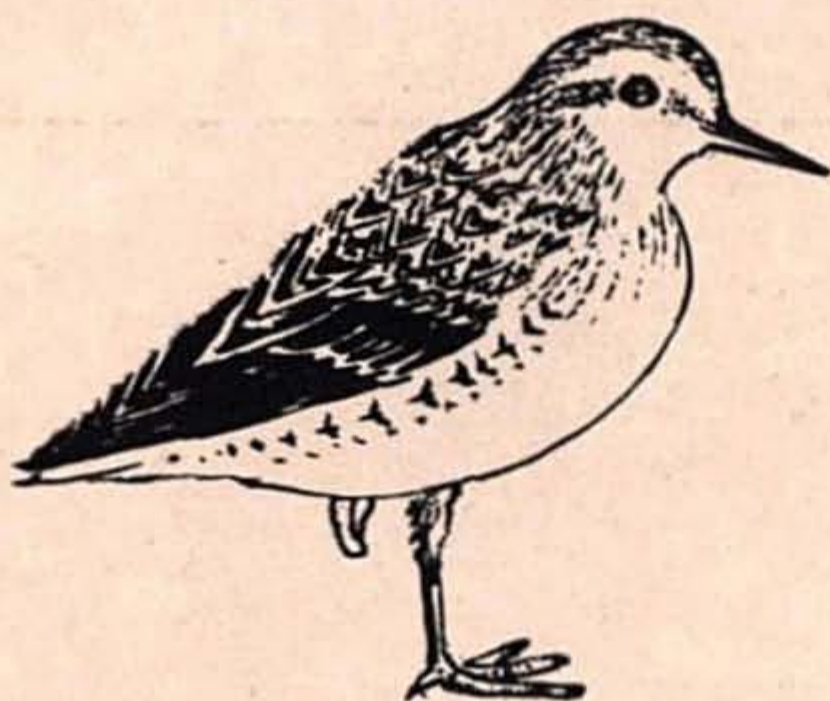


HORNBILL



BOMBAY NATURAL HISTORY SOCIETY

TIE A



To Remember ?

Knot (*Calidris canutus*) arrives in India from its summer home in the north in time to remind members that *their subscription for the following year falls due end December.*

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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Mr J. C. Daniel—*Curator*

Dr R. B. Grubh—*Asst. Curator*

Members receive during a year three issues of the *Journal of the Bombay Natural History Society* now in its 75th 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/-.

Annual and other membership subscriptions

Entrance Fees	Rs 25.00
<i>Subscription</i>	
Ordinary individual membership	Rs 50.00
Ordinary corporate membership	Rs 100.00
Life membership	Rs 750.00
Compound corporate membership	Rs 1500.00

The first annual subscription of members elected in October, November, or December will extend to the 31st De-

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ember 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
 S. A. HUSSAIN
 J. S. SERRAO

On cover: *Robber Crab*
 Photo: R. Altevogt

EDITORIAL

We have moved in from the first page, mainly as a result of a well-reasoned argument presented by a dynamic lady member of the Society, Barbara Tufty. Twenty years ago Mrs Tufty, then a 'married dependent' at the American Consulate at Bombay, spent months organizing the Society's library into a modern scientific library. A grateful Executive Committee made her an honorary member. Barbara was with us again this December and asked why there is lack of information in the *Hornbill* on the objectives of the Society, administration and membership details. We have therefore adopted 'the American plan' for the first page.

Another question asked of us by another dynamic lady member, Dilnavaz Variawa, till recently the Administrator of the Indian National Appeal of the World Wildlife Fund is also being answered here. Exasperated by the Society's chronic financial anemia, Mrs Variawa wanted to know what the Society has done all these years. We were perplexed. Surely it must be evident that we have been and are the pioneers of the Conservation movement in India. Way back in the thirties the theme of the Society's Golden Jubilee celebrations was *Conservation*.

Some of the suggestions made by Prater, the then Curator of the Society, in his keynote address to the Golden Jubilee gathering 45 years ago, have since been fulfilled. He advocated the creation of a 'wildlife fund' from revenue derived

from wildlife sources which 'can be expended with every justification upon the conservation of these sources'. Summing up he stated the problems resolve themselves into the formation of a co-ordinate policy for the protection of wildlife in India, into the selection of suitable areas where our wildlife can be protected without undue detriments to human interests, the creation of a special agency for carrying out the work of protection and finally, a revision, whenever necessary, of such laws as exist in order to help these agencies to carry out their task effectively.'

Slightly over a quarter of a century ago, the Society drafted the Bombay Wild Animals and Wild Birds Protection Act, 1951. This act was the main base for the Indian Wildlife Act, 1972. It is a pity that the earlier act was not adopted in toto; then perhaps the patching up of loopholes so necessary for the 1972 Act could have been avoided. In the fifties the Society organized a University Department for field studies, a development which has taken nearly two decades for other institutions and universities to catch up with.

The Society's enquiries and field trips have assisted in the conservation of endangered species; such programmes are the status enquiry of the Liontailed Macaque/Nilgiri Langur in 1967; of the tiger in 1968-69; and of the gharial in 1971. Field surveys of interest are of the Blackbuck at Pt. Calimere (1961),

(contd. on p. 4)

FEEDBACK

Sport shooting and Conservation

When preparing for our present visit to India, we sought information from the Government of India Tourist Office in Sydney, and among various brochures obtained a booklet entitled INDIA: TOURIST INFORMATION. In this we could read that:

1) as items admitted temporarily free of duty, we could bring in three sporting fire-arms with a total quantity of 50 cartridges;

2) on payment of duty we could import 250 additional cartridges;

3) an Arms Possession Licence is necessary for these, but it can be obtained in India from police or magistrates, or from Wildlife Outfitters;

4) we can at the end of it all export anything except 'tiger, leopard and panther skins (*sic*), and/or products made therefrom.

Now, the booklet is dated 1974, but its continued use as an official tourist guide confers some status on it. The tourist may well come to India armed with his three pop-guns, expecting to get a shot at a tiger (even if he has no permit to export more than its gallstones), and to gain kudos by dispatching the savage blackbuck or felling the ferocious Wood Duck—and exporting every scrap of them to boot. His impression that India is unconcerned about its wildlife will be strengthened by seeing, offered for open sale, hundreds of stuffed mongoose/cobra pairs, and articles made of python skin.

Whether any tourist would actually be allowed to do this, or whether his guns would be peremptorily confiscated on arrival, the fact that an official booklet seems to give him this sanction is a matter for grave concern.

The sooner the world realises that India's wildlife is at a critical pass, and that the Government is serious about preventing its obliteration at the eleventh hour, the more hope there will be for the future. And this means that nobody, tourist or local, must be allowed to destroy, or given the impression that they may do so. Contra the President of this Society (*Hornbill*, Jan.-Mar. 1977), though it pains us greatly to take issue with such as he, no killing of wildlife can be looked on with favour. Chital may not be endangered, but they are food for tigers: the transfer of a few chital from the forests of Kanha to the dining-room walls of Delhi may mean one less tiger finds prey—and that will be one tiger too few. The argument that sport hunters prevent poaching surely works only if they are there twenty-four hours a day, and would in any case apply with equal force to photo hunters. It is hardly ethical, either: how can the poor reasonably be required to desist, when the wealthy are seen carting their trophies away?

However much we go on about sportsmanship, the thrill of the chase, pitting our wits, and so on, it is bloodlust. The final coup de grâce makes this inescapable; if the

thrill of the chase is the rationale, why kill the quarry? Why not touch it with a coup-stick, like the Redskins of the Old West? Why not photograph it—or is that too difficult? We dare not count the number of times when, had we a gun, a trophy would have been ours; instead of which we had to be content with a wretchedly poor photo.

In the interests, then, of world opinion, of accurate information, and of India's own future, let us stop pretending that India's wildlife can stand any further hammering.

COLIN P. GROVES

PHYLLIS R. GROVES

*Dept of Prehistory & Anthropology
Australian National University,
Canberra, A.C.T., Australia.*

'World's largest crocodile skull'

The picture of the skull of *Crocodylus porosus* (*Hornbill*, April/June 1978) reminds me of the crocodile I saw at the aquarium in Green

Island, 18 miles off Cairns on the east coast of Australia. It may be interesting to recall that the apt name of Green Island is not to be attributed to the fact that it is extremely dense in foliage and verdure, lying as it does, at about the same altitude south of the equator, as Bombay does to the north; but rather to the fact that it was first seen by Mr. Green on Captain Cook's ship. Though Green Island has a lot of rain, we were lucky to have almost continuous sunny weather, and could bathe in the sea and examine the coral reefs girdling the island. There is an interesting aquarium with many strange fishes: cow fish, harlequin, moorish idol, stone fish, clown fish among many more. Now to return at last to the crocodile I saw in the aquarium: It is reputed to be largest in captivity: 18 ft. long, and over one ton in weight.

A. M. TYABJI

(contd. from p. 2)

Wild Buffalo at Bastar—now a sanctuary (1965); the Nilgiri Tahr at Eravikulam (now a sanctuary) and other areas in south India (1970), the Estuarine Crocodile at Bhitarkanika—now a sanctuary (1973), the Narcondam Hornbill in the Narcondam Island, the Andamans (1972), which is a sanctuary now and the Blacknecked Crane in Ladakh, where a high altitude National Park has been declared. The Gir Project organized in collaboration with the Smithsonian and Yale University drew pointed attention to the problems of the lion. The successful re-discovery of Finn's Baya

after well over three-quarters of a century is one of the Society's success stories; the search for Blewitt's Owl, Jerdon's Courser and the Mountain Quail continues.

The Society still leads in the survey of the less known areas of the subcontinent, from the salt marshes of Ladakh to the evergreen forests of Arunachal Pradesh and the Andamans.

The Society's publications are standard reference on their subjects. The Society maintains its interest and continues to enquire into the basic needs for the conservation of nature and natural resources in the subcontinent.

