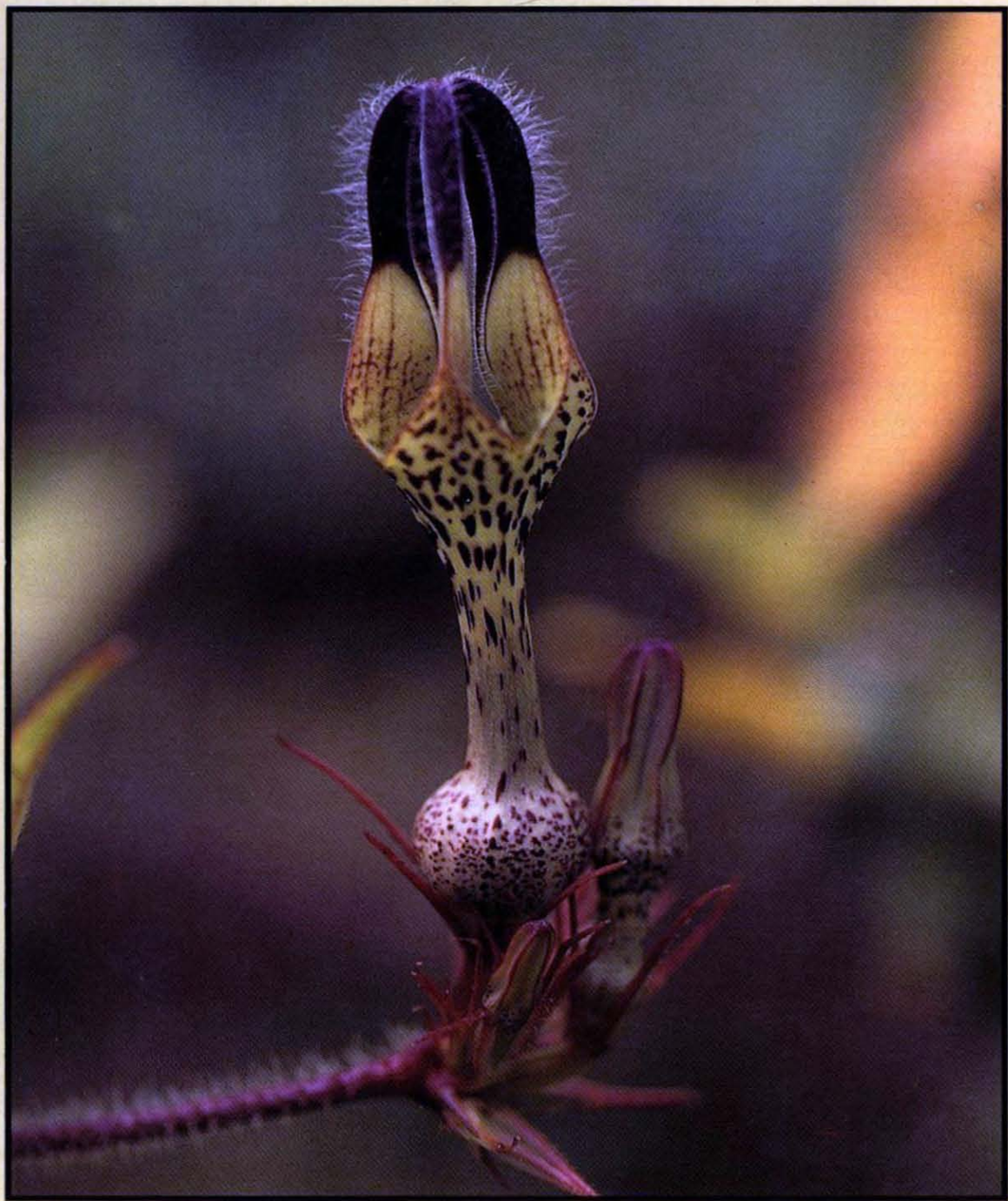


# HORNBILL

1996. No. 1



BOMBAY NATURAL HISTORY SOCIETY

# C O N T E N T S



## 2. The Flytrap Flowers of the Western Ghats

— S.R. Yadav

The curious modifications of the corolla of these flowers are ideally suited to specific insect pollinators



## 20. Seashore Lore — 21. Have Your Cake and Eat it Too

— Beefsea

As the old song goes: "Goodbye Sam, Hello Samantha" — the author describes sex change in fishes



## 28. A Spectacle in the Sky

This photofeature displays different stages of a total solar eclipse, captured by the camera of Sudheer Agashe  
Text: Heema Rao



## 8. Letters

## 11. Conservation Notes

## 15. Newslines

## 24. News, Notes and Comments



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 for nature conservation. Individual membership can be either in personal or official capacity. Membership is also open to scientific and educational associations and institutions as well as companies.

