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Research article

New records of the oleander seed bug *Caenocoris nerii* (Germar, 1847) (Insecta: Hemiptera) in Bulgaria and notes on its hosts in the Black Sea region

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Abstract: The oleander seed bug *Caenocoris nerii* (Germar, 1847) is a Mediterranean species associated primarily with Apocynaceae host plants that has been expanding its range northward in recent decades. We report new records of *C. nerii* in Bulgaria and discuss the distribution and the hosts of the species in the Black Sea region. Analysis of regional occurrence data revealed a clear northward range expansion since 2000, with very recent records from Croatia, Bosnia-Herzegovina, Serbia, and Romania. In Bulgaria, reproduction appears limited to areas where the primary host plant *Periploca graeca* occurs in suitable density, particularly in Black Sea wooded dunes and Flooded forests of Common alder (*Alnus glutinosa*). The timing and pattern of establishment suggest climate-mediated range expansion, as rising winter temperatures progressively remove thermal barriers that historically confined the species to the Mediterranean region. Our findings indicate that *C. nerii* is likely to continue spreading northward across the Danube River and Thracian lowland in areas with both suitable climatic conditions and host plant availability.

Keywords: climate change, Lygaeidae, milkweed bugs, *Periploca graeca,* range expansion

Introduction

Caenocoris nerii (Germar, 1847) is the only representative of the genus *Caenocoris* Fieber, 1860 recorded in the Palaearctic. It is associated with plants of the family Apocynaceae: *Nerium oleander* (Péricart, 1998; Streito et al., 2015); *Periploca laevigata* (Péricart, 1998; Zito & Sajeva, 2012); *P. graeca, P. angustifolia* (Cuesta Segura et al., 2010; Gianguzzi et al., 2025); *Cynanchum acutum* (Martinović et al., 2023); and *Calotropis gigantea* (Thangavelu, 1980), feeding usually on the fruits and seeds (Evans et al., 1986) and laying eggs on the leaves (Sweet, 2000). Occasionally it has been found on other plants: *Phoenix canariensis* (Streito et al., 2015), *Lonicera implexa* (Cuesta Segura et al., 2010), *Cedrus, Fraxinus, Styrax, Tamarix* spp. (Lodos et al., 1999), and ornamental *Chrysanthemum* spp. (Šeat et al., 2019). These records likely represent incidental occurrences rather than true trophic associations, as the species seems to be reliant on Apocynaceae hosts. The oleander seed bug stores toxins in its body which originate from its hosts of this family, and its aposematic ation signals its toxicity to potential predators (Von Euw et al., 1971).

The species is widely distributed from the Mediterranean Region and Arabian Peninsula to tropical Africa and Oriental Region (Péricart, 2001). In the last two decades, several new records show its northward spread – from coastal Provence and Languedoc (Streito et al., 2015) through the Adriatic coasts of Croatia and Bosnia-Herzegovina (Marti-

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nović et al., 2023) to inland Serbia (Šeat et al., 2019) and Romania (Radac, 2022).

Until this study, the species was recorded only twice in Bulgaria. The first record was from the southernmost part of the country (Rupite near Petrich) in May 1995 (Josifov, 1999) – a single specimen was observed and collected in aggregation of another milkweed bug species *Tropidothorax leucopterus* (Goeze, 1778). For the second time, the species was recorded in the late spring of 2010: two specimens at a very unusual place – above forest limit of the Vitosha Mt, on snow patches (Simov, 2011). This record is far away from the closest localities of *C. nerii* on the Balkan Peninsula and the observed specimens were probably transported by Mediterranean cyclones, which are characteristic for the late spring and early summer period (Simov, 2011).

In the present paper, we report the first evidence of reproduction of *C. nerii* in Bulgaria and provide a provisional evaluation of the relationship between this true bug species and *Periploca graeca,* its host plant in the Black Sea Region.

