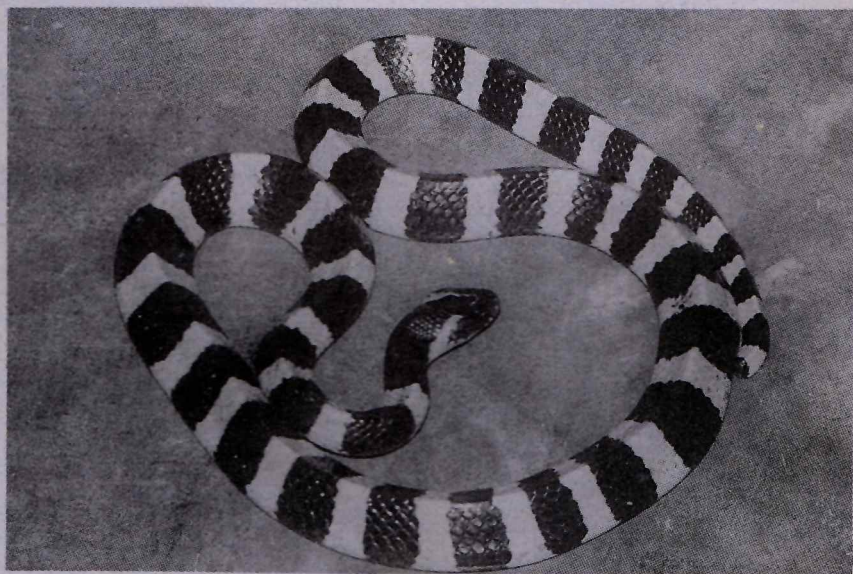


Cobra

Volume 23

January - March 1996



*Quarterly Newsletter
of the Madras Snake Park Trust*

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Cover

Banded Krait (*Bungarus faciatus*)

A large, conspicuous yellow and black-banded snake growing up to an average length of 1.5 m. living in termite mounds and rodent holes close to water. Feeds during night on other snakes including common krait. Fairly common in North-eastern India. Highly venomous.

Photo : K. Deuti

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Cobra invites articles and short 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.

Please send your contribution to the Editor, **Cobra**, Madras Snake Park Trust, Rajbhavan Post, Madras 600 022.



*A snake came to my water - trough,
On a hot, hot day, and I in pyjamas for the heat,
To drink there.*

.....
*The voice of my education said to me
He must be killed.*

.....
*I looked round, I put down my pitcher,
I picked up a clumsy log
And threw it at the water-trough with a clatter.*

.....
*I think it did not hit him
But suddenly that part of him that was left behind
convulsed in undignified haste,
Writhe like lightning, and was gone.
Into the black hole, the earth-lipped fissure in the wall-front,
At which, in the intense still noon, I stared with fascination.*

.....
*And so, I missed my chance with one of the lords of life.
And I have something to expiate;
A pettiness.*

D.H. Lawrence.



AMBIENT TEMPERATURE INFLUENCES THE POPULATION COUNT OF FROGS

R. J. RANJIT DANIELS & G. ANURADHA

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Declining populations of amphibians has emerged as a global concern. In India although we frequently refer to local declines in amphibian numbers, few studies have seriously attempted to collect data on any species to enable continuous monitoring of changes in numbers. In fact, even assessing the impact of frogleg trade and collection for laboratories on local frog populations has not been possible as no attempt was ever made to systematically collect the relevant data (Daniels, 1992). The reason for this inadequacy is that researchers in India have not had access to practical and affordable techniques for sampling amphibians in the field. In order to bridge this gap, a couple of papers on methodology were published in earlier volumes of *Cobra* (Daniels, 1994 a&b). Although simple methods for studying amphibians over both small and large geographical space have off and on been discussed with specific reference to Indian conditions, factors that bias sampling have not been elaborated. Here, in the following lines, we present some data on the influence of ambient temperature on the daily counts of 4 species of South Indian frogs.

Data on amphibian response to ambient air and water temperatures were obtained from the field study of 4 species of frogs. In the city of Madras at least 8 species of frogs viz., *Rana hexadactyla*, *Rana crassa*, *Rana limnocharis*, *Rana cyanophlyctis*, *Tomopterna rolandae*, *Ramanella variegata*, *Kaloula pulchra*, *Polypedates maculatus* and the toad *Bufo melanostictus* emerge in large numbers after the rains in the August-December season. Variations in the local abundances of frogs viz., *R. hexadactyla*, *R. crassa*, *R. cyanophlyctis*



and *T. rolandae* were monitored over a three month period between October and December 1992 in a village called Vadanemmeli in the outskirts of Madras. The study was concentrated in a small rainwater pond of maximum length 70m, width 40m, depth 1m and perimeter 300m. All observations were made in the evenings between 18.00 and 19.00 hours. Temperatures (air) at 50 cm above and 2.5 cm below (water) the surface of water were recorded at a predetermined point each day at the start of the observations. Air temperature during the study period ranged between 24.2 and 29.6° C (mean 27.451° ± 1.413). Water temperature varied from 24.7 to 33.0° C (mean 30.208° ± 2.28). This difference is statistically significant (z test; n=37; p<0.05). The number of frogs counted per day varied considerably as indicated in the table.

The observed pattern of frog abundance at the pond was positively correlated to the temperature of both air and water ($r=0.5370$ and 0.7594 respectively; $p<0.01$) (Figure). Individually, *Rana hexadactyla* failed to show any significant correlation. On the other hand, *R. cyanophlyctis* showed the highest correlation with both air and water temperatures viz., $r=0.5719$ and 0.7212 respectively ($p<0.01$). These results suggest that within a certain temperature range, the temporal abundances of *Rana cyanophlyctis*, *R. crassa* and *T. rolandae* increase with higher temperature.

Table : Variations in the number of individuals seen of the 4 species of frogs during the study.

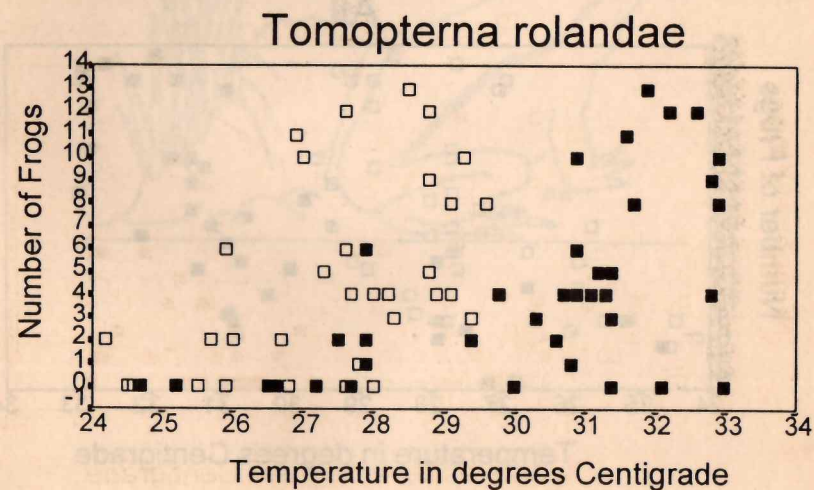
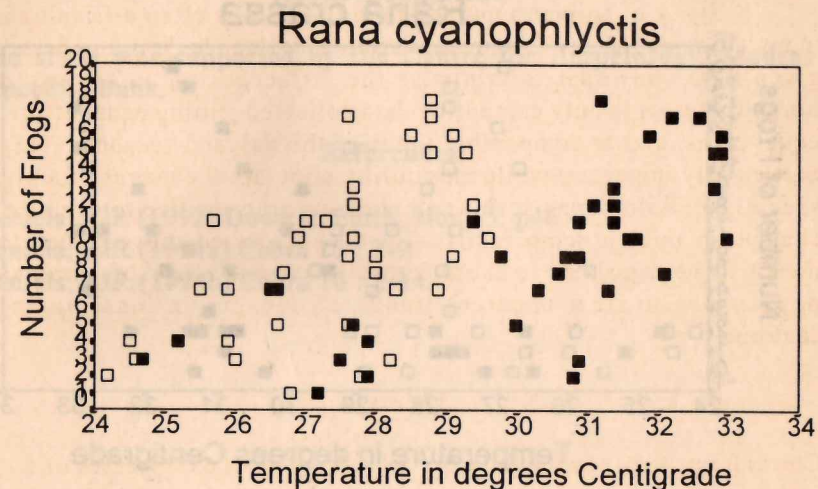
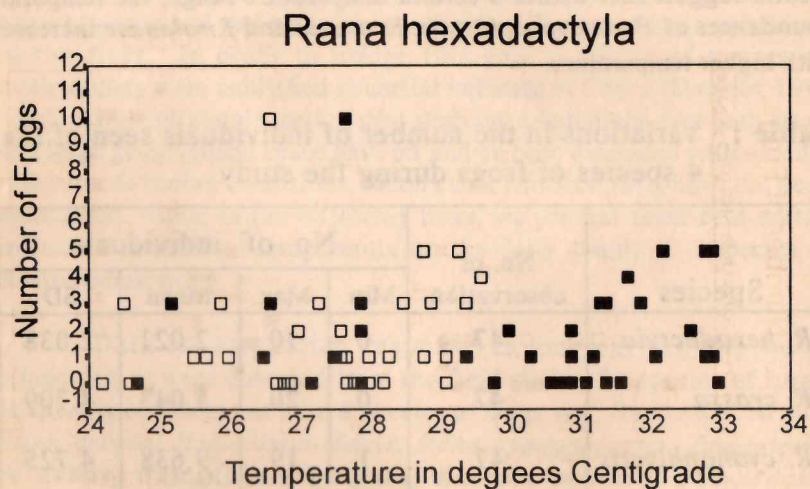
Species	No. of observation	No. of individuals			
		Min.	Max.	Mean	SD
<i>R. hexadactyla</i>	47	0	10	2.021	2.038
<i>R. crassa</i>	47	0	20	5.043	4.709
<i>R. cyanophlyctis</i>	47	1	19	9.638	4.725
<i>T. rolandae</i>	47	0	30	4.809	5.388
ALL	47	1	58	21.511	11.714



