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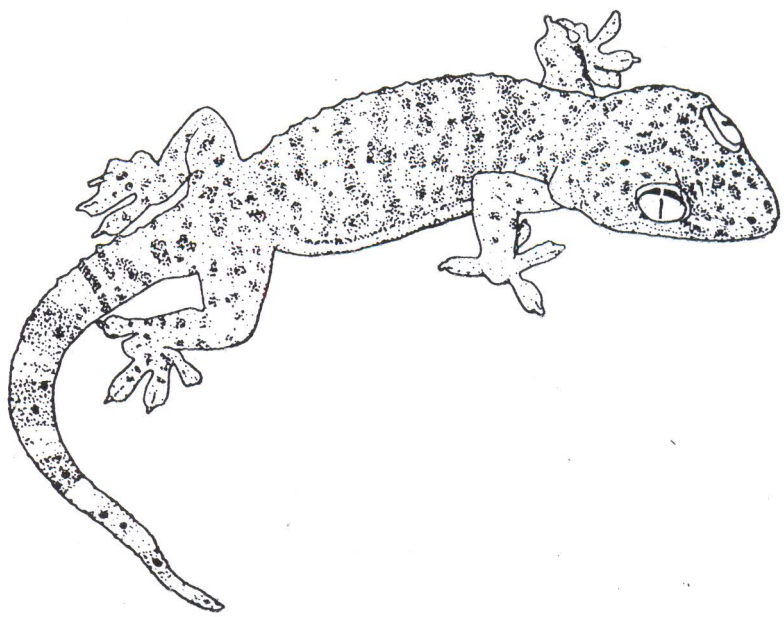

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H A M A D R Y A D December 1989 Vol.14(2)

NEWS FROM THE MADRAS CROCODILE BANK

1. Rom Whitaker, Harry Andrews and Indraneil Das attended the First World Congress of Herpetology held in September at the University of Kent at Canterbury. Special thanks is due to Dr. Roger Avery, Commonwealth Foundation, Dr. Peter C.H. Pritchard, Chelonia Institute and Mr. Ronald Javitch, for the support received.

2. Director, Rom Whitaker attended the 2nd Steering Committee Meeting of IUCN/SSC Crocodile Specialist Group held on 8th October 1989 at the IUCN, Switzerland, and was appointed Vice Chairman of the CSG for Western Asia.

3. Dr. Ed Moll of the University of Eastern Illinois, U.S.A. visited the Croc Bank in October to organise a survey of Batagur baska on the east coast of India. Satish Bhaskar, one of India's most experienced turtle field biologists, is now in the field in Orissa.

4. The Croc Bank received a generous grant from the Indo-German Social Service Society for the purchase of a computer and setting up of a database. We are presently in the process of computerising our comprehensive herpetological reference library which will be of immense use to Indian and foreign biologists.

5. **"The Boy and the Crocodile"**, a children's feature film, produced and directed by Rom Whitaker for the Children's Film Society of India, recently won two awards at the 6th International Children's Film Festival of India held in New Delhi, the **Silver Elephant** and the **Prix Cifej** of the International Jury. The film was also chosen for the 8th International Film Festival at Teheran.

6. Mike Miller, a volunteer from Canada, is presently here to help in setting up an interpretation and educational centre for the Irula Tribal Women's Welfare Society's afforestation programme in Chingleput District, Tamil Nadu.

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THE GHARA OF THE GHARIAL

Romulus Whitaker and Zai Whitaker
Madras Crocodile Bank, Vadanemmeli Village, Perur P.O.,
Mahabalipuram Road, Madras 603 104

The gharial (generically named Gavialis when its describer apparently read 'v' for 'r' in the early description of the animal), is unique among crocodilians for a number of reasons, including the extreme length of the jaws, the almost exclusive fish diet and the fact that it is the single surviving taxa of what was once a large, widespread family, the Gavialidae.

While adult male crocodilians are usually larger than the females, there are no external morphological characteristics to tell the sexes apart - except in the gharial. Hindi speaking people of the gharial inhabited states of Uttar Pradesh and Rajasthan in northern India first described the strange orb on the male gharial's snout and have called it "**ghara**" or pot for perhaps thousands of years. As late as 1972 some herpetologists even doubted the existence of the bump on the snout, now called a "narial excrescence" in the scientific literature.

But what is the function of this cartilagenous hump? Its large size would seem a disadvantage when sidesweeping for fish. It is big enough in an adult male to act as a visual sex character, certainly from the water-level view of a female. The various hypotheses made up about the **ghara** give credit to the human imagination. It was proposed that a big male gharial can hold its breath longer with the extra bit of air in its hollow appendage. Then we heard that the male "hooks" the female by the snout for a sort of half-nelson mating grip. But the herpetologist, Dr. Angus Bellairs probably came closest when he proposed that the **ghara** may help to resonate male gharial vocalisations. We still know

relatively little about gharial behaviour and no one has reported hearing an adult male vocalize, so that theory has yet to be checked. But we have been watching three male gharial approach maturity at the Crocodile Bank and this has shed light on some of our observations on wild gharial.

The largest male gharial at the Croc Bank (hatched in 1971 from a wild nest on the Jumuna River) that we've been rearing since it was a yearling, 75 cm long, is now 420 cms long and has a well developed **ghara**. The snout looked like a female's snout till 1982 when the first protruberance became obvious. **Ghara** growth proceeded steadily though a bit slowly, with a definite back folding tendency which eventually covered the nostrils in 1988. The exhalation hiss and hum of this male upon surfacing is much louder than the females and two younger males. invariably calling attention to itself when it arrives near a group, and more especially heard during the breeding season (February to April).

Gharial do some unusual social signalling which include short warning "barks", hissing and loud underwater clicks which are perhaps jaw slaps, (quite different in the case of the mugger and saltwater crocodiles who jaw slap on the surface of the water). But the most obvious and consistent audible signal of the adult male now is the hiss and hum which was dramaically modified when the large **ghara** folded over to form a large flap.

Overlooking the Padma River in Rajshahi District of Bangladesh, engrossed in watching several Indian softshell turtles (Aspideretes gangeticus), we heard a sound resembling the hum of a movie camera. Just 150 metres upriver a large male gharial had surfaced and the sound was the hiss and hum resulting from the air, forced past the **ghara** enfolding the reptile's nostrils. It thus seems that the **ghara** does help to amplify sound, not vocal sound but as a hiss modifier, allowing the adult male gharial's presence to be broadcast along a considerable length of his territory.

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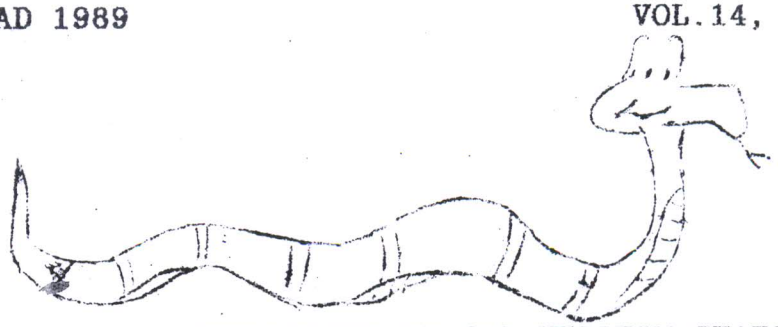

CHELONIANS OF THE WESTERN GHATS

Jack Frazier
Programa Regional De Vida Silvestre
Escuela De Ciencias, Ambientales, Apartado 1350
Heredia, Costa Rica.

Introduction

Truly wild Travancore tortoises, today known as Indotestudo forstenii, are found only in the Western Ghats of south-western India, its geographic range reported to be the Travancore Hills of Kerala and Coorg, the south-western extreme of Karnataka.** No confirmed records farther north are known, and in fact there is only one documented record from Coorg.

Fundamental data such as geographic distribution and habitat type - to say nothing of basic natural history - are sketchy at best. The rapid rate of deforestation; increases in human populations and exploitation levels of natural resources; and the increasing number and size of dams built in forest areas, has resulted in a very rapid decline in both area and quality of forest. It is therefore, of considerable urgency to establish a baseline on the status and distribution of the Travancore tortoise.

