HORNBILL

1985 (4)

BOMBAY NATURAL HISTORY SOCIETY

APPEAL

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Seth Purshotamdas Thakurdas & Divaliba Charitable Trust of Bombay has been kind enough to donate Rs. 25,000/- for the publication of *Hornbill*, claiming 50% exemption for donation made for General Purposes.

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We solicit donations from our members, lovers of nature and the Society's friends. Donate generously for the laudable cause of Education on Nature.

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.

Society's Administration

Members receive during a year three issues of the *Journal of the Bombay Natural History Society* now in its 82nd volume, and four issues of *Hornbill*, the Society's popular publication.

Journal Editors

J. C. Daniel, P. V. Bole and A. N. D. Nanavati.

Advertisements for publication in *Hornbill* are welcome. Rates: Inside full-page Rs. 500/-; half page Rs. 250/-; back cover Rs. 1000/-.

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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
Bombay Natural History Society
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Shahid Bhagat Singh Road
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EDITED BY
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J. S. SERRAO
I. D. KEHIMKAR

EDITORIAL

Wildlife Conservation in India, and perhaps elsewhere in the world also, is haunted by numbers. How many? is the crucial question that is being asked. The answer has never been satisfactory and has been and continues to be a vital cause for concern on the status of many species. Take the case of the tiger, the major conservation programme, the Project Tiger itself started on the rather dubious premise that at the turn of the century there were 40,000 tigers and at the start of the Project less than 2000. The nice round number of 40,000 is we believe a contribution to Conservation by the late E.P. Gee, the author of WILDLIFE OF INDIA. Salim Ali reviewing the book in the Society's *Journal* wrote:

> "In the case of several of the larger animals Mr Gee offers his estimates of the present-day population as compared with that of fifty years ago. For example he estimates the total number of elephants in the whole of India today to be about 7000; of tiger about 4000 contrasted with 'a possible 40,000 of fifty years ago'; of leopards 6000-7000' as compared with 10 times that number fifty years ago'; of wild asses 860; Great Indian Rhinoceros 625. Of the Kashmir Stag he estimates 175-200 in 1962, against 400 in 1957, about 2000 in 1947, and 'probably about 5000 fifty years ago'. Whatever the accuracy of these figures, the decline within recent years has certainly been cataclysmic and alarming. As no proper censuses have been taken and the author's present-day estimates must largely rest upon his own limited observations plus not too reliable local testimony, they must of course be taken with reserve and as purely subjective, as they are clearly meant to be. He may be right in feeling that *some* estimate based on reasonable premises is better than no estimate at all; but the reviewer cannot help admiring his courage in estimating the 'probable' populations of 50 years ago for which even fewer and less reliable data are available..."

The State Wildlife Departments have been regularly censusing tigers in the country and putting out figures that have consistently shown a steady increase in population. There is no denying that Project Tiger has definitely benefited the tiger's habitat and the tiger and to that extent the tiger project is a success story. But whether one should accept the population figure which is presumed to be the standard of recovery is open to question. The calibre of the personnel collecting the data varies widely and even one black sheep can queer the pitch. We know that black sheep do exist and several indulge in the pernicious pastime of manufacturing tigers at the time of census, based as the censuses are, on the tracings of tiger pugmarks. No tiger sanctuary shows a static population or a reduction in numbers. Conditions may be good but it is unlikely that they are that good at all times.

Another animal plagued by numbers is the Indian elephant. A commercially viable species, the temptation to present a population with animals of an age structure suitable for domestication is often insurmountable. Political pressure may play a key role.

(Continued on p. 16)

Encounter with a Royal Tusker in Nagarhole

Nagarhole National Park in Karnataka enjoys immense popularity among wildlife enthusiasts and tourists alike. This place has a character and atmosphere of its own — a 'wild place' of natural forest (tropical moist deciduous type) interspersed with *hadlus* (grassy swamps) and large tracts of teak plantations and minimum of human disturbance are the features of the park. Elephants and gaur are the major herbivores commonly encountered with in this forest. Chital, sambar, wild boar and barking deer are the lesser herbivores that are found in good numbers. Common langur and Indian giant squirrel are also seen.

The special feature of the park is the visible proof of how effective protection against poaching and minimum interference with nature (habitat) has brought about the increase in prey animals (chital population in particular) and the consequent increase in sighting of predators like the tiger and leopard in the sanctuary.

Thanks to the efforts of duty conscious and committed Range Forest Officers who have been in charge of the place. In particular, Mr Chinnappa, the present RFO, 'is a devoted wildlife conservationist with a strong aversion to compromise on matters relating to wildlife and their protection. He has effectively curbed the criminal activities of the influential and the rich of the area which has contributed to this qualitative change. These measures have paid rich dividends as one can see and perceive in the qualitative transformation that has taken place. The sightings of tiger and leopard in the park have increased. Many people have had the thrilling experience of coming upon the predators on the prowl along the roads of the sanctuary.

In fact, one party of visitors were lucky to witness the entire process of a leopard stalking and killing a chital and carrying it away into the forest near 'Peacok Tank'.

Quite recently during last week of February 1985, in the course of our stay of five days, we came upon tigers in daylight on two occasions. Our first sighting was that of a tigress with its two half-grown cubs on Tiger Road, hardly 150 yards from the junction of the Bison Road and Tiger Road. The two cubs were sunning themselves in the morning sun (8.15 a.m.) besides a dry thicket in front of the swampy place with a cluster of pandanus trees. They were about 30 yards from the jungle road. One fellow was seated like a miniature sphinx covered by a few dry stalks of burnt grass, but the other cub was a timid fellow, who, at the sight of our vehicle, quickly got up and took cover behind a dry thicket where their mother was hiding. Perhaps, our excited antics

were too much for them, as they disappeared into dense cover after giving us a brief view. We thought that they would come back to the area and give another chance, if we also quickly moved out of sight and came back after a while to look for them. So, we moved away for some distance and turned back to motor along the same road, but failed to see them.

Wildlife is unpredictable. They do not always conform to known patterns of behaviour and often surprisingly upset theories. Quite so; after all they are the masters in the wild, and there is no need for them to conform to thinking of a human mind.

Two days later on an early afternoon round through Kunthur Road, we perceived a tiger moving leisurely across the *hadlu* towards an island of dense cover of bushes and trees in the middle of Hessargadde *hadlu*. In the foreground a small herd of chital were intently watching the predator and proclaiming its presence with their repeated alarm calls. The scene was unfolding itself like a page from the classics of Jim Corbett. A herd of gaur was peacefully grazing in the middle of the *hadlu* and a big single-tusked elephant was splattering himself with liquid mud from a muddy pool at the far end of the *hadlu*. But, none of these animals showed any sign of alarm and they were quite unaware of the presence of the prowling predator. It was moving upwind towards the cover of the island of dense bushes and trees and the gaur were hardly 100 yards from the edge of the cover. We stayed put to see if the gaur would become aware of the animal or show any other signs of alarm. They did not even take notice of the alarm calls of the chital and continued to graze peacefully, as the tiger reached the dense cover and was lost to view.

Another interesting scene observed on this trip was the sight of a herd of gaur and the big single-tusked elephant in a small swamp near Kayi tholayo kere. The tusker was scraping thick liquid mud with his front foot collecting the stuff in his trunk and repeatedly splattering himself with the black liquid. The gaur were quite at ease and secure in his company.

Actually, I have had many memorable and cherished moments of wildlife encounters in this beautiful jungle. One such experience was the rare opportunity of participating in an adventure with a Royal Tusker, in the very same Hessargadde *hadlu*. That was long ago in the company of the celebrated naturalist photographer and writer par-excellence, Mr M Krishnan, and another young knowledgeable fellow enthusiast and wildlife photographer Mr Ajai M. Ghorpade.

It was during a summer camp, as usual we set out early in the morning on a riding elephant. It was misty (even summer mornings are misty in Nagarhole) and clean, unpolluted

fresh air in the forest was exhilarating. The melodious flutey calls of the Grackles or Hill Mynas, the long repertoire of liquid song of a Magpie Robin and the chatterings of a flight of parakeets filled the air. The chital moving in the pearly mist formed interesting graphic patterns in the forest landscape.

We were ambling along Kunthur road on "the rolling ship"—our riding elephant, our mahout was frequently bending down from his perch to look for fresh tracks of animals. As the area is a favourite haunt of the tiger, our mahout was expecting to come upon pugmarks, but the jungle lord had not used the road. While nearing a *hadlu,* there were fresh tracks of a herd of gaur which we followed into the forest and came upon the herd. They were grazing on the fresh grass in the swamp. We spent some time with these animals observing them and taking pictures. And, a little later when the sun became hot, the gaur started moving into dense cover. We followed them with the hope of getting some more pictures. The animals had spread themselves out and one small group of four young cows moved towards a clear puddle in the centre of a dense patch of lantana and drank water undisturbed by our presence. Suddenly, there was a shrill trumpet of an elephant near by, which drew our attention and we went after the elephant leaving the gaur in peace. Soon we came upon a small herd of elephants comprising two or three small calves and half-a-dozen cow elephants moving towards the forest from the far end of the *hadlu*. There was much trumpeting, and the usual rumblings, squeaks and squeals from the herd as they moved along, and behind them at a distance of 150 yards was a big tusker separated from the herd and facing away from us. At the sight of the tusker, Mr Krishnan immediately ordered the mahout to take the riding elephant towards the tusker, exclaiming! "what a Royal Tusker — a perfect Koomeriah," and that he must take a real close picture of him. But, our mahout got jittery and was haltingly and hesitatingly taking the riding elephant across the *hadlu*. Mr Krishnan firmly told the mahout to take the elephant closer.

