HISTORIA NATURALIS BULGARICA

ISSN 2603-3186 (online) · ISSN 0205-3640 (print)

Volume **45** · Issue **1**

Contents

National Museum of Natural History — Bulgarian Academy of Sciences
Sofia · 2023

Published online **16 January 2023** by:
National Museum of Natural History, Bulgarian Academy of Sciences
1 Tsar Osvoboditel Blvd, 1000 Sofia, Bulgaria
https://www.nmnhs.com/historia-naturalis-bulgarica/

Historia naturalis bulgarica 45 (1): 1–4
ISSN 2603-3186 (online) | ISSN 0205-3640 (print) · nmnhs.com/historia-naturalis-bulgarica
https://doi.org/10.48027/hnb.45.011
Publication date [online]: 16 January 2023

Research article

New data on the distribution of *Eryx jaculus* (Linnaeus, 1758) (Reptilia: Serpentes) in Bulgaria

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Abstract: We report three newly registered localities of the javelin sand boa – *Eryx jaculus* along the Black Sea Coast. The nearest known localities (outside of the study area) of the species are situated at a considerable distance (100–230 km) from the recently discovered ones. The data presented here confirm the presence of *E. jaculus* along the Bulgarian Black Sea Coast and expand the knowledge on its distribution both in the country and in the Balkans.

Keywords: Black Sea Coast, javelin sand boa, new records, range

Introduction

The javelin sand boa, *Eryx jaculus* (Linnaeus, 1758) is a medium-sized snake, rarely reaching more than 80 cm in length (see Naumov et al., 2020 and references therein) and is the only representative of the family Erycidae (formerly belonging to Boidae) in Europe. *Eryx jaculus* spends most of the time underground, burrowed in the soil or in rodent galleries. The species is occasionally active on the surface during the breeding season, at night or in cloudy and humid weather, or during dawn and dusk on warmer periods (Valakos et al., 2008; Speybroeck et al., 2016).The distribution range comprises parts of northern Africa, the Balkan Peninsula, Asia Minor and the Caucasus, and also the northern part of the Arabian Peninsula, and to Iran and Iraq in the east (Ananjeva et al., 2006; Speybroeck et al., 2016).

In Europe, the javelin sand boa is one of the rarest snake species and it is protected by the international legislation (Council Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora: Annex IV; Convention on the Conservation of European Wildlife and Natural Habitats – Bern Convention: Annex III). The species is also listed in Appendix II of the "Convention on International Trade in Endangered Species of Wild Fauna and Flora". According to Beshkov & Nanev (2002), the javelin sand boa is among the most endangered species of the Bulgarian herpetofauna; at the national level the species is strictly protected by the Biodiversity Protection Act (Annex III) and it is categorised as "Endangered" in the Red Data Book (Beshkov, 2015).

In Bulgaria, *E. jaculus* is found in the southern part of the Struma River Valley, parts of the Eastern Rhodopes and Sakar Mts, as well as sporadically in the Danubian Plain and in the periphery of the Thracian Lowland (Stojanov et al., 2011; Pulev.et.al., 2014; Beshkov, 2015). Although there are a few publications on the herpetofauna along the Black Sea Coast (e.g.

Received: 17 November 2022; accepted: 3 January 2023 · Editor: Vladislav Vergilov

