

Some New Records on Aphid (Hemiptera, Aphididae) Fauna of Turkey and Aphid Host Plant Interactions

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ABSTRACT

This study was carried out in Kayseri province and its districts between 2015 and 2018. Aphids were collected from different regions of Kayseri province. Three aphid species; **Drepanosiphum aceris* Koch, **Subsaltusaphis (Subsaltusaphis) picta* (Hille Ris Lambers), **Trama (Trama) troglodytes* von Heyden are new records for the Turkish aphid fauna, while seven species *Aphis (Aphis) spiraephaga* F.P. Müller, *Acyrtosiphon (Acyrtosiphon) cyparissiae* (Koch), *Acyrtosiphon kondoi* Shinji, *Macrosiphoniella staegei* Hille Ris Lambers, *Phloeomyzus passerinii* (Signoret), *Pleotrichophorus persimilis* Börner, *Uroleucon (Uromelan) rapunculoidis* (Börner) were recorded for the first time in Kayseri province.

Information on biology and geographical distribution for each species is also provided. Besides, seven (*Epilobium angustifolium* L., *Euphorbia cyparissias* L., *Astragalus melanophrurius* Boiss., *Acer cinerascens* Boiss., *Centaurea maculosa* Lam., *Populus alba* L., *Artemisia campestris* L.) host plant species and one new endemic host plant (*Campanula rapunculoides* L.) species are recorded for eight of the aphid species for the first time. *Acyrtosiphon (Acyrtosiphon) kondoi* Shinji was found for the first time on the *Astragalus melanophrurius*. This plant is not included in the Holman catalog (2009). It is the new host plant registration for the World Aphid-Host plant catalog.

Key words: New record, Aphididae, Kayseri, Turkey, new host plant.

INTRODUCTION

Turkey has a high number of endemic species which make up about 31% of the total flora, the largest in Europe (Davis, 1988). Turkey is also a bridge between Asia and Europe and it has a geographically very large area with different kinds of climate zones favourable for aphid breeding. Turkey can be divided to seven distinct geographic areas and each with different climatic conditions and flora. Steppe climate is dominant in many parts of Kayseri. Here summers are hot and dry, winters are cold and snowy. However, since there are mountainous places and plains and boats between them, some climatic characteristics of height are also effective. In the lands of Kayseri, steppe vegetation is dominant in the mountains and hilly areas as in the plains. Although forest cover is seen in high parts of the province, soils are generally covered with degraded forests and shrubs (Anonim, 2019).

Aphididae (Hemiptera) species, known as aphids, contain important pests that can cause economic loss in cultivated plants. As a result of the feeding of aphids on the flowers, shoots, fruits, leaves, trunk and roots of the plants; folds in the leaves, stunting in the plant, deformations in the plant organs occur. When Aphidoidea is fed to the upper family, saprophyte fungus is released on the egg they secrete, causing the formation of fumagine and thus the leaves cannot perform the assimilation task. The Aphids can cause direct damage to the plant plants by indirectly destroying the plant physiology and vectoring them to virus and virus-like organisms.

More than 5600 valid species of Aphidomorpha have been described worldwide (Blackman & Eastop, 2020; Favret, 2020). Aphids are a predominantly northern temperate group and more than 75 % of the species are known from the Palaearctic region (Holman, 2009). During last two decades aphid fauna of Turkey has been studied intensively by different authors (Remaudière, Toros, & Özdemir, 2006; Görür, Akyıldırım, Olcabey, & Akyürek, 2012; Barjadze, Japoshvili, & Bakhtadze, 2010; Barjadze, 2011; Barjadze, Karaca, Yaşar, & Gratiashvili, 2011; Barjadze, Özdemir, & Blackman, 2014a; Barjadze, Japoshvili, Karaca, & Özdemir, 2014b; Barjadze, Blackman, & Özdemir, 2015; Barjadze & Özdemir 2014, 2018; Özdemir & Barjadze 2015; Kanturski, Barjadze, Jensen, & Wiczorek, 2018; Akyürek, Zeybekoğlu, Görür, & Karavin, 2019). At present 555 aphid species are known from Turkey (Akyürek et al, 2019). Knowledges on the aphid fauna of Kayseri are very limited. In present study, were evaluated aphid specimens collected from Kayseri province, were presented new records for Turkish fauna. In addition, new information about the host plants of the species is included. New information about the hospitality of aphids on endemic plants is given.