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*Ceropegia vincaefolia*  
S.R. Yadav

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**A Return to Bharatpur**

**L**IFE originated in the sea and evolved in wetlands, rivers and salt water bodies. Great civilizations arose and flourished in the environs of the Indogangetic river system, the Nile, Yangtze and the Mediterranean Sea, to name but a few. Man understood this vital relationship, and in the limits of his primitive understanding, revered water as the elixir of life.

But today, we face a grim scenario. Human greed, over-exploitation of natural resources and unplanned development have reduced these once rich and life-giving habitats to a travesty of their former wealth.

The statistics spoke for themselves when presented by one hundred and sixty two scientists who attended the Sálím Ali Centenary Seminar on the Conservation of the Avifauna of Wetlands and Grasslands in February, 1996 in Mumbai. This international seminar raised several vital issues, particularly with regard to some indicator bird species that are the subject of international concern and conservation action.

The endangered status of the blacknecked crane was highlighted, stressing the need to involve government resources to augment and support efforts by non-governmental organisations and concerned citizens.

The results of concerted and effective conservation measures for over a decade were demonstrated in the restoration of numbers of the great Indian bustard under the Drought Prone Areas Programme in Maharashtra. From 55-60 birds in 1981-85, the current population has risen to an estimated 100 or more birds. A similar effort could be made for the Bengal florican which has become perhaps one of the rarest of the 22 bustard species in the world. Agricultural activity has reduced its natural grassland habitat to fragments in Assam, West Bengal and Uttar Pradesh and decimated this elusive species.

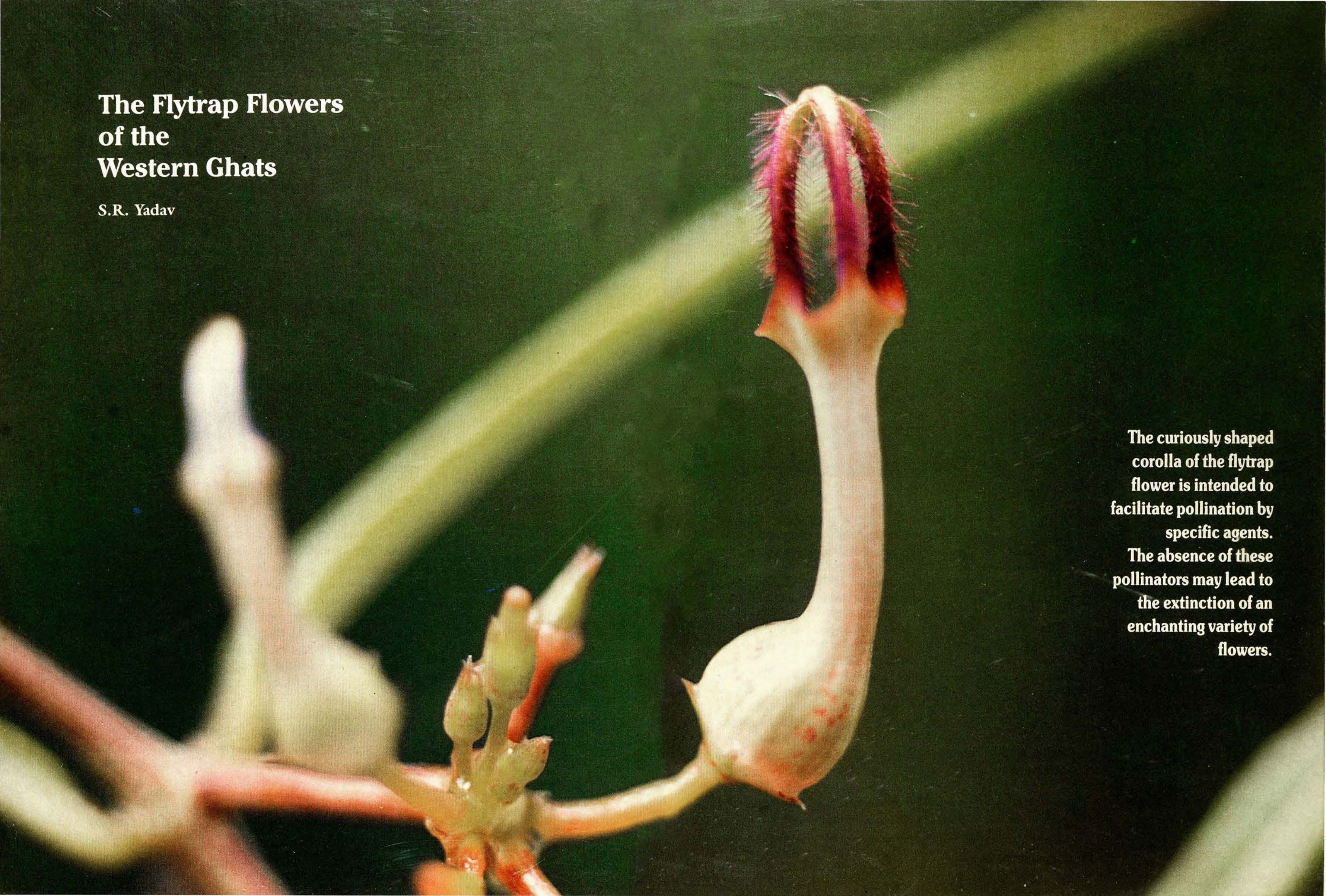
The lack of data on diseases of birds of grasslands and wetlands was pointed out, along with effects of parasites, toxic pesticides and other hazardous chemicals which need to be carefully monitored.