There are several reasons why this tortoise is thought to be dispersed and difficult to find: the species was discovered relatively recently; very few studies have been made on this

** (Editorial note: The species has been recently collected from Indira Gandhi (formerly, Ahnamalai) Wildlife Sanctuary in north-western Tamil Nadu).

tortoise; numerous field biologists who have worked in the Western Ghats - often over extended periods of time - have never seen the animal; and its colouration is cryptic against the leaf litter of dense forest.

Summary of Findings

Searching in evergreen forest areas in Subramanya and Neria where the Travancoore tortoise had been found (as shown by the presence of shells left from animals that have been consumed) yielded no sign of these animals. The dense cover, textural complexity, and especially the colour and irregular surface of the forest floor in the areas visited all contribute to create a habitat in which a brown tortoise would be extremely difficult to detect visually. The fact that tribals hunt tortoises with dogs shows that even people who virtually live in the forest rely more on their dogs' sense of smell than on their own eyes for finding tortoises.

Unfortunately, there is next to nothing in the literature to help one find Travancoore tortoises. Up until the present study it was not documented that this species occurred on the western slopes of the Western Ghats in Karnataka, and the records reported here represent a northward extention of the geographic range by at least 50 km. As the Ghats in Karnataka have no major discontinuity, it seems likely that the distribution of this species may extend at least as far north as the Goa Gap.

Another query is what habitats this tortoise occurs in. The Travancoore Hills, from where the animal is best known, are most likely to be covered in evergreen forests, as are the western slopes of the Ghats in Karnataka. However, the animal may also occur in various types of decidious forests, and it is virtually certain that remanent populations are in degraded forests. Nonetheless, there is no published record giving a detailed habitat description for even one Travancoore tortoise sighting.

The shells of animals that have been eaten show that immatures and adults are caught. There are stories of tortoises yielding more than 10 kgs. of meat, but this size of animal must today be very rare.

It is clear that the Travancore tortoise is eaten throughout South Kendra District, and despite common beliefs, it is not only tribals and Harijans who are consuming these animals. The rate of consumption per family would appear to be low - possibly one a year. Yet, overall the rate of predation on these reptiles is probably high. Coupled with massive habitat destruction this does not bode well for the Travancore tortoise.

Recommendations

A thorough status survey of the Travancore tortoise is urgently needed, and there is just as important a need for acquiring basic data on natural history and habitat parameters. Once a baseline of fundamental information is established it would be possible to establish captive rearing programmes so that: 1) the captive animals can be kept under the best possible conditions, giving the best chances for surviving and breeding in captivity, and 2) the captive reared progeny can be reintroduced into those areas where they will have the best possible chances of survival and make the most significant contribution to the wild tortoise populations. It must be emphasized that any attempt at captive rearing will be greatly handicapped until basic biological information on this species becomes available.

Comment

An explanation about the scientific name of the Travancore tortise is in order. Until 1957 the land tortoises of India were all considered to be various species of the genius Testudo; the Travancore tortoise was Testudo travancorica. After extensive studies, Professor E.H. Loveridge concluded that Testudo was a heterogenus group, and he put nearly all of the large land tortoises into the genus Geochelone, so the Travancore tortoise became Geochelone travancorica. Recent detailed studies of the tortoises by Dr. C. Crumly have resulted in further changes, and the genus Indotestudo is now thought to be the best name for the Travancore tortoise; hence its scientific name became Indotestudo travancorica.

Three species of tortoise were included within the genus Indotestudo: the spur-tailed tortoise of southeast Asia

and eastern India, Indotestudo elongata; the Celebes tortoise, Indotestudo forstenii; and the Travancore tortoise, Indotestudo travancorica. Although each of these three species are geographically separated by a large distance from the other, the morphological differences between the three species are minor.

Studies by Drs. M. Hoogmoed and C. Crumly concluded that there is no difference between the Celebes and Travancore tortoises and, furthermore, that there is no wild Celebes tortoise, but that this so called species is, in fact, based on Travancore tortoises which were brought to Indonesia. However, by an accident of science, the Celebes tortoise was named before the Travancore tortoise. In the parlance of taxonomists, the senior synonym is the name for the Celebes tortoise, but taxonomically it is nothing but a Travancore tortoise. Hence, now once again the scientific name of the Travancore tortoise has been changed, and it is known as Indotestudo forstenii.

Acknowledgements

The assistance given by Mr. B.K. Sharath was invaluable, and the generous hospitality given by his family was a great boon. Professor M.S. Appa, Principal of Venkanada College, kindly gave Mr. Sharath permission to take a week off from his teaching and accompany me during the survey. Mr. R. Hebar provided generous hospitality and assistance in Neria. Numerous other people from the various villages helped us during the survey. The visit was done under an Indo-American Fellowship Programme with logistic support from the University Grants Commission and the American Institute of Indian Studies; the U.S. Fish and Wildlife Service, through the Science Office of the U.S. Embassy, New Delhi, provided funds to make the visit possible.

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SURVEY OF THE MARINE TURTLE HATCHERIES OF KARNATAKA

Jack Frazier, Programa Regional De Vida Silvestre
Escuela De Ciencias, Ambientales, Apartado 1350
Costa Rica.

SUMMARY

A brief visit was made to three sea turtle hatcheries in Mangalore, Kundapur and Bhatkal between 20th and 24th March 1987. The only species of sea turtle known to nest is the olive ridley, Lepidochelys olivacea. No massed nesting ("arribada") is known from the west coast of India, although it does occur on the north-eastern coast of the country. In Karnataka, eggs have been collected as early as 13th June and as late as 4th April, showing that the nesting season is protracted. Comparable to the east coast, the season begins and ends earlier in the south. As is normal for the species throughout its range, the average number of eggs per nest is about 110, and hatching success varies from 20 to 94%. Eggs and hatchlings are normal for the species, except that hatchlings show remarkably large amounts of white colouration on the plastron - a feature normally associated with the green turtle. This indicates that there may be a distinct population of olive ridley turtles from Karnataka or the west coast.

There is great variation in the actual techniques employed in each hatchery, with differences in the: 1) record keeping efficiency, detail and reliability; 2) number of eggs handled; 3) relationship between the hatchery project and local inhabitants; and 4) priorities in nest protection and long term operation of the programme.

RECOMMENDATIONS

It is of the greatest importance that reliable records be kept, because management practices, policies and decisions will be distorted by false and inaccurate records. To facilitate general comparisons and state-wide policies and decisions, it is essential that there be standardisation of records and procedures between various installations. This is not to underplay the necessity of modifications to meet with local constraints and conditions, but it is imperative that there be easy means of comparing and relating different parts of the same programme.

The ultimate goal is to enhance the turtle populations, and this objective should not be clouded by temporary goals such as "number of eggs purchased per year". By far the most effective - both financially and biologically - way to manage the turtle stocks is by providing adequate conditions to the animals for breeding and feeding. Because modern biology and wildlife management techniques cannot provide many critical details on how to manage turtles, it is best to provide support for the natural situation - such as *in situ* protection of nests. With our present lack of basic information, manipulation should be kept to a minimum.

Another consideration which will directly effect the true success of any sea turtle conservation programme is that of time and stability of the programme. These are long-lived animals requiring a decade or more to reach maturity. The results of conservation practices will only become clear after a long term commitment. Short-term solutions will only serve as window-dressing. It is essential that the full support and participation of the local population be involved in the programme; official involvement should ultimately serve only for guidance.

INTRODUCTION

At the invitation of the Chief Wildlife Warden of the Karnataka Forest Department, an evaluation survey of the state sea turtle hatcheries was conducted. Three sites, one in each of the three southern coastal divisions, were visited between 20th to 24th March 1987 in collaboration with the local Forest Department official(s), and a preliminary analysis of each site is given in this report.

