

Hornbill

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BOMBAY NATURAL HISTORY SOCIETY



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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 study of natural history in the Oriental region, and to measures for nature conservation. Individual membership can be in either personal or official capacity. Membership is also open to scientific and educational associations and institutions as well as companies.

Ordinary members get *Hornbill* free, and can subscribe to the *Journal of the BNHS* (now in its 90th volume) at concessional rates.

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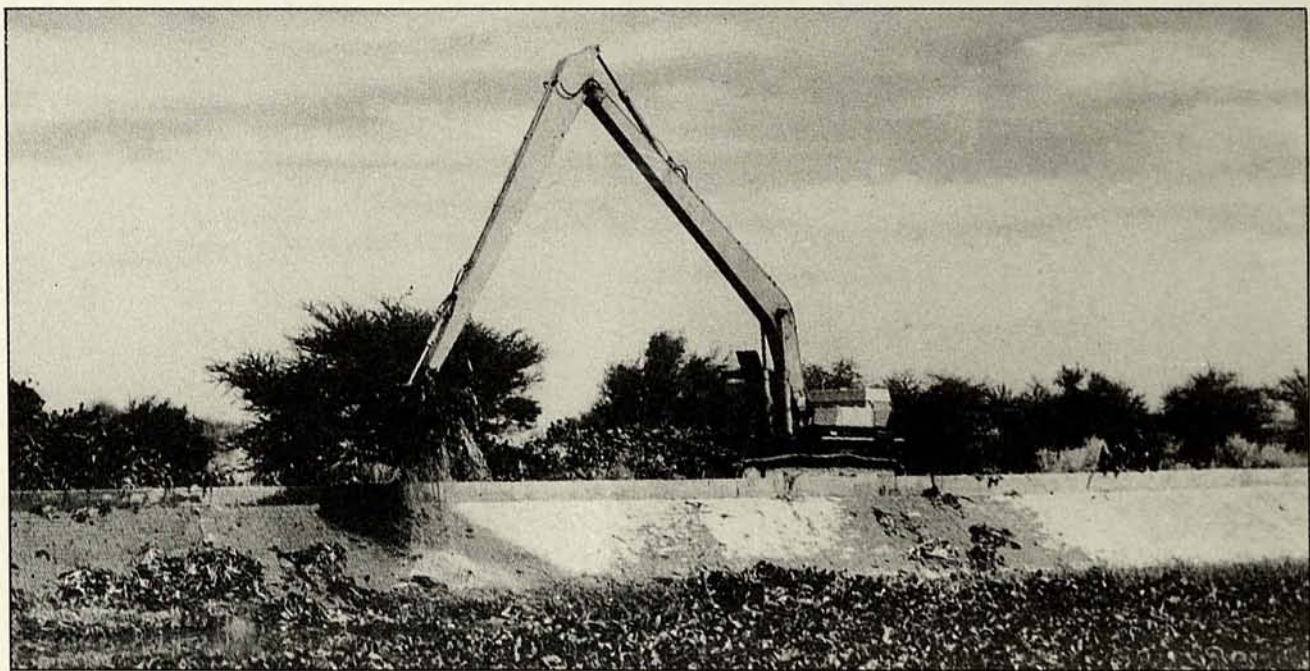
Hornbill

EDITORIAL

Exotics

Forest habitat loss to agriculture and human encroachment which are recurring phenomenon can be quantified. No one has attempted to quantify the enormous habitat loss to exotics which has happened over the years in the forests and grasslands of India. In this issue the effects of one introduced species, the Prosopis, has been described. The prosopis is atleast to some extent, beneficial and becomes a pest only when it goes out of control. There are other exotics which have replaced natural vegetation in the forests of India and its waterbodies. The enormous ecological loss that these cause have not yet been quantified and they have been left to flourish in peace. During a recent seminar attention was drawn to the need to quantify the area lost to Lantana where it has replaced natural undergrowth in forests in the subcontinent. There were some surprising arguments, the most astonishing being that Lantana preserves biodiversity! The loss to biodiversity by the insidious invasion of Lantana and Eupatorium and Mikania in forests, Parthenium in pasture lands and Water Hyacinth in waterbodies is enormous. It is time the loss is quantified. Only then the magnitude of the loss will be understood and serious efforts made for their eradication.

J C DANIEL



Asad R. Rahmani

Water hyacinth being mechanically cleared from the newly constructed Indira Gandhi Canal

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Asiatic lion (*Panthera leo*)

Photo : Robert D'Souza

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The Wandering Lion

J C Daniel



Two hundred years ago, the Asiatic Lion was found in good numbers in Rajasthan, Gujarat, Punjab, Uttar Pradesh, Bihar and Orissa. Today the Asiatic Lion survives, rather precariously in its last stronghold in the Gir National Park, Gujarat.

Photo: Robert D'Souza

The lion had been on the move from the previous night when he had lost his territory in the Gir Forest of Saurashtra to a more vigorous and younger animal. To move deeper into the forest would have meant facing further harassment from other territory holders and his age was a factor against success; so he had moved out. The forest ended abruptly and gave way to agricultural fields. The only avenue of escape was a stream bed, a deeply eroded gully which had green cover. The lion kept to the river bed and the cover provided by the forest that clothed the banks. Dawn found him where the river banks flattened into the surrounding fields and the only cover was the tall fields of sugarcane. It moved into one to shelter for the day. Unfortunately for the lion sugarcane fields attract people during the day and the lion was discovered. There was, within a short time, a noisy crowd of curious people around the field. The lion growled in annoyance, and the crowd multiplied. The more foolhardy ventured closer and closer to the angry growling lion which they could see faintly among the sugarcane stalks. As they crossed the imaginary line which was the lions' safety margin, it erupted into a roaring savage charge. Whether it intended to press home the charge is a moot point but from among the panic stricken crowd running helter skelter one man ran into the charging lion and was struck down by a paw rigid as steel and crowned with knife sharp claws. The lion returned to its lair among the sugarcane. The more fortunate among the crowd had watched this drama from a safe distance.

Once the lion retreated no one came forward to rescue the wounded man. Apparently he was a Harijan and they were all high caste hindus unwilling to pollute themselves by touching him. It was left to the much maligned forest department officials to rescue the man from this appalling callousness. The man recovered in due course. The lion was trapped and taken to a permanent life behind bars at the Junagadh City Zoo.

Such accidents are now not common around the border of the Gir Forest, Saurashtra, the last home of the Asiatic Lion. The lions of Asia are much more a part of human history than the more elusive and secretive tiger. Within historic times the lion had inhabited West Asia and South Europe from Greece

to Bihar in India. They had during this long association with man acquired a reputation for nobility, courage and had generally become the animal of royalty, hunted by Kings and had also become very much a part of human history and folklore.

In India, to be a Singh was to have all the virtues of courage and nobility. But as the centuries passed man increased in number and perfected his weapons of destruction as well. From arrows and spears to guns was a sea change and the balance shifted from muscle power to gun power. Animals like the lion were progressively wiped out. In India the process was accelerated by the arrival of an alien culture. The lion was exterminated from Sind to Bihar by the British who hunted them and the cultivator who converted its habitat of open forests and grasslands into agricultural fields. The turn of the century saw the pitiable remnants of a once widely distributed animal confined to the remote degraded and backward area of Saurashtra, the Gir Forest in the former princely state of Jungadh.

The more remote and backward an area the more the chances of a rare animal surviving. This has been amply proved by the history of the Indian lion in the present century. The Nawabs of Junagadh State had been one of the lesser lights among the now vanished breed, the Nawabs and Maharajas of India. The nawabs of Junagadh managed to be both backward and decadent. The last among them had a peculiar addiction to dogs, he had eight hundred of them and spent his time in arranging sumptuous marriages for them. When he fled to Pakistan at Independence he took with him, with remarkable impartiality, four of his favourite wives and four of his favourite dogs.

It is questionable whether any of the nawabs understood the meaning of the word Conservation. But they were shrewd enough to know that in the lion they had an ace up their sleeve in their game of one upmanship with other Maharajas. They used the lions as bait to entice Viceroys to their State to shoot lions and thereby win considerable 'izzat' for themselves. The lions, therefore received strict protection.

The lions when they first moved into the Gir during the great famine that devastated Saurashtra at the turn of the Century were as aggressive towards

man as are the lions of Africa. But an extraordinary change came in their behaviour towards man as the famine lifted and conditions became normal. They stopped attacking people. This singular behaviour change was largely responsible for their survival to the present day. To anyone who has been intimidated by the lions of Africa, where to get out of the vehicle is to court death, the disinterested manner with which a lion of the Gir treats a man on foot is unbelievable. Except for an occasional accidental encounter man and lion have coexisted amicably in the Gir up to the present decade. True, the lions did hang around the Nesses or villages of the Maldhari herdsmen of the Gir to try and pick up a cow or young buffalo. The Maldharis looked upon such losses as occupational hazards. According to Ravi Chellam, a researcher of the Wild Life Institute of India, who has been studying the lions of the Gir, they may charge at you roaring intimidatingly if disturbed and provoked. But normally they apparently will not press home the charge if one stood firm; perhaps as exciting and as chancy as Russian Roulette where you do not know which chamber of the gun has the bullet; obviously not a confrontation for the faint hearted.

The quality of protection in the Gir Forest and of

the lion has improved since independence and the shooting of lions is completely prohibited. The population of the lion has increased and is at the moment believed to be in the region 280 animals in the 1412 sq. km Gir Forest.

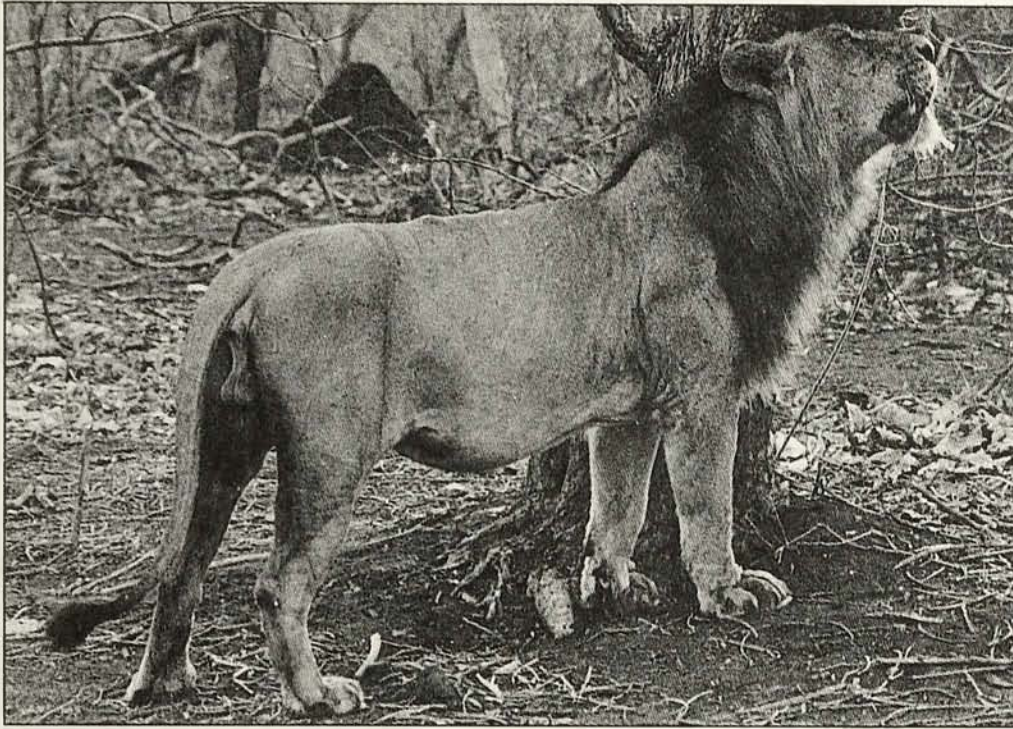
A paradoxical situation has now developed. The lions have increased in numbers, the quality of the forest, their habitat has improved and their prey species mainly the chital deer have become abundant. Infact the analysis of the lions' food through checking lion kills and examination of their droppings shows that their main food is wild herbivores instead of cattle as it was in former years. Yet the confrontation between man and lion has increased particularly outside the limits of the sanctuary. The lions are still at peace with man within the sanctuary but outside its limits encounters with man have resulted in several human deaths.