Yet, from behind the dark clouds shone a silver lining. The return of four Siberian cranes brought hope to Bharatpur, and to the scientific community at large. It set to rest the fear that sibes, like the Indian cheetah, may only be sighted in books on the natural history of India.

GAYATRI UGRA

# The Flytrap Flowers of the Western Ghats

S.R. Yadav



The curiously shaped  
corolla of the flytrap  
flower is intended to  
facilitate pollination by  
specific agents.  
The absence of these  
pollinators may lead to  
the extinction of an  
enchanted variety of  
flowers.



S.R. YADAV

*Ceropegia jainii* grows in crevices of lateritic rocks on comparatively higher plateaus such as Amboli and Kas.

The genus *Ceropegia*, with its curious modifications of the corolla, is one of the largest genera of Asclepiadaceae, comprising about 200 species distributed over most of Africa, Madagascar, the Arabian peninsula, India and Australia. The generic name *Ceropegia* is derived from the Greek words *keros* (wax) and *pege* (fountain), conveying that the flowers look like a fountain of wax.

Flytrap flowers are borne on erect or twining herbs with tuberous or fleshy roots and watery latex. The leaves are opposite, membranous or fleshy. Flowers are borne in subumbellate cymes. The corolla tube has a funnel-shaped mouth and the corolla lobes are usually shaped to form a lantern. Two free ovaries with a single style and stigma characterise this genus, along with narrow follicles in pairs and comose seeds.

About 44 species of *Ceropegia* are found in India, of which 32 have been originally described from

India. They are endemic to this country. While a few of the Indian endemic species are rare, some are endangered and most of them are threatened. All the endemic species have a very narrow range of distribution. Presently, some 32 species of *Ceropegia* have been listed in the Red Data book.

There are about 30 species of *Ceropegia* endemic to peninsular India. Most of them are found in the Western Ghats. In Maharashtra alone, 20 species have been recorded, of which 18 are endemic to the state and its neighbouring areas. Some of them are known only from their type locality. The populations of these species are declining because of modifications of natural habitats by modern developments, destruction of edible tubers by man and animals, poor seed setting in the absence of pollinators, and species-specific habitat requirement. In the present context, propagation, multiplication, domesti-



S.R. YADAV

The curious flowers of *Ceropegia fantastica* are seen on the Lolium Plateau in South Goa.

