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Further contribution to the Heteroptera (Hemiptera) fauna of Turkey with a new synonymy

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Abstract: A total of 11 new Heteroptera species are recorded from Turkey for the first time: *Amphiareus constrictus* (Stål, 1860), *Anthocoris simulans* (Reuter, 1884), *Halyomorpha halys* (*Stål*, 1855), *Engistus exsanguis* (Stål, 1872), *Campylomma unicolor* Poppius, 1914, *Campylomma vendicarinum* Carapezza, 1991, *Capsodes gothicus* (Linnaeus, 1758), *Leucodellus zagdani* (Putshkov, 1970), *Phytocoris scitulus scitulus* Reuter, 1908, *Psallus cruentatus* (Mulsant and Rey, 1852) and *Solenoxyphus punctipennis* (Reuter, 1879). Additionally, *Phytocoris* (*Phytocoris*) *malckyi* Rieger, 1995 is synonymized with *Phytocoris* (*Exophytocoris*) *parvuloides* Wagner, 1961; *Phytocoris* (*Exophytocoris*) *parvuloides* = *Phytocoris* (*Phytocoris*) *malckyi* Rieger, 1995 syn. nov.
Keywords: Heteroptera, New species, Faunistic, Turkey, New synonym.

Introduction

The suborder Heteroptera is a diverse group of insects with more than 42.000 species described so far all over the world. The number of families recognized is 89 while only 66 of them are distributing in the Palearctic Region (Henry, 2009). The Heteroptera fauna of Turkey is diverse with more than 1500 species recorded (Önder et al., 2006). Matocq et al. (2014) mentioned that Heteroptera fauna of Turkish Thrace, Mediterranean, Aegean and Black sea regions, and even Central Anatolia was studied many times and was known fairly well in contrast to the Heteroptera fauna of Eastern and Southeastern regions of Turkey and recorded 14 new Heteroptera species for the Heteroptera fauna of Turkey from these regions and many others new for East and Southeastern regions of Turkey. Very recently Çerçi and Koçak (2016, 2017) recorded 18 more new Heteroptera species for the fauna of Turkey from Turkish Thrace, Mediterranean, Aegean and Black sea regions, and Central Anatolia regions. Two more new Heteroptera species for the fauna of Turkey was recorded from Turkish Thrace by Fent and Dursun (2016). Now we report further 11 new Heteroptera species for the fauna of Turkey from Turkish Thrace, Mediterranean, Aegean and Black sea regions, and Central Anatolia regions of Turkey. The fact that 45 new Heteroptera species were recorded from Turkey for the first time in last 3 years shows that the Heteroptera fauna of Turkey is indeed in need of study in all the regions of Turkey.

Materials and Methods

The examined specimens were collected between 2016 and 2017 from Istanbul, Karaman, Mersin and Ordu. Specimens were collected either by sweeping the grass and branches of trees or with the help of UV light traps. When necessary, male genitalia of Miridae and Anthocoridae species were examined using Celestron 44125 Microscope. Identification of the species was done based on Péricart (1972), Yamada (2008) and Yamada and Hirowatari (2003) for the species of the family Anthocoridae; Carapezza (1991), Konstantinov (2008, 2012), Konstantinov et al. (2016), Linnavuori (1999), Putshkov (1970), Wagner (1974-78) and Wyniger (2004) for the species of the family Miridae and Péricart (1998) for the species of the family Lygaeidae. The habitus photos were taken by using Nikon D3200 DSLR Camera combined with a macro bellow and Lomo 3.7X 0.11 Microscope lens. Photos were stacked using Combine ZP.

Results

Anthocoridae Fieber, 1836

Amphiareus constrictus Stål, 1860
(Fig. 1A)
Material examined: Karaman: Yollarbaşı, 05. 09. 2017 1♂ B. Çerçi leg.

