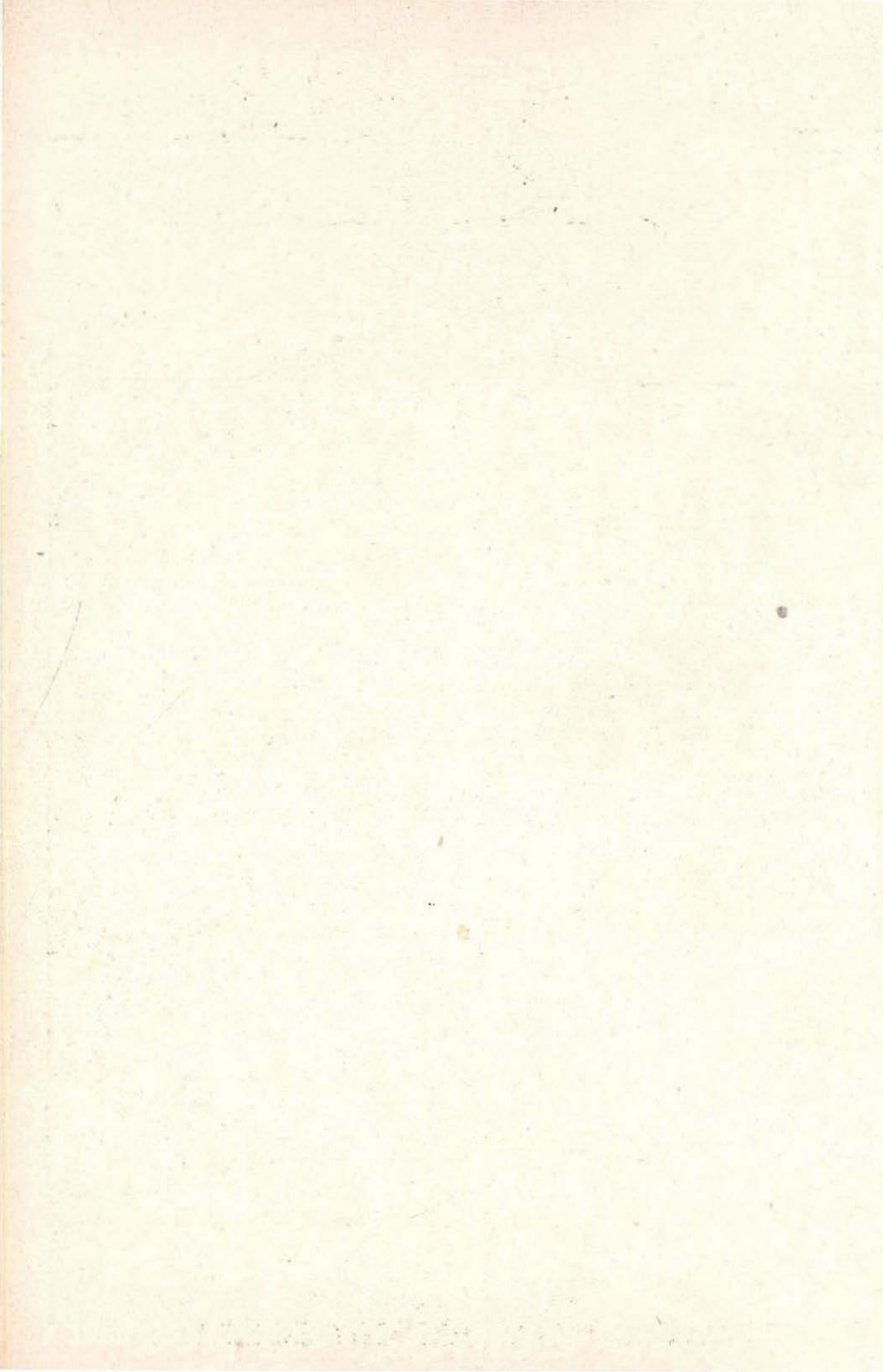


HORNBILL

1984 (3)



BOMBAY NATURAL HISTORY SOCIETY



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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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
 Hornbill House, opp. Lion Gate
 Shahid Bhagat Singh Road
 Bombay 400 023

EDITED BY

J. C. DANIEL
 J. S. SERRAO
 I. D. KÉHIMKAR

EDITORIAL

A Centre of Excellence in Ornithology

In the last issue of *Hornbill* (April-June 1984) we gave a summary of what the Society planned to do provided that we had assumed correctly that substantial financial assistance would be forthcoming from the Department of Environment, Government of India, under the Seventh Five-Year Plan.

The Department of Environment who examined our plans felt that the Society whose expertise during the last fifty years of its existence had veered towards Ornithology should be a nodal point in the study of ornithology and was best suited for the establishment of an institute or school of ornithology under the Department's Centre of Excellence programme.

Dr T.N. Khoshoo, Secretary, Department of Environment, very kindly discussed with the Executive

Committee of the Society the proposal for the establishment of such an institute and a revised proposal with the main thrust towards its establishment is under active consideration and a note, we understand, has been submitted by the Department to the Prime Minister as the Head of the Department of Environment for approval of the establishment of a Centre of Excellence in Ornithology at the Bombay Natural History Society.

The plan that we had submitted earlier will now be considered in two sections to be funded separately, one for the establishment of the Institute of Ornithology and one towards enhancing member facilities, such as an auditorium, increasing library services, establishment of a herbarium and enhancing educational and publication programmes.

The Streaked Weaver Bird

The cover picture by Mr Robert D'Souza depicts the Streaked Weaver Bird. It differs from the Common Baya in having the breast boldly streaked dark brown-and-black. The species inhabits the whole of India and frequents swampy, rain-flooded localities where tall grass and bulrushes abound. Like the Common Baya, it breeds during the rainy season in colonies, among reeds standing in water or in inun-

dated paddy crops, invariably always away from human habitations.

The breeding season commences after the onset of the rains. Like the Common Baya, the male alone builds the nest, pulling the leaf-blades inwards and binding them in a knot, which forms the suspension point of the nest.

With the nest reaching the 'helmet stage', the male adds wet mud blobs

(Contd. on p. 41)

African Diary

Ever since my father first read me Jim Corbett stories my interest in Wildlife was awakened. Later when I was about 12 years old I read Durrell's *THE OVER LOADED ARK* in one sitting staying up till the early hours and I was hooked. Interested in photography I would often use my father's old Kodak Retina — a very good basic camera with a fixed 2.8 mm normal lens and excellent depth of field, but not good for wildlife.

The opportunity to photograph wildlife did not arise till I got my first camera and a 300 mm tele lens in January 1975 and later the same year in March my cousin Jamshyd coincidentally suggested a two week African safari.

Our tour manager met us at Embakari Airport and after dropping us at our hotel for the night saw us off early the next morning with a memorable night at Tree Tops. We did the tourist circuit — Mt Kenya Safari Club — Kilimanjaro, Manyara, Ngorongoro, Serengeti and Masai Mara. This type of safari was fulfilling for the others but to my frustration all it entailed was driving up to various animals and moving on after a few snap shots so that we would be in time for breakfast, lunch and dinner at various lodges. A real rush job. One most exasperating moment in the Serengeti was when we drove past a martial eagle and a silverbacked jackal confronting each other over

the carcass of a monitor lizard most probably killed by the eagle.

It was this that decided me to stay on for a month to get 'my fill' of Africa. I bought a Land Rover, climbed Killimanjaro and travelled around visiting many of the reserves and national parks. Tavo, Nakuru, Serengeti, Ngorongoro, Lake Manyar and mainly Masai Mara where I spent months together in various parts of the reserve. I would get together a few like - minded travellers so that petrol and other expenses would be shared. Some of the administration staff were very helpful and unbureaucratic. In Arusha I went to meet Mr Dereck Bryeson, the Director of Tanzania's National Parks and husband of Jane Goodall. He was away in Gombe but his secretary told me to return in half an hour, and on my return she handed me a Free Entry Pass to all the game parks of Tanzania valid for a period of one month! Most of my photographs were taken from the Land Rover.

