



Some Reproductive Facts in Female Snakes of *Lapemis Curtus* (Shaw, 1802) Occurring Along the Jaffna Coastal Waters

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Abstract

The objectives of the study are to find out reproductive pattern of *Lapemis curtus* such as gestation period, spawning season and clutch size in Jaffna coastal waters. The study was under taken along the coast of Vadamarchy, Northern part of Sri Lanka. Dead Sea snakes were collected from December 2018 to November 2019. 58 female snakes were used in which 15 snakes were gravid females. Snout to vent length (SVL) and total length (TL) were taken to the nearest 0.1cm with a measuring tape. Weight (Wt) of all snakes was measured to the nearest 0.002kg using digital balance. Sex probe was used to find out the sex of snake. Females which having eggs and embryos were dissected, measurements of eggs and clutch size were recorded. Follicles were found in female snakes from November to June. Fully developed embryos were observed in June, but any follicles were not found from July to October. Follicle number ranged from 3 to 10. Average follicle number was 5.2. Arrangement of eggs was regular in all except one.

Key words: *Lapemis curtus*, Gestation period, spawning season, Follicles

Background

Nineteen species of marine snakes in three families (1 acrochordid, 2 homalopsids and 16 elapids (15 in Hydrophiinae and 1 in *Laticauda*)) are known to inhabit the coastal waters of Sri Lanka (Das and de Silva 2011, Abyerami and Shivashanthini 2008). *Lapemis curtus* (Shaw, 1802) is one of the most abundant species in the coastal waters of Jaffna Peninsula (Abyerami and Sivashanthini, 2008). Among the sea snakes there are three major lineages (Voris 1977). One is the genus *Laticauda* and it is oviparous and probably also ovoviviparous (Smith 1930; Smedley 1931). The other two lineages (the *Aipysurus* and *Emydocephalus* groups and Hydrophiinae of Smith (1926)) consist entirely of viviparous species (Kasturirangan 1950, 1952; Smith 1926; Wall 1921). The only nonhydrophid marine snake is *Acrochordus granulatus* (Acrochordidae) and it too is viviparous. Viviparity is the reproductive pattern in which females retain fertilized eggs in their reproductive tracts and give birth to their young. *Lapemis curtus* Seasnake, like most sea snakes, is viviparous, that is giving birth to live young (Cogger 2000). Gestation lengths vary moderately among viviparous snakes. Durations of 2 to 3 months are common in snakes (e.g., in



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thamnophines and crotalids) (Fitch 1970; Tinkle and Gibbons 1977) while some of the longest reported gestation lengths (6-8 months) occur among elapid sea snakes (Bergman 1943; Hin *et al.* 1991). The objectives of the study are to find out reproductive pattern of *Lapemis curtus* such as gestation period, spawning season, clutch size in Jaffna coastal waters.

Materials and Methods

Study area: The study was undertaken along the coast of Vadamaratchy, Northern part of Sri Lanka. Dead sea snakes were collected from December 2018 to November 2019, as by catch of fisheries from Valvettithurai to Manalkaddu and covered a length of 17.5 km.

Methods: 58 female snakes were used in which 15 snakes were gravid females. Snout to vent length (SVL) and total length (TL) were taken to the nearest 0.1cm with a measuring tape. Weight (Wt) of all snakes was measured to the nearest 0.002kg using digital balance. Sex probe was used to find out the sex of snake. The Probe was inserted into the holes located on the either side of the anus. Easy probe insertion indicates a male while females would not allow this. Female snakes were checked for the presence of eggs and embryos by the lower ventral side. Females which having eggs and embryos were dissected, measurements of eggs and clutch size were recorded. In fully developed embryos, weight, snout to vent length, total length and length from anus to connected place were measured and the sex was also determined. Regression analysis was carried out to find relationship between SVL and egg numbers, then number of eggs compared with egg size and clutch size. Gravid females compared with months to find out gestation period, spawning season and pregnant time.

Results

The knowledge on the reproduction of *Lapemis curtus* is essential for ecological and biological study and eventually it will help to conserve them. Follicles were found in female snakes from November to June. Fully developed embryos were observed in June, but any follicles were not found from July to October. Follicle number ranged from 3 to 10. Average follicle number was 5.2. Arrangement of eggs was regular in all except one. Two snakes had fully developed embryo. In R153 (tag number), all follicles were developed as embryo, but in R172 (tag number) only 2 out of 4 follicles were developed as embryo. Other 2 follicles were undeveloped. The p-values of regression analysis of number of eggs versus snout-vent length, average egg length versus number of eggs and clutch size versus number of eggs were 0.008, 0.058 and 0.002 respectively.



