

A NEW RESIDENT OF BELGRADE (SERBIA), THE MEDITERRANEAN SPIDER *ZOROPSIS SPINIMANA* (DUFOUR, 1820)

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Abstract

A Mediterranean synanthropic spider species, *Zoropsis spinimana* (Dufour, 1820), was recently found in Belgrade and recorded as a new member of Serbian fauna. Several individuals of both sexes and juveniles were caught or observed. Pregnant females and their cocoons were also observed. According to our findings, this spider has established a small population in the city. Considering that this species has been recognized as a successful colonizer and could be identified by the general public, the first "Citizen Science" approach in Serbia was applied. An invitation to participate was made via social media. The manuscript includes photos contributed from other parts of the country. This confirmed our suspicion that *Z. spinimana* is to be found in more than one place in Serbia, which requires further investigation. This paper aims to report this species as a new member of the national and synanthropic fauna and to present the benefit of using "Citizen Science" data.

KEY WORDS: synanthropic species, distribution, faunistic, first records, introduced, non-native species

Introduction

The natural distribution of the well-known species of the Zoropsidae family, *Zoropsis spinimana* (Dufour, 1820), is in the vicinity of the Mediterranean Sea, where it can be found in open woodland, under stones and in the bark of trees (Nentwig *et al.*, 2023). However, over the past 30 years, it has been introduced in Central Europe, mostly by accident, and established as synanthropic in human settlements. Presence and distribution were well documented by several studies (Hänggi & Zürcher, 2012; Szinetár *et al.*, 2014; Hänggi & Straub, 2016;

Hänggi *et al.*, 2020; Szinetár *et al.*, 2020; Purgat *et al.*, 2021; Nentwig *et al.*, 2023). Moreover, according to iNaturalist and GBIF databases, the species has spread further north to Finland (2010), Sweden (2012), and Denmark, where it was first found in 2015 and then recently in 2023, but its appearance in these countries needs to be researched more closely.

Unfortunately, information on synanthropic spider species in Serbia basically does not exist. Some historically published data refer to the city of Belgrade (Stojićević, 1929; Drensky, 1936), or Jagodina (Stojićević, 1929; Drensky, 1936), and some other towns (Deltshv *et al.*, 2023), but it could not be related to any human settlements. Proper records on this subject were presented by Komnenov & Pavićević (2008) when they collected the Mediterranean species *Segestria florentina* (Rossi, 1790) in some residential areas in Belgrade, and Stanković (2010) when he recorded *Pseudeuophrys lanigera* (Simon, 1871) in his apartment in Jagodina. Both findings represented new records for the national fauna. But that is far from any faunistic insight or even the possibility of observing potential changes in species composition in synanthropic fauna like Szinetár *et al.* (2014) did in other countries.

Therefore, the main goal of this paper is to present a small contribution to the synanthropic fauna of Belgrade, this time with species *Z. spinimana*, also recorded as a new member of the national fauna. Furthermore, since the species could be recognized by the general public (Nentwig *et al.*, 2022), this will be the first manuscript to present the possibility of using “Citizen Science” in an arachnological field in Serbia.

Materials and Methods

The material presented here was collected/photographed in Belgrade (Žarkovo district) in a multifamily residential building with a yard. Spiders were collected accidentally from 2021 to 2023, by hand and preserved in 70% ethanol. All notes (observations) about the species and its behavior were made by the second author (NM) in his apartment and in the yard. Not all individuals found were caught so that the species could be observed in the future.

Identification of the species was done by the first author (GG) according to Nentwig *et al.* (2023) and Purgat *et al.* (2021). The reference collection was deposited on the premises of the association Spiders of Serbia: spider research and protection center. Nomenclature follows the World Spider Catalog (WSC, 2023).

In addition to our findings, the public was invited to participate in observing this species via social media through two educational Facebook groups: Insects of Serbia and Spiders of Serbia. Their photographs and notes are included and discussed. The call was made in September 2023 and lasted approximately 30 days. This will be the first engagement of the “Citizen Science” in the arachnological field in Serbia, and the best way to present the benefit of such an approach.

Results

Family: Zoropsidae Bertkau, 1882

Zoropsis spinimana (Dufour, 1820)

Determination: Nentwig *et al.* (2023), Purgat *et al.* (2021).

Material: 1 ♀ 12.09.2020., 1 juv 19.09.2021., 2 ♀♀ 02.11.2021., 1 ♂ 24.11.2021., 1 ♀ 21.06.2022.

