Cobra

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CHENNAI SNAKE PARK TRUST

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Editor:

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Cover

Mozambique spitting cobra (*Naja mossambica*) See Pp. 1-5

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"I love discovering some of the ordinary miracles that surround us each day, especially at dawn, a luminous time before all the weight of the world has chance to settle on one's shoulders".

– Diane Ackerman

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.

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Cobra, the quarterly journal of the Chennai Snake Park Trust, invites articles and notes on reptiles and amphibians, their ecology, biology, natural history, conservation or other aspects. These may be of scientific or popular interest. Black and white photographs are also welcome.

All manuscripts must be sent in hard copy or on a 3½' floppy disk, CD-Rom to the Editor, *Cobra*, Chennai Snake Park Trust, Rajbhavan Post, Chennai – 600 022. Or through email to cspt1972@md5.vsnl.net.in

ARE THERE SPITTING COBRAS IN INDIA?

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There is a general belief that there are no spitting cobras in India. This may not be wholly true even though sufficient authentic information is not forthcoming.

Eight species of spitting cobras are found in Africa. These include the rinkhals, (*Hemachatus haemachatus*), the black-necked spitting cobra (*Naja nigricollis*), the Mozambique spitting cobra (*N. mossambica*), the red spitting cobra (*N. pallida*), the Nubian spitting cobra (*N. Nubiae*) and the West African brown spitting cobra (*N. katiensis*). These have specially adapted fangs that make it possible for the snake to eject its venom in a stream for a distance of upto 10 ft. and directed at the eyes of the victim. Spitting cobras are also found in some of the Southeast Asian countries. But are there spitting cobras in India too? The evidence available is not very helpful either way.

Four species of cobra are known to occur in India: the spectacled cobra (*Naja naja*) found throughout mainland India, the monocled cobra (*N. kaouthia*) confined to parts of North and Northeast India, the Central Asian cobra (*N. oxiana*) with authenticated records* only from Jammu & Kashmir and Himachal Pradesh (probably, Punjab also) and the Andaman cobra (*N. sagittifera*) endemic to the Andaman islands. Till recently, all these were reckoned as subspecies of *Naja naja* but have now each been given specific status (Wuster W. (1998) *Hamadryad* 23(1): 15-32.)

* Sighting or capture of the spectacled cobra *(N. naja)* black in colour and with indistinct or no hoodmarkings is sometimes reported from different parts of India outside the confirmed range of *N. oxiana*. In the absence of a study of scalation and dentition, such snakes are often readily misidentified as black cobra (*N. oxiana*). In fact, even as regards colour, *N. oxiana*, properly called Central Asian cobra, is "very rarely black" (Whitaker & Captain, 2004). Its usual colour is various shades of brown above and paler underside.

P.E.P. Deraniyagala, in papers published in *Spolia Zeylanica,* 24(1945) and 29 (1960 and 1961) distinguished between two subspecies of *Naja naja*, *N. naja naja* in Sri Lanka and *N. n. madrasiensis* in Southern India based on his observation that the Sri Lankan population have more dark ventral bands than the S. Indian population and they have fangs adapted for spitting venom. In *Herpetologica*, 48 (1), 1962, 69-85, Wuster and Thorpe disputed this and found that "in fact, the Sri Lankan cobras, like all populations of *N. naja,* have non-spitting fangs" and that despite the presence of a higher number of dark ventral bands than the Indian specimens, there is no major differentiation in the over-all phenotype and the taxonomic distinction between the two populations is not valid.

Whitaker in his *Common Indian Snakes* (1978) stated that "cobras in Northeastern India spray their venom for a shorter distance," that is, compared to the African species. Though he did not say which species in Northeastern India, the reference presumably was to *N. kaouthia.*

In *Herpetologica* 56(2), 2000, Slowinski and Wuster reported the discovery of a new species of spitting cobra of the genus *Naja* from Central Myanmar (Burma). DNA analysis showed that the new species is very closely related to the Thai spitting cobra (*N. siamensis*). Named *N. mandalayensis,* the species is apparently endemic to central Myanmar. It was observed that the snake readily spits venom, that the venom is expelled in two streams of tiny droplets with an effective range of at least 6 ft. In the course of this paper, the authors spoke of two cobra specimens in the collections of the Bombay Natural History Society from Bihar which were briefly discussed earlier by Wuster and Thorpe in *Herpetologica* 48: 1992 (69-85) who noted that they do not correspond to either *N. naja* or *N. kaouthia.* On a later re-examination of data, Wuster "found them to be similar in many ways to *N. mandalayensis* including fangs modified for spitting." Slowinski and Wuster added in their paper in *Herpetologica* 56 (2): 2000 "However, without tissues for molecular analysis and further specimens, it is not possible to allocate them to *N. mandalayensis* or to any other named *Naja".* They, however, proceeded to hazard a guess that "an undescribed spitting cobra, possibly closely related to or conspecific with *N. mandalayensis*, occurs in Northeast India". (Bihar is not Northeast India. Whether they meant Bihar or Northeast India or both is not clear).

Indraneil Das in his *Snakes and Other Reptiles of India* published in 2002, says that "some populations [of *N. kaouthia*] are capable of spitting their ... venom". And, as recently as 2004, Whitaker and Captain (*Snakes of India : The Fieldguide*) say with

regard to *N. kaouthia*: "Fangs [are] somewhat adapted for spitting, though records of them doing so are rare."

Much earlier, Malcolm Smith had said in his volume on *serpentes* (1943) in the *Fauna of British India* series about cobras in the Indian subcontinent in general without distinguishing between the different species, which distinction then existed only at the sub-specific level: "... it can eject or 'spit' its poison for a distance of at least three feet and with considerable accuracy". Whether his observation was based only on *N. kaouthia* or any of the other species is not clear.

There is an observation in Stidworthy, (1974) *Snakes of the World,* 96-113, that "a few Indian cobras have developed the additional defence of spitting venom for a short distance." Since no details are given, this cannot be discussed.

The following anecdotal accounts of spitting in Indian cobras will be of interest.

In the *Journal of the Bombay Natural History Society,* Vol. XIII (1900 - 1901), p.376, one Capt. M.D.Goring Jones reported a small black cobra 3'4" in length at Mandalay lunging at one Lt. Gibson who was bending down near the snake. It ejected venom into his eye causing much swelling and pain. The same incident is reported in F.Wall, *Snakes of Ceylon* (1921) P.466 and Loveridge, (1974) *Reptiles of the Pacific World,* p.148.

