

## BREEDING DATA ON CAPTIVE INDIAN ROCK PYTHON (*PYTHON MOLURUS MOLURUS*)

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### Abstract

The data is presented on the basis of eight years study on a captive pair of Indian Rock Python (*Python molurus molurus*). The female laid in total six clutches (18-12 eggs clutch size) and produced totally 87 eggs, of which 56 eggs were incubated for an average of 72 days and 24 hatchlings were successfully achieved with female bias ratio (F14:10M). Breeding pattern and some important aspects of captive management of the species is discussed.

### Keywords

Snake, Boidae, *Python molurus molurus*, breeding, captivity, management

### Introduction

The Rock Python (*Python molurus*) is a widely distributed snake in the Indian subcontinent and East Asia (Daniel, 1983). It is a giant serpent, locally extinct from many areas due to loss of natural habitat and due to poaching for skin and for pet trade. The species is recognised by three subspecies *Python molurus molurus*, *P. m. bivittatus* and *P. m. pimbura*. These subspecies are very distinctly distributed and have varied preferences to habitat. *P. m. molurus* is confined to Pakistan and India, *bivittatus* is found in the Indo-Chinese sub-region and the peninsula of Southeast Asia to Java, Sumbawa and Celebes, while *pimbura* is only restricted to Sri Lanka. The Sri Lankan Rock Python is not believed to be a separate subspecies by many taxonomists.

This species is popular because it can be easily maintained in captivity. It is found in every zoo in the world and also with private captive breeders and hobbyists in India and abroad.

Very little information is available on reproduction and captive management of *P. molurus*. Acharjyo and Mishra (1976), Vyas (1993), Urfi (1997) and Vyas (1998) have published breeding data on *P. m. molurus*. Mierop and Barnard (1976), Townson and Toad (1976) and Wanger (1976) have described breeding and captive management on *P. m. bivittatus*. Inter breeding between two subspecies *P. m. molurus* and *P. m. bivittatus* are described by Vineger (1973) and Townson (1980). Yadav (1967) and Joshi *et al.* (2001) have made an attempt in captive breeding of *P.*

*molurus* and described breeding data without mentioning the subspecies. Ross and Marzec (1990) gave a detailed account on captive management of all three subspecies. Yet, information on husbandry and management aspects especially on nominate subspecies in India is scanty and not well documented, except for a single reference of Dattari (1990).

Therefore a study was carried out for a period of eight years from 1989 to 1997 at Sayaji Baug Zoo, Vadodara, Gujarat, India to understand husbandry and management problems of this subspecies in captivity.

The Sayaji Baug Zoo maintains a small population of pythons for display and visitor education purposes. A pair of pythons was maintained separately for breeding purpose to gather more information on captive management. This experience is discussed and documented here with the understanding that it may be helpful in its management in zoos.

### Materials and Methods

An adult and healthy pair was selected for successful breeding. The male was 286cm long and the female was 267cm. Both the animals were originally caught from the zoo premises.

### Breeding enclosure

The pair was kept in a 3 x 3 x 3m concrete room the front side of which was covered with a welded wire mesh with an entrance

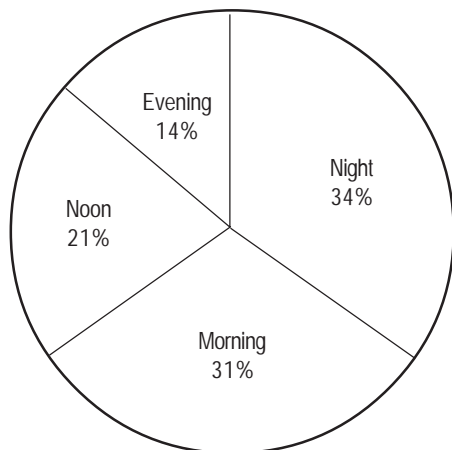


Figure 1. Observation of mating in *Python molurus molurus* in different parts of the day.

and the back wall was provided with a 1 x 0.7m window for ventilation. The cage was not in display and was away from disturbance providing the pair with all possible necessities like a long, forked wooden log and water pool for drinking and cooling. Also, four 30 x 20 x 50cm size hiding places were made of concrete and the floor of the cage was covered by 8cm thick earthen layer. All necessary environmental factors like temperature, humidity and photo-period were also considered and maintained properly.