Global distribution: Europe, Turkey, Caucasus, Russia (Europe to the Far East), Central Asia, China, and Japan; also introduced to the USA (WSC, 2023).

Natural habitat: In open woodland, under stones and bark (Nentwig *et al.*, 2023).

Habitat in Belgrade: multifamily residential building and yard in the Žarkovo district (WGS84 coordinates N44.761490°, E20.410022°).

Notes (observations):

Both sexes and juvenile spiders were caught/observed in the building and yard in the Žarkovo district (Belgrade) (Fig. 1). Some dead individuals were found in a wardrobe. The spiders were present almost all year round but more frequently in summer. They were usually observed at night, on walls inside and outside the building and apartment, but some observations occurred during the day. Juvenile individuals were mostly found in the kitchen, but adults were all over the apartment and the backyard.



Figure 1. *Zoropsis spinimana* individuals recorded in Žarkovo, Belgrade, Serbia; A – male, B – female, C – juvenile.

One pregnant female was caught on 21.06.2022 in the apartment and put in a glass jar for observation. The spider was fed with one roach (captive-bred *Blatta lateralis*). After several days in captivity, she laid her cocoon but died 4 days later. She was conserved in 70% ethanol and added to the collection. Young spiders emerged from the cocoon approximately 7 days after her death and were released.

On 24.06.2022, one more pregnant female was observed and photographed in the backyard (Fig. 2). She was already on her cocoon on some building materials (block or brick) under a bush. This individual was not collected; she was just observed, but after 2 days, she and the cocoon disappeared.

During 2023, the spider was observed several times in different parts of the house and the yard. No individuals were caught; only photos were taken.

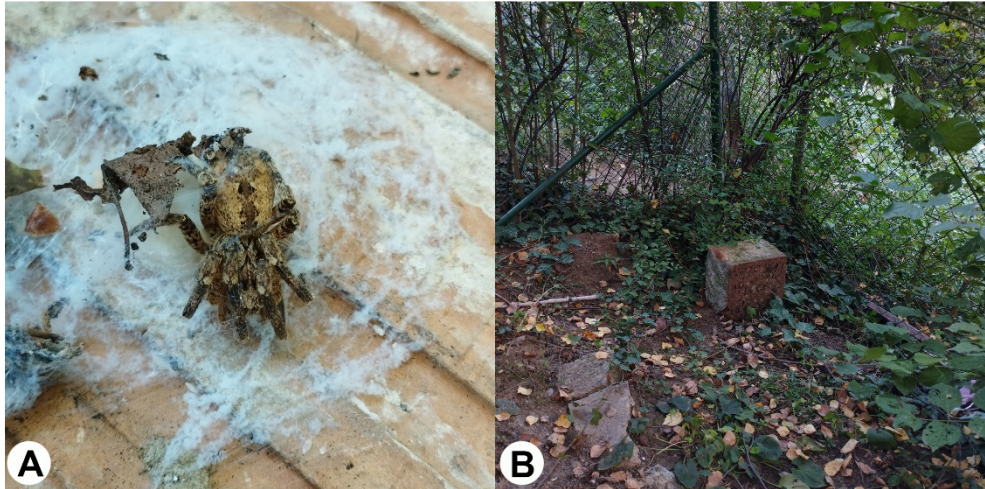


Figure 2. *Zoropsis spinimana*, A –female on her cocoon and B – in the backyard in Žarkovo, Belgrade, Serbia.

“Citizen Science” contribution

The “Citizen Science” call for information was very successful. More than 20 people sent photos for this study, but unfortunately, the majority were of the species *Hogna radiata*. However, four participants recognized “the wanted spider” in their archives and sent us photos and notes (Fig. 3). Both male and female individuals were recorded. Single observations of the spider were made in Subotica, Čačak, and the Vračar district of Belgrade, but continuous observation occurred in Tošin Bunar, New Belgrade. WGS84 coordinates of the cities and areas are listed below.

An adult male was found on 21.08.2021, in Čačak (N 43.8893387°, E 20.3446163°) in the bathroom of a family house, caught in a glass, observed, and released outside (pers. comm. Duško Marković). An adult female was observed on 21.02.2023 in another part of Belgrade (Vračar, N44.798433°, E20.472062°). It was found on the wall of the dark and damp entrance hall of the family house (pers. comm. Nikola Minčić). One individual was also found this year in June 2023 in Subotica (N46.0969299°, E19.657666°) on a mattress in the bedroom. The spider was caught and released (pers. comm. Nedeljka Dimić). In the Tošin Bunar area of New Belgrade (N44.820212°, E20.3956066°), the spider was continuously monitored for the past 2 years. A female was caught and photographed in October 2021 in the family house, and observed in 2022 again in the same place. A male was found in October in 2022 in the backyard (pers. comm. Gligor Milošević).