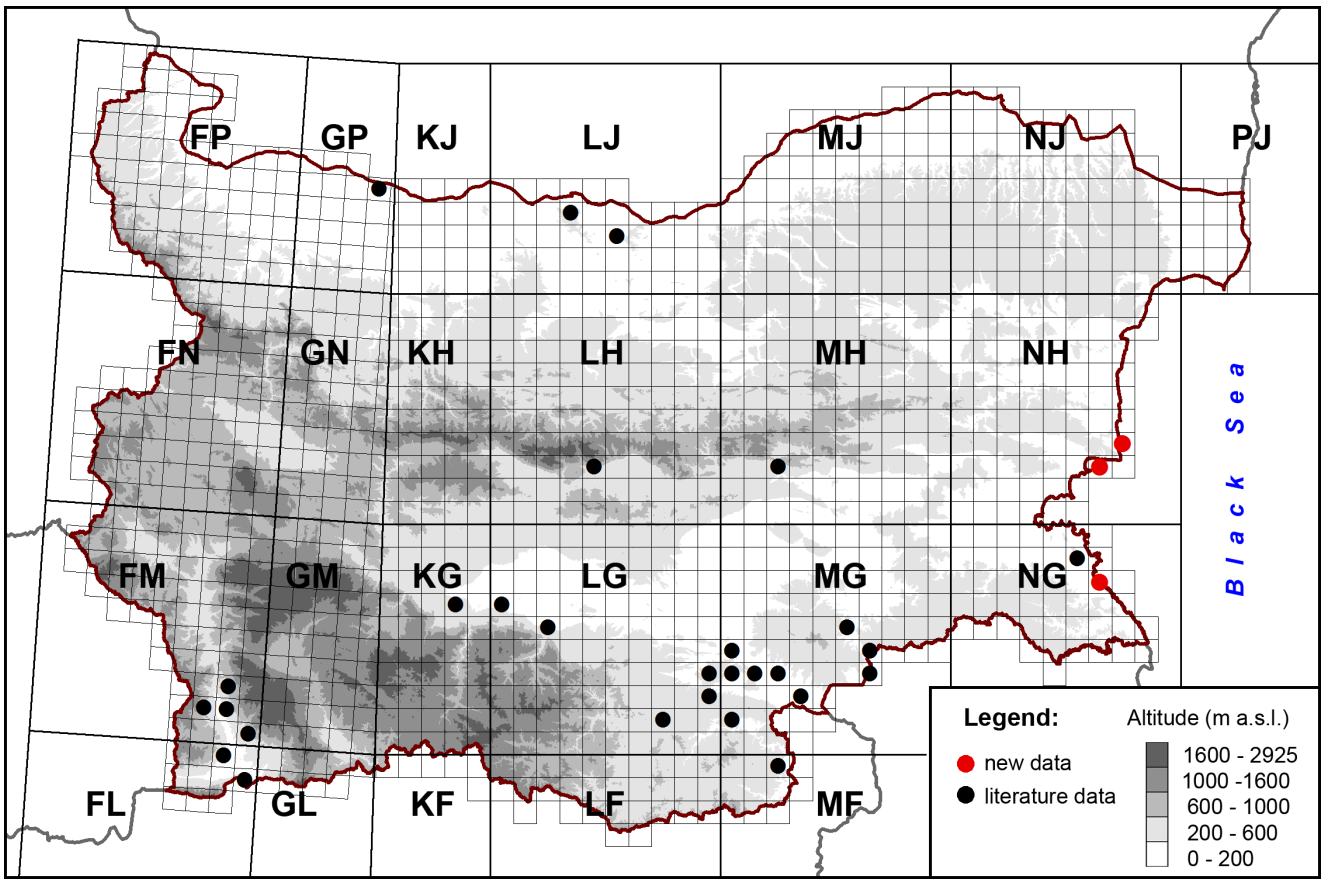

Fig. 1. Distribution of *Eryx jaculus* in Bulgaria, based on a 10 km UTM grid. "New data" refer to the localities given in this study; "literature data" – to a compilation after Stojanov et al. (2011), Pulev et al. (2014) and Beshkov (2015).

Nöllert et al., 1986; Schlüter 2006; Tzankov et al., 2009), the only evidence of the presence of *E. jaculus* is given by Moeller (1990). The author reported the finding of one dead individual on the road near Arkutino (a swamp and a camping site with the same name, situated close to each other). Note that this locality is marked with a question mark on the respective map in the work of Stojanov et al. (2011), and on the map in Beshkov (2015) it is not shown at all, i.e. these authors considered the locality to be uncertain or invalid (on the assumption that since only one specimen is known, it may have ended up there by accident).

The main aim of this work is to present newly registered localities of *E. jaculus* along the Black Sea Coast. Since the species is "sensitive" (it is of interest for illegal collecting) the localities are described only as settlement names (without exact geographical coordinates of the snakes' actual locations) and are mapped in a 10x10 km UTM grid (Fig. 1).

Results and discussion

In the period 2018–2021, during field trips along the Bulgarian Black Sea Coast, three new localities of *E. jaculus* were established, as follows: 1) Near the village of Velika – a dead specimen (photographed, but not measured) found in 2018 by P. Belev (Fig. 1: NG67; Fig. 2: A); 2) Near the village of Irakli – an adult specimen (photographed, but not measured) observed on 17 July 2020 by K. Milanova (Fig. 1: NG73; Fig. 2: B); 3) Near the village of Elenite an adult specimen (with a total length of 45 cm) captured on 26 May 2021 by M. Stanchev on a dirt road in an open deciduous forest with many scattered piles of stones (Fig. 1: NG62; Fig. 2: C).

