

Hornbill

BOMBAY NATURAL HISTORY SOCIETY



COVER PICTURE

Swamp Deer *Cervus duvauceli duvauceli*, by Ravi Sankaran

The Swamp Deer is a gregarious species that inhabits grasslands and marshlands. Two races are recognised: *Cervus duvauceli branderi*, found only in the grasslands of Kanha, Madhya Pradesh, and the marsh-dwelling *C.d. duvauceli* that inhabits parts of the *terai* in Uttar Pradesh, Assam and Nepal. The latter, in an adaptation to its habitat, has spongy hooves, larger and more splayed out than in the Kanha subspecies.

The steady decrease of *C.d. duvauceli* populations is due largely to the reclamation of the deer's marshland habitat for agriculture. Today they occur only in isolated pockets, and their status in most parts of their range is not clearly known. Dudwa National Park, where this photograph was taken, now holds about 800 swamp deer, the largest population in the country.

Acknowledgement

We are grateful to Seth Purshotamdas Thakurdas & Divaliba Charitable Trust for financial help for the publication of *Hornbill*.

The Society was founded in 1883 for the purpose of exchanging notes and observations on Zoology and exhibiting interesting specimens of animal life. Its funds are devoted to the advancement of the study of zoology and botany in the Oriental Region. The Society also promotes measures for conservation of nature.

Membership of the Society is open to persons of either sex and of any nationality, proposed and recommended by one or more members of the Society; and also to persons in their official capacity, scientific societies, institutions, clubs, etc. in corporate capacity.

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Entrance Fees Rs. 50.00

Subscription

Ordinary individual membership Rs. 75.00

Ordinary corporate membership Rs. 250.00

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Ordinary members may subscribe to the *Journal*; annual subscription Rs. 80.00 for members resident in India.

The first annual subscription of members elected in October, November, or December will extend to the 31st December of the year following the election.

Write to: The Honorary Secretary,
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Editorial

The Overloaded Ark:

Sanctuaries and National Parks are the last refuge for wildlife in India. Many among them shelter the surviving remnants of once widely distributed populations of endangered species. The majority of the sanctuaries are circumscribed in area, with little or no possibility of extension. The protection by forest departments of State Governments has ensured that none of the animals has become extinct since 1948, when the Cheetah disappeared from the Indian scene. It is unlikely that existing endangered species will become extinct. However, the animals and their habitats are under persistent pressures, one such pressure being uncontrolled tourism.

Most of the sanctuaries have limited viewing seasons, and these are being over-exploited. Those which are open throughout the year have no respite at all. For example, the Keoladeo Ghana National Park at Bharatpur has thousands of people visiting it on public holidays. In other areas like Manas, uncontrolled vehicular traffic is a particularly pernicious bane. Admittedly, tourism does help in getting people oriented towards conservation. However, unless it is managed with discretion, the demands it makes on the habitat and the disturbance it creates may prove to be a leading cause for extinction. ■

Tourist invasion — Manas Sanctuary



Lagga Bagga

ASAD R. RAHMANI

There was something funny about the name, and whenever I thought of places to visit in search of the Bengal Florican, Lagga Bagga always came to mind. I asked many people in Uttar Pradesh, but no-one could explain the origin of the name.

It was in April 1985 that the name was first mentioned. We were with Mr. K. K. Chattree of the UP Forest Department, discussing our forthcoming survey of the florican. He

tried to locate Lagga Bagga on the map, but without success. Perhaps cartographers did not find it important enough; we certainly did, because it held the possibility of sightings of this elusive florican, and this was our first survey of the species. We did the survey, but unfortunately the visit to Lagga Bagga did not materialise because elephants (the only means to get there) were not available at short notice. It was not till three years later, in May '88, that

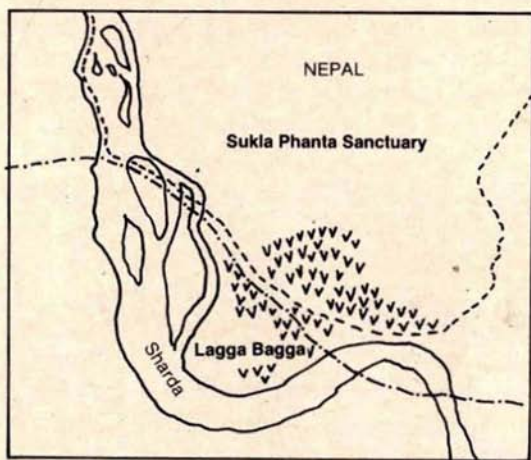


we finally made the trip.

This time there was no talk of elephants. Had the area become "developed" in three years' time? Fortunately, my fears were unfounded. The area was as remote as ever, but now it could be reached by a more modern means of transport — a country boat. The local ranger was unable to accompany us, but deputed a forest guard to act as a guide. The guard seemed unusually keen to come along; the reason became apparent only later.

We started from the rest house at Mustufabad, in Pilibheet district, Uttar Pradesh. A five kilometre drive through thick forest brought us to a crossing called Bifurcation. Then came a 14 km drive along the embankment of the picturesque

Sharda Sagar reservoir and a thankfully short drive down a dusty road filled with potholes, and we reached a forest *chowki* called Naujalia. The local forester took his own time to get ready, but the moment his official *topee* was on his head, he developed extraordinary enthusiasm. He guided us to another village, a Bengali settlement called Kutiacover, where the boatman lived. As soon as the village children saw our jeep they poured out from every hut. It was hard to decide what to avoid first — a pothole or a child. After successfully negotiating large numbers of both we reached the boatman's hut. He was missing; a search revealed that he was away fishing — not an unusual pastime for a Bengali! He reluctantly returned to his hut, with us trotting



- International Boundary
- Sukla Phanta Boundary
- ▽▽▽▽ Grassland



Location of Lagga Bagga

behind him in single file, and hundreds of children following. It was like something out of the Pied Piper of Hamelin; there was even a lame child who could not catch up with his more exuberant companions.

We could see Lagga Bagga across the Sharda river. Because the current was swift, the boatman took a long detour to reach the opposite bank. We had left the rest house at 2.00 p.m. By the time we finally reached Lagga Bagga it was half past five. The forest guard suggested that we return to Mustufabad, and come back the following morning, so that we could spend the entire day at Lagga Bagga. But having come so far, we decided to explore. A 3 km walk in the forest and the fording of a wide stream brought us to a beautiful grassland, which appeared to be ideal florican habitat. There were no sightings that day, even though we covered the whole 50 hectare patch on foot, trying to flush the birds. The guards were extremely reluctant to participate; they feared they would perhaps flush a tiger instead. And the boatman, amused to hear that we had come all the way from Bombay merely to see a bird, elected to stay back and smoke his *bidis*. We then decided to go back, hoping for better luck the next day.

The return trip proved considerably more difficult than we had expected. It was dark by the time we got to Naujalia. Then the guard, who was meant to escort us to Mustufabad, announced that he was staying back. No wonder he had been so

eager to accompany us — he had wanted a ride home. We now had to drive back in the dark, along an unfamiliar forest road, and it was 9 p.m. by the time we reached the rest house.

We started at 5 a.m. the next morning. This time things moved much faster, mainly because we were accompanied by the ranger. The guards and foresters were ready at the Naujalia chowki when we reached there, and even the boatman at Kutiacover was waiting. By 7.30, we were in Lagga Bagga.

