

# Cobra

*V. Kalaian*  
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Quarterly Newsletter  
of the Madras Snake Park Trust

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**COVER**

**The Indian Green Frog (*Rana hexadactyla*)**

The Indian Green Frog is one of the largest of frogs in India. It is widespread in the plains, inhabiting ponds with a luxuriant growth of aquatic vegetation. This species is much persecuted because of collection for biology studies in schools and colleges.

Photo: **R.J. Ranjit Daniels**

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## CONTENTS

- 1** Editorial
- 2** The Amphibian fauna of Jammu and Kashmir State, India : Anil-K. Verma, D.N. Sahi and Kulbhushan Verma
- 7** Habitat selection in Western Ghats Amphibians-Anura : Implications for Species Conservation : R. J. Ranjit Daniels
- 16** A catalogue of herpetological specimens in Madras Snake Park. Part II Amphibians : V. Kalaiarasan, R. Aengals, R. Rajarathinam
- 17** Book Review : B. Vijayaraghavan
- 20** Book Review : R. J. Ranjit Daniels
- 22** Random Harvest : B. Vijayaraghavan



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, Raj Bhavan Post,  
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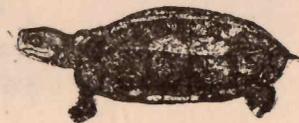


" A large part of my life has been concerned with some of the beauties and mysteries of this earth about us, and with the even greater mysteries of the life that inhabits it. No one can dwell long on such subjects without thinking rather deep thoughts, without asking himself searching and often unanswerable questions, and without achieving a certain philosophy.

" There is one quality that characterises all of us who deal with the science of the earth and its life-- we are never bored. We can't be. There is always something new to be investigated. Every mystery solved brings us to the threshold of a greater one ....

"The pleasures, the values of contact with the natural world are not reserved for the scientists. They are available to anyone who will place himself under the influence of a lonely mountain top, or the sea, or the stillness of a forest; or who will stop to think about so small a thing as the mystery of a growing seed."

- Rachel Carson .





### Editorial

With the first rains there are frogs and toads around us. Some of them are already breeding while the others are yet to be fully active. This is probably the current scenario over much of the plains in India. Interestingly, even in a large metropolis like Madras, there are amphibians after the rains. The few showers in July and August have brought life to frogs and toads in the neighbourhood. There are at least eight species of frogs and a toad that exist and breed in the peripheral parts of Madras city. Nights are alive with their choruses; Indian toad (*Bufo melanostictus*), common treefrog (*Polypedates maculatus*), green frog (*Rana hexadactyla*), Jerdon's bull frog (*Rana crassa*), skipper (*Rana cyanophlyctis*), paddyfield frog (*Rana limnocharis*), south Indian burrowing frog (*Tomopterna rolandae*), painted frog (*Kaloula pulchra*) and variegated frog (*Ramanella variegata*) are all abundant members of the 'monsoon choir'.

Nine species of amphibians in a city as that of Madras is remarkable. Worldwide, biologists are concerned about the rapid decline of amphibians especially in the neighborhood of humans due to increasing population and habitat loss. All those interested in amphibians should try to monitor changes in the population of locally breeding species. This will certainly provide a lot of useful hints that can be linked with changing trends in environmental health.

This issue of Cobra, although meant to be a summer volume, has been brought out as a special amphibian issue at probably the most appropriate season. I sincerely hope that all the readers will find this immensely interesting and inspiring.

I also take this opportunity to request all subscribers and readers of Cobra to kindly excuse us for the poor reproduction of the common Indian krait on the cover of volume 19.

Editor





THE AMPHIBIAN FAUNA  
OF JAMMU AND KASHMIR STATE, INDIA

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and Kulbhushan Verma  
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Surveying the state of Jammu & Kashmir for its amphibian fauna has been sporadic and infrequent. Although the works of Boulenger (1890), Das *et al.* (1964), Gunther (1864), Sahi & Duda (1985) and Smith (1935) with collections from various localities within the state are worth mentioning, these studies deal mostly with casual observations and provide no information on the specific localities, taxonomy and habitat of the amphibians of the Jammu & Kashmir State.

Of the 181 species of Indian amphibians (Inger and Dutta, 1986) nine have been recorded by the authors during extensive surveying from 1989 to 1992. A record of nine species of amphibians as revealed by the present study is rather too modest and there might be a few more species of amphibians in Jammu & Kashmir State especially in the lofty snow-clad mountains and the Ladakh region of Kashmir Province which have only been partly surveyed.

The amphibians were collected either by hand picking or with a hand-net from diverse environment ranging from aquatic or semi-aquatic to terrestrial habitats. The details are as follows.