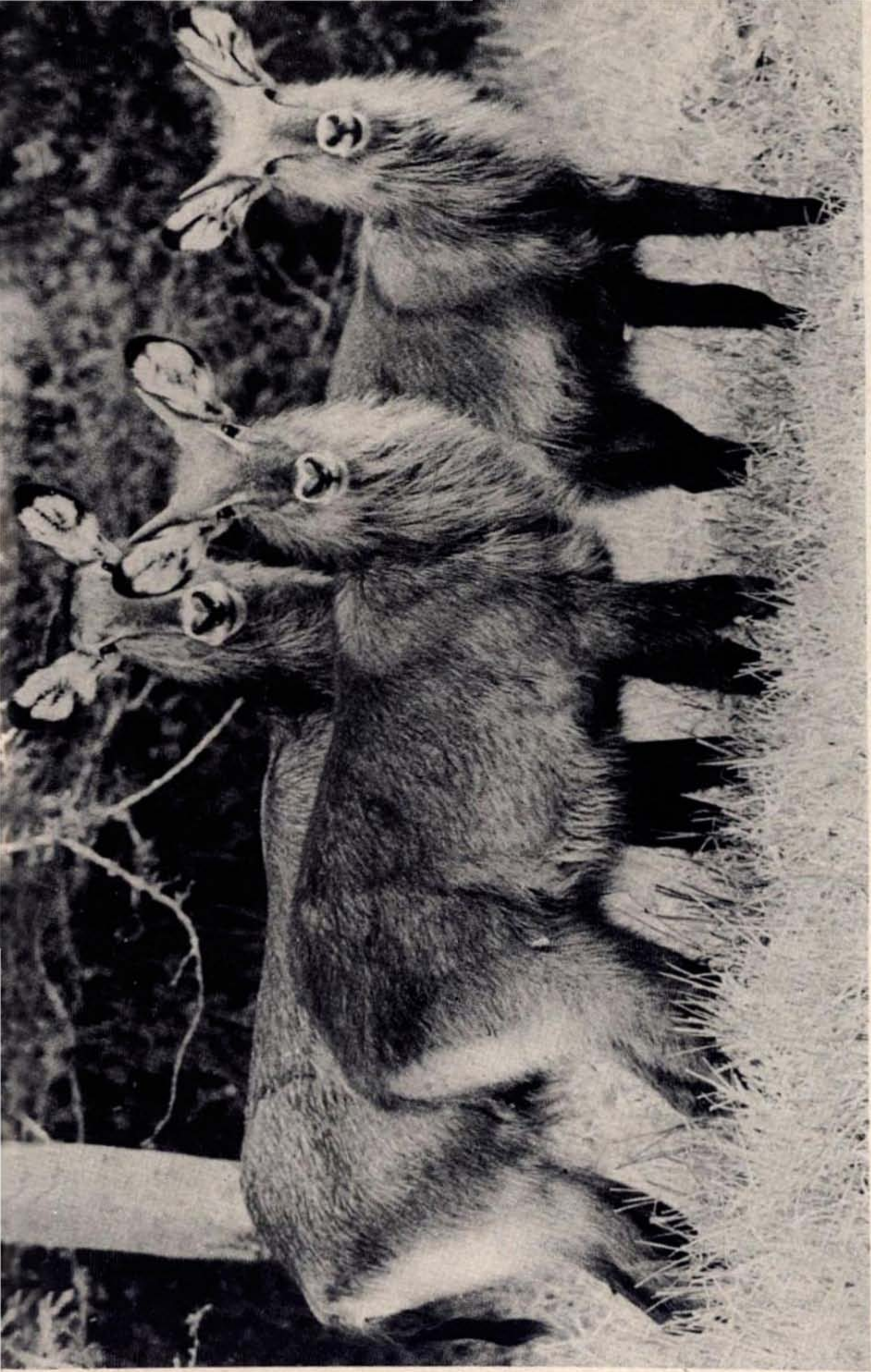
WATERBUCK

Waterbuck are common in the major sanctuaries and parks of East Africa. As their name suggests they are fond of water and prefer open woodlands. There are two types of waterbuck — Ringed or Common, and Defassa. Both types are found in Nairobi National Park where they have even interbred with each other with interesting results. This is the



Above. *Rishad at the Nairobi orphanage; Below. Camp at Lake Nakuru*
Photos: Rishad Naoroji





Defassa Waterbuck found in Lake Nakuru environs

Photo: Rishad Naoroji



Defassa Waterbuck male leaping in the Nakuru waters

Photo: Rishad Naoroji

only place in Africa where both species are seen together. Defassa are found in Lake Nakuru whose environment supports a high concentration of this waterbuck which prefer cover to open grasslands. Both pictures were taken at Lake Nakuru.

A few days before this picture was taken from a permanent hide built by the park authorities I saw this male on more than one occasion leap into the water instead of calmly crossing over. One morning at 11.00 he obliged and I took this picture with my 300 mm at 1/500 sec. fully open at F5.6. on Tri-x. Among the

waterbirds in the picture are pelicans, crested grebes, egrets, dabchicks and shovellers. He landed in the middle with a big splash spooking the birds as he waded across.

A few days later at dusk I was on my way to this very hide to get a glimpse of hippo when I saw a group of females with two males. I stopped my landrover as three does merged together for a few seconds enabling me to take this picture with my 300 mm at 1/30 sec. fully open at F5.6.

(To be continued)

RISHAD NAOROJI

Return of the Great Indian Bustard

The Great Indian Bustard is perhaps the most well known among the endangered birds of India. Its popularity can be judged by its various names in different parts of the country. For our countrymen, most of the birds are just 'birds' or 'chirya', but when it comes to the Great Indian Bustard, it is specially identified, thanks to its large size and proclivity to live in open areas where it can be easily recognized. It is known as *Godawen* in Rajasthan, *Maldhok* in Maharashtra, *Betameka* Andhra Pradesh, *Tuqdar* in the former Nizam State, *Yerreladdu* in Karnataka, *Gorard* in Gujarat and *Haank* in Madhya Pradesh. In addition to this, there are local dialectical variations, like *Haank*, *Hukan* and *Hukna* in Shivpuri and Gwalior.

The bustard is a bird of open scrub, savanna and semi-deserts. It avoids forests and thick grass stands which are above its eye level. It can survive in marginal agricultural land and lightly grazed areas.

To know more about the ecology, behaviour and the present status of the bustard, the Bombay Natural History Society in 1981 started a five-year project under Dr Salim Ali in collaboration with the Department of Wildlife, Government of India and the forest departments of Maharashtra, Madhya Pradesh, Rajasthan, Andhra Pradesh, Gujarat and Karnataka and with funds provided by the Fish & Wildlife Services

of the United States Government from P.L. 480 funds held in India. Two field stations — one at Nanaj, Solapur (Maharashtra) and another at Karera, Shivpuri (M.P.) were selected for intensive studies. Numerous surveys were done in all the six states. During the last three years much data has been collected which has thrown new light on the behaviour and habits of this species. One of the most encouraging results is that we found that the bustard is not so rare as we used to believe. Many healthy populations survive in Jaisalmer, Jodhpur, Bikaner, Ajmer, Kota, Bhilwara and Tonk districts of Rajasthan. Though it is difficult to estimate the population due to the vastness of the area as well as restrictions along the sensitive border regions, perhaps not less than 500-600 bustards are present in Rajasthan. Some 'experts' claim that the population in Rajasthan is above two thousand!

Apart from Rajasthan, Maharashtra and Madhya Pradesh each has between 60-80 bustards. Both these states have done wonderfully well in bustard conservation. The M.P. Forest department maintains two bustard sanctuaries: one at Karera in Shivpuri and another at Ghatigaon in Gwalior. Pohri in Shivpuri district is another place where very recently we have found twelve adult birds. Fortunately, the State Government has agreed to declare the Pohri area also as a



A female Great Indian Bustard at Karera (April 1984)

Photo: A.R. Rahmani

bustard sanctuary. There are two more areas in Shivpuri where bustards are definitely present. Guna is another district which may hold a few more bustard.

In Maharashtra, Solapur, Beed, Aurangabad and Ahmednagar districts are now the "stronghold" of the bustard. There are two bustard sanctuaries and many protected areas maintained by the Maharashtra Forest Department. One of the advantages of the Drought-Prone-Areas-Programme (DPAP) is the protection given to the bustard habitat. Under DPAP, from 1976, the State Forest Department developed pastures and woodlot plots of various sizes to provide fodder and fuel to the

villagers. Within one or two years of this programme, bustards were seen in the plots. This proves that the birds which had survived in the region, finding adequate protection and a perfect habitat, colonized the pasture plots. As the disturbance was minimum in the DPAP plots, breeding was successful. From 5-6 birds in 1979 at Nanaj, the population has gone up to 20-22 birds. This has happened in other DPAP areas also. Unfortunately, due to lack of funds, the DPAP had to be stopped but the state Forest Department is willing to continue protection to the pasture plots under different schemes. On the basis of the recommendations of the Bombay Natural History Society team, the Forest

Department has evolved an ambitious plan under which 200-500 hectare grassland pockets will be maintained throughout the Marathwada region for the bustards.

Rollapadu and Baiganpalli in Kurnool district are two places in Andhra Pradesh where the bustard is seen. Actually one of the best natural grasslands seen by us is near Rollapadu village. Ten adult birds and four chicks were seen in December 1983 and recently (July 1984) we have seen 35 bustards. This is the largest flock of bustards seen anywhere in recent years. As soon as the State Forest Department came to know about the presence of bustards, they deputed a ranger and few forest guards to protect the birds. Grazing was also curtailed as a result of which all the four nests located were successful. Unfortunately, the district administration has already drawn a plan to settle 100 poor families in the main bustard area. Each family will be given 50 goats and sheep. It is needless to add here that with the invasion of 5000 livestock in the Rollapadu grassland, extermination of the bustards will not be far off. With the cooperation of the Forest Department, the Bombay Natural History Society team is studying the problem to find possible solution which will help both the colonisers and the bustards.

In Gujarat, the bustard is present in Jamnagar and Kutch. The whole region between Mandvi and Nakhatrana is good bustard area. Like other places, it is difficult to

estimate the population. Tentative estimates are between 50 to 200. Surprisingly, the bustards have disappeared from Bhavnagar, Amreli, Junagadh and Rajkot districts. Poaching and spread of *Prosopis* cannot explain this total disappearance. This is the region where Shri S. Dharmakumarsinhji did pioneer studies on the bustards and according to him the birds were quite common 30-40 years ago.

In Karnataka, the bustard is occasionally seen in the Rannibenur Blackbuck Sanctuary and Guttal in Dharwad district, but due to extensive eucalyptus plantation, its habitat has been almost destroyed. The bustard is generally seen outside the sanctuary in the so-called blank (non-planted) areas, but due to the intensive grazing pressure, the birds cannot breed successfully. The irony is that the sanctuary area is under eucalyptus plantation while the outside areas are under the hooves of livestock. We have suggested to the Forest Department to develop a few grassland plots of 200-300 hectares each where the bustards can breed successfully.

It was believed that the bustard female abandons the eggs easily when disturbed by man. On the contrary, we have found that the bustard has strong bonds to the egg and chick. Out of the 20 nests studied at Karera not even one was deserted. Similarly, out of the 18 nests at Nanaj, only three nests were abandoned and we suspect that all the three females laid again. Though only colour-banding can confirm the view, we think that only young



An adult male bustard resting in the shade of Acacia leucophloea (09.30 hrs, April 1984, Karera)

Photo: A.R. Rahmani

females desert the nest and this desertion is not always due to human disturbance.

The reason why people find 'abandoned eggs' can be explained by the polygamous nature of the bustard. Only the female bustard incubates and raises the chick. Everyday, morning and evening, she takes a recess for foraging. She generally forages 200-400 m around the nest and hides as soon as she senses any danger. If a man finds the egg and does not see the hen in the vicinity he will think it is a deserted egg though the bird watches unseen from a distance. Of course, the female would not return to the nest as long as the danger (human) persists. In one place, we found a wat-

chman sitting about 50 m from the nest to confirm the opinion of a forest official that the nest had been deserted and the egg could be picked up for artificial incubation. The female bustard was in fact hiding 200 m away and no one had seen her! As soon as the *chowkidar* moved away from the nest, the bustard came back to the nest.

