

The next missing piece of cannibalism in *Coronella austriaca* (Laurenti, 1768): a new record of wild predation on a juvenile from Switzerland

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The smooth snake *Coronella austriaca* has a wide range in Europe, from southern Scandinavia in the north to the Balkan, Iberian, and Italian peninsulas, as well as the Mediterranean islands of Elba and Sicily in the south (Speybroeck et al., 2016). The diet of *C. austriaca* mainly includes lizards, insects, small mammals, eggs, and sometimes also other snakes (Goddard, 1984; Rugiero et al., 1995; Reading and Jofré, 2013; Strugariu et al., 2014; Di Nicola et al., 2020; Kolanek et al., 2020; Escalante et al., 2023; Johansen et al., 2024; Phan et al., 2025; Wenner et al., 2025).

Cannibalism refers to the act of consuming all or part of the body of conspecifics at any point in their life cycle (Elgar and Crespi, 1992). It is a widespread behaviour among animals, significantly influencing their ecology and evolution, the benefits of cannibalism are various and include additional nutrient intake, elimination of reproductive and resource-based competition, and/or control of territory (Polis, 1981). The first evidence of cannibalism in *C. austriaca* was collected from the analysis of faeces and stomach contents, where it is not always possible to determine the life stage of the eaten individual (Galán, 1988; Drobenkov, 1995; 2000; 2014; Luiselli et al., 1996). In Spain, Galán (1988) and Amat (1998) recorded juveniles in their dietary studies. It was only recently that the first direct observations of cannibalism between adult *C. austriaca* were reported from England and Germany (Jofré and Reading, 2020; Rowland et al., 2021). Kolanek and Bury (2020) documented direct cases of attempted cannibalism among juveniles in Poland, while Zdunek

et al. (2023) reported attempts among adults in France and Switzerland. The only known direct observation of predation by an adult on a juvenile was in captivity in Turkey, and other instances between adults also in captivity in France (Saint-Girons, 1955; Uysal et al., 2019). Here we present the first direct observation in the wild of cannibalism between an adult *C. austriaca* and a juvenile in Switzerland.

On 11 September 2025 at 13:45 h, in a rocky habitat in the middle of a mountain meadow located in the Valle Maggia (46.2498°N, 8.6997°E, elevation 1780 m), Ticino, Switzerland, the first author observed an adult *C. austriaca* ingesting a juvenile. Within a radius of about 10 m, there were two other adult females of *C. austriaca* in late gestation (Fig. 1). The ambient temperature was approximately 15°C, the wind was moderate with a cloudy sky. An adult *C. austriaca*, probably a female that had recently given birth, as suggested by the slightly wrinkled posterior part of her body (Fig. 2), was in the process of swallowing a juvenile of the same species. The juvenile appeared not to have undergone its initial postnatal molt, which usually occurs within the first ten days after birth (Duguay, 1961).

Initially, the prey, seized either by the head or neck (Fig. 3A), was coiled around the predator's body. After a few minutes, the adult snake exerted a pulling force and managed to free itself. At that moment, the predator's head was visible, clearly showing it was swallowing the prey head-first (Fig. 3B). The juvenile snake then coiled its tail around a grass stem to resist the predator. The latter exerted another pull and positioned itself under a rock, likely to have a good support point to pull and swallow its prey (Fig. 3C, D), which it managed to do within a few minutes (Fig. 3E). It is impossible to know whether the predator fed on one of its recent newborns. Initially, the observer thought it might be a female eating one of her stillborn young, but the fact that the prey coiled around the predator's body and then around vegetation to avoid being swallowed dispels that hypothesis.

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Figure 1. One of two adult female *Coronella austriaca* observed at the site of cannibalism in the Valle Maggia, Ticino, Switzerland. Photo by Grégoire Meier.



Figure 2. Clearly visible wrinkles on the skin of a female *Coronella austriaca* from the Valle Maggia, Ticino, Switzerland, suggesting she had recently given birth. Photo by Grégoire Meier.



Figure 3. A sequence of images documenting cannibalism between an adult and a juvenile *Coronella austriaca* in the Valle Maggia, Ticino, Switzerland. After entangling the prey (A), the female begins to swallow it, starting from the head (B), and within a few minutes, swallows it whole, with the prey's ventral side facing upward (C–E). Photos by Grégoire Meier.

Photographs and video were taken with a Nikon Z 6 II camera and a 24–200 mm lens to avoid disturbing the animals during the observation.

To the best of our knowledge, these are the first direct observations in the wild of cannibalism between adult and juvenile smooth snakes photographed and filmed in Switzerland. Since cannibalism also occurs among juvenile snakes (Göçmen et al., 2008), the strong need for rapid physiological recovery in a postpartum viviparous female snake (Naulleau and Bonnet, 1996) may lead to predatory cannibalism on a smaller conspecific.

Jofré and Reading (2020) indicated that cannibalism in *C. austriaca* was an uncommon behaviour, likely occurring when an individual's body condition is poor, possibly during food shortages. The presence of other individuals at the observation site may indicate a high population density that could have led to a shortage of food resources. Unfortunately, in order to confirm this hypothesis, standardised monitoring of the population inhabiting the observation area is necessary. Recent studies suggest that cannibalism

may represent a significant component of the diet in certain populations of *C. austriaca*, with an estimated occurrence of approximately 2.5% (Wenner et al., 2025). Observations such as these, even as single events, can broaden the scope of information about the natural history and ecology of *C. austriaca* and the role of cannibalism in their diet.

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