As usual when confronted with a problem the Government appointed a committee to find out why the lions were leaving the protection of the sanctuary and to suggest remedial measures. Fortunately for the committee there was, instead of wild theories, solid data from the researchers of the Wild Life Institute of India to mull over. It was evident that lions had been suddenly appearing in areas where



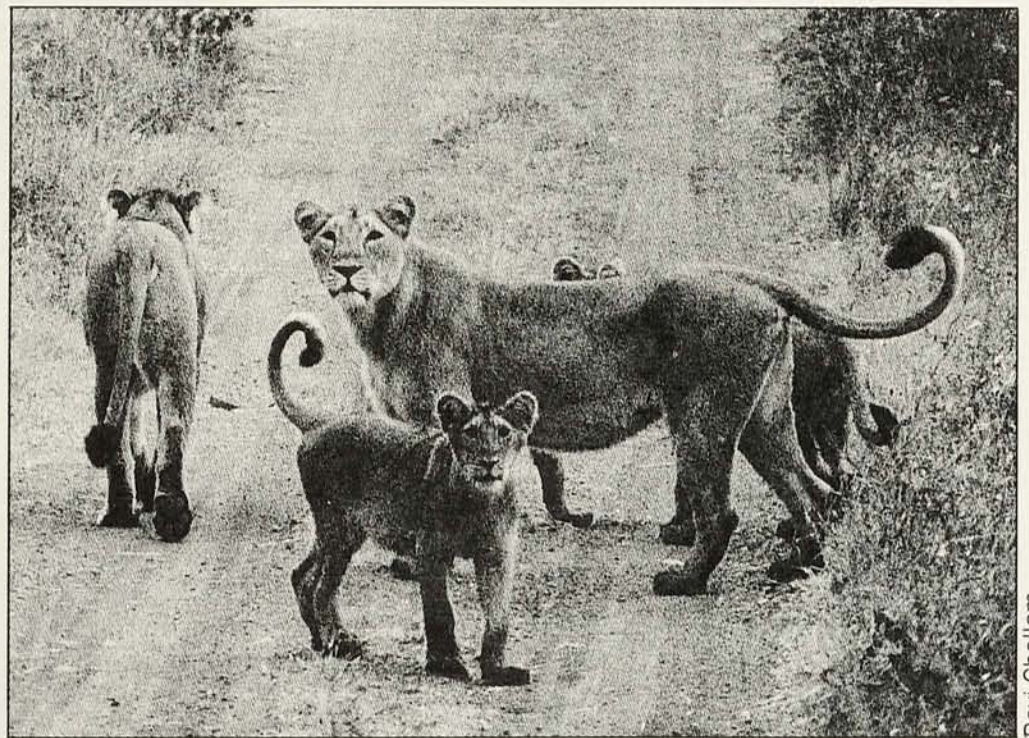
Robert D'Souza

If we have to save the Asiatic Lion from extinction, we can not remain lying down.



Ravi Chellam

His Majesty



Lions in making

Ravi Chellam



Ravi Chellam

Looking forward for a bright future



they had not been seen for decades, much to the discomfiture of both the human population and the lions. Unlike the Maldhari herdsmen living in the Gir the people outside the forests do not have the traditional knowledge of how to cope with marauding lions. In one instance two youths pulled at the tail of a lioness feeding on a cattle it had killed and were mauled to death. Before people learned to live with lions killing their cattle, more lives would be lost. It was therefore imperative to find the means of containing the lions within the sanctuary. This we in the committee felt was the crux of the problem. The data provided by the Wild Life Institute and the Forest Department showed that the animals in their prime remained within the sanctuary. It was evident that the problem was availability of living space. The dispossessed old animal and the young in search of territories were being elbowed out. The sanctuary had apparently reached saturation point in its lion population. But with the improved availability of food and quality of the habitat the population would continue to increase and the weak and the old would keep on being evicted.

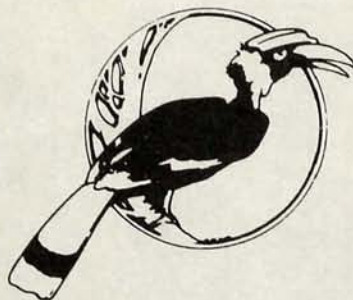
The problem is almost unsolvable. There is no other forest in India where the excess lions can be released. Perhaps the answer is to distribute the excess population to zoos within and outside the country and offer lions to countries like Iran and the

countries of the Middle East where lions did occur in the past. One of the advantages of such an action would be that the long term survival of the Asiatic lion would be assured. A single small population as presently exists is always under threat of extinction from disease and genetic faults. However this can only provide temporary relief to the people and lion conflict that now exists along the fringes of the Gir Forest. What is required is efforts to control the lion population. It is necessary to scientifically manage the lion if they are to survive in the future. Sophisticated methods have to be employed for controlling the breeding population, wild lions have been successfully immobilized and fitted with radio collars. There is no reason why the same technique cannot be used for inserting hormonal implants which make females sterile for a limited period of time. Implants have been successfully used for controlling the breeding of captive lionesses. It may sound impractical but considering the fact that the sex ratio is possibly equal for both sexes, the number of females in the population is probably about 150 and the percentage of breeding adults will be half to three quarters of this number. Even if a small percentage of this number is made temporarily sterile each year it is bound to affect the population numbers.

One is often asked, why take the trouble to preserve such a large dangerous animal as the lion? What is the use of such an animal? One could ask in reply why should you extinguish a life that has existed for millions of years? It is also the height of human arrogance to insist that everything that exists must have a use to man. The lion is a part of a system which is not directly relevant to man. It was the control on the herbivores in a much larger domain than what it now occupies. The herbivores in turn controlled the vegetation which in turn provided the environment for life including man. These systems have now been chopped and changed by man. The Gir forest and its lions are the residual of such a natural system. As such they are a national and world heritage as invaluable as the Taj Mahal or any other of the heritage of man.

J C Daniel was Curator of the BNHS for 35 years and now he is the Society's Honorary Secretary as well as Principal Investigator of projects on elephants and birds of prey.

NEWS NOTES COMMENTS



NATURE CONSERVATION — THE ROLE OF NETWORKS

Networks of people are our conservation force. Networks of vegetation are our conservation resource.

An international conference on the role of networks among people involved in conservation is being organised by the CSIRO Division of Wildlife and Ecology, the Centre for Conservation Biology at Auckland University, and the Department of Conservation and Land Management, Western Australia.

It will be held in Geraldton, Western Australia from Sunday 15 to Friday 20 May 1994.

Effective nature conservation requires the commitment and participation of local people. Without their involvement and acceptance, nature conservation on private lands is impossible and even on public lands will be constrained by inadequate resources or support. Conservation biologists and others aware of the need for conservation will only see effective translation of results into action if community linkages between land holders and other individuals, groups, conservation agencies and conservation biologists are as essential to effective nature conservation as are linkages across the landscape.

The conference will cover subjects such as: why we need community involvement in conservation; the role of indigenous peoples in conservation; the link between scientists and community groups involved in conservation: conservation biology as a discipline and as a force for change; current understanding of landscape linkages in conservation; the role of landcare groups in conservation; integrating conservation with production and development; and the role of mining companies in conservation. These issues, together with other subjects related to the conference theme will be presented in invited and contributed papers as well as structured workshops.

INSA MEDAL FOR YOUNG SCIENTISTS —1994

Instituted by the Indian National Science Academy in 1974 the Medal is awarded annually in recognition of outstanding work of scientists below the age of 32 (as reckoned on 31st December preceding the year of award). Only those born on or after January 1, 1962 are eligible for consideration in 1994. The work done in India by the nominee will be taken into consideration for the award.

The awardee is presented a medal and a cash award of Rs. 10,000. In addition, the recipient is considered for a research grant by the Academy not exceeding Rs. 40,000 per year.

Nominations for the awards for 1994 may be made by Fellows of the Academy, and by the established scientific societies of all India character, University faculties and departments, and the research institutions. The last date for the receipt of nominations in the Academy is October 15, 1993.

Nomination Proforma can be obtained from the Indian National Science Academy, Bahadur Shah Zafar Marg, New Delhi-110 002 by sending a self addressed envelope of size 25 cm X 12 cm.

PROPOSED NEW REGIONAL HANDBOOK OF ASIAN BIRDS

Asia is the home of many of the world's most beautiful and rare birds. No well-illustrated comprehensive book is available to serve as a reference and to show their beauty and diversity. The Trust for Oriental Ornithology is pleased to announce that plans are well advanced to finance the publication of the Trust's proposed **Handbook of Birds of the Oriental Region**. The Trust hopes to be able to tackle this together with the Oxford University Press.

An international team of artists and scientists is being formed to produce this definitive handbook with all 2630 or so species illustrated in full colour in 10 volumes of 600 pages each.

Ornithologists with an amateur or professional interest in the birds of the region who wish to be considered as potential contributors should contact either the Hon. Secretary (see below) or Dr Rene Dekker, National Naturhistorisch Museum, P.O. Box 9517, 2300 RA Leiden, The Netherlands.

More general information, including the precise geographical area being covered, may be obtained from the Hon. Secretary, Edward. C. Dickinson, Trust for Oriental Ornithology, Norman Chapel, Aston Magna, Moreton in Marsh, Glos. GL56 9QN, UK.

BRITISH GAS WILDLIFE PHOTOGRAPHY AWARDS FOR TWO INDIANS

Mr Jagdeep Rajput of Delhi and Mr Vivek R. Sinha of Bangalore have won awards for their entries in the British Gas Wildlife Photographer of the Year Competition 1992.

The entries of Mr. Sinha and Mr Rajput, along with the work of photographers from 18 other countries, are featured in a portfolio. Mr. Sinha has been declared runner-up for his photograph "Spider Spinning". Mr. Rajput's entry "Tigers Courting" has been specially commended, and has been placed on the cover of the portfolio, which has a foreword by the noted naturalist, Gerald Durrell. The contest

received entries from 42 countries.

The annual photography contest, first run in 1965, is organised by BBC Wildlife Magazine and Natural History Museum and has been sponsored by British Gas since 1990. The British Gas Wildlife Photographer of the Year Competition is now the largest and most prestigious event of its kind in the world, attracting more than 10,000 entries from professional and amateur photographers worldwide.

Entries (which must be coloured slides) compete for a runner-up and cash prize in each category. Where competition for the top places is particularly fierce, a specially commended or third place is sometimes awarded. The portfolio containing the winning and commended entries from the competition has been published and is now available in India. The book is being distributed by The Standard Literature Company, Calcutta.

For information about the publication contact:

Sachin Talwar

Burson-Marsteller Roger Pereira
Communications Pvt. Ltd.

47, Whitehall, 143 A K Marg
Kemp's Corner, Bombay 400 036.

BOOK REVIEW

WONDER WORLD UNDER WATER

B.F. Chhapgar

In the recent book 'Wonder World Under Water' published by National Book Trust, India, Dr Chhapgar introduces in his simple style a wide array of freshwater and marine animals without once using scientific jargon. It is creditable how he explains, in brief, the species including the non-exotic ones and creates an interest in the reader's mind about their place in nature! He laments that in spite of the earth being covered with three-fourth of water we, in the one-fourth portion, have a very limited understanding of marine life.

Starting off with the basic unicellular organism to multicellular sponges, moss-animals, worms, insects, snails, he moves on to the giant whales and sharks, without ignoring the odd ones like the sea horse, puffer fish, stone fish and exotic shells. His art of story telling is perfect when he describes about bio-luminescent fish and the symbiotic relationships between the sea-anemone and clown fish, jelly fish and leather jacket fish; the role of the 'cleaner' or 'doctor' fish, the parasitic remora, which like Tanaji's famous *Ghorpad* (Monitor lizard) is used by fishermen to capture the elusive sea turtles. His small book devoid of any glossy photographs but full of colourful and explicit sketches does not ignore amphibians, sea snakes, highly poisonous fish and also covers fish migration, marine mythology and man's dependence on the oceans.

For Rs. 8/- this book is an eye opener for anyone above the age of 10, and especially for those who would like to make a quick journey through the aquatic realm!

Suresh Malkani

FOLKLORE

The Peacock

NARESH CHATURVEDI

India culturally associates the koel with spring and the peacock with rains. At the commencement of the rains in the month of June and July one can see peacock in courtship display. This courtship display is well described by Kalidasa in *Ritu-samhar*

"See the peacocks hail the rain,
spreading wild their jewelled train,
they will dance and play
in wildest joy today."

The peacock has found a special place in our folksongs. In a Rajasthani folksong, the *nayika* (heroine), whose beloved has gone to a far-off place tells the peacock: "*Moriya aecho bolyo re dhalti raat ka, mahara hiyara main bahgu redudhar*" — Peacock your call at night pierces my heart like a sword". She further pleads with him not to sing *piyu piyu* as her *piyuji* (beloved) stays far-off. In a similar song the *nayika* reminds her beloved that peacocks are singing among the hills of Mount Abu — "*Mor bole re malgi Abu re pahada main*". In a Punjabi folksong when a king has gone on a peacock hunt, the queen reminds him that the peacock is her brother.