Order: Aruna

FAMILY: RANIDAE

Genus: *Rana* Linnaeus

1. *Rana cyanophlyctis* Schneider
2. *Rana tigrina* Daudin
3. *Rana limnocharis* Boie
4. *Rana sternosignata* Murray



FAMILY: BUFONIDAE

Genus: *Bufo* Laurenti

5. *Bufo andersoni* Boulenger
6. *Bufo melanostictus* Schneider
7. *Bufo viridis* Laurenti

FAMILY: PELOBATIDAE

Genus: *Scutigera* Theobald

8. *Scutigera occidentalis* Dubois

FAMILY: MICROHYLIDAE

Genus: *Microhyla* Tschudi

9. *Microhyla ornata* (Dumeril & Bibron)

1. Skittering Frog *Rana cyanophlyctis*

**Material Examined :** 355 specimens collected from whole of the Jammu Province and Kashmir Valley.

**Known Distribution :** Widely distributed from southern Arabia and Eastern Iran to Malayan Peninsula and from Himalayas (1900 mts.) to Sri Lanka.

**Remarks :** This is the most common species of frog occurring throughout Jammu & Kashmir State except Ladakh region. Specimens were collected from a variety of habitats such as ponds, rain puddles, ditches, streams, lakes and stagnant water bodies. It is almost ubiquitous in aquatic habitats and is seen nearly throughout the year. There appears to be a great variation in the colouration and wart pattern on the dorsal surface of the frogs.

2. Indian Bull Frog *Rana tigrina*

**Material Examined :** 205 specimens from District Jammu, Kathua and Rajouri of Jammu Province.



*Known Distribution* : Minton (1966) and Pillai *et al.* (1991) have reported its distribution from Taiwan through southern China, Malaya; Sri Lanka and northward to Nepal but avoiding the mountains.

*Remarks* : The frog can be easily recognized by its large size, a conspicuous colour pattern and a mid-dorsal streak. This frog is not as aquatic as *Rana cyanophlyctis*, although it can be found hiding in hydrophytes and aquatic weeds. It occurs sympatrically with *Rana cyanophlyctis* and is restricted to an altitude of 1100 m in the state.

### 3. The Cricket Frog *Rana limnocharis*

*Material Examined* : 15 specimens collected from Jammu, Kathua and Udhampur Districts of Jammu Province in Jammu & Kashmir State.

*Known Distribution* : Throughout India, Pakistan, Sri Lanka, Nepal, parts of Japan and Philippines ( Pillai *et al.*, 1991).

*Remarks* : The specimens of this species exhibited colour variation and were collected mostly from the lentic waters of ponds, pools, ditches and marshy areas. This species has been noticed to be rarer than the other Ranids in the state.

### 4. The Mountain Frog *Rana sternosignata*

*Material Examined* : 4 specimens collected from Bhaderwah town, district Doda of Jammu Province.

*Known Distribution* : Quetta Plateau in Baluchistan, northward to Kabul - Afghanistan, mostly at an altitude of 1500 to 2100 m.

*Remarks* : This is the rarest of the Ranid frogs in the State and only four specimens were collected from under stones in a slow running cold water stream at Bhaderwah region, a relatively temperate region of Jammu Province.

### 5. Anderson's Sind Toad *Bufo andersoni* (*Bufo stomaticus*)

*Material Examined* : 110 specimens collected from Jammu, Kathua and Udhampur, the subtropical regions of the Jammu Province.

*Known Distribution* : Bangladesh; Nepal; Pakistan and westward to Muscat in Arabia.



*Remarks* : This toad is distributed in urban areas and fields near the human habitation, and around lamp posts which provide the incidental feeding grounds. This species is usually met up to an elevation of 1200 m in the State whereafter it is replaced by *Bufo viridis*.

### 6. Common Indian Toad *Bufo melanostictus*

*Material Examined* : 3 specimens collected from Mandi township of district Poonch in Jammu Province.

*Known Distribution* : Boulenger (1890) stated it to be the commonest toad throughout India, Sri Lanka and Burma ascending the Sikkim Himalayas to about 3175 m. and 2222 m in the Nilgiris. Its range extends to southern China and Malayan Peninsula; Western Baluchistan in Pakistan and Sind.

*Remarks* : It is the first record of the species from the Jammu & Kashmir State. It is a rare toad in this part of the country. This species prefer dry and arid conditions. Not much is known about its other habitats in the State.

### 7. European Green Toad *Bufo viridis*

*Materials Examined* : 36 specimens collected from Bhaderwah in Jammu Province and Srinagar and Kargil districts in Kashmir Province of Jammu & Kashmir State.

*Known Distribution* : Minton (1966) recorded the distribution of this species from Germany eastward to Mangolia and Central Siberia and South to Tibet, Iran, Israel, Egypt and Morocco. Boulenger (1890) reported it also from the Himalayas.

*Remarks* : This toad inhabits cold temperate and cold arid parts of Jammu & Kashmir State. It is a high altitude toad and specimens were collected from 1500 m to 3500 m in the State. It inhabits marshy areas, near the spring and along the margins of the streams.

### 8. The Sikkim Frog *Scutiger occidentalis*

*Material Examined* : 8 specimens collected from cold temperate areas of Kargil and Ladakh region of Kashmir Province.

*Known Distribution* : Dubois (1978) recorded it as a new species of Scutiger from Ladakh, Jammu & Kashmir State.