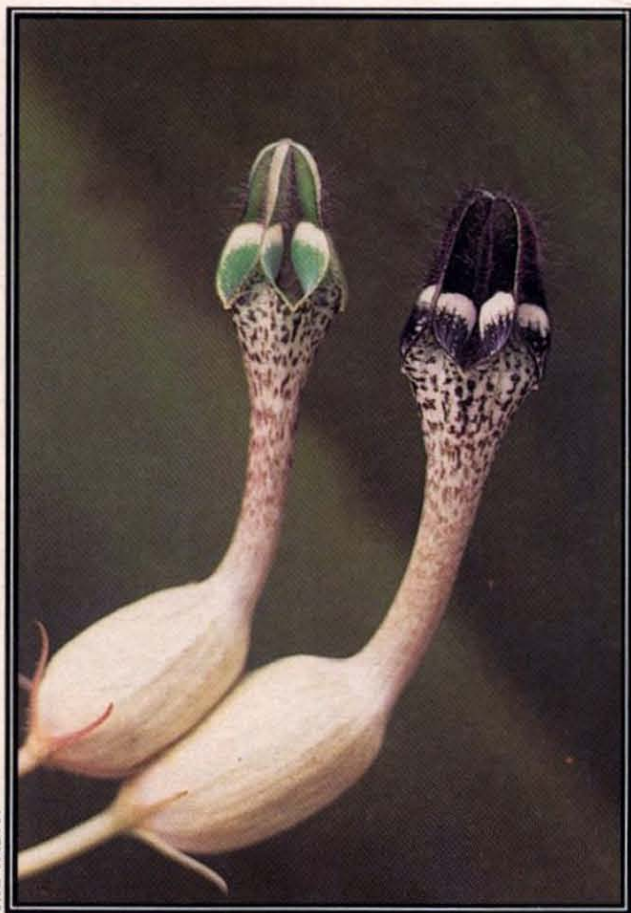
cation and introduction into horticulture by human intervention seems to be the best way for their conservation. As early as 1907, Theodore Cook rightly pointed out that home gardens can be good conservation grounds for *Ceropegia*. The peculiarly formed and beautifully spotted flowers of *Ceropegia* become an object of curiosity and wonder.

As most of the species of *Ceropegia* grow during monsoon (June-September), their collection in the forests during the rainy season is neither easy nor pleasant. However, their wonderful flowers attracted me and made me visit their natural homes several times in spite of numerous difficulties. Along the ranges of Sahyadri are my favourite hunting-grounds for *Ceropegia*. It is indeed a difficult task to photograph them in nature owing to the trying conditions prevailing on plateaus of higher elevations, such as wet weather, gusty wind, and

poor light on cloudy days. Consequently, locating *Ceropegia* is by no means an easy job. They grow among bushes where prickles and poor light further confound the untrained eye.

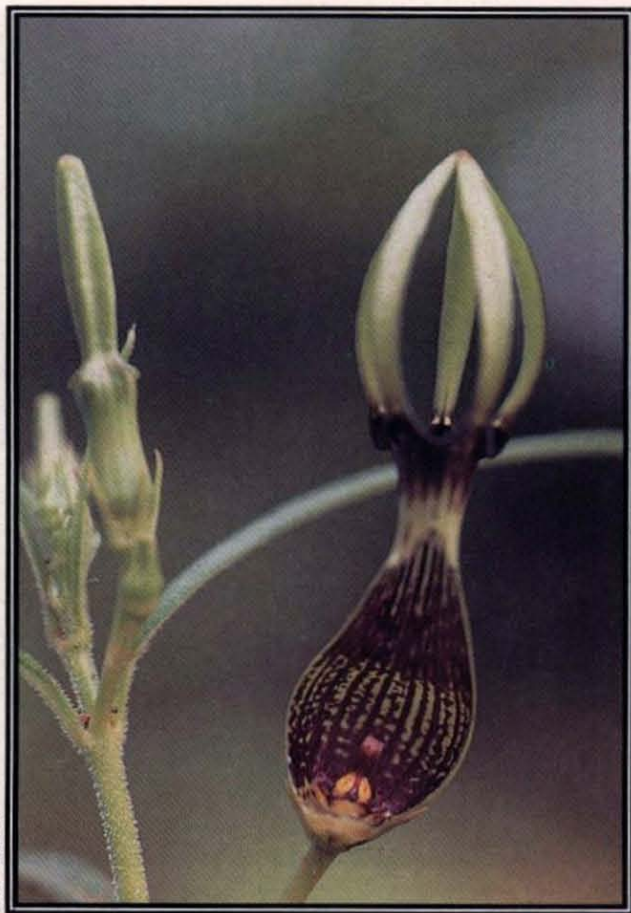
Architecture in these flowers is a wonderful creation of nature. Usually, the flowers have a deep funnel-shaped corolla with glossy sides and a narrow tube with its lower portion dilated to form a chamber wherein the insects are imprisoned. Here, the insects come into contact with the essential organs of the flower and thus effect pollination. In a number of species, the inner sides of the funnel and tube possess downwardly pointing hairs which prevent the trapped insects from escaping. The insects are compelled to move downwards, their exit is prevented and thus the intruders are trapped into acting as pollinators.

