

Hornbill



October-December, 2000

about nature and us



BOMBAY NATURAL HISTORY SOCIETY

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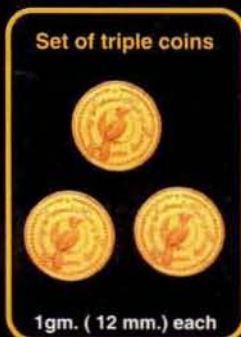
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HORNBILL

October-December, 2000



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IN THIS ISSUE



4. Wintering in an Oil Refinery

TEXT AND PHOTOGRAPHS: DR. VIBHU PRAKASH

Development has almost always been at the cost of the environment. However, man, his machines and wildlife can coexist.

26. A Midnight Rendezvous

TEXT: V. SHUBHALAXMI; PHOTOGRAPHS: ISAAC KEHIMKAR

They are the fastest flying and most handsome moths in the world. Meet hawkmoths, one of the lesser known, yet widely distributed members of the insect world.

Other Features...

- 9. Bird Watcher
- 12. Miscellanea
- 14. Butterflies — their early stages
- 18. Seashore Lore
- 22. The Young Naturalist
- 24. Response
- 30. News Notes
- 32. News Briefs

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A BIRD IN THE HAND

ALEXANDRINE
PARAKEET

RED MUNIA

India has had a blanket ban on trade in wild birds since 1991. The trade goes on merrily and according to a report by Traffic India of WWF, in 1997, over 65,000 birds of about 250 species, which included over 16,000 roseringed parakeets, 11,000 blackheaded munias, 6,000+ red munias, 4,000+ Alexandrine parakeets, 2,000+ blossom headed parakeets, 1,000 green munias and over 400 hill mynas. These were traded through 57 establishments in 36 cities of north India. Birds are caught for keeping as pets, food, sport, medicine, black magic and even for release to obtain relief against one's sins! The fact is that trapping and smuggling of birds has not been contained and is unlikely to be, considering the number of people who make a living out of it. The trappers have to be identified and alternate employment found for them. The BNHS, in its bird migration studies, uses trappers from different parts of the country and we have been impressed by the knowledge that they have of the species they trap. The Mirshikars of Bihar are particularly noteworthy. Ali Hussain, for instance, who has been working with the Society for the last three decades, can, from seeing the droppings of birds on the shore, predict with commendable accuracy the species he expects to trap in the night.

Ali Hussain, after working with the Society can identify in the dark, by touch only, the species in his collection basket before taking it out, and give its scientific name as well! There are similar talented trappers whose knowledge is being lost. It is now necessary to record this storehouse of information that trappers have on the behaviour and food habits of birds. Money is not made by the trappers, but by the traders who have to be suppressed. The Government of India has Regional Offices of the Ministry of Environment and Forests, who work with the Customs and State Forest Departments, confiscating illegal consignments of birds. The tragedy is that, once a consignment is confiscated, it invariably means death to the fledglings which have to be hand fed. Adult birds are haphazardly released in areas not within their natural distribution. What is urgently required is the establishment of rehabilitation centres where the fledglings and adults can be looked after by persons who know the art of rearing birds. This could be one source of alternate employment for trappers. As of today, any confiscated fledgling has no future.

J.C. DANIEL



HILL MYNA



GREEN MUNIA

Wintering in an Oil Refinery



Mazes of overhead pipes, 70 m tall chimneys, massive boilers and huge cooling towers enconsed the unexpected... a busy sanctuary for waterbirds in a polishing pond, thousands of wintering wild ducks and much more!

Text and photographs: Vibhu Prakash

Dr. Vibhu Prakash, a Principal Scientist at the BNHS, is presently working on the Birds of Prey

It was with mixed feelings that I read a letter from Mr. M.C. Dutta, Senior Technical Services Manager, Mathura Refinery, inviting the Bombay Natural History Society to carry out a bird survey, in their ecological park. I was aware of several ecological parks developed by industries with landscaped lawns and manicured flower beds lining the sides. A small fountain, a number of fast growing trees planted in a grove; each with a plate declaring the name of the high and mighty who had obligingly planted the tree, to improve the environment of the industry. A survey of these parks means marveling at the sight of a parakeet, myna or pigeon, or jumping with joy to see a peacock, with a bright engineer of the industry telling you how they are making the environment bird-friendly by efficient effluent water treatment, and tree plantation. Not a very exciting proposition

for BNHS biologists, who birdwatch in some of the best forested areas in the country! Yet, I immediately dispatched a letter to Mr. Dutta indicating our date of arrival and consultancy charges. The advantage of consultancy is that one can experience the luxuries of life: a cushioned bed, wall to wall carpeting, an air-conditioned room, an attached toilet with running water, a wash basin, a dining room with a bar attached, in sharp contrast to a sleeping bag on Mother Nature's lap, a running stream for 'running' water, Ramu's hotel for dining, with cats, dogs and mynas for company.

A tough talking cop of the Central Industrial Security Force, posted at the entrance of the Mathura Refinery, started opening my rucksack, demanding to know whether I was carrying a camera. My affirmation lit up his face, and he began a frantic search for some more incriminating stuff, which I might be trying to smuggle into this high security, public sector oil refinery. All he found was a shoulder support (easily mistaken for a sten-gun) a telephoto lens and a telescope — my equipment for the bird survey. Ignoring my explanation, he caught hold of my bag and ordered me to get off the jeep and see his boss, muttering all the way — “This fellow wants to survey birds, in an oil refinery!” The amiable Deputy Manager, Mr. Anoop Prakash Biswas, soon came to my rescue. He explained to the cop in-charge, the purpose of my visit, while I tried to

regain my composure and look like an expert. We were asked to get down from the jeep, walk through a gate with a metal detector installed and get back into the jeep. Again, we were asked to deposit our match boxes, lighters, and electronic items at the gate.

After this rather thorough security check, Mr. Biswas, who was to be our escort, asked the driver to take us to the ecological park. We drove



Beyond the manicured lawns, lay a busy sanctuary of waterbirds



Migratory waterfowl inhabited the water channels lined with innumerable trees

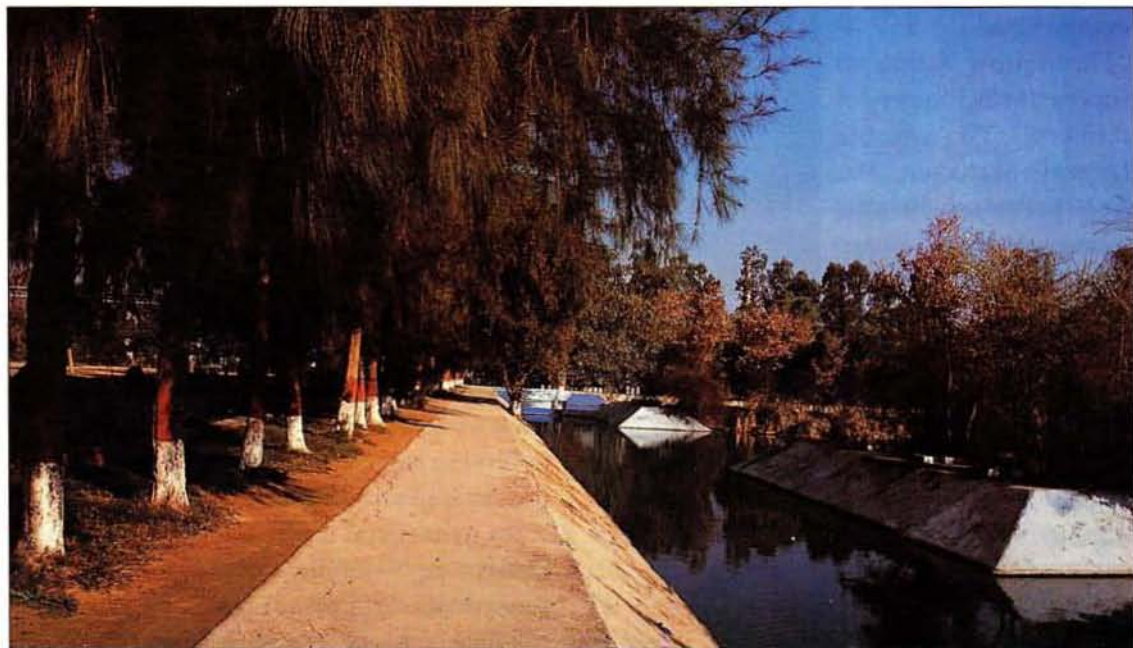
through a maze of overhead pipes, 70 metre tall chimneys, massive boilers, and huge cooling towers in a large, well-laid out area. Mr. Biswas, a chemical engineer, well versed with the functioning of the refinery, had the statistics at his finger tips. He kept explaining the functions of the various plants as we went past, finally pulling up at the polishing pond, the last stage in effluent treatment. Here I heard a constant, high decibel noise, as if

Wintering in an Oil Refinery

steam was escaping from a huge pressure cooker. I began wondering if we had landed at the wrong place. According to Mr. M.C. Dutta, thousands of wintering ducks could be sighted in this area, but to me, this place looked like anything but a duck habitat.

