



## Contributions of Aphrophoridae (Hemiptera: Cicadomorpha) fauna of Sinop, Kastamonu and Black Sea Region of Türkiye

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### ABSTRACT

In this study, Aphrophoridae (Hemiptera:) specimens collected from Sinop and Kastamonu between 2016 May-2018 October were evaluated. Specimens were collected by sweeping net and a hand aspirator over the plants during the daytime. Nine species belonging to 4 genera were identified in the study area: *Aphrophora alni* (Fallén, 1805), *A. salina* (Goeze, 1778), *A. geruzei* Tanyeri & Zeybekoğlu, 2021, *Lepyronia coleoptrata* (Linnaeus, 1758), *Neophilaenus albipennis* (Fabricius, 1798), *N. campestris* (Fallén, 1805), *N. lineatus* (Linnaeus, 1758), *N. minor* (Kirschbaum, 1868), *Philaenus spumarius* (Linnaeus, 1758). Information provided covering distributional data of the species in Türkiye and worldwide, collection localities, and number of species were given. Of the identified species *Neophilaenus albipennis* is the first record for the Black Sea Region of Türkiye. General photographs of *N. albipennis* and *N. lineatus* and drawings of genital structures are given.

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## Sinop, Kastamonu ve Karadeniz Bölgesi (Türkiye) Aphrophoridae (Hemiptera: Cicadomorpha) faunasına katkılar

### ÖZET

Bu çalışmada 2016 Mayıs-2018 Ekim döneminde Sinop ve Kastamonu'dan toplanan Aphrophoridae (Hemiptera: Cicadomorpha) familyasına ait örnekler değerlendirilmiştir. Örnekler gün içerisinde bitkilerin üzerinden atrap ve aspiratör kullanılarak toplanmıştır. Çalışma alanında 4 cins'e ait 9 tür tespit edilmiştir: *Aphrophora alni* (Fallén, 1805), *A. salicina* (Goeze, 1778), *A. geruzei* Tanyeri & Zeybekoğlu, 2021, *Lepyronia coleoptrata* (Linnaeus, 1758), *Neophilaenus albipennis* (Fabricius, 1798), *N. campestris* (Fallén, 1805), *N. lineatus* (Linnaeus, 1758), *N. minor* (Kirschbaum, 1868), *Philaenus spumarius* (Linnaeus, 1758). Tespit edilen türlerin Türkiye'deki ve dünyadaki yayılışları, toplandıkları lokaliteler, örnek sayıları verilmiştir. Tespit edilen türlerden *Neophilaenus albipennis*, Türkiye'nin Karadeniz Bölgesi'nden ilk kez kaydedilmiştir. *N. albipennis* ve *N. lineatus*'un genel fotoğrafları ve genital yapılarına ait çizimler verilmiştir.

### Zooloji

### Araştırma Makalesi

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## INTRODUCTION

Among the Hemiptera, the suborder Cicadomorpha is a diverse group of varied sizes, which may reduce crop yield by feeding on plant fluid and weakening the terminal young branches (Mozaffarian, 2018). The Cercopoidea superfamily (Hemiptera: Cicadomorpha)

is classified into five families Cercopidae, Aphrophoridae, Clastopteridae, Machaerotidae and Epipygidae. The superfamily comprises approximately 3000 species that have been described to date worldwide. The species of the superfamily Cercopoidea is known as spittlebugs because it produces a foamy mass during the nymphal periods of their development

(Cryan & Svenson, 2010). They are called froghoppers since the adults have jumping ability.

Aphrophoridae spittlebugs are the most abundant and widespread xylem-sap feeder insects and they have been mentioned as pests with economic importance on rice, sugarcane, strawberry, alfalfa, perennial plants and some pasture plants etc (Mozaffarian & Wilson, 2015). The plant pathogenic *Xylella fastidiosa* is transmitted to plants by several xylem-sap feeding insects belonging to the Cicadomorpha suborder, mainly the Aphrophoridae family and causes diseases such as Olive quick decline syndrome (Smaili et al., 2022). In this family member, *Aphrophora alni* is a potential vector for *Candidatus phytoplasma*. *P. spumarius* is the vector of *Candidatus phytoplasma* and *Xylella fastidiosa*. The genera *Neophilaenus* and *Aphrophora* are also considered potential vectors of *Xylella fastidiosa* (EPPO, 2017; Germain, 2016). Demir & Unver (2019) drew attention to the Cicadomorpha species which can be potential vectors in hazelnuts in Türkiye and *A. alni*, *P. spumarius* listed in that study. That's why local records are considered to be very important.

