

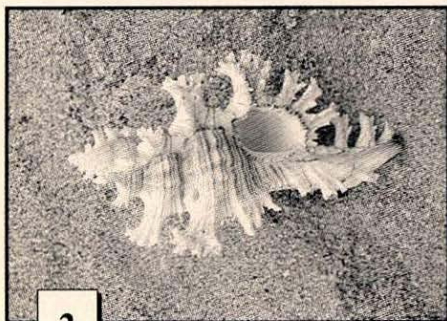
Hornbill

Vol. 1994, No. 4



BOMBAY NATURAL HISTORY SOCIETY

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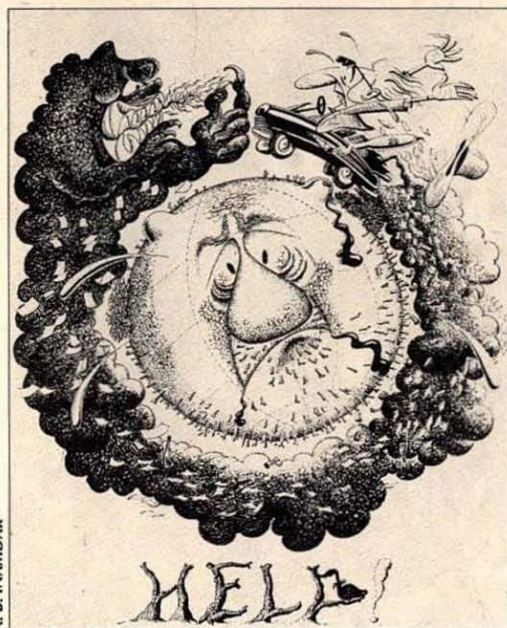
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EDITORIAL



Dead seas and fish-eaters

A Bombay man like me had never seen such crystal clear sea water as I watched the brightly spotted cowrie with child-like amazement while it glided amidst those fascinating folds of the brain corals at the Pirotan Islands, off the Gujarat Coast. That was the first time I saw a live cowrie and crystal clear sea water. The sea around Bombay is probably the murkiest, and deadly too!

Spinach (*palak*), irrigated with water from the Bombay sewers as it flows towards the sea, has now been found loaded with deadly heavy metals like lead, mercury and cadmium. The *palak*-eating population is certainly at risk, but more than that, fish-eaters are several times more at risk of heavy metal poisoning from contamination of the aquatic food chain. Only a fraction of the untreated industrial effluents reach the *palak*, whereas several tonnes of this

untreated waste is dumped in the sea. The people of Bombay have given up eating their favourite mullet (*boi*). This fish is caught locally and mullet now smells of kerosene. Some poisons smell and some show their effects on us when it is too late.

So where do we go from here? We can neither turn back to the poison-free earth that was, nor can we continue to poison ourselves. Industries we need, and pollution is the price. However, if the level of pollution is controlled, by treatment of effluents, the sea's inherent capacity to neutralise the poisons would receive a helping hand. But at present the system is being heavily overburdened and if dumping of pollutants in the sea is allowed to continue unchecked, there would be more dead seas around the world and fish-eaters would be rare or perhaps even extinct!

ISAAC KEHIMKAR

Editors

Jay Samant
Renee Borges
Isaac Kehimkar
Gayatri Ugra

Layout

V. Gopi Naidu

Cover

Cypraea mauritiana
Deepak Apte

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THE MAGIC LURE OF SEA SHELLS

DEEPAK APTE



The astonishing array of fantastic structures and beautiful colours of molluscan shells have always fascinated mankind. Alarming trends of local extinction point out the need for protection of this ancient group of animals.

The sound I always hear
inside a sea shell is
the wild music of wave
and wind.

Sea shells with their intricate shapes and vivid colours have been admired for centuries. The natural history of the living mollusc in its original habitat is fascinating in itself and the beauty of mollusc shells inspires collectors to prize them as works of art.

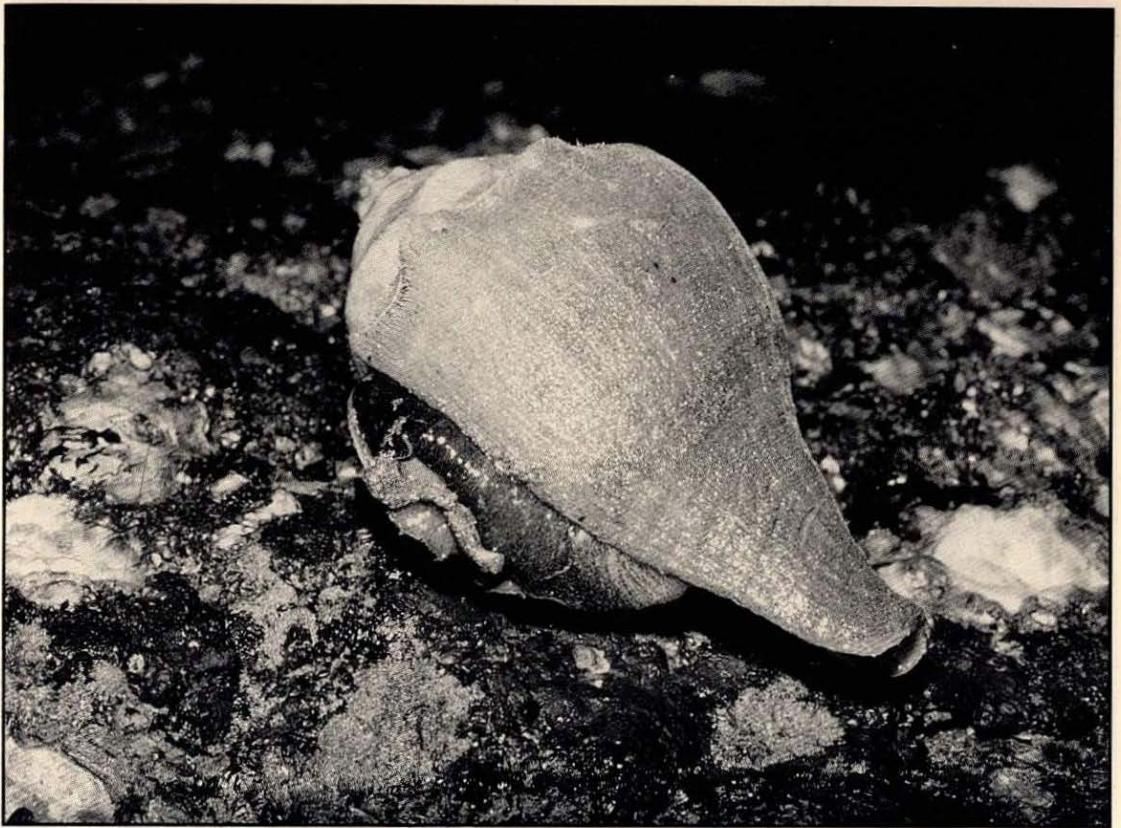
Mankind has always been astonished by the fantastic structures that the mantle can produce in the gleaming marble mound of the cowries, the ivory minaret of the augur, and the petrified flowers of the spiny oysters.

Molluscs are the second largest group in the animal kingdom. There are more than 100,000 known living species. They are an important and vital part of the ecology and economy of the sea. They serve as a major source of food for bottom-dwelling fishes. They also provide food for humans.

The reefs, shallow pools, sandy beaches, rock beds and mud-flats provide diverse habitats for molluscs. But the most colourful and beautiful shells occur in coral reefs. Several species of delicate cowries, giant *Tridacna* clams, massive helmets,



The highly endangered giant *Tridacna* clam with its beautiful flowing mantle



Hemifusus pugilinus feeding on green algae amidst oyster beds

elegant cones, and pretty mitra flourish in coral reefs. A single visit to a coral island can yield about a hundred species. Since very few coral reefs remain along the Indian coast, the fate of these creatures is uncertain and most of these coral-dwellers are becoming scarce.

Destruction of the habitat is the main threat to the survival of these delicate creatures. Dumping of various wastes like chemicals, sewage and nuclear waste on an unprecedented scale cause immense damage to our beautiful coral reefs. Oil leakages from vessels and oil rigs are other factors which cause destruction of reef platforms. The Persian Gulf, now on the verge of becoming an ecologically dead backwater, was once rich in marine creatures, and is the best example of the consequences of a man-made disaster.

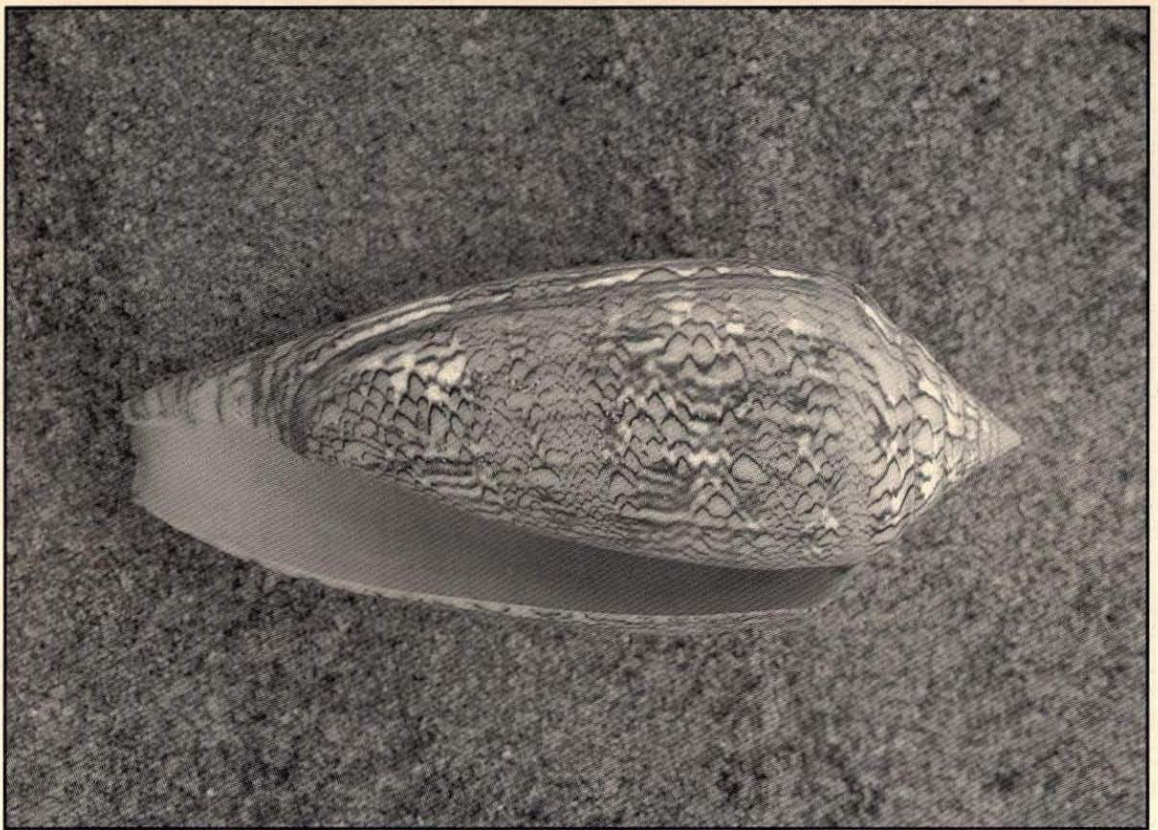
It is difficult to say how many species of shells occur along the Indian coast, since precise information is lacking for many areas. But comparing the present status with older literature, it is evident that more and more species are becoming locally extinct. Increasing human pressure is the main cause. The best example is the Bombay coast which has been well studied for

molluscan fauna for a long time. Subrahmanyam in 1954 reported 187 species. But a recent systematic survey I did in 1992 yielded only 108 species. In short, during a span of 40 years about 79 species have become locally extinct.

Despite all this, shell-watching is a fascinating hobby. Knowledge of habitats, tides and currents, the relationships between various organisms, foot tracks, and the habits of these creatures are some of the important factors which one must know to shell-watch or else it can be a frustrating experience for amateurs. For example, if you are not aware of the habitat of *Murex adustus*, it is virtually impossible to locate live specimens. The colour and shape of the shell merges completely with the background.

