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Cover

This green iguana (*Iguana iguana*) is from the Chennai Snake Park.

The green iguana is a native of Central America and northern regions of South America. It attain a maximum size of 6 feet 7 inches. It climbs trees with speed and is a good swimmer using its tail as paddle. A vegetarian; the young eats insects. It lays 20-40 eggs at a time. The green iguana does well in captivity.

Photo : M.V. Ravikumar

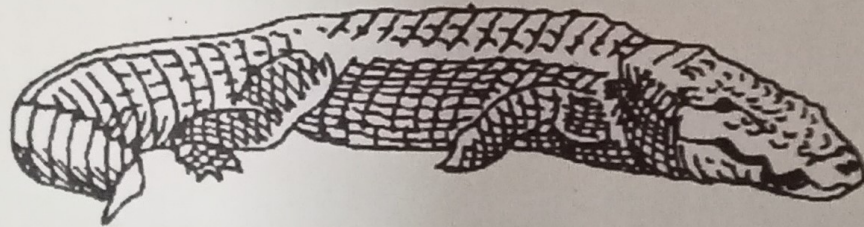
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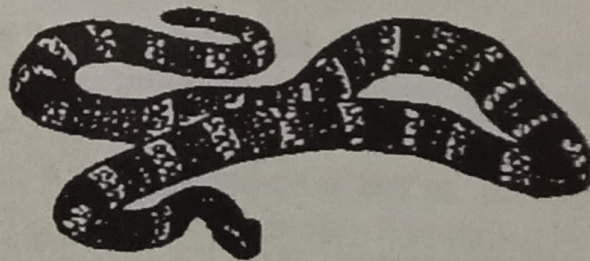
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"How many species of organisms are there on earth? We don't know, not even to the nearest order of magnitude. The number could be close to 10 million or as high as 100 million. Large numbers of new species continue to turn up every year. And of those already discovered, over 99 per cent are known only by a scientific name, a handful of specimens in a museum, and a few scraps of description in scientific journals."

-Ed Wilson (in *The Diversity of Life*)



A CASE OF BOWEL IMPACTION IN A CAPTIVE ALDABRA TORTOISE.

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and

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The Aldabra tortoise (*Geochelone gigantea*) is one of the largest land tortoises in the world. In its natural range, this tortoise is now restricted to the four islands in the Aldabra atoll* in the Indian ocean. Although this species (estimated population: about 1,50,000) does not appear to be declining, it is vulnerable to any interference to its limited habitat. Hence this species has been given a "Rare" status by the IUCN.

A few introduced colonies exist in other islands in the Indian ocean. Further, there are a number of these tortoises in zoological institutions. This species has rarely bred in captivity. Very little information is available about various diseases that can affect this species of land tortoises as well as other species of tortoises.

The Chennai Snake Park had acquired a pair of Aldabra giant tortoises in 1976. The female died in 1990; the remaining one, a male had been in good condition and got itself conditioned to the Park environment. Being essentially a herbivorous animal, it is being fed on a diet of mixed vegetables and fruits (bananas, guava, etc.) i.e about 1.5kg on alternate days.

* The Aldabra islands belong to the the Republic of Seychelles and are located 600km west of Tanzania, off the coast of Africa, in the Indian Ocean.

On 26.6.99 it was reported that this animal was off feed for the previous two days. As the animal was dull, it was given 5ml of Liv52 drops once a day. The animal started feeding from the next day. On 12.7.99, the animal was again reported sick and off feed.

Symptoms and Treatment

The tortoise was found to be squatting in a pool of water and refusing to come out of the pool. It was reported to have passed hard pellety motions.

The head and neck were tucked inside the shell. The animal was induced to come out of the pool and made to stretch its head and neck. We examined the cloaca and the mouth and visible mucous membrane, but no abnormalities could be detected. The dung sample which was very hard and gritty was examined for the presence of ova of gastro-intestinal parasites, particularly the helminths. No ova could be detected. But the excreta contained a lot of mud.

It was force-fed with two bananas. Unizyme 10ml was administered orally during the feeding of fruits with the help of a disposable syringe. We repeated the same treatment and force feeding with fruits was continued on the next day.

Observations

On 14.7.99, the tortoise was examined again. It had not passed any motion for the previous two days. It continued to be off feed. It was extremely dull and continued to lie down in the pool of water, and never showed any inclination to move out of the pool.

The cloacal region was observed to be dry and with foetid smell. It refused to feed on vegetables. Attempts were made to hand feed the animal with vegetables, without success.

However, it was force-fed with four bananas and two apples and administered Liv52 - 5ml, Unizyme 10ml during the feeding with fruits and Oxytetracycline (50mg/ml) - 6ml by i/m injection.

15.7.99 : No motion passed. Appeared to be active; had taken six bananas in the morning and two apples in the evening.

Followed the same line of treatment i.e. oral medication with Unizyme syrup and Liv52 drops and i/m injection of Oxytetracycline.

A small bunch of neem leaves (*Azadiracta indica*) was fed.

16.7.99: The tortoise was more active, moving about in the enclosure. Not yet passed any motion. Continued the same line of treatment. Fed with *Solanum nigrum* leaves to induce appetite and continued feeding with fruits.

17.7.99: The tortoise passed large quantities of dung which contained considerable amount of undigested leafy matter. Orally Metranidazole syrup (Aristogyl) 2ml, Liv52 drops - 5ml and Oxytertracycline 6ml i/m injection were given. We continued with the fruit diet.

18.7.99 to 20.7.99: We continued with the the same line of treatment.

21.7.99: The tortoise was very active; but had not passed any motion. It continued to show reluctance to feed on the vegetable diet but favoured the fruit diet. Oral medication: Continued (Aristogyl syrup.2 ml plus B-complex syrup 5ml).

22.7.99: Continued with the same line of treatment. Passed large quantities of dung. Consistency of the dung normal. No undigested leafy material found in the dung. The tortoise yet to feed on the vegetable diet. Continued feeding with fruits.

23.7.99: Repeated the procedure. Dung of normal consistency, Animal very active.

24.7.99: Not passed any dung. As the animal showed appetite for the mixed vegetable diet preferably green leafy diet, it was fed with *Solanum nigrum* leaves in addition to the regular diet.

25.7.99 to 27.7.99: Same routine followed. Passed liberal quantity of dung. No undigested material or earth found in the dung. The animal showed evidence of good appetite by feeding on the vegetable diet given. Continued feeding with fruits.