Material and methods

Material was collected on the Black Sea Coast in 2020 and in the Tundzha River Valley in 2024. Branch beating of *P. graeca* was used to collect *C. nerii* specimens on the Black Sea Coast. Visual inspection of the host plant *Periploca graeca* was also conducted to identify feeding damage by the true bugs. Sticky coloured traps (PAL, PALz, and other variants) with four types of visual stimulus – fluorescent-yellow, transparent, green and purple colour were deployed in the Tundzha River Valley. There were three replicates (at the same time) per colour, so in total 12 traps were checked and replaced every 7–14 days. The traps were installed from April till October 2024 in a Bulgarian Oil Rose plantation close to Gabarevo Village; coordinates of the centre of the sampling site: 42.636273 N, 25.158074 E.

Additionally, authors' records from neighbouring countries are included, records of the species were also obtained from GBIF.org (2025a): we downloaded a dataset containing all of the available 1461 records of *C. nerii*. Then in QGIS 3.44 (Dawson et al. 2025), we filtered these records using latitude/longitude min/max: longitude min = 20.296 E, longitude max = 43.375 E; latitude min = 33.819 N, latitude max = 50.137 N. This way we reduced the dataset to 94 records of *C. nerii* in the eastern Mediterranean region and in the Black Sea region (Supplementary material 01). In case when photos were connected to the respective record we visually inspected: 1) if the species on the photos were indeed *C. nerii;* 2) if the insect was photographed on a plant, we tried to identify the host on the picture. This approach was reliable since *C. nerii* has very distinctive habitus and colouration which allowed us to verify the true bug records by photos only. Additionally, its main Apocynaceae hosts are more or less easy to distinguish on a photograph, as well. Records of *P. graeca,* which is among the main host plants of *C. nerii,* were obtained from GBIF.org (2025b).

Results and discussion

Occurrences of *Caenocoris nerii* in Bulgaria

Published records: Bulgaria: Blagoevgrad Province, Rupite, 41.457548 N, 23.270511 E, 1 adult in *Tropidothorax leucopterus* aggregation, 18.IX.1995 (Josifov, 1999); Sofia City Province, Vitosha Mt, Konyarnika, 1885–1969 m a.s.l., 42.584457 N, 23.250321 E, 7.V.2010, 2 specimens collected on snow patches (Simov, 2011).

New records: Bulgaria: Black Sea Coast: Burgas Province: near Rezovo Village, 41.985244 N, 28.029795 E, on *Periploca graeca,* 3–5.IX.2020, leg. N. Simov; near Rezovo Village, 41.984511 N, 28.028975 E, nymphs and adults on *Periploca graeca,* 6.IX.2020 (Fig. 1), leg. N. Simov; near Silistar Beach, 42.023574 N, 28.008522 E, nymphs and adults on *Periploca graeca,* 7.IX.2020, leg. N. Simov; Tundzha River Valley: Stara Zagora Province; near Gabarevo Village, in a rose plantation, 42.636273 N, 25.158074 E, 1 adult collected by a green sticky trap, in the period 1–10.X.2024; 1 adult collected by a purple sticky trap, in the period 1–10. X.2024, leg. L. Lozanova, T. Baneva.

Distribution and host plants of *Caenocoris nerii* in the Black Sea Region

Caenocoris nerii belongs to the Mediterranean complex (Josifov, 1999), therefore a milder climate in



Fig. 1. Host plant, nymphs and adults of the oleander seed bug in Bulgaria: a) *Periploca graeca* – the host plant of *C. nerii* in Bulgaria, photographed on the Black Sea Coast, Rezovo Village; b) an adult specimen of *C. nerii;* c-d) nymphs in different stages on seed pods of the host plant. The traces of the bug's piercing are well visible – black dots and remains of milky latex droplets.

a given region is important prerequisite for the establishment of this species. The timing of *C. nerii* establishment in Bulgaria supports the possibility that this species has shifted northwards due to climate change. Despite the Black Sea coastline being well-studied and frequently visited (Josifov, 1974), the species has not been reported from this region before this paper. Although *C. nerii* apparently disperses readily by wind currents (Simov, 2011), its establishment and reproduction in Bulgaria occurred most likely within the last 15 years. Climate change appears to be a primary driver of this northward range expansion, similar to patterns observed in other species (Rabitsch, 2008). It could be assumed that among the main limiting factors in Europe are the lower winter temperatures which prevent the species expansion to north (compared to the observed in the Mediterranean Region). However, temperatures (both annual mean and annual minimum) in Europe have risen significantly above historical baselines, with projections indicating continued warming (European Environment Agency, 2025). Such warming progressively removes the barrier of low winter temperature that historically confined *C. nerii* to the Mediterranean Region, now allowing expansion toward higher latitudes (Fig. 2).