The genus *Amphiareus* Distant consists of seven species (Yamada, 2008; Yamada and Hirowatari, 2003). While five of them distribute only in East Palearctic region and southeastern Asia, *A. obscuriceps* (Poppius, 1909) and *A. constrictus* Stål, 1860 are also present in Europe. *Amphiareus obscuriceps* distributes widely in Europe as well as in Iran and Georgia and was recorded last year from Turkey for the first time (Aukema et al., 2013; Çerçi and Koçak, 2016). *Amphiareus constrictus* is a cosmopolitan species distributing in East Palearctic, North, Central and South America, North and tropical Africa, tropical Asia, Australia and Oceania (Péricart, 1996). It is only known from Netherlands in Europe (Aukema and Hermes, 2009). Its origin is unclear and since its first appearance in Europe no further reports of this species from Europe have been published so far. Our record of this species from Central Anatolia is quite interesting. It is possible that it has been introduced to Turkey from its eastern boundaries where it has not been discovered yet. *Amphiareus constrictus* can be distinguished from *A. obscuriceps* by its smaller size, pale colored head and presence of obscured area near the posterior margin of the clavus.
Distribution in Turkey: Karaman (This work).

Anthocoris simulans Reuter, 1884
(Fig. 1B)
Material examined: Istanbul: Esenyurt, 20. 05. 2016, 2♂♂ 6♀♀ B. Çerçi leg.; 19.06.2016, 2♂♂ 4♀♀, B Çerçi leg.; 24.05. 2017, 1♂ 2♀♀, B. Çerçi leg.; 24. 06. 2017, 1♀, B. Çerçi leg.

This species is very similar to *Anthocoris confusus* Reuter, 1807 in the coloration and patterns of the habitus but it distinguishes from it by the endocorium being brilliant on the outer edge while that of *A. confusus* is totally mat. *Anthocoris minki* Dohrn, 1860 is also a similar species but differs from *A. simulans* by its much lighter color of the hemelytra. *Anthocoris simulans* is mostly associated with *Fraxinus excelsior* L. but can be occasionally found on some other hosts such as *Salix* sp., *Prunus* sp. and *Cornus* sp. We have collected our specimens from a *Fraxinus* sp. by sweeping the branches of the tree. It is should be noticed that while some of the specimens are darker in color (as in the Fig. 2B), some of the specimens have pale colors in head, antennae and legs but the hemeytra is never pale colored as in *A. minki*. *Anthocoris simulans* is distributed in Austria, Belgium, Bulgaria, Croatia, Chekia, Finland, France, Great Britain, Germany, Hungary, Italy, Luxemburg, Netherlands, Norway, Poland, Spain, Sweden and Switzerland (Péricart, 1996). It is a new species for the fauna of Turkey.
Distribution in Turkey: Isstanbul (This work).