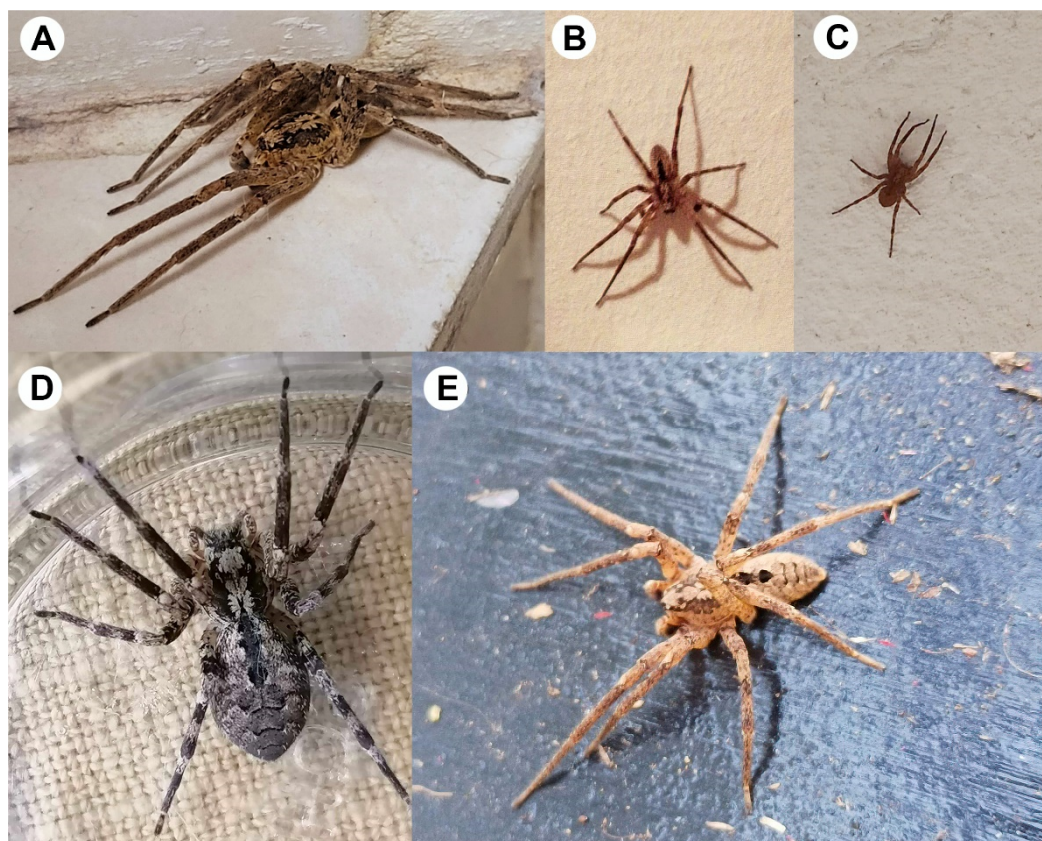


Figure 3. Photo collage of the species *Z. spinimana*, collected by the “Citizen Science” approach. Contributors: A – Čačak, Duško Marković 2021, B – Subotica, Nedeljka Dimić 2023, C – Vračar Belgrade, Nikola Minčić 2023, D – female and E – male, New Belgrade, Tošin Bunar, Gligor Milošević 2021/2022.

Discussion

The spider *Zoropsis spinimana*, a species with natural distribution in the Mediterranean area (Nentwig *et al.*, 2023), has good synanthropic abilities and is expanding its range towards the north. Several studies (Nentwig *et al.*, 2023a; Purgat *et al.*, 2021; Hänggi *et al.*, 2020; Hänggi & Straub, 2016) have reported successful colonization in several central European countries, such as neighboring Hungary and Romania (Szinetár *et al.*, 2014; Szinetár *et al.*, 2020). It was just a matter of time before the spider was found in Serbia. The number of individuals recorded in this study and also observed during the period of 3 years, was substantial (both sexes, a pregnant female with cocoon, and juveniles), so we can be sure that our finding was not accidental, but from a small established population in the Žarkovo district (Belgrade).