You also can trace and identify burrowing molluscs by observing their foot tracks. Each species (usually on sandy or muddy beaches) leaves a distinctive foot impression. Studying the foot tracks of various molluscs is itself a very interesting hobby. The study of egg cases is also a good hobby. For this you must know their breeding habits.

If one has to begin shell-watching as a hobby, then I feel that the rocky shore is the best habitat to start with. Here shells are either attached to rocks



Conus textile — deadly neurotoxic venom lies behind this beautiful shell

or stay in rock crevices. During low tide, these molluscs come out of their shells to feed on algal growth in rock pools. Most of the rock-dwelling molluscs make daily migrations either in search of food or to follow the wet intertidal zone. The zonal distribution of herbivorous molluscs on rocky shores is determined by their preference for certain kinds of sea weeds. Nerites, periwinkles, top shells, and frog shells are the most noticeable of these molluscs, which feed by scraping algae from rocks. On the other hand, sandy beaches or mud-flats are difficult habitats in which to observe live shells, since most of the animals are of the burrowing type.

If you are enthusiastic and more adventurous, then the coral reef is the best habitat. It is a paradise for elegant, delicate and rare shells. Blue lagoon water is a good place to observe various species of cones, mitra and cowries... But one must be very agile and aware of various types of other creatures inhabiting coral reefs. Any careless behaviour or negligence can be fatal. For example, the deadly stone fish which usually remains hidden among rocks and weeds is impossible for an amateur to locate. The dorsal fin of this fish carries an arsenal

of venomous spines. This venom is fatal for humans. The scorpion fish can also sting fatally. Some species of anemones, sea wasps, the Portuguese man o' war, and the stinging jelly fish are other creatures whose stings can be very painful.

Among shells, several species of textile cones (*Conus textile* and *C. geographus*) are known for their lethal neurotoxic venom. There are instances of human deaths caused by the sting of these cones. The cones are supreme among shelled predators for their skill and effectiveness. They hunt by scent, using a harpoon which carries the lethal venom. The most virulent poison is secreted by the fish hunting cone, *C. geographus*.

However, if you take proper precautions like wearing shoes good enough to provide protection from the strong spines of stone fish, or using forceps to study cone shells, or avoiding direct contact with coelenterates like jellyfish, then reef-watching is highly rewarding.

The lower level carnivores like cowries feed on sea squirts and soft corals. Cowries are among the world's most beautiful and highly sought-after shells and have been used as fertility symbols and money

by primitive cultures throughout the islands of the tropical seas. The false egg cowry and *Simnia* have an amazing relationship with the fan corals or gorgonids. *Simnia* and *Cyphome* occur exclusively on gorgonids in a parasitic relationship. The mollusc takes shelter and food (it feeds on coral polyps) from the host.

Perhaps the most exotic of all these grazing molluscs are the sea slugs. These creatures lack shells. Their decorations are spectacular with stripes, dots of bright yellow, deep pink and blue. The tentacles on their heads are in contrasting colours. The strangest of feeding habits among the sea slugs is that of the egg-eating *Calma*. This snail drills holes in fish eggs and sucks out their contents. *Calma* feeds only once in a year, during the egg-laying season of the fish. *Calma* is common in the Great Barrier Reef of Australia and is not available in India.

Several species of molluscs show commensalism. The mantle cavity of the pearl oyster serves as a protective chamber for certain kinds of shrimp. Some copepods and hydroids stay within the mantle cavity (the space between the mantle and the animal body)

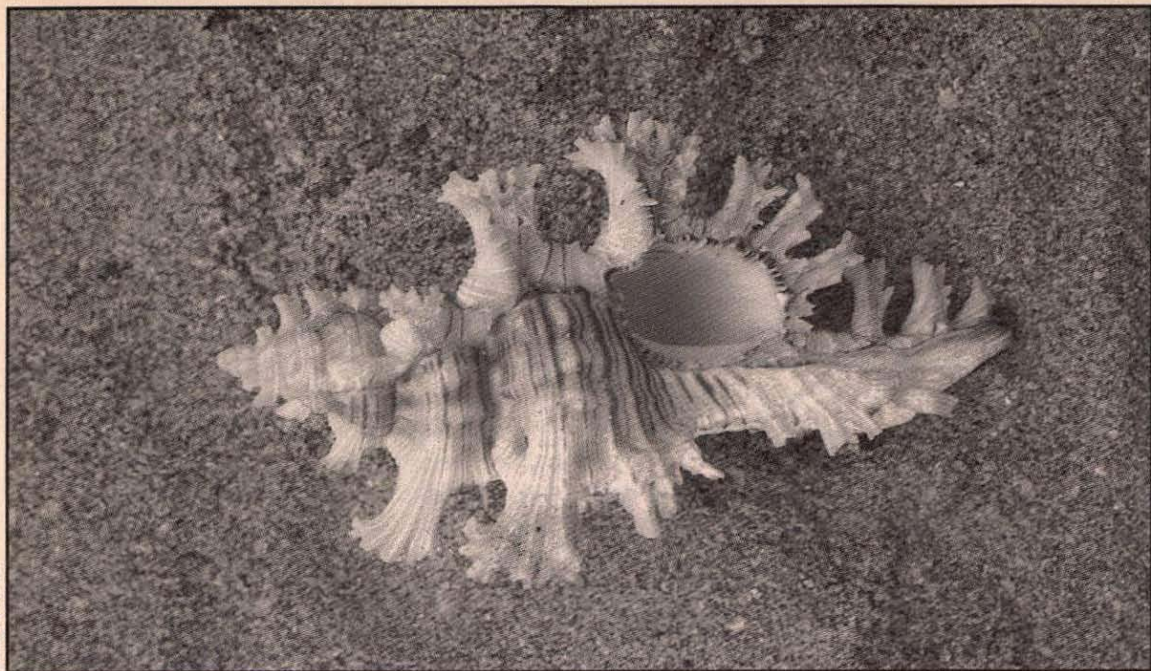
of clams. A unique species of symbiotic alga *Zooxanthella* lives in great quantities in the phagocytic blood cells (the cells which perform the function of ingestion and digestion of food particles) of one type of giant clam and serves as a ready supply of food. A few species of palaeonid shrimp also live deep within the mantle.

Molluscs can also act as hosts for other parasites. A trematode worm parasite of sea birds spends its larval stage in the type of mollusc called *Littorina*.

While observing molluscs it is interesting to record their association with other life forms. There are several marine communities among molluscs. For example, the mussel community is characterized by the presence of barnacles, small crabs, bryozoans and hydroids. In another association, *Donax* shells come ashore to feed on unicellular algae and invariably a predaceous gastropod *Terebra duplicata* is present there to prey on the *Donax* shells. The stability of these communities depends upon food availability, growth, mortality rate and the type of the lagoon bottom. Your observations over the years may help to discover such mysterious associations in the life of molluscs.



Moon snail — the typical foot tracks help to identify this burrowing scavenger



The Venus of the shell world — *Murex palmarosae*

The largest mollusc which lacks a shell is the 73 foot giant squid of New Zealand and the largest shell-bearing mollusc is the giant clam of the Indo-Pacific province which has a life span of more than 75 years. This clam usually remains buried in coral sand. The mantle has flowing colours of blue, pink, green and magenta. The muscles of these clams which hold the halves of the shell together and control the movement of these halves, weigh more than 5 kg in full grown specimens. Giant clams are now banned for export from India and are highly endangered.

Another group, commonly called scorpion shells, are among the world's most beautiful shells. They are known for their amazing shapes and vivid colours. The export of this group of shells from India is also banned, as is that of *Xancus pyrum*, *Turbo* spp., and *Trochus niloticus*.

Surprisingly none of the mollusc species are included in the Indian Wild Life Protection Act (IWPA). However, the species mentioned earlier are included in a "Negative List of Exports". Several species of molluscs are becoming rare and need special protection under the IWPA. Species like *Cypraea mappia*, *Tudicla spiralis* (a genus with only a single species occurring only in south-east India), *Murex palmarosae* (rose branch murex), *Harpulina arausiaca* (vaxillate volute), *Conus milneedwardsi*, and *Conus bengalensis* (Glory of India) are so rare

and highly prized that they are over-exploited by collectors. The distribution of these and so many other species needs to be updated to find out their exact status.

What we can do is to keep records of localities and numbers of such rare species and try to give legal protection to these delicate creatures by including them in the IWPA.

The various colours of shells are obtained by the combination of the four main types of pigments. Carotenoids provide yellow, melanins give black, porphyrins produce green and indigoids result in blue and red. The basic colours and their patterns are genetically inherited. Some colours, particularly the blue-green iridescent sheens of the interior of *Haliotis* and *Trochus* are the result of the diffraction of light. Recently, anti-viral and anti-cancer substances have been discovered in certain sea snails and clams. Conotoxins are now proven to be pharmacologically highly active substances.

Thus each year brings hope of discovery and knowledge and each year, I am sure, some one makes his way to the edge of the sea and finds there a fellow creature of his planet that evokes for him the magic of creation. □

Deepak Apte is an avid shell watcher. He is currently the Nature Education Officer, BNHS.



Although I have published many articles in the Journal of the BNHS, I had not seen Hornbill earlier. Fortunately I have received an issue. What an attractive front cover! The articles also have immense value. The quality of the paper is the best and the magazine would attract readers at first glance. I want to draw your attention to another aspect. English has become the language of intellectuals of the modern higher and middle class society of Indians who are a few drops in the ocean. I am surprised why you do not print Hornbill in Hindi. I believe that it would be highly appreciated and accepted by most Indian readers.

Dr. R.R. Jha
Dumka, Bihar

...

Mr. Sowrirajan's article on flamingoes at Bombay made attractive reading. However, seeing flamingoes at polluted waters is not rare. In the highly industrialised Shahwadi area of Ahmedabad, alkaline effluents released by detergent factories into marshes have led to the proliferation of algae and its feeders, molluscs and fishes, which attract numerous flamingoes, ibises, ducks, herons, storks and osprey. Similarly along the spectacular Jamnagar coastline, from Jodiya through Okha to Mithapur, the high salinity due to salt factories has increased flamingo populations at salt pans.

This proves that a) numbers are not the only criterion for a healthy environment. It is important to study each species in a holistic perspective. An increasing population of wild asses in the Little Rann of Kutch does not indicate an improving ecosystem. On the contrary, grasslands and thorn scrub are being lost rapidly to encroaching villages, agriculture and salt pans. The wild ass is not thriving on cotton and other crops and though its population is at a peak, the case for its protection may weaken in future, as also for tigers, antelope and other wildlife in India. b) Conservation and industrial development can coexist if we develop non-polluting industries. We should pay more importance to effluent treatment plants and recycling systems. *Hornbill* now needs more investigative articles on conservation and natural history rather than wildlife aesthetics. After all it is a magazine from India's longest surviving natural history organisation.

Anil Mulchandani
Ahmedabad

In his interesting article "Stars In The Sea" Hornbill, 1994 (1), Beefsea has mentioned arms nos. 1,3,5,7,9, etc., in feather stars. While we can number the limbs in a bilaterally symmetrical animal like a worm or a prawn, how can we number these in a sea star, brittle star or feather star, where there are no front or rear ends?

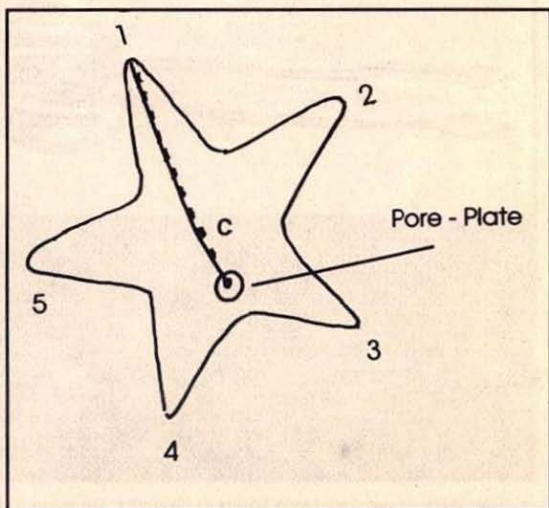
Avni H. Rambhia
Okha

...