The first studies of this family in Türkiye are Fahringer (1922), Dlabola (1957) and Metcalf (1962). Lodos & Kalkandelen (1981) evaluated the materials collected from field and museum and listed 4 new records and species of this family from Türkiye. In the following years, limited local records were given. In Türkiye, research on Aphrophorid spittlebugs was focused on polymorphism, mainly the meadow spittlebug *P. spumarius* (Yurtsever, 2001; Yurtsever et al., 2010).

According to Önder et al. (2011), Türkiye Aphrophoridae fauna consists of 14 species belonging to 6 genera. This number has increased to 15 with new records and species reported from our country in subsequent studies (Tanyeri & Zeybekoğlu, 2021).

Although they are an economically and ecologically important insect group, it has been observed that there is no comprehensive study in this region. In this study, it was aimed to determine the Aphrophoridae species in Sinop and Kastamonu in the Western Black Sea region of Türkiye.

## MATERIAL and METHOD

The material was collected from Sinop and Kastamonu provinces (North Türkiye) between May 2016 and October 2018 periodically during the daytime. In the sampling of the adults, a standard sweeping net and a hand aspirator were used. The specimens were prepared according to standard insect preparation. The genital capsule of males and pregenital sternite VII in females were separated from the body with the help of a dissecting needle. Features of the genital structures were examined and they were identified by the first author using previously published articles

(Emeljanov, 1967; Holzinger et al., 2003; Mozaffarian & Wilson, 2015). An overview photograph of dry samples was taken with a Canon EOS 70D model camera connected to a Zeiss Stem 2000-C stereomicroscope. The shapes of genital structures were drawn using Zeiss discovery V-20 stereomicroscope attached drawing attachment.

The material is deposited in Sinop University, Faculty of Arts and Sciences, Department of Biology, Invertebrata Laboratory.

## RESULTS and DISCUSSION

**Genus: *Aphrophora* Germar, 1821**

***Aphrophora alni* (Fallén, 1805)**

**Examined material:**

**Kastamonu:** 22.07.2017: 41° 38' 14.7" N 33° 17' 28.6" E (1 ♂), 41° 37' 14.1" N 33° 07' 08.8" E (4 ♀♀) leg. RT; 06.08.2017: 41° 47' 35.8" N 34° 04' 53.2" E (4 ♂♂, 4 ♀♀) leg. RT&ÜZ; 15.06.2017: 41° 58' 11.3" N 34° 05' 25.4" E (2 ♂♂) leg. RT; 16.06.2017: 41° 39' 33.3" N 33° 08' 02" E (2 ♂♂, 2 ♀♀) leg. RT

**Sinop:** 09.06.2017: 41° 47' 06.0" N 35° 11' 08.4" E (2 ♂♂) leg. RT; 08.06.2017: 42° 00' 52.1" N 34° 58' 24.4" E (3 ♂♂, 3 ♀♀), 41° 59' 41.7" N 34° 54' 00.2" E (4 ♂♂, 4 ♀♀), 41° 57' 15.6" N 34° 48' 05.3" E (5 ♂♂, 4 ♀♀) leg. RT; 13.06.2017: 41° 45' 40.7" N 34° 58' 32.5" E (14 ♂♂, 11 ♀♀), 41° 35' 50.1" N 34° 51' 04.6" E (1 ♀) leg. RT; 30.07.2017: 41° 41' 58.1" N 34° 35' 42.1" E (2 ♂♂, 1 ♀), 41° 58' 02.4" N 34° 50' 32.3" E (1 ♂, 4 ♀♀) leg. RT; 01.08.2017: 41° 52' 23.8" N 34° 51' 57.0" E (2 ♂♂) leg. RT&ÜZ; 17.08.2017: 41° 46' 17.8" N 35° 12' 20.4" E (1 ♂, 2 ♀♀) leg. RT&ÜZ

**Distribution in Türkiye:** Adana, Afyon, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bitlis, Bolu, Çanakkale, Çorum, Diyarbakır, Erzincan, Erzurum, Giresun, İstanbul, İzmir, Kayseri, Kırklareli, Konya, Kütahya, Mardin, Manisa, Muğla, Ordu, Rize, Samsun, Sinop, Tekirdağ, Trabzon, Yozgat (Önder et al., 2011; Demir, 2019).

