

Hornbill

1992 (3)



BOMBAY NATURAL HISTORY SOCIETY





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EDITORIAL

Tiger, tiger, counting right

India's best known tiger reserve is making headlines. Poachers appear to have invaded the Ranthambore National Park *en masse*, and the number of tigers has fallen from 45 in 1989 to 17 in May 1992. These figures are official, which is not to say that they are accurate. But the fact remains that Ranthambore's tigers have their backs to the wall.

Because there are no reliable population figures before and after the problem surfaced, no one really knows how many tigers were poached. According to the forest department, the poaching incidents have been exaggerated, and perhaps they are right. Certainly there has been a very sharp drop in the number of tiger sightings. But it is not clear how closely the number of deaths correlates with the reduction in sightings. Most sightings at Ranthambore tend to be at a few spots. In all probability, the resident animal in that particular area is quite used to man, and will continue to swagger along on its regular route, oblivious of jeeps and gaping tourists. If by some chance it is these 'friendly' tigers that are killed (quite probable, because the less wary a tiger is of man, the easier it is to kill), then the number of sightings will plummet.

The whole controversy centres on numbers, and one question would be pertinent — how accurate are wildlife censuses in India? The official figures for many of our sanctuaries and national parks are surprisingly encouraging. Tiger populations, for example, are said to have *trebled* in the last twenty years. In spite of large scale deforestation and human encroachment, Indian wildlife seems to have gone forth and multiplied.

Two factors probably contribute to this curious increase in numbers. One is that forest officials are judged at least partly by the census figures in their areas — a big increase means a better service record, and perhaps a promotion. Secondly, wildlife censusing is a job for specialists, and requires not only extensive training but also a high degree of familiarity with the census area and its wildlife. Unfortunately, few forest department staff are sufficiently competent. The answer is to develop a core of trained staff who would monitor the population on a continuous basis rather than only once every four years. The funds and manpower required would represent an insignificant fraction of the total expenditure in each Project Tiger area, and the dividends would be enormous.

Accurate data on populations and population trends are the basis of successful conservation — without such data, wildlife managers would simply be groping in the dark. It is time the government took its censuses a little more seriously. Professional biologists from institutions such as the Wildlife Institute of India or BNHS could be asked to help. Even more important is a change in policy (official or unstated). If the Environment and Forests Ministry makes it clear that officials will not be evaluated on the basis of census figures, then perhaps the real numbers will surface.

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COVER

Wild dog or dhole
(*Cuon alpinus*).
Painting
by Carl D'Silva

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THE WHISTLING HUNTERS

Text and photographs by SACHIN TAPASVI

Today I woke up with this strange feeling that something exciting was going to happen. We had been at the Tadoba National Park for four days now, and would be there for another three. But at least in my case, such premonitions are rarely correct, and I kept my feelings to myself.



IT WAS 5.30 A.M. — high time we left the camp. I was shepherding a group of 20 children, most of whom were somewhat dejected because another group had sighted a tiger the previous day. Our tracker, Prakash Esambre, had planned a trail to an area called Jamunbudi. As we left the camp behind us, we were treated to a bewildering succession of bird calls. Quite a symphony, in contrast to the bustle of city life. Green pigeons, golden-backed woodpeckers, paradise flycatchers, each one made it a point to deliver a personal greeting.

The jungle of Tadoba is of the dry deciduous type, completely barren in May. The entire ground was covered by a dull brown carpet of shed teak leaves. In brilliant contrast to this background was a beautiful, shiny-white tree aptly named 'The Naked Lady'. The only green touch was added by the occasional bamboo and the tendu (bidi) and jarul trees. Incidentally, jarul is the state flower of Maharashtra.

We had now entered the Jamunbudi area, a meadow dotted with dense patches and resting on a small hillock. We started our gentle climb to the top of the hillock. Everything was silent except for the 'cluck cluck' of an Indian tree pie. A sudden rustle of dry leaves brought to our notice a well-grown, solitary, adult wild boar. Putting his head down, he made his way through the low thickets. We were almost at the top of the hillock when the air was pierced by a strange, soft whistle. The sound came nearer, and my heart started beating faster. I was confused, for I had never heard such sounds before. I took no more than ten steps forward, and found myself staring into the eyes of three creatures — reddish-brown in colour and with bushy, black tails. Wild dogs!

This was my closest encounter ever with these ruthless predators. Seeing us they made off into the jungle to our left. All that we could do was watch them with gaping mouths. When we recovered, we caught sight of ten more of these animals congregated at a point about 100 metres off the trail. I guessed they were feeding on a kill. Instructing my group to walk ahead — and keep to the trail — I entered the jungle with my tracker.

IT WAS A FAIRLY open meadow and visibility was good. The three wild dogs now moved in. They would take 10-15 steps, then turn back and stare at us. We moved ahead, crouching,

trying to make ourselves inconspicuous. My speculations were correct — it was a sambar that had been killed. Apparently we had moved too close; the dogs scampered off into the jungle. We decided to perch ourselves on a tendu tree about eight metres away from the kill. We were dangerously close, but there was no alternative.

The sambar was a subadult, about a metre high at the shoulder, and had been killed approximately 15-30 minutes earlier. This was evident from the semi-clotted pool of blood near the body. The stomach had been torn out and was lying away from the body. Drag marks were seen but did not extend more than five metres from the carcass, indicating that the sambar had been pulled down and then eaten on the spot. The right hind leg had been completely devoured. The entire abdomen had been exteriorised and there were no traces of any viscera. On closer inspection, we saw three or four deep bites in the diaphragm. The throat bite was evident, as was the most fascinating thing that I had ever seen — the empty right eye socket.

THE TERM 'WILD DOG' is a misnomer — dholes are placed in a different genus (*Cuon*) from true dogs (*Canis*). Taxonomically, their closest relatives are the African wild dog and bush dog. On the basis of body size and structure of molars, two species, the southern dhole (*Cuon javanicus*) and the northern dhole (*Cuon alpinus*, which occurs in India) are distinguished.

The Indian dhole weighs about 18 kg and stands 50 cm at the shoulder; the total length including the 40-45 cm long tail is approximately 130 cm. Females are slightly lighter in build, but difficult to tell apart at a distance. There are three subspecies in India — *dukhunensis* is found south of the Ganga, *primaevus* in Kumaon and Sikkim, and *laniger* in Kashmir. The first subspecies is fairly common. The other two, however, are endangered, and perhaps nearly extinct. Several areas where dholes were seen as recently as 30 years ago now contain none at all — a result of loss of habitat, depletion of prey species and persecution by man.

TWENTY MINUTES passed. And just when I was convinced that the chance of a lifetime had eluded me, the whistling

hunters returned. They had circled round and now approached from behind us. They were letting out these queer whimpers and a variety of other sounds which I find difficult to describe. And for the next 30 minutes — from 7.00 to 7.30 a.m. — I watched them feast.

They wasted no time. Two adults stood (or rather, sat) guard 15 metres on either side of the kill. The cubs were allowed to eat first, and choose the part they liked best. Naturally, they chose the soft belly and the chest. One subadult chose the lips — perhaps some wild dogs like sambar lips as much as some people like tongue. The adults were busy with their 'leg piece'. The pack fed very hurriedly; or maybe they were very hungry. The feast continued for almost twenty minutes, during which time they were so busy that they did not seem to notice the sound of my camera shutter.

ONE SUBADULT, however, spotted me. He walked towards the tree, stood beneath it and started whimpering. My foot was dangling below the branch, just three metres off the ground, and I began sweating. But lady luck once again played her part, and the rest of the pack ignored his calls.

The six subadults and four adults soon moved off into the jungle (my tracker later confirmed that there was a waterhole in that direction). The two adults who were on the lookout now approached the kill. By now the magnificent sambar had been reduced to an ugly carcass. The adults left early, and we decided that it was time for us to get down.

Crows were already perched on top of a tree nearby, loudly demanding their share. We had one last look at the sambar. Then we left, pondering on the seemingly cruel ways of the jungle.



RUNNING WITH THE PACK

The dhole is nothing if not an efficient killer. It hunts in packs, and can kill in scrub, water or open land, both at night and during the day.

A dhole needs nearly 2 kg of meat each day, and may often eat 3-4 kg. For a hunting pack, therefore, it would be a waste of time to go for small mammals like rodents. They take whatever larger prey is available — gaur, sambar, chital, swamp deer, nilgai, blackbuck, wild boar, even hares. Domestic cattle, especially calves, are sometimes taken. Dholes hunt mainly in the morning and evening. Very occasionally,

if the weather is cloudy or if the morning hunt has been unsuccessful, they hunt during the day.

The hunt itself is a complex affair. It starts with a prelude, sometimes described as a 'mood synchronizing activity', that takes place near the pack's resting site. They may rest (lying close to one another and nuzzling or rubbing bodies) or play (this often involves chases and mock ambushes). After a while the pack trots off, usually in single file.

The hunting pack is believed to make use of smell, hearing and vision,

in that order. Prey is usually located by smell. When the alarmed prey runs, the pack can see or hear it, and follow. Sometimes the sound of the running quarry (invisible in the scrub) can inform other dholes of the progress of the hunt.

There are two main hunting strategies. One is to kill prey as the pack moves through the scrub. The other is for the pack to split



Pack size varies with the seasons and also in different areas — smaller packs in areas with poor prey density. Average pack size is about 10, though up to 40 (20 each of adults and young) has been reported.

up, the main body moving into the scrub to flush their prey, and the others remaining at the periphery to intercept it. Either way, they efficiently locate and flush out resting animals or hidden fawns. Occasionally they may stalk their prey.

When the prey is located the pack rushes in — dholes can touch 60 km per hour and even maintain that speed for a short distance. Few animals — except for gaur, wild boar and an occasional adult sambar — will stand their ground against an onrushing pack. Their speed and teamwork ensure that chases rarely last more than 500 m (in contrast, wolves and African wild dogs chase their prey for long distances, perhaps because of the openness of the habitat).

Dholes often single out an animal, such as a young or handicapped animal which cannot keep up with the others in the group, separating it from the herd before closing in for the attack. There is a report of dholes chasing a Nilgiri tahr through a herd without turning aside after any other animal.

The actual attack depends on the size of the prey. Small mammals like hares and chital fawns may be caught on any part of

the body, and often killed instantaneously with a single shake of the head. Large prey are attacked from behind, bitten on the rump and flanks and eventually brought down. If the prey is capable of injuring its pursuers either with antlers or with forelegs, the dholes keep well out of

dholes (as well as other coursing canid predators like wolves and African bush dogs) kill more male prey than female. For example, dholes kill more does than stags of chital and sambar. Why? One possible reason is that stags spend less time on the lookout for danger than



The eyeball is a favourite. So are the liver and heart. But the first part to be eaten is usually the rump, because it contains a large amount of meat.

reach.

Another tactic, particularly useful against large and formidable prey such as a sambar stag with hard antlers, is to grab the prey by the nose, usually when its progress is arrested by other members of the pack. One theory is that attacks on the face damage the facial and trigeminal nerves, leading to immobility or fainting.

There is one curious aspect to dhole predation. Studies have found that

does do. Another is that long antlers can be a hindrance to flight, and does are hence less vulnerable. Another intriguing possibility is that of optimization of yield. Stags, being heavier than does, provide more meat (for not much greater effort) than does or fawns.

Information on hunting courtesy A.J.T. Johnsingh and Aviva Patel. Dr Sachin Tapasvi is a Poona-based orthopaedic surgeon who frequently takes time off to go wildlife watching.

The Jungle Crow in India

BHARAT BHUSHAN



ONCE UPON A time, long long ago, as all good stories start, Emperor Akbar was instigated by his courtiers to ask Birbal, his favourite minister, exactly how many crows there were in Delhi. Unfazed as usual, Birbal promptly replied, "Forty three thousand six hundred and seventy five".

The Emperor was pleased, but his courtiers were not. A senior minister asked Birbal how he arrived at this exact figure. Birbal answered that he had himself counted each crow in the capital. Suppose the figure is proved wrong, they asked. Birbal answered that if there were more crows in Delhi than his estimate, then the additions were relations visiting their loved ones in the city. And if less, then it was because some Delhi crows had left to visit their brethren in the villages nearby! Birbal's count of crows in Delhi must therefore be one of the first avian censuses in India.

But what of the other attempts since Birbal to find out all about the crows in India? The *BNHS Journal* has in its pages an intriguing, long-drawn out discussion on the relationships amongst the various races of jungle crows in India. While one always remem-

bers a pleasant story, the correct scientific facts usually remain lost in research tomes. This article recapitulates the decades-old debate.