MATERIAL AND METHODS

Aphids were collected in the field from their host plant with a small soft brush and put in to a tube which contained 70 percent ethyl alcohol. The slide mounting technique was mainly based on the method of Hille Ris Lambers (1950). The specimens were studied using a LEICA DM LB2 compound light microscope and morphological characters

were measured using LAS 4.1 version software. Measurements of morphological characters were made according to Blackman and Eastop (2006, 2020). The species determination was done using Heie (1992, 1995), Blackman and Eastop (1994, 2000, 2006, 2020) and Wieczorek et al (2016). Aphids' host plants were identified according to Davis (1967, 1970, 1972, 1975, 1978, 1982, 1984, 1985) and Davis, Mill, & Tan, (1988) by Ufuk ÖZBEK (Gazi University, Faculty of Science, Department of Biology). Slides of the aphid species have been deposited in the Department of Agricultural Fauna and Microflora, Plant Protection Central Research Institute, Ministry of Agriculture, Ankara, Turkey.

RESULTS

List of investigated aphids and new aphid-plant interactions

Aphis (*Aphis*) *spiraephaga* F.P. Müller, 1961 (Aphidinae: Aphidini)

Comments: Çanakcıoğlu (1966) was given on *Spirea thunbergii* in the literature such as new records from Turkey. However, It was found in this study from the *Epilobium angustifolium* L. This species is a new record for the province of Kayseri. Host plant is a new record for Turkey.

Material examined: One apterous viviparous and three alatae females on *Epilobium angustifolium* L. (Onagraceae), Kayseri, Yahyalı (38°18'33" N, 35°54'52" E), altitude 1356 m, 08.07.2015, leg. M. Özdemir

Apterous viviparous females are dark brownish, greyish brown, with transverse dorsal bands of wax. Alatae have secondary rhinaria distributed on antennal III segment: 5-18. Both apterae and alate have a very variably developed pattern of dorsal sclerotisation (Fig. 1).

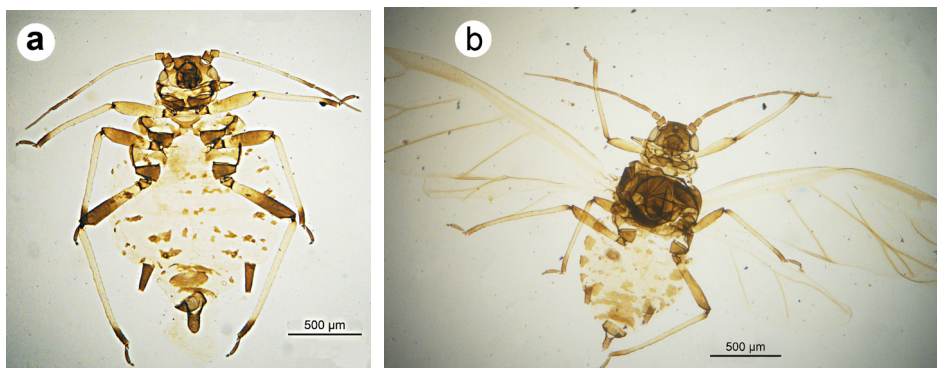


Fig. 1. *Aphis spiraephaga* F.P. Müller. a. Apterous viviparous female; b. Alata viviparous female.

