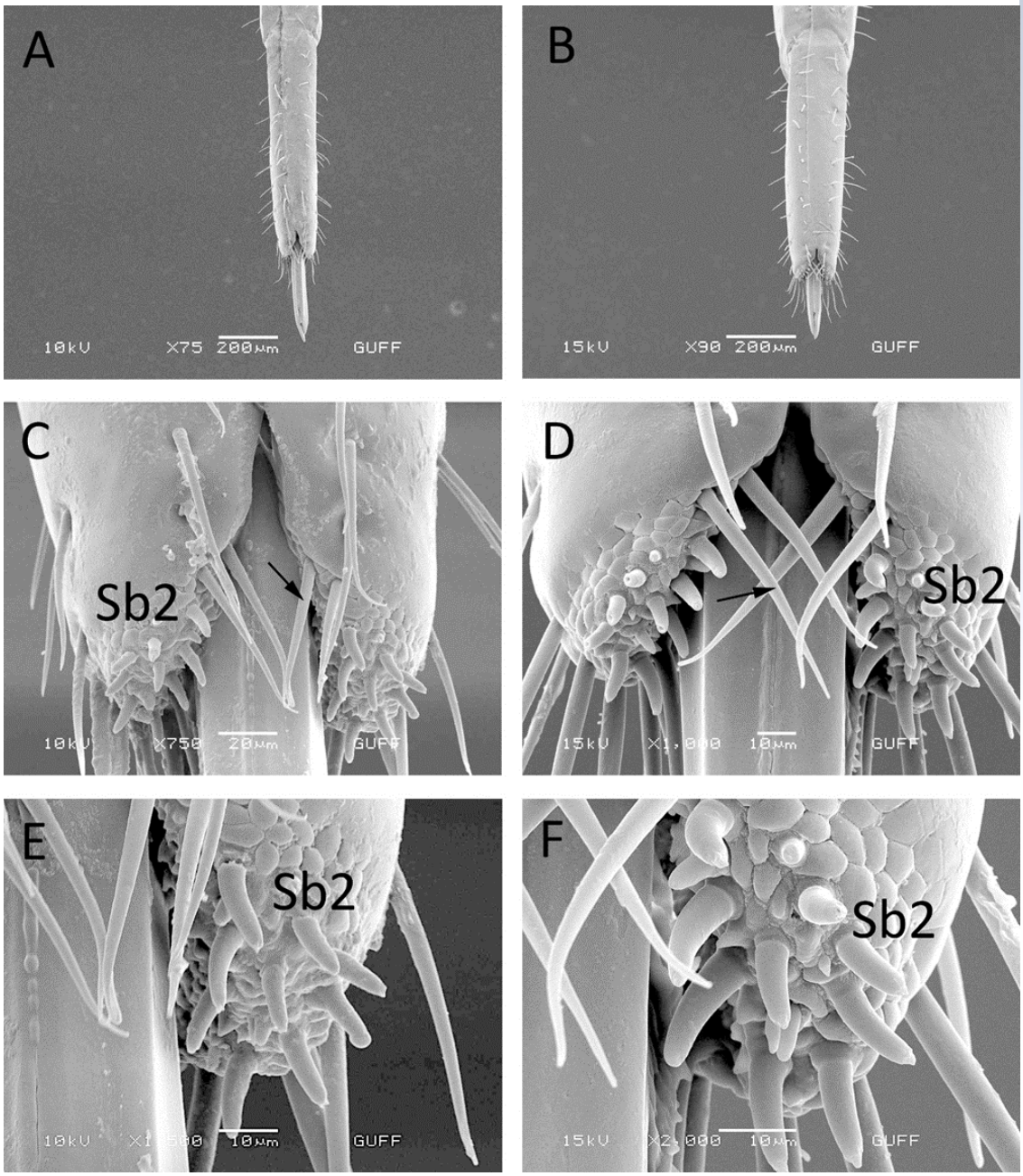


Figure 6. The fourth segment of the labium. A-C-E: Female, B-D-F: Male. Arrow: sensilla trichodea 1, Sb2: sensilla basiconica 2.

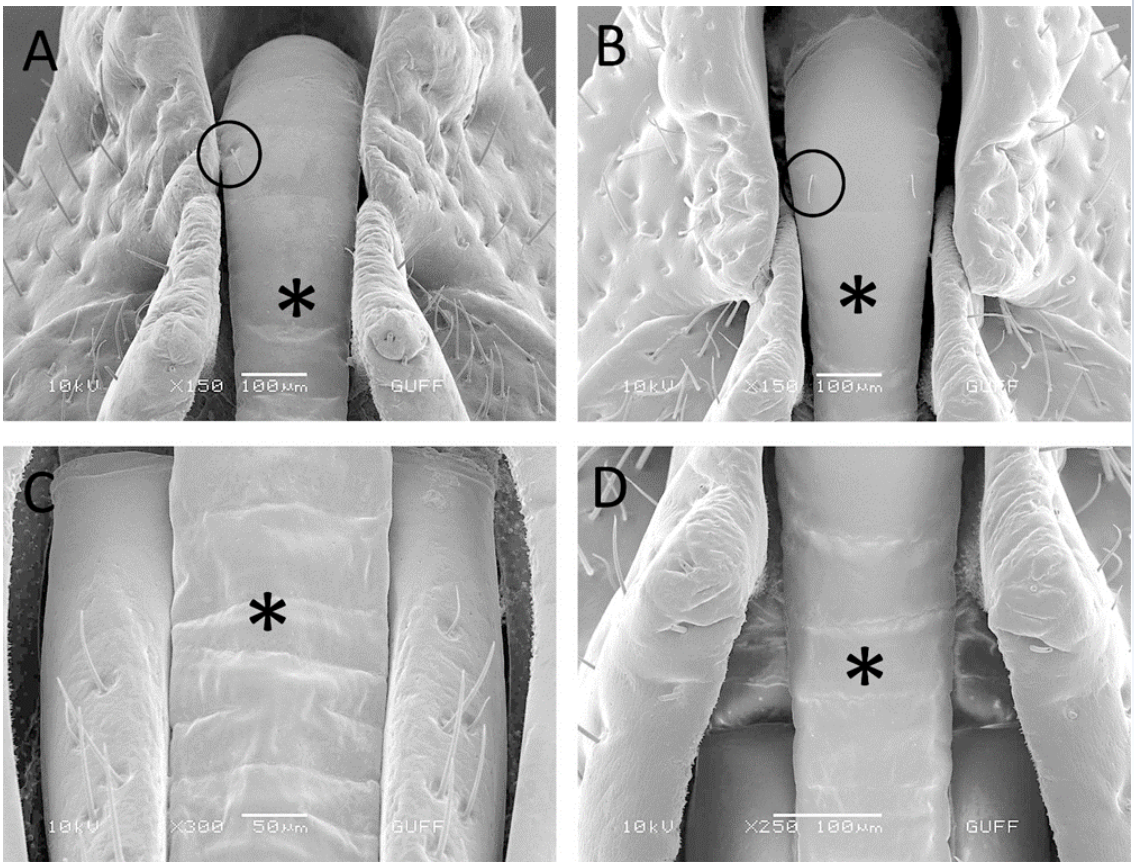


Figure 7. A-B. The proximal region of the labrum, C-D. The distal region of the labrum. A-C: Female, B-D: Male. Encircled: sensilla trichodea 3, asterisk: labrum.

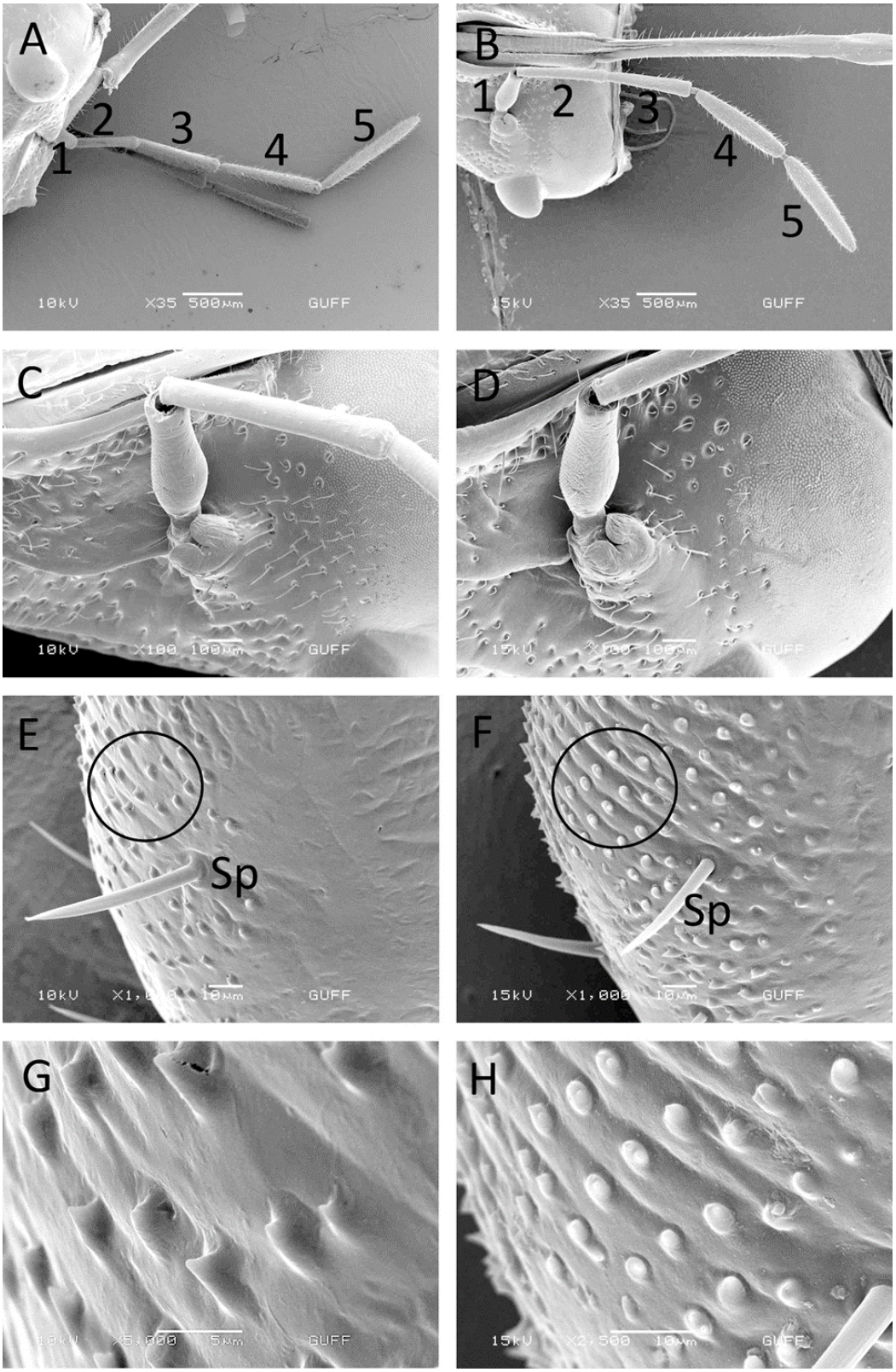


Figure 8. A-B. General view of the five segment of the antenna. C-H. The scape of the antenna. A-C -E-G: Female, B-D-F-H: Male. Sp: sensilla peg, encircled: cone-shaped protrusions.

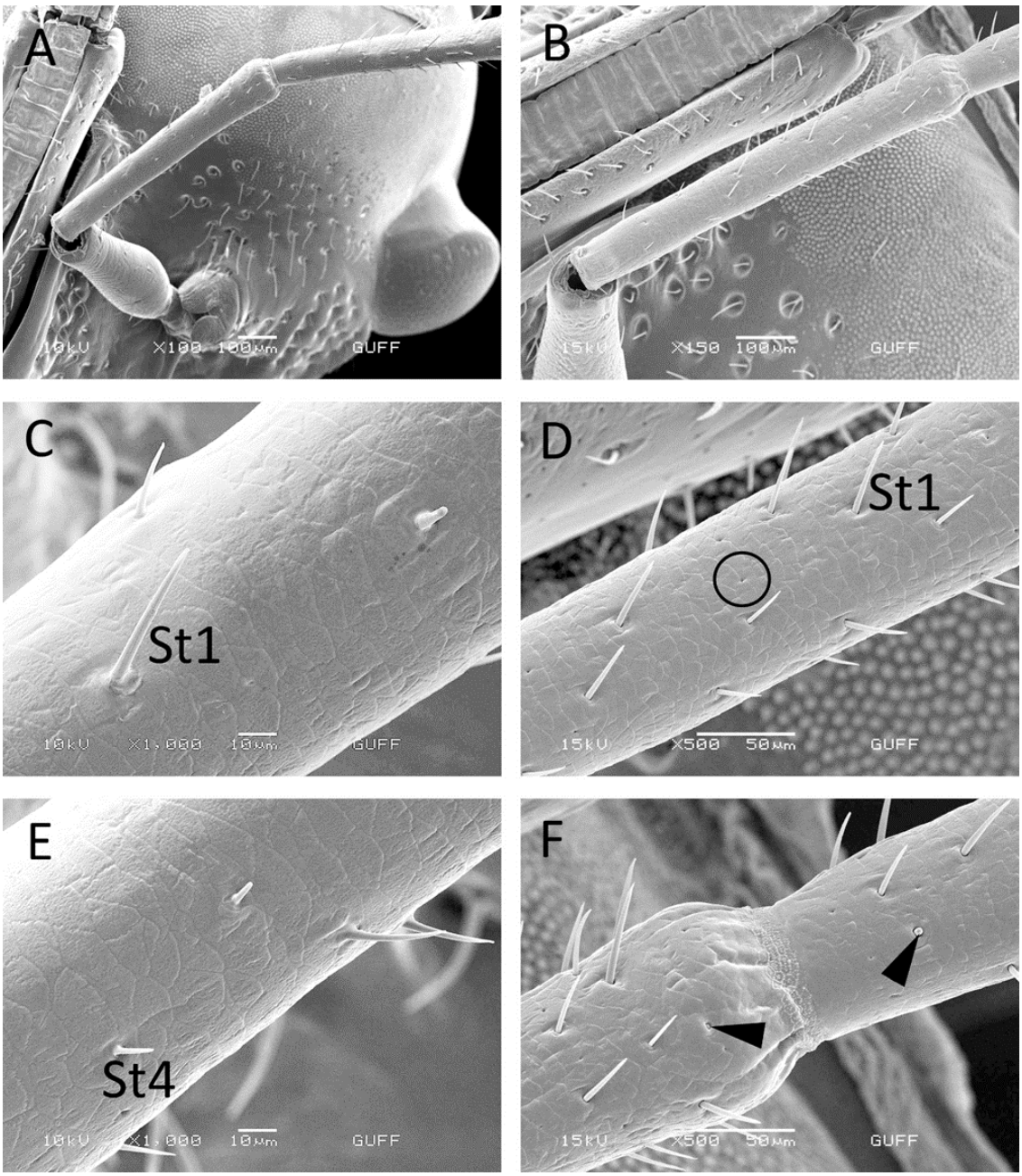


Figure 9. The pedicel 1 of the antenna. A-C-E: Female, B-D-F: Male. Encircled: sensilla campaniformia 1, arrowhead: sensilla campaniformia 2, St1: sensilla trichodea 1, St4: sensilla trichodea 4.

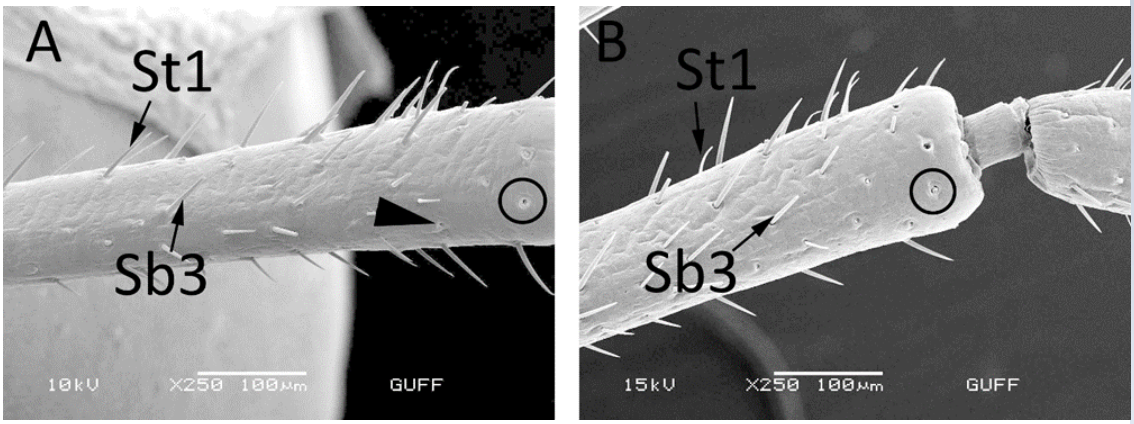


Figure 10. The pedicel 2 of the antenna. A: Female, B: Male. St1: sensilla trichodea 1, Sb3: sensilla basiconica 3, arrowhead: sensilla campaniformia 1, encircled: sensilla campaniformia 2.

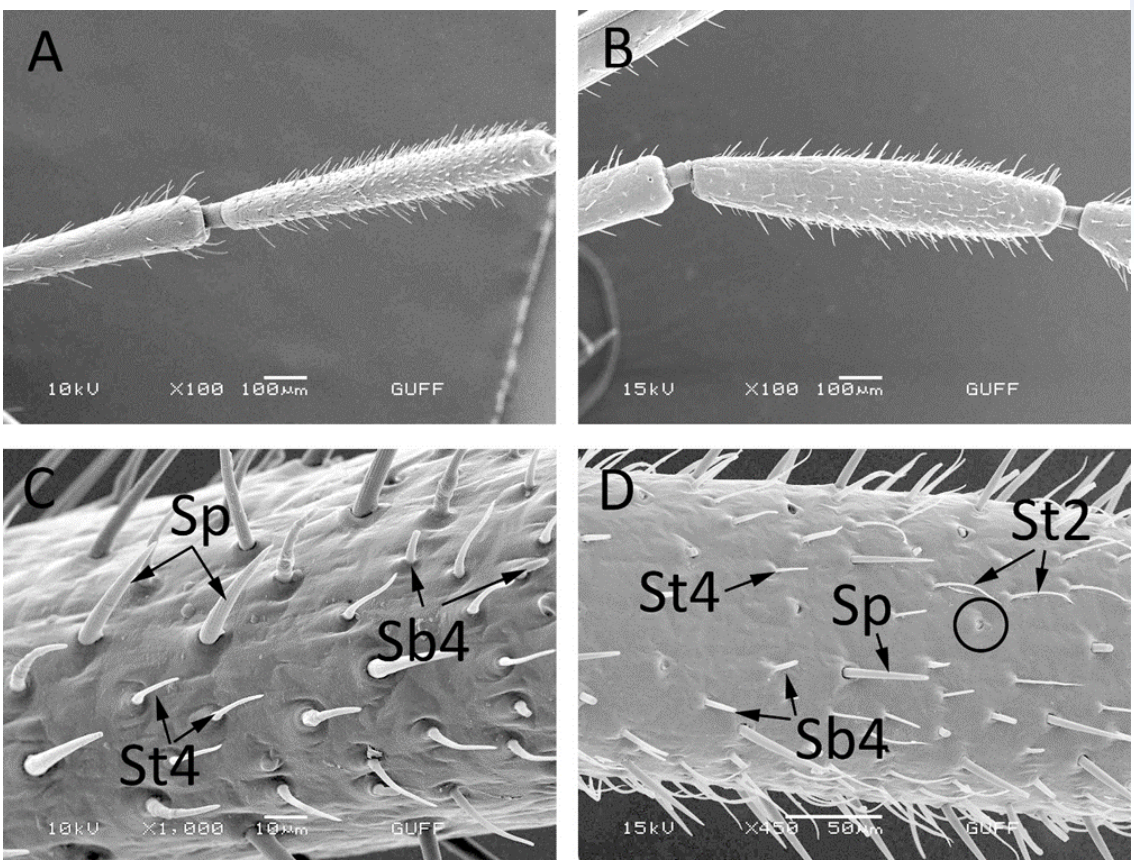


Figure 11. The flagellum 1 of the antenna. A-C: Female, B-D: Male. St2: sensilla trichodea 2, St4: sensilla trichodea 4, Sp: sensilla peg, Sb4: sensilla basiconica 4.