IN THE EARLY 1900s, large parts of the Eastern Ghats were completely unexplored. Then Arthur Vernay, an American magnate and patron of natural history, funded a survey of the area, for which some of the most famous naturalists of the day were enlisted. The Vernay Survey, carried out in 1928-29, focused mainly on birds and mammals, but reptiles and other wildlife were also studied. And such was the quality of work that many of the survey's findings still hold true. The Vernay Survey still remains the first point of reference for any study of the wildlife of the Eastern Ghats. The results were published in the *BNHS Journal* in several parts, starting in volume 34 (1930).

As always, there was considerable preliminary research required before the survey data could be analysed. Norman Boyd Kinnear collected the birds, and sent the specimens to Hugh Whistler in England for taxonomic classification; they wrote the ornithology section together.

FIRST THEY collected every record they could of the species, not only within British India proper — i.e. peninsular India and the central Himalaya south of Nepal — but also from Baluchistan, Kashmir, Assam, Burma and Ceylon. Additional information came from personal correspondence and the examination of bird specimens.

Once the known range of the species within British India was accurately listed, Whistler and Kinnear addressed the question of geographical races. The jungle crow has a wide distribution, almost throughout the country from the Himalaya to the extreme south, and a number of subspecies or races do exist. But they are all roughly the same size, and almost identical in appearance. The difference between races could only be established on the basis of minor differences in size. Whistler and Kinnear examined and measured a large number of bird specimens, the majority from the splendid collections of the British Museum.

BEFORE THE Eastern Ghats survey, there had been much difference of opinion about how to classify the jungle crow and its races. The question was whether the Indian jungle crow should be accepted as being conspecific with the Australian *coronoides*. No, said Ernst Hartert in 1929. Stuart Baker, perhaps the best known bird taxonomist of the day, and author of the classic Fauna of British India, agreed with Hartert and clumped the Asiatic forms together as a single group, distinct from the Australian species.

Even when taxonomists are of one view about the classification, identification of similar looking races can still be a problem. *Corvus macrorhynchos* and the carrion crow *Corvus corone*, for example, are exceedingly difficult to differentiate both in the museum and the field. They were at one time considered to be the same. Whistler and Kinnear held that they were different, but they weren't sure whether they could prove it. The distribution of these two species was said to overlap on the borders of north-west India; but the differences were clouded to a large extent by wrong identification.

Stuart Baker divided the jungle crows of the Indian peninsula into two races, *levaillantii* and *culminatus*. The former, he said, occupied "the whole of India south of the Himalayas, as far south as the

Deccan and on the east to about the latitude of the Madras Presidency. To the north-east it is found up to the Bay of Bengal, but east of the Brahmaputra its place is taken by the Burmese form". And *culminatus* occurred in "the Madras Presidency southwards, the Deccan and south through Malabar and Travancore to the south of Ceylon."

Others felt differently. In 1926, Richard Meinertzhagen placed the boundary between the two forms far lower in the peninsula, "south at least to Madras and the Nilgiri Hills." In other words, he said they were both the same; and called the southern race (in Madras) by a different name, *anthracinus*.

WHISTLER AND Kinnear claimed both Baker and Meinertzhagen were wrong, for two reasons. Firstly they hadn't taken into account the size difference between males and females, and so could have got the size ranges wrong for some races. Secondly, they felt that Baker and Meinertzhagen had not made allowances in their measurements for the stage of moult. Birds moult their feathers each year, shedding and regrowing them. Measurements taken for the same bird during and after the moult would be different.

For example, crows shed some feathers after the first year moult; wing sizes would be smaller than expected at this stage. Just after the next moult, when the wing and tail quills are *not* shed, wings and tails would be much larger than expected — and lo! one more subspecies.

One specimen of *culminatus* was dismissed by Baker and Meinertzhagen as "a very small specimen .. aberrant .. and not typical .. similar dwarf examples occur at Simla etc., but are exceptional". Whistler and Kinnear felt that the specimen in question was in fact an immature bird completing the post-juvenile moult, and perfectly normal for its age.

Another point that caused a great deal of confusion was migration of birds from the Gangetic plains into the hills in late summer. The visitors are on the average smaller than the hill crows; so measurements of specimens captured in the hills in late summer could be of either race, and would be smaller than average measurements taken in winter. This is exactly the point where we need to remember Birbal's contention about crows and their visiting relations!

SPECIES AND SUBSPECIES

A species is defined as a population of animals that breed freely among themselves, but not with others. The house crow *Corvus splendens* is a species. The jungle crow *Corvus macrorhynchos* that looks just as black and is found over the same areas, is a different species — jungle and house crows do not cross-breed in nature.

Birds of wide distribution (and even some of rather restricted distribution) sometimes break up into geographic groups called subspecies, races or forms. Essentially the bird has adapted itself to local conditions in different areas of its distribution and over the generations the adaptation becomes more marked, until it shows up as visible physical differences between the races.

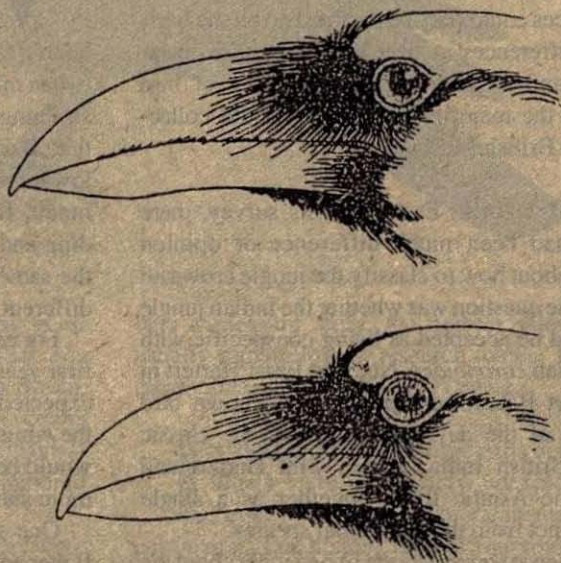
For example, races that inhabit colder regions are usually larger than their conspecifics in warm areas, and lay more eggs per clutch. Races of humid regions are darker than those of dry regions; wings tend to elongate in mountains and cold areas.

Many ornithologists feel that subspecies classifications are rather subjective because the various subspecies, being all one species, intergrade one into another with no sharp line of demarcation. To quote Leonard King's *Natural History of Birds*, "The validity of subspecies names therefore becomes rather substantially a matter of opinion because the fineness of the distinction used varies with taxonomists. The fact that taxonomists freely push around groups, combining some, elevating some and subordinating others, illustrates the very real difficulties in dealing with manifestations not as yet measurable and definable, and therefore matters concerned largely with subjective determination" (italics added).

KEY TO THE SUBSPECIES

- Wing male/female 320-380 mm; Bill very large and raven-like *C. m. tibetosinensis*
 Wing male/female 280-335 mm; bill stout and more arched; plumage more glossy black *C. m. levaillantii*
 Wing male/female 292-378 mm; bill comparatively weak; plumage dull greenish black *C. m. intermedius*
 Wing 260-319 mm; bill strong, plumage black and glossy *C. m. culminatus*

(From the Handbook)



Above — *C. m. culminatus*

Below — *C. m. levaillantii*

	WING	BILL	TARSUS	TAIL
<i>T. m. nigropileus</i>	118 - 143	20.3 - 24.3	26.5 - 36	84 - 103
Blackcapped blackbird	(av.127.1)	(av. 22)	(av. 29.6)	(av. 91.9)
<i>T. m. spencei</i>	121 - 126	21 - 22.7	26.5 - 29	89 - 96
Eastern Ghats blackbird				
<i>T. m. simillimus</i>	127 - 130	21.4 - 24.5	29.6 - 32.2	96 - 97
Nilgiri blackbird				

Avian subspecies may sometimes be different in appearance, but usually they are recognised on the basis of four measurements — of the wing, bill, tarsus and tail. This is where the trouble begins. Even within a subspecies, these measurements vary. There is an accepted range for each measurement for each subspecies. But these ranges almost invariably overlap between different subspecies. Or the range for one or more parameter for one subspecies may fall completely within the range of the same parameter(s) for another subspecies.

For example, consider the measurements for races of the blackbird *Turdus merula*, measured from specimens in the BNHS collection.

(See table of measurements below)

The designation of a subspecies depends on differences in measurements for all four parameters; each parameter taken individually would not represent a significant variation. Taken together the variation is believed to be significant enough to classify the bird into different subspecies which are found in different parts of its distribution. This system of classification has its limitations. Perhaps the most serious of these is that the number of birds measured is usually too small to permit such generalisation.

There is apparently no immediate solution to the controversy. But it is safe to say that over the next decade or so, subspecies classifications are likely to be revised fairly extensively. Modern genetic methods will be used more widely, to detect minor differences in blood chemistry, DNA structure etc. Ornithologists would finally have accurate, objective yardsticks to determine whether or not a particular individual or population is sufficiently different from the rest to be categorised as a separate subspecies.

THE BASIC reason for all the confusion about the races of *Corvus macrorhynchos* in India, Whistler and Kinnear felt, was that nowhere was a large, carefully sexed series of jungle crow specimens available. And without proper specimens, there scarcely seemed any point in arguing further. Fresh specimens were collected by the BNHS, with the cooperation of several museums. These (mainly from the north-west Himalaya, Calcutta and Bombay), together with Whistler's earlier collections, totalled over 70 birds — sufficient, apparently, for them to start re-examining the whole lot.

The results showed that there could be no hard and fast line of demarcation between the races because of the degree of individual variation. And any orderly sequence of measurements that could be deduced was promptly interrupted by first-year birds. They found that despite the individual variation, there was a gradual and regular intergradation across the country, from a small-billed race in Ceylon to a large bird with a small bill in the western Himalaya and a medium-sized bird with a deeply-bowed raven-like beak in Bengal. The sequence continued eastwards until they reached "the huge bird with the huge beak of Java".

CROWS FROM the north-west Himalaya were not difficult to grade as their habitat is largely isolated, and there is no confusion from other races that wander in, Birbal style. Since no series of bird skins existed for these regions, Whistler and Kinnear supposed that the north-west Himalayan race extended to the eastern Himalaya as well.

They were certain, moreover, that jungle crows from Ceylon and Bombay, and Nagpur and Visakhapatnam, were really the same race. The Calcutta birds (*Corvus leuallantii*), with their strongly curved raven-like beaks, were markedly different, but in turn were the same as *Corvus andamanensis* from Assam, Burma and the Andamans.

Though the jungle crows of the Gangetic plains of Uttar Pradesh and Bihar could have been intermediate between the two series, Whistler and Kinnear decided it would be most convenient to unite them with *culminatus* in agreement with the then established practice of regarding them as separable from the larger-billed form.

SO FINALLY Whistler and Kinnear recognised three Indian races of jungle crows, based mainly on measurements (including those of adult and first year birds).

1. *Corvus macrorhynchos intermedius* — The plumage is less glossy on the hind neck and lower parts, and the nape feathers usually whiter at their base, than in other forms. Baker put its distribution as "Himalayas from Afghanistan to Bhutan". The extension of this race to the eastern Himalaya is unsupported by a proper series of skins.

2. *Corvus macrorhynchos culminatus* — The nape feathers are dusky at their base. This race is mentioned as covering the Indian peninsula and Ceylon. It does not occur throughout north India as stated by Baker, and is absent from the whole plains area north-west of a line from Delhi to the eastern border of Sind, in which area it is largely replaced by the raven.

3. *Corvus macrorhynchos macrorhynchos* — A large bird with a heavily deeply-bowed beak. Base of nape feathers dusky: deeper and more glossy black than other races. Found from the vicinity of Calcutta through Assam and Burma to Java and the Andamans.

SALIM ALI and Dillon Ripley were of the opinion that the races of the jungle crow within our limits show rather minor distinctions. However there is common agreement that it shows a gradual intergradation from a "small-billed bird in Ceylon to large birds with comparatively small bills in the Himalayas and a medium-sized bird with stoutly bowed bill in Bengal."

The Handbook, that Bible of Indian birdwatchers, has two differences from Whistler's classification. One subspecies has been renamed, from *macrorhynchos* to *levaillantii*. And a fourth

subspecies, *Corvus macrorhynchos tibetosinensis*, is added to the earlier three. This one, according to the Handbook, is "large and uniformly jet-black, with a rather wedge-shaped tail in overhead flight, similar to *intermedius*. Available from north Sikkim, north Bhutan, and NEFA in the Mishmi Hills."

