



## A New Record of *Bythinella istoka* Glöer & Pešić, 2014 (Gastropoda: Bythinellidae) from Serbia

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**Abstract:** The genus *Bythinella* Moquin-Tandon, 1856 is represented by eight species in Serbia, four of which are stenoendemics. One of these stenoendemics is *Bythinella istoka* Glöer & Pešić, 2014, a species described from a small spring in Kosovo and Metohija. As stenoendemics are under higher extinction risk, particularly those inhabiting fragile freshwater habitats, new findings of such species are of particular interest. We present a new record of the stenoendemic *B. istoka*. A population was found in Sopotnica River (SW Serbia). Apart from widening its distribution range, this new finding indicates the presence of this species not only in the Adriatic Sea drainage but also in the Black Sea drainage.

**Key words:** snail, morphology, anatomy, stenoendemic, Balkan

### Introduction

The genus *Bythinella* Moquin-Tandon, 1856 is represented by western Palaearctic minute operculate freshwater snails inhabiting mostly springs and groundwaters (FALNIOWSKI et al. 2012). The representatives of this genus are generally stenothermic snails preferring clear oligotrophic waters, thus being quite sensitive to pollution and habitats destructions (RADOMAN 1976, STURM 2016). In favourable conditions, these snails could have mass occurrences, reaching over 100 specimens/m<sup>2</sup> (STURM 2016). The Balkan Peninsula is considered as one of its diversity hotspots (GLÖER & PEŠIĆ 2014). In Serbia, this genus was mostly studied by RADOMAN (1983) who described a number of species. Despite the efforts of RADOMAN and few other researchers, the Serbian fauna of the genus *Bythinella* could be described as understudied, with only eight species

being known so far. Of these eight species, four species are known only from their type localities, thus being stenoendemics (local endemics): *Bythinella istoka* Glöer & Pešić, 2014 (Spring Vrelo, Istok Municipality, Kosovo and Metohija); *B. nonveileri* Glöer, 2008 (Spring Vrmdža, Rtanj Mountain, central Serbia); *B. pesterica* Glöer, 2008 (Pešter Plateau, Stračijevac Spring) and *B. serborientalis* Radoman, 1978 (Spring Vrelo, near Visočka Ržana, eastern Serbia) (MARKOVIĆ et al. 2021). Only one of these eight species has been found in the Adriatic Sea drainage – *B. drimica alba* Radoman, 1976 (see RADOMAN 1976), while the remaining species belong to the Black Sea drainage. It should be noted that *B. opaca* (M. von Gallenstein, 1848) has been recorded in both Black Sea and Adriatic Sea drainages but its findings in the Adriatic Sea drainage are outside the Serbian territory (GLÖER & PEŠIĆ 2014). Generally, the genus *Bythinella* has scarce pres-

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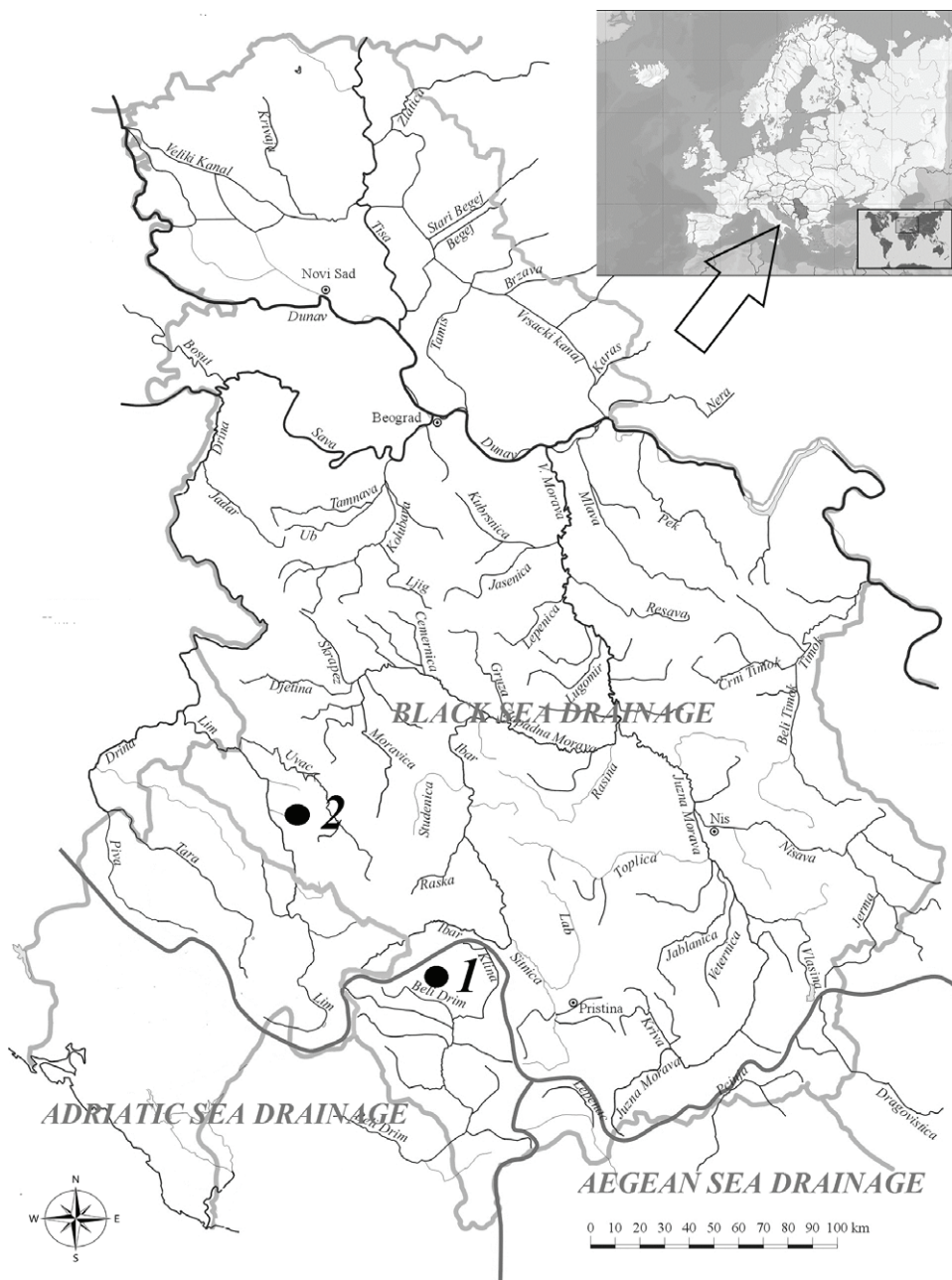
ence in the Adriatic Sea drainage (RADOMAN 1985, GLÖER & PEŠIĆ 2014). It can be speculated that few *Bythinella* spp. occurring in both drainages nowadays are most probably relicts linked to the Alpine orogeny, when the rise of Dinarides separated Adriatic Sea and Black Sea areas, thus fragmenting their geographical ranges. As RADOMAN (1985) stated, it seemed highly unlikely that those species had managed to overcome that barrier afterwards. More details regarding Serbian endemic snail *B. istoka* can be found in GLÖER & PEŠIĆ (2014).