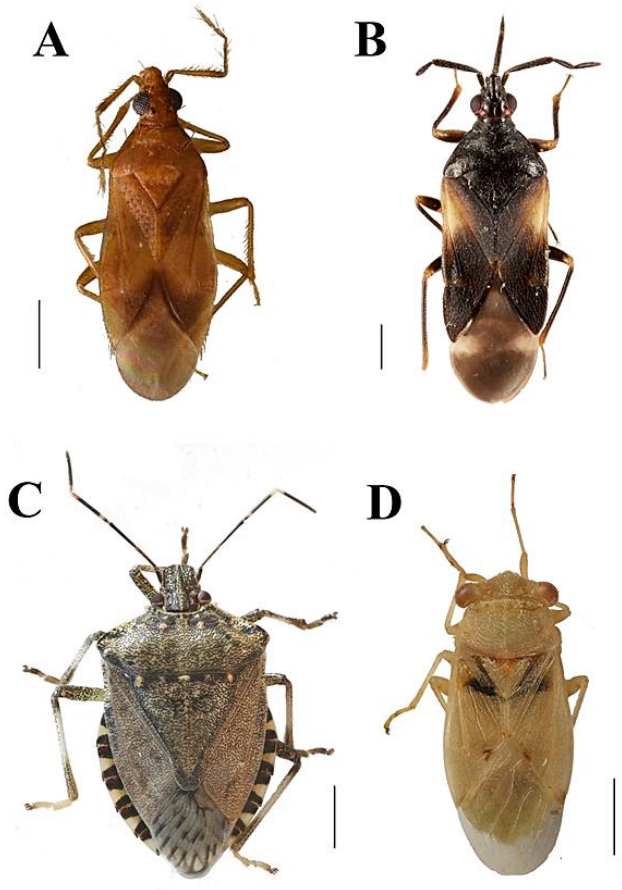

Figure 1. A- *Amphiareus constrictus* Stål, 1860, Karaman, Turkey, ♂ (Scale: 0.5 mm); **B**- *Anthocoris simulans* Reuter, 1884, İstanbul, Turkey, ♀ (Scale: 0.5 mm); **C**- *Halyomorpha halys* (Stål, 1855), İstanbul, Turkey, ♂, (photo credit: Esin Üstün) (Scale: 3 mm); **D**- *Engistus exsanguis exsanguis* Stål, 1872, Karaman, Turkey, ♀ (Scale: 1 mm).

Pentatomidae Leach, 1815
Halyomorpha halys (Stål, 1855)
(Fig. 1C)
Material examined: Istanbul: Levent, 02. 09. 2017, 1♂, E. Üstün leg., B. Çerçi det.

This species is commonly called as "Brown

Marmorated Stink Bug". It is an invasive species originated from Oriental Region. It was introduced to North America for the first time in 2001 where it spread rapidly. Later, it invaded Europe and recorded from Liechtenstein in 2004 for the first-time form Europe. Since then it spread throughout Europe and is now known from Austria, France, Georgia, Germany, Greece, Hungary, Italy, Lichtenstein, Romania, Russia (European part), Serbia, Slovakia, Spain and Switzerland (Hemala and Kment, 2017). The species is characterized by wide polyphagy and can feed on plants of 49 families. Therefore, it is a serious pest for agricultural plants (Gapon, 2016). The specimen we have examined was collected from a big colony feeding on *Ligustrum japonica* L. *Halyomorpha halys* (Stål, 1855) can be confused with *Rhaphigaster nebulosa* (Poda, 1761) in the first glance but can be easily distinguished from it by the last antennal segment being largely black. It is a new species for the fauna of Turkey.

Distribution in Turkey: Istanbul (This work).

Lygaeidae Schilling, 1829

Engistus exsanguis exsanguis Stål, 1872

(Fig. 1D)

Material examined: Karaman: Merkez, 17. 09. 2017. 1♀, Ö. Koçak leg., B. Çerçi det.

The genus *Engistus* is represented by four species and two subspecies in Palearctic region while only one species, *E. salinus* (Jakovlev, 1874), is known from Turkey. *Engistus exsanguis* Stål, 1872 is a widely distributed species and known in Europe from Spain, Ukraine, Russia and Greece as well as from North Africa, Middle East and Central Asia (Péricart, 1998). Considering the fact that it is widely distributed in most of the neighboring countries of Turkey, its discovery from Karaman is not surprising. This species can be distinguished from *E. salinus* by the second antennal segment being longer than the first one which is as long as or smaller than the first one in *E. salinus* (Péricart, 1998).

Distribution in Turkey: Karaman (This work).

Miridae Hahn, 1833

Campylomma unicolor Poppius, 1914

(Fig. 2A)

Material examined: Mersin: Ören, 28. 08. 2017, 2♂♂ 1♀, Ö. Koçak leg., B. Çerçi det.