PRESIDENT'S LETTER

Our declining Birds of Prey

The raptors or Birds of Prey (Order Falconiformes) include eagles, hawks, vultures and falcons. Something very serious is obviously happening to this class of birds today as personal experience and complaints received from all parts of the country clearly indicate. The Birds of Prey constitute the end of the food chain, or the apex of the food pyramid, and therefore along with carnivores among mammals, they are highly vulnerable to adverse factors affecting their prey species. These birds are the outward symbol of a healthy biological en-

vironment, and their catastrophic decrease everywhere is thus a cause for grave concern to conservationists and the general public alike. Unfortunately no precise estimates of the former abundance of birds of prey are available for comparison with the present, nor any statistical data concerning their decline. Subjectively, however, there is no doubt that many of the species are rapidly disappearing from the scene. It is more than likely that this may be the consequential result of the irresponsible and increasing use of toxic chemical pesticides in modern



Whitebellied Sea Eagle landing on nest

Photo: Loke Wan Tho

agricultural practise, as is proved to be the case in many developed countries. As yet, however, we have no direct or incontrovertible evidence of this in India. I can recall a number of localities where even as recently as 30 years ago, raptors—eagles, hawks and falcons—were so common that I used to recommend these localities to visiting foreign ornithologists specially interested in this group of birds. Foremost among such areas were the Great and Little ranns of Kutch and the semidesert country bordering them. The Keoladeo jheel of Bharatpur in Rajasthan, and its environs, was another such raptor El Dorado. I can recall a trip by car in the winter of 1965 between the town of Bhuj and Khavda, a distance of some 50 km (?) and how almost every furlong of the telegraph line along the route had a kite or a white-eyed buzzard or kestrel or other raptor perched atop a post, not to mention the numerous short-toed and tawny eagles and others in the air or on the ground that were never out of sight. The same journey repeated in 1974 was a dismal revelation. The telegraph posts, except at very long intervals, stood bare and unpatronized, and the sighting of any raptor elsewhere was something worthy of remark. The absence of birds of prey here was indeed so noticeable as to draw comment even from a local attendant.

Regarding Bharatpur, I have lately come upon an entry in the meti-

culously kept diary of an ornithological colleague, the late Col. R. Meinertzhagen, made on 2 March 1937 when together we were collecting water birds and raptors in that area for his Mallophaga studies. It says: "After breakfast I shot 2 Spotted Eagles, 2 Pallas's, 2 Imperials, 1 Tawny, 1 *Circaetus*, and might have shot a dozen of each if I had wished to." Although the Bharatpur Waterbird Sanctuary in winter is still a comparatively rewarding place for raptor watching, it now seems hard to believe that it was ever that rich! Yet this was just 40 years ago, and where all these eagles gone?

In view of this disturbing worldwide trend in the decline of Birds of Prey, it has become mandatory for conservationists in India to try and make an objective assessment of their present status, species by species, both resident and migratory, for possible comparison with such dependable data as may be available from the past, and to identify the factors responsible for the negative trend. This letter is meant to be an appeal to all serious bird-watchers to send to the Society any objective observations they may have made in the past, or may make in the future, concerning the populations or status of any birds of prey, including vultures. This may enable us to take stock of the situation and consider what to do.

SALIM ALI

NOTES NEWS & COMMENTS

Endangered species

The United States Supreme Court has by a 6-3 majority upheld a Court of Appeals decision that the extinction of a single species is too high a price to pay for a public works project (*IUCN Bulletin*, n.s. Vol. 9, No. 7/8, July/Aug. 1978). The question was the preservation of a small 3-inch long fish *versus* 90%-completed \$116-million dam. The Court of Appeals decision earlier had caused the U.S. Tennessee Valley Authority (TVA) to cease work on the Tellico dam because it would destroy the last remaining habitat of a tiny fish—the small darter—belonging to the perch family.

The Tellico project which had “literally bulldozed its way through all arguments—regardless of their validity”, that the dam would destroy the sacred ancestral Cherokee Indian lands and over 200 other historical sites, met its end in Section 7 of the US Endangered Species Act (ESA) which simply and clearly states that public monies should not be used to destroy that which man cannot replace—a living species.

How one wishes that developing countries too would have such dynamic environmental laws to save the numerous species which are being drowned in the dams constructed in the name of human progress and welfare.

Nature trail at Mahabaleshwar

Mahabaleshwar in the Western Ghats of Maharashtra is one of the few

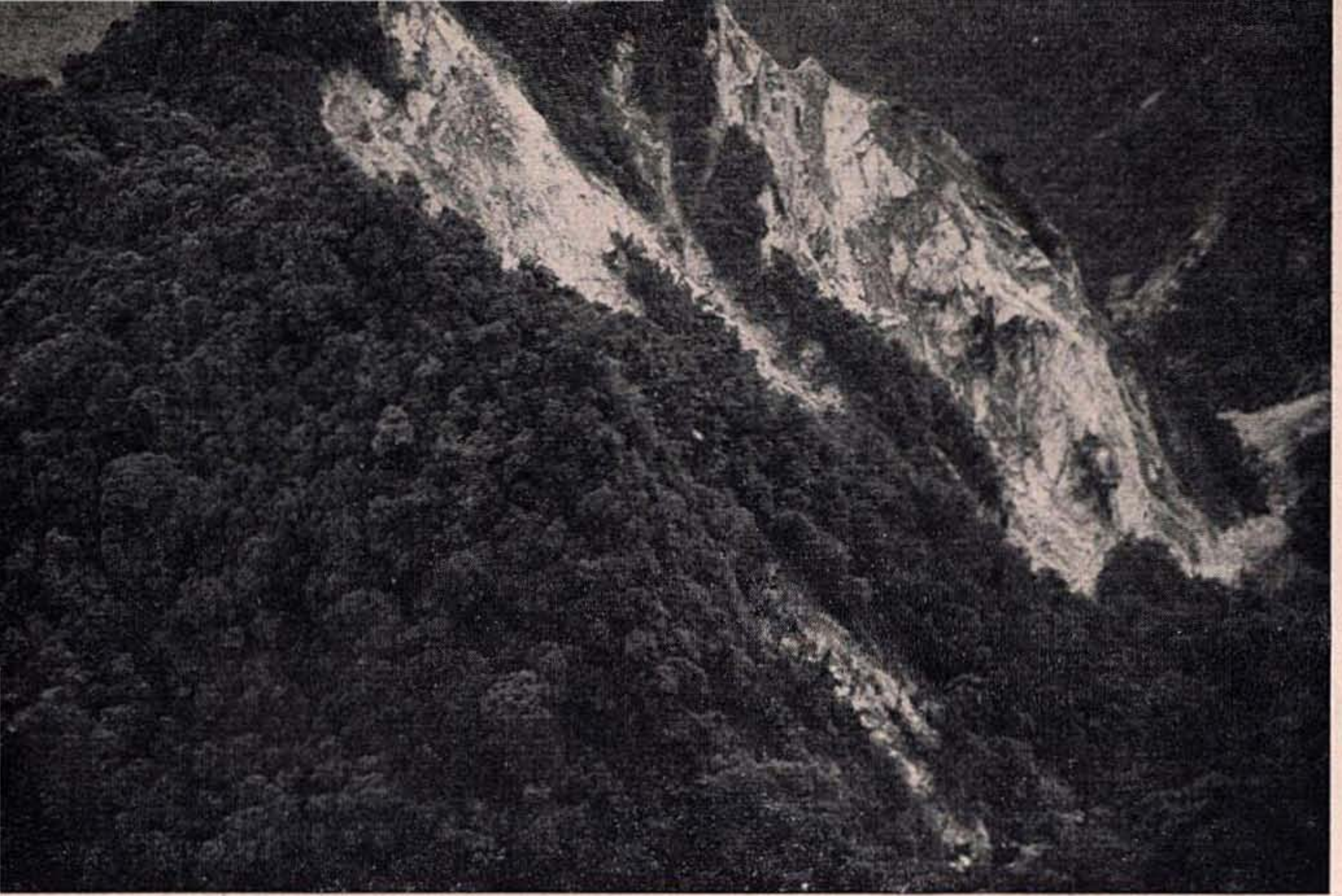
natural forests now easily accessible to the residents of Bombay and Pune cities. It is commendable therefore that Mahabaleshwar Rotarians in collaboration with the Rotary Club of Bombay Mid-Town have established a Nature Trail at Mahabaleshwar, with the assistance and cooperation of the Bombay Natural History Society. The trail would help visitors to acquaint themselves with the rich fauna and flora of Mahabaleshwar, to appreciate it, and strive for its conservation.

Symposium on the Tiger

The Government of India have decided to hold the International Symposium on the Tiger from 22nd to 24th February, 1978 at the India International Centre, New Delhi. Pre- and post-Symposium tours for the participants have also been planned. The main object of holding the Symposium is to gather information on the status of the tiger in countries where it is found and also to exchange information on the research being carried out on the tiger and its habitat.

The Symposium will have six sessions spread over three days. It would be preceded and followed by Study Tours. The participants would have a chance to visit some of the Tiger Reserves and see for themselves the work being done there. For further information contact

The Director
Project Tiger
Ministry of Agriculture &
Irrigation



Landslide — mark of human folly

Photo: E. P. Gee

Department of Agriculture
101 'B' Shastri Bhawan
New Delhi 110 001.

A timely realization

Evening News of India, Bombay, 15th November 1978 reports that Mr. K. Manoharan, Tamil Nadu Finance Minister, after a visit to the landslide-hit areas of the Nilgiris acknowledged that deforestation appeared to be the main cause of the disaster. The Hon'ble Minister is reported to have opined that potato cultivation after clearing the forests had contributed to erosion and landslides. He feared that unless something is done to end this, more disasters can be expected in the Nilgiris.

Such disasters could have been avoided if only deci-

sion makers listened to reasoned arguments of conservationists. It is a pity that only end results really teach those in power.

Second International Congress of Systematic and Evolutionary Biology (ICSEB-II)

The Second International Congress of Systematic and Evolutionary Biology (ICSEB-II) will be held at the University of British Columbia, Vancouver, Canada, 17-24 July 1980.

The provisional list of symposia topics include Evolution of Arctic Biota, North Pacific Marine Biota, Reproductive strategies, Epigenetics, Community Structure, etc.

Those interested in receiving an information circular in the spring of 1979, should write to the following:

Dr. G. G. E. Scudder
Department of Zoology
The University of British
Columbia
2075 Wesbrook Mall
Vancouver, B.C. V6T 1W5,
Canada.

Frog-leg fiasco

A recent issue (9th November 1978) of *Prime* (Price Indicator of Marine Products Exports) reports that approximately 70,000 lb. (c. 35 tonnes) of frog legs valued at c. \$117,000.00 (approximately rupees one million) were destroyed after landing by the U.S. Food and Drug Administration in July/August 1978 as they were found to be infected with the dreaded salmonella bacteria. The declared consignment value varies and it is possible that the actual value is more than the declared value. While we do not know the size gradation of the frog legs in the consignments in question, we estimate that the 70,000 lb. consignment involved killing of 200,000 to 900,000 of frogs for obtaining these legs. A colossal and criminal waste of the country's natural resources.

