

Rapid Communication**First record of the Common Crevice-cricket *Gryllomorpha dalmatina* (Ocskay, 1832) (Orthoptera: Gryllidae) in Slovakia: evidence of a viable population**Vladimír Hemala¹, Ján Svetlík² and Soňa Nuhličková^{2,*}¹Jalovec 32, 032 21 Bobrovec, Slovakia²Department of Ecology, Faculty of Natural Sciences, Comenius University, Bratislava, Slovakia

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Citation: Hemala V, Svetlík J, Nuhličková S (2023) First record of the Common Crevice-cricket *Gryllomorpha dalmatina* (Ocskay, 1832) (Orthoptera: Gryllidae) in Slovakia: evidence of a viable population. *BioInvasions Records* 12(2): 555–562, <https://doi.org/10.3391/bir.2023.12.2.18>

Received: 21 October 2022**Accepted:** 13 January 2023**Published:** 3 April 2023**Handling editor:** Wolfgang Rabitsch**Thematic editor:** Stelios Katsanevakis**Copyright:** © Hemala et al.

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OPEN ACCESS**Abstract**

In this study, we present the first record of the alien Common Crevice-cricket *Gryllomorpha dalmatina* in Slovakia, which was found near Bratislava, the capital of Slovakia, in the village of Ivanka pri Dunaji. The Common Crevice-cricket was observed for the first time on the wall of an old building. During the two years of the study, our observations suggest a viable population successfully surviving in a human-made environment. The most important pathway of introduction seems to be transport of the species with horticultural material or stored products from the Mediterranean to Central Europe, indicating introduction as a stowaway. Our findings represent the tenth known record of a non-native orthopteran species in Slovakia and probably the sixth known occurrence of this alien cricket confirmed in Central Europe.

Key words: alien species, Central Europe, cricket, introductions, urban environment**Introduction**

Unintentional translocations of species are the most common pathways for alien arthropod invasions into Europe (Rabitsch 2010). Europe currently ranks among regions with the most complete information on alien biota. More than 65% (1040 species) of arthropod species alien to Europe are associated with human-made habitats, especially due to human trade and the transport of goods and people (Hulme and Roy 2010; Lopez-Vaamonde et al. 2010; Krištín et al. 2022). However, there is still a lack of information in Central Europe on alien Orthoptera species (Krištín et al. 2022), particularly about their non-native range or details about their ecology in the new environment (Šefrová and Laštůvka 2005; László 2019; Essl and Zuna-Kratky 2021).

The Common Crevice-cricket *Gryllomorpha dalmatina* (Ocskay, 1832) is a wingless Ponto-Mediterranean species that has recently expanded into several parts of Europe as a consequence of human activity (e.g. Kollmann 1999; László 2019; Engling and Pfeifer 2020). In Europe, its native range is known from Crete and Sicily in the south to southern Switzerland in the



Figure 1. Current geographic range of the *Gryllomorpha dalmatina* (Ocskay, 1832). Explanations: orange polygon = native range, red dots = non-native records indicating introductions outside the species range. Compiled according to Hochkirch et al. (2016).

north, and from north-eastern Spain in the west to Crimea in the east (reviewed in Hochkirch et al. 2016; see Figure 1 and Supplementary material Table S1). The northernmost populations are known in northern Italy (South Tyrol) (Wilhelm et al. 2018) and southern Switzerland, with natural populations in Ticino and probably in Valais (Marchesi and Fournier 2006). From this range, the first non-native populations were found further north, in Belgium, with the first records in 1982 (Ath, Wallonia) and 1989 (the City of Brussels) (Adriaens et al. 2020). More recently, its non-native occurrence has also been reported, especially from several locations in France. For example, the first record of this cricket is known from western France in 2009 (Gennevilliers, Nouvelle-Aquitaine) (Robert et al. 2022). Other findings are also known from north-eastern France, with an observation in 2018 (urban area of Verdun) (Bonifait 2019), then also from northern (Favrieux, Île-de-France) and eastern France (Nantoux, Bourgogne). Both observations (Favrieux and Nantoux) were recorded in 2019 (Anonymous 2022a, b). The most recent observations were recorded again in Belgium in 2021 (Hemiksem, Flanders) and 2022 (Mechelen, Flanders) (Vanreusel et al. 2022) and in western France in 2022 (La Rochelle, Nouvelle-Aquitaine) (Tuffereau 2022). The northernmost occurrence of this alien cricket is currently known from north-eastern Germany, with an observation from Berlin in 2022 (see