The peacock's association with rain and clouds is well described by Kalidasa in various poems. In *Meghadoot*, where *Yaksha* sends message through *Megha* (clouds) to his beloved and he wants the message to be delivered soon, but is worried that after seeing *Megha*, the peacocks will dance with joy and *Megha* might stop to see the beautiful dance resulting delay in conveying the message.

In *Raghuvans*, Kalidasa describes how Lord Rama, while returning from Lanka after defeating King Ravana, remembers those days when Sita was in Ravana's confinement. Pointing at Malvyan Parvat (Malvyan mountain) near Tungabhadra river, Rama tells Sita that in her absence, those rainy days with the fragrance of earth, partially open flowers of *Kadamba*, and the calls of peacock were intolerable.

In *Ramayana*, *Rishi* (Sage) Valmiki depicts rainy season with imageries of peacocks dancing in the forest, branches of *Kadamba* loaded with flower, bulls in rut and the earth decorated with greenfields and forest.

In *Ritusamhar*, Kalidasa has mentioned that the peacock's dance and calls end with the rainy season.

No the cranes in armies fly,
steering through the cloudy sky.
Nor the Peacock lift the head,
love and joy for them are dead.

The peacock has also found an important place in folk tales. In *Hitopdesha* there is the story of Hiranyagarbha, a flamingo, who is the King of Karpura Island and Chitravarna, a peacock, who is the King of birds of Jambudweep. As the story goes, a crane named Dirghamukh that has been caught by the denizens of Jambudweep is brought in front of Chitravarna. On being asked from where he came, the crane describes his Karpura Island as a paradise and the King as a Lord of paradise. Hearing this, the peacock feels insulted and angry on being told that their country was less luxuriant. This leads to a war and then follows peace. The story advises on diplomacy in state of war.

Peacocks were considered sacred by the Buddha. According to the Jataka tales, Lord Buddha was born as a Golden Peacock. The Ksheshari tribe of the Mikir hills of Assam believes that Sita was born from an egg of a peahen. Janka, King of Mittula, found the egg while ploughing the field. A Bheel tribe, known as Mayuri perform a *pooja* of the peacock on occasions such as marriages and certain festivals.

As mentioned in the Uttarkand of *Ramayana*, Indra and various gods entered the bodies of different birds to save their lives from Ravana. Indra transformed himself into a peacock. When things became normal, he blessed the peacock that he will have no fear of snakes, his tail will have several eyes and he will be happy during rains.



Illustration by Rita Ganguli

सारंग ने सारंग भक्यो, सारंग पहुच्यो आन ।
जो सारंग मुख से कहे, सारंग भाग्यो जाय ॥

Peacock has eaten a snake and clouds have come. If peacock sing (calls) the snake will escape from his mouth.

In Hindu mythology, the peacock is the *Vahana* (carrier) of Kartikeya the son of Saraswati, the Goddess of Learning. In various sculptures at Bharat Kala Bhavan, and at Badami Cave I, a statue of 11th century A.D. show four-armed Kartikeya seated in Lalit Asana on his vahana, a peacock. The peacock figures prominently on coins of Kumar Gupta who was named after Kumar Kartikeya.

The peacock was a favourite insignia of Rajput warriors and a peacock feather was prominent on the turbans of Rajputs. Even the Crusaders had peacock feathers in their headgear in the war with the Saracens. In *Raghuvansh*, King Dashratha has gone in a forest near Ayodhya for hunting. As he moves ahead, a peacock, flies across him, but he does not shoot the arrow as the peacock's tail reminds him of the hair of his beloved adorned with colourful flowers. In a similar situation, King Pururava who is separated from his beloved, the

peacock's train reminds him of the hair of his beloved, Urvashi.

In Hindu mythology, the peacock is a sacred bird because its feather adorns the crest of Lord Krishna. Bhakta Kavi Surdasaa and Meera Bai have sung several devotional songs in praise of Lord Krishna. In one such song, Meerabai, who was deeply in love with Krishna describes him "*Jaake sir mor mukuta mero pati soi*" — "My husband is he whose head is adorned with a crest made of peacock feathers". In a poem of Suradasa, a lady tells her friend that peacocks are luckier than them, as the crest of their feathers adorns Krishna's head.

A bunch of peacock feathers, still an implement of conjuring is carried by medicants in India. Peacock feathers are offered in temples, Gurudwars and Boudha Viharas. The peacock has also found an important place in Indian art and rock paintings. It also appears on burial potteries of Harappa.

A 19th century painting *Navagurjara* of Orissa depicts a beautiful story where Lord Krishna appears before Arjuna (Pandava) in a disguised form, with the head of a peacock, the body of a tiger, the hump of a camel, one leg of an elephant, and the other of a horse, the tail in the form of a snake and holding in a female hand a flower to test whether Arjuna would recognise him. Arjuna sings a song in praise of Lord Krishna and on hearing, Krishna starts dancing and discloses his identity.

The *Mayur Nritya* (Peacock dance) or dance performed by Shiva for the amusement of his beloved wife, Parvati, is well known. According to the legend, it is said that the Peacock had beautiful feet, like his body, and which were once borrowed by a Myna to attend some party, but the latter forgot to return them. Since then, the feet of peacocks are ugly. Quite similar to this is a European fable of the Jackdaw borrowing the plumage of a peacock, and yet another Sri Lankan tale where the popular legend runs that the Pea fowl stole the plumage of bird called by the natives as *Avitchia*. This bird utters a cry resembling the word *Matkiang* which in Singhalese means I will complain. This they believe is addressed by the bird to the rising Sun imploring redress for its wrong.

The throne of Shah Jahan, the Mughal Emperor was in the form of a peacock with spread train, and well known in history as Peacock Throne, which was

plundered by Nadir Shah. The speciality of throne was that the colours of the train were represented in natural colours by precious stones like sapphires, emeralds, rubies and other gems. It was also famous as *Takhta-e-Taus* which is Turkish for peacock throne.

A legend regarding breeding of the peacock is famous in many parts of India. It is believed that when a peacock dances in excitement, tears start

rolling from his eyes and fall on the ground. The peahen swallows these tears which in turn fertilize her eggs. One cannot say why such a fallacy in the description of the peacock's mating has crept in as it is similar to that in all other birds.

Naresh Chaturvedi, an entomologist by specialisation, is Deputy Director (Collections) at the BNHS. He also collects references to natural history, (particularly birds) in mythology and literature.

REQUEST FOR INFORMATION ON SANDGROUSE

Sandgrouse of the genus *Pterocles* inhabit hot, semi-arid and arid biotopes, preferring areas covered with stones or low shrubby growth. They feed predominantly on hard seeds, especially of legumes (Fabaceae). Six *Pterocles* species are endemic to Africa, and six species are shared between northern Africa and Asia. India and Madagascar each have one endemic species. All 14 species are adapted to exploit the often ephemeral productivity of semi-arid ecosystems.

Although knowledge of the behavioural and physiological ecology of sandgrouse is fairly well developed, there is little recent documentation of their demography, ecological roles or value as a sustainable natural resource. Sandgrouse can occur at very high local densities. Meinertzhagen (1954) reported that huge flocks of Pin-tailed Sandgrouse *P. alchata caudacutus* darkened the Arabian skies early this century, and Baker (1921) speculated that this species was the "quail" provided for the wandering Israelites. Baker (1921) and Lynn-Allen (1951) described the great value placed on sandgrouse hunting at their traditional watering sites and in conjunction with falconry, and their importance as a source of protein for indigenous peoples in east Africa and India. Ali & Ripley (1969) tell of 'prestige' shoots of Black-bellied Sandgrouse *P. orientalis* for entertaining British viceroys, Governors and miscellaneous notables. Witherby (1902) was probably the first to report that "Sandgrouse shooting at many points along the banks of the White Nile affords such sport that millionaires would give untold gold for were it to be had in England or Scotland". Recently, commercial shooting of Namaqua *P. namaqua* and Spotted *P. burchelli* Sandgrouse has been offered at R450 (\$150) per hunter per morning hunt in the northern Cape Province, South Africa. Although this embryonic industry supplements agriculture in that semi-arid environment, we believe that the full commercial value of this resource is underestimated and that the resource itself is underutilized.

Research is required to understand the value of sandgrouse in terms of their ecological roles as consumers and dispersers of seed, and their value as a source of food and recreation for people. This knowledge will help the local populace whose livelihood is dependent on the productivity of these arid areas, either from hunting of wildlife, or through agricultural activities. Furthermore, a knowledge of the key biotic and abiotic factors which control sandgrouse abundance, annual productivity and dispersion could contribute to understanding the key environmental factors which drive these ecosystem.

Although any information (published or unpublished) on the ecology of Sandgrouse, particularly in terms of their ecological roles as consumers and dispersers of seed, and as a source of food and recreation for humans is welcome, we specifically require answers to the following questions.

1. Where are high population density nuclei located for each species of sandgrouse?
2. What are the sizes of these populations?
3. What are the limiting factors of these populations (e.g. habitat destruction for agriculture, human predation, etc.)?
4. Are these populations (species specific) utilized for human food or recreation (hunted, trapped, netted, etc.)?
5. If so, how many birds are 'hunted' each hunting season, year?
6. Is this utilization for subsistence, socializing or commerce?
7. What are the values of these bags, as substitutes for traditional protein sources or as commercial (paid) hunting?

Please specify sandgrouse species, specific locality, country, or general region relevant to the information wherever possible.

Please send information or addresses of any biologists, hunters, conservationists, farmers, etc. who might have such information to Dr R M Little or Prof. T.M. Crowe, Gamebird Research Programme, Fitzpatrick Institute, University of Cape Town, Rondebosch 7700, South Africa.

CONSERVATION NOTES

LARGE DAMS, WATER MANAGEMENT AND POWER GENERATION

Large river valley projects (dams) in India have increasingly proved to be environmentally disastrous, economically non-viable and socially unjust over the past forty years. They have been the major cause of forest destruction and land degradation. Instead of providing widespread protection to large areas including river catchments, the large dams have created enclaves of intensive but non-sustainable agricultural zones in their command areas where the benefits are centralised. They are highly capital intensive and ignore traditional methods of water conservation. Intensive irrigation has also increased the salinity of vast areas of cultivation making them less productive over the years. Due to time delays and enormous cost escalations the country is today faced with a backlog of about 140 ongoing or uncompleted projects and even the entire Eighth Five Year Plan (1990-95) outlay for irrigation projects is not sufficient to complete these mega dams.

The whole thrust of Central Water Commission should shift from large dams to small irrigation and drinking-water projects, preferably through time-tested traditional methods. Rain water harvesting and ground-water recharging methods should be given highest priority. Ongoing or uncompleted mega projects should be scaled down to the extent that they cause minimal environmental damage besides becoming economically viable without causing large-scale displacement of people. The catchment areas should be strictly protected in natural state and watershed development programmes should be initiated wherever possible. Power generation should also be done through a number of small and medium sized hydroelectric projects instead of a few mega projects. Most important of all, a massive drive must be undertaken on a war footing to improve the efficiency of the existing irrigation and power projects most of which are abysmally inefficient at present. This will release immense irrigation and power generation potentials of the existing dams at a fraction of the cost of constructing new facilities without extracting any additional social cost.

The Cost Benefit Ratio: The Government of India has set up a group of five eminent persons to review all the aspects of the Sardar Sarovar Project. This review process is essential to bring out all facts about the project, especially those regarding the benefits to the people. In this regard, it may be necessary to point out certain facts which, although known to some, need wider consideration. Some of these are given below:

1. The plan bases its cost benefit ratio on calculations of the actual cost of building the dam and on the cost of rehabilitation of oustees, which was grossly underestimated. The latter has increased already by a factor of 3 or 4, and is still inadequate. However, the "cost" being considered for the cost benefit ratio is still the original, inadequate figure. The construction cost of the Sardar Sarovar Project alone has gone up from Rs. 6,406 crores (1986-87 price level) to over Rs. 9,000 crores (1993 level).

2. Benefits are calculated on the estimated increase in agricultural production. Provisions for avoiding salination of irrigated soil (e.g. proper drainage and open wells at intervals of a few kilometres throughout the irrigated area) has not been considered as a cost in the project; it has been said that this expenditure, which is a direct result of the dam and irrigation project, should be borne by the local bodies in their own area.

3. The loss of forest wealth and agricultural land has not been considered while calculating the cost benefit ratio. When such a major item of loss due to submergence is not included in the cost, the calculation of cost benefit ratio is necessarily unrealistic. Environmental cost due to loss of forest wealth itself was estimated to be around Rs. 30,923 crores about five years ago according to a Department of Environment finding. Loss of productive agricultural and farm lands are additional costs.