Biology: In dense ant-attended colonies on young shoots of *Spirea* spp. However this species seems to be rather polyphagous, with records from *Epilobium* spp. (Holman, 2009), and other genera in several plant families (*Arabis*, *Carum*, *Centranthus*, *Erica*, *Filipendula*, *Helipterum*, *Symphoricarpus*, *Trinia* and *Valeriana*)

Distribution: This species is distributed in Europe (but not UK), west Siberia, Kazakhstan, Mongolia

***Acyrtosiphon (Acyrtosiphon) cyparissiae* (Koch, 1855) (Aphidinae: Macrosiphini)**

Synonymy: *Siphonophora cyparissiae* Koch, 1855

Comments: It was reported in Tuatay & Remaudiere, 1964. This is a newly recorded species from Kayseri province and new host plant record for the aphid fauna of Turkey (Fig. 2).

Material examined: One apterous viviparous and three alatae females on *Euphorbia cyparissias* L. (Euphorbiaceae), Kayseri, Yahyalı (38°01'24" N, 35°29'47" E), altitude 1322 m, 28.05.2015, leg. I. Özdemir

This species are greenish with brownish black front part of head and brownish-brown.

Biology: It lives on *Euphorbia* spp., feeding on upper sides of upper leaves.

Distribution: This species is distributed in In Europe, Middle East, Central Asia and China.

***Acyrtosiphon (Acyrtosiphon) kondoi* Shinji, 1938 (Aphidinae: Macrosiphini)**

Synonymy: *Siphonophora lactucae* Passerini, 1860

Comments: It was reported in Akyıldırım, 2010. This is a newly recorded species from Kayseri province and new host plant record for the aphid fauna of Turkey and World (Fig. 3). This aphid species was found for the first time on the *Astragalus melanophrurius*. This plant is not included in the Holman catalog (2009). It is the new host plant registration for the World Aphid-Host plant catalog.

Material examined: Two apterous viviparous females, on shoots and flower stems of *Astragalus melanophrurius* Boiss. (Asteraceae), Kayseri, Yahyalı, Avlak (37°58'46" N, 35°32'27" E), altitude 1400 m, 06.05.2018, leg. M. Özdemir.

Apterae are bluish greenish and brownish.

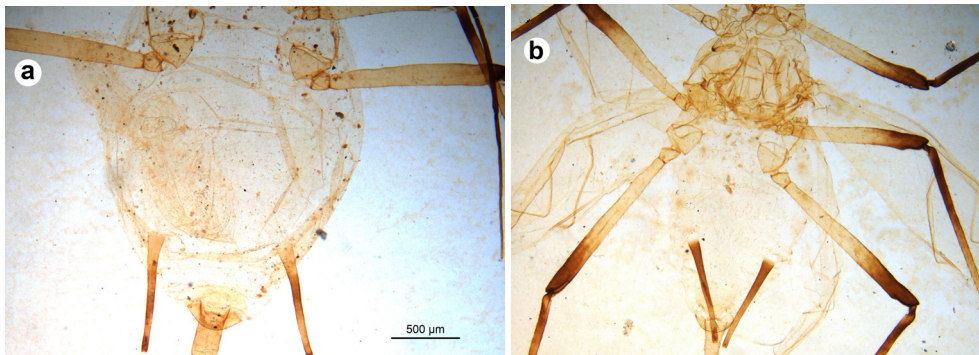


Fig. 2. *Acyrtosiphon cyparissiae* (Koch). a. Apterous viviparous female; b. Alata viviparous female.

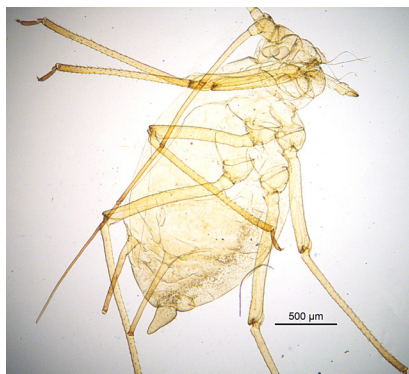


Fig. 3. *Acyrthosiphon kondoi* Shinji. Apterous viviparous female.

