

Cobra

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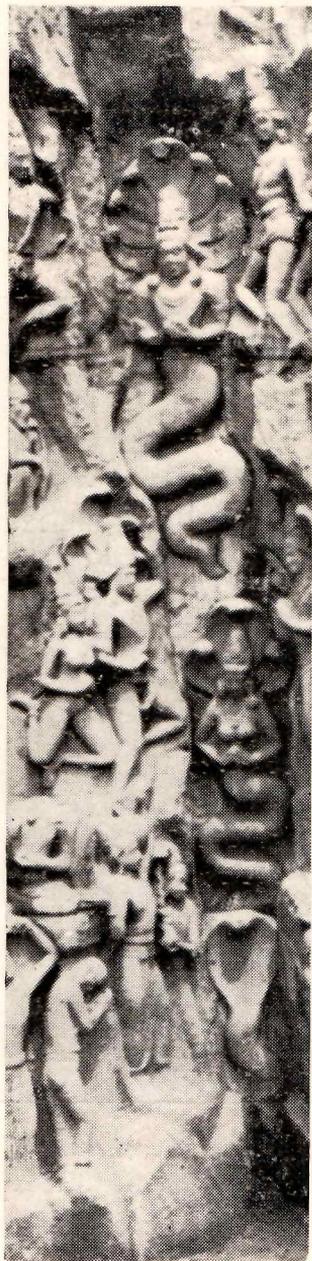
The Red Sand Boa, *Eryx Johni*

— Photo by : M. KRISHNAN.

Kalaiar
19/1/92

Madras Snake Park Trust
Guindy National Park - Guindy
Madras - 600 022. - India

WELCOME TO MADRAS SNAKE PARK TRUST



- * The Madras Snake Park Trust was established in 1971 on a one-acre plot of forest land leased by the Govt. of Tamil Nadu at Guindy, Madras. Managed by a Trust, the MSPT is a centre for Education, Tourism, Conservation, Service and Research on Reptiles.
- * A variety of live Reptiles, both Indigenous and Exotic are displayed which include Marsh Crocodile, Giant Tortoise, Reticulated Python, South American Iguana and other species of Snakes, Lizards and Turtles. Besides, a Snake Lore Centre and a Museum of Reptile specimens are maintained.
- * The Park is open from 8-30 a.m. to 5.30 p.m. on all days of the year.
- * **Entrance fee :** Adult Re. 1/- and Child Re. 0.50.
- * Photography charges are Rs. 5 for still cameras and Rs. 50/- for Video Cameras. For commercial Video contact office.
- * Hourly Demonstration of a few kinds of live Reptiles with commentaries is conducted.
- * Nearly 12 lakh persons visit MSPT in a year.

COBRA

Quarterly Newsletter of the Madras Snake Park Trust

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Annual Subscription for 4 issues
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Rs. 75/- Inland
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(including postage)

Cover : The Red Sand Boa, *Eryx johni*

Myths and superstitions galore shroud this harmless snake. Known popularly as the double-headed snake because of its blunt tail which resembles the head, it is supposed to move six months in one direction and six months in the opposite direction. The belief that one contracts leprosy or eczema by its bite or contact is totally false. It is an efficieent killer of rats, particularly babies of the infamous mole-rat.

MADRAS SNAKE PARK TRUST PROGRAMME FOR INDIA TOURISM YEAR 1991 - '94

1. Special pamphlets on common poisonous snakes and non-poisonous snakes with special legends about them to be issued.

2. The regular hourly demonstration of reptiles now being conducted in Hindi / Tamil / English will also be extended with special tapes in several Indian languages like Kannada, Telugu, Malayalam, Bengali, Oriya, Marathi, Punjabi, Gujarati, Goanese, Urdu, etc. and Foreign languages like Russian, Japanese, Spanish, German, French, Chinese, Italian etc.

Tourist groups could avail of these special demonstration at Rs. 50/- Indian and Rs. 100 or US \$ 5 for Foreign languages.

3. Opening of the Exhibition Building displaying—

—Reptile lore around the world.

—Myth, Mythology, Worship and other interesting facets of Reptile-lore in our Indian Culture to commemorate the India Tourism year 1991 — 1994.

SNAKE-AMPHIBIA INTERACTION

M.S. RAVICHANDRAN,

Zoological Survey of India, Madras.

Amphibians, namely the frogs and toads, constitute a major item in the diet of snakes, the others being rodents, other reptiles and insects. The theme of this paper is predatory interaction between snakes and amphibians in the three habitats, namely terrestrial, aquatic and arboreal.

Apart from the common toad, there are a number of frogs which are terrestrial and visit damp areas or forage on forest floor. They are mainly the burrowing frog or Jerdon's bull frog, the skipper frog, the cricket frog, and the narrow-mouthed frogs.

The toad, *Bufo melanositictus* is one of the commonest Indian amphibia found all over the country both in the plains and hills upto about 2000 metres. During day it hides in crevices, under logs etc; and comes out at night for foraging on insects. Although unpalatable to many predators because of the cutaneous wart glands, the cobras show a preference to toads. Juvenile toads are eaten by other snakes including the keelbacks.

The burrowing frog, *Rana crassa* is a fairly largesized, stout and toad-like frog. The shovel-shaped inner metatarsal tubercles are used for excavating the earth. By alternate shovelling movements of the hind feet, it sinks into the soil, head last.

The skipper frog, *Rana cyanophlyctis* is found in plains as well as higher altitudes. They are active both during day and night. *Rana limnocharis* or the cricket frog is the

commonest species found in plains as well as in higher altitudes. They live mostly in the vicinity of tanks and streams and generally frequent the edges of ponds and marshes. During dry season they take shelter under stones, in crevices of rocks and in damp places and are reported to aestivate.

The narrow-mouthed frogs such as *Uperodon systoma*, *Kaloula pulchra* and *Microhyla ornata* are also land frogs. *Uperodon systoma*, a fairly large stout microhylid, is an excellent burrower, found in areas with moist, loose soil and spend long periods in their subterranean hideouts, and come out of the burrows on rainy nights. They inflate their body, like a balloon to avoid predation. *Kaloula pulchra* is a small microhylid reported from plains as well as higher altitudes. Nocturnal in habit, they are seen in gardens and other shrubbery. They hide under broken bricks and rubble.

Microhyla ornata is a small microhylid which has adapted itself for life in a variety of biotopes. both dry and areas with heavy rainfall. Found in plains and higher altitudes they inhabit temporary rain water pools, seepage waters, dry litter or open grassy downs.

All these frogs are predated by a variety of snakes such as Cobras, Rat snakes, Kraits and some species of pit vipers which live on land.

The aquatic environment has a rich complement of both snakes and frogs. The

frog species are the bull frog, the green frog, the skipper frog, the cricket frog and a number of species belonging to the group of wrinkled frogs viz., *Nyctibatrachus*.

The bullfrog, *Rana tigerina* grows to a large size. Its olive green colour and markings make it difficult to be spotted in hollows and grass at the edge of water where it habitually rests. They are found in a wide variety of habitats from plains to elevations of 2000 metres. Always associated or in the immediate vicinity of water, they are found on the edges of ponds and lakes, in permanent and temporary pools, in agricultural areas, particularly in paddy fields. They can tolerate desiccation and go into aestivation when extreme conditions set in.

Rana hexadactyla or the green frog grows to a large size and is rarely seen outside water. In ponds or lakes it always hides among water plants where its green colour merges with the surroundings.

The wrinkled frog species belonging to the genus *Nyctibatrachus* are *N. aliciae*, *N. deccanensis*, *N. humayuni*, *N. major*, *N. sanctipalustris* and *N. sylvaticus*. Endemic to Western Ghats and completely aquatic they prefer stagnant, slushy water with lot of decomposing organic matter in well shaded forest areas.

Rana temporalis is a large frog found only in association with forest streams; they are neither very agile nor shy and could be captured with ease, their habit of sitting exposed on stones and pebbles in running water makes them easy for capture.

Although there are a number of water-snakes in India, the two common species are the checkered keelback and the olive keelback. Both are widely distributed in the plains and lower hills. They depend

primarily on the aquatic species of frogs listed above and tadpoles of many species, which is supplemented by fish. The buff striped keelback, *Amphiesma stolata* has an apparent liking for young toads too.

Compared to either terrestrial or aquatic environments, an arboreal life calls for some adaptive specialisations. This is well demonstrated in the case of both arboreal amphibians and tree snakes. Tree living frogs develop spoon-shaped adhesive discs on their digital extremities, extensive webbing between fingers and toes and cutaneous flaps which offer resistance while leaping from tree to tree, and an amazing capacity to change colour to match their immediate environment.

Three genera of tree frogs, viz., *Rhacophorus*, *Polypedates* and *Hyla* are available in India. *Rhacophorus malabaricus*, the malabar flying frog and *Polypedates maculatus*, the chunnam frog are two common examples. *Hyla annectans* is the tree frog of Meghalaya.

The arboreal snake species preying mainly on tree frogs and geckos belong to three main groups—the bronze backs, vine snakes and cat snakes. Their body is thin and long, the fore part being very light. Many of them have anti-skid arrangements on the belly to avoid slipping sideways off the narrow branches along which they have to creep. The flying snake, *Chrysopelaea ornata* is also a tree snake which could be considered as the counter part of the flying frog of Malabar.