The survey was made possible by the kind assistance of Mr. M.K. Appayya, Chief Wildlife Warden; Mr. M. Reddy, D.F.O., Mangalore, Mr. Sahai, D.F.O. Kundapur; and Mr. Vasant C. Kulkarni, R.F.O., Bhatkal.

It was said that during the 1985-1986 season a total of nine hatcheries were being run by the Forest Department, but that during the present season (1986-1987) only three were in operation. However, there was some confusion among staff members as to how many hatcheries were in operation, so we only visited the three sites generally known to have hatcheries.

RESULTS

Bengare Sand Spit Hatchery

The first visit was made to Bengare Sand Spit Sea Turtle Hatchery, in Mangalore Division, Dakshin Kannad District, on the 20th of March 1987, accompanied by the Range Forest Officer who is directly in charge of the installation.

Coastal Habitat

The coastal habitat at Bengare Sand Spit was characterized as a flat terrestrial platform. Nearly 100 % of the supralittoral beach was planted with Casuarina. The littoral as well as the supralittoral areas were covered with siliceous sands (terrestrial) which were brilliant white, but also there were frequent patches of black (ferrous) grains.

The most common native vegetation present in the gaps of Casuarina plantation was Fimbristylis spp., and Ipomoea biloba. Along the beach crest zone, just at the edge of the vegetation, were common tracks of small predators (mongooses or cats), rodents, crabs and birds. There were vast mounds and layers of chitinous tubes on the beach platform, indicating that there is a massive population of some shallow water invertebrate in the nearshore waters.

There are houses and boats on the beach in the near vicinity of the hatchery. This, coupled with the density of Casuarina planting, results in the nesting habitat being very reduced in area and of low nesting potential.

In the nearshore waters along the beach, as close as 100 m to the beach, were well over 100 motorised stern trawlers cutting back and forth across the shallow water. It is clear that the coastal zone in this area, from essentially the beach to several kilometres offshore, is very heavily (over) fished.

Hatchery Installation:

A weathered sign along the access road announces the presence of the hatchery. In the midst of a young Casuarina plantation, about 2 M inland of the beach crest, is a wire cage about 6M x 6M x 2M. Being of iron, it is rusting, and it has been painted recently with green paint, which is spattered on the sand inside the cage (thus contaminating the hatchery substrate). The base of the cage is not always

in contact with - much less buried by - the sand, and crabs and possibly also other animals can slip in under the wire. Dogs were patrolling outside the cage during our visit.

There were twigs stuck into the sand at 13 places, suggesting the presence of 13 transplanted nests. We were informed that the Bengare hatchery is responsible for the coastal area from Panabar (Port) to Ullal, a distance of some 10 km. The Forest Department pays 45 paise per egg (while the market value is at least 50 paise). It should be noted that legally there is a complete ban on digging up, selling or buying turtle eggs.

No species identification was made as no specimens were available, but given the fact that Lepidochelys olivacea is known to breed in Karnataka (see below), it is assumed that most (if not all) of the eggs are from this species.

A notebook kept by a local watchman, who was formerly a fisherman, contained the following information.

Date Eggs Collected/ Received	No. of Eggs	Date "Hatched (Emerged)	No. of Hatchlings Released	Incubation Time (days) (days)	Hatching %
10.11.1986	75*	23.1.1987	70	54	93.3
29.11.1986	200*	23.1.1987	178	55	89.0
8.12.1986	200**				
13.12.1986	225**	6.2.1987	209	55	92.9
25.12.1986	300	18,2,1987	275	55	91.7
26.12.1986	225	19.2.1987	185	55	86.7
28.12.1986	112	22.2.1987	96	56	85.7
2.2.1987	275*				

* Eggs obtained from the beach; otherwise, it is not recorded if the eggs are from the market or beach.

** nest identification lost

This data might be taken as evidence that:

1. Clutch size varies from 75 to 300, averaging 201.5 eggs/nest.

2. Incubation period varies from 54 to 56 days, averaging 55 days.

3. Hatching success varies from 85.7 to 93.3 % averaging 89.9 %.

However, based on long term, rigorous studies of marine turtles in other areas, several points must be considered.

1. The average clutch size in Lepidochelys olivacea is about 110 eggs; 150 is unusual and 170 is rare; there is no reliable record of clutches of 200 (or more) eggs in this species.

2. "Incubation Period" also shows considerable variation in nature and may vary from 45 to 70 days, depending on climatic and other conditions.

3. Hatching percent - even in the best of conditions - is highly variable and may range from 0 to sometimes 100 %. When eggs are transplanted from natural nests to a hatchery, there is regularly a noticeable decrease in hatchability - often hatcheries with rigorously kept records show results of 50 % hatching. When eggs from markets or egg sellers are used, hatching percent drops even further because of repeated trauma to the fragile embryo.

In conclusion, the records from Bengaro are incredible in indicating:

1. Clutch size is twice the average.

2. Absence of natural variation in "incubation period"

3. Absence of natural variation in hatching success, and hatching percentage that is twice as successful as in scientifically established hatcheries with the best possible conditions.

The intensity of trawling activity immediately in front of the nesting beach suggests that there must be incidental capture of sea turtles, and that the numbers caught must be sizeable. In other parts of India and the world there would be dozens - if not hundreds - of dead turtles on the beach during the nesting season. If this is not happening, it suggests that the trawlermen are finding some way to dispense with the turtles, perhaps by including them in their landings. This point needs to be investigated with great delicacy if reliable information is to be obtained.

Thrasi Hatchery

The second hatchery, at Thrasi Village, Marvanthe Range, Kundapur Division, Dakshin Kannad District, was visited on 23rd march 1987 together with the R.F.O. who is in charge of the work.

Coastal Habitat

The beach immediately to the south of the hatchery shows an open supralittoral platform with scattered cover of Pandanas sp. and coarse halophytic grass. The coastal highway is 10 to 50 M inland of the beach crest, essentially forming an inland boundary to the beach platform. The length of the natural beach is less than 1 km. Offshore, and along the shore to the north are (basalic) rock outcrops. The Thrasi beach, having open spaces and vestiges of indigenous vegetation, provides excellent nesting potential.

Hatchery installation.

The site in use was inland, off the road, 30 M from the beach crest, in an area of sand and compact red lateritic soil which is within a Casuarina plantation. A net covers the hatchery, which is 2M x 5M x 0.9M About 6 nest markers were inside the net. On the seaward side of the road are two wire mesh cages, each 10 x 6 x 2 m : they have been coated with a black paint, some of which has fallen onto the sand. These cages were not in use.

The coastal area served by this hatchery was said to be 5 or 6 km to either side of it. Eggs are purchased from casual labourers at Rs.75/- per batch, regardless of the number of eggs. In comparison, the market price is said to be 25 to 30 paise per egg (that is Rs.33/- for a nest of 110 eggs); however, turtle eggs are said not to be sold as freely as they were formerly.

A nest inside the hatchery was said to have hatched out on the 21st of March, and said to have contained 130 eggs and had been laid on 29th January. On examination the nest was found to have the following:
- total depth of 38 cm;

- 38 unhatched eggs, 21 egg shells of hatched eggs, and 2 eggs with hatchlings of which one was dead and one alive;

- ten intact eggs were weighed and measured, yielding weights of 29.5 to 39.Ø grams and diameters of 38.6 to 42.Ø mm;

- of the unhatched eggs, 4 were "nearly fresh" with no signs of development, 28 had "red fungus" and no signs of development, and 6 had dead embryos in various stages of development, some of which had fungus.

Ten hatchling Lepidochelys olivacea were being kept in a basin of water in the hatchery. These were measured and observed. Two were found dead - the water temperature in the basin around mid day was 35.2°C, which is likely to be related to the deaths. Weights varied from 17.5 to 20.5 grams and straight carapace lengths raned from 42.7 to 45.4 mm. There was, as is usual in this species, tremendous variation in the scutes of the carapace. Most notable was the presence of large amounts of white colouration on the plastron scutes; this is unknown in other populations of this turtle.