Siepmann 2022) (Figure 1 and Table S1). Finally, *G. dalmatina* was also confirmed in Central Europe. The cricket was reported from the south-western part of Germany, with the first record in 1998 (Landeck, Südbaden) (Kollmann 1999). Later, the insect was also reported further to the north of the country, with records in 2015 (Eilenburg, Sachsen) (Kästner 2015; Senckenberg 2022) and 2017 (Eisenberg, Rhineland-Palatinate) (Engling and Pfeifer 2020). Lastly, the non-native occurrence was also confirmed from north-western Hungary, with the most recent observation in 2019 (Gyarmat, Győr-Moson-Sopron) (László 2019) (see Figure 1 and Table S1). In addition, there is also one recent observation known from the Seychelles archipelago (Hugel et al. 2021). However, due to considerable distance from the native range, as well as the known introductions mentioned above, this observation remains questionable, requiring a detailed revision of the collected material.

In this paper, we provide the first record of *G. dalmatina* in Slovakia, in the south-western part of the country in the village of Ivanka pri Dunaji, near Bratislava, the capital of Slovakia. We describe new data on the species occurrence and its habitat with regard to a human-altered environment and provide the first details on population size and evidence of its viability during two successive years.

Materials and methods

The first Common Crevice-cricket was found on 1 November 2021, in Ivanka pri Dunaji, a village near Bratislava, the capital of Slovakia (see Figure 1 and Table S1). To provide details on the population size and evidence of its viability, a total of three checks of the study site were conducted (3 November and 8 November 2021 and then 8 August 2022). All specimens of the Common Crevice-cricket were found by individual collection during the night hours (from 19:00 to 23:00). In this way, all potential microhabitats, including the walls of old buildings, their crevices, as well as gaps between billboards were examined in detail using a portable hand-held torch. For documentation purposes, digital cameras (Canon EOS 6D Mark II, Canon EOS M10, Nikon D500) were used to deliver information on the species presence and its non-native microenvironment.

The captured individuals were stored in 96% ethanol and identified in the laboratory using an Arsenal SZS 1102-T ZOOM stereomicroscope based on morphological characteristics following standard identification keys for Orthoptera (Harz 1969; Goročov 2009). Species nomenclature and taxonomy follow the most recent checklist of European Orthoptera (Hochkirch et al. 2016). Finally, four captured specimens (2 ♂ and 2 ♀) were deposited in the collections of the Slovak National Museum – Natural History Museum in Bratislava (Slovakia) and one male in the first author's private collection in Jalovec (Slovakia).



Figure 2. *G. dalmatina* recorded for the first time in the village Ivanka pri Dunaji (south-western Slovakia). A: male. B: female. C: nymph. Photo: J. Svetlík.

Results and discussion

Our observations represented the first record of the Common Crevice-cricket in Slovakia. The species was confirmed in the south-westernmost part of the Slovak Pannonian area, approximately 84 km from the most recent observation in north-western Hungary (the village of Gyarmat) (László 2019) (see Figure 1). Altogether, 16 individuals were found (2021: 4 ♂ 2 ♀ and 1 nymph; 2022: 4 ♂ 3 ♀ and 2 nymphs) in two successive years, providing evidence of a viable cricket population surviving outside its natural range (Figure 2). The species occurrence was confirmed in two nearby locations – on an old building wall near a gardening store (48.18991°N; 17.25735°E) and under a billboard near a supermarket (48.18975°N; 17.25646°E) (Figure 3).

Compared to the native Orthoptera fauna, the habitat preferences of the alien species differ remarkably (Roques et al. 2010; Essl and Zuna-Kratky 2021; Krištín et al. 2022). As the name suggests, the Common Crevice-cricket is linked to the moist environment of crevices (Willemse et al. 2018). In its native range, the insect is common among leaf litter in open woodlands or underneath trees along streams or rivers, under stones, in caves and on stone walls. In addition, it can also be found in any crevices of old houses and their basements (Hochkirch et al. 2016; Willemse et al. 2018).



Figure 3. Urban environment of the Ivanka pri Dunaji village (south-western Slovakia), with the first record of the alien *G. dalmatina*. A: building and billboard near the supermarket. B: old abandoned building (near the gardening). C: detail of the left side of the billboard where crickets were found. Photo: V. Hemala.

