Reproductive cycle of the Striped legless skink, *Typhlosaurus lineatus* (Squamata: Scincidae) from Southern Africa

STEPHEN R. GOLDBERG

Whittier College, Department of Biology, Whittier, California 90608 USA.
Email: *sgoldberg@whittier.edu*

THE Striped legless skink, *Typhlosaurus lineatus* occurs in the Kalahari region of southern Africa extending from the Northern Cape Province through most of Botswana and adjacent Namibia with isolated races in western Zambia and the Limpopo Province of South Africa (Broadley, 1968). They are common in heaps of wind-blown sand, at the base of grass tufts and bushes and desert dune streets and sand ridges (Branch, 1998). *Typhlosaurus lineatus* is fossorial and viviparous (Huey *et al.,* 1974). Information on the reproductive biology of *T. lineatus* is in Huey *et al.* (1974). Anecdotal information on reproduction is in Broadley (1968) and a mean brood size is in Pianka (1986). The purpose of this note is to add additional information on the reproductive biology of *T. lineatus* from a histological examination of museum specimens.

METHODS

One-hundred and thirty three *T. lineatus* (82 females, mean snout-vent length, SVL = 133 mm ± 7 SD, range = 116–149 mm; 51 males, SVL = 129 mm ± 9 SD, range = 103–148 mm from southern Africa were examined from the herpetology collection of the Natural History Museum of Los Angeles County, LACM, Los Angeles, California (Appendix). Lizards were collected by Eric R. Pianka during 1969–1970. Gonads were dehydrated in ethanol, embedded in paraffin, sectioned at 5µm and stained with Harris hematoxylin followed by eosin counterstain. Enlarged ovarian follicles (> 5 mm length) were counted; no histology was done on them. Male and female mean body sizes (SVL) were compared with an unpaired *t* test using Instat (vers. 3.0b, Graphpad Software, San Diego, CA).

RESULTS AND DISCUSSION

Data on the testicular cycle is presented in Table 1. *Typhlosaurus lineatus* males follow a distinctly seasonal testicular cycle where spermiogenesis (sperm formation; seminiferous tubles lined by several rows of metamorphosing spermatids and/or spermatozoa) occurs in spring. Epididymides contained sperm. The exact duration of the period of spermiogenesis is unknown since no specimens from October were examined. All males from November-December contained regressed testes in which the seminiferous tubules contained spermatogonia and occasional primary spermatocytes. Testicular recrudescence in which there is a proliferation of germ cells in the seminiferous tubules (primary, secondary spermatocytes, spermatids) begins in summer and is completed by spring (Table 1). The smallest reproductively active male (spermiogenesis in progress) measured 103 mm SVL and was from August (LACM 83833). This is smaller than the estimate of 112 mm SVL in Huey *et al.* (1974).

Huey *et al.* (1974) plotted seasonal testicular volumes for *T. lineatus* and reported testes began enlarging in mid-autumn and reached maximum sizes in late winter; testicular regression was completed by mid-summer. My histological analyses support their morphological data. Mating is thought to occur in August and September (Huey *et al.,* 1974). The timing of the testicular cycles of *T. lineatus* and *Typhlosaurus gariepensis* are similar (Huey *et al.,* 1974). The testicular cycle of *T. lineatus* with distinct periods of regression and recrudescence differs markedly from those of two other species of African skinks, *Mabuya quinquetaeniata* (= *Trachylepis margaritifera*) and *Mabuya striata* (= *Trachylepis wahlbergii*) from Zambia in which spermiogenesis was continuous (Simbotwe, 1980).

Month	N	Regression	Recrudescence	Spermiogenesis
February	1	0	1	0
April	1	0	1	0
May	10	0	10	0
July	13	0	10	3
August	5	0	0	5
September	9	0	2	7
November	6	6	0	0
December	6	6	0	0

Table 1. Monthly conditions in the testicular cycle of 51 *Typhlosaurus lineatus* from southern Africa.