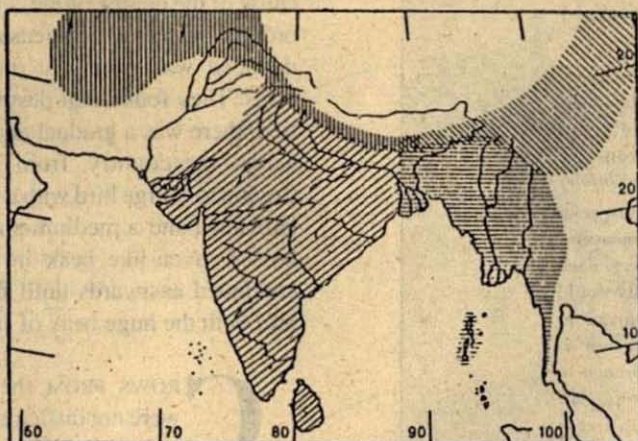
BIRDS FROM north east Nepal (Khumbu), and presumably the Sikkim-Darjeeling area, are intermediate between *intermedius* and *tibetosinensis*. Individual specimens from north-west Bhutan tend more towards *tibetosinensis*. Thus, *intermedius* and *tibetosinensis* of the higher Himalaya are our largest birds, while *culminatus*, "especially from the southernmost part

of the peninsula and Sri Lanka, is the smallest. *C. m. levaillantii* of Bengal, Assam and the Andamans is intermediate in size and has a heavy deeply bowed raven-like bill".

Ali and Ripley cautioned that examples from mere collected specimens cannot "be confidently assigned to a particular race without knowledge of their provenance".

The entire confusion developed due to the fact that, they felt, "individual variation (in the jungle crow) is great, and responsible for the lengthy discussions and divergent conclusions reached by earlier authors".

So after years of confusion and five pages of dense text, we come back to Birbal. But then this article would never have been written if the "earlier authors" had referred to Birbal's theories on the abundance of birds at any particular place. ■



culminatus
 Levaillantii
 tibetosinensis
 intermedius

Distribution of races of the jungle crow

Bharat Bhushan has been a field ornithologist at the BNHS since 1982. After studying the great Indian bustard and rediscovering Jerdon's courser, and later a three year stint as the Society's Conservation Officer, he is now working for his Ph.D. on the ornithology of the Eastern Ghats.

LETTERS

Sir,

'Jackals of Kala Dungar' in *Hornbill* 1992 (1) reminds me of a similar jackal feeding ground in Tamil Nadu. There is a ruined fort called Sankarapathi Kottai between Devakottai Road railway station and Devakottai town. The fort contains an Easwaran temple, where in the late 1930s and early 1940s, passers-by used to make offerings in the form of coconuts. Devakottai was also the seat of the Principal Civil Judge, who had jurisdiction over Chettinad. Chettians were apparently given to litigation; flush with fortunes made in Burma, they fought each other in the courts over trivial matters. Easwaran was a favourite with litigants — successful litigants would break dozens if not a hundred coconuts or more.

Sankarapathi Kottai was in the middle of a scrub jungle, with no habitation nearby. The beneficiaries of the offerings were jackals. As children, we often saw them slinking across the road in broad daylight as we drove past. Unfortunately, my father never had the time to stop and let us see the jackals feed.

Recent enquiries reveal that the offerings have come down and even the few coconuts that are broken are appropriated by human beings, leaving nothing to *Canis aureus*.

**E.R.C. Davidar
Padappai, Madras**

Sir,

I would like to add some more to the interesting items of koel lore given by Naresh Chaturvedi in *Hornbill*. Many years ago, women in Maharashtra used to keep a fast called Kokila Vrat, where no food was supposed to be eaten that day till a koel's call was heard.

The koel's call is usually pleasant, but the female koel can produce very harsh, unpleasant shrieks. Often a quiet summer afternoon is suddenly shattered by the screeches of a female koel flying away, being chased with great determination by a very silent crow. The koel's shrieks sound as though she is the aggrieved party. In fact the crow is chasing her away because she has been prying into his nest, where she has probably deposited her eggs!

**Neelima Bhawe
Bombay**

Sir,

This event occurred at Gir, the only sanctuary for the Asiatic lion. At about 6.30 a.m. on 12th June I, along with Bhooshan Pandya (a photographer from Rajkot) and Dilip Ravrani (our guide) reached a place called Valadra on the bank of the Hiran river. A group of two lionesses, five cubs (2-3 months old) and a subadult male was feeding on a buffalo which had died naturally the previous day. They took turns at the carcass, which was of a full grown buffalo. We stayed at the place till 7 p.m., watching and taking photographs. Finally, when twilight fell, we returned to Sasan.

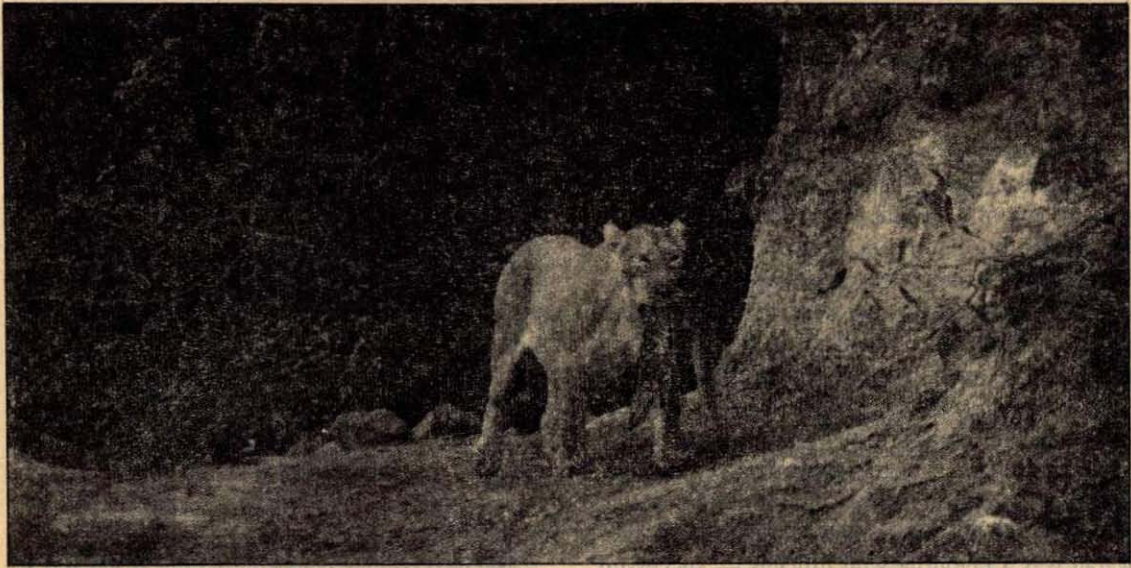
The next day we reached the same place at 6.30 a.m. I was amazed to see the partly eaten carcass of a 4 ft long crocodile lying near the dead buffalo. I guessed that since the buffalo was lying just beside the river, the crocodile might have come in our absence to eat the buffalo, and was killed by the lioness. The lions were still around, resting in the bushes a short distance away from the buffalo. Since the buffalo was only half eaten I presumed that they would come again to feed, and waited.

At around 7 o'clock, a lioness approached, this time without the cubs. She ignored the partly eaten crocodile and started eating the buffalo. She fed intermittently for almost an hour. Suddenly she got up, lifted the partly eaten crocodile in her mouth and started walking towards the bushes where the other lioness and the cubs were resting. She was probably taking the remaining part of the crocodile for her cubs. This would indicate that lions do occasionally prey on crocodiles if they get a chance, but prefer other prey if it is available.

**Rohit Vyas
Vadodara**

Sir,

The 104 sq km Borivli National Park lies on the outskirts of Bombay, barely 35 km north of the congested city centre. A large variety of flora and fauna struggles to survive in the park under very heavy and ever increasing man-made pressures — encroachment, tree felling, bootlegging, development of an air-force base, mushrooming growth of temples etc. And though all the state government literature refers to it as a national park, the central



Ronit Vyas

The lion's share — crocodile meat is not normally part of the diet. But with cubs to feed, anything goes.

government has yet to declare it as one, in spite of the state government's recommendation.

Sight records of the porcupine in the park are hard to come across, mainly because the animal is nocturnal. The low profile and small size of the animal makes it harder still to locate in the undergrowth. Since neither the park authorities nor BNHS have instituted a formal method of documentation of wildlife sightings, the only way to gather information on the status of the porcupine in the park was word of mouth enquiry. This obviously cannot be expected to produce accurate results, but in the absence of any formal data, it is the only method available.

The most recent sight record appears to be by BNHS member A. Dikshit, who in 1978 saw a pair of porcupines near culvert no. 48. Over the last nine years I have personally only four indirect observations of the species in the park. On 26th June 1988 I came across two porcupine quills on the Kanheri hills. Later, on 21st May 1989, I found three more quills in the same area. On both occasions a careful search of the surrounding area did not reveal any additional clues. On 16th June 1991 I found three quills at three separate locations on the same trail. Presuming that no jokers go to the park early in the morning to scatter porcupine quills to fool people, this should be proof enough of the animal's existence in the park today.

A more foolproof confirmation was obtained on 17th December 1989, when I located a leopard drop-

ping, consisting almost exclusively of porcupine quills. Besides the quills, a complete set of claws could also be seen once the scat was broken open.

My first reaction on seeing this rather unusual dropping was that the leopard must have been facing an acute shortage of prey for it to take on an animal as formidable as the porcupine. However, S.H. Prater in his *Book of Indian Animals* thankfully proves me wrong by recording that "The panther will kill and eat anything it can overpower with safety: cattle, deer and monkeys, the smaller beasts of prey and larger rodents like porcupines."

The leopard, however, has to be very careful while overcoming a porcupine because of the latter's habit of running backwards and ramming its rear end with erect quills into the attacker. Prater also mentions an instance of a leopard being killed by a porcupine, its head pierced by the quills.

On this occasion the leopard seemed to have gained the upper hand. What was amazing was that the quills, some over 5 cm long, had passed through the entire digestive tract and had been excreted in a neatly compressed longitudinal mass. It seems likely that the leopard might have suffered some internal injuries. Possibly it was young (the dropping was of a medium sized diameter), and too inexperienced to leave the porcupine alone.

I would welcome news of any other sight records or observations, including findings of quills, of the Indian porcupine in the Borivli park. The status of the porcupine is just one among numerous missing

links in our information about the park's diminishing wildlife. Indeed, the size and quality of our database is pathetic. The status of other wild animals like the palm civet, the jungle cat or the hyaena is anybody's guess. It is no wonder that due to the lack of hard information, controversial sightings like the recent one of the leopard cat are reported in the newspapers.

To build up an extensive database on all aspects of the wildlife of the park would only be the first step towards the protection and development of this naturalist's El Dorado. And we have a very, very long way to go!

**Navroz P. Behramfram
Bombay**

Sir,

Madhav National Park in north Madhya Pradesh is divided by two national highways into three parts — northern, central and southern. Nilgai are common in the central part, which has an ideal habitat of undulating hills with intermittent valleys and interspersed glades surrounding the main wetland of the park, Sakhya Sagar or Chandpata lake. The perennial source of water is another reason for the large population of the animals in this part.

Nilgai are occasionally seen in the southern part, and a heap of collective defecation indicates their presence in the northern part as well, which has very dense forest.

Last April, the collective defecation was noted at three places in the central part, all on table-land on top of the hills. Further observations showed that only one territory of about about 2.5 sq km was being used by five old bulls of the darkest coat, while many family groups of four to 23 members roamed freely

from place to place. Juveniles were seen throughout the year.

The animals usually fed till about 9 a.m. With the sun rising high, they gradually moved from the peripheral area of Sakhya Sagar to the hilly region. Females and subadults continued to feed for some more time after adult males settled to rest in the shade. This may be because the dark coat of full grown males absorbs more heat and consequently the animals need early shade.

The National Park is not surrounded by any government forest, and therefore, a buffer zone of forest cannot be created. 72 revenue villages around the park cause heavy biotic pressure on it. Cattle grazing is a major problem: about 1000 cattle enter the park daily and many of them reach the periphery of Sakhya Sagar, not only disturbing the daily movements of wild ungulates but also competing with them for food. In summer, food is provided by the park management to nilgai and chital. Sometimes chinkara and sambar also join the feeding parties. One evening in June 1990, I saw nilgai and chital already assembled at the place where such food is provided. Here, the otherwise aggressive nilgai behaved like a domesticated animal.