Paddy fields offer an ideal environment to observe a food chain involving amphibians and snakes. As many as 5 or 6 species of amphibians live in and around the fields such as the bull frog, skipper frog, cricket frog, burrowing frog, toad etc., They eat a variety of insects associated with

paddy plants and also small snails, worms etc. Predating on them are the rat snakes, checkered and olive keel backs and cobras which live in the water or in burrows on the bunds. The insect eating habit of amphibians and the frog eating habit of snakes are also responsible for a large number of snake bites which happen under street lights or desolate roads or even in ill-kept parks. The street lights attract insects at night which fall on the ground. Frogs and toads visit to feed on the insects and snakes come in search of the amphibians. Folks walking bare foot get bitten here.

Out of the four families of Reptiles, snakes exhibit more adaptive capabilities for life in a wide variety of environments. Although they appeared in the earth's history several million years later than the

Amphibians, it appears that they evolved some what parallel to the Amphibian, adapting themselves well into the major habitats of Amphibians, for predating upon them. The protective mechanisms evolved by the amphibians such as unpleasant exudation from the skin as in toads, or slimy skin of frogs, cryptic colouration or camouflage, ability to take long leaps or inflation of body as in balloon frogs, ability to burrow into the soil etc. have not been too effective to avoid their predation. The high rate of their predation is compensated only by the very high fecundity prevalent in the Amphibians.

The author is thankful to the Director Zoological Survey of India, Calcutta and to the Officer-in-charge, Zoological Survey India, Madras, for facilities and encouragement.

CONTRIBUTIONS ON REPTILES INVITED

COBRA solicits papers on snakes, lizards, turtles and crocodiles for *quick* publication.

Paper may be on any aspect: Ecology, Biology, Natural History or Conservation.

Faunal and Behavioural aspects are also welcome.

Snake-lore, Myths and interesting personal observations are also accepted for publication under Miscellaneous Notes.

Contributions may be sent to Dr. R.S. Pillai, Editor, COBRA, Madras Snake Park Trust, Guindy National Park, Madras-600 022.

A NOTE ON THE BREEDING OF THE INDIAN PYTHON

Python molurus IN THE WILD

S. BHUPATHY

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Information on the breeding of Indian snakes in the wild is scanty and is true in the case of Indian python also (Daniel 1983, Smith 1935). However, detailed studies are available in captivity on Indian python (Acharjyo and Misra 1976, Dattatri 1990). The present note is based on an observation in Keoladeo National Park (KNP), Bharatpur.

A python survey was conducted in the "python point area" (Bhupathy 1990) of the KNP on 23rd May 1993. Two fresh tracks and one dead python were recorded. The dead snake was found to be a gravid female and it was measuring 218cm in total length (head to tip of the tail) with a tail length 22cm. The snake had four well developed ellipsoidal leathery eggs which measured 12-13.5 × 6-7cm (l × b). The posterior end of the snake (near the vent) had an incision presumably torn by predators. Comparing the size of the snake and body cavity it was assumed that at least two eggs had been eaten by predators. Signs of jackal (*Canis aureus*) were seen near the snake and hence it was presumed that the snake was attacked by jackal. Also, the snake had two fresh hoof marks on the body. It is not clear whether the jackal attacked the snake before or after an ungulate trampled the snake.

Acharjyo and Misra (1976) reported that the Indian python reaches sexual maturity at the age of four in captivity (with mean body length 248.75cm; range 235-266 cm.). The present observation is the first

record of the smallest laying python in the wild. It is not clear whether the observed one is the first clutch of this individual. However, when compared with the length of captive bred pythons (Acharjyo and Misra 1976), the present one would be a third year python and may be in its first egg laying. Dattatri (1990) reported that a female python attained 215cm in 28 months in captivity. The present observation also confirms the egg laying period of wild python; May-June in North India (Smith 1935).

Dr. Edward O Moll, Professor, Department of Zoology, Eastern Illinois University, Charleston, USA and Mr. B.C. Choudhury, Scientist SE, Wildlife Institute of India (WII), Dehra Dun participated in the field survey. Mr. Sridhar Bhat, WII, Dehra Dun had gone through the manuscript and offered comments.

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MISCELLANEOUS NOTES

COBRA invites contributions under "Miscellaneous Notes". Short notes and interesting personal observations on Reptiles and Amphibians are invited for publication. Myths, lores and beliefs which highlight these animals from the cultural and traditional point of view are also welcome.

STRANGE BUT TRUE

M.V. RAJENDRAN, M.A., Ph.D., RHMP

Director, Nellai Snake Park, Tirunelveli.

Nature sometimes baffles common man as well as scientists. A pair of 7' long rat snakes suddenly refused to take food; they became weak, loss of weight made them inactive. This condition lasted for a month. They died one after the other. When the single large lung was cut open, there were giant parasitic larvae. The head end was blunt with 6 recurved spines on one side. They were about 10cm. long and 3mm. thick. These belonged to the genus *Railietella* of Pentastomid Arachnids. The adults are very small and are louse-like. These move through the wind pipe and reach the nostril. If the snake sneezes these are expelled to the ground and get stuck to the grass. Lizards and frogs feed on them. *Railietella* is eaten up by snakes along with the infested prey. They reach the stomach of the snake, multiply and become wormlike again, throwing off all the external appendages. There are a few other species of pentastomids which attack snakes, fish, frog etc.

There are 30 species of burrowing, colourful worm-like snakes belonging to the family *Uropeltidae*. They live in cold mountainous area. They are cylindrical with a sharp, pointed snout and short blunt, truncated tail. They burrow several feet deep and feed only on earthworms. Eggs develop in only one oviduct, the other being vestigial. A maximum of 9 embryos are ejected out. All these snakes are beautifully coloured on the belly. This is a strange and a nonadaptive character. Wild boars cut off the hind end of this nonpoisonous

snakes and eat their body. A few types mimic the poisonous coral snakes which occur along with them under dry heaps of leaves. The common gardener is afraid of these rough-tailed snake. He thinks their bite causes leprosy.

The earth snakes belonging to Genus *Eryx* are of two species. One has blunt tail. Hence it is called double headed snakes. Both feed on rats and are nonpoisonous. The common belief that their lick causes leprosy or eczema is false. The double headed snake has a uniform colour to match the red soil or cotton soil. The names, red earth snakes and dark earth snakes are not correct. Another strange fact is that the double headed snake is red when young and bears four or five dark black bands on tail end and a few dark bands on the neck and. Hence it is often mistaken for a poisonous variety. They give birth to eleven young ones.

Earth snakes are the smallest of the Boid groups. They are friends of the farmer, feeding largely on rats. The Pythons are the largest sand boas which grow to 18 feet in length. They feed on rats.

Mimics of poisonous kraits are many, because they are ringed or banded. The head, neck and forepart of trunk of the krait have no rings but the tail has clear rings. In other snakes it is the opposite way. The tail end of the body has no marks. Kraits do not attempt to bite. If it bites it holds on and injects its venom in full.

The pointed projection on the snout of the whip snake is often mistaken for a piercing organ. It is not supported by bone. Whip snake gives upto 28 brush like young-ones which are cannibals. If food is not available each feeds on the other.

The bronzeback tree snake is slender and long. It can climb and run fast. It is a coward and is afraid of man, and escapes fast. Still men are afraid of them.

The wolf snake has sharp teeth and bites. But it is non-poisonous. Because of the bands on the body it is often mistaken by people for a krait.

Vipers have characteristic venom. It is haemotoxic. The bite causes swelling. They bring forth young ones alive. The saw-scaled viper bite is often taken lightly since it is small in size. But it has strong poison that lingers in the body for a long time. Drop to drop its venom is equal to or more toxic than that of Russell's viper. It climbs palmyrah trees in search of lizards.

The Indian Pit vipers of the hilly gardens have mild poison. A sensitive pit is found in between the eye & the nose. With this sense organ it detects its prey.

Among the water snakes, the flat-tailed sea snakes are deadly poisonous. The zebra snake with pointed tail is very soft. Its skin is loose like a jacket. The yellow

bellied sea snakes float in warm sea water during the breeding season; hundreds of them swim together. They have mild neurotoxic venom. These can be easily tamed & handled. They roll like a ball when put into the trouser pocket. These lay cylindrical eggs.

Among the frog group, there are three legless varieties of worm-like animals in our wet hills. They hide in damp collections of leaves on road side and feed on termites and small insects. They are called caecilians. Handling them will not affect the fingers.

There are strange frogs even in the plains. After a rain when a puddle of water gathers, one can hear at night three different croaking sounds of frogs; one makes a grunting noise, another makes fast normal drum voice, the third sticking on to the wall or a bush makes a kettle drum note. The last one is called the *chunnam frog*. The first is a toad's and the second is a swimming frog. The last makes a frothy nest into which female lays its eggs. The male ejects the sperms into the frothy nest where the eggs get fertilised and grow into embryos. Later after developing the tail, they jump into the water as tadpoles. When the tail is absorbed, the frogs jump out of water.