4. No areas appropriate for compensatory afforestation are available. A few attempts to raise monoculture plantations are certainly not going to compensate the valley for the natural forest lost due to the submergence. On the other hand, existing forest areas are being used to rehabilitate the oustees.



Asad R. Rahmani

Endangered Chinkara

5. Surveys of flora and fauna and their habitat were to be undertaken *before* finalising the plans. These have not yet been done.

6. Much has been made of the 1979 award of Narmada Water Dispute Tribunal by the proponents of the project. In fact, the Tribunal was constituted under the Inter-State Water Disputes Act, 1965, and its award is limited to the pattern of inter-state cost and benefit sharing between Gujarat, Madhya Pradesh, Maharashtra and Rajasthan. It has nothing to do with the general cost benefit ratio or the ecological price of the project. Hence, the argument that no change can be made in the project as the award is sacrosanct, is only an attempt to cloud the issue.

NARAYAN SAROVAR CHINKARA SANCTUARY

It is highly distressing to learn that almost ninety percent of the area under the Narayan Sarovar Chinkara Sanctuary in Kutch has been denotified or is under the process of denotification. The 769 sq. km Sanctuary was declared in 1981 to protect the wildlife of the unique desert and scrub habitat of Kutch. Now, the area has been reduced to mere 95 sq. km as the area in Lakhpat taluka were found to be rich in minerals. The State Government has taken this step for economic exploitation of the region. Mineral prospecting, limestone mining and establishment of a cement plant are some of the activities now planned for the area.

Narayan Sarovar is one of the last remaining sanctuaries for some of the most endangered fauna of the region such as the Chinkara, the Great Indian Bustard and the Lesser Florican. The wildlife in the sanctuary also includes the Leopard, Caracal, Wolf, Pangolin and Nilgai, besides rare birds such as the Whitewinged Black Tit and the Redheaded Falcon. It is also the home for many other specialised flora and fauna whose survival is dependent on the unique dry scrub habitat. In fact, it is the only sanctuary of

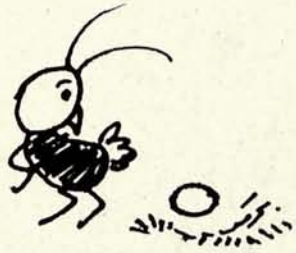
its kind not only in Gujarat but the whole country.

Narayan Sarovar has some of the best scrub forests in the state of Gujarat. The forest cover of the sanctuary is crucial for whatever little rainfall the area receives. Its destruction will be disastrous for the whole arid Kutch region. It is well known that the rainfall in any area is closely dependent upon the local forest cover.

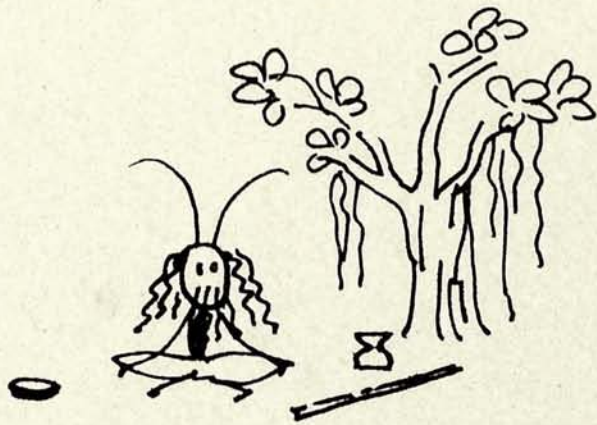
The Gujarat Government had promised to carry out compensatory afforestation at several places including Kutch in lieu of the forest cover lost due to submergence in Sardar Sarovar Project. In fact, some degraded parts of Narayan Sarovar was specifically selected for afforestation and better protection. Clearly the Gujarat Government in going back on its words. It is defending the move by saying that forest patches are not being disturbed under the plan and only 'open wasteland' will be used for mining etc. It is natural for a scrub forest habitat to have a lot of open patches and these are the integral part of the ecosystem. Any intensive activity in these open areas will certainly affect the forest patches as well as the wildlife of the region, particularly those who favour open patches such as the Chinkara and the bustards.

Please write to the Gujarat as well as the Central Government to rescind the plan and protect the important sanctuary and its surroundings to save an important heritage from going the way of most of the country's original forest cover. Possibility of using an alternate site away from the sanctuary to mine limestone and erect the cement plant should be explored. One of our members, Mr. Lavkumar Khachar, informs that large tracts of suitable land is available east of the sanctuary, but unlike the sanctuary these are not available free of cost !

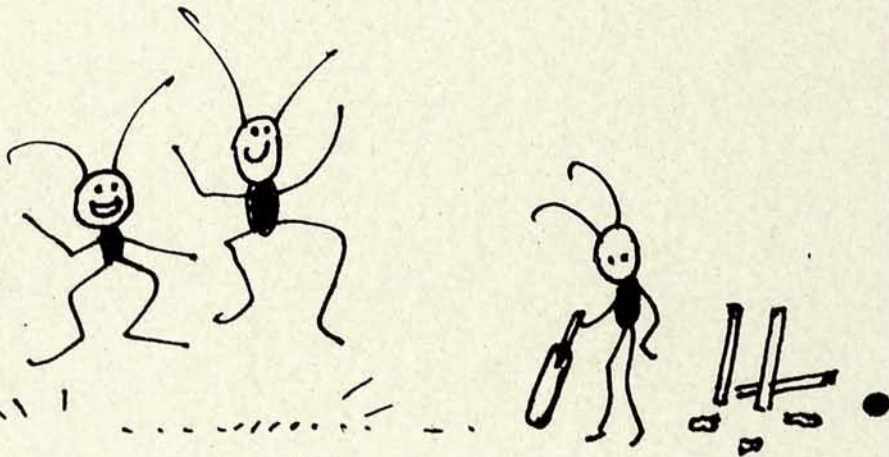
Compiled by Dr Goutam Narayan, Conservation Officer, BNHS.



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 C/o Sanjivani Medical, Opp. New English School
 Ram Maruti Road, Naupada, Thane (W)
 Phone : C/o 50 9299

DEALERS : **BOMBAY** : RAJU SPORTS, Shivaji Park, Dadar
 ● VALIJIS LUGGAGE, 323, D.N. Road, FORT ● DIANA AGENCIES,
 Dhobi Talao **PUNE** : SHAKTI SPORTS, 1533 Sadashiv Peth
 ● CHAMPION SPORTS, 1251, Deccan Gymkhana.



Correction

Please read the first line of the caption :

The Atlas moth is the largest moth in the world having a wingspan of 33 cm.

vi..

PHOTO: SUDHIR SAPRE

Letters

Sir,

This is with reference to your editorial "Curiosity kills the Bat" in *Hornbill* 1992 (4). Though the editorial has tried to raise some pertinent points regarding conservation of bats in India, it actually tends to shroud the real issues of more important nature. The blame on bat biologists as the prime cause for depletion of bat populations is too far fetched to be true. It is a fact that, to unravel their intriguing breeding biology several of the Indian bat species had been killed in large numbers. These research projects, however, date back at least a decade ago and today such projects are neither encouraged nor undertaken since, the techniques available today do not require specimens in such large numbers.

In fact, because of their pioneering research Indian bat scientists could successfully host the 8th International Bat Research Conference at Madurai University recently. The conference also saw the birth of Chiropterological Society of India whose main objective is conservation of Indian bats. The research projects by Indian bat scientists have not only aroused interests in bats nationally but also internationally.

One fails to understand over exploitation of a bat population at the hands of a bat biologist since a continuous supply of specimens in all seasons is a matter of major concern. Bat biologists therefore, only harvest populations at roosts without affecting the population. A disturbed roost will only lead to non-availability of specimens and finally jeopardise the project itself. Alternative sites of collection usually give varied results. In foreign countries bat roosts are in fact leased out to researchers so that research work can be carried out effectively! In India most of the roost sites are either under the Department of Archeology (caves & temples), Railways (tunnels) or other private organisations. They normally discourage research on bats in their premises. All these agencies consider bats as nuisance and regularly carry out bat eradication measures despite advices to the contrary by many bat biologists.

Bat populations at Kanheri caves, Elephanta caves and Jogeshwari caves (all in Bombay) were

destroyed due to fumigation. The bat colonies inside the railway tunnels at Khandala (near Bombay) were wiped out due to the replacement of tungsten bulbs by more powerful sodium vapour lamps. The bat colonies in most of our famous forts and temples are similarly facing serious threats of eradication. Pesticides also have a major role in the depletion of our bat populations especially the insectivorous ones. In India there is hardly any work on the pesticide residues in bats while in foreign countries bats are being used as indicator species in pesticide management programmes.

Public education on bats and their ecological role is almost non-existent. No efforts are being made to advertise conspicuous bat roosts even if they are situated inside national parks and zoos. There is unfortunately a general sense of public disinterest in matters concerning bats and therefore the pleas for bat conservation go unheeded. It is time that we take interest in these travelers of the night sky and voice our concern for them. In this context your allegation has made the bat biologist a scape goat, while you have actually concealed the total inaction and disinterest shown by wildlife groups in India towards the conservation and protection of Indian bat species. Let us all take note of the fact that "abundance in number is not an insurance against extinction of the species". The fate of Passenger Pigeon needs no special mention here.

Dr Shashi Menon
Bombay

Sir,

This refers to two articles published in the *Hornbill* 1992 (4), entitled *Nightmares from a Dreamland* and *The Japanese Serow*. It is not correct that wild elephants are no longer to be found in the Dibang Valley district of Arunachal Pradesh. During a survey in December, 1992 and March, 1993 I found elephants in Dibang RF as well as USF areas north of it. Some elephants are still there in the south-eastern corner which also move to the southern end of the Mehao Sanctuary. The Mehao lake was created by the 1950 earthquake and not 1952.

The serow occurs in much lower elevation in North-East India than is recorded earlier (1000 m). The lowest elevation where the serow had been recorded is c. 100 m in Innerline RF, Cachar district of Assam. A local Mizo (a tribe) shot a serow in 1985-86. I examined the horns while on a primate survey to the area. Then in the same reserved forest, but east of this site, one serow was killed by a tiger (1986-87). The head of the same had also been collected. In North Cachar Hills and Karbi Anglong, I found it to be fairly common from about 300 m up, with some areas like the Jungthung RF where the serow regularly comes down to c. 100-150 m throughout the year.

Distance between Balphakram in Meghalaya and the nearest protected area in Manipur is not 200 km, but much more than that. However, the serow is also found in some other protected areas in between like the Nongkhylliem Sanctuary (Meghalaya) and Intanki Sanctuary (Nagaland). In Assam, the only protected area with some serow is the Nameri Sanctuary in Sonitpur district.

Dr Anwaruddin Choudhury
Guwahati

Sir,

On 15th March 1993, around 2.30 p.m., I heard a strange call of a bird and so ran out to see what it was. To my utter surprise, I saw a rather large-size parakeet (never seen before) perching atop a tall mast tree, some two hundred feet away from my house. On referring to Salim Ali's HANDBOOK OF THE BIRDS OF INDIA AND PAKISTAN, I could identify the bird as Indian Redbreasted Parakeet *Psittacula alexandri fasciata*. A further surprise was in store for me when I saw another bird of the same feathers joining the first.

I observed them through my binoculars for quite some time and can vouch for having noted some of the field characters as given in the book. The plum-red throat and breast was unmistakable. The bright red bill, the brighter green hindneck and the broad black stripes emanating from mandibles were all there. I could not however, see the yellow patch on the wing-shoulders as the posture of the bird was frontal. From the difference in coloration of heads, the first bird was a male while the latter was a female. Half an hour after the first sighting, the pair mated for a few seconds on a nearby casuarina tree and then

flew away only to re-appear after an hour. The pair was seen and heard in the locality (Vishnunagar, Thane) till 6.00 p.m. on that day. Even thereafter the pair kept on visiting our area intermittently.

Fortunately, that day my camera was loaded and I could 'shoot' the male. The three photographs that I have, are reasonably good and leave no doubt of the identity of the birds.

Dr Arun R. Joshi
Thane

Sir,

I have always enjoyed reading Mr. Naresh Chaturvedi's articles under the little 'Folklore' in *Hornbill*. He provides readers with a wide range of references from the Vedas and the Puranas to even the Mughal literature.

For the same reason however, I was surprised to find Mr Chaturvedi making a confusion over a very well-known Sanskrit play and its author. May I with his kind permission present the correct statement for the benefit of the readers?

His sentence reads as:

- The court of king Vasantasena is described in Kalidasa's *Mrichchakatika*, whereas the correct line should be:
- The court of courtesan Vasantasena (obviously she is a woman) is described in Shudraka's (He was both a poet and a king) *Mrichhakatika*.