In the present article, we report a new finding of this species, the first one from the Black Sea drain-

age, thus widening its distribution range towards the north-west and providing new opportunities for further investigations.

## Materials and Methods

The Sopotnica River is a cold, fast flowing hilly-mountainous river in southwestern Serbia. Due to its wild beauty, the river and its waterfalls are a fairly popular touristic destination. During a field trip on 17.07.2021, bythinellid snails were collected from a site located at the Sopotnica River near the waterfalls (Fig. 1). The locality was under anthropogenic



**Fig. 1.** Distribution map of *Bythinella istoka* Glöer & Pešić, 2014: 1, type locality (42°46'29.6"N, 20°23'58.1"E); 2, locality of our finding (43°18'06.80"N, 19°44'21.71"E).



**Fig. 2.** Sopotnica locality: a, habitat; b, snails at the locality. Photo: M. Vujić.

pressure related to tourism (picnicking, sightseeing and bathing). Luckily, as for now, there were no wastewater or garbage disposal. The habitat consisted of tufa limestone covered by algae and aquatic mosses. Many small springs emerging from the tufa limestone were connected with the river (Fig. 2a). An abundant population of snails was found on the algal cover and in limestone crevices (Fig. 2b).

A total of 228 snails (190 adults) were collected by hand and preserved in 70% ethanol. In the laboratory of the Institute of Zoology, Faculty of Biology, University of Belgrade, the collected material was further processed and snails were dissected. The identification was based on morphological and anatomical features of the shell and body compared to the available species description (GLÖER & PEŠIĆ 2014). Photos of the snail shell and genital anatomy were taken by stereomicroscope Nikon SMZ800N equipped with a Nikon DS-Fi2 camera. A Nikon DS-L3 control unit was used for setting scale bars. Material is deposited in the gastropod collection of Institute of Zoology (Faculty of Biology, University of Belgrade).

