SHORT NOTES

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BIOLOGY OF THE BLINDSNAKE *TYPHLOPS BRONGERSMIANUS* (TYPHLOPIDAE) IN A SEMIDECIDUOUS FOREST FROM CENTRAL BRAZIL

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The biology of blindsnakes is virtually unknown. Herein, we present data on the biology of the blindsnake *Typhlops brongersmianus* from a semideciduous forest in Central Brazil. Males had longer tails and matured at smaller sizes than did conspecific females. Reproduction was highly seasonal, with clutch size of 4-5 eggs and oviposition in the early wet season. *T. brongersmianus* fed mainly on the pupae and larvae of ants, with ingestion of large number of prey items. Our findings agree with other studies of diet and reproduction of scolecophidians from other parts of the world.

Key words: diet, Neotropics, reproduction, snake

Although scolecophidian snakes are diverse (up to 300 species) and abundant throughout most of the world's land masses, they have attracted far less scientific attention than have the larger and more spectacular henophidian and cenophidian species (Shine & Webb, 1990). However, understanding their biology is crucial for interpreting the overall evolution of squamates, particularly the distinctive ecological attributes of higher snakes, because they represent the base of ophidian phylogeny (Greene, 1997; Webb *et al.*, 2000; Webb *et al.*, 2001).

Among the three Scolecophidia families, Typhlopidae is the more diverse, with 215 species confined to warmer parts of the world, with more than 70% belonging of the genus *Typhlops* (Greene, 1997). Despite their high diversity, the knowledge of the blindsnakes genus *Typhlops* is based entirely on African species (Webb *et al.*, 2001). In South America, *Typhlops brongersmianus* Vanzolini (1972) is the most widespread species, and occurs from Uruguay to Venezuela (Lema, 1982; Lema, 1987). However, virtually nothing is known about their biology.

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In Brazilian's Pantanal, *T. brongersmianus* is relatively abundant and occurs in elevated parts of the region, including deforested areas (Strüssmann & Sazima, 1993). In this paper, we describe some ecological aspects of *T. brongersmianus* from a semideciduous forest in Pantanal, Central Brazil.

The study was conducted in Santa Cruz Hill (19º24'49 "S, 57º22'47" W), Urucum massif in a semidecidous forest, Municipality of Corumbá, Mato Grosso do Sul State, Brazil. The region is characterized by Aw climate (Köppen classification), with an average temperature of 25ºC and a mean precipitation of 1483 mm. The climate is highly seasonal with two well defined seasons: dry (April-September) and rainy (October-March) (Brasil, 1992).

Snakes were caught monthly in pitfall traps with drift-fences (three sampling units with 24 buckets) from July 2000 to December 2002, humanely euthinased, fixed in 10% formalin, preserved in 70ºGL ethanol and deposited in Zoological Reference Collection, Laboratory of Zoology, *Campus* of Corumbá, Universidade Federal de Mato Grosso do Sul (UFMS), under the acronym CEUCH.

For each *T. brongersmianus* captured we recorded the following morphometric variables in mm: snout-vent length (SVL), head length (HL), head width (HW) and tail length (TL). To evaluate the sexual size dimorphism we utilized a Mann-Whitney *Z* test for SVL and an ANCOVA for HL, HW and TL, with SVL as covariate.

Males were considered reproductively active if they possessed enlarged testes or opaque efferent ducts. We utilized only the length and width of the right testicle for analysis, because testicular volume of both sides was not different (t-test=0.72, df=22, P=0.479). Females were considered reproductively active if they possessed vitellogenic follicles or oviductal eggs, and the simultaneous presence of both follicles and eggs was considered evidence of production of more than one clutch per season.

We dissected each specimen and analyzed the stomach contents. Prey items were identified to order and the number of each life cycle stage (larvae, pupae, adults) was recorded. We measured prey length and width and calculated the volume of prey items using the formula for a prolate spheroid.

All statistical tests appear with alpha set at 0.05 and, throughout the text means are followed by ±1 SD.

A total of 43 individuals (18 females and 24 males) were examined. The majority of the specimens were captured from September to December (81.4%), which corresponds to the end of the dry season until the middle of the rainy season.

Adult females reached 275 mm SVL (238±20.77 mm, n=11) and males 262 mm SVL (231.32±22.49 mm, n=22), but there was no significant sex difference in SVL. However, adult males had longer tails than adult females of the same body length (Table 1). Males

TABLE 1. Descriptive statistics of morphometric variables and analysis results of sexual size dimorphism in *T. brongersmianus* from Central Brazil. Values shows means ± standard deviations.