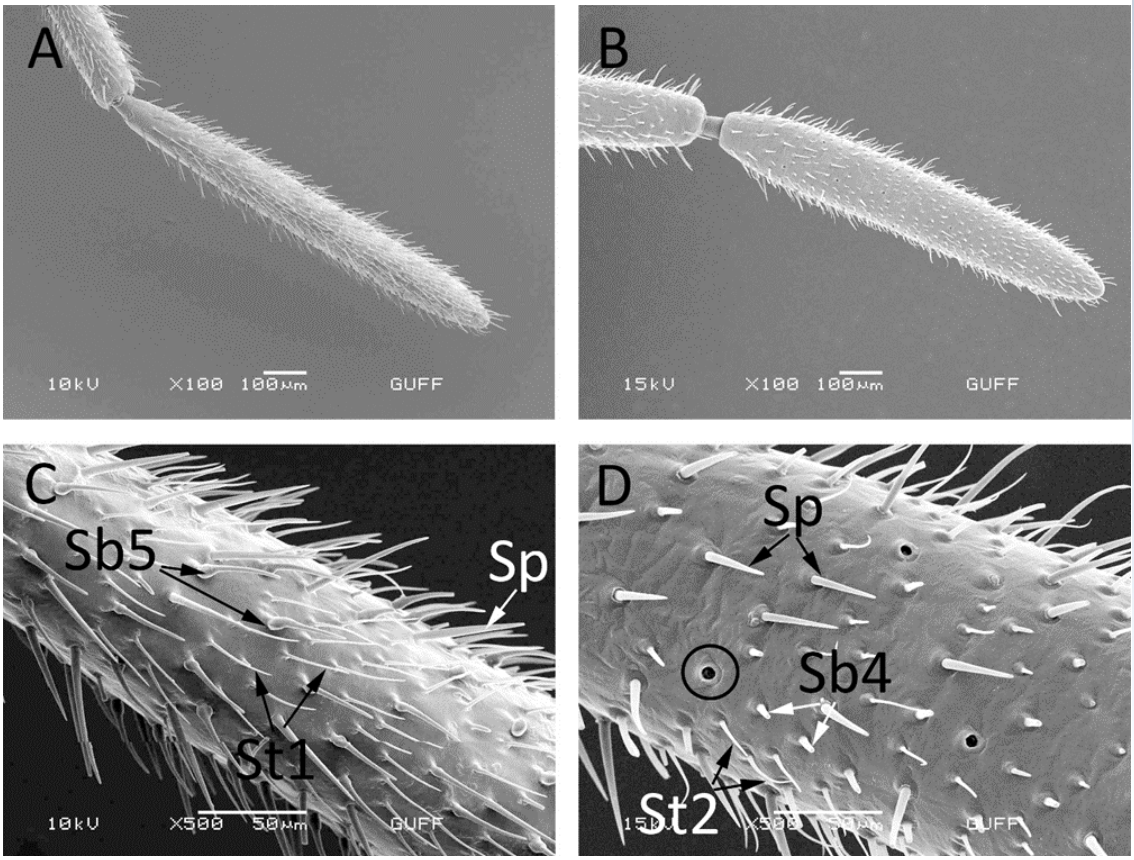


Figure 12. The flagellum 2 of the antenna. A-C: Female, B-D: Male. St1: sensilla trichodea 1, St2: sensilla trichodea 2, Sb4: sensilla basiconica 4, Sb5: sensilla basiconica 5, Sp: sensilla peg, encircled: sensilla campaniformia 3.

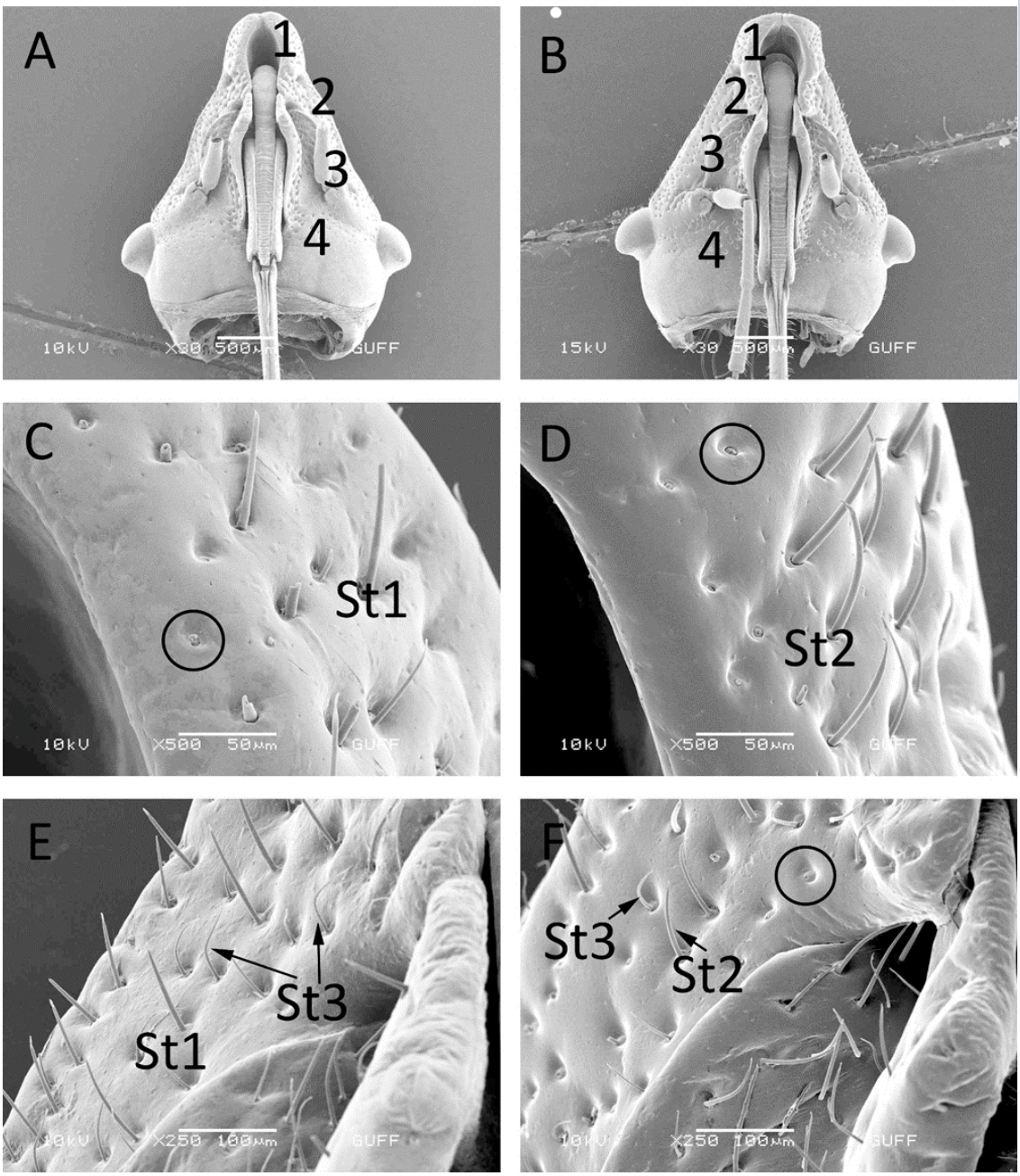


Figure 13. A-B. General view of 4 regions of the head. C-D. The first region of the head. E-F. The second region of the head. A-C-E: Female, B-D-F: Male. St1: sensilla trichodea 1, St2: sensilla trichodea 2, St3: sensilla trichodea 3, encircled: sensilla campaniformia 2.

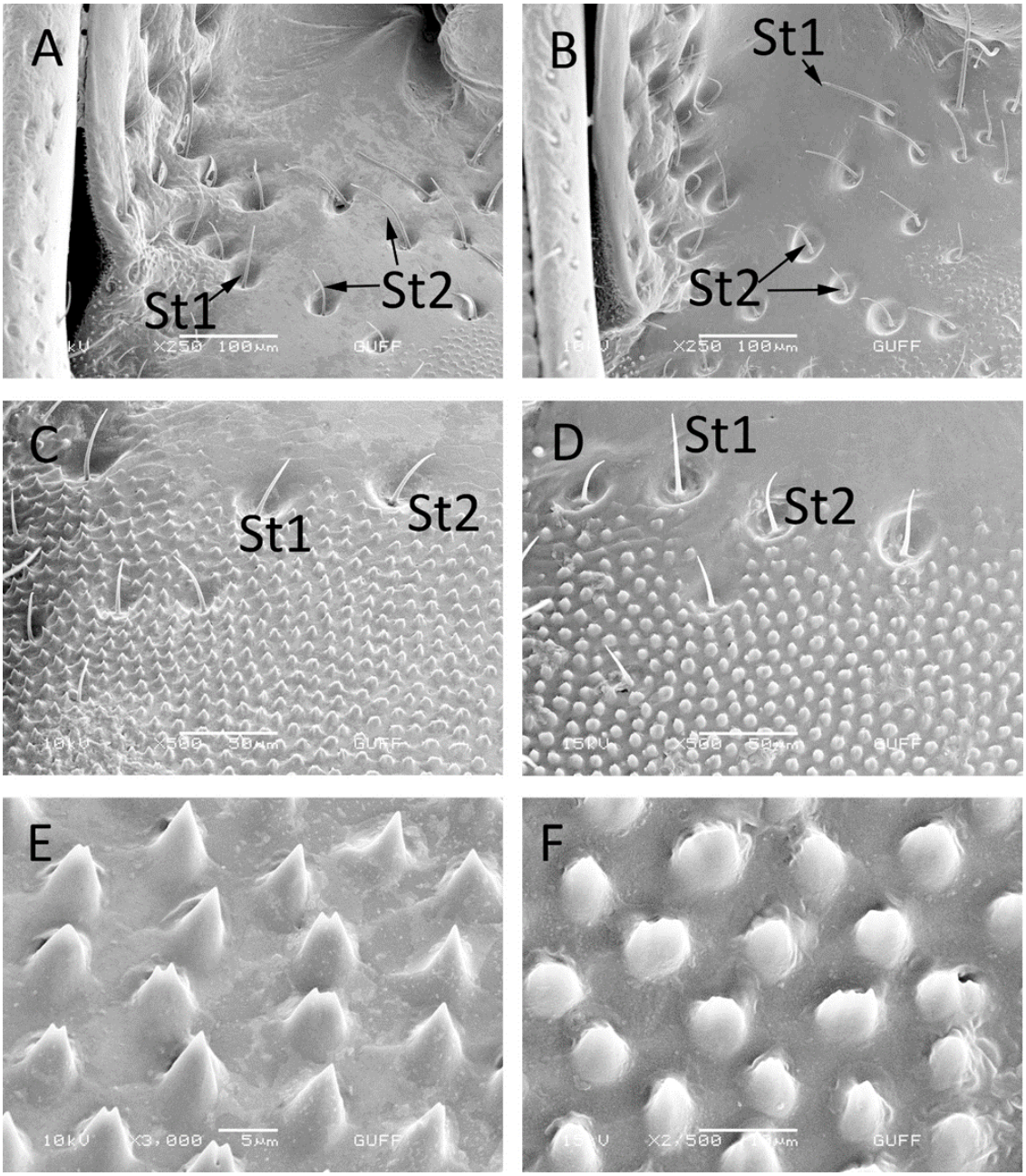


Figure 14. A-B. The third region of the head. C-F. The fourth region of the head. E and F shows the one or two pointed cone-shaped protrusions. A-C-E: Female, B-D-F: Male. St1: sensilla trichodea 1, St2: sensilla trichodea 2.

Sensilla types and distributions in insects are thought to be related to the insects' diet. Because, each sensilla has different sensory functions. For example, sensilla basiconica in the mouthparts is responsible for the movement of these parts, while sensilla trichodea acts as a mechanoreceptor and in this way ensures the discovery of nutrients (Liang et al., 2013; Gullan & Cranstone, 2014; Wang et al., 2019; Amutkan Mutlu et al., 2021). Comparison of sensilla types of some species in the literature is given in the Table 3. It is seen in the table that

sensilla types can vary in different species of insects. We can say that sensilla varieties, numbers and distributions give us taxonomic and phylogenetic data, especially thanks to their morphological contributions to the nutrition of insects and thus to the structure of their mouth-parts. The fact that it has so many different types of sensilla shows that it can receive various chemical stimuli in *A. rostrata*. We hope that this study on the sensilla of *A. rostrata* will contribute to other studies and literature on this subject.

REFERENCES

Ahmad, A., Parveen, S., Brozek, J., Dey, D., 2016, Antennal sensilla of phytophagous and predatory pentatomids (Hemiptera: Pentatomidae): a comparative study of four genera, *Zoologischer Anzeiger*, 261: 48-55.

Akent'eva, N. A., 2008, The formation of the antenna sensory apparatus in some bug (Heteroptera) species in the course of their postembryonic development, *Entomological Review*, 88(4): 381-390.

Altner, H, Prillinger, L., 1980, Ultrastructure of invertebrate chemo thermo and hygroreceptors and its functional significance, *International Review of Cytology*, 67: 69-139.

Amutkan Mutlu, D., Polat, I., Gözüpek, H., Kıyak, S., Suludere, Z., 2021, A scanning electron microscope study of the sensilla on antenna and mouthparts in *Eurygaster testudinaria* (Geoffroy, 1785) (Hemiptera, Heteroptera, Scutelleridae), *Journal of the Heteroptera of Turkey*, 3 (1): 14-30.

Bolu, H., 2020, Southeastern Anatolia region insect fauna II (Order Hemiptera I: Sub-order Heteroptera III: Pentatomoidea) of Turkey, *Journal of the Heteroptera of Turkey*, 2(2): 81-101.

Brown, E.S., 1965, Notes on the migration and direction of flight of *Eurygaster* and *Aelia* species (Hemiptera, Pentatomoidea) and their possible bearing on invasions of cereal crops, *Journal of Animal Ecology*, 34(1): 93-107.

Brożek, J., 2013, Comparative analysis and systematic mapping of the labial sensilla in the Nepomorpha (Heteroptera: Insecta), *The Scientific World Journal*, 1-44.

Brożek, J., Bourgoin, T., 2013, Morphology and distribution of the external labial sensilla in *Fulgoromorpha* (Insecta: Hemiptera), *Zoomorphology*, 132(1): 33-65.

Brozek, J., Chlond, D., 2010, Morphology, arrangement and classification of sensilla on the apical segment of labium in Peiratinae (Hemiptera: Heteroptera: Reduviidae), *Zootaxa*, 2476(1): 39-52.

Brożek, J., Zettel, H., 2014, A comparison of the external morphology and functions of labial tip sensilla in semiaquatic bugs (Hemiptera: Heteroptera: Gerromorpha), *European Journal of Entomology*, 111 (2): 275-297.

Cao, Y. K., Huang, M., 2016, A SEM study of the antenna and mouthparts of *Omosita colon* (Linnaeus) (Col.: Nitidulidae), *Microscopy Research and Technique*, 79 (12): 1152-1164.

Carey, A. F., Carlson, J. R., 2011, Insect olfaction from model systems to disease control, *Proceedings of the National Academy of Sciences*, 108(32): 12987-12995.

Chapman, R. F., 1998, *Mechanoreception. Chemoreception, In: Chapman R. F. (Ed.). The Insects, Structure and Function*, Cambridge University Press, UK, 610-652 pp.

Faucheux, M. J., Németh, T., Kundrata, R., 2020, Comparative antennal morphology of *Agriotes* (Coleoptera: Elateridae), with special reference to the typology and possible functions of sensilla, *Insects*, 11(2): 137.

Fernandes, F. D. F., Bahia-Nascimento, A. C., Pinto, L. C., Leal, C. D. S., Secundino, N. F. C., Pimenta, P. F. P., 2008, Fine structure and distribution pattern of antennal sensilla of *Lutzomyia longipalpis* (Diptera: Psychodidae) sand flies, *Journal of Medical Entomology*, 45 (6): 982-990.

Freitas, S. P. C., Santos, L. C., de Souza, A. C., Junqueira, A. C. V., 2020, Morphological aspects of antennal sensilla of the *Rhodnius brethesi* Matta, 1919 (Hemiptera: Reduviidae) from the Negro river, Amazon region of Brazil, *Journal of Parasitology Research*, 1-6.

Fu, B. X., Bellis, G. A., Hong, J., Wang, J. R., Wu, Q., Tang, Q. Y., Cheng, J. A., Zhu, Z. R., 2012, Morphology, distribution, and abundance of antennal sensilla of

male and female macropterous and brachypterous small brown planthopper, *Laodelphax striatellus* (Fallén) (Hemiptera: Delphacidae), *Microscopy Research and Technique*, 75(11): 1492-1512.

Giglio, A., Mazzei, A., Vommaro, M.L., Brandmayr, P., 2021,Antennal sensilla in an anophthalmic wood-dwelling species *Clinidium canaliculatum* Costa 1839 (Coleoptera, Rhysodidae), *Microscopy Research and Technique*, in press, doi: 10.1002/jemt.23969.

Gözüaçık, C., Fent, M., Özgen, İ., 2011, Güneydoğu Anadolu bölgesi Pentatomidae (Hemiptera: Heteroptera) faunasına katkılar, *Türkiye Entomoloji Bülteni*, 1(4): 235-252.

Gullan, P. J., Cranston, P. S., 2014, *The Insects: An Outline of Entomology*, 5th ed., Wiley Blackwell, 95-124 pp., Oxford, UK,

Hallberg, E., Hansson, B. S., 1999, Arthropod sensilla: morphology and phylogenetic consideration, *Microscopy Research and Technique*, 47: 428-439.

Hao, Y., Dietrich, C. H., Dai, W., 2016, Structure and sensilla of the mouth-parts of the spotted lanternfly *Lycorma delicatula* (Hemiptera: Fulgoromorpha: Fulgoridae), a polyphagous invasive planthopper, *PloS One*, 11(6): e0156640.

Ibrahim, A., Giovannini, I., Anfora, G., Stacconi, M. V. R., Malek, R., Maistrello, L., Guidetti, R., Romani, R., 2019, A closer look at the antennae of the invasive *Halyomorpha halys*: fine structure of the sensilla, *Bulletin of Insectology*, 72 (2): 187-199.

Isidoro, N., Romani, R., Bin, F., 2001, Antennal multiporous sensilla: their gustatory features for host recognition in female parasitic wasps (Insecta, Hymenoptera: Platygastroidea), *Microscopy Research and Technique,* 55(5): 350-358.

Kanturski, M., Akbar, S. A., Favret, C., 2017, Morphology and sensilla of the enigmatic Bhutan pine aphid *Pseudessigella brachychaeta* Hille Ris Lambers (Hemiptera: Aphididae)-A SEM study, *Zoologischer Anzeiger*, 266: 1-13.

Khaghaninia, S., Farshbaf-Pourabad, R., Askari, O., Havaskary, M., 2013, A faunistic study of true bugs (Heteroptera) from Horand grasslands, NW Iran, *Munis Entomology & Zoology*, 8(1): 468-474.

Li, S., Zhang, W., Wang, X., Lei, C., Zhu, F., 2016, Ultrastructure of sensilla on larvae and adults of *Chrysomya megacephala* (Diptera: Calliphoridae), *Entomological News*, 126(1): 52-63.

Li, Y., Liu, F., Du, X., Li, Z., Wu, J., 2018, Ultrastructure of antennal sensilla of three fruit borers (Lepidoptera: Crambidae or Tortricidae), *PloS One*, 13(10): 1-10.

Liang, X. M., Zhang, C. N., Li, Z. L., Xu, L. F., Dai, W., 2013, Fine structure and sensory apparatus of the mouthparts of the pear psyllid, *Cacopsylla chinensis* (Hemiptera: Psyllidae), *Arthropod Structure & Development,* 42: 495-506.

Lodos, N., 1981, *Aelia* species and their economic importance in Turkey, *EPPO Bulletin*, 11(2): 29-32.

Lodos, N., Önder, F., Şimşek, Z., 1984, Diyarbakır (Karacadağ)' da süne (*Eurygaster integriceps* Put.) (Het.: Scutelleridae)' nin ovalara göç ettiği dönemde kışlak böcek faunasının tespiti ve süne ile bazı türlerin kışlak yerlerinden çıkış ve göç etme davranışları üzerinde araştırmalar (II), *Bitki Koruma Bülteni*, 24(2): 75-87.

Nowińska, A., Brożek, J., 2017, Morphological study of the antennal sensilla in *Gerromorpha* (Insecta: Hemiptera: Heteroptera), *Zoomorphology*, 136: 327-347.

Önder, F., Karsavuran, Y., Pehlivan, E., Turanlı, F., 1995, Güneydoğu Anadolu Projesi (GAP) uyguluma alanında saptanan Pentatomidae (Heteroptera) türleriyle ilgili bir değerlendirme, *GAP Bölgesindeki Bitki Koruma Sorunları ve Çözüm Önerileri Sempozyumu*, 27-29 April 1995, Şanlıurfa, Türkiye. Book of Abstract, 120-130p.

Özgen, İ., Gözüaçık, C., Karsavuran, Y., Fent, M., 2005, Güneydoğu Anadolu bölgesi buğday alanlarında bulunan Pentatomidae (Heteroptera) familyasına ait türler üzerinde araştırmalar, *Türkiye Entomoloji Dergisi*, 42(2): 35-43.

Parveen, S., Ahmad, A., Brożek, J., Ramamurthy, V. V., 2015, Morphological diversity of the labial sensilla of phytophagous and predatory Pentatomidae (Hemiptera: Heteroptera), with reference to their possible functions, *Zootaxa*, 4039(2): 359-372.

Rani, A. T., Shashank, P. R., Meshram, N. M., Sagar, D., Srivastava, C., Pandey, K. K., Singh, J., 2021, Morphological characteriza-

tion of antennal sensilla of *Earias vittella* (Fabricius) (Lepidoptera: Nolidae), *Micron*, 140: 102957.

Seada, M. A., Hamza, A. M., 2018, Differential morphology of the sensory sensilla of antennae, palpi, foretarsi and ovipositor of adult *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae), *Annals of Agricultural Science*, 63: 1-8.

Shields, V. D. C., 2010, High resolution ultrastructural investigation of insect sensory organs using field emission scanning electron microscopy. Microscopy: science, technology, applications and education, *Formatex Badajoz*, 321-328.