In our hills, the *bull frogs* grows to 3 kg. making giant leaps of 10—15 feet. They feed on small snakes, water birds and frogs.

PISCIVOROUS SNAKES

S.V.A. CHANDRASEKHAR

Freshwater Biological Station, Zoological Survey of India, Hyderabad-500 020.

Though the majority of snakes are terrestrial, a few species live in aquatic and semi-aquatic systems. Among those snakes which sustain themselves in aquatic environment either completely or partially, a few have occupied lacustrine, riverine/estuarine and marine habitats. Some of these snakes spend their life in water and seek their food by chasing the fishes. While some are facultative, spending their life in aquatic environment in search of food (Colubridae : Colubrinae), some others are obligatory in habitants like the sub-family, Homolepsinae of the family Colubridae and the family Hydrophiidae.

The diet of snakes consists generally of snakes (ophivorous), insects (Insectivorous), rodents, frogs, lizards (Carnivorous), birds (Avivorous) and fishes (Piscivorous). Piscivorous snakes are also called 'fish-eating snakes'. While studying the food and feeding habits of snakes, the author has compiled a list of fish eating snakes belonging to 43 species of 23 genera belonging to 4 families.

Out of eleven families of the order Sauria, piscivorous snakes can be found in four families, viz., Anilidae, Colubridae, Elapidae and Hydrophiidae. The entire family of Hydrophiidae feeds on fish. Those species with small heads and long, slender forebodies appear to subsist almost exclusively upon eels.

LIST OF PISCIVOROUS SNAKES

Family : Anilidae

1. *Cylindrophis rufus* Laurenti

Family : Colubridae

2. *Acrochordus javanicus* (Hornstedt)
3. *Acrochordus granulatus* (Schneider)
4. *Amphiesma piscator piscator* (Schneider)
5. *Natrix percarinata* (Boulenger)
6. *Natrix nigrocincta* (Blyth)
7. *Atretium schistosum* (Daudin)
8. *Enhydris plumbia* (Boie)
9. *Enhydris enhydris* (Schneider)
10. *Enhydris chinensis* (Gray)
11. *Homalopsis buccata* (Linn.)
12. *Cerebrus rhyncops* (Schneider)
13. *Herpeton tentaculum* (Lacepede)

Family : Elapidae

14. *Bangarus caeruleus* (Schneider)
15. *Naja hannah* (Cantor)

Family : Hydrophiidae

16. *Laticuda laticaudata* (Linn.)
17. *Laticuda colubrina* (Schneider)
18. *Aepyurus eydouxi* (Gray)
19. *Kerilla jerdoni* Gray
20. *Praescutata viperina* (Schmidt)
21. *Enhydrina schistosa* Daudin
22. *Hydrophis nigrocinctus* (Daudin)
23. *Hydrophis spiralis* (Shaw)
24. *Hydrophis cyanocinctus* Daudin
25. *Hydrophis obscurus* Daudin
26. *Hydrophis klossi* Boulenger
27. *Hydrophis bituberculatus* Peters

- | | |
|--|--|
| 28. <i>Hydrophis stricticollis</i> Gunther | 36. <i>Hydrophis brookei</i> Gunther |
| 29. <i>Hydrophis torquatus diadema</i> Gunther | 37. <i>Thalassophis anomalous</i> (Schmidt) |
| 30. <i>Hydrophis ornatus ornatus</i> (Gray) | 38. <i>Kollophis annandalei</i> (Laidlaw) |
| 31. <i>Hydrophis lapemoides</i> (Gray) | 39. <i>Lapemis curtus</i> (Shaw) |
| 32. <i>Hydrophis mamillaris</i> (Daudin) | 40. <i>Astortia stokesi</i> (Gray) |
| 33. <i>Hydrophis caeruleascens</i> (Shaw) | 41. <i>Microcephalophis gracilis</i> (Shaw) |
| 34. <i>Hydrophis fasciatus</i> (Schneider) | 42. <i>Microcephalophis cantoris</i> (Gunther) |
| 35. <i>Hydrophis parviceps</i> Smith | 43. <i>Pelamis platurus</i> (Linn.) |

ACKNOWLEDGEMENTS

The author is thankful to the Officer-in-Charge, Freshwater Biological Station, Zoological Survey of India, Hyderabad and the Director, Zoological Survey of India, Calcutta for their encouragement, facilities and permission to prepare this paper.

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PAPERS ON AMPHIBIA

In deference to the wishes of a number of herpetologists, it has been decided to enlarge the ambit of COBRA to incorporate articles and notes on Amphibia as well. Contributions on ecology, conservation, fauna, behaviour and other aspects on Amphibia may be sent to Dr. R.S. Pillai, Editor, COBRA, Madras Snake Park Trust, Guindy, Madras-600 022.

—Editor

REPTILES IN THE NEWS

The Hindu 4-7-93

LOOKING FOR LOST DNA.

Millions of years ago, while dinosaurs and other pre-historic creatures we never knew roamed the planet, sap and resin ran from pre-historic trees, trapping within organic material, insects, bacteria, sometimes amphibians and reptiles, mummifying them, preserving some of their tissues.

In the tissue of entombed insects, millions of years old, scientists have found DNA. This is ancient DNA, molecular data from fossils whose study may be able to open the doors a crack to our pre-historic past, giving us pieces of the puzzle of evolutionary change, the origin of some species, and a glimpse into landscapes and animals long gone: like Cretaceous forests, the flora and fauna of extinct eco-systems. This is the legacy that has been left to us in amber.

The dinosaurs of "Jurassic Park," Steven Spielberg's film based on the best seller by Michael Crichton about scientists who fashion the pre-historic creatures from dinosaur DNA found in a blood sucking insect in amber—stalks across movie screens throughout the world this year. While the film is fantasy, scientists are working to unravel the ancient, extinct DNA of insects and other inclusions that were trapped in amber tens of millions of years ago.

Attempts to detect and study extinct DNA in insect tissue trapped in amber are real. In the Extinct DNA laboratory at California Polytechnic State University, the search continues for ancient, extinct DNA of members of the landscape of pre-history in the same laboratory where the oldest genetic material known to man has been extracted and sequenced.

It did not belong to a mighty dinosaur but rather to an extinct weevil over 120 million years old, preserved for modern science in its tomb of Lebanese amber of the Cretaceous Period. Sequences of DNA extracted from this weevil were reported by Raul J. Cano of California Polytechnic State University. This is the oldest DNA so far extracted and sequenced—by some 80 million years—and the signs are that most animal remains preserved in amber contain DNA. It is also the first DNA to have been extracted from an animal alive when dinosaurs roamed the Earth. The findings were published in the scientific journal *Nature*.

Extinct DNA gives us the clues, some pieces to the puzzle of our past. These fossils in amber and the ancient DNA that has thus far been identified (in amber as well as from other sources), belong to the realm of molecular palaeontology, the study of extinct organisms through molecular material.

"These results demonstrate the successful extraction and amplification of DNA from a 120-135 million year old amber fossilised insect. We speculate that on the basis of our investigation the majority of animal remains in amber have preserved DNA that can be extracted and studied, thus making amber a treasure chest for molecular palaeontologists," wrote the authors in *Nature*.

The results, show too, that DNA, or the building blocks of life, of the age of the dinosaurs has actually survived.

Dr. Cano and Dr. Poinar and Hendrick Poinar, in 1992, extracted what was at the

time the oldest DNA known to man, that of a 40-million year old stingless bee entombed in Dominican amber.

"Molecular data from fossils can be used to trace associations of taxa before evolutionary divergence has obscured their phylogeny...When compared with extant DNA, ancient DNA sequences may also provide an insight into the pattern of molecular evolutionary change through time. Thus the molecular study of fossilised organisms in amber can clarify evolutionary relationships among taxa and also yield information on mutation rates," wrote co-authors Dr. Cano, Hendrik Poinar, D.W. Roubik and Dr. George O. Poinar, Jr. in the introduction to a paper published in the April 1, 1992 issue of *Medical Science Research* which discussed the findings from the extraction of DNA from a 40 million year old bee.

Dr. Poinar, at Berkeley dates the amber and identifies the insects or inclusions in it. Some 1,000 pieces of Dominican amber pass through his office each week, he said. At California Polytechnic State University, the "D-team", (D for DNA) is busy splitting the amber, extracting and analysing the DNA inside.

"The preservative qualities of both fossil and recent resins are well known at the organism and tissue levels. The results presented here show the remarkable property of resin as a molecular preservative as well."

Shortly after the team at Cal Poly extracted the DNA of the stingless bee in 1992, another team found the multi-million year old DNA of a termite.

About 100 scientists are now working in the field of ancient DNA not only from amber but from other sources, not neces-

sarily as old as the amber inclusions. And some 90 papers concerning ancient DNA have been published in the last decade.

"We first started working at Berkeley, here in 1980 on the recovery of organisms from amber. We then met Dr. John Tkach, from Bozeman, Montana who had a similar interest in ancient DNA and we spoke and we decided it would be good to form an extinct DNA group which we did in 1983. We exchanged ideas," said Dr. Poinar in recent interview.