**Distribution in the world:** Austria, Belgium, Bosnia and Herzegovina, Britain, Bulgaria, Crete Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece Hungary, Ireland, Italy, Netherlands, Spain, Sweden, Switzerland, Near East, North Africa, Latvia, Lithuania, Macedonia, Malta, Moldova, Norway, Poland, Portugal, Romania, Russia (Southern Europe, Northern Europe, Central Europe), Sardinia, Sicily, Slovakia, Slovenia, West Palearctic, Yugoslavia (Anonymous, 2021)

***Aphrophora salicina* (Goeze, 1778)**

**Examined material:**

**Kastamonu:** 20.07.2017: 41° 14' 15.1" N 33° 21' 57.0" E (15 ♂♂, 13 ♀♀) leg. RT

**Sinop:** 13.06.2017: 41° 36' 02.1" N 34° 51' 02.4" E (23

♂♂, 6 ♀♀) leg.RT

**Distribution in Türkiye:** Balıkesir, Çanakkale, Elazığ, Giresun, Gümüşhane, Kırklareli, Konya, Kütahya (Önder et al., 2011; Özgen et al., 2018; Demir, 2019)

**Distribution in the world:** Albania, Austria, Belgium, Britain I, Bulgaria, Central European Russia, Croatia, Czech Republic, Danish, East Palearctic, Estonia, French, Germany, Greek, Hungary, Ireland, Italian, Latvia, Lithuania, Moldova, Near East, North European Russia, Norwegian, Poland, Portuguese, Romania, Sardinia, Slovakia, Slovenia, South European Russia, Spanish, Sweden, Switzerland, The Netherlands, Ukraine, Vatican City (Anonymous, 2021)

***Aphrophora geruzei* Tanyeri & Zeybekoğlu, 2021**

**Examined material:**

**Kastamonu:** 15.06.2017: 41° 58' 11.3" N 34° 05' 25.4" E (4 ♀♀, 8 ♂♂), 48.7 N 34° 09' 16.1" E (5 ♀♀, 7 ♂♂) leg.RT

**Sinop:** 08.06.2017: 41° 46' 20.0" N 35° 12' 18.4" E (10 ♀♀, 6 ♂♂) leg. RT; 09.07.2017: 41° 44' 25.7" N 35° 13' 49.7" E (8 ♀♀, 9 ♂♂) leg.RT

**Distribution in Türkiye:** Kastamonu, Sinop (Tanyeri & Zeybekoğlu, 2021)

**Distribution in the world:** Türkiye (Tanyeri & Zeybekoğlu, 2021)

**Genus: *Lepyronia* Amyot & Serville, 1843**

***Lepyronia coleoprata* (Linnaeus, 1758)**

**Examined material:**

**Kastamonu:** 20.07.2017: 41° 36' 53.5" N 33° 07' 09.1" E (1 ♂), 41° 38' 29.7" N 33° 07' 05.2" E (1 ♂), 41° 43' 09.5" N 33° 27' 23.5" E (1 ♂), 41° 39' 33.3" N 33° 08' 02" E (3 ♀♀), 41° 39' 20.1" N 33° 35' 14.2" E (1 ♀) leg.RT; 16.06.2017: 41° 18' 01.2" N 33° 31' 54.4" E (1 ♀) leg. RT; 22.07.2017: 41° 38' 48.7" N 33° 35' 49.2" E (2 ♂♂, 1 ♀), 41° 38' 14.7" N 33° 17' 28.6" E (7 ♂♂, 2 ♀♀), 41° 37' 14.1" N 33° 07' 08.8" E (1 ♂, 2 ♀♀), 41° 42' 29.9" N 33° 04' 34.6" E (1 ♂, 3 ♀♀) leg. RT

**Sinop:** 27.05.2017: 41° 44' 52.0" N 34° 57' 40.9" E (2 ♂♂), 41° 32' 45.1" N 34° 47' 0.0" E (5 ♂♂, 9 ♀♀) leg. RT; 12.08.2017: 41° 41' 58.1" N 34° 35' 42.1" E (2 ♀♀) leg. RT&ÜZ; 30.07.2017: 41° 36' 03.6" N 34° 51' 28.4" E (5 ♂♂) leg. RT

**Distribution in Türkiye:** Adana, Afyon, Ankara, Antalya, Artvin, Aydın, Bilecik, Bursa, Çanakkale, Çankırı, Çorum, Diyarbakır, Edirne, Elazığ, Erzincan, Gümüşhane, İzmir, Kahramanmaraş, Kars, Kahramanmaraş, Konya, Kütahya, Manisa, Mardin, Muğla, Muş, Sakarya, Samsun, Siirt, Tokat (Fahringer, 1922; Dlabola, 1957; Kartal et al., 1994; Önder et al., 2011; Özgen et al., 2018; Demir, 2019)