Biology: On stems and leaves of Leguminosae/Fabaceae, mainly of tribes Trifoleae (*Medicago*, *Melilotus*, *Trifolium*) and Loteae (*Dorycnium*, *Lotus*) but also on Galegeae (*Astragalus*), and also recorded from *Pisum*, *Vicia* and *Lens* (Vicieae). An important pest of alfalfa (Blackman & Eastop, 2000; 2020).

Distribution: This species is distributed from Afro-tropical region, Australian region, Corsica, East Palaearctic, Near East, Nearctic region, Neotropical region, Oriental region (Anonymous, 2019), Asia, North and South America, South Africa, Australia and New Zealand (Blackman & Eastop, 2020).

****Drepanosiphum aceris* Koch, 1855 (Aphidinae: Aphidini)**

Comments: This is a new species and new host plant record for the aphid fauna of Turkey from Kayseri.

Material examined: Two alatae viviparous females, on shoots *Acer cinerascens* Boiss. (Aceraceae), Kayseri, Felahiye, Mollahacı (38°57'38" N, 35°32'46" E), altitude 1275 m, 21.09.2018, leg. M. Özdemir.

Alate viviparous females are whitish-greenish or yellowish, with thoracic lobes darker, a conspicuous brown-black spot in front of the base of each siphunculus, siphunculi distally dark, and a short brown bar on abdominal tergites 4-5 only (Fig. 4).



Fig. 4. *Drepanosiphum aceris* Koch. Alata viviparous female.

Biology: On *Acer pseudoplatanus*, under lower leaves, usually in shade. (Holman, 2009; Blackman & Eastop, 2020).

Distribution. This species is distributed from Europe and east to the Caucasus and Georgia (Barjadze et al, 2010).

***Macrosiphoniella (Macrosiphoniella) staegeri* Hille Ris Lambers, 1947
(Aphidinae: Macrosiphini)**

Comments: It was reported in Tuatay & Remaudiere, 1964 on *Centaurea* spp. This is a new record from Kayseri province (Fig. 5) and new record host plant.

Material examined: Two apterous viviparous females, on *Centaurea maculosa* LAM. (Asteraceae), Kayseri, Bünyan, Süksün (38°45'50" N, 35°56'01" E), altitude 1601 m, 08.08.2015, leg. I. Özdemir.

Apterae are brownish, brown to black, dusted with dirty whitish wax.



Fig. 5. *Macrosiphoniella staegeri* Hille Ris Lambers. Apterous viviparous female.

Biology: It lives on underside of leaves of *Centaurea* spp. (Blackman & Eastop, 2020). Oviparae and alate males were found in Turkey in October (Tuatay & Remaudière, 1964).

Distribution: This species was recorded from southern Europe, Turkey, Armenia, Tajikistan and Kazakhstan (Kadyrbekov, 2014).

***Phloeomyzus passerinii* (Signoret, 1875) (Phloeomyzinae: Phloeomyzini)**

Synonymy: *Schizoneura passerinii* Signoret; *Lovia passerini* Signoret

Comments: *P. passerini* collected on *Populus alba* L. (Salicaceae) is a new species record for Kayseri province (Fig. 6). This aphid species is a new record for Kayseri province. Bodenheimer and Swirskii (1957) given record from Turkey. However, the host plant and its locality have not been given. Detailed registration is given for the first time in this paper.

Material examined: Three apterous viviparous females, on *Populus alba* L. (Salicaceae), Kayseri, Talas, Alıdağ (38°39'59" N, 35°32'59" E), altitude 1727m, 13.09.2017, leg. M. Özdemir.

Apterae are greenish-yellow to yellow, covered with dirty white wax wool.

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Biology: On bark and in crevices on trunks of *Populus* spp.