His laboratory is rather cozy, filled with amber and insects, book-lined, dotted with charts and drawings that examine aspects of the world of pre-history. Almost a decade later, the 40 million year old DNA of the stingless bee followed by that of the 120 million year old weevil, was found at Cal Poly where a technique for splitting amber in liquid nitrogen, thus preserving the tissues of the insects within, was developed.

"During this process", wrote the authors in *Nature*, the amber broke open and a pellet of tissue was removed from the weevil's body cavity."

Dinosaur DNA has yet to be found. But is it possible to find it in amber inclusions?

"Oh, I think that it will be. We can't say anything as yet because no one has done this. I think that that part of the book could be correct, that there are probably dinosaur blood cells in these blood sucking insects. And that we should be able to get some dinosaur DNA, little snippets, not the entire genome but little bits of it. That's not the only place (amber) you can get dinosaur DNA from but it is one, circuitous route," said Dr. Poinar.

In the event that dinosaur DNA was found could one then, you know, make dinosaurs? Well, no.

Explained Dr. Poinar. "Of course it is impossible to do what is in the book now, at this stage. First it is very impractical that we would find the full genetic code, the full genome of the dinosaur. Secondly even if we could, we don't know how to clone animals yet. If I took my own cell, I couldn't re-construct myself."

An opinion shared by Dr. Cano at Caly Poly, "The difficulty with cloning an animal, such as that is that first of all, is that you are dealing with five billion or four billion base pairs. You have to be able to retrieve the DNA from a single source that would contain that billion base pairs, then have a way to put them in order, it is an enormous jigsaw puzzle to put together. . . in dinosaurs, like all animals, the DNA is not just in one chromosome, it is distributed in many chromosomes. So in which chromosome do you put what?"

"The nice thing about Jurassic Park," he said, "is that it was all done in a computer. Well, that's wonderful but you still have to go from a computer to actual DNA. You can do all the splicing you want in a computer but you still don't have that DNA."

What the eventual discovery of dinosaur DNA could do however is shed some light on the mystery that has shrouded these pre-historic monsters for millennia. Dinosaurs, aside from the robotic ones, cannot be made but perhaps answers will someday be provided to the myriad questions and calm the controversies that have tracked the dinosaur. For our fascination with the "terrible lizards", as the British anatomist Sir Richard Owen baptised them using the Greek, *deinos* meaning terrible, *sauros*, meaning lizard, has been ongoing since the middle of the 19th century when they were all the rage in London following an 1854 exhibit featuring the creatures at the Crystal Palace. But amber, too, can offer us precious keys

to the past, for while scientists cannot reconstruct dinosaurs, they can try to reconstruct our pre-historic world.

"One of the projects we have is trying to reconstruct a whole eco-system of a forest back at that time, so we can take all the information that we can from the plants and then all of the animals in the amber and then put it together like a jigsaw so we can reconstruct forests; so what you have down there is the equivalent of a tropical rain forest which does not occur at all in the Dominican Republic today but this is the type of habitat that seems to have been present," he said.

Amber, too, he says can offer us a window on bio-diversity.

All in all, their work has brought dozens of journalists trooping into their office and laboratories, disrupting their work. The price of amber has soared, putting some pieces out of the reach of scientists. Dino-mania has opened the door on their laboratories.

GAMMA

The Hindu 31-7-93

HAVE DINOSAURS REALLY GONE?

Steven Spielberg's film *Jurassic Park* has aroused new interest in dinosaurs-those ungainly-looking animals that became extinct 65 million years ago.

Dinosaurs came in all shapes and sizes. Some were as small as chickens, others like *Tyrannosaurus rex*, were huge. Until recently dinosaurs were thought to have been slow-moving, dim-witted creatures but now scientists say dinosaurs might have been clever than previously believed. According to Don Lessem founder of the Dinosaur Society, dinosaurs were smart, swift and trim reptiles most of whom travelled in herds and went on annual migrations.

Dinosaurs were the dominant animals on earth for 165 million years—an enormous span of time, considering that man has been throwing his weight around for only 2 million years or so—and then they suddenly died out.

Some people maintain that it is wrong to say that dinosaurs have died out. They say that one line of dinosaurs is still surviving and not only surviving, going strong! Where are the dinosaurs they're talking about? Look out of the window. You can see them perched on trees and flying in the sky. Yes, we're talking about birds.

Do birds really have dinosaur ancestry? We do not know for sure, yet. All we know is that birds have evolved from reptiles and the dinosaurs were reptiles.

The Sunday Times of India 1-8-93

TRANSCENDENTAL TREE FROG

The chemical prowess of frogs and toads is not unknown to science. Nor to witchcraft. The poisonous giant toad (*Bufo marinus*), for instance, is used to produce death-like trance states in voodoo ritual. And the brilliantly coloured arrowhead poison frogs in the tropics supply native hunters with a venom so potent that a single dart is said to bring down an elephant.

Even the common garden toad (*Bufo bufo*) which hops into your home, chasing insects in the evening, secretes a toxic mucous from the glands near its jaws to keep predators at bay.

However, Gorman's discovery of *sapo* is unique because this skin secretion of the large green tree frog (*Phyllomedusa bicolor*) is probably the first zoologically derived medicine used by tribals ever investigated for western medical potential.

The hunters "take frog", that is, they introduce the frog's skin secretion into their body through freshly produced burns. This immediately causes violent illness, including a rapid pulse, vomiting and incontinence, after which the hunter lapses into a state of listlessness, followed by intense euphoria. Later, he claims to be a better hunter, with enhanced strength and stamina and sharpened senses.

This extraordinary ritual, which Gorman experienced first-hand, is now known to have been practised by generations of hunters in western Amazonia, particularly the Brazilian Mayoruna and Marubo and by the Peruvian Amahuaca and Matses tribes.

Western scientists who have investigated the Amazonian potion, say it works some hitech magic as well. The frog secretion contains a veritable pharmacopoeia—several dozens of compounds including a previously unknown peptide.

Named adenoregulin, the 33-amino-acid long peptide works on the receptors in the brain which handle adenosine. Adenosine is a fundamental component in all human cell fuel, and the frog peptide seems to enhance its binding by subtly altering the receptors in the brain.

"What makes this property an exciting pharmacological lead," says Dr. John Daly of the National Institutes of Health, USA, "is that the successful anti-anxiety drug Valium acts on a different class of receptors by much the same mechanism."

Daly, his colleagues and the pharmaceutical chemist Vittorio Erspamer and his team at the University of Rome who have been investigating *sapo* say no other amphibian can compete with *Phyllomedusa*'s medicinal magic: it contains myriads of molecules that work on adenosine itself

(instead of the receptor); on the pituitary and adrenal glands; and on the blood-brain barrier and on the release of 'feel-good' chemicals.

All these could eventually lead to new therapies for depression, strokes, seizures and cognitive ailments such as Alzheimer's disease. Even if they don't, *sapo* still promises to become an important tool in the study of the brain's receptors and the chemical actions they trigger.

The Sunday Times of India 1-8-1993

FREAKING OUT ON THE FROG

When he visited the rain forest on the border between Brazil and Peru nine years ago, Peter Gorman had no idea that he would be the first to discover a magic hunting rite of the Matses Indians based on an Amazonian tree frog with enormous medical potential.

Before his visit, all the New York-based writer knew about the rain forest was that it was being destroyed so fast that if he wanted to see it, he would have to do so soon.

So he had bought himself a plane ticket, landed at Iquitos in Peru and spent several weeks on a riverboat visiting remote fishing villages on the banks of the Ucayali River.

The stories he heard here from the natives rivalled the magic realism of Gabriel Garcia Marquez's Nobel Prize-winning *One Hundred Years Of Solitude*.

The locals told Gorman, for instance, about pink river dolphins that transformed themselves into beautiful women at night; and of electric eels that created lightning storms as they danced upon the waters; and black crocodiles so huge that they could swallow whole canoes; and anacondas

that grew so long that they lost their ability to move, relying on magnetic powers to attract food.

But the most fascinating stories, by far were about the Matses. They were described as cannibals who painted their faces red and blue. Jaguar-like whiskers radiated around the mouths of these hunters who lived in the malaria and yellow fever-infested jungle along the banks of streams. They were said to move like the wind, talk to the animals and roam the forest in search of blood, leaving piles of human bones bleaching in the sun.

Gorman did not believe that there still existed a tribe unspoiled by contact with the outside world. Some locals told Gorman that missionaries had long ago converted the Matses. Others doubted if they still existed.

It was Moises, a jungle survival expert in his mid-'50s, who had spent 30 years in the Peruvian military—some of them campaigning against marauding Indians—who told Gorman what he wanted to hear: not only did the Matses exist but they thrived as traditional hunter-gatherers in the harsh rain forest environment.

Under Moises' tutelage, Gorman entered the rain forest to search for the legendary tribesmen. "It was like entering a living organism whose defences all seemed to be geared toward keeping me out," recalls the amateur anthropologist in an article in *Omni*. "The air was thick and oppressive. The odour of decaying vegetation clung to my clothes and left a sickly aftertaste in my mouth. Stinging insects swarmed by the thousands, their bites festering instantly. I stumbled on the root-covered jungle floor and cut my hands on razorsharp leaves."

