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Base Line Information for Ovarian Cycle with Special Reference to Snake, Acrochordus Granulates (Schneider)

Shubhada M. Phatak

Zoology Department, B.N.N. College, Bhiwandi, Dist-Thane, Maharashtra

ABSTRACT

The cyclical nature of breeding activity is one of the most prominent features of reproduction in vertebrates. Reproductive cycle has been more fully investigated in mammals. A substantial amount of work has been carried out on the reproductive cycle of fishes due to their commercial importance. However, studies dealing with the gonadal cycle of reptiles are comparatively limited. Most of the data on the reproductive cycles of snakes come from temperate zone species and there is a natural tendency to consider these patterns typical of snakes in general. This is misleading however, because the majority species of snakes are not found in temperate zone but rather in tropical or sub-tropical areas. Moreover their data is often based on the museum records, forcing the investigators to combine information from different geographic regions and different years. Ecology of the area place valuable role in terms of protection of environment as a whole much concern is for terrestrial species. Although such data is valuable it cannot determine the magnitude of geographic especially temporal variations in reproduction. Thus broad generalization concerning reproduction in tropical and sub-tropical snakes are premature and there is need for additional data on these lines. Study of reproduction of aquatic species is important to know about their breeding habits, habitats and reproductive behavior. From this point of view following study is carried out at Mumbai coast (19.55^{0}N and72.54^{0}E) about snake *Acrochordus granulatus. A. granulatus*is least concernspecies, population of which is considerably stable. It has ability to survive in variety of aquatic environment.

Keywords: ***Acrochordus granulates,*** **distribution, reproduction, ovarian cycle.**

INTRODUCTION

The cyclical nature of breeding activity is one of the most prominent features of reproduction in vertebrates. Recent reviews of reptilian reproductive cycles (Shine, 1977; Aldridge, 1979; 1982;

Licht, 1984) suggest that the female reproductive cycle is relatively uniform in temperate zone species, and that seasonal reproduction is the rule in both the southern and northern hemisphere. Most of the data on the female reproductive cycle of snakes come from temperate zone, species and there is a natural tendency to consider these patterns as a typical of snakes in general. This is misleading however, because the majority species of snakes are not found in temperate zone but rather in tropical or sub-tropical areas.

Broad generalizations concerning reproduction in tropical and sub-tropical snakes are premature and there is a need for additional data on these lines. Hence the present study on the female reproductive cycle of the tropical estuarine snake, *Acrochordus granulatus* (Schneider) has been undertaken. Moreover this snake is readily available throughout the year.

The snake *A. granulatus* has been reported to be a seasonal or loosely seasonal breeder in Malaysia (Voris and Goldak,1980) and a seasonal breeder in the Philippines (Gorman et al.,1981).In Thailand ovulation was noted in the month of September(Sansareeya Wangkulangkul,2005) These reports indicate that the geographical position has an impact on the reproductive cycles. From this point view also this study on reproductive cycles of *A. granulatus* from the Mumbai coast which has a topography of 19.55°N and 72.54°E would be interesting.

Materials And Methods:
For the present studies, the females of *Acrochordus granulatus* were procured. The animals were weighed and their snout-vent length (SVL) was measured to the nearest centimeter. Females below 60 cm of body length were

discarded as they were considered sexually immature (Gorman et al.,1981). Both the ovaries were carefully removed, washed with saline, bottled on filter paper and weighed to the nearest milligram. Number of follicals were counted. In pregnant females no of eggs and no of corpus lutea were counted to observe intrauterine migration.

Observations:

The female reproductive system of Acrochordus consists of two ovaries and associated ducts. It is basically asymmetrical. The right ovary is usually larger in size and situated anterior to the left. The right oviduct is longer than the left. The saccular ovaries hang from the dorsal wall of the body cavity immediately mesial to the oviduct. Each ovary is enveloped by a peritoneum and suspended by a mesovarium. Ovaries are sac-like, elongated structures and vary in length. The mean length of the right ovary was found to be 16.12 cm (range:10.1cms to 16.12cms) and that of the left ovary 11.74cm (range:7.02cms to 11.74cms). However, in females showing a biannual reproductive cycle the ovaries were exceptionally long. The average ovarian weight showed maximum increase (31.16 gms,) in the month of December (i.e at the preovulatory stage) followed by a fall (0.491 gms,) in the month of January (i.e. at the post-ovulatory stage) which continued till September when it reached its minimum (0.192 gms i.e. in post-partum females). September-October is thus a resting period.

The ovary is not a single entity but a composite structure. Thus, in addition to a large number of follicles in various stages of development, it also shows other structures derived from growing and discharged follicles, such as corpora atretica (atretica follicles) and corpora lutea. All these contribute to the endocrine activity of the ovary. Apart from these follicular components, the ovary of A granulatus also contains non-follicular components such as surface epithelium, stroma and fibrous connective tissue. (Observations based on thesis of Shubhada A Phadke ,"Studies on the Female

Reproductive cycle of the snake. *Acrochordus granulatus* (Schneider)" 1997 submitted to University of Mumbai.)