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Discussion

Viviparity is widespread among snakes (Fitch, 1970; Tinkle and Gibbons, 1977) in that after ovulation the developing eggs, continues to receive nutrients from the mother via an allantoaplacenta (Kasturirangan, 1951). Viviparity can have the benefits of protecting eggs from predators and the external environment and of modulating conditions of embryo development. Fully developed embryos were observed in June 2012, but not observed in July 2012. So spawning season of *L.curtus* is from June to July. In northern Australia, the *L.curtus*, sea snake mates between gives birth between March and June (Fry *et al.*, 2001; Ward, 2001). In Borneo, this species usually gives birth between July–September (Hin *et al.*, 1991). So spawning season of *L.curtus* differs from place to place. Then we observed early stage follicle in November 2012, therefore that snake was pregnant in end part of the October. So we can conclude pregnant season of *L.curtus* is Mostly October. Fry *et al* (2001) also told all females were pregnant in Northern Australia in October. Mating time of snake is before the October which means July to September. But Fry *et al* (2001) and Ward (2001) said *L.curtus* mate between early May and the end of July in Northern Australia. Possible gestation period *L.curtus* is from 8 to 9 months according to observation. Longest reported gestation lengths (6-8 months) occur among elapid sea snakes (Bergman, 1943; Hin *et al.*, 1991) because *L. curtus* is one of the elapid sea snakes. Average follicle number was 5.2. Every researcher has different idea about average follicle size per female, Hin *et al.* (1991), Fry *et al.* (2001) and Ward (2001) told 3, 4.3 and 8.5 respectively. Main reason for differences in follicle number is the number of young and the size of the adults differed between locations (Lemen and Voris, 1981). All of the adult female did not contain eggs in our study period.

Embryos have connection point near the anal region. This connection may help get nutrients from mother. Follicles which contains fully developed embryo have no yolk. Average length of fully developed embryo was 30cm. So birth size of *L.curtus* is nearly 30cm.

That accumulated energy is enough for their survival and embryo development. Most reptiles including all snakes spend more time without food. The dissection of *L.curtus* showed large amount of fat mass inside of the body, but that fat mass disappear with egg development and totally disappeared in females having fully developed embryo.



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Table 1: Egg details of Matured female snakes

Date	Tag Number	Number of follicle	length of 1st follicle	width of 1st follicle	length of last follicle	width of last follicle
10/12/2011	R015	5	4.7	2.4	4.5	2.8
07/01/2012	R040	8	3.2	2.7	3.1	2.7
07/01/2012	R042	6	4.1	2.3	4.3	2.4
07/01/2012	R043	4	5.5	2.5	6.8	3.1
07/01/2012	R053	4	3.4	2.2	3.7	1.9
14/01/2012	R062	4	5.2	3.7	5.8	2.2
11/02/2012	R068	3	5.2	3.8	5.3	3.9
11/02/2012	R069	4	4.2	2.3	4.3	2.2
11/02/2012	R071	8	3.9	3.1	3.8	2.9
11/02/2012	R072	6	2.7	2.7	2.7	2.8
31/03/2012	R123	10	3.1	2.8	2.8	2.4
31/03/2012	R124	3	5.1	2.5	5.5	2.7
09/06/2012	R153	6	6	5.8	4	5.5
23/06/2012	R172	4	4	7.5	4.9	7.1
10/11/2012	R342	3	3	1	2.8	1.2



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Table 2: Embryo details of Matured female snakes

Species. No.	Embryo number	Weight	Total length	SVL	Vent-Connection point	Ring	SEX
R153	1	27.34	32.3	29.2	2.9	51	F
	2	24.56	32.8	29	3.8	41	M
	3	25.828	31.9	28.4	2.8	43	F
	4	27.949	31.9	28.4	2.6	47	M
	5	26.111	31.8	28.3	3.8	51	F
	6	26.09	32.1	28.6	3.4	49	M
R172	1	22.875	30.5	27.1	2.7	54	F
	2	20.88	28.5	25.3	3.1	51	F

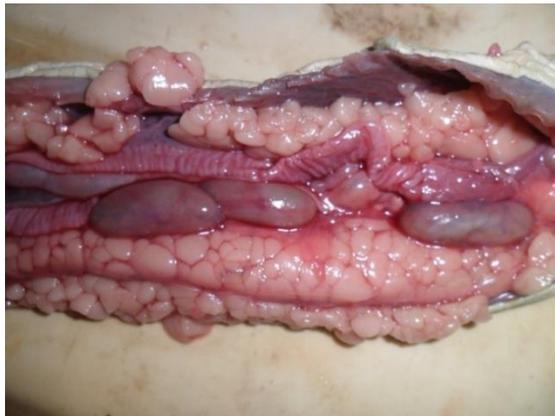


Fig 1: Early development stage of eggs



Fig 2: Irregular arrangement of eggs



Fig 3: Linear arrangement of eggs



Fig 4: Matured embryos of snakes

