



FAUNISTIC NOTE

Acanalonia conica (Hemiptera, Acanaloniidae) – a new exotic species in Bulgaria and Türkiye and its expansion in Europe

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Abstract

The green cone-headed planthopper, *Acanalonia conica* (Say, 1830) (Hemiptera, Fulgoromorpha, Flatidae), is native to North America and is already found in several European countries. The species is found to occur in Bulgaria and Türkiye for the first time and is the first representative of the family Acanaloniidae in both countries. The localities in Bulgaria where the species has been recorded are in the town of Malko Tarnovo, near the Turkish border, while the locality in Türkiye is in the Asiatic part of Istanbul. Data on the current distribution range in Europe, a list of plants on which *A. conica* has been found, and photos of the species are provided.

Keywords

alien species, allochthonous species, biological invasion, distribution, green cone-headed planthopper, new record.

Family Acanaloniidae Amyot and Serville, 1843 is a relatively small family of Fulgoromorpha (Hemiptera). There are only 6 genera in the family; however, the

richest of these is the nominate *Acanalonia* Spinola, 1839 with 62 described species and 4 subspecies (Bourgoin 2022; Stroński et al. 2022). The genus is widespread in the New World. Until 2022, the green cone-headed planthopper *A. conica* (Say, 1830), native to the USA and known from south-eastern Canada (Bartlett 2020), was the only member of the family known to have been introduced into Europe. The Nearctic planthopper species *A. bivittata* (Say, 1825) has only recently been established in Italy (Sanna and Poggi 2022). *Acanalonia conica* was first recorded in Europe in 2003 in a garden in the province of Padua, Italy (D'Urso and Uliana 2006). An expansion in the urbanized province of Verona was observed between 2005 and 2007 (Nicoli Aldini et al. 2008), and preferred habitats, phenology and host plants were detailed in the same paper. In 2014, more than 10 years after its initial discovery in Italy, the species was recorded in Switzerland (Trivellone et al. 2015) in an urbanized area relatively close to the Italian border. In 2016, *A. conica* was also found in Bucharest, Romania (Chireceanu et al. 2017), again in urbanised habitats. In the same year, it was collected in Hungary (Kóbor et al. 2021). Between 2017 and 2018 the species was also recorded in Slovenia (Seljak 2018), in Nova Gorica and its surroundings. In 2018 the species was collected for the first time in Slovakia, in an garden center in Galanta (Janský et al. 2021). More recently, in 2019, the species was discovered in Novi Sad, Serbia (Sciban and Kosovac 2020), Austria (Holzinger et al. 2020) and France (Pelozuelo et al. 2020).

This study presents the first records of the Nearctic planthopper *A. conica* in Bulgaria and Türkiye, extending its known range to the Bosphorus in the east.

Materials and methods

The specimens of *A. conica*, used for the morphological studies are collected in Bulgaria, and the record in Türkiye is based on a visual observation of iNaturalist occurrence. The specimens were collected during a field survey in urban green areas in the town of Malko Tarnovo, Bulgaria using a sweeping net. The specimens were photographed using a Canon 70D DSLR camera with a Canon MP-E 65mm macro lens and a Yongnuo YN-24EX macro flash. Morphological features, including male genitalia, comparative material from Italy and the key in Freund and Wilson (1995) were used for identification. All studied material is dry mounted, individually numbered and stored in the Zoological Collection of Sofia University (BFUS).

The species record from Türkiye comes from iNaturalist, a social network of naturalist citizen scientists (kuthan_c 2020). Due to the typical habitus and body colouration, we consider the photo to be reliable evidence for the presence of the species in Istanbul, Türkiye.

A distribution map (Fig. 1) of new localities of *A. conica* was created with QGIS (QGIS Development Team 2019) using QuickMapServices plugin (NextGIS 2022), OpenStreetMap layer (OpenStreetMap contributors 2015). The map of *A. conica*

records in Europe (Fig 2) was created with the same GIS software using Countries 2020 layer (Eurostat/GISCO 2020).