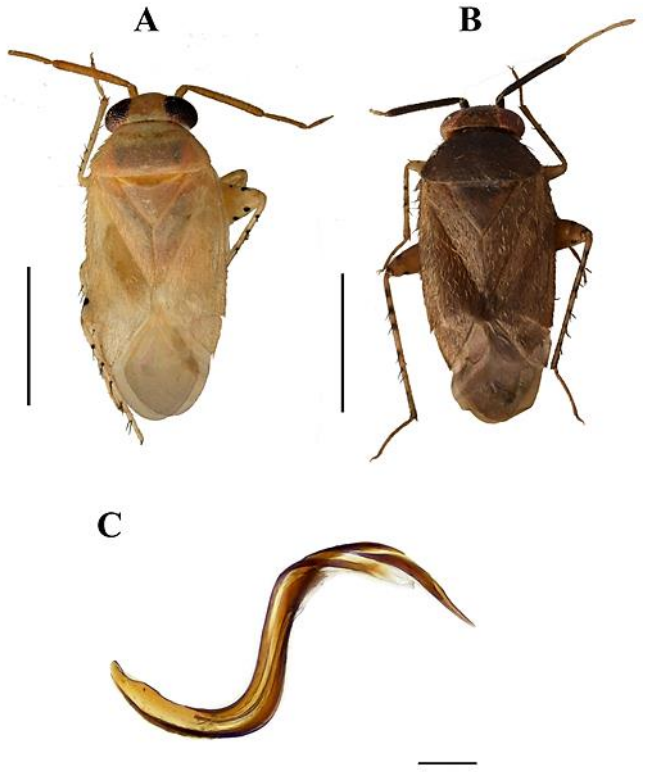

Figure 2. A- *Campylomma unicolor* Poppius, 1914, Mersin, ♂ (Scale: 1 mm); **B**- *Campylomma vandicarinum* Carapezza, 1991, Karaman, ♂ (Scale: 1 mm); **C**- *idem,* vesica (Scale, 0.1 mm).

Campylomma is a diverse genus with plenty of poorly studied and unknown species from Africa and Palearctic region (Konstantinov et al., 2016). The genus was represented by the following 8 species in Turkey; *C. annulicorne* (Signoret, 1865), *C. diversicorne* Reuter, 1878, *C. lindbergi* Hoberlandt, 1952, *C. oertzeni* Reuter, 1888, *C. verbasci* (Meyer-Dûr, 1843), *C. viticis* Lindberg, 1948, *C. nigronasutum* Reuter, 1878 and *C. simillimum* Jakovlev, 1882 (Önder et al., 2006; Konstantinov et al., 2016; Çerçi and Koçak, 2016). It is easy to distinguish *C. unicolor* from other *Campylomma* species present in Turkey by its antennae being totally unicolorous in both sexes. The only other species showing this feature is *C. nigronasutum* from which *C. unicolor* can be distinguished by the lack of the black spot on the tylus (Konstantinov et al., 2016). *Campylomma unicolor* distributes in Israel, Jordan, Saudi Arabia, Iraq, Iran, Yemen, United Arab Emirates as well as in Africa from Senegal to Egypt (Konstantinov et al., 2016). This species is recorded from Turkey for the first time.

Distribution in Turkey: Mersin (This work).

Campylomma vandicarinum Carapezza, 1991
(Fig. 2B-C)
Material examined: Karaman: Merkez, 01.07. 2017, 23♂♂, 37♀♀, Ö. Koçak leg., B. Çerçi det.

This is a rare species distributing only in Sicily and Tunusia. It is the only representative of the genus feeding on *Juniperinus* (Carapezza, 1991). We have collected dozens of specimens with UV-light trapping. The specimens we have examined differ from the typical form in the following characters: ocular index in male 1.3-1.6 (in *Campylomma vendicarina* 1.5), in female 1.6-1.8 (in *Campylomma vendicarina* 2.0); length of third tarsal segment of posterior tarsus/that of second tarsal segment of posterior tarsus ratio 1.1-1.35 (in *Campylomma vendicarina* 1.0); vesica without any spines or teeth on the anterior blade (in *Campylomma vendicarina* anterior blade is occupied with small teeth). The reason why our specimens differ from the original description of *C. vendicarinum* is that we had the chance to examine plenty of specimens. Totally black appearance and black first two antennal segments in both sexes make this species easy to distinguish from all the other Palearctic species of the genus *Campylomma*. The discovery of this species in the middle of Anatolia proves the fact that studies to show the Heteroptera fauna of eastern Mediterranean region is not adequate. Most probably this species is already widely distributed in east Mediterranean region.
Distribution in Turkey: Karaman (This work).

Capsodes gothicus (Linnaeus, 1758)
Material examined: Karaman: Mendereslik, 28. 05. 2017. 1♂, 3♀♀, Ö. Koçak leg., B. Çerçi det.; Bartın: Tuzcular, 04. 06. 2017. F. Eren leg., B. Çerçi det.