Egg collection records for each of the three seasons for which data were available are summarized below:

Season	Date		Total	No.of Eggs/"Nest"		Hatching %	
	First	Last	"Nests"	Min.	Max.	Min.	Max.
1984-85	18th Dec.	10th Feb.	6	93	122	20	94
1985-86	13th June	5th Feb.	24	94	133	-	-
1986-87	22nd July	30th Jan.	59	60	159	-	-

These datas were well organised in tabular form and the values show the degree of variation that is normal in clutch size, hatching success, etc. What is remarkable is that eggs are available from mid June until mid February, for a period of 8 months. This protracted nesting season is not known to occur with L. olivacea in India, although it does occur in Mexico and Costa Rica.

Two captive L. olivacea are kept in a cylindrical cement tank about 1 M in diameter. They are said to be fed 2 kgs of squid, or fish, per day. According to the records, these animals are from eggs that were laid on 13th July and hatched on 17th September 1985. At the time of the visit their curved carapace lengths were 44.0 and 43.5 cm. The smaller of the two had an abscess on the plastron, the likes of which has never been seen before by the writer; it was about 15 x 10 cm across and 3 cm deep. It was apparently exacerbated by the crowded conditions in the tank and the continual scraping of the venter on the cement.

Under normal captive-rearing conditions, as recorded in various studies both in India and elsewhere, it takes several years to reach the sizes seen in these animals, which were reported to be only 18 months old. The rearing conditions in Thrasi appear to be yielding a captive growth rate 2 or 3 times that found elsewhere. Alternatively, there may have been confusion in the date of hatching and the animals could be older than is thought. The matter warrants investigation.

Jali Hatchery

The final visit was made on 24th March to the Jali hatchery at the village of the same name in Bhatkal Range, Honavar Division, Uttar Kannad District. The R.F.O., Mr. Vasant Kukarni, accompanied us; previously he had described the hatchery programme under his charge, which began in 1984. In order to encourage the coastal inhabitants to cooperate, the Forest Department staff popularized the situation with marine turtles and the need for conservation measures; they also informed fishermen that their reduced catches were related to the present reduced stock of sea turtles and that increasing the turtles would help their fish catches.

Over the four year period the progamme has gradually evolved to utilize *in situ* protection of turtle nests whenever possible, and transplantation to a hatchery is now only done when necessary to ensure the safety of the eggs. To achieve this, the full support of the public is encouraged, and a reward of Rs.50/- is given for information about the location of recent nests. Hatchery personnel determine, after visiting the site, whether to set up a transportable metal exclosure or to transplant the eggs to the hatchery.

The ultimate goal of the programme, we were told, is to be self-motivating and self-guiding, for Forest Department staff are continually being transferred so the only way to have stability f is by encouraging full cooperation and participation of local residents. It was decided after unsuccessful attempts at keeping hatchlings for 6 months, or for a few weeks, that it is best to release the animals immediately into the sea.

Mr. Kukarni asked a number of important questions about sea turtle biology and conservation and exhibited considerable familiarity with the subject.

Coastal habitat

A gentle intertidal slope rises from what appears to be a vast area of shallow water with numerous rock outcrops and two vegetated islands each of several hectares in area. The slope from the high water mark to the beach crest is about 15 m in width and rises at an angle of 10 to 15°. The high beach is vegetated with indigenous strand plants such as *Pandanus sp.*, *Ipomoea biloba* and a coarse halophytic grass. This zone is rarely more than 10 M wide, for a road and houses are 10 to 20 m from the beach crest. Nesting habitat is good, but reduced by the amount of human buildings and activities, as well as the many dogs present.

Hatchery Installation;

A wire cage 6m x 6 x 2 m is immediately in front of the hatchery manager's house. It is being painted with coal tar. There were four neatly numbered nest markers inside the hatchery, showing the locations of transplanted nests. Wire cages about 0.8 x 0.8 x 2 m were nearby and available for *in situ* protection of nests. Formerly lighter and cheaper transportable exclosures were used.

At the house of the hatchery manager were 5 plastic tubs with sea water and said to have 183 hatchlings from two nests that had hatched on 11th March and 24th March. Twenty Lepidochelys olivacea hatchlings were observed for scale conditions (as the nests had been mixed the hatchlings were of unknown ages, so there was no use in measuring a sample). Usual to this species, there was great variation in the number of scales on the carapace as well as other body parts. Another 117 hatchlings were examined for colouration of the plastron, and one was found dead. As at Thrasi, there was a large amount of white on the scutes of the plastron; this appears to be characteristic of this species in Karnataka.

Records of egg collection are summarized below:

Season	Date		Total "Nests"	No. of Eggs/"Nest"		Hatching %	
	First	Last		Min.	Max.	Min.	Max.
1984-85 (data not available)							
1985-86	18th Aug	4th April	44	120	175	-	-
1986-87	2nd Aug.	6th Feb.	25	85	150	-	-

These datas were well organised in tabular form and the values show the normal degree of variation in hatching percent. However, the number of eggs per nest shows an incredible regularity; 55 % of the 1985-86 "nests" were reported to have had exactly 130 eggs.

As with the hatchery at Thrasi, the nesting season is protracted, with eggs available from early August until early April, again a period of about 8 months. It is notable that the season in the north of the state is 2 months behind that 40 km to the south. A similar phenomenon occurs with the nesting of Lepdochelys olivacea on the eastern coast of India.

Additional hatcheries

In addition to these three functional hatcheries it was learned that during the 1985-86 season there had been sea turtle hatcheries at Baindur, in Kundapur Division, Dakshin Kannad District. In Uttar Kannad District there had been hatcheries at Gangavali beach, Hiregutti range; Holangadde and Kade beaches of Kumta range; and Hadipur and Kasarkod beaches of Honavar range. No details of their activities were available.

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BOOK REVIEW

ERNST, C.H. & BARBOUR, R.W. 1989. TURTLES OF THE WORLD. SMITHSONIAN INSTITUTION PRESS, WASHINGTON, D.C. AND LONDON. 313 pp. 16 pl. $ 45

The discovery and rediscovery of several living species of turtles within the last decade, especially from Asia, as well as the rapidly changing nomenclature, still very much in a state of flux, had left compilations on the world's turtles (currently some 260 species) outdated. Thus, in many ways, the work under review is an improvement over similar compilations, providing detailed species descriptions, identification keys, data on distribution, habitat, status and where available, natural history notes. Ernst and Barbour are authorities on the North American turtles, and the volume has been prepared, as remarked in the preface, as a companion volume to their earlier (1972) work on the turtles of the United States.

The book is well produced. To pack such a considerable amount of information and photographs into one volume without making it unweldy is no mean feat. The 313 pages and 16 colour plates are well bound and can be opened flat on a coffee table. Paper, printing and layout are excellent.

'Turtles of the world' starts predictably with a general introduction to the group, with extensive notes on shell and skull morphology and includes a list of synonyms of terms

used by various authors to refer to the scutes on the turtle shell. Generic descriptions range from highly detailed accounts (eg. Cuora) to none at all (eg. Geoclemys, Hardella and Orlitia) in case of monotypic genera. Also present in this section are fossil records and distributional maps of recent turtles.