Wall in his *Snakes of Ceylon* (1921) P.466 says: "A hospital assistant of mine, whilst trying to dislodge a cobra that had taken refuge in the wall of his garden, had a jet of poison ejected into his face. Mr. Kinnear [of the Bombay Natural History Society]* tells me that in our Society's rooms it is a matter of common observation that cobras 'spit' at spectators and leave a spray on the glass".

These accounts do not mention the particular species since, as already stated, all species of Indian cobras (and even those in neighbouring countries) were until recently grouped together under *Naja naja.* But, based on subsequent knowledge, we may infer that the cobra reported from Mandalay by Capt. Goring Jones was *N. mandalayensis*

* Sir Norman Boyd Kinnear (1882 - 1957) joined tha Bombay Natural History Society as its first stipendiary Curator in 1907. He was greatly responsible for organizing the museum of collections in the Society. He joined the British Museum (Natural History) in 1920 and retired from the service as Director of the Museum.

which, it is now confirmed, does spit venom. We do not know whether the cobra confronted by the hospital assistant of Wall and the cobras in the Bombay Natural History Society referred to by Kinnear were *Naja naja* or *Naja kaouthia* or any other species. *Naja naja* is well-known all over India and is a common resident of many zoos in India for many many years and I doubt whether the reported behaviour has been noticed by anyone in the case of this snake except, may be, very occasionally and, that too, only in the manner stated by Wall and J.C.Daniel (see below). If the cobras mentioned were *N. kaouthia,* then the accounts are understandable notwithstanding that the reported mention by Kinnear of spitting being "a matter of common observation" in the Society's rooms seems to be a little bit of an exaggeration or a casual choice of words.

Wall also refers to "one variety of our Indian cobra" which Boie had named *sputatrix* (spitter). The use of the name 'Indian cobra' should not lead to the mistaken assumption that it was a cobra from India. The snake named by Boie in 1827 as *sputatrix* is the Southern Indonesian spitting cobra (*N. kaouthia sputatrix,* now re-named *N. sputatrix*) and occurs in Southern Malaya, Indonesia, Sumatra, Borneo and Komodo.

As for *N. naja,* the truth of the matter seems to be slightly different. Wall says (*ibid*): "I believe the venom ejected is shaken off the fangs, and carried forward by the vehemence of the thrust. In some instances, however, where a shower of spray is reported, it is more probably caused by the explosive expiratory blasts from the glottis, which occur while the snake is hissing ..." Wall, however, is in the wrong in attributing the venom-spitting of African cobras also to a similar process. In other words, he failed to see the distinction in this regard between the African cobras and *N. naja.*

J.C.Daniel says in his *Book of Indian Reptiles and Amphibians* (2002): "Occasionally when [*N. naja*] misses, the poison is ejected as a spray by the forceful thrust of the lunging snake".

What Wall and Daniel have described is not the same as 'spitting' and is more in the nature of a person, while speaking excitedly, involuntarily spraying spittle from his salivary glands (the morphological equivalent of venom glands in snakes). 'Spitting' will imply intent, forcible ejection and aim and will need specially adapted fangs which *N. naja* does not have and *N. kaouthia* has only partially and the African and the Southeast Asian spitting cobras have fully. The fang adaptation for 'spitting' has been described by Fitzsimons, (1962) *Snakes of Southern Africa* P.272: "In ordinary cobras

[i.e. 'non-spitters'], the venom is ejected through a slit-like opening near the tip of the fang, but in the 'spitters', the discharge opening is about midway up the fang, is smaller and more circular, while the inner tube or venom canal has an elbow just inside the orifice, so that the ejected venom is directed straight out at right angles to the plane of the fang". The spitting cobra directs the twin jets of venom outward and upward as it leaves the fang orifices. The forcible ejection of venom from the fangs is further assisted by a hissing which serves to spray the venom for a distance of upto 10 ft.

'Spitting' is a defensive behaviour and it does not kill the prey. If the cytotoxic venom hits the eye, it causes intense pain, temporary blindness and corneal damage that can lead to permanent blindness. But spitting cobras can bite and envenomate their victim just as other cobras do.

Some of the spitting cobras, e.g. *N. nigricollis* and *N. mossambica,* do not always 'hood' before spitting. *N. mossambica* is known even to lie on its back and spit (Mark O' Shea : *Venomous Snakes of the World* (2005). Mark O' Shea also says that "some populations of spitters are reluctant to spit and it is easy to be caught unawares by a Southeast Asian cobra that has never spat before".

It is not known whether there has been any further discussion on the observations made in 2000 by Wuster and Thorpe in their paper in *Herpetologica* 56 (2) on the presence of spitting cobras in India. The questions remain: Is *Naja kaoutia* capable of spitting venom and, if so, how often and how effectively does it do so? Could there be a hitherto unknown species of cobra in Bihar or any part of Northeast India capable of spitting venom in the manner of *N. mandalayensis*, an acknowledged Asian spitting cobra and the one nearest to India?

We will do well to remember in this context that we still do not know enough of the wildlife of Northeast India, arguably the richest biodiversity area of India. This is for reasons such as inaccessibility of terrain, the incidence of insurgency and so on. The discoveries in recent times of even large mammals such as the Arunachal macaque (*Macaca munzala*) and the Tibetan macaque (*M. thibetana*) in Arunachal Pradesh would indicate the possibility of many as yet unknown species of snakes being present in Northeast India which could escape detection far more easily than mammals and birds.

A STUDY ON REPTILES IN MUDUMALAI WILDLIFE SANCTUARY, NILGIRI BIOSPHERE RESERVE, TAMIL NADU

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Mudumalai Wildlife Sanctuary is one of the most popular Wildlife Sanctuaries in India. It lies between 11°30′ and 11°31′N and 76° 27′ and 76° 43′ E at the trijunction of three states, namely, Tamil Nadu, Karnataka and Kerala. The total area of the Sanctuary is 321.5 km^2 and it is bounded on the north by the Bandipur Tiger Reserve of Karnataka, on the west by the Wyanad Wildlife Sanctuary of Kerala and on the south and east by private cultivated lands and coffee and tea plantations of Tamil Nadu. This sanctuary with the neighbouring wildlife sanctuaries, national parks and reserve forests form a contiguous forest complex supporting a good population of the larger mammals like elephant, bison, tiger, leopard and a variety of birds and other wild animals. In spite of the rich biodiversity in the Sanctuary, studies have mainly been carried out only on the larger animals such as elephants and other mammals (Desai, 1991; Sivaganesan, 1991; Daniel *et al.* 1995 and Baskaran and Desai, 1996) and on birds. The reptiles of Mudumalai Wildlife Sanctuary have been the least studied among the vertebrates and such studies as there are have not gone beyond listing the reptiles (Bhupathy and Kannan, 1997, Kalaiarasan, 2000 and Murthy, 2001).