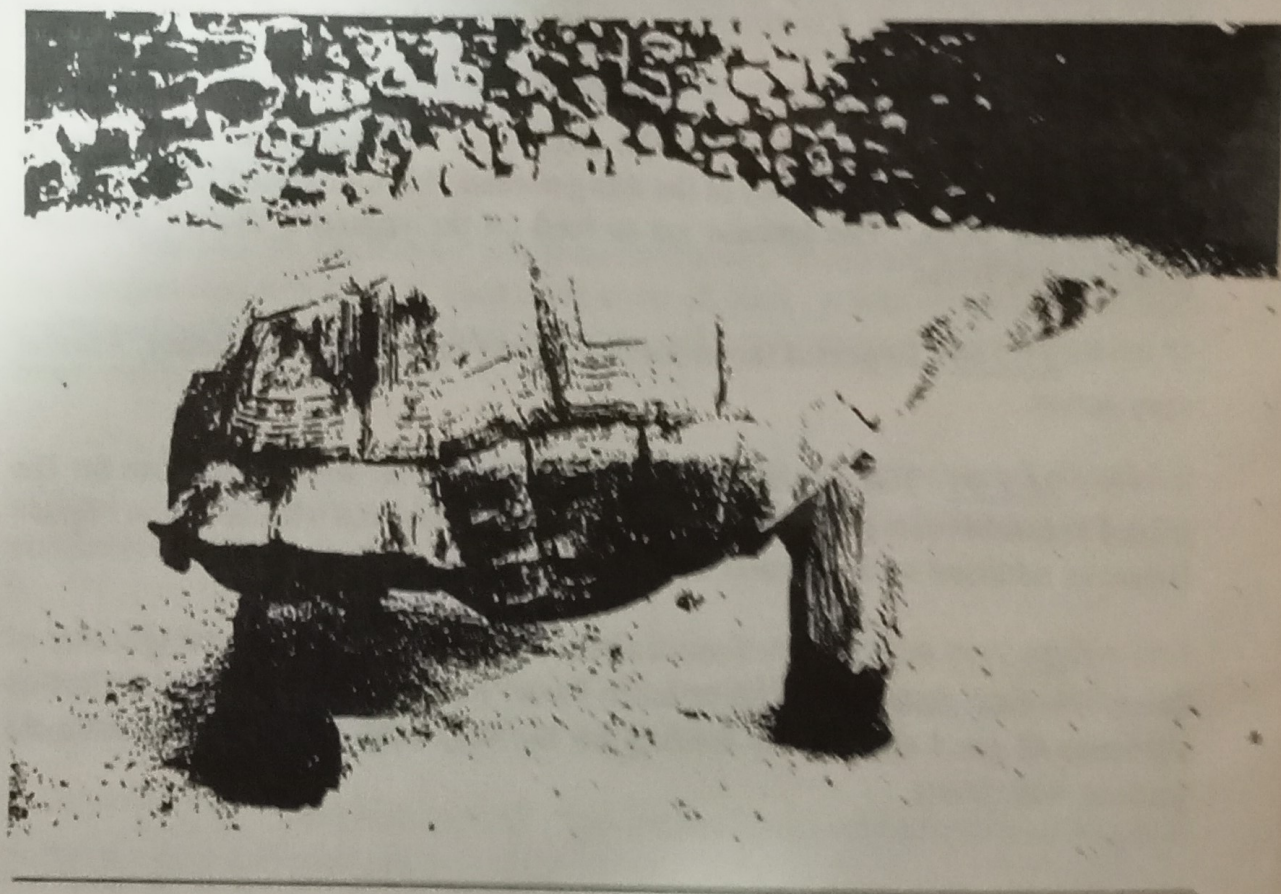
28.7.99: The tortoise totally recovered and was feeding normally. Normal bowel movement was observed.

29.7.99: From this date on, the tortoise was fed on alternate days as was done before it became sick and with its normal feed of mixed vegetables and fruits

Discussion

The Aldabra tortoise developed the condition of bowel impaction probably due to feeding with coarse *Ficus* leaves and mud contaminated food (accidentally).

Apart from force feeding with laxative diet, judicious administration of antibiotics both by oral and by parental route, as well as administration of gastric and hepatic stimulants, helped in the recovery of the animal.





DISTRIBUTION AND STATUS OF REPTILES IN KANYAKUMARI DISTRICT OF TAMILNADU

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The Kanyakumari district is situated in the southern tip of peninsular India. In relief, this district varies from sandy and rocky sea-shore to tropical wet evergreen forests in the higher altitudes. The elevation ranges from sea level to hills over 1000 metres. A wide range of habitats is unique to this district which includes dense tropical wet evergreen forests, to coconut and rubber plantations in the lower elevations. The plains are under agricultural crops such as rice, tapioca, etc.

The hills of this district are a part of the Western Ghats which support quite a good number of endemic species of reptiles. To assess the status of reptiles in Kanyakumari district, a survey was done in 1990 with M.V. Rajendran. Apart from this, information from Daniels and Daniels (1992) and other recent observations have been used for the preparation of this paper.

In this area only one species of crocodile, two species of freshwater turtles, one species of tortoise, 18 species of lizards and 22 species of snakes are reported. This list does not include marine turtles or marine snakes. (Table 1)

Acknowledgement: The first author is grateful to the Late Dr.M. V. Rajendran for introducing him to this field and Prof. Johnson and his family, Marthandam, for their support and help during the survey.

Reference:

Daniels, A.E.D. and Daniels, R.J.R, (1992): An account of the herpetofauna in the Western Ghats of Kanyakumari District, Tamilnadu, *Cobra*, 10 :3-7.

Table 1. Reptilian fauna of Kanaya kumari District

Order/Sub order	Family	Species	Remarks
Crocodylia	Crocodylidae	<i>Crocodylus palustris</i>	The mugger was not seen recently. However, there have been reports from Pechiparai and Perunjani reservoirs within the district. Some were said to have been introduced in these reservoirs in the early 1980s.
Testudines	Bataguridae	<i>Melanochelys trijuga</i>	The common pond turtle is frequently seen in streams and tanks.
	Testudinidae	<i>Indotestudo forsteni</i>	A juvenile travancore tortoise was once seen at over 400m in the hills.
	Trionychidae	<i>Lissemys punctata</i>	The common flapshell is recorded in all tanks in the district.
Squamata Sauria	Gekkonidae	<i>Hemidactylus frenatus</i>	This small house gecko is recorded throughout the district in human habitations.
		<i>Hemidactylus brooki</i>	This small gecko is distributed throughout the district.
		<i>Hemidactylus leschenaulti</i>	The large tree gecko is very common on tree bark & rafters all over the district.
		<i>Hemidactylus triedrus</i>	This small gecko is seen under stone piles all over the district.
	Agamidae	<i>Calotes versicolor</i>	The common garden lizard is distributed all over the district.
		<i>Calotes calotes</i>	The green forest lizard is noticed in the hills.

Order/Sub order	Family	Species	Remarks
	Chameleonidae	<i>Calotes rouxi</i>	This rare lizard was collected in the hills only once.
		<i>Calotes ellioti</i>	This agamid lizard has also been recorded in the hills.
		<i>Sitana ponticeriana</i>	Common in the drier plains.
		<i>Otocryptis beddomi</i>	Rare species noticed more frequently during 1960s. During 1990s very few specimens seen.
		<i>Psammophilus blanfordanus</i>	This redheaded rock lizard is commonly seen in the hills.
		<i>Draco dussumieri</i>	Several individuals were noticed in plantations.
		<i>Chameleo zeylanicus</i>	Common in the plantations and forests.
	Scincidae	<i>Mabuya carinata</i>	This is the common skink of this area.
		<i>Mabuya beddomii</i>	Only one specimen reported from the hills.
		<i>Mabuya macularia</i>	The small bronze skink is common in the forests.
	Varanidae	<i>Riopa punctata</i>	The red tailed common skink is distributed throughout the district.
		<i>Varanus bengalensis</i>	The common monitor lizard is known from all over the district.

Order/Sub order	Family	Species	Remarks
Squamata Serpentes	Typhlopidae	<i>Typhlops sp</i>	Very common species not identified upto species level ; possibly <i>braminus</i> .
		<i>Ramphotyphlops beddomi</i>	Only one specimen was collected from the hills.
	Uropeltidae	<i>Uropeltis mahendrae</i>	Collected from the hills.
	Boidae	<i>Eryx conicus</i>	Collected from the plains and plantations.
		<i>Eryx johni</i>	Common in the drier plains.
		<i>Python molurus</i>	Reported in the hills but not seen. Regularly collected from stream sides by snake charmers.
	Colubridae	<i>Ptyas mucosus</i>	This is a common snake all over the district.
		<i>Argyrogena fasciolatas</i>	Only one specimen recorded from the hills.
		<i>Dendrelaphis tristis</i>	Common throughout the district.
		<i>Ahaetulla nasutus</i>	Common in this area.
		<i>Lycodon aulicus</i>	The common wolf snake lives under tiles and bricks around human habitation.
		<i>Xenochropis piscator</i>	The common water snake found in the plains and hill streams.