Silva, C.C.A., De Capdeville, G., Morales, M.C.B., Falcao, R., Solino, L.F., Laumann, R.A., Silva, J.P., Borges, M., 2010, Morphology, distribution and abundance of antennal sensilla in three stink bug species (Hemiptera: Pentatomidae), *Micron*, 41: 289-300.

Slifer, E. H., 1970, The structure of arthropod chemoreceptors, *Annual Review of Entomology,* 15: 121-141.

Tarla, G., 2017, Morphological diagnosis of *Aelia rostrata* Boh.(Heteroptera: Pentatomidae) parasitized by *Hexamermis* sp.(Nematoda: Mermithidae) in Ankara, Turkey, *Türkiye Biyolojik Mücadele Dergisi,* 8(1): 21-28.

Taszakowski, A., Nowińska, A., Brożek, J., 2019, Morphological study of the labial sensilla in Nabidae (Hemiptera: Heteroptera: Cimicomorpha), *Zoomorphology*, 138(4): 483-492.

Wang, Y., Brożek, J., Dai, W., 2020a, Morphological disparity of the mouth-parts in polyphagous species of Largidae (Heteroptera: Pentatomomorpha: Pyrrhocoroidea) reveals feeding specialization, *Insects*, 11(3): 145.

Wang, Y., Brożek, J., Dai, W., 2020b, Functional morphology and sexual dimorphism of antennae of the pear lace bug *Stephanitis nashi* (Hemiptera: Tingidae), *Zoologischer Anzeiger*, 286: 11-19.

Wang, Y., Li, L., Dai, W., 2019, Fine morphology of the mouthparts in *Cheilocapsus nigrescens* (Hemiptera: Heteroptera: Miridae) reflects adaptation for phytophagous habits, *Insects*, 10(5): 143.

Yang, S. Y., Zhong, Y. Z., Zhang, J. P., Wang, X. P., Zhang, F., 2016, A comparative scanning electron microscopy study on antennal sensilla of *Trissolcus japonicus* and *Trissolcus plautiae*, egg parasitoids of stink bugs (Pentatomidae), *Annals of the Entomological Society of America*, 109(1): 112-120.

Zhang, J., Zhang, X., Liu, C., Meng, L., Zhou, Y., 2014, Fine structure and distribution of antennal sensilla of stink bug *Arma chinensis* (Heteroptera: Pentatomidae), *Entomologica Fennica*, 25: 186-198.

Zhang, Y. J., Chen, D. Y., Chao, X. T., Dong, Z. S., Huang, Z. Y., Zheng, X. L., Lu, W., 2021, Ultrastructure of antennal sensilla of *Copidosomopsis nacoleiae* (Eady) (Hymenoptera: Chalcidoidea: Encyrtidae), a parasitoid of *Diaphania angustalis* (Snellen) (Lepidoptera: Crambidae), *Microscopy Research and Technique,* 84(9): 2149-2165.

Zhao, H., Liang, C., Gao, P., Xie, Y., Wang, Z., Wu, G., Tang, G., Cheng, B., Gao, X., 2021, Observation of the fine structure of antennal sensilla of the stink bug, *Eocanthecona furcellata* (Hemiptera: Pentatomidae), *Micron*, 150: 103143.

Table 3. Comparison of sensilla types of *A. rostrata* and some species belong to the order Hemiptera in the literature.

Species	Mouth parts					Antenna					Head	Reference
	Labium 1	Labium 2	Labium 3	Labium 4	Labrum	Scape	Pedicel1	Pedicel2	Flagellum1	Flagellum2		
Aelia rostrata	St, Sca	St, Sb, Sca	St, Sca	St, Sb	St	Sp, cone-shaped protrusions	St, Sca	St, Sb, Sca	St, Sb, Sp	St, Sb, Sca, Sp	Sca, St, cone-shaped protrusions	-
Dolycoris indicus	-	-	-	-	-	-	-	-	St, Sb, Sca, Sch**		-	Ahmad et al., 2016
Plautia crossota	-	-	-	-	-	-	-	-	St, Sb, Sca		-	Ahmad et al., 2016
Eucanthecona furcellata	-	-	-	-	-	-	-	-	St, Sb, Sca, Sco***, Spl****		-	Ahmad et al., 2016
Perillus bioculatus	Sp, Sstc*, St, Sb, Sca				-	-	-	-	St, Sb, Sca, Sco		-	Parveen et al., 2015; Ahmad et al., 2016
Trissolcus japonicus	-	-	-	-	-	St	Sb, St		St, Sch, Spap****, Sca, sickle-shaped, grooved-peg sensilla		-	Yang et al., 2016
Trissolcus plautiae	-	-	-	-	-	St	Sb, St		St, Sch, Spap, Sca, sickle-shaped, grooved-peg sensilla		-	Yang et al., 2016
Stephanitis nashi	-	-	-	-	-	St, Sco	St, Sb, Sca		St	St, grooved-peg sensilla, SCo	-	Wang et al., 2020b
Halyomorpha halys	-	-	-	-	-	Sb, Sco, Sch	Sb, Sco, Sch	Sb, Sco, Sch	Sb, St, Sco, Sch	Sb, St, Sco, Sch	-	Ibrahim et al., 2019
Euschistus heros	-	-	-	-	-	-	Sb	Sb	St, Sb	St, Sb	-	Silva et al., 2010
Edessa meditabunda	-	-	-	-	-	-	Sb, Sch	Sb, Sch	St, Sb	St, Sb	-	Silva et al., 2010
Piezodorus guildinii	-	-	-	-	-	-	Sb, Sch	Sb, Sch	St, Sb	St, Sb	-	Silva et al., 2010
Eocanthecona furcellata	Sp, St, Sstc, Sb, Sch				-	Sch, Sb	St, Sch, Sb	St, Sch, Sb, Sco	St, Sch, Sb, Sco	St, Sch, Sb, Sco	-	Parveen et al., 2015; Zhao et al., 2021
Dolycoris indicus	Sp, St, Sb, Sca, Sch				-	-	-	-	-	-	-	Parveen et al., 2015;

Table 3. Continued

Plautia crossota	Sp, St, Sb, Sca, Sch				-	-	-	-	-	-	Parveen et al., 2015;
Piezodorus hybernı	Sp, St, Sb, Sca, Sch				-	-	-	-	-	-	Parveen et al., 2015;
Eurygaster testudinaria	no sensilla	Sb, St, Sca, Sp	Sb, St, Sca		dome-shaped protruzions, plate-shaped structures	Sb, St, Sca, Sp	Sb, St, Sca, Sp	Sb, St, Sca, Sp	Sb, St, Sca, Sp	Sb, St, Sca, Sp	St, Sca,	Amutkan Mutlu et al., 2021
Arma chinensis	-	-	-	-	-	Sb	Sb	Sb, Sch	St, Sb, Sch	St, Sb, Sch, Sca, Sco	-	Zhang et al., 2014

*: sensilla styloconica, **: sensilla chaetica, ***: sensilla coeloconica, ****: sensilla placoidea, *****: sensilla papillary

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

Contributions to the Nabidae (Hemiptera: Heteroptera) Fauna in the Thrace Region, Turkey

İlhan Asal[1] Meral Fent[2]

[1] Baraj District, Selcuk Bey Street, Toki Houses,18 H/6, Altındağ, Ankara, Turkey
E-mail: feedback32@hotmail.com
[2]Trakya University, Faculty of Science, Department of Biology, 22030, Edirne/Turkey
E-mail: m_fent@hotmail.com ORCID ID 0000-0001-5787-6714

ABSTRACT: The present study was conducted in 73 localities between May and September of 2013 and 2014 in Edirne Province and in two localities in in 2016 in Kırklareli Province. As a result, 6 species belonging to 3 genera from Nabinae and Prostemmatinae subfamilies of Nabidae family were determined. Among these species, *Nabis flavomarginatus* Scholtz, 1847 and *Nabis ferus* (Linnaeus, 1758) are first records for the Heteroptera fauna of the Thrace Region and additional locality records for 4 species known from the region are given.

KEYWORDS: Nabidae, fauna, taxonomy, first record, Turkish Thrace, Turkey.

To cite this article: Asal, İ., Fent, M., 2021, Contributions to the Nabidae (Hemiptera: Heteroptera) Fauna in the Thrace Region, Turkey, *J..Het.Turk.,* 3 (2):140–147
DOI:10.5281/zenodo.5717219
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A1.pdf
Received: Sep 21, 2021; **Revised:** Sep 30, 2021; **Accepted:** Oct 2, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

All species of the Nabidae family are predators and feed on eggs, larvae and adults of insects and other small Arthropods.

Most species are polyphagous, but species of the subfamily Prostemmatinae particularly feed on Lygaeidae, another family of Heteroptera. All Prostemmatinae and some Nabinae species live in soil and are found among debris or under stones. Some Nabinae species are found on grasses and some on trees.

Most species spend the winter as adults and some as eggs. Some species belonging to the subfamily Nabinae (*Nabis ferus*, *N. pseudoferus, N. punctatus, N. palifer, N. capsiformis* and *Himacerus apterus*) are more or less important in the control of agricultural and forest pests (Kerzhner, 1996).

Nabidae family is a small family and is represented with 500 species belonging to 21 genera in the world, 122 species belonging to 3 subfamilies and 10 genera in the Palearctic Region and 26 species belonging to 2 subfamilies and 5 genera

in Turkey (Kerzhner, 1996; Önder et al., 2006; Aukema et al., 2013).

Although the studies on the Nabidae family in Turkey started in the old years, they are quite limited. The foreign and native researchers (Horváth, 1883, 1901, 1905, 1918; Reuter, 1890; Puton, 1892; Puton & Noualhier, 1895; Kiritshenko, 1918, 1924; Fahringer, 1922; Gadeau De Kerville, 1939; Hoberlandt, 1956; Linnavuori, 1965, Tuatay et al., 1972; Önder et al., 1981, 1983, 1984, Kıyak, 1990) gave local records limited to a few species, while Erbay (1986) mentioned from 13 species in his master's thesis on Nabidae family collected from different localities from Turkey, and Dursun (2011) from 9 species in his study on Kelkit Valley Heteroptera species.

The records of the Nabidae family from the Thrace Region are very limited and so far 10 species belonging to 4 genera have been recorded (Horváth, 1918; Fahringer, 1922; Hoberlandt, 1956; Önder et al., 1984; Dursun & Fent, 2015). Nabidae family is represented by 42 species in Europe, 15 species in Greece and 17 species in Bulgaria (Aukema, 2013).

MATERIAL AND METHOD

The research material belonging to the family Nabidae were collected from different localities in terms of habitat characteristics, which were determined in Edirne Province between May and September in 2013-2014years, especially during the spring-summer period when the species are active. In addition, the material obtained from two locations (loc.74, loc.75) from Kırklareli Province was added the study data (Table 1).

The research material was collected with the help of a sweep net from short herbaceous plants and with an aspirator from the soil. In addition, male pygophore and paramer structures are highly useful morphological characters in Nabidae family species, as in most Heteroptera suborder species. For this reason, after the male specimens were kept in hot water for about 5 minutes, the pygophore and its paramers were removed under the microscope with the help of a fine-tipped forceps and a preparation needle, and

these structures were also used in the identification of the species.

Table 1. The localities, coordinates, altitudes and the dates of the field studies in Edirne Province

Loc No	Locality	Coordinate	Altitude	Date
1	Havsa-Arpaç	41°41'08N 26°52'33E	113m	30.08.2013
2	Havsa-Necatiye	41°30'18N 26°53'54E	57m	30.08.2013
3	Havsa-Osmanlı	41°35'00N 26°50'13E	82m	22.08.2013 11.06.2014
4	Lalapaşa-Sinanköy	41°48'55N 26°41'49E	127m	05.07.2013
5	Lalapaşa-Vaysal	41° 56' 26N 26° 52' 9E	438m	05.07.2013
6	Süloğlu -around the Süloğlu Dam	41° 46' 8N 26° 54' 36E	155m	21.07.2013
7	Edirne-Center	41°40'33N 26°33'31E	41m	12.06.2014 20.08.2014
8	Enez-Çavuşköy	40°41'17N 26°10'15E	68m	04.08.2008
9	Uzunköprü- Center	41°15'58N 26°41'19E	32m	08.07.2009 15.07.2009
10	İpsala-Center	40°55'16N 26°22'58E	19m	15.07.2009

Table 1. Continued

11	Lalapaşa-Çömlekköy	41°50'34N 26°36'38E	101m	14.08.2013
12	Enez- Center	40°43'29N 26°4'57E	24m	04.09.2013
13	Center-Bosnaköy	41°37'35N 26°36'12E	41m	29.05.2014
14	Center-Üyüklütatar	41°32'19N 26°36'3E	44m	29.05.2014
15	Havsa-Bostanlı	41°36'50N 26°58'0E	90m	11.06.2014
16	Havsa-Yolageldi	41°31'0N 26°56'60E	59m	11.06.2014
17	Havsa-Tahal	41° 5'0N 26°51' 0E	42m	13.06.2014
18	Uzunköprü- Değirmenci	41°18'37N 26°42'2E	48m	13.06.2014
19	Uzunköprü-Meşeli	41°22'60N 26°43'60E	83m	13.06.2014
20	Uzunköprü-Başağıl	41°15'49N 26°47'49E	39m	03.07.2014
21	Uzunköprü-Bayramlı	41°18'24N 26°49'34E	77m	03.07.2014
22	Uzunköprü-Çöpköy	41°13'8N 26°49'18E	87m	03.07.2014
23	Uzunköprü-Gazimehmet	41°12'0N 26°55'0E	112m	03.07.2014
24	Uzunköprü-Kırcasalih	41°23'33N 26°48'11E	98m	03.07.2014
25	Uzunköprü-Muhacirkadı	41°,20',30N 26°,52',18E	27m	03.07.2014
26	Uzunköprü-Sipahi	41°13'60N 26° 52' 60E	89m	03.07.2014
27	Uzunköprü-Yağmurca	41°10'0N 26°51'0E	125m	03.07.2014
28	Uzunköprü-Çobanpınar	41°10'60N 26° 33' 0E	25m	07.07.2014
29	Uzunköprü-Karapınar	41°7' 0N 26°37'60E	50m	07.07.2014
30	Uzunköprü-Kavacık	41°11'14N 26°39'56E	53m	07.07.2014
31	Uzunköprü-Kavakayazma	41°7'60N 26°31'60E	27m	07.07.2014
32	Uzunköprü-Kırköy	41°6'0N 26°43'60E	134m	07.07.2014
33	Uzunköprü-Süleymaniye	41°7'22N 26°48'30E	261m	07.07.2014
34	Lalapaşa-Çömlekakpınar	41°51'0N 26°37'0E	148m	09.07.2014
35	Lalapaşa-Çalıdere	41°55'60N 26°43'60E	197m	15.07.2014
36	Lalapaşa-Kalkansöğüt	41°58'60N 26°48'60E	414m	15.07.2014
37	Lalapaşa-Ömeroba	41°55'0N 26°55'60E	328m	15.07.2014
38	Lalapaşa-Süleymandanişment	41°53'60N 26°53'60E	383m	15.07.2014
39	Süloğlu-Taşlısekban	41°47'60N 26°52'60E	195m	15.07.2014
40	Enez-Arnavutköy	41°43'0N 26°34'60E	76m	04.08.2014
41	Lalapaşa-Kavaklı	41°47'60N 26°45'0E	174m	04.08.2014
42	Meriç-Hasırcı	41°16'0N 26°27'60E	54m	04.08.2014 24.08.2014
43	Meriç-Karayusuflu	41°15'28N 26°25'55E	24m	04.08.2014

Table 1. Continued

44	Uzunköprü-Çiftlikköy	41°14′0N 26° 37′ 0E	10m	04.08.2014
45	Uzunköprü-Karayayla	41°15'0N 26°34'60E	25m	04.08.2014
46	İpsala-İbriktepe	41°0′35N 26°30′11E	127m	12.08.2014
47	İpsala-Sarıcaali	40°59'60N 26°22'0E	53m	12.08.2014
48	Meriç-Karaağaç	41°11'28N 26°25'25E	23m	12.08.2014
49	Meriç-Küplü	41°6'25N 26°21'7E	12m	12.08.2014
50	Meriç-Subaşı	41°08'60N 26°22'0E	19m	12.08.2014
51	İpsala-Pazardere	40°58'40N 26°34'52E	125m	13.08.2014
52	İpsala-Turpçular	40°56'28N 26°26'15E	27m	13.08.2014
53	Keşan-Beğendik	40°55'57N 26°34'26E	114m	13.08.2014
54	Keşan-Altıntaş	41°00'0N 26°42'60E	185m	23.08.2014
55	Keşan-Kozköy	41°1'0N 26°36'0E	63m	23.08.2014
56	Enez-Abdurrahim	40°38'31N 26°15'25E	40m	24.08.2014
57	Enez-Hasköy	41°38'28N 26°51'31E	102m	24.08.2014
58	Enez-Işıklı	40°43'0N 26°18'0E	13m	24.08.2014
59	Enez-Koyuntepe	40°46'0N 26°20'60E	23m	24.08.2014
60	Enez-Küçükevren	40°38'60N 26°10'0E	41m	24.08.2014
61	Enez-Sultaniçe	40°37'35N 26°9'12E	11m	24.08.2014
62	Enez-Yenikarpuzlu	40°46'0N 26° 12' 0E	17m	24.08.2014
63	Keşan-Çelebi	40°40'41N 26°20'49E	135m	24.08.2014
64	Keşan-Orhaniye	41°43'0N 26°25'60E	29m	24.08.2014
65	Keşan-Bahçeköy	40°46'10N 26°40'32E	45m	26.08.2014
66	Keşan-Boztepe	40°50'60N 26°33' 0E	53m	26.08.2014
67	Keşan-Çeltik	40°40'60N 26°33'0E	117m	26.08.2014
68	Keşan-Karahisar	40°45'0N 26°30'0E	21m	26.08.2014
69	Keşan-Koruklu	40°39'60N 26°25'0E	51m	26.08.2014
70	Keşan-Mecidiye	40°38'20N 26°32'14E	29m	26.08.2014
71	Keşan-Mercan	40°44'60N 26°36'0E	72m	26.08.2014
72	Keşan-Suluca	40°41'20N 26°27'49E	145m	26.08.2014
73	Lalapaşa-Hacıdanişment	41°54'35N 26°49'26E	508m	07.06.2016
74	Kırklareli–Lüleburgaz–Evrensekiz	41°22'11N 27°29'42E	73 m	14.05.2016
75	Kırklareli- between Lüleburgaz–Pınarhisar	41°29'57N 27°24'51E	106m	16.06.2016

Family: NABIDAE A. Costa, 1853

Subfamily: NABINAE A. Costa, 1853

Genus: *NABIS* Latreille, 1802

***Nabis* (*Nabicula*) *flavomarginatus* Scholtz, 1847**

Material: EDİRNE: İpsala (Turpçular), 13.08.2014, 1♂; **Keşan** (Bahçeköy), 26.08.2014, 2♂♂; **Uzunköprü** (Karapınar), 07.07.2014, 2♂♂

Distribution in Turkey: Turkey Asian part (Anatolia) (Kerzhner, 1996).

***Nabis* (*Nabis*) *pseudoferus* Remane, 1949**

Material: EDİRNE: Center-Karaağaç, 12.08.2014, 2♀♀, 7♂♂; **Enez-** Center 5m 04.09.2013 1♂; Çavuşköy, 04.08.2008, 1♀, 2♂♂; Arnavutköy, 04.08.2014, 8♀♀, 5♂♂; Çelebi, 24.08.2014, 4♀♀, 3♂♂; Işıklı, 24.08.2014, 2♀♀, 4♂♂; Küçükevren, 24.08.2014, 10♀♀, 1♂; Sultaniçe, 24.08.2014, 2♀♀, 2♂♂; Yenikarpuzlu, 24.08.2014 5♀♀, 4♂♂; **Havsa-**Arpaç, 30.08.2013, 8♀♀,13♂♂; Osmanlı, 22.08.2013, 7♀♀, 1♂; Necatiye, 30.08.2013, 5♂♂; Bostanlı, 11.06.2014, 18♀♀, 5♂♂; Yolageldi, 11.06.2014, 2♀♀, 1♂; Tahal, 13.06.2014, 17♀♀, 3♂♂; **İpsala**-Center 15.07.2009, 1♂; İbriktepe, 12.08.2014, 3♀♀, 2♂♂; Sarıcaali, 12.08.2014, 4♀♀, 5♂♂; Pazardere, 13.08.2014 2♀♀, 9♂♂; Turpçular, 13.08.2014 10♀♀, 8♂♂; Keşan-Beğendik, 13.08.2014, 4♂♂; Kozköy 23.08.2014, 2♀♀, 1♂; Altıntaş, 26.08.2014, 4♀♀; Bahçeköy, 26.08.2014, 6♀♀, 2♂; Boztepe, 26.08.2014 1♂; Çeltik, 26.08.2014, 4♀♀; Karahisar, 26.08.2014, 2♀♀, 3♂♂; Koruklu, 26.08.2014, 1♀, 1♂; Mecidiye, 26.08.2014, 14♀♀, 7♂♂; Mercan, 26.08.2014 2♀♀, 2♂♂; Orhaniye, 24.08.2014, 5♀♀, 5♂♂; Suluca, 26.08.2014, 4♀♀, 2♂♂; **Lalapaşa -**Sinanköy, 05.07.2013, 8♂♂, 15♀♀; 05.07.2013, 2♀♀,4♂♂; Vaysal, 05.07.2013, 1♂; Çömlekköy, 14.08.2013, 1♂; Çömlekakpınar, 09.07.2014, 7♂♂; Çalıdere, 15.07.2014, 2♀♀, 4♂♂; Kalkansöğüt, 15.07.2014, 3♀♀, 2♂♂; Ömeroba, 15.07.2014 3♀♀, 4♂♂; Süleymandanişment, 15.07.2014, 1♂; Kavaklı, 04.08.2014, 8♀♀, 1♂; **Meriç-**Karayusuflu, 04.08.2014, 4♂♂; Subaşı, 12.08.2014, 2♀♀, 3♂♂; Hasırcı, 24.08.2014, 10♀♀, 6♂♂; **Süloğlu**- around the Süloğlu Dam. 21.07.2013, 2♀♀, 11♂♂; 21.07.2013 2♀♀; Taşlısekban, 15.07.2014, 13♀♀, 7♂♂; **Uzunköprü**-Center, 15.07.2009, 1♂; Meşeli, 13.06.2014, 1♀; Başağıl, 03.07.2014, 6♀♀, 3♂♂; Bayramlı, 03.07.2014, 2♂♂, Çöpköy, 03.07.2014, 2♀♀, 4♂♂; Gazimehmet, 03.07.2014, 14♀♀, 10♂♂; Kırcasalih, 03.07.2014, 3♀♀,1♂; Muhacirkadı, 03.07.2014, 10♀♀, 9♂♂; Sipahi, 03.07.2014, 8♀♀, 5♂♂; Yağmurca, 03.07.2014, 2♂♂; Çobanpınar, 07.07.2014, 5♀♀, 2♂♂; Kavacık, 07.07.2014, 1♀, 3♂♂; Karapınar, 07.07.2014, 40♀♀, 29♂♂; Kavakayazma, 07.07.2014, 1♀; Kırköy, 07.07.2014, 7♀♀, 4♂♂; Süleymaniye, 07.07.2014, 12♂♂; Karayayla, 04.08.2014, 10♀♀, 4♂♂.