Wild boar, sloth bear, wild dog and an estimated eight leopards also live in the park. Pugmarks of a tiger were recently seen for the first time in many years. I have taken photographs of a chinkara and sambar doe killed by leopard. There are reports of other animals like langur and chital killed by wild dogs, but I have yet to receive authentic information of nilgai being killed by these predators in the park.

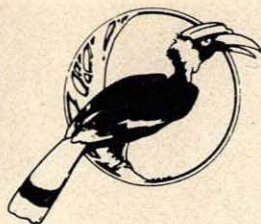
**Rajiv Saxena
Madhav National Park**



The name nilgai is said to have been coined by Mughal emperor Aurangzeb. The idea — people would associate the animal with the sacred cow, and hunting would stop.



NEWS NOTES COMMENTS



Hornless rhinos

What chance for *Diceros bicornis*? There are only around 3000 black rhinos left in Africa, about 1000 of them in Zimbabwe. And an epidemic of rhino poaching has forced the Zimbabwe government to take rather unusual steps. They plan to remove the horns of about 300 animals in a two month long operation, to make the rhinos worthless to poachers.

Zambian poaching gangs are crossing into Zimbabwe almost daily. They kill an average of one rhino a week. Last year poachers killed more than 100 animals, bringing the total to almost 1000 over the past seven years.

De-horning on such a large scale has never been tried before, and even biologists in favour of the idea are nervous. Early attempts at de-horning sometimes resulted in the death of the rhino, possibly because animals remained sedated and unconscious for about 45 minutes, which is now considered far too long. Reducing this time to 10 minutes has sharply reduced the losses.

Earlier theories held that the horns were primarily for defence. However, hornless animals seem just as capable of defending themselves and their young from predators as those with horns. It is entirely possible that the horn serves some essential but still unknown function. But desperate situations call for desperate measures. One can only hope that the de-horning will cause no long-term problems, except to poachers.

Sanctuary in Seychelles

Out of evil cometh good — sometimes. Six years ago, the Seychelles government began work on a large scale reclamation project at Mahe, on the east coast of this tourist idyll. Four kilometres of coral reef were dredged, and a considerable area of living coral destroyed. Inadvertently this created an area of habitat that is rare in the Seychelles. The settlement

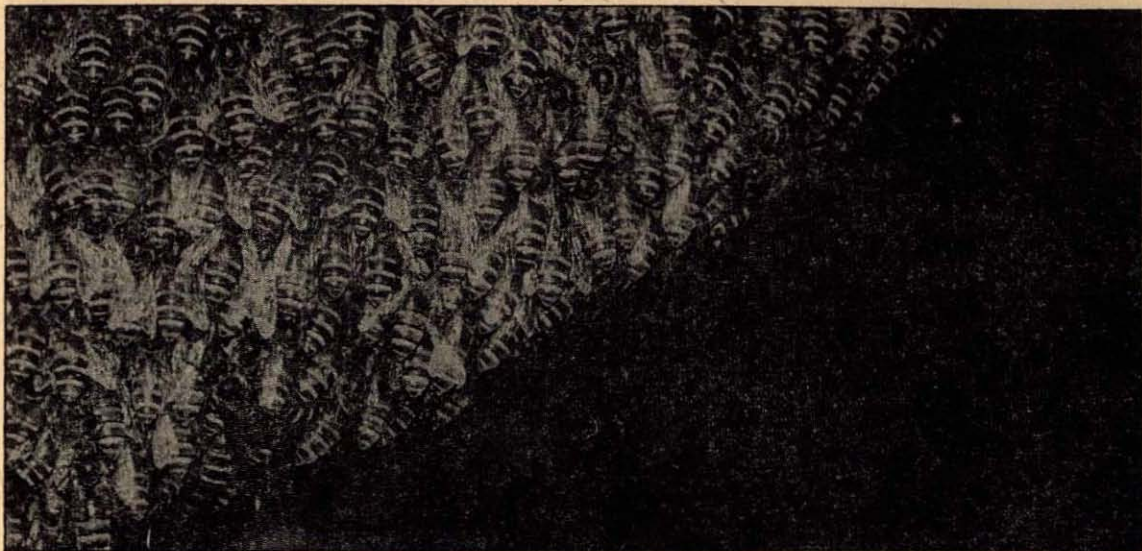
pond used during dredging remained as a depression in the coral rubble. When the monsoon arrived in December 1986 it partially filled the depression with water. This coincided with the inward migration of shorebirds, and the open area of shallow water attracted unexpectedly large numbers of birds.

The area was marked as a reserve on the development plans for the reclamation. The pro-reclamation lobby fought back, saying that the area was too close to the airport, and the birds would be a danger to aircraft. Nonsense, said ornithologists — firstly it wasn't very close to the airport, and in any case the reserve would actually make the airport safer by attracting birds away from the runway. These discussions went on through 1990.

In 1991 the reclamation project was expanded to include more of the reef, as well as a large area earlier used as a rubbish dump. It was then proposed that the rubbish be moved into the bird 'sanctuary' and covered with coral rubble. The reason? The water was polluted, and migratory birds no longer used the site — there were even surveys to prove it. The construction wizards were partly right — there were very few birds using the site when it was surveyed, but that was because the surveys were carried out in summer, at which time the birds were not in Seychelles but in their breeding grounds!

That gaffe apparently swung public opinion in favour of the birds. The arrival of the season's first migrants was televised. Studies on aquatic life were conducted, disproving the pollution claim. And finally, the decision to fill in the wetland was reversed and the reserve was reinstated on the development plans. Both sides won a little, lost a little. The area allocated is now only 29,000 sq m, while the original depression occupied 75,000 sq m.

There are plans to fence the entire area to prevent disturbance from people and stray dogs, and create and maintain pools and sandbars to provide a stable but varied habitat. The spread of vegetation around the pools will be monitored and controlled



No bonuses for this frequent flyer — bees that work too hard would be advised to take it easy.

The migrants include some species rarely recorded in the Seychelles and a few altogether new to the islands. Their numbers are still very small, but the area is the largest wader site in the Seychelles, and possibly an important stopover point for some species migrating across the western Indian Ocean. It is also important as a feeding ground for the grey heron, of which there was only a single pair at Mahe till 1990. Breeding had not been recorded at Mahe for many years, but the pair bred successfully for three consecutive seasons ('90-'92), and the population now stands at nine.

This small wetland is now even more important than it was five years ago, because almost all the mudflats at Mahe will be reclaimed. It still remains to be seen how secure the sanctuary will be — beachfront land in the Seychelles is extraordinarily valuable, and it is difficult to justify such a sanctuary purely on economic grounds. One can only hope that local authorities appreciate the fact that the reserve is but a small return for the loss of such a large area of coastal reef.

Work hard, die young

Is it really true that the harder you work, the sooner you die? If you are a bumblebee, probably yes. A study conducted on the Canadian bumblebee (*Bombus melanopygus*) in British Columbia found that workers that make the most foraging trips die earlier than their more slothful peers. Their wings simply wear out.

Eight colonies of *B. melanopygus* were studied. To make it easy to observe the bees as they came and went, the colonies were housed in boxes connected to the outside world by transparent plastic tubing. The workers in each colony were individually identified by gluing numbered plastic discs to their backs. Entomologists measured the natural wear on the wings of workers, and made matters worse for some bees by trimming the edges of their wings with scissors. Every five days over a period of several months, the hives were censused to see how wing clipping affected the fate of foraging bees.

Bees whose wings were already worn stopped foraging altogether when their wings were clipped. If they weren't, they soldiered on, frayed wings and all, eventually to go missing in action. And bees whose wings had worn out naturally suffered a higher mortality rate than those whose wings had suffered less wear.

This hard work-early death syndrome is not unknown in the insect kingdom; it has been studied earlier in honeybees. It is not yet clear, however, exactly how worn wings hasten death. It could make the bees less manoeuvrable in the air, and so less able to avoid predators, or it could make them more prone to being swept away in high winds. Alternatively, a smaller wing area could mean that foraging bees have to expend more energy in flight, which in turn accelerates their ageing.

There are other factors too, apart from wing wear, that can push the bee into an early grave. Other

structures on a bee's body also degrade with use. In particular, the fine pile that covers a bee's body wears off, often leaving a bald patch on the upper thorax, which houses the heat-generating wing muscles. The pile helps to protect bees from the weather, and also provides warning colouration to deter potential predators. Baldness brought on by a life of toil could be the final blow.

Homeless monkeys

The yellow-breasted capuchin is one of the world's rarer primates — there are estimated to be fewer than 800 animals left in the wild. They are found only in the Atlantic forest in the extreme south of Bahia state in Brazil. In 1984 a captive breeding programme was instituted near Rio de Janeiro, with six animals. The capuchins bred better than expected, and now there are 20. Unfortunately, they cannot be released into the wild because their natural habitat has been all but destroyed. Only small, isolated patches of forest are left, and these already contain all the monkeys they can support.

Releasing the monkeys elsewhere could prove disastrous. Capuchins have healthy and varied appetites — fruit, insects and small mammals. If a new species is released into an otherwise suitable area it may survive, but several other species (on which it feeds) could be put at risk.

One solution is to find an area close to the capuchins' original habitat where it would do a minimum of damage. Brazilian biologists are also trying to set up three or four satellite colonies in other countries to lessen the risk of the entire captive colony being wiped out by disease. But this involves the export of monkeys, and the Brazilian bureaucracy has stepped in with all the red tape at its command. Even if the rules are clear, it can take two years to obtain government approval for the export of an animal. And in this case, the regulations have been changed several times. Neither the primatologists nor apparently the government have any idea how long it will take to shift the capuchins.

Marine turtles — slowly sinking

Marine turtles face many threats. Nesting beaches are either destroyed or used so heavily by man that the turtles abandon them; they are caught accidentally in fishing nets, and both eggs and adults are taken for food or trade (trade in turtles and turtle

products still constitutes a major cause of mortality). There are several other threats, some of which are only now being identified and studied. These include marine pollution (from chemicals, oil and plastic waste) and a disease which could be pollution-related.

The disease in question is green turtle fibropapilloma (GTFP), which causes large external tumours (which may impair movement, feeding, breathing or vision), plus several other internal problems including severe anaemia. It primarily affects green turtles (*Chelonia mydas*), but has also been reported in loggerhead turtles (*Caretta caretta*) in Florida.

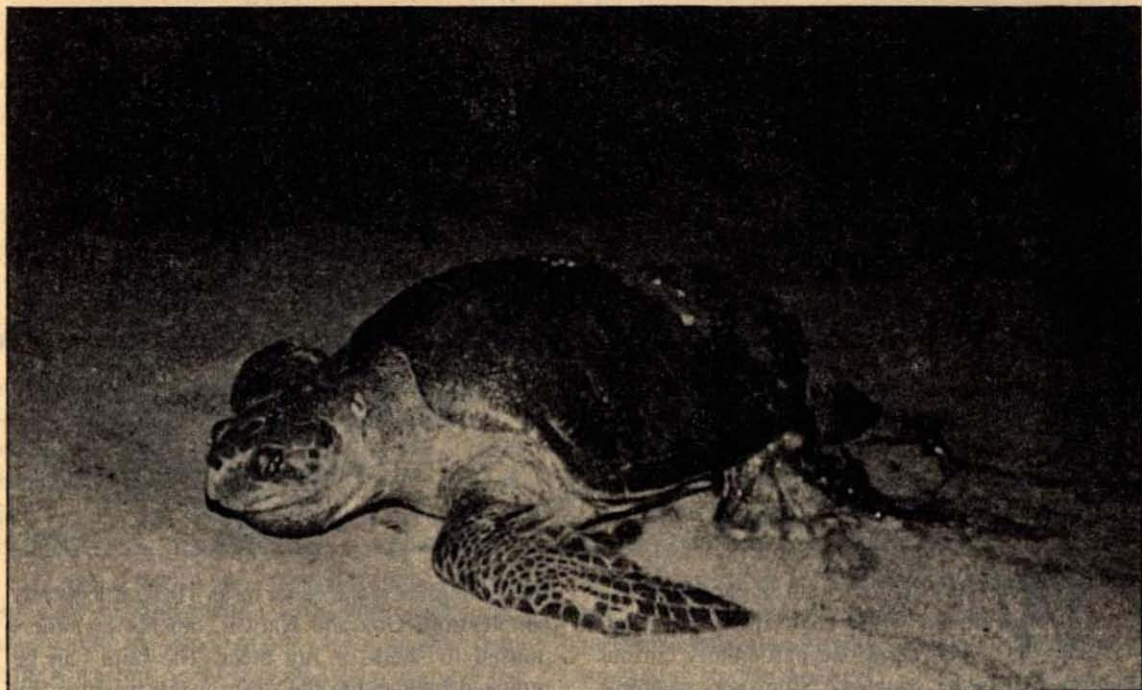
First described in 1938 as an occasional occurrence, GTFP was virtually non-existent till the mid 1960s, and not considered serious till the early 1980s. Today it has reached epidemic proportions in Florida and the Hawaiian islands. A 1991 study on the island of Maui in Hawaii reported that 31-53 per cent of the turtles stranded on Maui (examined each year since 1983) had GTFP. During 1989 and 1990 the figures rose to 77 and 85 per cent respectively. Similar figures have been reported from other sites in Hawaii.