Arundati Vartak
Bombay

Sir,

Was Shudraka the playwright from the 4th Century A.D. really the author of the MRICHHAKATIKA?

Fresh evidence as suggested by *Hornbill 1992 (4)* questions this fact. The article on 'The Sarus Crane' mentions Kalidasa (a close contemporary of Sudraka) as the author of MRICHHAKATIKA? The heroine of the play, Vasantsena, is mentioned as the 'King'.

Sandeep Unnithan
Bombay

Yes, we regret the error. Vasantsena is indeed the courtesan and the author of Mrichhakatika is Shudraka

Eds.

Sir,

I read with great concern the front page news item 'Mining opened to private sector', in the *Times of India* on the 6th of March 1993. It seems that one more flood gate is opened by the government to sweep off whatever few natural forests remaining in the country. It is a tragedy that the government and the environment ministry talk aloud on the international platform and compete at international levels to show their concern about various environmental issues, but at national level, accept clear destructive policies without any resistance or even a comment. How otherwise one could explain the acceptance of statements like..... 'mining operations will not *'ordinarily'* be taken up in ecologically fragile and biologically rich areas' or 'strip mining in forest areas *should as far as possible* be avoided and be permitted only when accompanied with comprehensive time-bound reclamation programme.' The words in italics are clear-cut provisions as loopholes. More over, our decision makers do not realise that even by execution of so called 'comprehensive time-bound reclamation programme' one may be able to create some green cover, but one can never recreate biologically rich natural forest. Controlled mineral extractions may be necessary for the country's development, but now the uncontrolled over exploitation of this natural wealth is going to take us to an environmental disaster. Such scarred evidences are present even today at many places like Goa & Kudremukh. I only hope that people concerned about the conservation of our natural forests and their bio-diversity, will pressurise the government to change this attitude towards our natural environment.

Ulhas Rane
Bombay

Sir,

I share the concern about the forests and about everything else connected with the environment which is under such a grave threat. Clearly, without a concerted national popular effort and it does not have to be millions of people, I am afraid, there is no hope of impelling the political will.

We have failed across the board. There is poaching in our sanctuaries, contractors overfelling our forests, industries polluting the rivers and affluent and middle class, supposedly educated, indifferent

to the pollution dangers to their children in all the major cities. As you know, I have been in the van of the struggle ever since I retired prematurely from the Foreign Service to do this — 15 years ago.

A few marginal results perhaps but now with the massive entry of the multi-nationals, there are no environmental controls and no hope of implementing environmental laws.

I listen to the Environment Minister with the mixture of dismay and distress. His presentations are impressive but at home, the Ministry is a subordinate department of the Power and Industry Ministries: He is a lion in abroad and mouse at home. As elsewhere, it is simply a global coterie of power groups who dominate and dictate terms to Governments. What has happened is nothing compared to what is going to happen.

You will ask what we should do. The first key response is a capacity of environmental and social justice NGOs to come together and provide a unified platform. The only occasion when this has almost happened is through the extra-ordinary efforts of Medha Patkar and the Narmada Bachao Andolan. For them the first battle is won but there are many more to be fought and, I fear, many people are going to be beaten up, imprisoned and even killed, but Government is not going to find it easy to complete the Sardar Sarovar Dam.

What a cheerful letter! All I can add is good luck to all of you.

Sunil K. Roy
New Delhi

Sir,

When a man murders a tiger he calls it sport; when the tiger wants to murder him he calls it ferocity.

George Bernard Shaw

This refers to "A Hundred Years Ago", *Hornbill* 1993 (1). As animal lovers, it pains us a lot to read such cowardly exploits of 50-60 cowards (fully armed) out to kill treacherously through sheer betrayal, just five innocent, defenceless, magnificent animals. Hence, kindly do not publish such articles in *Hornbill* which is our pet on protection and conservation.

Darayus C. Balsara
Bombay

Dear Sir,

Although each issue of the **Hornbill**, as a source of latest information covering various aspects of natural history, is praiseworthy, the January–March, 1993 issue is marked to have some more fascination being dedicated to the supreme of the wild — His Majesty, the *Panthera tigris*. My special appreciation goes to the article **MAN-EATERS**, which appears to be a treatise both from historical and regional points of view. However, I wish to express my doubt about the identity of a particular man-eating tigress mentioned in the article.

As you know, man-eaters are generally named after the locality they menace. So far as I understand,

there is no place known as Mandla in the hill of Dehra Dun. So it appears that the author has mis-referred the 1876 tigress of Dehra Dun hills as Mandla tigress, which in fact might have been one of the many notorious man-eating tigresses operative in the Mandla District of Madhya Pradesh during the early years of this century.

May I draw through your magazine the attention of the concerned author to this dilemma to dispel my doubt, if my above stated contention is not correct?

Mashkoor Hasan
Jabalpur, M.P.

PHOTOGRAPHS WANTED

Photographs of Indian birds of prey are required for a book of Indian raptors (to be published by Oxford University Press, India). The photographs should preferably be in colour, though black & white photographs will be accepted if suitable transparencies are not available on certain species. The photographs should be clear, with good contrast and tonal gradation. Requirements for each species: Firstly photographs depicting behaviour such as mating, on the nest, hunting etc. are required. Secondly, perched shots (tight close-ups) which adequately give the "giz" of the particular species in the air with adult plumage clearly visible. The photographers will be duly acknowledged. The name of the photographer should be embossed or stamped on the slide mount. The transparencies should be sent by regd. A/D to Rishad Naoroji, Godrej Bhavan, 4A Home Street, Fort, Bombay 400 001. Photographs not chosen will be returned by registered post.

1. Black Shouldered Kite *Elanus caeruleus*
2. Jerdon's Baza *Aviceda jerdoni*
3. Black Baza *Aviceda leuphotes*
4. Blackeared Kite *Milvus migrans lineatus*
5. Brahminy Kite *Haliastur indus*
6. Northern Goshawk *Accipiter gentilis*
7. Grey Frog Hawk *Accipiter soloensis*
8. Crested Goshawk *Accipiter trivirgatus*
9. Sparrow Hawk *Accipiter nisus*
10. Besra Sparrow Hawk *Accipiter virgatus*
11. Japanese Sparrow Hawk *Accipiter gularis*
12. Longlegged Buzzard *Buteo rufinus*
13. Upland Buzzard *Buteo hemilasius*
14. Eurasian or Steppe Buzzard *Buteo buteo vulpinus*
15. Rough-legged Buzzard *Buteo lagopus*
16. White-eyed Buzzard *Butastur teesa*
17. Booted Eagle *Hieraaetus pennatus*
18. Rufous-bellied Eagle *Hieraaetus kienerii*
19. Golden Eagle *Aquila chrysaetos*
20. Tawny Eagle *Aquila rapax*
21. White-tailed Sea Eagle *Haliaeetus albicilla*
22. White-bellied Sea Eagle *Haliaeetus leucogaster*
23. Grey-headed Fishing Eagle *Ichthyophaga ichthyaetus*
24. Cinereous Vulture *Aegypius monachus*
25. Lammergeier *Gypaetus barbatus*
26. Marsh Harrier *Circus aeruginosus* male in flight
27. Hen Harrier *Circus cyaneus* male in flight & perched
28. Montagu's Harrier *Circus pygargus*
29. Pallid Harrier *Circus macrourus* male perched & in flight.
30. Pied Harrier *Circus melanoleucos* male & female
31. Eastern Marsh Harrier *Circus spilonotus*
32. Nicobar Crested Serpent Eagle *Spilornis minimus*
33. Andaman Serpent Eagle *Spilornis elgini*
34. Osprey *Pandion haliaetus*
35. Collared Falconet *Microhierax caserulescens*
36. Pied Falconet *Microhierax melanoleucos*
37. Saker *Falco cherrug*
38. Barbary Falcon *Falco pelegrinoides*
39. Shahin *F. p. peregrinator*
40. Hobby *Falco subbuteo*
41. Sooty Falcon *Falco concolor*
42. Indian or Oriental Hobby *Falco severus*
43. Eastern Red-legged Falcon *Falco amurensis*
44. Kestrel *Falco tinnunculus*
45. Merlin *Falco columbarius*

Rishad Naoroji
Bombay

SEASHORE LORE

13 —Doctors at sea

BEEFSEA



*Come, tell me how it is you live,
And what it is you do.*
The Knight, in "Alice in Wonderland"

When we fall ill, what do we do? Of course, we go to a doctor. When fishes fall ill, what do they do? Do not be surprised; they, too, go to doctors who, moreover, have established clinics or dispensaries!

The "doctors" comprise some 45 species of fish, besides shrimps, but the commonest among them is the "cleaner" fish, *Labroides dimidiatus*, also sometimes known as "Blue Streak". As long as our finger, it has a small pointed head, a body colour passing from blue to a delicate pink, and a wide black tail. A horizontal median black band runs along the body, widening from head to tail. It swims in a peculiar manner, oscillating the rear part of the body while progressing slowly, a jerky dance like a small boat pitching at a fast rate. If you have heard the last movement, titled *Badinerie*, of Bach's Suite No. 2 for flute and orchestra, you will be astonished whether Bach had set an amazingly faithful reproduction of this fish's movement to music.

Practically all fishes carry parasites, mostly small caligid or lernaeid copepods and isopods, on their bodies and on the gills. The cleaners do a good turn by picking them off and eating them. In addition, they will also pick at infected wounds to remove the diseased and dead tissue, and unwanted particles of food from the teeth, thus serving as dentists as well as doctors!

The blue streak lives in coral reef lagoons, mainly in shallow water of 60 cm, but are also found in water as deep as 60 metres. It establishes a "cleaning station" — a particular rock or coral head (shall we call it a clinic?) and does not move very far from this. Fishes requiring to be cleaned soon come to know of this location and visit it from long distances away. To indicate to the cleaner fish that they wish to be "serviced", they assume awkward postures: on their sides, head up, head down, or upside down. Some change their body colour dramatically. They will hold their fins extended and held rigid, and their gill-covers open. Sometimes large crowds will gather at a cleaning station. If they are docile, they will simply jostle around the blue streak, but aggressive fishes like surgeon fish or jacks may even scrap with each other, like bullies breaking a queue at a bus stop. As many as 300 fishes are known to have been serviced in six hours.

On receiving the proper signals from its "patient", the blue streak swims in the peculiar manner described above. It will rush forward, turn sideways, extend its fins and then retreat, repeating the process. It also raises the front part of its back fin to form a conspicuous black triangle.

The fish to be cleaned will allow it to move all over its body, and even inside its mouth, to allow the cleaner to reach its gills and clean its teeth. When it can no longer hold its breath, it will give



A blue streak fearlessly entering a moray's mouth

a signal to the cleaner fish to come out. Thus a moray eel will give a convulsive jerk of its head to one side when it wants the wrasse to leave, while a grouper will close its mouth sharply but not completely, and then open it widely. Even in case of sudden danger to the fish being cleaned, it will spit the cleaner fish forcefully out of its mouth before fleeing. Even fishes dangerous to man, such as moray eels and barracudas, and giant groupers — fishes that could swallow the blue streak in one gulp if they wished to, will stay motionless and docile, with mouth wide agape, while the cleaner fish boldly goes in.

Once I carried out an interesting experiment. We have moray eels in Bombay seas, but no blue streaks. Morays do not migrate, so our morays had obviously never come across a blue streak. What would a Bombay moray do if it met a blue streak? We had collected some blue streaks from Sri Lanka, so I introduced

one into the moray tank. Morays are short-sighted and notoriously short tempered, so my heart was in my mouth when a metre-long moray swam straight towards the blue streak, probably taking it to be a tasty morsel to be gulped down. But the intrepid blue streak was not daunted. As the moray came near, it went into its peculiar boat-pitching mode of swimming. As if hypnotized, the moray swam back and settled down on the tank bottom. It opened its mouth wide and allowed the blue streak to groom it. It is a clear case of instinct overcoming the unknown.

Because of the immunity from being eaten by predators enjoyed by the blue streak, another fish — a blenny named *Aspidontus taeniatus*, has adopted a clever ruse. It resembles the blue streak remarkably in its body shape, colour pattern and even swimming behaviour. Like the proverbial wolf in sheep's clothing, it uses this likeness to approach unsuspecting fish, which stop to allow it to groom them. The blenny then bites off a small piece of fin and, before the large fish gets over its surprise, flees.

Many a time, while hovering motionless over a coral bed, I have been the focus of the cleaner fish's, not unwelcome, attention. While engrossed in watching something interesting on the sea bed, I would feel a gentle tugging of the hairs on my legs, or, sometimes, of the many healing scratches with clotted blood which every aqua lung diver manages to acquire however careful he may be. After some time, the blue streak would realise the futility of removing (non-existent) parasites from my skin and would swim away to seek better pastures.