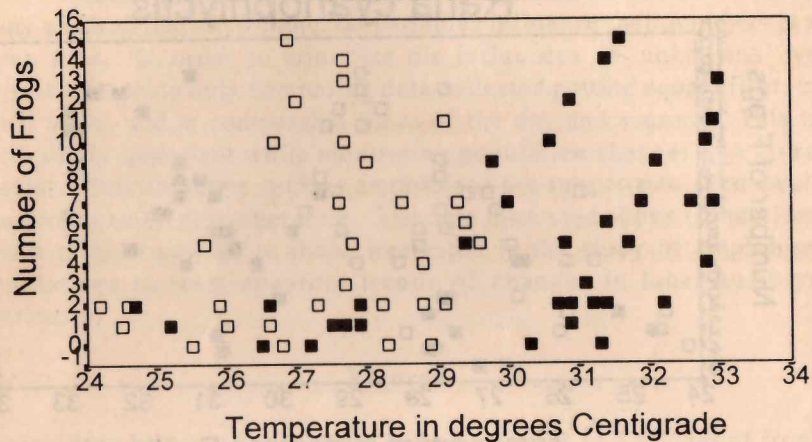
Study of animal populations in the field is often difficult as so many unidentified environmental variables influence their numbers at a given time. In order to minimise the influences of 'unknowns' we normally resort to only comparing data collected putting equal effort, in equal areas, and at comparable times of the day and seasons. This is particularly important while monitoring population changes of a given species. Poikilotherms such as amphibians are sensitive to even small changes in ambient temperature. The data discussed above is therefore meant to be a pointer to those interested in the study of amphibian populations to treat apparent trends of changes in local numbers cautiously.

Figure:

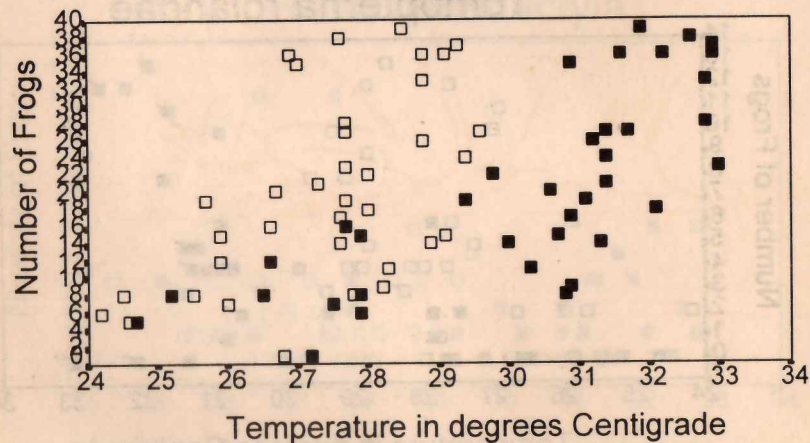
Correlations between temperature and abundances of 4 species of frogs individually and together. Grey squares are that of air and black squares, water.



Rana crassa



All

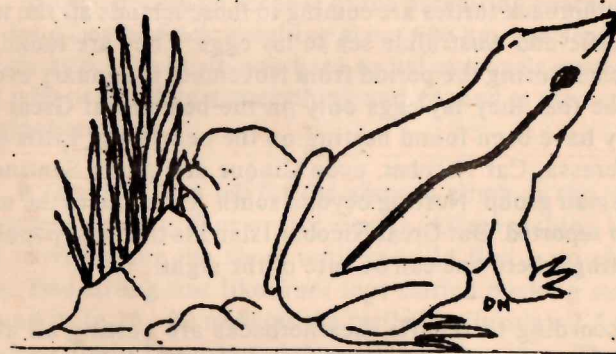


Acknowledgement:

The study was supported by the Centre for Herpetology, Madras Crocodile Bank.

References:

- Daniels, RJR (1992) Down to Earth, Nov 15. p46
 Daniels, RJR (1994a) Cobra 15 : 3-9
 Daniels, RJR (1994b) Cobra 16 : 2-14.





LEATHERBACK'S NESTING UNDER THREAT

Sri Biswajit Dutta

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Port Blair - 744 101

Watching a sea turtle coming out of water, dig a nest and lay her eggs is to see one of the miracles of nature. If it is the giant Leatherback weighing about a tonne, one may go mad at the mere sight of it. Not to go mad but to make a good photographic documentation of the egg laying ceremony and make people aware about the environmental aspects, I decided to go to Great Nicobar Island.

Leatherback turtles are coming to these islands all the way from South - Pacific and Australian sea to lay eggs. They are found nesting on the beaches during the period from November to January every year. It is not true that they lay eggs only on the beaches of Great Nicobar Island, they have been found nesting on the beaches of Little Nicobar, Katchal, Teressa, Car Nicobar, even Cinque and south Sentinel of the south Andaman group. Nesting beyond south Andaman to the north has hardly been reported. But Great Nicobar Island is the most popular place for the nesting where one can be sure of the sight.

According to reports, Leatherbacks are nesting all along the beaches of Casuarina Bay, Balle Bay and the South Bay but the most popular bay is the GALATHEA Bay; the bay where the longest river of the Great Nicobar is opening up to the sea.

I preferred December and dates around full moon to go to the Great Nicobar for the purpose. It is said that Leatherbacks come mostly on moonlit nights or may be in moonlight they are easily visible.

Galathea Bay is only 41 km. from Campbell Bay, the port town and headquarters of Great Nicobar; and is well connected by road. On full - moon nights, people including women and children crowded the



beach as if a mini kumbha mela is going on there. It was impossible for the only employee of the Forest Department there to guide and control the wild crowd. Obviously they broke every barrier and violated every law. Dropping the idea of watching chaos, I returned immediately and discussed the matter with the Wild life Authority. The enthusiastic officer rushed to the spot immediately with force to enforce law.

Next day was the best day for me to carry out my job. There were only two of us, myself and my assistant. The fear of last night's raid prevented people from crowding the beach. Referring to that night's incident, the camp officer said that it might have been excessive in that particular night but it's almost every night's story. When he briefs the visitors before going to the beach, what to do and what not, people understand and agree to it but the moment a turtle is sighted, they forget everything in their thrill.

By luck or may be because of the prevailing peace that evening, a 2 m. long Leatherback weighing about 600 kg. was seen crawling up the beach at 6.30 p.m. It was hard to believe one's own eyes. Now I realize why people forget everything and go mad at the very first sight of the giant creature.

It is not an easy job for the giant to climb up the beach. It was taking rest after every four or five crawls. After reaching the high tide line, it moved along the shore until it could find a suitable place for nesting. Two strong fins like front legs started pushing sand violently all around it. In 15 - 20 minutes the turtle was inside a 2.5 m. wide and 0.5 m. deep ditch. Then started the real craftsmanship. The rear couple of feet are also like fins but more soft and flexible. It could even fold them to dig and excavate sand to make a cylindrical hole of 20 cm. diameter and 50 cm. deep.

It is a very long process. If the place is found not suitable to complete the pothole, the turtle may decide to close it after half digging and search for a new site. In fact the first one we saw was doing the same. By that time there were four more turtles coming up the beach one by one along the sea shore.



After completing the digging the real process of egg laying starts. White round ping-pong ball-like eggs start dropping into that hole. The eggs are soft and elastic like rubber and therefore, do not break on falling. When the size of egg becomes smaller and smaller it indicates that the process is going to be over soon. Leatherbacks lay as many as 160 eggs at a time.

It is observed that at the time of egg laying tears come out of Leatherback's eyes. Some people say they cry of labor pain but scientists say tears are there to keep the eyes clear of sand that she flings around and also to get rid of the extra salt absorbed from the sea.

At the end of egg laying, packing the hole tightly is another specialised job done by Leatherbacks most skilfully. Before going back into the sea, sand of the area is rocked heavily in such a way that it becomes almost impossible to identify the actual site of its nest.

There are eight species of sea turtles in the world of which four are found in Andaman and Nicobar Islands. Olive ridley, Green sea, Hawksbill and Leatherback. But Leatherbacks are so different from the others that scientists had to put them in a different family. They are the largest living turtles and may measure upto 2.5 m. and weigh about a tonne. Unlike other turtles which become adult in ten years or more, Leatherback matures within two years. In two years its size may increase by an incredible 30,000 times.

Although Leatherbacks nest on tropical beaches, they roam the seas far and wide. These giants of the seas have been seen even in the freezing waters of the Arctic. How can this cold blooded reptile tolerate the extreme cold of the northern seas ? Biologists have not been able to solve this puzzle. Another startling fact about Leatherbacks was reported by scientists from the University of Georgia in the U.S. They found that these turtles can dive as much as 1200 m. below the surface of the sea. This is the deepest dive known for an air breathing animal, deeper than the mighty Sperm whale. These deep dives are thought to be performed to catch prey, mainly Jelly fish. Perhaps the thick layers of fat, the soft skin and the skeleton made of cartilage help them tolerate the water pressure in the deep.