The Great Indian Bustard is omnivorous, and an opportunistic feeder. Its diet varies from beetles, ants, grasshoppers, lizards, snakes to wheat, jowar, *Zizyphus*, gram and taramira or soeha. Taramira (*Eruca sativa*) is a dry-land winter crop of marginal land, belonging to the family Cruciferae and closely related to the mustard. It is exten-

sively grown in Shivpuri, Gwalior, Kota, Ajmer etc., and the oil from the seeds is used to adulterate mustard oil. The whole plant is relished by the bustard. At Karera, we found that as long as this crop is present, the bustards are generally seen eating them. Gram is another favourite crop of the bustards. Though many workers have reported the presence of bustards in wheat fields, we have never seen them inside standing wheat in our three years of study. However, soon after the wheat is harvested, they can be seen picking the fallen grains. Ripe drupes of *Zizyphus* are also much liked by the bustards. Unfortunately, goats, which are present in abundance, leave nothing for the bustards. At Karera goats directly compete with the bustards for *Zizyphus* in which the latter suffer.

Social life of the bustards is very interesting. Among birds, the bustard group shows the maximum sexual size dimorphism. In the case of the Great Indian Bustard, the adult male has almost twice the weight of the female. In the non-breeding season, all the females of an area flock together. The males, especially the subadults, also join together but the flock cohesiveness, is not very strong. Sometimes the adult males remain aloof for a few days before rejoining the male group. The postjuvenile bustard remains with the hens for a year or probably more. This mother-juvenile group either join the all-female flocks or remain separate, but they never join the male flock. The male juvenile, even when it has

grown bigger than its mother, remains with the mother till it is driven off in the next breeding season. Interestingly, the Great Indian Bustard never lives in pairs, though a temporary grouping of one or two males with a few females is not uncommon. True pairing as seen in birds like geese, brahminy duck or sarus, is not seen in bustards. Many people when they see a hen with her postjuvenile male offspring mistake them to be a pair.

In the breeding season, most adult males form a territory of their own, and adult females separate to nest. They move from one territory to another to select a mate. Only the subadult birds still move together. Adult males are strongly territorial and do not allow other adult cock birds to come near. However, subadult males are tolerated.

The cock bird has a fantastic courtship display. It selects a permanent place in its territory, called an arena. The male spends most of his time in and around the arena. In the morning and evening, the male struts in the arena with its tail cocked. Slowly, the neck becomes pendulous and hangs like a white balloon in between the legs. During the peak courtship display, it utters a deep moaning call every 14-16 seconds. While displaying, the conspicuous white neck is visible from more than a kilometre and the call is heard up to 500-600 m, depending upon the wind direction. The display lasts for hours — the maximum time we have noted is four hours of continuous display. Though the display peaks are in the



A cock bustard displaying in his arena at Nanaj (October 1983) Photo: A. R. Rahmani



Above. A cock bustard displaying near a female (Karera, June 1984); Below. A newly hatched bustard chick (11 June 1984, Karera)

Photos: A.R. Rahmani.



morning and evening, during cloudy days males can be seen displaying at any time of the day. Once we saw the cock bustard of Nanaj displaying at 12.15 hour in the presence of four females. They also display on moonlit nights.

The bustard female is generally unresponsive to the wooing attempts of the male. However, when she is receptive, she walks or flies straight to the displaying male and sits near him. The male comes and tenderly nibbles at the head of the female. This nibbling (fore play) goes on for 10-13 minutes. The actual copulation takes one or two seconds, after which, the female runs away, shuffling her feathers. Within seconds, the male starts displaying again.

A few days after successful mating, the female bustard makes a scrape in the ground and lays her precious egg. According to Shri Dharmakumarsinhji during a very good rainy season, a two-egg clutch may be found. All the 44 nests which we studied in Nanaj, Karera, Pohri, Kota and Jaisalmer had one egg. If the egg is not trampled by livestock, a fluffy, speckled chick comes out after a month. Within a day this precocial chick leaves the nest and follows the mother for about a year, till she is ready to mate again.

Contrary to the popular belief, the Great Indian Bustard breeds very successfully if its habitat is protected. Though fox, crow and mongoose sometimes damage the egg, the biggest danger to the egg is the ubiquitous livestock.

Throughout its range in the six states, one can see innumerable number of domestic animals, often unproductive. Wherever, the habitat is being protected, the bustard population is increasing very satisfactorily. At Nanaj, for example, the population has increased from eight birds in 1981 to 20-22 in 1983. Similarly at our other field stations in Karera, the population has gone up from 14 adult birds in 1982 to 30 in 1984. In the Desert National Park, Jaisalmer, the Forest Department has developed enclosures of 500 to 1000 hectares where sheep and goats are not allowed. Most of the successful breeding is inside these enclosures.

The Great Indian Bustard is an indicator species of the grassland ecosystem, like the tiger which is the indicator of the health of the forests. By saving the bustard and its habitat, we will save a number of other species. For example, the Rollapadu grassland holds a huge population of harriers in winter. I counted 110 harriers coming to roost in about 200 hectare area. Since the establishment of the Karera Bustard Sanctuary in 1980, the population of the chinkaras, blackbuck, partridges and quails has gone up. It is not difficult to imagine the fate of the bustards (and harriers etc.) if the Rollapadu grassland is destroyed. The key to the survival of the Great Indian Bustard and its associate species is the preservation of at least pockets of protected grasslands in its range of distribution.

ASAD RAFI RAHMANI

CONSERVATION ACTION

Mediterranean death-trap for migratory birds

The killing of migratory birds is probably worse in countries bordering the Mediterranean and some are located along an internationally significant birds of prey migration route. The worst areas are in Portugal, Spain, France, Italy, Malta, Cyprus and Lebanon where hunting and catching are particularly intensive. The main reason for these activities is fun, although in different regions varying degrees of importance is given to killing or catching for food, as a source of income, for caging, for stuffing, for prevention of damage to crops and target practice.

Of course there are legal restrictions to such activities in most of these countries but the law remains only on paper. In this region killing and catching song birds has been a way of life and the number of hunters far exceed the conservationists in some countries by thousands to one.

Bird catchers in France have organised themselves in several associations to defend their illegal activities on the ground, that it is a traditional pastime. In southwest France clapnets are used to catch thousands of skylarks each year. In addition over two million people in France, from all sections of society, shoot birds. They too are well organised and politically powerful, whereas the bird protection societies of these regions are small and lack finance and support to counter the

hunters.

Each year in Italy millions of song birds are snared in nets attracted by the decoy birds or Zimbelli (birds tied to a string, which by flapping their wings attract other birds). Most birds that are caught in Spain are eaten at home or in restaurants and despite such trade being banned, thrushes are still sold to canning factories for export. In Portugal spring-traps are commonly used to catch robins, flycatchers and thrushes. Colourful birds like Golden oriole and birds of prey Sparrowhawk are shot in Malta for fun. Several people there have collection of stuffed birds. Lime-sticks are commonly used in Cyprus. Sticks covered with a glue-type substance are left in bushes so that birds get stuck when they land on them. Several million migrants are trapped every year by this method.

Southern Lebanon is almost devoid of resident birds. The majority of the men are equipped with automatic weapons and a large part of the youth is armed. Eight year old boys shoot any birds they sight with air guns. Villagers and Falangist soldiers are often seen walking around with their booty tied to belts around their waists — migrants like orioles, shrikes, warblers, gold finches and birds of prey. Locals hunt mainly migrating birds. During the migrating season, hunting activity intensifies significantly and becomes almost a



Migrants in motion

Photo: S.A. Hussain

national sport. In Lebanon all the small birds and the birds of prey including migrating species are protected by law that is never enforced. Israel seems to be the only country of that region where no real damage to migrating birds is done and the ratio of birdwatchers versus hunters is the highest there. A large part of Israel's population hails from Arabic countries and Eastern Europe with no consciousness of nature conservation but with intensive educational activity they have been very successful to instill a respect for animals. This experience proves that massive educational campaign can have positive results. The need for international cooperation has been recognized and the European Economic Community

has issued a directive that aims to protect migratory birds and their habitats. The pressure is put on the member states to fulfill the requirements of the directive. But the hunter's lobby is so influential that more pressure is required from other countries too. The British Committee for the Prevention of Mass destruction of Migratory Birds has been set up by the International Council for Bird Preservation and has the support of other international conservation bodies.