Major shifts in nomenclature from similar compilations involve the splitting of the genera Geochelone and Trionyx, following the revisions by Crumly (In press) and Meylan (1987) respectively. Ernst and Barbour, however, choose to retain the Cochin forest cane turtle Geoemyda silvatica in the genus Heosemys, while aware of its generic relocation suggested by Moll et al. (1986) Identification keys to the families, genera and species of all recognised living turtles are a welcome feature of the book. Over-simplifications, resulting in inaccuracies in some of these keys should continue to bedevil efforts in identifying turtles using books such as these. A case in point is the key to the genus Aspideretes (pg 107), where the authors consider A. nigricans to be differentiable from the other members of the genus by possessing a 'head totally black'. This species, if at all distinct from A. hurum, has, as juveniles, broad green patches on the temporal regions and across snout. Newly described Asian taxa which are included in the compilation include Cuora mccordi, Ernst 1988 and Platysternon megacephalum shiui Ernst and McCord 1986. A recently revived species that find its place is Rafetus swinhoei Gray (1873), shown to be valid by Meylan and Webb (1988). Three species have been described/revived too late to be included in the book -- Pelochelys taihuensis from China by Zhang (1984), Homopus bergeri from South Africa by Branch (1989) and Testudo whitei, presumed to be from northern Africa, by Highfield and Martin (1989). At least 2 taxa of Asian turtles have been omitted: Melanochelys trijuga wiroti (Wirot 1979), from Thailand and Kachuga tentoria flaviventer (Gunther 1864), from the northern tributaries of the Ganga, in north India, the latter revived by Moll (1987). Certain mistakes and omissions on distribution that are quite important, have been perpetrated from earlier works, such as data suggesting that Kachuga tentoria circumdata occurs in Calcutta, following Mertens (1969). This subspecies has since been shown to be confined to the western part of the Ganga (Das 1985, Moll 1987) and the exclusion of India in the distibution of Pyxidea mouhotii and Batagur baska. Sixteen colour plates in the approximate centre of the book depict 56 species and subspecies of the world's turtles and tortoises. Rarely

seen species represented include Pelochelys bibroni. Geoemyda silvatica , Melanochelys tricarinata, Morenia petersi and Notochelys platynota. The photograph of Chitra indica, is however, an oft reproduced one that does not show the wavy patterns on the carapace or much details of the curiously-shaped which are diagnostic of the species. And an examination of the photographs of the two newly-described Chinese box turtles, Cuora pani Song (1984) and C. chriskarannarum Ernst and McCord (1987), lends support to Philippen's (in Stubbs 1989) opinion that the latter may be synonymous with C. pani.

Black and white photographs are scattered throughout the book and are obviously carefully selected and mostly reasonably well produced.

Page 165, however, depicts a Kachuga smithii, rather than K. tentoria, as the caption identifies it.

Ernst and Barbour's work is clear, concise, impersonal and naturally, clinical as opposed to the usually personalised (and highly readable) species accounts in Pritchard (1979), a book the present work will obviously be compared with. Despite the drawbacks, the excellent production, detailed descriptions and an extensive bibliography of the world's living turtles should make TURTLES OF THE WORLD the standard reading for many years to come.

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Indraneil Das
Madras Crocodile Bank Trust
Vadanemmeli Village, Perur P.O.
Mahabalipuram Road
Madras 603 104

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BEHAVIOUR AND THERMOREGULATION OF THE MARGINATED TORTOISE (TESTUDO MARGINATA)

Harry Andrews
Madras Crocodile Bank, Vadanemmeli Village, Perur P.O.,
Mahabalipuram Road, Madras 603 104

INTRODUCTION

Basking is obvicously of great importantance to reptiles to maintain a preferred body temperature, which in turn is vital for satisfactory growth rate and breeding. Studies on crocodilian and freshwater turtles have shown that growth rate and breeding are adversely affected when body temperatures are lower than preferred temperature, and temperatures above this affects breeding.

The daily behaviour pattern is an alternation of periods of activity with periods of basking. The frequency and duration of basking depend mainly on the intensity of solar radiation or other sources of radiation, and also on the range of the acivity temperature of the species (Avery, 1979).

The marginated tortoise (Testudo marginata) is the true Greek tortoise, being mainly restricted to southern Greece, from the Taygetos Mountains to Mount Olympus. It is thought to have been introduced by monks into Italy and has been discovered in Sardinia (Hellmich 1962). The species reaches a little over 30 cm.

There have been few studies on the species in the wild and the population is thought to be very low. There has been much loss of habitat and in the past, heavy exploitation of these animals for the pet trade in western Europe.

The four marginated tortoises, two males and two females, at the Jersey Wildlife Preservation Trust, are housed in a 4 M x 6 M enclosure. The tortoises are provided with a wooden hut within the enclosure which measures 1.3 M x 1.5M x 2M. The floor of the hut is provided with a heating device regulated by a thermostat. There is also an over-hanging light bulb (100W) which is kept on day and night. The floor temperature is maintained at 30°C. Outside, in the enclosure, the substrate is mostly grass and clover, with a 1 sq.m. sand pit on one side and three boulders covering an area of approximately 1 sq.m. on the opposite side of the sand pit. A water bowl is provided for the animals just outside the hut, and the hut floor is carpeted with hay.

The main objective of this study was to analyse behaviour ad thermoregulation over a seven day period.

METHODS

The study was carried out by doing thirty hours of observation over a period of seven days. Observational times were alternated everyday by morning and afternoon observations. A sample observation was done from morning to evening covering a period of eight hours. Behaviour was divided into three categories and recorded every time the tortoises exhibited one of these, the time period of the behaviour was also recorded. The three behavioural categories were a) feeding b) basking and c) social behaviour which mainly related to male-female interactions.

Different parameters of temperature in the enclosure were recorded every thirty minutes. The daily outside maximum and minimum temperatures were recorded every morning.

The body temperatures of the four animals were taken at the start and finish of the observation period everyday. Body temperature was taken by inserting a thermometer into the cloaca of the animals and read before extracting the thermometer. An 'E-MIL P1Ø63' thermometer with a range of ten to fifty degree celsius (with half degree divisions) was used for this purpose. Readings were taken to the nearest half degree.

For identification, each animal was marked on the carapaces; animals were coded **Ø1, Ø2, Ø3** and **Ø4**.

On the last two days of observation, the floor temperature in the hut was increased from 3Ø°C to 35°C and an additional box, 85 cms long 5Ø cms wide and 4Ø cms high was placed inside the enclosure to discover if the animals would use it. The box floor was covered with hay similar to the heated hut floor.

RESULTS

Behaviour

During the observation period, all animals spent most of the time basking in the heated hut. They came out to feed and forage only when it was sunny outside between Ø8ØØ hours and 11ØØ hours in the morning and between 13ØØ hours and 15ØØ hours in the afternoon. The animals went directly back to the heated hut after feeding. There was no interaction among animals while feeding; animals fed on the various leafy vegetables and fruits provided every morning, or ate the grass growing in the enclosure. Feed type preference was noticeable - tortoises ate more of the green leafy vegetables and grass than fruits.

Social behaviour was observed only on the last day which was a sample morning to evening observation. At 12.3Ø hours animal **Ø2, a female**, came out of the hut and started feeding on grass; **Ø3, a male**, came out at 12.37 hours and also started feeding on grass; at 13.ØØ hours **Ø3** moved to where **Ø2** was and went around her three times then bit her on the neck and head, then at 13.Ø6 hours he mounted **female Ø2**. This display of biting on the female's neck/head, after going around her and then mounting, went on till 16.16 hours at which point **animal Ø1**, the second male, joined in and

displayed the same as Ø3. At 16.31 hours **female** Ø2 moved into the hut with Ø3 following her. Here Ø3 mounted and copulated with Ø2 which lasted till 17.Ø4 hours. At 16.35 hours Ø1 also moved into the hut and here he mounted and copulated with the second **female** Ø4 lasting for 1Ø minutes. During the whole male-female interaction there was no male-male interaction and no display of dominance was displayed by either of the two males.

Thermoregulation

All four animals used the heated hut to bask most of the day, they spent less time outside the hut and then only for feeding. The ambient hut temperature ranged from 25.5°C to 28.4°C. The heated floor temperatures ranged from 28°C to 29.5°C and the outside ambient temperature on an average ranged from 18°C to 26°C. The body temperaures of all four animals on an average ranged from 28.8°C to 31.6°C. Body temperatures were maintained below and above the hut floor temperature, and above hut and outside ambient temperatures, which suggest that animals basked and seeked the highest available temperature source in the enclosure.

By monitoring various environmental parameters and animal body temperatures it was observed that animals never came out of the heated hut when outside ambient temperatures were lower than 18°C and their body temperatures below 2Ø°C. The increase in body temperatures during the day was at the rate of 1°C per hour on average.

The animals did not use the alternative box provided and the temperature in this box was the same as the ambient outside temperature.