Since *Z. spinimana* is one of the rare spider species easily recognized and even identified with high confidence from a photo (Nentwig *et al.*, 2023), the decision to include “Citizen Science” in our study was justified. We gathered information that the species appears in other parts of the country (Fig. 4): in Subotica, in the far north, and in Čačak in the central region, as well as other areas in the capital city of Belgrade (Vračar and New

Belgrade – Tošin Bunar area). Observations in Subotica, Čačak, and Vračar were on just one occasion, so they could be accidental. However, according to our contact from New Belgrade, a spider has been appearing in his house for the past 2 years, only in October. This could indicate that *Z. spinimana* has two small and steady populations in the city of Belgrade (7 km apart), but that needs to be determined in future.

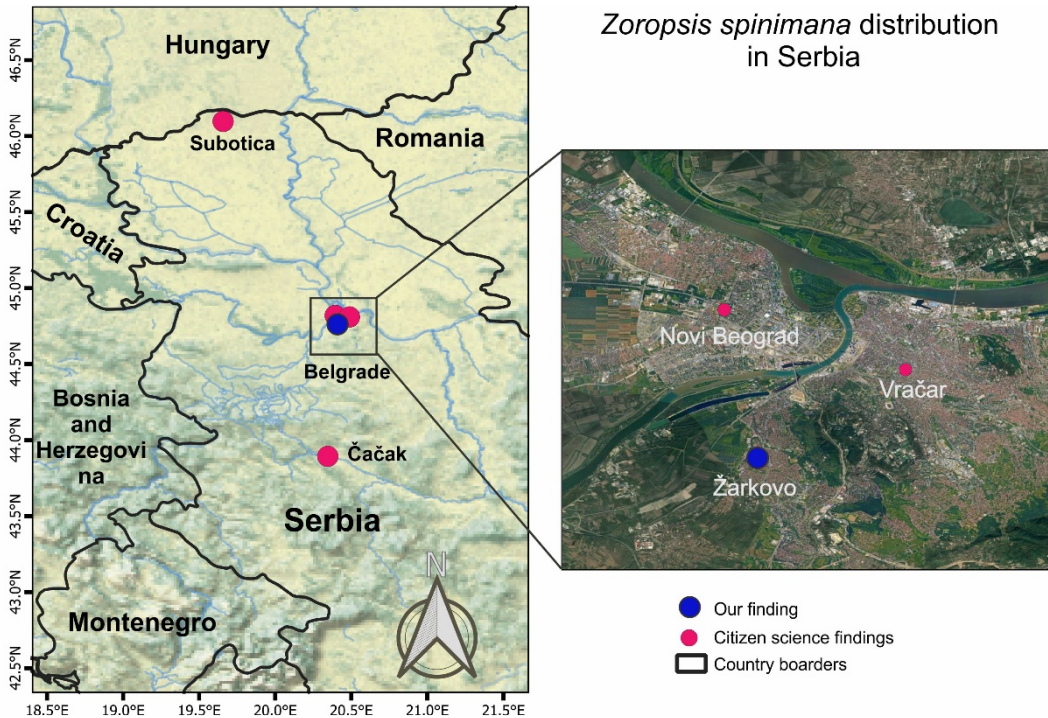


Figure 4. Map of Serbia with localities where the species *Z. spinimana* was found. Both “Citizen Science” and our records are included.

According to Hänggi & Zürcher (2012), the spreading of *Z. spinimana* occurred very fast in Switzerland, and 20 years after the first record, the spider has spread to nearly all cities (Hänggi & Straub, 2016). A prediction of spreading in Serbia is impossible since valid data on the species does not exist. Furthermore, how the first introduction occurred and when the spreading started, could not be determined either. However, the “Citizen Science” contribution suggests that we can already observe this species in more than one place (city or town) in the country.

Although scientists do not consider this species to be an alien in Europe because it does not meet the definition (Nentwig, 2015), it is not native to this part of the continent, so the impact on other species is unknown. Therefore, there is a real possibility that it could become invasive (Hänggi & Straub, 2016). Hence, gathering more information and monitoring this species should be a focus in the future.