The natural range of the primary Apocynaceae hosts of *C. nerii* (see Fig. 3) is also almost entirely within the hot-summer Mediterranean Region of the Köppen-Geiger climate classification (see Peel et al., 2007). It should be noted that some of the host plants of *C. nerii* are used as ornamental plants outside their natural ranges and typical habitats. However, we assume that for the establishment of *C. nerii* in a given area the hosts should be in higher densities than the occasional individuals planted in gardens and parks. Since the adults of this species mostly feed on fruits and seeds of a given host, for the establishment

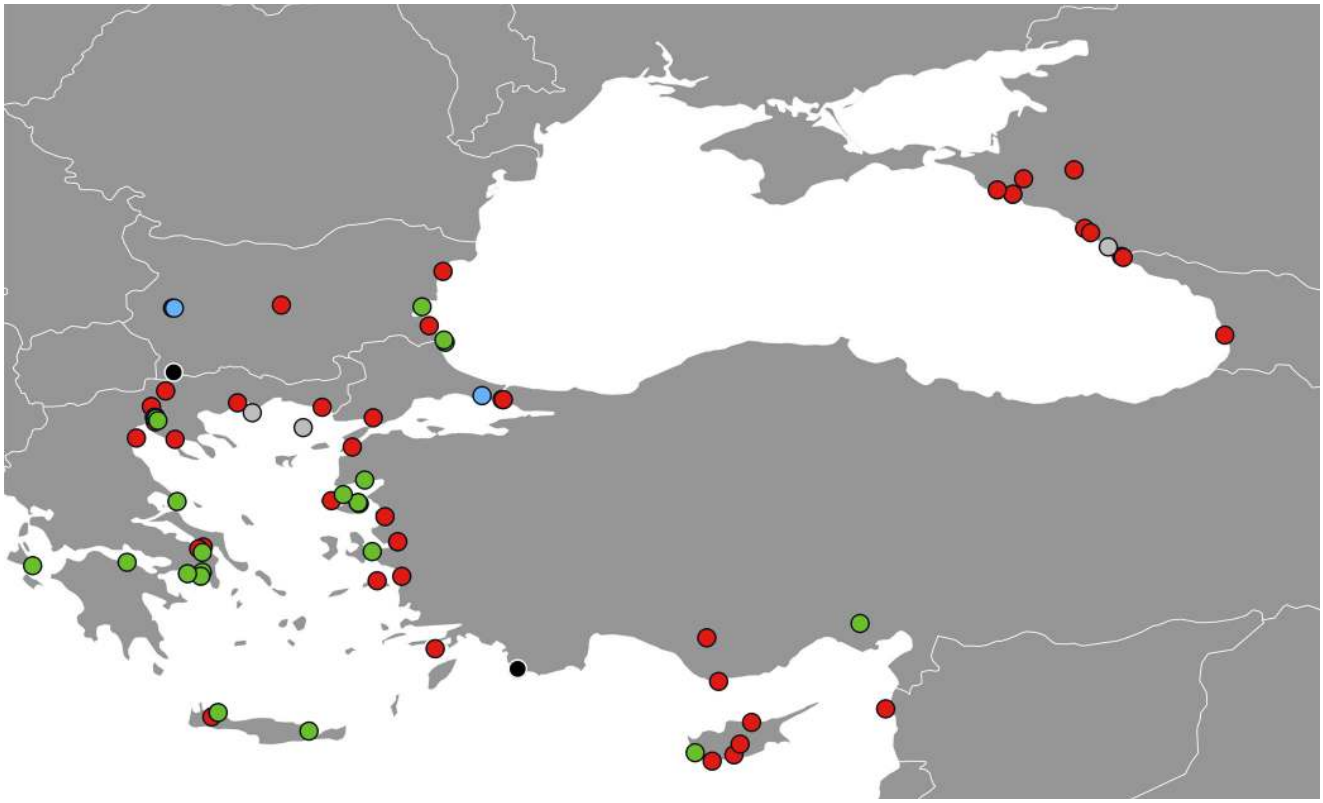


Fig. 2. Records of *Caenocoris nerii* in the study region between 1919 and 2025: black, 1919–2000; grey, 2000–2010; blue, 2011–2015; green, 2016–2020; red, 2021–2025.

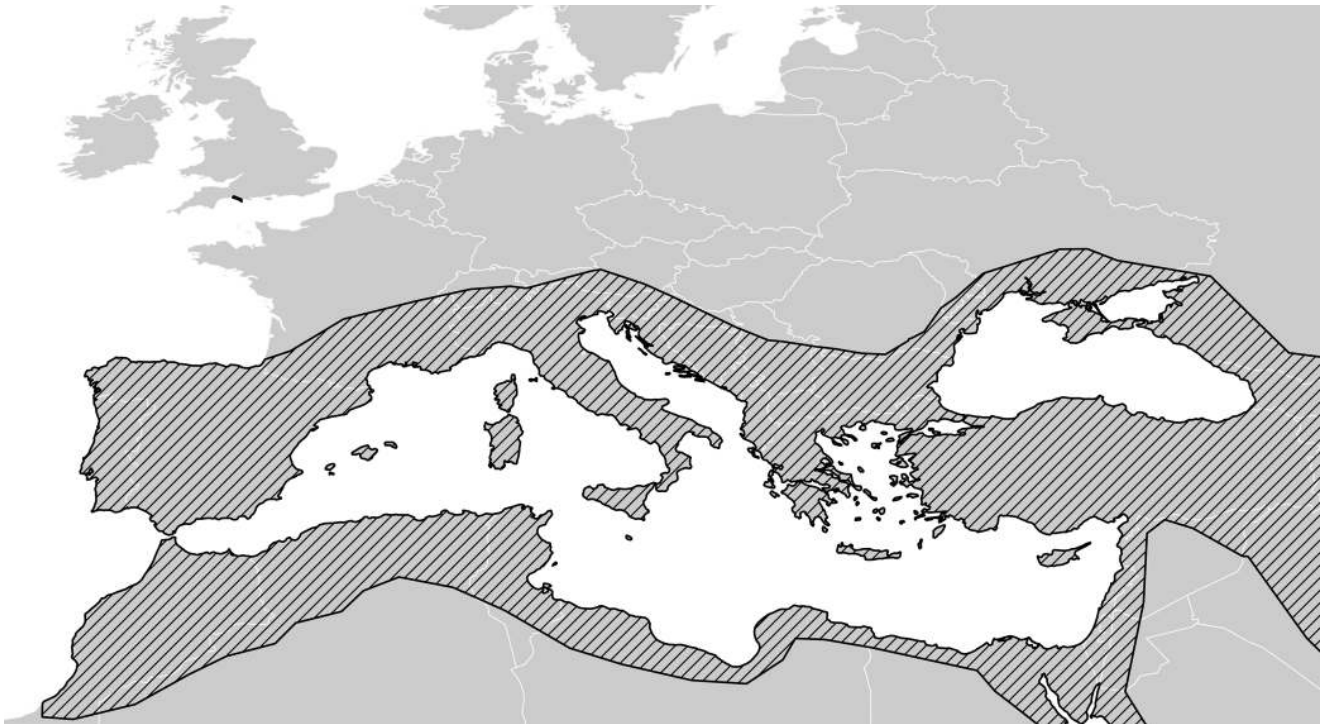


Fig 3. Distribution of the main hosts from Apocynaceae family: *Nerium oleander, Periploca graeca,* and *P. angustifolia;* following the description of their range in Goula (2023), and in Plants of the World Online (2025).