Lagga Bagga is about 11.6 sq. km of typical terai forest in the Mustufabad range of Pilibheet district. The area was so remote that it was rarely visited by the forest officers. Even the ranger, who lived barely 20 km away, confided that it had been twenty years since his last visit. That was during an earlier posting to the area; and during the three years of his current posting, not once had he visited the place.

The area abuts Nepal, and the Sharda river (known as the Mahakali in Nepal) forms a loop around the area (Map). The river is fairly deep, and is not spanned by a bridge, and so a boat is the only means of reaching Lagga Bagga from the south. On its northern side, it is contiguous with the domain of Nepal; more specifically, with the Sukla Phanta Wildlife Sanctuary, and this reduces to some extent the human pressure on this tiny patch of forest.

The 160 sq.km Sukla Phanta is



one of Nepal's important sanctuaries, and harbours a variety of endangered species. Nearly 4% of its area is under grassland — the chief habitat of the Bengal Florican — and 14-15 of the birds were seen by an ICBP team during a 1982 survey of the sanctuary. The grassland in which they were seen abuts the grassland of Lagga Bagga : they are separated only by the international boundary, which consists solely of a small ditch. It is therefore likely that there are floricans in Lagga Bagga too.

Sukla Phanta is strictly protected; the guards are said to have shoot-at-sight orders to control poaching, and Indian guards are afraid to enter the sanctuary without permission. Unfortunately, Lagga Bagga is not so

well protected, and Nepali graziers have a free run of the area. There are plans in Nepal to increase the size of the Sukla Phanta sanctuary by extending its eastern boundary to include more grassland areas. It would be of great value if India and Nepal could collaborate in this proposed expansion. There is certainly a strong case for awarding sanctuary status to Lagga Bagga, and making a protected forest out of the contiguous stretch of grassland that runs across the border.

In spite of the illegal grazing, the grasslands of Lagga Bagga are still healthy. There are three major grassland patches, known locally as *Chander*. One is not very suitable for the habitat-specific florican (the grass, upto 2 m high, is too tall), but

the other two are perfect, with growth less than a metre high when we visited it. *Grewia sapida* (local name *Phalsa*) was seen in abundance. The plant thrives in the Manas Tiger Reserve in Assam, too, and the floricans there have been observed eating the fruit.

We surveyed all three grasslands on foot. By the time we reached the last one it was already 9.30 a.m. — not the best time for florican-spotting. This bird is seen in short grass usually only in the early morning or late evening; it spends the rest of the day hidden from view in the tall grass. Moreover, like other bustards, it is wary and easily alarmed. We were walking without any attempt at circumspection, and with far more noise than on a conventional bird-watching trip, so as to warn off potentially dangerous animals like the tiger or wild boar (not only adult males, but even a female with piglets, can be dangerous). The guards were discussing departmental politics with such passion that any self-respecting florican would have taken cover.

The faunal list of Lagga Bagga does not end with the florican. There are many others, some almost as endangered, and all worthy of protection: tiger, leopard, bear, cheetal, sambar, barking deer... We found droppings of the extremely rare hispid hare. The swamp part-ridge has disappeared from most other areas because of destruction of the wet grasslands that are its habitat, but it is present in Lagga

Bagga, possibly in adequate numbers: we heard its call in several parts of this small forest. Peafowl and Red Junglefowl are said to be common here, though I have no definite information on their status.

An hour's walk brought us to a beautiful grassland of thatch grass, which lay beyond a narrow grass covered ditch. We jumped across, and only then realised that we had illegally crossed a border: we were in Nepal. Our escorts requested us not to go further, and we decided to rest in the shade of a *Simul* tree. We sat silently, perhaps unconsciously out of reverence to the unspoilt beauty of nature. The vast stands of emerald-green grass moved softly with the breeze. The only sound was the calling of a perky Streaked Fantail Warbler performing its undulating aerial display. Soon the bird landed on the Indian side, where possibly its partner waited, and all was silent once more.

I fell into a reverie, thinking about the stupidity of having political boundaries, which seem to do nothing except deface the good earth. Do we really need these borders? The floricans are free to move to and fro across the border. We, in spite of claiming to be *Homo sapiens* (= wise men), are not. And we have imposed this restriction on ourselves. Perhaps we could learn some lessons on coexistence from the animal world. ■

Birds From A Feather...

S.M. SATHEESHAN

Positioned in the control tower of Bombay airport one winter afternoon in 1982, I looked through my binoculars at a group of birds on the tarmac. They were unaware of impending disaster in the form of an aircraft on its landing run. There was no time to chase the birds away or to warn the pilot; and even if there had been, it would have been of no use. The aircraft approached closer, and most of the birds flew off. But two failed to escape; one succumbed to the force of the impact, the other was roasted alive by the jet blast.

Half an hour later, I had the carcasses of both victims. It was easy to identify them as Pariah Kites — I had seen them clearly before they were struck down. If I had not been present at the site of the accident, or if I had been given only a feather (or just a fragment of a feather) instead of a nearly intact carcass, identification would have become considerably more difficult. It would have involved checking through the 2100 odd species and subspecies found in the Indian subcontinent: time, effort, and no guarantee of success. It is here that the study of feather structure, macroscopic and microscopic, comes to ones rescue.

In addition to field work in the study of bird hazards at Indian aerodromes (an ARDB-sponsored project on which we have been

working for the past 9 years), my job also involves identification of bird species from the remnants of bird-aircraft collisions. This identification is a crucial preliminary in the countrywide attempts to tackle the problem of bird hazards at airports.

Macroscopic and microscopic studies complement each other in making a confirmed identification, but it is not always possible to do both satisfactorily. For example, the downy barbs at the base of a feather, which are necessary for microscopic study, are often absent. One then has to depend solely on macroscopic study, comparing the remains with specimens, a process made even more difficult when the feather fragment lacks the characteristic colour or shape. When the bird remnants include full feathers of characteristic shape and colour, or other parts like the beak, legs or claws, they are first compared with study specimens in the BNHS collection. Frequently one can, by detailed macroscopic examination, identify several species: for instance, crows, rollers, doves, pigeons, sandgrouses, plovers, vultures, kites and harriers from the remnants. But it frequently demands the eyes, and the patience, of a gem-sorter!