#### Food

The pair was fed on live animals, like two pigeons, a bandicoot or a domestic fowl, each. Sometimes they were also fed with animals that died naturally in the zoo. Food was offered once a week in warmer months and extended for once in two to three weeks in cooler months. During feeding time both the sexes were kept separate to avoid unnecessary conflict and accidental

Table 1. Month-wise numbers of mating recorded in *Python molurus molurus*.

Month	Total number of mating observed
September	03
November	02
December	01
January	00
February	08
March	12
April	04
Total	29

cannibalism.

## Result

### Mating and courtship behaviour

Mating and courtship behaviour period was observed for seven months, from September to April, except during the month of January. Highest mating frequency was noted during the month of March and lowest was in November (Table 1). Mating was observed 29 times in the pair, more during night and morning and was lowest in the evenings (Fig. 1). The recorded copulation duration was 30 minutes to three hours in the pair.

### Gestation period

The gestation period was considered from the date of last mating to the date of egg-laying. An average of 64.33 days gestation period with a range of 50 to 74 days was recorded in the female.

Table 2. Egg measurements of *Python molurus molurus*.

Batch No.	Date of laying	Clutch size	Length (Range) (in cm)	Width (Range) (in cm)	Weight (Range) (in g)	Date of incubation	Incubation period (days)
1	09.v.1991	15	11.17 (9.80-11.80)	6.03 (5.35-6.63)	208.0 (200-225)	15.vii.1991	68
2	05.v.1993	18	10.58 (9.00-11.90)	6.26 (5.80-9.10)	235.8 (225-265)	28.vii.1993	80
3	12.v.1994	14 (14)	--	--	--	--	--
4	05.v.1995	12 (12)	73.33	4.78	78.3	--	--
5	02.v.1996	16 (04)	10.26 (6.10-11.95)	6.61 (5.52-7.00)	255.8 (090-275)	11.vii.96	70
6	10.v.1997	12 (01)	10.11 (8.40-11.40)	6.61 (6.23-6.75)	244.0 (220-250)	15.vii.97	66
	Total	87 (31)					71

Numbers in parenthesis are abnormal eggs without or partial calcareous shell

**Table 3. Incubation period, successes and hatchling size of *Python molurus molurus***

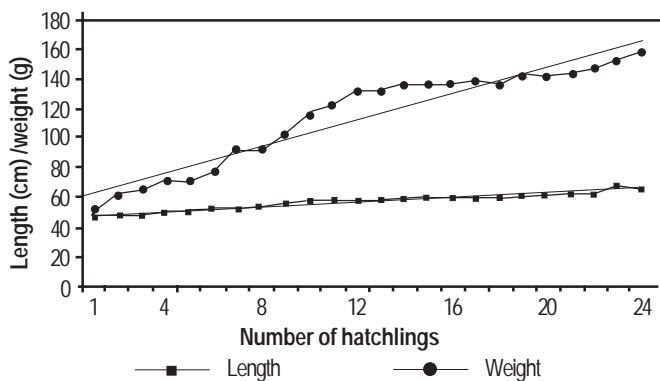
Batch No.	No. of eggs Incubated	No. of eggs hatched	Hatchling successes	Average Size of hatchlings * SVL + TL = TBL : Weight (Ranges)
1	15	7	46.66	53.23 + 7.80 = 60.90 : 136.7 (47.0-57.5) + (6.50-8.80) = (54.50-65.20) : (70-140)
2	18	8	44.44	43.50 + 6.71 = 50.18 : 81.25 (39.50-5.00) + (6.00-7.70) = (46.00-51.50) : (60-120)
3	00	0	-	-
4	00	0	-	-
5	12	3	25.00	49.00 + 7.50 = 57.33 : 140 (48.50-50.50) + (7.00-8.00) = (56.00-58.50) : (115-155)
6	11	6	54.54	49.83 + 6.96 = 56.8 : 130 (43.50-52.00) + (6.30-7.50) = (49.8-59.5) : (100-145)
	56	24	42.66	

\* Measurement in centimetre and weight in grams

### Clutch and egg size

Totally, six clutches were recorded with an average of 14.5 eggs per clutch, the largest clutch size of 18 eggs was recorded in 1993 and the smallest clutch sizes of 12 eggs were observed in the 1995 and 1997 (Table 2). During the year 1994 and 1995 undeveloped eggs, i.e., without calcareous shell were laid. All six clutches were laid at night or early morning only during the month of May.