For enquiries and support write to

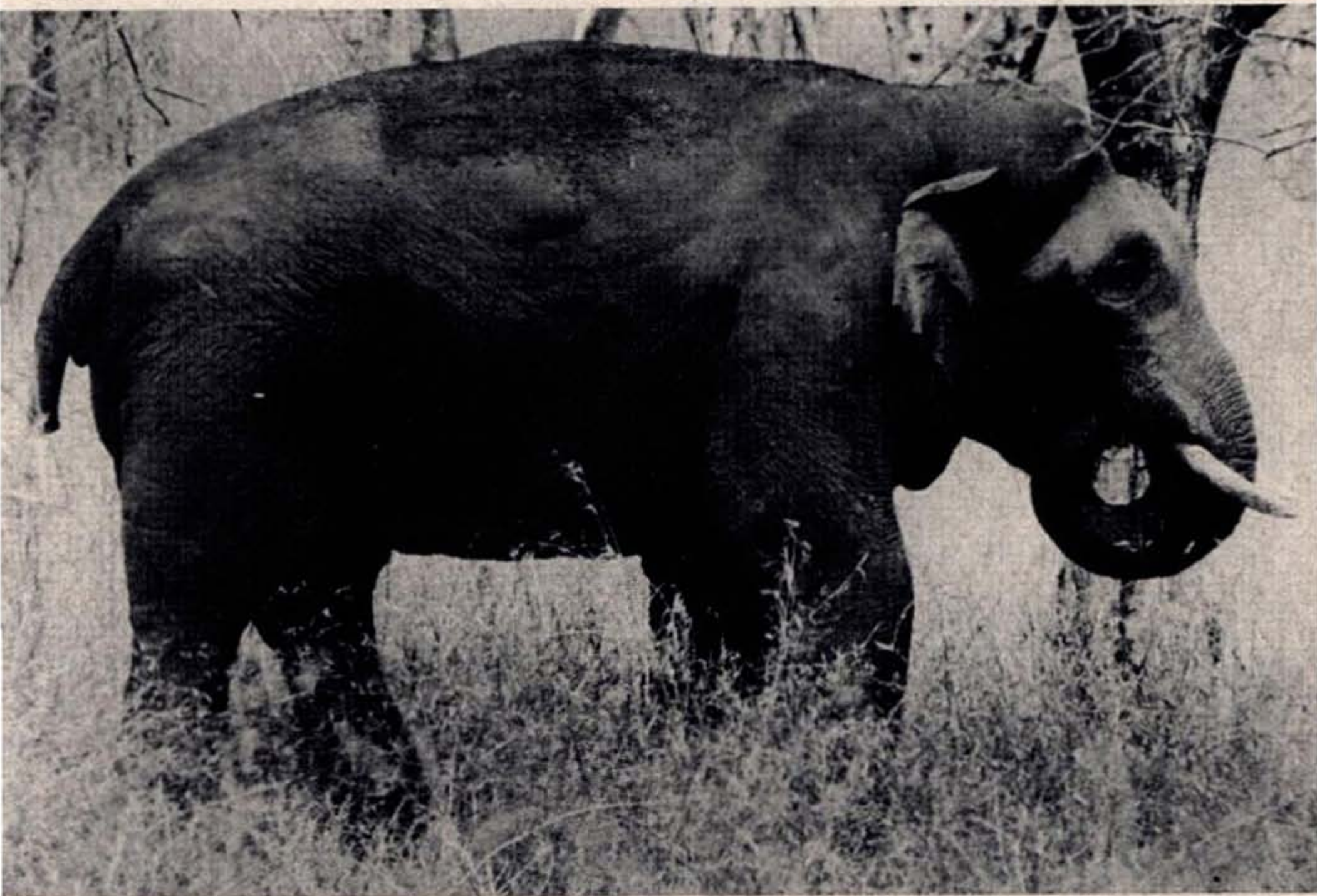
THE INTERNATIONAL COUNCIL FOR BIRD PRESERVATION,
C/O. THE LODGE, SANDY
BEDFORDSHIRE SG192DL
U.K.

A threat to Kalakadu Wildlife Sanctuary

The moonlit night was as bright as day. We were settling for the night on the terrace of the unfinished dormitory built by the Tamil Nadu Forest department two hundred metres from Thalayanai in Pachayar river in Kalakadu Wildlife Sanctuary. Earlier that day we had tracked an elephant herd in Vadagarai forest beat, three kilometres from Thalayanai and late in the evening when we were cooking our evening meal we heard another herd playing and bathing in Pachayar river.

The cool breeze from the hills and the warm floor of the dormitory terrace made us heavily drowsy and

around 10 p.m. when I was about to sleep I heard some heavy animals walking through the scrub close to the dormitory. Silently I aroused Ajay Desai and Sivaganesan, Field Biologists of the Elephant Project, BNHS, crouched near the parapet of the terrace and watched. There were at least twelve elephants walking past the dormitory, at a distance of 10-15 metres, with an adult tusker in the lead with short, straight pointed dagger-like tusks. When he came to the eastern side of the building the wind carried our scent to him. Alertly he stood erect for a few seconds testing the air with



Pachayar Scheme will deprive elephants a portion of their feeding ground

Photo: A.J.T. Johnsingh

the tip of his swaying trunk and then nonchalantly walked on.

The reaction of the herd to our presence was totally different. As we watched with bated breath the group bunched keeping its three calves in the middle and the matriarch trumpeted. Finally rumbling and squeaking repeatedly the herd moved away. Next day morning by following the feeding trails we caught up with the herd resting under a shady tree three kilometres from the dormitory.

Although Kalakadu Reserve Forest (253 km²) was given the status of a sanctuary in 1976 primarily to provide a secure home for the endangered Liontailed monkey it also has other endangered and critically threatened mammals such as the elephant, tiger, sloth bear, wild dogs, Nilgiri tahr and Nilgiri langur. Kalakadu has one of the few tropical rain forests left undisturbed by the onslaught of modernisation. With the evolutionary age of more than 50 million years the evergreen forests of Kalakadu have one of the richest biological and genetic heritage in the world. Small but useful rivers such as Pachayar, Kil Manimuthar, Nambiar and Kodamalaiar spring from these leech-laden forests bringing succour and prosperity to the people living in the adjacent plains.

As part of Bombay Natural History Society elephant study programme I have been on and off collecting information on elephants in Kalakadu Wildlife Sanctuary for the last one year and one of my impor-

tant observations was that Pachayar is the only river along which elephants come down to the foothills from October to May and make use of the resources of the forest beats such as the Kaspaa beat, Vadagarai beat and Therku Veeravanallur beat. After seeing the twelve elephants, watching the starry sky I wondered: What would happen to the movement pattern of these elephants if the proposed Pachayar dam comes through which will certainly block the migratory path of elephants.

The major objective of the Pachayar river project is to utilize the surplus water which goes to the sea for additional food production. The scheme plans the formation of a storage reservoir of 133 m., c.ft. stabilization of the existing irrigation to an extent of 10,203 acres in long term crop and 3313 acres in short term crop and hopes to bring an additional 260 acres in Naguneri Taluk under cultivation. Additional food production estimated by this project is 7841 tons. Nearly thousand workers will be engaged at least for four years and the financial estimate for this scheme in the year 1979-80 was rupees nine crores. When completed the length of the dam will be 815.50 m, top width 3.65 m and maximum height 33.30 m. A minimum of 200 acres of forests within the sanctuary will be needed for this project.

Tamil Nadu Government decided to drop this scheme in 1979 because the forest department raised serious objections and a high level commit-

tee of the Government considered this proposal uneconomical.

Now, regretfully, earlier decision is conveniently forgotten and a very strong lobby of politicians clamour for the revival of the project. This has led to Chief Minister Mr. M.G. Ramachandran declaring that the scheme will be taken up in the next five year plan.

The forest department is in a dilemma now. The proposed dam site comes in the tourism zone of the sanctuary where already rupees ten lakhs have been spent on buildings, water holes and roads. Whether to invest more money in developmental works or to wait for the final decision of the Government is a question haunting them now.

Many questions and thoughts, about the adverse environmental effects of this project, would assail any person familiar with Kalakadu forests and adjacent plains for many years. It should be remembered that often propounders of schemes such as this give a lowest estimate, shortest gestation period and promise maximum benefits. A proposal considered uneconomical few years ago can never become economical as a result of the stronger demand of the politicians. Even the major objective of the project "to utilise the surplus water which goes to sea" is a weak point as the water reaches the

sea once in many years.

It is our bitter experience with ventures like Servalar dam construction that projects do not get completed within the period originally envisaged. If the Pachayar scheme extends much beyond the time allocated the impact of its proposed 1000 workers, their families and cattle on this small sanctuary will be disastrous. Presence of a large number of workers will make the local forest staff submissive and many unlawful elements will make use of this opportunity to distil arrack, plunder timber and shoot wildlife. A permanent human habitation within the sanctuary is also likely as it has happened in Pabanasam and Kothayar camp areas.

Enquiries reveal that elephants have been visiting Pachayar valley and nearby areas, since the last five years, because their habitat on the Kannyakumari side is thoroughly disturbed mostly by rubber plantations and intensive reed collection. It appears elephants have now sought asylum in Kalakadu Wildlife Sanctuary where disturbances are minimal. It will be against the ethics of Wildlife Conservation if this ill conceived project robs the elephants of their newly found refuge.

A.J.T. JOHNSINGH

Birdwatcher

Teals or Tourism

Tourism, if properly developed, is no doubt, a very desirable thing. Apart from its value as a source of foreign currency, it encourages peoples of different nations to come closer. It could also make men and nature come closer. But when it is ill conceived and mismanaged, tourism becomes a serious threat to environment and to its humbler-than-human inhabitants.

A very good instance of the second sort of development is currently causing much anxiety to the bird-lovers of Kerala. The State Tourism Development Corporation, deaf to or in defiance of the State government's resolve to make 1984 the "Year of Nature and Environmental Conservation", has launched an ambitious project to turn a hitherto relatively undisturbed part of the Vembanad backwaters into a tourists' "paradise" and an environmentalist's lament

Kumarakom, a place not far from Kottayam town and known till recently only for its quiet commerce in *kakka* (mollusc shells, the chief source of lime), is soon to become a mini Riviera, complete with casinos, canoes, yachts and whatever else may in the eyes of the department bring in money.

Long ago a Britisher named Baker bought for a song, some acres of swampy ground at Kumarakom on the shore of the vast Vembanad Lake and raised rubber and coconut quite profitably there. Known even

today as the Baker Estate (Photo 1), its creator scorned concrete and tiles. He built a spacious bungalow and roofed it with thatch to keep it cool in the worst of summers. By not persecuting the birds and beasts that came into his garden, he turned it into a virtual sanctuary. Otters gambolled in the drainage ditches; waterbirds learned quickly that they were welcome to roost and even to raise families in Baker's trees. For a long time, only Mr. Baker and the birds knew all this. Now, designated a Bird Sanctuary, the Baker Estate is likely soon to become a hive of human activity and a rubbish dump that will attract only crows and kites.