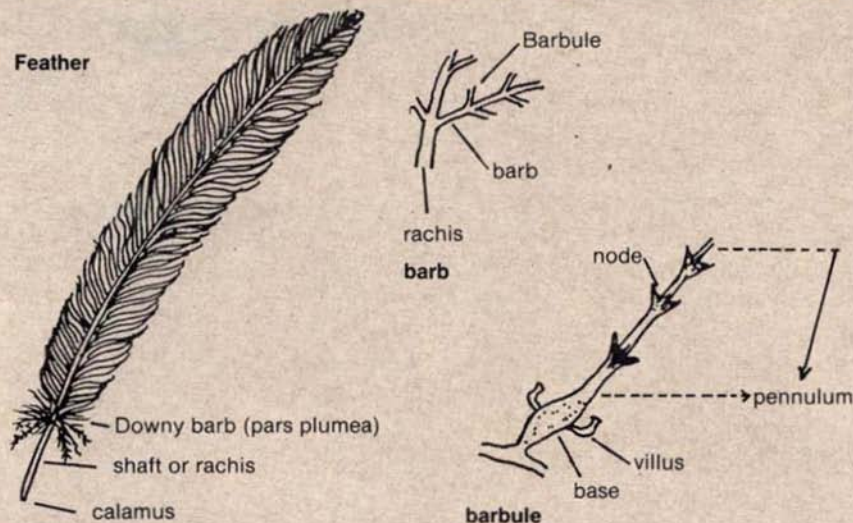
BNHS once received a bill-like structure from Gwalior aerodrome. The people at Gwalior suspected it was the bill (lower jaw) of a duck, and



Pariah Kite on an airport runway light. This species accounts for over 25% of all bird-strike incidents; its fairly large weight (approx. 650 gm) and its pattern of flight, covering a wide range of altitudes, makes it particularly dangerous to aircraft. Plentiful food — insects, snakes and rodents within the airport, garbage and offal from garbage dumps and slaughterhouses outside — is a major cause for its being so common around airports.

R.B. CRUSH

Feather



Bird feathers are of different types, from the (simplest) feathers that make up the down or under-plumage, to the vane or contour feathers, which are the most highly developed, and give each species its characteristic appearance.

The quill of the feather is rooted in the skin. When the growth of the feather is complete, the quill is sealed off, so that the feather, though it is manipulated by muscles in the skin, is itself a "dead" structure.

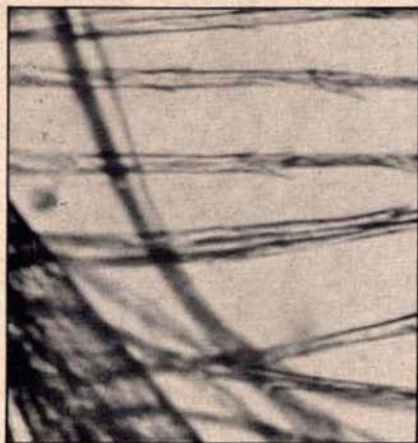
In contour feathers, a tapering central shaft continues from the quill. The short, hollow basal portion of the shaft is known as the rachis, and the larger, solid distal portion as the calamus. Two rows of barbs branch out from the rachis to form the vane, and each barb in turn branches out into barbules, which are usually too small to be seen with the naked eye. The barbules interlock, providing a measure of rigidity, and a smooth, uniform surface, to the feather, and this ensures that the feathers (and therefore the wing) remain aerodynamically efficient. (If the vane is disturbed, the bird has only to pass it through the bill for the barbules to link up again.)

we spent weeks comparing it with the bills of every duck and goose in our collection. Then, at a suggestion from Dr. R.B. Grubh, who has a personal knowledge of vulture anatomy from his studies in the Gir forest, we cut open the formalin-preserved head of a Whitebacked Vulture. And sure enough, the 'duck bill' turned out to be a vulture tongue!

How does one tell how many birds were involved? This is much harder than identifying the species, and frequently impossible. Sometimes,

however, there are clues. It is usually possible to tell the exact position the feather had occupied on the unfortunate bird's body — for instance, to distinguish between primary and secondary feathers, or between feathers on the right and left wings. If two feathers from the same wing or the same side of the tail are present, then one can conclude that at least two birds were involved.

For microscopic study, several permanent slides of the feathers from a single bird remnant are prepared, and compared with slides prepared



Barbules, under a microscope. Left: Blue Rock Pigeon, x125. Right: Whitebacked Vulture, x320.

from feathers of known bird species. The feather is cleaned (soap and warm water will do nicely), dried and fluffed out. Then a few of the downy barbs at the base of the feather are cut off close to the shaft, and kept on a clean, dry slide. A cover-glass is laid over the specimen. Adding a few drops of a mountant called DPX (the chemical name is a tongue twister) along the edges of the cover-glass ensures that it sticks to the slide. The slide is ready; now the painstaking process of identification begins.

The downy barbules (*Pars plumea*) consist of a base and a pennulum (Figure), and it is here that the features of groups, and even of species, can be distinguished. The pennulum may be clearly divided into swollen nodes and thin internodes (the space between nodes). The size, shape and arrangement of these nodal structures are different for different groups of birds. Out-growths called villi may be present at the base of the barbules in some

groups of birds. Lengths of barbules, and the number of nodal structures per millimetre length are also distinctive of certain groups. The Columbiformes (pigeons and doves), for example, have large, flattened plate-like quadrilobed basal nodes. In the Anseriformes (swans, ducks and geese), on the other hand, the distal nodes are triangular or heart-shaped.

Bird-strike remnants are usually sparse, nondescript fragments of feathers. Even these, however, are often sufficient to identify the bird to species, or at generic level. Out of 380-odd bird strike remnants received at the BNHS from 1980 onwards, 315 have been identified to species or generic level. More than 59 species have thus been identified as 'accident-prone'. Solving the problem of bird hazards is both difficult and time-consuming, but finding out which species are involved, and how often, is a step forward in the understanding of the problem. ■

News, notes & comments

More money for wildlife

The 8th five year plan brings good news (and the usual doubts about implementation) to conservationists. The Environment & Forests Minister announced in August that Rs 848 crores would be allocated for wildlife conservation, compared to Rs 48 crores in the 7th plan. The number of sanctuaries would increase from the present 398 to 500, and national parks from 67 to 137. By the end of the 8th plan, the government feels, approximately 150,000 sq. km, or 4.6% of India's land area, will be protected.

Two new projects — to save the elephant and the snow leopard — are planned, with initial outlays of Rs 20 and 15 crores respectively. Project Tiger, in spite of its many problems, has on the whole been a notable success; and it can only be hoped that the lessons learnt there will be put to good use while strategies to save the elephant and the snow leopard are being planned.

Chilka Lake

Asia's largest brackish water lake is growing smaller. Heavy siltation is causing the Chilka lake in Orissa to shrink by approximately 1.4 sq. km a year. A further 14 sq. km is affected by weed growth each year. Both siltation and weed growth, in addition to reducing the water area,

also reduce salinity levels — a change that is likely to disturb the delicate balance of this ecosystem. A Rs 12 crore plan has now been drawn up by the state government for desilting the lake. This includes the purchase of a dredger. As for the weeds, it has been proposed to hire a weed harvester from the Central Institute of Fisheries Technology to clear the growth, and later to use the weeds to produce compost. There are also plans to widen the lake mouth (which opens into the Bay of Bengal). Chilka lake, in spite of its many problems (severe overfishing being one of them) still provides a rich habitat for a variety of wetland birds. At the rate at which it is now shrinking, some observers have predicted that it will cease to exist in another 400 years or so. It would be unfortunate if the authorities dawdled over the implementation of these programmes on the grounds that 400 years is plenty of time.

Waterfowl Count

The third annual waterfowl count conducted by the BNHS with the help of individuals, wildlife organisations and NGOs, was held in January this year. Analysis of data has now been completed, and the results will be published shortly. Observations were made at over 530 sites throughout the country; almost

all the major states were covered, except Bihar. The count is undertaken not only to provide population data, but also to create public awareness of the importance of wetland ecosystems and the waterfowl that depend on them. It has succeeded on both counts. Some results from the '89 count:

Giant Heron: Sightings have been scarce in recent years. This year, one was recorded in Assam and 2 in Gujarat. Two more records (5 individuals in Madhya Pradesh, 6 in Maharashtra) have yet to be confirmed.