Discussion

Body temperature has a demonstrable effect on behaviour. If animals came out of the heated hut only when their body temperatures were above 24°C it suggests that the mean activity body temperature range is well over 24°C. Outside ambient temperatures are too low even for animals to bask in the sun and hence they seek out the heated hut.

The only time the animals came out of the hut other than for feeding and when social behaviour occurred was when body temperatures were above 31°C. Body temperatures ranged from 31.5°C to 32°C, which indicates that the mean activity temperature may be 31°C to 32°C or more and this aspect needs further study to determine the actual mean activity temperature range in this species.

These animals may need higher body temperatures if they are only seeking out the heated hut to maintain their preferred body temperature, without selecting a different thermal location to help this regulation.

It may be suggested that the animals used the heated hut most of the time to keep away from visitors, but social behaviour occurred near the visitors viewing area on the last day of observation.

These findings need to be compared with data derived from different seasons.

Acknowledgements

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ON THE MASS KILLING OF THE DOG-FACED WATER SNAKE (CERBERUS RHYNCHOPS) IN THE CHILKA LAKE, ORISSA

S.K. Dutta
Department of Zoology, College of Basic Sciences and Humanities,
Orissa University of Agriculture and Technology,
Bhubaneshwar 751003, Orissa

On 5th October, 1989, I made a field trip to Nalabana area of Chilka Lake for observing birds and reptiles. The area was completely submerged under water due to heavy rain during the monsoon. The minimum water depth was about 1 foot and the area was full of hydrophytes. To my surprise, I saw numerous dead dog-faced water snakes (Cerberus rhynchops) floating on the water. Within a radius of about 100 metres, I collected 20 dead snakes of which 10 were freshly killed. Furthermore, several dead specimens of wart snake (Acrochordus granulatus) and estuarine seasnake (Hydophis obscurus) which are supposed to be common in the lake, were found floating on the water.

On examination, I found that, all the snakes did not have any external injury except crushed heads and throats. On enquiring, the local fishermen said that the dog-faced water snake is most common and numerous in the lake and frequently get trapped in the fishing nets in large numbers. Generally the fishermen use nets with small mesh for catching prawn, and this is the principal cause of death. Once they push their head through the nets, they are not able to pass through the mesh or bring their heads back.

In the lake, the dog-faced water snake feeds mainly on fishes and prawn, and trapped fishes lure the snakes. While removing the fishes from the nets, the fishermen grab the neck of the snakes and squeeze their heads to pull them from the nets, thereby killing them. It was quite disappointing to see an area of about 100 metres with 20 dead snakes. Through verbal conversations I learnt that this is a common phenomenon during the rainy season at Nalabana. I have made an appeal to the State Forest Department (Wildlife Wing) to instruct the local fishermen not to kill the snakes.

Another interesting (non) observation on amphibians was made on the Kalajai hills located near the lake. In a small pond at the centre of the hill during 1978, I found several Rana cyanophlyctis and Rana tigerina. During the present trip, I wanted to observe this population, after a gap of eleven years. To my horror, I did not find a single frog !

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A CASE OF COMMON KRAIT (BUNGARUS CAERULEUS) BITE

S.G. Saha, Medical Officer, Raidighi Rural Hospital,
P.O. Raidighi, District 24 - Parganas (South), West Bengal

Smt. Rebati Bala Khatuya, 22 years of age, was bitten by a common krait (Bungarus caeruleus) on her left heel on July 30th, 1989 at about 1.45 A.M. while she was asleep on the floor of her house. The snake (2 feet long) was caught and brought with the patient. She was treated at home by an 'ojha' who tied tight ligatures on the lower leg and thigh. On July 30th, she was admitted to this hospital with the following complaints:-

> General malaise; pain all over the body; pain and swelling of the left leg, difficulty in swallowing, abdominal pain; vomitting; drowsiness and inability to open the eyes properly.

On examining the patient the following symptoms were noticed :

She was fully conscious; one distinct fang mark was visible along with a little subcutaneous haemorrhage; the left lower leg was endematous and tender; pupils were dilated and reacted to light; moderate ptosis; abdominal tenderness; no salivation; pulse 80/m.; respiration 20/m; B.P.122/76 mm of Hg. It is important to mention that the patient was six months pregnant.

Treatment:

The ligatures were removed at once. Immobilisation and elevation of the left leg and lukewarm water compresses hastened the rate of absorption of the edema. Polyvalent antivenom serum, 60 ml (concentrated), was given intravenous in 30 minutes. Dextrose injection 5% with normal saline by intravenous drip, Phenergon injection, Decadron injection, antibiotics, tetanus vaccine and other supportive measures were given. At 4 p.m. there was excessive salivation which was controlled by Atropine Sulph injection 1 amp. 9.M. Then her condition improved. No further antivenom serum was needed. She was given milk, biscuits and plenty of water through the mouth. Urine was normal. On the fifth day she was discharged in a satisfactory condition.

The patient gave birth at term to a normal healthy boy weighing 3 kgs. In this case it is evident that common krait venom and antivenom serum had no adverse side effect on pregnancy.

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A RECORD BANDED RACER (*ARGYROGENA FASCIATA*)

Sashank M. Buch,
73, Railnagar, Rajkot 360001

A banded racer (*Argyrogena fasciata*) caught in Rajkot city measured 1.71 m in total body length. This exceeds the maximum body length of the species given by Daniel (1983) : 1.26 m. Minton (1966) measured an example of this species, a female, which was 1.34 m.

The snake, again a female, was caught on 15th November, 1989, at about 1545 hours, from a rat hole. Measurements of the specimen have been given below:

Total body length	:	1.71 m
Snout - vent length:		1.37 m
Weight	:	827 gms.

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AMPHIBIAN RECORDS NEEDED FOR INDIA

Indraneil Das
Madras Crocodile Bank Trust, Vadanemmeli, Perur Post,
Mahabalipuram Road, Madras 603 104.

Two hundred species of amphibians have been recorded from within the political boundaries of the Republic of India (Inger and Dutta, 1986; Chanda and Ghose, 1988; Das, In press), and several are in the process of being described from the north-eastern region of India alone (Chanda, pers. comm.). In addition, quite a few amphibian species have ranges that closely approach Indian limits, and with further fieldwork, are expected to occur in the country. A list of such species, along with remarks on distribution, have been given below :

PELOBATIDAE

1. Scutiger adungensis Dubois.
Known distribution : Adung valley, north Burma (Dubois 1979).

2. Scutiger nepalensis Dubois.
Known distribution : Western Nepal (Dubois 1973).

BUFONIDAE

3. Bufo macrotis : Boulenger.
Known distribution : Bhamo, Teinzo and Kakhyen hills, north Burma (Boulenger 1890). Sankar and Sanyal (1985) reported on a collection of a damaged bufonid from near Miao in the Namdapha Tiger Reserve, Arunachal Pradesh, which they tentatively assigned to this species.

RANIDAE

4. Rana erecepeae Dubois.
Known distribution : Western Nepal (Dubois 1973).

5. Rana rostrandi Dubois.
Known distribution : North-west Nepal (Dubois 1973).

6. Rana polunini Smith.
Known distribution : West, north-west, west-central and east-central Nepal, south China (reviewed by Dubois 1979a).

7. Rana hazarensis : Dubois and Khan.
Known distribution : Northern Pakistan (Dubois and Khan 1979).

8. Rana arnoldi Dubois.
Known distribution : Northern Burma, Tibet (Dubois 1980).

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VOICES OF AN INDIAN NIGHT

Indraneil Das,
Madras Crocodile Bank Trust, Vadanemmeli, Perur Post,
Mahabalipuram Road, Madras 603 104.

FAMILY : BUFONIDAE

1. Bufo melanostictus : A child's horsehair rattle (McCann 1932). Chirping sound and sometimes.... a shrill whistle (Satyamurti 1967).