An interesting feature of *Ceropegia* is the narrow, generally bent corolla tube which



S.R. YADAV

The lantern top of *Ceropegia oculata* with fluttering hairs stands erect in the mist, recognisable even in dim light



S.R. YADAV

The species *noorjahaniae* flowers cut open to display a beautifully red-dotted corolla tube

becomes funnel-shaped or salver-shaped, terminating in five corolla lobes which adhere together at the tips forming a 'lantern top'. In many species such as *Ceropegia oculata*, *C. vincaefolia* and *C. bulbosa*, the beautifully mottled lantern tops have fluttering and dangling hairs. Any vibrating or dangling appendage of a flower, particularly if it glistens, is sure to attract insect attention. This feature assists in cross pollination.

Still another feature of many species of *Ceropegia* is an ingenious method of lighting the interior of the flower by means of the so-called light windows in the corolla tube. These are translucent strips or patches of tissues in the corolla tube, which allow light to penetrate and illuminate essential organs such as the androecium, gynaecium and the corona. The light

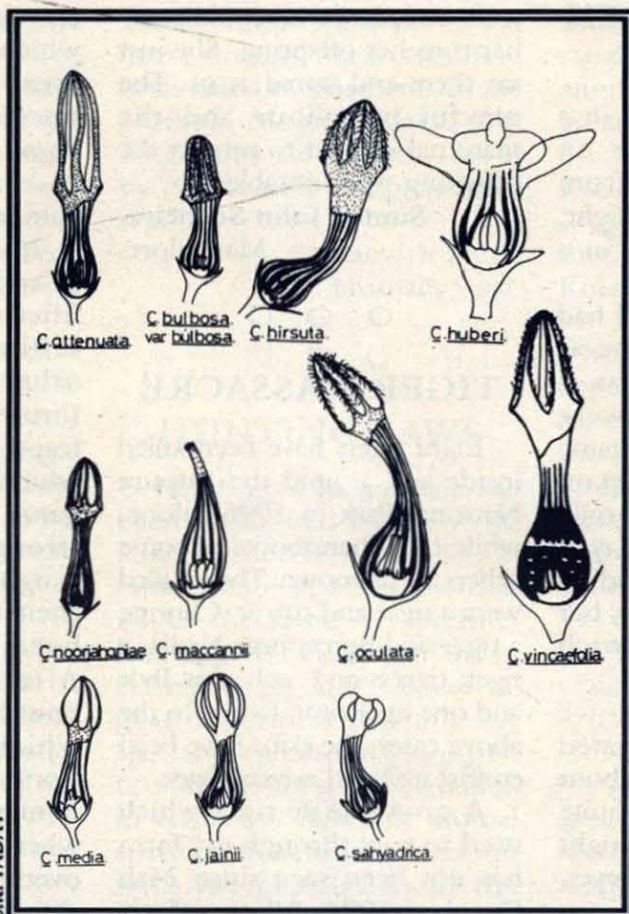
falls on the corona of the flower, directing the attention of flies towards the pollinarium and stigma and keeping them active. The basal dilated chamber of the flower has light windows either in the form of vertical stripes as observed in most of the species or as a circular band in the upper half and small circular pore-like area in the lower half of the chamber, as found in *C. vincaefolia*.

The flowers when in bloom generally stand erect, with their beautifully mottled lantern tops with fluttering and glistening hairs which very frequently catch your eye. The beauty of the lantern tops in *C. bulbosa*, *C. oculata* and *C. vincaefolia* and a number of other species cannot be described in words. The pollinators get attracted by the lantern, fall down and get imprisoned in the chamber. Following the maturation of the pollinarium, the flower stalk

bends down, the hairs in the tube either collapse or fall down and the insects carrying pollen escape and visit other flowers, thereby effecting pollination.