***Acanalonia conica* (Say, 1830) (Figs 3–5)**

Material examined: Bulgaria - 3♂♂ 3♀♀; Burgas province, Malko Tarnovo, near the firestation, on *Clematis vitalba* Linnaeus, 1753; 41°58'55"N, 27°31'09"E; 340 m a.s.l.; 18.VIII.2022; I. Gjonov and M. Pramatarova leg; BFUS-I-IG021312, BFUS-I-IG021313, BFUS-I-IG021318, BFUS-I-IG021314, BFUS-I-IG021315 and BFUS-I-IG021316; 1♂ 1♀; same place and collectors; 18.08.2022; BFUS-I-IG021337 and BFUS-I-IG021334); 3♂♂ 2♀♀1exuvium; Burgas province, Malko Tarnovo, city garden, on *Styphnolobium japonicum* (L.) Schott, 1830, *Robinia pseudoacacia* (Linnaeus, 1753), *Amorpha fruticosa* Linnaeus, 1753 and *Maclura pomifera* C.K.Schneid., 1906; 41°58'43N, 27°31'56"E; 350 m a.s.l.; 19.VIII.2022; I. Gjonov and M. Pramatarova leg; BFUS-I-IG021344, BFUS-I-IG021345, BFUS-I-IG021346, BFUS-I-IG021347 and BFUS-I-IG021348 and BFUS-I-IG021343 (Fig. 3); 5♂♂ 3♀♀; same place, date and collectors, on *Philadelphus* sp.; BFUS-I-IG021352, BFUS-I-IG021353, BFUS-I-IG021354, BFUS-I-IG021355, BFUS-I-IG021356, BFUS-I-IG021349, BFUS-I-IG021350 and BFUS-I-IG021351; 1♂; same place, date and collectors, on *Tamarix gallica* L. (1753); BFUS-I-IG021357; 7♂♂ 4♀♀; same place and collectors, on *Clematis vitalba*; 20.VIII.2022; BFUS-I-IG021323, BFUS-I-IG021324, BFUS-I-IG021325, BFUS-I-IG021326, BFUS-I-IG021327, BFUS-I-IG021328, BFUS-I-IG021329, BFUS-I-IG021319, BFUS-I-IG021320, BFUS-I-IG021321 and BFUS-I-IG021322.

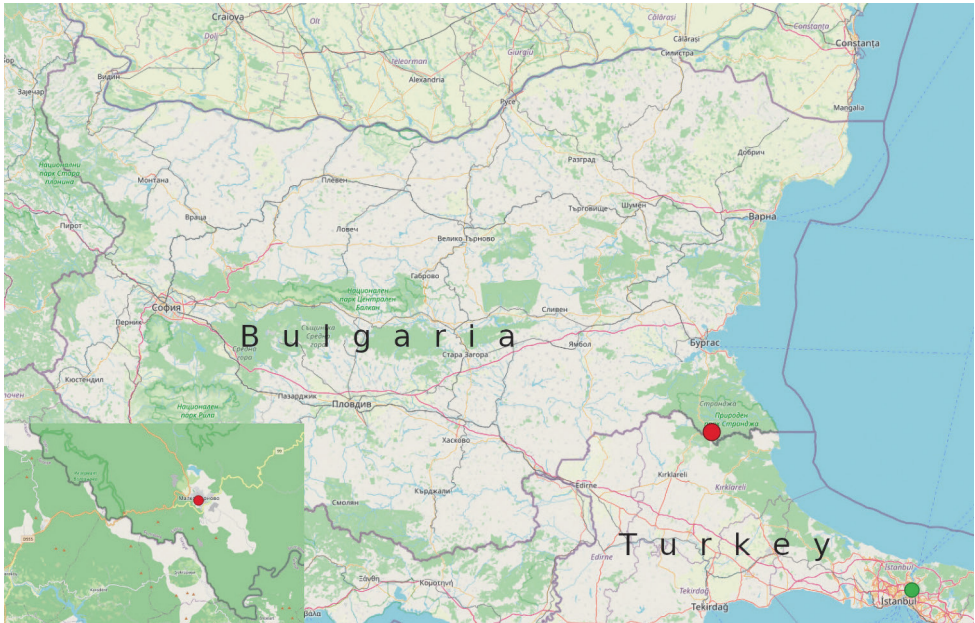


Figure 1. A map with the locations of *Acanalonia conica* in Bulgaria and Türkiye.