After months of hardship and gradual acclimatisation, Gorman and Moises entered the heart of the forest haunt of the Matses. One day, a young Indian appeared at their camp site like a silent apparition. The Matses had heard on the jungle grapevine that two white men were searching for them.

The youth's forehead and eyes were painted with a red dye, the mouth outlined in blue, and long, whisker-like spikes were stuck into the flesh of his upper lip. He was naked except for an old pair of green trunks and carried a long black bow and a handful of feathered arrows.

The youth spoke to Moises in the Panoan language, borrowed a shotgun from him and returned later, carrying two wounded monkeys in a leaf basket slung on his back.

Clinging to his hair was an infant monkey, taken from one of the wounded adults. The hunter returned the gun, left one of the monkeys at the camp and disappeared into the jungle.

Gorman and Moises followed him to a Matses pueblo in the forest and watched as he handed over the remaining adult monkey to a woman who began to roast it on an open fire, oblivious to its cries.

At the same time, the baby monkey was given to a young woman who was nursing her own child. She immediately allowed the monkey to suckle at her free breast. "Those dual images represented a combination of cruelty and compassion I had never imagined," says Gorman, "and they taught me more about the reality of the jungle than anything I had previously experienced. More than that, those images compelled me to return to the Matses again and again."

The Matses turned out to be a small, semi-nomadic tribe, already under threat of

acculturation, living in the jungle along the tributaries of the Rio Yavari, on the border between Peru and Brazil.

Unlike other tribes in the region, they possessed only rudimentary weaving and ceramic skills. They had no formal religion, no ceremonies or dances, and they produced nothing for trade. They lived by hunting with bows and arrows and clubs and spears. They also used shotguns when they could get shells.

During one of these trips, a young Matses Indian called Pablo introduced Gorman to a greenish powder called *nu-nu*. Matses hunters sniffed it to get visions of where to hunt.

Gorman tried *nu-nu* and got visions of a monkey, tapir and a wild boar. The next day, Gorman claims, a Matses hunting party did manage to bag seven boars at the very place Gorman ostensibly had seen the previous day in his drug-induced hallucination!

Remarkable as this may seem, Gorman says *nu-nu* was "old hat" to the anthropologists from the American Museum of Natural History to whom the writer-amateur anthropologist later described his experience. What was completely new to the scientists was *sapo* (from the Spanish for toad). Even the jungle-smart Moises had never seen it. He called it *una nueva medicina*, 'a new medicine', on the day Pablo introduced *sapo* to Gorman.

This was the skin secretion of the *dow-kiet!* tree frog used by the Matses to sharpen their senses, improve their stamina and enhance their strength.

Taken from a living Phyllomedusa frog, *sapo* is stored dry on sticks. (Incidentally, Boddaert, the taxonomist who invoked Medusa in naming the frog, knew what he

was talking about: in Greek mythology Medusa is the chief of the Gorgons. Her hair was said to have turned into serpents and her once beautiful face became so terrible that all who gazed upon it, turned to stone.)

During use, *sapo* is mixed with saliva and introduced into the skin through freshly inflicted burns: Pablo caused a match head-sized burn on Gorman's left forearm with a smouldering twig and he rubbed the greenish mustard-coloured concoction into the burn.

The reaction was so instant and violent—purging, vomiting, drooling and heart palpitations—that the writer says, “I was hoping and praying that I would die.” He fell into a daylong listlessness and eventually passed out, only to wake up “feeling god-like”: with his senses sharpened and insensitive to fatigue and thirst during the hunt. Curiously, Gorman also had vivid hallucinations—a feeling of animals passing through him—during the encounter with frog.

Gorman also reports that the Matses take ‘lots of frog’ for powerful magic, (*Bi-rambo sapo*), particularly during the rains when flooding makes hunting difficult. The drugged tribals supposedly project the *animas* of the forest creatures, to lure the wild animals into traps.

None of these ‘projective’ aspects have, however, been confirmed in the lab by scientists. Indeed, University of California anthropologist Katherine Milton, who has studied *sapo* following Gorman, says she isn't sure the concoction always lives up to its name, at least among the Mayoruna people she has studied. Also, she has never observed its effect on hunting. What she has noticed, however, is that the tribals tend to take *sapo* on rainy days, “when

hunting is at best a second-string activity and there is nothing else to do”.

However, the non-validation of ‘hallucinatory’ aspects of *sapo* does not detract from its exciting biomedical potential.

“Unfortunately, time is running out as science catches up on the natural medicines of the tribal peoples,” says Gorman. “The only man at San Juan able to draw a response from the *dow-kiet* (calling to it in its guttural, mating bark) is an indication that most Matses no longer rely on it. And we have no way of knowing how many other medicines the Matses and others—once used and have abandoned, which might also have been valuable to us.”

The Hindu 2-8-93

UNIQUE WORSHIP

Berhampur, Sept.

Villagers of Khajuria in Ganjam district worshipped a frog on Monday to please rain god Indra, as the dry spell continued to delay cultivation.

A report here on Tuesday said farmers in Khajuria village firmly believed that there would be adequate rain if the rain god was pleased with this unique method of worship.

A big live frog tied to a bamboo stick was carried by villagers who went round the village chanting couplets in honour of the wife of the rain god.

The frog, smeared with vermilion, was bathed in tamarind water by village men in the belief that there will be a downpour within 24 hours. There was no word whether the villagers' wish was fulfilled.

UNI

Indian Express, 26-8-93

PYTHON BLOWS UP TURBINE

HANOI—A 20 kg, 3.5 metre python slithered through three security grills at a Vietnamese hydroelectric plant and blocked a pressure pipeline, causing a turbine to explode.

Another turbine at the Iadrang plant was damaged by flooding in the recent incident and power supplies to the central city of Pleiku were disrupted, according to local officials quoted by the bi-weekly trade union newspaper Lao Dong on Wednesday. Reuter

The Hindu 17-9-93

FROG AND RAIN

Sir,—This is with reference to the news item "Unique worship" (*The Hindu* Sept. 2) of Khajuria villagers who, to end a dry spell, caught a big frog, bathed it in tamarind water, applied vermilion, tied it to a bamboo stick and took it round the village chanting couplets. Immediately, I went to the Meteorological Office at Lodhi road and checked on the week's cumulative rainfall in that region. Vizag in the south recorded 20 cm and Paradip on the north had 10 cm. during the weekended Sept. 2. Khajuria in between Vizag and Paradip should have had rain. Alas, it looked as if the prayers of the villagers were answered.

Occurrence of rain is probabilistic in that if during the monsoon there is a prolonged spell of no rain, then the probability of rain increases with every dry day. People resort to prayers and worship usually towards the end of a dry spell when without any meteorological data and charts one may say that the dry spell will end on probabilistic considerations alone. And when rains occur ending the dry spell, it looks as if the prayers were answered lending credibility to such forms of prayers and worship.

When the trouble is over, people forget God and prayer till the trouble starts once

again which makes Bhagvan Sri Krishna remark in Bhagavad Gita that people approach him when only they are in trouble!

In this particular case, tying the frog to a bamboo stick and bathing it in tamarind water amount to acts of cruelty and have no place in acts of worship. May I suggest to people of Khajuria to pray for the rains at the commencement of monsoon every year instead of resorting to worship when the rains fail? Recalling the happy hours I used to spend hearing the chorus of frogs and Valmiki's certificate that frogs croak and chorus to rhythmic beats (Kanta-talam), I may request the villagers to use an image of clay instead of a real frog.

S. Lakshminarayanan, New Dehi.

The Hindu, 29-9-93

NEW FINDINGS ON DINOSAUR KILLER

The speeding object from outer space that struck Earth 65 million years ago and wiped out the dinosaurs was far larger than previously thought, and produced what was perhaps the largest explosion to rock the planet since life began, a new study published in the journal *Science* says.

The crater which lies a mile or so beneath the Gulf of Mexico and the northern tip of the Yucatan Peninsula, has long been eroded by geological processes. That makes it hard to pin down its dimensions and whether it was an asteroid or a comet.

The crater has been known for several years, along with the date of its formation at the end of the Cretaceous period (the K/T period). That made it the leading candidate for the impact that may have ended the era of the dinosaurs.

But the explosion that would have caused such a crater seemed only barely large enough to wreak a global havoc, and scientists have been searching for companion craters that might have accounted for the catastrophe. They need search no more.

The new study increases the estimated diameter of the crater from 110 miles to 185 miles, based on a new map of variations in the area's gravitational field. The speeding object itself is now calculated to have been five to 10 miles across. The colossal energy released in its collision with Earth is now estimated to be equal to 300 million hydrogen bombs, each 70 times more powerful than the one that incinerated Hiroshima. The study's lead author, Dr. Virgil L. Sharpton of the Lunar and Planetary Institute in Houston, U.S., said, "Clearly, this type of event is extremely rare, something on the order of once every billion years or so." Such a colossus would slice through the Earth's atmosphere and ocean, and collide with bedrock at enormous speeds, vaporising material in a vast explosion and lifting huge amounts of rock and dust high into the stratosphere and beyond.