The new data presented here confirm the presence of *E. jaculus* along the Bulgarian Black Sea Coast and expand the knowledge on its distribution both in the country and in the Balkans. In these sense, "Arkutino" (Fig. 1: NG58) should also be considered as a valid

Fig. 2. The three individuals of the javelin sand boa found at the villages of Velika (A), Irakli (B), and Elenite (C), respectively.

locality of the species. The nearest (outside of the study area) known localities of *E. jaculus* are situated at a considerable distance from the newly established ones, respectively ca. 100 km west-southwest of Velika, ca. 140 km west and ca. 230 km northwest of Elenite (see Beshkov 2015), ca. 150 km north of Irakli (see Cogălniceanu et al., 2013), and ca. 130–150 km south and southeast of Velika (see Yaşar et al., 2021). It should be mentioned that there are not significant natural geographic barriers between these localities. Therefore it can be assumed that the range of the species is probably not as fragmented as many authors

suggest (e.g. Beshkov & Nanev, 2002; Naumov 2006; Beshkov 2015). The absence of data on *E. jaculus* in part of the vast territories located between the localities with proven presence (at least in eastern Bulgaria) is probably in a much greater extent due to insufficient research (due to the hidden way of life of *E. jaculus*) than to a real absence.

Acknowledgements

We are grateful to Peter Belev and Kristina Milanova for the provided data, including the informative photographs.

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Historia naturalis bulgarica 45 (1): 5–9
ISSN 2603-3186 (online) | ISSN 0205-3640 (print) · nmnhs.com/historia-naturalis-bulgarica
https://doi.org/10.48027/hnb.45.012
Publication date [online]: 16 January 2023

Research article

New genus and two new species of stygobiotic snails from Stara Planina Mts, Bulgaria

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http://zoobank.org/2A4A781F-80D5-404C-AA16-8498FEA400E7

Abstract: Two new species, one of them belonging to a new genus are described from two caves in North Bulgaria. *Polatenia sinuiapertura* **n. gen.** and **n. sp.** was found in sand deposits at the entrance of Izvora Cave, Polaten District of Teteven Town, and *Kolevia toplensis* **n. sp.** found at the water catchment near Toplya Cave at vicinity of village of Golyama Zhelyazna.

Keywords: Balkans, caves, Hydrobioidea, new genus, new species

Introduction

The water caves of North Bulgaria are rich on stygobiotic snail species (Georgiev & Hubenov, 2013). This high diversity is a result of their speciation dated back about 7.5 million years ago before the Messinian Crisis (Osikovski et al., 2017).

Some stygobiotic species described by beginning and at the middle of the last century are currently a subject of monitoring by the program of Ministry of the Environment and Waters of the Republic of Bulgaria. Participating on this project I visited two caves located on the northern slope of Stara Planina Mts. The object of monitoring were three Hydrobiidae species: *Pontobelgrandiella bulgarica* (Angelov, 1972), *P. nitida* (Angelov, 1972) and *Anangelovia macrostoma* (Angelov, 1972) described by Angelov (1972) from a spring cave in Teteven Town. The *A. macrostoma* I had also detected in another locality, Toplya Cave near Golyama Zhelyazna Village (Georgiev, 2013), thus those two localities were the main target of my visit, resulting in a find of two new species, one of them belonging to a new genus.

Materal and methods

Deposits of streams, emerging from two caves of Stara Planina Mts were sampled on 17–18.09.2022 (Fig. 1). Later the samples were sun dried and floated in water. The floating empty shells were collected by a strainer and a brush. Specimens were stored, identified and some photographed. Taxonomy follows Glöer (2022).

Abbreviations used: SH – shell height, SW – shell width, AH – aperture height, AW – aperture width, LWH – last whorl height, NMNH – National Museum of Natural History, Sofia, Bulgaria.

Results and discussion

Class Gastropoda Cuvier, 1795
Order Neotaenioglossa Haller, 1892
Family Hydrobiidae Troschel, 1857
Genus *Polatenia* **gen. nov.**

Type species: *Polatenia sinuiapertura* Georgiev n. sp., here designated.