Order/Sub order	Family	Species	Remarks
	Elapidae	<i>Atretium schistosum</i>	Seen in stagnant water bodies in plains and hills.
		<i>Amphiesma stolata</i>	Common in plains.
		<i>Sibynophis subpunctatus</i>	Four specimens recorded in the rubber plantations.
		<i>Naja naja</i>	The common cobra is frequently encountered in the plains and hills.
		<i>Bungarus caeruleus</i>	Only one specimen recorded from the plains.
	Viperidae	<i>Ophiophagus hannah</i>	Not common in the hills. During the rainy season, encountered and killed by plantation workers. Not recently however.
		<i>Daboia russelli</i>	Recorded from the rocky foot hills.
		<i>Echis carinatus</i>	Frequently seen in the drier parts of this district.
		<i>Trimeresurus malabaricus</i>	This pit viper is common along the hill streams.
		<i>Hypnale hypnale</i>	Only one specimem recorded in the hills.

INDIVIDUAL IDENTIFICATION OF INDIAN AND RETICULATED PYTHONS BASED ON BLOTCH STRUCTURE AND ARRANGEMENT.

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In doing field or captive studies on reptiles, individual marking is difficult as the animals shed their skin periodically. The usual method used is scale-clipping. However, this causes stress to the animals and alters their behaviour. In addition, the scales grow back over time and have to be repeatedly clipped for long-term studies. A more sophisticated method is the implantation of a transponder device in the body of the animal, but this too involves handling the reptile and is very expensive (Daniel, 1983; Vyas, 1997).

As a way of overcoming these problems and, in field studies, to avoid disparities in population estimation due to point counts, a method of identifying individual Indian pythons (*Python molurus*) based on their blotch structures was successfully attempted. This method is superior to scale-clipping as identification is possible from a distance, without disturbing the snake. Also, photographic records of individuals can be maintained (Bhupathy, 1990).

A follow-up of this study was done on the Indian pythons at the Chennai Snake Park and the method was extended to reticulated pythons (*Python reticulatus*).

15 Indian pythons i.e. 9 adults and 6 juveniles (same clutch) and 14 reticulated pythons i.e. 5 adults and 9 juveniles (of 2 clutches) were examined and the first few blotches (6-10) were drawn. The anterior portion of each snake was photographed using a Nikon FE 10 camera.

5 types of blotches were observed among Indian pythons, all of them dark colored against a lighter brown background. They were :



- (1) Head blotch : Single, lance-shaped, fading anteriorly.
- (2) Eye Streak : An oblique streak posterior to the eye.
- (3) Dorsal blotch : Blotches starting behind the head blotch and extending to the tail. Sometimes pale centrally.
- (4) Dorso-lateral blotch : Laterally, on either side of the dorsal blotch.
- (5) Lateral blotch : Next to the dorso-lateral blotch, visible from the side. Centrally of the same color as the background, usually.

The head, dorsal and lateral blotches were used for identification. There was some amount of fusion, mostly within or between the latter two categories. All connected blotches were counted as one, even though distinguishable.

In reticulated pythons, the blotches were light against a darker background, with black borders. The blotches were classified as :

1. Head blotch : Small dark at the posterior end of a midline on the head and within the light-colored head area.
2. Dorsal blotch : Serially on the body, mostly circular. Each with a white-in-black crescent or triangle-shaped mark on either side (semi-circles were counted as those with only one of these marks)

Indian python

Out of the 15 specimens, four could be identified based on the head blotch alone, which extended posteriorly or laterally. Of the remaining 11, the first dorsal blotch was attached to the dorso-lateral blotches in a distinct fashion in six cases. Of the remaining five with more or less rectangular 1st dorsal blotches, the 2nd dorsal blotch and dorso-laterals differed. Even with respect to dorsal blotches, each snake had a unique pattern when the first three were taken in conjunction. In the lighter colored specimens, some of the dorsal blotches had pale centres. There seemed to be no similarity between siblings.

Snakes No. 1 - 6 : Juvenile, siblings.