But just once did I really wish that a cleaner fish had been present to "service" me. That was on the approach march in the foothills of the Himalayas, on a long trek to reach our goal, a mountain peak in Sikkim. We were still in grass country, and, in the evening I had gone to a meadow of tall grasses for nature's call. While squatting, I saw a yak grazing nearby, but did not pay much attention to it. That night, I felt a peculiar sensation an inch to the right of my navel; it was a small pea-sized swelling. I realised that I had unwittingly picked up a tick in the meadow, and it was happily gorging itself on my blood. Now the best way to get a tick to fall off

OTHER CLEANERS IN NATURE

Removal of skin parasites on one animal by another seems to be a common phenomenon in Nature. Such instances on land have long been known, e.g. the crocodile and the Egyptian plover, domestic cattle and egret, and rhinoceros and tick bird.

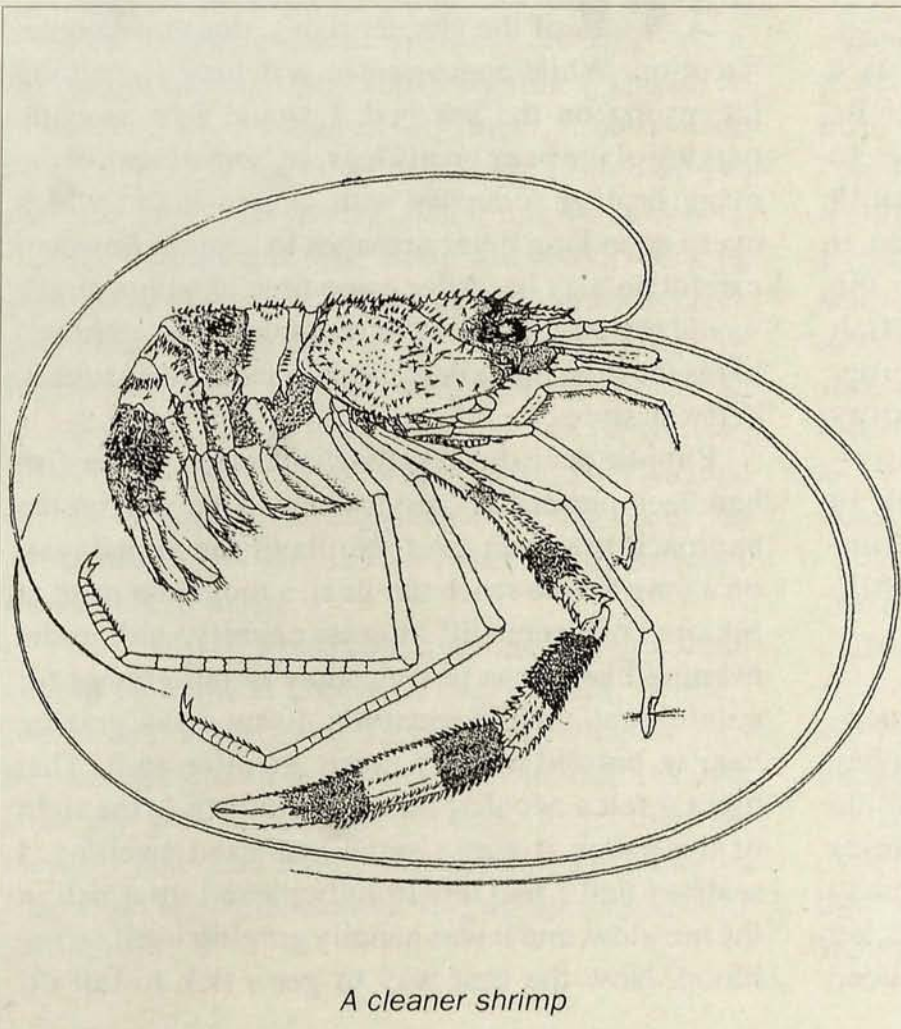
On the seashore, crabs remove ticks from sunbathing iguanas (lizards) in the Galapagos Islands. Sea gulls "clean" ocean sunfish (*Mola mola*), while wrasses pick at the shell of sea turtles; other wrasses clean parrotfish.

It was a long accepted notion that sucker-fish (remoras), found sticking to sharks, feed on the scraps of food left over by a feeding shark. But these too have been observed entering the mouths or gill chambers of large fish like swordfish, sailfish and ocean sunfish. Parasitic copepods found in the stomachs of remoras indicate that they are, atleast partially, parasite cleaners. And the pilot fish, which superficially resembles a remora, but does not have a sucking disc, cleans the jaws of manta rays.

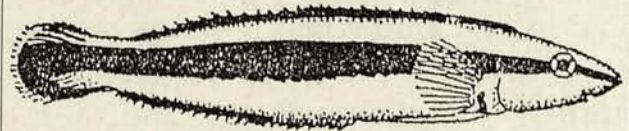
Pennant fish (*Heniochus*) clean groupers and goatfish. In the Nicobar islands, cardinal fish (*Siphamia versicolor*) shelter between the long spines of the sea urchin *Diadema*. The sea urchin tilts its spines together in small pyramidal groups which exposes the interradial fields, and the cardinal fish then picks at these surfaces to clean them.

In all the above instances, the cleaning agent does not depend solely on its cleaning activity for earning its food; it is a part-time job. But there are others who are compulsive cleaners in addition to *Labroides dimidiatus*, three other species of *Labroides*, viz. *bicolor*, *phthirophagus* and *rubrolabiatus* will even clean *Labroides bicolor*.

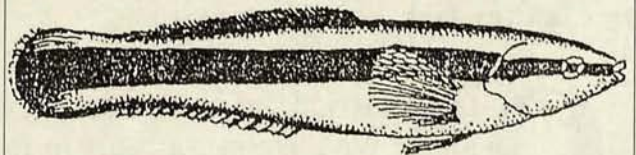
Shrimps belonging to three genera —*Stenopus*, *Hippolyasmata* and *Periclimenes* do full-time cleaning jobs as efficiently as cleaner fishes.

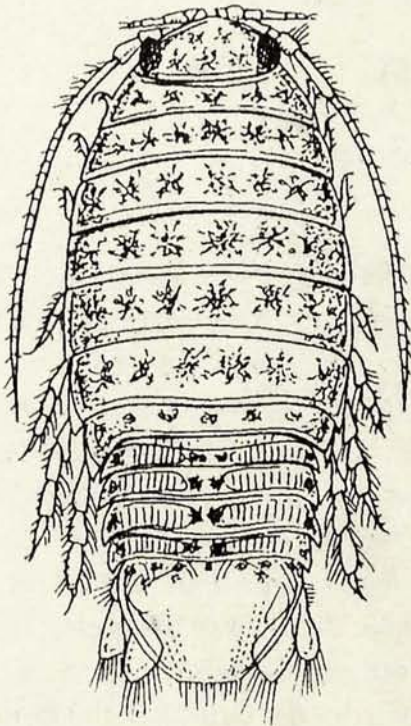


A cleaner shrimp



Cleaner wrasse (above)
and its mimic (below)



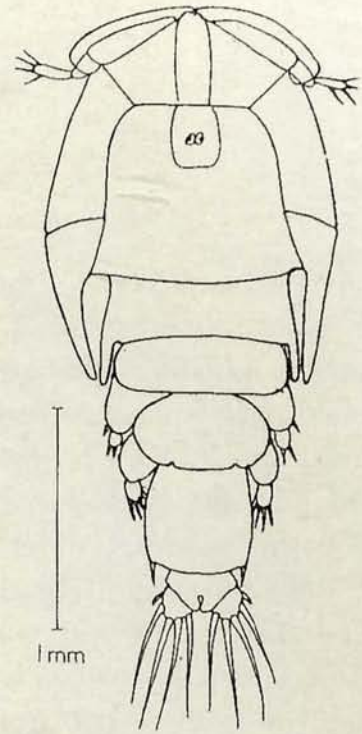


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An Isopod parasite on the fish skin

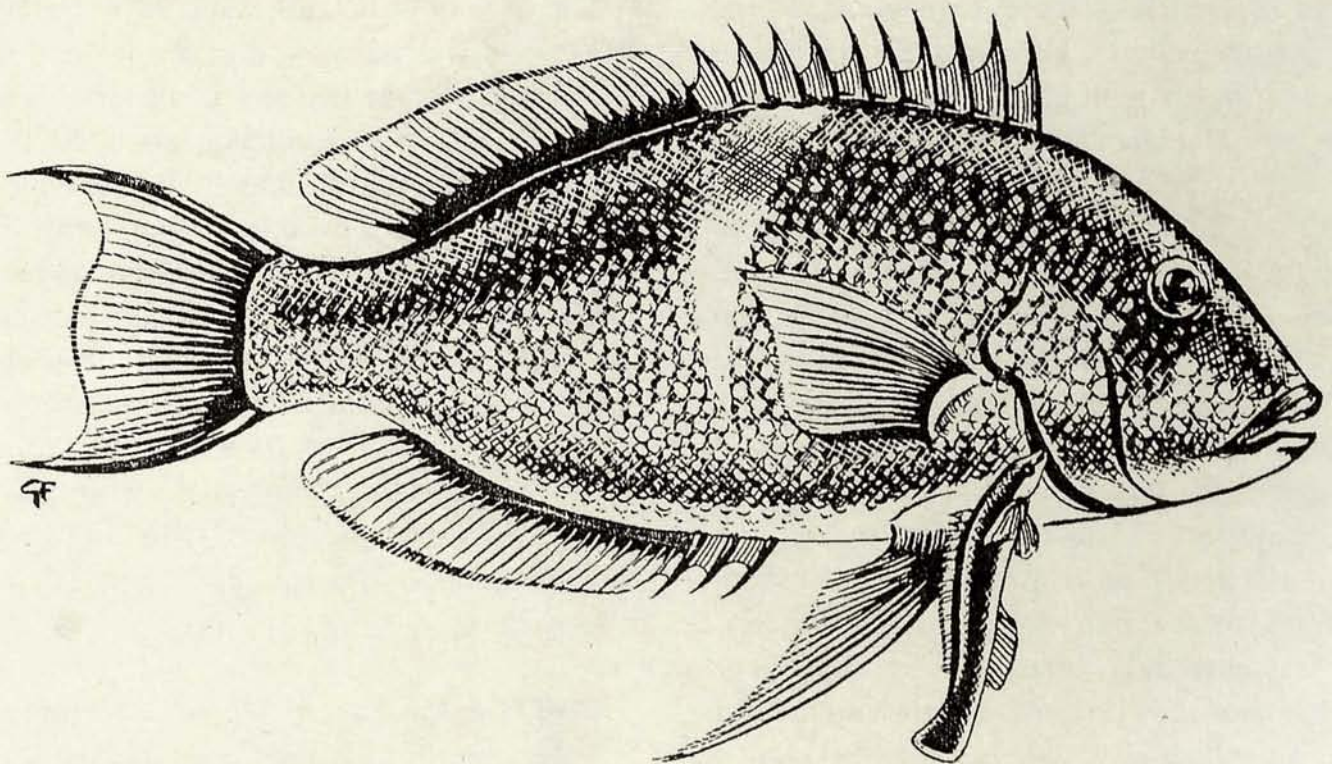
without leaving its mouthparts in our flesh is to rub salt or tobacco juice on it. At the first light of dawn, I told my tent partner, a captain in the Gurkha regiment, about my woes. He enjoyed a smoke first thing in the morning, and listened as I indicated the site of my troubles, near my navel.

Now I have a dark mole an inch to the *left* of my



A Copepod parasite on the fish gills

navel (remember that the tick was an inch to the *right*). In the semi-darkness, my partner could vaguely see a dark spot against the fair skin of my belly, and, thinking this to be the tick, jabbed his lighted cigarette on to it to dislodge the tick. That was one occasion when I would have preferred a cleaner fish.



