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## New aphid (Hemiptera: Aphidoidea) records from South Eastern Parts of Turkey

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**ABSTRACT.** The present study aimed to determine aphid species in South Eastern regions of Turkey. The material of this study was collected during April to October 2016. As a result of the evaluation of the samples, 110 species and 1 subspecies recorded from study area, of them 9 species and 1 subspecies are determined as new records for Turkey aphid fauna: *Aphis (Aphis) cirsiophila* Pashtshenko, 1992; *Aphis (Aphis) sanguisorbae* Schrank, 1801, *Aphis (Aphis) wartenbergi* (Börner, 1952), *Cinara (Cinara) intermedia* (Pašek, 1953), *Eulachnus cembrae* Börner, 1950, *Lipaphis (Lipaphis) pseudobrassicae* (Davis, 1914), *Pseudoregma panicola* (Takahashi, 1921), *Schizaphis (Euschizaphis) palustris* Theobald, 1929, *Sitobion (Sitobion) lambersi* David, 1956 and *Uroleucon (Uromelan) jaceaema crosiphon* (Hille Ris Lambers, 1939). With these new records, the number of species and subspecies of aphids in Turkey increased to 541 and 13, respectively.

**Key words:** Aphid, Turkey, Hemiptera, New record

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### Introduction

About 5000 aphid species have been described worldwide, and about 1600 species are present in Europe (Nieto Nafria et al., 2013; Blackman & Eastop, 2017). The primary studies about aphidofauna of Turkey started at the beginning of twentieth century (Trotter, 1903; Fahringer, 1922). Çanakçıoğlu (1975) reviewed previous studies and listed about 258 aphid species. Following these basic studies, Remaudière et al. (2006) listed 417 species and Görür et al. (2012) listed 480 aphid species. Barjadze

et al. (2014) described two new species (*Protaphis kvavadzei* Barjadze & Özdemir, 2014, and *Aphis matricariae* Barjadze & Özdemir, 2014). Another new species (*Aphis polii* Barjadze & Özdemir, 2015) was also recently described from Turkey (Barjadze et al., 2015). Görür et al. (2015) indicated that *Cinara curvipes* (Patch, 1912) is an invasive species and a new record for Turkey aphid fauna. Şenol et al. (2015a,b) added 26 aphid species and with these studies number of the aphid species in

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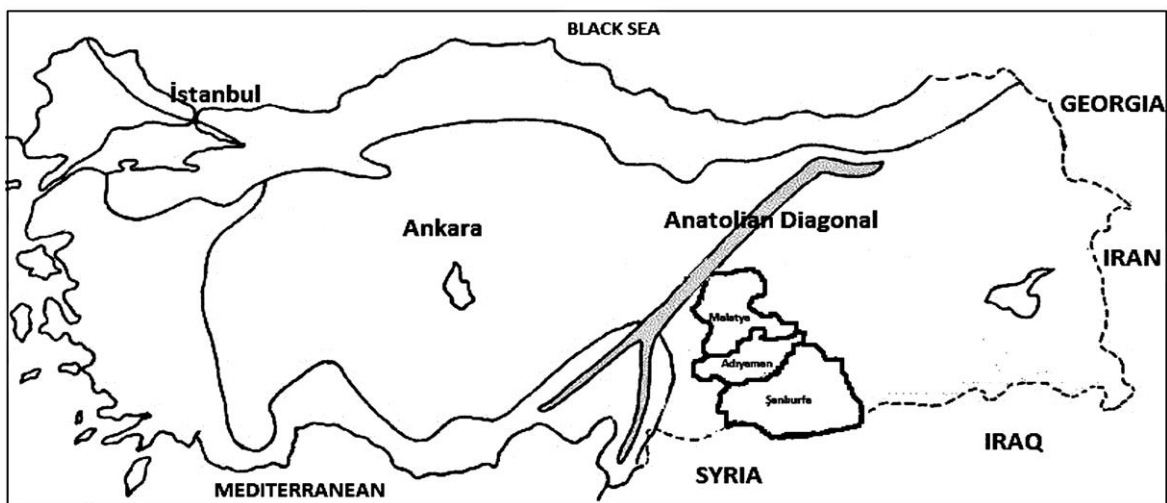
Turkey aphid fauna reached to 532. There are many unexplored areas in Turkey including study area to be studied in terms of both general compositions of fauna and aphid fauna. One of the important geographical barriers in Turkey for species entered into country to spread across is Anatolian Diagonal and study localities located around this barrier. The significant role of these barriers and other ecological-geographical factors in distributions and diversity of organisms has been evaluated by different researchers for different group of organisms (Çıplak, 2003; Mutun, 2010). It has been thought that these barriers might also influence aphid species distribution and diversity in whole country and study area. There is also big dam, namely, GAP (South Eastern Project), and recent studies indicated how big GAP is going to affect climatic, floristic, and agricultural characteristics of the area (Bahadır, 2011; Gezer et al., 2011) and in turn influence aphid species composition. As there is no detailed study related with aphid species conducted in this particular area, this study aimed to improve the knowledge of the aphid species living on various host plants basically in the South Eastern Parts of Turkey. Recent records by different researchers from neighbouring countries