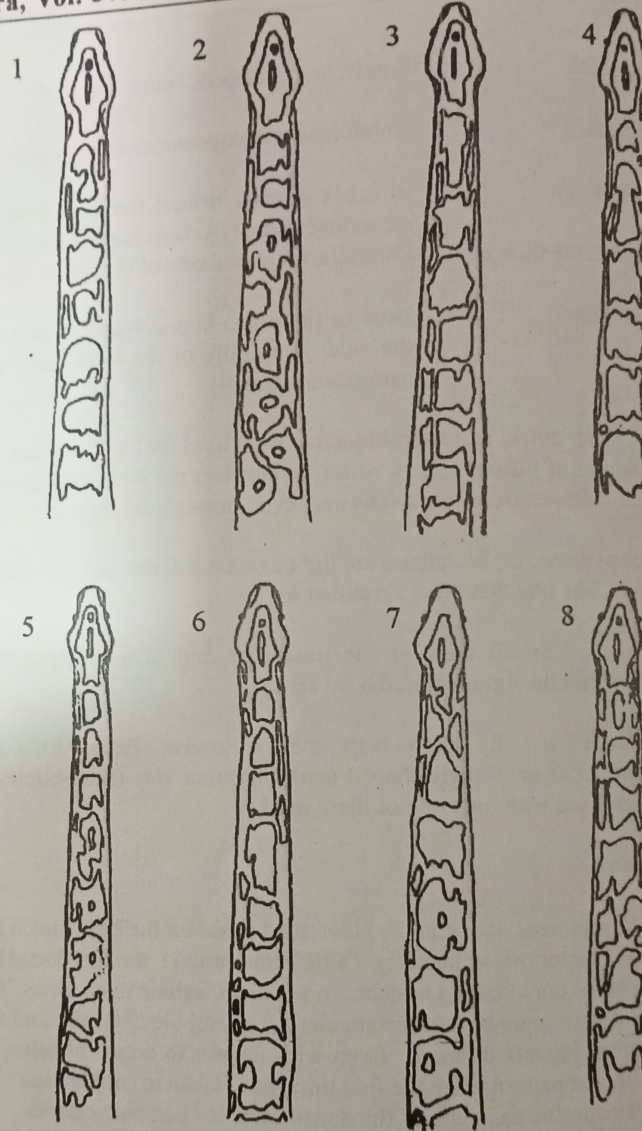


Fig. 1 : Dorsal blotch structure of *Python molurus*

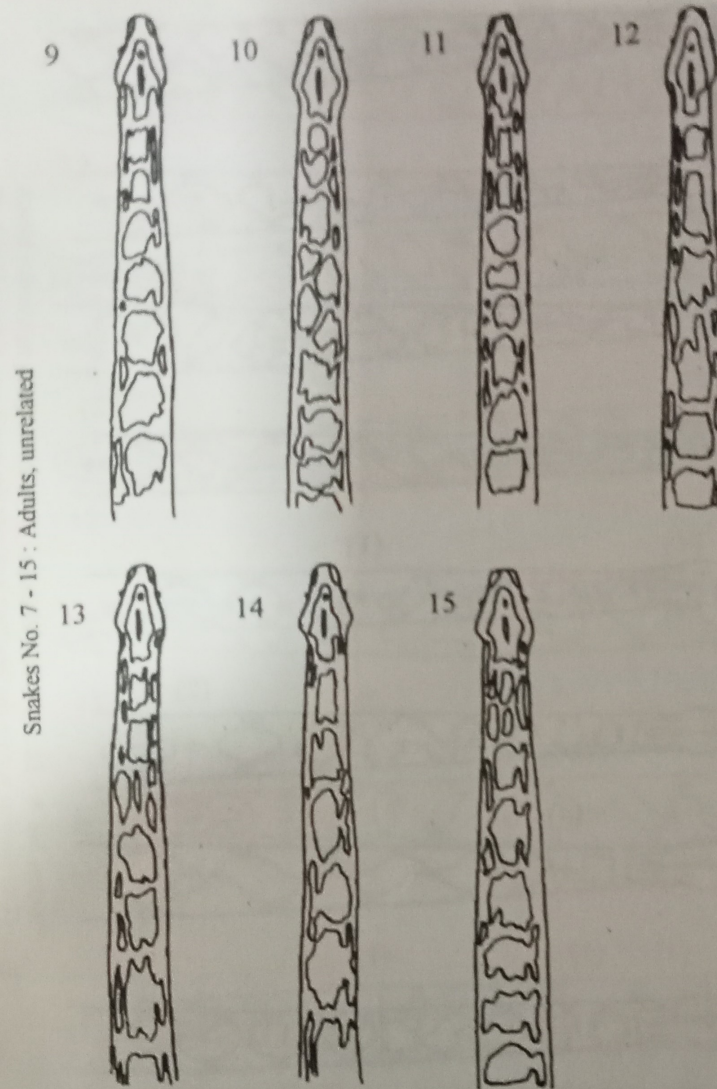
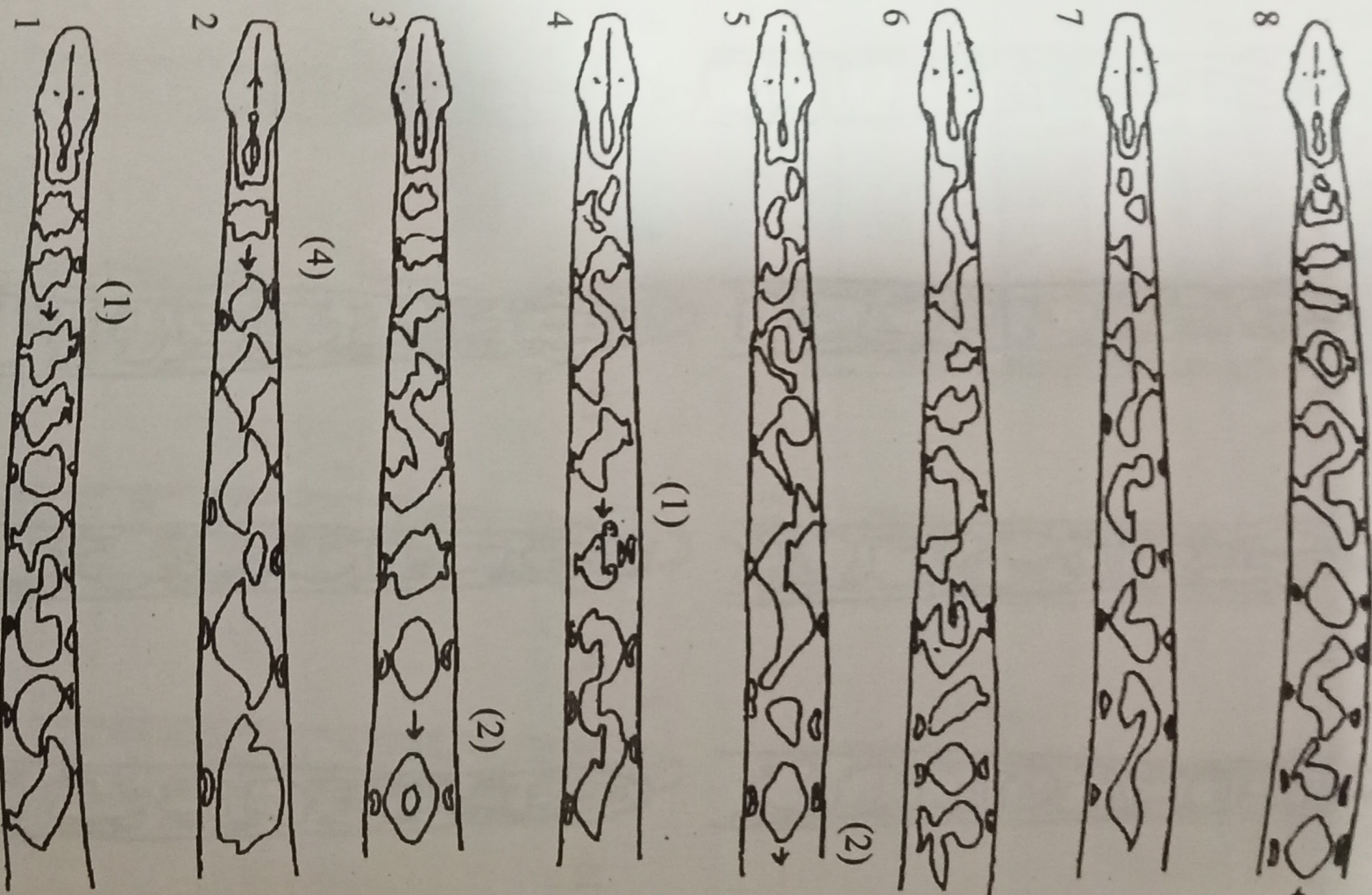


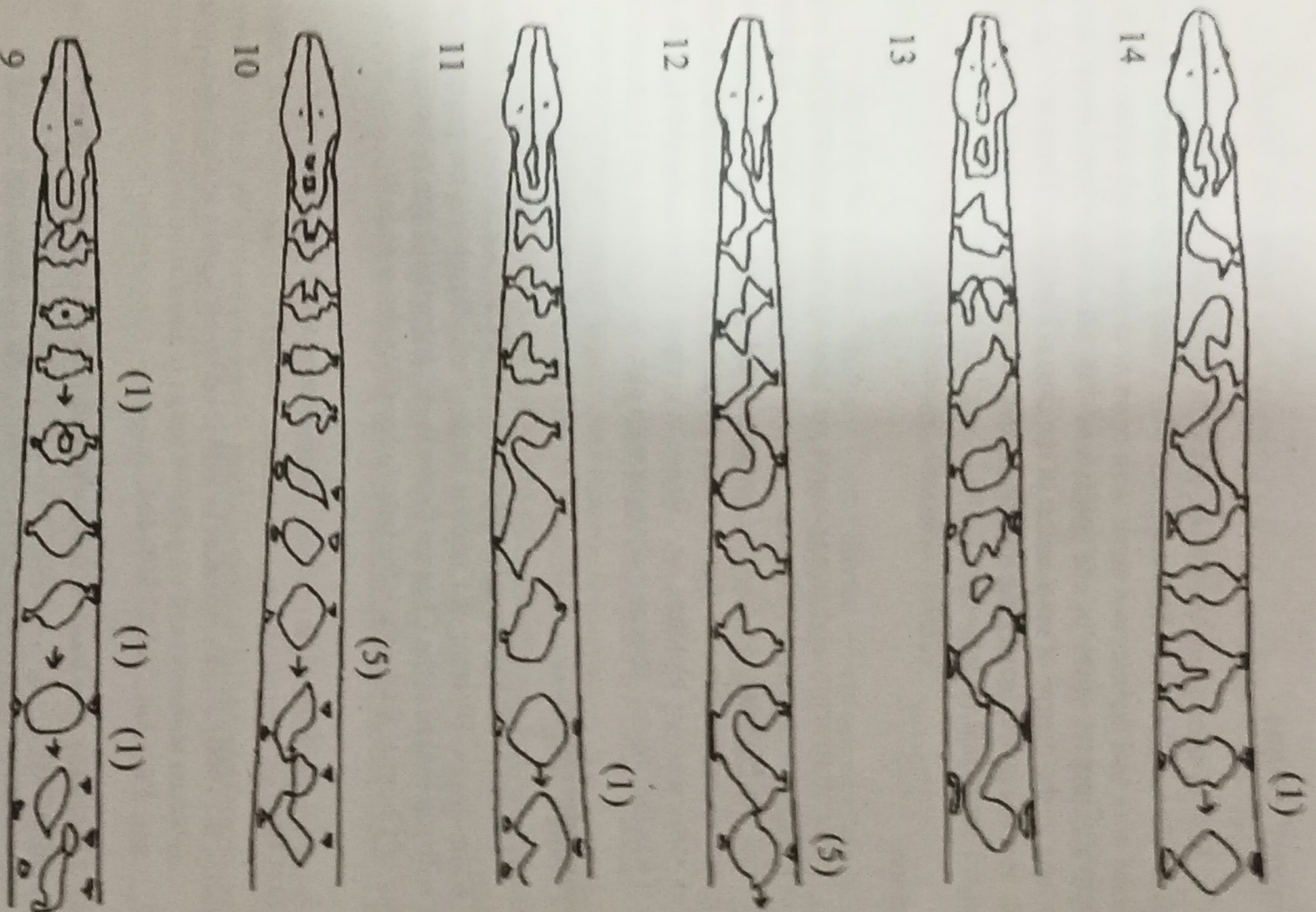
Fig. 2 : Dorsal blotch structure of *Python molurus*