Received: 14 December 2022; accepted: 11 January 2022 · Editor: Nikolay Simov

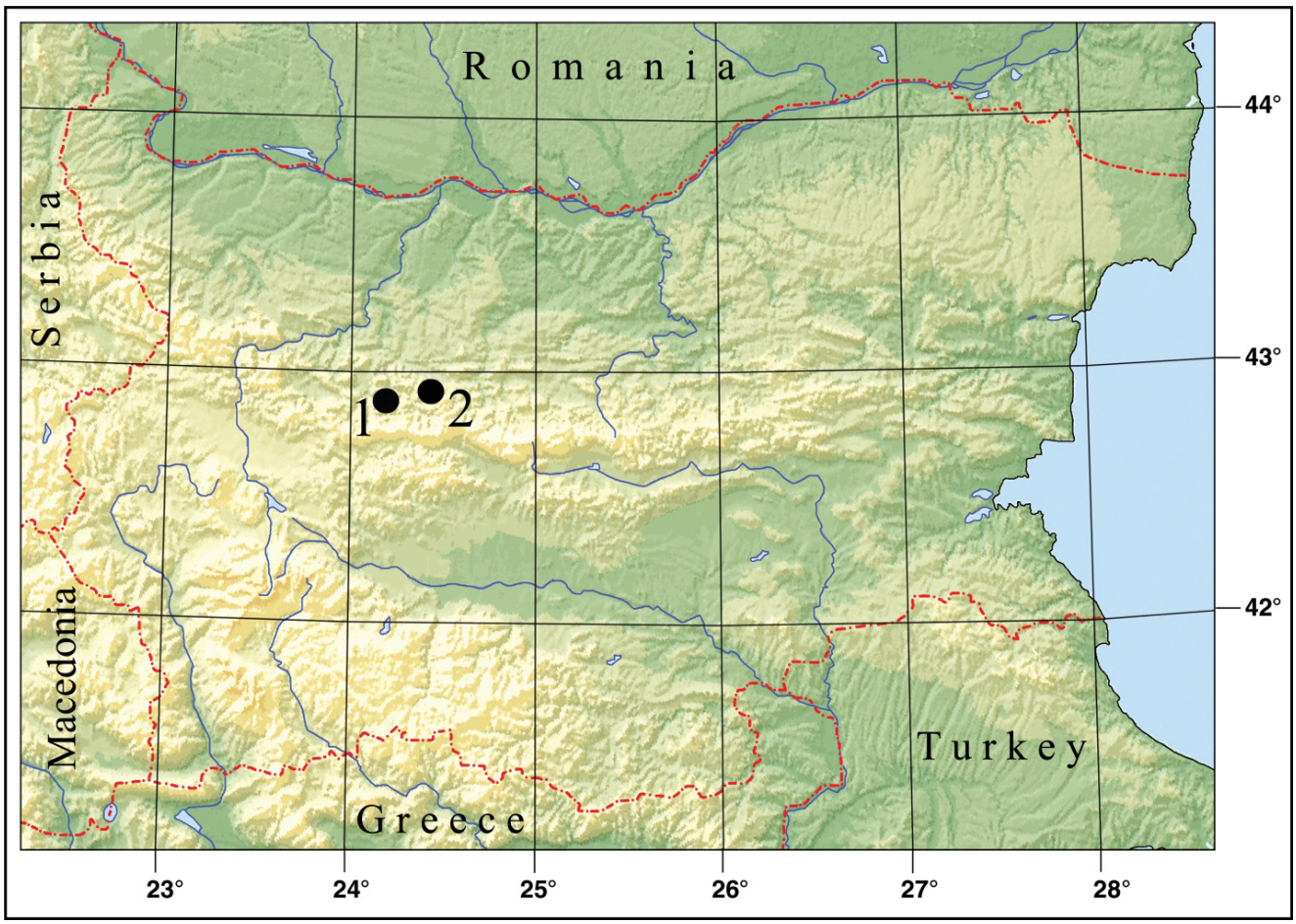

Fig. 1. Approximate position of the localities surveyed: 1 – Izvora Cave, Polaten District of Teteven Town; 2 – Toplya Cave near village of Golyama Zhelyazna.

Remark: About seven years ago a fragmented shell of this species had been collected by the author at the same locality. Lacking the aperture made its identification impossible, nevertheless it was evident that the specimen belongs to an unknown stygobiotic species.

Description: The aperture is round, with an irregularly folded periphery curving outwards, and deeply sinuated from right lateral view. The shell is relatively large for a hydrobiid snail (height 3.0 mm), elongated conical, and with smooth shining surface. Whorls are five, fast growing, relatively flat with shallow suture. The last whorl is slightly rounded and consists about 1/2 from the shell height. Apex is small and rounded. Umbilicus is wide open and aperture edge is not contact with the wall of the last whorl.

Diagnosis: By its sinuated aperture and conical shell *Polatenia* gen. nov. is similar with *Plagygeyeria* Tomlin, 1930 but the species from this genus has strongly rounded whorls with deep suture, with surface consisting of axial ribs with fine spiral ribs (Glöer, 2022). The morphologically closest Bulgarian taxon is *Plagygeyeria procerula* (Angelov, 1965) which has no sinus on the aperture, its whorls are more rounded and regularly growing (Angelov, 1965).

Etymology: Named after Polaten District of Teteven Town, where the new species was found.

Polatenia sinuiapertura **n. sp.**

Etymology: The name of the species is derived from its specific apertural sinus, well visible in lateral view.

Type locality: Bulgaria, Stara Planina Mts, Teteven Town, Polaten District, sand deposits at the entrance of Izvora Cave, N 42.945774°, E 024.198772°, 364 m a.s.l. (Fig. 2B).