The distribution of reptiles in the Mudumalai Wildlife Sanctuary during a survey carried out from July to September 2002.

Method

Field surveys were conducted between 0600 and 1200 hrs and 1600 and 1800 hrs. All major forest types such as southern tropical thorn forest, tropical dry deciduous forest, tropical moist deciduous forest and tropical semi-evergreen forest, marshy swamps, riparian and aquatic vegetation were surveyed. Two methods were used for data collection, namely, visual encounter survey and quadrat sampling.

Visual Encounter Survey: This method involved searching for reptiles in an area or habitat (Cambell and Christman, 1982), and recording all animals visible on the surface (Corn and Bury, 1990).

Quadrat Sampling: 25X25 m plots were laid out in various habitats and the area searched (Campbell and Christman, 1982). On locating a reptile, several parameters such as species, area, forest type, altitude, location of the reptile above the ground and substratum such as tree trunk, ground and rock were recorded.

Results and discussion

Based on the visual encounter survey and quadrat sampling, a total of 42 species of reptiles under 12 families were recorded that includes one (2%) crocodile, four (10%) turtles and tortoises, 16 (38%) lizards and 21 (50%) snakes (Table 1). Of these Large-scaled forest lizard (*Calotes grandisquamis*), Nilgiri forest lizard (*Calotes nemoricola*), Western Ghats flying lizard (*Draco dussumieri*), Hump-nosed pitviper (*Hypnale hypnale*) are endemic to the Western Ghats (Swenegal, 1990). The endangered species such as Marsh crocodile (*Crocodylus palustris*), Bengal monitor (*Varanus bengalensis*), Indian flapshell turtle (*Lissemys punctata*), Indian rock python (*Python molurus molurus*) were also recorded. Species such as the Indian day gecko (*Cnemaspis indica*), Roux's forest lizard (*Calotes rouxii*), Indian garden lizard (*Calotes versicolor*), Southern Indian rock agama (*Psammophilus dorsalis*) and Keeled grass skink (*Mabuya carinata*) were sighted frequently in the scrub jungle and dry and moist deciduous forests. Snakes were mostly seen in the riverine forest along the road sides.

Altitudinal distribution of reptiles

Mudumalai has an undulating terrain and its elevation varies between 900-1,200 m above msl. The medium altitudinal categories 900-1000 m had highest species diversity and this altitude range was dominated by the marsh crocodile, three species of turtles, a tortoise, a gecko, two agamid lizards, a skink, a chamaeleon, bengal monitor 11 nonpoisonous and five poisonous snakes. The higher altitude witnessed two species of pit vipers. Encounter rate of reptiles decreased considerably from dry to wet forest types. This decrease may be due to the abundance of a few generalist species such as *Calotes versicolor, Mabuya carinata* and *Psammophiulus dorsalis* in the dry forests.

Scope

Further and more intensive explorations may yield a good number of reptilian fauna in Mudumalai Wildlife Sanctuary. The available reports on reptiles are all only short term studies. It is suggested to have a long term project with adequate man power and expertise in view of the biodiversity in the Sanctuary.

Table 1. List of reptiles recorded in Mudumalai Wildlife Sanctuary

Class	**:**	**Reptilia**	
Order	**:**	**Crocodylia**	
Family	**:**	**Crocodylidae**	
1.		*Crocodylus palustris* Lesson	- Marsh crocodile
Order	**:**	**Testudines**	
Family	**:**	**Bataguridae**	
2.		*Melanochelys trijuga* Schweigger	- Indian black turtle
Family	**:**	**Testudinidae**	
3.		*Geochelone elegans* Schoepff	- Indian star tortoise
Family	**:**	**Trionychidae**	
4.		*Lissemys punctata* Bonnaterre	- Indian flapshell turtle
5.		*Aspideretes leithii* Gray	- Leith's softshell turtle

Order : Squamata
Sub order : Sauria
Family : Agamidae

6. *Calotes calotes* (Linnaeus) - Green forest lizard
7. *Calote grandisquamis* Gunther - Large-scaled forest lizard
8. *Calotes rouxii* Dum. & Bibr. - Roux's forest lizard
9. *Calotes versicolor* (Daudin) - Indian garden lizard
10. *Calotes nemoricola* Jerdon - Nilgiri forest lizard
11. *Draco dussumieri* Dum. & Bibr. - Western Ghats flying lizard
12. *Psammophilus dorsalis* (Gray) - Southern Indian rock agama

Family : Chamaeleonidae

13. *Chamaeleo zeylanicus* Laurenti - South Asian chamaeleon

Family : Gekkonidae

14. *Cnemaspis indica* (Gray) - Indian day gecko
15. *Hemidactylus brookii* Gray - Brooke's house gecko
16. *Hemidactylus leschenaultii* Dum. & Bibr. - Bark gecko
17. *Hemidactylus frenatus* Dum. & Bibr. - Asian house gecko

Family : Scincidae

18. *Mabuya carinata* Schneider - Keeled grass skink
19. *Mabuya macularia* Blyth - Bronze grass skink
20. *Riopa punctata* Gmelin - Snake skink

Family : Varanidae

21. *Varanus bengalensis* (Daudin) - Bengal monitor

Order : Squamata
Sub order : Serpentes
Family : Typhlopidae

22. *Ramphotyphlops braminus* (Daudin) - Brahminy worm snake

Family : Pythonidae

23. *Python molurus molurus* (Linnaeus) - Indian rock python

Family	**:**	**Boidae**
24.	*Gongylophis conicus* (Schneider)	- Common sand boa
25.	*Eryx johnii* (Russel)	- Red sand boa
Family	**:**	**Colubridae**
26.	*Ahaetulla nasuta* (Anderson)	- Common vine snake
27.	*Amphiesma stolatum* (Linnaeus)	- Striped keelback
28.	*Amphiesma beddomei* Gunther	- Beddome's keelback
29.	*Atretium schistosum* (Daudin)	- Olive keelback
30.	*Chrysopelea ornata* (Shaw)	- Ornate flying snake*
31.	*Dendrelaphis tristis* (Daudin)	- Common bronze back tree snake
32.	*Macropisthodon plumbicolor*	- Green keelback
33.	*Oligodon ornensis* (Shaw)	- Common kukri snake
34.	*Ptyas mucosa* (Linnaeus)	- Indian rat snake
35.	*Xenochrophis piscator* (Schneider)	- Checkered keelback
Family	**:**	**Elapidae**
36.	*Bungarus caeruleus* (Schneider)	- Common krait
37.	*Naja naja* (Linnaeus)	- Spectacled cobra
38.	*Calliophis nigrescens* Gunther	- Striped coral snake *
Family	**:**	**Viperidae**
39.	*Echis carinatus* (Schneider)	- Saw scaled Viper
40.	*Daboia russelii* (Shaw & Nodder)	- Russell's Viper
41.	*Trimeresurus malabaricus* (Jerdon)	- Malabar pit viper
42.	*Hypnale hypnale* Merrem	- Hump-nosed pit viper

* First reports for Mudumalai Wildlife Sanctuary.

