

Breeding and Cannibalism Behaviours of Captive *Coronella austriaca* (Colubridae) in a Terrarium

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ABSTRACT: Cannibalism involves consuming all or part of another individual of the same species as food. Consuming the same species, or showing cannibalistic behaviour is common in reptiles, especially in snake species. The captured female *Coronella austriaca* of the Colubridae family was kept in captivity for two months in the terrarium. The female sample fed on one of the offsprings after ovoviviparous delivery. In the following observations it was determined that one of the juvenile individuals fed on another juvenile with similar size. The objective of this study is to provide information about the breeding and cannibalistic behaviour of *Coronella austriaca* under captivity.

Key words: *Coronella austriaca*, Cannibalism, Maternal cannibalism

Kaptivite Altındaki *Coronella austriaca* (Colubridae) Türünde Üreme ve Yamyamlık Davranışı

ÖZET: Sürüngen türleri içerisinde özellikle yılan türlerinde kanibalizm yani aynı türe ait bireylerin yenmesi yaygın durumdur. Çalışmada yakalanan Colubridae familyasına ait olan dişi *Coronella austriaca* bireyi iki ay süre ile teraryumda tutulmuştur. Dişi bireyin ovovivipar doğumunun ardından, ebeveynin yavrularla ve yavruların da kendi arasındaki kanibalizm davranışları gözlemlenmiştir. Yapılan çalışma *Coronella austriaca* türünde üreme ve kanibalizm davranışı ile ilgili bilgiler vermektir.

Anahtar Kelimeler: *Coronella austriaca*, Kanibalizm, Maternal Kanibalizm

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INTRODUCTION

Cannibalism is an important and common behaviour affecting population structure, living conditions, competition, resources and behaviour of individuals (Polis, 1981; Polis and Myers, 1985; Mitchell, 1986; Göçmen et al., 2008). Age, size, sex, density of conspecifics, available food, degree of relatedness and other factors all may influence the occurrence and the magnitude of cannibalism to various degrees (Fox, 1975; Polis, 1981). In most species of reptiles, cannibalism appears to occur opportunistically as a by-product of normal predatory behaviour (Polis and Myers, 1985).

Maternal cannibalism involves the consumption of offspring by the female parent and can be further categorized as either the consumption of non-viable offspring (eggs, undeveloped ova or stillborn neonates) or of living offspring (Mocino-Deloya et al., 2009). Maternal cannibalism has been described from a number of animal species, including numerous reptiles (Huff, 1980; Polis and Myers, 1985; Kevles, 1986; Somma, 1989; Somma, 2003; Mitchell and Groves, 1993; Lourdais et al., 2005). Many reptile species where males protect eggs, sometimes they consume some of the eggs they protect (Rohwer, 1978; Petersen and Marchetti, 1989; Thomas and Manica, 2003). Eggs and newborns are rich in nutrients (Polis, 1981; White, 1991; Speake et al., 2003). Postnatal females weaken and take several weeks to heal. For this reason, the ingestion of especially non-living offspring may provide energy to the female, but also help restore the body's muscular system (Lourdais et al., 2005).

Cannibalism is more common in reptiles, especially in snakes (Mitchell, 1986; Mori and Moriguchi, 1988). In nature, cannibalism is especially frequent among fossorial snakes and *Ophiophagus* snakes (Gasc, 1994). The cannibalism behaviour in *Clelia*, *Malpolon*, *Bungarus* and *Ophiophagus* genera has been

reported (Saint-Girons, 1994). *Dolicophis jugularis* may also possess potential cannibalistic behaviour (Göçmen et al., 2008). Lisicic et al. (2011) observed and photographed that *Hierophis gemonensis* species ate the same species of similar size during field study. Mienis (1986) reported cannibalism among juveniles of the genus *Coluber jugularis* in Israel.

Coronella austriaca, lives in meadows, on stony slopes and in bushy landscapes along forest edges. They move slowly, calmly and are nonvenomous and harmless. They usually feed on lizard species, small birds and rodents, from the family of Colubridae, which are about 75 cm in length (?). Backside ground colour may be in light brown tones and occasionally close to red. There are darker sparse and scattered lines on the back than the ground colour. On the sides of the head, there is a dark stripe that runs from the nostrils to the neck (Tosunoğlu et al., 2017).