***Nabis* (*Nabis*) *punctatus* A. Costa, 1847**

Material: EDİRNE: Center, 12.06.2014, 5♀♀, 1♂; Karaağaç, 12.08.2014, 1♂; **İpsala-**Turpçular, 13.08.2014, 1♂; **Meriç**-Küplü, 12.08.2014, 4♀♀, 2♂♂; **Uzunköprü**-Gazimehmet, 03.07.2014, 1♂.

***Nabis* (*Nabis*) *ferus* (Linnaeus, 1758)**

Material: EDİRNE: **Center**, 12.06.2014, 3♀♀, 2♂♂; Bosnaköy, 29.05.2014, 6♂♂; Üyüklütatar, 29.05.2014, 2♀♀, 5♂♂; Karaağaç, 12.08.2014, 1♀, 8♂♂; **Enez-**Arnavutköy, 04.08.2014, 14♀♀,10♂♂; Abdurrahim, 24.08.2014, 1♂; Çelebi, 24.08.2014, 3♀♀, 2♂♂; Hasköy, 24.08.2014, 1♂; Işıklı, 24.08.2014, 3♀♀, 2♂♂; Koyuntepe, 24.08.2014, 2♀♀,1♂; Küçükevren, 24.08.2014, 11♀♀, 3♂♂; Sultaniçe, 24.08.2014, 1♂; Yenikarpuzlu, 24.08.2014, 5♀♀, 7♂♂; **İpsala-**Sarıcaali, 12.08.2014, 2♀♀, 4♂♂; **Keşan**-Kozköy, 23.08.2014, 1♀, 1♂; Orhaniye, 24.08.2014, 2♀♀, 2♂♂; Bah-

çeköy, 26.08.2014, 2♀♀, 1♂; Boztepe, 26.08.2014, 1♂; Çeltik, 26.08.2014, 2♀♀, 2♂♂; Karahisar, 26.08.2014, 1♀, 1♂; Mecidiye, 26.08.2014, 10♀♀, 5♂♂; Mercan, 26.08.2014, 1♀, 1♂; Suluca, 26.08.2014, 2♀♀, 2♂♂; **Meriç**-Hasırcı, 04.08.2014, 12♀♀, 12♂♂; **Süloğlu**-Taşlısekban, 15.07.2014, 8♀♀, 4♂♂; **Havsa**-Bostanlı, 11.06.2014, 10♀♀, 6♂♂; Osmanlı, 11.06.2014, 2♀♀, 15♂♂; Tahal, 13.06.2014, 10♀♀, 11♂♂; **Uzunköprü**-Değirmenci, 13.06.2014 5♂♂; Çöpköy, 03.07.2014, 1♀, 4♂♂; Gazimehmet, 03.07.2014, 10♀♀, 9♂♂; Muhacirkadı, 03.07.2014, 7♀♀, 1♂; Sipahi, 03.07.2014, 6♀♀, 7♂♂; Çobanpınar, 07.07.2014, 5♀♀, 2♂♂; Karapınar, 07.07.2014, 15♀♀, 16♂♂; Çiftlikköy, 04.08.2014, 3♂♂; Karayayla, 04.08.2014, 4♀♀, 7♂♂.

Distribution in Turkey: Ağrı, Amasya, Antalya, Bursa, Diyarbakır, Elazığ, Erzurum, Giresun, Iğdır, Hatay, Kahramanmaraş, Kars, Tokat (Hoberlandt, 1856; Dursun, 2011; Yıldırım et al., 2013).

Genus: *HIMACERUS* Wolff, 1811

***Himacerus* (*Aptus*) *mirmicoides* (O. Costa, 1834)**

Material: EDİRNE: Center-Sarayiçi (Tavukormanı), 20.08.2014, 1♀.

Subfamily: PROSTEMMATINAE Reuter, 1890

Genus: *PROSTEMMA* Laporte, 1832

***Prostemma sanguineum* (Rossi, 1790)**

Material: EDİRNE: Lalapaşa-Hacıdanişment, 07.06.2016, 1♂, 3 nimf; **KIRKLAELİ: Lüleburgaz-**Evrensekiz, 14.05.2016, 1♀, 1♂; between Lüleburgaz-Pınarhisar, 16.06.2016, 2♂♂.

RESULTS AND DISCUSSION

In this study, 6 species belonging to 3 genera from Nabinae and Prostemmatinae subfamilies of Nabidae family were determined in Turkish Thrace. Among these species, *Nabis flavomarginatus* Scholtz, 1847 and *Nabis ferus* (Linnaeus, 1758) are new records for the Heteroptera Fauna of the Thrace Region and additional records of 4 known species from the region were given.

The first findings of *Nabis flavomarginatus* for the Thrace Region, was detected in 3 localities located in the south of Edirne (Uzunköprü - Karapınar, İpsala - Turpçular, Keşan - Bahçeköy). When taking into account the distributional data of the species in Turkey (Kerzhner, 1996; Aukema, 2020), it is given only as the "Asian part" without specifying the locality. The species, which has a wide distribution in Europe and Asia in the Palearctic distribution, also spreads in Alaska, Canada, Greenland in the Nearctic Region, apart from the Palearctic.

Nabis (*Nabis*) *ferus* has a wide distribution, and was detected in 37 different localities in Edirne Province in this study.

Although its known distribution from Anatolia is based on quite old years, it is not very common in Anatolia.

In the Palearctic Region, it shows a very wide distribution in Europe and Asia, including Turkey and the neighboring countries to the research area (Kerzhner, 1996). This species was recorded for the first time in the Thrace Region during this study. It is very similar to *N. pseudoferus* and *N. punctatus* species in terms of general appearance, but it is easily distinguished from these two species by the fact that the apex of the paramer in the male is pointed in the form of spines.

The other 4 species, *Nabis pseudoferus*, *N. punctatus*, *Himacerus mirmicoides* and *Prostemma sanguineum* identified in this study, arevery common both in Turkey and intheir general geographical distribution. *N. pseudoferus* was also detected in many localities during the research.

The species of the genus *Nabis* were generally detected in the alfalfa fields or the wild green grasses on the field or roadside during our research. These habitats, where the species are detected, are generally rich in other soft-bodied insect larvae or adults hunted by the species. It is thought that *Nabis* species chose these habitats because of the convenience in finding prey by them. *Prostemma sanguineum* was found on the ground in the alfalfa fields, and under stones and *Himacerus mirmicoides* in the mixed forest dominated by poplar.

In the study, when the most common species in 75 localities where field studies were carried out were evaluated respectively; *Nabis pseudoferus* was detected from 62 localities, *N. ferus* from 37 localities, *N. punctatus* from 5 localities, *N. flavomarginatus* and *Prostemma sanguineum* from 3 localities, and *Himacerus mirmicoides* from only 1 locality.

When the data obtained as a result of the research were evaluated, the number of species of Nabidae family in the Thrace Region increased to a total of 12 with the addition of two new records. In addition, new data on the distribution of previously known species were obtained.

ACKNOWLEDGMENT

This work was supported by Trakya University Scientific Research Projects Unit, Project Number: TÜBAP-2013/101.

REFERENCES

Aukema, B., 2020, Catalogue of Palaearctic Heteroptera. Naturalis Biodiversity Center. Available from https:// catpalhet.linnaeus.naturalis.nl/ (Accessed on 06- 01-2021).

Aukema, B., Rieger, Chr., Rabitsch, W., 2013, *Catalogue of the Heteroptera of the Palaearctic Region. Volume 6.* The Netherlands Entomological Society, Supplement: xxii + 629pp.

Dursun, A., 2011, Study on the Nabidae and Reduviidae (Hemiptera: Heteroptera) of the Kelkit Valley and Amasya, Turkey. *Acta Entomologica Serbica*, 16 (1/2): 35-43.

Dursun A., Fent, M., 2015, Notes on some little known species of Heteroptera from Turkey with new records for the fauna of Europe and the Turkish Thrace. *North-Western Journal of Zoology*, 11(1): 92-96.

Erbay, H., 1986, *Türkiye Nabidae (Heteroptera) Faunası Üzerinde Sistematik Çalışmalar.* Ege Üniversitesi Fen Bilimleri Enstitüsü, M.S. thesis, 87 pp.

Fahringer, J., 1922, Eine Rhynchotenausbeute aus der Türkei, Kleinasien und benachbarten Gebieten. *Konowia*, 1: 137-144.

Gadeau De Kerville, H., 1939, *Voyage zoologique d'Henri Gadeau de Kerville en Asie-Mineure*. Paul le Chevalier, Paris, 148 pp.

Hoberlandt, L., 1956, *Results of the Zoological Scientific Expedition of the National Museum in Prague to Turkey. 18. Hemiptera IV. Terrestrial Hemiptera- Heteroptera of Turkey.* Acta *Ent. Mus. Nat. Pragae.* Supp. 3: 1-264.

Horváth, G., 1883, Heteroptera Anatolica in regione Brussae collecta enumeravit. *Termeszettudomanyi Füzetek*, 7: 21-30

Horváth, G., 1901, Hemipteres du voyage de M. Martinez Escalera dans L' Asie-Mineure. *Természetrajzi Füzetek*, 24: 469-485.

Horváth, G., 1905, Ergebnisse einer natürwissenschaftlichen Reise aus Erdschias Dagh (Klein Asien) Hemiptera. *Ann. Nat. Hof. Wien,* 20: 179-189

Horváth, G., 1918, Ad cognitionem faunae Hemipterorum Balkanicae. *Ann. Hist. Nat. Mus. Hung.,* 16: 321-340.

Kerzhner, I. M. 1996, Family: Nabidae, 84-107pp. *In: Aukema, B. & Rieger, Ch. (eds.): Catalogue of the Heteroptera of the Palaearctic region.* Volum II, Cimicomorpha I. The Netherlands Entomological Society, Amsterdam, xiv + 361pp.

Kiritshenko, A. N., 1918, Hemiptera- Heteroptera faunae Caucasiae, Paris I. *Mém. Mus. Caucase*, 6, 1-177.

Kiritshenko, A. N., 1924, Beitrag zur Hemipteren Fauna des Südlichen Armenian. *Wiener Entomologische Zeitung*, 41: 1-15.

Kıyak, S., 1990, Systematisch-Ökologische Untersuchungen über die Wanzen (Insecta- Heteroptera) aus dem Gebiet Hazar-See, Maden und Ergani (Prov. Elazığ). *Journal of Biology of Gazi University Faculty of Arts and Sciences*, 1: 43-95.

Önder, F., Ünal, A. Ünal, E., 1981, Heteroptera fauna collected by light traps in some districts of Northwestern part of Anatolia. *Turkish Journal of Plant Protection*,5 (3): 151-169.

Önder, F. Atalay, R. Karsavuran, Y. 1983, İzmir ili ve çevresinde kışı ergin halde geçiren Heteroptera türleri ve kışlak yerleri üzerinde araştırmalar I. Notonectidae, Leptopodidae, Anthocoridae, Miridae, Nabidae, Reduviidae, Tingidae, Aradidae, Pyrrhocoridae, Coreidae, Alydidae, Rhopalidae. *Turkish Journal of Plant Protection*, 7: 65–77.

Önder, F., Ünal A., Ünal, E., 1984, Heteropterous insects collected by light traps in Edirne. *Turkish Journal of Plant Protection,* 8 (4): 215-224.

Önder, F., Y. Karsavuran, S. Tezcan & M. Fent, 2006. Türkiye Heteroptera (Insecta) Kataloğu. Meta Basım Matbaacılık Hizmetleri, İzmir, 164s.

Puton, A., 1892, Hémiptères nouveaux ou peu connus et notes divers. IV. Hémiptères d'Akbès. Région de l'Amanus (Syrie septentrionale). Récoltés par M. Delagrange. *Rev. d'Ent.,* 11: 24-36.

Puton, A., Noualhier, M., 1895, Supplement a la liste des Hemipteres d'Akbes. *Revue d'Entomologie (Caen),* 14: 170-177.

Reuter, O. M., 1890, Notes géographiques sur les Hétéroptères paléarctiques. *Rev. d'Ent.*, 9: 237-245.

Tuatay, N., Kalkandelen A., Aysev, N. 1972, *The Insect Catalogue of Plant Protection Museum (1961-1971).* 119 pp., Yenigün Matbaası, Ankara.

Yıldırım, E., Yazıcı, G. Kul R., Moulet, P., 2013, Contribution to the Knowledge of the Anthocoridae, Lyctocoridae, Nabidae, Reduviidae and Tingidae (Hemiptera, Heteroptera) Fauna of Turkey. *J. Entomol. Res. Soc.*, 15 (3): 53 -66.

J.Het.Turk,
Journal of the Heteroptera of Turkey

ISSN 2687 - 3249 (online edition)

November, 2021
Volume 3, Issue 2

Short Note

First record of *Dryadocoris apicalis* (Herrich-Schaeffer, 1842) (Hemiptera: Heteroptera: Pentatomidae) in Greece

Torsten van der Heyden

Immenweide 83, D-22523 Hamburg, Germany.
E-mail: tmvdh@web.de ORCID iD: 0000-0003-4138-7160

ABSTRACT: The first record of *Dryadocoris apicalis* (Herrich-Schaeffer, 1842) for Greece is reported. Information on the known distribution of the species is summarized.

KEYWORDS: *Dryadocoris apicalis*, first record, distribution, Greece.

To cite this article: van der Heyden, T., 2021, First record of *Dryadocoris apicalis* (Herrich-Schaeffer, 1842) (Hemiptera: Heteroptera: Pentatomidae) in Greece, *J.Het.Turk.*, 3 (2):148-150
DOI:10.5281/zenodo.5717235
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A8.pdf
Received: Nov 03, 2021; **Revised:** Nov 11, 2021; **Accepted:** Nov 15, 2021; **Published online:** Nov 30, 2021

So far, *Dryadocoris apicalis* (Herrich-Schaeffer, 1842) (Hemiptera: Heteroptera: Pentatomidae) has been reported from the following European countries: Albania, France (including Corsica), Italy (including Capraia, Pantelleria, Sardinia and Sicily), Portugal and Spain (including the Canary Islands) (Carapezza, 1995; Jiménez et al., 2003; Aukema et al., 2006; Dusoulier & Lupoli, 2006; Rider, 2006; Belousova, 2007; Gessé, 2011; Roca-Cusachs & Goula, 2017; Fernández Ruiz, 2018; Roca-Cusachs et al., 2018; van der Heyden, 2019).

Outside Europe, the species has been reported from Algeria, Cameroon, the Democratic Republic of the Congo, the Republic of the Congo, Eritrea, Ethiopia, Guinea, Kenya, Morocco, Nigeria, Rwanda, Somalia, South Africa, Sudan, Tanzania, Togo and Yemen (Rider, 2006; Belousova, 2007; Robertson, 2009).

Now, the first record of *D. apicalis* in Greece can be reported: On 02.11.2021, an adult specimen was photographed by Christopher Bakos in Parga, a coastal village in North-West Greece (Fig. 1).

The specimen was found inside a building where vegetable plants are grown hydroponically. Likely, it was drawn to the heat of the LED lamp that provides the sunlight/heat to the vegetables or

alternatively to the moisture at the base of the vegetable plant (Lettuce) where the bug was found (Christopher Bakos, pers. comm.). So far, the nearest location of findings of other specimens of *D. apicalis* is the Albanian city of Vlorë, located less than 200 km north-west of Parga (van der Heyden, 2019).

ACKNOWLEDGEMENTS

I would like to thank Christopher Bakos for allowing me to use his photo of *D. apicalis* to illustrate this note and for additional information about his finding.

REFERENCES

Aukema, B., Duffels, J. P., Báez, M., 2006, A Checklist of the Heteroptera of the Canary Islands (Insecta), *Denisia*, 19: 755-774.

Belousova, E. N., 2007, Revision of the Shield -bug Genera *Holcostethus* Fieber and *Peribalus* Mulsant et Rey (Heteroptera, Pentatomidae) of the Palaearctic Region, *Entomological Review*, 87 (6): 701-739.

Carapezza, A., 1995, Heteroptera, 199-278 pp. In: *Arthropoda di Lampedusa, Linosa e Pantelleria* (*Canale di Sicilia, Mar Mediterraneo)*. (Il Naturalista Siciliano, XIX (Suppl.)). (Ed. B. Massa). Società Siciliana di Scienze Naturali, Palermo, 909 pp.

Dusoulier, F., Lupoli, R., 2006, Synopsis des Pentatomoidea Leach, 1815 de France métropolitaine (Hemiptera: Heteroptera), *Nouvelle Revue d'Entomologie (Nouvelle Série)*, 23 (1): 11-44.

Fernández Ruiz, D., 2018, Els heteròpters del delta del Llobregat, 483-524 pp. In: *Els sistemes naturals del delta del Llobregat*. (Treballs de la Institució Catalana d'Història Natural, 19). (Eds. J. Germain i Otzet, J. Pino i Vilalta) Institució Catalana d'Història Natural, Barcelona, 715 pp.

Gessé, F., 2011, Heterópteros terrestres (Hemiptera: Heteroptera) de Castelldefels (Barcelona, Cataluña, noreste de la Península Ibérica), *Heteropterus Revista de Entomología*, 11 (2): 245-256.

Jiménez, P. J., Ribes, E., Ribes, J., Rofes, J., Solà, C., 2003, Dades preliminars sobre els hemípters terrestres de la Reserva natural de Sebes i Meandre de Flix i el seu entorn, Ribera d'Ebre (Heteroptera), *Sessió Conjunta d'Entomologia ICHN-SCL*, 12: 167-184.

Rider, D. A., 2006, Family PENTATOMIDAE Leach, 1815, 233-402 pp. In: *Catalogue of the Heteroptera of the Palaearctic Region.* Volume 5. Pentatomomorpha II. (Eds. B. Aukema, C. Rieger). The Netherlands Entomological Society, Amsterdam, 550 pp.

Robertson, I. A. D., 2009, *The Pentatomoidea (Hemiptera: Heteroptera) of Sub-Saharan Africa. A Database*. Self-publishing, Malindi, 451 pp.

Roca-Cusachs, M., Goula, M., 2017, Photosharing website photographs as a tool to refine distribution of Iberian and Canarian Pentatomoidea (Hemiptera: Heteroptera), *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, 60: 397-405.

Roca-Cusachs, M., Prieto Piloña, F., Pérez Valcárcel, J., Goula, M., 2018, Checklist de Fauna Ibérica. Superfamilia Pentatomoidea Leach, 1815 (Insecta: Heteroptera) en la península ibérica, islas Baleares e islas Canarias (edición 2018). In: *Documentos Fauna Ibérica*, *4*. (Eds. M. A. Ramos, M. Sánchez Ruiz). Museo Nacional de Ciencias Naturales, CSIC, Madrid, 2 (sn) + 17 pp.

van der Heyden, T., 2019, First records of *Dryadocoris apicalis* (Herrich-Schäffer) (Heteroptera: Pentatomidae: Pentatominae: Antestiini) for Albania, *Revista Chilena de Entomología*, 45 (3): 331-333.