Field Work Grants

The Bombay Natural History Society invites applications from members, and others introduced by members, to carry out studies in various aspects of natural history, particularly in the field.

The projects must relate to subjects in which the applicants are personally interested (preferably supported by published papers) and of which they wish to pursue some special aspects which they are un-

able to undertake without assistance for travelling, hire of local assistance, technical services, etc. The Society may also be able to help with the loan of certain equipment.

Proposals received will be scrutinised by an expert committee and it is hoped that it will be possible to get some useful work done.

Control of ivory trade

In the last year action to control the ivory trade, which has been the cause of dramatic decline in many elephant populations, has at last been taken.

Iain Douglas-Hamilton of the Elephant Survey was among those called on to testify to the U.S. Congressional Hearings on the status of the African elephant, which were held in Washington in December 1977. The outcome of the Hearings placed the African elephant on the U.S. Endangered Species list, and restricted imports of ivory into the U.S. Today, only those countries who have signed the Convention on International Trade in Endangered Species (CITES) are allowed to place their ivory on the U.S. market. An exception is made for legitimate hunting trophies.

Ivory is a very valuable resource for many African countries. Aims to completely halt the trade would be wasted—not least because ivory is naturally produced in large quantities each year, and is also obtained from control shootings and culling programmes which are occasionally unavoidable. The value of ivory can sometimes provide an incentive for



Governments to protect their valuable elephants—and through this bring benefit to many other species. (*WWF/IUCN Elephant Survey & Conservation Programme Newsletter* No. 3, August 1978).

Fascicles of Flora of India

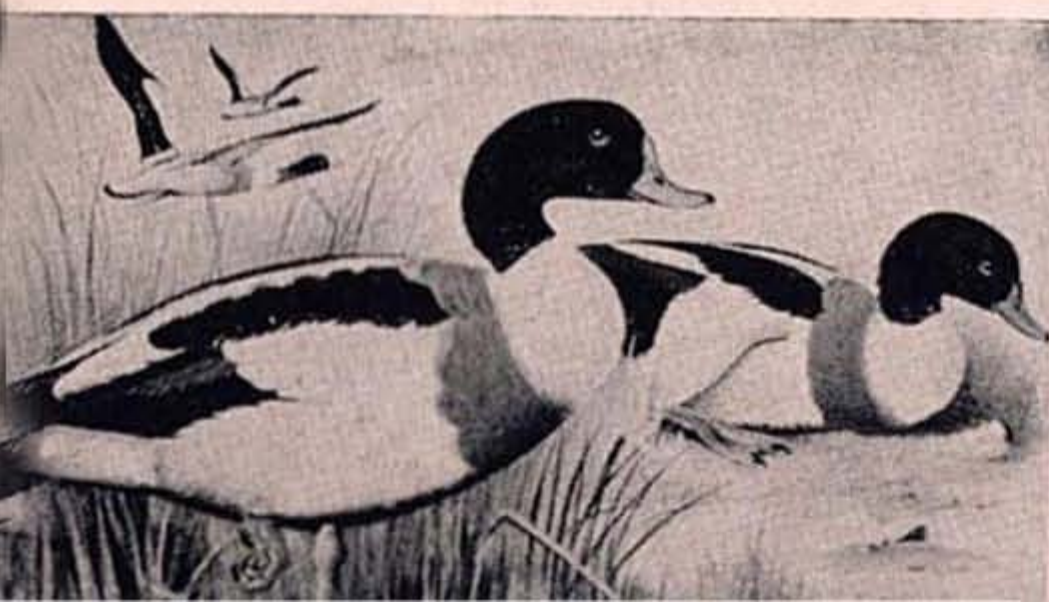
The Botanical Survey of India announces publication of first *Fascicle of Flora of India*. Copies are being despatched to libraries of all Indian Universities, research institutes related to plant resources, individuals associated with Flora of India and other plant taxonomists.

Copies of this fascicles can be had from the office of

The Director
Botanical Survey of India
P.O. Botanic Garden
Howrah 711 103. India.

Portfolio of bird paintings

Chimanlals, the well-known paper manufacturers, have brought out an excellent portfolio of paintings of birds published in early issues of the Society's **Journal**. A set of four reproductions size 43 × 28 cm of paintings by late 19th and early 20th century bird artists H. Gronvold and J. C. Keuleman is priced at Rs. 20/- plus 8% local tax, which totals up to Rs 21.60 per set. The pictures depict the Sheldrake, the Great Indian Kingfisher, the White-winged Wood Duck and the Red-breasted Merganser. Sets can be had from the Society.



Sambar and pie-dogs

It was particularly a bright day for the 15th of July (1977) and we were at our usual haunt—Culvert 39—as we have got to call it, at Borivli National Park (Bombay). Tulsi Lake was quiescent at 8 a.m. with the sun probing gentle fingers through the mist and trees on the hill in the east. All at once this tranquility was shattered by the barking of dogs, and almost immediately we located them on the bank of one of the arms of the Lake. Three pie-dogs had an adult sambar hind at bay.

How long they had been at her before we arrived was difficult to say. Keeping clear of the water, they worked up and down the bank barking persistently. The hind had

taken a stand in the water and faced them with her tail held high and the hair bristling along her back. My brother Denzil who was now moving in on the scene, found rather to his surprise, that the dogs suddenly directed their attention towards him. They were not too happy to have him there.

While the dogs were thus distracted, the hind attempted a get away across the Lake towards the opposite bank. The silty lake bed would not support her, and when she found herself sinking, she returned to the firm spot she had held out on earlier. She seemed to have no escape except over the bank on which the dogs had positioned themselves.



Sambar hind chased into water by pie-dogs

Photo : Denzil Sequeira



Sambar hind at bay
Photos: Denzil Sequeira
Escapes



The dogs were now at her again, but she had regained most of her confidence, and faced them baring her teeth when they got too close. At regular intervals she would also lift a forefoot and bring it down, striking the water with force and sending up a shield of water.

There have been earlier reports of pie-dogs chasing chital deer in the Park, but they had not been known to work on anything as large as an adult sambar. Most of the dogs seen in the Park belong to the local people. It is also likely that some of the dogs are now only semi-domesticated like the ones we saw in action whose human masters were nowhere in evidence. It is known that pie-dogs can survive independently in the wild, living on carrion and animals like land crabs,

lizards and rodents (possibly bigger animals as well).

Is anything being done about these dogs in the Park? Can they become a menace to the wildlife? Is it necessary to do anything at all, as the dogs apparently are preyed on by the Park leopards?

Denzil who was taking photographs as he was moving in, decided that both the dogs and the sambar had had enough and so drove off the dogs. Soon the hind was wading out of the water, towards him. She was not really bothered by his proximity, in fact she seemed almost relieved. When she was on the bank again she shook herself dry, took one backward glance at Denzil, almost saying 'thanks', and dashed off into the jungle.

MERVYN SEQUEIRA

One of us in the company of Messrs Humayun Abdulali, H. P. Harchekar and Dr. P. T. Thomas of Indore (all members of this Society) witnessed a couple of years ago pie-dogs chasing a pair of chital in the Park. Having scared the dogs away we combed the area to find out whether the dogs were deliberately set upon by the locals. Having found no incriminating evidence we concluded that such incidents could be occasional pranks played by the local dog population. The incident reported by Mr. Mervyn Sequeira, as well as others narrated to us, lead one to suspect that many such attacks go unnoticed either by the visiting public or the forest staff. One agrees that with about 3,500 inhabitants in the Park and about 40,000 hutments on its periphery, whom the Park authorities are unable to vacate owing to legal implications, it is difficult for the Park's limited staff to watch its every nook and cranny. However, it should not be difficult to contain the nuisance created to the Park's wildlife by stray dogs, and their elimination would not tangibly affect the leopard's food source as feared by the author. The inhabited areas in and around the Park being under the jurisdiction of the Greater Bombay Municipal Corporation the Park authorities could prevail upon the Corporation to stringently exercise its powers of rounding up unlicensed pets and free the area of the stray dog menace. — EDS.

The Robber or Coconut Crab

The photograph on the cover was taken in the Andamans by Prof. Rudolf Altevogt of the University Zoological Institute, Münster, W. Germany. Prof. Altevogt's closest friends are those happy urchins of the seashore, the Fiddler Crabs, who wave their brightly coloured claw as a protestation of their love. Prof. Altevogt finds them 'an especially enchanting and rewarding type of animal' and is most happy when he is deciphering the subtle differences between species and species in their semaphoring.

— EDS.

The Robber Crab is not the animal one should see 'the morning after', particularly if one is sleeping under a coconut tree and the crab is climbing after *its* night's foray. A sight guaranteed to make anyone who "indulges" a teetotaller for life. The Robber is a hermit crab but, a very enlarged version, irreconcilable with the small sea shells that scamper away from you on the seashore, which when picked up turn out to be shells with a crab in occupation, a conventional hermit crab for which the shell gives protection for its soft belly. The Robber Crab having attained a size far beyond the holding capacity of sea shells has provided itself with armour for its soft belly. Darwin who saw them at Cocos Keeling Atoll describes them as of monstrous size, attaining as they do a weight of 5 to 6 pounds, length of over a foot, width of three quarters of a foot, with claws nearly a foot long and 8 inches in girth, and the longest legs with a span of 2½ feet.

The species name *latro*—robber—is from its alleged habit of climbing coconut for the nuts. Whether it does so has been doubted by Darwin and others, but it can climb. There is apparently no doubt about its ability to feed on coconuts which

it does by dehusking with its powerful pincers the eye end of the nut, hammering open one of the eyes with its pincer and extracting the meat using the pincers provided on its hind legs. It eats other crabs and is also cannibalistic. An air breather as an adult, the Robber passes through zoea larval stage in the sea as do other crabs.

The survival value that the large size gave the Robber Crab against its normal enemies has proved to be its nemesis as far as man is concerned. It is good to eat. Drake's sailors refitting their ship, the *Golden Hind*, at Celebes in the 16th century speak "of the huge multitude of a certain kind of crayfish of such size that one was sufficient to satisfy four hungry men at a dinner, being a very good and restorative meat."

The Robber Crab has been wiped out over most of its range. In the Indian region it is now found in South Sentinel, a tiny islet of the Andaman group less than 1 sq. mile in extent. The island is now a sanctuary and *Birgus latro* is on Schedule I of the Indian Wildlife Act 1972, which means that its killing carries a penalty of six months in jail *if convicted*.