Beefsea replies: Though sea-stars and their relatives show an obvious pentamerous (based on 5 or its multiples) symmetry, there is also a hidden bilateral symmetry.

The pore-plate or madreporite on the upper surface of the sea-star's disc is situated between two of its arms. A line joining the pore-plate and the centre of the disc, and then continued, will pass through one arm (ray). We can call this arm (1) an *anterior ray*, and the other arms in a clockwise direction as 2, 3, 4 and 5. The pore-plate is thus located between arms 3 and 4 or, in other words, in the inter-radius 3-4. The rays 3 and 4 constitute a *bivium* and the other rays a *trivium*. In feather stars, a line drawn from the anus to the mouth and extended, passes through one of the ambulacral grooves. This is the anterior ray, and rays 2,3,4, etc., run clockwise from 1. Here the anus is in inter-radius 3-4. If the anus is centrally located, the line joining the hydropore and mouth is used instead.

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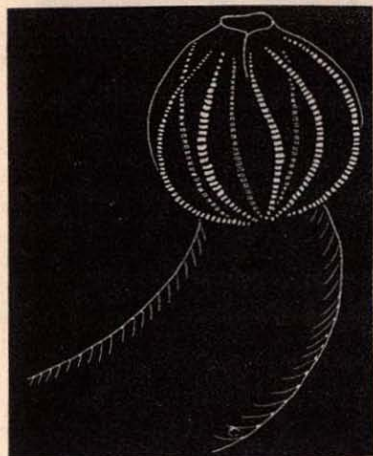


No. 17 Living Lights

BEEFSEA

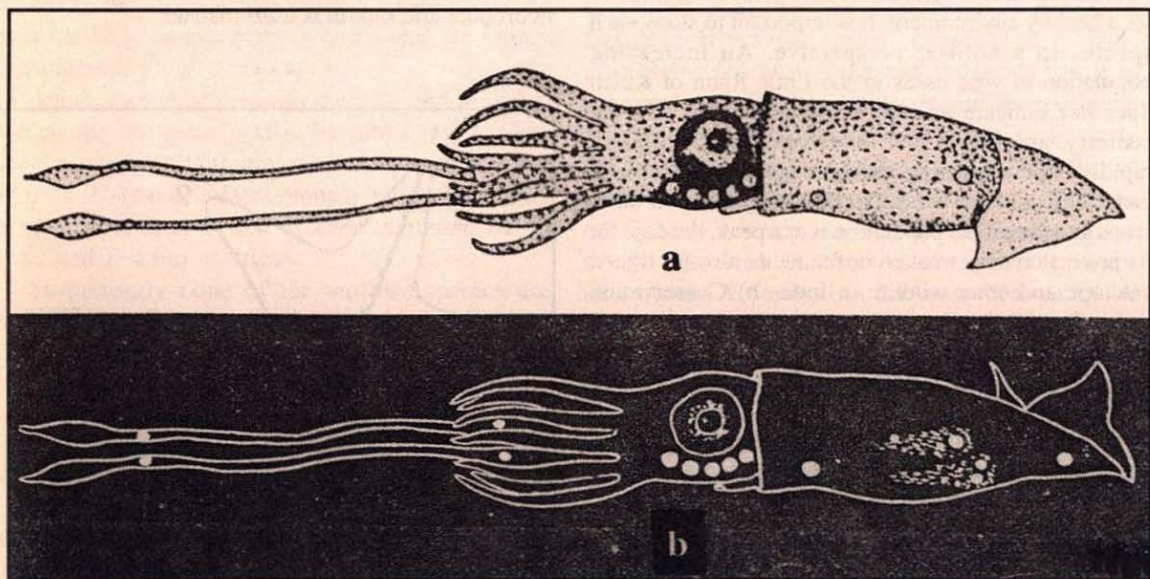
See, as they float along, the entangled weeds
 Slowly approach, upborne on bladdery beads;
 Wait till they land, and you shall then behold
 The fiery sparks those tangled fronds infold —
 Myriads of living points, the unaided eye
 Can but the fire, and not the form, descry.

Crabbe



If you walk along a fishing village at night, where prawns have been strewn for drying, quite often you may see a ghostly glow around each prawn. This is caused by a coating of bacteria on the prawns which shines. It is an example of bioluminescence. Sailors call it phosphorescence. While boating at night, too, you often see that the waves made by the bow of the boat or churned behind the propeller or even an oar splashing through the water, shine with flashes of light. These are caused by minute animals drifting by, being disturbed and reacting by emitting a flash.

Unlike in fresh water, where a limpet and some aquatic glow-worms are the only forms that emit light, the sea has over a thousand different kinds of living creatures that shine. From the invisible bacteria and some microscopic dinoflagellates such as *Noctiluca* and *Gonyaulax* to animals such as sponges, hydroids, jellyfish, sea pens, comb-jellies, worms, copepods, seed shrimps (ostracods), krill, opossum shrimps, prawns, swimming sea snails (pteropods), squids, octopuses, brittle stars, acorn worms, salps, sea squirts, deep-sea sharks and many fishes living below 350 metres — representatives of all these animals emit light. Even the eggs and



a. Side view of wonder lamp squid in daylight, showing light organs. b. The same at night, white dots indicate light organs

young of some marine animals emit light, e.g. comb-jellies, paddle worms (*Chaetopterus*), copepods, krill and brittle stars.

The light is usually blue, blue-green or green, but there are a few exceptions. The fire-squirt (*Pyrosoma*) usually flashes blue light, but if kept in warm water the colour of the light changes to red. In the deep-sea fish *Echiostoma*, minute photophores (light-producing organs) scattered all over the body give out yellowish light, but the large light-organ below the cheek flashes blue or pink. And the most fascinating display of coloured lights is found in the "wonder lamp" squid (*Lycoteuthis diadema*) — a small 7.5 centimetre long squid with as many as 24 light-organs — 2 on each of the two tentacles, 5 on the lower edge of each eye, and 10 on the under-side of the body. The middle organ near the eye gives out an ultramarine blue light, the two on either side of it have a mother-of-pearl glow, the front organs on the belly shine ruby red, the back ones white or mother-of-pearl, except the middle one which has a sky blue glow.

This animal light is called "cold light". Unlike the incandescent light bulb which wastes most of

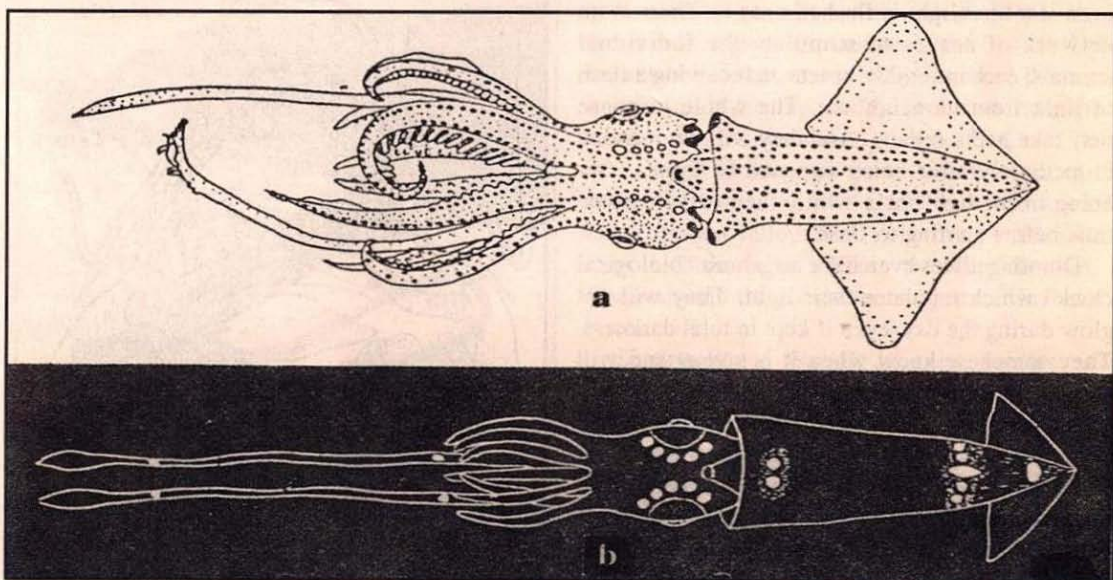
the electricity supplied to it as heat, and even the fluorescent (tube) light which gives out considerable heat, bioluminescence produces no heat, all the energy being converted to light. If we could master the chemical reaction used by animals to produce cold light, we would have efficient illuminating

devices which did not waste any electricity. The chemicals involved are a substance called luciferin and an enzyme (catalyst) named luciferase. When the two come together, luciferin combines with oxygen and produces light. In the jellyfish *Aequorea*, the reaction is between a protein and calcium ions.

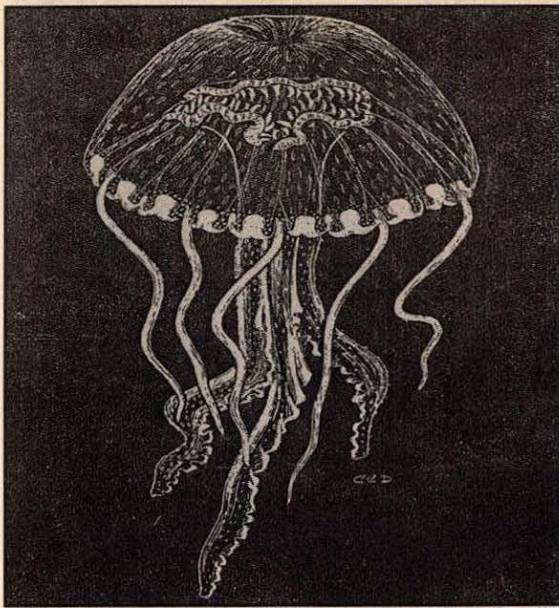
The light may be produced inside body cells, or the chemicals involved may be secreted as a slime. In a few cases, the animal does not produce its own light, but keeps light-producing bacteria inside pockets of skin. The simplest

light-organs are just button-like collections of photocytes (light-producing cells) on or near the body surface. But often they are complex, bulls-eye-lantern-like devices which have a black screen that absorbs any light reaching the back of the light-organ and masses of shining interwoven fibres acting as a reflector, thickened overlying scales

Light-organs of fishes and other animals can be used in various ways. Fishermen from the Banda Islands of Indonesia cut out the light-organs below the eyes of a fish and use them as a bait for night-fishing.



a. Wonder lamp squid back view in daylight, showing light organs. b. The same at night, white dots indicate light organs



Jellyfish showing light organs along the rim of the bell

serving as a lens to focus the light into a beam, thin layers of coloured cells acting as a colour filter, and a diaphragm brought into play by muscles.

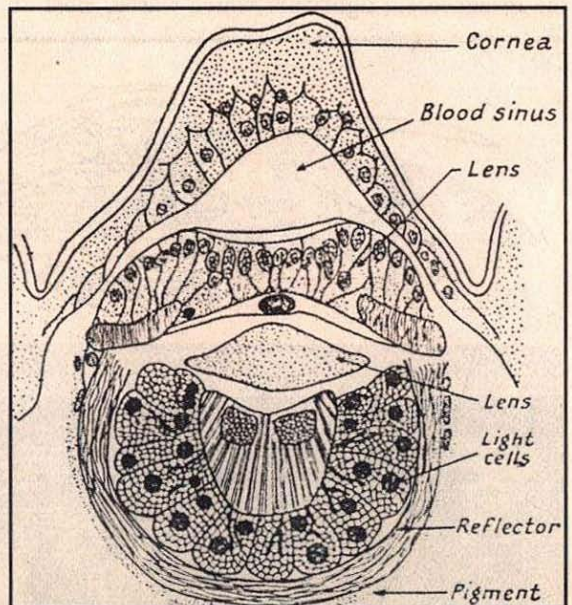
The duration of light can be controlled. The deep-sea squid *Spirula* emits a steady glow, but in most other animals the light emission is intermittent and takes place when the animal is disturbed. If a sea pen is touched, a wave of light sweeps quickly across the colony. The fire-squirt *Pyrosoma* is a colony of individuals living in a common cylinder of cellulose. If touched, a train of light passes from animal to animal. It will glow even if a torchlight is flashed onto it. There is no network of nerves to stimulate the individual animals; each individual reacts on receiving a flash of light from its neighbour. The whole response may take half a minute. And they will not respond immediately after being exposed to light. After being in the light for a while, they rest for some time before starting to flash.