2. Bufo fergusonii : Higher pitched than B. melanostictus and more harmonious (Whitaker and Whitaker 1983).

3. Bufo stomaticus : A harsh but not particularly loud 'qui-qui-qui' (Minton 1966).

4. Bufo viridis : A rather faint, melodious trill (Minton 1966).

5. Scutiger nepalensis : Resembling that of a crow (Nanhoe and Ouboter 1987).

FAMILY : MICROHYLIDAE

6. Kaloula pulchra : Wau-auhhh (Murthy 1968). Bommm, bommm, bommm (Whitaker and Whitaker 1983).

7. Microhyla chakrapani : Low pitched interrupted call (Mehta and Rao 1987).

8. Microhyla inornata : Slightly low pitched vocal call (Mehta and Rao 1987).

9. Microhyla ornata : Trrk-trrk-trrk, strikingly loud and ventriloquistic (Abdulali and Sekar 1988). Weak, intermittent, rasping note (Minton 1966).

10. Microhyla rubra : Akin to chirping of crickets, but is interrupted (Rao 1915). Sharp, double ''trrrt'' (Whitaker and Whitaker 1983).

11. Ramanella montana : Brong...brong...brong (Abdulali and Sekar 1988).

12. Ramanella variegata : Qhuay, qhuay, qhuay (Rao 1918).

13. Uperodon globulosus : Loud grunting oink (Daniel 1963).

14. Uperodon systoma : Bleating of a goat (Rao 1918). Bek, bek, bek (Whitaker and Whitaker 1983).

FAMILY : RANIDAE

15. Rana cyanophlictis : Krrrack, krrrack, krrrack (Personal observations). A prolonged 'creek-creek' and also an irregularly repeated quacking call (Minton 1966). Low pitched rattle of castnets (McCann 1932).

16. Rana limnocharis : Resembling the clatter of castanettes in the distance (McCann 1932). A series of loud staccata notes often delivered in bursts suggesting telegraphy (Minton 1966). Resembling a clattering sound produced in the distance (Satyamurti 1967).

17. Rana malabarica : A metallic call, like the noise made by a tin rattle (McCann 1940). Wack, wack, wack (Abdulali in Chari 1962).

18. Rana hazarensis : A low grunt uttered in a short series (Dubois and Khan 1979).

19. Rana tigerina : Oong awang (Daniel 1975). Loud, resonant 'quonk-quonk (Minton 1966).

20. Rana hexadactyla : Dinning noise (Satyamurti 1967).

21. Rana semipalmata : Rapid drumming of the finger nails on a thin tin plate (Fischer 1916).

22. Rana temporalis : Loud clater (Whitaker 1981).

23. Rana tytleri : Musical tittering (Whitaker 1981).

24. Tomopterna breviceps : Rut-rut-rut (Kirtisinghe 1957). A soft awang (Daniel 1975). A loud nasal 'quonk', repeated at intervals of about one second (Minton 1966).

25. Ooedozyga lima : Series of quiet peeps (Bartlett 1989).

FAMILY : RHACOPHORIDAE

26. Polypedates maculatus : Tak...tak...tak (Abdulali and Sekar 1988).

27. Philautus leucorhinus : Treek...treek...treek (Abdulali and Sekar 1988).

28. Philatus variabilis : Tinkering call (Satyamurti 1967).

29. Rhacophorus malabaricus : Truk-truk-truk (Abdulali and Sekar 1988).

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AN ANNOUNCEMENT

IUCN/SSC INDIAN SUBCONTINENT REPTILE AND AMPHIBIAN SPECIALIST GROUP

An Indian Subcontinent Reptile and Amphibian Specialist Group of the International Union for Conservation of Nature and Natural Resources/Species Survival Commission (IUCN/SSC) has been recently formed. The group is to deal with conservation problems not covered by the taxonomic specialist groups of the SSC, and will focus on identification of conservation problems and undertaking or helping initiate suitable action to protect the herpetofaunal resources within the subcontinent. The Group members will also work closely with the other IUCN/SSC Groups, whenever possible.

Two consultants, 14 regional members and 24 correspondents from Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka, and 12 overseas members, mostly from the SSC taxonomic groups have been nominated to the new Group.

Current workplan include identifying taxa in need of conservation and regions of high herpetological diversity and/or endemism, preparing suitable action plan and initiating conservation action.

Interested individuals are advised to get in touch with the Co-Chairmen of the Group:

INDRANEIL DAS
Madras Crocodile Bank,
Vadanemmeli Village, Perur P.O.,
Mahabalipuram Road,
Madras 603 104,
INDIA

SUSHIL K. DUTTA
Department of Zoology,
Utkal University,
Vani Vihar,
Bhubaneshwar 751004,
INDIA

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REPORT ON A HERPETOLOGICAL TRIP TO BARBARA, PURI DISTRICT, ORISSA

S.K. Dutta [1] and J. Ahmed [2]

[1]Department of Zoology, College of Basic Sciences and Humanities, Orissa University of Agriculture and Technology, Bhubaneswar 751 003, Orissa.

[2]Department of Zoology, Banapur College, Puri, Orissa.

Parbara is about 15 kms west of Banapur of Puri District, Orissa. The locality comprises several small hills and there is a state Forest Department bungalow within the forests. On 23rd April, 1989, we made a specific search for the Eublepharis hardwickii, locally known as Kalakuta. Infact, several years back, the second author obtained a specimen of this species from Barbara. Hence, we wanted to collect more specimens and to gather information about its field ecology. Unfortunately, our efforts failed due to several reasons. The soil was completely dry and the vegetation burnt, which is a common phenomenon in some of the forests of Orissa, and the area was being used for cultivation of egg plants.

Being unsuccessful in finding our quarry, we observed and collected other reptile and amphibian species. Given below is a list of herps that were either collected or observed by us.

1. Calotes versicolor
2. Mabuya carinata
3. Mabuya macularia (?)
4. Psammophilus blanfordanus
5. Hemidactylus flaviviridis
6. Hemidactylus brookii
7. Rana cyanophlyctis
8. Rana limnocharis
9. Rana tigerina

Of the above species, four lizards (C. versicolor, M. carinata, H. flaviviridis and H. brookii) and all the frogs are suppposed to be common in most of the places of Orissa. However, the distribution of M. macularia (?) and P. blanfordanus in the locality is quite interesting because, no specific locality record of these two species is available from Orissa. In addition, P. blanfordanus has also been collected by one of us (S.K. Dutta) from the adjoining areas of Andhra Pradesh. Another interesting observation made on the frogs, is the abundance of R. limnocharis in the streams and below rotten leaves in nearby places. In fact, hundreds of juvenile R. limnocharis were found near the streams. Most probably, these were juveniles of froglets of last year, because the species is a seasonal breeder and during April one cannot find juveniles of the same year.

Field trips to the locality are being planned in the future for further study.

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NEWS CLIPPINGS

"**Prolific croc breeding puts officials in a fix**": Indian Express, New Delhi Sunday, 17th September 1989.

The fate of nearly 3000 crocodiles in the crocodile breeding centre run by the Forest Department at Sathanur dam in North Arcot District hangs in the balance, following the Department's inability to feed them properly.

As crocodile skins are the costliest in the world and as the meat of this animal has high nutritious value, the crocodile harvesting scheme was started as a Central Government project in 1981 at Sathanur, along with similar centres at Amaravathi in Coimbatore and Hogenekal in Dharmapuri District, with a view to providing locals employment opportunities.

However, as these freshwater crocodiles were on the endangered species list, the Central Government belatedly realised that killing these amphibians (sic) was out of the question, as they were covered by Schedule I of the Indian Wildlife Act. It was then that the troubles for the Department started.

The scheme had been thought of in the first place because of the successful venture carried out in this field in Thailand, and today a 20 year old crocodile easily fetches Rs. 1 lakh while even a five year old amphibian (sic) has a value of nearly Rs 30,000.

After the Central Government realised that these animals, raised for the specific purpose of using their skins, hides and meat, could not be killed, it indirectly suggested to forest officials that the crocodile feeding fund of Rs.2.5 lakhs per annum should not be used. Officials were unable to understand the logic behind being given a fund and then being asked not to use it. Because of this, the amount of meat fed to these animals daily has now come down to 50 kilos from the 100 kilos some months before. Fed as they are on fish and beef, procuring the former was no problem as the Sathanur Dam itself has a fish farm.