Blue streak cleaning the gills of a fish much larger than itself

GANDA BAWAL

Story of an alien

S. Asad Akhtar and J. K. Tiwari

Mirages simmered on the orange horizon as a jeepful of BNHS members were returning from a run of the Little Rann. The mood was jubilant, especially of the photographers, who had bagged good pictures of the handsome wild ass. At the wheel was Sarfaraz Mallik, a trained falconer, who was hosting the campers at his ancestral mansion in the small town of Dassada. While they were cruising along a road lined by a profuse and at places impenetrable growth of prosopis, Sarfaraz spotted two blackwinged kites closely circling low over a prosopis thicket. Curiosity brought the jeepload of campers to the prosopis thicket to see a pitiable sight that would forever remain etched in their memory. Not one, but two fledglings of the blackwinged kite were badly trapped among the large wicked thorns of the prosopis. Extricating the fledglings was not easy enough as it appeared initially, since one fledgling was impaled by the thorn in the neck and gullet and the other had the thorn stuck at the junction of its neck and breast. Both were struggling fiercely to free themselves only to get more entangled. Seeing Sarfaraz' predicament, Dr Dasgupta, an avid birder joined in and finally with great difficulty freed the fledglings from the clutches of the prosopis thorns. Since the birds were badly injured, they were taken to the base camp. Trying to feed them with bits of medicated meat and water was of no use as both the meat pieces and water just leaked out of the lacerations in the neck. Next morning one of the birds had died and a day later the second bird too succumbed. This incident appears quite strange since several birds do nest frequently on many of our native thorny trees and shrubs for obvious reasons and their young fly out unscathed, but somehow it appears that some birds have not yet learnt to tackle this alien thorn.

Ganda Bawal (Ganda = mad, Bawal = Acacia) or the mad acacia, is the popular Gujarati-Kutchi term for the Mesquite, *Prosopis chilensis*. It is also known as *keekar* in the local army units. It is now a familiar

plant in most parts of the arid country. The earliest records of the species in the subcontinent, goes back to its introduction in Sind in 1877, where it was successfully grown to check the invading desert. To shore up this scheme, some more better quality seeds were brought in 1878 from Kew in England. An attempt was made in 1879 to introduce the species in Sholapur district, though a few years later it appears to have died out in the area. The first large scale plantation, seems to have been carried out in the Pabbi hills in district Gujrat, in the Punjab around 1894, as a trial measure by the forest department. It reportedly adjusted well to the locality. In 1913 it was introduced in Jodhpur as part of a highly successful afforestation scheme. Later in 1940, it was declared a royal plant by a decree issued by the Government of Jodhpur, which urged the public to protect all the existing trees of this species and to raise extensive plantations. In the late thirties it was planted in certain areas around the Navlakhi fort in Morvi state, adjoining Kutch. Hence, initially in Kutch, it was also known as "Morvi Bawal". In 1934-35, it was introduced in the Jalgaon range of Maharashtra. In the fifties, under a scheme to check the Little Rann from spreading, about 3000 acres of prosopis were planted annually on the edges of the Rann. Interestingly, the forest department here, considered cattle as their ally, because by eating the prosopis pods and excreting its seeds, they helped to spread the plant further in the vast expanses of the Rann. E P Gee, the renowned conservationist reported that the wild asses too fed on the dry seed pods of the prosopis, though they avoided its leaves. The plants spread from the seeds in the animals' droppings thus aiding the forest department in its work.

The Mesquite is a legume belonging to the family Leguminosae. It has a very strong and deep tap root, besides a number of



Photo by Das Gupta

lateral roots, which hold the tree firmly to the ground. It is an evergreen tree and is represented in India by several forms. Though, *Prosopis chilensis*, appears to be the most common. The plant is highly aggressive and crowds out all the endemic vegetation, in localities where it gets a foothold. Climatic vagaries hardly seem to have any effect on this unusually hardy species. A hot dry climate, mild winter, a low rainfall and a clear atmosphere are said to suit it best, and incidentally Kutch provides the mesquite with all these favourable conditions. Being extremely tenacious to withstand harsh conditions, it is considered a pioneer in afforesting dry and degraded grasslands and wastelands. Though damp and very cold localities are unsuitable for its growth, as it is sensitive to excess moisture and vulnerable to frost. It has been recorded to average an annual growth upto a metre. It seems to flourish even in those areas, where other plants can hardly survive. Thickets of mesquite thrive on the edge of the Rann of Kutch, where other species are barely visible. Though, in areas where intensive agricultural activities are practised the plant does not take root, because of the ploughing and deweeding activities. Initially, hailed as a boon, it is now considered a bane in most parts of the country.

The Mesquite has gone berserk in places, where its presence is totally unwanted. A few such areas have come to our notice in the Banni grassland and the sand dunes of the Mandvi coast in Kutch district. During our visits to these sand dunes, in the course of our bird migration studies, it was disheartening to see the once undulating and open areas, as the locals recall, covered with a thick prosopis forest. Except for a few well beaten paths through the thickets, the dunes are almost impenetrable. These dunes used to be one of the most prominent wintering grounds of the houbara in Kutch.

The houbara, like the great Indian bustard and other bustards, is a bird of the grasslands. A mesquite dominated scene is totally alien to their way of life, as its thorny thickets unlike a ber, *Ziziphus* sp, bush are useless for these birds, which prefer open spaces sparsely dotted with bushes of ber, capparid and other local species. Similarly, some of the large raptors, like the tawny eagle, steppe eagle, imperial

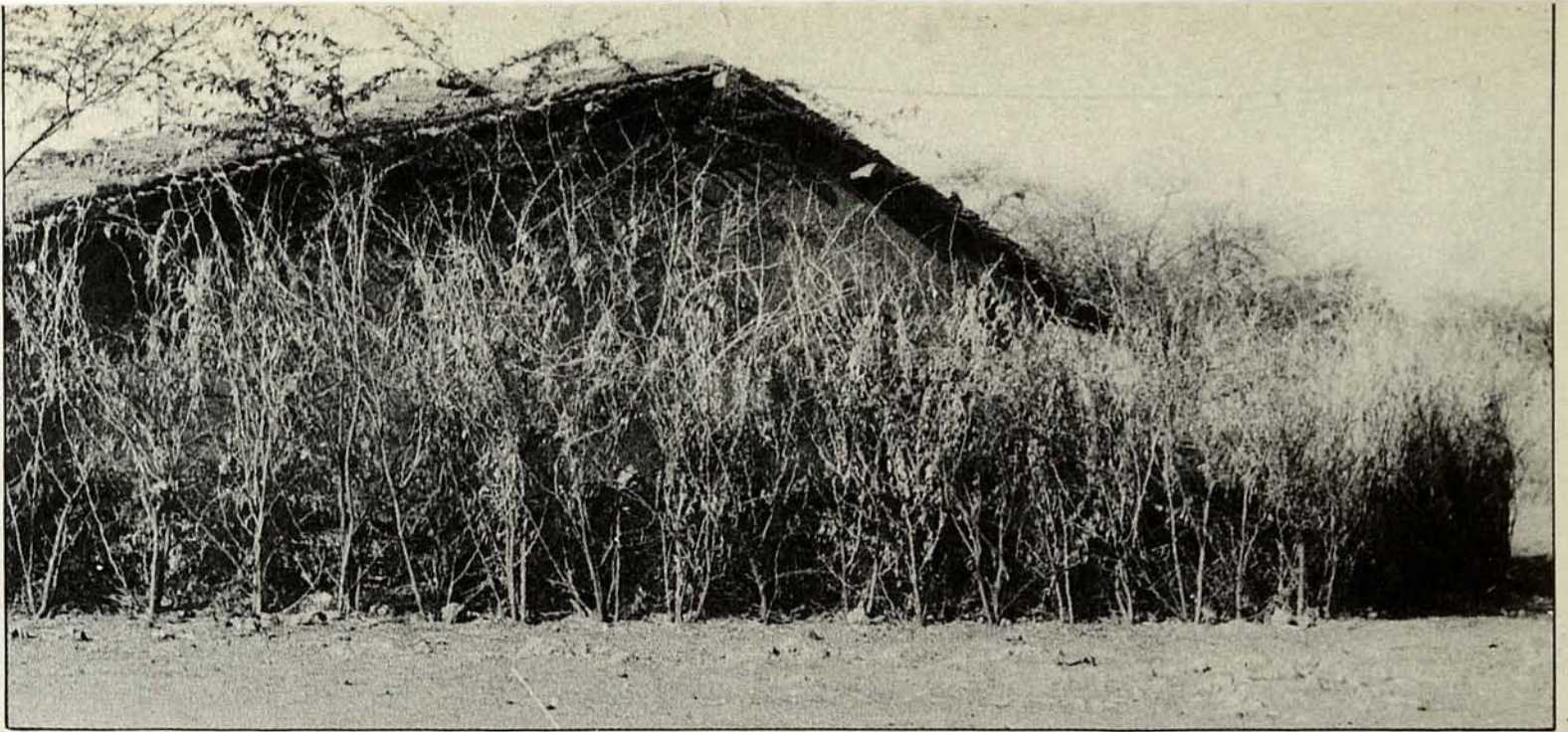
eagle and the short-toed eagle hunt best in open country, as they scan the terrain either on their wings or from a prominent perch and locate their quarry before going in for the kill. An unhindered view of their hunting territory, is vital for a successful hunt.

Certain precocial species like the sandgrouse and lark also avoid the prosopis-dominated localities, because the grasses are absent in such areas, thus depriving the birds of the grass seeds, an important item of their diet. Cranes are another group of birds, which have been affected by the prosopis encroachment on their foraging grounds in the Banni.

The enthusiastic response, which the mesquite received earlier, was mainly due to its ability to strike root and flourish in highly degraded soil, under extremely hostile environmental conditions. The boost, that it gave to the afforestation efforts in the country and the many thousands of square kilometres of deserts, that it seemed to have held back, gladdened the hearts of quite a few administrators, otherwise under pressure to show results within a certain, generally unrealistic, time-frame.

But, when the wonder plant, considered a panacea for all ills, started spreading in places, where it was not wanted the success story started turning sour. One such area is the once verdant Banni of Kutch. Considered to be one of Asia's most extensive grassland. The 840 sq. kms. pastureland lies on the edge of the Great Rann of Kutch and in spite of large chunks of it having been lost to the Mesquite menace, it still sustains a population of about 25000 milch cattle and 15,000 sheep and goats. Our mist nets were often destroyed by these cattle, which overran our netting sites.

Ironically, most of the pastoralists now fall back on the prosopis scrub forest in the Banni, to supplement their income, in times of scarcity conditions, which are frequent. They collect the Prosopis exudes, pods of the prosopis plant and honey. A family of about four adult members, manages to collect about Rs.20/- worth of prosopis gum per day, for about six to seven months of the year, especially during the hot season when the output of gum is very high. This gum is sold to government approved agents in the village. Depend-



Asad Akhtar

A hedge of Ganda Bawal — one of its many uses

ing upon the quality, it sells for about Rs.10 to Rs 12 per kg. Besides this, they also collect honey from these forests, which sells for about Rs.12-15 per kg. The honey from these areas is of a very good quality. The pods are used as supplement to cattle feed. In some areas, prosopis wood is used for making charcoal, which fetches the villagers a good remuneration in the market, considering the ever increasing demand for fuel. Though, if given a choice between prosopis and the local flora, the villagers prefer walking a few extra kilometres to lop the less thorny and woodier indigenous acacia, rather than the extremely thorny and hence painful Ganda Bawal which literally chokes their backyards.

Moreover, prosopis wood cannot be stored for long unlike other species, as it is readily attacked by wood boring insects, which reduce it to a yellow powdery mass resembling gram flour, within a short period. Though, when seasoned in water and treated with a solution of copper sulphate, it stays longer.

The scene of desolation, that is gradually unfolding before our very eyes, is frustrating indeed. This becomes all the more painful when we realise that, thousands of hectares of prosopis forests lie unutilised, considering that they are primarily meant as a source of fuel. M K S Himmatsinhji a scion of the Kutch Royal family opines that, if properly managed these forests have enough potential to generate charcoal not only for the district, but also for the entire state of Gujarat and adjoining Rajasthan too. The proceeds he suggests could be ploughed back into ecorestoration programmes for the district.

The mesquite now covers large tracts of the Banni and smothers the growth of grass, thus depriving the pastoralists of their basic resource. Besides, choking out the endemic flora, it retards the growth of whatever plant species, which still manage to survive amidst its thickets. The phenomenal rate at which the plant grows is obviously due to a highly efficient nutrient absorbing capacity which enables it to thrive at the cost of the other flora in the vicinity. We have come across patches of withering *Salvadora* bushes hemmed in by these thickets, in the banni. As the mesquite gradually spread its tentacles all over the Banni, the cattle demography of the area underwent a drastic change. The comparatively hardier buffaloes, have almost replaced the once common cows of the Kankrej or Wadhiari breed. Cows are highly susceptible to the wounds caused by the thorns of the mesquite, especially to their udders and hooves. The wound turns septic very easily and festers over a long period. Moreover, its pods which the cows relish, dislocates their jaw, thus reducing their grazing efficiency. Our mentor, M.K.S. Himmatsinhji, often sadly recalls the loss of his dairy cows to this scourge. The leaves, which the cattle ingest accidentally, disrupt their digestive system. All this results in a gradual fall in their productivity.