Snakes No. 1 - 3 & 13-14 : Adults, unrelated. Snakes No. 4 - 7 : Juvenile, siblings



Snakes No. 8 - 12 : Juvenile, siblings. ↓ - blotch similar to anterior blotch.
(The number within the brackets indicate the number of similar blotches).

Fig. 3 : Dorsal blotch structure of *Python reticulatus*



↓ - blotch similar to anterior blotch.

(The number within the brackets indicate the number of similar blotches).

Fig. 4 : Dorsal blotch structure of *Python reticulatus*

Reticulated python

The 14 specimens were more difficult to classify, especially the juvenile siblings. Close observation was required, which may not be possible in the wild. The head area was distinct in 6 cases with open or double blotches (two and three respectively) and an arrow in one specimen. The other eight specimens showed variations in the degree of connection of the dorsal blotches. Three siblings of a clutch showed open/closed ring formation whereas three of another clutch had a U-shaped 1st dorsal blotch.

Inference

Blotch structure and arrangement can be easily used to identify individual Indian pythons and, with a little more difficulty, reticulated pythons. It is better not to use the background color as an additional guide, as this darkens when moulting. It is possible that this method could be used for individuals of other species with distinct blotches eg. Russells's viper (*Vipera russelli*). It is not known whether blotch structure changes with age.

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I thank Mr.B.Vijayaraghavan, Chairman of Chennai Snake Park Trust and Dr.V.Kalaiarasan, Director of Chennai Snake Park for giving me permission to work with the snakes at the Chennai Snake Park. I also thank Mr.Selvaraj, Animal Keeper of Chennai Snake Park for help in handling the snakes.

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SOME RECENT HERPETOLOGICAL INITIATIVES OF SUNDARVAN NATURE DISCOVERY CENTRE, AHMEDABAD

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Sundarvan Nature Discovery Centre started off with an educational snake show held in Ahmedabad in 1978. The show was jointly organized by the Vikram Sarabhai Community Science Centre (VASCSC), Nehru Foundation for Development (NFD), World Wide Fund for Nature - India (WWF) and Madras Snake Park Trust (now, Chennai Snake Park Trust). This week-long programme which was attended by nearly 60,000 persons from the city and run by volunteers, demonstrated the potential of using snakes as a medium for nature education and in stimulating a process of inquiry into nature. Subsequently, the Karmakshetra Educational Foundation, donated land to house snakes and reptiles where nature education activities could go on and thereby Sundarvan was formed. Sundarvan was formally inaugurated by Dr. Salim Ali in October, 1979. Presently, Sundarvan is a facility of the Centre for Environment Education (CEE), and a mini-zoo recognised by the Central Zoo Authority (CZA), New Delhi. The CEE is a centre for excellence under the Ministry of Environment & Forests, Government of India.

At present, on its 2 acre campus, Sundarvan houses several species of reptiles (see Table) for the purpose of education and research. In this paper, we present an overview of recent herpetological activities of Sundarvan largely through a review of published literature

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Captive Breeding Research

Many snakes and reptiles breed naturally in Sundarvan inside their pits (starred tortoise) and inside diatomas (saw scaled viper). A single male king cobra (*Ophiophagus hannah*) from Sundarvan was transferred to the Madras Crocodile Bank Trust for a captive breeding project in 1996. However, the most successful planned project has been the breeding, rearing and release of Indian rock python into the protected habitats in Gujarat.

Sundarvan was successful in breeding the python in a 3m x 1.5m mesh cage. The lengths of the male and female were 2.72m and 3.6m respectively. The cage has an earthenware pot into which the snakes retire, besides a large tree branch and a water-tub. On 23rd May, 1996 a total of 16 eggs were observed and after 54 days' incubation they hatched. But, some of the hatchlings had to be removed manually from their eggs shells. The full details of this project are reported in Urfi (1997). With the approval of the CZA, four baby pythons were retransferred to the Kamala Nehru Zoological Park in Ahmedabad in 1997. A release plan for the remaining juveniles in the protected areas of Gujarat was prepared and approvals obtained from the CZA and the state Forest Department. The IUCN/SSC-RSG, Re-introduction Specialist Group in Nairobi, Kenya, made available the latest IUCN re-introduction guidelines and also commented on the proposal.

Pre-release planning included sub-species verification, veterinary screening, recording morphometric parameters and head-marking patterns. A couple of months before release, the snakes were regularly taken out of their enclosure and allowed to move about in the park so that they became acclimatized to the natural habitat. Post-release monitoring was envisaged in our plan on the basis of sighting records by locals and forest staff. Unfortunately, due to resource constraints, direct monitoring could not be envisaged in this venture.

The Chief Conservator of Forests (Wildlife) recommended Shoolpaneshwar Sanctuary, Rajpipla (East) as one of the sites for release. On 12th November, 1998, six pythons were released with the help of forest officials deputed by the Deputy Conservator of Forests (D.C.F). The two release sites in the forest were selected on the basis of their potential as python habitats and each had a water body close-by with adequate vegetation cover (Urfi, 1999 a & b).

Survey of Reptilian Habitats in Gujarat

As a part of its 'wetlands initiatives' programme, Sundarvan team members have been surveying inland and coastal wetlands and documenting their biodiversity. During some recent field surveys an unusual habitat, namely a village pond in Kheda district, was observed for the Indian Mugger *Crocodylus palustris* (Urfi and Nareshwar, *in prep*). The Sundarvan team has also been documenting marine biodiversity, especially birds and marine turtles (Nareshwar, 1994, Urfi *et. al.* 1997).

Since Sundarvan has a field office and a campsite at Beyt Dwarka in the Gulf of Kachchh, an evaluation of sea turtle nesting beaches was undertaken here with the following objectives: 1. identification of nesting beaches; 2. identification of species of nesting sea turtles; 3. determination of the "wow" factor to sell conservation education with reference to sea turtles; and 4. development of a conservation strategy for implementation. Study methods included: 1. preliminary beach survey; 2. day and night surveys of identified beaches during high tide and 3. interviews with the local people (Nareshwar, 1998 a).