close to the study area increased the importance of this study. Recently Mehrparvar (2016) added *Liosomaphis atra* Hille Ris Lambers, 1966 to Iranian aphid fauna. Ali et al. (2012) added 24 species and four genera to Iraq aphid fauna.

### Material and methods

Field works conducted in Adiyaman, Malatya and Şanlıurfa (basically in the South Eastern Parts of Turkey) provinces between April and October 2016 (Figure 1). As much as more apterae and alatae individuals' samples were collected from aphid colonies on host plants and then placed in 96 % alcohol in Eppendorf tube.

During field works, it was tried to sample species from all potential host including naturally grown, herbaceous and cultured plant species. Samples were processed in the laboratory based on the methods offered by Martin (1983). Identification process of obtained samples was performed by Gazi Görür throughout studying on slide mounted viviparous female individuals based on Heie (1980–1993), Blackman & Eastop (2017) and identifications of new records were confirmed by Özhan Şenol.



**Figure 1.** Locations of the study area Adiyaman, Malatya and Şanlıurfa Provinces of Turkey.

Host plants of the sampled population were identified by Hayal Akyıldırım Beğen by comparing collected both fresh material and dried host plants with herbarium material and published materials. During the identification process, all documents related with identified species including their diagnostic characteristics, biology, reported host plants, origin and current dispersal area were followed carefully. The reason is to identify species by studying on viviparous female individual is that the majority of the aphid species identification key developed according to viviparous female individual characteristics as oviparous female and male individuals are rarely existed in aphid population due to their unique way of reproduction. Identification, taxonomic status and dispersal data checked by related literature (Heie, 1980–1993; Holman, 2009; Blackman & Eastop, 2017; Favret, 2017). Voucher samples were stored in the Biotechnology Department of Omer Halisdemir University.

## Results

During the indicated study period, about 110 aphid species were collected from study area. The consideration of acquired data indicated that 9 aphid species and one subspecies are new entry for Turkey aphid fauna. It was avoided to give whole list of the recorded aphid species from study area that can be found in other literature such as Blackman & Eastop (2017) and Gorur et al. (2012). Instead, general information about recent new records are shown as follows:

### *Aphis (Aphis) cirsiophila* Pashtshenko, 1992

**Material examined:** Two populations with black aptera individuals were sampled on stem of *Cirsium* sp. from Adıyaman-Besni district-Taşlı yazı village (02.V.2016).

**General distribution:** This species distributed in Far East Russia (Blackman &

Eastop, 2017) and living on the family Asteraceae.

### *Aphis (Aphis) sanguisorbae* Schrank, 1801

**Material examined:** Three populations consist of black aptera individuals, which were mentioned as blackish brown, sometimes with copper and red-brown hues on the posterior abdomen in literature, were collected from stem of *Sanguisorba minor* from Malatya- Pütürge district (28.IV.2016).

**General distribution:** This species distributed in Austria, Czech Republic, England, France, Israel, Italy, Germany, Finland, Kazakhstan, Lithuania, Mongolia, Poland, Russia, Serbia and Montenegro, Slovakia, Spain, Sweden, former Yugoslavia (Holman, 2009; Blackman & Eastop, 2017).

### *Aphis (Aphis) wartenbergi* (Börner, 1952)

**Material examined:** Three populations consist of ant-attended black aptera individuals (color of aptera has not been mentioned in literature) were sampled on stem and leaves of *Carduus* sp. from Şanlıurfa- Viranşehir district (03.V.2016).