Siberian Crane: 22 at the Keoladeo National Park, Bharatpur, and a single bird in the Karera Bustard Sanctuary in Madhya Pradesh.

Marbled Teal: 14 were seen; sightings of another 30 in Tamil Nadu (which is far south of its normal range) have yet to be confirmed.

Baer's Pochard: It is possible that it does occur in numbers in the northeast states. 3173 were reported from Assam and 15 from Tripura.

Stork arrives in rhino village

The rhino reintroduction programme, at the Dudwa National Park has met with mixed success since it began in 1985. But with 3 calves born this year (the first births since '87) the Project Rhino director, Mr. R.P. Singh, is hopeful about the future.

The programme started with 5 rhinos being airlifted from the Pobitara Wildlife Sanctuary, Assam, of which three survived. Four more



Field biologist in the rhino enclosure — the hard work pays off.

were brought from Nepal. The loss of one calf at the end of 1987, supposedly killed by a tiger, and the death of an adult male in a territorial battle with a younger male, seemed to set the project back. With the new births, there are now 9 rhinos in the 27 sq.km, electrically fenced-in enclosure: 1 male, 5 females and 3 calves. However, this nucleus of 6 adults rhinos is much too small. It is hoped that the target originally planned — release of 30 animals within the enclosure — is reached soon.

Wetlands Directory

The IUCN has published a Directory of Asian Wetlands, consisting of 24 national reports compiled over a 3 year period. Over 900 sites are described, along with their respective wetland values (water storage, flood control, coastal protection, fisheries and wildlife). It concludes that an alarming 85% of the sites surveyed are threatened with destruction, or at least significant

degradation.

Spoonbill Sandpipers

A flock of 257 Spoonbill sandpipers *Eurynorhynchus pygmaeus* — the largest flock ever seen in the non-breeding period — was discovered in Bangladesh in late January this year, according to a report in *Asian Wetland News*. The birds were spotted during a survey of the islands around Hatiya Island in the Noakhali district in Bangladesh. Two of the birds had earlier been ringed in their breeding grounds in northeast Siberia. If this is indeed a confirmed sighting, it is a significant one: this species is usually seen in twos and threes in the non-breeding season even in places like the Point Calimere Sanctuary, which has extensive mudflats, the bird's preferred habitat.

Manas Sanctuary

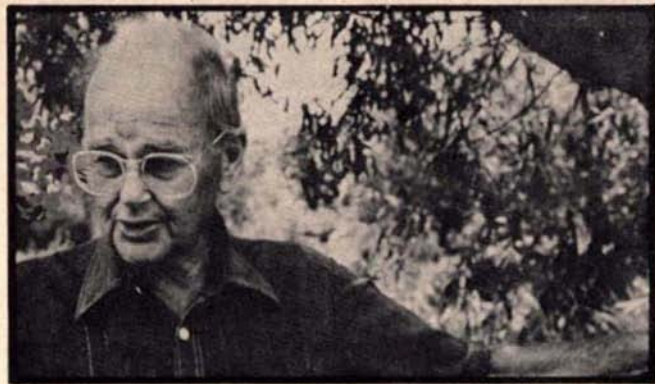
The Manas Wildlife Sanctuary is suffering from a combination of politics, violence and governmental inaction. The continued presence of Bodo militants within the sanctuary threatens to make a mockery of conservation efforts. The Chief Conservator of Forests, Assam, recently asked for army assistance to flush out the militants, but was turned down by the government. There is a possibility, however remote, that Manas may be removed from the World Heritage list if the problem continues unchecked. The operational guidelines of the World Heritage Convention contain a provision to remove an area from

the list in cases "where it has deteriorated to the extent that it has lost those characteristics which determined its inclusion".

Manas has recently been declared a biosphere reserve, and several new conservation schemes have been announced. But it makes very little sense to plunge headlong into new schemes, even with the best of intentions, while turning a blind eye to the wanton destruction that is now taking place within the sanctuary.

Large mammals, small numbers

Censusing wild animal populations accurately is always difficult, and the numbers obtained can sometimes prove wrong by embarrassingly large margins. The International Whaling Commission earlier used data from catches by commercial whaling ships to estimate populations. Now, for the first time, data from surveys is being used for the estimates, and the results are almost frightening. The earlier estimates of Blue Whale populations stood at 11,000. Current estimate (which was discussed at this year's meeting of the Commission, and is currently under review): five hundred. For Fin Whales, the estimates have been reduced even more drastically: 102,000 earlier, a mere 2,000 now. Efforts are now being made to complete the census for other species by 1990, when the current moratorium on commercial whaling will be reviewed.



Sir Peter Scott, 1909 —1989

On August 29, the world lost a man of extraordinarily diverse talents, and the moving force behind many of today's most successful conservation programmes. Sir Peter was associated with the International Union for Conservation of Nature (IUCN) from its beginnings, and was Chairman of the IUCN's Species Survival Commission from 1963—1980; subsequently until his death, he remained chairman Emeritus. He was largely responsible for the development of the IUCN into a major force in wildlife conservation. He built up the IUCN network of specialist groups to its current level: 80 groups, involving 2,300 members in 134 countries. He invented Red Data books, which are now a standard requirement for natural history libraries anywhere. He was a founder member of the World Wildlife Fund and later its chairman.

In 1946 he founded the Wildfowl Trust at Slimbridge, U.K., which has been remarkably successful in building up captive populations of highly endangered species of birds for subsequent release into the wild. He led a series of expeditions to the Arctic (his father was a celebrated Arctic explorer himself), to study breeding and migration patterns in geese.

He was a champion sportsman too — winner of a bronze medal for sailing in the 1936 Olympics. He put his skills to good use in World War II, when he commanded armed patrol boats well enough to win the Distinguished Service Cross twice. Later he took up gliding, and won the British National Championship when he was past 50. Men of action are not normally associated with the fine arts, but Sir Peter was widely acknowledged as one of the world's leading wildlife painters. His subjects were mainly, though not exclusively, birds — he gifted a painting of a Panda to Dr Salim Ali, which now hangs in the Society. The *IUCN Newsletter*, in its tribute to this great man, quoted Samuel Johnson's compliment to Oliver Goldsmith, which words apply equally well to Sir Peter: "He touched nothing that he did not adorn". ■

VANISHING!

The Swamp Deer of Satiana

TEXT AND PHOTOGRAPHS BY RAVI SANKARAN

As the sun made ready to set, we turned back from the far end of the *jheel*. The elephant squelched noisily through the marsh, plucking at tufts of grass. Then the bugling began. A nudge and the elephant was brought to a halt. Closer still, another stag echoed its challenge, the call alternately rising and falling, deep and resonant. A call that had drifted over these marshes every winter since time immemorial. In a matter of a few minutes half a dozen stags had disclosed their whereabouts by bugling. It was an enchanting spectacle: the white cotton like flowers of *kans*, patches of dark water glinting in the approaching dusk, and then again the bugling of rutting



Each year, after the annual grass burn, the swamp deer return to the park, to congregate on the emerging grasses. And each year the herds grow smaller.