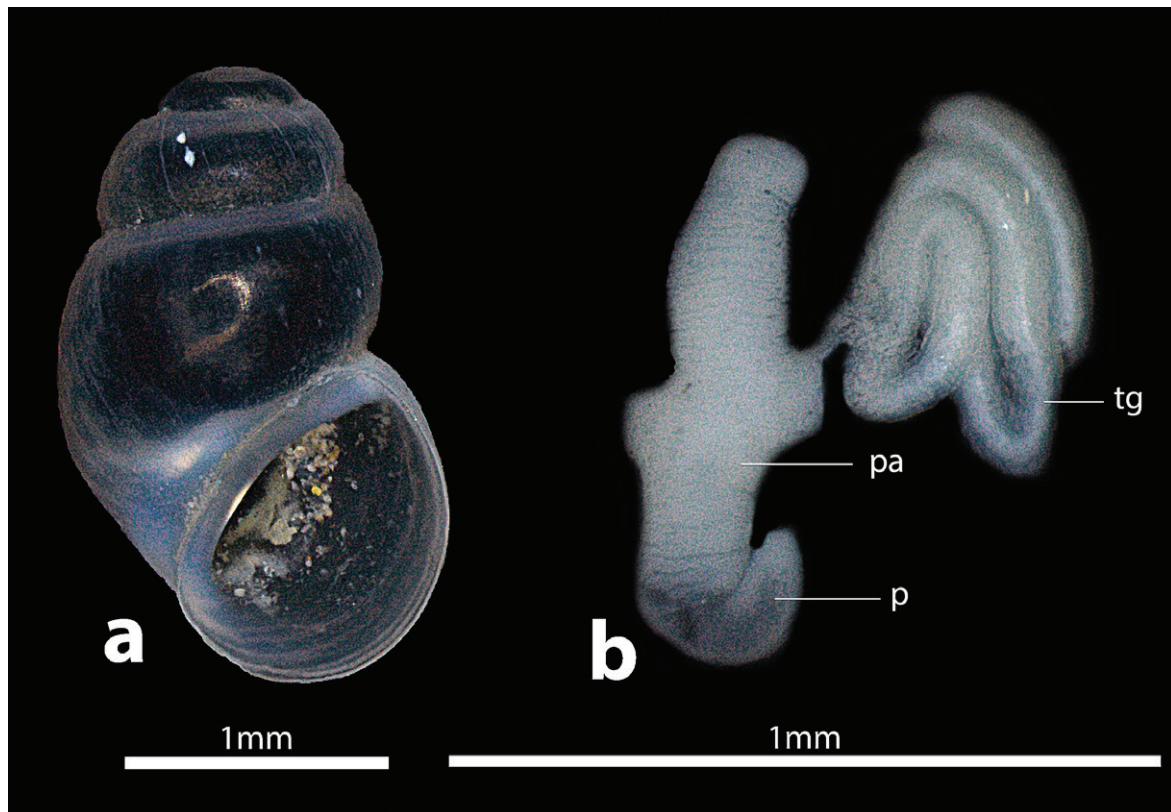
## Results

Analysed snail specimens are characterised by whitish cylindrical shell with 4.5 whorls and a deep suture (Fig. 3a). Penis is short, shorter than penial appendix and tubular gland is long (Fig. 3b). The first two whorls are shortened, which is a distinctive character (GLÖER & PEŠIĆ 2014), yet shared with *B. taraensis* Glöer & Pešić, 2010. Those two species however can be distinguished by tubular gland morphology, as it is narrow proximally in *B. istoka* and being of the same width along its entire length in *B. taraensis* (see GLÖER & PEŠIĆ 2014).

## Discussion

Though not being located far away from the type locality (80–85 km by air), the newly-discovered population of *B. istoka* belongs to a different main drainage, i.e. the Black Sea drainage, which covers most of the Serbian territory. In contrast, the type locality belongs to the Adriatic Sea drainage, which covers only a small part of Kosovo and Metohija (Fig. 1). The vast majority of species of this genus are local endemics (GLÖER & GEROGIEV 2011), with only a few having wider distribution ranges. Furthermore, as even fewer species can be found in different main sea drainages, this fact is further increasing the importance of the present record. In the region, only *B. opaca* is known for inhabiting both drainages (GLÖER & PEŠIĆ 2014) and, as the Dinarides are considered a quite solid barrier for dispersal of these snails during the time, we could speculate that the distribution of *B. istoka* could be even wider, perhaps comparable with the range of *B. opaca*. There are many unstudied potential habitats in the region and further investigations should shed more light in that regard. Since the bythinellid snails are a rather controversial group from a taxonomic point of view (FALNIOWSKI et al. 2012), more comprehensive morphological, anatomical and molecular data are to be used.

The recorded abundant population of this pollution-sensitive snail species at the Sopotnica locality indicates the favourable habitat conditions and the low-level of anthropogenic pressures (tourism as the most prominent one). Having in mind that the type locality (Spring Vrelo) is under more pronounced pressures (water captivation, see GLÖER & PEŠIĆ 2014), it is important to preserve this newly-found population by maintaining low levels of pollution in general. Considering the number of *Bythinella* spp. recorded



**Fig. 3.** *Bythinella istoka* Glöer & Pešić, 2014 from Sopotnica: a, shell; b, male genitalia (p, penis; pa, penial appendix; tg, tubular gland). Photo V. Gojšina.

in neighbouring countries, e.g. Bulgaria with 22 known species (GEORGIEV & GLÖER 2014), the *Bythinella* fauna of Serbia is fairly poor. We speculate that the main reason for the small number of species is that this group is understudied in Serbia. The reasons might be that many of these minute snails are either overlooked during general ecological investigations or are identified at the generic or even family levels, mainly due to the lack of taxonomic expertise in this group. As many of those snails are stenoendemics found in fairly fragile freshwater habitats, there is a great risk of their extinction. Therefore, every new record of these snails is important from taxonomical, ecological and faunistic perspective.

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