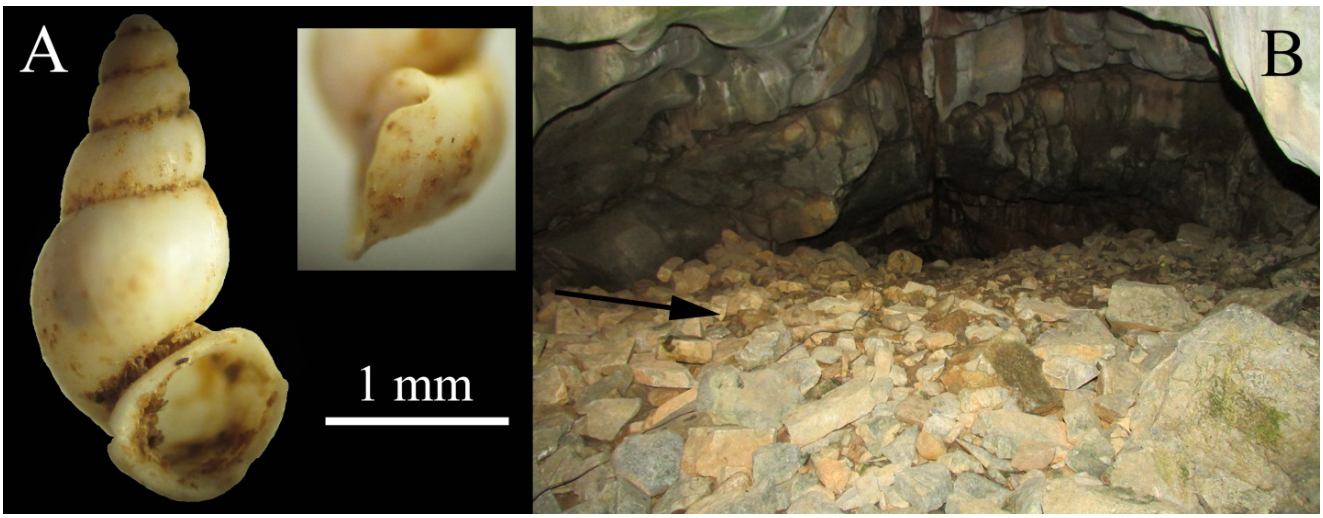

Fig. 2. *Polatenia sinuiapertura* gen. et sp. nov: A – shell, front view and lateral view of the aperture (holotype); B – type locality (Izvora Cave, Polaten), the sampling point is shown by an arrow.

Material examined: Holotype: 1 shell, 18.09.2022, from the type locality, D. Georgiev leg., NMNH (Fig. 2A).

Description: The aperture is round, with an asymmetrically folded edge curving outwards, and deeply sinuated from lateral view. The shell is relatively large (height 3.0 mm), elongated conical, and with smooth shining surface. Whorls are five, fast growing, relatively flat with shallow suture. The last whorl is slightly rounded and consists of about 1/2 from the shell height. Apex is rounded. Umbilicus is wide open and aperture edge is not in contact with the wall of the last whorl. Soft body and operculum unknown.

Measurements: Holotype: SH = 3.00 mm, SW = 1.06 mm, AH = 0.76 mm, AW = 0.84 mm, LWH = 1.38 mm, AH/SH = 0.25, LWH/SH = 0.46, SW/SH = 0.35.

Habitat and ecology: A stygobiotic species living in subterranean karstic waters. It was found in sand deposits of a stream emerging from a small limestone cave in an inhabited area (Polaten District of Teteven Town). Associated gastropod fauna: *Pontobelgrandiella bulgarica* (Angelov, 1972), *P. nitida* (Angelov, 1972), *Anangelovia macrostoma* (Angelov, 1972).

Genus *Kolevia* Georgiev & Glöer, 2015

Diagnosis: The shell is white, conical to ovate-conical with 5 whorls having fine growth lines and deep suture. Last whorl is more than 50% from the total shell height and is somehow flattened at its wider part. The apex is rounded to relatively sharp. The aperture is ovoid with simple lip having brownish periphery. The operculum and the soft body are unknown (Georgiev & Glöer, 2015).

Kolevia toplensis **n. sp.**

Etymology: The species is named after the Toplya Cave from which river sand deposits the species was found.

Type locality: Bulgaria, Stara Planina Mts, near Golyama Zhelyazna Village, in sand deposits of the stream at the water catchment near Toplya Cave, N 42.948109°, E 024.487527°, 462 m a.s.l. (Fig. 3B).

Material examined: Holotype: 1 shell, from the type locality, 17.09.2022, NMNH, D. Georgiev leg., (Fig. 3A); paratypes: 3 shells, from the type locality, 17.09.2022, NMNH, D. Georgiev leg.

Description: The shell is white, conical to elongate conical with 4.5–5 whorls having fine growth lines and deep suture. Last whorl is more than 50% from the total shell height and is somehow flattened at its wider part. The apex is rounded to relatively sharp. The aperture is ovoid with simple lip having brownish periphery. The operculum and the soft body are unknown. Small species (SH = 1.3–1.4 mm).