Conservation strategy for a threatened world

The International Union for the Conservation of Nature and Natural Resources represents the world community's interest in the conservation of living natural resources. It meets every third year in a General Assembly to review conservation action throughout the world and to plan conservation action for the next three years. The 14th General Assembly of the I.U.C.N. held at Ashkhabad, the capital city of the Turkmen S.S.R. of the Soviet Union in early October this year, with over 200 delegates and observers from 59 nations attending was significant in several respects. The socialist countries participated fully in its deliberations. A representative of the third world, Prof. Moh. El Kassas of Egypt, was unanimously elected President of the Union for the next triennium and the Assembly approved for presentation to world governments a strategy to conserve the living natural resources of the world. Ashkhabad, the city itself is symbolic of man's will to survive and his capacity to use natural resources wisely. Situated on the edge of one of the most desolate deserts in the world, the Kara Kum, which could be an example of what can happen if the world persists in uncontrolled exploitation of its natural resources, the city was completely rebuilt after being razed to the ground by a disastrous earthquake in 1948. It stands today a living tribute to man's indomitable will. The magnificent Karakum canal, a permanent monument to man's ingenuity, runs close to the city and

acts as a life-giving artery carrying water from the Amu Darya (Oxus) river for nearly 1300 km into the desert and transforming the desert along its banks into a subtropical environment.

The world conservation strategy that the I.U.C.N. General Assembly adopted is aimed at decision makers in government and hopes to urge them to achieve to the fullest extent possible the conservation of the living natural resources on which human survival and well being depend.

The problem that confronts the world today is that "40% of the world's tropical rain forests, the richest environments on the planet have been already destroyed. The rest are being felled and burnt at the rate of 20 hectares a minute. Thirty million sq. km equivalent to 19% of the earth's land surface are threatened with desertification. The world's drylands are being degraded at the rate of 44 hectares a minute, coastal wetlands and shallows, the support systems of two-thirds of the world's fisheries are being degraded or destroyed by dredging, dumping and pollution. More than thousand vertebrate and 25,000 kinds of plants are threatened with extinction."

The world conservation strategy calls for "the management of the human use of the biosphere and of the ecosystems and species that compose it, so that they may yield the greatest sustainable benefit to present generations while maintaining their potential to meet the needs



Human endeavour — the Himalayas being cut to size

Photo: E. P. Gee

and aspirations of future generations”.

Living natural resources are inherited natural wealth and has cost nothing to the past or present generations of man in its making. It is easy to take but, when destroyed some are prohibitively expensive to replace and some are irreplaceable. The value, both ecological and economic, of these resources to human well being is invariably underestimated or not understood. Some examples would be pertinent. A number of ecosystems and species which may appear useless, or at least dispensable, are critical to the health and maintenance of ecosystem and species of direct economic importance.

Watershed and other hill forests for instance protect and provide re-

sources for areas downstream by controlling waterflow, preventing floods, erosion and silting. Forests also modify climates, especially micro-climates by reducing temperature range and generally making local climates more equable. It is however, difficult to evaluate in monetary terms the benefits derived as the services received are free and therefore undervalued and unaccounted. Yet the decline in extent and abundance of such areas results in reduced yields and rising costs. The main problem however is that costs and benefits of conservation are distributed unequally. The costs of clearing a watershed forests is paid by the farmer and the dwellers downstream whose fields are flooded and whose continuous water resources are lost. The benefits are

felt only by the timber company. The farming and other human communities which had benefitted from the free goods and services rendered by the watershed forests have the option of either starving or migrating to live in misery in already overcrowded cities. The disastrous floods that swept the Gangetic plain recently would not have brought misery to the people of the plains to the extent they did if the forests of the Himalayas had been carefully husbanded. It is in this context that the General Assembly by a special resolution called upon the Governments in the Indian subcontinent "to develop together integrated policies for watershed management including forest, soil, and water conservation, in accordance with the recommendations contained in the world conservation strategy".

In its plea for their conservation, the World Conservation strategy lists the numerous well known as well as little known benefits of living natural resources. The wild and semidomesticated relatives of cultivated plants and animals, for instance, are essential breeding materials necessary to achieve continued improvements in the quality of the domesticated varieties. These qualities keep changing and to meet these changes the reservoir of still evolving innumerable varieties of wild and semiwild varieties of rice, wheat, tea, sugarcane, etc. is humanity's only insurance against the destruction of the crop plants by diseases equivalent to the Dutch elm disease which almost wiped out that species of tree. For scientific

research it is impossible to predict what species or ecosystems will provide yet another key to scientific progress. Only a minute proportion of the world's plants and animals have been investigated for their value as drugs and scientific interest. There are certain to be more discoveries similar to that of the two compounds derived from a caribbean sponge *Tethya crypta*, one of which, ara-C, is a powerful inhibitor of various cancers including leukaemia and the other, ara-A, has provided a breakthrough in the treatment of diseases caused by viruses much as penicillin did in the treatment of diseases caused by bacteria. Another discovery which recently received public attention is the fact that a minute free floating coccolith algae concentrates uranium 10,000 fold and could give a clue to a method of cleaning up radioactive spills.

The problems that concern man with regard to living natural resources is that degradation and destruction of ecosystems and the depletion of species is proceeding at such a rate and on such scale that it directly threatens the survival and well being of many peoples and the stability of their Governments.

Another set of problems with serious consequences for human survival is that of extinctions. All over the world the centres of origin of crop plants are disappearing. For instance the last remaining forests in western Ethiopia holding wild coffee are being cleared to plant coffee! More plant and animal spe-

cies are threatened by habitat destruction and degradation than by any other factor. These include replacement of the entire habitat by settlements, cropland, plantation, mines and the drowning of habitats by construction of dams. In this context two resolutions of requests addressed to Government of India have been passed by the General Assembly at Ashkhabad. One specifically urges the Government of India to effectively conserve the undisturbed forests of the Silent Valley of Kerala and the Kalakkad Hill Forests of Tamil Nadu, both apart from being primary tropical evergreen forests are also the habitat of endangered species of animals like the Liontailed Macaque and of many endemic plants. The second draws attention to the plight of the Indian Elephant now endangered through the destruction of its habitat. Preservation of the elephants and the elephants' ecosystem would itself assure preservation of a large number of plants and animals.

There is one category of problem about which little is known but which could make survival of biological systems precarious or impossible. These include increase in carbon-dioxide and its effect on climate and the effect of fluoro-carbons and other chemicals on the ozone layer and the consequent increase in ultraviolet radiation which could be disastrous to many species including man.

All these problems are reflections on the demand on living natural resources by human numbers. A large number of people with very

low per capita consumption of resources can destroy the basis of its livelihood by converting forests into fuel and clearing slopes too steep for cultivation. A much smaller number of people can be no less destructive if their consumption of resource is high. Human numbers and human activities are to be managed if both the level of demand and the means of supply are to be compatible with the conservation of the resources on which such activities depend. This is the crux of the problem.

At the administrative level the difficulty facing conservation is that most Governments fail to consider it as a major policy concern. Conservation is misunderstood and is considered to be anti-growth and anti-development and to be the preserve of pressure groups with narrow specialised interests. This is very unfortunate.

For conservation to be viewed in its proper perspective, the conservation strategy lists certain priorities for action. At the political level, it suggests that a commitment to conservation should be publicly made at the highest level and if possible a commitment to conservation should be written into a nation's Constitution. Better communication and application of existing knowledge is rightly considered an essential factor. This requires that ecology be at least as well understood and as widely accepted by the lay person as is economics and receives intelligent media coverage. Administrators should be trained not only in conventional disciplines of ad-



This is my pool
Asian Elephant in a prime habitat
Photo: Theodore Hubback

ministration but should be also knowledgeable about ecology, wildlife biology and conservation in general. Governments and national and international organisations should devise and launch programmes to promote understanding by local communities of the values of conservation and its need and train them in wise land use practices.

The strategy rightly concludes that "public support and under-

standing is the base of the pyramid of Governmental commitment. Relatively little can be achieved and few achievements will last while the values and requirements of living natural resources remain poorly communicated".

At the Planning stage it recommends preparation of an integrated National conservation strategy which should influence economic or development plans by identifying criti-

(contd. on page 22)

BIRDWATCHER

Bird visitors to a Khasi Hills garden

I have a compound, 5500 feet above sea level, on a ridge in the Khasi Hills. When I came here it was a litter of old tins and bottles, and there were no birds in my compound; the boys of the village prowled in and out with their catapults. Six years later after the whole acre was planted with azalias and other flowering shrubs and the boys banished, a pair of Common Mynas took possession and nested under the eaves. Their family was about the back premises, where Jagloo, the cook, who loves all young things, fed them, until the bewildered little birds were driven away and scattered by their parents!

With the mynas came the sparrows to live around the bungalow. They make forays over the hedge to feed near the cattle sheds and pig pens of my neighbours. Their nests are under the eaves and in the season, their fledglings are to be found in the flower beds on the lawn to the satisfaction of the cat.

In the spring of the first year and in the subsequent years, a pair of Jungle Crows have nested in the tall *Cryptomeria* (Nepalese, *Dhuji*—EDS) trees along the lower boundary. The cock strides through the assembled mynas and sparrows for his share and more, when Jagloo feeds all comers at the back door. His mate is smaller and has a strange 'hair-do', for the feathers on top of her head stand nearly upright. They reared three young

crows this year and on the day the young first flew, there was much low gurgling and cawing in the branches around the nest. First one, then the second and the third young bird, took to the air and flapped straight outwards and onwards with no idea of navigation! The agitated parents flew around them, until their offsprings crash landed on the tree tops.

In the third year, I found the 'larder' of a shrike, on the thorns of a lemon tree—spiders, grasshoppers and some beetles. The owner was a Rufousbacked Shrike, and my compound formed a part of its hunting grounds.

The Hoopoe has twice come to the compound in the spring and sought for insects in the moist moss-covered soil under the plum trees, its crest rising and falling the while.

During the warm months, the tits (the Grey Tit) are frequent visitors, searching for insects amongst the plum boughs. They leave and go down to lower levels when the cold weather comes.

The Magpie Robins live and nest in the compound and are with us throughout the warm months. Although in all other respects similar to the same species found in the Assam Valley, the cock lacks the jet black plumage of his Assam cousin and has instead a deep grey plumage.

After the rains in March, the gladiolii flower in the compound.



Hoope — about to land

Photo: Loke Wan Tho

To them come the Sunbirds (Mrs. Gould's Sunbird) to feed. The male has striking yellow underside and rump, the head of shot-blue and back of iridescent red. To reach the nectar in the gladioli flowers he perches on a bloom or stem and bends over and round, sometimes upside down, to thrust his beak deep into the base of the flower cups. He spends his days in the compound, feeding from the flowers or resting in the trees. When disturbed, he, and later his little dun and yellow mate, fly away over the edge and down the scrub jungle-covered hillside. It is some while before I see the hen bird; she is perched on the gladioli outside the window within a few feet of me. It is prob-

able that she had been incubating her eggs, and so had not often come to the compound.