In addition to Sharpton, the new study was carried out by D. Scott Lee and Paul D. Spudis of the Lunar and Planetary Institute; Kevin Burke and Stuart A. Hall of the University of Houston; Antonio Camargo-Zanoguera and Juan Manuel Quezada-Muneton of *Petroleos Mexicanos* in Mexico City, and Luis E. Marin, Gerardo Suarez-Reynoso and Jaime Urrutia-Fucugauchi of the *Universidad Nacional Autonoma de Mexico* in Mexico City.

The new study adds support to the idea that a doomsday rock from outer space brought an end to the dinosaurs and other creatures at the end of the Cretaceous period by creating a global pall of dust that blotted out the sun, as well as environmental disasters like fire storms and acid rain. That hypothesis, first proposed in 1980, has been questioned by skeptics even while gaining credibility in recent years. And the new study is unlikely to end the debate.

Yet, at 185 miles, the Yucatan crater now becomes far and away the largest known celestial blemish to mar Earth's surface. The two closest rivals are in Sudbury, Ontario, and Vredefort, South Africa, where eroded craters were originally thought to be some 90 miles across but lately are thought to be 125 miles.

Dr. Clark R. Chapman, a senior scientist at the Planetary Science Institute in Tucson, Arizona, who had no involvement in the new study, said the latest estimate of the Mexican crater's size makes it larger than any known to have formed in the past few billion years on Earth, Moon, Mars, Venus or Mercury. "The implication", he said, "is that this is the biggest thing that happened anywhere in the inner solar system since life began," that is a billion years ago.

The closest rival is the Mead crater on Venus, named after Margaret Mead, the American anthropologist who died in 1978. The Mead crater is about 175 miles across. Larger craters exist in the inner solar system including such well-known features as the *mares*, or seas, that comprise the man in the Moon's face. But these were formed during the early days of the solar system by speeding swarms of planetoids and their smaller cousins, asteroids.

That heavy bombardment ended 3.8 billion years ago, after which life slowly began taking shape on Earth. Complex lifeforms first appeared about 600 million years ago during the Cambrian life explosion.

The team, Sharpton said, analysed about 7,000 readings of gravitational strength that had been made over the suspect region by such groups as the National Oceanic and Atmospheric Administration, the Pentagon's Defence Mapping Agency and *Petroleos Mexicanos*. The violent impact of the cosmic object 65 million years ago churned up the deep Earth, creating new patterns of low and high-density rock that in turn can be detected as local changes in Earth's gravitational field.

The scientists say they detected three major rings and parts of a fourth expanding in ever-increasing circles, not unlike the pattern of a bullseye. The spacing between the rings, they said is similar to that found on big craters on other planets.

William J. Broad

New York Times News Service

News Compiled By

T. RAVEENDRA BABU

OBITUARY



Prof. M.V. RAJENDRAN

AN IRREPARABLE LOSS

Prof. M.V. Rajendran, the pioneer herpetologist of South India, who was a Founder-Trustee of the Madras Snake Park and had served on the Trust Board ever since, passed away on 6.8.93 at the age of seventy-seven.

This is an irreparable loss. Not only was he a highly qualified herpetologist on the Trust Board, but had also always placed his vast experience and knowledge of snakes and other reptiles at the disposal of the Park. He had been running a snake research centre in Tirunelveli from well before the Madras Snake Park was founded. Here, he treated hundreds of cases of snake-bites, many the bites of poisonous snakes, as a labour of love and Christian charity, and was acclaimed throughout the district as the "paambu doctor". In that countryside, where anti-venom serum was seldom available, he treated the victims successfully with scientific first aid and herbal remedies, which he had tested out.

Right from his boyhood he had an incurable interest in reptiles, particularly snakes. He took his M.A. degree in Zoology from the Madras Christian College in 1951, and thereafter joined the staff of St. Xavier's College at Palayamkottai as the Professor of Zoology. His Ph.D. thesis was on the Uropeltidae of the Tamil Nadu and Kerala hills. He was a dedicated edu-

cationist and his many students, now settled all over the country, remember him with affection and regard.

Prof. Rajendran was inspired by that quality rare in a scientist, an authentic empathy with his subjects. He has many original research studies to his credit, but such was his enthusiasm for his vocation that instead of seeking recognition for himself by publishing them in English scientific journals, he plunged deeper into field studies, and wrote for a much wider lay public in his own mother-tongue, Tamil. His Tamil writings testify to his talent for presenting scientific knowledge without the least sacrifice of precision or integrity most interestingly and readably. His fascinating book, *NAM NĀATTU-PAAMBUGAL* (The Snakes of Our Country) provides a quite adequate taxonomic account of our snakes, interspersed with personal experiences of diverse snakes and original ethological observations, and chapters on first aid in cases of snake-bite and treatment with serum and herbal remedies, snakelore and lizardlore, and is illustrated with numerous evidentiary photographs.

His quiet but impressive presence and infectious interest in all reptiles will be sorely missed by all who knew him or had read him.

MEMOIR

Dr. M.V. Rajendran, was an eminent naturalist and ethologist. Born to humble parents, Mr. Visvam and Mrs. Parvathi on 2.11.1916 at Satankulam Village of V.O C. district, he grew up to be a nature lover. He passed the high school examination with distinction and merit scholarship in science at St. Xavier's High School, Higher Grade Training in Don Bosco School, Vellore and B.Sc. Botany in St. Joseph's College, Trichi. He joined as Lecturer in Botany at St. Xavier's College, Palayamkottai.

After losing his beloved mother in 1934, he wanted to be ordained as a priest in the Saletian Seminary of Monks, but realised that he was wanted elsewhere in the world. In September 1945 he married Mrs. Nesam-mal, who at that time was working in the Government Hospital at Nagercoil.

He blossomed into a zoologist while at the Madras Christian College and took his Doctorate in March 1974. The wealth of knowledge he gathered as a result of his close observations and love of nature is evident from the publications he made over the years, the more important of which are:

ஆடும் பாம்பு (1951)

Outlines of Botany (1954)

Pre-Professional Biology (1958)

இயற்கை இன்பம் (1969)

Pre-University Botany

Pre-University Zoology 14 Editions

நம் நாட்டுப் பாம்புகள் (1967)

பாப்பாவுடம் பாம்பு (1970)

Recent advances in Ecology (Tamil) 1973

Common birds by Salim-Ali (Tamil)

Uropeltid snakes (Madurai Univ. Publication.

நம் நாட்டுப் பாம்புகள் (Revised 1986)

He was also a practising Homoeopathic Doctor who has cured several cases of viper bites.

As the Founder Member of the Herpetological Society of India, Professor Rajendran organised a number of camps with the motto "Know your Snakes; Save our Snakes". He involved 26 colleges in the "Save Our Snakes" campaign and organised public meetings at more than 300 places. He exhibited his snakes at the Chithirai and Dasara festivals at Madurai, Theni, Kovilpatty, Mysore and many other places. He was also the Founder Member of Nellai Snake Park and Courtallum Snake Park and Founder Trustee of the Madras Snake Park Trust. He has participated and made useful contributions in many conferences and symposia on ethology, wildlife conservation and invertebrate reproduction at Porto Novo, Palayamkottai, Thiruvananthapuram, Bangalore, Madras, Palani, Tanjore and Bombay. He carried out extensive field survey and research on the taxonomy of snakes, especially the Uropeltids from all over Tamil Nadu along with Dr. Carl Gans, University of Michigan, U.S.A.

Dr. Rajendran's love for field work and environmental conservation is abundantly clear from the way he volunteered in October-November 1990, to accompany the team of scientists from the Madras Snake Park Trust to the Narmada Valley, Madhya Pradesh, to study the possible impacts of the proposed Indira Sagar Dam on the reptiles of the submersion area and to make suitable recommendations. Disregarding his age and health, he traversed on foot many rough terrains for almost a month and collected and identified a number of reptiles. The reports on the Reptiles of the Narmada valley and on the Island Ecology which he co-authored were well received by the sponsoring agencies.

Dr Rajendran has made significant contributions to the field of education also. As a Member of the Senate, Academic Council and Board of Studies and as Chairman of the Examination Board, he brought about useful changes and revisions in the pattern of examination.

Acclaimed as the Snake-man Tamilnadu, he was a person spiritually inspired, morally sound, academically excellent and socially committed. He had left behind several of his science students who occupy high positions today.

Dr Rajendran passed away in his sleep on 6.8.1993 at the age of 77 and Tamil Nadu has lost a devoted herpetologist and an ardent lover of snakes. Today he sleeps peacefully in his own Nature Garden at the Nellai Snake Park, Shantinagar where he had spent many years along with his pet python and other pet reptiles. He is survived by his wife, three daughters, three sons and 10 grandchildren.

We, the Trustees and Staff of the Madras Snake Park Trust, record our deep appreciation and gratitude for the most valuable advice and guidance rendered to us and pay homage to this naturalist and conservationist. We also dedicate this issue of COBRA to his loving memory.