Measurements: Holotype: SH = 1.32 mm, SW = 0.74 mm, AH = 0.48 mm, AW = 0.44 mm, LWH = 0.82 mm, AH/SH = 0.37, LWH/SH = 0.62, SW/SH = 0.56;

Fig. 3. *Kolevia toplensis* n. sp.: A – shell, front view (holotype); B – type locality (water catchment near Toplya Cave), the sampling point is shown by an arrow.

Paratypes: SH = 1.26 mm, 1.36 mm, 1.30 mm; SW = 0.68 mm; 0.66 mm; 0.68 mm (respectively).

Differential diagnosis: *Kolevia toplensis* n. sp. differs from the only known species of this genus, *K. bulgarica* Georgiev & Glöer, 2015 by its smaller size (SH = 1.2–1.3 mm vs 2.00 mm), the more elongate shell, and its open umbilicus (vs. slit-like).

Habitat and ecology: A stygobiotic species living in subterranean karstic waters. Shells were found in sand deposits of a stream emerging from a limestone cave. Associated gastropod fauna: *Stoyanovia* cf. *stoyanovi* (Georgiev, 2013), *Stoyanovia* cf. *kolevi* (Georgiev, 2013), *Anangelovia macrostoma* (Angelov 1972), *Pontobelgrandiella* sp.

The recent discovery of two new species and even a new genus of stygobiont snails in Bulgaria, after 15 years of their intensive research (Glöer, 2022) indicates, that their diversity is still poorly known. Localities rich in a shell material of these interesting animals have to be visited repeatedly at different seasons and large quantities of river sediments has to be collected and screened to gain scientifically valuable samples. Additionally, living individuals have to be searched for anatomical and genetic studies to better understand their taxonomy and systematics. The scarcity of live specimens washed out from their hypogean habitats represents the main challenge in the field work and in their future study.

Acknowledgements

The trips to the caves of Iskar River Gorge were financed by project "Consultations and assistance in the collection, analysis and interpretation of data on types of natural habitats and species for the purposes of the National System for Monitoring the State of Biological Diversity (NSMSBR) and the policy on the protection of biological diversity", according to an Agreement with National Museum of Natural History-BASc and the Ministry of Environment and Waters reg. No. D-33-19/07/08/2022.

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Historia naturalis bulgarica 45 (1): 11–15
ISSN 2603-3186 (online) | ISSN 0205-3640 (print) · nmnhs.com/historia-naturalis-bulgarica
https://doi.org/10.48027/hnb.45.013
Publication date [online]: 16 January 2023

Research article

The Oriental turtle dove (*Streptopelia orientalis* Latham, 1790) (Aves: Columbidae), a new species for the avifauna of Serbia

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Abstract: On 13 January 2019, an individual Oriental turtle dove (*Streptopelia orientalis* Latham, 1790) was recorded. The species is shortly observed during tree-perching in an intensive agricultural landscape near Temerin Town, Vojvodina Province, Northern Serbia. The observed dove was a putative juvenile bird belonging to the subspecies *meena*. This finding represents the first observation of the Oriental turtle dove and the sixth native species from the order of Columbiformes recorded in Serbia.

Keywords: Columbiformes, first record, Northern Serbia, vagrancy, Vojvodina Province

Introduction

Pigeons and doves (Columbidae Leach, 1820) are a monogamous, large, species-rich, and well-recognisable bird family. They are widely distributed across all continents except Antarctica (Gibbs et al., 2001). Worldwide, the family contains 348 valid species divided into 49 genera (Winkler et al., 2020). The highest species richness is related to the South-East Asian and Australasian biogeographic realm, particularly on the islands (Gibbs et al., 2001; Winkler et al., 2020). Compared to other continents, the diversity of pigeons and doves in Europe is pretty low. In the European continent only ten species within two genera live: pigeons (*Columba* Linnaeus, 1758) and doves (*Streptopelia* Bonaparte, 1855). *Streptopelia* is an exclusively Old-World genus that comprises four medium-sized species native to Europe (Winkler et al., 2020). The rarest and relatively poorly studied species among them is the Oriental turtle dove (*Streptopelia orientalis* Latham, 1790).