Now, Mr Krishnan took complete command of the situation, we were more excited and over-awed spectators of the events that followed. We had arrived at the middle of the *hadlu* and were about 75 yards from the tusker; he was still facing away from us. But, I suppose he was aware of our presence. Again our mahout was ordered by Mr Krishnan to approach closer. At this word of Mr Krishnan, our mahout lost his nerves and became jittery and was mumbling quick prayers in Kuruba language and pleaded that he may be spared from going closer. Mr Krishnan assured him that he need not worry and that he was responsible for the safety of all of us. Also, that he knew what exactly the tusker would do. The mahout

Left. "*...coming towards us swinging his trunk in a peculiar manner...*" Right. "*...stopped in its tracks and was quite puzzled at the situation...*"

Photos: T.N.A. Perumal

slowly nudged our riding elephant (a cow) another few yards closer when the tusker turned around to face us in our direction and stood there alert with ears spread out listening and watching. The tusker, a fine specimen with good long symmetrical tusks, was in 'Musth'. His temples were swollen, dark oily substance was copiously oozing out from the pores on each side of his temples between the eyes and ears. Mr Krishnan whispered to us — "now, you will see that the tusker would slowly come towards us". He had hardly finished the sentence when the tusker started coming towards us with slow and steady steps swinging his trunk in a peculiar manner like a man swinging his walking stick sideways. Mr Krishnan instructed the mahout to control our fidgety mount and keep it steady. (elephants are shy and scared of "musth animals") our mahout managed to keep the riding elephant in control, but he was literally shivering and was muttering Kuruba words praying to the tusker not to harm us. The tusker had approached us to an uncomfortable distance of less than 25 metres, when Mr Krishnan softly told us that this is the time to stop the tusker from coming any closer and gave out a sharp clear word of command — "Halt!!" What magic? The Tusker stopped in his tracks and was quite puzzled at the situation. Mr Krishnan asked the mahout to take the riding elephant broadside and to gently face it away from the tusker, which the mahout quickly obeyed. The tusker will calm down and will also move parallel to us and move towards the forest and pause for a final look-up before entering the dense forest, said Mr Krishnan. The incredible thing was that the tusker did just that — he followed us moving parallel to our elephant almost at the same pace and keeping the same distance between us. At the edge of the forest; he paused — with one leg raised, ears cocked and the trunk thrown up striking a 'dream of a pose'. But, unfortunately all of us mucked up that shot in the confusion that ensued and the sudden jerking movements of our riding elephant completely ruined our pictures due to shake. That is wildlife photography; there is many a 'slip between the cup and the lip' in this sport. Though, in retrospect, one feels like kicking oneself for mucking up a grand picture. But, certain things do happen that way to make one to develop a philosophical bent of mind to accept such failures as experience gained.

After this show of mercy, tolerance and gentleman-like behaviour, the Royal Tusker majestically moved into the forest to join his herd.

At the end of this drama, our mahout was visibly relieved and smiled meaningfully at Mr Krishnan. We were also happy to be safe and clicking. Mr Krishnan had for once displayed and demonstrated his deep knowledge of the elephants for our benefit. We

"...moving parallel to our elephant almost at the same pace..." *Photo*: T.N.A. Perumal

were thankful to him for the extraordinary experience of an encounter with the Royal Tusker. As we headed towards camp, he explained the theory that any single, sharp, clear call (human voice) with the right volume and intonation uttered at the animal when he approached closer than the "critical distance" would have the effect of stopping him in his tracks. May be, one could have uttered the name of any *ishta devata* Muruga, Ishawara, Ganesh etc and, that would have had the same effect on the animal and people would think that the *ishta devata* had come to their rescue and intervened in controlling the elephant. But, the truth of the matter is only a question of uttering an abrupt call at the crucial moment. Of course, one can never be sure of the turn of events, as things could have gone out of control and anything could have happened. Also, that it is unwise to be dogmatic and absolutely sure of the behaviour of wild animals in a given situation. Perhaps, the tusker was conscious of his supreme might and behaved in a lordly manner befitting his stature and was averse to throwing his weight about on puny humans perched atop a cow elephant — a member of his own tribe, a chivalrous animal too. He was a Royal Tusker indeed.

T.N.A. PERUMAL

Lesser Florican in Sailana, Madhya Pradesh

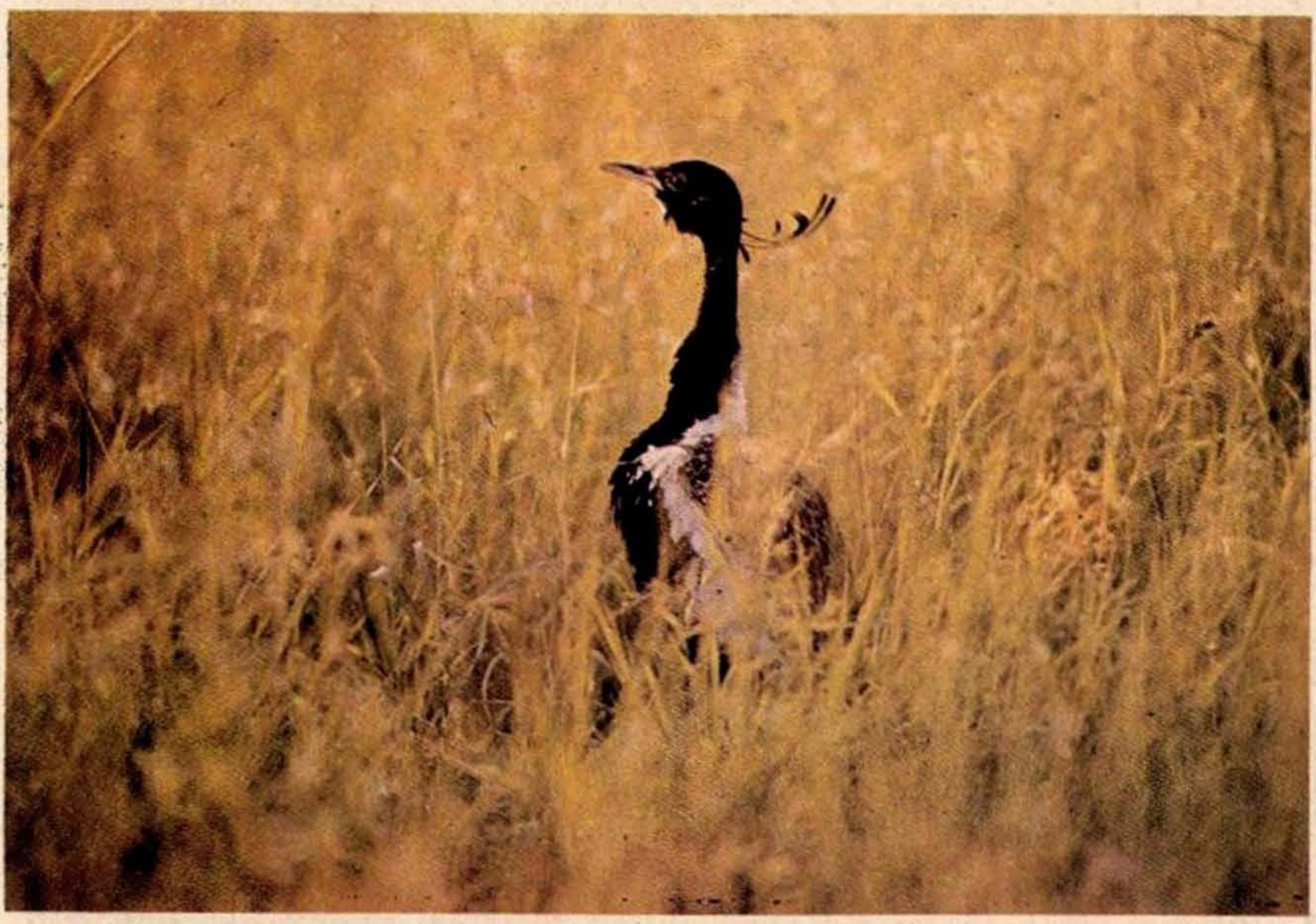
Of our three endemic bustard species, the smallest is the Lesser Florican (*Sypheotides indica*), which was till recently being steadily relegated into oblivion with the increasing pressure of agricultural progress. It was only during the International Symposium on bustards in 1980 in Jaipur, India, that its plight became a cause for concern, mainly from lack of any evidence regarding its present status.