- Follicles:-Follicle is the fundamental and morphological unit of the ovary. The follicles in the ovary of A. granulatus are linearly arranged in stroma fiving it a beaded appearance in the snake, *A. granulatus* the follicles occur in four size groups:

i) Pre-vitellogenic (less than 1 mm to 5 mm in diameter)
ii) Vitellogenic (6 mm to 11 mm in diameter)
iii) Late vitellogenic (12 mm to 17 mm in diameter) and
iv) Pre-ovulatory (18 mm to 30 mm in diameter)

A. Pre-vitellogenic (Late Jan-Sep)
B. Vitellogenic (Oct – Nov)
C. Pre-ovulatory (Dec – Early Jan)
D. Postovulatory (Late Jan – Sept)

Fig. Annual Variations in the cross morphology of ovary in the snake *A. granulatus.*

It should be noted that the various types of follicles mentioned above could not be observed at any one time, in the ovary of *Acrochordus* (Table-1).

The various development stages of follicles can be identified using morphological criteria. Follicles are said to be non-estrus when they are white and translucent. As they start accumulating yolk, they lose their transparency and become opaque yellow in colour. Such follicles are termed as estrus follicles. The period in which all the follicles in the ovary are white and translucent, is termed as the non-estrus period. In *A. granulatus* the period between January and September is the non-estrus; while the period between November and early January is the estrus period. However, it was observed that not all the females; of *Acrochordus* show an annual reproductive cycle, a few females exhibited a biannual reproductive cycle. In these females estrus follicles were not seen in the same year but at the same time in the subsequent year.

i)Follicles: The number of follicles in the ovary decreases as they become mature. Reduction in number of follicles is due to follicular atresia. In Acrochordus it was observed that at the previtellogenic stage the total number of follicles in both the ovaries was greater than that at the preovulatory stage (Table-In the month of December most of the females were observed to be in the preovulatory stage. A part of the stroma of pre-ovulatory ovaries gets stretched due to the large-sized follicles and becomes very transparent at the locations of the follicles. The stromal tissue in the ovary of the snake, is comparatively more at the preovulatory stage than at any other stage.

Ovulation in Acrochordus takes place in the first or second week of January. The right ovary generally releases a greater number of follicles than the left one. Generally five to eight follicles are released at one time and it was observed that this number depends on the size of the females. Females having snout-vent length (SVL) above 70 cms tend to release a larger number of follicles than females having less SVL. However, it was observed that the number of released follicles never exceeds eight.

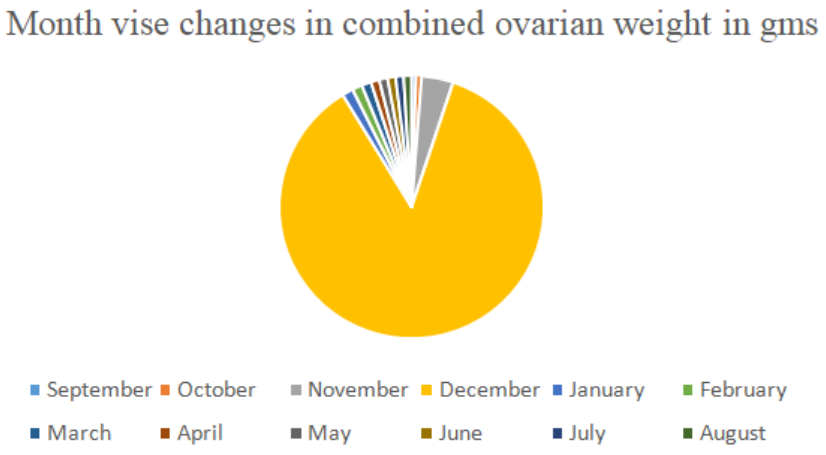
An interesting phenomenon in relation to ovulation was observed in the snake, Acrochordus. Sometimes the number of oviducal eggs or embryos and the corresponding number of corpora lutea in the differed. This is due to the displacement of ova.

ii) The corpus luteum: In *Acrochordus* the corpus luteum formed from a recently released follicle measured about 15±5 mm in diameter. It had a central cavity containing clotted blood and remanants of yolk. Soon after its formation the corpus luteum starts shrinking and becomes almost half of its original size. The central cavity disappears. The period of gestation in *A. granulatus* extends over six to eight months. Parturition can occur as early as in July and may extend up to September. Corpus luteum was seen to persist as a brownish yellow mass of tissue for approximately three to four months after parturition.

iii)Follicular atresia:
Follicular atresia can be observed at any stage of development. It is mainly of two types: one occurring in previtellogenic follicles and the other in vitellogenic follicles.

Table 1- Table showing month ovarian weight, length and no. of follicles.

