

PREDATION ON *Anguis fragilis* BY *Coronella austriaca* PHOTO-DOCUMENTED BY A CITIZEN IN A NEW UTM SQUARE IN SERBIA

Žarko Simić¹, Sonja Nikolić^{2,3,*}

1. Raj settlement, 36210 Vrnjačka Banja, Serbia
 2. University of Belgrade, Faculty of Biology, Institute of Zoology, Studentski trg 16, 11000 Belgrade, Serbia
 3. Serbian Herpetological Society “Milutin Radovanović”, Despota Stefana Blvd. 142, 11000 Belgrade, Serbia
- *Corresponding author; E-mail: sonjadj@bio.bg.ac.rs

(Received September 19, 2024; Accepted November 12, 2024)

ABSTRACT. In a previously unreported UTM square, a citizen spotted a smooth snake feeding on a slow worm. Although not a spectacular finding, this is a new distributional record for both species and a nice example of how an expert NGO can help inform and educate laypeople regarding wildlife.

Keywords: citizen science, education, NGO, slow worm, smooth snake

In addition to small reptiles and mammals, despite their comparatively small size, smooth snakes (*Coronella austriaca* (Laurenti, 1768), fam. Colubridae) were documented to feed on various snake species (including their own), and even on bird eggs (DI NICOLA *et al.*, 2020; JOFRE and READING, 2020; JOHANSEN and FLAATTEN, 2021). They are known to consume slow worms (*Anguis fragilis* (Linnaeus, 1758), fam. Anguidae), but the information regarding these snakes' diet was obtained usually through analyses of their faeces or regurgitated stomach contents (GODDARD, 1984; READING and JOFRÉ, 2013; BROWN *et al.*, 2014; JOFRE and READING, 2020; JOHANSEN *et al.*, 2024). There is even a record of a smooth snake ending up dead after consuming a large slow worm (KOLANEK *et al.*, 2020). However, regarding direct observations of *C. austriaca* consuming *A. fragilis*, only a photograph was found from Croatia (GUNTER), and a video from England (MELLOWSHIP, 2012).

The current distribution of *C. austriaca* in Serbia was published almost a decade ago, based on old literature/museum data and newly collected information (TOMOVIĆ *et al.*, 2015). In 2020, the distribution of *A. fragilis* was also made public (UROŠEVIĆ *et al.* 2020). Neither of the two species were recorded in Vrnjačka Banja. Like other scientific results, these data are almost completely unknown to the public.

On 10th June 2024, at approximately 14:00 h, in the Raj settlement, a part of Vrnjačka Banja town (43°37'34"N, 20°54'21.6"E), the first author observed a smooth snake, *C. austriaca*, tightly coiled around the body of a slow worm, *A. fragilis*. He carefully removed the animals from the road they were on and did not disturb the feeding process. The snake had already swallowed the lizard's head, suffocating it (Fig. 1). After approximately 30 minutes, it

ORCID ID:

S. Nikolić - 0000-0003-0458-515X;

consumed it whole. The first author recorded the animals with his camera. Finding the observation interesting, he sent the photo to the Serbian Herpetological Society “Milutin Radovanović” (SHS).