**Remarks :** This frog is a high altitude stenothermal amphibian species with a most restricted range of distribution as it has been collected only from the cold semi-arid, low humidity area of Ladakh region of the Jammu & Kashmir state. The specimen were collected during the months of May and June. A clutch of 105 eggs was also recovered from underneath the stones in a cold water stream in Ladakh.

9. Ornate Narrow Mouthed Frog *Microhyla ornata*

**Materials Examined :** 13 specimens collected from Jammu and Udhampur districts of Jammu Province of the State .

**Known Distribution :** This species has been reported to occur from Taiwan and Southern China through most of the Indian subcontinent and Kashmir (Minton, 1966) and Malayan Peninsula and Japan ( Pillai *et al.*, 1991)

**Remarks :** *Microhyla ornata* is a small amphibian exhibiting more or less typical toad-like habits. It seems to be an uncommon frog in the State. The species is restricted in the state to the low elevation and specimens were encountered in the grassy lawns especially during monsoons and in the paddy fields. This frog species is very active during night.

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HABITAT SELECTION IN WESTERN GHATS'  
AMPHIBIANS - ANURA :  
IMPLICATIONS FOR SPECIES CONSERVATION

Paper presented at the First International Conference  
of IUCN/SSC - ISRAG

at Bhubaneshwar, February 23 - 25, 1992.

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Introduction :

Habitat selection in amphibians has been of interest to biologists since the 1940s. However, it was between 1950 and 1965 that the most interest was shown by community ecologists in this line of research. During the early phases of amphibian study, the interest was purely academic when amphibians were just another set of organisms serving as tools in testing community ecological theories. Current interest nevertheless, has been directed on utilizing our knowledge of amphibian community ecology and habitat selection in conserving either local populations of species or managing the diversity of entire communities (Scott, Jr. and Campbell, 1982).

Recently there has been a worldwide concern about the declining amphibians (Balustein and Wake, 1990; Wake, 1991; Pechman, *et al.*, 1991). Of the various factors attributed to the decline, direct destruction of habitats is apparently the most important; others being less obvious such as conversion of agricultural land from traditional use to more mechanised industry, acid and mineral pollution due to mining and pesticidal poisoning resulting from the agricultural industry. However, it has been debated as to whether the apparent decline in amphibian populations should really be related to the increasing human interference and demand on natural habitats. It has also been felt that a lot of publications pointing to decline in amphibian populations are based on anecdotal evidences and not on careful long-term studies. Long-term studies in the temperate regions have shown that amphibian populations fluctuate considerably in nature and that the dynamics cannot be detected within short periods of just a few years or less (Pechman, *et al.*, 1991).

For a better understanding of amphibian populations, it is good to study their ecology not only at the level of species but also as communities of coexisting and interacting species. Communities have been defined simply as 'three or more species living together in the same area' (Scott, Jr & Campbell, 1982).



A brief discussion of the amphibian communities of the Western Ghats and their habitat requirements will therefore be the theme of this paper.

#### Study area :

The Western Ghats are a continuous hill chain running between 8 ° & 21 ° N. They are spread over an area equal to c. 160,000 km<sup>2</sup>. Rising from the Arabian sea in the west, the hills rise to over 2600 m above sea level. In general, the hills of the southern Western Ghats are higher and rugged than those in the north and mountains above 2000 m are restricted to the Nilgiris, Palanis and Anamalais.

The Western Ghats receive an average rainfall of not less than 2500 mm. However, the rainfall goes upto 9000 mm in parts of Maharashtra and is as low as 1000 mm towards the drier east. Generally, rainfall above 5000 mm is characteristic to the hills north of 14 ° N. Much of the rains are received during June- October when the southwest monsoon is active. But there are also pre-monsoon and winter showers over parts of the southern Western Ghats making these hills wet almost all the year. Thus while the Western Ghats north of 14 ° N experience 5-8 dry months despite the heavy rains, the hills south of 11 ° N are dry for barely 2-3 months. Hence, the less seasonal evergreen rainforests are also restricted largely to the southern Western Ghats.

The Western Ghats are very rich in amphibians. A total of 117 species including 15 caecilians have been reported from the Western Ghats (Inger & Dutta, 1986; Daniels, 1991 a & b). Endemism is very high (74 %). 86 species are considered endemic to the Western Ghats, which is not only the highest for the Indian vertebrates, but also 2.2% of the world's endemic amphibians (Swengel, 1991).

Despite the century long taxonomic studies on the amphibians of the Western Ghats such as that of Boulenger (1890), Rao (1937), Daniel (1963, 1975), Pillai (1986) and Daniel and Sekar (1989), only Robert Inger and colleagues have looked at amphibian communities and their habitat utilization (Inger *et al*, 1984 and 1987). This study was however restricted to the Ponnudi Hills in the southern Western Ghats.

A comparison of all the published lists of amphibians from the Western Ghats suggests that the hills south of 13 ° N where there is widespread rainfall are the richest in species. Moreover, the hills less than 1000 m altitude are generally richer in species than those higher (Daniels, 1992).



