

## Body bending in smooth snakes *Coronella austriaca* in Serbia

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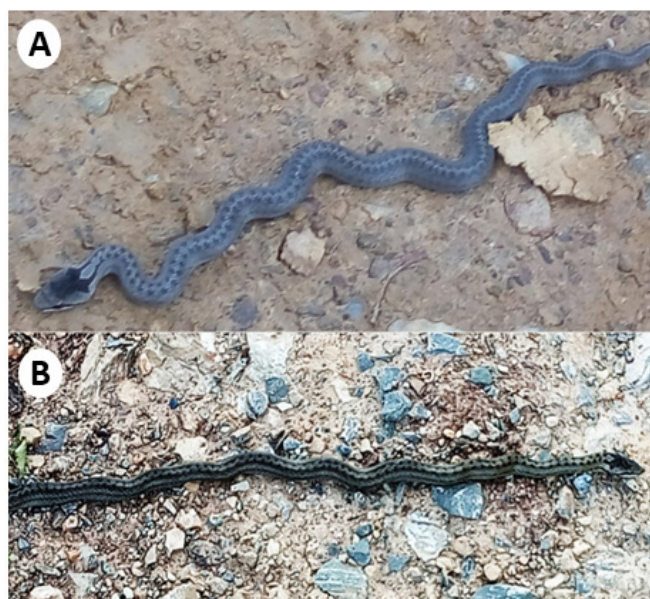
Published rarely – and almost exclusively from subtropical regions – body bending is believed to serve as a defensive/warning/camouflage behaviour making a snake look like a vine or stick, something inedible, dangerous or dead (Duarte, 2012; Hauser et al., 2020). It is also known as liana-mimicry or kinking.

While searching for *Coronella* through e-mails and Facebook messages sent to the Serbian Herpetological Society since 2015, I retrieved three photographs of smooth snakes in this unusual zigzag posture. I could not contact the author of one of these to get his consent for publishing, hence only two body bending cases are presented here. Once again, the importance of citizens' contribution to scientific research is demonstrated.

I found only a handful of papers describing this specific body bending behaviour (BBB) in snakes. The species proven so far to display BBB belong to the families Colubridae, Dipsadidae and Viperidae (Duarte, 2012; França et al., 2020; Hauser et al., 2022; Pokhilyuk & Maslova, 2025). In one of the most recent papers (2020), França et al. wrote about it as “one of the more rarely-reported and poorly understood defensive behaviours”. Still, in 2022, Hauser et al. stated that BBB “has been reported for less than a dozen different snake species from tropical and subtropical America” and reported the first records of this behaviour in snakes in Asia and southern Spain. The most recent findings originate from the Russian Far East (Pokhilyuk & Maslova, 2025). The BBB is clearly exhibited by more species – and in more regions – than was originally thought.

The parts of Serbia where *Coronella* individuals were photographed (Fig. 1A & B) are under sub-alpine (south-eastern Serbia) and moderate variants of continental climate (western Serbia and Šumadija). The third individual was observed in the town of Užice (app. 400 m a.s.l.), western Serbia. Therefore, however simple, the present note is possibly only the third regarding body bending in snakes outside (sub)tropical regions of the world.

Although wide, the distribution of the smooth snake in Serbia is underestimated, with huge gaps resulting from the lack of sightings i.e. targeted faunistic research (Tomović et al., 2015). The global deficiency of data regarding *Coronella* is due to its “cryptic behaviour and secretive lifestyle” (Goddard, 1984; Gleed-Owen, 2005). Bearing that in mind, finding smooth snakes in BBB is even more interesting.



**Figure 1.** Two *Coronella austriaca* displaying BBB - **A.** Gornje Gare village (south-eastern Serbia, app. 800 m a.s.l.; 2016), **B.** Rajac (Suvobor Mt., western Serbia – Šumadija, approx. 800 m a.s.l.; 2021)

Hauser et al. (2022) suggested that the function of BBB is “more often aposematic than cryptic” and that snakes display BBB more often than is formally known and published in the scientific literature. It was experimentally triggered in rat snakes in the USA (ibid.) and observed in captive specimens (França et al., 2020). An alternative hypothesis, that such a posture is a response to a threat by an insufficiently warmed snake, appears unlikely (Marques et al., 2006; França et al., 2020). It is neither only cryptic and defensive nor restricted to arboreal snakes (Marques et al., 2006; Maddock et al., 2011; Hauser et al., 2022; Pokhilyuk & Maslova, 2025). *Coronella* is not only terrestrial but also spends much time underground, although it can climb branches in search of bird eggs or nestlings (Gleed-Owen, 2005; Johansen & Flaatten, 2021).

All three snakes in the present report were seen on dirt/asphalt roads and possibly frightened by the approaching human(s). Hauser et al. (2022) and other authors also usually spotted kinking snakes on roads or paths: “Apparently BBB is triggered after snakes have been detected in opened areas”

(Duarte, 2012). This is probably because the snakes are most easily visible on roads, where they are fully exposed, devoid of shelter, taking this unusual ‘play freeze’ posture as if they were among vegetation. And we, the people, use paths and roads more often than thickets – where we have trouble spotting a snake in whichever posture it has adopted. The rarity of observations may be attributed to snakes’ ability to blend with their background when not on open ground (França et al., 2020). We will probably never know the full repertoire of postures snakes may take when approached by a variety of predators in the wild.

Most species that Houser et al. (2022) described or reviewed are known as “aggressive” when defending themselves. *Coronella* also employs “several defensive strategies, including biting with a chewing action” (very aggressive compared to many other non-venomous snakes); also, it often flattens its head posteriorly and takes up a striking position, presumably to mimic *Vipera berus* (Gleed-Owen, 2005), which it resembles in colouration. Body bending is the smooth snake’s additional reaction to threat.

There is still no definite conclusion regarding body bending in snakes. Because I do not have any information about the circumstances under which the smooth snakes in question were photographed or the surrounding habitats, I refrain from any new speculation. This behaviour remains to be studied directly. Surely, new information from engaged enthusiasts will significantly contribute to our data pool.

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