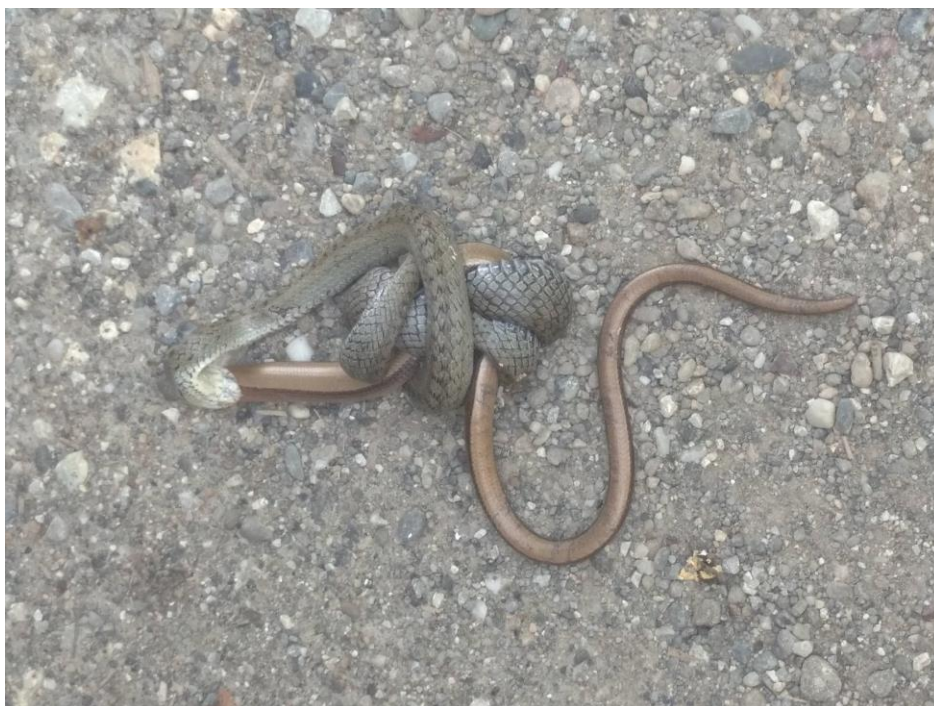


Figure 1. *Coronella austriaca* starting to swallow its prey, *Anguis fragilis*

Every year, SHS receives numerous identification requests from laypeople: often, the unrecognized species are smooth snakes. This indicates that *C. austriaca* occurs in more places in our country than has been scientifically confirmed thus far. Nevertheless, although widespread, it is, assumedly, not numerous in the regions it occupies and leads a secretive life: people are usually surprised, stating that they have never seen a snake like that. However, the first author has noticed that in the last several years he and his neighbours have encountered snakes more often than previously. In addition to various biotic and abiotic factors (climate oscillations, food availability, etc.), that could result from extensive construction works in the area: numerous houses are being built, so the habitat (shrubs, open grassy areas, canals, sewerage system, etc.) is severely disturbed.

The case we report of here is a rare photo-documented instance of smooth snake feeding on slow worm. It was recorded by the citizen who wanted to learn about wild species in his surroundings. In general, the number of people aware of environmental problems and willing to learn about the values of biodiversity is increasing, especially in urban environments (TEIXEIRA *et al.*, 2016). Seeking information, especially regarding highly unpopular animals such as snakes (BALLOUARD *et al.*, 2013) is a huge step in a society where many people are so afraid of these animals that they don't want to say their name and some claim they cannot see a snake in a picture. Social networks are crucial in gathering people around common interests/ideas/goals and communicating important information.

This particular record from Vrnjačka Banja is new: the respective UTM quadrant (DP92) has not been covered previously although there is a scientific confirmation of both species' presence from the adjacent quadrants, EP02 and DP93, EP92, and EP93 respectively (TOMOVIĆ *et al.*, 2015, UROŠEVIĆ *et al.*, 2020).

The presence of smooth snakes in urban environments is not unusual: their small size might be beneficial in such circumstances (WOLFE *et al.*, 2018). They can be found even in the Serbian capital, Belgrade. *Coronella* can persist in (sub)urban environments in healthy

populations, as was shown in Germany (DICK and MEBERT, 2017). Given appropriate microhabitats and food, these snakes can survive in small areas. Slow worms are also often seen – but usually not sought for and recorded by scientists – in (sub)urban areas (SMITH, 1990; HUBBLE and HURST, 2006).

Reptiles in cities are significant in several aspects. From the anthropocentric point of view, they are important as natural predators of rodents and insects, but there is still not much information regarding their ecology in urban surroundings (WOLFE *et al.*, 2018; LETTOOF *et al.*, 2023; MÉSZÁROS *et al.*, 2023).

Citizen science has proven significant in biodiversity research and conservation, including resolving human-wildlife conflicts (OSTERMANN-MIYASHITA *et al.*, 2021). To improve the distribution picture of smooth snakes in Serbia, we intend to collect all the reports we received from laypeople and combine them with the expert-proven data. Publicizing such findings will, hopefully, encourage other people to inspect their surroundings more closely in an attempt to understand and respect all living beings.

Acknowledgements

Sonja Nikolić is financed by the Ministry of Science, Technological Development and Innovation of Serbia, contract No. 451-03-66/2024-03/ 200178.