May his soul rest in Peace. ●

SNAKE LORE

Snake worship from South India

(Courtesy: Indian Serpent Lore by Vogel)

Nagakals are found at entrance of towns and villages. These are thanksgiving offerings by Childless couples who undertake the *Nagapratishta* under the combined peepul and neem tree.

In North Canara in the Kumta taluk there is a place called *Nagatirtha* with a wellbuilt tank around which there are artificial caves containing thousands of stone serpent images

In South Canara on one of the highest mountains of the Western Ghats, there is a place known as Subramanya, famous for its serpent temple. The annual festival takes place during November / December. People suffering from Leprosy and also childless couples visit this place and take vows to roll and wriggle like a snake around the temple if their wish is granted. A person supposed to be possessed by the spirit of Subramanya dances at the temple and is believed to have the power of foretelling the future. In the jungle around this temple, there grows a species of cane known as *Nagaveta*. A walking stick made out of this cane is considered to afford protection against poisonous snakes.

Another famous serpent temple exists at Nagapattinam where *Naganatha* is worshipped on his ant-hill.

The Malabar coast of Kerala is a great seat of serpent cult. In the Southwest corner of the estate gardens of Hindu Malayalis is a *Sarpa Kavu*, or *Nagakotta*. Pujas are offered by Brahmins once a year atleast and songs and dances known as *Nagana-pattu* are performed. Pambanmakkad Nambudiri who lives in Ponmani town is famous with the house full of cobras said to be harmless to his family.

In South Canara two curious rites are known in serpent worship. Three afflictions are attributed to the wrath of serpents for having killed a snake in a former life, namely Leprosy, Childlessness and Sore eyes. Afflicted people often perform costly ceremonies to remove the curse. These are *Sarpa samposhkara* by Childless couples, *Nagamandala* for frustrated hopes.

Another important festival is the *Nagapanchami* which is celebrated on the 5th day of the bright fortnight of the waxing moon during the month of Sravan or rainy season i.e., early August. It is declared as a holy day where *Naga* markings and images are worshipped. There should be no digging of the earth either by day or night during *Nagapanchami*.

Compiled by A.N. Jagannatha Rao.

NEWS FROM MADRAS SNAKE PARK TRUST

19th July '93

Mr. A.N. Jagannatha Rao, Hony Secretary delivered a lecture on Conservation of Reptiles at Meston College of Education, Royapettah, Madras.

28th August '93

The Research Department personnel attended a one day workshop on 'Animal Rights' organised by Animal Welfare Board of India. Madras.

23rd September '93

Mr. A.N. Jagannatha Rao, Hony Secretary delivered a guest lecture at Stella Mautama College of Education, K.K. Nagar, Madras on the Role of Reptiles in the Eco-system.

Compiled By

R. RAJARATHINAM

CURRENT RESEARCH PROJECTS AT MADRAS SNAKE PARK TRUST

1. "Ecology of Reptiles in scrub jungles of Tamil Nadu" by Mr. V. Kalaiarasan for his Ph.D. Programme under the guidance of Dr. R. Kanakasabai, Prof. and Head, Dept. of Zoology A.V.C. College, Mayiladuthurai. This project is being co-ordinated by Mr. A.N. Jagannatha Rao, Hony. Secretary and Dr. R.S. Pillai, Research Officer, Madras Snake Park Trust.

2. A research project on "Rodent control using harmless Reptiles" is being undertaken by Mr. T. Raveendra Babu for his Ph.D. Programme under the guidance of Dr. P. Vivek Raja, Lecturer in Zoology, Govt. Arts College, Madras-35 co-ordinated by Shri A.N. Jagannatha Rao, Hony. Secretary and Dr. R.S. Pillai, Research Officer Madras Snake Park Trust.

3. Mr. R. Aengals is working for his Ph.D. on "Studies on Iso-enzymes of Snakes"

under the guidance of Dr. E. Prabhakaran Selection Grade Lecturer in Zoology, Presidency College (Autonomous) Madras-600 005. This project is being co-ordinated by Shri A.N. Jagannatha Rao, Hony. Secretary and Dr. R.S. Pillai, Research Officer, Madras Snake Park Trust.

4. The following Research programmes on captivity studies are being undertaken-

- a) Studies on Chamaeleon—R. Rajarathinam and R. Aengals.
- b) Studies on Turtles and Tortoises—R. Rajarathinam and V. Kalaiarasan
- c) Captive breeding in Green Iguana (*Iguana iguana*)—R. Rajarathinam and T. Raveendra Babu.
- d) Correlation between morphology and habits of Snakes—Mrs. R. Chitra.

**SURPLUS REPTILES AVAILABLE AT
MADRAS SNAKE PARK TRUST IN EXCHANGE**

(Subject to approval by the Government)

WE OFFER

Snakes

1. Indian Python (*Python molurus*)
(Babies and Sub-adults)
2. Reticulated Python (*Python reticulatus*)
(Single specimen not pair)

Turtles, tortoises and Crocodiles

3. Pond turtle (*Melanochelys trijuga*)
4. Star Tortoise (*Geochelone elegans*)
5. Marsh Crocodile (*Crocodylus palustris*)
(7 years old)

WE ARE LOOKING FOR

Snakes

1. Black Cobra (*Naja naja oxiana*)
2. King Cobra (*Ophiophagus*)
3. Banded Krait (*Bungarus fasciatus*)
4. The Indian Egg-Eating Snake
(*Elachistodon westermanni*)
5. Flying Snake (*Chrysopelea ornata*)

Monitor Lizards

6. Desert Monitor (*Varanus griseus*)
7. Yellow Monitor (*Varanus flavescens*)
8. Water Monitor (*Varanus salvator*)
9. Common Indian Monitor (*Varanus bengalensis*)

Turtle

10. Fresh water turtles—any species.

Crocodile

11. Estuarine Crocodile (*Crocodylus porosus*) (Juveniles and sub-adults)
12. Preserved specimens of 5 species of
Sea turtles
 - a) Leatherback turtle (*Dermochelys coriacea*)
 - b) Green turtle (*Chelonia mydas*)
 - c) Logger Head turtle (*Caretta caretta*)
 - d) Olive Ridley turtle
(*Lepidochelys olivacea*)
 - e) Hawksbill (*Eretmochelys imbricata*)

An Appeal

The Madras Snake Park Trust has obtained, with the help of the Govt. of Tamil Nadu, 2.5. acres of land on the old Mahabalipuram Road on the outskirts of the city of Madras to establish an elaborate Reptilium on modern scientific lines to promote Tourism, Conservation, Education, Service and Research on Reptiles.

The proposed layout and estimates of the various units are shown on the next page. The total cost of the project is estimated around Rs. 180 lakhs or 6,00,000 \$ (US).

The MSPT now seeks financial contributions from various organisations and individuals to fulfil this ambitious future programme unit/block-wise.

Grants and donations are exempted by the Income Tax authorities under 80G vide Ref. No. DITE/1146/(34)/78 dated 1-4-89 to 31-3-92.

Generous contributions are solicited. Contributions may be sent to "The Madras Snake Park Trust" Guindy National Park—Guindy, Madras-600 022 India.

Trustees of the Madras Snake Park Trust, Madras-600 022.

DETAILS OF COST OF CONSTRUCTION AND DISPLAY

Building 1 and 2 (3 floor)

Each floor has 40' — 40' area and will house Rooms, Mess, Recreational area for Research students, each building 12 students.

Cost per floor Rs. 6 lakhs or \$ 20000.
Total cost of building 18 lakhs or \$ 60000.

Building No. 3 and 4 (3 floor)

Each floor has 70' — 40' area and will house Research Division, i.e., Library, Laboratory etc.

Cost per floor Rs. 10 lakhs or \$ 35000.
Total cost of each building Rs. 30 lakhs or £ 105000.

Pit No. 5 and 6 (1000 sq. ft.)

Specially designed, natural setting with pond etc., to house 3 species of Indian Crocodiles

Cost Rs. 1,50,000 or \$ 5000.

Pit No. 7

This will house exotic reptiles like Iguanas, etc., in 500 sq. ft. area.

Cost Rs. 75,000 or \$ 2,500.

Pit No. 8 and 9 (area 1000 sq. ft.)

Skunks, Chamaeleons, Monitors etc., will be exhibited in these enclosures in specially designed habitats.

Cost Rs. 1,50,000 or \$ 5000.

Pit No. 10 and 11 (area 1000 sq. ft.)

Specially landscaped to display land tortoises, marine turtles and fresh water terrapins.

Cost Rs. 1,50,000 or \$ 5000.

Pit No. 12 (Area 500 sq. ft.)

Giant tortoise of Seychelles, Komodo dragon etc., will be displayed.

Cost Rs. 75,000 or \$ 2500.

Building No. 13 and 14 (area 1000 sq. ft.)

Different poisonous and non-poisonous snakes of India will be exhibited in specially designed habitats. King Cobra will find a special habitat cooled by air cooler.

Cost Rs. 1,50,000 or \$ 5000

Building No. 15 and 16.

Indian snake lore and myths which are in plenty will be elegantly brought out and made interesting and attractive for tourists. Simple hall 40' × 40' with a sloping roof.

Cost Rs. 6 lakhs or \$ 20,000 — each building.