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A CASE HISTORY OF AILMENTS IN ALDABRA TORTOISE (*Geochelone gigantea* SCHWEIGGER) IN CHENNAI SNAKE PARK

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The varied artificial habitats created for the captive housing and display of reptiles may often contribute to high incidence of diseases and injuries.

The successful maintenance of tortoises in captivity poses many challenges. It is fair to say that with their special environmental and dietary requirements, tortoises are, in fact, one of the more difficult reptiles to manage. This article describes the recent ailments of an Aldabra tortoise in Chennai Snake Park.

Chennai Snake Park has been keeping one male Aldabra tortoise (*Geochelone gigantea*), weighing about 150 kg in an open enclosure. Its exact age is not known. However, it may be mentioned that it was received by the Snake Park from the Republic of Seychelles in 1979 as a full grown animal.

On 14.05.2005, the animal keeper in charge of the Aldabra tortoise reported that the tortoise was not moving about. On examination, it was found that it was unable to rise on its forelegs. There was no swelling in the forelegs.

Prior to 14.05.2005, the Aldabra was being provided with 2½ kg of mixed vegetables and fruits (apple, guava, papaya, green leaves, ladies finger, carrot, cucumber, cabbage, tomato and cowpea) on Sundays, Wednesdays and Fridays. On alternative days i.e. on Mondays, Thursdays and Saturdays it was provided with one dozen bananas and two boiled eggs. On Tuesdays the tortoise used to be kept off feed.

From 14.05.2005 onwards it was noticed that its intake of food had considerably diminished. It took only 500 gms of vegetables.

On 15.05.2005 Dr.S.Lakshmanan,Trustee and veterinarian, examined the tortoise. He consulted Dr.Jayathangaraj, Associate Professor, Madras Veterinary College over phone. They suggested application of Iodex cream externally.

On 16.05.2005 Dr.Jayathangaraj examined the tortoise and opined that its condition might be due to pneumonia or arthritis or both. He prescribed following medicines

(1) Enrofloxacine at 5mg/Kg body weight by I/M in forequarters, once in 2 days, for a total of 6 injections
(2) Dexamethasone at rate of 0.2 mg/kg body weight, by I/M in fore quarters, once in 2days for a total of 3 injections.
(3) Meloxicam at rate of 0.2 mg/kg body weight once in 2 days for a total of 5 times, along with Ranitidine at rate of 2 mg/kg body weight of 5 times in all – to be administered orally with palatable feed materials like cucumber and cabbage.

Nasal discharge was collected for further investigation.

The prescribed medicines were given on 17.05.2005, 19.05.2005, 21.05.2005, 24.05.2005 and 26.05.2005. Everyday from 14.05.2005 Iodex cream was applied externally to the forelegs.

In the meantime, from 21.05.2005, in order to increase its appetite, the tortoise was orally given 5ml of Liv. 52 syrup (An Ayurvedic medicine prescribed to promote appetite and growth in humans). There was no improvement in the condition of the tortoise.

On 27.05.2005, Dr.Jayathangaraj examined the tortoise. He suggested Neurobion forte 1.5ml, 2 dosages per week and Ostocalcium syrup daily. Neurobion forte 1.5 ml was administrated intramuscularly on 27.05.2005, 30.05.2005, 3.06.2005 and 5.06.2005. 5 ml of Ostocalcium syrup was administrated orally daily from 27.05.2005 to 30.6.2005. The forelegs were fomented with hot water compress and with hot rice bran bundled up in cloth from 27.05.2005 on alternative days till 10.06.2005.

On 10.6.2005 the tortoise showed a slight improvement. The tortoise took about 750 gms of mixed vegetables. Normal defecation noticed.

Dr. Bindu Raghavan, Veterinarian of the N.G.O., Group for Nature Preservation and Education (GNAPE), examined the tortoise on 3.06.2005 and perused the diet chart.

She suggested a change in diet particularly removal of cabbage, tomato, banana and egg and the rest of the feed given on alternative days only. Dr.M.Senthilkumar, Veterinarian, Aringar Anna Zoological Park, suggested to add radish to the diet. Literature was also consulted. Cabbage, tomato, banana and egg were removed from the diet and radish added from 12.6.2005. Food was offered only on Sunday, Wednesday and Friday.

Nasal discharge sample confirmed the presence of *Staphylococcus aureus*.

On 29.6.2005, the tortoise tried to stand on its legs for a few minutes. The food tray was placed at a distance of about 15 ft. from the usual resting place. The tortoise dragged its body to it and ate the food.

On 30.6.2005 the tortoise walked up to the water trough for a distance of 15 ft. and sat in the water trough.

During the month of July, the condition of the tortoise gradually improved and it fully recovered from the ailments by end of July. From then on it has been moving around in the enclosure and the quantity of intake has become normal.

Stearns (1988) has reported that the Aldabra tortoise is generally very hardy although it is susceptible to respiratory ailments in extreme cold conditions. Such conditions did not exist in this case during the period mentioned.

Highfield (1990) has reported septic arthritis in long term captive tortoises of *Testudo graeca* though its incidence in the wild is unknown. There is a link between this condition and excessively high intakes of dietary protein. This may cause urea to be deposited in the joints and thereby initiate the arthritic condition. But he says that definite proof is lacking. Secondary bacterial infection also is likely in joints incapacitating the animal.

Highfield also refers to two forms of pneumonia observed in chelonia. An acute form, which can manifest rapidly and without very much in the way of advance warning leading to death within hours if untreated and a chronic form which can last many weeks, months or even years. Of the two types the acute form is by far the easiest to treat as it generally responds to readily available antibiotics and even cases in a state of unconsciousness and near death can make almost miraculous recoveries when so treated.

Chronic form may be persistent low level discharge of mucous, mouth may be synoptic. Coughing and wheezing may be audible. There may be a lack of strength and poor retraction. Oropharyngeal cultures will frequently reveal resistant strains of Gram-negative bacteria present (Highfield 1990).