For some decades a good number of Night Herons (*Nycticorax nycticorax*), rather uncommon and patchily distributed in Kerala, built their nests every year in the mangroves growing in an unclaimed corner of the estate. In March 1981 there were no less than a thousand nests of the Night Heron at this place. Soon after that date the little swamp was dubbed a Bird Sanctuary and, to provide visible evidence of its elevated status, surrounded by barbed wire. For some mysterious reason the mangroves began to decline (Photo 2) yielding ground to a sort of reed which has come to dominate the swamp. This, however, did not deter the Night Herons from carrying on their nesting activities. Since 1981



Baker's bungalow — Now tourist hotel

Photo: Suresh Elamon

One of the surviving mangrove trees — A rare sight in Kerala today

Photo: Suresh Elamon





A gathering of gate crashers: Little Cormorants, Darter & Jungle Crow

Photo: Suresh Elamon

moreover, what had been a monopoly of the Night Heron has been invaded by a good number of Little Cormorants (*Phalacrocorax niger*) and a few pairs of Darters (*Anhinga rufa*).

The hard-headed and the hard-hearted among us may say that none of these birds is on any Endangered List and that thousands of them breed in other parts of the subcontinent. But, so far as the tiny state of Kerala is concerned, since it cannot boast of a Bharatpur Ghana, a Vedanthangal or a Ranganthittoo, it should try to preserve the Kumarakom heronry and not let that swamp be swamped by a deluge of tourism. (See also the article by Shri. K.K. Neelakantan in 'THE NEWSLETTER FOR BIRDPWATCHERS', March-April 1984.)

Worse still is the scheme to attract foreign tourists to Pathiramanal (close to Kumarakom) by building hotels and organising water sports; for Pathiramanal is the *only place* now left in Kerala where our migrant waterfowl spend the day.

As it is, the numbers of ducks and teals visiting Kerala in winter have fallen drastically. If, then, their only roosting place — the waters around Pathiramanal — are to be churned by yachts and motor-boats, the Keralite birdwatcher may have to go beyond the borders of the State to see a wild garganey or a pintail, pochard or whistling teal.

But who cares? Does the average citizen of the State prefer the sight of a pintail to that of a blond pigtail of a bikini-clad tourist — or the politician want to have more wild ducks on the Vembanad than votes for himself and his faction in the ballot box? When the sky ceases to be split by the whirring wings of a skein of ducks, and he can no longer listen to the incessant shrill piping of a flock of whistling teal, the poor birdwatcher may say:

Could I revive within me
That symphony and song,
To such a deep delight 'twould win
me...

But, alas! Who else cares?

K. K. NEELAKANTAN &
SURESH ELAMON

The Cycas Tree—A Living Fossil

Cycas trees are often cultivated in our gardens. Usually they are given a place of pride as they form a prominent and permanent feature in the garden. They are very graceful and hardy little trees resembling the palms and often erroneously called sago-palms. Botanically they are more allied to the cone-bearing

plants like the Pine-trees rather than the tropical palms. Cycas is a very slow growing but long-lived tree. Examples of 15-20 ft tall trees of about a hundred years in age are numerous in the Colaba area of Bombay particularly in the military establishments.

The Cycas tree, like a palm, has



Cycas circinalis: A female tree Wilson College compound Bombay

an unbranched trunk with a crown of more or less stiff leaves. There are separate male and female trees which cannot be distinguished from each other until they bear the reproductive structures in the form of cones on the male trees and a whorl of carpels in the female crown.

There are 16 species of *Cycas* trees which are distributed in the tropics of our globe. Six of these are found in India on the Malabar coast and in Assam *Cycas circinalis* and *Cycas revoluta* are the two more popular garden species of *Cycas* in India.

Cycas circinalis is the bigger of the two and attains a height of about 15 ft, whereas *Cycas revoluta* goes up to about 8 feet. They have long leaves with many leaflets which are 6-8 inches long in the larger species and 3-4 inches long, more pointed and stiffer leaflets in the smaller species. The leaves have a very soothing dark green colour with a shiny surface on account of a thick coating of cutin. The young leaves are protected by special protective scale-leaves which are very formidable, tough and spiny structures. The fresh crown of leaves appears once a year in spring and the whorl of young delicate leaves on emergence appears quite attractive almost like a big gorgeous flower in the centre of the old crown of dark green leaves. The older leaves drop off by and by.

The trunk is usually unbranched but it gives out small side buds or bulbils, which may fall down and give rise to new plants. In fact, the



Cycas circinalis with male cone

best way of propagating the *Cycas* plants is to remove these bulbils and pot them. They are very resistant and remain green for 2-3 months without any injury before developing new roots. Some of the roots of *Cycas* trees allow a few soil-organisms including some greenish algae to grow in their tissues. As a result, these roots swell up and bifurcate repeatedly forming coral like bunches of roots near the soil surface. There is good reason to believe that the trees obtain nitrogenous materials synthesised with the help of these organisms.

It is curious that in Bombay a large majority of *Cycas* trees — of which there are hundreds in the

private and public gardens — are female trees. This is mainly due to its extensive vegetative multiplication from the female stock. We have only two previous records of the male trees coming into bloom. The earlier record of over a hundred years related to a male tree in the compound of the Central Telegraph Office and the later one mentions some male trees in the Victoria Gardens over 50 years ago. In the interval there does not appear to be any record of any male bloom of *Cycas* in Bombay. At Baroda and

Poona the males bloom more frequently. The Bombayman will be gratified to learn however that some transplants of *Cycas circinalis* at St. Xavier's College and at Ruparel College Bombay, are bearing, male ones since 1962, while well-grown trees of *Cycas revoluta* in Bombay are still shy of manifesting their sex. The male plants, came into bloom in March-April emitting a peculiar aroma when the cone is fresh. While in bloom it attracts much of curious attention. A laymen is often greatly puzzled to learn that it is the male

Cycas circinalis male cone



bloom and not a pineapple like fruit of the tree.

Cycas is often considered a living fossil on account of its antiquity. It shows some unique features which are considered very primitive. For example, the leaf-like female part (carpel) bearing the eggs and active swimming type sperm fertilising the egg are very rare in the present day tree life. These features do not occur in the flowering plants. There is reason to believe that the seed-bearing trees with swimming sperms were common on the surface of the earth much before the flowering plants evolved when the atmosphere of the earth was much more humid and the climate was more or less uniform over the globe in the

Mesozoic era. With the advent of seasons after the Palaeozoic the intervention of the dry season did not secure the process of fertilisation of the egg in the absence of adequate humidity. Thus a large number of seed plants became extinct and they are found only in fossilised condition. A few lucky survivors like the Ginkgo tree or Maidenhair tree (Mesozoic) of the Buddhists in China and Japan a few others like *Cycas* type are therefore considered as living fossils. They deserve our fullest support and present a good case for their preservation in their natural habitat.

P. V. BOLE

Cycas circinalis close up of female structures. The round objects on the structure are ovules or eggs.



A new type of Elephant-proof Barrier

In recent years there have been many experiments in India in elephant-proof barriers. Apart from the traditional ditch, with masonry sides where funds permit, boulder-sausages have also been tried successfully. Spikes embedded in concrete strips 8 feet wide are a proof against even the most determined pachyderms, but are controversial because of the possibility of serious injury to elephants' feet. Energised fences are now in use in several parts of India including West Bengal and Arunachal Pradesh. In this context, a new experiment by Arunachal Pradesh Forest Department deserves special mention. I was first told of this in 1983 by Shri A.K. Sen, Assistant Conservator of Forests, then attached to Banderdewa Silviculture Division in Lower Subansiri District, that it was his experience in Namdapha, now Namdapha Tiger Reserve in Tirap District in Arunachal Pradesh, that elephants did not cross even shallow ditches covered with bamboo matting. In March, 1984 I visited Vana Vigyan Kendra at Chessa under Banderdewa Silviculture Division where such a trench was in effective use in protecting a bamboo silvicultural plot which was subject to regular extensive damage by elephants before the construction in 1983 of trench with bamboo-mat covering.

The trench was 570 m long, 2 m deep and 1.5 m wide, and was covered with split bamboo mat. The cost of construction in 1983 was

about Rs 14,000/- at a daily labour rate of Rs 11.00 inclusive of 22% Sunday benefit. The cost per km worked out to about Rs 24,561/-, employing daily labour.

It is possible that contractor's rate would be cheaper as the cost of excavation work here has worked out to Rs 8.18 per cm^3 of earth.

This trench, not requiring any expensive masonry work to protect its sides, has given complete immunity to this vulnerable plot. The Forest Department are thinking of reducing the prescribed depth of the trench, as elephants do not know how deep these trenches are anyway. This particular type of E.P. barrier could be especially useful in tea plantation areas where the existing extensive net-work of wide drains could be easily converted to elephant-proof barriers at minimum cost with only the addition of bamboo mats.

For further details the following may be contacted:

- a) THE CHIEF CONSERVATOR OF FORESTS,
ARUNACHAL PRADESH,
ITANAGAR 791 111,
ARUNACHAL PRADESH.
- b) THE DIVISIONAL FOREST OFFICER,
SILVICULTURE DIVISION,
P.O. BANDERDEWA,
DIST. LOWER SUBANISIRI,
ARUNACHAL PRADESH,
PIN. 791 123.

D.K. LAHIRI CHOUDHURY



Elephant-proof barrier at Chessa, Arunachal Pradesh

Photo: D.K. Lahiri Choudhury

Sunderpura Blackbuck Reserve

The Blackbuck (*Antilope cervicapra*) was once one of the most common herbivores of the Indian plains. Now isolated populations survive in many sanctuaries and reserves — both private and government owned. One such public trust reserve near Baroda in Gujarat is the Sunderpura Blackbuck Reserve which is managed by the Trustees of the Maharaja Fatesingh Zoo Trust. This 270-acre reserve near Sunderpura village is about 12 kilometres from Baroda. Previously the reserve consisted of 700 acres but now only 270 acres are left for the antelopes — the rest is under cultivation. This small area is enclosed by a fencing which is in a dilapidated condition. The enclosure was made to contain the blackbucks from raiding the crops but now the same enclosure is used to prevent cattle from destroying the habitat.

According to Dr G.M. Oza, a well-known conservationist and Chairman of the IUCN Asian Antelope Sub-group, there are nearly 350 blackbucks in Sunderpura. On 7th January 1984, when we visited the area with Dr Oza we saw about 200 blackbucks — mainly females and juveniles. Only six black males were sighted, together with fifteen subadult males. The unequal sex ratio confirms the suspicion of selective shooting of adult males, allegedly by the air-force people having their headquarters near the reserve.