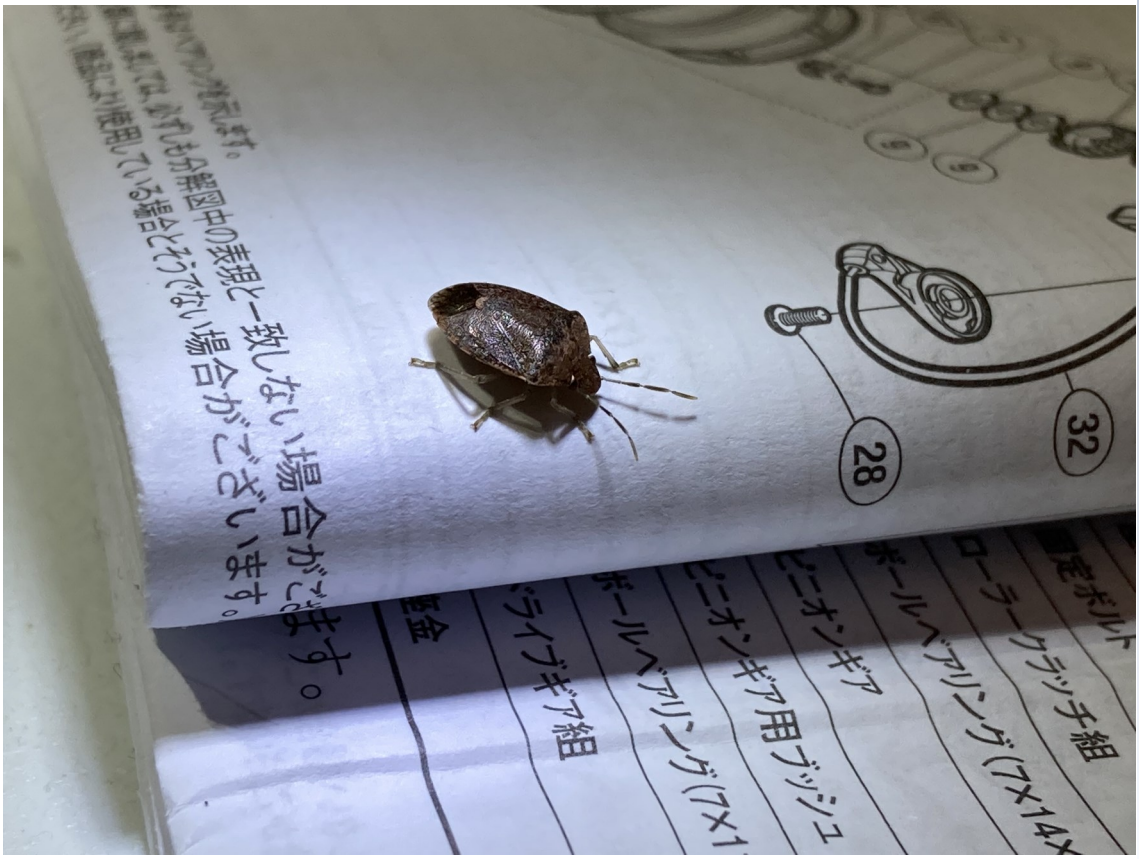


Figure 1. *Dryadocoris apicalis* (Herrich-Schaeffer, 1842), Parga, Greece, 02.11.2021. (Photo: Christopher Bakos).

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

Some Heteroptera (Hemiptera) species that are potential natural enemies of *Cimbex quadrimaculata* (Müller, 1766) (Hymenoptera: Cimbicidae)

İnanç Özgen[1]* Paride Dioli[2], İbrahim Koç[3] Aykut Topdemir[1]

[1]Fırat University, Bioengineering Department, Elazığ, TURKEY
[2]Natural History Museum, Department of Entomology, Milano-ITALY
[3]Artuklu University, Mardin, TURKEY
*Corresponsing author E-mail: iozgen@firat.edu.tr

ABSTRACT: The study was carried out in the provinces of Elazig and Diyarbakir between 2020-2021. In the studies conducted in nature and in laboratory conditions, it is observed that the species does not feed on advanced larval stages of the pest. From the species identified in the study, *Deraeocoris trifasciatus* Linnaeus, 1767 and *Globiceps sphaegiformis* Rossi, 1790 species belonging to the Miridae family were observed in nature, and *Nagusta goedelii* Kolenati, 1857 and *Zelus (Diplodacus) renardii* (Kolenati, 1856) species belonging to the Reduviidae family were observed to in laboratory conditions to feed on the pest. *Geocoris luridus* Fieber, 1844 and *Geocoris putonianus* Bergroth, 1892 species belonging to the Geocoridae family were found to be abundant in nature before the pest began to be observed in nature. *Brachycoleus steini* Jakovlev, 1884 specimens and *Macrotylus ponticus* Seidenstücker, 1966 found in abundance in the garden at the larval period of pest of these species.

It has not been determined that they feed on pests. All species have been detected in the fauna of both provinces. These species are also the first record for the provinces where they have been found.

KEYWORDS: Almond, *Cimbex quadrimaculata*, Natural Enemies, Predator.

To cite this article: Özgen, İ., Dioli, P., Koç, İ., Topdemir, A., 2021, Some Heteroptera (Hemiptera) Species that are potential natural enemies of Cimbex quadrimaculata (Müller, 1766) (Hymenoptera: Cimbicidae), *J.Het.Turk.*, 3 (2):151– 156
DOI:10.5281/zenodo.5717243
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A9.pdf
Received: Nov 5, 2021; **Revised:** Nov 13, 2021; **Accepted:** Nov 15, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

The Cimbicidae is a small family, with 196 species occurring in the World (Özbek, 2014). In Turkey; There were a 23 species (Önder, 2011). *Cimbex quadrimaculata* (Müller, 1766) is an important pest in fruit-growing areas that especialy on almonds of Turkey (Bolu, 2016) (Figure 1). *C. quadrimaculata* was very serious pest on young almond plants (Özbek,

2014; Çakıcı et al., 2015). When this pest is not methodological managed, it creates significant damage of many fruits.
Additionaly; There is no licensed chemical control recommended against to this species. Therefore, its biological control is an opportunity. Özgen et al. (2010) obtained *Listrognathus mactator* (Thunberg) (Hymenoptera: Ichneumonidae: Cryptinae) as a parasitoid of *C. quadrimaculata* for the first time. Özbek (2014) obtained *Opheltes glaucopterus* (Linnaeus) and *Phobetes nigriceps* (Gravenhorst) (Hymenoptera: Ichneumonidae: Ctenopelmatinae), as larva – pupa parasitoids of *C. quadrimaculata*. *P. nigriceps* was obtained for the first time from *C. quadrimaculata* larvae. No any studies have been conducted on the predator species of this species. The aim of the study is to determine the predator species belonging to the Heteroptera order of the pest.

Figure 1. The habitus of Cimbex quadrimaculata larvae and feeding on almond trees.

MATERIAL AND METHODS

The present study was carried out in Elazığ and Diyarbakır provinces in Anatolia Region of Turkey in 2021-2022. The studies were carried out between 03.05.2021 and 15.06.2021 in Diyarbakır, Egil and Elazığ province and Keban district. Studies were carried out in a climate cabinet with 65% humidity and 25C ± 2°C temperature conditions (Figure 2). When the larvae started to appear in nature, 50 1st instar larvae were collected and brought to the laboratory and left to feed on almond leaves in culture plates. Species that have been found to feed in nature and the biological periods of the pest have been recorded. Miridae species could not be brought alive from natural conditions to laboratory conditions, while Reduviidae species brought from nature were left in the same environment as pests with culture plates. It has been observed that some species insert their stylets into the pest.

Figure 2 a) Climate Cabinet b) Containers with Cimbex quadrimaculata larvae and pupa.

RESULTS and DISCUSSION

Following 8 species were found in the C. quadrimaculata research conducted in two localities in Elazığ and Diyarbakır (Table 1)

Table 1. Heteroptera species, Localities and Biological Observations

Family	Species	Locality	Biological Stage of Cimbex quadrimaculata larvae fed by the predator (*Field and labortory, **Field,***Potential)
MIRIDAE	*Brachycoleus steini* Jakovlev, 1884	Diyarbakır, Eğil, Elazığ, Keban	No feeding (Abundant)
MIRIDAE	*Deraeocoris trifasciatus* Linnaeus, 1767 **	Diyarbakır, Eğil, Elazığ, Keban	1st instar larvae
MIRIDAE	*Globiceps sphaegiformis* Rossi, 1790 **	Diyarbakır, Eğil, Elazığ, Keban	1 instar larvae
MIRIDAE	*Macrotylus ponticus* Seidenstücker, 1966	Diyarbakır, Eğil, Elazığ, Keban	No feeding (Abundant)
REDUVIIDAE	*Nagusta goedelii* Kolenati, 1857 *	Diyarbakır, Eğil, Elazığ, Keban	1st instar larvae.
REDUVIIDAE	*Zelus (Diplodacus) renardii* (Kolenati, 1856) *	Diyarbakır, Eğil	1st instar larvae.
GEOCORIDAE	*Geocoris luridus* (Fieber, 1844)***	Diyarbakır, Eğil, Elazığ, Keban	Before the pest occured in nature, it was observed in each orchards in many ammounts.
GEOCORIDAE	*Geocoris putonianus* Bergroth, 1892 ***	Diyarbakır, Eğil, Elazığ, Keban	Before the pest occured in nature, it was observed in each orchards in many ammounts.

The species has been seen during the months of March and July. They are abundant in the egg and larval stage of the pest (Figure 3).

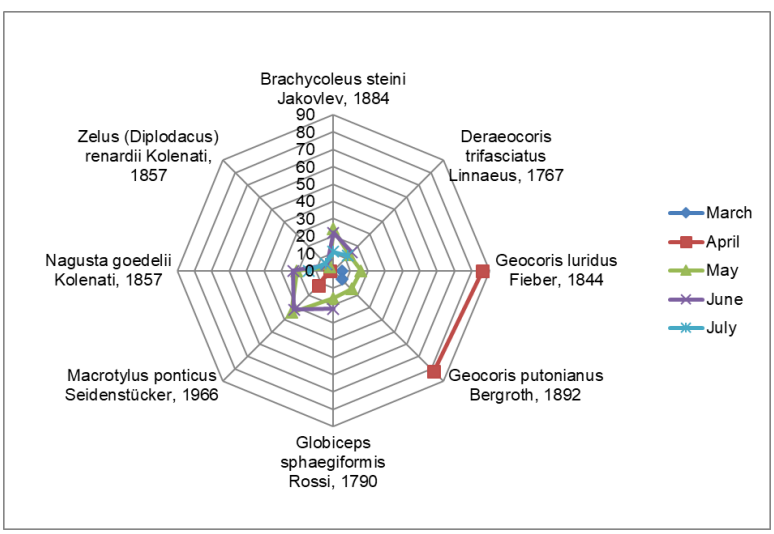


Figure 3. Dates of Predator Species in Nature

Species belonging to the Miridae family were observed in field conditions where they were fed in the first larval stage of the pest. Since the species belonging to this family could not be brought to the laboratory. conditions alive, the culture plate feeding experiments could not be conducted. In these species; *Globiceps sphaegiformis* Rossi, 1790 was determined in the provinces of Elazığ and Diyarbakır in previous years (Matocq et al., 2014; Özgen and Dioli, 2019). There are no studies on the food preferences of the species belonging to this genus. Kıyak (2020); reported that *Deraeocoris* spp. is zoophytophageous, generally feeding on aphids and it preys on eggs of true bugs, larvae of whiteflies. However, there is no record of it feeding on the Hymenopera species. On the other hand; *Zelus (Diplodacus) renardii* (Kolenati, 1856) and *Nagusta goedelii* (Kolenati, 1857) species collected from the field and brought to the laboratory were fed with the first larval stage of the pest. These species stand out as the polyphagous predator. Çelik et al., 2021; reported that this species is fed on *Allantus* (s.str.) *viennensis* (Schrank, 1781) in Diyarbakir. *N. goedelii* was generalist predator potentially capable of attacking the eggs and first instar nymphs of some Pentatomidae specimens and gypsy moth (*Lymantria dispar* (Linnaeus, 1758), Lepidoptera (Erebidae) (Bigsby et al., 2011; Bulgarini et al., 2020). The feeding record on this species is the first. *Geocoris* spp. are among the most important predaceous insects in the world. They feed on eggs and small larvae of most lepidopteran pests. Moreover, *Geocoris* sp. species were found to be abundant in almond trees in gardens where they formed a population before the pest began to appear in nature. In studies conducted in nature and laboratory conditions, it was found that the species did not feed on the advanced larval periods of the pest. All species have been detected in the fauna of both provinces. These species are also the first record for the provinces where they have been found. It has been observed that *Zelus (Diplodacus) renardii* and *Nagusta goedelii* Kolenati, 1857 species do not feed on the biological periods of the pest after the 2nd larval period. For *Brachycoleus steini*; The presence of the *Centaurea* sp. plant in the garden edges has also increased the probability of this species being found in almond trees. Abundant varieties of this plant in this species in the literature are supportive (Hosseini, 2016). Phytophagous status in *Macrotylus* species should be investigated.

ACKNOWLEDGEMENTS

This study was supported by TUBITAK 118O124 number" 3001 project" and All authors would like to thanks to TÜBİTAK Scientific Council.

REFERENCES

Bolu, H.,2016, Distrtibution, Life History and Biology of Almond Sawfly (*Cimbex* quadrimaculata (Müller, 1766), Hymenoptera: Cimbicidae). *Scientific Papers. Series A. Agronomy*, Vol. LIX: 219-222.

Bigsby K.M., Tobin P.C., Sills E.O., 2011, Anthropogenic drivers of gypsy moth spread. *Biological Invasions*, 13, 2077.

Bulgarini, G., Badra, Z., Leonardi, S., Maistrello, L., 2020, Predatory ability of generalist predators on eggs, young nymphs and adults of the invasive *Halyomorpha halys* in southern Europe. Bio Control, https://doi.org/10.1007/s10526-020-10066-3.

Çakıcı, F., Özgen, İ., Bolu, H., Erbaş, Z., Demirbağ, Z., Demir, İ., 2015, Highly effective bacterial agents against Cimbex quadrimaculatus (Hymenoptera: Cimbicidae): isolation of bacteria and theirinsecticidal activities. *World J Microbiol Biotechnol.*, 31:59–67.

Çelik, H., Dioli, P., Bolu, H., 2021, First Record in Southeastern Anatolia of *Zelus (Diplodacus) renardii* (Kolenati, 1856) (Hemiptera: Reduviidae) and his New Prey *Allantus* (s.str.) *vienne*nsis (Schrank, 1781) (Hymenoptera: Tenthredinidae: Allantinae). *J. Het.Turk.*, 3 (1):31 – 39.

Çerçi, B., Özgen,İ., 2021, Contribution to the Knowledge of Heteroptera (Hemiptera) Fauna of Elazığ Province with a New Record for the Fauna of Turkey. *J.Het.Turk.,* 3 (1):50 – 75.

Hosseini, R., 2016, A Review on the Genus Brachycoleus (Hemiptera, Miridae) with identification key to the species found in Iran. *Vestnik zoologii*, 50(2): 105–110,

Kıyak, S., 2020, The First Record of *Deraeocoris flavilinea* (A. Costa, 1862) (Hemiptera: Heteroptera: Miridae) as an Invasive Alien Species (IAS) in the Anatolian Peninsula (Turkey). *J. Het. Turk.,* 2 (2):69-74

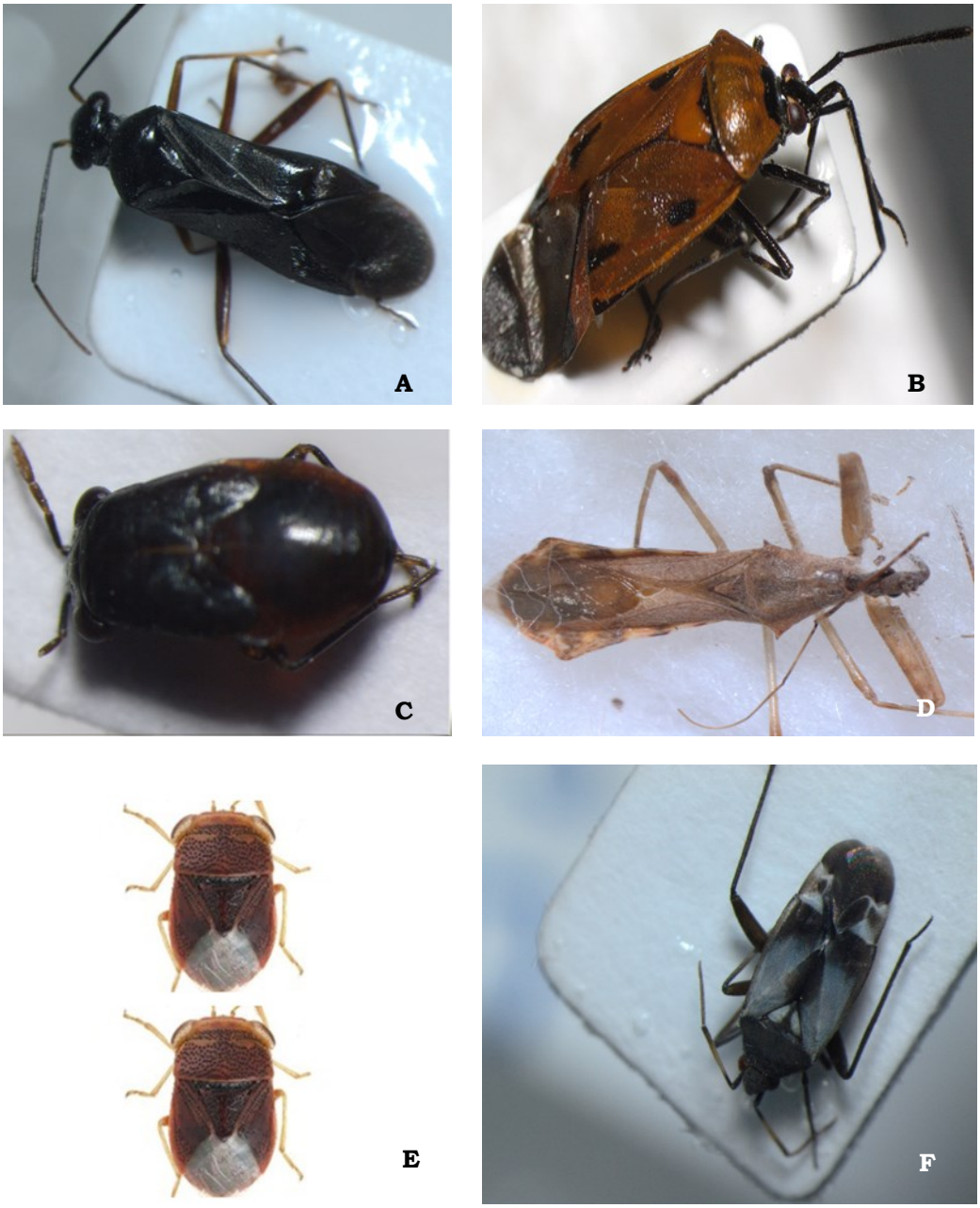
Matocq, A., Sigwalt, D.P., Özgen, İ., 2014, Terrestrial Hemiptera (Heteroptera) Collected in South-East Anatolia (Diyarbakır, Mardin and Elazığ Provinces) (Turkey): Second list, *Mun. Ent. Zo*ol, 9 (2):884-930.

Önder, Ç., 2011, Check-list of the family Cimbicidae of Turkey and some biological observations (Hymenoptera: Symphyta).*Mun. Ent. Zool.*, 6:779–784.

Özbek, H., 2014, Ichneumonid parasitoids of the sawfly *Cimbex quadrimaculata* (Müller) feeding on almonds in Antalya, along with a new parasitoid and new record. *Turk J Zoology*, 38: 657-659.

Özgen, İ., Yurtcan, M. Bolu, H., Kolarov,J., Kolarov, 2010, *Listrognathus mactator* (Thunberg, 1824) (Hymenoptera: Ichneumonidae) — A New Recorded Parasitoid of *Cimbex quadrimaculatus* (O. F. Müller, 1766) (Hymenoptera: Cimbicidae) in Turkey," Entomological News, 121(4), 391-392.

Özgen İ. Dioli, P., 2019, Contribution to the knowledge of Lygaeidae and Miridae (Hemiptera: Heteroptera) in East Anatolia. *J.Het.Turk.*,1(1-2):25-32.



Figues 2. The Figures of Heteroptera Species in Almond Orchards. A: Globiceps sphaegiformis Rossi, 1790; B: *Deraeocoris trifasciatus* Linnaeus, 1767; C: *Geocoris* sp. nymph, D: *Nagusta goedelii* Kolenati, 1857; E: *Geocoris putonianus* Bergroth, 1892 (Çerçi and Özgen, 2021); F: *Macrotylus ponticus* Seidenstücker, 1966.

JHT
J.Het.Turk,
Journal of the Heteroptera of Turkey
ISSN 2687 - 3249 (online edition)
November, 2021
Volume 3, Issue 2

Research Article

A study on the Coreoidea (Hemiptera: Heteroptera) fauna of Çorum Province

Nazım Akman[1§] Ahmet Dursun[2*]

[1]Mustafa Kemal Ortaokulu Buharaevler Mahallesi 6. Cadde, No: 8, Çorum/Turkey
E-mail: nazimakman@hotmail.com ORCID iD: 0000-0002-5381-9752
§: This study was produced from the MSc thesis.

[2]Amasya University, Faculty of Arts and Science, Department of Biology, 05100, Amasya/ Turkey
ORCID iD: 0000-0002-5114-7470

*Corresponding author, e-mail: ahmet.dursun@amasya.edu.tr

ABSTRACT: : In this study is reported28 species belonging to 20 genera from 4 families (Alydidae, Coreidae, Rhopalidae and Stenocephalidae) of the superfamily Coreoidea on the material collected from 39 different localities in Çorum province between 2019 and 2021. Of them, 23 species are new records for the Coreoidea fauna of Çorum. While 20 species recorded in the present study are of Holomediterranean origin, 3 species of Pontomediterranean origin, 2 species of Irano-Turanian origin, 1 species has distribution in Euro-Siberian, Mediterranean and Nearctic. As a result of our observations in the field, a total of 21 taxon at genus level from 15 plant families were identified in relation to Coreoidea species.

