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Oxyrhopus clathratus (SERPENTES: DIPSADIDAE): REPRODUCTION AND CANNIBALISM

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ABSTRACT
Oxyrhopus clathratus is an Atlantic Forest endemic snake. It is an oviparous species and little is known about its reproduction. Here we present the analysis of two clutches of eggs with information on egg laying period, clutch size, incubation time, hatching rate and size of the females, eggs and newborns. We also report on two events of cannibalism among the young in one of the litters.
Keywords: fecundity; oviparous; reproductive strategies; sexual dimorphism.

Oxyrhopus clathratus (Duméril, Bibron & Duméril 1854) is an Atlantic Forest endemic species (Argôlo 2001, Bernardo *et al.* 2012) with significant variation in color patterns (Bernardo *et al.* 2012). It has predominantly nocturnal activity (Marques *et al.* 2001) and feeds mainly on small rodents and lizards (Marques & Sazima 2004). It is an oviparous species and little is known about its reproduction. This note presents the analysis of two clutches of eggs with information on egg laying period, clutch size, incubation time, hatching rate and size of the females, eggs and newborns. It also reports on two events of cannibalism among the young in one of the litters.

Two females collected in the municipality of São Paulo, State of São Paulo, Brazil, and housed at Instituto Butantan laid 10 and 11 eggs in December 2014 (late spring). Each clutch was incubated in separate plastic container containing moist vermiculite, at temperature ranging from 24 to 27ºC and humidity ranging from 70 to 80%.

Data on female biometrics, month of egg laying/hatching, clutch size and relative clutch mass (RCM) are shown in Table 1. The length of the eggs ranged from 29.3 to 52.8 mm (37.1 ± 6.2), the width varied from 15.7 to 24.9 mm (19.5 ± 2.5) and the mass of the clutches were 68.7 g and 120 g, respectively. The newborns hatched in February 2015 after an incubation time of respectively 81 and 72 days (Figure 1). Hatching success was 60% in the first clutch (N = 6 newborns; 3♂, 3♀) and 82% in the second one (9 newborns; 6♂, 3♀).

Table 1. Data on female of *Oxyrhopus clathratus* biometrics: clutch size (number of eggs), relative clutch mass (RCM), snout-vent length (SVL), tail length and body mass. Egg-laying was in December and hatching in February.

Female	Clutch size	RCM (g)	SVL (mm)	Tail length (mm)	Body mass (g)
1	10	0.46	930	180	147.6
2	11	0.48	1020	210	248.0

Hatchling biometric data (N = 15; 9 ♂ ; 6 ♀) were analyzed for sexes differences. No significant differences were observed between sex in body length ($t_{0.05;\ 13} = 0.859$; $p = 0.405$) and body mass ($t_{0.05;\ 13} = 0.676$; $p = 0.511$), although males had larger tails than females ($t_{0.05;\ 13} = 8.63$; $p < 0.001$). Biometric and mass data of the newborns are presented in Table 2.

Sexual dimorphism in body size is well known in adult snakes, whereas information on newborns is scarce (King *et al.* 1999). Our results point to ontogenetic change in the character snout-vent length (SVL), since this dimorphism was not found in newborns but is present in adults with females being longer (Bernardo *et al.* 2012). Sexual dimorphism in tail length is frequent in adult snakes (King 1989, King *et al.* 1999), and our results showed that this dimorphism also occurs in early lifetime of *O. clathratus*.

Newborns were maintained in cages with at most four specimens. Most of the newborns did not accept neonate mice and geckos as food, so they were biweekly fed with a feeding probe. At two months old,

two cannibalism events were registered among the young. Due to similar length of the prey and predator, both were found dead (Figure 2). It is noteworthy that in both events the young had been fed at least one week before. Cannibalism among captive newborn snakes has already been reported as a behavior possibly caused by the stress of captivity conditions (Bullock 1971, Cardoso Junior *et al.* 1990, Braz *et al.* 2006, Freiria *et al.* 2006, Capella *et al.* 2011). Ingestion of large preys is a common behavior in young snakes and it may be related to reduced availability of preys with compatible size to the newborns (Sazima & Martins 1990).

Our results, although based in only two clutches, contribute to the understanding of some reproductive aspects of *O. clathratus*, an endemic Atlantic Forest Dipsadidae snake. Nevertheless, we are aware that in order to establish accurate dimorphism standards for the species it is necessary to analyze a larger sample of newborns. The specimens are deposited in the herpetological collection of the Instituto Butantan (IBSP 87.485 and IB 87.486).

Table 2. Data on newborns of *Oxyrhopus clathratus* biometrics. Range of values (minimum–maximum) of snout-vent length (SVL), tail length and body mass. Mean and standard deviation are shown between brackets.

	SVL (mm)	**Tail length (mm)**	**Mass (g)**
Males (N = 9)	220.0 – 300.0 (271.7 ± 29.6)	70.0 – 80.0 (74.1 ± 3.1)	5.1 – 10.0 (7.6 ± 1.8)
Females (N = 6)	220.0 – 290.0 (257.5 ± 34.0)	55.0 – 65.0 (60.0 ± 3.1)	4.8 – 9.0 (6.9 ± 2.2)

Figure 1. Hatching eggs of *Oxyrhopus clathratus*. The length of the eggs ranged from 29.3 to 52.8 mm.

Figure 2. Cannibalism in *Oxyrhopus clathratus.* Due to similar length, prey and predator were found dead. a - Predator = 295 mm snout-vent length (SVL); Prey = 285 mm SVL; b - Predator = 300 mm SVL; Prey = 290 mm SVL).

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