An average egg was 10.57cm long and 6.88cm wide, and average weight 234.82g (n=56). Average clutch-wise egg size is mentioned in Table 2.



**Figure 2. Correlation of total body length and body weight of *Python's* hatchlings**

### Incubation

All the eggs were incubated artificially by known incubation method (moist cotton wool/vermiculite substrate method), except the eight eggs of the first clutch which were left with the mother for natural incubation and for further observation of maternal behaviour. The average incubation period was 71 days with a range of 66 to 80 days.

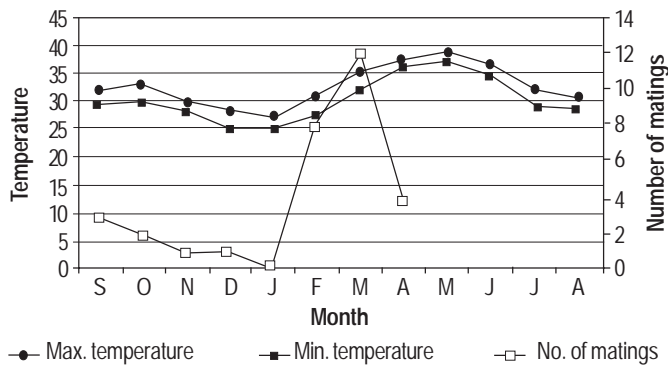
### Hatchling size and breeding successes

All hatchlings were active with individual identity body marks. The batch-wise incubated eggs, hatchling success and hatchling sizes are mentioned in Table 3. Totally, 24 (14 females and 10 males) hatchlings were obtained out of 56 eggs with 42.66 % successes. An average total body length of 55.6cm with body weight of 112.9g was recorded.

Total body length and body weight of hatchlings indicate a relation in this species and the trend of growth indicates that body length growth becomes slow in comparison to body weight growth after a certain age (Fig. 2).

### Discussion

During the present study period, mating of *P. m. molurus* was observed during September to April, except in the month of January, which shows that temperature influences the reproductive activity of the species. Figure 3 clearly shows the cyclic temperature range and correlation between temperature fluctuation and performance of mating activity in the species. The ambient temperature ranges from 27.13<sup>o</sup>-23.13<sup>o</sup>C and from 37.05<sup>o</sup>-35.20<sup>o</sup>C. Since it had an effect on mating activities, mating was observed only during September to April and not in January.



**Figure 3.** Correlation of ambient temperature and month-wise mating in Python

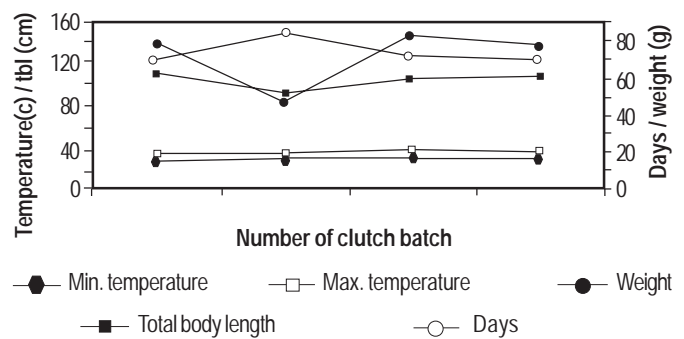
The observed period of mating is a little more extended than that is found in the reports of previous workers (Ross & Marzec, 1990) which is from November to March. The two-month early mating records (September and October) in the present study may be due to the female not involved in brooding the eggs (after 1993) and its extension up to the month of April might be due to influences of local environmental and climatic changes.

The mean gestation period of 64.33 days is quite close to earlier report of two months (Dattatri, 1990; Ross & Marzec, 1990). The variable incubation period in the present study from 66 to 80 days is a result of variable ambient temperatures during incubation period. Variation in weight and size of hatchlings of different clutches shows the effect of ambient temperature on incubation period and growth development of embryos. According to Vineger (1973) temperature not only affects the metabolic activity in ectothermic animals but also plays vital role in the development of embryos. Eggs incubated at low temperatures extended incubation period and those incubated at high temperatures shortened incubation period. This also affected growth and development of embryos (Fig. 4).