Andaman and Nicobar Islands are the popular nesting grounds for Leatherbacks. They once nested on the Kerala coast but have abandoned the area as there is now too much human disturbance. For the same reason nesting in the islands has become restricted to some unpopulated areas. The way roads are constructed in Great Nicobar making more and more area easily accessible to the people, it is hard to say how long Leatherbacks will continue to perform the miracle on its beaches.

It is said that the main threats are from local inhabitants and tribal people. It is also said that the tribals dig out turtle eggs for consumption. I tried to go deep into the probable reasons for such threats to these amazing creatures. My findings are painful and shameful to us as well.

Great Nicobar is inhabited by Ex-servicemen from Indian Armed Force. The "ugly giant " Leatherback is not consumed by them and the egg laying sight is so casual to them that they do not have any more interest to see it.

On the other hand it is true that the tribals consume turtle eggs. But they have been consuming these for hundreds of years. How then have the species survived for so long ?

It was very interesting to know that the tribals consume Leatherback's eggs only occasionally. They dig out eggs only from one nest out of a kilometer of beach. Tribals are not reckless exploiters of nature like us. To my mind, they are very part of the nature and their every activity is a natural phenomenon.

My experience at Galathea Bay beach of Great Nicobar prompted me to believe that the main threat is from the civil developments and well educated government employees posted there.

Government employees of different departments are posted there for a tenure of two to three years. Arrival of Leatherbacks for egg laying is a festival for them. It provides big recreation to these Government employees who go to the beach in Government vehicles in groups, arrange



night picnic and have fun with the Leatherbacks. It was surprising to see that very high officials choose the area for amusement. They even climb on the back of the turtles and try to turn them. All these show ineffective education and lack of environmental awareness among the educated lot there. Are we waiting for the tribals to revolt one day and throw us out of the island for the very survival of its nature and of themselves ?

Above all these, the greatest threat is from misguided development fuelled by foreign investments..

It is said that business houses from Hong Kong and NRI's are interested in investing huge amounts in these islands to create and develop a trade platform as an alternative to Hong Kong. Great Nicobar island is on the international sea route and therefore, South Bay has been chosen for bunkering of big ships, mainly oil tankers. Such activities are detrimental to the survival of many endemic sea species and of-course to the nesting grounds of the Leatherbacks. Tremendous pressure is also exerted on the Government of India to declare some areas of Andaman as FREE PORT.

The I.D.A. (Island Development Authorities) and Ministry of Environment and Forests are sincerely resisting the same. But it is difficult to say how long they will be able to withstand the pressure of big money.



Errata

pp 15 - 31 : M. S. Ravichandran; please read
p 17, 28 - 30 : *Philantus* as *Philautus*
p 16, 18 - 19 : *Mycrohyla* as *Microhyla*
p 16, 25 : *R. curtipes* as *R. curtipes*

AMPHIBIA OF THE KALAKAD WILDLIFE SANCTUARY, TAMILNADU, INDIA.

M.S. Ravichandran
Zoological Survey of India,
Southern Regional Station
Madras 600 028.

The result of a three year faunistic survey (1984 to 1987) of the little explored Kalakad Wildlife Sanctuary, Tamilnadu, is presented in this paper. During the study a total of 1583 amphibians referable to twenty nine species under ten genera and four families have been observed in the field, collected and studied.

The species richness of the amphibian fauna of Kalakad Wildlife Sanctuary which is a major conservation area as compared to the other areas studied is much greater as evident from the following table.

Table I : Details of the areas of study and the species reported.

S. No.	Study Area	No. of genera	No. of Species
1.	Silent Valley	11	19
2.	Ponmudi	11	25
3.	Sabarigiri	7	14
4.	Periyar Wildlife Sanctuary	6	14
5.	Kalakad Wildlife Sanctuary	10	29



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Checklist of Amphibia of Kalakad Wildlife Sanctuary.

Class : Amphibia

Order : Anura

Family : Bufonidae

Genus : (1) *Bufo*

1. *Bufo melanostictus*

2. *Bufo microtympanum*

Laurenti

Schneider

Boulenger

Family : Microhylidae

Genus : (2) *Microhyla*

3. *Microhyla ornata*

4. *Microhyla rubra*

Tschudi

(Dumeril & Bibron)

(Jerdon)

Genus (3) *Ramanella*

5. *Ramanella montana*

Rao & Ramanna

(Jerdon)

Family : Ranidae

Genus (4) *Micrixalus*

6. *Micrixalus fuscus*

7. *Micrixalus opisthorhodus*

8. *Micrixalus silvaticus*

Boulenger

(Boulenger)

(Gunther)

(Boulenger)

Genus (5) *Nannobatrachus*

9. *Nannobatrachus beddomii*

Boulenger

Boulenger

Genus (6) *Nyctibatrachus*

10. *Nyctibatrachus aliciae*

11. *Nyctibatrachus deccanensis*

12. *Nyctibatrachus major*

Boulenger

Inger, Shaffer, Koshy & Bakde.

Dubois

Boulenger

Genus (7) *Rana*

13. *Rana aurantiaca*

14. *Rana beddomii*

15. *Rana brachytarsus*

16. *Rana curtipis*

17. *Rana cyanophlyctis*

18. *Rana keralensis*

19. *Rana limnocharis*

Linnaeus

Boulenger

(Gunther)

(Gunther)

Jerdon

Schneider

Dubois

Boie



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20. *Rana malabarica*

21. *Rana temporalis*

22. *Rana tigerina*

Tschudi

(Gunther)

Daudin

Genus (8) *Tomopterna*

23. *Tomopterna breviceps*

Gunther

Schneider

Family : Rhacophoridae

Genus (9) *Philantus*

24. *Philantus beddomii*

25. *Philantus femoralis*

26. *Philantus nasutus*

27. *Philantus pulcherrimus*

28. *Philantus variabilis*

Gistel

(Gunther)

(Gunther)

(Gunther)

(Ali)

(Gunther)

Genus (10) *Polypedates*

29. *Polypedates maculatus*

Tschudi

(Gray)

Species Account :

Under each species materials observed in the field / collected, locality, date of collection / observation, size range, remarks where ever relevant and distribution are given.

Family : *Bufonidae*

Genus : (1) *Bufo*

1. *Bufo melanostictus*

Laurenti

Schneider

1799. *Bufo melanostictus* - Schneider, *Hist. Amph.*, 1 : 216.

1963. *Bufo melanostictus* - Daniel, *J. Bombay Nat. Hist. Soc.*, 60 (2): 435

Materials : (i) 17 exs. Sengaltheri (23. viii. B4; 19, 22 & 24. xi. 84; 23. iv. 87) ; (ii) 9 exs. On way to S.S.R. Cardamom Estate, (24 & 26. viii. 84) ; (iii) 2 exs. On way to Kakkachi c 6 km. West of Sengaltheri, 25. viii. 84, 5. iii. 85) ; (iv) 6 exs. Beyond Thalai Odai, on road to Kalakad, 23. xi. 84, 27.ii.85; (v) 2 exs. On way to Kuliratti Estate, (22, 26. xi. 84) (vi) 10 exs. Kakachi and Nalumukku, (4, 6 & 10. xi. 85) ; (vii) 3 exs. Kalakad Forest office compound, (8,12 & 14. ii. 86) ; (viii) 2 exs. Vaithu paarai, 21. viii.86, 11. i. 87; (ix) 20 exs. Thulukkan Paarai, 23. viii.86, 13.i.87; (x) 1 ex. Karungal Kasam, 10.i.87.



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The smallest of the 72 specimens examined measure 10 mm. and the largest 140 mm. in size. They agree well with published descriptions.

Distribution : Southern Asia to Sri Lanka, Sumatra, Java, Borneo, Bali, South Western and Southern China (including Taiwan)

2. *Bufo microtypanum* Boulenger

1882. *Bufo microtypanum* - Boulenger, *Cal. Batr. Sal. Brit. Mus.* : 307.

Material : (i) 2 exs. Thalai Odai, 19.xi.84; (ii) 1 ex. On way to Kakkachi c 1.5 km. beyond Kurumandi Amman Temple, 20. xi. 84 ; (iii) 1 ex. On way to S.S.R. Cardamom Estste, 21.xi.84; (iv) 1 ex. Beyond Thalai Odai, 23.xi.84; (v) 1 ex. Kari Karan Thondu, 12.ii.86; (vi) 1 ex. Vaithu Paarai, 24.viii.86.

Altogether 7 specimens were studied with a size range from 20 mm. to 35 mm.

Remarks : Snout short, parotoid glands narrow, skin not much tuberculated, tympanum less than half the diameter of the eye. Hind legs very short, toes slightly webbed. Two small metatarsal tubercles present. Colour : Brown dorsal side and white ventral.

Distribution : Western Ghats and Sri Lanka.

Family : Microhylidae

Genus : (2) *Microhyla*

3. *Microhyla ornata*

Tschudi

(Dumeril & Bibron)

1841. *Engystoma ornatum* - Dumeril & Bibron, *Erpet.Gen.* viii : 745

1934. *Microhyla ornata* - Parker, *Monogr. Frogs fam. Microhylidae* : 139.

Material : (i) 4 exs. Pachayar River close to Thalayani dormitory, 12.ii.86; (ii) 1 ex. Vallioor R.F., 27. viii.86; (iii) 9 exs. Pool near Vallioor R.F., 11.i.87.