Month	Mean weight of ovary in gms.		Mean length of the ovary in cms.		No of follicles	
	Right	Left	Right	Left	Right	Left
January	0.223	0.127	12.70	9.70	37	25
February	0.261	0.159	11.82	8.00	28	15
March	0.264	0.189	11.95	6.58	20	14
April	0.216	0.159	11.68	7.02	19	15
May	0.259	0.221	16.60	11.24	22	18
June	0.224	0.206	14.70	9.90	31	30
July	0.210	0.146	10.10	8.65	24	18
August	0.168	0.161	10.10	8.02	28	20
September	0.230	0.130	12.50	9.11	19	15
October	0.245	0.140	12.50	8.15	18	15
November	0.672	0.491	12.50	8.15	18	14
December	14.094	13.523	16.12	11.74	19	16



DISCUSSION

The vertebrate ovary is typically a paired structure. There is considerable variation in the structure of the ovary in different classes and orders of subphylum Vertebrata. In spite of this diversity, the initial development of the ovary in all vertebrates is essentially similar.

The ovaries of mammals are bilaterally symmetrical and are of equal size. In most avian species, only the left ovary is functional. In some birds as hawks and king doves however, the right ovary is also functional. Reptiles, amphibians and many fishes have paired ovaries. The ovaries of reptiles are either oval as in most lizards and turtles or elongated as in snakes. The ovaries of turtles are symmetrically positioned; while in lizards and snakes they are usually situated asymmetrically, with the right ovary anterior to the left. Moreover in snakes the right ovary is larger in size and produces more eggs than the left ovary.

Ovaries of lizards and snakes are structurally different from the ovaries of birds and mammals. They have a fluid-filled central cavity or a series of cavities lined with squamousepithelium. The stromal tissue is sparse and the bulk of the ovary consists of a narrow cortex surrounding the central cavity. Insnakes the follicles of the ovary are linearly arranged in the stroma, while in lizards they are dispersed in the stroma.

The ovary is not a single entity but is a composite structure of follicular and non-follicular components. The follicular components consist of normal follicles, atretic follicles and corpus luteum. All these components contribute to the endocrine activity of the ovary. The non-follicular components are the surface epithelium or peritoneal epithelium and stroma.

In A. granulatus normal follicles, atretic follicles and corpus lutea are arranged in a linear manner in the connective tissue stroma of the ovary giving the ovary a beaded appearance. Observations on the morphology of the ovary of Acrochordus are in accordance with similar observations made in other species of snake (Betz, 1963; Loft and Lance, 1978; Saha et al, 1984).

Growth is an important phenomenon in oogenesis in which nutrients and other material necessary for the development of the embryo are synthesized. Due to accumulation of nutrients and other material, the oocyte increase considerably in size.

The present data on the ovarian cycle of *Acrochordus* clearly shows that the process of vitellogenesis is of the pre-nuptial type. In this snake the ovary remains in the pre- vitellogenic state for the major part of the year (January to September). During this period the growth of the ovary is very slow. A rapid development of the ovaries takes place in late November and December, followed by a sharp increase in ovarian weight. Ovulation takes place in the first or second week of January, followed by a sharp drop in the weight of the ovaries. Throughout the gestation period, which extends from January to late September the ovarian weight goes on decreasing and reaches the minimum in the month of September, which is the resting period.

The ovarian cycle of Acrochordus is auto chronic because the follicles develop simultaneously in both the ovaries. Acrochordus is monoestrous as the extended period of gestation (six to eight months) would not allow the animal to start a new ovarian cycle.

An interesting phenomenon called intrauterine migration of ova is observed in a number of reptiles. Intrauterine migration occurs when the number of oviducal eggs or embryos and the corresponding number of corpora lutea differ in the ovary. The outcome of this study is to provide baseline data for snake reproduction for future studies

like ecological impact on reproduction of reptiles also conservative measures can be taken to protect our rich biodiversity. This project will be useful as baseline database for scientists to do further work in this regard,

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REFERENCES

[1]. Legler. J. M 1958 Extrauterine migration of ova in turtles. Herpetologica14: 81 -167.
[2]. Kulkarni, P 1970 Studies on the reproductive cycles and the endocrine glands of the lizard, *Calotes versicolor* (Boulenger). Ph.D Thesis University of Bombay.
[3]. Jones. R E 1978 Ovarian cycles in non-mammaliann vertebrates. In the vertebrate ovary: Comparative Biology and Evolution (Ed R.E Jonas). P. P. 731-762. Plenum Publ.corp. New York.
[4]. Gorman G. C P. Licht and F. Mc Collum. 1981. Annual reproductive patterns in three species of marine snakes from the central Phillippines. J. Herpetol15 : 335-354.
[5]. Shubhada A Phadke 1997 Studies on the Female Reproductive cycle of the snake. *Acrochordus granulatus* (Schneider).
[6]. Sansareeya Wangkulangkul, Kumthorn Thirakhupt and Harold K. Voris 2005 Sexual sixe Dimorphism and reproductive cycle of the little file snake *Acrochordus granulatus* in Phangnga Bay, Thailand Science Asia 31 (2005): 257-263.
[7]. The female reproductive cycle of the Bedriaga plate tailed gecko, Teratoscincus bedriagai (sauria:Gekkonidae) in Iran International Journal of Zoology article ID 782641 Vol. 16 Nov, 2014.
[8]. Histological description of the reproductive system of male and female hatchlings of Megadalena river turtle (Podocnemis lewyana)