It is said that extreme specialization leads to extinction, which seems to be true in at least some species of *Ceropegia*. Highly specialized mechanisms of pollination fail due to the absence of specific pollinators, resulting in poor reproduction. In many species of *Ceropegia*, it is observed that although there is abundant flowering, fruit set is very low or absent, as in *C. jainii* and *C. sahyadrica*. This seems to be one of the important reasons for the rarity of these outstanding flowers.

The habits and habitats of this genus are highly select. *Ceropegia attenuata* is an erect species which grows in crevices of lateritic rocks in the plains of Konkan. *Ceropegia bulbosa* survives among thorny bushes of hilly regions, while *Ceropegia fantastica*, one of the rarest species first described from territory which is presently in Karnataka, is also endemic to Goa. It grows in bushes on lateritic plateaus (Lolium Plateau) of South Goa. It is very peculiar due to its characteristic sepals which are longer than the corolla and glisten in the air. *Ceropegia hirsuta*, a widespread species, grows in the shrubby forests of the drier regions of Maharashtra. *Ceropegia huberi* has a peculiar corolla, unusual among Indian species. It is distributed along the ridge of Sahyadri from Ambaghat to Ramghat.



Different kinds of light windows found in *Ceropegia* are diagrammatically depicted above.

*Ceropegia jainii* is an erect species which grows in the crevices of lateritic rocks of higher plateaus such as Amboli, Barki and Kas. Fruit and seed setting in this species is very rare, probably due to the absence of the specific pollinator. *Ceropegia media* grows in the forests of Mahableshwar, Kas and its environs. *Ceropegia noorjahaniae* grows on slopes of hills in Satara district. It has both erect and climbing habits and fruit setting is abundant. The species *oculata* with its elegant flowers grows amongst shrubs in open forests, usually of higher altitudes, such as Mahableshwar, Kanheri-caves, Kas and Panhala.

*Ceropegia vincaefolia* is one of the rarest species growing along the edges of plateaus of higher elevations, and is characterised by beautiful flowers.

There is a serious threat to all the endemic species of plants in India, and conservation of all of them in their natural habitat is not possible. Under such circumstances, conservation in alternative sites like gardens appears to be a meaningful effort towards their survival. Research on their propagation, multiplication and domestication is urgently needed. The question is, who will lead the movement? I am optimistic and feel that a solution will be found and that is the very purpose of writing this article. □

S.R. Yadav is a Reader in the Dept. of Botany, Shivaji University, Kolhapur. His photographs reflect his vast field experience.



## ENCOUNTER WITH A JUNGLE CAT

On 6th January, 1995, in a field near our house in Damarskathe (30 km from Mangalore) on a moonlit night, I sighted three wild cats in a field gambolling playfully.

My friend Anand and I had gone hunting small game as usual. Although it was a moonlit night, we were determined to get some game at least. We started at 9 p.m. After searching in vain we only saw a blacknaped hare *Lepus nigricollis* and a small Indian civet cat *Viverricula indica* but we were unable to approach them within firing range.

At about 11.25 pm, we neared a somewhat elevated field. We were thinking about going home as we were quite tired. Then suddenly we caught the glare of three pairs of eyes, which looked bluish green because they were reflecting the beam of the headlight. We took them to be the eyes of jackals. As we moved nearer, the eyes became crimson red. We moved up to a distance of about 15 metres from where it was evident that they were jungle cats. The cats were rolling on the ground and clawing each other. They appeared to be two kittens and a mother. We moved up, to make identification possible. The kittens now slunk away into the undergrowth bordering the fields, only to reappear every minute or so. But the mother appeared to be brave and just sat on her haunches like a tiger. She looked upon us warily, fearing that we

were intruders who could cause harm to her offspring. She just sat there and stared at us. The playful behaviour and the maternal instinct to protect the offspring were notable.

Suman John Sequeira,  
Mangalore.



## TIGER MASSACRE

Eight tigers have been killed inside and around the Satpura National Park in 1995 alone, while the whereabouts of some others are unknown. Those killed were a tiger and cub at Churna, a tiger and tigress near Nadia, a tiger, tigress and cub near Jhot and one tiger near Tamia. In the above cases, the skins have been confiscated and arrests made.