The male and female sunbird rarely feed together, but forage individually. After the gladioli cease to flower, the sunbirds which are still with me, turn their attention to the nectar of a local variety of *Salvia* which has some two dozen smallish blue and white flowers on a stem and is a prolific flowerer. There is a profusion of flowers for sunbirds, which are not uncommon in these hills, but only the one pair is seen and this suggests that the sunbird is meticulous over the rights of territory.

A little blue hawk soared up from the valley, swept through the Cry-

ptomeria trees, across the compound and on into the pine forest. Perhaps a cock kestrel? The mynas, which delight in mobbing the crows, gave a squawk and dived into the plum trees for safety. The sparrows fled to the eaves of the bungalow, and the crows gave a belated ineffective chase.

The bulbuls come to the Khasi Hills in large numbers and stay until the cold weather, when their food becomes scarce. A pair nest each year in the grape vines and seem always to have four young ones. They are fruit and insect eaters and so the grapes appeal, as does the red berry of the Dwarf Red Solanum, so popular in Europe at Christmas time, where it is sold in pots at a high price to town dwell-

lers.

As the cold weather comes in, the Scarlet Minivet, in red and yellow pairs, comes in flocks to the trees in the compound, where they stay a little while before lifting off all together and flying on into the pine forest.

In November, the summer visitors leave these Hills until only the mynas, the sparrows and the crows remain. It is then, sometimes late at night, that I hear the call of wild geese (the Grey Lag) flying south. They have come in from the other side of the Himalayas to the Brahmaputra and are on their way to the Tangua and Balda bheels. I do not hear them again until they migrate north once more in the spring.

RALPH F. TWIST

(contd. from page 19)

cal areas of overlap with policies on human settlements, energy, mining, industry, water, agriculture, forestry, etc. so that such policies can be suitably modified well in advance. The National conservation strategy should also estimate investment of resources, describe political decisions necessary for conservation aims and propose a plan of action to attain the resource and the political backing.

Finally in the words of the strategy "there is no single problem,

no single cause, no single solution. There are multiplicities of problems and causes, all interrelated—and the only way to deal with them is through a multiplicity of measures, themselves interrelated, directed at a common end, namely *Conservation*—for human survival and well being and for the sustainable development of the world's rich yet vulnerable heritage of natural resources.

J. C. DANIEL

This report is based on "A World Conservation Strategy" presented at the I.U.C.N. conference at Ashkhabad, U.S.S.R., which the author attended. — EDS.

CONSERVATION ACTION

Silent Valley : A lost cause?

Members in India extended generous support to the appeal to the Prime Minister of India to save the magnificent rain forests of the Silent Valley in Kerala from being submerged under the waters of an hydroelectric project. The Prime Minister in his reply to the President, Dr. Sálim Ali, drew attention to the safeguards suggested by the Task Force appointed by the National Committee on Environmental Planning and Co-ordination. The task force safeguards had suggested only as a desperate attempt to salvage some part of the environment in case the project went through in spite of their strong recommendation that the project should be abandoned. Dr. Sálim Ali in his reply to the Prime Minister drew attention to this fact and suggested

that as the Silent Valley has been identified as a potential biosphere reserve, i.e. as an area which is of sufficient global importance to form part of the world heritage, there is every possibility of saving this area even at this 11th hour, by constructing a Thermal Station, with Central Government assistance in north Kerala. This and alternative possibilities are presently being explored by a team of conservationists. The Prime Minister was requested to consider the following:

- (a) To have a moratorium on the hydal project and on all activities which would be detrimental to the Silent Valley for a period of six months while these alternatives were being considered.
- (2) To ensure that the spirit of the halt in construction of the project is followed until the rele-

Silent Valley — A last look?

Photo: R. Whitaker



vant law is enacted, and that the construction of roads and ancillary activities which, was proceeding, was extremely detrimental as it opened up the area for environmentally destructive forces which have only been held in check so far because of its inaccessibility.

The efforts of the Society, the World Wildlife Fund, local naturalists and societies are continuing but one cannot say at the moment whether the area will be saved. The support of the International Community has been offered through the resolutions passed at the International Union for Conservation of Nature and Natural Resources General Assembly at Ashkhabad,

U.S.S.R. in September/October 1978.

Tiger Project 1977-78

One of the successful conservation projects undertaken by the Government of India is Project Tiger which is being implemented by the State Governments of Assam (Manas), Bihar (Palamau), Orissa (Simlipal), Uttar Pradesh (Corbett), Rajasthan (Ranthambor), Madhya Pradesh (Kanha), Maharashtra (Melghat), Karnataka (Bandipur) and West Bengal (Sunderbans) covering sanctuaries with a total area of 13,385 sq. km. The addition of Periyar in Kerala in the year under review increases the total area to 14,162 sq. km.

Core areas free from all types of

Quo vadis, Panthera tigris?

Photo: E. P. Gee



human intrusion and interference cover a total of 4230 sq. km.

Between the years 1973 and 1978 the Government of India has spent 2.85 crores or 28.5 million rupees on the protection of the tiger and its habitat. The World Wildlife Fund has spent on the project during the same period \$438,784 or approximately 3.75 million rupees in technical equipment, specialist services and staff study tours.

IUCN General Assembly and Conservation in the Indian subcontinent

Three resolutions passed at the General Assembly of the International Union for Conservation of Nature and Natural Resources at its 14th session at Ashkhabad, U.S.S.R. (25 Sept. to 5 Oct. 1978) specifically concern urgent conservation problems of the Indian subcontinent. The resolutions are:

Tropical Forests

RECALLING resolution no. 6 adopted by the 12th General Assembly of IUCN at Kinshasa, Zaire, in September 1975;

RECOGNIZING the importance to conservation of the tropical rain forests of the world, of their unique flora and fauna, and of the genetic resources which they contain, many of which are as yet little studied;

RECOGNIZING ALSO the adverse consequences of the continued destruction of these ecosystems and the resources they contain;

RECOGNIZING ALSO that some utilization of these forests is inevitable to meet the needs of the tropical countries;

The General Assembly of IUCN, at its 14th Session, Ashkhabad, USSR, 26 September-5 October 1978:

CALLS UPON all governments and government agencies, international and national aid agencies, intergovernmental organizations including the specialized agencies and other bodies of the United Nations system, and consultants, companies and corporations engaged in the exploitation of the tropical forests:

- (a) to take all necessary steps to preserve adequate representative undisturbed areas of these forests;
- (b) to develop selective utilization procedures based on conservation principles for other areas which would ensure the continuation of a tropical forest cover of indigenous species;

SPECIFICALLY URGES the Governments of

- (a) India to conserve more effectively the forest areas of the Western Ghats, including the undisturbed forests of the Silent Valley of the State of Kerala and the Kalakkad Hill forests in the State of Tamil Nadu;
- (b) Thailand and other nations of South East Asia to develop a regional programme to conserve the dipterocarp forests of the region;

REQUESTS that financial and technical assistance be given to the regional documentation centre for tropical ecology presently being established in Yaoundé by the Government of Cameroon;

CONGRATULATES the eight nations of the Amazon Basin for concluding the Amazonian Pact, which, by providing for the rational use of the natural resources of the region, including the protection of its flora and fauna, forms a basis for action in accordance with the objectives of the World Conservation Strategy.

Conservation of the Himalayan Region

CONCERNED at the rapid destruction of the world's greatest mountain ecosystems leading to the loss and extinction of their biota;

AWARE that this destruction impedes economic and social development and even endangers human life, within and beyond the region of the Himalayas;

The General Assembly of IUCN, at its 14th Session, Ashkhabad, USSR, 26 September-5 October 1978:

CALLS UPON all Governments of the region:

- (a) to develop together integrated policies for watershed management, including forest, soil and water conservation, in accordance with the recommendations contained in the World Conservation Strategy;
- (b) to this end, to integrate national efforts, including that of the various Government Departments with a direct or indirect involvement in conservation issues;
- (c) to undertake and encourage the necessary monitoring, research, education, information and

public awareness measures in support of ecosystem conservation and related aspects of social and economic development;

RECOMMENDS that the United Nations Educational, Scientific and Cultural Organisation, with the participation of other international and national organisations as appropriate, establish and operate "A Regional Centre for Integrated Mountain Development" as recommended by the Regional Man and Biosphere meeting on integrated ecological research and training needs in the South-East Asian mountain systems, held in Kathmandu, Nepal, from 26 September to 2 October, 1975.

Conservation of Indian Elephant Ecosystems

CONCERNED at the continuing destruction of elephant (*Elephas maximus*) habitat in India due to ever-increasing human pressure;

AWARE of the concentration and confinement of elephants in isolated pockets;

RECOGNIZING that the elephant's survival depends on conservation and management of the whole ecosystem;

The General Assembly of IUCN, at its 14th Session, Ashkhabad, USSR, 26 September-5 October 1978:

CALLS ON the Government of India to include a country-wide programme for the conservation of the elephant and its ecosystem as an essential component of the country's next six year plan.

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tumbler driers, nuclear reactor vessels... In order to make this equipment available L&T found it necessary to evolve into a major industrial complex pulsating with a rich variety of talent that is destined to shape the development of industry in India.



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The social imperative

A colony of wasps or honeybees, a flock of babblers or mynas, a herd of chital or elephant, a pack of wild dogs or wolves, a troop of langurs or macaques; such social groups always fascinate us humans who regard solitary confinement as the cruelest of punishments. But sociality is an exception, rather than a rule in the animal kingdom, occurring only sporadically in this species or that. Nor does sociality become more prevalent in the evolutionarily advanced forms; in fact, sponges, the lowliest of multicellular animals are amongst the most advanced social animals, while many higher forms such as tigers and bears are largely solitary.

Wherever it occurs, the social instinct may take the most varied forms. In wild dogs the leading male of a pack regularly regurgitates to feed the young pups at the den, while in the hanuman langur the leading male of a troop may snatch and deliberately kill the black infants in his troop. In the elephants, the aunts may suckle a calf even while its mother is alive and well, while in the wildebeest a female will reject an orphaned calf even when she may have just lost her own and has udders bursting with milk. In the paper wasps several egg-laying females may fight and eat each other's eggs, while in the social bees the workers may deliberately feed the queen's larvae with their own eggs.