Often, when we talked to Pir Muhammad, the village elder and others, the first question that they put to us, was about the relevance of our Bird Migration Studies to the prosopis problem. How would it help free them from this curse, they asked. We told them, that we would be highlighting the topic in various forums and try to convince the planners and



Isaac Kehimkar/DPA

The Asiatic Wild Ass has aided the spread of prosopis in the Little Rann from seeds in its dung.

administrators of the seriousness of the issue. This seemed to allay their doubts and they appeared to take our arguments seriously. Though sceptics amongst them, found it hard to relate our studies with the menace that confronted them. We told them further how important the grassland was to the thousands of migratory cranes that wintered in the area. A healthy grassland would not only help the cranes, but would ultimately benefit the pastoralists too. The collaborative spirit, for the environmental well being of both man and bird, that we espoused, struck a chord in their hearts and we soon had well wishers all over the place.

Studies elsewhere have proven our findings here, that cattle which eat the prosopis pods and excrete its seeds are the primary source for the dispersal of this plant, while in certain areas like Sriharikota in Andhra Pradesh and Point Calimere in Tamil Nadu, Bonnet Macaques have also become an agent in the dispersal of prosopis seeds. Besides the initial planting of prosopis to check the ingress of the Rann into the area, it has spread mainly due to the cattle, which enter the banni

from the adjacent district of Banaskantha, where this plant is already dominant. It grows very fast as compared to the local desert flora, moreover the livestock avoid its leaves. On the contrary, the endemic vegetation not only has to withstand the excessive grazing pressure, but also climatic vagaries like frequent droughts and disturbance in the water regime of the area, due to ill planned water harvesting schemes in the upstream areas of the streams flowing into the banni. This hardly leaves any water for a proper drainage of the area. All these factors inhibit the local flora, while the mesquite seems to thrive under such circumstances. Unfortunately, this is proving detrimental not only to the livestock, but also to some of the public utility services in the Banni. Its well developed root system is reported to have choked and damaged pipes supplying water to the villages. A small crevice in the plumbing is enough, for its roots to penetrate and choke the pipelines.

The plant generates a very strong feeling, both for and against, amongst the learned and the laity. One school of thought opines, that the plant is here to stay and should be allowed to run its course, while others

argue, that if not a complete removal an attempt should at least be made to control its further spreading in the area. The plight of the pastoralists is enough to settle the argument against the species, they opine. Both sides have enough pros and cons at their disposal, to counter the other's propositions.

It should be realised that a grassland is not a wasteland, where compensatory afforestation programmes with prosopis as the kingpin, can be casually fitted in. The implications of such schemes is there for all to see in the bustard sanctuary in Abdasa taluka of Kutch district. Here prosopis has been planted extensively to 'develop' the sanctuary in lieu of the forests that will be submerged under the Sardar Sarovar Project on the river Narmada. We were astonished, when it was brought to our notice, that thousands of hectares of the banni grassland had been allotted for energy plantations, to an agency pioneering efforts in the field of non conventional energy sources. Luckily, the scheme was noticed in time and the lease cancelled by an ecologically enlightened collector, who realised its disastrous implications.

The floral and faunal diversity and the economy that the pastureland still sustains should be enough to justify the Banni's existence. The numerous endangered species, that find a refuge here and the migratory waterfowl and cranes, that settle down in winter in the dhandhs (*dhandh* = Sindhi word for a *jheel* or shallow lake), should open, the eyes of the decision makers to allot top priority to the areas ecological well being.

Interestingly, the mesquite is not the only alien in Kutch. It is in the limelight, because of the notoriety that it has acquired. Some of the other exotics are the Doum Palm *Hyphaena* sp and the Baobab tree, some of which exist in the Mandvi Taluka of Kutch. These, along with *Parkinsonia aculeata*, which is also an introduced species in Kutch, are African in origin. These occurrences highlight the role of the ancient trade links, between Kutch and the African continent, in their inadvertent introduction in the district. The arrival of these plants in Kutch precedes the prosopis by many years. We

have also noted scattered bushes of the South American species, *Lantana camara*, in Bhuj city. Though not yet a problem plant, it could nevertheless assume worrisome proportions in well watered localities of the district. Its ripe berries are relished by birds, which could spread the plant very easily.

Any large scale removal of the prosopis thickets, will aggravate the erosion of the topsoil in the area. As in the absence of a healthy cover, the endemic vegetation will be unable to buffer the impact of high velocity surface winds, prevalent in the Banni. Under the prevailing conditions, prosopis is one of the major species acting as a soil binder, besides its extensive thickets in the Banni also serve as effective windbreaks, thus checking the ingress of salt laden soil from the Rann, for which they were primarily planted. The average annual mean wind speed in the area is about 15 km per hour. We still remember the hot and gusty April afternoon, when our tent which was pitched on the edge of the dhandh in the Banni was torn through the middle, while we looked on helplessly. The scene was pathetic, as we ran around chasing our data sheets and clothings!

Research in a semiarid zone of Tanzania, has highlighted the importance of some form of cover for the soil. The study revealed that almost 135 tons of soil per hectare per year and 50% of the total rainfall, were lost in the absence of some form of vegetation cover. These findings were true for both cultivated or uncultivated land.

The mesquite should be kept under check by demarcating areas for its removal, where soil conservation schemes can be implemented simultaneously. The cleared sites can be developed as grass plots for generation of fodder. Manual harvesting of the fodder should be encouraged. Any prosopis seedlings, that emerge in these plots should be removed by employing the locals which will generate additional employment, as well as prevent the seedlings from taking root. Moreover such protected plots are also known to become good refuges for the local fauna.

The locality supports a number of endangered and rare species. Prominent amongst birds are the Great Indian Bustard, the Lesser Florican, the King Vulture, the Cinerous Vulture, the Redheaded falcon, the DIma-

EXOTICS ON THE RUN

Exotics are defined as organisms which have been introduced by man, either deliberately or inadvertently, into regions outside their normal range of distribution. The introduced species often competes directly with the native species to the detriment of the latter.

Some classic examples of areas, which have suffered from the thoughtless introduction of exotics, are the Oceanic islands, where the endemic species are often incapable of withstanding the competition from the more aggressive introduced species. Numerous island species have been exterminated as a direct result of the introduction of alien predators or competitors. Rabbits and goats stripped the Round Island near Mauritius, of its vegetation and much of its top soil, after they were introduced in the Island in the 19th century. Similarly, the introduction of exotics on some of the Galapagos islands has played havoc with the endemic flora and fauna.

Large areas of quite a few of our national parks and sanctuaries, are now covered with the exotic, *Lantana camara*, which was originally introduced as an ornamental plant. Another ornamental plant introduced from South America, the ubiquitous water hyacinth, *Eichornia crassipes* now chokes most of our ponds and lakes. Parthenium or the Congress Grass is the most notorious of the exotics. It has overrun almost all vacant lots in the cities as well as in the countryside. The Eupatorium too is the recent invader of the undergrowth.

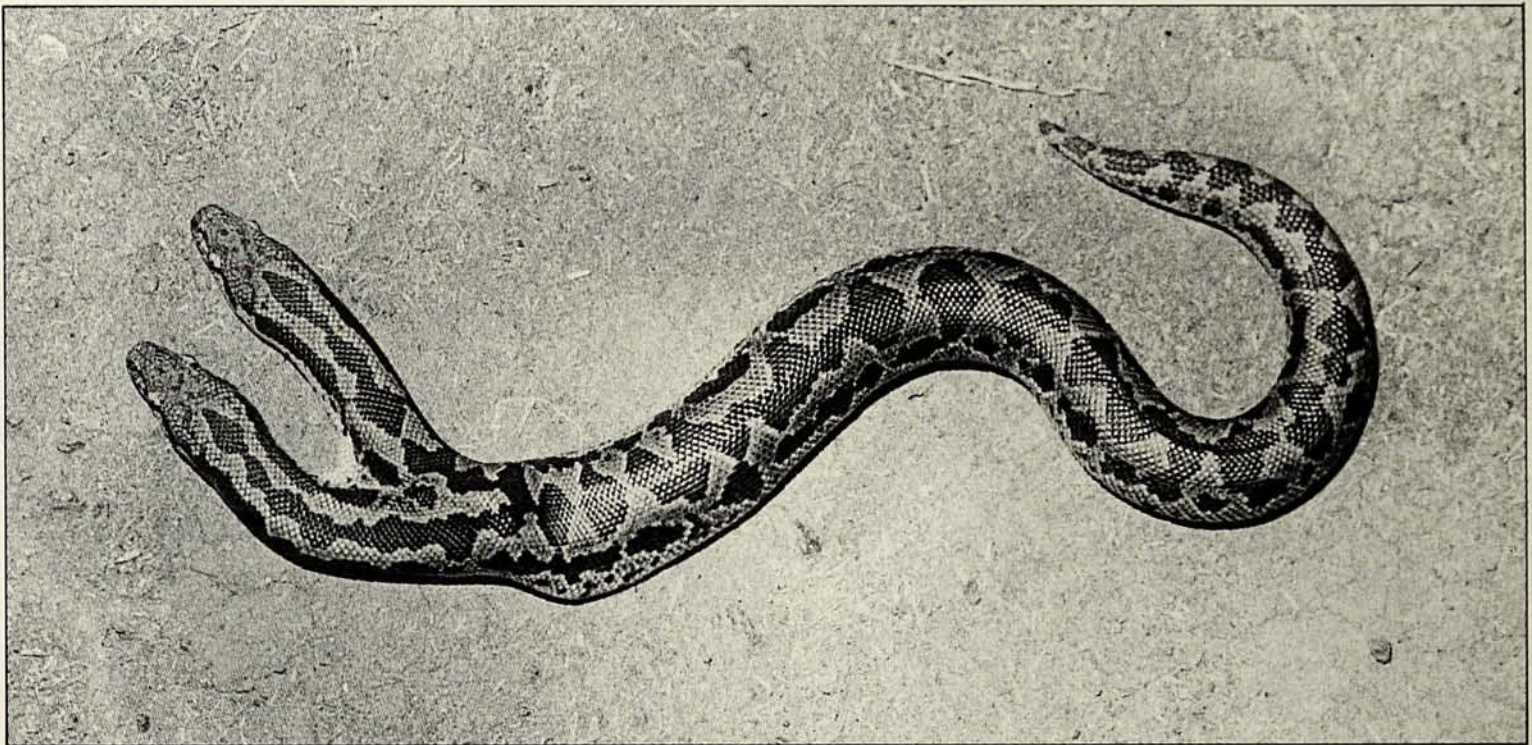


Asad Akhtar

A bewildered grazier under the shade of the *Prosopis* Pelican, the Blacknecked Stork, the White-winged Black Tit and the Whitebellied Minivet. The endangered mammalian fauna include the Grey Wolf, Desert fox, Caracal, Chinkara and the Blackbuck, a small population of which is reported to survive in the eastern parts of the Banni. The Pangolin is also reported from this area. Besides a small population of leopards also survives in the hills bordering the Banni grassland. In winters, following a good rainfall this grassland also supports a wintering population of about 40,000 Common Cranes.

The need of the hour is an enlightened management outlook so as to turn the usurper into a provider. The way it has overshadowed the local flora is a problem to be faced squarely rather than lose hope and time in bureaucratic prevarication. Moreover the rapid degradation of this picturesque habitat that is currently underway should jolt the decision makers to initiate remedial measures immediately to save a bewildered pastoral community from ecological disaster.

Mr Asad Akhtar is a biologist at the Society who is also an ornithologist who has worked on cranes, migratory waterfowl and raptors.



A. Surya Narayana Rao

Double headed Common Sandboa *Eryx conicus*

A common or Russell's sandboa *Eryx conicus* with two heads was captured at Shikaripura, Shimoga district in Karnataka state. The snake is now in the possession of a snake keeper, Ravindranath Aithal.

The snake measures 18 cm from the snout to the tip of the tail. The point of axial bifurcation is 3 cm from the tip of the mouth and 15 cm from the tip of the tail. A hump on the body, about 1.5 cm behind the point where the two heads diverge, was noticeable. Both the heads were identical. The snake can take food through both the mouths. In similar cases it has been noticed that while feeding, the two heads fight for the same mouse though both have one stomach. Two headed *Eryx conicus* has also been reported from Karnataka and Madhya Pradesh.

Sandboas are stumpy, nonvenomous snakes related to pythons. Superficially, they resemble the Russell's Viper, but the spots on the Russell's Viper are uniform and when cornered the viper hisses like a pressure cooker.

Unlike pythons, Sandboas give birth to live young. Young Sandboas feed on mice and small lizards and later on birds, larger lizards and rodents when big enough. They are one of the best rodent controllers.

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for financial support for the publication of Hornbill.

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