A grown male tiger which used to pass through my farm has not been seen since 24th October, 1994. All my efforts to trace him have failed. A tiger and tigress which could be seen on the Paraspani road were never seen again, when the tiger in a show down near Khari village, killed three buffaloes that blundered into its territory during the mating season in November, 1993. A tiger which used to frequent the area of Panar Pani and Bari Am has not been sighted since about two years. In the Angandhana, Mogra, Paras area there was a family of three tigers. There is only the cub left. The male and female with a half grown cub in the Kamptec, Madai area are missing from their usual haunts. I have yet to ascertain

the fate of the male tiger which lived and hunted in the area between the Tawa reservoir and Bagra. Nor do I know the fate of the tigers of Kukra Patan. I have no contacts in the area.

All this has been the work of an intruding gang of about fifteen persons who go about selling paper flowers and other household articles at throw-away prices. They have traps, both of steel and rope, which are placed on well used game paths. The traps are so strong that an animal once caught cannot get free. It is then beaten to death, with bones broken and skin intact. After skinning, a white powder is rubbed on the skin which removes all odour. Bones are cleaned of meat by immersion in a forest stream where small fry do the work overnight. The skin is then put into the poachers' bedding which is often just a gunny bag used for sleeping in.

Two years ago, such a gang had encamped near Paras in Kursi Khapa village. They killed seven panthers, bears and other animals. Some otters were also taken from the Denwa river. A tiger escaped from the trap, leaving its nails and flesh in it. A guard on his beat had come across a trap with a bear screaming in it near Paras.

Four years earlier, I had helped in the arrest of one Imran Khan who was accused of selling a panther skin. The case is still in the sub-divisional civil court at Sohagpur. The

Ranger responsible for the arrest has long since been transferred. The witnesses have turned hostile. Imran Khan has purchased a truck and a motorcycle. A man from Raikhedhi who was the source of supply of skins has never been questioned. I have only made a fool of myself.

No evidence of collusion between the forest staff and the killer gangs has come my way. I have received every courtesy from the staff, high and low, except once in November, 1994, when I had put in a request to the D.F.O. at Hoshangabad to allow the Deputy Ranger R.R. Chowdhry to accompany me to a Florican Seminar at Baroda at my cost. The Ranger had been of great assistance to me in discovering the presence of the lesser florican, an endangered species in the grasslands adjoining the Jhiria Ameda forest track. I did not receive the courtesy of a reply. I learned later that he was too busy to reply.

Whatever I have written is the bare and unadulterated truth. Anyone who wants to verify what I have written is welcome to be my guest. At sixtyfive I have no axe to grind.

The tiger and panther count done in June 1995 was unable to find the animals listed as missing. In addition, unknown numbers of panthers (I have personal knowledge of 28), jungle cats and foxes are not to be seen any more in their usual haunts. Other species in large numbers have been taken from the Denwa, Sonebhadra, Ganja-

kunwar and other perennial forest streams. Six wolves have been killed by goatherds in the Matkuli, Mogra, Chakar and Singanama area alone. This is by no means a comprehensive report.

**Ramesh Dutt,**  
Hoshangabad.



## HUNTING LAWS

Hunting wild animals has been prohibited by the Wild Life (Protection) Act 1972, under section 9, whereas section 11 of the same Act permits hunting of wild animals in certain cases, and section 12 grants permits to hunt for special purposes, provided that no such permit shall be granted in respect of any wild animal specified in Schedule 1, except with the permission of the Central Government. It means that highly endangered species of animals have been grouped under schedule 1 of the said Act and no permit is granted in those cases except with the prior permission of Central Government.

In the month of January, 1995 when I was travelling by bus from Silchar (Assam) to Aizawl, somewhere near Bikhawthlir (a small village on National Highway 54) I saw a skin stretched on bamboo strips along the roadside, hung on a bamboo pole for drying. On the basis of characters given in the Book of Indian Animals (S.H. Prater), it appeared that the animal was a binturong (bear cat). This also confirms its

availability in Bikhawthlir range. Any enquiry about the animal skin was not possible because the bus was moving and on being asked, the driver refused to stop it.

A second case was observed during February 1995 at Kolasib Sub-Division situated on National Highway 54 where a young hornbill was kept tied by one leg with a rope, depriving the bird from escape.

The third case was observed at Serchhip Subdivision, which is also situated on National Highway 54, on the way to Lunglei, in the last week of March 1995, which was very painful to see.