Though the Central Government's argument did have some logic when the scheme was started in the beginning of this decade, when the crocodile population in this Centre was limited, the good facilities provided resulted in prolific breeding. When the Central Government was approached with the idea that the scheme could be revitalised again as the animals had come out of the endangered species list, the Centre was still against it because of the view that ideas regarding conservation of wildlife generated in the country could come to nought if harvesting was now re-started.

Because fresh water facilities where human thoroughfare is less are limited in Tamil Nadu, officials are now in a quandry about what to do with these animals. When officials mooted the idea to the dam officials to have these crocodiles in the Sathanur reservoir itself, the latter put their foot down with an emphatic 'no' as they feared for the life of their fish population and the possible harm the step might do to humans who frequently visit the dam site on all days.

Releasing them in the Sunderbans delta in West Bengal was also out of the question, since it is a saltwater area, unsuited for these fresh water crocodiles. Similarly, at the Amirthi forest park maintained by the Forest Department about 20 kilometres from Vellore, the department found that the original two crocodiles have now swelled to 40. To put a stop to their prolific breeding, the department now takes recourse to breaking their eggs. But here feeding the animals is not a problem because it is a zoo and hence the feeding budget comes under a different head in the accounts.

But the incongruity of the whole situation is that the crocodile is one animal for which the department has perfected the harvesting technique. And so matters stand today with the department twiddling its thumbs, being unable to feed the crocodiles, and also not being able to either kill them or release them in their natural habitat.

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"Gharials battling for survival" : "Hindustan Times" dated 20.6.89.

Gharials, one of the three endangered species of crocodiles found in the Gangetic region, are battling for survival in the Satkoshia Gorge Sanctuary. Conservation of this harmless crocodile in the dense deciduous forest, covering 964 sq km, has suffered a major setback now, with the increasing disturbing trend of human encroachment into the crocodile habitat and illegal fishing in the prohibited sprawling Sanctuary area.

Though a fresh census of gharial in the Sanctuary is yet to be carried out by the State wildlife officials, experts feel that their numbers are fast dwindling, despite concerted efforts by the officials of the decade-old Gharial Research Station inside the Sanctuary.

Gharial conservation was undertaken for the first time in the country in 1975 in the Sanctuary, with the technical assistance of the United Nations Development Programme and the Food and Agriculture Organisation. The Rearing and Releasing Research Station was set up at a time when the gharial in Orissa were almost nearing extinction. Only 16 of them were spotted in the Mahanadi river, while a research study found that all had disappeared from the Brahmani and Baitarani river systems in the State.

The Centre started collecting gharial eggs from the Chambal and Narayani rivers in Nepal, and from the Gandak river in Bihar, as no eggs were found in the Mahanadi river. Since its inception, the Centre has so far released nearly 500 gharials into the gorge to study their dispersion, movement, feeding, growth and migration, besides conserving and protecting them.

The research station has the unique distinction of having produced arificial hatchlings of the gharial for the first time in the country, by simulating natural conditions. But the problem of conservation and protection has been compounded with the Revenue Department issuing licenses to fishermen to catch fish from the Sanctuary area. Crocodile experts say the released young gharials are killed when caught or trapped by the fishing nets.

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A NOTE ON THE IRULA TRIBAL WOMEN'SAFFORESTATION PROGRAMME

Mike Miller
Madras Crocodile Bank, Vadanemmeli Village, Perur P.O.
Mahabalipuram Road, Madras 603 104

The Irula Tribal Women's Welfare Society Afforestation Project made significant strides in 1989, successfuly raising 300,000 seedlings of 30 different species at the two nurseries and completing the planting of 300 acres at Thirunillai site, Chingleput District, along with extensive land work for soil and water conservation. Initial results promised very high survival rates for the new seedlings, while growth rates for the previous year's crop were turning out to be among the best in south India. Prospects seemed very positive all around. But then tragedy struck, and much of the plantation was razed to the ground by misled villagers.

While we continue to recover from our shock and disappointment, we have now turned our energies back to the Echoor site, Chingleput District, where we plan to devote 1990 to developing an education cum training centre and extension awareness programme, along with a nursery devoted exclusively to growing seedlings for free distribution to schools and villages in the surrounding area. The recent sad events at Thirunilai have made it clear to us that until we can get people to truly want to grow trees for themselves, there is little point in trying to do it for them.

In the meantime, we have begun to look for private land that the I.T.W.W.S. can buy and give outright to the landless Irula tribals of the I.T.W.W.S., so that the women who have worked so long and hard to grow trees, can continue to grow them, but to do so secure in the knowledge that their efforts will not go in vain again.

We know now that whose land we plant trees on is not important; the point is to make it all green again.

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THE NEW HAMADRYAD

Your favourite herp publication will be printed from the next (Vol.15, No.1) issue. Papers and notes on the herpetology of Asia are solicited for this. Manuscripts should be typed on one side of the paper. Photographs should be original, at lease 8.2Ø x 5.6Ø cm and on glossy paper, preferably mounted on backing boards. Colour transparencies can be reproduced, at author's cost. Authors will receive 25 copies of reprints of their paper gratis. Additional copies will be supplied at cost, plus postage and packing.

Submit two copies of the manuscript to : The Editor, **Hamadryad**, Madras Crocodile Bank Trust, Vadanemmeli Village, Perur Post, Mahabalipuram Road, Madras 6Ø3 1Ø4, India.

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THE 10TH WORKING MEETING OF THE IUCN / SSC CROCODILE SPECIALIST GROUP

23 to 27 April 1990, Gainesville, Florida, U.S.A

The meeting will include technical reports on the status of crocodilian populations throughout the world. Discussions of current programs for the sustained utilization of prolific populations and plans for returning depleted populations to former abundance; descriptions of the latest developments in farming and ranching husbandry, including nutrition the newest designs for captive propagation facilities; trends in international trade in crocodilian hides and meat; and research studies on reproduction, incubation, metabolism and disease.

Participants will examine a population of large American alligators in Paynes Prairie State Preserve, will take part in night-time airboat surveys of alligators on Orange Lake, and will visit the captive breeding facility for one of the largest collections of crocodilians in the U.S.A. Post meeting fieldtrips will visit Florida alligator farms, the Everglades National Park and the Okefenokee National Wildlife Refuge,

The 10th Working Meeting of the CSG is cosponsored by the Florida Game and Fresh Water Fish Commission; the Fish and Wildlife Cooperative Research Unit; the American Alligator Farmers Association; the Florida Aligator Farmers Association; the St. Augustine Alligator Farm; and the Florida Alligator Trappers Association.

WHO SHOULD ATTEND. The 10th Working Meeting of the Crocodile Specialist Group is open to anyone interested in crocodilian biology. conservation, management, and sustained utilization, including ranching and farming, If that encompasses your interests, plan to attend More than 250 participants are expected. Registration will cost U.S $100.00.

LOCATION AND HOTEL BOOKING. The CSG's 10th Working Meeting will be held at the:

Holiday Inn-West Banquet & Conference Center
7417 NW 8th Ave.
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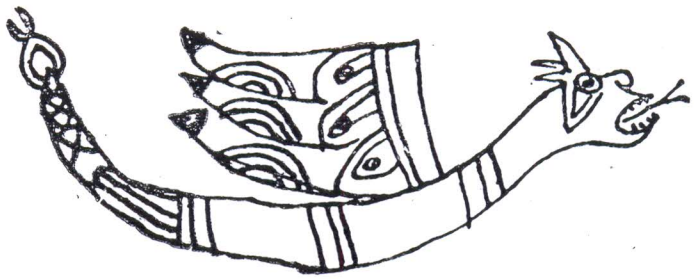

OVER DRAWING: Tokay gecko (**Gekko gecko**) by Indraneil Das

DITORIAL BOARD: Zai and Rom Whitaker, Indraneil Das, Romaine and Harry Andrews. Information presented here may be used elsewhere with acknowledgement to HAMADRYAD