According to information from local ferry and trawl operators, two species of sea turtles are known to nest at Beyt Dwarka, the olive ridley (*Lepidochelys olivacea*) and the green turtle (*Chelonia mydas*). A carapace of a leatherback sea turtle (*Dermochelys coriacea*) was found, but nesting of this species appears doubtful here. It is possible that hawksbill sea turtles (*Eretmochelys imbricata*) may also be found off the coast.

Snakes in Ahmedabad

The appearance of snakes (and small reptiles such as monitor lizard) in the domestic environment, viz. homes, gardens, farms and other residential premises, is a common phenomenon in the city of Ahmedabad. This could be because rapid urbanization is disturbing the snakes from their natural habitat. Simultaneously, residential premises may also be attracting many reptiles moving about in search of food (primarily rats) and shelter. When snakes appear in residential premises, the inmates panic and may even attempt to kill them. Sundarvan staff are often asked for help, in rescuing these creatures and relocating them in safe places some distance away from inhabited areas. This snake conservation programme is done voluntarily by Sundarvan and on public request.

Evaluation of the Programme

Although the above mentioned programme has been on for the past two decades, a decision to evaluate it in a formal manner was taken in 1996 when the senior author (AJU) joined as the Coordinator of Sundarvan. The questions which motivated us to undertake this study were many, though, broadly speaking, pertaining to snake and reptile ecology, nature education and policy related. For instance, we were interested in knowing precisely what species were rescued and with what frequencies? Was any seasonal pattern discernible in snake appearances? In what sort of places/habitats were snakes likely to appear? Other questions were: Do people in the city still kill snakes? Are snakes killed/protected on account of any particular setiments? A difficult question to address was the following: Has a certain degree of consciousness about the usefulness of snakes come about in Ahmedabad, through the education programs of Sundarvan? Finally, this evaluation exercise was undertaken with a view to contributing to the debate on the subject of rescuing animals by zoos. It was also felt that an elucidation of Sundarvan's activity could serve as a model for other reptile parks and zoos engaged in a similar activity.

Method of Analysis

In June, 1996, a 'snake rescue form' in a bilingual format (Gujarati and English) was put into use by the Coordinator, Sundarvan. The park staff who had been attending 'snake calls' were asked to complete it at the time of handling snakes. Initially, when this form was put into use, it was necessary to make the persons who went to attend snake calls to understand why this data were being collected. It was also necessary to explain why certain parameters viz. snake length, colour and health condition needed to be properly recorded. However, there always remained the practical difficulty of ascertaining parameters values of the desired level of sensitivity in the field. A total of 721 forms for the period June, 1996 to July, 1997, were studied in detail. The results of this study have been discussed in Urfi (1999 b). In it's second phase, this study is going to explore issues pertaining to the ecology of snakes in an urban environment in greater detail by using a larger data sheet.



Education and Media

As discussed before, initiating a process of enquiry into the living world is achieved very satisfactorily by using snakes as a tool. The details of educational programmes of Sundarvan are being described in detail elsewhere (Urfi, *in prep*) but briefly, live snake shows are performed at Sundarvan and elsewhere (e.g. schools) coupled with distribution of take-away literature on snakes, film shows and slide-illustrated talks. Sundarvan once tried an innovative programme of doing snake shows in villages in Saurashtra (CEE Annual Report 1987-88) and similar approaches may be tried again. Several popular articles about snakes have appeared (for e.g. Nareshwar, 1997, 1998 b, etc.) and often Sundarvan staff are called to explain the ecology and behaviour of snakes to students engaged in specialized study. The most particular academic activity recently was when students of the National Institute of Design (NID) came to Sundarvan to learn about snakes from the viewpoint of 'design in nature'. A special session was conducted for them, emphasizing form and function of snakes. Several organisations and wildlife film makers have in recent years filmed snake shows and reptiles for their programmes.

Table The list of Sundarvan reptilian exhibits :

Common name	Scientific name
1. Mugger or marsh crocodile	<i>Crocodylus palustris</i>
2. Crowned turtle	<i>Hardella thurgii</i>
3. Indian sawback	<i>Kachuga tecta</i>
4. Starred tortoise	<i>Geochelone elegans</i>
5. Rat snake	<i>Ptyas mucosus</i>
6. Checkered keelback	<i>Xenochrophis piscator</i>
7. Striped keelback	<i>Amphiesma stolata</i>
8. Trinket	<i>Elaphe helena</i>
9. Common wolf snake	<i>Lycodon aulicus</i>
10. Red sand boa	<i>Eryx johni</i>
11. Common sand boa	<i>Eryx conicus</i>



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12. Indian cobra
13. Common Indian krait
14. Saw scaled viper
15. Russell's viper
16. Indian rock python
17. Common Indian monitor

Naja naja
Bungarus caeruleus
Echis carinatus
Daboia russelli
Python molurus
Varanus bengalensis

Note: Sundarvan's reptile exhibits are those faunal types which are confined to North Gujarat and Saurashtra. Captive animals are fed periodically, using favourable prey species such as rats, guinea pigs, rabbits and chicken.

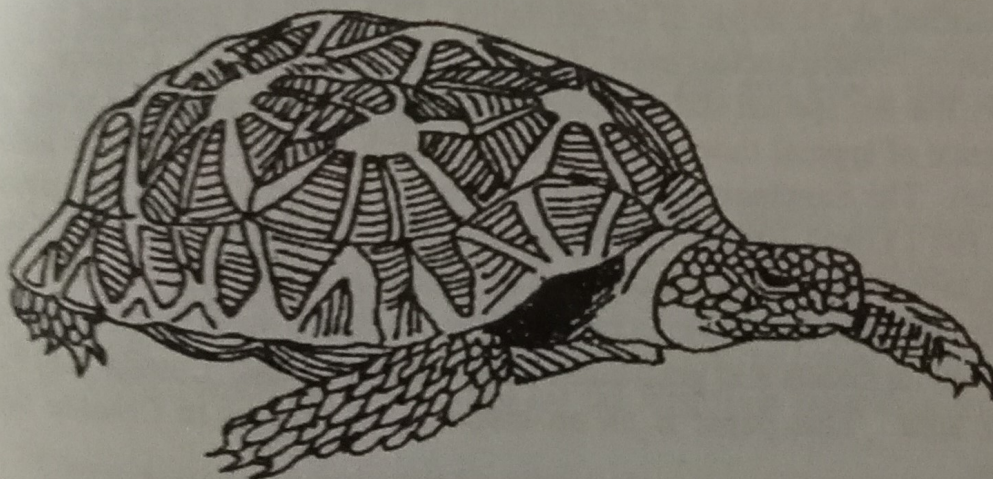
Acknowledgements

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AN INVENTORY OF REPTILE FAUNA IN CHINNAR WILDLIFE SANCTUARY, IDUKKI DISTRICT, KERALA

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Information on the biological features of an area such as uniqueness and richness are important criteria for identifying the viability of the area for long term conservation. The lower vertebrates, especially the herpetofauna could be one of the best indicators for an evaluation of the area for conservation. However, studies on Indian reptiles are rather scant and the major explorations made date back to the pre-independence period. Western Ghats and Eastern Himalayas have been identified as the abode of herpetofauna. Distribution, status and ecology of many of them remain unclear even in most of the explored areas. Chinnar Wildlife Sanctuary has the special status, compared to other sanctuaries in Kerala, due to the presence of typical thorny scrub forest, which provides congenial habitat to the reptiles. The Sanctuary is located between 77°5' and 77° 17'E longitude and between 10° 15' and 10° 21'N latitude. It is about 90 Sq Km in extent and is a part of a larger landscape encompassing Protected Areas and Reserve Forests. Altitudinal variations in the area result in dry deciduous scrub in the low elevation areas and shola forests and grasslands in the upper reaches. Chinnar and Pambar drain the area. This paper is on an inventory of reptiles in Chinnar Wildlife Sanctuary.