#### Methods :

This study includes data on 37 species of amphibians observed in the different parts of the Western Ghats between May 1990 and July 1991. Since the frogs in the genus *Philautus* could not be correctly assigned to the respective species, at least 3 species have been grouped as one. Hence the effective number of species in the analysis that follows is 35. Habitat data on a total of 780 individual anurans were obtained during the short period (see appendix).

Data was collected using 500 m transects in different parts of the Western Ghats. These transects were sampled for two hours in the morning and two hours during the early nights. Field trips were made in all months except August, the rainiest month in the Western Ghats. Species were identified in the field by mere sighting, handling or hearing and information regarding the altitude, activity during night/day and the habitat/microhabitat utilized were recorded. However, unidentified species were collected as and when encountered.

Habitat and microhabitat niche breadths are calculated using the Simpson's index  $1 / \sum p_i^2$ , where  $p_i$  is the proportion of individuals of a species using the  $i$  th habitat or microhabitat. Only those species in which at least five individuals were recorded are included in the analysis. Thus the number of species in this analysis comes down to 25. Additional data on the shifts in niches in relation to changes in temperature and humidity in a few species of anurans were obtained from a captive study in Bangalore.

#### Results and Discussions :

Table I shows that the maximum number of species was observed between 400 and 600 m, and that 32 (91 %) out of the 35 species observed were at elevations not more than 600 m. The lower hills are less variable in climate annually than those higher and such a pattern of species richness confirms with the general predictions that climatic stability favours a greater diversity of species in amphibians (Duellman and Trueb, 1985).

The next significant result is that 34 (97 %) species were observed being terrestrial and/or aquatic. This result is however different from what has been observed in the neotropical forests where Duellman (1989) reports instance of arboreal species dominating the anuran community. This difference is probably explained best by the fact that in the Western Ghats we have not more than 30 species (Rhacophoridae), out of the 102 species (29%) of anurans, which may be considered as arboreal. On the contrary, the Hylids and Centronellids, which are treefrogs have diversified considerably in the neotropics often dominating the local anuran communities (Daniels, pers. observ). As in much of the



Old world tropics, the anurans of the Western ghats are instead dominated by species of Ranids which are either aquatic or terrestrial. That more anurans tend to be nocturnal in the neotropical forests as Duellman (1989) suggests is true of the Western Ghats too. 21 species observed in the study were more active, either foraging or calling, during the night.

Eight habitats and 16 microhabitats were utilized by the 25 species of anurans studied. These exclude those habitats and microhabitats where less than five individual anurans were found and those species represented by less than five individuals. Thirty six percent of the species are restricted to a single habitat and 48% of species have a habitat niche breadth of less than 1.5. Whereas species such as *Micrixalus fuscus* and *Micrixalus saxicola* were restricted to the evergreen forests and hill streams respectively, *Rana limnocharis* was found in all the eight habitats making it the most generalised habitat user with a habitat niche breadth of 4.5. One third of the species use two microhabitats and not just one. This may be explained considering the bimodal life of amphibians; a dependence on an aquatic as well as nonaquatic microhabitat to complete their life histories (Duellman, 1989). Except some species of *Philautus*, all species of anurans in the Western Ghats depend on water for breeding. The species of *Philautus* that spend most of their time above ground on low plants breed in leaf litter, thus becoming dependent on two microhabitats. The maximum number of microhabitats utilized by any one species is nine; *Rana limnocharis* being the broadest microhabitat utilizer with a niche breadth of 4.0.

Table I : Altitudinal distribution of the 35 species of anurans observed on the Western Ghats.

Range (m)	No. Species	Cumulative No. Species
0 - 200	20	20
200 - 400	20	21
400 - 600	30	32
600 - 800	17	33
800 - 1000	18	35
1000 - 1200	10	35
1200 - 1400	5	35
> 1400	3	35



Table II : Habitat utilization of the anurans on the Western Ghats.

Habitat	No. Species	Individuals	Niche Breadth *	
			Habitat	Microhabitat
Evergreen forest	16 (13)	208	1.86 0.84	2.38 0.99
Degraded forest	11 (8)	111	2.34 1.09	2.52 1.03
Deciduous forest	5 (4)	15	2.56 1.01	2.05 0.97
Moist plantations	10 (8)	22	2.45 1.03	2.48 0.87
Lakes	1 (1)	20	4.51 0.00	4.04 0.00
Wet cultivation	6 (6)	25	2.68 1.23	2.67 1.05
Human settlement	14 (12)	114	2.06 1.21	2.56 1.02
Streams	14 (11)	258	2.04 1.05	2.51 0.83

Parantheses: number of species with at least 5 individuals

\* mean and standard deviation

Table II shows the species richness in the different habitat types studied. The evergreen forests have the maximum of 16 species. However, the maximum density of anurans was observed along the streams. Aquatic anurans tend to be more abundant and it is not surprising that *Rana cyanophlyctis*, an aquatic species, was the most abundant during the study accounting for 20 % of all the anurans observed.