The Oriental turtle dove, also known as the rufous turtle dove (Cramp, 1985), is the largest representative of the *Streptopelia* genus in Europe. Its breeding area stretches from southern Ural Mountains to Sakhalin and Kuril Islands, south through southern Kazakhstan, Afghanistan to southern India in the west, and from Japan and Taiwan south to northern French Indochina and Hainan Island in the east (Gibbs et al., 2001; Baptista et al., 2020). The species is polytypic, and literature recognised at least six subspecies: *S. orientalis orientalis* (Latham, 1790) breeds in Central Siberia east to Sakhalin, the Kuril Islands and Japan south through China to northern French Indochina; *S. orientalis meena* (Sykes, 1832) breeds from south-west Siberia to the Altai Mountains, Kazakhstan, Afghanistan, northern Pakistan, and India west to Nepal with marginal extension into Western Palaearctic (Ural Mts); *S. orientalis erythrocephala* (Bonaparte, 1855) is found in Indian Peninsula from Bihar, Jharkhand and Orissa south to Karnataka State; *S. orientalis agricola* (Tickell, 1833) inhabits north-east India, Bangladesh and Myanmar to Tenasserim Hills in Malaysia; *S. orientalis stimpsoni* (Stejneger, 1887) is found in the Ryukyu Islands in Japan, and *S. orientalis orii* (Yamashina, 1932) inhabits Taiwan Archipelago (Gibbs et al., 2001; Baptista et al., 2020). Northern populations, in particular, subspecies *meena* and *orientalis* are primarily migratory, moving from their Siberian, Mongolian and Chinese summer

Received: 19 August 2022; accepted: 31 December 2022 · Editor: Peter Shurulinkov

Fig. 1. Oriental turtle dove (*Streptopelia orientalis* Latham, 1790) perching on a tree branch near Temerin Town, Vojvodina Province, Northern Serbia, 13 January 2019 (photo: Geza Farkaš).

grounds to India and South-East Asia, where they co-occur and mingle with the southern resident subspecies (Gibbs et al., 2001; Wilson & Korovin, 2003). The Oriental turtle dove is principally found singly, in pairs or small groups, gathering in larger flocks on passage or at copious feeding patches. The species is predominantly granivorous, foraging on the ground in clearings. Primarily feeds on grains, cereals, bamboo and weed seeds but also takes green shoots of various plants (Gibbs et al., 2001; Yoshikawa & Isagi, 2012; Baptista et al., 2020). It occupies a wide variety of habitats but prefers mosaic landscapes with fields for feeding and forest patches for breeding in the warmer Palaearctic and colder tropics, up to roughly 4000 m a.s.l. (Nepal). This species usually avoids densely forested areas unless close to open countryside or in desert zones. It is widespread and typically ubiquitous throughout a vast geographic area that covers most of Asia, although quantitative data is lacking (BirdLife International, 2016; Baptista et al., 2020). Because of the absence of evidence for any declines or significant threats, the entire world population trend was evaluated as stable. The species is categorised as Least Concern (BirdLife International, 2016).

Herein, we described the discovery of the putative first winter (juvenile) Oriental turtle dove for Serbia. In addition, we briefly discussed the status and observations of the species in the Balkans and adjacent countries.

Results and discussion

During a car driving on 13 January 2019, a little after 12 PM, one individual of Oriental turtle dove accidentally observed approximately 1 km from the northern edge of Temerin Town (UTM 34T DR13, 77 m a.s.l), Vojvodina Province, Northern Serbia. The exact coordinates of observation were 45°26'44.4"N 19°54'14.0"E. The specimen was observed from a car while perching on a lateral tree branch near the state road Temerin–Bečej. After less than one minute of observation, the observed individual flew far away, and it was impossible to follow it further. During this brief

encounter, the first author obtained several diagnostic photographs with Canon EOS 80D and the following settings: f/5.6, focal length 400 mm, ISO-800, and exposure time 1/1250 s (Fig. 1). The registered specimen did not produce any call. The weather was calm and cloudy, with a temperature of around 5°C. The surrounding landscape was rather typical for this part of the country – apparently endless agricultural fields interspaced with patchily distributed tree lines, groves, and farms.