This is a common species in Europe and it is widely distrubured in Palearctic region from Spain to China (Kerzhner and Josifov, 1999). Even though plenty of researches have been done on the Miridae fauna of Turkey, this species has not been recorded from Turkey yet. We finally report this species from Turkey based on the species collected from Karaman and Bartın.
Distribution in Turkey: Karaman, Bartın (This work).

Leucodellus zagdani (Putshkov, 1970)
(Fig. 3A)
Material examined: Ordu: Çavuşlar, 28. 06. 2017. 1♂, B. Çerçi leg. and det.

This species was firstly described from Caucasian region of Russia as *Heterochlorillus zagdani*. It had been transferred to the genus *Leucodellus* by Li and Liu (2007). It is very similar to the closely related *L. amydali* (Linnavuori, 1965), an endemic species of Anatolia, and differs from it only in the slightly different coloration of the hemelytra with presence of only one big dark pattern on the corium. In contrast, *L. amygdali* constantly has numerous dark patterns on the corium. Also, the host plants of both species are different, *L. zagdani* is associated with *Corylus* sp. while *L. amygdali* is only collected from *Amygdalus* sp. There is no difference between the genital structure of both species (Konstantinov, 2012). We have collected the examined specimen from a *Corylus* sp. tree. It is distributed in Caucasian region of Russia, Azerbaijan and Georgia so its discovery in Ordu is not unexpected.
Distribution in Turkey: Ordu (This work).

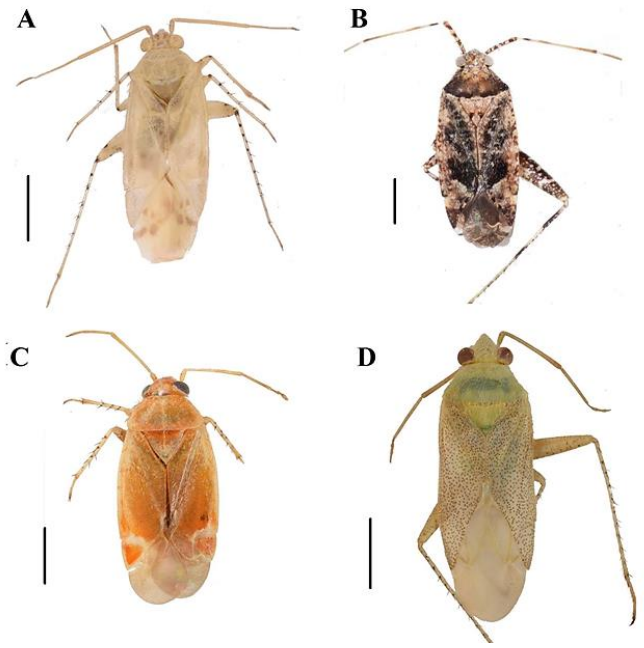

Figure 3. A- *Leucodellus zagdani* (Putshkov, 1970), Ordu, ♂ (Scale: 1 mm); **B**- *Phytocoris (Exophytocoris) scitulus scitulus* Reuter, 1908, Karaman, ♂ (Scale: 1 mm); **C**- *Psallus (Psallus) cruentatus* (Mulsant and Rey, 1852), Karaman, ♂ (Scale: 1 mm); **D**- *Solenoxyphus punctipennis* (Reuter, 1879), Karaman, ♂ (Scale: 1 mm).

Phytocoris (Exophytocoris) scitulus scitulus Reuter, 1908
(Fig. 3B)
Material examined: Karaman: Merkez, 29. 06. 2017, 4♂♂, Ö. Koçak leg., B. Çerçi det.