Outside its range, *G. dalmatina* has been observed exclusively in human-altered environments. In Slovakia, the species was found directly in the inner part of the village of Ivanka pri Dunaji. The crickets were hidden in a narrow, ca. 4 cm wide, area between a billboard and the building wall or were sitting on the walls of old buildings (see Figure 4). Similar to our observations, the preference of alien Orthoptera species towards modified habitats corresponds well with the general patterns of the human-habitat affiliation of alien insects in Europe (Roques et al. 2010; Essl and Zuna-Kratky 2021). For example, Kollmann (1999) observed the Common Crevice-cricket in the garage basement of a house. Engling and Pfeifer (2020) discovered the insect in an apartment building. In Hungary, a female individual of *G. dalmatina* was found in the disused part of a house (László 2019). More than 20 individuals of the Common Crevice-cricket were observed on a cemetery wall (an anthropogenic habitat) and on an adjacent embankment (a semi-natural habitat). The site was exposed to the south, which allows the wall and the adjoining embankment to accumulate heat during the day and release it gradually at night. In the first part of the evening, the site was significantly warmer than the surroundings (Bonifait 2019). Similar to these observations, our results indicate that urban areas generate globally warmer microclimatic patterns, which may represent a



Figure 4. Microhabitat of the alien *G. dalmatina* outside its native range. A: detailed view on the 4 cm narrow space between the billboard and building. B: Detail on the old building wall with the typical insect posture. C: Lining of buildings with small gravel used as a refuge especially during escape behaviour. Animals were not arranged. Photo: J. Svetlík.

suitable microhabitat for thermophilic alien species spreading from the Mediterranean (Pincebourde et al. 2016; Bonifait 2019; Krištín et al. 2022). Furthermore, this may also be indicated by the fact that viable individuals found far from their natural range were commonly observed during autumn or winter months, when temperatures could drop to zero. For example, in Germany, the cricket was observed in September (see Kollmann 1999; Engling and Pfeifer 2020). In Hungary, a female cricket was found at the beginning of October (László 2019). In Slovakia, crickets were found in November. Therefore, the occupied non-native microhabitats and some of their environmental characteristics may resemble the original environment in the Mediterranean (Essl and Zuna-Kratky 2021).

In conclusion, our findings represent the tenth known record of a non-native orthopteran species in Slovakia (see Krištín et al. 2020, 2022) and probably the sixth observation of this alien species confirmed in Central Europe (in Germany, Hungary and Slovakia) (Figure 1 and Table S1). Documented observations of both nymphs and adults (Figure 2) provide clear evidence of a viable population successfully surviving outside its natural range. As our records were made near a gardening store and supermarket, the most important pathway of introduction seems to be transport of the species with horticultural material or stored products from the Mediterranean

to Central Europe (e.g. in association with fruits or plants), indicating introduction as a stowaway (e.g. transported as blind passengers in cars or trains). Furthermore, the different habitat compared to the native range may indicate the introduction pathway. It is possible that eggs transported by humans are more likely to end up in human settlements than in forests or other habitats. As a result, newly emerged animals are more often observed in human-altered habitats than in natural environments, suggesting the important role of transport infrastructure in the introduction of alien species (Rabitsch 2010).

Finally, it is also possible that *G. dalmatina* is already more widely distributed in more villages or towns in Hungary as well as south-western Slovakia (and possibly also in Austria), but the species escapes attention due to the lack of interest of entomologists in the fauna of urban areas. Therefore, our records emphasise the importance of faunistic study of insects in urban areas, which are often overlooked “hotspots” for the introduction of various alien species.

Acknowledgements

We would like to thank anonymous reviewers and editor for their valuable comments and recommendations, which improved this manuscript. We would like to thank also A. Hochkirch for kindly providing a map of the current distribution of the *G. dalmatina* species. This research was supported by the VEGA grant No. 2/0097/22

Authors' contribution

Research conceptualization: SN. Sample design and methodology: VH, JS, SN. Investigation and data collection: VH, JS, SN. Data analysis and interpretation: SN. Roles/writing – original draft; writing – review and editing: VH prepared the original draft of the manuscript; all the authors collected the data and edited the manuscript.

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Supplementary material

The following supplementary material is available for this article:

Table S1. Occurrence data of *Gryllomorpha dalmatina* outside its native range: overview of known published records.

This material is available as part of online article from:

http://www.reabic.net/journals/bir/2023/Supplements/BIR_2023_Hemala_etal_SupplementaryMaterial.xlsx