Due to some legalities, the State Forest Department cannot post its guards to protect the wildlife of Sunderpura. Nevertheless poaching must be a very minor threat to the blackbucks because it can be easily prevented by strict vigilance: the greatest threat hanging like a proverbial sword of Damocles is the ultimate fate of the reserve. If the reserve is declassified — which many locals want due to the excellent black cotton soil — the remaining area will also come under cultivation and the blackbucks will have no place to live.

Apart from blackbucks, langurs are the most conspicuous mammal of the reserve. Cheetal-langur association is commonly seen in our forests but in Sunderpura we saw blackbuck-langur association. The langurs due to their wasteful eating habits drop more *Zizyphus* and *Salvadora* than they can eat. These fallen fruits and leaves are relished by the blackbucks.

Sunderpura is well wooded, perhaps too wooded for the liking of these antelopes which prefer open savanna-type country. Among trees, *Prosopis julliflora* is the most common and unfortunately spreading to more areas in the reserve. *Zizyphus mauritiana* and *Bahunia racemosa* are other important trees. Bushes and shrubs consist of *Zizyphus nummularia*, *Cassia tora*, *Cassia occidentalis*, *Ocimum basilicum* and *Salvadora persica*. We saw



Above. Blackbuck in a well-wooded portion of the reserve; Below. Langur and Blackbuck
Photo: Carl D'Silva



some huge bushes of *Salvadora* which were covered by chattering and bickering Blossomheaded Parakeets, Rosy Pastors, Redvented Bulbuls and Brahminy Mynas. According to Dr Oza, the blackbucks feed on *Cassia* in the initial stages of these annual plants but later on they are probably not touched. *Alghai camelorum* is another spiny shrub fed by the blackbucks.

The forest-type of Sunderpura is dry deciduous thorn forest which becomes green during the monsoon for a few months. Grasses like *Eragrostris*, *Chrysopogon*, *Chloris virgata*, *Heteropogon* etc., come up during the monsoon and provide enough food for the greater part of the year. However, an unpalatable grass called *Desmostachya bipinnata* has covered a large part of the reserve and thus has decreased the quantity of palatable varieties. *Desmostachya* grows up to a metre in height and becomes very dense. We saw many pure stands of *Desmostachya*. However this grass also has its value in the ecology of this small reserve. It hides the vulnerable blackbuck fawns from the maruading pie-dogs of the surrounding villages as reported by

Dr Oza and Mr A.C. Gaekwad in *Cheetal* (vol. 16(1): 31-32, 1974). Moreover, in summer the grass is cut by villagers for thatching. Thus selective removal of *Desmostachya* before monsoon helps in regeneration. According to Dr Oza this grass is also considered sacred by villagers — a ring of a blade of *Desmostachya* put around the finger of the dead body results in instant salvation of the departed soul.

Sunderpura has all the potentialities to become an excellent sanctuary or a sort of a blackbuck safari park. Its proximity to Baroda can bring a continuous stream of tourists. However, due to its small size the tourist traffic has to be properly regulated. Guided tours on a slow-moving van will help the visitors watching and photographing the blackbucks. Off-the-road driving and walking has to be banned in order to avoid harrassment to wildlife. Lastly, removal of *Prosopis* and control of *Desmostachya* will greatly enhance the habitat for the graceful antelope.

ASAD RAFI RAHMANI
CARL D'SILVA

Among Desmostachya grass

Photo: A.R. Rahmani



Nandur-Madhameshwar, 'Bharatpur' of Maharashtra

It was cold early in the morning of the 3rd of December 1974, but a bird watching session appeared appealing despite the warmth of woollen blankets. We 'emerged' from the resthouse after a hot cup of tea, but everything was covered with thick mist and fog. It was impossible to see beyond a few metres. We started walking towards the dam, Mr S.A. Hussain leading and even through that thick mist, using his binoculars on the lake.

Suddenly, like a miracle, the mist lifted and we saw a beautiful scene before us. In the shallow water besides the dam and also on small islands and marshy shore of the lake were thousands of waterbirds, dabbling, wading, feeding and diving. All of us were momentarily mesmerised by that sight.

But very soon, hurried observations began — "Those are Brahminy ducks and that's a Pochard. Look at those Whistling teals and Common teals, and the Openbilled Stork amongst the Purple Moorhens? Watch that Pale Harrier chasing the Coots..."

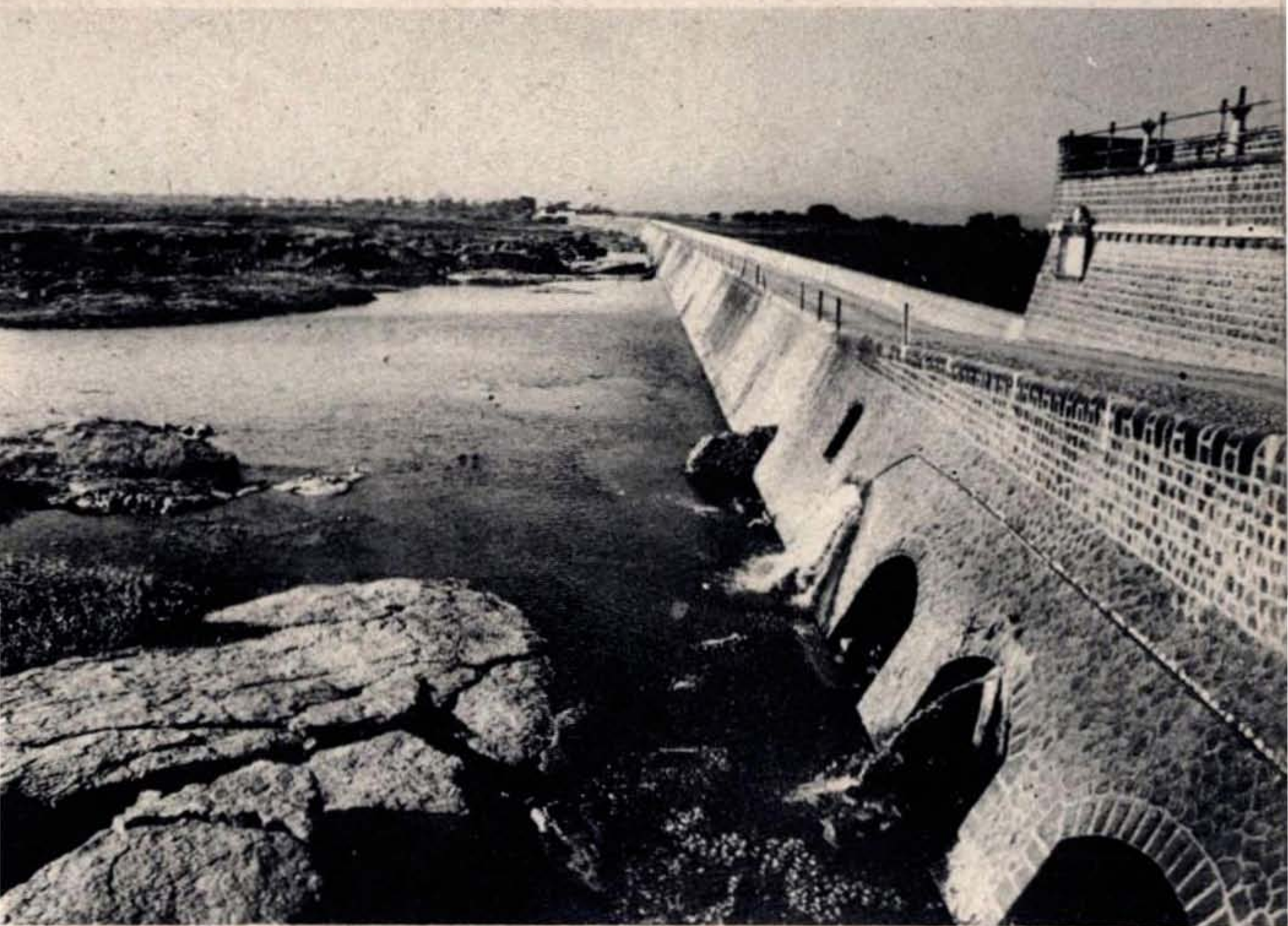
Should I look at the birds first or should I attempt to list them? I finally gave up struggling with that list, and stood there, drinking in the view. And so began my acquaintance with Nandur-Madhameshwar!

I had just become a member of the Bombay Natural History Society, at the end of 1974. There was a study team scheduled to survey the

fauna along the Godavari from the 29th of November to the 4th of December. I joined the team with the only qualifications of a love of nature and great enthusiasm! Our ten-man team started along the Godavari river, right from its origin at Tryambakeshwar. All of us were assigned to various categories of observations.

I thus began to learn the rudiments of Natural History. It was truly an eye opener on the fascination of nature, colourful birds, innumerable types of plants, tiny insects, jackals loping along the barren lands, tempting, bright red, juicy fruits of *Opuntia* and then the painful sensation of their tiny spines embedded in one's tongue, different types of rocks and then while writing up notes of all these things in the evening — the camp along the river bed! I had an exciting time and after four days the trip ended with the awesome experience at Nandur-Madhameshwar lake. But that was not the end! Actually it turned out to be only the beginning!

The Nandur-Madhameshwar irrigation dam and the catchment area is situated in Niphad taluka of Nasik district. It is about 50 km from Nasik and can be approached either *via* Niphad or Sinnar. It is surrounded by fertile sugarcane, onion, jawar and wheat fields and grape orchards. There is no surrounding forest. The lake is a pick-up weir constructed in 1907 on the



Madhameshwar Lake

Photo: Ulhas Rane

Godavari to supply water for irrigation. Gangapur lake on the Godavari and Darna lake on Darna river are the main feeder lakes for Nandur-Madhameshwar. River Kadva also joins this lake from the north, thus giving it a huge backwater area. It is a shallow lake due to siltation, with three big islands in the middle and has an abundance of aquatic vegetation, fishes, mollusc and insect life, thus making it a paradise for migratory birds. Resident birds, however, do not have many trees for nesting. Even for roosting there isn't any suitable vegetation except the thickets near the resthouse or near the village. A lot of raptors are also seen here because of the masses of

birds. Another feature of this place is about 23 small satellite lakes within a radius of a 25 km area. All these lakes could be extremely productive areas for ornithologists. And the dry rocky riverbed of Godavari has also a special attraction. It is supposed to be extremely rich in fossils! It appears that a bird sanctuary comparable to Bharatpur can easily be developed here. The basic immediate need is plantation of plenty of *Acacia*, *Ficus* and *Neem* trees on the islands, along the earth bunds and canals. This will attract more birds for breeding and perhaps alleviate the crowding at roosts.