Females were significantly larger than males (unpaired *t* test, $t = 3.1$, $df = 131$, $P = 0.003$). Monthly stages in the ovarian cycle of *T. lineatus* are in Table 2. Females with oviductal eggs or developing young were found between September and February. Females with enlarging follicles (> 5 mm length) occurred in June, September and from November to December (Table 2). Mean clutch (= brood) size for 60 gravid females was 1.3 ± 0.45 SD, range: 1–2. This is close to the 1.5 ± 0.1 SD value for 90 *T. lineatus* in Pianka (1986). The smallest reproductively active female measured 117 mm SVL (LACM 84256) and was collected in December 1969. This is slightly smaller than the value of 123 mm SVL for the smallest reproductively active female in Huey *et al.* (1974). Branch (1998) reported 1–2 babies were born mid-January through early March after a gestation period of five months. There was a report of two gravid female *T. lineatus* from Twee Rivieren, Kalahari Gemsbok Park, collected on 20th February (Brain, 1959) but they were subsequently found to be specimens of *T. gariepensis* which both contained a single young (Broadley, 1968). By having parturition occur in summer, young are presumably assured a plentiful supply of termites which are their major food source (Huey *et al.,* 1974). Female *Typhlosaurus* produce one litter per year (Huey *et al.,* 1974). The small litter size (1–2, very rarely 3; see Broadley, 1968) of *T. lineatus* is likely the result of space constraints of the narrow body width of this species which is needed for a fossorial life.

Branch (1998) lists nine species in the genus *Typhlosaurus* but gives reproductive information on only three of them: *T. gariepensis, T. lineatus* and a report of three eggs and presumed viviparity in *Typhlosaurus vermis*. Subsequent studies on reproduction in other species of *Typhlosaurus* will be needed to ascertain whether the reproductive pattern shown by *T. lineatus* and *T. gariepensis* (testicular cycle with spring spermiogenesis, summer regression; ovarian cycle with 5 mo

Table 2. Stages in seasonal ovarian cycle of 82 *Typhlosaurus lineatus* from southern Africa.

Month	N	Inactive	Early yolk deposition	Enlarging follicles > 5 mm length	Oviductal eggs
January	4	0	0	0	4
February	3	2	0	0	1
May	3	2	1	0	0
June	4	2	1	1	0
July	7	6	1	0	0
August	1	1	0	0	0
September	7	0	3	2	2
October	1	0	0	0	1
November	15	1	0	6	8
December	37	2	0	3	32

gestation period and young born in summer) is shared by other species.

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Appendix

Specimens of *Typhlosaurus lineatus* from southern Africa examined from the Natural History Museum of Los Angeles County (LACM): BOTSWANA, Kgalagadi District, 11 km S Tsabong, 26°08'S, 22°28'E, LACM 83792, 83815-6, 83825, 83833, 83835-6, 83842-4, 83760, 83765, 83770, 83774; Kgalagadi District, 9 km N, 11 km E, Twee Rivieren, 26°23'S, 20°43'E, LACM 83867, 83881, 83900, 83905, 83918, 83921, 83932, 83936-7, 83942-4, 83947, 83949, 83951-3, 83957, 83960, 83969, 83975; Kgalagadi District, 131 km N Tsabong, 25°32'S, 22°18'E, LACM 84001, 84005-6, 84011; Kgalagadi District, 80 km S. Tsane, 21°90'S, 24°03E, LACM 84382-3, 84392, 84397, 84405, 84409, 84410-1, 84414, 84428, 84436, 84441, 84445, 84451-3, 84455, 84465-6, 84469, 84471; Kgalagadi District, Mabuasehube Pan, 24°90'S, 22°00'E, LACM 84201, 84205, 84210, 84214-5, 84219, 84222, 84225-6, 84230, 84241, 84252, 84256, 84265, 84267, 84269, 84275-6, 84279-80, 84287, 84290, 84299-300, 84302, 84305, 84310, 84314, 84318, 84320, 84330-3, 84336, 84342, 84354, 84358, 84361, 84364, 84369, 84371. NAMIBIA: Karas Region, 28 km N, 20 km E Aroab, 26°35'S, 19°50'E, LACM 84015; Karas Region, 46 km N, 17 km E Aroab, 26°22'S, 19°49'E, LACM 83723, 83742; REPUBLIC OF SOUTH AFRICA, Northern Cape Province, 18 km S, 22 km E Witkoms, 27°58'S, 21°32'E, LACM 83756; Northern Cape Province, 29 km S, 40 km E. Rietfontein, 27°00'S, 20°27'E, LACM 92456, 92461, 92464; Northern Cape Province, 120 km N, 54 km W Upington, 27°22'S, 20°43'E, LACM 83621, 83626, 83631, 83635-7; Northern Cape Province, 121 km N, 16 km E Upington, 27°22'S, 21°25'E, LACM 92481, 92483-4, 92491, 92500, 92503, 92508; Northern Cape Province, Kalahari-Gemsbok National Park, 26°26'S, 20°37'E, LACM 83753; Northern Cape Province, Kalahari-Gemsbok National Park, 25°45'S. 20°44'E, LACM 83668, 83674, 83685, 83696, 83701, 83703, 83708, 83710-11, 83719.