Dinoflagellates even have an inbuilt "biological clock" which regulates their light. They will not glow during the day, even if kept in total darkness. They somehow know when it is sunset and will start shining at night. These plant-animals sometimes multiply in large numbers, making the sea water milky, and then the whole surface of the sea shines with an eerie glow. I well remember, in the early 1950s, the whole city harbour shone for a few days as if in moonlight. And in Puerto Rico, there is a place called Phosphorescent Bay, where the water glows throughout the year.

Some squids and fishes do not have their own light-making mechanism, but take the help of luminous bacteria, which they house in pockets of their skin. Now, bacteria shine continuously, so the animals use screening devices to produce intermittent flashes. Squids have the light-organ inside their ink-sac, and cut off the light by spreading ink in front of the light-organ. Fishes can control the intensity of light by expanding pigment cells which, when contracted, allow the light to pass through. The fish *Photoblepharon* thus draws an opaque screen over the light-organ situated beneath the eye, while another fish, *Anomalops*, rotates its light-organ so that it is concealed in a dark pocket.

Many animals produce a luminous slime which can spread over parts of the body, or be discharged with force. Some prawns, when attacked, throw out a cloud of this luminous slime to startle their enemy. In shallow water, octopuses and squids, when threatened, discharge brownish or sepia ink from their ink-sac. This makes the water turbid and acts as a smoke-screen, behind which the animal escapes. In the dark waters of the deep, such ink would be useless. Instead squids throw out luminous ink, which temporarily blinds their enemy while the squid escapes.

A momentary flash also serves to startle the attacker. Some worms (*Polynoe*) cast off a few scales from the back when attacked. While these shining scales distract the attention of the enemy,

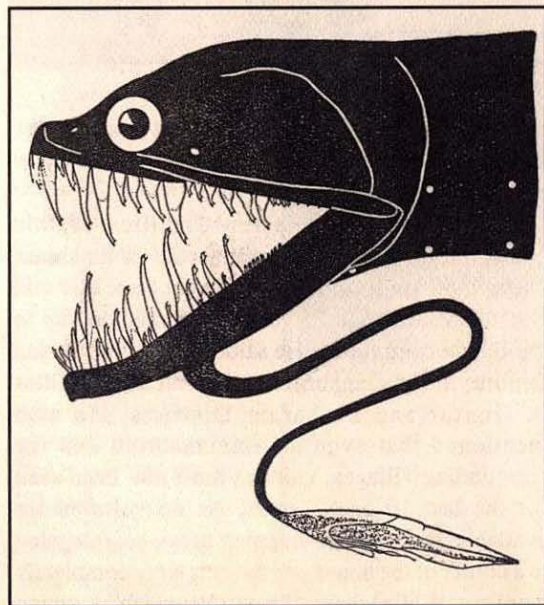


Section through a light organ showing lens, filter, reflector and iris "shutter"

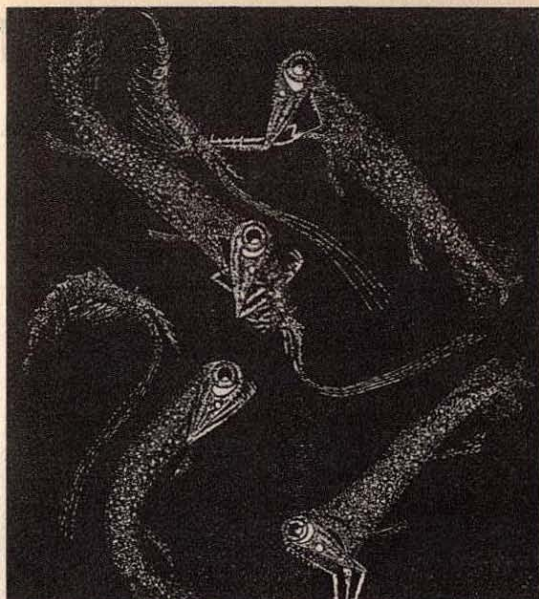
the worm escapes. New scales grow in their place.

Some fishes use light-organs on the head, or near the eyes, as flashlights to illuminate the water nearby and enable them to see (non-luminous) prey in the dark. Light-organs shining into the eyes help accustom the fish to light, so that the eyes are not dazzled in the dark by a sudden flash. Deep-sea angler fish have a lure, called the illicium, which is the modified first ray of the dorsal fin. A light-organ at the tip of the illicium has a transparent window through which the light can shine and attract prey. Another angler fish has a forked light-organ just inside the mouth. When the fish approaches its victim, it opens wide its mouth, and the shining light entices the prey to enter and be swallowed. Rows of light-organs help shoaling fish to stay close to each other. The arrangement of light-organs is different not only in different species of lantern fish, but even between the two sexes of the same species. Thus the male may have a certain number of photophores on top of the tail, while the female has a different number on the underside of the tail. Such differences in the number, arrangement and even colour of the light in the two sexes is also found in some squids.

Such differences help the two sexes to come together for courtship and mating. The worms *Odontosyllis* rise to the sea surface for an hour after sunset for precisely three nights after a full moon night. The females come up first and shine brightly for 10 to 20 seconds continuously. The males follow,



Head of female viper fish *Idiacanthus* showing light organ at the tip of the lure



The deep sea fish *Malacosteus indicus* hunting prawns

flashing their light intermittently. If a male fails to reach a female before her light fades, he waits nearby until she becomes luminous again, when he mates with her.

In some cases of bioluminescence, the reason is obscure. For example, what is the significance of luminous organs inside the belly muscles of some fishes, the liver of prawns, or the ink-sacs of squids, where they cannot be seen? And why do some blind animals have light-organs on their body, when they themselves cannot see?

Light-organs of fishes and other animals have been used in various ways by men. Fishermen from the Banda Islands of Indonesia cut out the light-organs below the eyes of a fish and use them as a bait for night-fishing. In Portugal, fishermen from Cezimbra rub a piece of dogfish flesh with the belly of a rat-tail (a deep-sea fish). Near the vent of the latter is the opening of a gland from which oozes out a viscous yellow fluid containing bacteria that emit a blue light. When the dogfish bait is smeared with this, it shines and attracts fish to the hooks.

During World War II, Japanese soldiers who could not use their electric torches because of the proximity of the enemy, would moisten a little dried powder of the seed shrimp *Cypridina*. The glow, lasting for a few seconds, would enable them to read a message. One wonders if a day may come when bioluminescence is exploited fully to mankind's advantage — certainly nothing is impossible. □

A VULTURE-EATING COMMUNITY IN ANDHRA PRADESH

K. MRUTYUMJAYA RAO



A young tribal substitutes for a trapped vulture in the net

Ever since I came to Bapatla in 1981 I did not see vultures in and around Bapatla and surrounding villages. Bapatla is a town in Guntur District of Andhra Pradesh about 80 km from Vijayawada on the Vijayawada-Madras railway line. I could not find vultures within a radius of 30 to 40 km from Bapatla. I was surprised regarding the absence of vultures in this area. I would often find cattle carcasses with stripped skin, left to decay and being consumed by stray dogs and crows. After talking to several people my opinion was confirmed. About 25 years back vultures were seen in good numbers in and around Bapatla.

Further enquiries revealed that there is a community in Bapatla named "Banda", locally called Bandollu. The people of the Banda community eat vultures, crows and other carrion-

eating birds. They do not catch or hunt other species of birds, especially water fowl such as ducks, or egrets and storks.

I found out that a few families of this community resided at Ammanabrolu in Prakasam District, 50 km from Bapatla. I went there and met Kathula Venkaiah, a 75 year-old man belonging to the Banda community. He said there were 8 Banda families at Ammanabrolu and about 300 families in Guntur and Prakasam Districts. He also mentioned that even at Ammanabrolu and the surrounding villages, vultures have not been seen for the last 10 or 12 years. As no vultures are available, their vulture-trapping nets were relegated to a corner of the house and the nets were completely worn out. While I was talking to Venkaiah his young grandson brought in two crow chicks taken from a

crow's nest for a meal. Venkaiah along with other men of his community used to catch vultures not only at Ammanabrolu and the surrounding villages but also at Konijetikonda, Kodisenakonda and at Boyanakonda, far from his place near Chilakaluripet and Narasaraopet in Guntur District.

He said that the vultures used to nest at Konijetikonda, Kodisenakonda and Boyanakonda hills. According to him, on cliffs and rocky slopes, wherever they found some space between rocks, the vultures would gather four twigs, put them in a criss-cross form with two twigs parallel and the other two perpendicular, and would cover them with mud, and lay only one egg in the nest. They would also build nests on the floor of a rocky valley in the same way. The people of the Banda community would get down with the help of ropes onto the spot to collect the eggs and chicks.

I asked Kathula Venkaiah about the species of vultures they caught. He said that now and then king vultures and scavenger vultures were also found in their nets.

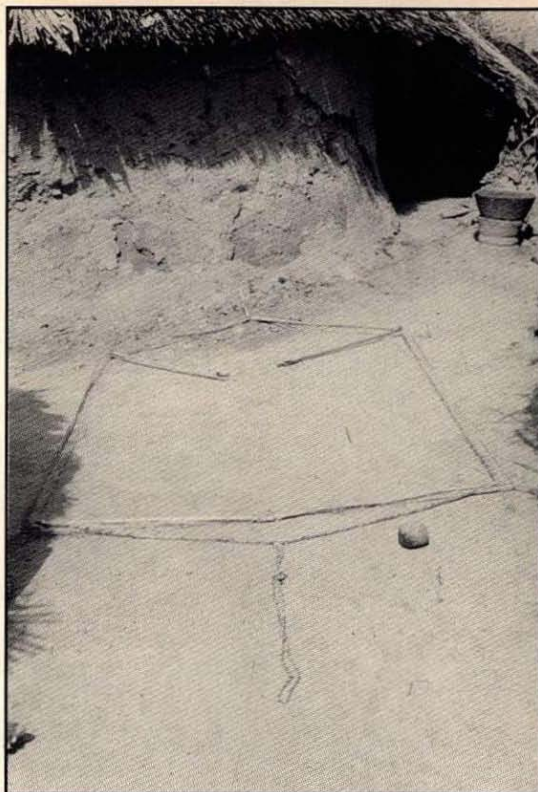
I took some photographs of the net. The net is spread on the ground with wooden spikes and resembles a badminton court net in weave. The thread used is very strong. It is capable of catching at least 10 vultures at one time.

I sent a person to Chilakaluripet to investigate this further. He found one Banda family at Chilakaluripet and learnt that the vultures at present do not nest at Konijetikonda or Kodisenakonda, and they have not been seen for the last 10 years at Chilakaluripet.

Eating of the vultures and the chicks is one of the root causes for the endangered status of vultures in Guntur and Prakasam Districts.

Much more study is required to establish the status and the breeding sites of vultures in the coastal districts of Andhra Pradesh.

Editor's note: This is a unique instance of a non-scavenging community feeding on



K. M. RAO

How the net is spread on the ground with wooden spikes

carrion-eating birds. Any further information on such communities would be welcome.

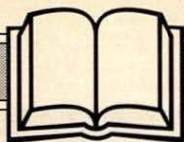
K. Mrutyumjaya Rao is a BNHS member and an avid bird watcher



K. M. RAO

The position of the net after pulling the rope





NATURE GUIDES-COMMON BUTTERFLIES OF INDIA.

Thomas Gay, Isaac D. Kehimkar and J. C. Punetha.
pp.67 with eight colour plates and
70 black and white text-figures.
Oxford University Press, Bombay. 1992.
Price Rs. 60/-.