Males	(n=22)	Females (n=11)	Results
SVL	227.18±24.83	241.91±20.88	U=159.50, P=0.14
HL	8.41±0.69	8.75±0.87	$F_{1,42}$=0.37, P=0.546
HW	5.72±0.74	6.01±0.61	$F_{1,42}$=1.63, P=0.211
TL	6.50±0.88	6.23±1.58	$F_{1,42}$=8.803, P<0.001

and females attained sexual maturity at 180 mm SVL and 211 mm SVL respectively.

Reproduction of *T. brongersmianus* was highly seasonal and began during the late dry season. Females commenced vitellogenesis in September (one female, probably initiated in July-August) and contained eggs in October (early wet season). Clutch sizes of four females averaged 4.67±0.58 eggs (range 4-5). The size of four well developed eggs was 8.27±2.46 mm long and 4.11±0.85 mm wide, with a mean volume of 78.05±48.09 mm^3. We did not register the simultaneous occurrence of both eggs and follicles. Males collected in August-September had large testes, whereas males collected during July and October-December had small testes. Testes volume was significantly greater In August-September than in other months (t=3.032, df=9, P=0.014).

Stomachs of *T. brongersmianus* (n=14) contained various stages of ant development (of two unidentified species), mostly larvae and pupae in volume (90.84%, see Table 2). The mean number of prey per stomach was 15.82±13.27 (range 1-49). The average size of prey was 4.18±1.86 mm long and 1.55±0.57 mm wide, while the mean prey volume was 7.56±10.90 mm^3 (n=209 prey items).

The seasonal reproduction of *T. brongersmianus*, with reproduction in the wet season, is very similar to others species of *Typhlops*, such as *T. bibronii* (Webb *et al.*, 2001), as well as others typhlopids (Webb *et al.*, 2001; Shine & Webb, 1990) and leptotyphlopids (Webb *et al.*, 2000). Moreover, this features fits with the general pattern shown by most Australian (Shine, 1985) and South American snakes (Fitch, 1970; Vitt & Vangilder, 1983). This can be due to seasonal variation in resource levels, hatchling survival rates and/or the costs of reproduction (Shine, 2003). This reproductive cycle may also explain the seasonality of captures of *T. brongersmianus* (most snakes were captured during the rainy season); however, food availability, tolerance to climatic conditions and phylogenetic constraints could also be responsible for the observed patterns (Marques *et al*. 2001).

Previous scientific reports of the biology of *T. brongersmianus* stated that this species had an insectivorous diet, but did not provide any qualitative or quantitative data (Strüssmann & Sazima 1993). Strüssmann (1992) found ant pupae and adult termites in stomachs of specimens from the northern part of the Pantanal. The absence of termites in diet of *T. brongersmianus* in southern Pantanal possibly reflects the prey availability in the two regions. Overall, the diet of *T. brongersmianus* found in the present study is similar to that of many other scolecophidian species (Webb & Shine, 1993; Shine & Webb, 1990; Greene, 1997). The infrequent ingestion of huge numbers of tiny prey is considered the most distinctive characteristic of the scolecophidians (Webb & Shine, 1993) and evolved to minimize the time spent inside ant nests and, thus, to reduce the risk of prey-inflicted injuries (Webb *et al.*, 2001). Most typhlopids studied to date feed on invertebrates and appear to locate these prey items by following pheromonal trails (Watkins *et al.,* 1969; Webb & Shine, 1992).

In conclusion, our study shows that the diet and reproductive habits of *T. brongersmianus* are remarkably similar to those of typhlopid snakes from other parts of the world. Nonetheless, the biology of most South American blindsnakes species is virtually unknown, and future studies of this poorly studied snake fauna are necessary for elucidating general patterns in the ecology of blind snakes.

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TABLE 2. Ant life cycle stages in diet of *Typhlops brongersmianus* (n=14) from semideciduous forest from Central Brazil. Frequency= proportion of snakes that contained each prey type.

Prey	Frequency (%)	Number	% Num	Volume	% Vol
Adults	28.57	11	5.26	26.01	2.86
Eggs	42.86	61	29.19	100.95	6.29
Larvae	85.71	85	40.67	682.30	42.53
Pupae	42.86	52	24.88	775.01	48.31
Total		209		1604.27	

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