A small microhylid. The specimens studied range in size from 10 mm. to 20 mm. and agree well with published descriptions. They were collected near temporary pools fed by rain water.

Distribution : All over India; Sri Lanka, Southeast Asia to Malay



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Peninsula, Southern China (Including Taiwan and Haina); and Ryukyu Island (Japan)

4. *Microhyla rubra* (Jerdon)

1854. *Engystoma rubra* - Jerdon, *J. Asiat. Soc. Bengal.*, xxii: 534.

1934. *Microhyla rubra* - Parker, *Monogr. Frogs Fam. Microhylidae* : 142.

Material : (i) 1 ex. Kalakad Forest Office Compound 14.ii.86.

The single specimen collected from the plains measured 15 mm. from snout to vent.

It differs from *M. ornata* by the presence of prominent, well developed, shovel shaped metatarsal tubercles and dull cross barred limbs.

Distribution : Sri Lanka, Southern and Central India.

Genus (3) *Ramanella*

5. *Ramanella montana*

Rao & Ramanna

(Jerdon)

1854. *Hylaedactylus montana* - Jerdon, *J. Asiat. Soc. Bengal.*, xxii: 533.

1934. *Ramaneela montanus* - Parker, *Monogr. Frogs Fam. Microhylida* : 91.

Material : (i) 1 ex. On the way to Kurumandi Amman temple via an abandoned bridle path (Nature Trail) South West of Sengantheri, 24.xi.84.

Remark : The single specimen examined was 15 mm. in total length. Blunt snout, circular pupil, fingers bearing half rounded disks. Slightly webbed toes and 1st, 2nd and 5th toes equal in length. Two metatarsal tubercles prominent. It is a rare microhylid collected at an altitude of c 940 m. under moist litter.

Distribution : South West India.

Family : Ranidae

Genus (4) *Micrixalus*

6. *Micrixalus fuscus*

Boulenger

(Boulenger)



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1882. *Ixalus fuscus* - Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 96.

1890. *Micrixalus fuscus* - Boulenger, *Fauna. Brit. India.* : 406.

Material : (i) 10 exs. Yanai Elumbu Odai, 24. viii. 84, 3.iii.85; (ii) 12 exs. Karumandi Amman Temple, (20,21 & 24. xi.84) ; (iii) 13 exs. On way to Kuliratti Estate. c 3 km. from Sengaltheri, 22.xi.84, 26.iv.87. (iv) 4 exs. Pachayar near Sengaltheri, 6.iii.85, 25.iv.87. (v) 30 exs. Choolai Palam Aru, (8,9,10 & 11. ix.85) ; (vi) 30 exs. Nambiar, on way to Nambi Kovil, 21.viii.86, 9&14.i.87; (vii) 11 exs. Vaithu Paarai, 24.viii.86.

Remark : In all 110 specimens were studied from seven different localities. Of these, the largest measured 33.5 mm. in body length.

Distribution : South Western Ghats.

7. *Micrixalus opisthorhodus* (Gunther)

1868. *Ixalus opisthorhodus* - Gunther, *Proc. Zoo. Soc. London.* : 486.

1890. *Micrixalus opisthorhodus* - Boulenger, *Fauna. Brit. India* : 465.

Material : (i) 5 exs. S.S.R. Estate, (21 & 26. viii.84); (ii) 22 exs. Yanai elumbu Odai, 24.viii.84; (iii) 23 exs. Kasanguliar on way to Kakkachi, 25. viii. 84., 5.iii.85; (iv) 11 exs. Pachaiyr Thalai Odai, 25.xi.84;4.iii.85. (v) 6 exs. Kakkachi and Choolai Palam Aru, (8,9 & 11.ix.85).

The smallest of the 67 specimens examined from 5 different localities measured 15mm. and the largest, 32 mm. in body length. Agrees with published descriptions.

Remark : Like most species of *Micrixalus*, this species also prefers moist vertical surfaces such as rock faces near fast flowing water. It is not at home in water and when pushed into it, swims back to a rock or stone and crawls up to a few inches above water line. Colour merges with moist dark greenish rock surface. Noticed and collected from the above habitat.

Distribution : Forests of South Western India.



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8. *Micrixalus silvaticus* (Boulenger)

1882. *Ixalus silvaticus* - Boulenger, *Cat. Batr. sal. Brit. Mus.* : 469.

1890. *Micrixalus silvaticus* - Boulenger, *Fauna. Brit. India* : 466.

Material : (i) 2 exs. S.S.R. Estate, 24.viii.84, 3.iii.85; (ii) 4 exs. Kakkachi and Choolai Paalam Aru (7 & 9 ix. 85) ; (iii) 3 exs. Tulukkan Paarai, 12.i.87.

The above nine specimens agree well with published accounts. The smallest measured 17 mm. and the largest 33 mm. from snout to vent.

Distribution : Forests of Southern Western Ghats.

Genus (5) *Nannobatrachus* Boulenger 9. *Nannobatrachus beddomii* Boulenger

1882. *Nannobatrachus beddomii* - Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 470.

1986. *Nannobatrachus beddomii* - Pillai, *Rec. Zoo. Surv. India* : 84 (1 - 4): 237.

Material : (i) 1 ex. On the way to Kakkachi c 6 km. West of Sengaltheri Rest house.

Nannobatrachus beddomii is represented in the collections by a single specimen measuring 15 mm. from snout to vent.

Remark : A small specimen with a broad snout, no canthus rostralis and narrow eye lids. Dorsal and ventral skin smooth ; a few minute warts may be present on the eye lids. Finger small. Tip of the fingers and toes are blunt. Toe disk bearing circum marginal groove, no groove on the finger disks. Upper arm and hind limbs cross barred. Dorsum dark brown in colour with clear black spots below the eye, there is a narrow cross band in between the eyes. The specimen was collected from a deciduous forest.

Distribution : Southern Western Ghats.



Genus (6) *Nyctibatrachus*
10. *Nyctibatrachus aliciae*

Boulenger
Inger, Shaffer, Koshy & Bakde

1984. *Nyctibatrachus aliciae* - Inger, Shaffer, Koshy & Bakde, *J. Bombay Nat. Hist. Soc.* **81** (2) : 414

Material : (i) 1 ex. Thalai Odai, 19.xi.84, (ii) 1 ex. Beyond Thalai Odai, on road to Kalakad, 22.xi.84, (iii) 1 ex. Pachaiyar near Sengaltheri Rest House, 4.iii.85., (iv) 2 exs. Choolai Paalam Aru, 9.ix.85.; (v) 1 ex. Vilakkennai Kasam c 0.5 km. West of Nambi Kovil, 8.i.87.

This is the first record of the species since its recent discovery (Inger *et. al.*, 1984) from Ponmudi, Kerala. Specimens range in size from 20 to 25 mm. in body length. They were all collected during day time either from or close vicinity of water.

Distribution : Ponmudi, Kerala (Type Locality)

11. *Nyctibatrachus deccanensis* **Dubois**

1875. *Rana pygmaea* - Gunther, *Proc. Zoo. Soc. London* : 568.
 1984. *Nyctibatrachus deccanensis* - Dubois, *Alytes.*, **3** (4) : 160. (replacement name)

Material : (i) 1 ex. Pachaiyar, near Sengaltheri, 25.xi.84, (ii) m8 exs. Along Choolai Paalam Aru, (8 & 11. ix.85), (iii) 16 exs. Nala near 10 acre tea estate, 10.ix.85, (iv) 7 exs. Karungal Kasam, 10.i.87, (v) 1 ex. Nambiar on way to Nambi Kovil, 14.i.87, (vi) 3 exs. Kuvapatti Odai, 23.iv.87.

Remarks : Snout short and flat. Skin smooth, except the head region, bearing closely set folds. Fingers and toes with discs, marginal grooves present, Fore and hind lambs are lightly cross - barred, toes half webbed, inner metatarsal tubercles and sub-articular tubercles are clearly visible. Dorsum of a uniform light brown colour in the preserved stage. Body length ranges from 15 and 40 mm. in the 36 specimens studied.

Distribution : Southern Western Ghats (Kerala and Tamilnadu)



12. *Nyctibatrachus major* **Boulenger**

1882. *Nyctibatrachus major* - Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 114.
 1978. *Nyctibatrachus major* - Pillai, *Bull. Zoo. Surv. India* : **1** (2) : 135.

Material : (i) 22 exs. Pachiyar upto Thalai Odai, 19.viii.84, 19 & 25. xi.84, 11.ii.86, (ii) 6 exs. Kelmanimuthar, 20.viii.84, 28.ii.85, 5.iii.85, (iii) 39 exs. On way to Kuliratti Estate, c 3 km. from Sengaltheri, 22.viii.84, 22 & 26.xi.84, 1.iii.85, 26.iv.87. (iv) 8 exs. S.S.R. Estate. 24 & 26. viii.84, 21.xi.84, 3.iii.85, (v) 4 exs. Kusanguliar, 25.viii.84, 20.xi.84, (vi) 154 exs. Kuvapatti Odai, 23.iv.84, 22.xi.84, 2.iii.85, 11.ii.86, (vii) 14 exs. Kakkachi and Choolai paalam Aru, (4, 7, 8 & 9.ix.85), (viii) 16 exs. Nala near ten acre tea estate, 16.ix.85, (ix) 1 ex. Parapalar near Pachiyar, 15.ii.86, (x) 10 exs. Vaithu Paarai, 24.viii.86.

The specimens examined agree well in all aspects with the published descriptions. The specimens were noticed in shallow, turbid slow-moving water. In all, 274 specimens were studied ranging in size from 15 mm. to 45.5 mm. in body length.