Distribution: *P. passerini* is widely distributed in Europe, and is also found in Belarus, Britain, Bulgaria, Central European Russia, Czech Republic, East Palaearctic, French mainland, Germany, Egypt.



Fig. 6. *Phloeomyzus passerinii* (Signoret). Apterous viviparous female.

***Pleotrichophorus persimilis* Börner, 1950 (Aphidinae: Macrosiphini)**

Comments: It was reported in Tuatay & Remaudiere, 1964. This is a newly recorded species for Kayseri province and new host plant record for the aphid fauna of Turkey (Fig. 7).

Material examined: Two apterous viviparous females, *Artemisia campestris* L. (Asteraceae), Kayseri, Kocasinan, Himmetdede (38°54'36" N, 35°05'18" E), altitude 1250 m, 30.09.2016, leg. I. Özdemir.

Apterae are pale yellowish red to brownish, appearing wax-powdered.

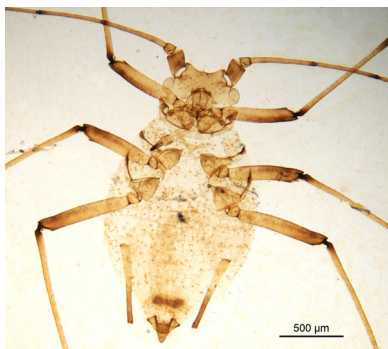


Fig. 7. *Pleotrichophorus persimilis* Börner. Apterous viviparous female.

Biology: Its colonies live on *On Artemisia* spp., especially *A. campestris* and *A. scoparia* (Blackman & Eastop, 2020). Life cycle is unknown.

Distribution: This species is distributed in Belgium, Britain, Bulgaria, Czech Republic, East Palaearctic, Finland, Germany, Hungary (Holman, 2009; Blackman & Eastop 2020).

****Subsaltusaphis (Subsaltusaphis) picta* (Hille Ris Lambers, 1939)
(Saltusaphidinae: Thripsaphidini)**

Comments: This is a newly recorded aphid species for the aphid fauna of Turkey (Fig. 8).

Material examined: Four apterous viviparous females and one alate on *Carex* sp. (Cyperaceae), Kayseri, Province, (38°46'09" N, 35°17'08" E), altitude 1065 m, 26.06.2017, leg. M. Özdemir.

Adult apterae of *S. picta* are whitish yellowish, with dark tranverse intersegmental muscle sclerites. The antenna are black beyond the basal half of the third segment.

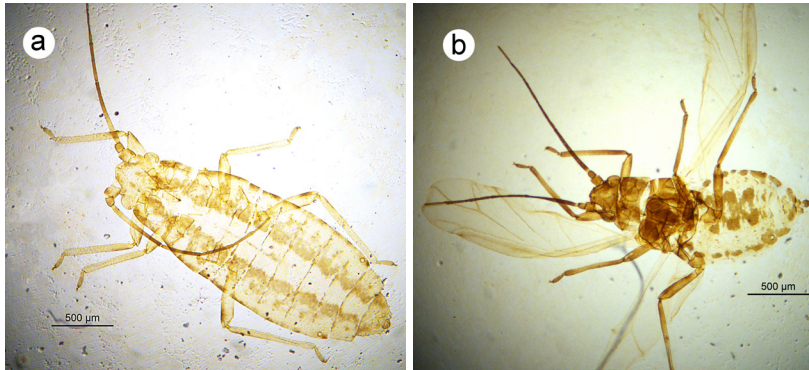


Fig. 8. *Subsaltusaphis picta* (Hille Ris Lambers). a. Apterous viviparous female; b. Alate viviparous female.

Biology: The painted sedge aphid lives on sedge (*Carex* sp.).

Distribution: *S. picta* is widely distributed in Europe, and is also found in Austria, Belgium, Britain I., Czech Republic, East Palaearctic, Finland, French mainland, Germany, Hungary, Poland, Kazakhstan and east Siberia (Blackman & Eastop, 2020).