The entrance to the ecological park was just as I had expected, a typical formal park with lawns and flower beds, but ten metres or so ahead, there appeared a different world in front of our eyes. Mr. Dutta was right. There was a busy sanctuary of waterbirds in the polishing pond! All the avian inhabitants of a good wetland were in sight: the swishing of ducks landing and taking off, lazing on the mounds, pochards and coots diving into the water, colourful male shovellers floating and sleeping with their heads tucked back and whistling teals, with their 'hunch back' flight and constant whistling, landing in the water. Dabchicks circled around each other in courtship display, making high pitched and long drawn laughing calls. The gadwals and shovellers were the most common and were often seen with pintails, feeding upside down in water. There was a sprinkling of all the

other duck species, which are seen in a good wetland in a north Indian winter, like common teals, garganey teals, wigeons and even diving ducks like the tufted pochards, ferruginous ducks and red crested pochards. The beautiful resident spotbill ducks with their attractive tricoloured beaks and flashing white on the wings were also all over the place. A lone nakta (comb duck) had also come to see this new high security bird sanctuary. A few coots with white frontal shields were seen in the company of their local cousin, the Indian moorhen. The bright purple moorhens were busy uprooting the sedges, with their red bills, like true nature's gardeners, pruning the vegetation. The atmosphere was a typical bird refuge. Trees of neem, prosopis, Australian acacia, and subabul lining the water channels, with a few grey herons nesting and hundreds of night herons all over the place. There were darters, large cormorants, shags and little cormorants perched on the trees, drying their wings. A few pond herons also lurked in the grass. Some shags and cormorants were fishing in the water. This is perhaps the best place to see shags in winter. The kingfisher, as usual, would break



The polishing pond, an abode for thousands of wintering birds, had all the inhabitants of a good wetland



Three spotted owlets unmindful of experts and their cameras

the halcyon with its strident intermittent call. We noticed a few sandpipers, characteristically bobbing along the shores. The white, grey and yellow wagtails were flitting around the pond, as well as over the lawns. The birds were going about their chores, unmindful of our presence about 50 m away, as if aware of the 'Z-category' security provided by the refinery. There was a definite increase in the numbers of birds towards the evening, as large flocks descended to roost in safety. On this cold winter evening, in early February, there must have been about five thousand waterbirds in the Sanctuary.

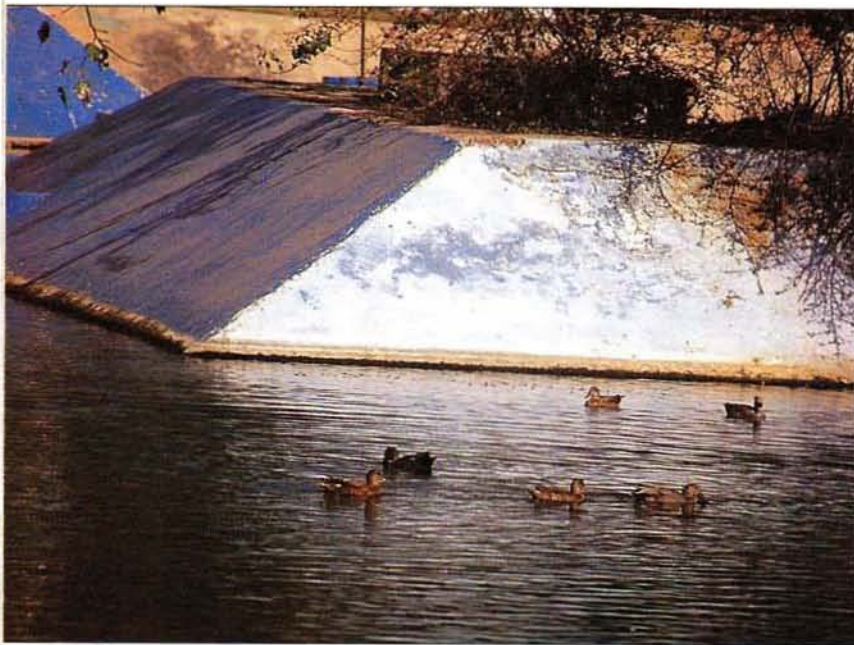
The pond being totally protected by barbed wire and with an assured water regime, has become an important wildfowl refuge in the region. The 1,500 sq. m polishing pond gets water from the many-tiered, modern effluent treatment plant of the refinery before finally being released outside for irrigation. The flow of water is regulated by sluice gates.

All the five bunds which divide the lakes have a luxuriant growth of khus *Vetiveria* and elephant

grass (*Pennisetum purpureum*). A few species of moderately sized trees, like the neem (*Azadirachta indica*), prosopis (*Prosopis chilensis*), sheesham (*Dalbergia sissoo*), peepul (*Ficus religiosa*), and subabul (*Leucaena leucocephala*) have been planted on the bunds; thick submerged vegetation can also be seen.

The Park was an amazing sight, a living example of peaceful coexistence of man, machine and wildlife. Wild ducks wintering in an operational modern refinery! It was unbelievable. But was it the attractive environment, or the lack of wetlands in the surrounding areas that had resulted in this unusual site? Strict protection and sufficient space for resting and roosting, and probably foraging, may account for the birds' preference for this place. The habitat at Sur Sagar Bird Sanctuary, 26 km from the refinery, is now degraded, with its huge lake choked with aquatic vegetation, leaving no space for birds to land and feed. That might also be another reason for this change.

The Mathura refinery has created one of the



The fairly tame birds would be seen close to the main channels, unmindful of the people walking around

finest places to watch ducks unhindered for hours. Mr. Dutta was of the opinion that the birds have been coming here definitely since 1984, and a strict watch is kept on the water quality. Various parameters like the levels of sulphide, phenol, biological oxygen demand, pH (hydrogen ion concentration), and total solid suspension are constantly monitored, and held much below danger level. The presence of aquatic flora and fauna itself is an indicator of good water quality.

The managers of the refinery now have the onerous, but pleasant responsibility of looking after their national and international feathered guests, and should remain extra vigilant about the levels of various pollutants, especially sulphides, in the water. The birds in the pond are at their mercy. A malfunctioning effluent treatment plant can play havoc with the birds. The management must ensure that problems, if any, are first detected by their sophisticated instruments and not by the sight of dead fish or birds.

All inland wetlands, especially man-made ones, need to be managed to make them attractive to wildlife. The habitat, food availability and water

quality should be regularly monitored to maintain or increase the current number of birds. A number of trees have been planted on the bunds and around the polishing pond and other parts of the ecological park, but most of them are exotics like eucalyptus, subabul, and casuarina (*Casuarina equisetifolia*). It would be better if trees native to this region like babul (*Acacia nilotica*), kadam (*Anthocephalus sinensis*), sheeshum, peepul and other ficus spp., and pilu (*Salvadora persica*) were planted, which attract birds, as they provide food and excellent natural nesting habitats.

Most of the wetlands in the country are under tremendous human pressure. We are losing them to agriculture and also to various other disturbances. Consequently, very little habitat remains for wetland birds. Habitats like the polishing pond in the refinery, which are totally free from human disturbance and the threat of encroachment, may become critical for the survival of many species. Birds take to man-made wetlands very easily, and are seen in very good numbers at reservoirs and barrages. They do not appear to be uncomfortable in noisy areas, unless the noise is loud, booming and staccato.

The Government should make it mandatory for all industries to develop habitats for birds with treated effluent water. This may ensure that the effluent water is indeed being treated and the good certificate has not been obtained by the greasing of palms. Periodic visits by the staff of the industry to this nature park will refresh them, increasing their work efficiency. And all this within a few paces from the work place. Any takers for this dual benefit scheme? 🐦

REMEMBER EXTINCTION IS FOREVER!

Supriya Jhunjhunwala

BIRDS are beautiful and fascinating creatures. They have managed to reach, flourish and breed in some of the coldest, hottest, driest, and highest of places that human beings have reached only in recent times. Places where we can survive, if at all, only with the help of artificial support systems. Despite their remarkable abilities and adaptations for survival, one in eight species of the world's and 78 species of India's 1,200 odd species are at a real risk of global extinction.

Although extinction like evolution is a natural phenomenon, species extinction is no longer an isolated natural event, but the result of major human-induced changes in the world's ecosystems. Fossil records indicate that globally, we might expect one bird species to die every 100 years. One hundred and twenty-eight bird species have been documented as becoming extinct over the last 100 years, with 103 of these since 1800. One hundred and eighty-two species of birds worldwide are listed as critical by the International Union for the Conservation of Nature (IUCN) in its Red Lists, which means that they are at a risk of becoming extinct in the next 10 years or in three generations. Unless urgent action is taken, the current rate of extinction (which is 50 times greater than the background natural rates), is predicted to rise 500 times more in the next 100 years.

Of the 78 species threatened with extinction in India, 7 are listed as critical. Amongst these, the pink-headed duck *Rhodonessa caryophyllacea* is probably extinct, since scientists have found no evidence of its survival despite various field expeditions. Studies are underway on the forest owlet *Athene blewitti*, which was rediscovered after

117 years and the Jerdon's courser *Rhinoptilus bitorquatus*, which was rediscovered after 86 years by the Bombay Natural History Society (BNHS) scientists. These along with the Himalayan quail *Ophrysia superciliosa* are restricted range species i.e. they have historically had a breeding range of less than 50,000 sq. km globally and are endemic to India. The number of Siberian cranes *Grus leucogeranus* that visit their wintering grounds in India are rapidly declining. Attempts have been made by the BNHS, with the help of the International Crane Foundation, to reintroduce Siberian cranes. The white-rumped vulture *Gyps bengalensis* and the long-billed vulture *Gyps indicus*, have been recently 'upgraded' because they have suffered an extremely rapid population decline, probably as a result



PINKHEADED DUCK

of some viral disease, resulting in a revised critical listing for both. Both species had been previously listed as 'least concern' and 'near threatened' in 1994. The BNHS has initiated a world-wide effort to identify and remedy this decline.

Alarm bells

The other 71 species are also declining and many others are in queue. The bird extinction rate continues to rise alarmingly and rapidly. Habitat loss is one of the major causes for extinction. Ninety-nine percent of globally threatened species

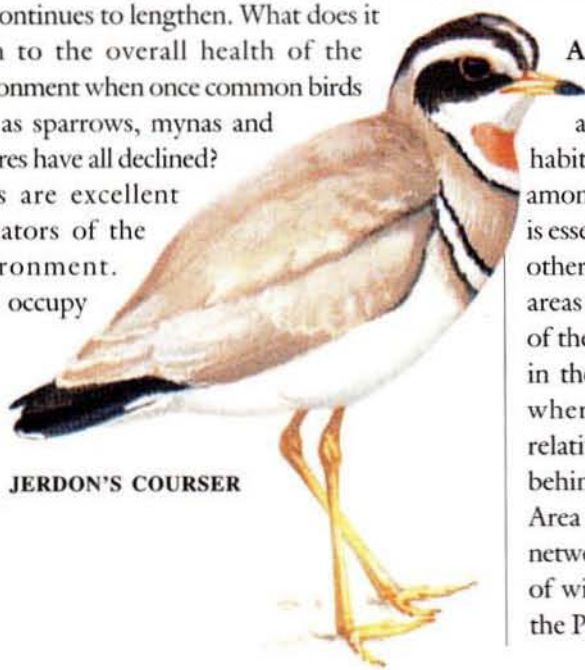
are at risk from human activities such as agriculture, logging, hunting, trapping and industry. In India, birds have the additional pressure of traditionally being trapped as pets or for the pot. Various bird parts are used for their alleged medicinal values assigned by the local medicine men — the Indian equivalent of witch doctors. They are also used in black magic and to ward off evil spirits. This has led to a flourishing trade of live birds in India. About 250 species of wild-caught birds have been recorded in north India. Trade Records Analysis of Flora and Fauna in Commerce (TRAFFIC India), a joint programme of the World Wide Fund for Nature (WWF) and IUCN, is conducting research and initiating action to save these birds.

