

A case of communal nesting in the Neotropical snake *Sibynomorphus mikanii* (Serpentes, Colubridae)

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Espinosa and Lobo (1996) defined communal oviposition as “the nonincidental deposition of eggs at a shared nest cavity by two or more conspecifics”. Reports of communal nesting are common among Nearctic (Fowler 1966, Brodie *et al.* 1969, Parker and Brown 1972, Palmer and Braswell 1976, Swain and Smith 1978), Palearctic (Goin and Goin 1971), and Australian (Covacevich and Limpus 1972) snakes, but virtually unknown within Neotropical taxa. The only known cases for South American snakes involve just a few females of *Dipsas oreas* from the Peruvian Andes (Cadle and Chuna 1995), and *Philodryas patagoniensis* and *Psomophis obtusus* from Uruguay (Vaz-Ferreira *et al.* 1970), all with regards to cold climate inhabitants. These, however, may represent occasional aggregation rather than true cases of communal nesting.

We currently report a noticeable case of nonincidental communal nesting of another dipsadine colubrid snake, *Sibynomorphus*

mikanii (Schlegel, 1837).

Sibynomorphus mikanii, an inhabitant of mesophytic forests mainly within the Cerrado of the Upper Paraná, Upper São Francisco and Upper Tocantins basins (Franco 1994), is a very common snake in urbanized areas of southeastern Brazil (O. A. V. Marques pers. comm.). *Sibynomorphus mikanii* has a seasonal reproductive cycle, with oviposition occurring from November to January, and recruitment after 12 to 13 weeks (Laporta-Ferreira *et al.* 1986, Franco 1994, Marques 1998). The clutch size varies from three to 10 eggs (mean 5.9 ± 1.7) (Oliveira 2001).

A total of 66 eggs were found in Jundiá (23°11'11"S, 46°53'03"W), state of São Paulo, southern Brazil, during a land cleaning in an urban area. Eggs were in a humid ravine comprised of soil and overlapped pieces of concrete wall (pulled down) forming a hole of approximately 15 cm height, 35 cm width and 60 cm depth, covered by grass (Figure 1). All eggs were found together, in contact but not adhered one to another. They were donated to the Instituto Butantan on January 7, 2003, some days after collection. By this time, ten eggs had

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Table 1 - Size and weight measurements of egg clutches, embryos and newborn (as grouped by sharing the same developmental stage) in a communal nest of *Sibynomorphus mikanii*.

Collection number	N	egg length (mm)		egg width (mm)		egg mass (g)		embryo length (mm)		embryo mass (g)	
		range	mean	range	mean	range	mean	range	mean	range	mean
70000	7	27.24-32.27	29.35	13.41-15.83	14.74	3.07-4.64	3.75	101.00-119.00	113.25	0.56-0.90	0.84
70001	10	25.49-27.79	26.46	13.62-16.87	15.88	3.11-4.25	3.91	120.00-145.00	132.28	0.70-1.36	1.16
70002	4	26.25-32.08	30.31	14.79-16.01	15.63	4.00-4.86	4.43	150.00-158.00	153.00	1.58-1.87	1.65
70003	7	23.08-28.63	25.65	13.34-15.90	14.09	2.62-4.00	3.14	67.00-101.00	78.83	0.30-0.51	0.41
70004	5	27.00-30.06	27.51	16.11-17.93	16.50	4.10-5.02	4.36	153.00-166.00	158.89	1.39-2.13	1.81
70005	9	-	-	-	-	-	-	149.00-167.00	159.20	1.61-2.02	1.84
70006	5	21.51-29.08	25.51	12.69-14.97	13.69	2.64-3.28	2.99	-	-	0.12-0.32	0.18
not	10 newborns	-	-	-	-	-	-	-	-	-	-
70007	7	21.72-30.15	24.77	12.71-14.7	13.9	2.32-3.72	2.98	-	-	0.46-0.57	0.49

hatched. Eggs, embryos, and hatchlings were measured and weighed. Each removed embryo was observed with regards to morphology in order to determine its developmental stages (Girons 1923, Hubert 1923, Zher 1962), as an aid to infer the minimum number of different females contributing to the communal nesting. The number of clearly different developmental stages was compared to the variation and mean number of eggs laid per female, as determined from a previous study (Oliveira 2001) was compared with the number of females contributing to the communal nesting. Embryos and newborns were deposited in the herpetological collection of Instituto Butantan (IB 70000–70007).