**General distribution:** This species distributed in Austria, Slovakia, Romania, Georgia (Holman, 2009; Blackman & Eastop, 2017).

### *Cinara (Cinara) intermedia* (Pašek, 1953)

**Material examined:** Two populations consist of brownish-blackish with a weak longitudinal stripes (appearance of aptera mentioned as pale brown, with two brownish or greenish-black dorsal longitudinal stripes in literature) apterus individuals were sampled from young branch of *Pinus* sp. from Malatya-Yeşilyurt district (23.VI.2016).

**General distribution:** This species distributed in Czech Republic, Slovakia (Holman, 2009; Blackman & Eastop, 2017).

***Eulachnus cembrae* Börner, 1950**

**Material examined:** Five populations consist of ant-attended, weak spindle shaped green aptera (appearance of aptera individuals cited as spindle-shaped, bright green to yellowish green, dusted with wax powder in literature) individuals were obtained from needles of *Pinus* sp. from Adıyaman- Mimarsinan park (26.VI.2016) and Şanlıurfa-Osmanbey University campus (27.VI.2016).

**General distribution:** This species distributed in Austria, Italy, Switzerland, Poland, Slovakia (Blackman & Eastop, 2017).

**Note:** It was surprised to record *E. cembrae* from study area as this species mainly recorded from montane parts of the recorded regions, and their identification process carried out independently by different researchers and reached the same result.

***Lipaphis (Lipaphis) pseudobrassicae* (Davis, 1914)**

**Material examined:** Two populations with light green (appearance of aptera in literature indicated as yellowish green, grey-green or olive-green, with a white wax bloom) aptera individuals were picked up from lowest part of bud of *Crambe* sp. from Malatya-Yazihan (07.IV.2016).

**General distribution:** This species distributed globally including China, India, Japan, Australia, Brazil, New Zealand (Blackman & Eastop, 2017).

***Pseudoregma panicola* (Takahashi, 1921)**

**Material examined:** Three populations with ant-attended orange (appearance of aptera in literature defined as brownish black or dark brownish red-violet, secreting columns of dense white wax) aptera individuals were sampled on root of *Elytrigia* sp. from Malatya-Akçadağ district-Develi village (20.VIII.2016).

**General distribution:** This species distributed in Africa, east and south east Asia, southern India, New Zealand (Holman, 2009; Blackman & Eastop, 2017).

***Schizaphis (Euschizaphis) palustris* Theobald, 1929**

**Material examined:** Three populations contain dark green (general appearance explained as yellowish brown to olive brown or dark green) aptera individuals were sampled on leaves nodes of *Triticum* sp. from Şanlıurfa-Harran district (02.IV.2016).

**General distribution:** This species distributed in Czech Republic, Germany, Great Britain, India, Netherlands, Poland, Slovakia, Spain Ukraine (Holman, 2009; Blackman & Eastop 2017).

***Sitobion (Sitobion) lambersi* David, 1956**

**Material examined:** Five populations contain green aptera (general appearances of aptera individuals are pale green with brown siphunculi and pale cauda in literature) individuals were collected on leaves of *Cynodon* sp. from Şanlıurfa-Halfeti (01.IV.2016), upper side of leaves of *Triticum* sp. from Şanlıurfa-Balıkligöl (02.IV.2016) and Malatya-Yeşilyurt (30.IV.2016).

**General distribution:** This species distributed in Africa, Brazil, southern India, Java, Fiji, Sri Lanka (Holman, 2009; Blackman & Eastop, 2017).

***Uroleucon (Uromelan) jaceaema crosiphon* (Hille Ris Lambers, 1939)**

**Material examined:** Two populations consist of blackish brown aptera individuals were collected on stem of *Cirsium* sp. from Şanlıurfa-Viranşehir district (03.V.2016).

**General distribution:** This subspecies distributed in Austria, Finland, Greece, Italy, Serbia and Montenegro, Sweden (Holman, 2009; Blackman & Eastop, 2017).