Distribution : Southern part of Western Ghats.

Genus (7) *Rana* **Linnaeus**
13. *Rana aurantiaca* **Boulenger**

1904. *Rana aurantiaca* - Boulenger, *J. Bombay Nat. Hist. Soc.*, **15** : 430.
 1966. *Rana aurantiaca* - Grandison & Senanayake, *Ann. Mag. Nat. Hist.*, **ix** : 419

Material : (i) 6 exs. On way to Kuliratti Estate, 22.viii.84.

Remark : Bright orange colour above, usually with spots on the back. A broad band of black on flanks, clearly delineated from the dorsal orange along canthus rostralis and dorsolateral folds, all the specimens agree well in all aspects with the published descriptions. Size of the six specimens range from 22.5 mm. to 41 mm in body length.

Distribution : Southern Western Ghats, India & Sri Lanka.

14. *Rana beddomii*

(Gunther)

1875. *Polypedates beddomii* - Gunther, *Proc. Zoo. Soc. London* : 571
 1920. *Rana beddomii* - Boulenger, *Rec. Indian Mus.* xx : 114.

Material : (i) 39 exs. Sengaltheri, (19,20,22 & 23.viii.84; 22,24 & 25.xi.84), 6.iii.85 (ii) 11 exs. S.S.R. Estate on way to Natterikal. (24 & 26.viii.84, 21.xi.84, 3.iii.85, (iii) 3 exs. Kusangulinar, 25.viii.84, 20.xi.84, (iv) 71 exs. Near Thalai Odai, 23.xi.84, 27.ii.85, 2 & 4. iii.85; 8,10 & 11.ii.86; (v) 5 exs. Keela Manimuthar, 28.ii.85, (vi) 5 exs. Kuliratti Aru, 1.iii.85, 27.iv.87. (vii) 9 exs. Kakkachi & Choolai pallam Aru (6,7,10 & 11.ix.85) (viii) 10 exs. Poochi thoundu Odai, 120.ii.86 (ix) 16 exs. Karumandi Amman Temple, 11.ii.86, 27.iv.87, (x) 30 exs. Kombaiyar Thekkadu charagam (22,23 & 25.viii.86; 12 & 13.i.87), (xi) 1 ex. Vaithu Paarai, 24.viii.86; (xii) 38 wxs. Vilakkannai Kasam c 0.5 km. West of Nambi Kovil, 8.i.87.

Of the 238 specimens examined, the smallest was 10 mm. and the largest 45 mm. in body length. The specimens examined agree well in all aspects with the published descriptions. Some specimens were dark brown and some light brown in colour with a yellow dorsal vertebral line.

Remarks : Several stages of tadpoles were also noticed at elevations between 900 & 1050 m. Habitat and descriptions agree well with those described by Inger et al (1984) from Ponnudi. The tadpoles are very active and their colour merges remarkably well with that of the rocks on which they normally are found. It is sometimes therefore, difficult to locate them unless they move about.

Distribution : Western Ghats, India.

15. *Rana brachytarsus*

(Gunther)

1875. *Polypedates brachytarsus* - Gunther, *Proc. Zoo. Soc. London* : 572.
 1984. *Rana brachytarsus* - Inger, Shaffer, Koshy & Bakde, *J. Bombay Nat. Hist. Soc.*, 81 (2) : 423.

Materials : 15 exs. On way to Kusangulinar from Sengaltheri, 25.viii.84.



Agree well with the published descriptions. *Rana brachytarsus* appears to share the same habitat as *Rana beddomii*, having a preference for forest floor with dense undergrowth in evergreen, moist semi - evergreen and moist deciduous forests. The two species are different in their behavior. *Rana brachytarsus* being more muscular and more active takes longer leaps when alarmed.

Distribution : Southern Western ghats, India.

16. *Rana curtipes*

Jerdon

1853. *Rana curtipes* - Jerdon, *J. Asiat. Soc. Bengal.*, xxii : 532.
 1989. *Rana curtipes* - Daniel & Sekar, *J. Bombay Nat.Hist. Soc.* 86 (2) : 196.

Material : (i) 8exs. Keelamanimuthar. 28.ii.85.

This species has been collected from a single locality at an altitude of c 740 m. It ranges in size from 35 mm to 50 mm. in body length. The specimens agrees well with earlier descriptions.
 Distribution : Karnataka, Kerala & Tamilnadu. (Western Ghats area).

17. *Rana cyanophlyctis*

Schneider

1799. *Rana cyanophlyctis* - Schneider, *Hist. Amph.*, 1 : 137.
 1975. *Rana cyanophlyctis* - Daniel, *J. Bombay Nat.Hist. Soc.*, 72 (2) : 510.

Materials : (i) 1 ex. Thalai Odai, 19.viii.84, (ii) 1 ex. Kuliratti Aru, 22.viii.84, (iii) 10 exs. Karumandi Amman Temple, (20 & 21.xi.84, 24 & 27.iv.87), (iv) 1 ex. Beyond Thalai Odai on way to Kalakad, 23.xi.84. (v) 23 exs. Pachaiyar, close to Thalayanai Dormitory, (13, 14 & 15.ii.86, (vi) 8 exs. Onbadukul Sonai, 29.viii.86, (vii) 7 exs. Off Nambiar on way to Nambi kovil, 21.viii.86, (9 & 11.i.87), (viii) 23 exs. Tulukkan Paarai, 23.viii.86, 12.i.87, (ix) 11 exs. Stream near Kodamadi Estate, 15.i.87.

From 85 specimens studied from localities listed above the largest measured 56 mm. in body length. The Skipping frog seems to prefer stagnant to running water bodies. In all the above localities it was found in stagnant pools and ditches not directly connected to the main streams.

Distribution : All over India, Sri Lanka, Malaya, Afghanistan, Pakistan and Southern Iran.



18. *Rana keralensis*

Dubois

1875. *Rana verrucosa*, Proc. Zoo. Soc. London : 567.

1980. *Rana keralensis* - Dubois, Bull. Mus. Natl. Hist. Nat., Paris : 4, 2 : 928.
(replacement name)

Material : (i) 1 ex. Sengaltheri, 25.xi.84, (ii) 2 exs. Parapalar, near Pachaiyar, 15.ii.86, (iii) 1 ex. Kuliratti Aru, 26.iv.87.

Of the four specimens examined, the largest measured 40 mm. in body length. It had a white middorsal line and irregular dorsal folds.

Distribution : Western Ghats & Andamans.

19. *Rana limnocharis*

Boie

1835. *Rana limnocharis* - Boie, In Weigmann, Nova Acta Acad. Caesar Leop. Carol. Halle., xvii 1 : 225.

1975. *Rana limnocharis* - Daniel, J. Bombay Nat. Hist. Soc., 72 (2) : 515.

Material : (i) 36 exs. Pachaiyar at Thalayanai dormitory, (10, 12 & 13.ii.86) (ii) 35 exs. Nambiar on way to Nambi Kovil, (21 & 24.viii.86, 11,13 & 14.i.87) (iii) 30 exs. Stream near Kodamadi Estate, 26.viii.86, 15.i.87, (iv) 1 ex. Todethi Odai on way to Nadukam, c 5 km. from Sanctuary border, 25.viii.86.

The largest of the 102 specimens studied measured 32 mm. in body length. No specimens were collected from localities above 390 m. altitude.

Distribution : All over India, China (Taiwan) Sichuan, and South of Chuanche (= yangtze) River and North to Shandong to Nepal, Pakistan, Sri Lanka, Southern Japan, Phillippines, Greater Sunda Islands, and the Lesser Sundas as far east as Flores.

20. *Rana malabarica*

Tschudi

1838. *Rana malabarica* - Tschudi, Clasif. Batr. : 80.

1975. *Rana malabarica* - Daniel, J. Bombay Nat. Hist. Soc., 72 (2) : 516.

Material : (i) 30 exs. Pachaiyar near Thalai Odai, 22.ii.84, 19 & 23.xi.84,



(ii) 3 exs. Kavupatti Odai, 2.iii.85, 23.iv.87, (iii) 7 exs. Nambiar on way to Nambi Kovil, 21.viii.86.

Of the 40 specimens studied from three localities, the largest one measured 35 mm. in total length. The highest altitude from where specimens were collected is 850 m.

Distribution : Kerala, Madhya Pradesh, Maharashtra and Tamilnadu.

21. *Rana temporalis*

(Gunther)

1864. *Hylorana temporalis* - Gunther, Rept. Brit. India : 427.

1920. *Rana temporalis* - Boulenger, Rec. Indian Mus. : xx: 157.

Material : (i) 45 exs. Kurumandi Amman Temple, 19.viii.84, 11.ii.86, 24 & 27.iv.87); (ii) 128 exs. in and around Sengaltheri, 20,21,22,23 & 24.viii.84) 24.xi.84, 25.iv.87, (iii) 15 exs. Kusangulinar on way to Kakkachi, 25.viii.84, 20.xi.84, (iv) 31 exs. S.S.R. Estate, 26.viii.84,21.xi.84, 3.iii.85, (v) 29 exs. on way to Kuliratti Estate, 22 & 26.xi.84, 26.iv.87, (vi) 37 exs. Near Thalai Odai on way to Kakkachi, 23.xi.84, 11.ii.86, 23.iv.87 (vii) 38 exs. Pachaiyar upto Thalai Odai, 25.xi.84, 4 & 6.iii.85, 23.iv.87, (viii) 2 exs. Keelamanimuthar, 28.ii.85, (ix) 31 exs. Kakkachi and choolai Palam Aru, (4,8 & 10.ix.85) (x) 6 exs. Tulukkan Paarai Aru, 22,24 & 25.viii.86), (xi) 37 exs. Vaithu paarai, 24.viii.86, 1.i.87, (xii) 12 exs. Vilakkannai Kasam, c 1.5 km. west of Nambi Kovil, 8.i.87, (xiii) 12 exs. Karungal Kasam, 10.i.87.