Marshland is an essential habitat requirement of rutting stags. At Satiana, the marshes are outside park limits, and open to the deprivations of man.



stags. Both mahout and I sat absorbing it all. He, perhaps, was thinking what an excellent paddy field this would make; I dreamt of what once must have been. The fidgeting elephant brought us out of our reverie. As we made our way back to the National Park on a cart track beside which stretched fields of sugarcane, the vision of immense beauty faded into a sense of despondency. For I had finally seen for myself why the largest herd of swamp deer at Dudwa has steadily declined to a fraction of its former size.

Fifty years ago, the alluvial grasslands that stretched from the river Sharda in the south to the escarpment above the Neora *nala* in the north were home to the largest congregation of the marsh dwelling northern race of the swamp deer *Cervus duvauceli duvauceli*. It was a land made inhospitable to man by the "deprivations of wild beasts" and by malaria that raged among the local populace. The swamp deer roamed these marshes, and early settlers recall that herds of over 500 animals were a common sight. After Independence and partition came the need for agricultural lands to resettle displaced people from Punjab, Sind and Bengal. Vast tracts of *terai* were reclaimed, marshes filled and drained. Settlers from overpopulated eastern Uttar Pradesh followed; first as landless labour and then, after the land ceiling act, as holders of small agricultural plots. Acre after acre of sugarcane has replaced the marshes and grasslands. Today, near Dudwa National Park alone there are three major sugar mills, scores of smaller sugarcane processing plants, hundreds of tractors and jeeps, and bustling towns shops that boast of luxuries that few agricultural townships

can afford.

With the tide of encroaching humanity came the decimation of animal populations, and the herds of swamp deer began dwindling at an alarming rate. Judging from the reminiscences of various early settlers that I have met, the butchery that was carried out must have had few parallels in the country. Swamp deer have always been considered poor eating, but in the name of crop protection animals were shot and the carcasses left to rot where they fell. *Mirchia jheel* to the west, the *bhagars* on the banks of the Sharda to the south, were all once prime swamp deer areas. Shoots that bagged fifty animals were not uncommon. Today the swamp deer no longer exist there.

In the sixties, the swamp deer in the *terai* of northern Lakhimpur district gained some respite. Billy Arjan Singh, an agriculturist and a deeply committed conservationist, lobbied fiercely for the declaration of the forests, grasslands and marshes of Dudwa as a sanctuary. His efforts culminated in the declaration of the area as a Sanctuary in 1967, primarily to protect the swamp deer. In 1977 it was upgraded to a National Park and at the end of 1988 the National Park, along with the Kishanpur Sanctuary (about 30 km south), was brought under the purview of Project Tiger. The project area consists of 850 sq. km of excellent moist deciduous forests, dominated by *sal* and

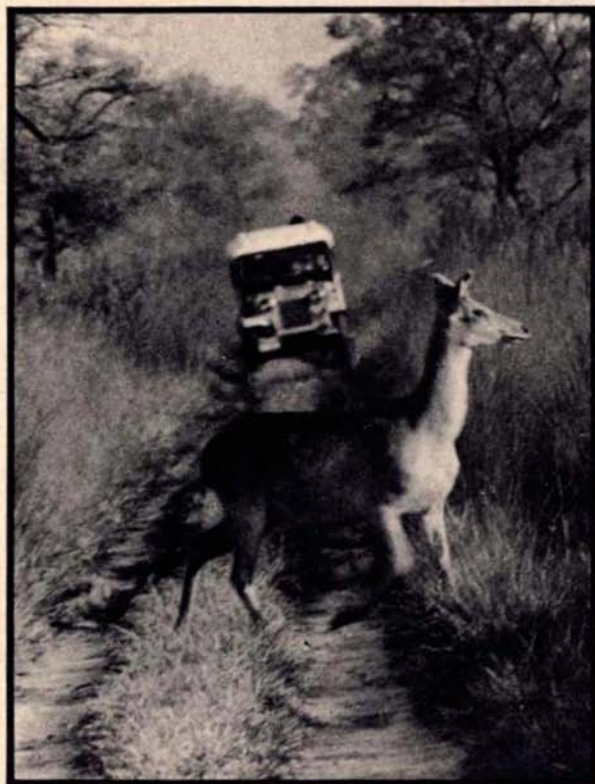


The deer's well-protected summer range, consisting of alluvial grasslands and *sal* forests.

interspersed with large tracts of alluvial grasslands.

With all these measures having been taken, one would have thought that the swamp deer and other ungulates would now thrive. But herbivore populations are declining, in some areas insidiously, and in others so drastically that one can see the numbers falling every year.

Currently Dudwa has about 750 swamp deer, the maximum numbers being present in two disjunct grasslands, Satiana and Kakraha. Smaller populations exist at Bankey Taal, Bhadi Taal, Nagra Taal, Churela Taal and Naan Taal. In 1985, when the rhino re-introduction programme began, the extensive grasslands of Kakraha were enclosed by an electric fence within which seven rhinos were released. Several years ago the population of swamp deer at Kakraha was not large. But after the area was declared a National Park, strict protection was given from livestock grazing and *nikasi* (the rights permitting local villagers to collect thatch grass and firewood from the Park) was abolished. The numbers gradually increased: today it houses a little over 300 swamp deer, the largest number within the Park.



When they enter the Park, the deer flee at the first sign of a vehicle. Gradually, as they become more familiar with jeeps, they are less easily alarmed, though still wary.

While one can be complacent about the populations that have remained static at the *taals*, and even be encouraged by about the increasing numbers at Kakraha, the problems faced by the swamp deer at Satiana are depressing. Satiana once had the largest population of swamp deer in this region, perhaps even in the entire *terai*. In the early seventies there certainly were over 1200 deer at Satiana alone. Today only a pathetically low population of about 300 survive.

Various reasons have been postulated for the declining of the swamp deer at Satiana. On the basis of the information I collected while studying the Bengal Florican at the Dudwa National Park, I found that the answers are in fact quite different.

Satiana lies in the southwest corner of the Park. Here the Suheli is barely a stream. To the north is the Neora *nala*, above which lie the *sal* forests for which Dudwa is best known. To the south and west of the Suheli is a vast sea of agriculture. Here the National Park has no buffer zone; prime grasslands merge with sugarcane, and only the meandering path of the Suheli prevents further encroachment by farmers.

The problem lies in the very drawing of the boundaries of the Park — which was established to ensure the survival of India's largest herds of swamp deer. But neither the biology nor the movement patterns of the deer were known. As a result the Park protected excellently the deer's summer grounds, but left the crucial breeding areas open to the deprivations of man.