Worse still, the disease, once confined to a small area on the south-east coast of U.S.A., is spreading to Central America and northern South America. Cases have been even reported from Australia, Malaysia and Japan.

No one knows exactly what causes the disease. It could be a virus or a parasite, or perhaps environmental factors such as pollution or food chain contamination by 'foreign' algae. The current theory is that at least some of these factors are related — a study has been planned in Barbados (West Indies) to examine whether GTFP is related to pesticides used on the island's sugar crop.

PCBs (polychlorinated biphenyls) are likely to be a major factor. These chemicals affect animals in several ways — for example they can cause reproductive failure or suppress the immune system. According to some estimates over 50 million tons of PCBs have been released into the environment. Because their dispersal into the ocean cannot easily be controlled, there is a serious risk that ocean pollution will grow to unacceptable levels.

Turtles (as well as fish-eating mammals like seals) will be among the most affected. Pollutant chemicals are ingested by marine organisms, which



This female olive Ridley turtle was drowned in a gill net and washed ashore at Gahirmatha beach in Orissa, one of the world's largest turtle rookeries.

are eaten by fish. The concentration of pollutants builds up at every step in the food chain, from algae to fish to turtles and seals.

There have been very few studies on the effects of PCBs and other pollutants on turtles (except for some studies on green and loggerhead turtles and their eggs). But studies on various species of seals and sea birds have clearly demonstrated the effects of such pollutants, particularly on eggs and young animals, and there is every reason to believe that turtles will suffer too.

One major source of PCBs is plastic waste. Many plastics contain considerable quantities of PCBs as plasticizers. These can be released from plastic during its breakdown. Plastic debris is dangerous even before it breaks down; plastic bags and packaging material, woven sacks, styrofoam beads, all take a steady toll of marine life.

One problem is that turtles aren't very smart. Hatchlings often mistake tar pellets and plastic beads (which are similar in size and shape to the floating vesicles that readily fragment from their favourite *Sargassum* plants) for food. Adults of some species are not much better — they mistake plastic bags for jellyfish.

Mother nature too plays her part, through oceanic circulation patterns. These patterns cause what are known as oceanic convergences, which carry debris or oil patches etc. to certain coastal areas. Unfortunately, both debris and hatchling turtles are carried to the same area, making the problem of chemical- and debris ingestion far worse.

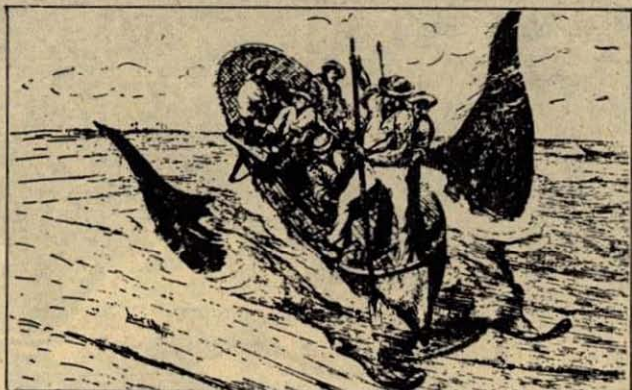
Oil pollution is another killer. Tar residues from oil can partially block the mouths and nostrils of turtles. Other oil-induced problems include a tendency to haemorrhage, and an immune system defect that causes the affected animal to produce white blood corpuscles en masse. Even low-level chronic exposure to oil might result in breaks in the integument, which may cause infection. Which brings us back to GTFP, which is possibly caused (or at least exacerbated) by immune system weaknesses and infected wounds.

In short, we have at least three new threats to marine turtles, all of which have greatly increased since the early '80s. Each of these threats is serious enough by itself. Acting together, and feeding on each other as it were, they constitute a dangerous threat to some marine turtle populations certainly, and perhaps to entire species as well. ■

SEASHORE LORE

11 — Kites in the Sea (and their kin)

BEEFSEA



*The King of Ithaca, Laertes' son,
I mean Ulysses, 'twas myself that killed,
And not Telemachus with scale-fish bone.*

—Lucian

WE CAN LEARN a lot by strolling on a beach when fishermen land their catch. And one particularly curious looking fish is the sting ray. Sting rays resemble kites — a flat, oblique square body and a long tail. There are many kinds of sting rays, and the largest grow to over 1.8 metres in body width. They give birth to live young. Cousins of sharks, they too lack bones, having a cartilaginous skeleton instead; but their skin is far smoother than shark skin. On the upper surface are the two eyes. Behind these are two round holes (called spiracles) which constantly open and close. On the lower surface are the mouth, and on either side of it, the nostrils. Behind the mouth are five pairs of gill-slits.

Sting rays live and feed on the sea bottom, preying on crabs, worms and small fishes. They are admirably camouflaged. The upper side of the body is muddy brown, the underside white. Thus an enemy looking down at a ray will miss it against the muddy background; looked at from below, it will merge with the water or sky. Even its mode of breathing is modified. Other fishes take in water from the mouth and expel it from the gill-slits or gill-cover. If the ray were to breathe in this manner, it would suck in mud and choke the gills. Instead, water, free from mud, is taken in by the spiracles and passed out of the gill-slits.

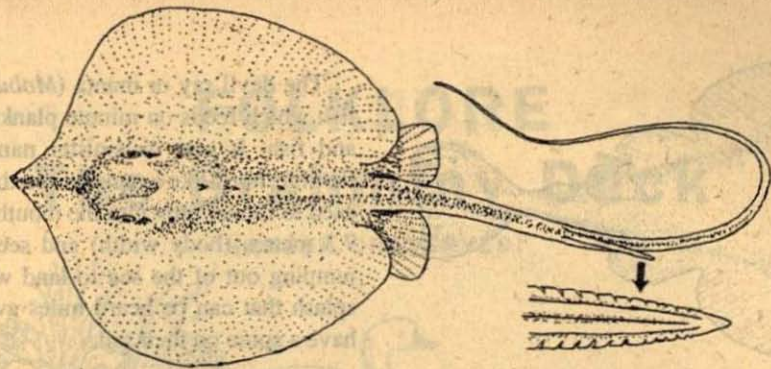
Their flesh is edible. Their blood, like that of sharks, contains a lot of urea. When fishermen catch a sting ray they usually lop off the tail to let the blood flow out. If this is not done, the urea seeps into the

flesh and gives it a peculiar taste. This is relished by people from Goa and Karwar, but not by others unused to shark or ray meat. The taint can be removed by soaking the flesh in salt water, or by holding it under running water for some time.

UNFORTUNATELY, sting rays, like sharks, are unduly maligned. This is because the long whip-like tail bears, on its upper side near the root, one (sometimes two or even three) spine with saw-toothed edges. This spine, in large rays, may be as long as 38 cm. On the lower surface of the spine are two grooves containing venom glands. (Let me digress a little to explain the difference between venom and poison. *Venom* is injurious to us when it is injected, or otherwise introduced, into our blood — usually by a jab from a needle-like spine. *Poison* causes harm only when eaten or drunk. Thus, some snakes are venomous — not poisonous, though many persons wrongly use the latter word. If you have no cuts in the mouth, and no ulcers, you can safely swallow snake venom.)

The sting ray's venom is very potent — sometimes even fatal — and I have often had to help fishermen who had been accidentally slashed by the tail spine while handling a thrashing sting ray in fishing boats.

A sting ray once involved me in a real-life 'Crime does not pay' episode. To collect live fish for display at our aquarium, we use a barrier net, which is like a wall several hundred metres long and two metres high. As the net extends over too vast an area to be



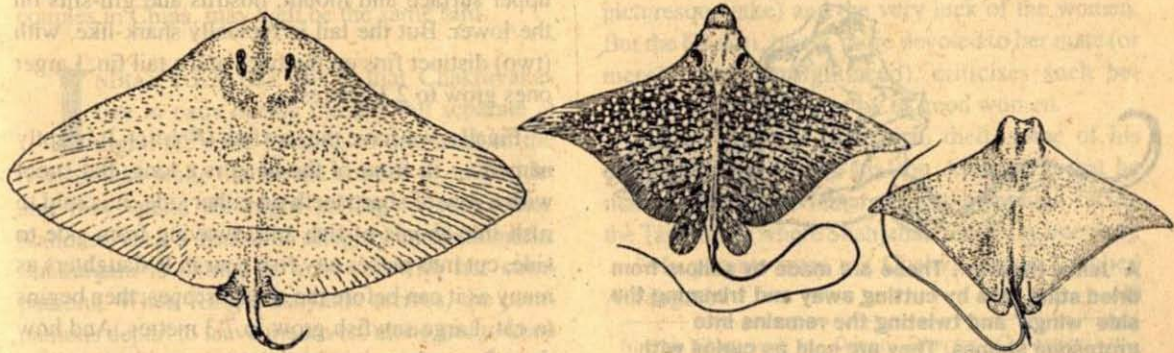
Sting ray — the tip of the tail spine, which causes all the trouble, is shown magnified.

properly guarded, an assortment of 'poachers' takes a heavy toll. The culprits are mostly gulls and crows, but these are joined by people too. They wade through the knee-deep water and deftly remove fishes with a hand-net when the fisherman is not looking.

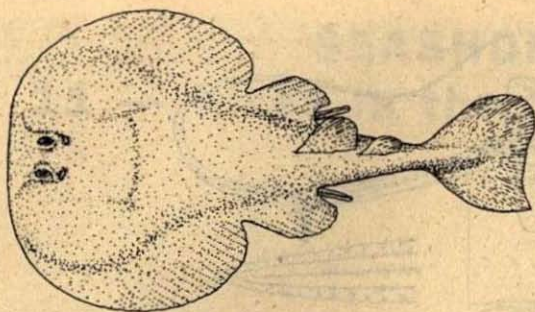
On one of these expeditions, we collected some pompano and kept them in a tub along with a sting ray, pending the arrival of our van to transport them to the aquarium. As we were busy catching more fish at the other end of the net, the tub was left temporarily unguarded. A small urchin, obviously inexperienced, decided to filch some fish without taking the trouble to catch them. He put his hand into the tub, disturbing the fishes, and the sting ray jabbed. The boy was soon rolling in the mud, howling with pain, and his finger had swollen to an alarming size. There was no alternative for us but to abandon our collection and pack him off to hospital, there to ruminate over the oft-repeated adage, 'Crime does not pay.' And that is how a fish made, I'm sure, an honest citizen out of a not-so-straight forward boy!

Ulysses, whose wooden horse idea helped to end the Trojan war, is said to have been slain by the tail-spine of a fire-flair (sting ray). Paradoxically, the sting ray is not belligerent; it never uses its formidable weapon to kill its prey, and never takes the initiative in attack — only for defence. Most sting ray victims are stabbed when they accidentally step, while wading in the sea, on a sting ray lying in the mud. I always advise persons walking in shallow seawater to shuffle their feet.