Does this mean that we are next?

The rising numbers of birds that are threatened with extinction world-wide is a clear indication of the unfolding global environmental crisis, caused mainly by human activities, whose victims will ultimately be humans themselves, while remaining blissfully ignorant of the impending doom, or turning a blind eye to self inflicted disaster. The list of declining species is worrying and continues to lengthen. What does it mean to the overall health of the environment when once common birds such as sparrows, mynas and vultures have all declined?

Birds are excellent indicators of the environment.

They occupy



JERDON'S COURSER

habitats that are at the top of the food chain, so much so that a bird's well-being reflects that of the animals and plants right across the country. If bird numbers fall, then the rest of the biodiversity is suffering too. In groups other than birds the situation is equally grim. The recently published IUCN 2000 Global Red List, lists 24% mammals, 27% reptiles and 30% fishes of the world as globally threatened.

Research to Save Birds

Although birds are documented better than any group of animals or plants, we still know comparatively little about many threatened species. For most, we still require baseline surveys to map their distributions, estimate population sizes or identify areas that need to be protected. Such data are needed in order to prioritise highly risked species from extinction and identify the key factors endangering them. Several institutions in India like the BNHS, Salim Ali Center for Ornithology and Natural History (SACON) and Wildlife Institute of India (WII) are conducting research on wild birds and their habitats. Research is only the first step towards saving them. Effective solutions also require effective action.

Action for species, sites and habitats

Threatened species can be saved by actions taken to address specific threats, like habitat loss, poaching and invasive exotic species among others. To save birds and other wildlife, it is essential to save their habitats and try to mitigate other factors that threaten their existence. The areas where threatened birds live represent some of the most damaged and precarious ecosystems in the world. Protection of particular localities where threatened species occur presents a relatively cost-effective method. This is the ethos behind BirdLife International's, Important Bird Area (IBA) programme which is identifying a network of sites essential for the long term survival of wild birds. Funded by the Royal Society for the Protection of Birds (RSPB), the programme

is coordinated by the BNHS in India. The programme also focuses on the conservation of wild birds that are more common.

Shaping public policies.

For conservation action to be effective it is essential that appropriate international and national legislation and policies are reformed and new ones introduced. Knowledge and information about threatened species helps shape global, regional and national conventions, like the one on the regulation of trade under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Such information can also effectively influence policies and agreements such as those on forests, energy use, tourism pollution, wildlife trade and National Biodiversity Strategies and Action Plans (NBSAP) that are being shaped.

Conservation as an investment

Species extinction is also the indication and result of major human-induced changes in the world's ecosystems that provide vital services such as maintaining global climate patterns, mediating the carbon cycle, safeguarding watersheds and stabilising soils. These services are valued at approximately 1,386 trillion rupees per year and are invaluable, and needs to be maintained. A key part of the solution is to increase the human and financial resources invested in conservation in order to safeguard birds and ecosystems. Governments have to increase their conservation investment budgets many fold the current levels, to do any justice to mitigate the current extinction crisis. Turning the tide of extinction certainly needs herculean efforts which to succeed have to be shared amongst the world's governments, businesses, Non Governmental Organisations and citizens.

When any species becomes extinct, it is a sign that we are paying too high a price for economic growth, a price on which the returns are likely to be much too small, short term and



"It is vital that we should not simply accept these things as inevitable but that we should mobilize our energies in defence of the living.

If we can manage to shorten the 'Red Lists' of species in danger then there will be hope for the future for us, as well as for the wild creatures with which we share this planet."

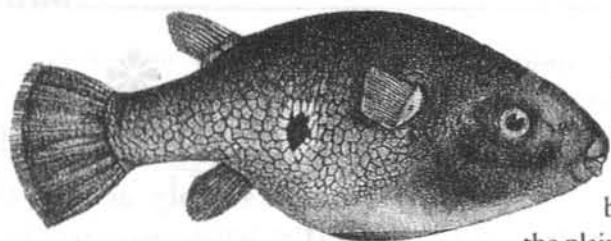
— SAVE THE BIRDS
ICBP 1989



eventually, almost certainly, non-existent. We are destroying our beautiful planet, in the name of development, without anticipating the consequences that we will ultimately face in our blindfolded rush to catch up with the so called developed countries. We brush aside the species with which we share it, gradually turning the earth into a wasteland where all the natural life support systems that humans and all species depend on will wither and die along with the habitats. Instead, we should learn from the mistakes that have already been made and act now to ensure a better future for generations. Remember, extinction is forever. ☹️

Supriya Jhunjhunwala is the Important Bird Areas Ornithology Officer at the BNHS.

Paintings: Carl D'Silva © BNHS



Tetrodon cutcutia (Ham.)

Rain of fish in Shillong, Meghalaya

FOLLOWING a severe hailstorm and heavy rains on 10 April, 1971, one of us (SJS) saw at about 1300 hrs, a whitish object, resembling a tennis ball, fall from the sky with a thud into the open courtyard. On closer inspection it was found to be a fish in a highly inflated condition. The fish was preserved and was later identified as the freshwater globe fish, *Tetrodon cutcutia* (Ham.). Although dead, it was in a very fresh condition and did not have any marks of injury. It measured 106 mm in length, 75 mm in width and had a displacement volume of 160 ml.

Tetrodon cutcutia does not occur in the Khasi-Jaintia hills of Meghalaya. This rules out the possibility of the fish having been dropped by a bird in flight. It could only have fallen from the sky with the rain and such instances of rain of fishes, although rare, are on record.

Various reasons are attributed for the phenomenon. The most tenable explanation is that it is brought about by the action of high winds, whirlwinds and water-spouts. The presence, sometimes, of fishes that normally live in mud is indicative of the force with which the water is sucked up from the water-spout.

The available records show that all rains of fishes have occurred in plains or places with a low elevation. Thus, the present rain of the globe fish at Shillong with an altitude of about 1,524 m is of considerable interest. It is also significant that

Tetrodon cutcutia does not occur in the hills of Khasi-Jaintia, but is known from the neighbouring plains only. We are inclined to believe the fish was lifted up from the plains of East Bengal and deposited at Shillong through the agency of the prevailing winds. The fact that the Meteorological wing of the Military Airport at Shillong recorded a strong wind with a velocity of 25 to 30 knots on the forenoon of 10 April, from a southwesterly direction, lends support to this. Standing at the border town of Mawblang (Cherrapunjee) one can well understand how this could have happened. The plains of East Bengal are visible down below to the south, stretching as far as the eye could see. The steep incline of the hills here would lift up the winds blowing from East Bengal almost vertically to great heights. One of us (RSP), who on that day happened to be near Dudhnai (c. 150 km west of Shillong) in the plains district of Garo hills on a collection tour, experienced a very strong gale and was compelled to take shelter under a bridge. The wind came from the southwest.

Had the fish been floating in the puffed state in which it was picked up, it would have been very easily lifted up by a strong wind or whirlwind. If, on the other hand, it were swimming normally, the formation of a water-spout alone would have explained its transport. The aerial mode of transport would naturally have agitated the fish, resulting in its inflated condition.

Most of the rain of fishes have occurred during the monsoon months, July to September, although there have been exceptionally heavy fall of fishes at Dacca in February, 1830 and Fatehpur in May, 1834. The general belief that the fishes come down usually in the middle of the day with a final heavy shower appears to be true.

R.S. PILLAI

S.J.S. HATTAR

Eastern Regional Station,

Zoological Survey of India, Shillong.

August 23, 1971.

The food of dragonflies

I HAVE on many occasions seen, in New Zealand, dragonflies catch cicadas. The cicadas were generally caught when on the wing though sometimes when on the trees. These insects (cicadas) are very common in the *ti-tree* scrub and especially so near water. They are one to one and a half inches long.

The dragonflies appeared to hold the cicadas between the two front pairs of legs and were able to continue their flight with the cicadas, though the latter appeared to be a great deal heavier than the dragonflies.

On 12th October, 1910, while shooting in the Lissoo Nallah, Naoboog district, Kashmir, I watched with interest a dragonfly try to catch

what appeared to be a small mayfly about half an inch long. I got a good view as the sun was setting, the insects almost between me and the sun, with a dark background of cedars.

The dragonfly swooped down like a king crow on a moth, missed, turned and tried again.

This was done five or six times and every time at the same mayfly, though three mayflies were within three or four inches of each other.

The dragonfly eventually gave up the chase.

H. FULTON

Major, 2nd K.E.O., Gorkhas
Dehra Dun.

November 3, 1910.

Strange behaviour of certain birds when in possession of strong smelling insects

DURING THE last few years I have repeatedly noticed that certain birds, notably babblers, in confinement, go through extraordinary antics when presented with strong smelling insects, e.g. bugs (Hemiptera), which when irritated emit a powerfully smelling secretion, in self-defence.

If, for instance, a bug of the above kind be offered to a laughing thrush (I have experimented with *Trochalopteron erythrocephalum* and *T. nigrimentum*, also *Dryonastes caerulatus*), it will seize it in its beak and make repeated efforts to press it against the underside of its tail feathers, near their base.

In order to do this, it is obliged to bend round its head and to bring its tail forward.

This it does with considerable energy, so much so that I have seen the bird lose its balance and fall over, quite a ludicrous performance.