**Distribution in the world:** Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Central European

Russia, Croatia, Czech Republic, Danish, East Palearctic, Estonia, Finland, French, Germany, Greek, Hungary, Ireland, Italian, Latvia, Lithuania, Macedonia, Moldova, Near East, North Africa, North European Russia, Norwegian, Poland, Portuguese, Romania, Sardinia, Sicily, Slovakia, Slovenia, South European Russia, Spanish, Sweden, Switzerland, The Netherlands, Ukraine, Yugoslavia (Anonymous, 2021)

**Genus: *Neophilaenus* (Haupt, 1935)**

***Neophilaenus albiguttatus* (Fabricius, 1798)**

**(Figures 1,2)**

**Examined material:**

**Kastamonu:** 06.08.2017: 41° 55' 57.5" N 34° 11' 13.1" E (3 ♂♂, 4 ♀♀) leg. RT&ÜZ

**Sinop:** 30.07.2017: 41° 41' 58.1" N 34° 35' 42.1" E (1 ♂) leg.RT

**Distribution in Türkiye:** Ankara, Kırklareli (Demir, 2006; Önder et al., 2011)

**Distribution in the world:** Europe, North Africa, Eastern Palearctic (Anonymous, 2021)

***Neophilaenus campestris* (Fallén, 1805)**

**(Figure 3,4)**

**Examined material:**

**Kastamonu:** 14.06.2017: 41° 15' 12.2" N 33° 59' 53.8" E (4 ♂♂, 3 ♀♀) leg. RT; 16.06.2017: 41° 42' 09.1" N 33° 26' 41.9" E (2 ♂♂, 3 ♀♀) leg. RT; 20.07.2017: 41° 13' 21.9" N 33° 25' 38.0" E (4 ♂♂, 2 ♀♀) leg. RT

**Sinop:** 27.05.2017: 41° 47' 23.9" N 35° 09' 26.9" E (1 ♂, 1 ♀) leg. RT; 08.06.2017: 41° 46' 20.0" N 35° 12' 18.4" E (1 ♂) leg. RT; 13.06.2017: 41° 33' 55.8" N 34° 48' 49.9" E (4 ♂♂, 3 ♀♀) leg. RT; 12.08.2017: 41° 25' 13.1" N 34° 58' 44.2" E (4 ♂♂, 3 ♀♀) leg. RT&ÜZ

**Distribution in Türkiye:** Adana, Adıyaman, Afyon, Ankara, Antalya, Artvin, Bitlis, Bursa, Çanakkale, Eskişehir, Elazığ, Giresun, Hatay, İstanbul, İzmir, Kırklareli, Konya, Kütahya, Manisa, Muğla, Nevşehir, Samsun, Sinop, Siirt, Trabzon, Van (Lodos & Kalkandelen, 1981; Önder et al., 2011; Özgen et al., 2018; Demir, 2019)

**Distribution in the world:** Austria, Bulgaria, Czech Republic, East Palearctic, Estonia, France, Germany, Greece, Hungary, Italian, North Africa, Poland, Romania, Sardinia, Slovakia, Slovenia, Switzerland, Ukraine, Yugoslavia (Anonymous, 2021)

***Neophilaenus lineatus* (Linnaeus, 1758)**

**Examined material:**

**Sinop:** 14.06.2017: 41° 35' 17.4" N 34° 51' 01.3" E (1 ♂, 1 ♀) leg. RT

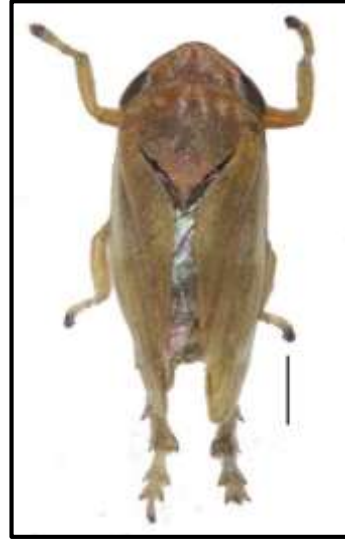
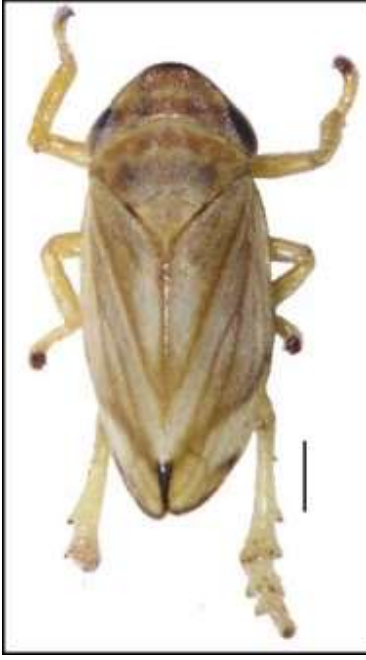