A literature survey showed that it was widely distributed in the Indian subcontinent in the late 19th century, when as small game it was shot under licence or trapped by tribals in large numbers during the monsoon—its breeding season. Reason? Its reputation as the best-eating game-bird in India. Preliminary field surveys by the International Council for Bird Preservation and Bombay Natural History Society after 1980 showed its depressing, if not hopeless, present status. Between 1943 and 1949, Dharmakumarsinhji, our pioneer bustard expert, ringed 489 birds. In 1981, the International Council for Bird Preservation(ICBP)could locate 22 birds and in 1982-83, Bombay Natural History Society (BNHS) could locate 58 birds in the same region. The rather extensive grasslands of the olden days have now dwindled into tiny fragmented pockets.

Floricans have been reported from Gujarat, Rajasthan, Punjab, Haryana, Uttar Pradesh, Bihar, West Bengal and the entire central peninsula east of the Western Ghats and south and east of the Godavari, right down to Tamil Nadu. Essentially a grassland species, its existence is confirmed by different local names for this *grass peacock*, namely *Tun-mor* (Marathi); *Leekh, Chota charaz* (Hindi); *Chota dahar* (Bengali); *Khar-mor* (Gujarati); *Tiloor* (Kachchhi); *Kannoul* (Kannada); *Niala nimli* (Telegu); *Warragu-kozhi* (Tamil); and *Chatta-kozhi* (Malayalam).

Our field station was set up at Sailana in Madhya Pradesh in August 1984 in order to make ecological and behavioural studies on this species. Just an overnight train journey from Bombay, the location is ideal for studying floricans in their natural habitat. The gently undulating, lush, grassy landscape dotted with small *Butea* bushes was once the private shooting preserve of the Maharaja of Sailana. *Shikarwadi,* as it was then and even now called, boasted of small game such as boar, deer, hare, fox, and other animals. Today, a broad metalled road runs east-west through it, linking Saliana with Ratlam; the area around the ruins of his shooting lodge is converted wholly into grasslands and with the creation of reservoirs to trap the monsoon run-offs, what remaining forest cover there once was has vanished. The grassland to the north of the road is almost totally

Salim Ali holding a florican for ringing.



2. ***A male Lesser florican at his jumping spot***

Photos: A.R. Rahmani

Above. *Typical florican habitat in Sailana.* Below. *Cock florican "floating" down*
Photos: A.R. Rahmani

cultivated, with grassy patches dotting vast areas of crop fields. The surviving grassland is spread over some 350 hectares and includes the ruins on the north bank of a reservoir, Gordhansagar, formed by damming the streamlets flowing between four eastward-running low ridges (10-20 m high). Crop fields of 4 villages surround this grass oasis which is now their joint property and is maintained solely for hay production. Hence, except for some peripheral plots used for grazing, the grass is left strictly undisturbed in much of the 'core-area' and is only harvested when it ripens in November around the time of Diwali festival. In this pure undisturbed grassland, the floricans have found a safe refuge when the Madhya Pradesh forest department declared it a sanctuary in June 1983.

In the course of our field studies between August and October 1984, we came across at least 15 male and 3 female floricans. Of these we identified all but 3 males (from the adjoining forest department plantation) by the ridges they occupied. Thus, of the 6 ridges in the sanctuary, we noted that ridge 2 (R2) had the maximum number of males on it (five), while the vast area of R3 had only three. All birds had occupied fixed territories where they spent much of their time displaying and foraging. Each male was roughly half a kilometre from the others who were always within sight or earshot. We plotted their positions on our rough maps and saw that they formed rough polygons with respect to the nearest 4 or 5 males. Our main observation point was on a slope which afforded us a good view of five males occupying prominent spurs on R2 and R3.

A dapper little bird, the size of a trim domestic hen, the male florican in full breeding regalia sports proudly a glossy black head, neck and front with three long, slender, club-ended upcurving plumes on either side behind the head, tossed back and fluttering in the wind. Pale brown-patterned wings, back and tail and a trim black body are supported on long bare greenish yellow legs tipped with short strong toes, ideal for running through grass. The shy female is at all times clad in sober inconspicuous buff-brown, but she stands taller than the male and is better built.

During the monsoon, the most conspicuous activity of the male is his peculiarly quaint display jumps performed to advertise his presence to his rivals and attract eligible females. These jumps are at a fever pitch at the height of the breeding season with the restless male performing unflaggingly almost throughout the day and hardly spending any time foraging.

A single display jump consisted of an alert phase, an ascent and a descent. Prior to a jump, the male restlessly stamps the ground while turning all around alertly looking at or listening to other males. When sufficiently goaded by his rivals'

calls or on sighting a female florican flying overhead, he cocks his plumes overhead, gathers himself and with all the energy of a coiled spring, shoots up vertically into the air, wings aflutter and legs bunched up. This jump of about 2 metres is accompanied at its apex by a distinct clattering call audible for quite some distance. The fluttering wings reveal a hitherto un-noticed broad white band on each wing (meeting at the base of the neck) which when flashed so conspicuously is visible from quite a distance. The bird then descends on down curved wings, legs furiously pedalling against the strong oncoming wind, seemingly fighting for balance, and lands on the very spot of take-off. The constant use of this spot, leaves a distinct round or oval stamped-out patch or 'arena' in the grass.

It is possible that due to the strong territorial instincts of the males, it is the females who move between their territories. After having mated, they lay their clutch of about four eggs either in the grass or in a convenient crop field without any decent attempts at nest-building and raise their broods without any aid from the males. At this time they are highly vulnerable not only to ground predators like the fox, mongoose, monitor lizard or black cobra but also the ever-vigilant hawk-eyed aerial predators like harriers, raking the grassland for titbits such as juicy grasshoppers and downy florican chicks.

Come harvest-time and sunny skies — the tail-end of their breeding season, their new generation foraging in the thick golden grass or dense soyabean fields, there is a perceptible decline in the displays. Soon an un-naturally quiet and empty-looking grassland shouts its silence at you. Even the Rain Quails which called throughout the day as well as the night cease their inquiring *which-which* calls. We looked all over for the floricans and the only traces we found were their moulted feathers dropped casually on the tracks. Obviously the floricans were now more busy foraging in an attempt to gain weight for the imminent migratory flight back. The males were shedding their conspicuous black for the sober brown attire of the female.

Where do they go? Do the same birds return to their breeding grounds of yesteryear? Do they all migrate or are the females and chicks left behind? What are the survival strategies of those left behind in a barren land that lies fallow and dusty-dry till the next life-bringing rains? What about the migrating bird which must survive the journey if it is to bring back its genes the following year and propagate them? Is the grassland going to be there when it returns?

All these and more questions are well under scrutiny as we step into our second year of study of these rare birds once so sought-after for the table.

USHA GANGULI-LACHUNGPA

NEWS,NOTES AND COMMENTS

Raptor Organisation Registry

There are several splendid organisations whose major purpose is to deal with some aspect of the life of raptors (birds of prey) but unfortunately their number, location and specific purpose are unknown. The Raptor Research Foundation is interested in identifying locations and purposes of as many of these organisations as possible, and a copy of this assembled information will be sent to each responding organisation to facilitate communication. these documents will also be available to other wildlife or conservation agencies and funding agencies.

Organisations dealing with some aspects of the life of raptors are requested to submit the following information for inclusion in *A Directory of Raptor Organisations of the world:* Official Organisation Name; Address, Brief statement of purpose; Approximate Number of members; Major Area(s) of Interest, e.g. Basic Research, Captive Breeding of Raptors, Conservation, Education, Falconry, General Aspects, Raptor Movement or Rehabilitation; Name and Official position of Responding Individual. This information should be forwarded to:

RAPTOR RESEARCH FOUNDATION, INC.
DEPARTMENT OF BIOLOGY
YORK COLLEGE OF PENNSYLVANIA
YORK, PA, 17403-3426 USA.

Keoladeo Ghana, Kaziranga, and Manas

Keoladeo Ghana, Kaziranga National Park, and Manas WIldlife Sanctuary have been recommended by the International Union for Conservation of Nature and Natural Resources for inclusion in the list of the World Heritage Bureau (UNESCO). The list includes sites that possess outstanding natural or cultural value. Other sites recommended by the IUCN in 1985 are Iguaca National Park (Brazil), Huascaran National Park (Peru), Goreme Valley (Turkey), Glacier National Park (U.S.A.) and Cocos Island National Park (Costa Rica).

World's coral reefs

The International Union for Conservation of Nature and Natural Resources would bring out a 1500 page directory on the world's coral reefs. The directory, prepared by Sue Wells of IUCN's Conservation Monitoring Centre, will be in three volumes—one each on the Indian, Pacific and Caribbean Oceans. A companion volume has also been recommended in which data could be analyzed and protection measures outlined.