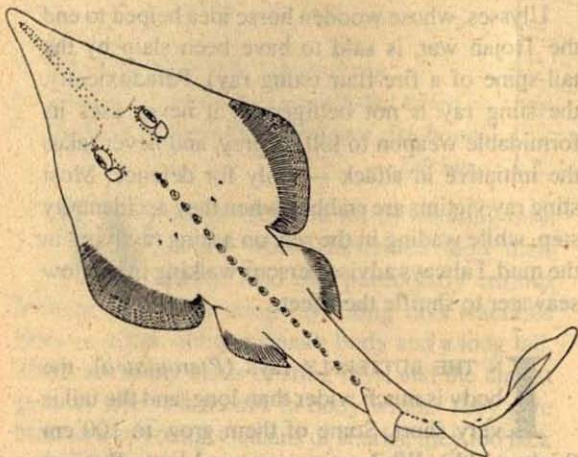
IN THE BUTTERFLY rays (*Pteroplatea*), the body is much wider than long, and the tail is very short. Some of them grow to 100 cm (body width). While sting rays and butterfly rays swim by wave-like motions of the body, eagle rays (*Myliobatis*, *Aetobatis*) and cow-nosed rays (*Rhinoptera*) use their fins as 'wings', flapping them up and down in a movement akin to flying. They have shorter tails with a serrated spine and feed on clams and oysters, which are cracked by flat, pavement-like teeth.



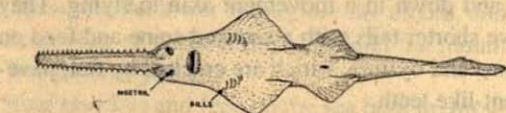
Butterfly ray (left), spotted eagle ray (centre) and cow-nosed ray (right).



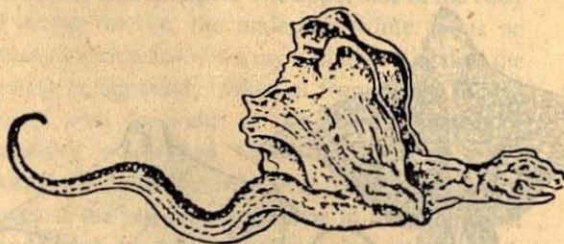
A *Torpedo* normally explodes. This one delivers electric shocks.



Shovel-nosed ray or guitar fish (*Rhynchobatus granulatus*).



The sawfish's method of hunting is gory — and sometimes wasteful — but effective.



A 'Jenny Haniver'. These are made by sailors from dried sting rays by cutting away and trimming the side 'wings' and twisting the remains into grotesque shapes. They are sold as curios with such names as Sea Dragon, Basilisk, Monkey Fish, Sea Eagle or Mermaid. From a woodcut in Gesner's 'Historia Animalium', published in 1558.

The devil ray or manta (*Mobula*) is a harmless fish which feeds on minute planktonic crustaceans and fish. It gets its sinister name from the two flexible, horn-like extensions on the head, which are used to funnel prey into the mouth. Mantas grow to 7.3 metres (body width) and seem to be fond of jumping out of the sea to land with a resounding splash that can be heard miles away. They do not have a spine on their tail.

Electric rays or numb fish (*Narcine, Torpedo*), though related to sting rays, have a distinct fish-like tail and a flat, disc-like body. They can deliver an electric shock, depending on their size, from 60 to 200 volts. The ancient Greeks and Romans knew this, and used them to treat gout and headaches!

When I was younger (and naughtier), I had a cocky colleague from Pune who refused to believe that a fish could give an electric shock. We had just caught an electric ray, and were keeping it in a tub prior to release into the display tank. Wearing my most innocent expression I handed my colleague a metal-framed net and asked him to catch the fish. He bent down to net it, and I still remember his hasty reaction, both in words and action, as he leapt almost a foot in the air!

In all the above fishes, the males can be distinguished, as in sharks, by having claspers used for mating.

THE SHOVEL-NOSED RAYS or guitar fish (*Rhynchobatus, Rhinobatus*) are halfway through their evolution from sharks to rays. The front of the body is flattened into a spade-like head and body, with eyes and spiracles on the upper surface and mouth, nostrils and gill-slits on the lower. But the tail is typically shark-like, with (two) distinct fins on the back and a tail fin. Larger ones grow to 2.1 metres.

Finally, we have the sawfish (*Pristis*). It is aptly named — in front of the head is a long, flat snout with a row of sharp teeth on either side. It is said to rush into shoals of fish and, swaying from side to side, cut into pieces any fish near it. It slaughters as many as it can before the shoal escapes, then begins to eat. Large sawfish grow to 7.3 metres. And how does the mother give birth to young without getting hurt? Simple — the teeth on the baby's snout are folded back and sheathed. ■

FOLKLORE

The Brahminy Duck

NARESH CHATURVEDI

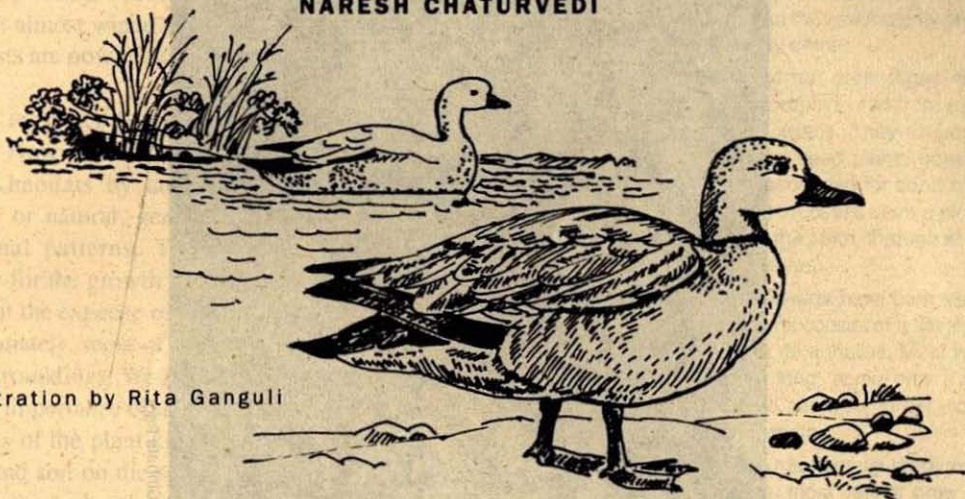


Illustration by Rita Ganguli

LITERATURE DATING FROM the Vedic era refers to the Chakravaka, a bird regarded as the ideal of conjugal love. The Rig Veda compares a Chakravaka pair to the inseparable Asvins. In the Surya Sukta (Atharva Veda), Indra is requested to inspire husband and wife to be like a Chakravaka pair:

The Chakravaka is more commonly known as Chakva-chakvi (for the male and female) or the ruddy sheldrake (*Tadorna ferruginea*). Beliefs about the bird are not restricted to India: it is sacred to Mongolians and Kalmucks too. And according to the Encyclopaedia of Religion and Ethics the red goose, a pair of which is given to newly married couples in China, may well be the same bird.

INDIAN FOLKLORE has it that Chakravakas live in pairs during the day but separate at night, the male keeping to one bank of the river or lake while the female crosses to other side; and they spend the night calling to each other. Kalidasa uses a beautiful allegory in Shakuntala. Shakuntala is sitting in a bower with her companions. When King Dushyanta arrives, the companions depart to leave the lovers alone and to keep watch for intruders. When they see Aunt Gotami approaching (she plays the role of wet blanket, among other things), they warn the lovers:

*O, she-Chakravaka, take leave of your companion,
For here comes the night.*

In Vikramorvaisi, Kalidasa coins a new name for the bird — Rathanga (from rath = chariot, anga = organ). Its nocturnal calls — roughly, *a-oung... a-oung* — somewhat resemble the sound of a badly greased chariot wheel.

THERE IS AN interesting reference in the Markandeya Purana to promiscuity. One day a Kalahansi (greylag goose) and a Chakvi were watching a group of women sporting amorously with a prince. The greylag is all appreciation for the activity, the setting (a hill overlooking a picturesque lake) and the very luck of the women. But the Chakvi, being more devoted to her mate (or merely more straightlaced), criticises such behaviour as being unworthy of good women.

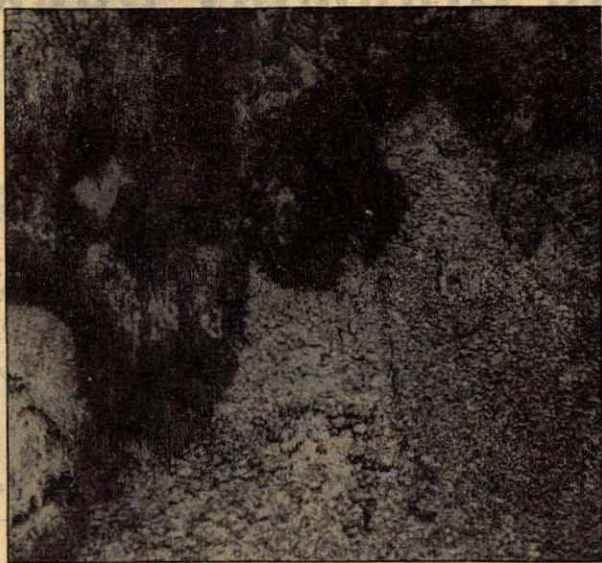
When emperor Shahjahan died, some of his ministers suggested to his son Aurangzeb that he make a tomb for his father across the Yamuna, facing the Taj Mahal (where Shahjehan's wife lay interred).

"My parents were not Chakva-chakvi," replied Aurangzeb. ■

Naresh Chaturvedi is Deputy Director (Collections) at BNHS. An entomologist by specialisation, he is also interested in references to natural history (particularly birds) in Indian literature and mythology.

Himalayan Bryophytes

GIRIBALA PANT AND MALCOLM BERNARD



Giribala Pant

IF THE HIMALAYAS are India's crowning glory, then the multitude of plant species that the region supports are the jewels in the crown. Among the many-splendoured floral gems are the small, green, delicate bryophytes — flowerless, but unique in their beauty and their life-cycle. They come in every possible shade of green, tinged with hues of brown, red and yellow. Tree trunks of *Aesculus*, *Lyonia*, *Rhododendron*, *Quercus*, *Cedrus*, *Cupressus*, *Pinus* and even twigs of small shrubs in the Himalayan region are draped with an amazing variety of leafy hepatics and mosses.

A humid forest enveloped in mist; long garlands of moss hanging from trees; and a limestone cavern or a mountain stream in the background: few scenes can be more mystical. Even on many man-made habitats — stones, bricks, cement blocks, gravel footpaths, road-cut surfaces, cut ends of exposed hills-slopes and roof-tops — bryophytes form a lush green carpet. Conditions in the Himalayan region are ideal for mosses; the altitude makes it cool, the proximity to the ice-caps makes it damp. Consequently, the region boasts of a series of taxa that are found nowhere else.

BUT THIS Himalayan wealth may not remain for long. Bryophytes in general react sensitively to the chemical nature of

their surroundings. Whenever or wherever there is a change in the environment — land, air or water — these plants are the first to be affected. Biodegradation, pollution and indiscriminate exploitation of forests has ravaged their natural habitats. The region does need roads, bridges and hotels, perhaps even hydel projects. But the pace of construction, and the builders' thoughtless lack of concern for the environment, have ensured that few microhabitats or niches remain. Even these few are not likely to last long.

Huge quantities of mosses are being uprooted callously from walls, rocks and tree-trunks, packed in sacks and transported to the plains, where they are fashioned into 'moss sticks' or 'moss pots' for interior decorations in homes and restaurants. Himalayan hanging mosses (members of *Isobryales*, *Hookeriales* and *Hypnobryales*), which drape woodland and forest, are suddenly facing devastation.

Along with Hussain's horses and Shyam Ahuja durries, moss-draped hanging baskets, pots and sticks have become the status symbol of the modern elite. But there is hope yet. Fashion fads rarely last long; one can only pray that this trend dies out before the mosses do.

Mosses are also widely used as packing material for the protection of temperate fruits, especially plums and apples, in many parts of Nainital and

Almora districts. Quintals of moss-material are scraped up each year to satisfy the growing needs of orchard owners. The rare ones have become rarer — some face extinction — and even the common ones of yesteryear are dwindling rapidly. The bryoflora of the Doon valley, Mussoorie and Shimla has already been almost wiped out; the eyes of commercial interests are now focused on the Kumaon hills.

RECOVERY OF a bryophyte population is a slow process. Destruction of original habitats by any disturbance, whether man-made or natural, generally leads to changed successional patterns. The sites become more favourable for the growth of other invading groups of plants, at the expense of bryophytes.

Unfortunately, most of us are indifferent to our natural surroundings. We are not even aware of the ecological importance of this group of plants. These Lilliputians of the plant kingdom help to conserve nutrients and soil on the substrate over which they grow. The thick sheath of corticolous bryophytes conserves humidity around the tree trunks; it is the bryophyte layer that retains much of the moisture in a forest.