The anurans of the evergreen forests have the narrowest habitat niche ( $1.86 \pm 0.84$ ). However, the species found in the deciduous forests have the narrowest microhabitat niche ( $2.05 \pm 0.97$ ). Species of anurans found in the drier and more seasonal deciduous forests probably utilize only one or a few specialized microhabitats. Anurans that have invaded the wet cultivation are the most generalized habitat and microhabitat users. The most interesting habitat is probably the human settlements in the Western Ghats. This habitat has been invaded by 14 species, which is only next in species richness to the evergreen forests. These species also have narrow habitat preferences ( $2.06 \pm 1.21$ ). However, they have a much broader microhabitat niche ( $2.56 \pm 1.02$ ). Whether the observed differences are statistically significant is not tested as the number of species in many habitat types available for comparison is rather small (Table II).



Amongst the different microhabitats defined, leaf litter on the ground is utilized by a maximum of 22 species. However, the edge of water has the highest density of anurans ( Table III). In general, it appears that species of anurans that are aquatic, fossorial and found in secondary microhabitats such as short grass and beside lamps around human settlement have a broader habitat niche (> 2.0) than the other species found in microhabitats such as leaf litter. Interestingly, the species found underlogs have the broadest habitat niche of  $3.07 \pm 1.5$ . It is likely that these species experiencing a rather constant microclimate under logs are tolerant of a wider range of habitat conditions than the more exposed terrestrial species which are easily desiccated under dry conditions. It is therefore not surprising that I found an adult *Uperodon systoma* under a partly burnt log in the deciduous forest of Mudumalai Wildlife Sanctuary.

The niches of certain species of anurans tend to shift with seasons. During a brief study of amphibians in Panama, I found that most species tend to be spread on the forest floor during the wet season, whereas they restrict themselves to edges of streams and ponds during the drier months. Four species of ranids that I have observed under captive condition suggest that species do shift niches according to the changes in the surrounding temperature and relative humidity. However, some species, especially *Rana temporalis*, are more sensitive than the others ( Table IV). Year round observations on a captive individual suggested that the species tends to be arboreal much of its adult life and descends into water when the air temperature goes above or below  $25^{\circ}\text{C}$  and the relative humidity drops below 50 %. Water temperature averages about  $20^{\circ}\text{C}$  even during winter when air temperatures drop below  $10^{\circ}\text{C}$  or go beyond  $30^{\circ}\text{C}$  ( Daniels, pers. observ.). During December 1990, I observed more than 50 individuals of *Rana temporalis* in Silent Valley. All were in or close to water along the streams. Though I have no records of water temperature from these streams, the minimum air temperature was  $11^{\circ}\text{C}$ . Individuals of the same species observed during rainy season in Karnataka by me and in the Ponmudi hills by Inger *et al* (1984) were not strictly aquatic.

The above analysis of data suggests that anurans are sensitive to their surrounding temperature and relative humidity. This is however to be expected (Duellman, 1989). What is interesting is that the choice of habitats and microhabitats are limited by the sensitivity of species. Hence the most sensitive species tend to disappear from the secondary and man-modified habitats. The largest diversity of species is associated with the evergreen rainforests and the associated moist leaf litter in the Western Ghats. These ecological resources are under constant human pressure and are disappearing fast (Daniels, 1991 a & b). That there is the greatest abundance of anurans along the streams should also cause concern to the conservationists. Agricultural and industrial pollutants, besides the massive hydroelectric projects are rapidly usurping these pristine habitats from the anurans.



Table III : Microhabitat utilization of the anurans on the Western Ghats.

Microhabitat	No. of species	Individuals	Habitat	Niche *
Edge of water	10 (9)	189	2.12	1.13
Between plants				
in water	4 (4)	50	2.17	1.66
Crevices				
in water	3 (2)	16	1.93	1.32
Wet rocks	6 (4)	24	1.18	0.35
Litter	22 (17)	185	1.96	1.05
Grass	12 (11)	126	2.19	1.13
Wet sand	6 (4)	28	1.80	1.00
Dry rocks	9 (8)	42	1.95	1.15
Lamps	5 (5)	27	2.28	1.53
Damp packets	2 (2)	26	1.35	0.50
Under soil	1 (1)	5	2.86	0.00
Under logs	6 (5)	7	3.07	1.50
Under stones	5 (5)	8	1.83	0.84
Nooks within houses	7 (7)	20	1.93	1.35
Leaves < 1 m.				
above ground	2 (1)	8	1.30	0.00
Trees < 3 m.				
above ground	3 (3)	11	1.60	0.26

Parentheses : Number of species with at least 5 individuals

\* means and standard deviation.

Table IV : Microhabitat niche shifts in captive ranids

Species	Days of observ.	Total No. observ.	Microhabitat use(%)			Remarks
			Abl.	Terr.	Aqu	
<i>Rana hexadactyla</i>	113	43	0.0	9.3	90.6	Under water
<i>Rana keralensis</i>	113	77	2.6	92.2	5.2	Arboreal on rainy days
<i>Rana temporalis</i>	113	96	77.1	9.4	13.5	Terrestrial at night
<i>Rana tigerina</i>	113	51	0.0	21.6	78.4	Edge of water

Abl. - Arboreal. ; Terr. - Terrestrial. ; Aqu. - Aquatic.



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## Appendix

The 35 species of anurans observed during the study.