## Discussion

Increasing international trades, global climate change, tourism, agricultural activities, establishment of huge dams and tunnels and transport over the last two decades unintentionally resulted in the increased introduction of non-native species, including aphids, which was followed by their tremendously successful establishment and spread capacity among countries in many cases (Kollar & Barta, 2016). More than 100 alien aphid species are recently detected in Europe and most of them originate from temperate regions of Asia and North America (Cœur d'acier et al., 2010) despite some speculation goes on alien aphid species. Recently, Mehrparvar (2017) recorded two aphid species for Iranian aphid fauna that are originally described from different regions and different host plants. Most of the above factors are effective in Turkey and in addition, Turkey has their own particular features that directly impact aphid diversity and distribution. Çanakçıoğlu (1975) reviewed studies dated back to 1990's and listed 258 aphid species, host plants and distribution. During last two decades several researchers conducted studies on Turkey aphid fauna and with their contribution number of the aphid species increased to 532 and 12 subspecies (Remaudière et al., 2006; Görür et al., 2012; Barjadze et al., 2014, 2015; Görür et al., 2015; Şenol et al., 2015a,b). Current study performed basically in South Eastern Parts of Turkey (Adıyaman, Malatya and Şanlıurfa provinces) and 9 aphid species and one subspecies were determined as a new entrance for Turkish aphid fauna.

With these recent findings number of aphid species that were known from Turkey, reached up to nearly 541. Study area is one of the important species entrance gate from Syria, Arabian Peninsula, desert area and some parts of

Mediterranean to Anatolia. There are also one of the biggest project, namely, GAP that have an effects on climatic, floristic, crop variability, faunistic diversity of Adıyaman, Malatya and Şanlıurfa provinces and recent analyses indicated that these impacts are going to increase sharply in near future. For example, some climatic models anticipate that mean temperature of the study area is going to increase about 1°C in next 10 years (Gezer et al., 2011).

Results presented here is the preliminary findings of the proposed project and there is no detailed study have been carried out so far in the study area. However, study area has own particular features such as different microclimatic areas, agricultural diversity, crop variability and richness, barriers against species distribution and various species entrance from different zoogeographical regions in addition to Turkey general characteristics. These additions and information about species can be informative for aphid fauna of South Eastern Parts of Turkey and also for Turkey aphid fauna as the aphid fauna of Turkey has not been extensively studied and there is no comprehensive information on aphids that are ecologically and agriculturally important group of insects. Findings of new records for Turkey aphid fauna are parallel with the recent aphid species records in neighboring countries close to the study area like Iraq and Iran (Ali, 2012; Mohsen, 2016; Mohsen et al., 2017). Authors believe that introduction of aphid species to Syria most likely to be happened but we have no detailed study after Remaudière & Talhouk (1999) for Syrian aphid fauna. Both study area and neighboring countries are most likely to be affected from global warming and therefore more detailed study should be carried out to find out current aphid fauna and make predictions for future changes.

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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## گزارش جدید شته‌ها (Hemiptera: Aphidoidea) از بخش‌های جنوب شرقی ترکیه

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**چکیده:** هدف از انجام این تحقیق شناسایی شته‌های مناطق جنوب شرقی ترکیه است. نمونه برداری طی ماه‌های آوریل تا اکتبر سال ۲۰۱۶ انجام شد. در نتیجه ارزیابی نمونه‌های جمع‌آوری شده؛ ۱۱۰ گونه و یک زیرگونه شناسایی شد که از بین آنها ۹ گونه و یک زیرگونه برای اولین بار از ترکیه گزارش می‌شوند که عبارتند از: *Aphis (Aphis) sanguisorbae* Pashtshenko, 1992، *Aphis (Aphis) wartenbergi* (Börner, 1952) Schrank, 1801، *Cinara (Cinara) intermedia* (Pašek, 1953) Eulachnus cembrae Börner, 1950، *Lipaphis pseudobrasicae* (Davis, 1914) (Lipaphis) panicola، *Schizaphis (Euschizaphis) palustris* Theobald, 1929 (Takahashi, 1921)، *Uroleucon (Uromelan) jaceama* و *Sitobion (Sitobion) lambersi* David, 1956، *crosiphon* (Hille Ris Lambers, 1939). با در نظر گرفتن گزارش‌های جدید در این تحقیق، تعداد گونه‌ها و زیرگونه‌های شته‌ها در ترکیه به ترتیب به ۵۴۱ و ۱۳ افزایش یافت.

**واژگان کلیدی:** شته، ترکیه، Hemiptera، گزارش جدید