Why then are tigers solitary and

lions social? Wild dogs altruistic and langurs murderous? Hoolocks organized in small family parties and chimpanzees in large, fluid troops? For the first time, we are beginning to perceive answers to such questions, although we are yet far from a complete explanation. The explanations that are emerging are based on the notion that social behaviour is as much an adaptive character as, say, the dentition of an animal. Thus, a tiger needs huge canines and cutting molars to deal effectively with the meat it feeds on, and a tiger needs to be solitary because that is the most effective way in which a stalker can hunt. Elephants have molars with massive grinding surfaces to grind down the hard plant material they browse on, and elephants are social because that is the most effective way in which they can protect their calves from tigers. We believe that social behaviour of a species takes a particular form because that is the form most suited to maximise survival and reproduction of individuals of that species. The variety of social behaviour patterns is then explicable on the ground that different forms of social behaviour are appropriate to achieving this goal of maximising survival and reproduction for the different ecological requirements that tigers, as opposed to lions or langurs as opposed to wild dogs are subject to.

Efficiency of food collection and avoidance of predation appear to be the two major ecological forces

governing the evolution of social behaviour. In wasps sociality implies reduction in the level of predation by rodents on wasp nests, and in bees improvement in feeding efficiency brought about by signalling information about nectar sources. Elephants actively defend their calves as a social group, while wild dogs can bring down large prey like sambar only because they hunt in packs. Examining thus in a careful fashion the way in which any animal species meets its food requirements and avoids its predators, we can make a great deal of sense of its specific pattern of social behaviour.

This series of six articles attempts to show how the social systems of a number of our own animals could be viewed from this perspective. Consider, as a first example, the following set of ungulates; mouse

deer, barking deer, fourhorned antelope, spotted deer, blackbuck and sambar. These are herbivores, grazing on grass, or browsing on shrubs. There is no way in which they can co-operate in feeding on this widely dispersed plant food. If anything, too many ungulates grazing together are apt to compete with each other and lower everybody's feeding efficiency. We must therefore look for enhanced efficiency of predator avoidance as a rationale for sociality in these animals. This enables us to make an interesting prediction: habitats in which ungulates can successfully escape predation by making themselves inconspicuous through camouflage will not favour the evolution of sociality. This is because the effect of camouflage can only be lessened by being in a group. Camouflage is obviously easier in denser vegetation. Forest

Fourhorned Antelope — a portrait

Photo: Juan Spillet





Blackbuck — a school of stags

Photo: E. P. Gee

Chital — a partial alert

Photo: H. S. Sharatchandra



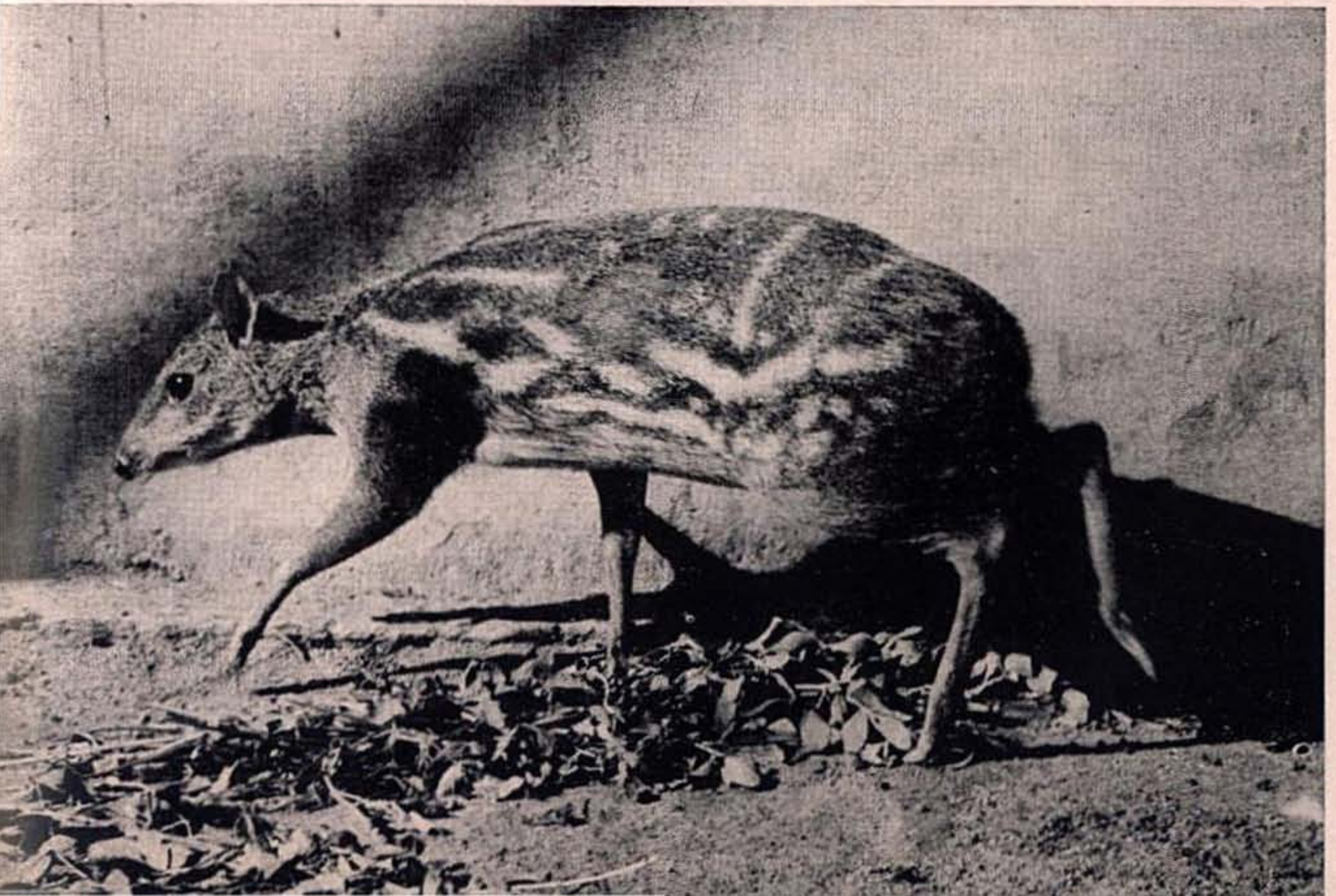
dwelling ungulates should therefore tend to be less social than the ungulates of more open habitats. This is evidently so: mouse deer, barking deer and fourhorned antelope are essentially solitary, and are forest dwellers. On the other hand, blackbuck which form the largest herds are characteristic of very open habitat. Spotted deer prefer the ecotone between the grassy glades and forest and are highly social; sambar which is more of a forest deer is much less so.

We then believe that rather different forces of natural selection have been operating on the forest ungulates in contrast to ungulates of the open habitats. Any social tendencies amongst the forest deer like mouse deer would render them more conspicuous to the predators.

Such mouse deer would thereby have lower survival. Consequently they would leave behind themselves fewer offspring than the mouse deer without any social tendencies. Provided that the social tendencies are heritable, the proportion of social mouse deer in the population would then go on declining whilst that of non-social ones go on increasing because of the relatively lower survival of animals bearing social genes. Eventually mouse deer populations would be dominated by individuals lacking in social tendencies. In the next article we shall turn to how an analogous process would lead to a prepondence of the social genes in species of open habitats.

This process of differential survival and reproduction of individu-

Mouse Deer — a self-effacing type



als bearing certain hereditary characters or genes, and the eventual dominance of the fitter types in the population is the process of evolution through natural selection. It is the same process by which mosquitoes have become more resistant to DDT. Whenever DDT is used on a sustained basis, those mosquitoes that are hereditarily more resistant will leave more of their descendants behind than those which are less resistant. As time progresses the mosquito population will then become more and more resistant to DDT.

This process of evolution through

natural selection confers a certain fitness of design on living organisms. Mosquitoes living in an environment with large scale use of DDT eventually become fit to live in such an environment by becoming resistant to DDT. In the same sense, the solitary habits of forest ungulates also fit them to live in that environment. In the succeeding articles in this series we shall explore in greater detail the way in which natural selection has favoured the varied social systems of spotted deer, hanuman langur, paper wasp, elephant and the wild dog.

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Bent Ear

I first noticed him on 22nd October 1976 when he trotted in the morning sun on a forest road in the company of other pack members. Seen from the tree, his bent right pinna looked like an extra growth of skin on the top of his head. I got the chance to observe him carefully only in the month of January 1977 when the wild dog pack had a whelping den in a rock shelter on the slope of a hillock, a kilometre and a half from Bandipur. My first prolonged meeting with him was on 4th January 1977 when I went to the den around 1100 hrs. Bent Ear had already returned from the hunt and was lying in front of the den. The leaf litter was so dry that I

found it difficult to walk without making any noise. My approach had alerted him, and pricking his left ear, he watched in the direction of the sound. I crawled to the cover of a rock 40 metres from the den and lying comfortably under a bush observed him.

He had an unusually thick neck and a pale white throat, chest and belly. His tail had a bend as if somebody had broken it. His scrotum hung loosely showing that he was aged. Throughout the three hours of observation, he was suspicious of my presence but never came close to investigate. This was probably because of his dislike for the hot sun which scorched the shadeless

Bent Ear — the leader

Photo: A. J. T. Johnsingh



areas. When I left the den he was sleeping in the shade. The rustle in the bush made him raise his head lazily and open the eyes partly but he again fell into deep slumber to while away the hot afternoon.

Afterwards, whenever I met the pack I often saw him. Eventually I called the pack, the Bent Ear pack. I tried my best to make a good picture of his but he was very shy and never gave me a satisfying opportunity. He was exceptionally fond of water. While eating, if water was nearby, he often went, flopped and lapped water ravenously.

I do not know who actually fathered the pups of my pack, but Bent Ear was extremely fond of the pups. The latter also duly reciprocated his love. When the kill was insufficient pups ran mostly to Bent Ear, pestering him to regurgitate. Like African wild dogs, he had the ability to bring out meat even after seven or eight hours after the kill was made. Other adult pack members also showed an enviable respect for him. Whenever they approached, even when he was lying at rest, dog tired after the hunt, they greeted him. Sometimes the greeting dogs over did it by crawling under his belly and forcing him to jump away. Bent Ear never bullied other dogs but occasionally he showed his dominance by urinating on tree trunks raising one hind leg. Though he appeared to be dominant, other dogs also equally took a leading part in the hunts.