Madhameshwar temple in the Godavari features significantly in mythology. The Godavari is a

sacred river, known as the Ganga of the South and it is believed that during their exile Ram, Laxman, and Sita stayed in this region which was known as Dandkaranya (i.e. thick forest). It is believed that when Sita asked for the skin of *Suvarnamrug* (golden deer — probably Spotted Deer!), Ram went after it, and it (Marich in form of a deer) was killed by him at the place where Madhameshwar temple stands today. Thus the core of the story of the Ramayan begins at this place. That reminds me of the beginning of that famous epic—

‘ मा निषाद प्रतिष्ठाम् त्वमगमः शाश्वति समः ,
 एत कौच मिथुनात् एकमवधिः काममोहितम् ’
 (Oh hunter, how could you kill a mating pair of Sarus Cranes? You will never have peace!)

It is said that when the poet Valmiki saw a hunter killing a mating pair of Sarus Cranes, he uttered this curse and thus he got the inspiration to write the Ramayan. After so many years, there is no forest left, and still the indiscriminate hunting continues.

Ever since the trips in 1974 I have been very much involved in BNHS activities. Last year, I had an opportunity to visit Nandur-Madhameshwar again. All my memories were fresh inspite of a gap of seven years. But a niggling doubt lingered — would Madhameshwar be the same?

In the early morning of the 3rd of January 1982, three of us started walking from Niphad railway station. At dawn we could hear Painted Partridges calling from the

fields around. The silence was broken intermittently by shrieks of the Spotted Owlet. At sunrise we proceeded towards Madhameshwar on a tractor. By mistake the farmer took us to a village some distance from the temple instead of to Madhameshwar dam. But we didn't mind — we saw more of the beautiful countryside!

We started walking towards the dam through the dry, rocky river bed of the Godavari and saw many birds feeding on algae and aquatic organisms in small puddles. A flock of Whitenecked storks was spotted and while following this flock we saw three species of Ibises — Black, Glossy and the White and also many types of ducks. There was no greenery around but we found a number of herbs and algae. And a Shaheen Falcon startled us when we almost stumbled on it.

Yet, in comparison with the 1974 trip I was disappointed by the status of the birds on the lake and when we came across a contingent of military officers in the resthouse and a pile of dead birds stacked behind the building, we didn't need to know more. We tried reasoning with them but to no avail. Very disheartened, we walked towards the dam and came across the Forest Department officials who were subjected to a rapid barrage of complaints. The D.F.O. — Mr Suneel Mitra was very sympathetic and enthusiastic and took prompt action against the offenders. Instructions were given to his staff to watch the lake and a prohibition of shooting notice was also issued to the surrounding villages in



Purple Moorhens at Madhameshwar

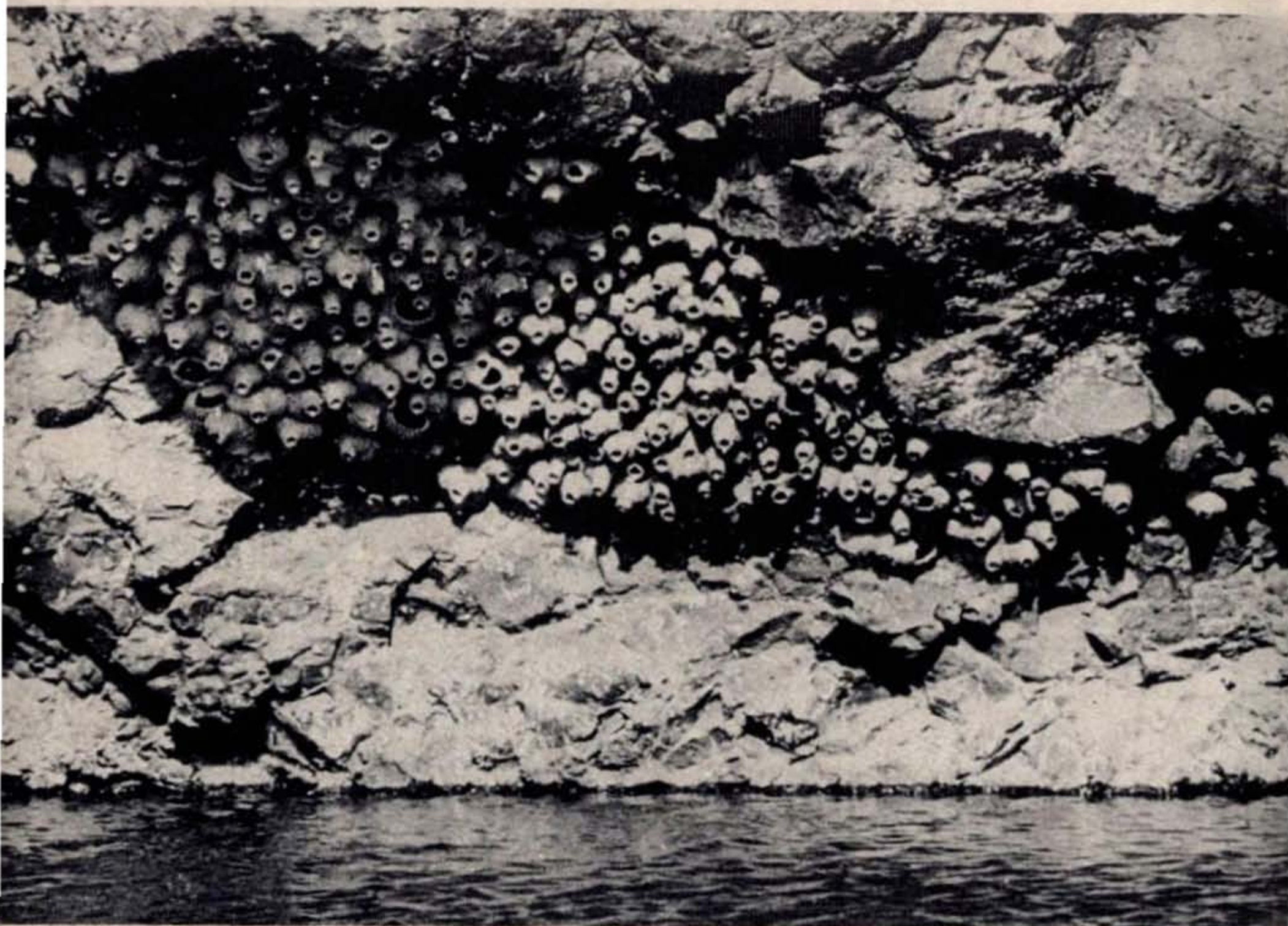
Photo: Ulhas Rane

the traditional manner of a *davandi*. But what made me most happy was when Mr Mitra along with his staff joined us at birdwatching along the lake!

While I was thinking about the proper action to pursue for the protection of Madhameshwar, on the 8th of January I read a letter in **The Maharashtra Times** written by Mr Digambar Gadgil and Dr Thakar from Nasik. They had also had a similar experience at Madhameshwar. Somehow this gave me the required impetus. I wrote a letter to the newspapers and also to organisations like BNHS, WWF-India etc. and to the ministers concerned requesting prompt action for the protection of

this place and the wheels have definitely started moving now! The WWF-India, took interest and arranged a camp for subscribers at Madhameshwar on the 30th of January. The results of those efforts and the timely action by Mr Mitra were clearly evident. There were notice boards prohibiting shooting put up in the vicinity of the lake and also in the resthouse. Permanent forest guards were assigned to the lake. My efforts were bearing fruit.

During the winter of 1982, I visited Madhameshwar four times with members and others on every occasion new birds were seen. The photographers amongst us were naturally kept very busy. All our expectations were more than fulfilled



A colony of Cliff Swallow nests

Photo: Ulhas Rane

by also discovering a nesting colony of Cliff Swallows, White Storks and the Redheaded Merlin. During our last visit, a small number of Lesser Flamingos were also recorded. During these various visits over 200 odd species of birds were recorded out of which 33% are aquatic, 25% long distance migrants (both aquatic and non-aquatic). The fish-eating variety consisted of 12% and the birds of prey 9%. Some species of ducks as well as granivorous passerines feed on surrounding cultivated areas during the day or night. The wetlands of Nasik district provide not only a halting refuge for the migratory waterfowl on their way south but also wintering, and resting place for some of the migratory and most of

resident birds. The lakes and marshes provide a well-developed supporting system catering for varied feeding techniques. These shallow marshes provide perfect niche for wading birds, and gradient of water depths provide for dabbling, diving and surface feeding birds. A review of the checklist of the birds of Nandur-Madhameshwar reveals the existence of a bird community well represented in all departments of the food chain. Though there is very little natural vegetation in the surrounding areas, the presence of considerable number of non-aquatic passerines and non-passerines speaks well of the richness of the wetlands of this area. An ecosystem that caters for such a varied bird

community no doubt has an equally rich supporting system in prey species. A careful inventory of the micro fauna and flora, as well as an enquiry into the status of each life form will give a clear understanding of the nature of the whole ecosystem.

We then began a phase of conservation education for the villagers. A number of nature conservation films and slide shows were projected with the help of WWF-India. World Forestry Day was also celebrated at Madhameshwar in this way. The enthusiasm of the villagers is truly amazing. Many times we have had to have two film shows to accommodate huge crowds. An atmosphere of conservation awareness was created much sooner than expected. On the 8th of October during Wildlife week, Mr Mitra organised a function at Nasik where I presented a slide show on Nandur-Madhameshwar. Next day a trip to Madhmeshwar was also arranged for birdwatchers from Nasik.