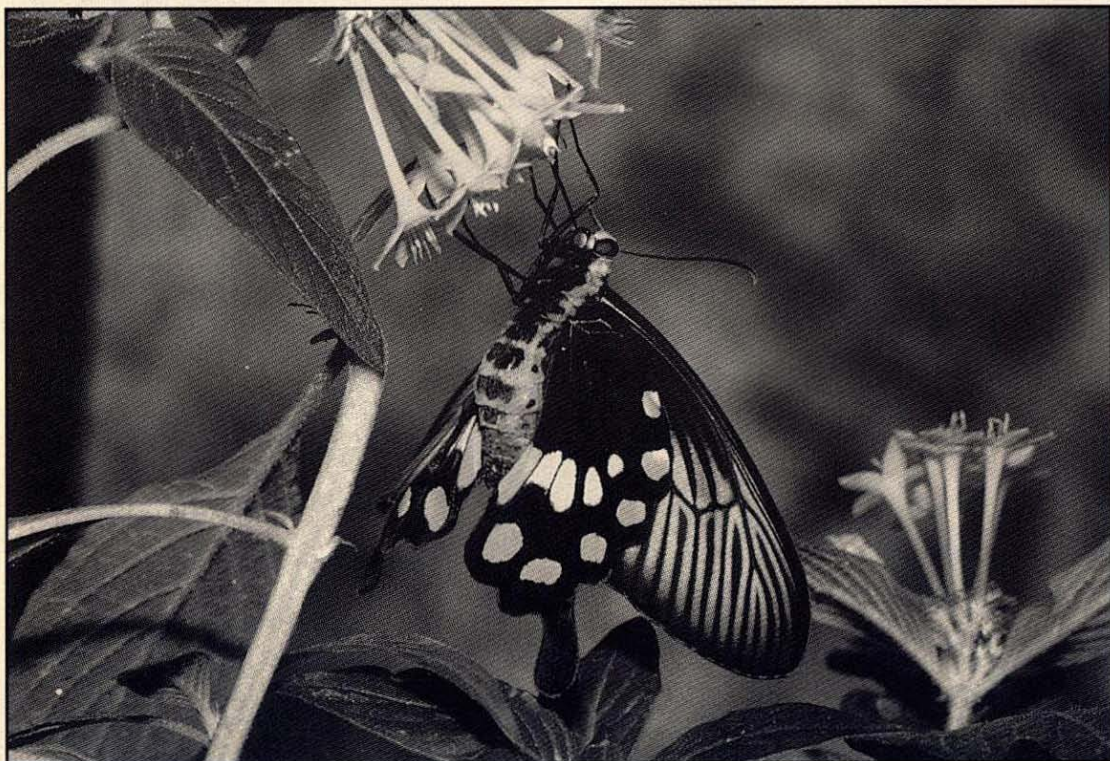
During the early days of the WWF nature camps, birds were the unchallenged centres of attention for most of us. Mammals were seldom noticed and other groups were, for the most part, unknown quantities. The world of an amateur naturalist in the early 1980s consisted primarily of birds, occasional mammals, some reptiles, insects and plants and a few oddities like the flying frog. With time, this highly skewed emphasis on mammals and birds has been remedied to a large extent with the less visible animals getting their due share of attention.

WWF-India has brought out the *Common Butterflies of India* as part of its series on Nature Guides with the avowed purpose of inculcating

interest in our flora and fauna to promote the cause of nature conservation

It is the only identification guide on Indian butterflies available for the beginner and the casual observer: The authors have made it a point to use non-technical language where possible. A glossary as well as several figures explain the unavoidable technical terms used in the text. The introduction is quite comprehensive and gives a wealth of general information on butterflies. All the butterflies dealt with have been illustrated with many photographs (both colour and black and white) and sketches. The butterflies have been grouped into families with emphasis on their characteristic features and habits.

The major feature of this book is its emphasis on observing and identifying live butterflies. It is perhaps the only guide without a chapter on collecting butterflies. Butterfly guides throughout the world give the impression that collection is essential for their study. But many studies, including rigorous scientific ones, do not require it. With some



The common rose — bright colours warn birds of a distasteful encounter

practice, all the common species and many rare ones can be identified in the field. Close-up photographs or line sketches together with notes on their behaviour and habitat along with some patience will make for sufficiently accurate identifications and provide you with an engrossing hobby without having to bloody your hands and soul! You can always take your notes and photographs to the nearest butterfly collection and compare them with the dead specimens. It is only proper that dead butterflies are utilised to avoid killing more of their kin!

Some of the other plus points of this book are the various tips about rearing butterflies and photographing them. A butterfly coming out of the chrysalis is a fascinating event and well worth the effort and the patience that is required to see it.

While the colour photographs are reasonably good (though not in the same league as many of Isaac's other photographs) the black and white ones as well as the sketches leave much to be desired. I could not see the Indian sunbeam or the common castor in the sketches, even after reading the caption! And some photographs (e.g. the black prince and the common crows on *Heliotropium*) do not serve any purpose. Several such figures could have been avoided. Sketches with shading seem to be particularly bad while the line sketch of the tree nymph is much better. There is not much use in shading the white parts of a butterfly (sketch of the female yellow orange-tip); in fact it is misleading. The sketches of the handsome swallow-tails in the main text are superfluous considering the identical colour plate on the back cover.

By and large the selection of butterflies is fairly representative. But considering some of the rarer butterflies shown, some common ones like the

Forget-me-not and the chestnut bob could also have been mentioned. Groups like the blue crows and the royals are easy enough to identify (though not the individual species) and a line or two regarding them would have sufficed. Closely related species could have been mentioned while describing some species, like a one-line description of the crimson tip while describing the orange tips.

A list of the more comprehensive guides and the butterfly collections in this country would have been of immense help to students who wished to go beyond this book. Considering that the more detailed books on butterfly identification follow the older nomenclature, older Latin names ought to have been mentioned to facilitate cross reference.

That I've spent more time on the shortcomings of the book is not an indication of my evaluation of the book. This is an excellent, cost effective book which if presented to children may well initiate an engrossing and lifelong hobby.

The last decade has seen a groundswell in nature watching as a hobby; even better is the realisation that there is more to wildlife than a tiger or a Siberian crane; that much maligned creatures like the spiders and snakes lead lives as fascinating as those of their more visible brethren and that every part is essential to the whole. In my experience, familiarity does not breed contempt; on the contrary, it nurtures a fascination for the natural world. Easily available inexpensive guides would go a long way in making popular attitudes friendlier towards our environment. Ultimately it is only a change in public attitudes which will decide the sort of environment we will inhabit. I shall end this review on a note of hope that this guide to butterflies is not the last of the series devoted to various groups of little-known animals. □

RAMANA M. ATHREYA

INSTRUCTIONS TO AUTHORS

We welcome your articles, letters, comments, photographs and illustrations for *Hornbill*. Kindly send us material in the following format.

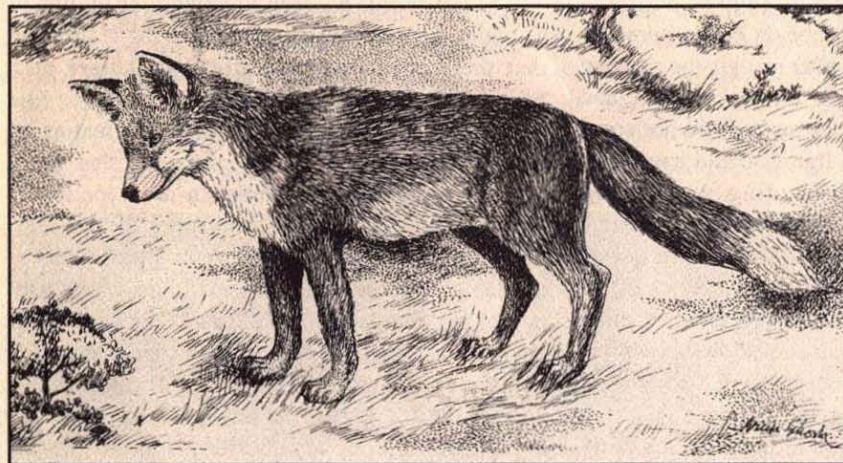
1. Original article, along with 2 xerox copies:
 - Text should be typed in double-space (article, letters, etc.)
 - Illustrations, if any, should be submitted as clear, glossy, black and white or colour photographs. Colour transparencies are preferable to colour prints. Hand-drawn illustrations should be done on high quality art paper in China Ink.
 - Captions for illustrations or photographs must be provided, typed on a separate sheet of paper.
2. A covering letter with a detailed list of all enclosures should be addressed to:
Hornbill Editorial Board, Bombay Natural History Society, Hornbill House
Dr. Salim Ali Chowk, Shaheed Bhagat Singh Road, Bombay 400 023.



MAMMALS OF THE THAR DESERT

Ishwar Prakash
Scientific Publishers,
Jodhpur, 1994.
pp.114, Price Rs. 100

There are few books on wild species of Indian animals written specifically for non-professionals. Recognising this need, the author decided to write a popular book on the mammals of the Thar desert, to share with people "these marvels of animal life, the glory of the past wildlife harboured by the desert and the fury of the Thar", and to instill in his readers an urgency for the preservation of natural ecosystems.



ARUN GHOSH

The desert fox, one of the important canines of the Thar desert

After a brief introduction to the Thar region, and to general mammalian characters, there are detailed descriptions of 49 species of mammals, ranging from hedgehogs through bats, cats and ungulates to rodents. For each of these selected species and their relatives, there is relevant information on size, distinguishing features, distribution, as well as adaptation to the desert.

The description of each species is accompanied by a black and white sketch. (As a matter of fact, the author waited for many years to publish this book until he found a suitable artist, and Arun Ghosh's drawings are excellent.)

The text is liberally sprinkled with interesting facts, and I learnt, for example, that the fat of the

giant fruit bat *Pteropus giganteus* is believed to be a cure for rheumatism, and that when the pipistrelle bats return early to their roosts in the evening, a desert storm can be expected within the hour.

Habitat changes in the desert due to such development activities as the Indira Gandhi Canal are correlated with the expanding populations of some mammals like the nilgai. The cheetah, once a desert inhabitant, now extinct in the Indian sub-continent, and the lion, now locally extinct in the desert, also feature here. The book also describes the sloth bear and the tiger — species typical of the Aravalli hills. The author has seen the elusive ratel at Jodhpur, Jaipur, and Barmer and feels that since

it is strictly nocturnal, people are usually unaware that it inhabits their region. From his vast experience in the desert, the author fills in details about specific food resources, crop preferences of marauding rodents and ungulates and levels of population decline in species once common in the desert like the Indian fox *Vulpes bengalensis*) or

the wild boar.

The value of the text is enhanced by a glossary as well as recommendations for additional reading. The book is slim, easy to handle, and the printing is excellent. It would be better if a more detailed map were provided showing all the places mentioned in the text. The author makes passing reference to a fascinating story involving the wild boar and Maharana Pratap Singh of Rajasthan, which could be completed the next edition.

This book will not only evoke interest about desert fauna in the general public but will also serve as a compact source of reference material for serious study. □

RENEE M. BORGES

ENVIRONMENT MINISTER VISITS BNHS

The Minister of Environment and Forests, Govt. of India, Mr Kamal Nath visited BNHS for the first time on 15th April, 1994. The Honourable Minister was taken around the collection rooms and the library where he saw some of the rare specimens and natural history books.