The aim of this study is to provide general information and observations about the breeding and cannibalistic behaviour of *Coronella austriaca* under captivity.

MATERIALS AND METHODS

The female individual of *Coronella austriaca* was caught using the snake stick in the rocky habitat with sparse vegetation around Tödürge-Sivas (Turkey) (37S380627; UTM: 4412834; elevation: 1313 m) on 09.07.2014 (Figure 1). The captured specimen was kept under semi-captivity for 2 months in the terrarium, measuring 50x70 cm, prepared in accordance with the habitat requirements of the species. Body length measurements of female and offsprings were performed with Mitutoyo digital calliper and weight measurements were made with precision scales. The images of the offsprings and cannibalism were recorded with a digital camera. Samples were included in the collection of Çanakkale Onsekiz Mart University Zoological Museum.



Figure 1. Localities of *Coronella austriaca* specimens.

RESULTS AND DISCUSSION

The total body length of the female *Coronella austriaca* specimen was 52.5 cm and head + body length was 45 cm respectively. Specimen was fed with a small lizard for 8 days. This ovoviviparous specimen produced 7 offsprings approximately after one month of captivity. The weight and body measurements of the offsprings immediately after birth are given in

Table 1. The mean weight of the offsprings was 6.32 g, mean total body length was 176.3 mm, head length was 8.21 mm and head + body length was measured as 144.74 mm, respectively. *Tenebrio molitor* (mealworm) was placed in the terrarium and the offsprings were fed regularly. Cannibalistic behaviour started 35 days after birth where one offspring consumed another and the mother fed on one of the offspring 42 days after birth (Figures 2-3).

Table 1. The mean weight and body measurements of the offsprings

Offsprings	Weight (gr)	Total body length (mm)	Head length (mm)	Head + body length (mm)
1. Offspring	6.154	176	8.70	139.46
2. Offspring	6.407	175	8.87	128.46
3. Offspring	5.923	174	7.24	148.88
4. Offspring	6.454	176	7.52	143.05
5. Offspring	6.633	175	7.83	147.32
6. Offspring	6.374	183	8.45	153.66
7. Offspring	6.303	175	8.86	152.36
Mean	6.321	176.3	8.21	144.74



Figure 2. Maternal cannibalism



Figure 3. Cannibalism among juvenile individuals

Göçmen et al. (2008) reported cannibalism records of *Dolicophis jugularis*. He determined that cannibalistic behaviour was common for this species and that hunger could be the stimulating factor for this behaviour.

Martinez et al. (2006) studied, male and female *Vipera latastei* samples in the same terrarium and observed that the mother who gave birth to 5 offsprings first consumed the adult male and then gave birth to 2 more offsprings. During the field study, they found that the juvenile *Vipera latastei* feeds on juvenile *Coronella austriaca* with the same size. The same researchers reported that a small male individual was a stimulant for cannibalistic behaviour for the mother after birth in the terrarium, whereas *Coronella austriaca* was a potential prey in its natural environment.

Lourdais et al. (2005) suggested that the maternal cannibalism in *Epicrates cenchria maurus* of Boidae family is used to recycle wasted energy and reduce the time required for recovery from pregnancy. Mocino-Deloya et al. (2009) found that importance of maternal cannibalism in rattlesnakes, and suggest stronger support for the maternal recovery hypothesis than for the parental care hypothesis.

CONCLUSION

Cannibalism is an important behaviour that influences competition for resources and spouse selection (mating?), population structure, life

history and habitat preferences of species. Mitchell (1986) suggested that cannibalistic individuals might suffer from a flaw in same species of recognizing mechanisms. If this phenomenon exists, it is possible to explain the occurrence of cannibalism in some species more often than others. It is stated by Heinen and Abdella (2005) that experimental studies focused on understanding the factors and mechanisms underlying cannibalism in reptile species will be more enlightening.

This study provides information about the breeding and cannibalistic behaviour of *Coronella austriaca* under captivity. Although they were fed in captivity, maternal cannibalism of *Coronella austriaca* was observed and it was determined for the first time that the juveniles fed on each other.

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