This species was firstly described from Adjikent,

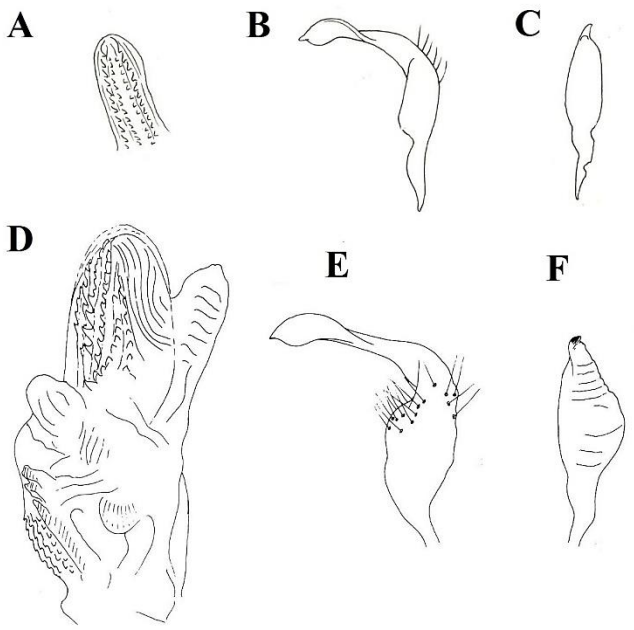

Figure 4. **A**- *Phyotocoris (Exophytocoris) parvuloides* Wagner, 1961, comb-like spiculum of the vesica; **B**- *idem*, left paramere; **C**- *idem,* right paramere; **D**- *Phytocoris (Phytocois) malickyi* Rieger, 1995, comb-like spiculum of the vesica; **E**- *idem,* left paramere; **F**- *idem,* right paramere (**A** to **C** originated from Wagner, 1974; **D** to **F** originated from Rieger, 1995).

Transcaucasia by Reuter (1908). It can be distinguished from the *Phytocoris* species present in Turkey by the comb-like spiculum of the vesica having only 5-6 big and sparse teeth. It is now known from Bulgaria, Croatia, Moldovia, Russia, Azerbaijan, Armenia, Iran and Georgia (Kerzhner and Josifov, 1999; Linnavuori, 1999; Kment et al., 2005). The examined specimens were collected by UV-light trap. The subspecies *P. scitulus frater* Kerzhner, 1964 is only known from Ukraine and differs from the nominotypical subspecies by being slightly smaller, having 6 toothed spiculum and the ocular index of male a little bit larger (Linnavuori, 1974). This species was mentioned by Yazıcı and Yıldırım (2016) in an article about distributional data on Mirini fauna of Turkey. They had examined only one female specimen from Antalya. We believe that identification of a species of such a complex genus as *Phytocoris* based on a single female is not reliable. Maybe the authors also realized this fact and did not mention this discovery elsewhere in their publication. It is recorded from Turkey for the first time in this paper.

Distribution in Turkey: Karaman (This work).

Phytocoris (Exophytocoris) parvuloides Wagner, 1961
(Fig. 4A-F)

Phytocoris (Phytocoris) malickyi Rieger, 1995 syn. n.

Phytocoris (E.) parvuloides is an endemic species of Crete described by Wagner in 1961 (Wagner, 1961). According to Wagner (1961), it is similar to *Phytocoris (Exophytocoris) parvulus* Reuter, 1880 and is characterized by the hemelytra with brown spotted area with a pale area posterior and anterior of it and the comb-like spiculum of the vesica having a membranous continuation with lots of little teeth on it. Both of these characteristics can be found in the description of *P. (P.) malickyi* Rieger, 1995 which was described from Crete (Rieger, 1995). In the original description, the author has not compared *P. malickyi* with *P. parvuloides*. Mr. Rieger kindly shared the colored photo of the holotype with me and after comparing the photo of the holotype and the original paper of *P. malickyi* with the original description of the *P. parvuloides,* it is obvious that both are the same species, therefore *P. malickyi* Rieger, 1995 is a synonym of *P. parvuloides* Wagner, 1961.

Psallus (Psallus) cruentatus (Mulsant and Rey, 1852)
(Fig. 3C)

Material examined: Karaman: Kazımkarabekir, 30. 06. 2017, 1♂ 1♀, Ö. Koçak leg., B. Çerçi det.

The genus *Psallus* consists of plenty of similar species which mostly can only be distinguished by the examination of the male genitalia. *P. cruentatus* has the characteristic appearance of the *Psallus* species such as *P. varians, P. flavellus* and *P. lepidus.* It is known from Austria, Bulgaria, Chekia, France, Germany, Italy, Russia, Slovenia, Azerbaijan, Armenia, Georgia and Iran (Kerzhner and Josifov, 1999; Kment and Bryja, 2001; Linnavori, 2007). See (Wyniger, 2004) for the male genitalia. It lives on *Quercus* spp. New record for the fauna of Turkey.