Italy - 1♂1♀; Province of Padova, region of Veneto, Rosara di Codevigo; 45°17'21"N; 12°06'00"E (approx.); 5 m a.s.l.; 20.07.2009; M. Uliane leg.; BFUS-I-IG021358, BFUS-I-IG021359).

Additional data: Türkiye, Istanbul (Asian part), Aktaş Boğaziçi Evleri Yolu, Üsküdar, 41°04'08"N; 29°04'15"E 08.08.2020, observed and photographed by a user named "kuthan_c" under Creative Commons NonCommercial license - <https://www.inaturalist.org/observations/68909108>) (kuthan_c and iNaturalist 2020).

Due to the typical habitus and body colouration, we consider the photo to be reliable evidence for the presence of the species in Istanbul. There is a possible scenario that another Nearctic species, known or undescribed, has been introduced into Türkiye. The lack of morphological examination of the specimens from Istanbul leads to the postulate that the observed species may belong to such a species. However, when compared to the probability that a species previously introduced into Europe and with a clear tendency to radiate has arrived in the Bosphorus, the likelihood of this conjecture is trivial.

The Nearctic planthopper species, *A. conica*, is the first representative of the family Acanaloniidae in Bulgaria and Türkiye. It has been recorded in several European countries – France, Italy, Switzerland, Austria, Slovakia, Hungary, Slovenia, Serbia and Romania. The discovery is unsurprising given its expanding range in recent years, and new data shows that its range extends east of the Bosphorus (Fig. 2).

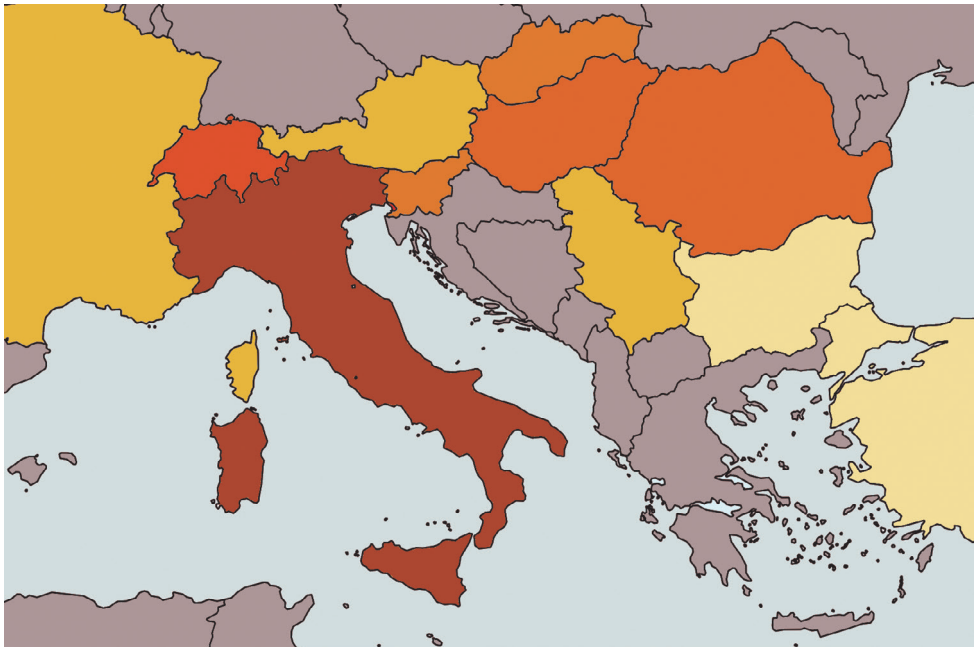


Figure 2. Map of *Acanalonia conica* records in Europe: in darker colour – earlier records, lighter colour – more recent records.



