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REPRODUCTION IN THE BANDED SAND SNAKE, *CHILOMENISCUS CINCTUS* (COLUBRIDAE), FROM ARIZONA

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Key words: Chilomeniscus cinctus, *banded sand snake, Colubridae, reproduction, Arizona.*

The banded sand snake, *Chilomeniscus cinctus* Cope, 1861, ranges from central Arizona to extreme southern Sonora, and throughout all but the northern part of Baja California (Stebbins 1985). Anecdotal comments on the reproduction of this species have been published in Stebbins (1954), Wright and Wright (1957), and Behler and King (1979), and in this report I provide data on reproduction in *C. cinctus* from Arizona.

I examined 38 *Chilomeniscus cinctus* (24 males, 14 females) from Arizona in the herpetology collections of Arizona State University (ASU), Tempe; Natural History Museum of Los Angeles County (LACM), Los Angeles; San Diego Natural History Museum (SDSNH), San Diego; and the University of Arizona (UAZ), Tucson. Museum numbers of specimens examined are given in Appendix 1. All Arizona *C. cinctus* in the above collections were examined; however, some had been damaged (roadkills) or had not been preserved promptly enough to avoid autolysis. These were not used and are not in Appendix 1. Counts were made of oviductal eggs or enlarged follicles. The left gonad was removed for histological examination, embedded in paraffin, and cut into histological sections at 5 μm. Slides were stained with Harris' hematoxylin followed by eosin counterstain. Testes slides were examined to determine the stage of the male cycle; ovary slides were examined for the presence of yolk deposition.

Data on the male *C. cinctus* seasonal testicular cycle are presented in Table 1. Testicular histology was similar to that reported in Goldberg and Parker (1975) for two other North American colubrid snakes, *Masticophis taeniatus* and *Pituophis melanoleucus*. In the regressed testes, seminiferous tubules contained spermatogonia and Sertoli cells. In recrudescence, there was renewal of spermatogenic cells characterized by spermatogonial divisions; primary and secondary spermatocytes, and spermatids, may have been present. In spermiogenesis, metamorphosing spermatids and mature sperm were present.

Small sample sizes from all months except May–June (Table 1) prevented a definitive description of the male cycle. However, since all 10 May males and 5 June males were undergoing spermiogenesis, it is likely that *C. cinctus* breeds during these months. Epididymides from 2 May and 1 June males contained sperm. The smallest spermiogenic male (sperm present) measured 151 mm in snout-vent length (SVL).

Data on the *C. cinctus* seasonal ovarian cycle are presented in Table 2. I recorded two clutch sizes: 6 June, 3 enlarged follicles (3–4 mm diameter), 188 mm in SVL; 4 July, 2 oviductal eggs (6 mm diameter), 192 mm in SVL. Yolk deposition (vitellogenic granules) was found on histological examination of ovarian

TABLE 1. Monthly distribution of conditions in seasonal testicular cycle of *Chilomeniscus cinctus*. Values shown are the numbers of males exhibiting each of the three conditions.

Month	*N*	Regressed	Recrudescence	Spermiogenesis
January	1	0	0	1
February	1	0	1	0
March	2	0	1	1
April	2	0	0	2
May	10	0	0	10
June	5	0	0	5
July	1	1	0	0
September	1	1	0	0
December	1	0	1	0

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TABLE 2. Monthly distribution of conditions in seasonal ovarian cycle of *Chilomeniscus cinctus*. Values shown are the number of females exhibiting each of the four conditions.

Month	*N*	Inactive	Yolk deposition	Enlarged follicles	Oviductal eggs
February	1	1	0	0	0
March	1	1	0	0	0
April	2	2	0	0	0
June	4	1	2	1	0
July	2	1	0	0	1
August	1	1	0	0	0
September	1	1	0	0	0
October	1	1	0	0	0
November	1	1	0	0	0

tissue from two June females (173 mm and 198 mm in SVL). No yolk deposition was seen in the remainder of the female sample. The lack of vitellogenesis in some adult females during the reproductive season may indicate that not all *C. cinctus* females breed each year. Breeding by only part of the adult female population has been reported for other North American temperate zone snake species (see Aldridge 1979). The smallest reproductively active female (yolk deposition in progress) measured 173 mm in SVL.

The biology of *C. cinctus* is poorly known. A few reports on its food habits reveal that it eats centipedes and insects (Vorhies 1926, Stebbins 1954, 1985, Behler and King 1979). According to Lowe et al. (1986), *C. cinctus* has grooved rear teeth; it is not known whether it has toxic gland secretions. The small numbers of *C. cinctus* in the two major Arizona herpetology collections (ASU, UAZ) reflect the secretive nature of this snake. Intensive study will be required before the biology of *C. cinctus* is known.

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APPENDIX 1

Specimens examined by county from herpetology collections at Arizona State University (ASU), Natural History Museum of Los Angeles County (LACM), San Diego Natural History Museum (SDSNH), and University of Arizona (UAZ).

Maricopa: ASU 04669, 09161, 13903, 26367-26368. LACM 112460. UAZ 24104, 35645, 35795, 35818. **Pima:** SDSNH 33383. ASU 01231, 15391, 28401. LACM 34918. UAZ 24087, 24089, 24092, 24095-24096, 24103, 24107-24108, 30241, 33815, 34411, 34680-34681, 35166, 36108, 37819, 37821, 42197. **Pinal:** ASU 15376, 23573, 26411, 26413. UAZ 24097.