KEYWORDS: Heteroptera, Alydidae, Coreidae, Rhopalidae, Stenocephalidae, new records, Çorum, Turkey.

To cite this article: Akman, N., Dursun, A., 2021, A study on the Coreoidea (Hemiptera: Heteroptera) fauna of Çorum Province, *J.Het.Turk.,* 3 (2):157–170
DOI:10.5281/zenodo.5717259
To link to this article: https://www.j-ht.org/wp-content/uploads/2021/11/V32-A10.pdf
Received: Nov 18, 2021; **Revised:** Nov 19, 2021; **Accepted:** Nov 21, 2021; **Published online:** Nov 30, 2021

INTRODUCTION

The superfamily Coreoidea take part in the infraorder Pentatomomorpha (Hemiptera: Heteroptera) and that includes families Alydidae, Coreidae, Rhopalidae and Stenocephalidae in Palaearctic region. Currently approximately 344 species in 84 genera of family Coreidae, approximately

69 species in 26 genera of family Alydidae, 71 species belonging to 14 genera of family Rhopalidae and 18 species of a genus of family Stenocephalidae are known from the Palearctic region (Dolling, 2006). Data based on the studies on Coreoidea in Turkey, show that there are 7 species in 4 genera of Alydidae, 48 species from 20 genera of Coreidae, 29 species in 11 genera of Rhopalidae, and 7 species in 1 genus of Stenocephalidae. Of those, *Camptopus bifasciatus* Fieber, 1864 of the family Alydidae from Amasya and *Anoplocerus luteus* (Fieber, 1861) from İzmir, *Arenocoris latissimus* Seidenstücker, 1960 from Ulukışla (Niğde), *Cercinthus griseus* (Fieber, 1861) from Turkish Thrace region, *Ceriomeris armeniacus* Tshernova, 1978 from easten Anatolia of the family Coreidae, *Corizus brevicornis* Horváth, 1917 from Oltu (Erzurum), *Corizus fenestella* Horváth, 1917 from Tuzluca (Iğdır) of the family Rhopalidae and *Dicranocephalus putoni* (Horváth, 1897) from Hassa (Hatay) of the family Stenocephalidae are species described from Turkey (Puton & Noualhier, 1895; Horváth, 1883, 1901; Fahringer, 1922; Kiritshenko, 1918, 1924; Hoberlandt, 1955; Seidenstücker, 1958, 1960; Wagner, 1959, 1966); Linnavuori, 1965; Pehlivan, 1981; Kıyak, 1990a, b, c; 1993; 2000; Moulet, 1995; Özsaraç & Kıyak, 2001; Önder et al., 2006; Dursun, 2009, 2011; Dursun & Fent, 2009, 2017; Dursun et al., 2010; Fent & Kment, 2011; Fent & Dursun, 2019 and Zengin & Dursun, 2019).

Although it has been rarely reported of feeding on fecal and putrefaction matters and that humans were bitten by species of superfamily Coreoidea, especially the species are phytophagous and feed on meristematic tissues and ripe seeds. Many species of Coreoidea are known as economically and biologically important (Dolling, 2006; Faúndez, 2016).

The study area Çorum is located in the Central Black Sea region and is a transition area between the Black Sea and the Central Anatolia region. The Black Sea climate is generally dominant in the province. The Black Sea climate type is especially prevails in Bayat, Dodurga, İskilip, Kargı, Laçin, Oğuzlar, Osmancık and Uğurludağ districts situated in the Kızılırmak basin. In Alaca, Boğazkale, Mecitözü, Ortaköy and Sungurlu districts prevails Central Anatolian climate. The winter months are cloudy and the summers are hot with the effect of the Central Anatolian climate. In the southern parts of İskilip is the steppes consisting of herbaceous plants. Çorum province is located at the intersection of Irano-Turanian and Euro-Siberian plant belt. Therefore Çorum province has very rich areas in terms of microclimate, different vegetation and habitat properties of flora and faunal elements (Kaya, 2015). The aim of this study is to give the current fauna of superfamily Coreoidea, and to open a new way for scientific and ecological studies in Çorum province.

MATERIAL AND METHODS

The study material was obtained from 39 localities with different vegetation and habitat in Çorum province in the years from 2019 to 2021 (Fig. 1).

The specimens were collected from herbaceous vegetation with a sweep net and from trees plants with a Japanese umbrella. All samples were put in tubes in 70% ethanol and brought to the laboratory. In the laboratory, specimens were softened in hot water (80°C-100°C) for preparation of the male genitalia which was used for further identifications. The specimens were prepared and identified using the relevant diagnostic was investigated under a stereomicroscope (Leica EZ4) and keys of Stichel (1960), Pehlivan (1981) and Moulet (1995).

The material is deposited in the collection of Amasya University, Faculty of Science and Arts, Department of Biology (Amasya, Turkey).

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

RESULTS

Hemiptera Linnaeus, 1758
Heteroptera Latreille, 1810
Coreoidea Leach, 1815
Alydidae Amyot & Serville, 1843
Alydinae Amyot & Serville, 1843

***Alydus* Fabricius, 1803**
***Alydus calcaratus* (Linnaeus, 1758)**
Material examined: Çorum: Center, 19.07.2020, 2♀♀, 2♂♂; **Çatak**, 03.07.2021, 1♂; **Osmancık:** Yaylabaşı, 06.10.2020, 1♂; Sarpınkavak, 19.10.2020, 2♀♀.
Comments: This Holomediterranean species was found under *Astragalus* sp. and it is widespread and frequently distributed in Turkey (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Fent & Dursun, 2019; Zengin & Dursun, 2019). In the study, this species was recorded for the first time from Çorum province.

***Camptopus* Amyot & Serville, 1843**
***Camptopus lateralis* (Germar, 1817)**
Material examined: Osmancık, Center, 25.05.2019, 1♂; 23.04.2021, 1♂; Sarpınkavak, 19.10.2020, 1♀, 1♂; **Alaca**, 05.06.2021, 1♀; **Kargı**, Karapürçek, 02.10.2021, 11♀♀, 9♂♂.
Comments: This Holomediterranean species was found on *Chrysantemum* sp., *Rosa* sp., and *Rumex* sp. and it is widespread and frequently distributed in Turkey (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Fent & Dursun, 2019; Zengin & Dursun, 2019; Çerçi et al., 2016; Çerçi & Özgen, 2021). In the study, this species was recorded for the first time from Çorum province.

***Camptopus tragacanthae* (Kolenati, 1845)**
Material examined: Osmancık, Akören Plateau, 18.04.2020, 1♂; Sarpınkavak, 19.10.2020, 1♂.
Comments: This Irano-Turanian species was found under *Astragalus* sp. and it is widespread and frequently distributed in Turkey (Pehlivan, 1981; Kıyak et al., 2004; Önder et al., 2006; Dursun, 2009; Kıyak & Akar, 2010; Fent & Japoshvili, 2013; Küçükbasmacı & Kıyak, 2015; Kıyak, 2016; Özgen et al., 2018; Fent & Dursun, 2019; Dursun, 2009; Kıyak & Baş, 2021). In the study, this species was recorded for the first time from Çorum province.

Coreidae Leach, 1815
Pseudophloeinae Stål, 1868

***Ceraleptus* A. Costa, 1847**
***Ceraleptus gracilicornis* (Herrich-Schaeffer, 1835)**
Material examined: **Kargı**, Uzunyurt, 19.06.2021, 1♂.
Comments: This Holomediterranean species is rarely encountered in Turkey and it was recorded for the first time from Çorum province(Önder et al., 2006; Baş, 2013; Yıldırım et al., 2013; Seferoğlu, 2013; Küçükbasmacı & Kıyak, 2015; Fent & Dursun, 2019; Zengin & Dursun, 2019). It has been found on *Trifolium* sp. in the study.

***Coriomeris* Westwood, 1842**
***Coriomeris affinis* (Herrich-Schaeffer, 1839)**
Material examined: Kargı, Karapürçek, 20.06.2020, 2♂♂.

Comments: The known distribution of this Mediterranean species in Turkey is widely and frequently distributed (Puton, 1892; Seidenstücker, 1960; Önder et al., 2006; Baş, 2013; Matocq, 2014; Çerçi et al., 2016; Fent & Dursun, 2019; Zengin & Dursun, 2019). In the study, this species was recorded for the first time from Çorum province and it has been found on *Pinus* sp.

***Coriomeris denticulatus* (Scopoli, 1763)**
Material examined: Alaca, 05.06.2021, 3♀♀, 3♂♂; **Osmancık,** Öbektaş Plateau, 24.07.2021, 1♂.
Comments: The known distribution of this Euro-Siberian species is common and widely distributed in Turkey (Horváth, 1883; Hoberlandt, 1955; Linnavuori, 1965; Önder et al., 2006; Dursun, 2011; Fent & Dursun, 2019; Zengin & Dursun, 2019; Bolu, 2020; Bulak Korkmaz & Yıldırım, 2021). This species was found on *Lamium* sp. and the record of the species given in the present study is for the first time from Çorum province.

Coreinae Leach, 1815

***Leptoglossus* Guérin-Méneville, 1831**
***Leptoglossus occidentalis* Heidemann, 1910**
Material examined: Çorum, Center, 17.08.2020, 1♀, 1♂♂; **Osmancık**, Yaylabaşı, 04.05.2020, 1♀, 1♂; Sarpınkavak, 19.10.2020, 1♂; **Laçin**, Yeşilgöl, 03.10.2021, 1♀.
Comments: This western conifer seed bug is an invasive alien species originated from North America. The distribution of *Leptoglossus occidentalis* rapidly expanded to the eastern and western of Turkey. This species was found on *Pinus* sp. This Neactic species is common and widely distributed in Turkey (Arslangündoğdu & Hızal, 2010; Fent & Kment, 2011; Hızal & İnan, 2012; Çerçi & Koçak, 2016; Özgen et al., 2017; Parlak, 2017; Yücel & Kıvan, 2018; Zengin & Dursun, 2019; Oğuzoğlu & Avcı, 2020).

***Centrocoris* Kolenati, 1845**
***Centrocoris spiniger* (Fabricius, 1781)**
Material examined: Çorum, Center, 06.06.2021, 1♀; **Ortaköy**, Mollahasan, 26.07.2020, 1♀; **Osmancık**, Sarpınkavak, 19.10.2020, 1♀.
Comments: This Holomediterranean species is common and widely distributed in Turkey according to available data (Horváth, 1883; Kiritshenko, 1918; Hoberlandt 1955; Wagner, 1966; Tuatay et al., 1972; Kıyak, 1993; Önder et al., 2006; Dursun & Fent, 2009; Dursun, 2011; Fent & Dursun, 2019; Zengin & Dursun, 2019). This species was found on *Cirsium* sp. and it is reported for the first time from Çorum province in the study.

***Centrocoris variegatus* Kolenati, 1845**
Material examined: Osmancık, 23.06.2021, 5♀♀, 3♂♂.
Comments: This Holomediterranean species is frequently and widely distributed in Turkey according to the available records (Horváth, 1901; Hoberlandt, 1955; Kıyak, 1990a; Kıyak, 1990b; Özsaraç, 2004; Önder et al., 2006; Dursun, 2011; Yıldırım et al., 2011; Fent & Dursun, 2019; Zengin & Dursun, 2019; Bolu, 2020; Koçakoğlu, 2020; Bulak Korkmaz & Yıldırım, 2021). This species was found on *Cirsium* sp. and it is reported for the first time from Çorum province in the study.

***Coreus* Fabricius, 1794**
***Coreus marginatus* (Linnaeus, 1758)**

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

Material examined: Çorum, Center, 27.06.2020, 1♀, 1♂; 19.07.2020, 2♀♀; 17.08.2020, 1♂; 18.08.2020, 2♀♀; **Çatak**, 12.06.2021, 5♀♀, 7♂♂; 03.07.2021, 1♀; Kıvırcık, 26.07.2020, 2♀♀, 1♂; **Bayat,** 19.07.2020, 2♀♀, 2♂♂; **Dodurga,** Berkköy, 18.09.2020, 1♀, 1♂; **İskilip,** Seyirtepe, 11.07.2020, 4♀♀; **Kargı,** Hacıhamza, 02.10.2021, 1♀, 1♂; 26.06.2021, 1♀, 3♂♂; Uzunyurt, 19.06.2021, 3♀♀, 4♂♂; Karapürçek, 02.10.2021, 2♀♀; **Mecitözü,** Elvançelebi, 30.07.2020, 2♀♀, 2♂♂; Hıdırlık, 09.10.2021, 2♀♀, 3♂♂; 09.10.2021, 4♀♀, 2♂♂; **Oğuzlar,** Obruk Barajı, 28.09.2020, 1♀; **Ortaköy,** İncesu; 26.07.2020, 1♀; Oruçpınar, 26.07.2020, 1♂; Mollahasan, 26.07.2020, 1♀, 1♂; **Osmancık,** 25.05.2019, 1♀; Ardıç, 02.10.2021, 1♀; Akören Plateau, 18.06.2020, 1♂; Yaylabaşı, 04.08.2020, 2♀♀, 3♂♂; 04.05.2020, 1♂; Öbektaş Platau, 24.07.2021, 1♀; **Sungurlu,** Karakaya, 15.07.2020, 1♀; Koparan, 15.07.2020, 1♀, 1♂; **Uğurludağ,** 10.07.2021,1♀.

Comments: This Holomediterranean species is frequently and widely distributed in all the regions of Turkey according to the available records (Hoberlandt, 1955; Önder et al., 2006; Yıldırım et al., 2011; Baş, 2013; Küçükbasmacı & Kıyak, 2015; Fent &Dursun, 2019; Kaçar, 2019; Zengin & Dursun, 2019; Bulak Korkmaz & Yıldırım, 2021; Kıyak & Baş, 2021). This species was found on *Rumex* sp.

***Enoplops* Amyot & Serville, 1843**

***Enoplops disciger* (Kolenati, 1845)**

Material examined: **Osmancık,** 25.05.2019, 1♀; **Ortaköy,** Fındıklı, 26.07.2020, 1♂.

Comments: This Pontomediterranean species is commonly and widely distributed in Turkey according to available records (Horváth, 1901; Kiritshenko, 1918; 1924; Hoberlandt, 1955; Linnavuori, 1965; Moulet, 1995; Kıyak, 2000; Özsaraç & Kıyak, 2001; Özsaraç, 2004; Önder et al., 2006; Dursun & Fent, 2009; Dursun, 2011; Yıldırım et al., 2011; Zengin & Dursun, 2019). This species was found on *Echium* sp. and it is reported for the first time from Çorum province in the study.

***Spathocera* Stein, 1860**

***Spathocera lobata* (Herrich-Schaffer, 1840)**

Material examined: Çorum, Center, 06.06.2021, 1♀.

Comments: This Holomediterranean species is rarely encountered in Turkey according to available records (Önder et al., 2006; Yıldırım et al., 2013; Bayrakçı, 2011; Dursun, 2011). This species was recorded fort he first time from Çorum province in the sudy and it was found on *Rumex* sp.

***Syromastus* Berthold, 1827**

***Syromastus rhombeus* (Linnaeus, 1767)**

Material examined: Osmancık, 25.05.2019, 1♀; Akören Plateau, 18.04.2020, 1♀, 1♂; **İskilip,** Seyirtepe, 11.07.2020, 1♀.

Comments: This Holomediterranean species is common in Turkey accordint to evailable records (Horváth, 1883; 1901; Kiritshenko, 1918; 1924); Hoberlandt, 1955; Linnavuori, 1965; Tuatay et al., 1972; Kıyak, 1990a, b; Çağlar, 1992; Özsaraç, 2004; Önder et al., 2006; Dursun & Fent, 2009; Dursun, 2011; Fent & Dursun, 2019; Altınok & Muştu, 2019; Zengin & Dursun, 2019). This species was found on *Poa* sp.

***Gonocerus* Berthold, 1827**

***Gonocerus acuteangulatus* (Goeze, 1778)**

Material examined: **Çorum**, Center, 19.07.2020, 1♀, 1♂; Kıvırcık, 26.07.2020, 2♀♀, 1♂; **Laçin,** Yeşilgöl, 01.09.2019, 1♀; Kırkdilim, 01.09.2021, 1♂; **Osmancık,** 1♀; Yaylabaşı, 14.07.2019, 1♀; 04.05.2020, 1♀, 1♂; Akören Plateau, 18.04.2020, 1♀, 1♂.

Comments: This Holomediterranean species is commonly and widely distributed in

Anatolia according to available records (Horváth, 1883; Hoberlandt, 1955; Linnavuori, 1965; Tezcan & Önder, 1999; Tezcan & Önder, 1999; Özsaraç, 2004; Önder, et al. 2006; Dursun, 2011; Yıldırım et al. 2011; Küçükbasmacı & Kıyak, 2015; Zengin & Dursun, 2019; Bulak Korkmaz & Yıldırım, 2021; Çerçi & Özgen, 2021). This species was found on *Juniperus* sp. and it is reported for the first time from Çorum province in the study.

***Gonocerus juniperi* Herrich-Schaeffer, 1839**
Material examined: Dodurga, Berkköy, 18.09.2020, 1♀, 1♂; **Oğuzlar,** Obruk Barajı, 28.09.2020, 1♀; **Osmancık,** Akören Plateau, 18.04.2020, 1♂; Sarpınkavak, 19.10.2020, 1♂; Yaylabaşı, 14.07.2019**,** 1♀; 06.10.2020, 1♀, 1♂; 08.02.2020, 1♀, 1♂.
Comments: This Holomediterranean species is frequent and widely distributed in Anatolia and Turkish Thrace according to the available records (Horváth, 1883; Kiritshenko, 1918; Hoberlandt, 1955; Kıyak, 1993; Önder et al., 2006; Dursun & Fent, 2009; Dursun, 2011; Kıvan & Dirik, 2016; Özgen et al., 2018; Sert & Özdemir, 2019). It was found on *Juniperus* sp. and is reported for the first time from Çorum province in the study.

***Phyllomorpha* Laporte, 1833**
***Phyllomorpha laciniata* (Villers, 1789)**
Material examined: Bayat, 19.07.2020, 1♀, 1♂; Dodurga, Berkköy, 18.09.2020, 1♀, 1♂; Osmancık, Akören Plateau, 18.04.2020, 1♂; **Osmancık,** 25.05.2019, 1♀; **Ortaköy,** Fındıklı, 26.07.2020, 1♂; Sarpınkavak, 19.10.2020, 1♂; Yaylabaşı, 14.07.2019, 1♀.
Comments: *Phyllomorpha laciniata* (=*Phyllomorpha lacerata* Herrich-Schaeffer, 1835) is Holomediterranean species. It is frequent and widely distributed in Anatolia and Turkish Thrace according to the available records (Fahringer, 1922; Hoberlandt, 1955; Kıyak, 1990a; Kıyak, 1990b; Moulet, 1995; Özsaraç, 2004; Önder et al., 2006; Dursun & Fent, 2009; Dursun, 2011; Zengin & Dursun, 2019). This species was found under *Acantholimon* sp. and *Astragalus* sp. and is reported for the first time from Çorum province in the study.

Rhopalidae Amyot & Serville, 1843
Rhopalinae Amyot & Serville, 1843

***Brachycarenus* Fieber, 1860**
***Brachycarenus languidus* (Horváth, 1891)**
Material examined: Çorum, Center, 19.07.2020, 2♀♀, 1♂; Kıvırcık, 26.07.2020, 2♀♀, 2♂♂; **Laçin**, Yeşilgöl, 01.09.2019, 1♂, Kırkdilim, 01.09.2021, 1♂; **Osmancık,** 1♀, 1♂; Yaylabaşı, 14.07.2019, 2♂♂, 1♀; 04.05.2020, 1♀, 1♂.
Comments: This Irano-Turanian species is rare in Turkey according to available records (Horváth, 1891; Kiritshenko, 1918; Zengin & Dursun, 2019). This species is reported for the first time from Çorum province in the study and it was found on *Chenopodium* sp.

***Brachycarenus tigrinus* (Schilling, 1829)**
Material examined: Kargı, Karapürçek, 02.10.2021, 2♀♀.
Comments: This Holomediterranean species is widespread distributed and frequently found in Turkey (Puton & Noualhier, 1895; Horvath, 1901, 1905; Kiritshenko, 1918; Gadeau de Kerville, 1939; Tuatay et al., 1972; Pehlivan, 1981; Yıldırım et al., 2011; Dursun, 2009; Fent & Dursun, 2019; Zengin & Dursun, 2019; Kaçar, 2019; Bulak Korkmaz & Yıldırm, 2021). This species was found on *Chenopodium* sp.