At Satiana the swamp deer use the grasslands within the Park for just five months a year — between the annual grass burn in January and the onset of the monsoon in June. At the end of June they move into two excellent marshes, Ghola and Ghajrola *taals*, that lie just outside the Park, surrounded by agriculture. Here they spend the next seven months raiding crops, and in the process being shot at. It is here that the annual rut begins at the end of September, continuing till the end of December. And this is, in my opinion, the crux of the problem. Good marshes are lacking within the Park at Satiana, but are an important habitat requirement of the swamp deer, especially during the rutting season. Secondly the swamp deer, like other species in the family Cervidae, show strong site fidelity to their breeding grounds, returning year after year to the same areas. The Ghola and Ghajrola *taals* have been used since time immemorial by the swamp deer as their rutting grounds. To fulfill specific habitat needs, out of a strong traditional sense, and with the added incentive of emerging crops of sugarcane, paddy and wheat, the swamp deer continue this seasonal movement out of protected areas into these *jheels*. These areas are small, ill protected marshes amidst vast tracts of agriculture. Here, in the name of crop protection and out of avarice for cheap flesh, the butchery continues unabated. And very year, when the grasslands are burnt within the Park at the end of January, the swamp deer return to congregate in

ever diminishing numbers on the emerging grasses.

While at Satiana, I heard gunshots almost every day. There was no way to know whether animals were killed each time, or which animals were being shot at, if at all. But with cartridges costing Rs. 14 each, few (if any) farmers will simply fire into the air. Legal action is almost never taken against the poachers. Patrolling at Dudwa is extremely poor, but not all the blame can be laid at the feet of the forest guards. On one hand they are poorly equipped, and their shotguns are no match for the poachers' rifles. On the other, there is virtually no support from the higher authorities within the department. The negative role that the administrative services and the judiciary play probably takes the cake. An exchange of fire between wildlife guards and a jeep load of poachers within the sanctuary limits resulted in the death of a poacher. The guards were doing their duty, yet the police and the judiciary saw fit to embroil them in a protracted legal wrangle. Some of the guards were even jailed for a few months. In a more recent instance a guard was killed by a group of poachers. The murderers walked away scot free. As a result of such episodes, the morale of the staff is low, their commitment to their jobs often non-existent.

In sharp contrast an elephant ride within the rhino enclosure is a welcome change from the dejection that Satiana often instills in me. Here, on a good day, one sees hundreds of hog deer and numerous swamp, deer. It becomes obvious to the observer that the movement of animals from park to agriculture and the subsequent poaching pressure is the root cause for the pathetically small herbivore population in Satiana.



C. d. duvauceli are sometimes referred to as Barasingha; the name, however, is more commonly used only for the subspecies found in Kanha.



Swamp deer doe — is her time running out?

Two solutions are apparent. Firstly the acquisition of the Ghola and Ghajrola areas. However the opportunity to do so appears to have long since passed. Currently, several hundred families live along the Suheli in scattered hamlets in what was some years ago prime swamp deer habitat. To displace them will not be easy. Furthermore, I question the ethics of such a step. Does the survival of 300 deer entitle us to displace hundreds of people from their homes? Especially when we know that the acute shortage of fertile land makes it almost impossible to provide alternative agricultural land? And when the swamp deer as a species is not threatened with extinction?

As the problem lies in the deer's seasonal movement into Ghola and Ghajrola *taals*, I propose that we stop the movement into the agricultural areas. This could be achieved with the aid of a chain link fence along the Suheli river. If the *jheels* of Ghola and Ghajrola are essential to the survival of the swamp deer, then a fence which blocks movement may prove detrimental. However, if the current situation continues, within four of five years it may be too late to do anything at all.

The swamp deer of Satiana teaches us an important lesson: the need for adequate research before making crucial decisions about our natural heritage. At the time Dudwa was declared a sanctuary, it seemed logical to use the Suheli river as the Park boundary. But little did the planners realize that the areas beyond the Suheli were of greater importance to the deer than the grasslands that were to be protected. The end result was that the endangered ungulate for which the Park was created continues to decline. For the swamp deer of Satiana, time is running out. Fast. ■

The Small Miracle

ADAPTED FROM JOURNAL OF THE B.N.H.S.



ISAAC KEHIMKAR

“Go to the ant, thou sluggard, consider her ways and be wise”.

When the behaviour of an insect is commended in the Bible itself (Proverbs 6:6), it must be a remarkable creature. The Red Ant, *Oecophylla smaragdina*, is just over a centimetre long. Those who have inadvertently disturbed a swarm will feel, perhaps, that this is about a centimetre too long: but watching an ant colony at work is not only instructive, but at times also humbling.

Several species have been named by their colour, as has this one; but this method sometimes gives rise to anomalies. *Smaragdina* is Latin for green, and the worker ant, which is the one most commonly seen, is reddish or orange-brown. The first specimen sent to Europe for identification, however, was a queen, which is a striking shade of green. (Another example is the wild crosander, *Eranthemum rubrum*. *Rubrum* means red, and the flower in question is blue. But it turns red when it dries out, as it must have done before it reached the systematist who named it.)

Other ants stay on the ground, in anthills or burrows. The Red Ant, however, is wholly arboreal. It uses no camouflage, and goes about its business without any attempt at concealment. Several species of birds have been known to prey upon it, but only when no other food is available; usually they give it a wide berth. So do most people. One camper who was the subject of their attentions has this to say: "A multitude of them were making a thoroughfare of my

tent ropes. I got some kerosene oil, the best antidote I know for insect pests, and began coating the rope with a feather dipped in it. There was a perfect storm of indignation; they rushed at the feather from both sides, and threw themselves on it. They died, of course, but others came on in scores.... I lit a cheroot and blew the smoke where they were thickest. Never have I seen anything like the frenzy of passion which followed. To be attacked by an enemy on whom they could not lay hold seemed to be really too much for them. In their rage they laid hold of each other; and as a Red Ant *never* lets go, they were soon linked together by head, legs and antennae into one horrible, quivering red mass." He tried everything short of burning down the tent, but it was no use. When he quit in disgust the ants were soon back on the tent ropes, walking up and down as if nothing had happened.

This tenacity of purpose serves them well. When a colony takes over a tree (except for unusually large groups they restrict themselves to a single tree), practically nothing can dislodge them. Apart from their numbers and their apparent willingness to die for the common cause, they are armed as well. The grip of their mandibles is extremely powerful — an ant can be torn in two without relaxing its hold. They also squirt a highly acidic poison from a sac in the abdomen. The jet can be sprayed to a distance of over 10 cm, or accurately directed at closer range. When the ant bites through the

enemy's skin, it raises the abdomen, and bends it forward over its back till the sac lies directly over its head. Then comes the squirt of poison. It flows between the ant's jaws and into the wound, and the victim's discomfiture rises markedly.