Distribution in Turkey: Karaman (This work).

Solenoxyphus punctipennis (Reuter, 1879)
(Fig. 3D)

Material examined: Karaman: Merkez, 01. 07. 2017; 1♂ 1♀, Ö. Koçak leg, B. Çerçi det.; 10. 08. 2017; 1♂, Ö. Koçak leg., B. Çerçi det.

This species was synonymized with *Solenoxyphus adsperus* by Linnavuori (1961). After examination of both species, *S. punctipennis* was erected to the species level

by Konstantinov (2008). It is similar to *S. adspersus* but can be readily distinguished from it by the regular distribution of the much smaller dots on the hemelytra. Other species of the genus *Solenoxyphus* known from Turkey are *S. fuscovenosus* (Fieber, 1864) and *S. alkani* Önder, 1975. *Solenoxyphus punctipennis* can also be distinguished from both of these species by the same characters mentioned for the separation of *S. adspersus*. *Solenoxyphus punctipennis* is known from Georgia, Azerbaijan, Armenia, Dagestan, Asian part of Kazakhstan, Turkmenistan, Iran, Uzbekistan, Kyrgyzstan, Tajikistan and Northwestern China (Konstantinov, 2008). Examined specimens were collected by UV-light trap.

Distribution in Turkey: Karaman (This work).

Discussion

This study is a continuation of our last two papers on the new Heteroptera species for the fauna of Turkey (Çerçi and Koçak 2016, 2017). In total, we have recorded 29 new species for the fauna of Turkey based on specimens collected between 2011 and 2017. Following 29 species have been recorded from Turkey for the first time in these studies:

Çerçi and Koçak (2016):

- *Hydrometra gracilenta* Horváth, 1899
- *Halosalda lateralis* (Fallén, 1807)
- *Deraeocoris flavilinea* (A. Costa, 1862)
- *Eurystylus bellevoyei* (Reuter, 1879)
- *Orthotylus (Parapachylops) caprai* Wagner, 1955
- *Damioscea komaroffii* (Jakovlev, 1879)
- *Amphiareus obscuriceps* (Poppius, 1909)
- *Zelus renardii* (Kolenati, 1857)
- *Pasira marinadolina* Putshkov and Moulet, 2003
- *Liolobus walkeri* (Saunders, 1876)
- *Amnestus pusillus* Uhler, 1876
- *Fromundus pygmaeus* (Dallas, 1851)

Çerçi and Koçak (2017):

- *Heegeria tangirica* (Saunders, 1877)
- *Brachysteles parvicornis* (Costa, 1847)
- *Dicyphus (Mesodicyphus) martinoi* Josifov, 1958
- *Campylomma simillimum* Jakovlev, 1882
- *Orthotylus (Melanotrichus) rubidus* (Puton 1874)
- *Orthotylus (Litocoris) ericetorum arboreae* Wagner, 1969

This work:

- *Amphiareus constrictus* Stål, 1860
- *Anthocoris simulans* Reuter, 1884
- *Halyomorpha halys* (Stål, 1855)
- *Engistus exsanguis exsanguis* Stål, 1872
- *Campylomma unicolor* Poppius, 1914
- *Campylomma vandicarinum* Carapezza, 1991
- *Capsodes gothicus* (Linnaeus, 1758)
- *Leucodellus zagdani* (Putshkov, 1970)
- *Phytocoris (Exophytocoris) scitulus scitulus* Reuter, 1908
- *Psallus (Psallus) cruentatus* (Mulsant and Rey, 1852)
- *Solenoxyphus punctipennis* (Reuter, 1879)

Our results contribute to a better knowledge of the Heteroptera fauna of Turkey. It also shows that the Heteroptera fauna of Turkey still is not fully illustrated and is in need of further researches. We believe that these researches should be concentrated on new species for the fauna of Turkey and new species for the science. In this aspect, we will describe several Heteroptera species and a Heteroptera genus new to the science from Turkey in the following years and want to encourage other specialists to describe new Heteroptera species from Turkey as well.

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