Beside biological and ecological characteristics of the species that make it an interesting object for observation, this spider has a medical importance too, since there are documented cases of bites (Nentwig *et al.*, 2013). In

Switzerland, five instances of *Z. spinimana* bites were registered in two years of observation (2011-2013). All occurred in urban areas, involved adult female spiders, and happened throughout the year. Only local symptoms of swelling and mild to moderate pain were reported, even in the case of a very young child (Nentwig *et al.* 2013). No special medical attention was required (Nentwig *et al.*, 2013). Furthermore, two arachnologists volunteered to be bitten by the spider so they could give feedback information for the study. Nentwig *et al.* (2013) describe the symptoms as slight swelling and pain “between mosquito and bee sting”. But all symptoms disappeared very quickly.

Since no medical study regarding spider bites has been performed in Serbia, the presence of this species could be the right moment for new projects and joint studies. Medical diagnoses of a ‘spider bite’ are usually incorrect, as Nentwig *et al.* (2013) underlined, and in most cases, incidents attributed to spiders turned out to be something else. Based on our personal communication with citizens, the same conclusion can be made for Serbia. Neither the bitten person nor the physicians could distinguish a spider bite from any other bite/sting. Therefore, general education and collaboration is necessary.

The public’s positive response to this small project indicates that people in Serbia are interested in spiders. So the potential of “Citizen Science” in raising awareness about the presence of this and other spider species of interest and knowledge about their biology, ecology and potential influence on humans and native species should be explored in future.

Instead of conclusion – thinking ahead

The arachnological field in Serbia is developing very slowly. As a result, the number of recorded species in national fauna increases gradually. The main reason is the small number of scientists in this area, and lack of collaboration with researchers from other fields. There is also the issue of very limited financial support through project and job positions. However, progress in the field could see improvement through the engagement of “Citizen Science” in cases where it could be beneficial. In this study we showed how information gained in such a way could be very helpful.

Furthermore, studying spiders does not only mean working on the faunistic aspects. A wide spectrum of research covers genetics, biochemistry, toxicology, medical, social, and other fields involving spiders. Combining these fields could present a very interesting interdisciplinary project with more appeal for financial support and the involvement of scientists from various fields. Medical research on spider bites in Switzerland successfully involved arachnologists alongside other experts. We think it is time to encourage scientists from different fields to collaborate, with the aim to increase progress in each respective scientific field.

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НОВИ СТАНОВНИК БЕОГРАДА (СРБИЈА), МЕДИТЕРАНСКИ ПАУК *ZOROPSIS SPINIMANA* (DUFOR, 1820)

ГОРДАНА ГРБИЋ и НИКОЛА МАРИНКОВИЋ

Извод

Средоземна врста паука *Zoropsis spinimana*, која је позната као добар колонизатор, недавно је пронађена у Београду као синантропна и представља новог члана српске арахно фауне. Неколико јединки оба пола, као и више јувенилних јединки, је сакупљено или посматрано. Посматране су чак и гравидне женке и њихови кокони. Према нашим сазнањима, овај паук је успоставио малу и стабилну популацију у Жаркову у нашем главном граду.

Пошто је ово једна од ретких врста паукова која може да се препозна на основу фотографије, први пут је позвана шира јавност и примењен приступ „грађанска наука“ у арахнологији у Србији. Позив за учешће упућен је путем друштвених мрежа, пре свега преко две велике фејсбук групе Паукови Србије и Инсекти Србије. Одзив је био на високом нивоу. Пристигло је преко 20 фотографија електронском поштом. На жалост, већина фотографија које су стигле приказивале су једну другу врсту (*Hogna radiata*). Ипак, 4 учесника (Недељка Симић, Душко Марковић, Никола Минчић и Глигор Милошевић), пронашло је овог паука у својој фотоархиви и послало запажања и фотографије. На основу њих, установили смо да се *Z. spinimana* појављује на више места у Србији (Суботица, Чачак и још два локалитета у главном граду, Врачар и Нови Београд - Тошин бунар). Сусрет са пауком у Суботици, Чачку и на Врачару, догодио се само једном, па би присуство врсте на тим локалитетима могло бити случајно. Међутим, како наводи наш контакт из Тошиног бунара, на Новом Београду, паук се стално појављује у његовој кући у последње 2 године, углавном у октобру. То указује да *Z. spinimana* има две мале и стабилне популације у граду Београду, што би даљим истраживањима требало потврдити.

Позитиван одзив шире јавности на овај мали пројекат, сугерише да су људи заинтересовани за паукове у Србији. Дакле, потенцијал „грађанске науке“ у подизању свести о присуству ове и других врста паука од интереса као и сакупљању знања о њиховој биологији, екологији и потенцијалном утицају на људе и аутохтоне врсте постоји и требало би га даље истраживати у будућности.

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