Irregularity in clutches and number of eggs per clutch indicate following possibilities in the species and some lacuna in the management of the species.

1. The species breeding season and pattern is not annual.
2. The health of the female is not normal in each season.
3. Supply of food is not sufficient or proper.
4. Some climatic factors may not be maintained as per the requirements of the species.
5. Disturbances could be a cause for the clutch-size fluctuation.

During the present study the female laid abnormal eggs during 1994 and 1995, which emphasises all the above mentioned possibilities in the study. The laying of a good number (35.6 %) of abnormal eggs, either without calcareous or half shell eggs



**Figure 4.** Effect of temperature on incubation period and growth developments of hatchlings

due to calcium deficiencies in the female may be due to lack of calcium or Vitamin D in its feed. Vitamin D is very essential for reptiles to bind calcium level in the body especially during the breeding season. That is only possible in the presence of sunlight or artificial ultraviolet light (UV-B radiation is necessary for vitamin D synthesis). In nature, exposure to ultraviolet light induces a chemical reaction in the skin which converts vitamin D<sub>2</sub> into D<sub>3</sub> that is responsible for proper absorption of calcium from the digestive gut (Millichamp, 1980; Phillips, 1986). Therefore the gravid female often spends long periods basking. It was observed that the pregnant female basked the posterior portion of her body turned ventral side up for warmth 15-10 days prior to egg-laying. Exposure to sunlight decreased during the year 1994 and 1995 due to good growth of trees surrounding the breeding enclosure. When it was apprehended that the growth of trees prevented sunlight and resulted in negative impact on the natural synthesis of vitamin D<sub>3</sub>, the branches of those trees were cut to enhance sunlight in the cage. Consequently in the next breeding season (1996) eggs with normal calcified shells were laid.

Usually large-sized snakes especially boids and vipers show non-annual breeding pattern. Body weight and accumulation of fat is necessary to enable the process of follicular maturation and egg production (Smith, 1976). Usually, a gravid female loses over one-third to one-fourth of her body weight during a reproductive cycle due to egg-laying and spending long periods without food during gestation and brooding (Ross & Marzec, 1990; Vyas, 1996). However in the present study, the entire egg clutch (1993) was removed from the mother and was artificially incubated, so the female did not spend two months in incubation and was free from brooding. She started to take food earlier than usual, which indicates her response to accumulate the required body weight and fat for the next breeding cycle.

The present study on python captive management emphasises that if certain basic parameters are provided to the species with

a certain degree of individual care and attention, breeding will be successful. Health of the female python also affects reproduction and therefore should be maintained by offering optimum food and freeing her from brooding. This promotes rapid increase in body weight, thereby reestablishing ovulation more quickly. This also results in short breeding cycles compared to the usual long non-annual cycle. This technique can be used to promote quick captive breeding for conservation purposes.

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### Looking for a Research Assistant

**Project Title:** Ecology and behavior of the Nilgiri langur; **Project period:** 2 years starting: April 2002

**Position Description:** Research Assistant will join a team investigating the ecology, behavior and demography of the Nilgiri langur. The focus of this position is collection of behavior and habitat data. Work will also involves data entry and basic analysis. Position requires for person to stay at the field site where minimum/basic facilities will be available.

**Qualifications:** Candidate should have a minimum Bachelor's degree. Students enrolled for or completed Masters degree in Sciences and interested in gaining field experience are encouraged to apply. Candidate should be interested in working on primates and those with driving skills and 4-wheel license will be preferred.

**Stipend:** Will be based on experience and qualification of the candidate; **Application Deadline:** Until filled

**Comments:** RA can be trained in the use of GPS for research, basic GIS techniques and also in collecting behavioural data. RA is welcome to collect any additional data outside the scope of the study and use the same to pursue his/her interests.

**Contact:** Sunita Ram, Old No. 42, New No. 12 Pelathope, Mylapore, Chennai 600004, Tamil Nadu, India  
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