One remarkable hunt by Bent Ear is worth noting. The Twenty-

first of July 1977 was a rainy day. The wind from the southwest swished through the trees. Early in the morning, four dogs chased a big chital fawn which ran into Thavarakatte, a big pond, and bayed. On either side of the pond sat two dogs preventing the escape of the fawn. Soon the rest of the pack assembled on the shore and Bent Ear got into the water. First, he walked, then swam and reached the fawn which by this time had moved farther to deep water and stood keeping only its head above water. Bent Ear caught the rump of the fawn and tried to pull it ashore. But the chital stood firm. Then the dhole jumped on to the back of the fawn, slipped but ultimately caught the muzzle. Dragging the screaming fawn, he swam and walked to the shore.

In the second breeding season Bent Ear was with the pack. I saw him courting a female but I could not see it mating. Once the female urinated on a clump of grass in the middle of the road. Bent Ear, somewhat in the African wild dog fashion, urinated in the same spot and squeezed out a small piece of dropping. Till March 1978, we saw Bent Ear in the pack but since April he has been missing. Every time I saw the pack, I looked for the familiar figure but it was missing.

What could have happened to that aged hunter? In wolves it is said that when a dominant animal becomes aged and unfit, it would be driven out of the pack. To me

it is inconceivable that Bent Ear should have been chased by the members of his pack who once submissively crawled under his belly. But who does fully understand the laws of nature? I remember having read somewhere that in the Red Indian society of bygone days, when people became old they stayed away all alone and perished without becoming a burden to their fellow members. This may not happen in wild dogs, as I have seen a lame female in the pack for more than a year. Other probable conjectures might be that Bent Ear joined another pack, was killed by a big cat

or snake or that he died of an accident or old age. However, this much I would say. During the period I observed him, he led a hale and daring life. Alone and unafraid of the dangers involved, he often went through the thickets where I entered with much hesitation, with bated breath and with a tense body. When hungry, he mostly ate the best in the jungle. He loved and was loved by the pups, and when his day came he disappeared mysteriously, leaving a void which was poignantly felt by me for quite a long time.

A. J. T. JOHNSINGH

The pack takes time off for a drink



Photo:

A. J. T. Johnsingh

An incubating python

India's largest snake, the Indian Python (*Python molurus*) mates in February and lays eggs in late April or early May, after a gestation period of 82-83 days. The clutch size varies from about a dozen to about 107 eggs depending upon the size of the egg-laying female.

The size and weight of the eggs varies to a great extent from 2.4 x 2.1 cm (weight 10 g) to 9.5 x 6.1 cm (weight 178 g). The normal sized eggs are generally white but there may be some small subnormal eggs in a clutch with light brown colour. These eggs are generally infertile. The newly laid eggs adhere to one another in a mass.

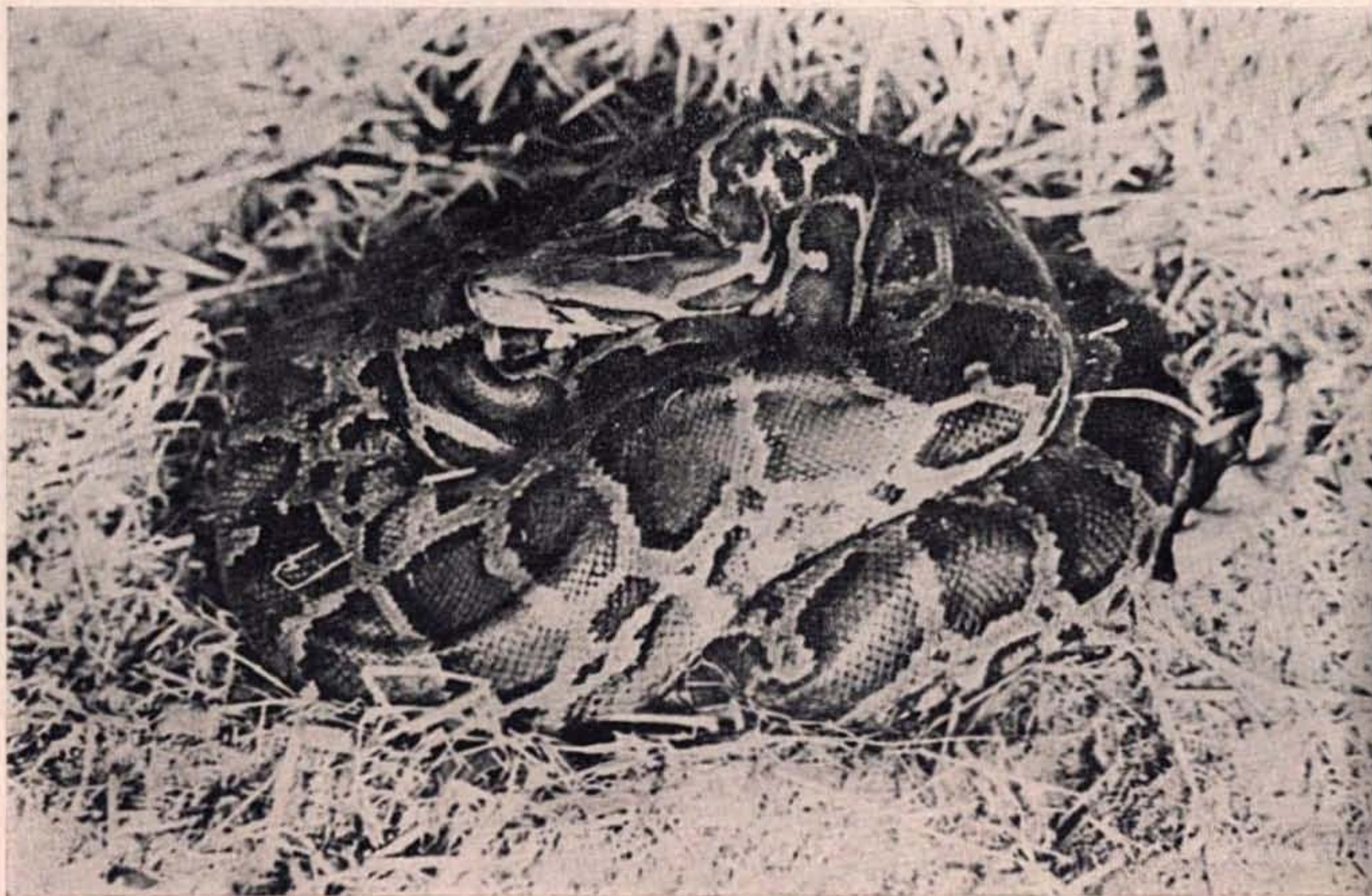
The female python soon after egg-laying coils round the eggs, keeping the head at the top in such

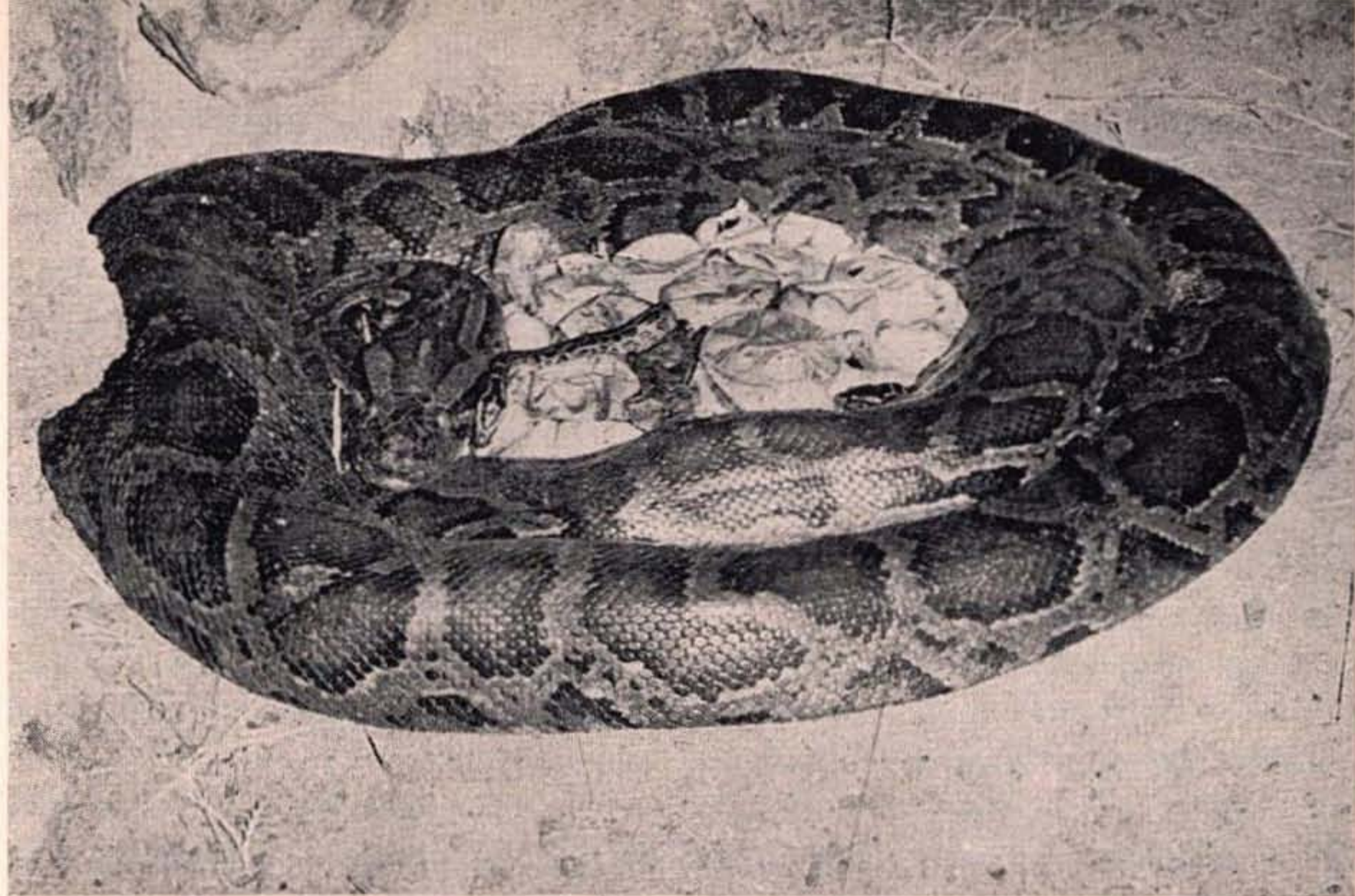
a way that no egg is visible to the outside. During incubation she resents approach of any one by moving the head in the direction of the intruder and at times hissing. While incubating she makes frequent body jerking movements which may be muscular function for raising the body temperature to facilitate egg incubation.