Figure 1. *Neophilaenus albipennis* (Fabricius, 1798) (♂)  
(Scale: 1 mm)

Figure 3. *Neophilaenus campestris* (Fallén, 1805), (♂)  
(Scale: 1 mm)

Şekil 1. *Neophilaenus albipennis* (Fabricius, 1798) (♂)  
(Ölçek: 1 mm)

Şekil 3. *Neophilaenus campestris* (Fallén, 1805), (♂)  
(Ölçek: 1 mm)

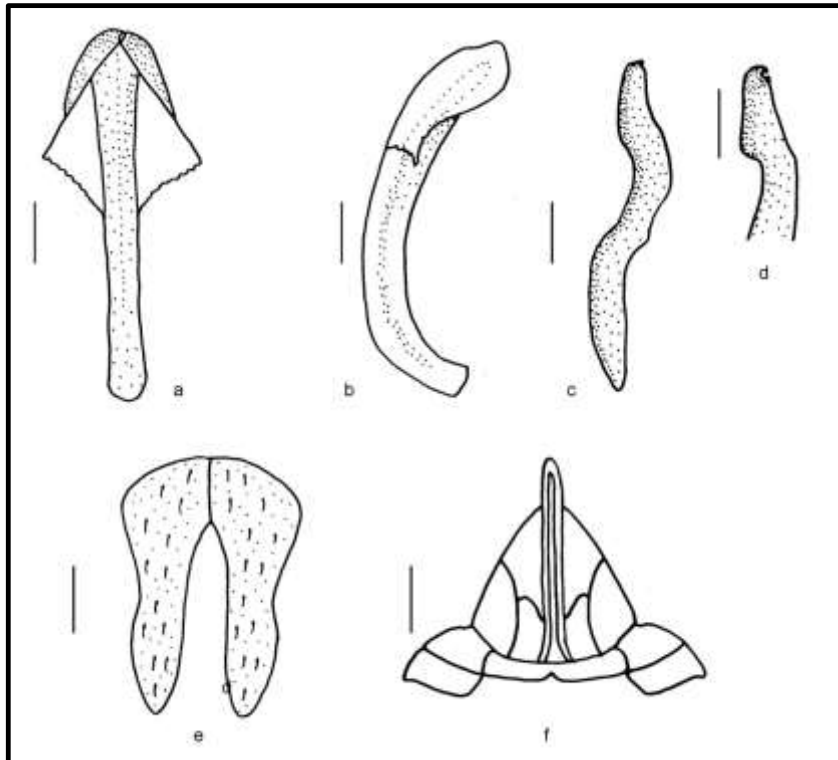


Figure 2. Genital structures of *Neophilaenus albipennis* an aedeagus from dorsal; b, aedeagus from lateral; c, stylus, d, the tip of the stylus; e, genital plates; f, the tip of the female abdomen from ventral (Scale a, b, c, d, e: 0,1 mm; f: 0,5 mm)

Şekil 2. *Neophilaenus albipennis*'te genital yapılar a) Aedeagus dorsal, b) Aedeagus lateral, c) Stilus, d) Stilusun uç kısmı, e) Genital plaklar, e) Dişi abdomenin uç kısmı (Ölçek a, b, c, d: 0,1 mm; e: 0,5 mm)