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

***Corizus* Fallén, 1814**
***Corizus hyoscyami* (Linnaeus, 1758)**
Material examined: Alaca, 05.06.2021, 1♂; **Bayat,** 19.07.2020, 2♀♀, 1♂; **Osmancık,** 25.05.2019, 1♂; 23.04.2021, 1♂; 23.06.2021, 2♀♀; Yaylabaşı, 17.04.2020, 1♂, 1♀; Akören Plateau, 18.04.2020, 1♂, 1♀; **Sungurlu,** 16.10.2021, 1♂; **Uğurludağ,** 10.07.2021, 1♂.
Comments: This Holomediterranean species is widespread distributed and frequently found in Turkey. (Pehlivan, 1981; Yıldırım et al., 2011; Yücel & Kıvan, 2018; Fent & Dursun, 2019; Zengin & Dursun, 2019; Bolu, 2020; Çerçi & Özgen, 2021; Kıyak & Baş, 2021). This species has been found on the *Hypericum* sp. and *Onosma* sp. It is reported for the first time from Çorum province in this study.

***Liorhyssus* Stål, 1870**
***Liorhyssus hyalinus* (Fabricius, 1794)**
Material examined: **Çorum**, Center, 23.08.2021, 1♀, 1♂; **Kargı**, Karapürçek, 02.10.2021, 1♀; **Osmancık,** Yaylabaşı, 14.07.2019, 1♀.
Comments: This Holomediterranean and cosmopolitan species is widespread and frequently distributed in Turkey (Pehlivan, 1981; Özsaraç & Kıyak, 2001; Önder et al., 2006; Dursun, 2009; Yıldırım et al., 2011; Matocq et al., 2014; Altınok & Muştu, 2019; Fent & Dursun, 2019; Dursun ve Zengin, 2019; Bulak Korkmaz & Yıldırm, 2021). This species is new record for the Heteroptera fauna of Çorum province and it was found on the *Poa* sp.

***Maccevethus* Dallas, 1852**
***Maccevethus corcicus corsicus* Signoret, 1862**
Material examined: Çorum, Center, 18.10.2020, 1♀; **Sungurlu,** 30.10.2021, 1♀.
Comments: The distribution of this Ponto-Mediterranean species is common in the Turkey. (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Fent & Dursun, 2019; Altınok & Muştu, 2019; Zengin & Dursun, 2019; Bulak Korkmaz & Yıldırm, 2021). In the study, this subspecies was recorded for the first time from Çorum. It has been found on the *Poa* sp.

***Maccevethus errans caucasicus* (Kolenati, 1845)**
Material examined: Sungurlu, 16.10.2021, 1♂.
Comments: This Ponto-Mediterranean subspecies was recorded on the *Erodium* sp. from Çorum for the first time in the study. It is widespread and frequently distributed in Turkey (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Altınok & Muştu, 2019; Zengin & Dursun, 2019; Bolu, 2020; Çerçi & Özgen, 2021; Kıyak & Baş, 2021).

***Rhopalus* Schilling, 1827**
***Rhopalus parumpunctatus* Schilling, 1829**
Material examined: Çorum, Center, 19.07.2020, 3♀♀, 2♂♂; 06.06.2021, 2♀♀, 1♂; **Kargı,** Karapürçek, 02.10.2021, 2♀♀; **Osmancık,** Ardıç, 02.10.2021, 2♀♀; Yaylabaşı, 17.04.2020, 1♀; Akören Plateau,, 18.04.2020, 1♀.
Comments: This Holomediterranean species was recorded on the *Alnus* sp., *Artemisia* sp., and *Geranium* sp. and from Çorum for the first time in the study. It is widespread and frequently distributed in Turkey (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Yıldırım et al., 2011; Matocq et al., 2014; Fent & Dursun, 2019; Fent & Dursun, 2019; Zengin & Dursun, 2019; Altınok & Muştu, 2019).

***Rhopalus subrufus* (Gmelin, 1790)**
Material examined: Kargı, Başköy, 26.06.2021,1♀, 1♂.

Comments: This Holomediterranean species was recorded from Çorum for the first time in the study. It is widespread and frequently distributed in Turkey (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Uygun & Yiğit, 1982; Yıldırım et al., 2013; Beyaz & Tezcan, 2002; Fent & Dursun, 2019; Kıyak & Baş, 2021; Sarı & Yıldırım, 2021). It was found on the *Poa* sp.

***Stictopleurus* Stål, 1872**
***Stictopleurus abutilon* (Rossi, 1790)**
Material examined: Çorum, Center, 18.08.2020, 1♀, 2♂♂; 06.06.2021, 1♀.
Comments: In the study, this Holomediterranean species was recorded for the first time from Çorum. It was found on the *Achillea* sp. and *Artemisia* sp. It is widespread and frequently distributed in Turkey (Puton, 1892; Horvath, 1901; Fahringer, 1922; Gadeau de Kerville, 1939; Tuatay et al., 1972; Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Yıldırım et al., 2011; Matocq et al.,, 2014; Fent & Dursun, 2019; Zengin & Dursun, 2019; Bolu, 2020; Bulak Korkmaz & Yıldırım, 2021).

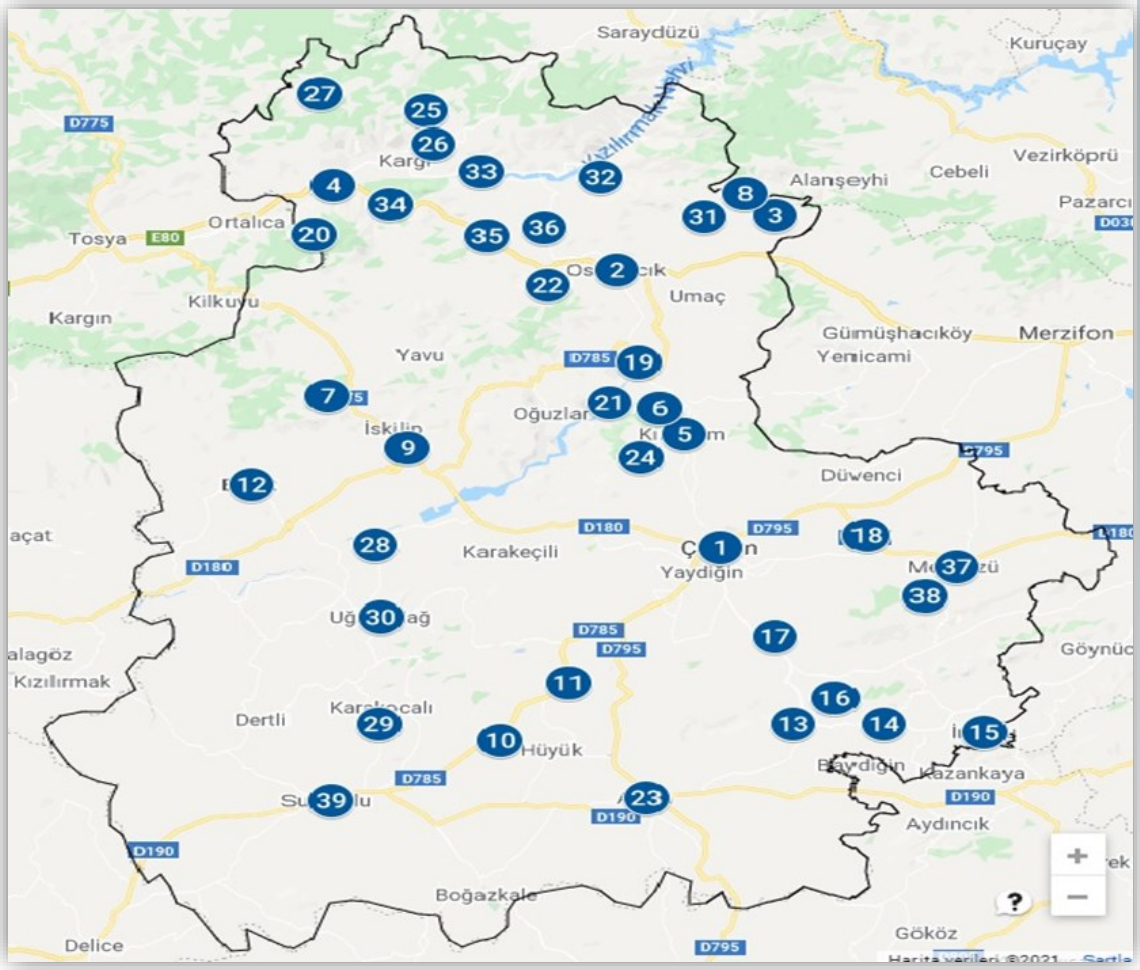
***Chorosoma* Curtis, 1830**
***Chorosoma schillingii* (Schilling, 1829)**
Material examined: Çorum, Center, 06.06.2021, 2♀♀, 2♂♂; Dodurga, Berkköy, 18.09.2020, 2♀♀, 1♂; **Osmancık,** Akören Plateau, 18.04.2020, 2♀♀, 3♂♂; 25.05.2019, 3♀♀, 4♂♂; Ortaköy, Fındıklı, 26.07.2020, 1♀, 2♂♂; Sarpınkavak, 19.10.2020, 1♀ 1♂.
Comments: This Holomediterranean species is widespread and frequently distributed in Turkey and it was recorded for the first time from Çorum province in this study (Horvath, 1894; 1905; Puton et Noualhier, 1895; Kiritshenko, 1918; Fahringer, 1922; Hoberlandt,1955; Pehlivan, 1981; Dursun, 2009; Yıldırım et al., 2013; Matocq et al., 2014; Fent & Dursun, 2019; Zengin & Dursun, 2019). This species has been found on the *Poa* sp.

Stenocephalidae Dallas, 1852
***Dicranocephalus* Hahn, 1826**
***Dicranocephalus agilis* (Scopoli, 1763)**
Material examined: Çorum, Center, 27.07.2021, 2♂♂; **Osmancık,** Akören Plateau, 18.04.2020, 1♀, 1♂; **Kargı,** Kargı Plateau, 19.06.2021, 1♀, 1♂.
Comments: This Holomediterranean species is widespread distributed and frequently found in Turkey (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Fent & Dursun, 2019; Zengin & Dursun, 2019). The finding of the species is the first record for Çorum province and it has been found on *Euphorbia* sp.

***Dicranocephalus albipes* (Fabricius, 1781)**
Material examined: Bayat, 19.07.2020, 2♀♀; **Kargı,** Kargı Plateau, 19.06.2021, 2♀♀, 3♂♂; Kargı Tatil Köyü, 26.06.2021, 6♀♀, 4♂♂; **Osmancık,** Ardıç, 02.10.2021, 1♀; Öbektaş Plateau, 24.07.2021, 1♀; **Sungurlu,** Kertme, 10.07.2021, 4♀♀, 3♂♂.
Comments: The present record of this Holomediterranean species is the first time for the Heteroptera fauna of Çorum province. It has been found on *Euphorbia* sp. This species is widespread distributed and frequently found in Turkey (Pehlivan, 1981; Önder et al., 2006; Dursun, 2009; Küçükbasmacı & Kıyak, 2015; Fent & Dursun, 2019).

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

Figure 1. The area of study in Çorum (from google earth).



CONCLUSION AND DISCUSSION

In this study, as a result of the identification of the material collected from 39 different localities in around Çorum province between 2019 and 2021 revealed 3 species belonging to 2 genera of the Alydidae family, 13 species belonging to 10 genera of the Coreidae family, 10 species belonging to 7 genera of the Rhopalidae family and 2 species belonging to 1 genera of the Stenocephalidae family. The total 28 species belonging to 20 genera of the superfamily Coreoidea were reported in Çorum province. Of them, 23 species are new records for the Coreoidea fauna of Çorum province.

The species *Ceraleptus gracilicornis*, *Coriomeris affinis*, *Centrocoris variegatus*, *Spathocera lobata* from the family Coreidae and *Brachycarenus tigrinus*, *Maccevethus errans caucasicus* from the family Rhopalidae found at only in one locality in the research area too. Although of those species *C. affinis, C. variegatus, B. tigrinus* and *M. errans caucasicus* are widespread reported and frequently founded in Turkey, the species were found rarely in research area. Among the species of superfamily Coreoidea recorded in the surrounding of Çorum; *A. calcaratus, C. lateralis, C. marginatus, G. acuteangulatus, G. juniperi, P. laciniata, C. hyoscyami, R. parumpunctatus, C. schillingii, D. albipes* and the invasive alien species *L. occidentalis* are widespread distributed and frequently found in Turkey and also in our present study area.

In the present study, 1 species origin of Euro-Siberian, 20 species origin of

Table 1.The plant relationships of Coreoidea species from Çorum province

Family	Species	Origin	Host Plant
Alydidae Amyot & Serville, 1843	Alydus calcaratus (Linnaeus, 1758)	Holomediterranean	Astragalus sp. (Fabaceae)
	Camptopus lateralis (Germar, 1817)	Holomediterranean	Chrysantemum sp. (Asteraceae) Rosa sp.,(Rosacae) Rumex sp. (Polygonaceae)
	Camptopus tragacanthae (Kolenati, 1845)	Irano-Turanian	Astragalus sp. (Fabaceae)
Coreidae Leach, 1815	Ceraleptus gracilicornis (Herrich-Schaeffer, 1835)	Holomediterranean	Trifolium sp. (Fabaceae)
	Coriomeris affinis (Herrich-Schaeffer, 1839)	Mediterranean	Pinus sp. (Pinaceae)
	Coriomeris denticulatus (Scopoli, 1763)	Euro-Siberian	Lamium sp. (Lamiaceae)
	Leptoglossus occidentalis Heidemann, 1910	Neactic region	Pinus sp. (Pinaceae)
	Centrocoris spiniger (Fabricius, 1781)	Holomediterranean	Cirsium sp. (Asteraceae)
	Centrocoris variegatus Kolenati, 1845	Holomediterranean	Cirsium sp. (Asteraceae)
	Coreus marginatus (Linnaeus, 1758)	Holomediterranean	Rumex sp. (Polygonaceae)
	Enoplops disciger (Kolenati, 1845)	Pontomediterranean	Echium sp. (Boraginaceae)
	Spathocera lobata (Herrich-Schaffer, 1840)	Holomediterranean	Rumex sp. (Polygonaceae)
	Syromastus rhombeus (Linnaeus, 1767)	Holomediterranean	Poa sp. (Poaceae)
	Gonocerus acuteangulatus (Goeze, 1778)	Holomediterranean	Juniperus sp. (Cupressaceae)
	Gonocerus juniperi Herrich-Schaeffer, 1839	Holomediterranean	Juniperus sp. (Cupressaceae)
	Phyllomorpha laciniata (Villers, 1789)	Holomediterranean	Acantholimon sp. (Plumbaginaceae) Astragalus sp. (Fabaceae)
Rhopalidae Amyot&Serville, 1843	Brachycarenus languidus (Horváth, 1891)	Irano-Turanian	Chenopodium sp. (Chenopodiaceae)
	Brachycarenus tigrinus (Schilling, 1829)	Holomediterranean	Chenopodium sp. (Chenopodiaceae)
	Corizus hyoscyami (Linnaeus, 1758)	Holomediterranean	Hypericum sp. (Hypericaceae) Onosma sp. (Boraginaceae)
	Liorhyssus hyalinus (Fabricius, 1794)	Holomediterranean	Poa sp. (Poaceae)
	Maccevethus corcicus corsicus Signoret, 1862	Pontomediterranean	Poa sp. (Poaceae)
	Maccevethus errans caucasicus (Kolenati, 1845)	Pontomediterranean	Erodium sp. (Geraniaceae)
	Rhopalus parumpunctatus Schilling, 1829	Holomediterranean	Alnus sp., (Betulaceae) Artemisia sp., (Asteraceae) Geranium sp. (Geraniaceae)
	Rhopalus subrufus (Gmelin, 1790)	Holomediterranean	Poa sp. (Poaceae)
	Stictopleurus abutilon (Rossi, 1790)	Holomediterranean	Achillea sp., Artemisia sp. (Asteraceae)
	Chorosoma schillingii (Schilling, 1829)	Holomediterranean	Poa sp. (Poaceae)
Stenocephalidae Dallas, 1852	Dicranocephalus agilis (Scopoli, 1763)	Holomediterranean	Euphorbia sp. (Euphorbiaceae)
	Dicranocephalus albipes (Fabricius, 1781	Holomediterranean	Euphorbia sp. (Euphorbiaceae)

Holomediterranean, 2 species origin of Irano-Turanian, 1 species origin of Mediterranean, 3 species origin of Pontomediterranean, and 1 species origin of Nearctic region (cosmopolitan) have been recorded from Çorum. Holomediterranean species are a very common and abundant in the surroundings of Çorum.

J.Het.Turk., 3(2), Nov 2021 (eISSN 2687-3249)

As a result of our observations in the field, a total of 21 taxon at genus level from 15 plant families were identified in relation to Coreoidea species. When take into account the preferences of Coreoidea species in these families, 5 species were associated with Asteraceae and Poaceae, 4 species with Fabaceae, 3 species with Polygonaceae, 2 species with Boraginaceae, Chenopodiaceae, Cupressaceae, Euphorbiaceae, Geraniaceae and Pinaceae, 1 species with Betulaceae, Hypericaceae, Plumbaginaceae and Rosacae (Table.1).

Many microclimate areas is very important for faunal component. The geographical location of Çorum is beetwen central Antolia and central Black sea region. There are also microclimate areas in Çorum. Because of its location, Çorum is a dispersal corridor for different animal. With the present additional records were contributed to the distribution of the families Alydidae, Coreidae, Rhopalidae and Stenocephalidae, in Turkey the determination of biodiversity of this families in the surroundings of Çorum.

REFERENCES

Altınok, M., Muştu, M., 2019, Insect Fauna Found on Vine Plant in Vineyards of Cappadocia Region. *Fresenius Environmental Bulletin,* 28, 5421-5429.

Arslangündoğdu, Z., Hızal, E., 2010, The Western Conifer Seed Bug, *Leptoglossus occidentalis* (Heidemann, 1910), Recorded in Turkey (Heteroptera: Coreidae). *Zoology in the Middle East,* 50(1), 138-139.

Baş, A., 2013, Yahyalı (Kayseri) ve Çevresi Coreoidea (Heteroptera) Faunasının Araştırılması. Yayımlanmamış Yüksek Lisans Tezi, Gazi Üniversitesi Fen Bilimleri Enstitüsü, Ankara.

Beyaz, G., Tezcan, S., 2002, Kültür Kekiği (*Origanum* spp.)(Lamiaceae)' ndeki Heteroptera Takımına Bağlı Böcek Faunasının Belirlenmesi Üzerinde Çalışmalar. *Türkiye Entomoloji Dergisi*, 26(1), 3 -10.

Bolu, H., 2020, Southeastern Anatolia Region Insect Fauna II (Order Hemiptera I: Suborder Heteroptera II: Tingoidea, Reduvioidea, Aradoidea, Coreoidea, Lygaeoidea) of Turkey. *Munis Entomology and Zoology,* 15 (1), 121-139.

Bulak Korkmaz, Y., Yıldırım, E., 2021, Contribution to the Knowledge of Alydidae, Coreidae, Rhopalidae and Pentatomidae (Hemiptera) Fauna from Fruıt Orchards in Iğdır Province of Turkey. *Munis Entomology and Zoology,* 16 (2), 947-952.

Çerçi, B., Özgen, İ., 2021, Contribution to the Knowledge of Heteroptera (Hemiptera) Fauna of Elazığ Province with a New Record for the Fauna of Turkey. *Journal of the Heteroptera of Turkey,* 3 (1), 50-75.

Çerçi, B., Özgen, İ., Dioli, P., 2016, Additional Faunistic Notes on Heteroptera (Hemiptera: Insecta) in East Anatolia (Turkey). *Journal of Entomology and Zoology Studies*, 6(1), 1225-1231.

Çerçi, B., Koçak, Ö., 2016, Contribution to the Knowledge of Heteroptera (Hemiptera) Fauna Of Turkey. *Journal of Insect Biodiversity,* 4(15), 1-18.

Dolling, W. R., 2006, Coreidae Leach, 1815. In: Aukema, B. ve Rieger, Ch. (eds.): *Catalogue of Heteroptera of the Palaearctic Region,* Vol. 5, Pentatomomorpha II. Amsterdam, The Netherlands Entomological Society, 43-101.

Dursun, A., 2009, Kelkit Vadisi (Türkiye) Alydidae, Rhopalidae ve Stenocephalidae (Heteroptera: Coreoidea) Türleri Üzerine Araştırmalar. *Turkish Journal of Entomology*, 33(3), 205-215.

Dursun, A., Fent, M., 2009, A Study on the Coreidae (Insecta: Heteroptera) of the Kelkit Valley, Turkey. *Acta Entomologica Serbica,* 14 (1), 13-25.

Dursun A., Kaçar G., Ulusoy, M. R., 2010, The Alydidae (Heteroptera: Coreoidea) of Turkey: A Key to the Genera, New Records and a Species Checklist. *Entomological News,* 121(5), 487-497.

Dursun, A., 2011, Additional Records of Coreidae (Hemiptera: Heteroptera) from Turkey, with Checklist. *Entomological News,* 122(2), 135-148.

Dursun, A., Fent, M., 2017, Type Localities of Heteroptera (Insecta: Hemiptera) from Turkey. *Zootaxa*, 4227(4), 451-494.

Fahringer, J., 1922, Eine Rhynchotenausbeute Aus Der Turkei, Kleinasien und Benachbarten Gebieten. *Konowia*, 1, 137-144.

Faúndez, E. I., 2016, The Coreoidea Leach, 1815 (Hemiptera: Heteroptera) of Magallanes Region: Checklist and Identification Key to the Species. *Anales Instituto Patagonia*, 44(1), 39-42.

Fent, M., Japoshvili, G., 2013, Isparta-Gölcük Tabiat Parkı Heteroptera (Insecta-Hemiptera) Faunası Bazı Nadir ve Özgün Türler ve Türkiye'nin Akdeniz Bölgesi için Yeni Kayıtlar. *Türkiye Entomoloji Bülteni,* 2 (3), 149-164.