From our observation of the Aldabra tortoise in the Chennai Sake Park it could not be conclusively proved whether the ailment was due to dietary disorder or bacterial infection. However, it is seen that with a change in the diet as described above and also combination of the drugs as listed above, the tortoise was fully cured of its ailment.

Acknowledgements

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DIETARY HABITS OF INDIAN GARDEN LIZARD *Calotes versicolor* (DAUDIN)

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The Indian garden lizard (*Calotes versicolor*) is a common agamid found in all types of biota. Being a common species, the general biology (Mc Cann, 1937) physiology (Oommen 1978, Banerjee 1981, Akbarsha and Balasubramaniam 1982, Akbarsha 1983, 1985, 1985a, Jacob and Oommen, 1990) breeding biology (Goel, 1973, Bhati and Bhati 1985, Pandha and Thapliyal, 1967, 1967a) and behavioural studies (Subba Rao 1974) have been well-documented.

Various reports have been published on the feeding habits of *Calotes versicolor* as follows:

Feed item reported	**Reference**
Insects and their larvae, spiders, etc. Also young birds in the nest.	Smith (1935)
Mainly insectivorous but adds birds' eggs and nestlings also to its diet. Small lizards and small frogs that it can overpower are also eaten. Earthworms and tiny crabs are also taken.	Mc Cann (1937)
A blue throat (*Erithacus svecicus*) and baya (*Ploceus philippinus*).	Pereira (1961)
Eating *lima* bean pods with soft seeds reported.	Daniel and Shull (1963)
The vegetation in the food contents of the lizard. (plant parts of *Dalbergia sissoo, Rose indica, Acacia sp. Gossypium sp. Saccharum munjo, Sorghum, Moras alba, Sestrum nocturnum, Sestrum alba* and flower parts such as *Colotropis procera, Solanum nigrum, S. melongena, Althera rosea, Malverstrum sp.*)	Bhatti *et al.* (1987)

The buds of *Tabarnae montana* and its petals.	Sekar (1988)
A variety of invertebrates especially insects.	Piotr Sura (1989)
Chewing the tender succulent shoots of cowpea *Vigna sinensis*. However it never attempted to swallow the chewed plant materials.	Devasahayam and Anitha Devasahayam (1989)
Calotes versicolor (Cannibalism)	Sharma (1991)
Brook's gecko *Hemidactylus brooki* (1991b).	Sharma (1991a)
Germinating seeds of *Feronia limonia*	Sharma (1994)
Dry mango (*Mangifera indica*) leaf.	Sharma (1998)
Wolf snake (*Lycodon aulicus*) measuring 25 c.m. length.	Sharma (1999)
The fresh excreta of the green iguana (Green iguana feeds only on vegetable matter) in Chennai Snake Park.	Rajarathinam and Kalaiarasan (1999)
Fallen flowers of *Morinda tinctoria* and occasionally flowers of *Cassia marginata.*	Aengals (2000)
Insects, ants forming a large proportion of the food. Small birds nestlings frogs and small animals are also occasionally taken. Sometimes cannibalistic. There is one report of the species feeding on unripe cultivated beans and a report of their chewing on tender shoots of cowpea (*Vigna sinensis*) possibly for its moisture content.	Daniel (2002)

In Chennai Snake Park, ten striped keelback (*Amphiesma stolatum*) babies measuring between 13 c.m. and 17 c.m. (weight 10 gm to 11.5 gm.) hatched out on 1.4.2005. After the first sloughing, the snakes were provided with small crickets, flies and other insects in addition to small frogs. None of the snakes consumed any of the above prey items provided. Since the babies were off-feed for long, and to avoid mortality they were released in a nearby water resource. While they were being released an Indian garden lizard *Calotes versicolor* which was nearby suddenly pounced upon a snake and caught it in its mouth. Within five minutes, the calotes swallowed the snake.

The above review of literature and our own observation clearly indicate that *Calotes versicolor* is not an exclusively insectivorous animal. It is an omnivorous animal having a broad spectrum of diet from plant materials to animal matter such as birds, birds' eggs, lizards and snakes. This partly explains its widespread occurrence in all types of habitats.

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A NOTE ON THE BREEDING BIOLOGY OF AGAMID LIZARDS

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Agamid lizards are distinguished from other groups of lizards by their dentition. They have accordant (rootless) and heterodont (various types of teeth such as incisors, canines and molars) teeth. They are closely related to the iguanas of the New World. Agamids are confined to the old world, and a majority of them are distributed in the oriental region (Smith, 1935) and inhabit most of the habitats from sea level to over 4000 m altitude. In India 49 species of agamids are seen, of which 13 occur in the Western Ghats (Smith, 1935). Eleven out of the 13 species reported by Bhupathy and Kannan (1997) included seven species endemic to the Western Ghats. A few studies are available on the breeding of agamid lizards in the wild (Kannan and Bhupathy 1997, Rathinasabapathy and Gupta 1998, Karthikeyan 1993) but no detailed study on the breeding of this group in captivity is available except a single study by Vyas (1995). The present study provides information on the breeding, courtship behaviour, clutch size, egg laying and egg morphometry of some of the agamids such as the Western Ghats flying lizard *Draco dussumieri,* green forest lizard *Calotes calotes*, Indian garden lizard *Calotes versicolor* and south Indian rock agama *Psammophilus dorsalis* based on observation in the wild as well as in captivity at Chennai Snake Park.

Western Ghats flying lizard (*Draco dussumieri* Dum. & Bibr.)

Two species of Draco are recognized within the Indian limits (Das, 2002). Of these, the Western Ghats flying lizard *Draco dussumieri* is endemic to this hill range. It can be distinguished from other lizards by the presence of prolonged ribs supporting a wing like expansion called petagium and it is capable of making glides between trees with the help of this membrane. On 19th May 2005 we had an opportunity to observe the breeding behaviour of this species while conducting a reptile survey in the evergreen forests in the higher hills at Siruvani in the Nilgiri Biosphere Reserve. We sighted four flying lizards on a fig tree. They were very active on the tree trunk just 5 m above the ground. This was a fruiting tree and a lot of ants and insects were noticed and holes also observed. Around

9.30 am courtship behaviour of this species was observed. A male was maintaining courting territory and bobbing its head and rising on its forelegs and shaking the throat appendage vigorously. A female was also vibrating her gular appendage. This courtship behavior was observed for half an hour.