References

- [1] BALLOUARD, J.-M., AJTIĆ, R., BALINT, H., CRNOBRNJIA-ISAILOVIĆ, J., DESMONTS, D., ELMOUDEN, E.H., et al. (2013): Schoolchildren and one of the most unpopular animals: are they ready to protect snakes? *Anthrozoös* **26**(1): 93–109. doi: 10.2752/175303713X13534238631560
- [2] BROWN, D.S., EBENEZER, K.L., SYMONDSON, W.O.C. (2014): Molecular analysis of the diets of snakes: changes in prey exploitation during development of the rare smooth snake *Coronella austriaca*. *Molecular Ecology* **23**: 3734–3743. doi: 10.1111/mec.12475
- [3] DICK, D.C.D., MEBERT, K. (2017): Between housing and deep forest: Long-term population biology and dispersal of suburban Smooth snakes (*Coronella austriaca*). *Zoologischer Anzeiger - A Journal of Comparative Zoology* **270**: 98–106. doi: 10.1016/j.jcz.2017.09.007
- [4] DI NICOLA, M.R., ZECCHIN, L., D'AMICO, M., FARAONE, F.P. (2020): Ophiophagy in *Coronella austriaca*: first case of predation on *Hierophis viridiflavus* and first direct observations of predation on *Vipera aspis*. *Herpetology Notes* **13**: 1107–1110
- [5] GODDARD, P. (1984): Morphology, growth, food habits and population characteristics of the Smooth snake *Coronella austriaca* in southern Britain. *Journal of Zoology* **204**(2): 241–257. doi: 10.1111/j.1469-7998.1984.tb02373.x
- [6] GUNTER. A smooth snake (*Coronella austriaca*) eating a slow worm (*Anguis fragilis*), Plitvice Lakes National Park, Croatia. Available at <https://stock.adobe.com/images/a-smooth-snake-coronella-austriaca-eating-a-slow-worm-anguis-fragilis-plitvice-lakes-national-park-croatia/480002920>. Accessed 8th August 2024.
- [7] HUBBLE, D., HURST, D. (2006): Population structure and translocation of the slow-worm, *Anguis fragilis* L. *Herpetological Bulletin* **97**: 8–13.
- [8] JOFRE, G.M., READING, C.J. (2020): Cannibalism in smooth snakes, *Coronella austriaca*. *Herpetological Journal* **30**: 168–172. doi: 10.33256/hj30.3.168172
- [9] JOHANSEN, B.S., FLAATTEN, Ø. (2021): Smooth snake *Coronella austriaca* eating bird eggs from the nest. *Fauna* **74**(3-4): 138–141.
- [10] JOHANSEN, B., SLETTAN, A., CLEARY, A., SAMSLÅTT, M., PHAN, V., SØRENSEN, P. (2024): Dietary adaptations along the northern limit of distribution: What does the smooth snake (*Coronella austriaca*) eat in Norway? Metabarcoding of stomach content and visual analysis of faeces. *Authorea*. October 04, 2024. doi: 10.22541/au.172804869.94469322/v1 [pre-print]
- [11] KOLANEK, A., PASTRYKIEWICZ, M., BORAWSKI, W., BURY, S. (2020): *Coronella austriaca* (smooth snake) – mortality after prey ingestion. *The Herpetological Bulletin* **152**: 32–33. doi: 10.33256/hb152.3233

- [12] LETTOOF, D.C., PARKIN, T., JOLLY, C.J., DE LAIVE, A., VON TAKACH, B. (2023): Snake life history traits and their association with urban habitat use in a tropical city. *Urban Ecosystems* **26**: 433–445. doi: 10.1007/s11252-023-01327-x
- [13] MELLOWSHIP, R. (2012): Smooth Snake Eating a Slow Worm [Video file]. YouTube. <https://www.youtube.com/watch?v=g5Qaz609ZyI>. Accessed 9th October 2024.
- [14] MÉSZÁROS, B., BÜRGÉS, J., TAMÁS, M., GÁL, B., BOHUS, A., SCHMERA, D. (2023): Effects of the urban environment on the developmental stability, size and body condition of dice snakes (*Natrix tessellata*) living in artificial lakeside habitats. *Ecological Indicators* **156**: 111117. doi: 10.1016/j.ecolind.2023.111117
- [15] OSTERMANN-MIYASHITA, E-F., PERNAT, N., KÖNIG, H.J. (2021): Citizen science as a bottom-up approach to address human-wildlife conflicts: From theories and methods to practical implications. *Conservation Science and Practice* **3**:e385. doi: 10.1111/csp2.385
- [16] READING, C., JOFRÉ, G. (2013): Diet composition changes correlated with body size in the Smooth snake, *Coronella austriaca*, inhabiting lowland heath in southern England. *Amphibia-Reptilia* **34**: 463–470. doi: 10.1163/15685381-00002899
- [17] SMITH, N. (1990): The ecology of the slow-worm (*Anguis fragilis* L.) in southern England. Master's thesis: University of Southampton, Department of Biology.
- [18] TEIXEIRA, C.P., PASSOS, L., GOULART, V.D.L.R., HIRSCH, A., RODRIGUES, M., YOUNG, R.J. (2016): Evaluating patterns of human-reptile conflicts in an urban environment. *Wildlife Research* **42**(7): 570–578. doi: 10.1071/WR15143
- [19] TOMOVIĆ, L., UROŠEVIĆ, A., AJTIĆ, R., KRIZMANIĆ, I., SIMOVIĆ, A., LABUS, et al. (2015): Contribution to the knowledge of distribution of Colubrid snakes in Serbia. *Ecologica Montenegrina* **2**(3): 162–186.
- [20] UROŠEVIĆ, A., TOMOVIĆ, L., CRNOBRNJA-ISAILOVIĆ, J., KRIZMANIĆ, I., AJTIĆ, R., LABUS, N., et al. (2020): Distribution of the slow worm (*Anguis fragilis* complex) with possible species delimitation in Serbia. *Bulletin of the Natural History Museum, Belgrade* **13**: 253–265. doi: 10.5937/bnhmb2013253U
- [21] WOLFE, A.K., BATEMAN, P.W., FLEMING, P.A. (2018): Does urbanization influence the diet of a large snake? *Current Zoology* **64**(3): 311–318. doi: 10.1093/cz/zox039