Fig. 4. Records of *Caenocoris nerii* with host plant data: black star – on *Periploca graeca,* grey square – on *Nerium oleander,* black square – on *Cynanchum acutum,* triangle – on snow, black circle – on sticky traps in the rose field, white circle – the species has been photographed on artificial surfaces, not on a host plant. Arrows refer to the new records.

of *C. nerii* in a locality, the host should be able to produce fruits.

While in the Mediterranean Region the species is mainly associated with *Nerium oleander,* noticeably less studied were other host plant and habitat associations of *C. nerii* in the Black Sea Region. Based on the records from GBIF and our new data (Fig. 4), in the Black Sea Region, the main host of *C. nerii* seems to be the silkvine, *Periploca graeca* – eight records of the true bug, close to the Black Sea coast, were associated with *P. graeca* (Fig. 4). The rest (thirteen) of records of the true bug close to the Black Sea coast were individuals found on other surfaces like wall, floor, stones, pavement and ext. In Bulgaria, the only records of nymphs were from *P. graeca,* and the rest were single adults, most likely migrating ones. Therefore, we assume that the presence of host plant *P. graeca* is necessary for the successful reproduction and development of the *C. nerii* species in the region.

Considering the observed relationship between *C. nerii* and *P. graeca* in the area near the Black Sea coast, we suggest that other locations with *P. graeca* in the region might be suitable for *C. nerii* as well (see Fig. 5). Therefore, sampling in these locations with no or scarce data on *C. nerii* is highly advisable in the future. For instance, potentially suitable habitats might exist in the coastal areas of Romania and Ukraine, and support for our assumption is the recent record of *C. nerii* from Romania, but unfortunately, without exact locality or host plant data (Radac, 2022).

In Bulgaria, the records of reproducing oleander seed bug were associated with *P. graeca,* from two localities and habitat types which belong to Black Sea wooded dunes and Flooded forests of Common alder (*Alnus glutinosa*). These habitat types are listed as endangered in the Red Book of the Republic of Bulgaria (Biserkov et al., 2011) and correspond to the NATURA 2000 habitats: 2180 Wooded dunes of the Atlantic, Continental and Boreal region and 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (Biserkov et al., 2011). According to Glogov et al. (2021), *Periploca graeca* could be used as a diagnostic species of the latest type of habitat. Other



Fig. 5. Records of *Periploca graeca:* white circles – records downloaded from GBIF, black circles – records obtained from Glogov et al. (2021).

habitat types in Bulgaria with *P. graeca* are Riparian and lowland mixed woodlands and longoses and Willow-poplar galleries of South Bulgaria (Biserkov et al., 2011). Therefore, these habitat types in other regions might be suitable for both the host plant P. graeca and the true bug *C. nerii*.

Recent tendencies for milder winters and presence of suitable host plants in natural habitats in Bulgaria suggest that the oleander seed bug may continue its northward spread with successful establishment of reproductive populations around the Danube River and Thracian lowland.

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Data availability

The occurrence and hosts data about *Caenocoris nerii* analysed and discussed in this work is available as a Supplementary material 01: Records of *Caenocoris nerii* in the Black Sea Region and adjacent Mediterranean locations.

Conflicts of interest

No potential conflict of interest has been reported by the authors, reviewers, or subject editor. As members

of the editorial board, Snejana Grozeva and Nikolay Simov withdrew from discussions and decisions on the manuscript.

Author' contributions
(using CrediT)

Desislava Stoianova: conceptualisation, data curation, formal analysis, funding acquisition, investigation, methodology, resources, software, validation, visualisation, writing—original draft, writing—review and editing; Tania Karakicheva: investigation; Snejana Grozeva: visualisation, writing—original draft, writing—review and editing; Nikolay Simov: conceptualisation, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualisation, writing—original draft, writing—review and editing.

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Supplementary materials

01
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