The entire Sanctuary was visited for two years (1997-1998) in different seasons and surveys conducted. All the possible microhabitats were thoroughly searched. The observed specimens were identified with the help of manuals and Fauna volumes (Smith, 1933, 1935, 1943; Tikader and Sharma, 1992; Daniel, 1983).



Fifty-one species of reptiles belonging to thirteen families were recorded from Chinnar Wildlife Sanctuary (Table 1)

Two tortoises, the Indian pond terrapin, *Melanochelys trijuga* and the starred tortoise, *Geochelone elegans* are represented in the area. Jayson (1993) first reported the latter from the area and in Kerala, it is restricted to Chinnar wildlife sanctuary.

Chamaeleo zeylanicus, *Calotes versicolor*, *C. calotes*, *Hemidactylus frenatus* and *H. triedrus* are common species observed in almost all habitats. *Cnemaspis kandianus* was recorded from shola forests and grasslands. Though this species is considered as rare, recent reports indicate its occurrence in more areas (Murthy, 1983; Thomas and Easa, 1997; Thomas *et al.*, 1997; Easa, 1998)

The ophidian fauna is represented by twenty-nine species of snakes belonging to the families typhlopidae, uropeltidae, boidae, colubridae and viperidae. *Ramphotyphlops braminus* and *Rhinotyphlops acutus* were common. The former is a widely distributed species reported as abundant (Murthy, 1990). *Rhinotyphlops acutus* is considered as rare known from only two specimens collected from Calicut and Trichur in Kerala (Murthy, 1990). The present finding extends its range. *Typhlops porrectus* was first described from Bengal and later reported from Bangalore and Travancore in South India (Smith 1943). *Typhlops thurstoni* is known only from the four specimens deposited in ZSI and hence this record is significant in terms of its conservation value.

Python molurus, *Elaphe helena*, *Dendralaphis trisitis*, *Lycodon aulicus*, *Xenochrophis piscator*, *Amphiesma stolata*, *Macropisthodon plumbicolor*, *Eryx conicus*, *Boiga trigonata*, *Ahaetulla nasuta*, *A. dispar*, *Vipera russelli*, *Echis carinatus* and *Naja naja* are common occurring widely in the Indian sub-continent. Jahas *et al.*, (1996) reported *E. carinatus* for the first time from this area.

Chrysopelea ornata, the golden tree snake was recorded in Kerala from Periyar (Mukherjee, 1985), Wayanad (Thomas *et al.*, 1997) and Parambikulam (Radhakrishnan, 1996). *Macropisthodon plumbicolor*, though reported to be common is so far recorded from Kerala only from New Amarambalam (Murthy, 1990) and Parambikulam (Radhakrishnan, 1996). The present observation indicates wider distribution. *Sibynophis subpunctatus*, originally described from Sri Lanka

was later reported from Maharashtra, Madhya Pradesh and West Bengal (Murthy, 1990). Murthy (1983) reported it from Upper Aliyar in Tamil Nadu. The occurrence in Chinnar extends its range further.

Chinnar Wildlife Sanctuary with varied microhabitats is an abode of reptilian fauna. The area is comparatively the richest in Kerala in terms of the number of species.

Table.1. List of reptiles recorded from Chinnar Wildlife Sanctuary.

Testudinidae

1. *Geochelone elegans* (Schoepff)

Emydidae

2. *Melanochelys trijuga* (Schweigger)

Gekkonidae

3. *Cnemaspis kandianus* (Keelart)
4. *Cnemaspis gracilis* (Beddome)
5. *Geckoella collegalensis* (Beddome)
6. *Hemidactylus frenatus* (Dum. & Bibr.)
7. *Hemidactylus leschenaulti* (Dum & Bibr.)
8. *Hemidactylus triedrus* (Daudin)
9. *Hemidactylus subtriedrus* Jerdon

Agamidae

10. *Calotes calotes* (Linnaeus)
11. *Calotes versicolor* (Daudin)
12. *Draco dussumieri* (Dum. & Bibr.)
13. *Psammophilus blanfordianus* (Gray)
14. *Psammophilus dorsalis* (Gray)

Chamaeleonidae

15. *Chamaeleo zeylanicus laurenti*

Scincidae

16. *Mabuya macularius* (Blyth)
17. *Mabuya carinata* (Schneider)
18. *Mabuya bibronii* (Gray)
19. *Riopa punctata* (Linnaeus)
20. *Ophisops leschenaultii* (Milne-Edwards)
21. *Ristella rurkii* Gray

Varanidae

22. *Varanus bengalensis* Daudin

Typhlopidae

23. *Ramphotyphlops braminus* (Daudin)
24. *Rhinotyphlops acutus* (Dum. & Bibr.)
25. *Typhlops porrectus stoliczka*
26. *Typhlops thurstoni* Boettger

Uropeltidae

27. *Uropeltis ellioti* (Gray)

Boidae

28. *Python molurus* (Linnaeus)
29. *Eryx conicus* (Schneider)

Colubridae

30. *Atretium schistosum* (Daudin)
31. *Elaphe helena* (Daudin)
32. *Ptyas mucosus* (Linnaeus)

33. *Dendralaphis tristis*(Daudin)
34. *Lycodon aulicus* (Linnaeus)
35. *Xenochrophis piscator* (Schneider)
36. *Chrysopelea ornata* (Shaw)
37. *Amphiesma stolata* (Linnaeus)
38. *Amphiesma beddomei* (Gunther)
39. *Macropisthodon plumbicolor* (Cantor)
40. *Oligodon arnensis*(Shaw)
41. *Oligodon taeniolatus* (Gunther)
42. *Boiga trigonatus* (Schneider)
43. *Ahaetulla dispar* (Gunther)
44. *Ahaetulla nasutus* (Andersson)
45. *Sibynophis subpunctatus*(Dum.,Bibr.&Dum)

Elapidae

46. *Naja naja* (Linnaeus)
47. *Bungarus caeruleus* (Schneider)

Viperidae

48. *Daboia russelli* (Shaw)
49. *Echis carinatus* (Schneider)
50. *Trimeresurus macrolepis* Beddome
51. *Trimeresurus malabaricus* (Jerdon)

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STATUS OF REPTILES IN INDIA

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There are about 3,000 species of lizards, 2,700 snakes, 243 turtles and 25 crocodiles in the world. Out of this, 151 lizards, 262 snakes, 32 turtles and 3 crocodiles are distributed in India in a wide variety of habitats. These fascinating reptiles are objects of fear and subject of worship in India from time immemorial. All snakes are dreaded and killed. This "ophio phobia" may be a product of human evolution and has to some extent proved an impediment in our conservation efforts as the lay public may not see any reason to conserve reptiles.

The inadequate knowledge of their status and life history is also a problem in conserving reptiles and their ecosystem. The available data on status basically reflect the individualistic, personal opinions of the workers without much scientific study.

Conservation aspects of reptiles gained prominence in 1970. The Govt. of India listed some species as protected under the Wildlife (Protection) Act (1972) mainly in the context of the threat posed by the skin trade. Due to their rarity, a few freshwater turtles were also protected. IUCN also included python, saltwater crocodile, gharial, desert monitor and batagur turtle as endangered animals from the Indian subcontinent in the Red Data Book.