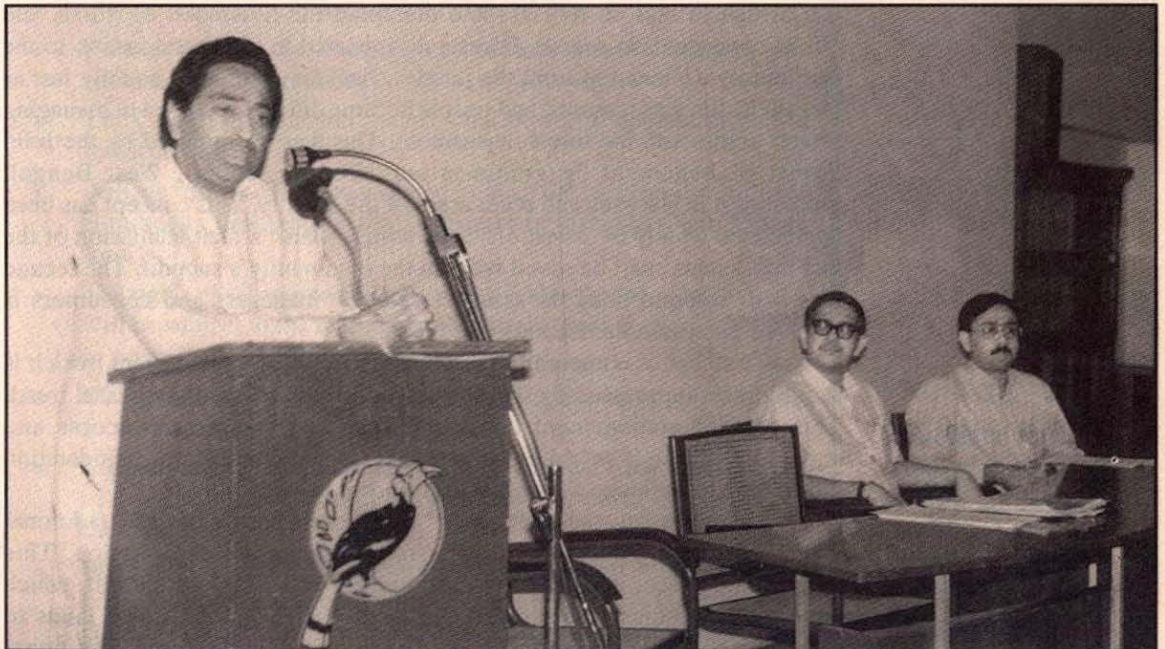
The Minister then had a meeting with representatives of some NGOs, along with the Honorary Secretary of BNHS, Dr. A. M. Bhagwat. Besides BNHS and Sanctuary Asia, other NGOs represented at the meeting were the Bombay Environmental Action Group, Save Bombay Committee, Narmada Bachao Andolan, Human Rights Law Network, Save Pooyamkutti Organisation and the Nivara Hakk Suraksha Samiti. Representations were made by these organisations on the issues of denotification of protected areas, relationship of NGOs and the Ministry, people's participation in the procedure for clearing development projects, fresh assessment of Narmada projects, clearance of the Pooyamkutti Hydroelectric Project by the Ministry, and rehabilitation of peoples

displaced by the sewerage project at Worli, Bombay.

Finally the Minister met the BNHS members and invitees from the public and press in the Members' room. After a short speech, he devoted most of the evening to answering questions on current environmental issues posed by the audience.

The highlights of the Honourable Minister's meeting was his announcement of the intended reconstitution of the Central and State Pollution Control Boards into National and State Environmental Protection Agencies, which will have more powers and play greater roles in monitoring air, water and land pollution laws. He also announced the creation of a National Park Authority in the near future. This Authority will narrow the gap between the perception of the Central and State Governments regarding the Protected Areas.

Mr. Kamal Nath's visit to BNHS proved to be an educative and mutually beneficial one for all the participants. □



Mr. Kamal Nath addressing the assembly while Dr. A M Bhagwat, Honorary Secretary and Mr. Sunil Zaveri, Honorary Treasurer look on

QUE SERA SERA

The present attempt to amend the Indian Forest Act of 1927 by the introduction of a new draft forest bill has drawn flak from different quarters, especially NGOs working at the grassroots level.

The draft bill will supersede all state laws, vesting the Ministry of Environment and Forests with all powers to decide upon reserving forest land and allowing commercial exploitation. Some legal experts view this as an attempt at extreme centralisation. Though this is not the first such attempt, the Forest Conservation Act of 1980 empowered the centre to decide upon the diversion of forest land for other uses. The present draft forest bill is claimed to be more regressive than the previous Forest Conservation Act (1980) as it proposes to expand the forest bureaucracy's jurisdiction. Section 77(1) of the draft bill says that any rules made by the state forest administration need central approval before notification. The present draft is silent on people's rights over forest produce as it fails to state in clear terms whether the people's legitimate requirements would be given priority. The concept of carrying capacity has been made the single most important criterion for people's rights. It is left entirely to the forest settlement officer's discretion to estimate the carrying capacity of a forest, leaving the community or other experts totally out of this very important decision. Unfortunately, such draconian measures will prove to be the last straw for forest users.

Colonial forestry attitudes were dominated by the importance of forest divisions which generated more revenue. The state's takeover of forests by the British to rake in revenue had disrupted the livelihood of tribals and others dependent on forests. Forests disappeared in direct proportion to the community's alienation from the jungles. And they recouped equally fast as this alienation was removed and people became directly involved in managing forests along with the forest department. This was exemplified by the Joint Forest Management Programmes launched in Arabari, West Bengal, Sukhomajri in Haryana and other areas of the country. This concept has been appreciated widely by forest officials, which is also a tacit admission of the fact that forests can't be saved without the community's support. The fecund land will respond once the conflict between managers and consumers is resolved to sustain the fecundity of the land.

This concept of community participation in forest management, which is sought to be suppressed by the draft forest bill, is ironically a global trend. This type of management takes into account grassroots concerns and conditions, hence it would be wise to take such opinions into consideration rather than to bulldoze through with a poorly debated bill.

As it stands today, the draft forest bill will strip people of their traditional rights - without protecting forests from commercial exploitation. This commercial aspect is one of the most sinister provisions of the bill, which among other things also proposes to hand over degraded forest lands to industry. This might lead to gross misuse and domination of traditional communities with their ecofriendly ways and means, by industrial houses whose only criteria will be a quick return on their investments.



S. ASAD AKHTAR

“ **The draft forest bill will strip people of their traditional rights without protecting forests from commercial exploitation** ”

CONSERVATION NOTES

The community indeed has every right to know the implications of such bills, for the future is indeed ours to see, unlike the song which conveys a fatalistic approach, when it says "whatever will be, will be, the future's not ours to see." We should not take this attempt to muzzle people's opinion a fait accompli, because the future is indeed ours to see ! □

Compiled by S. Asad Akhtar, Conservation Officer, BNHS.

SOME SALIENT FEATURES OF THE DRAFT FOREST BILL

- ♦ The state governments have the right to declare any government land as "reserve forests". The Centre will monopolise the decisions directed towards the state government to constitute reserve forests.
- ♦ No people's rights will be entertained in the reserved forests.
- ♦ The state governments can bypass procedural necessities in extending immediate protection to any forest land, depriving people of their rights by declaring it a protected forest.
- ♦ The state governments can deny villagers access to any village forest land by declaring it "protected" if it is felt that "unrestricted access" is detrimental to biomass creation.
- ♦ The Centre has overriding powers in declaring any forest "protected".
- ♦ The government can reserve any class of trees.
- ♦ It can declare any portion of protected forests closed for grazing or collecting forest produce.
- ♦ The Central government reserves the power to demote protected forests to open season.
- ♦ Village forests can be constituted to meet the biomass needs of the community, but reserve forests cannot be converted into village forests.
- ♦ The rights of villages to enjoy usufruct, fuelwood and other benefits, will be subject to the management plan prepared by the local body in consultation with the forest department.
- ♦ The village community will have to restrict its usage to limits stated in the management plan.
- ♦ State governments reserve the right to take over the management of the village forests if they are dissatisfied with the functioning of the local body.
- ♦ State governments can declare any forest "agro forests" if they consider that shifting cultivation is harming it. All claims of jhum cultivators will be settled and shifting cultivation will have to cease within 3 years.

Courtesy: Down to Earth



S. ASAD AKHTAR

“ **The commercial aspect is the most sinister provision of the bill, which also proposes to hand over degraded forest lands to industry** ”

NEWS NOTES AND COMMENTS



INDIAN TORTOISE-SHELL SEEN AT 6000 METRES

The spirit of adventure is present in each and every living thing and more so in human beings. It takes them to places far and wide, in conditions so trying that the law of the jungle might prevail over them. But here is an example of animal behaviour which helped humans to reach their destination. This is reported by Manju Savla.

On 16th July 1992, Atul Kulkarni and Sangram Singh, a high altitude porter, were on their way to establish camp-III at the height of about 6000 m. The rough weather and an avalanche had made them worried and cautious. Due to the previous year's earth-quake, the medieval moraine structure of Purbi Kamet glacier was disturbed. They were finding it difficult to choose a safe camp-site for camp III.

Tired and disheartened, they were walking along slowly when they saw a beautiful butterfly hovering over them. At first they did not pay any attention to it, but the tiny creature kept on flying around them and followed them all the

time. They walked on and on and it continued to hover on them. Now Atul could move no further, so he sat down. The butterfly hovered around him once more and flew off to a distance of 15 to 20 m, bringing to Atul's notice the flag post of an old camp-site. Surprised by the tiny creature's persistence, they followed it and to their surprise and joy found the signs of an old camp-site, a flag, tin cans, and ground which had been made level with stones.

Atul heaved a sigh of relief, and took a picture of his unwitting guide, which was an Indian tortoise-shell butterfly. The question was, what was it doing in a snow-field full of serracs?

Generally, the small Indian tortoise-shell *Aglais cashmirensis aesis* Kollar (1984) are found from low elevations to an altitude of about 5000 m.

They are usually found on the wooded slopes of the Himalaya, but they also occur just above the snowline. Extremely rare cases are reported of their occurrence at 5500 m. □

COURT CURBS GANGA POLLUTERS IN BIHAR, BENGAL

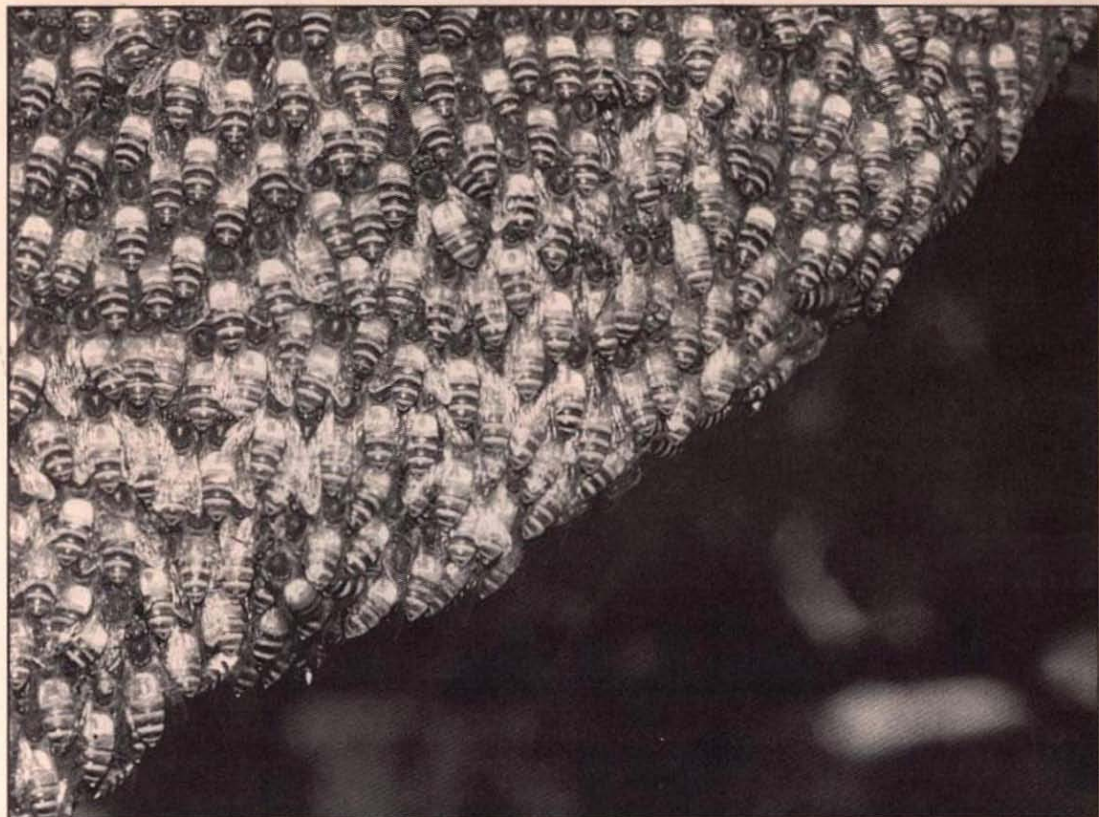
Casting its anti-pollution petition net wider, the Supreme Court has cracked down on industries in Bihar and West Bengal spewing pollutants into the Ganga and its tributaries, ordering them to be shut down or relocated.