Three of these lizards (2 males and one female) were collected and released in a cage at Chennai Snake Park on 21st May 2005. The average morphometric measurements of these three lizards are as follows: Snout vent length 18.4 cm, tail length 19.8 cm, head length 1.3 cm and width 8 c.m. The enclosure was 123 cm height and 70 cm width a branch of a tree was fixed inside for the easy movement of the animals. The floor was filled with dry sand a bowl of water was placed inside. All the lizards were fed with red tree-ants (*Oecophylla smaragdina* Fabr.).

On 4.6.2005 a female lizard was seen digging in the substrate and it laid one white coloured egg. Morphometric details of the lizard are as follows: body length 23.1 cm , tail length 13 cm, head length 1.5 cm and head width 1 cm. The egg was measuring 17x 9.1 mm and weighed 0.3 gm. Another 4 eggs were palpable. Das (2002) and Daniel (2002) quoted that the courtship of *Draco dussumieri* was between February and April and egg laying during July. Das (2002) reported that the mating season is between February to April and clutch size was 3 to 4 eggs.

The present observation shows that the clutch size of Draco was five. The present observation supports the record of egg laying season of Draco.

Green forest lizard (*Calotes calotes* Linnaeus)

Courtship behaviour of green forest lizard (*Calotes calotes*) was observed during the second week of May 2005 in the cages at Chennai Snake Park. On 1st June 2005 a female green calotes died due to natural causes, post mortem was performed. Thirteen fully developed eggs were found inside measuring on an average 1.7 x 0.9 mm and weighed 1.01gm.

Smith (1935) mentioned that the clutch size was 6 to 12 and Das (2002) described that the egg laying season was between April- September. Daniel (2002) mentioned that the breeding of this lizard is from February to May and multiple clutches of eggs up to ten are laid.

The present observation supports the records on egg laying season (April-September) made by other workers (Murthy, 1985; Prasad and Jayanth, 1991; Karthikeyan, 1993 and Kannan and Bhupathy, 1997). Since *Calotes calotes* lays multiple clutches of eggs and the present observation showed 13 fully developed eggs in the uterus the death might have been due to egg stagnation.

Indian garden lizard (*Calotes versicolor* Daudin)

On 24th June 2004, a female *Calotes versicolor* was observed to dig a hole to lay the eggs. It started digging the hole on the ground around 1.30 pm. The depth of the hole was about 8 cm. and the diameter was 1.5 cm. Most of the time it used its fore legs to make the hole. It laid seven eggs at around 5.30 p.m. After laying eggs it sealed the hole and consolidated the hole by using its snout. The hole was completely sealed and no one could locate the exact place where it had laid the eggs. Eggs size was not measured since we did not want to disturb the eggs.

On 13th August 2005, a *Calotes versicolor* was observed on the ground near the office building of the Snake Park when it started digging a hole on the ground. The lizard was examined by palpation. Number of eggs could be around five to seven. Smith (1935) had described that the eggs are laid in June-August. Daniel (2002) also described the breeding season of this species as between April-September

Southern Indian rock agama (*Psammophilus dorsalis* Gray)

The Chennai Snake Park has been housing this species for the last few years. Mating has not been reported. However on 19thApril 2004 a female laid two eggs in the rocky boulder placed in the enclosure. The eggs measured 2 x 1.8 c.m in size and weighed 2 gm on an average. These eggs were buried in the earth of the same enclosure. On 2nd June only one baby hatched out and another egg had got decayed. On 23rdJuly 2005 a female was noticed with bulged middle. It was palpated and found to have four eggs inside. On 25th July 2005 it dug a burrow in the sandy part of the enclosure and laid four eggs. On 23rd September 2005 two young ones hatched out which measured 6.25 c.m. in average body length (Snout to vent: 3 c.m. Tail length: 3.25c.m.) The present observation revealed that the incubation period of this lizard varies between 45-60 days. Daniel (2002) noted that the clutch size was up to eight eggs. Smith (1935) mentioned that the breeding season was from April and May. But no previous record is available on the incubation period of this species.

General

The present observations shows that agamid lizards in general have an extended breeding season between January and September.

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THE BAY ISLAND FOREST LIZARD *Coryphopylax subcristatus* BLYTH,1860

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The Andaman and Nicobar group of Islands are situated in the Bay of Bengal between 5°40′ and 14°15′ N and 92°10′ and 93°30′ E. They support a rich variety of plants and animals characteristic of the tropical evergreen rain forests. With their diverse habitats, these Islands are endowed with a unique and rich animal life both on land and in sea. The long periods of isolation of these islands from the adjacent land masses and subsequent changes in the environment have largely contributed to the evolution of many of their endemic species and sub species (Rao and Dev Roy, 1985). The speciation in these islands was also encouraged by the rich variety of isolated biotopes favoring unchecked evolution of a variety of species. These islands have therefore been considered as living laboratories and compared with the Galapagos Islands of the Pacific Ocean in exhibiting interesting biological results.

Many land and littoral animals are endemic to these islands. This endemicity is more pronounced in land animals compared to the marine organisms which have greater chances of dispersal of adults and their pelagic larvae.

There are 72 reptiles on these islands, of which 24 (33.3%) are endemic to these Islands. Lizards of these islands are represented by 32 species which include 11 species of geckos, 8 species of Agamids, 11 species of skinks and one species of Dibamid and Varanid (Tikader & Das, 1985).

The present note describes sightings of the endemic Bay Island Forests lizard *Coryphopylax subcristatus,* Blyth in Andaman Island during a post-Tsunami study between 2.2.2005 and 4.2.2005.

This lizard is brownish or greenish in colour with more or less triangular head and sharply slanting forehead. Presence of dorsal crest, dorsal scales are small and intermixed with larger scales, pre anal and femoral pores are absent, strongly keeled ventral scales, belly light brown in colour.

In Chidiyatappu, 25 km away from Port Blair at the southern tip of the South Andaman island has semi evergreen, moist deciduous, littoral and mangrove forests. A search for the lizard was made within 3 sq kilometer radius in these habitats. Seven individuals of *Coryphopylax subcristatus* were located inside the forest. It mostly inhabited the low land rain forest and the plains including the edges of mangrove forests. The present observation shows that this lizard preferred ground and tree trunk.

The habitat is under threat from clear-felling of forest and cattle grazing and this is detrimental to the survival of the endemic agamid lizard.

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A NOTE ON THE COLOUR PATTERN IN *Philautus shillongensis* PILLAI AND CHANDA 1973 (ANURA: RHACOPHORIDAE)

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The genus *Philautus* comprising of small frogs has about 36 species in India and 8 in North East India (Dutta, 1997). Though 4 species have their type locality in Meghalaya, only *Philautus shillongensis* Pillai and Chanda is described new from Shillong (Pillai and Chanda, 1973).