After this has been going on for a minute or so, the bird gradually relaxes its efforts and eventually swallows the insect.

The above described behaviour is not, however, I believe confined to the laughing thrushes. I am almost certain, I observed it also in the case of the Andamanese tree-pie (*Dendrocitta baylei*) in the Andamans.

The habit is, therefore, evidently a widespread one, the origin and meaning of which however, I am quite at a loss to explain. It would be interesting to know if others have observed this strange habit, and also in the case of what kinds, and also if they can suggest a reason for such behaviour.

B.B. OSMASTON

Naini Tal.
June 1909.

Butterflies — their early stages

Text: Naresh Chaturvedi and Isaac Kehimkar

Photographs: Isaac Kehimkar

Common Blue Bottle *Graphium sarpedon*

This butterfly is probably one of the fastest fliers among the swallowtails. A restless flier, it is often seen hovering from flower to flower. Confined to wetter and heavily forested regions, it prefers open sunny places and avoids undergrowth. A large congregation of males can be seen on damp patches. It occurs in south India up to West Bengal and from Uttar Pradesh in the north to the northeastern region.

Larval foodplants: Eggs are laid on plants belonging to the Laurel family (Lauraceae) like the Cinnamon (*Cinnamomum* spp.), *Machilus* spp., *Alseodaphne* sp. and *Litsea* sp.

Egg: A single, spherical, pale green egg is laid at a time, as the female hovers over tender growing shoots and young leaves of the larva's food-plant.

Larva: The full-grown larva is green above with three short spines on each side of its upper back and a pair at the rear end. The underside is lighter. Generally sluggish, the larva moves with jerky movements. It prefers to rest on the upper surface, in the middle of the leaf, on which it has woven a silken layer. When fully grown, the caterpillar pupates on a branch or leaf.

Pupa: The pupa is light green with a prominent horn on its back. The horn is straight and more pointed than in the pupae of other related species. The butterfly emerges in two about weeks.

Common Yellow Swallowtail *Papilio machaon*

Widely distributed in Europe and Asia, this swallowtail occurs all along the Himalaya from Kashmir to Arunachal Pradesh. It is fond of flowers and often flutters while feeding. Its flight is rather slow. Both sexes look similar, the female is larger and the male is easily distinguished by the presence of prominent claspers at the tip of the abdomen. The width of the black bands, helps identify the different races.

Larval foodplants: Eggs are laid on plants belonging to the Coriander family (Umbelliferae) like the wild carrot *Daucus* spp., fennel *Foeniculum vulgare*, *Heracleum* sp. and other species of the same family.

Egg: A single egg is laid on young shoots or flowers of the foodplant. The freshly laid, spherical, yellow egg, develops brownish-red markings as it nears hatching.

Larva: During the first three instars, the larva is black with several tubercles and a white band, closely resembling a bird dropping. The colour changes to become more pronounced with each moult. The full-grown larva is green with a black band on each segment. The osmeterium is bright orange in colour.

Pupa: The pupa varies from a greenish-yellow to pale greyish-brown, depending on the area of pupation. The butterfly emerges in two to three weeks. The pupae are known to overwinter till favourable climate prevails.

Blue Bottle



Yellow Swallowtail



CATERPILLARS



PUPAE



ADULTS

Glimpses of Indian Birdlife

Photographs: P.M. Lad



Waiting for my lady

A popular cage-bird, the red munia *Amandava amandava* is found throughout the country in wet grasslands and reedy marshes. The male above in breeding plumage, utters a low, continuous, twittering song.



Noisy pirates

Whitebellied drongos *Dicrurus caerulescens* are noisy residents of deciduous or bamboo forests. They normally form groups of two or three and feed on nectar, insects or occasionally on small birds, apart from pirating food from unsuspecting birds.



Singing a sweet melody

A shy bird, the orange-headed ground thrush *Zosterops citrina* feeds on the ground in dense undergrowth. This species has a loud sweet call and cleverly imitates other bird calls.



Feathered friend

The mottled wood owl *Strix ocellata* is a friend of the farmer, as it destroys rodent pests. The plumage closely resembles the bark of a tree, making it almost indiscernible in its surroundings. Its call is a quavering whaa-aa-aa-ah.



A grub in the beak is worth two in the ground!

The Indian pitta *Pitta brachyura* is a brightly coloured, stub-tailed, monsoon migrant from the Himalayan foothills and northeast India. It has a conspicuous white spot near the wing-tip, exhibited during flight. Pittas search among dead leaves and dig into the damp earth for grubs and worms.

Blue diamond

Blacknaped blue flycatchers *Hypothymis azurea* flit through the middle or lower strata of vegetation, diving around in the air for insects. They are often found in the company of other insectivorous birds.

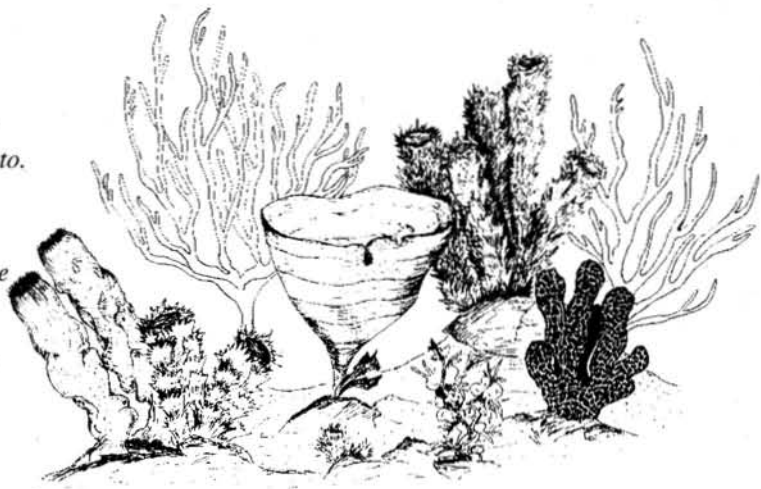


Seashore Lore

38. The living sieve

*There was a fence with spaces you
Could look through if you wanted to.
An architect who saw this thing
Stood there one summer evening,
Took out the spaces with great care
And built a castle in the air.*

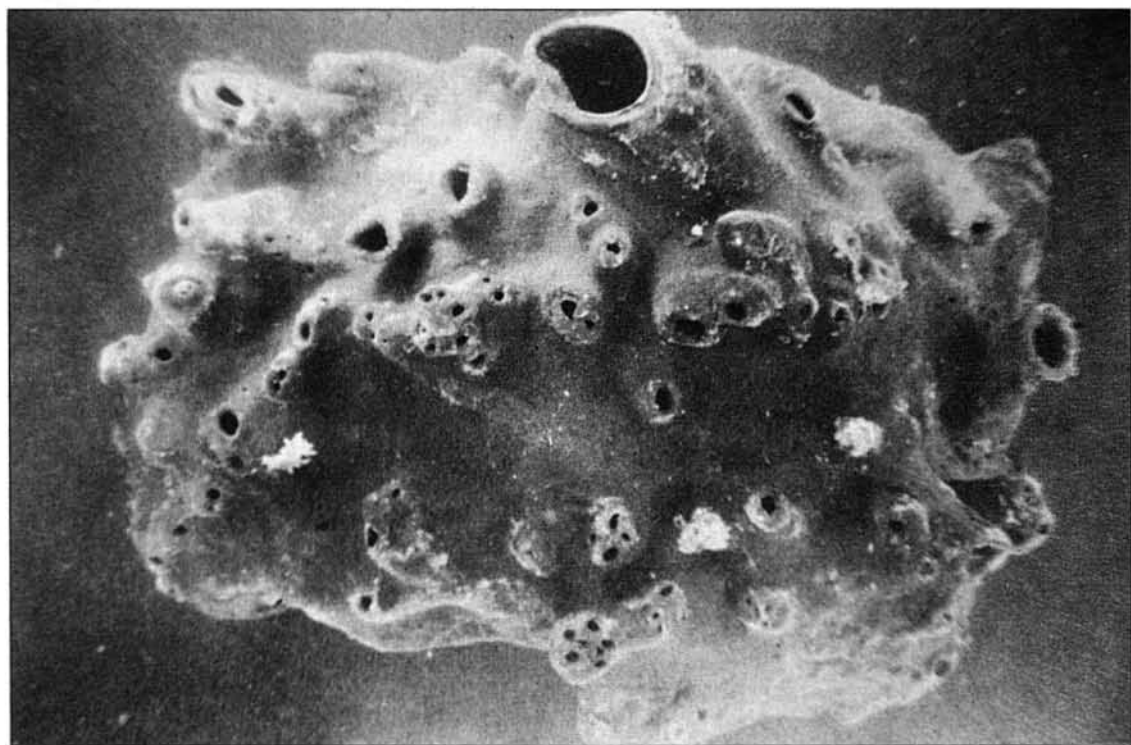
Christian Morgenstern



Beefsea

In general, we have a tendency to be interested in things that move, and overlook sessile (immobile) life. On the other hand, sessile animals do not try to run away and hide, so that you can

devote as much time and attention to them as your patience lasts. Sponges fall into this category. Until the nineteenth century, they were confused with plants and later, with coelenterates such as sea



An encrusting sponge (*Spheciospongia*) shows the numerous holes from which sea water flows

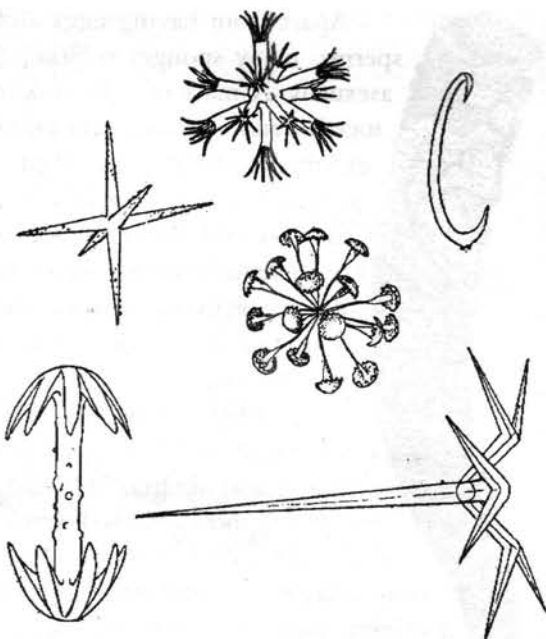
anemones, both being called zoophytes (plant-animals). They are the most primitive animals visible to the naked eye, and their body is built up of many cells. But they do not have body organs such as brain, stomach or a mouth.