Species	Abundance
<i>Bufonidae</i>	
<i>Ansonia ornata</i>	14
<i>Bufo fergusonii</i>	10
<i>Bufo melanostictus</i>	12
<i>Bufo microtypanum</i>	2
<i>Bufo parietalis</i>	2
<i>Bufo stomaticus</i>	49
<i>Microhylidae</i>	
<i>Kaloula pulchra</i>	7
<i>Uperodon systoma</i>	1
<i>Microhyla ornata</i>	22
<i>Microhyla rubra</i>	8
<i>Ranidae</i>	
<i>Micrixalus fuscus</i>	11
<i>Micrixalus saxicola</i>	15
<i>Nannobatrachus beddomi</i>	13
<i>Nyctibatrachus aliciae</i>	8
<i>Nyctibatrachus humayuni</i>	2
<i>Nyctibatrachus major</i>	15
<i>Nyctibatrachus minor</i>	4
<i>Rana beddomi</i>	98
<i>Rana breviceps</i>	2
<i>Rana crassa</i>	6
<i>Rana curtipes</i>	7
<i>Rana cyanophlyctis</i>	153
<i>Rana keralensis</i>	15
<i>Rana limnocharis</i>	125
<i>Rana malabarica</i>	8
<i>Rana murthi</i>	4
<i>Rana temporalis</i>	37
<i>Rana tigerina</i>	26
<i>Rana syhadrensis</i>	27
<i>Rana sp</i>	1
<i>Rhacophoridae</i>	
<i>Philautus spp*</i>	54
<i>Polypedates cruciger</i>	9
<i>Polypedates maculatus</i>	6
<i>Polypedates sp</i>	2
<i>Rhacophorus malabaricus</i>	4
<b>Total:</b>	<b>780</b>

\* Includes *P. charius* and *P. leucorhinus*



A Catalogue of Herpetological specimens in The Madras Snake  
Park Part II\*- Amphibians

V. Kalaiarasan, R. Aengals & R. Rajarathinam  
Madras Snake Park Trust, Madras - 22.

Collection No.	Family	Genus	Species	Locality	No. of examples
1	Caeciliidae	<i>Ichthyophis</i>	<i>subterrestus</i>	-	2
2	Salamandridae	<i>Tylotriton</i>	<i>verrucosus</i>	-	1
3	Ranidae	<i>Tomopterna</i>	<i>breviceps</i>	Narmada Valley	13
4		<i>Rana</i>	<i>limnocharis</i>	"	114
5		<i>Rana</i>	<i>cyanophlyctis</i>	"	7
6		<i>Rana</i>	<i>tigerina</i>	"	5
7		<i>Rana</i>	<i>sp.</i>	"	4
8		<i>Rana</i>	<i>hexadactyla</i>	"	3
9	Microhylidae	<i>Microhyla</i>	<i>ornata</i>	"	23
10		<i>Microhyla</i>	<i>rubra</i>	"	4
11		<i>Kaloula</i>	<i>pulchra</i>	"	4
12		<i>Uperodon</i>	<i>systema</i>	"	5
13	Rhacophoridae	<i>Polypedates</i>	<i>maculatus</i>	"	6
14		<i>Polypedates</i>	<i>sp.</i>	"	1
15		<i>Rhacophorius</i>	<i>malabaricus</i>	"	1
16	Bufonidae	<i>Bufo</i>	<i>melanostictus</i>	"	19

[to be continued]

\* Part I appeared in Vol. 19.



## Book Review :

*Tracking the Vanishing Frogs* by Kathryn Phillips (1994)  
Penguin Books. Pp. 244+x special price \$ 9.50

During the last couple of decades, amphibian researchers in many parts of the world have expressed concern about the sharp declines and disappearances of numerous toad and frog populations. They have been so worried about this trend that is global in its dimensions that the International Union for Conservation of Nature/Species Survival Commission (IUCN/SSC) has set up a special task force on this, called the Declining Amphibian Task Force (DATF), with a worldwide network of amphibian researchers organised in effective working groups.

Supported by assignments from several magazines that took an interest in this phenomenon, journalist Kathryn Phillips has, for some years, been tracking the scientists who have been tracking the frogs. This chronicle is the result.

In popular perception, the term 'wildlife' is reserved for what are, some times, called 'charismatic megafauna' such as the large mammals and the birds. And a lot has been written about the plight of several of these species. But even for many of such educators, frogs and toads are beneath notice, and this makes the fate of some of these species even more precarious for want of the much-needed public awareness. In matters of conservation, indifference can be as deadly as ignorance.

Against this background, Kathryn Phillips has rendered yeoman service by writing this book in an attempt to focus public attention on the subject. All that sloshing about in ooze looking for frogs has not been in vain.

For a lay person, she has gone about her job with meticulous skill, fortifying her observations in the field with interaction with the scientists and extensive study of published material.