Some more progress was achieved in 1983 when the BNHS arranged a bird ringing camp at Nandur-Madhameshwar from the 22nd of January to the 26th of January. A total of 86 birds belonging to 21 species were ringed and released. The expert bird trapper, Mr Ali Husain from Bharatpur demonstrated his techniques to members from Bombay and Nasik.

The BNHS staff also made various visits to the region in order to study its potential as a bird sanctuary. On the 5th and 6th of March 1983, Dr Salim Ali visited Nandur-Madhameshwar and expressed his delight over the protection of the place. The Conservator of Nasik, D.F.O. Mr Mitra with his staff and the Deputy Collector accompanied Dr Salim Ali on a birdwatching session. Lots of villagers also joined in and were very happy to see the great ornithologist in their village. Dr Salim Ali in his characteristic way also obliged by giving his autograph to a long queue of villagers, particularly youngsters! On the evening of the 6th a function was arranged at Nasik when Dr Salim Ali formally inaugurated *Pakshi Mitra Mandal* at Nasik. A project proposal for Nandur-Madhameshwar bird sanctuary was also presented to the Forest Department by BNHS. Nandur-Madhameshwar has now become a permanent study area. Both the BNHS and WWF-India have taken up the region as their project areas and we hope to achieve both goals—scientific investigation and nature conservation of this region. The enthusiasm shown by D.F.O. Mr Mitra is commendable and exemplary. Nandur-Madhameshwar has already been declared a protected area. Now the next step should be 'Bird Sanctuary'!

ULHAS RANE

Butterflies of Bombay-13

This is the concluding section of the series, and is continued from p.38 of *Hornbill* 1984 (1). Eight species of the Family Satyridae are being dealt in this issue.

Butterflies of this family are commonly known as Browns owing to predominance of their brown colour. Their wings are usually marked with eye-like spots or *ocelli*. The markings are prominent in wet season forms and less conspicuous in the dry season individuals.

112. BAMBOO TREE BROWN *Lethe europa* Fab. Common in rainy season. Active at dawn and dusk. Found in plains, jungles by the side of rivers and around human habitations. Seen in bamboo jungles or around bamboo clumps. Settles on bamboo leaves; strong flier but seldom flies long; rarely flies to tree-tops. Larva feeds on dwarf-bamboo. Attracted towards lights in houses at night.

113. COMMON TREE BROWN *Lethe rohria* Fab. Common in lightly wooded or fairly open country, less confined to jungle. Larva feeds on grasses. Males more commonly seen than females. Alert and fast fliers.

114. LONG-BRANDED BUSH BROWN *Mycalesis visala* Moore. Common among dwarf-bamboo jungle. Larva feeds on plant species of gramineae. Exhibits seasonal dimorphism.

115. DARK BRANDED BUSH BROWN *Mycalesis mineus* Linn. Affects

jungles, hills and plains. Common in rice fields. Larva feeds on grasses and bamboo. Dry season form has more cryptically coloured undersides.

116. COMMON BUSH BROWN *Mycalesis perseus* Fab. Very common in bamboo jungles and in gardens. Dry season form is seen in March-May and October; wet season form in July-September. Cryptic undersides of DSF makes it difficult to be detected when it settles among dead leaves. Comes to sugar. Male settles on damp patches.

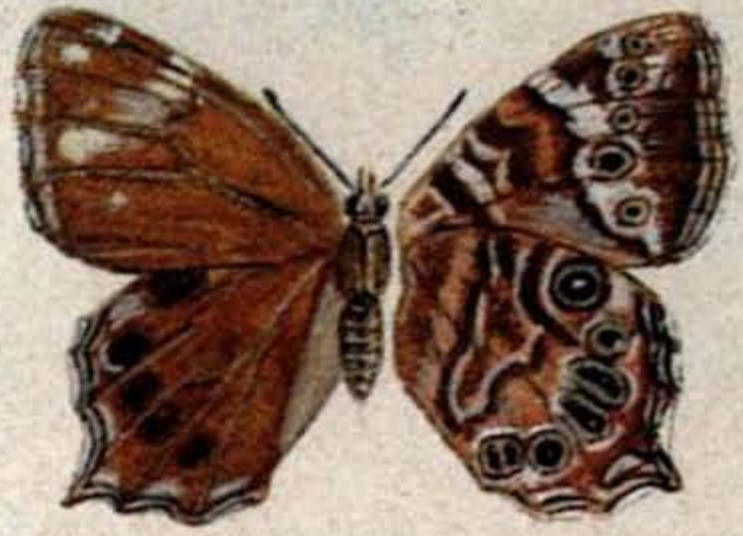
117. COMMON FOUR-RING *Ypthima hubneri* Kirby. Small satyrid with weak but bouncing flight. Found in both jungle and open grasslands in May-June and August-October. Exhibits seasonal dimorphism. Larva food plants are species of gramineae.

118. COMMON FIVE-RING *Ypthima baldus* Fab. Common; small, weak flier of the plains and occasionally of forest areas. DSF seen in December-March and WSF in April-June and August-October. Both forms occur together in autumn. Larva feeds on grasses.

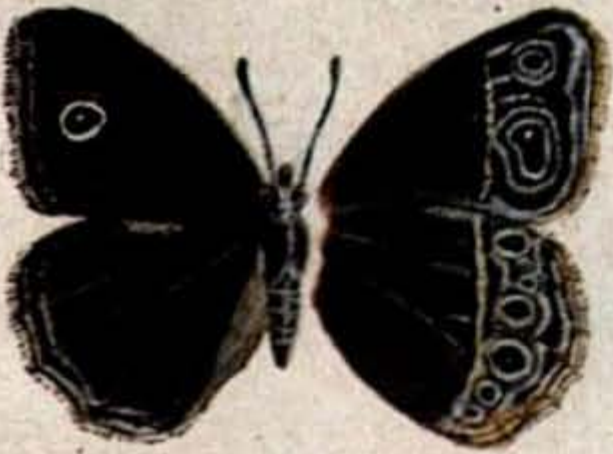
119. COMMON EVENING BROWN *Melanitis leda ismene* Cramer. Crepuscular and shade loving. During day time takes refuge from predators like bee-eaters in undergrowth or among bushes. Common around lights in the even-



112



113



114



115



116



117a



117b



118



119

SMT Sattler

ing. Flies in rapid jerky movements. Well camouflaged when it settles down, owing to protectively coloured underside. Found on ripe fruit and toddy; hence seen about tapped palm trees. Exhibits seasonal dimorphism. Larva feeds on sugar-

cane, rice and other grasses and bamboo, almost attaining pest proportions.

NARESH CHATURVEDI
'S. M. SATHEESAN

(Concluded)

Butterfly Farming

Butterflies are no longer items of beauty to be enjoyed in their natural settings. Their colours and forms have created an international demand for their possession. Each year millions of them are captured and sold throughout the world. The prospective buyers are scientists interested in the various aspects of lepidopteran disciplines, butterfly collectors, manufacturers of curios such as butterfly-set paper-weights and wall hangings, decorators, and zoos and butterfly gardens for live exhibition.

The demand is not restricted to butterflies of a particular region exclusively. It covers the whole globe. Neither is it restricted to a single species, but extends to almost all the 20,000 species or so found the world over. This demand has to be viewed with a certain amount of apprehension by conservationists and wildlife enthusiasts. Allowed to be caught without control, many of the world's gorgeous species of butterflies, in our fast-changing environment, may follow in the footsteps of the British Glorious Large Copper (*Lycaena dispar dispar*) — a butterfly discovered in 1790, which was more colourful

than most of the butterflies of the British Isles. The scramble for its specimens which followed its discovery sent the insect into extinction by 1849.

Butterfly farming saves indigenous lepidopteran fauna from such an eventuality. It is being intelligently worked out in Papua New Guinea, and has helped to conserve the seven or so colourful species of Birdwing butterflies found in that region. The project was started in 1974 with less than 30 villagers participating therein. By 1978 it involved 500 villagers over 10 provinces, farming and collecting butterflies for export.

The establishment and working of a farm is simple. Botanists and ecologists of an area identify the plants the various species of butterflies to be reared use as food during their life cycle. The butterfly farmer now builds up a 'livestock' by clearing a small area of ground and planting leafy foodplants for the larvae. Nectar-yielding flowering plants on which adults of the insect feed are also provided in the same farm. The boundaries of the farm are neither fenced nor walled. The combination of plants provided

completes the habitat a butterfly species needs to grow in and reproduce. This induces the adults to attach themselves to the farm, and tends to make themselves a self renewing resource.

The 'ranching' is done under a central authority, which regulates the numbers captured. Foreign residents and visitors should be allowed to collect butterflies for pleasure and study, for a payment of fee for defraying the expenses involved in the maintenance of the farm. Export from the country of origin, however, has to be strictly regulated and made subject to certificates of origin issued by the central authority. Permits for bonafide exports should be granted charging an export levy, and with minimum of red tape involved. Live specimens

should, however, be debarred to prevent establishing of breeding 'livestock' elsewhere outside the country of origin of the species.

Incidentally the Wildlife (Protection) Act 1972 places under Schedule IV more than 300 species of butterflies which require permission for collecting and for export from India. About a third of these are common to very common in the country. Most of the status data on Indian butterflies was collected over fifty years ago. There has been no such intensive work since then, and should soon be undertaken. In a fast changing environment, our schedules to the Act may have to be drastically revised, deleting many of the species that are there, and bringing in others not already included.

NARESH CHATURVEDI

(Contd. from p. 2)

on the inside to maintain its equilibrium, and often sticks brightly coloured flower petals to the blobs. Now starts the courtship, and if the construct is approved by a female, nest completion proceeds. The female lays 2 or 3 eggs in the finished nest, and carries on

with their incubation. The male is polygamous, and starts building successive new nests in the vicinity of the first, courting receptive females, and raising additional families.

V. C. AMBEDKAR

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