The Japanese are very conscious of their heritage of bryophytic flora, and protect it fiercely. In Britain, botanists have organised a campaign for bryophyte conservation. Pamphlets are being distributed in tourism areas and at field study centres. Nature strips are preserved everywhere in the world and people — except in our country — now realise that if we neglect their conservation we will soon have little left to study except herbarium specimens and a few ruderal species.

Since we last wrote in defence of these plants six years ago (*Hornbill* 1986 (1)), the only change in attitude we have noticed is that the educated class of botanists and students has become careful about their collections. Botanical parties, conscious of our diminishing bryoflora, take every precaution not to destroy them. But the real threat — which shows no signs of receding — is from the commercial interests who are busy plundering this green 'gold', unmindful of either the law or of nature. ■

Giribala Pant and Malcolm Bernard are botanists at Kumaon University, Nainital. They have worked extensively on bryoflora, both as academicians and as conservation campaigners for the protection of endemic Himalayan species.

Mosses and liverworts together constitute the group of plants known as bryophytes, which includes some 35,000 species (about 10,000 liverworts and 25,000 mosses) distributed almost throughout the world. Several species are found in Antarctica and others in the Andes and the Himalaya, at altitudes above 6000 m. A few species are found on dry, exposed rocks and in deserts, but the vast majority prefer places which are permanently damp.

Bryophytes, which evolved from green algae, differ from fungi in possessing chlorophyll, and from algae in having multi-cellular sex organs. They are structurally simpler than ferns and seed plants because they have no woody cells specialised for conducting water through the stem (some mosses have a strand of dead cells in the centre of the stem, through which water is transported to the leaves).

All mosses and most liverworts have both stems and leaves, but some liverworts consist of a flat sheet of cells with no stem, known as a thallus. Most liverworts are less than 20 cm long, some only a few millimetres long. Mosses are generally larger, some species reaching 50 cm in length.

Many bryophytes are extraordinarily hardy once developed, but nevertheless, most cannot grow unless the conditions are just right. Several species grow only on bark or rotten wood, and often only on a few specific tree species. And at least six species have adapted themselves to grow on copper ores, and in fact were used by prospectors as indicators for the presence of copper.



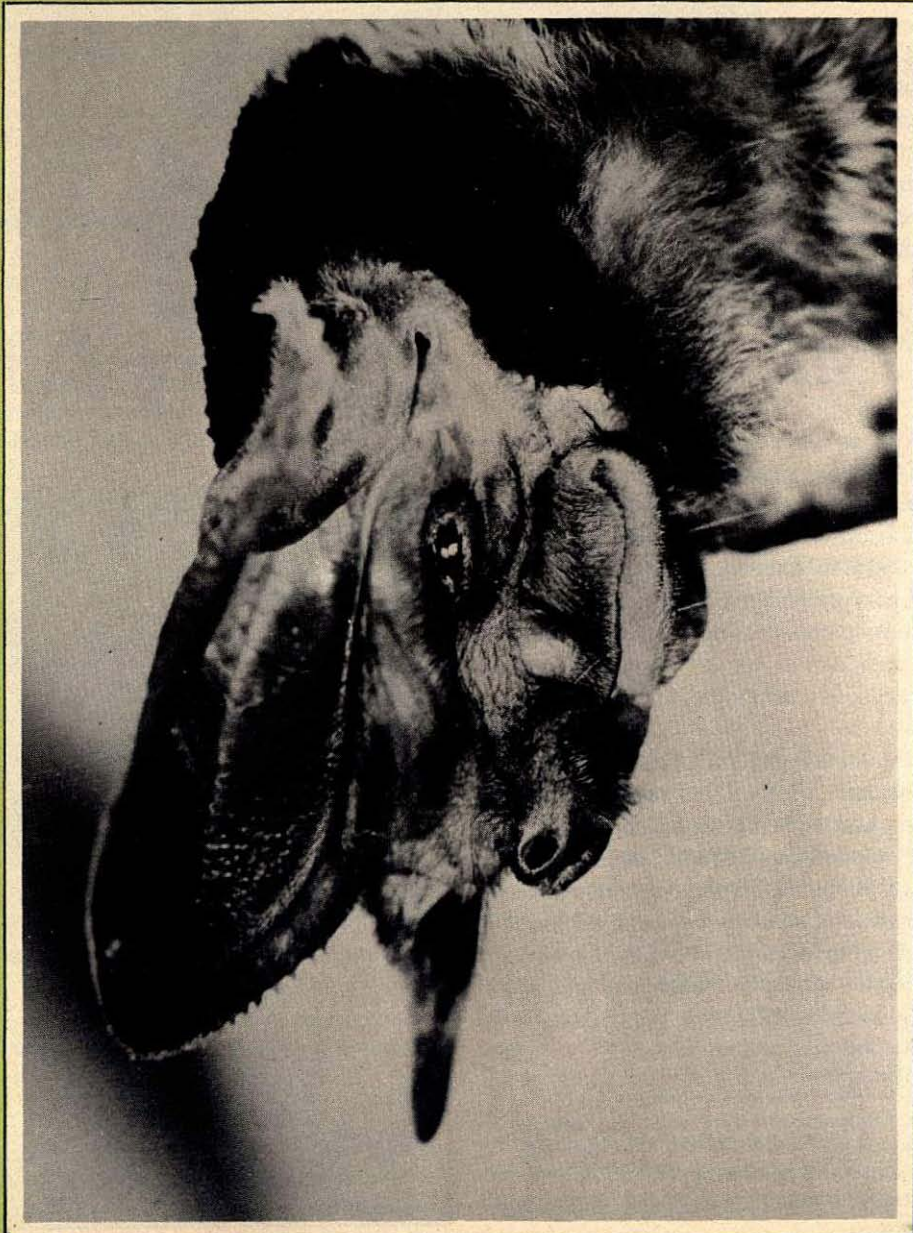
Giribala Pant

Hymenostyliella llanosii — a rare moss found mainly on limestone rocks. Facing page: *Hydrogonium gracilentum* on a moist hillside.

Bryophytes are usually subordinate members of the vegetation, but they dominate the flora of bogs in humid, temperate parts of the world. For example, in Ireland *Sphagnum* fills valleys, covers large areas of hillside and forms circular raised bogs which may be several kilometres in diameter and 10 m higher in the centre than at the edges (decaying *Sphagnum* forms peat, which is locally used as fuel).

The Bats of Barapede Caves

J.C. DANIEL, MANOJ MUNI AND ASAD AKHTAR



Harrison Zoological Museum

The elusive Otomops

NOTHING IS MORE FASCINATING than a rarity. To discover why an animal species should occur in only one area and nowhere else in the whole wide world should awaken the questing spirit of any scientist worth his salt. India has a few such rarities, and perhaps the most interesting among these is Wroughton's freetail bat, known to science as *Otomops wroughtoni*. This insectivorous bat is perhaps one of the rarest of the world's mammals—the only known population lives in a cave in the forests of North Kanara in Karnataka.

Its discovery goes way back to the commencement of the BNHS mammal survey of India in 1913.

A Mr Andering was hunting in what was then known as the Goa Frontier; a wild, undisturbed, thickly forested country. He came across a large cave, hidden behind a screen of vegetation near the village of Talewadi, the last human outpost in that primeval country. Anderson, incidentally, came to the area in pursuit of the herds of gaur that grazed on the grassy plateau on which the village was situated. Intrigued by the bats he saw massed in the pits on the cave roof, he fired a shot, collected half a dozen of them and sent them to the BNHS.

THE SECOND REPORT on the freetail was by S.H. Prater, who was to serve the Society with distinction as its Curator from 1923 to 1948. Prater, who had been enrolled in the Society in 1907 as an assistant, was collecting for the mammal survey in north Kanara in 1913. He described the discovery in the Society's *Journal* the same year. The bats were found at Talewadi in Belgaum district, some 20 miles north of Castle Rock. They occupied a large cave which is locally known as Bara Pede (12 caves) and is reported as being a favourite haunt of bears.

"The entrance is completely screened by vegetation; the interior is very roomy and the sides and upper surface are scarred with deep hollows and ridges. The Otomops sought shelter in the hollows about the entrance. Deep within these holes both males and females were clustered in masses, and a single shot fired into one of these hollows secured some 30 specimens. As a rule, they hang by their hind feet, head downwards, but I saw two specimens clinging flat against the surface of the roof, using the claw at the end of the wing for support. Last December, Mr J.B. Anding, who secured several specimens for the Society, found a female with a young one clinging on in front of it. Out of the same lot we secured three or four foetal specimens, but never more than one from each bat. These bats utter a very sharp cry when alarmed, which they prolong for some time."

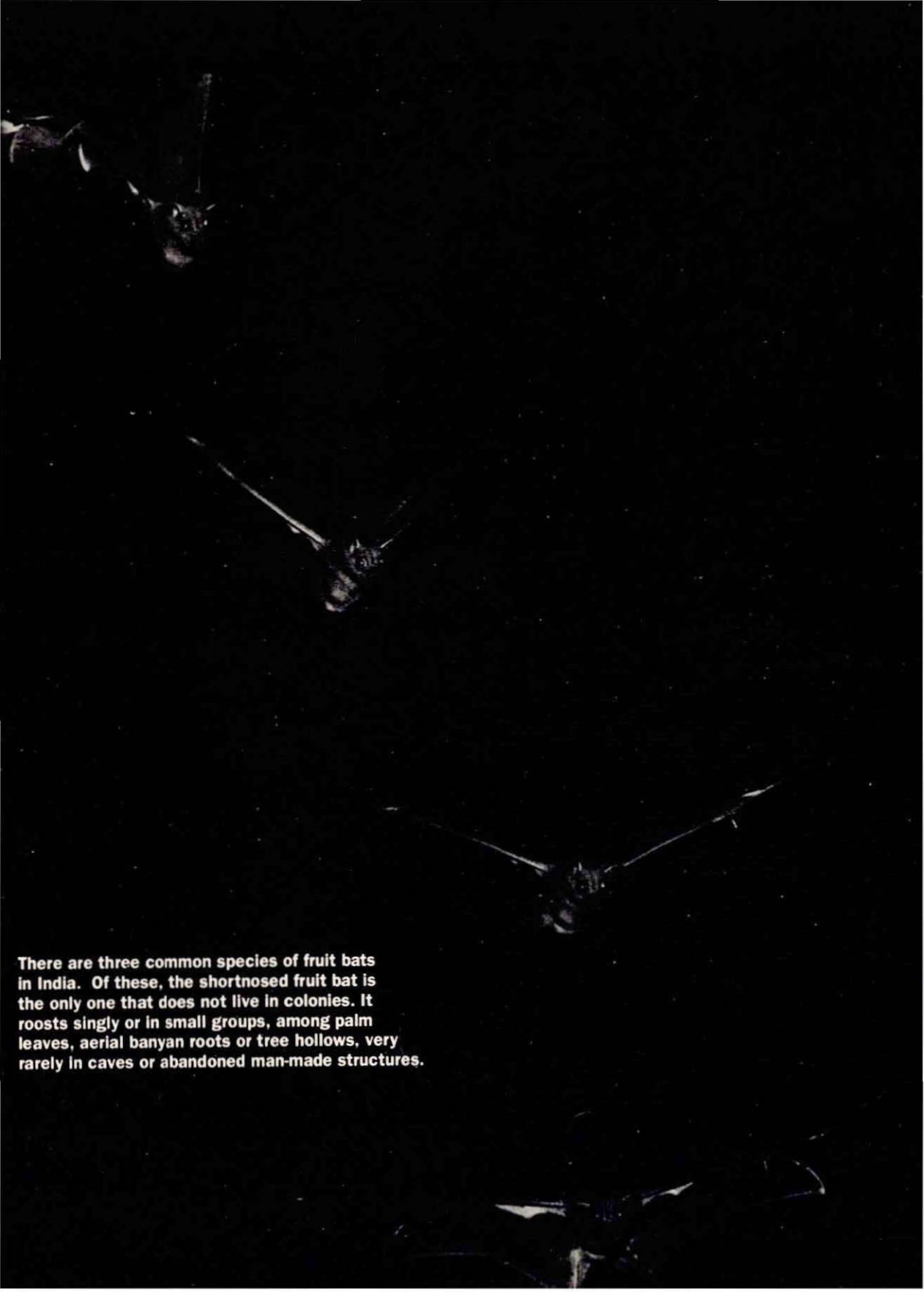


Asad Akhtar

Talewadi — 30 km from Belgaum, the world's most exclusive bat haunt.