Distinct developmental stages were represented in the communal clutch, based on increasing size and structural development of morphological features. The last parameter includes body scales and head shields construction, the heart and brain visible or not, trunk bending, maxillary process, eye pigmentation, cloacal mound, hemipenis everted or not, cervical flexure, pigmentation visible or not, and development of the pigmentation pattern. Our class A represents the most premature developmental stage found, and so

on, following a progressive order in which class H represents the last developmental stage (i.e., the newborns).

The analysis of the embryos indicated eight visually distinct developmental stages (A-H) demonstrating that at least eight different females contributed to the communal clutch (Table 1). However, *S. mikanii* lays a mean of 5.9 eggs at a time (Oliveira 2001). Based on our observation that sets of eggs at specific developmental stages exceeded the number of eggs found in single clutches; it is likely that egg classes in developmental stages B, F, and H originated from spawning by two or more different females nearly the same time, while the other egg classes (A, C, D, E, and G) must have been laid at different times, added to the same nest successively. Thus we can deduce that the total of 66 eggs could have resulted from eight to 11 different oviposition events.

Nest site selection in reptiles (excluding birds) has been studied for a few species (Heatwole 1977). Descriptions of nest sites of snakes are cursory or based on small sampled or random observations. Snakes usually oviposit in suitable microenvironments beneath logs, under leaf litter, debris (Wright and Wright 1957) or within ant nests (Vaz-Ferreira *et al.* 1970).

All reports of *Sibynomorphus mikanii* laying eggs have been based on captivity data (Laporta-Ferreira *et al.* 1986, Oliveira 2001), and natural nesting has not been observed for the species. The 66 eggs that we found were in a cavity covered by grass (Figure 1). This site was presumably chosen because it provided protection against impact, predators, and inclement weather. Also, suitable sites for egg laying in proximity of an urban area may be in short supply, and this was the only site which was flat and protected by a slope. Egg aggregations offer potential advantages such as protection (Jackson 1989), predator satiation (Jackson 1989, Eckrich and Owens 1995), and thermoregulation (Booth and Astill 2001). However separate nest sites, each with optimum conditions, would presumably maximize survival of offspring (Swain and Smith 1978). Previous personal observations by one of us (HF) in the field involving several individuals resting close together suggest at least aggregation, if not social affinity, and communal nesting may be an expression of a tendency to aggregate.

Two factors thus appear to have collaborated to the production of a communal nest: environmental limitation and tendency to aggregate. However further observations on natural clutches of this species are necessary to explain the significance of these and other factors causing communal nesting behavior of *S. mikanii*. Aggregation occur in another malacophagous colubrid snake (*Tomodon dorsatus*) and may be related to available food, abundance of slugs (Bizerra 1998).

The taxonomic distribution of the known cases of snake communal nesting includes the colubrid subfamilies Colubrinae (tribe Colubrini), Natricinae (tribe Natricini), Dipsadinae (tribe Dipsadini, subtribe Dipsadina), and the North American xenodontines (some independent lineages), as well as the hydrophieine elapid *Demansia* (Fowler 1966, Brodie *et al.* 1969, Parker and Brown 1972, Palmer and Braswell 1976, Swain

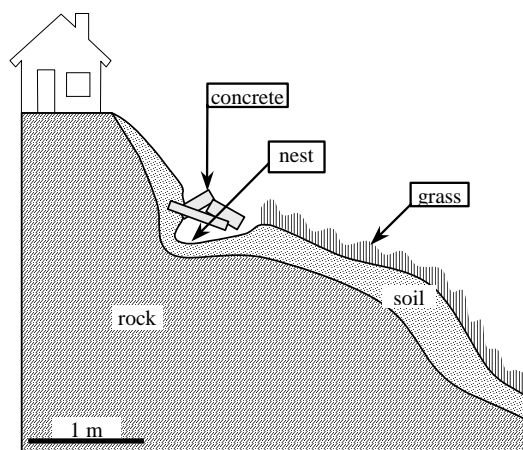


Figure 1 - Diagrammatic vertical section of the terrain surrounding the reported *Sibynomorphus mikanii* communal nest.

and Smith 1978, Goin and Goin 1971, Covacevich and Limpus 1972, Cadle and Chuna 1995), following the classifications of Ferrarezzi (1994a,b) and Zaher (1999). Most cases refer to species inhabiting cold climates (i.e. the Holarctic region). Within Neotropical xenodontines, and considering the present report, all the known cases are restricted to the subfamily Dipsadinae, especially to the go-eaters lineage (tribe Dipsadini). Only after the gathering of further information for Neotropical snakes, we could decide if this occurred randomly or if it may represent a phylogenetic trend or pattern of such colubrid clade.

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