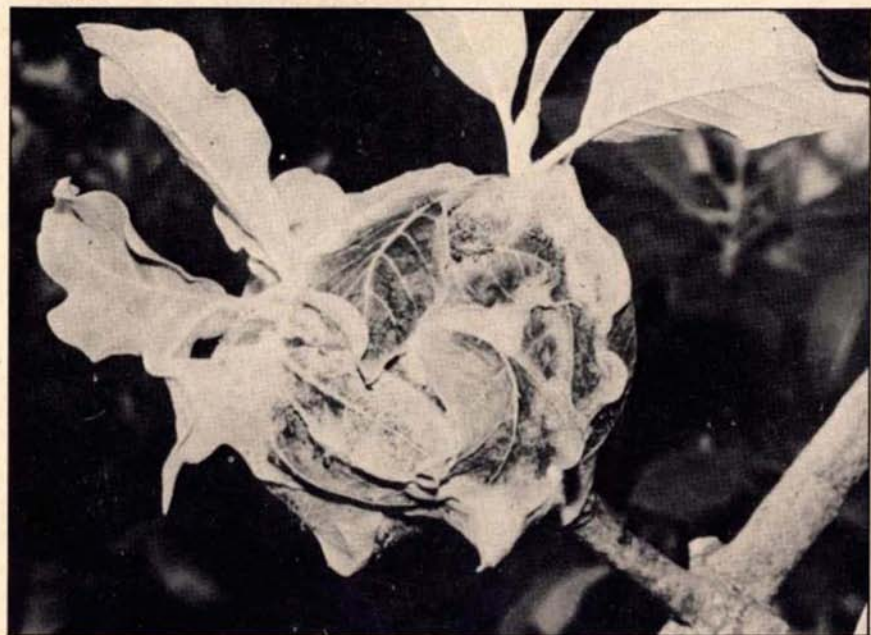
They are warriors, but they are architects too. The nests, which can be as large as a man's head, are built from leaves; sometimes twenty leaves for a large nest. The leaves are placed side by side, their tips pointing upwards, and gummed together with the silk produced by the larvae. The space enclosed is roughly pear-shaped, and the entrance is from a hole at the top of the nest. Lewis Carrol's Alice would probably be at home there. Not only would she be able to get in, she would find things as

A completed Red Ant nest.

remarkable as she did in the book. (In view of the ants' uncertain temper, and the manner in which they deal with uninvited guests, perhaps even a queen who would say "Off with her head!")

The interior is divided into chambers by dividing walls of silk; sometimes five of the six sides are of silk. It is in these chambers that the larvae are raised. There is no segregation by occupation (queen, drone, worker) or by stage of development. They are piled together in a heap, either in the soft elastic bags formed by the chamber's silk walls, or resting against the leaf. Among insects that metamorphosize from a pupa, the Red Ant is one of the few that doesn't build a cocoon.

The larvae, do have the ability to



produce silk; indeed, without this ability the nest could not have been built. But the purpose of a cocoon is to shield the developing pupa from injury and damp, and to maintain a constant temperature as it develops. In this case, the nest is protection enough.

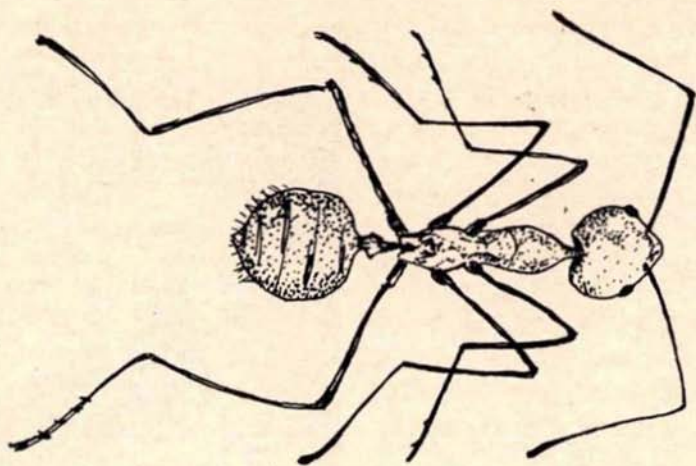
Building the nest requires both precision and teamwork. The leaves are not broken off, but merely bent till they meet, and then joined with the silk. It sounds simple, until you go into the details. The ants grab one leaf with their hind legs (tarsi) and reach out into space for the nearest leaf. If it is within range of their mandibles, they pull till the leaves meet. If it isn't, a chain of two or more ants (upto five have been observed) is formed. Each one holds the one in front around the waist. Eventually the chain grows sufficiently long. To keep the chain held together and then pull is hard enough. But enormous strength is required when the chain has not yet spanned the gap, and must remain suspended in mid-air without drooping. The ants deploy themselves at regular intervals along the edge of the leaf, then form chains of different lengths, depending on the gap between leaves at that point, and haul them together.

The leaves still have to be joined together, and the larva is sent for. It arrives, cradled gently between the jaws of a worker ant, and gets to work. The worker holds it above the junction and swing it to and fro, as



Worker ants hold the leaves together, waiting for the larva to arrive.

regularly as a pendulum. The swing ends at the leaf edge; and each time the larva stops it deposits a bit of silk. The work is precise and synchronised; no silk is ever wasted, or deposited anywhere but the exact place where it is required. The other workers meanwhile, are still hanging on. Until the weaving is complete they cannot let go, because then the leaves would spring apart and they would have to start all over again. The nest, once completed, is ferociously guarded. Even ants of the same species, from other colonies,



are promptly dismembered if they intrude.

Red ants prey on a variety of insect species, irrespective of their size. Several types of bugs and beetles, crickets, butterflies and moths; sometimes creatures as formidable as wasps and hornets are taken unawares. One observer has written of a beehive in his house that was invaded by a column of ants. The hive itself remained intact, but the majority of the bees were carted away for food. They take the prey back to the nest and scatter it about the different chambers so that each one, especially the larvae, can dine at leisure.

During the process of capture, the prey is held down by hordes of ants, but has not been incapacitated. Were they to release their hold, it would still escape. Other ant species would sting, or poison the prey to death

immediately after capture. The Red Ant uses a more diabolical method — it stretches it to death. Willing mandibles grasp the prey firmly wherever its anatomy allows; concertedly they pull outwards in all directions, for as long as it takes. The process, and its duration for different prey species, is instinctive; they will do the same even for the carrion they find. For a weevil about half the size of the ant, some six executioners are used. For a medium-sized beetle, such as *Gymnopleurus miliaris*, it takes thirty, pulling for fifteen to thirty minutes. The ants take no chances; even as the victim is being stretched, it is poisoned as well. They inject the stuff at selected spots — the cleft between head and thorax, for instance, or the relatively unprotected junctions of limbs and body. And when they have finished, they cart the victim back to the nest

and set off in search of another.

The ants have another food source as well. Several species of coccids (*Lecanium hesperidium*, *Icerya* spp. and one or two others), after feeding on the sap from leaves, excrete minute drops of a clear, slightly viscous liquid on which the ants feed. Like cattle, the coccids need to be stabled, fed and milked. The stables are the smaller nests that the ants build. These are smaller and less complicated than the main nest; usually 3 or 4 leaves, sometimes only one, and consist of a single chamber. Sometimes the stable is built *in situ*; if the ants find a group of the coccids grazing on a cluster of leaves, they may bend the leaves together to enclose the coccids. This does not seem to alarm the coccids, who continue feeding unperturbed. Sometimes the stables are constructed of fresh, juicy leaves even when there are no coccids in sight. The ants collect a group from another part of the tree and carry them to their new residence. And if the leaves of the stable wither or dry out, the cattle are transported to greener pastures. The milking is straightforward. The ant — there are always several in attendance at each stable — strokes the coccid with the antennae, and the coccid promptly obliges. Symbiosis is common in nature; the cattle egret and the buffalo is probably the most commonly quoted example. But this one, the ant providing shelter, protection and an unlimited supply of fresh food, the coccid providing its

host a dietary supplement, is one of the most fascinating.