Ruling on a public interest petition the Supreme Court ordered the closure of the Bhawani Paper Mills near Patna and state-owned sugar mills in Bihar for not installing effluent treatment plants (ETPs) despite repeated deadlines. In a separate order, the court ordered the West Bengal government to relocate 230 small-scale tanneries by June 1 to a site with an ETP that can serve all the units.

The industries ordered shut in Bihar had been instructed by the court to install ETPs by April 30, 1994. These industries had ignored notices issued by the state pollution control board asking them to explain what action they had taken to set up ETPs. The state pollution control board later informed the court that 20 industries were operating ETPs and 27 others were "in the process" of setting them up. These 27 industries were then allowed eight weeks by the court to begin operating ETPs. □

Excerpted from Down To Earth, June 15, 1993.

CAN HONEYBEES CAUSE 'TURMERIC RAIN'?



Honeybee hive — the source of "turmeric rain"

We have noticed numerous yellow spots on our car bonnets and roof tops usually in this flowering season when honey bees are active (March). There are obviously a number of honeycombs constructed in a number of tall trees and buildings which may be the cause," says N. Shivakumar, a BNHS member. He further writes in to say:

"A number of superstitious villagers are mistaking the yellow spots for a heaven-sent turmeric rain (Haldi rain). I intend to educate people with facts and figures. I presume that these numerous yellow spots are excreta or pollen grains being dropped by the honeybees."

He has asked for a plausible explanation, which is as follows:

A protozoan parasite, Nosema apis Zander causes 'Nosema' disease of adult bees, detected for the first time in 1974 in parts of Uttar Pradesh. It enters the gut of adult bees, rendering them unable to fly. Other symptoms of the disease

are paralytic movements, dysentery, stoppage of egg-laying, and decreased nectar collection, leading to large scale death of bees. Unhygienic conditions, material exchange between bees, excreta, robbing, grouping and exchange of hive parts are some of the causes for the spread of this disease.

The infection can be controlled by fumigation of the comb with acetic acid or formalin. Systemic treatment or spraying each colony with the antibiotic Fumagillin.

In England, Nosema apis is reported to be associated with Bee-virus Y and Black Queen-cell virus. These are controlled with the control of Nosema disease. In Canada, Fumidil B is reported to be a potential control measure for Nosema. □

Reference:

Tech Bull, cent Bee Res Inst, No. 9, 1974, 1; Indian Bee J, 1982, 44, 24; 1983, 45, 22; Singh, ibid, 1974, 36, 16).

THE ENDANGERED BULLFROG ONCE COMMON, NOW RARE

Froglog - the newsletter of the IUCN Amphibian specialist group reports that the Biodiversity Legal Foundation (BLF) has petitioned the United States Fish and Wildlife Service (USFWS) for the listing of the Amargosa toad *Bufo nelsoni*, a native species of America as an endangered species in the United States. Less than 40 years ago, thousands of this species inhabited the Oasis valley in Southern Nevada. Today this endemic population probably consists of fewer than 100 individuals. Dr. Jasper Carlton, the Executive Director of BLF said that this

decline in the population of the bull frog in the agricultural area of Sambalpur. Similarly a study conducted by Aloysius G. Sekar in 1993 in the Sanjay Gandhi National Park at Borivili, Bombay, where this species was abundant once, were found poor in abundance of this species (7/ha). What is the reason for the population decline of this species even after the government banned the export of frog legs. There are two probable explanations. The first is the heavy use of pesticides in the agricultural areas. For example, in Orissa State about 1300 tonnes of pesticides are used annually. Of this total

pesticide consumption, Sambalpur district consumes about 208 tonnes. This huge quantity of pesticides affects the growth of the developing tadpoles in the agricultural fields especially in the rice fields.

The second explanation is habitat degradation or habitat conversion, for instance, converting the low-lying areas or wetland habitat suitable for amphibians to mono-

culture and other plantations. Modification of wetland habitats affects the lower vertebrates, especially amphibians, which are very beneficial to farmers. This problem was discussed in a national seminar on endangered fauna held at Nagercoil, Tamil Nadu. Frogs do not attract the attention of ecologists. But they are silent workers who do their job and help to maintain the ecological balance. Unless we stop the excessive application of pesticides and the modification of habitats, it will be difficult to protect the Indian bull frog and this once very abundant species will soon be listed among the endangered frog species of India as has happened to the Amargosa toad in the United States.



Rana tigerina — a victim of gastronomic persecution

species is one of the most imperilled unprotected amphibians in the United States.

In India, *Rana tigerina*, popularly called the Indian bullfrog has diminished in numbers. The population of this commercially valuable frog was brought down by frog leg exports and use in biological research in colleges and institutions. The Government of India banned frog leg export following a project report submitted to the Indian Council of Agricultural Research by Mr. Humayun Abdulali in 1979. Thereafter the population of this species was not systematically monitored. Recently, a community study conducted at Sambalpur District in Orissa by Dash and Mahanta in 1993 indicates a sharp

BIRD HOUSE WORKSHOP

'Prakruti,' an environmental education non-governmental organisation based in Ahmedabad, organised a one day "Bird House do-it-yourself workshop" at the sprawling, lush green premises of Khadi Gramodyog Prayog Samiti in Ahmedabad. Thirty school children participated and, besides learning about nests and nesting habits of local bird species, also made and they proudly carried home their own bird-houses.

In the smaller groups, children first counted on their own, the number of bird nests in the surroundings. Their observations were presented and discussed in the larger group. The practical aspects of ornithology, like



The young participants displaying their completed bird houses

"what can we do to attract more birds in our environs?" were discussed with enthusiasm and useful suggestions came up from the participants. A scientifically tested bird-house design was used and its design details were discussed by Arvind Pandya. This workshop was the third one in the series of do-it-yourself workshops on various environment related topics organised by 'Prakruti' under the co-ordinatorship of Sandhya and Rajesh Bhat. It is Prakruti's experience that scientific teaching can be made very interesting and digestible when mingled with hands-on experience. This experiment proved



Working on the construction of bird houses

to be a valuable one both for the persons conducting the workshop as well as for the children who participated in it. Further details can be obtained by request from:

Prakruti's Centre for Ecocentric Development and People's Action, L/114, Swatanrya Senani Nagar, Nava Wadaj, Ahmedabad-380 013. Gujarat, India. □

LAND OF THE ELEPHANT GODS

DHIKALA

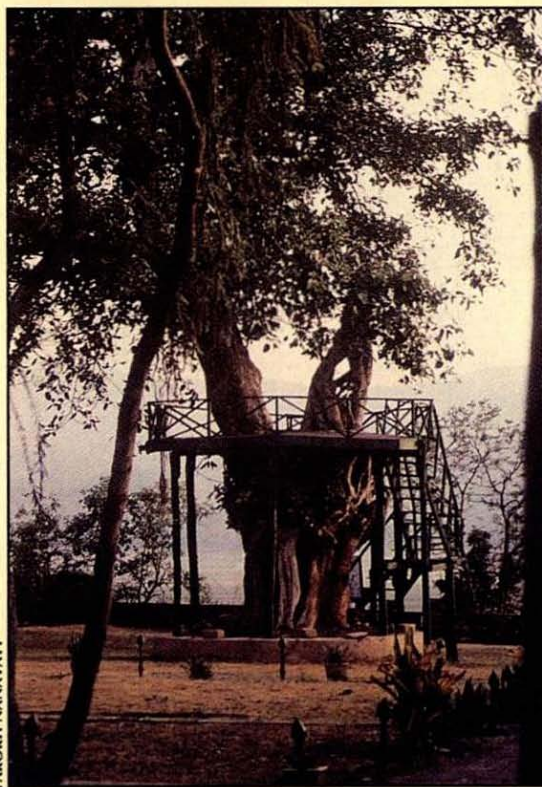
FAROKH H. NANAVATY

The time was 2.30 p.m. on June 6, 1994. It was the peak of summer when the mercury rises to 40° C in the shade just before the monsoons set in and quench the parched earth. The sky was cloudless, the air was still and nothing stirred except a few birds flying from tree to tree and occasionally landing on the lawn below to scavenge. I was sitting on a tree platform at Dhikala Forest Complex in Corbett National Park overlooking the Ramganga river and the distant hills.

Dhikala *chaud* (open grassland) is the largest in Corbett National Park, the others being at Bijarani, Paterpani, Khinannauli, Mohinpani, Bhadali and Phulai. It is eleven kilometres long and five kilometres wide situated in the core of the park. To the north lies a buffer zone of forested hills, to the west a reservoir and to the south and east deciduous forests of stately sal and sesham trees. The river Ramganga (dry in the summer) runs through it from west to east. This forms the ideal habitat for large herds of animals to graze in the grasslands, with water available from the Ramganga and the cool of the forest providing shelter and reprieve from the heat of the day. Predators flourish where there are large herds of animals and the forest forms an ideal habitat for tigers, leopards (preferring higher ridges) and lesser carnivores.

A great expanse lay before me to view. The river bed was dry with islands of tall grass and weeds surrounded by a sand and rock bed from which the heat rose in a steady haze. My eyes strained as I scanned the entire area with my binoculars for any sign of life. Looking north-west I spotted a cheetal stag sitting at the edge of the tall grass — then another and in all five with a few does grazing nearby. I observed them for a long while and put down my binoculars to rest my eyes from the glare of the afternoon.

A few minutes elapsed, then directly across from where I was sitting on the opposite bank rose a cloud of dust. Before I could refocus my binoculars, someone shouted, "Elephants!" From the edge of the forest emerged a huge matriarch followed by two smaller cows and a young one. They made straight for the river, where on the northern shore there is a continuous flow of water. Perhaps a minute elapsed and six more elephants emerged, with two adolescent males. Then there was a pause. Soon more clouds of dust could be seen at different parts at the edge of the forest as more actors made their entry onto the stage. Some stood on the bank taking a dust bath as they sprayed dust on their flanks, some stood browsing at the edge of the forest, others made straight for the water and were soon lost to sight as they went down a ridge. The first elephants to emerge had

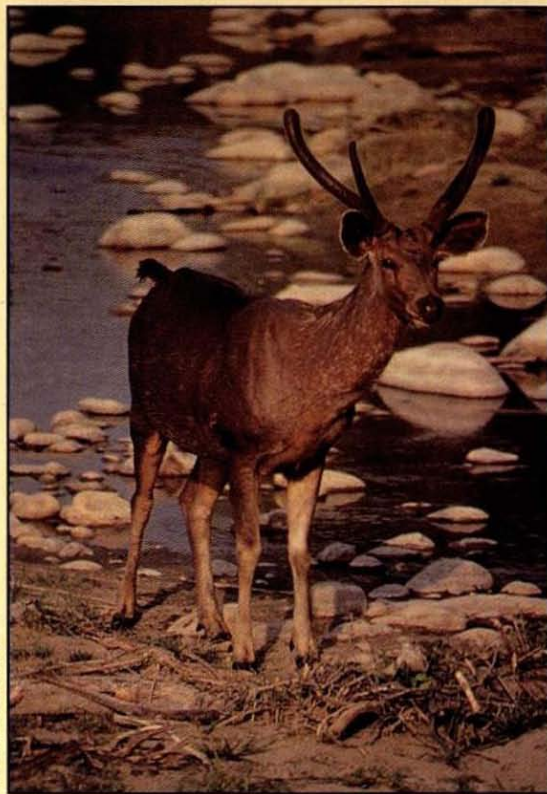


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A machan built for elephant watching

already drunk at the river and had crossed over and were now standing in the tall grass, grazing. Their great wet bulk glistening in the sun as they swayed from side to side with clumps of grass in the tip of the trunk which they lashed around to shake the earth from the roots before they ate. Simultaneously two mature tusked bulls emerged from opposite flanks of the herd. The younger of the two walked to several groups, sniffing and touching the members with his trunk, as if checking to see if all was well before settling at the edge of the forest

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Protected in Dhikala — the threatened sambar

fanning his great bulk with his ears. The older bull carrying a heavier set of tusks turned away from the herd and walked along the shore with an almost measured and meditative gait. He painted a majestic picture, his massive bulk silhouetted against the green forest with a backdrop of hills. An Elephant God giving us a rare audience. He re-entered the forest and was lost to sight. I had all but forgotten about the cheetal as I trained my binoculars on them once again. There were a lot more visible now, perhaps fifty or sixty of them. It was time now to go wildlife viewing on elephant back. Later we saw the same herd at the river at a distance of a hundred and fifty yards on elephant back. The healthy sign was that there were more young ones than I had seen earlier.