Even in an environment undisturbed by man, the frog has a tough time. "Frog eggs, tadpoles and juvenile frogs are extremely vulnerable to predators, weather and water conditions, and other environmental factors. One study found that northern red-legged frogs lay about 680 eggs, and that these eggs have a 91% chance of hatching. But the tadpoles have only about a 5% chance of actually making it to metamorphosis, when they transform into tiny frogs. Only about half of these baby frogs survive a full year. All the numbers taken together mean that about 2.5% or about 17 of the 680 eggs laid actually make it to the over one year old frog stage. Considering that it takes three years of dodging predators



and bad luck before a red-legged frog reaches adulthood, the odds are even smaller that one of those eggs will ever become a breeding frog."

The author details the work done by various scientists in tracking the declining species such as the mountain yellow legged frog, foothill yellow legged frog, boreal toad, yosemite toad, harlequin toad, golden toad, cascade frog, leopard frog, arryo toad etc. She discusses at some length the observations made by the scientists about the impact of different adverse factors with reference to particular frog and toad species. A variety of causes has been identified : habitat destruction, pesticides and herbicides, acid rain, pathogens such as *Aeromonas hydrophila* (red-legged disease), introduction of non-native predatory fish, cattle grazing, prolonged droughts or floods, global warming, depletion of the ozone layer, human exploitation for food, for the pet trade and for purses and wallets and so on.

One of the problems in the area is that the scientists still do not know the precise magnitude of the amphibian decline. There is a lack of basic information about many species, about their life habits, the relationship of species to their particular environment, and population dynamics. This makes the task of identification of the exact reasons for the decline of a species very difficult.

Kathryn Phillips concludes her account trying to answer the question 'Why save frogs?' The blurb gives the impression that the book makes out a case that frogs are a kind of 'living barometers' for the earth's environmental health (like the canaries used by the coal miners') and that their disappearance could be a warning of a more serious ecological disaster that could ultimately claim humans. The author, of course, does set out this view held by some scientists and explains why amphibians are thought to be good bio-indicators, 'living markers that flag serious environmental change'. Compared to other animal species, amphibians are, in some respects, more vulnerable to any erosion in the quality of the environment. Their segmented life cycle--partly in a wet environment and partly on land -- exposes them to the rigors of both. Their hairless skin puts them in immediate contact with the atmosphere and sunlight. Gases readily flow through their skin which is 'permeable'. Their jelly - coated eggs give less protection to the embryos from the elements than in the case of most vertebrate embryos. Having given these reasons as to why some scientists believe that the disappearance of amphibians is an early warning signal for the deteriorating quality of the environment and impending disaster for humans, the author goes on to explain another view why frogs are not true bio-indicators. An animal species just because it gets wiped out partly or wholly in an inhospitable environment does not qualify itself to be described as a bio-indicator. Any biological marker or indicator has to be capable of being used as a measure. Declining or disappearing amphibians would be bio-indicators under this definition if scientists could measure some part of their physiology or chemistry to get a reading



of exactly how much of what environmental pollutant was causing the problem." This is not now possible with frogs. Therefore, frogs are not true bio-indicators as such but only constitute another entry in the list of causalities caused by the depredation of the environment.

That brings the author back to the question why frogs matter. Here she speaks of a joyful day spent exploring a bog, looking for frogs, and sums up: " It is quiet and still and chaotic at once. It is peaceful and turbulent. It is full of life, this bog, and these frogs are a part of that life. This, I realise, is the way it is supposed to be. This is why frogs matter." That's a bit of an anticlimax perhaps, at least to the utilitarians among conservationists. But then, many of the things that make our lives worth living are not utilitarian. What is more, a scientific or quasi-scientific account has to be balanced and objective; striving for a climax is not part of it's function, not necessarily.

B. Vijayaraghavan.

Madras Snake Park Trust  
Raj Bhavan Post, Madras 600 022.

What a wonderful bird the frog are !

When he walk, he fly almost;

When he sing, he cry almost.

He ain't got no tail hardly, either ;

He sit on what he ain't got almost

-Anon.



**Book Review :**

***Amphibians of West Bengal Plains* by Kaushik Deuti and  
B.C. Bharati Goswami, 1995, World Wide Fund for Nature - India  
( Eastern Region) pp53. Price : Rs. 100/-.**

In a time when the general interest in amphibians worldwide is gaining momentum, a photo-guide to the amphibians of eastern Indian region is a most welcome contribution. This book, although covering just 15 species of frogs and toads, would be very useful to all amphibian lovers and naturalists in India as 14 of these species are found all over the country.

The photographs of species are rather nicely composed and printed enabling easy identification of the respective species. The illustration on tadpoles of the described species is a valuable addition to the book. The size of the book is small and handy making it an appropriate field guide.

The few corrections addition that I wish to make are the following. Amphibians need not necessarily lay eggs in water or a frothy medium. They can lay eggs between leaves moistened by mucus ( as in some *Philautus*), carry them on their backs ( European toads) or internally within special brood pouches ( a few tropical frogs/toads).

Caecilians are known to guard their eggs. There are many species of frogs where one of the parent stays with the eggs, especially in tropical America eg., glass frogs and some of the dendrobatid frogs.

There are not many authenticated reports of the parotoid gland's secretions of common Indian toads being capable of killing dogs. Such statements in the book need validation.