Human beings, as a rule prefer not have anything to do with Red Ants, but there are exceptions. The tribals of Bastar, Madhya Pradesh, once used them as a regular article of diet. Nests were collected by members of a separate sub-caste, the Purjas. The contents were shaken out into a cloth and then pounded into a pulpy mass with a stone. Mix with salt, turmeric and chillies, grind fine, and serve raw with boiled rice. Sometimes they were cooked with rice flour, salt and *masalas* into a thick paste, which was said to prevent fatigue and heat-stroke.

They are (or were, before TV commercials and Vicks inhalers) used as a cure for colds. One correspondent, writing to the Society's *Journal* in 1895, describes their use in parts of Sri Lanka. "The modus operandi is to go up to a nest, sieze it with both hands, rub ants and nest together violently between the palms, and then take a few good long sniffs of the strong ammonia-like fumes which rise from the mass of crushed and bruised insects. I am told that this instantly relieves a severe cold, if the sufferer has no objection to a few dozen of the more active ants burying their mandibles in various parts of his person while he is sniffing at the remains of their community. I should object to this myself, so I cannot speak with authority as to the efficacy of the remedy". ■

SEASHORE LORE

III - Women's Lib in the Water



BEEFSEA

*Though the Sea-horse in the ocean
Owns no dear domestic cave;
Yet he slumbers by the motion
Rocked of many a gentle wave*
— Song for the wandering Jew.

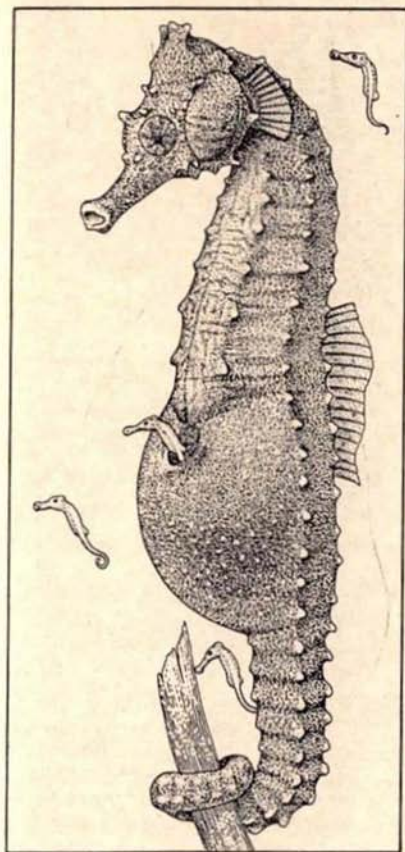
William Wordsworth

Now, when the seawater near shore has been diluted by the rain, is the time to look for sea horses. If you search carefully in places where there is a profuse growth of seaweeds or sea grass, sea fans, sea whips and hydroids, you are likely to find some. It would require a considerable stretching of the imagination to call a sea horse a fish. But it is one, despite the lack of scales or a forked tail or the typical fish's mode of swimming. Nothing about the sea horse seems to be ordinary. Mother Nature seems to have created this animal during a fit of absent-mindedness, for she has endowed it with the head and neck of a horse (or, more accurately, the knight in chess), a body encased in armour, a tail like a monkey's, and a

pouch like the kangaroo's.

The sea horse swims, slowly and in a dignified manner, as if it had all the time in the world to go places. But how does it swim? If you look carefully, you will see a small transparent fin on its back, quivering rapidly. This fin vibrates at an incredible 35 times a second, and it is this miniature dynamo that propels the sea horse forward. As it swims, it maintains its balance with the help of a pair of tiny, transparent fins near the gill-opening.

Its body is encased in interlocking bony plates which form a series of about 45 rings. The tail, however, can be coiled as by a chameleon, and is used, when the sea horse wants to rest, to grasp and hang on to seaweeds or sea fans. This curious creature shares another common feature with the chameleon: each eye can move independently in different directions. It is a weird sight to see a sea horse peering one way with its left



Male seahorse giving birth

eye and quite another with its right.

As if all these characteristics were not quaint enough, it is the father who gives birth to the young! The male sea horse has a pouch on its belly. During courtship, a couple lock tails together. Then one of them begins to tremble rapidly. Abruptly, this stops, and this is a signal for its partner to begin trembling. This continues for about half an hour and ends in an embrace, during which the female transfers her eggs— and

her responsibilities — to the male's pouch. A couple may embrace as many as a dozen times, at intervals of five minutes, before all the eggs are transferred. Many females may visit a male, until its pouch is full. The eggs remain in the pouch for a month to 50 days, at the end of which about 200 babies are born of the father.

The delivery is slow, extending for two or three days. The father turns pale, and twists and writhes as if with labour pains. The pouch is now fully distended. With a heave of his pouch, the father forcefully expels 10 to 30 babies at a time, until all have emerged. To make things easier, he rubs his pouch against any convenient hard object nearby (rocks, shells etc.) Even after the birth is complete, the muscular contractions of the pouch continue, gradually becoming less violent, and finally the slot-like opening of the pouch closes. The young are about 12 mm long at birth, and are miniature replicas of the adult.

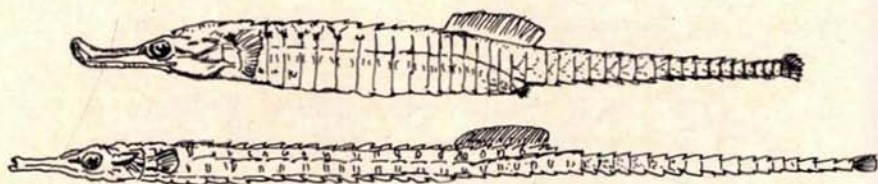
Although they are so lovable, do not be tempted into bringing a sea horse home. They eat only moving food. The mouth is a long, narrow tube, with no teeth. The food has therefore to be small enough to pass through it. In nature, small, shrimp-like animals and side-swimmers (Amphipoda) are taken. In captivity, adult brine shrimp (*Artemia salina*), which are found in salt pans, or mosquito larvae or juvenile male guppies (a particularly small fish) can be given, but they must be alive and moving. If you listen carefully when a



Sea horse



Leafy Sea Dragon *Phycodorus eques*, found in Australia. The exaggerated frills make it look just the algal fronds of kelp.



Pipefishes: Above: *Choeroichthys suillus*, in which the broodpouch is under the body. Below: *Maroubra perserrata*, with unusual arrangement of spine-bearing ridges.

sea horse is feeding, you will hear faint clicking sounds. (These sounds are also made during courtship.)

As sea horses rely mainly on concealment to escape their enemies (sting rays, skates and fishes living on the sea bottom), they do not grow to a large size. The larger of the two species found in our seas is said to grow to 30 cm, but we usually see them only half this length. The large ones probably live in deeper water, down to a depth of 70 m.

In the pipe fishes, which are cousins of the sea horse, the body is shaped like a long, straight tube, with a transparent tail fin at the tip.

Unlike in sea horses, the head of pipe fishes is not bent at right angles to the body. They too live at the sea bottom among seaweeds, and because they are so thin, are even harder to locate than are sea horses.

Here, too, the father carries the eggs through to delivery, but instead of a pouch, two long parallel folds of skin hold the eggs. Most pipe fishes are marine, and our Indian species grow to 20 cm. But some pipe fishes have migrated successfully to fresh water. A common Indian freshwater species is found in the Ulhas river near Titvala, on the outskirts of Bombay. ■

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