That day I turned in early. At around 1.00 a.m. I was awakened by noises coming from the bathroom. Only half-awake, I was too tired to get up and investigate. But periodically the noises continued, as if someone was moving about and fidgeting in the bathroom. By now I was fully awake and became a little apprehensive. Now there were two doors; one front door leading into the room and another door in the bathroom leading to the back of the building. As I lay there on my bed I could see

an outside wall of the building I was in, through the window. It was lit by moonlight. As I groped for my flashlight to go and investigate, a huge shadow passed by on the wall. I jumped out of bed and looked out of the window and saw an elephant standing near the building opposite. Thinking it was the Forest Department's elephant I went back to bed. A few minutes later I heard a crash, followed by shouts of men and a fire was lit. Again I sprang out of bed to look through the window and saw the elephant walk away in a south-easterly direction. I smiled to myself and fell back asleep. In the morning,

I found out that a wild elephant had entered the camp. The crash I heard was the elephant pushing in a kitchen door attracted by the smell of food. The noises coming from the bathroom were from the elephant standing right outside my bathroom door drinking from the open drain. He had also uprooted a signpost at the eastern entrance as he was chased off. Elephants are known to cause such destruction during the night in different parts of the park.

Next morning we started off on elephant back to look at wildlife. We took a southern route behind the complex. We saw three adults and a young elephant grazing in a *chaud* at the edge of the forest. As we continued, a tusker emerged from the forest directly ahead intersecting our approach and walking towards the other elephants. We stayed our course and came to a halt at a respectable distance. The tusker turned and faced us. He was not very large and one of his tusks was shortened and curved inwards. We edged forward and stopped again. After a long moment, the tusker suddenly lowered his head and mock-charged us. In an instant our mahout turned the elephant around and we made a run for it. The tusker did not pursue and we stopped after a few yards. I was amazed at the agility of our elephant



The gentle giant can be fatal when enraged

in turning her great bulk around. I learnt that the park mahouts well understood the danger from wild elephants. They were often charged and took no liberties while on excursions. There was an incident where a Forest Department elephant was gored in the eye by a wild elephant, blinding her. Later, on the same ride, we saw a large herd of elephants apparently in some state of agitation in a *chaud* west of the complex towards the reservoir. The mahout pointed out a tusker with a mean disposition amongst them who was known to almost always attack the park elephants.

That evening three park elephants set out towards a patch of jungle near water-hole #2 where a tigress with two cubs had taken up residence. As we rode along the track going south-west, we heard an alarm call. A short bark, followed by another. The mahouts were immediately animated. They stopped the elephants to listen for further signs, then converged together for a small whispered conference as to the best approach to try and track the tiger. After a quick consultation we spread out and faced the jungle. We entered the jungle first close to the water-hole. Immediately we were in a dense jungle patch of tall sal and sesham trees with impregnable undergrowth of lantana, creepers and weeds. The forest floor was covered with dead leaves, fallen branches and

tree trunks. Our elephant negotiated the undergrowth with relative ease as we helped push branches away. It is truly an experience to see an elephant move through a dense jungle. Nothing stands in its way, as it breaks small trees like twigs, breaks through a bundle of lantana, creepers and weeds with its bulk, climbs over fallen tree trunks, occasionally tearing at some leaves of branches of trees with its trunk for a delicious morsel. We were all very alert knowing that somewhere in this patch of jungle lurked a tiger, the probable cause of the alarm call which we had heard earlier. We could hear the other elephant to our right engaged in the same game. We searched every thicket in our path and were engaged in what the mahouts call a "rumble-tumble" to flush out the tiger. We could not see or hear the third elephant who had also entered the jungle at a further distance away. Suddenly our elephant got quite excited, her breathing quickened and she let out whiffs of air from her trunk. You could feel her tension. She had scented the tiger. The air became charged with excitement. The mahout shifted, goaded and manoeuvred to keep the elephant under control. A mistake now and the whole effort would be lost. Then he brought the elephant to a halt to listen. To our left a little ahead some birds fluttered.



The striking Oxford-and-Cambridge blue Indian roller is a friend of the farmer

Immediately he manoeuvred the elephant in that direction. The elephant let out a shriek. The tiger was close at hand. Just then we saw a flash of stripes as the tiger moved deeper into the jungle hidden by the undergrowth. For a moment we seemed to have lost him. Our elephant was still excited as she kept scenting him. As we emerged into a small clearing, right in front of us we saw the tiger enter into the ganja weeds. He looked back at us, then disappeared. Unseen to our eyes this time he turned right to circle around us and come up on our flank not realising that there was another elephant in pursuit. We continued on and we could still hear the other elephant and from time to time see her through small clearings. Then we heard her shriek twice. It was getting late as we started to retrace our steps back out of the jungle. We reached the track from where we had entered the jungle. We found the other elephant was already there with the mahout standing by her side. He was in the process of removing a stick embedded in her foot when we came upon them. Then he narrated to us that the tiger after being sighted by us had moved to our right and had gone in the opposite direction. The tiger was sitting under a thicket when they had come upon him. The elephant seeing the tiger had let out a shriek and charged. There was a small incline and in the

process she had fallen on her front knees right in front of the tiger when she let out another shriek. Luckily the tiger had not charged and instead had chosen to turn around and disappear. No one was thrown off or injured, but a stick was embedded in the elephant's foot. Soon the third elephant also joined us and they had not sighted the tiger. We returned to camp after a most exhilarating experience of tiger-tracking on elephant back.

Two days later on a morning excursion we came upon three adolescent bulls standing on high ground. The sun was barely up when we approached them quite close. They were extremely handsome as they stood looking at us curiously. Then they turned and ran off in the forest as if spooked by us.

At another time while roaming the river bed on elephant back, we were moving through tall grass viewing an elephant herd at the river. An adolescent male all of a sudden started running towards us at right angles, maybe fifty yards ahead. We saw him and stopped. He was totally unaware of us until he was directly in front of us in tall grass. He stopped and looked at us in surprise. He did not move as he stood there transfixed. This time our elephant mock-charged him. We had a good laugh as he ran away with his tail raised.



Sunset in the land of the Elephant Gods

One evening we saw a herd of elephants stampede on the river bed from west to east kicking up a huge cloud of dust. They were obviously spooked by something.

It was the last evening of my stay at Dhikala and as usual we were out to view wildlife. We had gone towards a patch of jungle called "Sher Bhogi". On our way back to the camp as we emerged from the jungle and came into a *chaud* we sighted a lone tusker in the thicket. We slowly came closer to him and stopped at a respectable distance. Seeing us, he stepped out of the thicket and stood in the clearing. We took photographs and then continued on our way. The tusker started moving parallel to us and then edged closer. As soon as we reached the jungle track he charged us. We immediately took off as he pursued us with mean intent. I was sitting at the rear of our elephant and the charging tusker painted a menacing picture as he came at a steady but fast pace swaying his head from side to side with ears pulled back. The shouts of our mahout, "Hhaat, Hhaat!" to deter him had absolutely no effect. He must have chased us for a good kilometre or so and as suddenly as he had attacked us, he stopped and turned right and entered the forest. We stopped to catch our breath. We turned to see where the tusker had gone and then realised that there

was a herd of elephants in the forest where the attacker had stopped. Unknown to us, he had probably attacked us to drive us away as we had gone in the direction of the herd. On the same track we saw another park elephant returning at quite a distance totally unaware that there was a tusker with a mean disposition lurking in their path. As luck would have it, the herd started to cross the jungle track and move out towards the *chaud*. This was seen by the mahout as they came to a stop to let the herd pass. In the meantime the tusker had moved deeper into the jungle and we were out of harm.

Elephants were once just visitors to the park but the hydroelectric dam at Kalagrah and the creation of the reservoir has changed the ecology of the area. The elephants are now residents of the park, their migratory routes cut off to the Sonanadi Sanctuary and other areas. Dhikala with its high biodiversity was an excellent area to view the elephant population of the park. I spent ten of the most exciting days viewing the gentle giants and other wildlife. Each day a different drama was enacted on our excursions, though the actors and the stage were the same. A land of the Elephant Gods! □

Farokh Nanavaty, a BNHS member, is involved in ecotourism. He wrote this article on a visit to India from New York where he resides.

NATURE ALIVE



DEEPAK APTE

The spotted forest gecko Cyrtodactylus collegalensis — a rare find

Until recently, this spotted ground dweller was known to occur in the forests of the Western Ghats from Kerala to Karnataka. Then last March, BNHS scientist Aloysius G. Sekar, and his field assistant Vithoba Hegde came across this gecko in Sanjay Gandhi National Park, Bombay, when they were searching for frogs in the night. This finding established the range extension of this gecko north up to Maharashtra. Not much else is known about this nocturnal gecko.

Then again, Vijay Awasare, a reptile enthusiast who looks after the security of the BNHS land at Goregaon, next to the Sanjay Gandhi National Park, stumbled upon this gecko curled up under a rock. Further search yielded 12 more geckos under different rocks within a radius of about 6 metres. The rocks were replaced in their original position without disturbing the geckos. Next day, however, all these lizards had abandoned their diurnal hide-outs — a shrewd survival strategy. This picture was taken of one of these geckos at Goregaon.

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**PADMA VIBHUSHAN DR. SALIM ALI
BIRTH CENTENARY YEAR
NOVEMBER 1995-1996**

The Birth Centenary year of the late Padma Vibhushan, Dr. Salim Ali, ex-President of the Bombay Natural History Society will be celebrated with a variety of programmes in which the participation of his friends, admirers, well wishers and the general public is invited. The following are some of the programmes contemplated:

Salim Ali International Awards for outstanding work in Field Ornithology/Nature Conservation.

Salim Ali Young Scientist Award for outstanding research work in the field of Natural History, Conservation Biology or Restoration Ecology.

Salim Ali Memorial Lecture by an eminent person in the field of Natural History and Nature Conservation from India or abroad.

Salim Ali Memorial International Seminar on Ornithology and Nature Conservation on issues related to nature conservation.

Dedication of the BNHS Conservation Education Centre at Goregaon, which is an outcome of the vision of the late Dr. Salim Ali. The Centre will be dedicated to the nation in his memory on 12-11-1995.

Release of Commemorative Stamp on Dr. Salim Ali during the Centenary Year.

Exhibitions at Bombay and other places on Natural History and Wildlife on coins, Ornithological Surveys by Dr. Salim Ali, History of the BNHS, Wildlife and Nature paintings.

Other activities include Workshops, symposia, regional meetings of NGOs, publication of revised and enlarged edition of the **Book of Indian Birds** by Dr. Salim Ali, special issue of the **BNHS Journal** and **Hornbill**, release of **Bird Call Cassettes**, fund raising to augment the Dr. Salim Ali Memorial Fund to perpetuate the work done by him and by the BNHS for the study and conservation of nature.

We invite you to participate and help to make the celebration a success.

For details contact the Director, Bombay Natural History Society, Hornbill House,
Dr. Salim Ali Chowk, Shaheed Bhagat Singh Marg, Bombay 400 023.

Ph: 2843421, 2843869. Fax: (91-22) 2837615.