Figure 3. An adult of *Acanalonia conica*, Malko Tarnovo, 19.08.2022.

In both countries, Bulgaria and Türkiye the localities are in urban environments – two in the town of Malko Tarnovo and one in Istanbul. Due to the data from Türkiye (Istanbul) being based only on photos published in iNaturalist, additional information on the species' biology is missing, including its host plants.

In Bulgaria, apart from adults, there were no nymphs found, only an exuvia (Fig. 4) and a paler specimen, leading us to believe it was freshly emerged. This probably means that the preimaginal stages of *A. conica* in the area had already been completed before the studied period (second half of August), which is consistent with the literature, according to which nymphs are found from late June (D'Urso and Uliana 2006; Seljak 2018). *Clematis vitalba* Linnaeus, 1753 (Ranunculaceae) was the plant on which *A. conica* was mostly collected in the established localities in Bulgaria, although efforts were also focused on other plants. However, in the city garden of Malko Tarnovo it was also found on a wide range of undergrowth shrub species, both exotic and native. The oviposition of an adult female on a branch of *Amorpha* sp. (Fabaceae) was observed and photographed (Fig. 5), confirming the information provided by D'Urso and Uliana (2006). The plants on which the species was found in our study are the following: *Styphnolobium japonicum* (L.) Schott, 1830, *Robinia pseudoacacia* (Linnaeus, 1753) and *Amorpha fruticosa* Linnaeus, 1753 (Fabaceae), *Philadelphus* sp. (Hydrangeaceae), *Maclura pomifera* C. K. Schneid., 1906 (Moraceae), *Clematis vitalba* Linnaeus, 1753 (Ranunculaceae), *Tamarix gallica* L. (1753) (Tamaricaceae).

Many non-native insect species have been observed along the Black Sea coast, such as *Orosanga japonica* (Melichar, 1898) (Hemiptera, Ricaniidae) (Gjonov 2013; Akiner et al. 2022) and *Metcalfa pruinosa* (Say, 1830) (Hemiptera, Flatidae) (Preda and Skolka 2011). Despite numerous collecting trips in the Malko Tarnovo area, *M. pruinosa*, which is widespread in large urban parks and along the coast, was established there almost a decade after its initial introduction in Bulgaria and at least five years after it became common along the Black Sea coast (unpublished personal observations). Given the relatively large research efforts on the Auchenorrhyncha fauna of the southern Black Sea coast of Bulgaria, including urbanized areas, it is unlikely that a large and highly distinctive species like *A. conica* would go unnoticed. However, Malko Tarnovo is isolated both geographically and economically from the rest of Bulgaria due to its mountainous terrain, remoteness, low population density, and limited transportation links. The only major traffic exchange in the area is the international traffic from Türkiye to Burgas and vice versa. As the occurrence data of *A. conica* in Türkiye predate those in Bulgaria, and given the proximity of the Bulgarian localities to the Turkish border and an international road with high cross-border traffic, a plausible hypothesis is that the species entered Bulgaria from Türkiye.

Based on the literature and new data, it can be concluded that since its initial introduction into Europe, the species has mainly adhered to ruderal habitats without causing serious damage to agricultural or wild plants. However, given its known



Figure 4. An exuvia of *Acanalonia conica*, Malko Tarnovo, 19.08.2022.



Figure 5. A branch with *Acanalonia conica* eggs on *Amorpha fruticosa*, Malko Tarnovo, 19.08.2022.

distribution, it is expected to be found in many other ruderal sites, and its mass reproduction may cause damage to park or ornamental plants.

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