Sponges are predominantly marine, except for a small family found in lakes and ponds. They grow by spreading and branching in a plant-like manner. Some sponges may have the shape of a cylinder or vase, but most grow as irregular encrustations on rocks, or as flat, rounded or branching structures. There is no particular shape except in the vase-like forms, as the animals mould into the shape of the substratum, also being modified by wave action and water currents. If the water is turbulent they form an encrusting layer on the substratum, but in calm water they may form finger-like or shrub-like erect branches which may sometimes be a metre high or round.

The hollow body is stiff due to many needle-like spicules made of silica, lime (calcium carbonate) or fibres made of a substance called spongin. The body wall is pierced by many small pores called ostia, and fewer larger openings called oscula. The inside of the hollow body is lined by collar cells, which have a whip-like flagellum. The beating of these collar cells creates an incoming water current from the ostia, via a complex system of canals and chambers, bringing with it oxygen and minute food particles. After absorbing oxygen (for breathing) and food, the water is passed out through the large osculum.

Sponges are mostly drab in appearance, but yellow, orange, red or even blue, violet and black can be seen occasionally. They seem to be disagreeable in taste and smell, hence they are usually shunned as food items. However, dorid nudibranchs (sea slugs) feed on them. The boring sponges (*Cliona*) bore into corals, clams and barnacles. A coral head one metre high, after being attacked by *Cliona* can crumble to coral sand in a century.

As sponges are very low in the ladder of evolution, their powers of regeneration are high.



These spicules show only a few of the pretty and intricate shapes designed by Mother Nature

Even if broken up and passed through a fine meshed cloth, the individual cells clump together and then rearrange themselves to form a new sponge.



This sponge shows the many tiny holes (ostia) and five larger oscula through which water, bringing life-giving oxygen and food, flows in and out

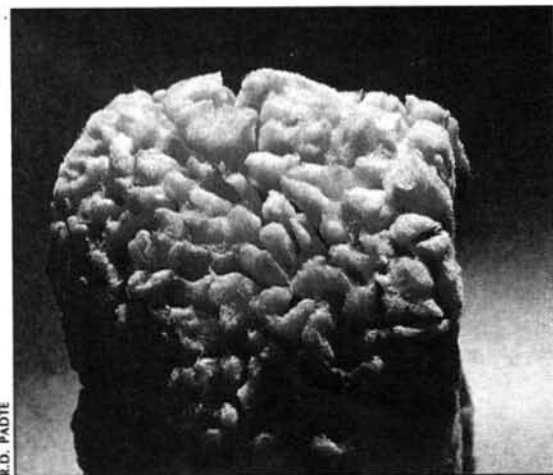


Apart from having eggs and sperms, many sponges reproduce asexually. A mass of cells collect together and are enclosed in a thin membrane of flat cells, called a gemmule. The flat cells, except at the rear end, grow whip-like organs and the larva swims away to settle on the sea floor, lose the whip-organs and grow into a young sponge.

Sponges play host to a variety of animals, both for support and shelter. Hydroids (zoophytes), moss-animals (Polyzoa) and barnacles may grow on them. Worms, brittle stars and pistol shrimps live inside them, protected from enemies and bathed by oxygenated water bringing food particles. (A large loggerhead

◀ A deep-sea sponge aptly named Venus's Flower Basket

sponge was found to shelter 16,352 pistol shrimps.) Venus's flower basket (a deep-sea sponge) often contains a pair of shrimps. They enter the sponge body when young and, in their sheltered life, are content to live and grow there.



R.D. PADIE

A bath sponge (*Spongia*) — once a familiar household item and now replaced by synthetic substitutes

Anyway, they cannot escape even if they want to because they are too large now; the osculum of this sponge is closed by a perforated sieve-plate. They thus live their entire life voluntarily imprisoned within the sponge. The Japanese present such sponges, containing a captive pair of shrimps, as gifts to newly wedded couples, as they symbolize a marriage lasting until death. The Japanese name for this sponge means "Together unto old age and into the same grave".

The sponge crab *Dromia* carries a live sponge on its back, keeping it in place by holding it with its last pair of legs. Decorator crabs (spider crabs such as *Paramithrax*) break off pieces of sponge, seaweeds and hydroids and place them on the spines on its back, where they stick and continue to grow. The crab looks like a walking garden. Some hermit crabs also place a piece of sponge on the (dead) snail shell in which they shelter. The sponge grows all over the shell except at its opening. In due course, the shell dissolves and the hermit crab is covered only by the live sponge.

The bath sponge, once familiar in all households, has a skeleton of spongin fibres without any limy or silica spicules. They grow in the eastern Mediterranean and Aegean Seas as well as in Bahama Islands, Gulf of Mexico and Florida. Collecting sponges by diving has been carried out for thousands of years and was one of the sports in the ancient Athenian Olympic games.

Natural sponges are far superior to the synthetic foam-rubber 'sponges' now used in households and made of cellulose, neoprene or vinyl. They are firm yet pliable, rigid yet resilient, and can be squeezed, but will spring back to their original shape. Their inner network of chambers connected by channels can hold a large amount of water. Spongin does not melt or burn, so the sponges can be sterilized in boiling water for medical use in hospitals, and in cannons and rockets. Apart from the familiar use of scrubbing our body while taking a bath and for washing cars and boats, they are used by artists and painters, lithographers, tile setters, ceramic and leather workers. 🍷

Editors' Choice

HEAR ME

I have listened to the voices
of those who care
Not for themselves
but for the life of trees,
Who have no voice.

They softly spoke
of their beauty
Neatly juxtaposed
within a concrete jungle,
A necessary phenomenon.

Within my mind
of thoughts so real
Clouded fields of destruction,
to reign upon these gentle giants,
An unnecessary outcome.

How do we touch
the hearts who need to feel
Not for themselves
but for the breath of trees,
Whose voices do cry to us.

Lim Bing Yee



The Endangered Wildlife Society's movie of the month

Courtesy: Singapore Power

The Young Naturalist

Compiled by: V. Shubhalaxmi and Vibhuti Dedhia

Hard Facts

- ❑ Shells are divided into five main classes called gastropods, bivalves, tusk shells, chitons and cephalopods. About 80% of the living molluscs belong to the Class Gastropoda, while bivalves are the second largest.
- ❑ In 1996-97, India exported 668 tons of various shells, worth Rs. 5 crore.
- ❑ Often, prohibited species of shells and corals are mixed with general permissible consignments or labelled as 'shells', in order to avoid detection by the authorities.
- ❑ Commercial trochus living near coral reefs, was once used to provide material for buttons and was exported from India. It is still being fished in small quantities for decorative purposes.
- ❑ Turban shells provide mother-of-pearl for making decorative buttons, beads and jewellery, and are in great demand for making curios and utilitarian articles.
- ❑ Conches are collected for decorative purposes.
- ❑ Sacred chanks are exploited for the popular bangle industry in West Bengal. Imported from Sri Lanka, it is one of the most traded shells. Also used in making ornaments, and blown on religious occasions.
- ❑ Sinistral shells are highly priced for their rarity and are also known as 'Valampuri shankh'.
- ❑ Giant clams are the largest bivalves in the world and live in tropical seas in the Indo-Pacific. Mostly exploited for edible purposes by the local population.
- ❑ Export of the abovementioned species is prohibited and shall not be allowed in any form as described in the Export Import (EXIM) Policy. All the species belong to the class Gastropoda except for the giant clams, which are bivalves.

(Source: TRAFFIC-India/WWF-India)



Did you know?

- ❑ **Maximum plant species:** The Angiosperm family (flowering plant group), represents 867 out of the 300,000 known plant species.
- ❑ **Oldest tree:** A shaitoot tree, at Joshimath, in the Chamoli district of Uttar Pradesh, is believed to be about 12,000 years old. A deodar tree, at Balcha, Garhwal is said to be over 704 years old.
- ❑ **Longest-living tree:** The banyan tree lives for over 250 years.
- ❑ **Tallest trees:** Fir and deodar have an average height of 76.2 m.
- ❑ **Largest tree canopy:** A banyan tree in the Anantapur district of Andhra Pradesh, covers an area of 5.2 acres and is over 600 years old. The Banyan tree at the National Botanical Gardens, Calcutta, with a canopy covering three acres was the earlier record holder.
- ❑ **Biggest tree trunks:** The majestic deodars of Jammu and Kashmir, and Himachal Pradesh have trunks measuring a record 12 m or more.
- ❑ **Largest tree hollow:** A 700 year old baobab or monkey-bread tree of African origin, belonging to the hibiscus family, standing amidst the ruins of the eastern part of the Golconda fort near Hyderabad, has a hollow of 10.8 sq. m, which can comfortably accommodate 10-12 people and has a base width of 29 m.
- ❑ **Longest Creeper:** The elephant creeper (*Entada pursaetha*) which can grow 1.5 km long, making it one of the longest in the world has enormous bean-shaped pods over 1.5 m long and 10 cm wide containing chocolate-coloured seeds. It grows in the eastern Himalayas and in the Western Ghats.

(Source: Limca Book of Records)

Life started evolving on our planet some three billion years ago. All the major plant and animal groups have developed from primitive and simple forms, which have evolved into complex forms, adapted to different ways of life. All the existing species are constantly evolving, gradually increasing the already diverse world of life. Paleontology (the study of fossils) traces the various paths of evolution to the present days. Some forms like elephants and horses have evolved greatly through the ages, whereas others, like the horseshoe crab and cockroach, have not changed in hundreds of millions of years. Still other fossils show lines of development that came to a dead end. Giant sloths, once plentiful, are now known only as fossils. The theory of evolution became clearer with the aid of fossils.