Common Indian toads screaming when taken by a predator is not usually known. That toads locate food by vision is a sheer guess.

The description of *Microhyla ornata* as a slender frog is not right. 20 - 62 mm is too wide a range for *Rana limnocharis*. A 62 mm specimen of this species may easily be considered a giant by normal standards. The skipping frog (*Rana cyanophlyctis*) is best described by its habit of floating in water with all limbs up at the surface. The call of *Rana crassa* is much higher in pitch and repetitive compared to that of the much larger *Rana tigerina* and contrary to that indicated in the book. The occurrence of *Rana keralensis* in West Bengal needs confirmation. And finally, not all rhacophorids lay eggs in foam nests.



Barring these minor errors, the book is an excellent starter. There should be more attempts like this in the immediate future. I strongly recommend this book as a field guide to the common amphibians of India.

R.J.Ranjit Daniels.

M.S.Swaminathan Research Foundation  
Madras - 600 113.



Be kind and tender to the Frog,  
And do not call him names,  
As 'Slimy Skin' or 'Polly-wog',  
Or likewise 'Uncle James',  
Or 'Gape-a-grin' or 'Toad-gone-wrong',  
Or 'Silly Bandy-knees';  
The Frog is justly sensitive  
To epithets like these.  
No animal will more repay  
A treatment kind and fair.  
At least so lonely people say  
Who keep a frog  
( and, by the way, they are extremely rare).

- Hilaire Belloc.



## RANDOM HARVEST

### *The Frog and the Stork.*

" A species of South African frog, the plantanna, was, until recently, used so extensively in pregnancy tests that it became threatened with extinction. To perform the test, 2.5 cc. of chemically treated urine would be injected into the adult female frog. If the woman was pregnant, the frog would lay thousands of eggs within six to twelve hours. If she was not, there would be no eggs. The success rate of this experiment created an enormous demand for the plantanna world-wide, and many South Africans made a living by netting them. In 1962 alone, 13,000 frogs were exported to the United States. Luckily for the plantanna, alternative means have now been found for testing."  
(Source : *Frogs* by Linda Sonntag.-1981)

### *The Alien Invasion.*

The damage caused by various alien species, ie. species introduced outside their natural range, is engaging the attention of the Species Survival Commission of the World Conservation Union (IUCN) which has formed a new group, the Invasive Species Specialists Group (ISSG). The group aims to reduce the threats caused by invasive species to natural ecosystems and their native fauna and the means of controlling or eradicating them. The ISSG publishes a news letter, *Aliens*.

One example of an alien among amphibians is the bull frog *Rana catesbeiana*. Many amphibian workers are worried about the severe damage caused to native fauna where this bull frog has been introduced. Among such countries of introduction are Brazil, Columbia, Indonesia, Italy, Malaysia, Peru, Singapore, Spain and Taiwan.  
(Source : *Froglog*, June, 1995.)

### *Denmark Makes its Mark !*

Remarkable work in amphibian conservation has been done in Denmark where scientists have, for some years, been comprehensively documenting and tackling the problem of declining amphibians. Holm Anderson did pioneering work in the collection of data in the 1940s and later around 1960. The extensive documentation of severe declines and their causes has made it possible to convince public authorities of the need for serious conservation efforts. This has facilitated changes in legislation an example of which is that every pond in Denmark of the size 100 sq.m. or more is now protected by law. The government have awarded grants for pond restoration, creation of new ponds and similar habitat restoration projects which are under close inspection by herpetologists.  
(Source : *Froglog*, June, 1995)



## *Wyoming... Going.... Gone ? Not Yet.*

The Wyoming toad is one of Canada's most endangered animals. Discovered in 1946, the Wyoming toads were locally abundant until the 1970s. Since then, the toad has virtually disappeared from all known sites. New populations were located in 1980 and 1987 where too they all but disappeared by 1994. A recovery plan for the toad was developed by the U.S. Fish and Wildlife Service in 1992. Large portions of the known habitats were acquired as part of a conservation program. In 1994, hormones were used to induce breeding in Wyoming toads and this has brought greater success to the captive breeding programme. (Source : *Notes from NOAH-The Northern Ohio Association of Herpetologists* - June 28, 1995.)

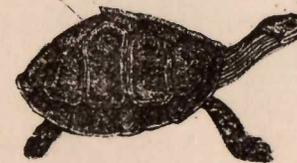
### *Licking Toads is Dangerous to Health !*

The presence of hallucinogens in the skin secretions of some toad species- the Yosemite toad (*Bufo cinorus*) is one such -- has led to a still-uncommon practice called " toad licking " which is exactly what the term implies. This is dangerous business though, since amphibian poisons can be extremely toxic. A single adult rough-skinned newt, for instance, has enough toxin to kill 25,000 white mice or a few humans.  
(Source : *Tracking the Vanishing Frogs* - (1994) by Kathryn Phillips.)

### *A Generous Genus.*

The neotropical frog genus *Eleutherodactylus* has more than 400 species and is considered the largest single genus of vertebrates known to man.  
(Source : *Ibid.*) .

Compiled and processed by B. Vijayaraghavan.



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