One to three days before hatching of the baby pythons, the mother exposes the eggs in the middle and coils round the eggs. At this time the eggs crack and the heads of the baby pythons appear through the openings. The young hatch and come out one after another, after an incubation period of 56-58 days. She refuses food and does not slough during the entire period of incubation.

Python incubating

Photo: P. K. Patnaik





Python and clutch of eggs

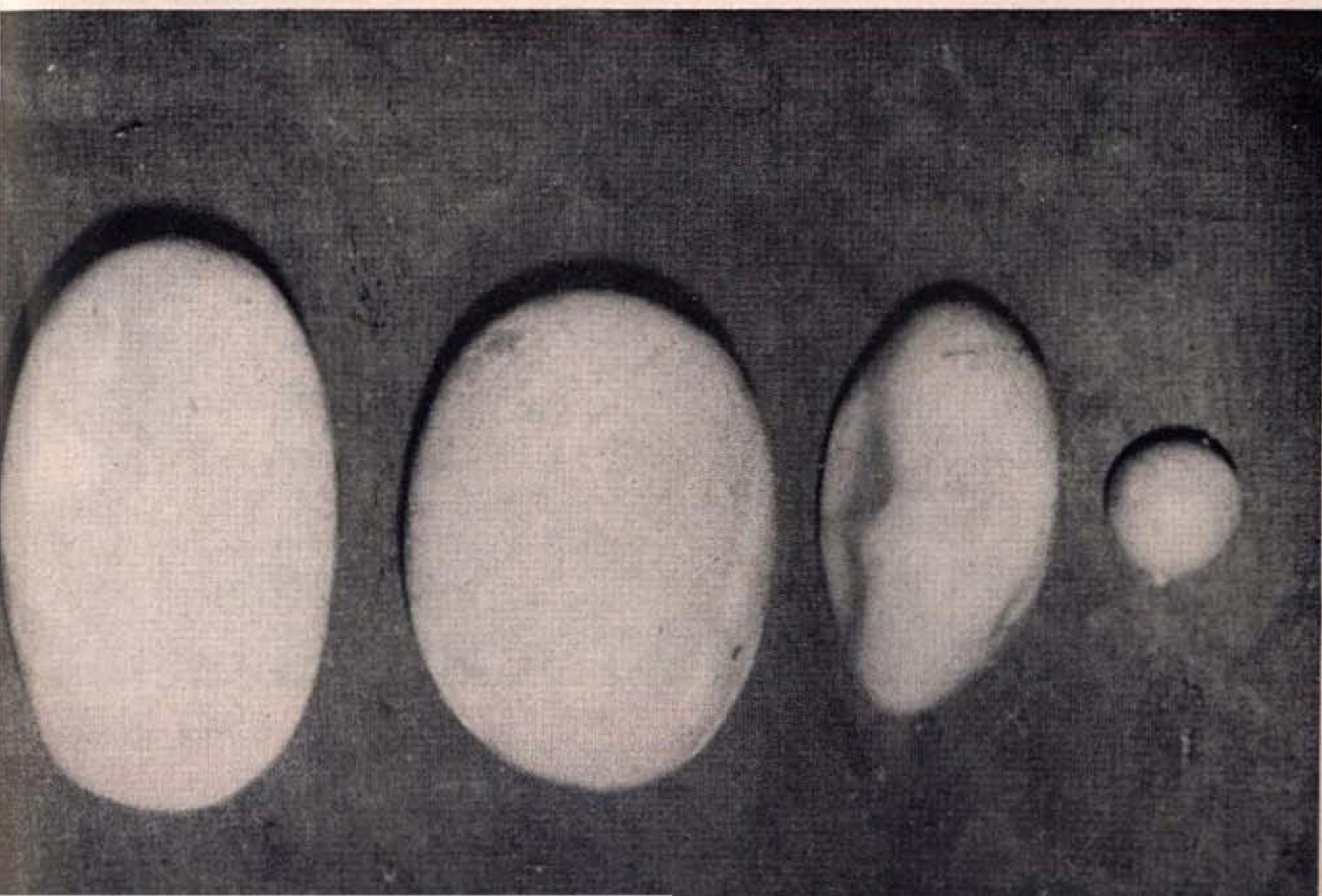
It is observed at the Nandan-
kanan Biological Park, Orissa that
the mother python resents the re-
moval of the empty shells and
spoiled eggs even at the termination

of incubation. The percentage of
hatching in one observation was
71.7%. The mother shows no in-
terest in the newly hatched young.

L. N. ACHARJYO

A selection of eggs from a python clutch

Photos: N. Das



Mumbra Island: A sanctuary for waterbirds and mangroves

The belt of mangroves surrounding the island of Salsette on which Bombay City is partly situated presents ideal conditions for a bird sanctuary. This belt covers the banks of the Ulhas river from Kalyan to Ghodbunder. After Mumbra at Thane the river bifurcates, one shallow branch leading into the Bombay harbour and the main branch flowing towards Ghodbunder. After Thane the main branch is strengthened by two rivers from Bhiwandi, Kasheli and east Kaman Durg. Surprisingly the area is more than 100 sq. km in extent. At Mumbra where the river takes a turn to the right, there are many islands isolated from the mainland through-

out the year. There is very little human interference. I, with other members of the Society, had examined this area in January by boating on the Ulhas river at Mumbra. We saw many species of waterbirds including kingfishers, night herons, paddy birds, various egrets, sandpipers, avocets, redshanks, little stints, blackwinged stilts, terns, plovers, etc.

Since the area is marshy and gets partly submerged during high tide and totally submerged in the rainy season no housing development can take place. Because of the salinity of the soil the land is useless for cultivation. Conditions are thus ideal for conversion into an undis-



A view of Mumbra Islands

Photo: Anil Kunte

turbed sanctuary. Possibly more waterbirds such as ibises and pelicans which are rare would then use the area. I have occasionally seen a pair of black ibis in the area. The Mumbra islands have a variety of flora worth studying by a competent botanist. The only difficulty in getting to the islands is that one has to plough through knee deep mud.

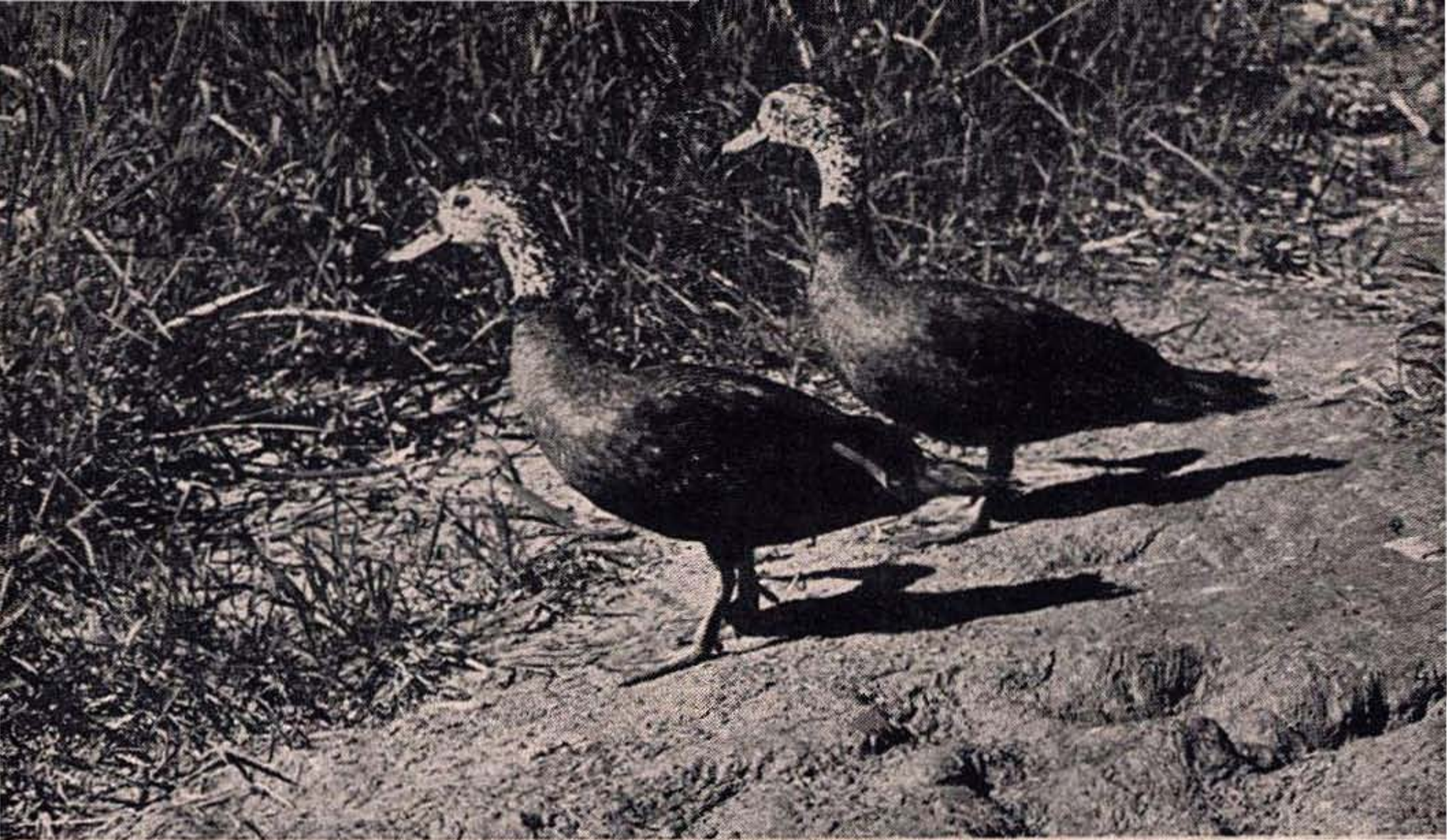
Incidentally it may be useful to arrange a study of the Ulhas river

from its origin at Khandala. The Society could perhaps undertake the Ulhas river as an ecological project. The river is easily accessible by train. It flows just along the railway track except at Kalyan region. At its lower reaches the river water is highly polluted from the uncontrolled chemical industries in Ulhasnagar and Kalyan; the upper and middle reaches should provide a study in contrast!

ANIL KUNTE

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*A pair of Whitewinged Wood Duck, one of India's most endangered birds.
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Photo: E. P. Gee

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Inflation?

Plumbeous Redstart cuckolded by the Asiatic Cuckoo

Photo: Loke Wan Tho