Fossils are the remains of prehistoric life — a direct evidence that such life existed. To become fossilised, a plant or an animal must usually have hard parts, such as bone, shell or wood. It must be buried quickly to prevent decay and remain undisturbed for a long time. This is why very few plants or animals that die are preserved as fossils. In rare cases, whole animals may be preserved.

Fossils are mainly found in sedimentary rocks, occasionally in beds of volcanic ash, or preserved in lava. Fossil mammoths, completely refrigerated for about 25,000 years, have been found in the frozen ground of Siberia and Alaska.

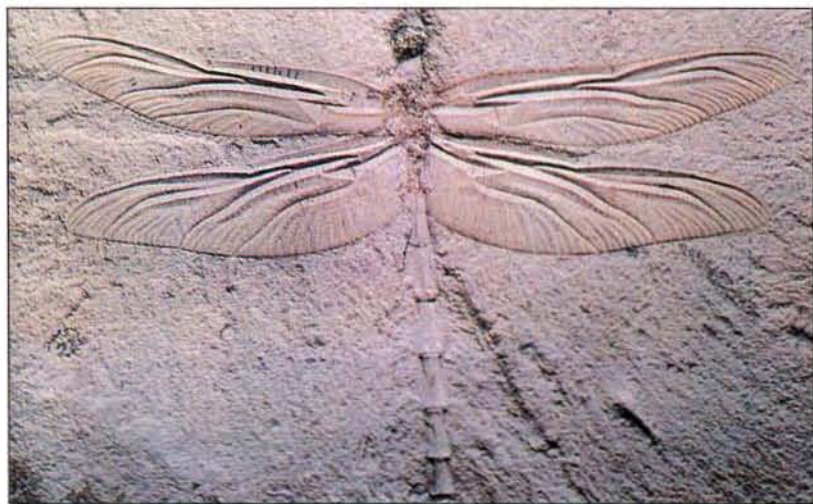
In Poland, a woolly rhinoceros of the Ice Age was well preserved in asphalt. Parts of mummified ground sloths have been found in caves in the semi-arid South America. In each of these cases, unusual conditions: cold, chemical action and dryness were involved. Numerous fossils have been found in the strata of the Gondwana System, in India.

Soft parts are rarely found intact, but insect exoskeletons and minute appendages have been preserved in amber, the

hardened resin of ancient trees. Leaves and small, soft marine animals buried in mud, which hardened into shale, have sometimes left behind a thin film of carbon outlining their form and preserving delicate details of their structure. In western Canada, sandstone casts of dinosaur skins have been preserved.

Hard parts are often preserved with little or no alteration. Intact teeth of sharks and mammals, and small jaws of ancient sea worms have been found. Bones may be preserved, but have been often altered and replaced by dissolved mineral matter. Shells frequently remain intact, and in a few places logs and stumps have been preserved as peat or coal.

During the past two centuries paleontology has moved to a professional level. Amateurs have also made major discoveries and won acclaim from professional geologists. Most people collect fossils for the simple fun of tramping and exploring, or for the excitement of a rare find, or the challenge of 'working out' a perfect specimen. A fossil collector usually hunts for fossils in sedimentary rocks because they are preserved best in them. And in the course, he unfolds pages of a gigantic book, revealing the fascinating story of the earth's long and exciting past. ♡



This dragonfly flew around dinosaurs and pterodactyls

The Hidden World of Mushrooms

WHILE going through the April-June, 2000 issue of *Hornbill* I saw an article titled "The Hidden World of Mushrooms" by Priti Sawant. The article is quite interesting and informative. But I would like to bring the following points to your kind notice:



1. The photograph of the mushroom at the bottom of page 4, identified as the Giant Toadstool by Priti Sawant, appears to be an edible *Lepiota*. 'Toadstool' refers to a poisonous agaric.
2. The mushroom printed at the bottom of page 5 is not

of the Death Cap. *Amanita phalloides* (Death Cap) is an entirely different mushroom. The mushroom identified so by the author appears to be a *Hygrophorus* / *Hygrocybe* species!

3. The Fairy Ring Mushroom *Marasmius oreades* grows among grasses on lawns, pastures and grasslands, whereas the picture at the top of page 6 is of *Marasmius siccus*, which grows on dead, decaying leaf litter.

Kamal Ch. Semwal,
Garhwal, U.P.

Author's response:

I admit that Mr. Kamal is absolutely correct. The pictures were wrongly identified by me, and I wish to rectify the names for the same.

1. There is no difference between a mushroom and a toadstool except that the latter are poisonous. The genus of the Giant Toadstool on page 4 could not be identified then, and since it had a scaly covering, I wrongly identified it as a toadstool.
2. The bottom photograph on page 5 is not of the Death Cap. It was wrongly identified because of its red colour. The mushroom resembles a *Hygrocybe* sp.
3. The Fairy Ring Mushroom on page 6 belongs to the genus *Marasmius*. But the species

that forms fairy rings is *Marasmius oreades* and not the one given in the picture.



The Hedgehog

Mr. Ishwar Prakash's very interesting article on the hedgehog (*Hornbill*, January-March, 2000) prompts me to make two observations. The first concerns the distribution of *Paraechinus micropus micropus* upto the decade of 1950-1960. It was fairly common in what is now Punjab and Haryana. This is also borne out by Prater (p. 166). The overall colour that I remember was grey rather than yellow or pale. The local name was *Chhledda* and *Chahaa*. However, by the mid 70s as the green revolution rooted in firmly, the hedgehog and much else ceased to exist. The rural generation of today, in these two states, have never seen one. Sadly, it has also vanished from their oral knowledge bank and folk lore.

An interesting fact is that it figured very prominently in the folk tales of Punjab. Any farmer walking home alone, from his fields, on a dark night, was sure to be followed by an evil spirit (Jini), always keeping two paces behind in the same footsteps, quietly. If the farmer dared look back, he was sure to drop dead in his tracks. So no one attempted to. When one brave farmer did look back, the mischievous evil spirit played on

the nerves of its victim by instantly changing guise to a *Chbledda*. The spiky, black ball deepened the mystery as it rapidly grew in size and weight till the farmer fainted, never to walk dark nights alone, ever again.

My second observation is on the drawing of the hedgehog ascribed to "an Indian artist Gen. Hardwicke." Thomas Hardwicke arrived in India as a cadet in the Bengal Artillery of the East India Company, at Calcutta, in 1778, rose to command it ultimately as a Major General, and retired to England in 1823. He was a dedicated naturalist and believed to be the first in India. He had amassed what may be the first significant collection from India. For four years I have tried, without success, to piece together his profile. The little that is known does not suggest that the General was an artist. Instead, he had employed the best Indian artists from Bengal and its neighbourhood to sketch and paint the specimens of birds and mammals from his collection. The "Illustrations of Indian Zoology" (in 32 folios) which the General had had published in collaboration with Dr. J.E. Gray of the British Museum, has 366 illustrations, all having been commissioned by the General during his service in India.

If any reader of the *Hornbill* has come by this publication in

India and if they have a textual profile on the General, please write to:

Lt. Gen. Baljit Singh
'Sakhua',
P.O. McCluskie Ganj,
Bihar 829 208.

✽✽✽

The Slothful Sloth

Here is a viewpoint that I would like to share with the *Hornbill* readers: Regarding sloths (their near-total insensitivity to strong stimuli, their incredibly lethargic courtship, the minimalist bonding of sloth mother to child), William Beebe (1923) wrote in his book *JUNGLE DAYS* "It is interesting to know of the lives of such beings as this — chronic pacifists, normal morons, the superlative of negative natures, yet holding their own amidst the struggle for existence. Nothing else desires to feed on such coarse fodder, no other creature disputes with it the domain of the underside of branches...From our human point of view, sloths are degenerate; from another angle they are among the most exquisitely adapted of living beings. If we humans, together with our brains, fitted as well as them into the possibilities of our own lives, we should be infinitely finer and happier..."

I wonder at the wisdom of the slothful sloth!

Vibha Wattal,
Mumbai.

Haste makes waste

Dr. Sálím Ali believed in pragmatic rather than emotional conservation. This refers to a report (13th June) in the newspapers that some 300 monkeys, suffering from a viral disease, at Sariska Sanctuary, were caught and later released in the nearby Dholpur and Bharatpur districts. The report quotes that this was because "the recent death of some wildlife in mysterious circumstances, including tigers, was reportedly (read supposedly) caused by the infected monkeys."

It raises quite a few queries. Did the tigers actually die of viral disease? Did their autopsy reveal viral infection, or was the assumption based merely on symptoms? Is the virus in question capable of switching from a monkey host to other hosts?

A basic remedy for any infectious disease (including in humans), is to isolate or quarantine the sick animals. Instead, the infected monkeys are now sure to spread the virus to other healthy monkeys in the neighbouring districts.