****Trama (Trama) troglodytes* von Heyden, 1837 (Lachninae: Tramini)**

Comments: This a new record from the Turkish aphid fauna (Fig. 9).

Material examined: Three apterous viviparous females, *Helianthus tuberosus* L. (Asteraceae), Kayseri, Hacilar (38°35'39" N, 35°29'50" E), altitude 1863 m, 21.09.2015, leg. M. Özdemir.

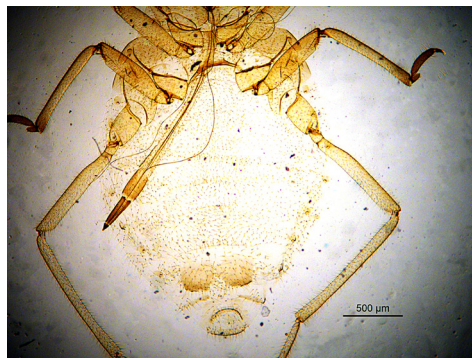


Fig. 9. *Trama (Trama) troglodytes* von Heyden. Apterous viviparous female.

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Apterae are white or yellowish white or grey.

Biology. Various names have been applied to populations on different host plants (*Achillea*, *Artemisia*, *Centaurea*, *Cichorium*, *Cirsium*, *Cynara*, *Helianthus*, *Lactuca*, *Lapsana*, *Sonchus*, *Taraxacum*) (Blackman & Eastop, 2020).

Distribution. This species was recorded from Europe, west Siberia, Central Asia, and Japan, England.

***Uroleucon (Uromelan) rapunculoidis* (Börner, 1939) (Aphidinae: Macrosiphini)**

Comments: It was first reported in Tuatay & Remaudiere, 1964. This is a newly recorded species from Kayseri province and new endemic host plant record for the aphid fauna of Turkey (Fig.10).

Material examined: Two apterous viviparous females and two alatae on *Campanula rapunculoides* L. (Campanulaceae), Kayseri, Yeşilhisar (38°20'41" N, 35°05'35" E), altitude 1125 m, 22.09.2016, leg. I. Özdemir.

Apterae are shiny dark brown with black antennae, siphunculi and cauda.

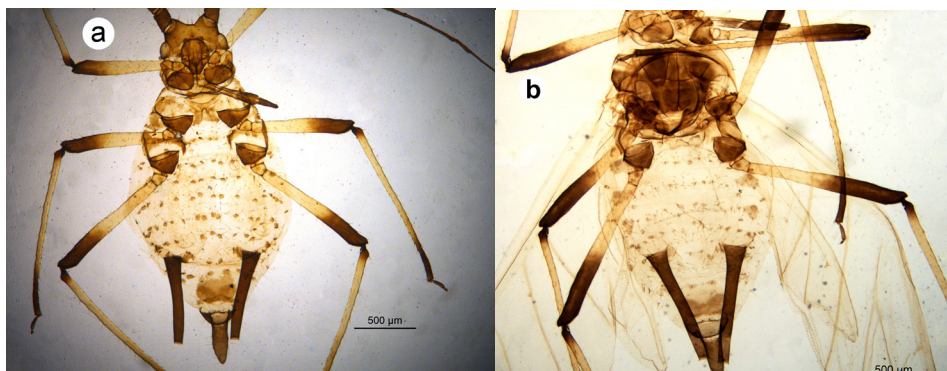


Fig. 10. *Uroleucon (Uromelan) rapunculoidis* (Börner). a. Apterous viviparous female; b. Alata viviparous female.

Biology: On stems and flowers of *Campanula rapunculoides* in Europe (Blackman & Eastop, 2019).

Distribution: This species is recorded from *C. glomerata* and *C. sibirica* in south-west and central Asia. Oviparae were found in October in the Netherlands (Holman, 2009; Blackman & Eastop, 2020).

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