Crane and Goose Workshop for Indian Ornithologists

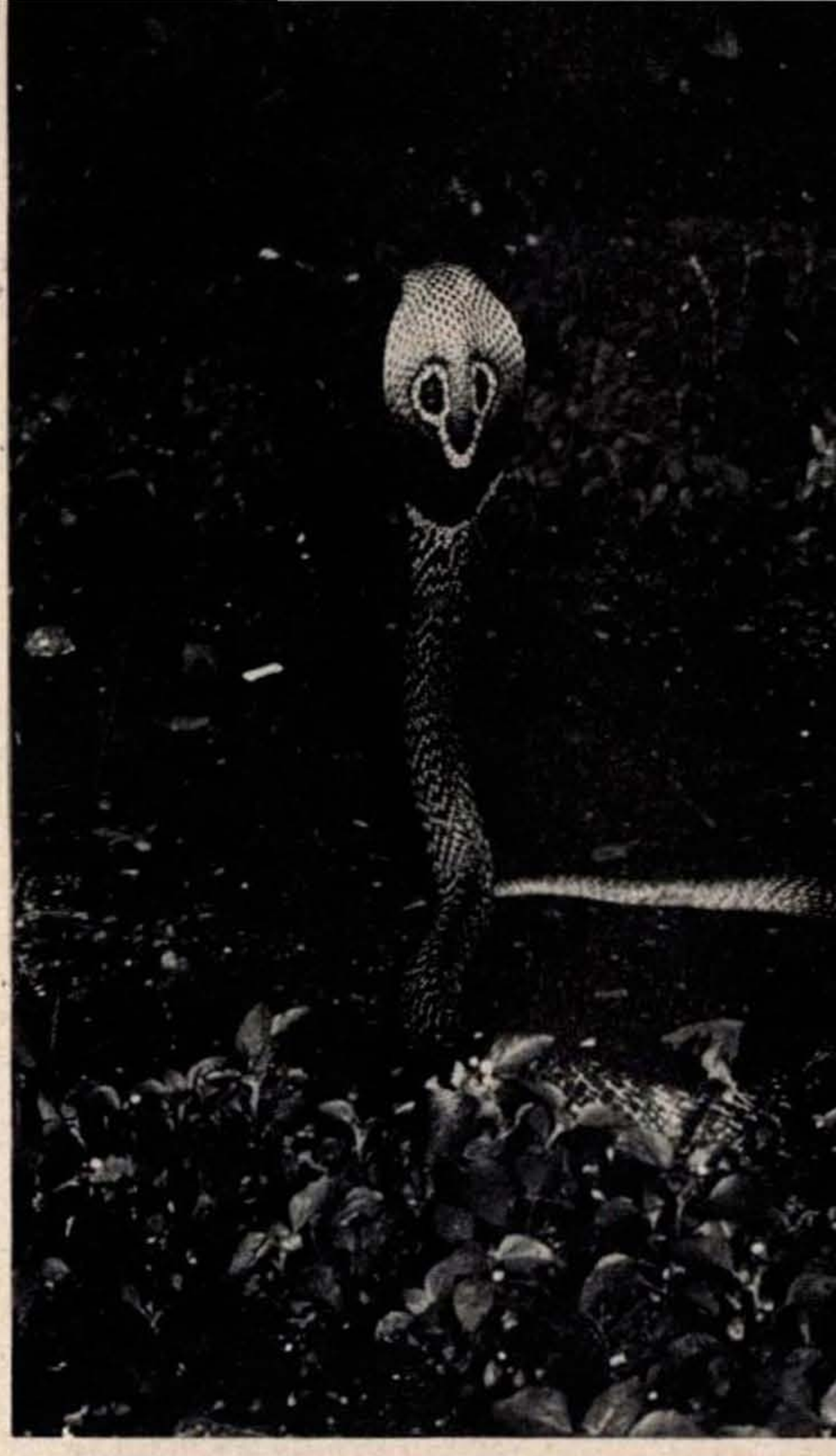
It is proposed to organise a Workshop on Cranes and Geese for Indian ornithologists. Birdwatchers who are interested in participating should send their names and ad-

dresses to the undersigned. They will be informed about the venue and other details of the Workshop at a later date. The Workshop will be scheduled probably in January or February 1986.

Scientific papers and notes on distribution and ecology of Cranes and Geese from the Indian subcontinent are welcome. Photographic material including transparencies and posters, maps and charts may also be displayed during the Workshop. Artists are welcome to send paintings depicting cranes and geese.

Besides discussions and presentations, the participants are expected to decide whether to form a Working Group of crane and geese researchers to continue research and conduct action-oriented programmes for crane and geese conservation, to appoint monitors all over India to monitor their numbers and condition of their wintering and breeding habitats and to keep effective communication with like-minded groups abroad.

Please write to: PRAKASH GOLE, 1B ABHIMANSHREE SOCIETY OFF PASHAN ROAD, PUNE 411 008, INDIA.



The Indian Cobra — Irula tribals' poison source *Photo*: I.D. Kehimkar

Snake Research Projects

The Irula Snake Catchers' Cooperative is a tribal self-help project based on catching snakes, extracting their venoms, marking and releasing them back to the wild.

Last year about 22,000 snakes were caught and released, the majority were Saw-Scaled vipers *Echis carinatus*.

The Irula Cooperative is committed by its stated objectives to carry out research pertinent to its activities of "passive exploitation" of snakes. Present data collection on distribution and abundance of snakes, scat analysis, sex ratios etc. are just some of the areas to be worked on.

The cooperative is interested in collaborative research projects. As it is a tribal project it could provide basic facilities only, funding would have to be provided by the collaborator.

For further information please write to:

ROMULUS WHITAKER
IRULA SNAKE CATCHERS,
INDUSTRIAL COOPERATIVE SOCIETY
c/o MADRAS CROCODILE BANK TRUST
VADANEMMELI VILLAGE, PERUR POST
CHINGLEPUT DIST., TAMIL NADU
SOUTH INDIA 603104

India's first major Environmental judgement

The Supreme Court bench headed by Justice P.N. Bhagawati handed down an unprecedented decision on India's first major environmental case. The suit had been filed by the citizens of Doon Valley to save a unique and fragile ecosystem in the Himalayas.

Doon valley is endowed with rich water resources that support flourishing forests, agriculture and horticulture. In addition to its other resources, Doon valley also has a rich deposit of limestone. As a result limestone industry flourished with as many as 60 quarries eating into the bowels of the earth. The subsequent destruction of the hillsides began to destabilize the hydrological balance of the Valley.

The Supreme Court's final judgement decreed that 53 of the 60 quarries be shut down. In the contemporary reality of rapid environmental degradation, this fruitful interaction between the judicial system and the public provided new hope.

(*Continued from p.2*)

It is best to consider all census figures as showing only a trend and not to accept any absolute figure. Sex and age break-up can usually be checked if figures are available over a period of years and the breeding biology of the species is known.

A summer visit to Bharatpur

"Never go to Bharatpur sanctuary during summer; the sanctuary dries up, no wildlife, no vegetation. You will return disappointed". That was the sermon someone had given me long ago. After a recent summer visit to Bharatpur, I felt he was not correct and he was not acquainted with seasons in Bharatpur.

Since my early naturalist days, my fascination is for birds and plants. Bharatpur offers both aplenty.

Shutterbug, as I call myself, I had been happy to rattle away with my camera at the slightest provocation, unmindful of film consumption. I had to get pictures and not lose any rare opportunities. This time I had my Nikon and a new lens; a 35 mm to 105 mm macro zoom. Too small for wildlife photography, one is likely to say. But Bharatpur offers a lot to the pictorialist as would be evident from my pictures. I came across some rare incidents.

Near Keoladeo Temple one morning, Pied Kingfishers were having

Pied Kingfishers "each one catch one competitors"
Photo: S.R. Nayak

1. *Pied Wagtail at Bharatpur.*

2. *Pied Kingfisher — 'a winner' with fish*

Photos: S.R. Nayak

Above. *The Keoladeo Temple pond.* Below. *"A family of wild pig stood in my path"*

Photos: S.R. Nayak

Egrets flying over a drying marsh **Photo**: S.R. Nayak

what seemed to be a fish catching competition. Perched on a row of poles sunk in the water by some scientist, it appeared as if a "each-one catch-one" competition was going on. One bird would dive into the water and if unsuccessful in catching a fish, would return to the pole. A successful bird would go to the nearby tree with the catch and another bird would take its place on the pole.

On another occasion a Pied Wagtail sat on a dry branch and changed poses as I clicked. The bird on the dry twig looked like a piece of art. Elsewhere, a family of wild pig stood in my path as if for a family portrait and as soon as I took a shot disappeared in the tall grass.

Egrets in flocks, sarus in pairs, multitude of kingfishers, doves, cormorants, drongos were seen everywhere. Resident birds were in plenty and wherever they perched, were pleasing to the eye.

S.R. NAYAK

Common marine shells of the Bombay coast

This is the second part of the above article and is continued from p. 25 of Hornbill *1985(3)*—EDS.

We describe and illustrate nine species of gastropods in this issue. *Gastropod* which means 'belly-footed', refers to the broad and tapered foot on which the animal glides. These widely distributed molluscs include land, freshwater and marine forms. Land gastropods lacking shells are commonly called Slugs, and marine forms lacking shells are known as Sea-slugs. On the Bombay coast these animals have occupied all habitats—sand, mud, and rocky shores at low and high tide levels.

The Key-hole Limpets (Family Fissurellidae) cling to rocks and corals and are vegetarians.

1. KEY-HOLE LIMPET *Diodora bombayana.* As the name suggests the conical shell possesses an oval or tiny slit-like aperture at its apex. The shell is small but more elongated and generally provided with radial and concentric striations. The shape and size vary greatly even within the species. They live below the low tide mark and are seldom obtained except by dredging.