The first impression during the short observation was that the observed dove was darker, something larger and bulkier than the European turtle dove (*Streptopelia turtur* Linnaeus, 1758) – a typical species of most parts of Serbia. However, the time of year did not fit the observation period, considering that the European turtle dove is a typical long-distance migrant that winters in sub-Saharan Africa from October to April (Cramp, 1985; Gibbs et al., 2001; Marx et al., 2016). Moreover, after carefully examining the photographs on a computer, we also detected the following discrepancies: the nape and hindneck were pink-brownish, not bluish-grey, contrasting with a grey crown, but not with the mantle. Also, the underparts were darker and duller than on the European turtle dove and the colouration of the breast extending further to the belly. Other incompatible morphological characteristics with European turtle dove appearance were extensive, almost rounded, blackish-brown centres on upperwing coverts, distinctly bluish-grey uppertail/lowerback coverts and noticeably pale bill tip. With the European turtle dove being ruled out, it was clear that depicted morphological features and colouration belong to the Oriental turtle dove (Cramp, 1985; Hirschfeld, 1986; Gibbs et al., 2001; Brazil, 2009; van Duivendijk, 2011). Considering the origin of the bird, the only somewhat confusing detail represents the slightly longer tip of the maxilla, the premaxillary nail. However, looking at the different photographs of this species on the Internet, we noticed that the somewhat longer bill tip is not unusual for this species. Although speculative in our case, it cannot be excluded that overgrowth of the premaxillary nail was caused by a nutrition deficiency, genetic mutations, collision traumas, diseases, or other known and well-described anomalies in wild birds (Pomeroy, 1962; Ledger, 1970; Purificação, 2019). Flying away due to human presence along with fine plumage conditions without clipped or damaged feathers represents reliable indicators of the wild origin of the bird. Furthermore, we did not notice a leg ring or other markings typical for captive-bred birds. The rather white undertail coverts hint at the subspecies *meena* (Hirschfeld, 1986; Gibbs et al., 2001; Wilson & Korovin, 2003; Svensson et al., 2009). We were unable to determine the sex of the observed individual because sexual dichromatism is not sufficiently developed in this species (Gibbs et al., 2001). Additionally, the analysis of the photographs showed that the individual was near the end of its moulting cycle. A small amount of unmoulted wing coverts shows conspicuously pale rufous edges of tips. Hence, this character entirely corresponds to the first winter bird, i.e., hatched during the previous calendar year (van Duivendijk, 2016; Baptista et al., 2020).

Prior to the above-described observation, the Oriental turtle dove had never previously been recorded in Serbia (Šćiban et al., 2015). Consequently, we can consider it a new member of Serbia's avifauna. Except for the tiny non-native resident population in the southern Czech Republic established in 2015 or 2016 (Zeman J., pers. comm.) and the low-density breeding population in the far east of the European part of the Russian Federation (Wilson & Korovin 2003; Voltzit & Kalyakin, 2020), no documented breeding population of Oriental turtle dove exists in Europe. Therefore, in the rest of the continent, the species is considered a scarce but regularly observed vagrant (Cramp, 1985; Gibbs et al., 2001; Baptista et al., 2020). Indeed, during the last 11 years, there were 103 official records of this species outside the breeding area (Krišovský & Krišovský, 2021). On the other hand, between 1842 and 1986, there was only 31 confirmed observations (Hirschfeld, 1986). To date, the British Isles, the Netherlands, and the Scandinavian Peninsula are the regions with the most historical observations. Both migratory subspecies *S. orientalis meena* and *S. orientalis orientalis* have been identified and around two-thirds of the records referred to the non-breeding period from late September until the end of January (Hirschfeld, 1986; Krišovský & Krišovský, 2021). In contrast, across south-eastern and central Europe, apart from Greece, the Oriental turtle dove remains a quite scarce autumn-winter vagrant. In southeast Europe, the first appearance of this dove species was in mid-August of 1965 on the Maritsa (Evros) River on the border between Greece and Turkey (Loterijman, 1968). Altogether, there are less than 30 primarily unpublished records in Greece (Kontopoulos A., pers. comm.), four in Hungary (www.rarebirds.hu), three in Cyprus (Stylianou J., pers. comm.), two or three in

Turkey (Kulaçoğlu K. & Abbasoğlu Ç., pers. comm.), two in Romania (www.rombird.ro), Austria (www.tarsiger.com) and Malta (Fenech, 2017), and one record in Slovakia (Krišovský & Krišovský, 2021). There are no observations from Albania (Topi & Nikolov, 2016), Bosnia and Herzegovina (Topić G., pers. comm.), North Macedonia (Velevski & Vasić, 2017), Croatia (Barišić et al., 2016), Bulgaria (Ivanov et al., 2019) or Slovenia (Denac M., pers. comm.). Thus, we reasonably believe there are no more than 40 proven records in the Balkans and adjacent countries. The most significant number of observations refers to the last twenty years, mainly during the autumn-winter period as in the case of our observation. Along with the gradual increase in the number of birders and the slight range expansion of the *meena* subspecies in Russian breeding grounds (Voltzit & Kalyakin, 2020), it is not impossible to expect an increase in the number of observations in Southeast Europe in the forthcoming years.

Acknowledgements

We want to thank Srđan Čuturilov (Serbia) for his initial help with the species identification. We are also grateful to Natalino Fenech (Malta), Jane Stylianou (Cyprus), Ádám Kaczkó (Hungary), Nikos Samaritakis and Alexandros Kontopoulos (Greece), Cornel Cotorogea (Romania), Kuzey Cem Kulaçoğlu and Çağan Abbasoğlu (Turkey), Folkert Jan Hoogstra (Netherlands), Mitja Denac (Slovenia), Goran Topić (Bosnia & Herzegovina), Lyubomir Profirov (Bulgaria) and Jaroslav Zeman (Czech Republic) for the sharing national records and literature.

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