The species is found virtually at all elevations between 250 m. and 1150 m. in abundance. The snout to vent length range from 15 mm. to 75.5 mm. in 433 specimens examined.

Distribution : Western Ghats, India and Sri Lanka.

22. *Rana tigerina*

Daudin

1803. *Rana tigerina* - Daudin, Hist. Rain Gren. Crap. : 64.

1975. *Rana tigerina* - Daniel, J. Bombay Nat. Hist. Soc. : 72 (2) : 512.

Material : (i) 3 exs. Vallioor Reserve Forest, 21 & 27.viii.86.



The largest of the specimens collected measured 87 mm. from snout to vent. It has been collected only from Vallioor which constitutes the periphery of the sanctuary (200 m. altitude) and not from higher elevations.

Distribution : All over India, Sri Lanka Malaya, Southern China (North of Hubei and including Taiwan; introduced to Madagascar.)

Genus (8) *Tomopterna* Gunther
23. *Tomopterna breviceps* Schneider

1799. *Rana breviceps* - Schneider, *Hist. Amph.*, 1 : 140.

1985. *Tomopterna breviceps* - Frost, *Amph. Species of the World* : 523.

Material : (i) 2 exs. Pachaiyar river close to Thalayanai dormitory, 12.ii.86, (ii) 2 exs. Karikaran Thondu, 13.ii.86, (iii) 1 ex. Aruval Theti Odai, 14.ii.86, (iv) 2 exs. Forest Range Office compound, Kalakad, 14.ii.86, (v) 4 exs. Tulukkan Paarai Aru, 23.viii.86, (vi) 1 ex. Todathi Odai, 25.viii.86, (vii) 12 exs. Stream near kodamadi Estate,

Remark : Medium sized frogs, body / snout, head convex, snout blunt, canthus rostralis very narrow, loreal region concave, nostrils half way between eye and tip of the snout. Inter - Orbital space narrow, tympanum distinct. Skin granulate above, colour brown often with middorsal streak. Although a typical burrowing frog, all the above specimens were noticed from above the soil surface. Of the 24 specimens examined, the smallest has a snout to vent length of 15 mm. and the largest 35 mm.

Distribution : Bihar, Himachal Pradesh, Kerala, Orisa, Punjab, Rajasthan, Tamilnadu, Uttarpradesh, West Bengal, Andhra pradesh, karnataka, nepal, Burma and Sri Lanka.

Family : Rhacophoridae

Genus (9) *Philantus* Gistel
24. *Philantus beddomii* (Gunther)

1875. *Ixalus beddomii* - Gunther, *Proc. Zoo. Soc. London* : 575.

1974. *Philantus beddomii* - Gorham, *Checklist of World Amphibians* : 166.



Material : (i) 3 exs. On way to Nattarikal - 5 km. South East of Sengaltheri Rest House, 24.viii.84 ; (ii) 1 ex. on way to S.S.R. Estate, 21.xi.84 ; (iii) 1 ex. Near Kusanguliar, 5.iii.85 ; (iv) 1 ex Karumandi Amman Temple, 24.iv.84.

In all 6 specimens the largest measured 34.5 mm. and the smallest 23.5 mm. in snout to vent length. All the specimens were noticed in evergreen forests at a maximum altitude of c 1250 m. In life, the frogs are uniform light green above with dull white thighs.

Distribution : Southern part of Western Ghats.

25. *Philantus femoralis* (Gunther)

1864. *Ixalus femoralis* - Gunther, *ept. Brit. India* : 434.

1984. *Philantus femoralis* - Inger, Shaffer, Koshy, & Bakde, *J. Bombay Nat. Hist. Soc.*, 81 (3) : 553.

Material : (i) 1 ex. Near Kuvapatti odai, 3.iii.85.

This Rachopodid agrees fairly well with the description of Boulenger (1890) except for the tympanum which is barely distinguishable. Inger et al. (1984) also noted that the tympanum is barely visible. Liem. (1970) points out that all species of the genus possess the characteristic "X" marking on the dorsum. This is not true atleast with reference to the material I have studied.

Distribution : Southern parts of Western Ghats and Sri Lanka.

26. *Philantus nasutus* (Gunther)

1868. *Ixalus nasutus* - Gunther, *Proc. Zoo. Soc. London* : 484.

1957. *Philantus nasutus* - Kirtisinghe, *Amph. Ceylon* : 73.

Material : (i) 1 ex. S.S.R. Estate, 26.viii.84; (ii) 1 ex. Yanai Elumbu Odai, 3.iii.85.

The larger of the specimens, measuring 40 mm. in size, was collected at an elevation of 1330 m.

Snout pointed, canthus rostralis narrow, tympanum distinct, fingers free, toes less webbed, a small inner metatarsal tubercle, no outer



tubercle, skin with minute warts on dorsal side. Colour brownish in preserved state.

The specimens were collected from among herbs growing beside the foot path in moist evergreen forest.

Distribution : Southern India and Sri Lanka.

27. *Philantus pulcherrimus* (Ali)

1882. *Ixalus pulcher* - Boulenger, Cat. Batr. Sal. Brit. Mus. : 469.

1927. *Philantus pulcherrimus* - Ali, *Sitzungsber. Ges. Naturforsch. Freunde Berlin* : 41.

Material : (i) 1 ex. Near Netterikal - 5 km. Southeast of Sengaltheri Rest House, 24.viii.84.

The single specimen was collected at an altitude of 1250 m. in moist evergreen forest measuring 35 mm. from snout to vent.

Snout short, triangular canthus rostralis distinct, inter orbital space 1.5 times broader than upper eye lid. Loreal region flat, nostril near to the tip of the snout than to the eye, tympanum indistinct. No lingual papilla, throat smooth. Fingers with well developed discs and circum-marginal grooves, tibiotarsal articulation of the adpressed limb reaching between the tip of the snout and the eye, toes slightly webbed at the base. Small inner metatarsal tubercles. Skin smooth, fore arms colourless, thighs with green cross bars when alive.

Distribution : Southern parts of Western Ghats.

28. *Philantus variabilis* (Gunther)

1858. *Ixalus variabilis* - Gunther, Cat. Batr. Sal. Brit. Mus. : 74.

1984. *Philantus variabilis* - Inger, Shaffer, Koshy, & Bakde, *J. Bombay Nat. Hist. Soc.*, **81** (3) : 555.

Material : (i) 2 exs. On way to Netterikal c 1 km. from S.S.R. Estate, (24.viii.84, 3.iii.85) ; (ii) 2 exs. On way to Kakkachi, c 6 km. West of Sengaltheri, (25.viii.84, 5.iii.85) ; (iii) 1 ex. Choolai Paalam Aru, 9.ix.85.

The five specimens examined exhibited a size range of 20 mm. to 30 mm. Hind limbs more than half webbed. Fingers with slight rudiment



of web. Discs of the fingers are broader than toes. The dorsal surface of the skin is smooth, except the belly and throat regions, which are granular. Colour of the dorsal side light tan, white on ventral. A dark interorbital band present.

Distribution : Western Ghats, Andhra Pradesh and Sri Lanka.

Genus (10) *Polypedates* Tschudi

29. *Polypedates maculatus* (Gray)

1834. *Hyla maculata* - Gray, *Illustr. Indian Zoo.*, 1 : pl.82.

1989. *Polypedates maculatus* - Daniel and Sekar, *J. Bombay Nat. Hist. Soc.*, **86** (2) : 199.

Material : (i) 2 exs. Vallioor Reserve Forest complex, 20.viii.86.

The specimens examined agree well with published accounts.

The smallest among the two specimens measured 60 mm. while the larger measured 65 mm.

Distribution : All over India except Haryana, Punjab and Rajasthan; Sri Lanka.

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HABITAT PREFERENCES, NICHE AND CONSERVATION OF MONITOR LIZARDS

(*Varanus bengalensis* and *Varanus griseus*)
IN THAR DESERT, RAJASTHAN.

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Monitor lizards are the largest of lizards. They prey heavily upon a large number of invertebrates, frogs, snakes, small birds and mammals. Therefore their niche in the ecosystem is of much ecological importance. The niche of monitor lizards has been little studied. Monitor lizards prefer dry forests, although they can swim well. They rob nests of birds (Mac Cann, 1945). Monitor lizards occur in all types of biotopes including desert fringes. The desert monitor lizard is common in deserts. It resides in crevices of rocks and ruins. It swims well in water to catch prey (Daniel, 1983). I studied habitat preference and niche of the monitor lizard and their conservation in Western Rajasthan.

Various types of habitats in Thar Desert, Western Rajasthan (Jodhpur, Pali, Badmer and Jaisalmer districts) were surveyed to study habitat preferences and niche of the monitor lizards. 6 x 30 binoculars were used to observe the lizards from a distance without disturbing their natural activities.

Varanus bengalensis inhabits different types of habitats yet prefers agricultural fields, hill-sides, banks of rivers and rivulets and tank shores having better availability of prey species. It prefers wasteland with dense scrub having plenty of prey and shelter.

Varanus griseus prefers light scrub, agricultural fields and groves, where they get plenty of prey and shelter in hollows of trees.