The Limpets (Family Patellidae) have conical shells with apex turned forwards. The folds on the mantle edge function as secondary gills. The family is represented by a single genus and a single species.

2. COMMON INDIAN LIMPET *Cellana radiata.* These are popularly known as true limpets and can be easily distinguished from Key-hole Limpets by the absence of the apical aperture. Shell, oval and conical and forms a stony cap under which the animal lives securely. Dislodgement of the shell is almost easy when the limpet is unaware; otherwise it can create a vaccum beneath its foot museles, making it impossible to dislodge it without applying a pressure of 15 pounds or more. The habitat is intertidal zone on rocky coasts.

Top shells (Family Trochidae) possess flat-based conical shells with horny operculum. They inhabit the intertidal zone and shallow waters.

3. TOP SHELL *Clanculus depictus* Shell shows spiral rows of fine rounded nodules mostly light or dark brownish in colour and vertical, crosswise light greyish bands on the body. Columella ends in a tooth and operculum is shiny. Usually found at low tide but empty shells are occasionally found on the shore.

4. RADIATED TOP SHELL *Trochus radiatus.* It is commonly found in the littoral zone and most commonly on rocks at low tide mark. Its thick and conical shell differs from the turban shell in having

Trochus radiatus

Umbonium vestiarium

Cellana radiata

Nerita polita

Clanculus depictus

Turbo brunneus

Diodora bombayana

Nerita albicilla

Nerita oryzarum

a thin and horny operculum. Easily recognised by broad red and maroon irregular stripes running down the shell. The colour between these stripes is greenish when the animal is alive and turns to yellow or whitish when dead. *Trochus* is important commercially because of the thick and beautiful mother of pearl lining of its shell. Shells of *Trochus* and *Turbo* are also used as ingredients of tooth powders.

5. BUTTON SHELL *Umbonium vestiarium* . A very common, beautifully variegated, and polished little shell. It may be uniformly red, violet, white and black or of other combinations. Live ones are found a few inches deep on sandy mudflats between full and half tides. It has a high export value in Europe, where generally it is used in ornamentation of shell boxes. Large quantities of the button shells are collected along the Bombay coast and the animal part is eaten as a delicacy.

The Turban shells (Family Turbinidae) are turbinate (top-shaped) and are of a moderate size with a rounded and inflated body whorl. The aperture is round and the operculum is hard and stony.

6. TURBAN SHELL *Turbo brunneus* The animal is found attached to rocks and boulders near low tide. It has a large solid turbinate shell with rounded whorls and more or less circular aperture. The Maoris of New Zealand used the operculum of the *Turbo* as eyes of their idols. It has its decorative value in India also. In Tamil Nadu it is popularly called *ambiliman*, i.e. 'the disc of the moon'. The flesh of *Turbo* is eaten as a delicacy and like *Trochus*, it has also got commercial importance because of the mother of pearl lining of its shell.

The Nerites (Family Neritidae) have small, thick, and globular shells. The mouth is D-shaped. Operculum shelly.

7. NERITES *Nerita oryzarum* Shell thick, solid, turbinate, polished, and with a short spire. It attains a size of more than 19 mm in height and 31 mm transversely. The animal feeds on algae and lower plant life, and is extremely common on rocky shores and reefs at half tide.

8. PIMPLE-LIP *Nerita albicilla* Shell elongated with rough and flat growth lines. Columella possesses four teeth. Shell is cream coloured or green, marbled with dark brown. Interior of columella is white and operculum green.

9. MOTTLED NERITE *Nerita polita* Shell elongated with fine growth lines. Columella possesses four to five columellar teeth. Shell cream coloured, white marbled or lined with brown, green or orange. Operculum green. All nerites are in great demand for lime manufacture.

MANOJ MUNI
CARL D'SILVA

(*To be continued*)

Gir Lion Census-1985

The Gir forest in Gujarat State is unique as the only remaining home of the Asiatic lion. It may be difficult to imagine that the Asiatic Lion once ranged from Greece to Bihar. The destruction of its habitat and hunting was the beginning of the end of Asiatic lion from one country after another. The Asiatic lion ultimately found its last abode in Gir forest of Gujarat State. Gir is the largest biological, intact, continuous tract of land reserved primarily for the conservation of the indigenous fauna. The total area of the forest is 1412 sq.km out of which 258 sq. km have been declared as national park and the remaining area is declared as sanctuary. The era of protection to the Asiatic Lion came in 1900 when its population had dropped to only 100. However, the actual protection started with the active interest taken by the Government of Gujarat in declaring the area as a Sanctuary in 1962, which followed by various development activities undertaken for the rehabilitation of the flora and fauna in the area. By 1972 the tempo of development was at a peak when the Government of Gujarat decided to launch a special programme for resettlement of the *Maldharis* residing in the Gir area. A census of the permanent *Maldharis* residing within the area was carried out, cattle maintained by them were enumerated and a detailed scheme was worked out which was put into operation by 1974. There were more than 850 *Maldhari* families with 50,000 cattle. Out of these, 547 *Maldhari* families have already been shifted by giving them land for cultivation, houses and other facilities like education, medical etc. outside the Sanctuary. Simultaneously, the Government of Gujarat has declared the entire Gir forest as closed to grazing from outside cattle. Facilities for drinking water for the wildlife in the Sanctuary were created, commercial harvesting of the forest was totally stopped and the staff in the area was strengthened to protect wildlife against outside forces. The facilities for the visitors were also improved and a network of roads was laid down.

All these activities undertaken by the Government and the dedication of the staff started paying dividends. The stoppage of grazing and the removal of cattle from the forest area not only improved the quality of grass but also made it available for the herbivore animals. While the health and strength of the herbivore animals improved, the Asiatic Lion also fared well in turn. It is very difficult to judge the impact of any development activities undertaken with reference to wildlife, except through the increase in the population or the natural death rate. The census of the Asiatic Lion has been carried out since last 30 years. Initially the censuses were carried out either on the basis of the

information gathered from the local people and the forest officials stationed in the area on the basis of pugmarks etc. No visual count was undertaken in the earlier censuses. It was felt that in order to arrive at a definite trend in the population of the lions it was necessary to establish a standard practice for the censuses. For the first time in 1968 the census was carried out on live baits and by visual count. Subsequently, with a view to carry out the census of other animals also and to have a double check on the lion censuses, a method was evolved to enumerate the animals first on water holes and then on the live baits. This method proved quite successful and has given sufficiently accurate data regarding wildlife in Gir forest. The census in May 1985 was also carried out on the same lines. The methodology is described in brief as follows:

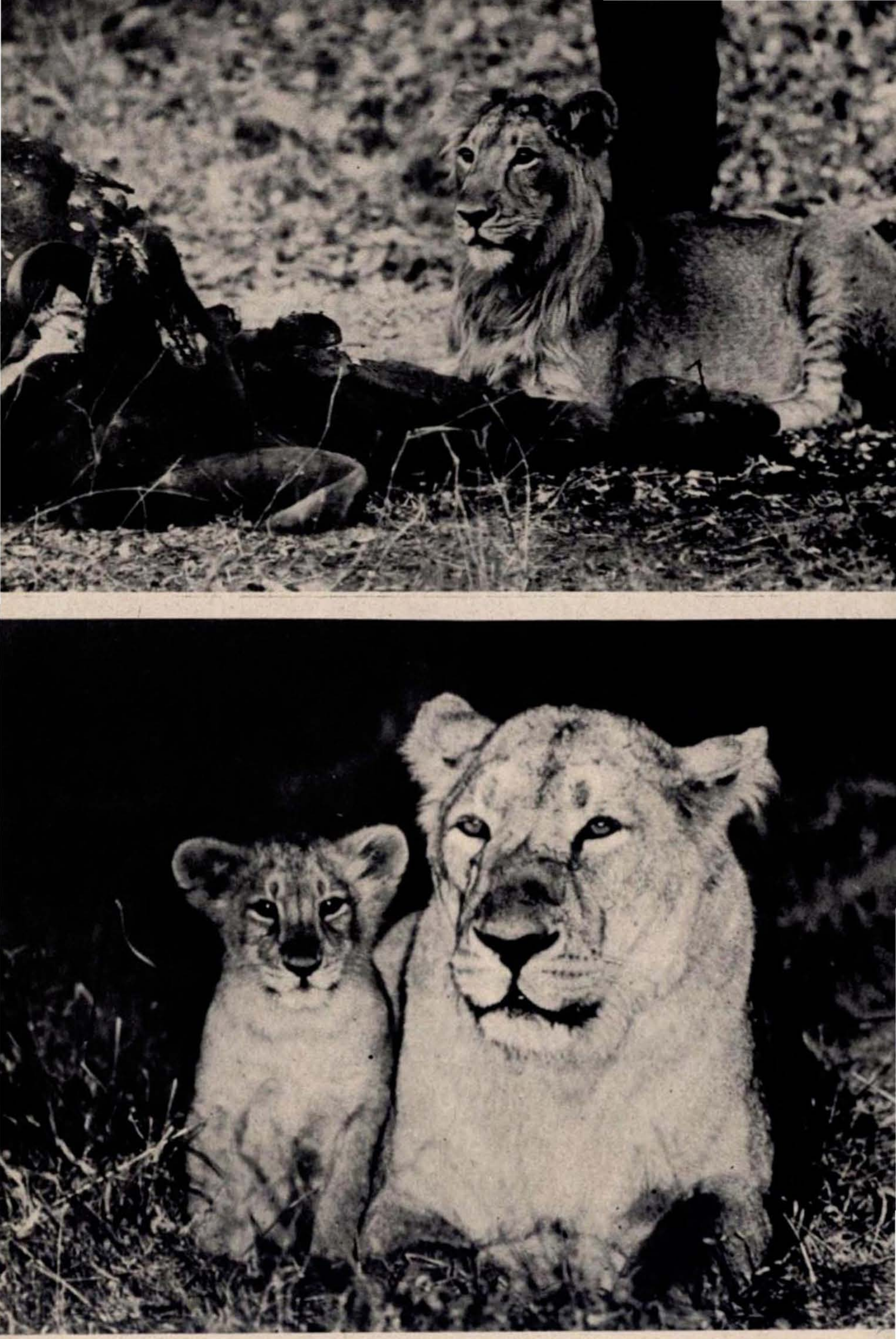
CENSUS ON WATER HOLES

Normally the period of census is fixed in month of May so that the number of water holes is reduced to the minimum. In the current census 487 water holes were identified and on each water hole either a *machan* was constructed at a proper position or a hut was constructed on the ground for the enumerators. On each water hole three persons were posted to keep a vigil of the visit of animals round the clock for 24 hours. All the animals visiting these water holes were timed and listed individually. It was expected that all the animals will be visiting at least once during the period of 24 hours to one of these water holes. Since the water holes were situated far apart, there was no possibility of one group crossing over within 24 hours to another water hole.

CENSUS ON LIVE BAITS

It is presumed on the basis of observations made in the past that lions go for a kill at least once in 72 hours. Not only this, but once a male makes a kill, the pride or the individual animal remains around the location of the kill. The census on baits was carried out for 3 days and on each day the likely locations where the lions are found were fixed and baits were given all the three days. Once the kill was made by the lions, these lions were tracked by the enumerators so as to avoid any duplication over the adjoining area. The entire area was divided in more than 90 locations and baits were given for all the 3 days. It was reported that more than 87 baits were killed.

For the purposes of organising the entire census operations commenced six months in advance for dividing the areas into regions, zones and sub-zones depending on the terrain, availability of water, etc. There were 3 regions, divided into 13 zones which were further sub-divided into 43 sub-zones. Each one was put in charge of an officer with additional help made available locally. In all, more than 1500 persons were deployed for 7 days bet-



Above. *A young lion at a bait*. Below. *A lioness with a cub*
Photos: E. Hanumantha Rao

ween 2nd and 8th May 1985. The result of the census was compiled by 10th May 1985, and declared by the Hon'ble Forest Minister, Government of Gujarat, on 13th May 1985. The following are the final results of the lion census carried out in May 1985:

(1) Lions:		
Male	239	66
Female		75
Sub-adult		50
Cub		48
(2) Panthers		201
(3) Chital		10,466
(4) Sambar		772
(5) Nilgai		2,081
(6) Wild boar		2,212
(7) Fourhorned Antelope		1063
(8) Chinkara		311
(9) Monkeys		6,912
(10) Hyaenas		192
(11) Others: wild cat, fox pangolin, mangoose, etc.		1,548

While we are looking at the final census figures available before us, it is time to analyse some of the basic data before us:

(1) There has been a steady increase in the population between 1974 and 1985 at the rate of 2.5% or more annually. This is a very healthy sign.

(2) The ratio of the males and females has been maintained and indicates a healthy ratio for the population rise.

(3) The number of juveniles and cubs is more when compared to the previous census which clearly indicates the acceptance of the various activities undertaken by the Department for the preservation and protection of wildlife.

(4) The population of the herbivore animals has marginally increased which in the context of the shifting of the *Maldharis* and their cattle and the improvement of fodder is satisfactory.

While we are discussing various aspects of the Gir forest, it will be worthwhile to mention that it will be a mistake to visit the Gir forest for viewing of lions only. There are many other wild animals like chital, sambar, fourhorned antelope, nilgai, chinkara, etc. which give a thrill to the lovers of wildlife. In addition to these animals, Gir forest offer a wide range of birdlife in which more than 250 species have been identified. The Sanctuary has a freshwater crocodile breeding farm and reservoirs which add to the attraction to this area.

The Forest Department had been arranging for the lion show for the

A lion in the Gir — Note the distinctive belly fold *Photo*: E. Hanumantha Rao

benefit of tourists for a limited duration, but the viewing of the lions or the lion show will be coming to an end very soon with the opening of a Wildlife Park. The park covers an area of 400 ha. and is fully fenced. The visitor will be taken round within the park in vehicles where they can view the Asiatic Lion in the natural surrounding. This park will afford good opportunities to study and research on various aspects of the life cycle of the Asiatic Lion.

B.P. LAKHANI
Chief Conservator of Forests
Vadodara, Gujarat.

PRECIS

The Sumatran Rhinoceros

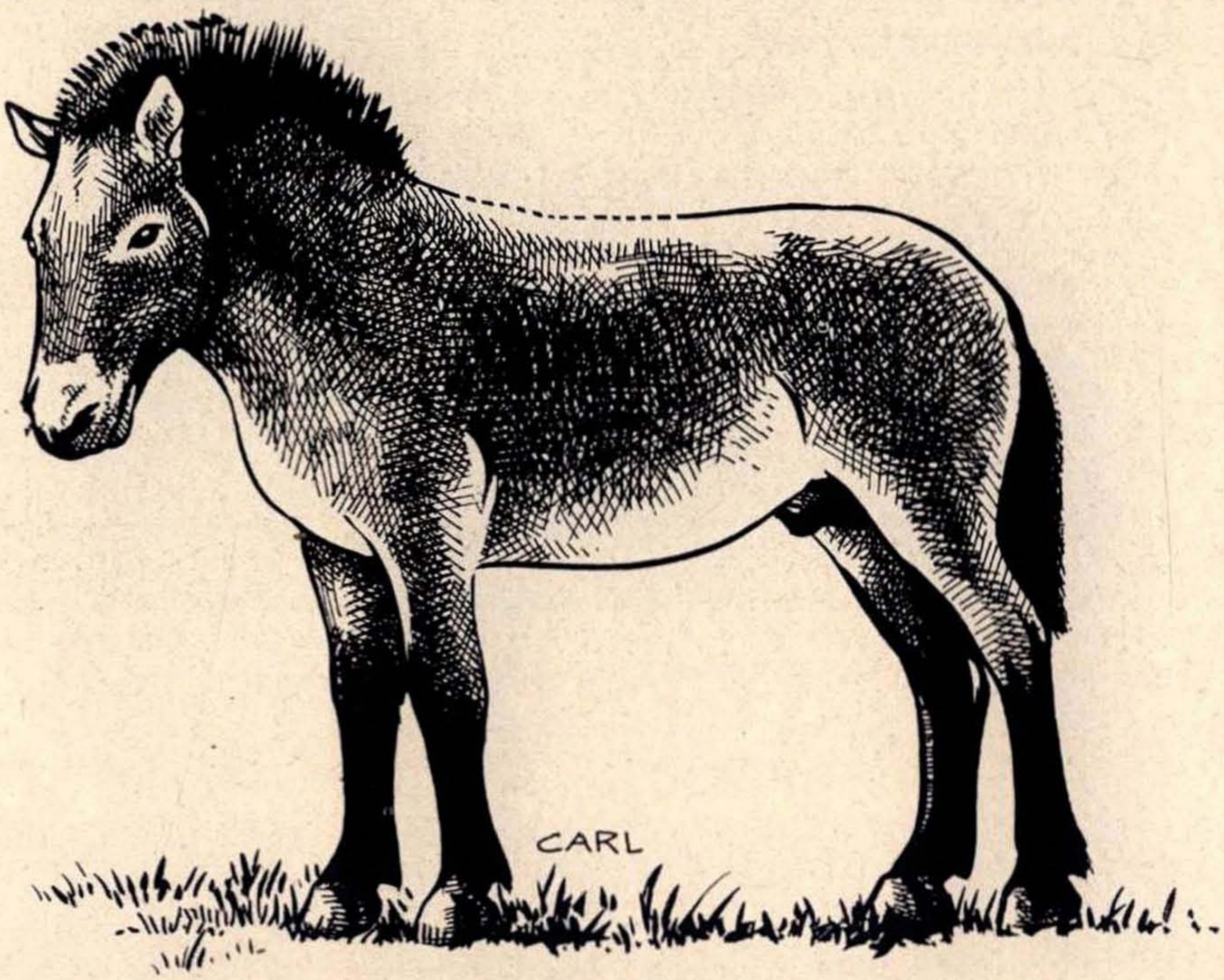
Agreement on a programme, Conservation of the Sumatran Rhino, has been provisionally made by the governments of Indonesia and Malaysia, the American Association of Zoological Parks and Aquaria and Howlett's and Port Lympne Zoo Parks in Britain. The estimated population of 850 Sumatran Rhinos faces extinction in its native homes in Thailand, Indonesia and Malaysia due to the pressures of human population and hunting. The world record of sighting, by Dr Nico van Strien, is 3 rhinos in 4 years. Dr. van Strien will coordinate the programme, which will include:

1. Protection of the sufficiently large areas of the rhino's natural habitat.
2. Capture of a few "doomed" animals from small isolated populations for captive breeding and subsequent release in the wild.
3. Launching of an education programme to increase public awareness of the rhino's plight.