Earlier reports stated that all the three species of crocodiles were abundant in their natural habitats. The gharial was found throughout the Gangetic and Mahanadi River systems. The salt water crocodile formerly occurred abundantly in suitable coastal habitats from Cochin in West India round the Peninsula and up to East Coast of Bangladesh. The mugger's distribution was also very wide and throughout India.

Extensive hunting for skin and habitat destruction made these crocodiles rare. In 1975, Govt. of India initiated a project on crocodiles based on the report of the FAO expert H.R. Bustard and an independent report by the Madras Snake Park on gharial. These reports revealed the real status of crocodiles in 1974, i.e. 5 gharials in Mahanadi system, 128 in Uttar Pradesh, Madhya Pradesh



and Rajasthan river systems. The salt water crocodiles became extinct in south India. A small population existed in Bhitar Kanika of Orissa. The status of the mugger was much more difficult to assess due to its extensive distribution. However reports revealed that they were depleted in numbers and the species was declared to be rare.

As a result of the active implementation of the project, by 1991, 1000 mugger were raised from eggs in captivity and released. In 1977 and 1981, 26 and 177 gharials were also respectively released. In 1982, 125 saltwater crocodiles were introduced in Bhitar Kanika.

Regular monitoring, research and creation of sanctuaries have raised the stock of Indian crocodiles to 10,000 both in the wild and in captivity.

As a result of intensive protection, and release of hatchlings from hatcheries to wild undertaken by various government and non-governmental organisations, the 5 species of marine turtles were saved from extinction in 1970. The Central Marine Fisheries Research Institute played a major role in their conservation.

A status study of fresh water turtles of India was made in 1983 by Edward Moll. Subsequent reports on the status of turtles published regionwise have emphasised need for more information on status and need for conservation which prompted the Wildlife Institute of India to initiate a project, on status and conservation of turtles and tortoises (Bhupathy and Choudry). The endangered *Heosemys sylvatica* (Cochin Forest Cane Turtle) was sighted, in Kerala, and *Batagur baska* has a captive stock and a few populations in the Sundarbans.

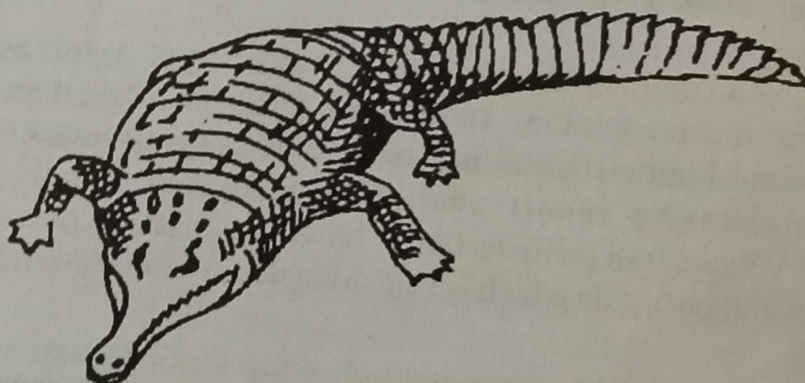
In contrast, the status and distribution of lizards and snakes have not received much attention. Information available is based on the impressions of individual biologists and not substantiated by documented facts. The only comprehensive report available on snakes namely uropeltids is by Dr.M.V.Rajendran published in 1972. He emphasized the need for conservation of this unique family which is vanishing due to habitat destruction in the Western Ghats.

Reports on other groups of reptiles are not comprehensive and are scattered. Most of the species may appear rare because proper surveys have not

been made on their ecological niches or habitats. Most of the published accounts deal with the taxonomic aspects only. On the whole, a review of literature does not provide a critical assessment of the status of reptiles and serves only to emphasise the lacunae in our knowledge on their status and biology.

The principal cause for the decline of reptile populations in India is identified as habitat destruction/alteration, which results in elimination of both animals and the ecosystem. Habitat fragmentation reduces population size and results in potential loss of genetic diversity. Single species management in forestry and wildlife and clear felling affect the narrow niche of reptiles severely. Forest fire, burning of ground vegetation and grazing of cattle causes great disturbance to ground cover and leads to decimation of reptiles. Collecting specimen for biological purposes and trade may also contribute to the population decline.

Various toxic chemicals are used in agriculture and forestry practices. The possible effect of these toxins on reptile populations have not been studied. It has been established that the toxic materials play a role in population depletion of birds. This could be equally true of reptiles also. To sum up, it is felt that there is need to collect more data on the status of various species of reptiles along with their life histories.



A STRANGE FEEDING HABIT OF *CALOTES VERSICOLOR*

The garden lizard (*Calotes versicolor*) is mainly insectivorous and feeds on a wide variety of insects. Other than insects, they occasionally feed on frogs, birds and small mammals (Daniel, 1983). The garden lizard rarely feeds on vegetable matter also (Daniel and Shull, 1963; Sekar, 1988; Sharma, 1994). Sharma (1991 & 1999) reported that it fed on gecko and wolf snake. Incidence of cannibalism was reported by Sharma (1991).

An adult male calotes fell into the enclosure where three green iguanas were kept for exhibition at the Chennai Snake Park.. Unable to escape, it started moving within the enclosure. It was later noticed that the calotes fed on the fresh excreta of the green iguana. (Green iguanas feed only on vegetable matter).

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RANDOM HARVEST

Gujarat goes jurassic

A four-member Mumbai-based team of the Oil and Natural Gases Commission has unearthed fossil remains of the oldest known dinosaurs in India at Kaur Bet in the Kutch region of Gujarat. These are believed to belong to the middle jurassic period around 178 million years ago.

(Source: *The Hindu Business Line*. 22.9.99)

Landmark

A 15-centimetre-long lizard-like animal named *Casineria kiddi* whose fossilised skeletal fragments minus the head were found in an ancient scottish lake-bed may have been one of the first creatures to live on dry land. It dates back to almost 340 million years, a period about which little is known.

(Source: *The New Indian Express*. 17.8.99)

Bigmouth

How the amazingly stretchable jaws of snakes evolved from the inflexible jaws of their lizard ancestors has been a puzzle. Now, an intermediate stage in the evolution of a stretchable jaw has at last been identified in the mosasaurs, an extinct marine lizard in the Late Cretaceous seas around 100 million years ago. The discovery has been made by Michael S.Y. Lee from the University of Queensland and his colleagues who have written about it in a recent issue of *Nature*. Unlike all other known lizards, fossil or living, the mosasaur had highly flexible lower jaws like snakes and long teeth on the palate for gripping it's prey. But it retained the immobile upper jaw typical of a lizard.

(Source: *The Hindu*. 19.8.99)

AIMS AND OBJECTIVES OF CHENNAI SNAKE PARK TRUST

- i) To maintain and display a captive collection of snakes and other reptiles as a means of education of the public.
- ii) To undertake captive breeding of vulnerable species of snakes and other reptiles.
- iii) To promote knowledge on snakes, and other reptiles and amphibians and dispel the erroneous beliefs about them.
- iv) To aid and assist research on reptiles and amphibians.
- v) To provide facilities for the identification and classification of snakes and other reptiles and amphibians and, for this purpose, maintain a museum of study collections.
- vi) To maintain a library of books and other literature on reptiles and amphibians
- vii) To publish scientific and semi- scientific literature on snakes and other reptiles and amphibians.
- viii) To undertake survey on the distribution and status of snakes and other reptiles and amphibians.
- ix) To provide consultancy services on snakes and other reptiles.
- x) To provide a common forum for interaction among amateur scientists and friends of reptiles and amphibians.