Fent, M., Kment, P., 2011, First Record of the Invasive Western Conifer Seed Bug *Leptoglossus occidentalis* (Heteroptera: Coreidae) in Turkey. *North Western Journal of Zoology*, 7(1), 72-80.

Fent, M., Dursun, A., 2019, Contributions to Coreoidea (Hemiptera: Heteroptera) Fauna of Western Black Sea Region. *Munis Entomology and Zoology,* 14 (1), 217-223.

Gadeau de Kerville, H., 1939, *Voyage Oologique d' Henri Gadeau de Kerville en Asie Mineure* (Avril-Mai 1912). Paris: Paul de Chevalier, 148.

Hizal E., İnan, M., 2012, *Leptoglossus occidentalis* (Heidemann, 1910) is an Invasive Species. *Bartın Forest Journal,* 14(21), 56-61.

Hoberlandt, L., 1955, *Results of the Zoological Scientific Expedition of the National Museum in Praha to Turkey*. Acta Entomologica Museum Nationalis Pragae, 3, 162-263.

Horváth, G., 1883, Heteroptera Anatolica in Regione Brussae Collecta. *Editro Separata e Természetrajzi Füzetek*, 7, 21-30.

Horváth, G., 1897, Note Emitterologische I. Tavola Analotica Dele Specie Palearticha Tel Genre. *Stenocephalus* Latr. *Bull. Soc. Ent. Ital. Firenze,* 19, 1-4.

Horváth, G., 1891, Hemipteres Recueillis Dans L'Armenie Russe Avec la Description d' Especes et Varietes Nouvelles. *Revue d'Entomologie,* 10(3), 68-79.

Horváth, G., 1901, Hemiptères du Voyage de M. Martinez Escalera Dans L'Asie-Mineure. *Termeszetrajzi Füzetek,* 24, 469-485.

Kaçar, G., 2019, Seben (Bolu) Elma Bahçelerinde Belirlenen Zararlı, Yararlı Türler ve Biyoekolojileri. *Uluslararası Tarım ve Yaban Hayatı Bilimleri Dergisi*, 5 (2), 286-291

Kaya, G., 2015, Çorum İli Teke Böcekleri (Coleoptera: Cerambycidae) Üzerine Faunistik Araştırmalar. Yayınlanmamış Yüksek Lisans Tezi, Gazi Üniversitesi Fen Bilimleri Enstitüsü, Ankara.

Kıyak, S., 1990a, Studies on the Eco-faunistic and Systematic of the Terrestrial Heteropteran Adults in Binboğa Mountains (Kahramanmaraş-Kayseri). PhD Thesis, Gazi University Science Institute, Ankara [inTurkish with English abstract].

Kıyak, S., 1990b, Systematisch-Okologische Untersuchungen uber die Wanzen (Insecta-Heteroptera) aus dem Gebiet Hazar-See, Maden und Ergani (Prov. Elazığ). *Journal of Biology Faculty of Science and Arts Gazi University*, 1, 43-95.

Kıyak, S., 1990c, Systematisch-Oekologische Untersuchungen ueber die Wanzen (Insecta: Heteroptera) aus dem Gebiet Hazar-See, Maden und Ergani (Prov. Elazig)-II. *Journal of Biology Faculty of Science and Arts Gazi University,* 1, 97-144.

Kıyak, S., 1993, Über Terrestrische Wanzenarten Von Soğuksu National Park. *Priamus*, 6 (3/4), 131-156.

Kıyak, S., 2000, Systematisch-Okologische Untersuchungen uber die Wanzen (Insecta-Heteroptera) von Işık Gebirge-II. *Journal Institue Science and Technology Gazi University,* 13(2), 347-367.

Kıyak, S., 2016, On Heteroptera Fauna of Binboğa Mountains (Turkey, Kahramanmaraş, Kayseri). *Munis Entomology and Zoology,* 11(2), 441-449.

Kıyak, S., Akar, E., 2010, Faunistic Study of Terrestrial Heteroptera of Çaldağ (Ankara, Turkey). *Munis Entomology and Zoology,* 5, 1104-1118.

Kıyak, S., Baş, A., 2021, About Habitat Type Preferences of Some Coreoidea (Hemiptera: Heteroptera) Species of Yahyalı-Kayseri. *Journal of the Heteroptera of Turkey*, 3(1), 46-49.

Kıyak, S., Özsaraç, Ö., 2001, Cheklist of Aquatic and Semiaquatic Heteroptera of Turkey, with a New Record. *Journal of the Entomological Research Society*, 3, 17–32.

Kıyak, S., Özsaraç, Ö., Salur, A., 2004, Additional Notes on the Heteroptera Fauna of Nevşehir Province (Turkey). *Gazi Üniversitesi Journal of Science,* 17(1), 21-29.

Kıvan, M., Dirik, E., 2016, Edirne İli Buğday Ekiliş Tespit Edilen Heteroptera Türleri. *Türkiye Entomoloji Bülteni,* 6(4), 357-369.

Kiritshenko, A. N., 1918, Hemiptera-Heteroptera Faunae Caucasiae. Paris I. *Mém. Mus. Caucase,* ser. A, 6, 1-177.

Kiritshenko, A. N., 1924, Beitrag zur Hemipteren Fauna des Südlichen Armenian. *Wiener Entomologische Zeitung,* 41, 1-5.

Küçükbasmacı, İ., Kıyak, S., 2015, A Study on the Fauna of Heteroptera of Ilgaz Mountains (Kastamonu, Çankırı) With a New Record for Turkey. *Nevşehir Bilim ve Teknoloji Dergisi*, 4(1), 1-33.

Linnavuori, R., 1965, Studies on the South and Eastmediterranean Hemipterous Fauna. III. Hemipterological Observations *from Turkey. Acta Entomologica Fennica,* 21, 44-61.

Matocq, A., Pluot-Sigwalt, D., Özgen, I., 2014, Terrestrial Hemiptera (Heteroptera) Collected in South-East Anatolia (Diyarbakır, Mardin and Elazığ provinces) *(*Turkey): Second List. *Munis Entomology and Zoology,* 9(2), 884–930.

Moulet, P., 1995, Hémiptères Coreoidae (Coreidae, Rhopalidae, Aldidae) Pyrrhocoridae, Stenocephalidae Euro-méditerranéens. Faune de France. Vol. 81. Paris: *Fédération Française des Sociétés de Sciences Naturelles,* 336.

Oğuzoğlu, Ş., Avcı, M., 2020, Türkiye'de *Leptoglossus occidentalis* Heidemann, 1910 (Hemiptera: Coreidae) Üzerine Biyolojik Gözlemler, Parazitoitleri ve Yayılışına Katkılar. *Ormancılık Araştırma Dergisi*, 7(1), 9-21.

Önder, F., Karsavuran, Y., Tezcan, S., Fent, M., 2006, *Heteroptera (Insecta) Catalogue of Turkey.* İzmir: Meta Basım Matbaacılık Hizmetleri, 164.

Özgen, İ., Dioli, P. ve Çelik, V., 2017, New and Interesting Record of Western Conifer Seed Bug: *Leptoglossus occıdentalis* (Heidemann, 1910) (Heteroptera: Coreidae) in Eastern Turkey. *Journal of Entomology and Zoology Studies*, 5(5), 830-833.

Özgen, İ., Çerçi, B., Kaya, C., 2018, Heteroptera (Hemiptera) Species Determined in Pistachio Orchards of Siirt Province with a New Record for Fauna of Turkey: *Yotvata nergal* Linnavuori, 1993. *Cercetarı Agronomice In Moldova (Agronomıc Research In Moldavıa)* 4 (176),87-95.

Özsaraç, Ö., Kıyak, S., 2001, A Study On The Heteroptera Fauna Of Bozcaada (Çanakkale Province). *Turkish Journal of Zoology,* 25, 313-322.

Özsaraç, O., 2004, The Heteroptera Fauna of Cicek Mountain. PhD Thesis, Gazi University Science Institute, Ankara. 225.

Parlak, S., 2017, An Invasive Species: *Leptoglossus occidentalis* (Heidemann) How Does it Affect Forestry Activities. *Journal of Forestry Faculty,* 17(3), 531-542.

Pehlivan, E., 1981, *Türkiye Stenocephalidae, Rhopalidae ve Alydidae (Heteroptera: Coreoidea) Faunası Üzerinde Sistematik Araştırmalar.* İzmir: Ege Üniversitesi Ziraat Fakültesi Yayınları (No:410), 189.

Puton, A., 1892, Hemipteres Nouveaux ou peu Connues et Notes Diverses. (IV. Hemipteres d'Akbes, Region de 1'A-manus (Syrie septentrionale) Recolte par M. Delagrange). *Revue d'Entomologie*, 11, 34-36.

Puton, A., Noualhier, M., 1895, Supplement A'La Liste Des Hemipteres d'Akbes. Ibid, 14, 170-177.

Sarı, E. D., Yıldırım, E., 2021, Gülnar (Mersin) İlçesi Elma Ağaçlarındaki Zararlı ve Yararlı Arthropoda Türlerinin Tespiti ve Bazı Biyoekolojik Gözlemler. *KSÜ Tarım ve Doğa Dergisi*, 24(6), 1247-1262.

Seferoğlu, Ç., 2013, Konya İli Ereğli İlçesi Coreoidea Üstfamilyası Türlerinin Saptanması. Yayımlanmamış Yüksek Lisans Tezi, Gazi Üniversitesi Fen Bilimler Enstitüsü, Ankara.

Seidenstücker, G., 1958, Heteroptera aus Anatolien II. *Revue De La Faculte Des*

Sciences De L' Universite D'Istanbul, 23, 119-129.

Seidenstücker, G., 1960, Heteroptera aus Anatolien III. *İstanbul Üniversitesi Fen Fakültesi Mecmuası*, 25, 145-154.

Sert, O., Özdemir, S., 2019, Türkiye'nin Orta, Doğu ve Güneydoğu Anadolu Bölgelerinin Bazı İllerinde Böcek Faunası Üzerine Bir Araştırma. *Hacettepe Biyoloji ve Kimya Dergisi*, 47(1) , 33-49.

Stichel, W., 1960, *Illustrierte Bestimmugstabellen der Wanzen. Vol. II. Europa (Hemiptera-Heteroptera).* Berlin: 4(12-14), 354-441.

Tezcan, S., Önder, F., 1999, Heteropterous Insects Associated With Cherry Trees in Kemalpaşa District of Izmir, Turkey. *Ege Üniversitesi Ziraat Fakultesi Dergisi,* 36(1), 119-124.

Tuatay, N., Kalkandelen, A., Çağatay, Aysev, N., 1972, *Nebat Koruma Müzesi Böcek Katalogu (1961-1971).* Ankara: T.C. Tarım Bakanlığı Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü Yayınları Mesleki Kitaplar Serisi, 2-12.

Wagner, E., 1959, Beitrag zur Heteropterenfauna Anatoliens. *Zeitschrift für Angewandte Entomologie*, 44, 102-113.

Wagner, E., 1966, Eine Heteropterenausbeute aus der Turkei (Hemiptera, Heteroptera). *Bulletin des RecherchesAgronomiques de Gembloux*, 4(1), 647-654.

Yıldırım, E. Yazıcı, G., Linnavuori, R., 2011, Contribution to the Knowledge of Alydidae, Coreidae, Rhopalidae and Stenocephalidae (Coreoidea: Heteroptera: Hemiptera) Fauna of Turkey. *Linzer Biologische Beiträge,* 43(2), 1625-1639.

Yıldırım, E., Yazıcı, G., Moulet, P., 2013, Contribution to the Knowledge of the Gerridae, Coreoidea, Piesmatidae, Saldidae, Corixoidea, Nepoidea and Notonectidae (Hemiptera, Heteroptera) Fauna of Turkey. *Linzer Biologische Beiträge*, 45 (1), 995-1010.

Yiğit, A., Uygun, N., 1982, Adana, İçel ve Kahramanmaraş İlleri Elma Bahçelerinde Zararlı ve Yararlı Faunanın Saptanması Üzerinde Çalışmaları. Bitki Koruma Bülteni, 22(4).

Yücel, S. A., Kıvan, M., 2018, İstanbul Göztepe Parkı Gül Bahçesinde Bulunan Zararlı Hemiptera ve Hymenoptera Türleri. *Tekirdağ Ziraat Fakültesi Dergisi,* 15(2), 95-100.

Zengin, P., Dursun, A., 2019, A study on the Coreoidea (Hemiptera: Heteroptera) Fauna of Amasya Province, Turkey. *Acta Biologica Turcica,* 32(3), 160-167.

AUTHOR GUIDELINES

Aims & Scope

The *Journal of the Heteroptera of Turkey* is a biannual peer reviewed international journal that publishes original articles, review articles, and short communication on all aspects of Heteroptera.

The *Journal of the Heteroptera of Turkey* publishes qualified research articles on the systematics, taxonomy, faunistical and ecology of heteroptera suborder. The topic of the research may include a wide range of heteropteran fields. Detailed studies on systematics, morphology, ecology, and phenology of heteroptera, and the biological, ecological, and faunistic formation of heteroptera taxons.

In this Journal full-papers and short communications containing original researches on any aspect of heteropteran in palaearctic region and Turkey will be considered as publication.

The *Journal of the Heteroptera of Turkey* welcomes review articles in the field of heteropteran.

The *Journal of the Heteroptera of Turkey* also published short notes on heteropteran topics. Information of the heteropteran specialists and book reviews will also be published.

We would like to make an open invitation to all potential contributors. We have a fast publishing process to process and evaluate.

Taxonomic revisions and descriptions of individual species will be accepted especially if additional information is included on habitat preferences, behavior, phenology etc. Descriptions of single specimens are discouraged.

For submitted article there are restrictions on the subject, author, geographic area, and so on of any submission (palaearctic only). For our journal mission all fields of heteroptera studies are suitable.

All papers being peer-reviewed by two referees, and under rapid publication process.

Preparation of Manuscript

All manuscripts should be written in the Turkish or English languages to be published only in the Journal of the Heteroptera and should be prepared with Microsoft Word.

Manuscripts should be written on A4 (21 cm x 29.7 cm) paper with margins of at least 2 cm in width.

All pages should be numbered consecutively. Manuscripts should be organized in the following order: Title, abstract, brief introduction, materials and methods, results, discussion, acknowledgments, references, tables and figure legends.

Parts of the Manuscript should be:

Arrange manuscripts in this order: title; name(s), address(es) and e-mail address(es) of the corresponding author(s) who will receive and approve the page proofs (research articles only); keywords; text; acknowledgments; references; tables and figure legends.

Title: The title of the manuscript should be informative and clear, not exceed 15-20 words. Just under the title full name(s) of author(s); (surname(s) in capital letters; full address(es); e-mail address(es); if available, ORCID numbers for all authors, Corresponding Author contact information should be give (each on a separate line).

Abstract: The abstract should not exceed 250-300 words (maximum), should be one paragraph.

Keywords: For subject indexing, up to 6 topical keywords in English are required (for Turkish articles).

Text: Introduction, Materials and Methods, Results, Conclusion and Discussion, Acknowledgments, References, Figure and table legends.

Use italics for Scientific names of genera, species, and subspecific taxa.
Do not use italics for abbreviations such as “spp.”, “sp.”, “ssp.”, ”var.”, ”gen.nov.”, “sp.n.”, “ssp.nov.”, “stat.n.”, “comb.n.”, “s.l.”, “s. str.”, “et al.”, and names of taxa of rank higher than genus.
For faunistic research follow this order: Taxon name, Material examined, Habitat, Host plant(s), Distribution. Example:
Miridae Hahn, 1831
Deraeocoris rutilus (Herrich-Schaeffer, 1838)
Habitat: The specimens belonging to *D. rutilus* (H.,-S., 1838) were found on *Carduus pycnocephalus* subsp. *albidus* (Bieb) Kazmi.
Materials examined: 1 male, 24.6.1996 (Loc. 1), 1 female, 24.6.1996 (Loc.6).

Distribution in Turkey: The Aegean, the Marmara, and the Anatolia regions (18,10,8,13,29).
Distribution in the world: Israel, Sardinia, Syria, Cyprus, Poland, the Balkans, Russia, and Turkey (18,25).

References: References should be prepared according to "*The Guidelines to Authors*".

The complete reference list should appear alphabetically by name at the end of the paper. A sample of the most common entries in reference lists appears below. Please note that a DOI should be provided for all references where available.

References must be cited in the text as (Dursun, 2013), Fent & Dursun (2005) or Fent et al. (1997), or in a parenthesis (Dursun, 2013; Fent & Dursun, 2005; or Fent et al. ,1997).

Journal article: Abbreviate names of periodicals basically according to the World List of Scientific Periodicals, 4th Edition, Butterworths, London, 1964–1965. (If you are not certain about the correct abbreviation, give the journal's name in full).

Fent, M., Kment, P., Elipek-Çamur, B., Kırgız, T., 2011, Annotated catalogue of Enicocephalomorpha, Dipsocoromorpha, Nepomorpha, Gerromorpha and Leptopodomorpha (Hemiptera: Heteroptera) of Turkey with new records, *Zootaxa*, 2856:1-84.

Books: Alexi Popov, A., Grozeva, S., Simov,N., Tasheva, E., 2013, *Advances in Hemipterology*, PenSoft Publishers Ltd, 377 pp., Sofia, Bulgaria.

Article/Chapter in Book: Kerzhner, I. M., Jaczewski, T. L.,1964, *Order Hemiptera (Heteroptera) 851–1118pp. I*n: *Keys to the insects of the European USSR 1. (Ed. G. Y. Bei-Bienko).* Nauka, Moskva & Leningrad [in Russian; English translation, Israel Program for Scientific Translations, Jerusalem, 1967]. 1214 pp.

No Author Given: (USDA) U.S. Department of Agriculture. 2001. Title. USDA, Beltsville, MD. (IRRI) International Rice Research Institute. 2001. Title. IRRI, City, State or Country.

Proceedings: Šeat, J., Kaur, H., Gallé, R., Torma, A. 2018, The role of road verges as secoundary linear habitats for Forest steppe Heteroptera, *8th European Hemiptera Congress*, 24-29 Jun 2018, Zawiercie, Poland. Book of Abstracts, 61 p.

Theses/Dissertations: James, H., 2001, Thesis or dissertation title. M.S. thesis or Ph.D. dissertation, University of Pennsylvania, Philadelphia.

Özsaraç, Ö., 2004, Çiçekdağı (Kırşehir) Heteropterleri, Basılmamış Doktora Tezi, Gazi Üniversitesi Fen Bilimleri Enstitüsü, Ankara, 225 s.

Online Citations/ Websites: Rabitsch, W., 2005, Spezialpraktikum aquatische und semiaquatische Heteroptera; (Web page: http: homepage.univie.ac.at/wolfgang.rabitsch).(Date accessed: May 2010).

Using the DOI (Digital Object Identifier) Number: Nestel D., Papadopoulos N. T. & Miranda Chueca M. A. (2008). Current advances in the study of the ecology of fruit flies from Europe, Africa and the Middle East. *Journal of Applied Entomology*, DOI: 10.1111/j.1439-0418.2008.01378.x

Please note on the illustrations, figure, table, and photographs legends: Illustrations should be arranged into blocks or plates by the author(s). Figures should be provided electronically in either JPG or TIFF format. JPG images should be the highest resolution possible. TIFF images should be at 300 dpi resolution.

Morphological illustrations (if not schematic) and **photographs/** electron microscope micrographs should include scale bars. Photographs and electron microscope micrographs must be in JPEG file format (300 dpi).

Images pasted into Word become low-resolution and cannot be used in print.

Photographs should be high-contrast, black and white or color. Lettering should be typed and legible. All papers should be accompanied by information on the credited photographer or copyright holder. If the photographer or copyright holder is not an author on the paper, then permission must be granted by the copyright holder.

Tables should be numbered consecutively and include headings and explanations. References in the text to illustrations (schematic, photographs) and tables into parenthesis: e.g.(Fig.1) (Figs.1–4) (Table 1.) (Table 1., Figs.1-4). Morphological illustrations should be provided with scale bars.

Taxonomic papers in *JHT* must follow the *requirements below:* Follow all requirements of the current *International Code of Zoological Nomenclature* (4th edition 1999), and be followed the recommendations of the Code.

A holotype should always be designated for each newly described species-level taxon and at least holotypes should be deposited in public collections that provide long-term care and access for study (note that such deposition is mandatory for neotypes). For this reason, two particular recommendations (73A and 16C) should be observed in JHT.

In the Abstract must be listed new combinations, new status, new taxa, new synonyms, etc. in. The list of synonymized names must indicate their disposition. For newly should be described taxa included for all newly synonymized or combined names. Use “sp. n.”, “gen. n.” etc.. **Important note:** Descriptions based on single specimens are discouraged.

The standard order of sections for description a species is: “Diagnosis”, “Description”, “Material”, “Type locality”, “Etymology”, “Distribution”, “Biology”, and other comments if appropriate. Author(s) of species name must be provided when the scientific name of any animal species is first mentioned. (The year of publication is not compulsory. ıf you give it, then provide a full reference of this in the reference list.)

It is the *author’s responsibility* to know the group, both material and literature, well enough (preferably on a worldwide basis) to be able to ensure that all relevant taxa were taken into account and that any new taxa proposed have not already been described from elsewhere.

Accepted manuscripts are published online and in two issues at the end of May and December.