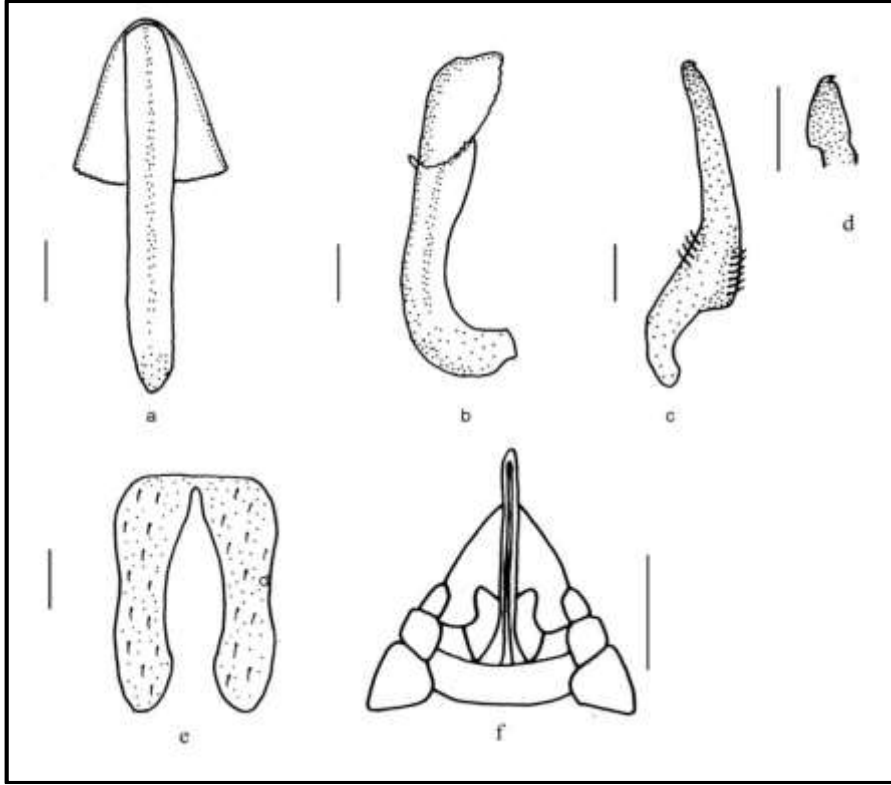


Figure 4. Genital structures of *Neophilaenus campestris* an aedeagus from dorsal; b, aedeagus from lateral; c, stylus, d, the tip of the stylus; e, genital plates; f, the tip of the female abdomen from ventral (Scale a, b, c, d, e: 0,1 mm; f: 0,5 mm)

Şekil 4. *Neophilaenus campestris*'te genital yapılar a) Aedeagus dorsal, b) Aedeagus lateral, c) Stylus, d) Stylusun uç kısmı, e) Genital plaklar, e) Dişi abdomenin uç kısmı (Ölçek a, b, c, d: 0,1 mm; e: 0,5 mm)

**Distribution in Türkiye:** Afyon, Ankara, Bursa, Erzincan, İstanbul, İzmir, Konya, Nevşehir, Van (Önder et al., 2011; Demir, 2019)

**Distribution in the world:** Albania, Austria, Balearic Islands, Belgium, Britain, Bulgaria, Central European Russia, Czech Republic, Danish, East Palearctic, Estonia, Finland, French, Germany, Greek, Hungary, Ireland, Italian, Latvia, Lithuania, Macedonia, Moldova, Near East, Nearctic Region, North Africa, North European Russia, Norwegian, Poland, Portuguese, Romania, Sardinia, Sicily, Slovakia, Slovenia, South European Russia, Spanish, Sweden, Switzerland, The Netherlands, Ukraine, Yugoslavia (Anonymous, 2021)

#### *Neophilaenus minor* (Kirschbaum, 1868)

##### Examined material:

**Sinop:** 13.06.2017: 41° 35' 17.4" N 34° 51' 01.3" E (1 ♂, 1 ♀) leg. RT

**Distribution in Türkiye:** Ankara, Antalya, Konya, Manisa, Mersin, Sivas (Dlabola, 1957; 1981; Önder et al., 2011, Demir, 2019)

**Distribution in the world:** Albania, Austria, Belgium, Bulgaria, Czech Republic, East Palearctic, Finland, France, Germany, Greece, Hungary, Italian, Latvia, Lithuania, Near East, Poland, Portuguese, Slovakia,

The Netherlands, Ukraine, Yugoslavia (Anonymous, 2021)

#### Genus: *Philaenus* Stal, 1864

#### *Philaenus spumarius* (Linnaeus, 1758)

##### Examined material:

**Kastamonu:** 15.06.2017: 41° 14' 03.9" N 34° 00' 45.7" E (5 ♂♂, 4 ♀♀) leg. RT; 16.06.2017: 41° 43' 09.5" N 33° 27' 23.8" E (2 ♂♂), 41° 42' 09.3" N 33° 26' 41.8" E (228 ♂♂, 80 ♀♀), 41° 40' 56.6" N 33° 23' 34.1" E (3 ♂♂), 41° 36' 53.5" N 33° 07' 09.1" E (3 ♂♂) leg. RT; 20.07.2017: 41° 18' 01.2" N 33° 31' 54.4" E (16 ♂♂, 13 ♀♀), 41° 14' 15.1" N 33° 21' 57.0" E (7 ♂♂, 4 ♀♀), 41° 13' 21.9" N 33° 25' 38.0" E (21 ♂♂, 20 ♀♀), 41° 38' 48.7" N 33° 35' 49.2" E (14 ♂♂, 4 ♀♀) leg. RT; 02.08.2018: 41° 37' 14.1" N 33° 07' 08.8" E (14 ♂♂, 25 ♀♀) leg. RT&ÜZ