Philautus shillongensis is a small (SVL 13-22 mm), sluggish animal of light grey to dark brown colour. Presence of intercalary ossicle between penultimate and terminal phalanges, rudimentary web on fore and hind limb and absence of vomerine teeth differentiate *P. shillongensis* from other frogs. Other characters are irregular dorsal markings forming 'H' shape (in lighter shade specimens, usually males) and skin smooth or with few tubercles. Mathew and Sen (2003) have given a detailed description of this species. Presently we have collected (A.B.Meetei) a female specimen with a colour pattern which is noteworthy. In this specimen, the supra-tympanic glandular fold from eye to shoulder is bright yellow and the entire forearm and upto slightly beyond the elbow bright orange and the discs on the digits are orangish in colour. This is distinctly noticeable against the dark brown dorsum.

The live specimen kept for observation in a glass jar with a little water for over an hour turned lighter in shade both dorsally and ventrally. The visceral organs including the pulsating heart became visible from the ventral side.

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A NOTE ON INCUBATION OF STRIPED KEELBACK

(*Amphiesma stolatum* LINNAEUS)

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A striped keelback (*Amphiesma stolatum*) housed in the Chennai Snake Park laid ten eggs on 8.3.2005. The eggs were isolated and kept for incubation. On 1.4.2005 babies hatched out from all the ten eggs. They measured between 13 c.m. and 17 c.m. and weighed between 10 gm. and 11.5 gms.

The incubation period of striped keelback has been reported as between 36 and 62 days (Das, 2002) and the shortest incubation period as a month (Daniel, 2002). However, in the present case, the incubation period was only 24 days.

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RANDOM HARVEST

Changing approaches to the species concept

"The last two decades have seen a revival in interest in the alpha taxonomy of many groups of animals. This resurgent interest can be traced to several factors including the increasing awareness of the extreme rate of extinction caused by human activities, the development of new molecular (e.g. Avise, 1994) and numerical (e.g. Thorpe, 1976, 1987) methods for the investigation of species-level systematics, and a widespread shift from process-based species concepts (in particular, the biological species concept) towards historical concepts, such as the evolutionary and phylogenetic species concepts (Wiley, 1981; Cracraft, 1989; Frost & Hills, 1990). In general, the current trend has been towards the recognition of clearly distinct taxa as separate species rather than subspecies, without undue concern for often untestable questions of reproductive compatibility".

(Wolfgang Wuster *et al.*
Herpetological Journal, Vol. 11, No.4.(Oct. 2001)

* * *

A bizarre tortoise

Russian researchers, Dr.Sergej Anpenb and Dr.Andrei Aypek, have discovered a new species of tortoise that is capable of inflicting a venomous bite. The tortoise which was discovered in 2001 in Denow, Uzbekistan, possesses two enlarged teeth at the front of the mouth, similar to the fangs in poisonous snakes. The purpose and function of this unique adaptation are not known. (The report implies that the tortoise is not carnivorous). "At this point, we believe that its primary function is of defensive nature", Dr.Anpenb said. A spokesperson of the U.S. Wildlife and Fisheries described this as one of the most bizarre discoveries in the last 20 years.

(Source: *Voice of the Turtle,* San Diego
Turtle and Tortoise Society, July 2005)

* * *

A sticky frog

It is well-known that the secretions on the skins of certain species of frogs belonging to the genera *Dendrobates* and *Phyllobates* contain a powerful toxin from glands on their backs which is used by the Indian tribes in Colombia to rub on their blowgun darts with lethal effect on their targets. Now a report from Reuters published in the *Hindu Business Line* of 13th July 2005 says that a frog of *Notaden* species found in the driest regions of Australian outback secretes a non-toxic fast-drying glue which could be used to seal human wounds. The secretion of the glue is a defence mechanism of the frog which is also known as the crucifix frog because of its cross-shaped markings.

* * *

Learning ability in snakes

In *The Herpetological Bulletin* 2003 – No.86, Robert Bustard writes of five adult Arizone Mountain Kingsnakes comprising one large male, one young adult male, and three females kept in a glass tank covered by a sliding glass panel. It was observed that on four successive nights all the snakes escaped and on each occasion had to be rounded up and put back into the vivarium. A close watch showed the strategy adopted. "The large male emerged from cover as dusk fell, climbed up onto the glass ledge near the top of the tank immediately below the vivarium lid, and by a combination of pressing its body against the glass and making sideways movements of its body all in one direction, slid the glass lid back. It then moved out of the vivarium followed shortly thereafter by the other four snakes." The author adds: "The fact that one of them (assumed to be the large male on all four occasions) managed to escape by sliding the glass of the vivarium lid is unremarkable. What is noteworthy is that having once managed to slide the lid back and escape it was able to repeat the performance at will ... ...It was obvious from watching it that the snake was carrying out a precise set of movements which resulted in a rapid escape, not effecting escape by trial and error as must have happened on the night of the first escape. Hence the components of what began as a trial and error escape routine were learned as a result of the single 'trial' on the first escape night, and used successfully to effect escape on each of the three following nights."

* * *

Missing link

The remains of a 125 million-year-old dinosaur were found by a black market fossil collector named Lawrence Walker while digging clandestinely on a government land in Utah, U.S. Named *Falcarius utahensis*, the animal, equipped with 10 cm. claws and spoon-shaped molars is supposed to offer the first glimpse into how dinos made the transition from small, agile meat-eaters to elephant-sized vegetarians. "Convinced he was onto something big, the poacher tipped off a palaeontologist he knew, James Kirkland, and led him to the site. Kirkland tried to protect his source but, asked under oath how the dianosaur was discovered, reluctantly turned Walker in. Kirkland got his 15 minutes of fame ... Walker served five months in prison".

(Source: *Time* May 16, 2005)

* * *

Snake invasion and worse

The St. Pierre snake invasion was one of the unusual disasters in History. When in Apr. 1902 volcanic activity in Mt. Pelee towering over St. Pierre, Martinique, an island in the West Indies, made the mountainside uninhabitable for snakes, more than 100 fer-de-lance snakes slithered down and invaded the town. The 6 ft. long serpents killed 50 people and innumerable animals before they were destroyed by the town's street cats.

But this was only the beginning. On May 5, a landslide of boiling mud from the volcano spilled into the sea followed by a tsunami that killed hundreds and, three days later, Mt. Pelee finally exploded, the white hot lava engulfing the town. Within three minutes, St. Pierre was completely obliterated and of its 30,000 population, there were only two survivors.