The next year I was fortunate enough to obtain a specimen alive. It lived in captivity for about six days, and used to spend the greater part of its time hanging by the legs from a 'game carrier' which was suspended on the wall, though occasionally it climbed up and lay flat on it. From what I observed, this species seemed to prefer a fruit diet and invariably spat out any flies I offered it: at first he would not eat by itself, but showed no reluctance in swallowing pieces of banana put into its mouth. Latterly it fed itself and while in the museum ate a couple of figs that were put into the cage."

THE BAT WAS thereafter forgotten till the early sixties, when Humayun Abdulali (then Honorary Secretary of the Society) and Andre Brosset (a French consular official and a dedicated mammalogist) accompanied by two research assistants of the Society, reached the caves in



There are three common species of fruit bats in India. Of these, the shortnosed fruit bat is the only one that does not live in colonies. It roosts singly or in small groups, among palm leaves, aerial banyan roots or tree hollows, very rarely in caves or abandoned man-made structures.

ECHOES FROM A STRANGE WORLD

India has 96 species under 28 genera. Worldwide, there are over 850 different species of bats, comprising about one quarter of the living mammalian fauna. Bats have been reported from every continent (except Antarctica) and from many oceanic islands and archipelagoes. They have successfully exploited deserts, grasslands, tropical, subtropical and temperate forests, and some taxa range from sea level to mountain tops.

Bats (Chiroptera) are classified under two broad groups, Megachiroptera (fruit eaters) and Microchiroptera (insect eaters). Fruit eating bats are generally larger than the insect eaters, but the best way to tell the groups apart is by looking at the ear. In fruit bats the margins of each ear meet at the base to form a ringed, funnel-like opening; in insectivorous bats they do not meet at the base. Many insect-eating bats (but no fruit bats) have a pair of additional hearing aids known as the tragus and anti-tragus.

Bats have the ability to navigate unerringly in poor light, often in total darkness. Eyesight is one factor, especially in species which are active in the evening or early in the morning. But there are many species which depend little on vision to guide them, using a sophisticated radar system instead. They emit high frequency sound waves which, when they strike an object in their path, bounce back, and are picked up by the bat. These echoes enable bats to locate and evade obstacles in their course.

How do bats pick up these echoes? The faculty of sound perception is probably not located in any single organ. It arises from a combination of senses acting in unison and mutually assisting one

another. The most important is perhaps the sense of hearing. Co-ordinated with hearing is a sense of touch delicate enough to pick up the slightest pulsation in the air, thanks chiefly to the highly sensitive flying membranes. Besides these, many insect-eating bats have another organ of perception — the nose-leaf, which is an expansion of skin around the nose. It may be small and simple as in false vam-



Flying fox (*Pteropus giganteus*)

pires or large and complex as in horseshoe (*Rhinolophus*) and leafnosed bats (*Hippo*). Its intricate folds are lined with fine sensitive hairs. When the bat is alarmed these facial crests, like the ears, are thrown into tremulous movement; the bat turns its head from side to side, seeking the source of danger.

Fruit bats are less sensitive than insectivorous bats, particularly to very high frequency sounds, and are less successful in avoiding obstacles in the dark. Many of them come to grief at night on telegraph and telephone wires, evidence of misdirected flight.

Why conserve bats? These flying mammals have long suffered from a combination of misinformation, prejudice and rapid environmental change. Populations are dwindling, and some species are endangered. Their food supplies have been reduced, and roost sites destroyed. The removal of old trees reduces roosting opportunities; cave-dwelling bats find their roosts blocked or too frequently disturbed by tourist traffic.

While fruit bats often wreak havoc in fruit orchards, they also function as agents in plant dispersal, carrying away fruit from trees to their distant roosts. They feed on flower nectar too, and in the process carry pollen from one flower or tree to another. Insectivorous bats prey on a very large number of insect species, and in large quantities — they are perhaps nature's most important check on nocturnal insect life.

1961. Conditions on the ground were extraordinarily difficult; they walked the last five miles to the caves, and found the bats in the same situation as Prater had described half a century earlier. The bats again sank back into oblivion till the Hungarian mammalogist Topal somehow managed to hike a ride on a truck to the village in the seventies.

THE SPECIES IS one among six of the disjunctly distributed species of the genus *Otomops*.

One species occurs in Africa, one in Madagascar, one in India, one in Java, Indonesia and two in Papua New Guinea. Commonly known as big eared freetailed bats or bigeared mastiff bats, very little is known of their habits.

The Barapede caves and its bat have always had an extraordinary appeal to us at the Society and the opportunity to visit the caves again came recently. The Society is presently assisting Drs Harrison and Bates of the Harrison Museum in Kent, U.K., the authors of 'Mammals of Arabia', in the preparation of a three volume monograph

on the mammals of India. What we wanted to do was to resurvey the areas surveyed earlier by the Society's mammal survey (1913-1923), and use mammals as indicators to determine the present status of the environment. As a preliminary exercise we decided to look at areas in western India where Brosset had studied bats in the early 1960s. And the cream as it were of this month long field study was the visit to Talewadi and the Barapede caves.

We arrived in Belgaum on 24th March, and took

the road to Talewadi the same afternoon. We were not quite sure of the location but knew that the village was approximately 50 km to the south and west of Belgaum. Near the town of Khanapur, we approached a narrow bridge protected by what the Highways department had thoughtfully labeled as 'Tremble Trips'. These were in fact a formidable array of rumble strips; and as we rolled over them, smoke began pouring out of the bonnet. The jeep had caught fire. Nair, the driver, shot out, opened the bonnet and everyone threw sand in with a will. The fire went out, leaving a charred main cable, effectively immobilizing the jeep.



False vampire (*Megaderma lyra*)

Harrison Zoological Museum

LUCKILY A good Samaritan turned up: the driver of another jeep. He took Manoj, Asad and Nair to Khanapur, while we lounged in the shade of large mango tree sipping tea from a nearby tea shop. The jeep returned with an electrician who did some magic with wires, and we were back on the road. While the wiring was being redone, Drs Harrison and Bates and Manoj Muni

hitchhiked to Belgaum in a truck in search of bats in the Belgaum Fort (they were unable to collect any, as it later turned out). We returned two hours later with a defective alternator and the battery light indicating that it was being drained, and that was the end of day one.

On the second day, while the alternator was being repaired we continued our hunt for bats. An abandoned mosque in the centre of the city provided an exciting chase and capture of a false vampire bat.

The false vampire (not related to the blood sucking vampires of South America) is the most carnivorous of Indian bats. Apart from insects, it preys on small roosting birds as well as lizards and tree frogs which it picks off trees, walls, and rock faces. One curious bird banding recovery recorded by the BNHS was of a swallow; it had been ringed near Cochin, but the leg was recovered from below a *Megaderma* bat roost near Point Calimere on the east coast of Tamil Nadu.

In the afternoon we again set out, braving the rumble strips, passed through Khanapur and started our search for the road to Talewadi. Enquiries in our execrable Marathi and Kannada did not produce satisfactory results till we stopped a bullock cart. The cartman's instructions were fairly precise — take the road to Gunji railway station 10 km further down the highway, cross the railway track, and keep going west; the road would end at Talewadi. We set off once more. Now the road plunged into the forest, deteriorating in quality as we moved deeper into the hinterland. Shirol, the last forest rest house, was more or less the halfway mark.

THE ROAD WAS not even a cart track thereafter but merely a gap between trees; and the route had apparently been decided by the trees. Finally at dusk we climbed the last gradient to the plateau and reached Talewadi and luckily enough, drove into the courtyard of a villager who seemed to be a man of some substance. He not only knew the location of the cave but was also willing to take us there immediately, before the last light faded. We picked up a pair of long poles to hang our mist nets and with our guide and his assistant drove up part of the way to the cave, then walked along the slope of the hill till we reached the cave. It was exactly as it had been described eighty years earlier, hidden behind a screen of vegetation, wide and roomy within; but most of the bats had left for foraging.

The mist net held at the entrance trapped only a few specimens of the not uncommon *Rhinolophus rouxi*. Those of us who were inside the caves could hear and see a larger, fast flying bat which was reluctant to fly out. We therefore 'trawled' with the net and as we neared the end of the cave, caught three of these bats. To our delight they were *Otomops*: the beautiful dark grey mantle contrasting with the vel-

vety brown of the back was distinctive. So was the loud squeaking call. Their faces did look like something conjured up by the special effects man of a horror movie. But to us they were the most precious — and beautiful — among our collection. It was a happy band of bat hunters that returned to the village.

OUR HAPPY MOOD seemed to have preceded us. The villagers were very obviously firm believers in the ritual of having sundowners. Even our normally silent driver was garrulous and had apparently participated in seeing the sun down. But it remained only a suspicion as we were unwilling to light a match in the alcohol fumes that surrounded us; and Manoj and Asad held the opinion that in the alcohol surcharged atmosphere he deserved the benefit of the doubt.

It was at this moment of general gaiety that the jeep performed its second act of sabotage. The headlights went off. The pitch darkness that followed was met with a momentary silence and then the babble and bustle started again. People ran to fetch lights, torches were produced and we watched Nair, who had thoughtfully brought along a packet of fuses, burn then all out one after the other. Finally he tied a piece of copper wire in the fuse box strong enough to hold up against a surge of probably a thousand volts, well beyond the capacity of the poor jeep, which admitted defeat. The lights came on.

Taking a villager with us as an insurance against being left guideless in the dark en route, in case the lights failed again, we started back for Belgaum. Sure enough, as we reached the highway the lights went out again. But again luck was with us. Even while Nair fiddled around with the fuse wire, another good samaritan turned up, a man driving a car to Bangalore. He disconnected one of the headlights which was shorting, and we drove back to Belgaum like a one-eyed Cyclops, happy and contented. ■

J C Daniel was Curator of the BNHS for over 35 years. One of India's most eminent naturalists, he is a member of the IUCN Specialist Groups for elephants and reptiles. Manoj Muni and Asad Akhtar are biologists at the Society. Muni works with the BNHS collections and specialises in mammal taxonomy. Akhtar is an ornithologist who has worked on cranes, migratory waterfowl and raptors.

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The Bombay Natural History Society was formed 109 years ago, as a forum for exchanging information on natural history. Over the years, it has helped to shape the course of wildlife conservation in India. Its members and scientists have helped document India's diversity of wildlife; BNHS studies on little-known and highly endangered species have provided the basis for many conservation projects, and indeed for the establishment of some of India's best known sanctuaries and national parks.



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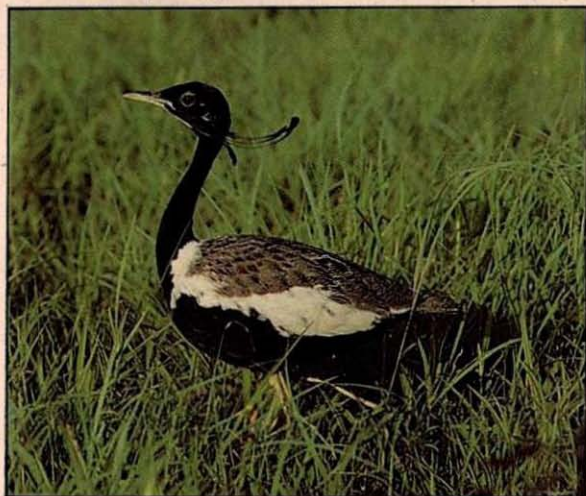
Access to India's finest library of wildlife and shikar books, including priceless volumes over a hundred years old, and available nowhere else. Outstation members too can borrow books.

The use of a reference collection — recognised by the government of India as a National Heritage Collection — of specimens of birds, mammals, butterflies and reptiles, built up over more than a century.

Today, the BNHS is Asia's premier conservation organisation, with members in over thirty countries and an international reputation as an authority on Indian wildlife.

The Society's work is not restricted to wildlife research. Its publications wing has produced a series of books on natural history, many of which are standard works of reference. It runs a nature education programme of over fifty years' standing, propagating conservation through film shows, lectures and nature camps for students, biology teachers and the Society's members.

BNHS members enjoy a range of activities — film shows and lectures on natural history, regular weekend bird-watching trips, and the opportunity to participate in environmental conservation campaigns, and even field studies in wildlife sanctuaries and national parks.



The lesser florican is one of the world's most endangered birds. BNHS studies have focused on the critical factors involved in the conservation of such species.

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