**Sinop:** 31.05.2016: 41° 53' 07.9" N 34° 33' 52.6" E (4 ♂♂, 15 ♀♀) leg. RT; 07.06.2016: 42° 01' 21.5" N 35° 12' 06.7" E (16 ♂♂, 20 ♀♀), 42° 05' 41.9" N 34° 56' 50.8" E (3 ♂♂, 3 ♀♀) leg. RT; 06.06.2016: 42° 01' 03.9" N 34° 54' 03.7" E (2 ♂♂), 42° 03' 04.8" N 35° 02' 25.6" E (2 ♂♂, 1 ♀) leg. RT; 27.05.2017: 41° 52' 32.2" N 34° 59' 54.5" E (4 ♂♂, 6 ♀♀), 42° 00' 50.5" N 34° 56' 90.6" E (70 ♂♂, 12 ♀♀), 42° 01' 21.5" N 35° 12' 06.7" E (4 ♀♀) leg. RT; 01.06.2016: 41° 32' 45.1" N 34° 47' 0.01" E (10 ♂♂), 41° 48' 46.9" N 35° 10' 23.5" E (33 ♂♂, 34 ♀♀), 41° 50' 22.0" N 35° 03' 02.2" E (3 ♂♂, 7 ♀♀) leg. RT; 08.06.2017: 41° 46' 18" N 35° 11' 12"

E (118 ♂♂, 88 ♀♀), 41° 46' 20.0" N 35° 12' 18.4" E (35 ♂♂, 29 ♀♀), 41° 44' 25.7" N 35° 13' 49.7" E (3 ♂♂, 1 ♀), 41° 47' 24.4" N 35° 09' 27.4" E (18 ♂♂, 16 ♀♀), 41° 53' 21.8" N 35° 00' 52.0" E (21 ♂♂, 30 ♀♀), 42° 01' 21.6" N 35° 12' 06.8" E (49 ♂♂, 31 ♀♀); 01.06.2017: 41° 57' 15.6" N 34° 48' 05.3" E (133 ♂♂, 60 ♀♀) leg. RT; 09.06.2017: 41° 44' 21.9" N 35° 13' 53.1" E (23 ♂♂, 16 ♀♀) leg. RT; 01.08.2017: 42° 01' 21.5" N 35° 12' 06.7" E (3 ♂♂, 10 ♀♀); 12.08.2017: 41° 36' 03.5" N 34° 51' 28.3" E (3 ♀♀) leg. RT&ÜZ; 17.08.2017: 41° 46' 02.5" N 35° 12' 11.0" E (3 ♀♀) leg. RT&ÜZ

**Distribution in Türkiye:** Ağrı, Amasya, Ankara, Antalya, Artvin, Aydın, Balıkesir, Bilecik, Bitlis, Bolu, Bursa, Çanakkale, Elazığ, Erzincan, Erzurum, Eskişehir, Giresun, Gümüşhane, Hakkari, İstanbul, İzmir, Kars, Kırklareli, Kuzeydoğu Karadeniz Bölgesi, Kastamonu, Kocaeli, Konya, Kütahya, Malatya, Manisa, Mardin, Muğla, Ordu, Rize, Samsun, Siirt, Sinop, Tekirdağ, Trabzon, Tokat, Van (Dlabola, 1957; 1981; Lodos & Kalkandelen, 1981; Kartal et al., 1994 Önder et al., 2011; Tanyeri & Zeybekoğlu, 2018; Demir, 2019)

**Distribution in the world:** Afro-tropical Region, Albania, Australian Region, Austria, Azores Islands, Balearic Islands, Belgium, Bosnia and Herzegovina, Bulgaria, Canary Islands, Central Cyclades Is., European Russia, Channel Islands, Corsica, Croatia, Cyprus, Czech Republic, Danish, the Dodecanese Is., East Palearctic, Estonia, Finland, French, Germany, Gibraltar, Greek, Hungary, Ireland, Italian, Kriti, Latvia, Lithuania, Macedonia, Malta, Moldova, Near East, Nearctic Region, Neotropical Region, North Aegean Is., North Africa, North European Russia, Norwegian, Oriental Region, Poland, Portuguese, Romania, Sardinia, Sicily, Slovakia, Slovenia, South European Russia, Spanish, Sweden, Switzerland, The Netherlands, Ukraine, Yugoslavia (Anonymous, 2021).

During this study, it was found that 10 species were distributed in the provinces of Sinop and Kastamonu. These are; *Aphrophora alni*, *A. salicina*, *A. geruzei*, *Lepryonia coleoptrata*, *Neophilaenus albipennis*, *N. campestris*, *N. exclamationis*, *N. lineatus*, *N. minor* and *Philaenus spumarius*.