Ex-poachers may be employed in the programme, so that their experience and knowledge of the rhinos may be utilized. — *IUCN BULL.* 16(4-6)

The Wild Horse

The last wild horse of our times, Przewalski's Horse, became extinct in its Central Asian Steppe homeland during the 1970s. Around 600 animals exist in captivity today, mainly in zoos all over the world. Efforts are being made by the IUCN, UNEP, the USSR Centre for International Projects and the FAO to reintroduce the horse in its natural range. A workshop was held in Moscow in May 1985, attended by delegates from Europe, North America, the Peoples Republic of Mongolia and the USSR. The 25 specialists descussed the problems and agreed upon plans that "seem sound and practicable but not simple, easy or quick".



Przewalski's Wild Horse

Leatherback Turtle

WWF/IUCN researchers have recently discovered a nesting site of the Leatherback Turtle on Irian Jaya Island (Indonesia). This is perhaps the largest nesting site in the world and may represent a 10% increase in the recorded population of nesting Leatherbacks.

The world's largest marine turtle, the Leatherback was believed to be gravely threatened twenty years ago. But intensive survey work since then has resulted in the discovery of many more of its nesting sites. The main reason for the Leatherback's vulnerable status is the loss of its eggs to introduced wild pigs, monitor lizards, domestic dogs and humans. Commercial harvesting of its eggs has greatly increased since the proliferation of outboard motor vessels made remote nesting beaches accessible. Leatherbacks are also killed for meat. A new threat to leatherback turtles is the presence of floating plastic bags that pollute the sea. Leatherbacks feed in the open sea and often swallow plastic bags, mistaking them for jellyfish which constitutes their major food. —*WWF News* No. 33 (Jan/Feb. 1985).

Dams are not forever

Studies of 17 major reservoirs in India show them to be silting up at three times the expected rate as a result of deforestation. In the southern slopes of the central snow-covered Himalayas, the hillsides have been denuded of vegetation, leading to an extraordinarily fast rate of erosion. With the river carrying silt for eight months of the year, the giant Tehri Dam downstream is now expected to last only 30 to 40 years instead of the 100 years as initially predicted.

With the flooding of river basins, farmers are forced to move to less fertile land, often higher up the slopes of river valley, which soon become eroded as crowded conditions leave the soil overworked, silt soon finds its way into the river filling up the reservoirs and thus shortening the dam's lifespan.

ENVIRONMENT LIASON CENTRE
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The Brown Pelicans

Once a large number of brown pelican nested on small coastal islands along the shores of Texas, Louisiana, Florida and South Carolina. Between 1957 and 1961, Louisiana coast had not a single nesting bird and in Texas the pelicans had nearly vanished. The suddenness and severity of this population crash suggested that a toxic substance was to blame.

Later as the problem became more widespread in late 1960s and 1970s when brown pelican populations in South Carolina showed evidence of decreased reproduction, primarily from eggshell thinning.

Organochlorine pesticide pollution was implicated as the main cause of these population declines—Endrin in Louisiana and Texas, and DDT in California and South Carolina. These chemicals, which do not easily break down into less harmful substances, accumulated in the food chain and affected pelicans in two ways. Endrin was directly toxic to all age classes. DDT interfered with Calcium deposition during eggshell production, resulting in thin-shelled eggs that broke too easily during incubation. Not only the pelicans but avian predators like the bald eagle and peregrine falcon too were affected.

In 1970, the brown pelican was listed as endangered, and two years later the Environmental Protection Agency banned the use of DDT in US and the use of Endrin has been curtailed. With these measures taken, recent surveys indicate that the brown pelican has made a successful come back. *Endangered Species* Vol. 10:3

Water Hyacinth

Water Hyacinth, an attractive floating plant from South America has been carried by tourists to 80 countries in the past century. A lot of money is now being spent to check this practically uncontrolable pest that chokes lakes and riverways. Ten plants can multiply to 600,000 covering an acre of water in eight months.

The attitude is now changing. San Diego, faced with water scarcity now spends three and half million dollars to cultivate the hyacinth for treating waste water. Needing no soil, and absorbing dissolved nutrients direct from the water, their main requirements--nitrates, phosphates and potassium—are also common water-pollutants. The hyacinth has also been found to absorb toxic wastes, pesticides and heavy metals. So harvesting the hyacinth should leave behind cleaner water.

San Diego officials predict that in ten years they will be using hyacinth to process 50 million gallons of sewage daily, since the city now imports some 90% of its water. *Species Survival Commission Newsletter*, Oct. 1984.

Water Hyacinth *Photo*: R.B. Grubh

Pollution Indicator Tree

The 'Cannon Ball Tree' is a large deciduous tree of South American origin reaching about 100 feet or more in height; having brown bark, with almost perpendicular branches along its entire length of height. The leaves are produced in clusters at the ends of branches which are arranged in alternating patterns.

The flowers are large, fleshy, sweet scented and have a pleasing combination of rose and purple as well as white and yellow colours. They are borne on long and slender stalks, springing from the stems. They have a curious structure with a hood-like united stamens in the centre of the flower. The fertile stamens are fused into a one-sided band, which rises from the base of the ovary and curls over it, so that the anthers are pressed over the ovary.

The hood-like structure curling over the ovary is responsible for its Indian names, "Kailaspati" "Nagalingam" and "Shivalingam", which gives an appearance of a snake spreading its hood over Shivalinga.

Sterlile stamens (non-functional male organs, which are called staminodes) surround the ovary. The fruit is globular in shape, which does not open naturally and is of a size of Man's head or a coconut. It is dark brown in colour and has a somewhat acidic taste when unripe and young; but emits very foul smell when ripe. It contains many seeds embedded in the pulp and takes about eight to nine months for ripening. The shell of the fruit is hard and is said to be used for making utensils. The pulp is said to be eaten and made into beverages by South American natives. Timber is used for furnitures.

The plant is propagated from seeds sown fresh or by suckers which are produced in large numbers even at great distance from the tree.

This tree is reported to shed all its leaves in the course of a single week. But it was observed that the tree along Thane-Belapur Road, in the compound of an industrial estate, completely defoliated in two hours due to the bursting of a chlorine cyclinder and started sprouting afresh within 24 hours. This process of sudden defoliation has been observed repeatedly since the first incidence whenever obnoxious gasses are released by surrounding industries.

It has been noticed that the tree regularly responds to the seasonal climatic changes also. At the onset of monsoon this is the first tree to start shedding leaves after receiving first rains and at the beginning of winter this is the first tree to start shedding leaves in response to arrival of cold season.

It is probably the only effective pollution indicator tree we can claim to have.

M.R. ALMEIDA

Close-up of a 'Cannon Ball'

A Cannon Ball Tree.

Photos: S.R. Nayak

The three cannibals

The forest and its munificence in the Abehand Reserve of the Sagar district in Madhya Pradesh is really enchanting. During the early days of 1950, though large scale shooting was done during the Second World War and even after the introduction of those great destroyers of wildlife, 'the jeep and the search light', there still remained in this magnificent area plenty of animals. One could come across tigers on the roadside, panthers on the outskirts of the villages, spotted deer in the scrublands, blackbuck and the Indian Gazelle in the more open lands, and the blue bull on the tablelands and plateaus called *kharis*. The wild boar and their sounders were omnipresent and one could be secured whenever desired.

Though this forest could not be called the breeding ground of tigers, yet the river passing across the forest, almost bifurcating it, was full of caves in which at any time hyaenas, foxes and sometimes the wild dogs did have their litters. The larger caves were more often than not under the privileged occupation of panthers and tigers.

One such cave as the reports went, a family of tigers came from somewhere and occupied. One day they caught hold of a she buffalo which was busy munching the succulent grass in the river and apparently playfully but very painfully, killed it against the methods usually adopted by tigers in killing. The buffalo was badly hamstrung after multiple efforts, horribly scratched and bitten at the back and ultimately at the neck, when it must have succumbed to weakness and loss of blood. Exhaustion in defending itself must also have taken its toll. But this type of killing could only be possible when the tiger was either a young one or undersized but as the reports went there was a group of tigers with cubs of almost full size and capable of making a kill, so the only deduction one could make was that they were still under the training of their mother and had not fully learnt to kill outright.

Further reports were that the tigers did not eat the buffalo at a sitting but had eaten very small or negligible quantity despite their number being four. This was very amazing and misleading. However, one thing was certain that there were a number of tigers, almost precisely four. The graziers had actually counted them in broad day light from the top of the opposite bank and added that their size was comparatively small and the group indulged more in gambolling than in eating. These very graziers had noticed that the tigers entered a spacious cave and did not come out for a long time so they also got together, went near the cave and closed up its mouth with large stones. A pair of them went to the

village to inform the elders and the rest kept watch.