Varanus bengalensis lives in wide burrows (widened burrows of gerbils) and thickets of *Capparis decidua*, *Dycium barbarum* and *Maytenus emarginatus* with sand mound, and also burrows in sand along fences of agriculture fields. Adapted to live with man, it inhabits in crevices of walls, ruins, heaps of fire wood and cow dung cakes, rafters of houses, underground tanks with openings and hollows of trees particularly *Prosopis cineraria* and *Tecomella undulata*.

It preys upon insects, largely beetles, frogs in water, toad, skinks (*Mabuya spp*), *Calotes versicolor*, House sparrow (*Passer domesticus*), Finchlark (*Eremopterix grisea*), rats (*Rattus spp*), gerbils (*Meriones hurriane*), *Tatera indica*, young of hare (*Lepus nigricollis*), young and eggs of birds, particularly Grey partridge (*Francolinus pondicerianus*), Peafowl (*Pavo cristatus*), Myna (*Acridotheres tristis* and *Sturnus spp*), and rose-ringed parakeet (*Psittacula krameri*), etc. It has been observed killing and taking small-size snakes such as sand boas (*Eryx spp*), sawscaled viper (*Echis carinatus*) and striped sand snake (*Psamophis condanarus*). It heavily preys upon frogs from ponds, reservoirs, canals and tanks as it can swim well in water. It was observed taking flesh from carcasses also.

Varanus bengalensis being stout and powerful, few carnivorous animals dare to attack it. When enraged, it hisses loudly with widely opened mouth and puffs the body, violently lashing its powerful tail. Therefore the cat (*Felis spp*) and dog (*Canis familiaris*) generally do not attack it. Dogs occasionally attack and kill the *Varanus* by encircling it from all sides. Cats have been observed attacking and killing by tearing the *Varanus* from the back. Scavenger vultures (*Neophron percnopterus*), eagle (*Acquila rapax*), short toed eagle (*Circetus gallicus*) attack the *Varanus*. Mynas and crows (*Corvus spp*) mob the *Varanus*.

The Monitor lizard is fairly well adapted to live near human inhabitants. It prefers to inhabit fences of agricultural farms having suitable sites for burrows and prey. (e.g.) gerbils, rats, lizards. It frequently enters huts and houses in search of crickets, rats, geckoes and other prey, often entering spaces in roof and fodder and firewood heaps. It often enters underground water storage tanks of houses to pick up frogs. Generally, local people do not molest the *Varanus* but only scare them away from houses.



The breeding details of the monitor lizards could not be studied although young were observed in March and July, when insects are available in plenty. Dogs and cats occasionally succeed in hunting the young of the *Varanus*.

Monitors are heavy predators and play a notable role in controlling the population of highly productive fauna, but prove destructive when overpopulated and badly affect ground and hole nesting birds particularly the peafowl, partridges, sandgrouses, quails, hoopoe and the rose-ringed parakeet.

Jogi tribesmen hunt Monitors with pointed spears, staff or even large stones as they relish the flesh. Populations of *varanus* were observed of much lower numbers in areas inhabited or frequented by Jogies.

Jogies used to sell pelts of the *varanus* to dealers, which were smuggled to big cities. Now it is a protected species. Wildlife wardens of Forest Departments vigilantly apprehend poachers and pelt smugglers and hence poaching is now insignificant.

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THE HIMALAYAN SALAMANDER

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The Himalayan Salamander is the only species of salamander known from India. This tailed amphibian is endangered and listed in Schedule I of the Indian Wildlife Protection Act of 1972. The species occurs from 1330 - 2220 m in Darjeeling district of West Bengal; Sikkim, Khasi hills of Meghalaya, Kamalanga valley in Lohit district of Arunachal Pradesh and Manipur besides eastern Nepal, Kakhe hills of upper Burma, Loei and Chiang Mein provinces of Thailand and western Yunnan regions of China. Indeed, John Anderson who described this species, *Tylotriton verrucosus* in 1871, discovered it in the flooded rice fields near the little Chinese town of Nantin. It is mostly known to inhabit the cool mountain lakes and temporary as well as perennial pools and streams in the Himalayas. But wherever it is found, it is threatened and its future is uncertain.

It attains a length of 20 cms. Somewhat lizardlike, it has a large flat head and tubercular skin. There are 15 knob-like glands along the sides of the body. A broad median ridge is present and the tail, which is as long as the body, is laterally compressed with sharp edges. It has four fingers and five toes. The colour is blackish brown, paler on the under-surface of the limbs, lips and throat. The underpart of the tail is dull orange-yellow. It swims slowly by the undulatory motion of its tail and occasionally comes up to the surface for breathing. Water beetles and bugs, tadpoles of frogs, insect larvae, earthworms, snails and slugs comprise its main diet. It often shelters among bamboo stumps in the dry season and feeds on termites and woodlice infecting the rotting vegetation. It makes a low noise while snapping its jaws, giving its Nepali name 'pani kukur' and Thai name 'mah nam' both of which mean 'water dog'. The Gorkhas of north Bengal call it 'gorho'.



The salamander is mostly found during the monsoons when it comes out of hibernation with the spring showers to breed. Some sluggish and inactive animals have been observed during December under decaying logs or dense vegetation far away from water. They are known to withstand temperatures of -20°C . By early April the male becomes bright in colour and displays before the female. This courtship display is very elaborate and lasts several hours. Mating takes place in underground tunnels and burrows when male holds the female under her body and transfers a sperm sac or spermatophore to her cloaca. Egg laying commences in May and continues throughout the rainy season. The 16-20 spherical, greenish yellow eggs, measuring about 1 cm. in diameter, are deposited singly, in pairs or in clusters on ground or blades of grass. After egg-laying, the female broods them by coiling around them, an example of parental care quite uncommon among amphibians. The larvae emerge about twenty days later, measuring 9 - 11 mm in length, have large eyes and four external gills on each side of the head. The body is grey with black reticulated patterns, except for the white belly. At first they do not have to feed as their belly is full with yolk. After two weeks, they start taking microcrustaceans and larval insects inhabiting the bottom sediments. In three months, they pass through five stages, each larger than the previous one until they metamorphose to adults by October. By now the wetlands dry up and the adults leave water to lead a terrestrial mode of life, only to return to water the following year for spawning.

Therefore, water bodies are extremely important for the completion of the life cycle of this species. In northern West Bengal, it is found in small wetlands at Jorepokhri (near Sukhiapokhri), Namthing lake (Latpancher) Manebhanjang, Pacheng Bazar, Bagora, Kurseong, Mongpyu, Sonada, ghoom and tung areas, Mirik lake, Raidhap region above the lake, Simana Basti and at Margaret Hope and Gopal Dhara tea estates. Although no population estimates have been made, observations indicate that the species is becoming rare in the entire eastern Himalayas because of rapid disappearance of their fresh water habitats which are being drained for housing and agriculture. Disposal of domestic sewage into the waterbodies and pollution due to pesticides, fertilizers and detergents are also taking a heavy toll on the population of the salamanders. Deforestation which results in landslides and grazing of



cattle and goats which loosen the soil thereby causing siltation of ponds and pools are also responsible for the decline in population. Recently, the introduction of carps and other freshwater fishes into these ponds and lakes is posing a serious threat to the eggs and larvae of this species. Salamanders are also collected for food, medicine and research. In the local market of Shillong, salamanders are sold along with hill stream fishes after being caught along with them by basket-traps or nets. The Khasia tribesmen eat the amphibian. In Nepal, the dried and smoked salamander is used as an alleged cure for typhoid and gastric ailments. Salamanders are also collected from areas around Darjeeling by biological product dealers and sold in Calcutta to educational institutions. A number of Indian zoology textbooks make remarks about this species and strangely many college laboratories have collections of this salamander, even though a number of common amphibians are poorly represented. In Bangkok, pet shops sell these animals for 100 bhat each. However, habitat destruction is the main factor responsible for the increasing rarity of the salamanders in the Himalayas.





Breeding Notes on Checkered Keelback Watersnake in Madras Snake Park

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Checkered Keelback (*Xenochropis piscator*) watersnakes were kept in glass fronted enclosures measuring 4' x 5' x 4' high. The floor of the enclosure was covered with a thick layer of sand and a water trough deep enough for the animals to immerse themselves was set in it. Large tree branches for climbing and resting on were provided for the snakes to make maximum use of the space available in the enclosure. The watersnakes were fed with frogs, lizards and geckos. Out of seven specimens, one gravid female laid 42 leathery white eggs on 16.1.95 in the late evening, as a clutch near the water trough. In the closed enclosure, temperature variation was very high so the clutch mass was collected along with base sand and kept in a sand filled glass bottle (22cm. high and 4 cm. radius) covered with cloth and placed in room temperature. To avoid damage, egg morphometric details were not collected.

On 15 th March 1995, after an incubation of 55 days the young ones emerged from the eggs. Out of the 42 eggs, 35 eggs hatched successfully. Of the remaining 7 eggs, 4 proved to be infertile and the other three held small dead embryos. The length of the young ones ranged from 15 to 19 cm. (mean = 17.14 cm.) and weight ranged from 4 to 6 grams (mean = 4.43 gm.) The new born were kept in a fish tank (65 cm. x 40 cm. x 40 cm.) provided with sand and dead leaves, along with a bowl of water. The first sloughing occurred on 20th March and onwards (6 th day) and the second from 1 st April onwards.