(Source: *The Book of Lists* by David Wallechinsky & Amy Wallace)

* * *

Egg-eater

The Indian egg-eater (*Elachistodon westermanni*) was one of the rarest of Indian snakes, first reported in 1863 and now considered as probably extinct. The species had been reported from Bihar and North Bengal and the Corbett National Park, Uttaranchal. The snake fed mainly on the eggs of birds and reptiles. As the egg is swallowed, the sharp

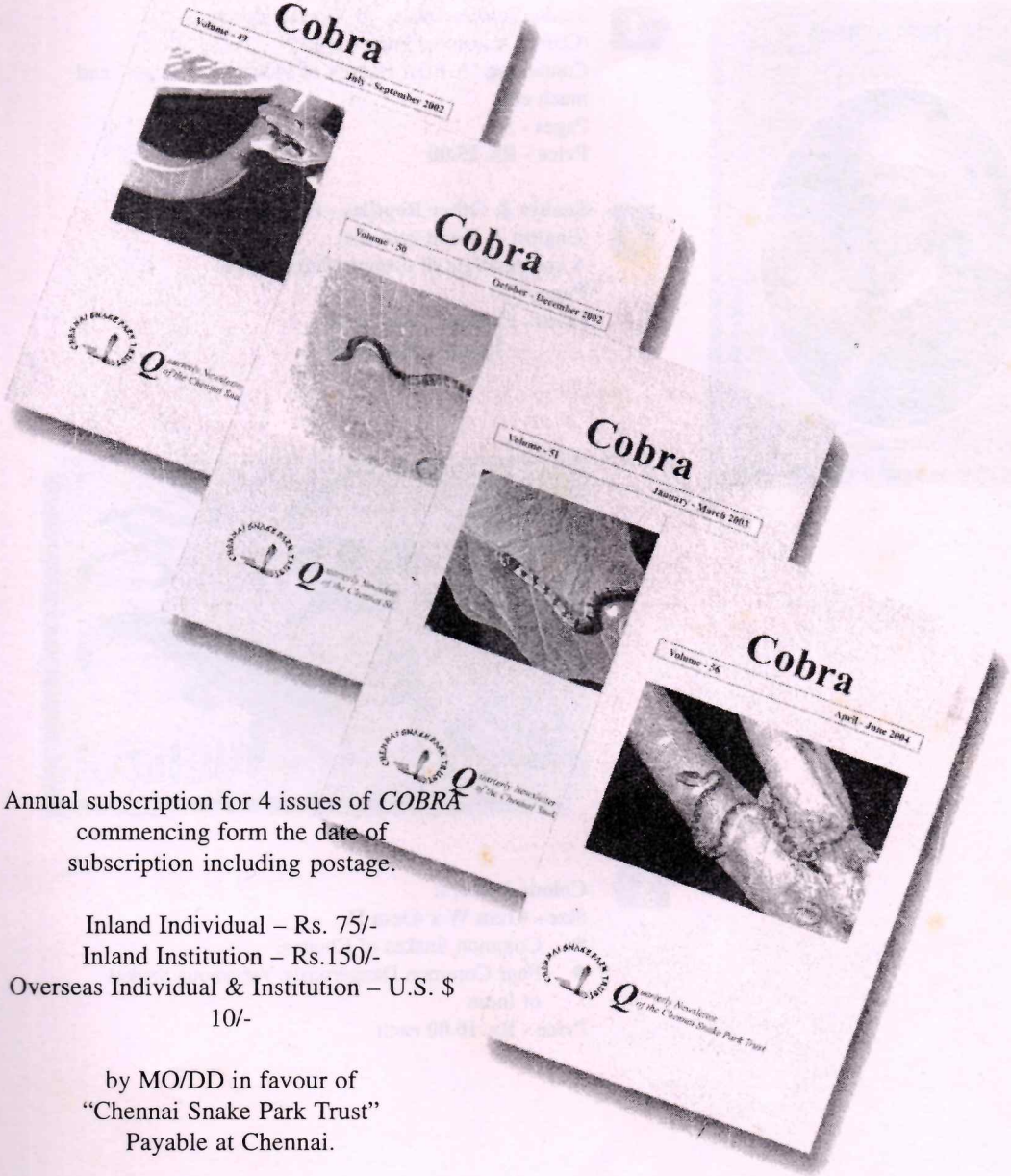
projections from the backbone slit the egg so that the contents travel down the digestive tract. The shell is regurgitated.

"[The Indian egg-eater] hasn't been seen since the early 1900s" (Whitaker & Captain, 2004).

Now *The Hindu* of 30 July 2005, quoting PTI, reports that the remains of a snake found in Wardha district of Maharashtra by Parag Dandge, District Coordinator of the Satpuda Foundation of Wardha, on 3 Aug. 2003 have been confirmed by "herpetologists and taxonomists of India and Russia" as belonging to this species.

The report adds that Ashok Captain (co-author of *Snakes of India,* 2004) and Frank Tielack and Andreas Gnampect, both from Germany, have co-authored a paper on the finding and it has been accepted for publication by the *Russia Journal of Herpetology.* We await this with keen interest.

– B.Vijayaraghavan



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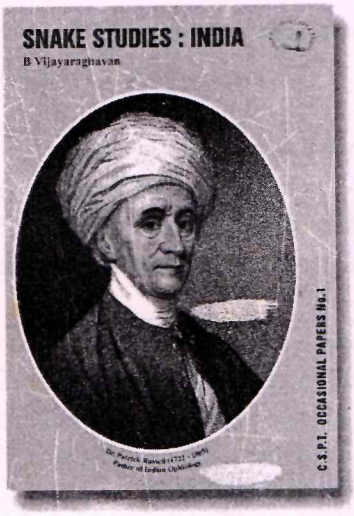

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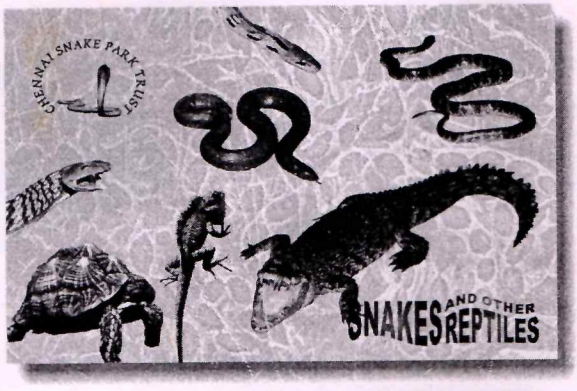

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