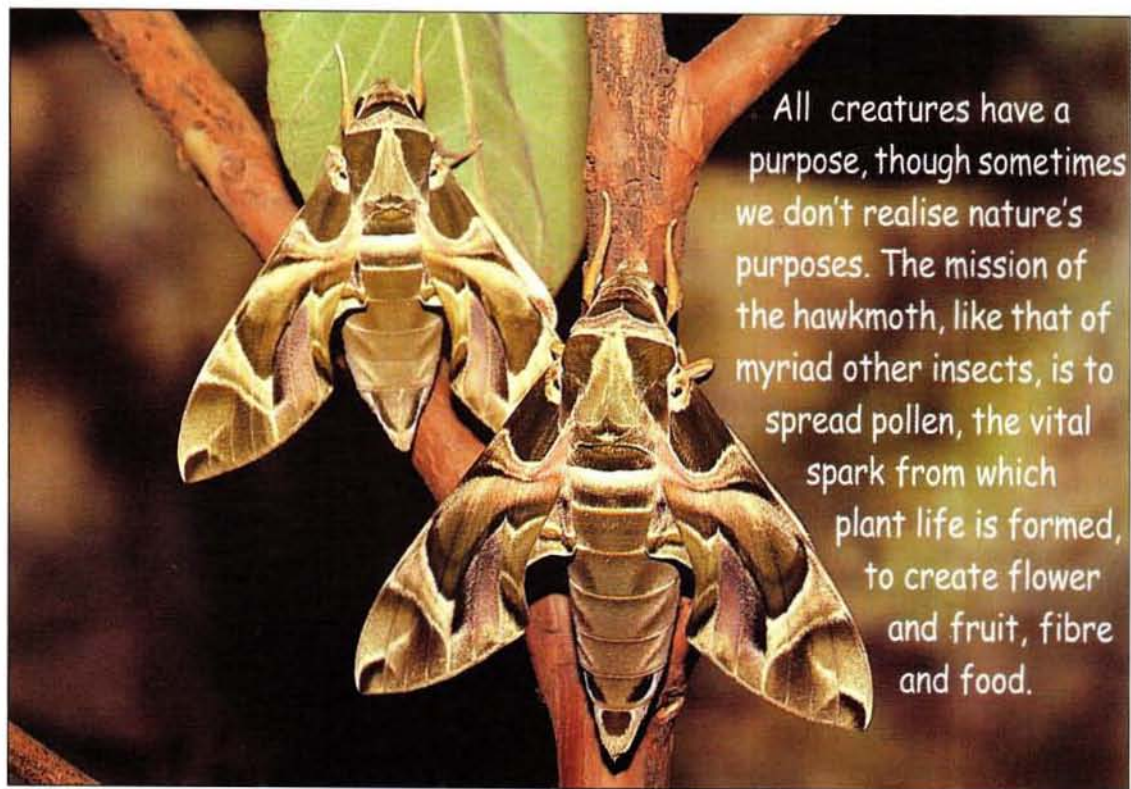
B.F. Chhappgar,
Mumbai.

✽✽✽

ERRATA

Page 22, *Hornbill*, July-September, 2000. The length of *Yarcha Gombuk*, and not the stick-like projection on its head, is 7.5 cms.

A Midnight Rendezvous



All creatures have a purpose, though sometimes we don't realise nature's purposes. The mission of the hawkmoth, like that of myriad other insects, is to spread pollen, the vital spark from which plant life is formed, to create flower and fruit, fibre and food.

OLEANDER HAWKMOTH

Text: V. Shubhalaxmi

Photographs: Isaac Kehimkar

Time: A dark, moonless night.

Venue: The dense jungle of Sanjay Gandhi National Park (SGNP), Mumbai.

With the caressing blanket of darkness, illuminated by scattered shoals of twinkling stars, the continuous chirping of crickets, and intermittent calls from an owl, the stage was set for the descent of the moths. We sat impatiently next to our light trap, waiting for them to descend upon the white curtain with fluorescent tubes on the sides. Not all moths are gorgeous, but some are certainly the most graceful of creatures. Among the fluttering moths that had 'agreed to perform', I could easily distinguish my favourite hawkmoths, demonstrating their exclusive flight trait, as they zap-zoomed before settling.

Hawkmoths are the fastest flying and some of the most handsome moths in the world. They are generally medium to large sized. The 2-8 cm long forewings are often 2 to 3 times longer than the hindwings, and have either eleven or twelve veins, whereas the triangular hindwings have only eight veins. When at rest, they hold their wings over the body like a tent. They have a protruding head with large eyes, a robust thorax and a narrow conical abdomen, which protrudes well beyond the hindwings when the moth is flying, giving the body a spindle-like shape. A heavy body, with a small wing area (compared to butterflies), means that the moth must have a rapid wing beat to stay aloft. Hawkmoths are therefore strong fliers. Some of the species can fly at a speed of up to 48 km per hour. Though there are a few diurnal species, most hawkmoths are active at dawn, dusk and in the night.

Hawkmoths are essentially a tropical group, but are spread all over the world. There are about 1,100 known species worldwide and approximately 200 species in India. They are also called as Sphinx moths as when alarmed, caterpillars often rear up, giving them the appearance of a Sphinx. The scientific name Sphingidae is derived from this posture. They are known to migrate over long distances. Some have even been encountered at mid-sea by ships. Information on hawkmoths being scanty, it is worthwhile to record the locality where you see one.

The distribution of Indian hawkmoths appears to be largely governed by climatic factors, such as soil humidity, temperature, seasons and by environmental factors such as topography, floral canopy, camouflaging surroundings and predator pressure. A stable population of hawkmoths can be an indicator species for monitoring environmental changes. This has been proved by the research carried out by the Zoological Survey of India, in Kumaon, north India, where they studied a probable case of faunal drift, occurring due to climatic changes, wherein hawkmoths were one of the key species used to monitor the changes.

Perhaps the most distinguishing feature of this night flier is its long proboscis, which is rolled out of the way in flight and uncoiled while feeding. But not all Hawkmoths are bestowed with this unique tool, as some have rudimentary or no proboscis at all. While probing for nectar and laying eggs, most of these moths do not settle, but hover over the flower. The larger, day-flying species are often mistaken for hummingbirds.★ The proboscis is as long as, or longer than, the moth's body. Some are known to have a proboscis as long as 14 cm! The hawkmoth can thus reach for nectar and pollen where most other flower visiting insect pollinators fail. In fact, hawkmoths and tubular flowers appear to be tailor-made for each other — a fine example of co-evolution.

Nectar glands at the base of the long, slender, floral tube of the bitter hedge plant's (*Clerodendrum*



The *Convolvulus* Hawkmoth is probably one of the most widely distributed hawkmoth

inermis) white flowers, produce a copious amount of sweet nectar. When a *Clerodendrum* flower blooms, only its mature stamens shed pollen, while the stigma bends outwards, to prevent self-pollination. By the next evening, the spent stamens curl down, baring the solitary stigma which has now straightened up to receive pollen from other



Deceptive looks: The huge Bee Hawkmoth appears to be a nasty bee

★ Hummingbirds don't occur in India.



The masked prey: Eyespots of the Leea Hawkmoth caterpillar give it the semblance of a snake

newly bloomed flowers. Cross-pollination, so essential for survival, is thus ensured when the moth flits from one flower to another. Nocturnal hawkmoths are therefore important pollinators in tropical forests.

Most hawkmoths feed on flower nectar; an exception to this is the Death's-head Hawkmoth, which is reportedly attacked by bees while trying to enter and steal honey from a honeycomb.

Hawkmoth caterpillars can be easily recognized by the dorsal horn on the last segment of the body. They look dangerous, but are quite harmless. The caterpillars are often brightly coloured, with diagonal stripes and eyespots. They can grow from 4-10 cm. They are solitary feeders, and often feed on specific food-plants. Many are economically important pests, as they feed on crops such as tomato, tobacco, potato and brinjal. They generally pupate in a silk case, in leaf litter or in mud cells, 50-100 mm deep, in the soil. Most pupae are medium to dark brown.

The hawkmoth caterpillar is the most defenceless creature. Its only hope of escape is to avoid detection, which is why its habits and colour are admirably adapted. It usually lives on the underside of the leaves of its preferred food-plant. When resting, it is entirely hidden from above by the leaf, and when feeding, only the head and one or more pairs of legs are visible. When young, its pale colour matches that of the midrib, and later,

when the green colour and oblique side stripes have developed, it lies parallel to the side veins. In some species, such as the Carrisa Hawkmoth (*Nephele didyma*) the caterpillar resembles a bird dropping. When discovered and attacked, the caterpillar can only defend itself by raising the front part of the body and hitting sideways with the head. The Death's-head caterpillar squeaks like a mouse and surprisingly the pupa and adult also produce the same squeaking sound. The Leea hawkmoth caterpillar (*Theretra lycetus*) has eye-like markings on the anterior segments, giving it a snake-like appearance. When alarmed, the effect is enhanced by swaying the raised, enlarged head end of the body. The Oleander Hawkmoth (*Daphnis nerii*) caterpillar feeds on the poisonous oleander plant (*Nerium*). The cardio-toxic substance oleandrin, present in the leaves, is digested, but cannot be stored in the body tissue. When attacked, the caterpillar lashes its head sideways and sprays the predator with a noxious green vomit, which contains the plant poison.

The predators of hawkmoth caterpillars are many and varied. Wolf spiders suck their juices. Ants of most kinds consider them fair game and attack them, regardless of size. It is reasonable to assume that birds and lizards eat them when they can find them, and that hunting wasps carry them off to their burrows. But the really insidious foes are the parasitic wasps and flies, which attack them from the half-grown stages to maturity. Parasitic insects lay their eggs inside the caterpillar's body; on hatching, the grubs eat away the caterpillar's soft tissues before pupating inside or outside the host's body. Twenty to thirty 12 cm long nematode worms can be found inside an infected caterpillar. Virus, bacteria and fungi also take a toll of the caterpillars.

The pupa does not usually fall prey to the same predators as the caterpillar, but they too are attacked by ants and pathogens. Adults are swift on the wing and hide skillfully when resting, but occasionally fall prey to bats, birds and lizards. The speed of flight is a deciding factor when it

comes to protection. A short drama I witnessed confirms this. A gecko had caught a resting Hummingbird Hawkmoth (*Macroglossum belis*). It held the complete head and thorax inside its mouth, when the moth started vibrating its wing with great speed. As a result, the smooth furry thorax of the moth started slipping from the gecko's grip. The tiny moth escaped, leaving the hapless gecko with a mouthful of its body hair.

The diurnal Bee-Hawkmoths have better survival tactics. A newly emerged Bee-Hawkmoth (*Cephanodes bylas*) has white scales all over its wings, which are shed during the first flight. This gives them a clear-winged appearance, like that of bees. This huge, nasty bee-like hawkmoth is a perfect example of a sheep in wolf's clothing.