In subsequent seasons another gravid female in the same enclosure laid 46 eggs on 29.12 95. The egg clutch was collected and placed as mentioned above. After 54 or 55 days (21.2 96 and 22.2.96) 33 hatchlings emerged, remaining 13 out of the 46 eggs collected were found damaged. The first sloughing occurred from 6 th day (26.2.96) onwards and the second from 18 th day (9.3.96) onwards.



SHEDDING OF FANGS IN KING COBRA

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The King Cobra (*Ophiophagus hannah*) mostly feeds on other snakes and prefers Checkered Keelback and Rat snake. Among the prey species the Rat snake is the strongest and fastest. Normally King Cobra catches the prey near the head. If this is not possible it catches the prey on any part of the body and grips it very strongly. After some time it loosens the grip and starts moving its jaws very slowly towards the head of the prey.

If the prey even moves a little, the King Cobra again grips it very strongly and stops moving the jaws and put its body weight and coils around the prey. Sometimes the King Cobra rubs the prey on the soil giving more strength to the grip and to stop further movement of prey. It was observed that in captivity one King Cobra had lost both its fangs and the blood was oozing out. However it did not stop swallowing the Rat snake. The same observation was also made during its feeding on rats. After loosing its fangs, it got a new set of fangs which looked like the old fangs, within three days. In the wild it is not possible to observe when the fangs are shed and when the snake catches its next prey.

In captivity they take small prey within six days when the new fangs are just peeping out. It is also observed that the King Cobra avoids bigger prey till such time it sprouts a new set of fangs. Similar observations were made in Monocled Cobra though they depend more on their fangs than strangulating their prey. In captivity it was observed that King Cobra looses its fangs more frequently compared to Monocled Cobra. It is not only captive snakes but wild caught King Cobra were also found with newly sprouted fangs.



RANDOM HARVEST

Tongue - tied

Aristotle (384 - 322 B.C.) is justly famous for his erudition in an astonishing range of subjects — physics, astronomy, cosmology, geology, meteorology, theology, metaphysics, to mention a few. Strangely enough for such a person, he also entertained many grossly erroneous beliefs. One such was that the crocodile had no tongue. The crocodile cannot stick out its tongue since it is fused to its lower jaw and this, perhaps, made Aristotle believe that the crocodile had no tongue. It was also Aristotle who believed that women had fewer teeth than men. I think it was Bertrand Russell who said that Aristotle could easily have put himself wise on the subject by simply asking Mrs. Aristotle to open her mouth. Not having done that, there is little wonder that he did not think of inspecting the mouth of the crocodile.

Turtle Disease

The green sea turtle (*Chelonia mydas*) is an endangered species and is listed in Schedule I of the Wildlife (Protection) Act, 1972. It is pantropical in distribution. Sternberg (1981), recognised forty four nesting areas of which ten are in the Indian subcontinent. Biologists have been citing numerous threats to the survival of the species in common with the other species of sea turtles — habitat loss, human exploitation, artificial lighting on nesting beaches and incidental take during commercial fishing operations.

In an article in the March/April 1996 issue of the *Endangered Species Bulletin* published by the US Fish and Wildlife Service, Stefanie Barrett refers to another significant threat— a disease known as green turtle fibropapillomatosis. The disease was first described over fifty years ago in Florida, but its threat to the survival of this species has been recognised only in recent years. The disease is characterised by non-cancerous fibrous tumours. Similar lesions have also been reported in



flatback (*Natator depressus*), loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles. Of these, the last two are found on the Indian coast and are listed in Schedule I of the Wildlife (Protection) Act, 1972.

Book on chelonians

The Oxford University Press has brought out a book for World Wide Fund for Nature-India on the Indian chelonians — *Turtles and Tortoise of India*, written by Indraneil Das of the Centre for Herpetology, Madras Crocodile Bank Trust. Priced at Rs. 150/-, the book is equally useful to the layman and the expert.

Croc Worship

A news item in the *Indian Express* of the 7 th May 1996 reads as follows :

"Atop the green mountain range that rims the Kotohira valley town on the Shikoku island in Japan stands a unique shrine dedicated to the Indian crocodile, and the presiding deity "Kunpira San" is believed to be the ocean god protecting Japanese fishermen and agriculture.

"For centuries, millions of tourists - native and foreign have climbed the 785 stone steps leading to the peak of the Kotohira mountain to seek the blessings of Kunpira - San in the simple belief that he can grant boons as he comes from India".

" Kunpira - San has attained godhood in his role as the protective lord of oceans, master of agriculture, forestry, medicine and source of health and vigour."

It is a matter of common knowledge that the snake has been worshipped from time immemorial in many parts of the world. But what is not so well-known is that the crocodile also has occasionally been an object of worship in some parts of the world. There are accounts dating

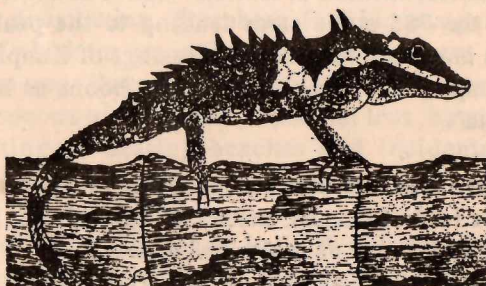


from 2400 B.C. of the Egyptians worshipping Sobek, a crocodile - god with the head of a crocodile and the body of a man. Kom Ombo, a temple dedicated to Sobek is located 48 km. south of Edfu on the Nile.

In ancient Egyptian temples, live crocodiles were worshipped. When they died, their bodies were embalmed and mummified and hundreds of such mummies can be seen at these sites even today.

The crocodile was similarly worshipped by the Buganda people of present day Uganda who built a temple for it on an island in crocodile-infested Lake Victoria. The Bugandans as also the Bobo tribe of Upper Volta worshipped the crocodile by sacrificing humans.

B. Vijayaraghavan



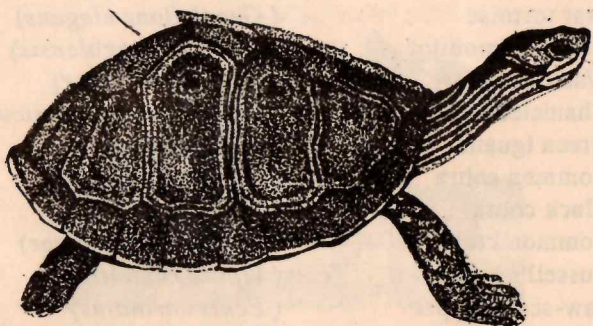
REPTILE SPECIES ON DISPLAY AT THE MADRAS SNAKE PARK TRUST

(As on 31. 03. 96)

- | | |
|-----------------------------|----------------------------------|
| 1. Marsh crocodile | (<i>Crocodylus palustris</i>) |
| 2. Gharial | (<i>Gavialis gangeticus</i>) |
| 3. Saltwater crocodile | (<i>Crocodylus porosus</i>) |
| 4. Morelett's crocodile | (<i>Crocodylus moreletti</i>) |
| 5. Spectacled cayman | (<i>Caiman crocodilus</i>) |
| 6. Siamese crocodile | (<i>Crocodylus siamensis</i>) |
| 7. African dwarf crocodile | (<i>Osteolaemus tetraspis</i>) |
| 8. Indian soft-shell turtle | (<i>Lissemys punctata</i>) |
| 9. Pond turtle | (<i>Melanochelys trijuga</i>) |
| 10. Aldabra tortoise | (<i>Geochelone gigantea</i>) |
| 11. Star tortoise | (<i>Geochelone elegans</i>) |
| 12. Common monitor | (<i>Varanus bengalensis</i>) |
| 13. Water monitor | (<i>Varanus salvator</i>) |
| 14. Chameleon | (<i>Chamaeleon zeylanicus</i>) |
| 15. Green iguana | (<i>Iguana iguana</i>) |
| 16. Common cobra | (<i>Naja naja</i>) |
| 17. Black cobra | (<i>Naja naja oxiana</i>) |
| 18. Common krait | (<i>Bungarus caeruleus</i>) |
| 19. Russell's viper | (<i>Vipera russellii</i>) |
| 20. Saw-scaled viper | (<i>Echis carinatus</i>) |
| 21. Pit viper | (<i>Trimeresurus sp.</i>) |
| 22. Rat snake | (<i>Ptyas mucosus</i>) |
| 23. Green vine snake | (<i>Ahaetulla nasutus</i>) |
| 24. Bronze-back tree snake | (<i>Dendrelaphis tristis</i>) |
| 25. Flying snake | (<i>Chrysopelea ornata</i>) |



26. Banded racer (*Argyrogena sp.*)
27. Trinket snake (*Elaphe helena*)
28. Kukri snake (*Oligodon sp.*)
29. Wolf snake (*Lycodon aulicus*)
30. Cat snake (*Boiga trigonata*)
31. Checkered keel-back (*Xenochropis piscator*)
32. Olive keel-back (*Atretium schistosusm*)
33. Striped keel-back (*Amphiesma stolata*)
34. Green keel-back (*Macropisthodon plumbicolor*)
35. Common sand boa (*Eryx conicus*)
36. Red sand boa (*Eryx johnii*)
37. Indian python (*Python molurus*)
38. Reticulated python (*Python reticulatus*)
39. Dog-faced water snake (*Cerberus rhynchops*)
40. Annulated sea snake (*Hydrophis cyanocinctus*)
41. Yellow sea snake (*Hydrophis spiralis*)
42. Hook-nosed sea snake (*Enhydrina schistosa*)
43. Narrow-headed sea snake (*Microcephalophis gracilis*)



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