Building No. 17 (Demonstration shed—3000 sq. ft.)

To educate the public on reptiles. Hourly display of live reptiles with commentaries in English, Tamil and Hindi. Tapes in 10 Indian languages and choice of 6 Foreign languages will be available for large groups for a special fee.

Cost Rs. 10,00,000 or £ 35,000.

Building No. 18 and 19.

40' × 40' to house preserved specimens of Indian and exotic reptiles for Research purposes. Sloping roof.

Cost Rs. 6 lakhs or \$ 20,000 each building.

Building No. 20.

This is a storeyed building. The ground floor to be used by visitors as a Rest-shed. The second floor for the Administrative Office of the Madras Snake Park Trust. 3rd floor for Guest house.

Each floor is 70' × 40' Cost Rs. 10 lakhs or \$ 35000. Total cost of the building would be 30 lakhs or £ 105000.

Building No. 21

3 floors each of 70' × 40'. To house an auditorium, a conference hall and a records room.

Each floor cost Rs. 10 lakhs or \$ 35000 and the total cost of building Rs. 30 lakhs or \$ 105000.

Building No. 22 and 23.

These are quarters for watchman, on either side with 300 sq. ft area.

Cost Rs. 1,00,000 or \$ 3500. The 2 units cost Rs. 2,00,000 or \$ 7,000.

Building No. 24 and 26

Open wells of 6' diameter each costing Rs. 37,000 or \$ 1250. Together they cost Rs. 74,000 or \$ 2500.

Building No. 25

General store Room of 20' × 10'.
Costing Rs. 75,000 or \$ 2500.

Building No. 27 and 31

Large underground storage tanks to hold water, each 15,000 litres capacity.

Cost Rs. 75,000 or \$ 2500/- each 2 sumps together would be Rs. 1,50,000 or \$ 5000.

Building No. 28 and 30

10' × 10' rooms for electric meters and water pumps, each room Rs. 37,000 or \$ 1250.

Cost of 2 room Rs. 75,000 or £2500.

Building No. 29

10' × 10' Security room. Cost Rs. 37,500 or \$ 1250.

No. 32 and 33

IN and OUT gates Each cost Rs. 15,000 or \$ 500. Cost of 2 gates Rs. 30,000 or \$ 1,000.

All costs are worked out on present exchange rate of US \$ — 30.00 as on date March 1993.

ALL GRANTS WILL BE DISPLAYED ON A MARBLE SLAB ON THE RESPECTIVE FLOOR/BUILDING.

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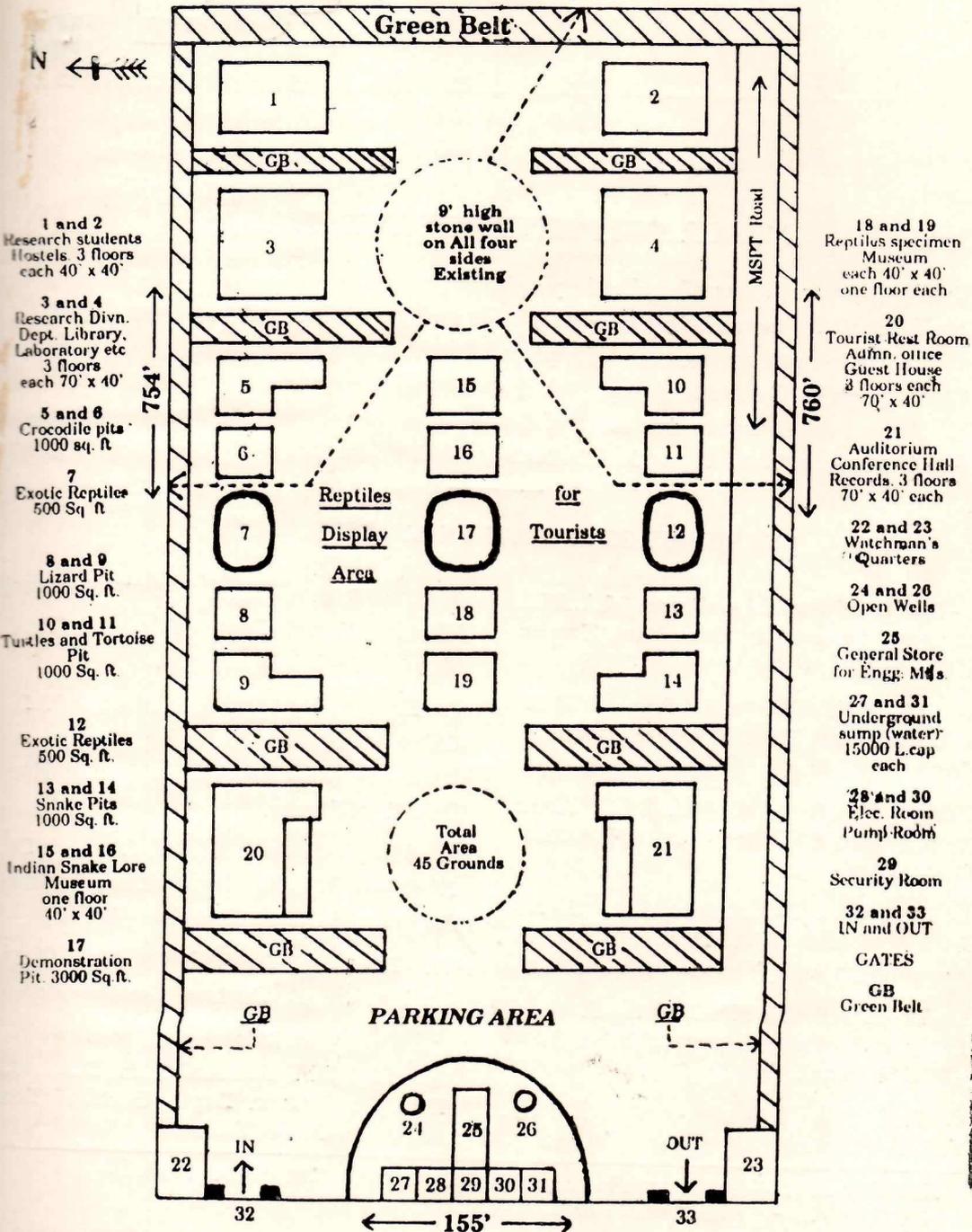
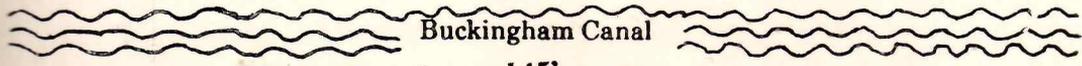
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Proposed Layout of Madras Snake Park Trust at Kottivakkam, Madras



- 1 and 2 Research students Hostels, 3 floors each 40' x 40'
- 3 and 4 Research Divn. Dept. Library, Laboratory etc 3 floors each 70' x 40'
- 5 and 6 Crocodile pits 1000 sq. ft.
- 7 Exotic Reptiles 500 Sq. ft.
- 8 and 9 Lizard Pit 1000 Sq. ft.
- 10 and 11 Turtles and Tortoise Pit 1000 Sq. ft.
- 12 Exotic Reptiles 500 Sq. ft.
- 13 and 14 Snake Pits 1000 Sq. ft.
- 15 and 16 Indian Snake Lore Museum one floor 40' x 40'
- 17 Demonstration Pit, 3000 Sq. ft.

- 18 and 19 Reptiles specimen Museum each 40' x 40' one floor each
 - 20 Tourist Rest Room Adm'n. office Guest House 3 floors each 70' x 40'
 - 21 Auditorium Conference Hall Records, 3 floors 70' x 40' each
 - 22 and 23 Watchman's Quarters
 - 24 and 26 Open Wells
 - 25 General Store for Engg. Mf's
 - 27 and 31 Underground sump (water) 15000 L. cap each
 - 28 and 30 Elec. Room Pump-Room
 - 29 Security Room
 - 32 and 33 IN and OUT GATES
- GB Green Belt

MAJOR OBJECTIVES OF THE TRUST

1. To dispel blind fear of snakes in people
2. To highlight the usefulness of reptiles in controlling rodents and pests.
3. Efforts towards conservation of reptiles.
4. To promote Tourism.
5. To promote scientific Treatment of Snake bites.
6. To conduct Research on the Eco-biology of Reptiles.

TRUSTEES OF MADRAS SNAKE PARK TRUST

1. Shri S. Meenakshisundaram, M.A., B.L., Advocate, Labour Law Consultant, Trustee & Chairman.
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10. Dr. G. Durairaj, M.Sc., Ph.D., Prof. and Head, Dept. of Zoology, Madras University. Ex-Officio Trustee.
11. Shri S M Sankaralingam, B.Sc., B.L. Director, Tourism Dept., Govt. of Tamil Nadu, Ex-Officio Trustee.

Edited by Dr. R.S. Pillai and Printed on behalf of Madras Snake Park Trust.

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Editorial Board Dr. R.S. Pillai, Dr. M.V. Rajendran, Dr. G. Durairaj, Mr. M. Krishnan, Dr. P.T. Cherian, Mr. Sankaralingam and Mr. A.N. Jagannatha Rao.