*Aphrophora* is the largest genus in the family Aphrophoridae. Three species were identified from the study area. Species included in the genus *Aphrophora* are similar to each other in terms of body structures. The ratio of the body parts to each other, the swelling of the frontoclypeus, and the prominence of the anterior wing veins differ in terms of colour and patterning. Male genital structure characteristics are quite different between species (Komatsu, 1997). In addition, it has been shown that the species identified from this study area differ in terms of host plants and are in a close relationship with the host plants. *A. alni* is a major species found in pastures. However, in Japan, it has also been detected on trees such as *Salix*

spp. and *Populus* spp. (Komatsu 1997). In the study area, samples were collected from pastures and were not found in the tree layer. Mozaffarian & Wilson (2015), reported that *A. salicina* has a host relationship with *Salix* spp. This species was also found on *Salix* spp. in the study area. *A. gauze* was collected from *Pinus* spp. *A. corticea* which was reported to be found in the region according to Önder et al., (2011), but was not found in this area. It should be clearly stated that the species *Aphrophora geruzei* Tanyeri & Zeybekoğlu, 2021, which was given in this study and which is essentially part of the Aphrophoridae section of the first author's PhD thesis, was separated from this study and evaluated in a previous study for a new species article.

The hook-like at the tip of the stylus is one of the important taxonomic characters in specimens belonging to the genus *Neophilaenus*. The body structure, wing patterning and genital structure of the examined specimens in the region are consistent with the definitions and drawings of Holzinger et al., (2003). *N. campestris* in terms of colour and patterning is very similar to typical phenotype of *Philaenus spumarius*. Although there are differences in body sizes, genital structures should be examined for the diagnosis of samples belonging to these two species. *N. lineatus* and *N. minor* were collected from the tree layer, while other taxa were collected from pastures and herbaceous vegetation.

*N. lineatus* and *N. minor* are characterized by a longitudinal black band on the lateral parts of the wings and are very similar to each other. Also, there is a similarity in genital structures. This makes their diagnosis difficult. *N. lineatus* is relatively smaller than this taxon. (4-5mm). *N. minor* is 3-3.5 mm in size. It also differs in the structure of the stylus of *N. lineatus* and *N. minor*. The distance between the outer tooth and the inner tooth in the stylus is shorter in *N. minor* compared to the others. According to the measurements of the individuals obtained in the study, this distance in the stylus was 0.15 mm in *N. lineatus* and 0.08 mm in *N. minor*.

*N. albipennis* has a characteristic patterning. In the lower 1/3 of the anterior wing, there is a dark band extending from the clavus to the wing margin (Figure 1). 5 ♂♂, 2 ♀♀ individuals were collected from Kastamonu and Sinop. The genital structures of the diagnosed specimens are consistent with the drawings of Holzinger et al. (2003).

*L. coleoptrata*, known as a polyphagous species, is the only known taxon from Türkiye belonging to the *Lepryonia*. *L. coleoptrata* which is found in both herbaceous and tree layers, was collected from the herbaceous layer in this study. It has been determined that it is found on different plants belonging to the Apiaceae family. When the material was evaluated, it was determined that the female and male individuals

of this species exhibited a significant sexual dimorphism in terms of body size and the females were larger than the males. The average size is 6.1 mm in males and 7.6 mm in females.

*P. spumarius*, known as the meadow spittlebug, is common and is distributed in the warm regions of both hemispheres and also attracts attention with its colour and patterning polymorphism. 8 phenotypes of this species from Sinop province and 9 different phenotypes from Kastamonu were determined and evaluated in previous studies. (Tanyeri & Zeybekoğlu, 2018; 2019).

## CONCLUSION

At the end of the study, six species; *A. salicina*, *L. coleoptrata*, *N. albipennis*, *N. lineatus*, and *N. minor* were first recorded from Sinop and Kastamonu provinces. *A. alni* and *N. campestris* were recorded for the first time from Kastamonu provinces. *N. albipennis* which is known to be distributed in Ankara and Kırklareli, was recorded for the first time in the Black Sea Region of Türkiye.

*A. alni*, *A. salicina*, *L. coleoptrata*, *N. albipennis*, *N. campestris*, *N. lineatus*, *N. minor*, *P. spumarius* are considered as potential vectors for the bacterium *Xylella fastidiosa* associated with serious diseases in a wide range of plants in Europe (European Food Safety Authority, 2013). Considering the damage potential of Aphrophoridae spittlebugs, taxonomic and faunistic records from different regions are thought to be important.

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## Contribution of the Authors as Summary

Authors declare the contribution of the authors is equal.

## Statement of Conflict of Interest

There is no conflict of interest between the article authors.

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