Some villagers returned with the messengers with spears, swords and even with a muzzle loader and examined the buffalo as also the foot marks. Immediately they placed much larger stones sealing the mouth of the cave fully so that the tigers could not come out. They decided to send word to the shikaris and did so. They also guarded the cave and kept a fire burning throughout the night and a number of the braver villagers stood by.

The news reached its destination late, and the shikaris arrived on the third day. It was concluded that the four tigers were alone without their parents and in all probability their mother had deserted them to pair with a new suitor. They were not yet experts in killing as they were still immature, but at the urgent entreaties of the villagers who were afraid of the huge losses of cattle that might follow the presence of four tigers at a time, it was decided that the mouth of the cave should be opened in such a manner that one tiger alone could come out at a time and could be bagged. So hides were prepared behind the rocks for two guns, each a few feet away from the mouth of the cave.

Before relating further what happened it is essential to give an idea of the cave and its formation. It appeared that it was formed by some sort of backward erosion and displacement of rocks. Though the mouth was narrow there was enough area inside, hence the tigers were ensconed in it comfortably. It was closed on all sides but there was an oblongish hole on the top of the cave along a crack. In all probability it was through this crevice that water came flowing and somehow found its way into the cave through that oblongish opening which due to hard rocky strata could not increase in size easily. The villagers had found this opening while they stayed there and peeped in several times to locate the tigers but only succeeded in confirming their presence. Nothing more about their size etc. could be found out, the light inside being also very poor.

With the posting of guns the action began and after full preparations two bold fellows went towards the mouth and removed a couple of stones making just enough opening for a tiger to come out. After completing their job they speedily ran up the slope for about 12 to 14 feet. They had expected the tigers to come out of their own accord immediately as they remained captives for almost three days and naturally starving. But nothing of the sort happened and quiet prevailed for a few minutes. When the tigers did not stir the villagers on the top of the cave were made to shout and make tapping noises on the top of the cave. This effort also proved abortive.

Somebody suggested that burning sticks or grass should be thrown in

from the top hole so some grass and dry twigs were collected and one by one thrown in. After a couple of minutes there was a movement inside and the guns were alerted. After repeated efforts one of the tigers peeped out and went back but then afterwards jumped out and stopped for a moment outside the mouth of the cave to take stock of the situation. Immediately a shot rang and it fell dead. The sound of the gun disturbed the inmate of the cave and another tiger stirred out in the same manner but was promptly made short work of.

However, these two shots and the noise of human beings greatly disturbed other tigers inside the cave, who apparently made a lot of movement but failed to muster sufficient courage to come out and after repeated dropping of burning grass one of them emerged. It was badly perplexed and coming out of the mouth of the cave ran straight into the guns, gallopping blindly, but was promptly snapped up by the third bullet. A fourth bullet was also administered to stop its movements. The three tigers, all almost full-grown, yet immature, were lying dead, two at one place and the third a little farther off in another direction.

With this bag any hunter would have been overjoyed and could call it the most successful day in his career; but it was not so for those who were forced to do it under very compelling circumstances. It was still a big problem to take out the fourth tiger which refused to come out of the cave. More burning grass was thrown in and in its light the yellow-and-black stripes could be faintly seen inside and due to flickering light the villagers thought that the tiger made movements. It also appeared to be unperturbed by all the burning grass and twigs thrown in. So a big pole was brought to probe around inside without any success. As a result every one was in a fix what to do.

Since the tigers sometimes sit close and stir out only after blanks are fired, the muzzle loader was asked to fire in tne cave which was also repeated, yet no movement was detected. Ultimately, a small angular curved piece of wood was fastened to the bamboo and used as a probe. It came out with a small piece of stinking tiger skin with some flesh attached to it. The problem became more intricate. The very sight of this piece gave rise to the presumption that the fourth tiger might be either dead or a bullet fired in might have severed this piece from the body. But a closer examination revealed that the blood was old, hence the tiger in all probability had been dead for a long time. Yet a tiger is always a tiger till it is actually dead and it is always safe to take full precautions before approaching it. So the mouth of the cave was broadened, a gun kept ready to fire into the cave and then the bamboo was pushed in from the mouth with the angular piece of wood attached to it. It was moved in

A young tiger — resting *Photo*: E. Hanumantha Rao

all directions but the tiger made no movement. Yet to confirm the position more burning grass was thrown in and in its light a couple of tiger skin pieces with separated tail and its head was detected. This then confirmed that the tiger was dead but how it reached that condition was still to be seen. The pieces were dragged out; they clearly disclosed that the portions of the fourth tiger's body were gnawed and chewed; obviously he was killed and eaten by the tigers. Cannabalism no doubt, but the tigers were driven to it out of extreme hunger and nothing else to fall back upon.

I am reminded of another instance of cannabalism by a male tiger eating a female in the forest of Sihora in Jabalpur district. The incident was either in 1929 or 1930 of which photographs were duly published, the article, appearing in one of the issues of the Bombay Natural History Society's *Journals*.

R.R. BHAROS

BIRDWATCHER

Crane Survey in Gujarat

At the International Crane Workshop held at Keoladeo Ghana National Park, Bharatpur, Rajasthan, India, during 7th to 11th February 1983 it was decided that a census of Crane be carried out in Gujarat State, as the State provided a home for the migratory species of cranes, whose population is fast depleting all over the world. In response to this resolution, the Gujarat Forest Department accepted this challenging task of enumerating the various species of cranes in Gujarat. The first Crane survey in Gujarat State was carried out during January 1984, from 16th to 22nd.

During December 1983, circulars were issued throughout the State to all Forest Officers, subordinate forest staff and to all well-known wildlife enthusiasts. These circulars contained details and description of the three crane species, namely the Sarus Crane (*Grus antigone antigone*), the Demoiselle Crane (*Anthropoides virgo*), and the Common Crane (*Grus grus lilfordi*) found in Gujarat. The mode and dates of enumeration were also detailed in it. The whole Gujarat State was divided into administrative zones and enumeration units specially for this survey work. The State was divided into 12 zones each in charge of a Conservator of Forests, 43 sub-zones each in charge of a deputy Conservator, 187 Supervisory units each in charge of a Forest Ranger, and 2000 Enumeration units in charge of Foresters, Guards and Watchmen. Each zone contained four to five sub-zones, each sub-zone, 5 to 10 Supervisory units, and each Supervisory unit, 10 to 15 enumerators, and each Enumerator in charge of 8 to 12 villages.

The major problems and constraints faced by the Department in carrying out this enumeration work were as under:

1. *Constraints of time*

a. The migratory species of cranes are at a peak and are in a stabilized form during a narrow span of the months of December and January.

b. The crane species generally are very gregarious and move about in definite groups to and fro from waterholes to feeding grounds, but they may change their roosting places and move over to a different area at least once in 24 hours.

2. *Limitations due to non-availability of modern amenities*

Facilities like binoculars, pedometers, cameras, computers and survey helicopters would certainly have enhanced the preciseness of this survey work, which had to be totally relied upon tiring manual work owing to absence of such facilities.

3. The entire forest staff had to concentrate all their energy and had to slow down certain forestry work

Demoiselle Cranes on the ground and in flight

Photos: A.R. Rahmani

A flock of Sarus Cranes *Photo*: A.R. Rahmani

for quite some time.

In spite of these adversities, the survey work was carried out very systematically, and meticulously. The methodology was very satisfactory, and was successfully used in avoiding duplication or in recounting, because

a. The survey unit was minimised up to the maximum possible extent, utilizing maximum possible enumerators and taluka-supervisors so that enumeration became easy and quick, and also enough time was on hand to cross-check the data.

b. The enumeration was done during morning hours during which the birds generally do not change their location.

c. The proformas were exhaustive and prepared in such a way that any error of misinformation came immediately to notice.

d. Four supervisory stages were kept for checking out the data.

e. Strict adherence to the time table.

The details of the final results of the Survey for the 7193 villages covered in the 19 districts of Gujarat are: 19,659 (Sarus crane), 14,78,073 (Demoiselle crane), 83,337 (Common crane).

H.A. VAISHNAV

Chief Conservator of Forests
Gujarat State

The Painted Sandgrouse

The cover picture of the current issue is that of the Painted Sandgrouse *Pterocles indicus*, photographed by Mr Rishad Naoroji at Ranthambor Tiger Sanctuary, Rajasthan. The most beautiful among the Sandgrouse, its distribution in the Indian subcontinent is from Pakistan east of the Indus; India east to Bihar and Orissa, and south to Karnataka and Tamil Nadu. Bare, stony plateau country with sparse ground cover is its favoured habitat.

The birds keep in exclusive groups of 10 to 12 individuals and never associate in the huge flocks in which other species of Sandgrouse occur. Their flight is strong and tolerably fast, but they do not take to flight until almost stamped upon, thus offering an easy shot to the hunter.

During the early part of the rains they leave cover and are found in the open country. This is the time the bird-catchers approaching under cover of green-leaf-and-twig screens drop a circular net suspended to a hoop and held out horizontally at the end of a long bamboo over the birds which never suspect the danger at hand. Barring short distance local movements brought about by seasonal change or varying nature of cover, Painted Sandgrouse are never subject to long-distance migrations.

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