Rearing a hawkmoth caterpillar is more demanding than rearing a butterfly caterpillar, as very little is known and written about them. Thus, breeding hawkmoths proves to be a fascinating hobby, of great scientific value. Monsoon is the best time to start. Choose an area with plenty of vegetation and search systematically by turning over leaves and branches, turning over strands of creepers, to expose their undersides. Keep a sharp lookout for eaten leaves along roads, paths, streambeds and similar places and only then will you win this hide-and-seek game. The caterpillars can be reared in boxes or plastic jars with minute holes in their lids. They should be fed on the same plants as they were collected on, as their choice of food can be quite specific. The caterpillar's stage and size varies from species to species. Caterpillars of large moths such as the Death's head Hawkmoth take more than a month to grow up to 10 cm, whereas those of the Hummingbird Hawkmoth grow 4-5 cm long in about 10 days. If provided with suitable pupating sites, such as soil and leaf litter, the caterpillar makes its own choice. Species with an extra long proboscis, such as the Lesser Yam Hawkmoth, (*Rhyncholaba acteus*) have a structure shaped like the handle of a jug to encase it. The pupal stage is also as variable as the caterpillar stage. Overwintering (hibernation) is



Some hawkmoth pupae have a structure shaped like the handle of a jug to encase the extra long proboscis

observed in pupae. Adults emerge during early mornings and evenings and while drying out their wings they often eject a pinkish, milky liquid, which is used as a defence mechanism if the moth is handled. Before taking off, the moth readies itself by vibrating its wings vigorously before rocketing up into the air.

Apart from rearing caterpillars, another way to study hawkmoths is to set up light traps. Moths are easily attracted to any artificial light source. If provided with a platform near the light source, such as a white curtain, these moths readily settle on it. They sit as if hypnotized by the light, giving us ample time to study and photograph them. Light traps are essential in estimating the population and species richness, while rearing caterpillars in captivity unravels their life-history. The two together provide complete information on hawkmoths, a lacuna we can fill with collective effort. 🍷

V. Shubhalaxmi has studied the Ecology of Saturniid and Sphingid moths of SGNP and is currently doing her Ph.D studies on their population dynamics.

Information on moths being scarce, BNHS has taken the initiative of maintaining a database on moths. We appeal to all our members to provide details about moths seen in their localities. The information can be sent in the form of notes, photographs or specimens. For any query write to: Mr. Naresh Chaturvedi, Curator, BNHS, Hornbill House, S.B. Singh Road, Mumbai 400023, India. Or e-mail at: bnhs@bom4.vsnl.net.in

The Fasting, Feasting Malabar Giant Squirrel

Compiled by: Rachel Reuben



ISAAC KEHINKAR

THE Malabar giant squirrel, *Ratufa indica*, is fairly common locally, and is widely distributed, from Gujarat south through the Western Ghats, and in Peninsular India. The squirrels live almost entirely in the canopy, rarely coming to the ground when obliged to cross from one patch of suitable forest to another. Wildlife biologist Ajay Desai and his colleagues recently made a short-term study of the ecology of the species in Mudumalai Wildlife Sanctuary and National Park (NP), jointly sponsored by the BNHS and the Tamil Nadu Forest Department. An earlier study had been carried out in Bhimashankar, Maharashtra, by Rene Borges and her associates.

In both the studies, the squirrels ate leaves, flowers, fruit, seeds and bark. They were recorded

feeding on 25 varieties of plants in Mudumalai and 30 in Bhimashankar, but in both, the bulk of their diet was made up of only a few preferred species. Here, however, the similarities ended, as their foraging behaviour in the two habitats was quite different.

In Mudumalai, teak (*Tectona grandis*) contributed 41% of the diet, and was the most common tree species in all the microhabitats selected for study. Other important food sources were *Terminalia tomentosa*, *Grewia tiliifolia*, *Loranthus* sp. and *Lagerstroemia lanceolata*. Even though mango, *Mangifera indica*, was quite common, it was hardly eaten. In Bhimashankar, the preferred species were different, and 51% of the diet came from *Mangifera indica*. The squirrels here were distinctly less dependent on a few species than their counterparts in Mudumalai.

Several parts of the plants were eaten — bark, flowers, fruit, leaves, petioles and seeds. In Mudumalai, diet changed seasonally. From March to June, roughly corresponding to the dry season, the squirrels feasted on fresh young leaves, buds, flowers and fruit. There was only occasional feeding on bark and seeds. Food was plentiful and so easily available that the squirrels spent more time resting than feeding. For the rest of the year, bark (36%) and seeds (36%) made up the bulk of the diet. Leaves were, of course, available for much of the year, but the quality seemed unappetizing in the wet season. The bark is not very nutritious and thus largely ignored in the season of plenty, while teak seeds are nutritious, but require time to crack and eat. In the lean season, squirrels had to spend most of their time foraging, and there was little time for leisure. In Bhimashankar, by contrast, flowers, leaves and fruits were eaten throughout the year, and only 6.5% of bark.

These differences in feeding behaviour are related to the differences in habitat and forest type. In the Bhimashankar Sanctuary, evergreen, semi-evergreen and moist deciduous forest (MDF) provide a rich and varied diet throughout the year. But the vegetation of the Mudumalai NP is moist

deciduous forest in the western part, which receives quite heavy rainfall. The central portion is dry deciduous forest (DDF) and the eastern portion, which has the lowest annual rainfall, is thorn forest. New leaf growth, flowering and fruiting are mostly restricted to a few months after the monsoon. Though the squirrels have adapted to these conditions, it is obvious that the evergreen forest is more suitable, and population densities in Bhimashankar are higher than in Mudumalai.

Giant squirrels were found wherever there were tall trees and continuous canopy cover. This means they were present throughout the MDF in the western portion of Mudumalai, and in patches in the DDF, but not in open savannah. In the teak plantation and thorn forest they were mostly restricted to the stream-beds and nullas which supported larger trees and vegetation. Since the squirrels are heavily dependent on the canopy for feeding, travelling and nesting, old tree growth is vital for their existence. Felling is banned in sanctuaries and national parks, making forest fires the greatest threat. The riverine and streambed habitats form narrow, but essential corridors, which could be strengthened by constructing rope-ways if necessary. Malabar giant squirrels have small home ranges, and therefore poaching would be easy, and must be guarded against. 🐾

Save the Tiger

Compiled by: Belinda Wright

Conservationists everywhere will be delighted that a world leader has at last recognised the worsening plight of the tiger and has issued a call for action.

President Bill Clinton's tour of the Ranthambhore Tiger Reserve in India was historic. He clearly left Ranthambhore with tigers on his mind because he talked about their plight twice, when he addressed big business conferences the next day in Hyderabad and Mumbai.

Developing a theme that there should be a "higher purpose" than just business success and wealth, he said that there was "a need to protect our planet and those who share it with us". He had seen two "magnificent tigers" at Ranthambhore and had learned, much to his "dismay", that already this year "20 tigers have been killed in India, even though it is not legal to do so". This had made him aware of the problem of tiger

poaching and that the world was "in danger of losing" the tiger.

The President added: "We must find a way to help people make enough money and have a decent income, to conserve the environment and the biological species with which we share this planet. This is very important, and technology has a big role to play in all of this."

Tiger experts, Mr. Sen, Mr. Thapar and Ms. Wright, requested the President to help declare the tiger a global heritage species and to lead the way in encouraging India and the world to do more to save the tiger.

Few people can imagine a world without tigers, but this is a looming reality that we must now face. Only strong political will, and world support, can now save the most magnificent animal on our planet. It is gratifying that a world leader has at last publicly recognised the problem. By his words, he has shown up Indian leaders, none of whom has shown concern for the plight of the tiger since the late Mrs. Indira Gandhi took up the cause. 🐾



VIVEK SINHA

Wildlife Week Celebrated



Mr. B.G. Deshmukh, President, BNHS and Mr. Adhik Shirodkar at the inauguration of Mr. Hira Punjabi's exhibition (R-L)

THE Bombay Natural History Society (BNHS) organised a photo exhibition — Images of Nature — by Hira Punjabi on the occasion of National Wildlife Week. The exhibition was inaugurated by Mr. Adhik Shirodkar, MP, Rajya Sabha, at Hornbill House on October 4, 2000, and was sponsored by Sanctuary Magazine. Mr. Hira Punjabi, a BNHS member is a widely travelled and enterprising wildlife photographer. He is the proud winner of a gold medal at the Taipei International Photography Competition in 1999. Recently, one of his photographs reached the semi-finals of the prestigious BG Wildlife Photographer of the Year 2000 contest, organised by the BBC.

Dr. Sálím Ali Remembered



Mr. P.M. Lad and Mrs. D. S. Variava are among the fortunate individuals who had the opportunity to work with Dr. Sálím Ali

THE 105th Birth Anniversary of Dr. Sálím Ali was celebrated on 12th November. BNHS members all over the country participate in the annual Sálím Ali Bird Count organised by the BNHS, on this day since 1993. An important annual event, it helps activate a network of birdwatchers across the whole country. A photo exhibition on the birdlife of India by Mr. P.M. Lad, from 13th-16th November, was inaugurated by Mrs. D.S. Variava, Vice President, BNHS. A former Chief Conservator of Forests, Mr. Lad, a BNHS member, is interested in birdwatching and bird photography. A 'Who am I' — Bird Identification contest was also organised on this occasion in collaboration with the Indian Express group of newspapers.

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Snap Shots

Text and Photograph: P.M. Lad

THE LESSER FLORICAN has always fascinated me. I still remember the gleam of pleasure on Dr. Salim Ali's face when he saw it in 1981, after almost 35 years. His visits to Madhya Pradesh during 1981-84, converted many *shikaris* of the lesser florican into determined protectors. They still cherish his memories.

I can never resist the temptation of observing this bird, during its breeding season (July-September), in Gujarat, Madhya Pradesh and Rajasthan. The male florican attracts eligible females with his well-known spring display, at times lasting an entire day. The showy and active male loses interest once the female settles on the eggs.

Photographing a lesser florican is a challenging job. I have been photographing the bird since 1981. Hundreds of poses were trapped in my camera, but none to my satisfaction. Its elegant pose as it looks around for a female, suddenly jumping to a height of 2-3 m provides one of the most thrilling birdwatching moments. The plumes behind its neck add to its elegance. I finally got an opportunity to photograph the florican as it stands at its jumping spot — a scene I had only watched through binoculars.

Destruction of *birs* (grasslands) and use of pesticides is affecting the lesser florican like other birds. The florican may find it difficult to survive if the ratio of *bir* to pesticide-use-area moves towards zero.



P.M. Lad is a former Chief Conservator of Forests, Madhya Pradesh. He enjoys watching and photographing birds



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