African Herp News No. 48, pp. 2 — 4

REPRODUCTION IN SPEKE'S SAND LIZARD, *HELIOBOLUS SPEKII* (SQUAMATA: LACERTIDAE) FROM KENYA

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INTRODUCTION

Heliobolus spekii is an oviparous terrestrial lizard that occurs in northern and southern Kenya, northern Tanzania and extreme eastern Uganda, southern Ethiopia and Somalia (Spawls *et al.* 2002). To my knowledge, the only information on *H. spekii* reproduction is a report in the field guide by Spawls *et al.*, 2006, that clutches of 4 – 6 eggs are produced. The purpose of this paper is to add information on the reproductive cycle of *H. spekii*. Minimum sizes for male and female reproduction and the first information on the testicular cycle are presented.

MATERIALS AND METHODS

Sixty-two *H. spekii* were examined from the herpetology collection of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California. The sample consisted of 25 males (mean snout-vent length [SVL] = 40.3 mm ± 3.7 SD, range = 33 – 47 mm), 15 females (mean SVL = 44.7 mm ± 5.4 SD, range = 33 – 52 mm) and 22 juveniles (mean SVL = 23.5 mm ± 1.6 SD, range = 21 – 26 mm). *Heliobolus spekii* were collected in 1968, 1970, 1971 and 1973.

For histological examination, the left testis was removed from males to identify the stage of the testicular cycle and the left ovary was removed from females to check for the presence of vitellogenesis (yolk deposition) and/or corpora lutea. Counts were made of oviducal eggs or enlarged ovarian follicles (>4 mm length). Slides were stained with Harris haematoxylin followed by eosin counterstain (Presnell & Schreibman, 1997). An unpaired *t*-test was used to compare male versus female body sizes (SVL) and linear regression analysis was used to examine the relation between female clutch size and body size (Instat vers. 3.0b, Graphpad Software, San Diego, CA). Histology slides were deposited at LACM.

The following *H. spekii* were examined from Kenya (by province) from LACM: **Coast Province**: 50594, 50596; **Rift Valley Province**: LACM 63245 – 63255,

63257 – 63259, 65776, 65782, 65785, 65787, 65788, 65790 – 65807, 65809, 65811, 65814 – 65818, 65820 – 65824; **North Eastern Province**: LACM 93124, 93125, 93128, 93129, 93136 – 93138, 93140, 93144 – 93146.

RESULTS AND DISCUSSION

Two stages were present in the testicular cycle of *H. spekii* (Table 1). (1) Recrudescence, which occurs prior to the onset of spermiogenesis (sperm formation). Secondary spermatocytes and spermatocytes are the predominant cells; (2) Spermiogenesis, in which the seminiferous tubules are lined by clusters of spermatozoa and/or metamorphosing spermatids. Sperm formation occurred during the three months from which samples were available. The smallest reproductively active male (spermiogenesis in progress) measured 34 mm (LACM 65799) and was collected in June. One male which measured 33 mm SVL (LACM 65818) had regressed testes and was considered a subadult.

Females of *H. spekii* were significantly larger than males (unpaired *t*-test = 3.10, $df = 38$, $P = 0.0036$). Mean clutch size for nine clutches was 3.8 ± 0.83, range = 2 – 5. Linear regression analysis revealed the relationship between female body size and SVL was not significant. However, this may reflect my small sample size. Clutch sizes of three (LACM 63249) and two (LACM 63259) eggs are new minimum clutch sizes for *H. spekii*. There were three cases (Table 2) in which females with oviducal eggs were also undergoing concomitant yolk deposition for a subsequent egg clutch (LACM 63249, 65787, 93125). This indicates *H. spekii* may produce multiple clutches in the same reproductive season. The smallest reproductively active female (yolk deposition in progress) measured 43 mm SVL (LACM 93128). Two females with quiescent ovaries (no yolk deposition) (LACM 93138, SVL = 33 mm and LACM 93140, SVL = 35 mm) were considered subadults.

While it is not possible to completely characterize the reproductive cycle of *H. spekii,* it is shown herein that females produce clutches of 2 – 5 eggs. Clutches of two and three eggs are new minimum values for *H. spekii.* Evidence that multiple clutches may be produced in the same year is presented. Collection of neonates in January, February and June suggest an extended period of reproduction.

East Africa has a large group of lacertid lizards consisting of 19 species in nine different genera (Spawls *et al.* 2002). Subsequent investigations on different species of East African lacertid lizards are needed before the diversity of reproductive cycles exhibited by these lizards can be ascertained.

ACKNOWLEDGMENTS

I thank Christine Thacker (LACM) for permission to examine specimens.

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Month	*n*	Recrudescent	Spermiogenesis
February	2	0	2
March	9	0	9
June	13	1	12

Table 1. Monthly distribution of stages in the testicular cycle of 24 *H. spekii* from Kenya.

Month	*n*	Quiescent	Early yolk deposition	Enlarged ovarian follicles > 4 mm	Oviducal eggs	Oviducal eggs and yolk deposition
January	1	0	0	0	1	0
February	4	0	2	1	0	1
March	5	1	0	3	0	1
June	3	0	1	1	0	1

Table 2. Monthly stages in ovarian cycle of 13 *Heliobolus spekii* from Kenya.

African Herp News No. 48, pp. 5 — 7

REPRODUCTION OF JACKSON'S FOREST LIZARD, *ADOLFUS JACKSONI* (SQUAMATA: LACERTIDAE)

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INTRODUCTION

Adolfus jacksoni is known from northern Tanzania, north-central Kenya, western Uganda, Rwanda, northern Burundi and the eastern Democratic Republic of the Congo (Spawls *et al.*, 2002). There is a report that *A. jacksoni* usually produces clutches of 3 – 5 eggs in the field guide by Spawls *et al.*, 2002. In this paper I add information on *A. jacksoni* reproduction, including the first information on the testicular cycle and evidence that multiple clutches are produced. Minimum sizes for male and female reproductive activity are presented.

MATERIALS AND METHODS

Thirty-one *A. jacksoni* were examined from the herpetology collection of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California. The sample contained of 19 males (mean snout-vent length [SVL] = 72.5 mm ± 6.1 SD, range = 60 – 80 mm) and 12 females (mean SVL = 67.8 mm ± 7.6 SD, range = 56 – 80 mm). *Adolfus jacksoni* were collected in 1967 – 1969, and in 1973.

For histological examination, the left testis was removed from males to study the testicular cycle and the left ovary was removed from females to check for the presence of vitellogenesis (yolk deposition) and/or corpora lutea. Counts were made of oviducal eggs or enlarged ovarian follicles (> 4 mm length). Slides were stained with Harris haematoxylin followed by eosin counterstain (Presnell & Schreibman, 1997). Histology slides were deposited at LACM. An unpaired *t*-test was used to compare male versus female body sizes (SVL) using Instat vers. 3.0b, Graphpad Software, San Diego, CA.

The following *A. jacksoni* were examined from Kenya (by province) and Uganda (by district) from LACM: **UGANDA, Rakai District**: LACM 35146, 35147, 39487 – 39509, **KENYA, Kenya Rift Valley Province**: LACM 60798, 60857 – 60859; **Eastern Province**: LACM 93307, 93308.

RESULTS AND DISCUSSION

There was no significant size difference between male and female mean body sizes (unpaired *t*-test, $P = 0.070$).