Two whole skins of gibbons, black in colour, with the arms longer than the legs, and no tail, and easily identifiable, were also kept along the roadside, on the road leading to Lunglei from Serchhip. I tried to enquire about the animals and the hunters but could not get any information. I moved ahead and after 40 minutes when I went back to the spot I found that both the skins had disappeared and on later enquiry it was denied that there had been any gibbon skins there at all.

All the three animals mentioned above, i.e. binturong (bear cat), hornbill and gibbons are endangered and placed under Schedule 1 of the Wild Life (Protection) Act 1972. These animals being harmless to humans, there was no question of legal hunting.

There are also reports of hunting of primates from Cachar area (Chaudhary, 1994 *JBNHS*, 91(2): 203-210)

Such hunting is threatening to wildlife and would gradually lead to extinction, especially of the gibbon.

In order to protect wild animals from hunting, the Wild Life Act should be implemented and brought in force strictly and offenders should be punished accordingly.

Total land survey of the State should be done to lay out a plan to protect wildlife of the hill terrain.

Financial assistance should be extended to the persons concerned with wildlife conservation and protection.

Regular awareness programmes should be conducted by the officials responsible for the maintenance of wildlife, in schools and colleges to educate youth. These programmes could be carried on in collaboration with the Animal Welfare Board of India (MOEF, Govt. of India) to teach from compassion for animals from childhood.

D.N. Harit,  
Mizoram.



## MAMMOTH IVORY

Ivory dealers have thought of an ingenious excuse for evading the long arm of the law; they now claim that they are not using elephant tusks in the ivory trade, but those of extinct mammoths of Siberia. (see *Times of India*, 30th January, 1996: *Delhi HC*

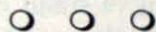
*reserves ivory case verdict.*)

Even a college-level biologist knows that mammoths are found buried in ice for thousands of years and hence preserved in excellent condition. I am not aware if the Russian government allows their export; this is not likely as they are very rare and are keenly sought by museums all over the world as well as for scientific studies. Even if sale were permitted, the price of the mammoth tusks would be exorbitant, and no trader could afford to buy them.

The reasoning given seems to be a ruse by smugglers to hoodwink the judiciary. It is possible to differentiate mammoth ivory from that of elephants by microscopic examination and DNA tests, but the method is cumbersome and time consuming so there is scope for escaping the clutches of law enforcing agencies.

It is high time that NGOs interested in wildlife conservation like WWF-I and BNHS take up the issue of educating lay persons about such gimmicks. This will help in sustaining our dwindling elephant populations.

B.F. Chhappar,  
Bombay.



## DEVIL FISH LURE

I am mystified by the enormous tassel hanging down from the chin of the devil-fish (see *Hornbill* 1995 (2), page 11, *The Complete Angler*). It

must be a nuisance to the fish to carry it, as it would drag along and even get entangled in branches. Is it used to attract mates, as are beards in men?

Bharini N. Parikh,  
Palanpur.

*Beefsea replies:* No. During evolution, an organ is retained only if its usefulness exceeds its handicap. Moreover, at 400 metres depth in the deep sea where the fish (*Linophryne*) lives, there are no branches for the appendage to get entangled in.

It is thought that the "beard" is a sense-organ for gauging the strength and duration of currents impinging on it. The devil-fish can then estimate the size of any intruder and the direction from which it is approaching, and decide whether to prepare to catch it or to flee from it.



## BOUQUETS

I received *Hornbill* 1995 (3). The cover and all the articles were brilliant. I saw my letter which has encouraged me a lot. But you have decided to honour me before my time, I am not Dr. B. Utpal as the *Hornbill* makes me out to be but just B. Utpal XIIth Std. However, I hope the prefix will hold good some day.

B. Utpal

*Ed:* We hope the same.

# The Mining Policy and Its Repercussions

## THE CURRENT SCENARIO

An innocuous announcement by the Govt. of India, a few months back went unnoticed for its longterm implications, for protected and wilderness areas in the country. The statement released by the Union Minister for Mines, Balram Singh Yadav, indicated that fresh guidelines were being issued by the government allowing mining companies to prospect areas up to 20,000 sq. km. from the present limit of 25 sq. km. This was being done in response to the demands by foreign investors ! The occasion was the annual meeting of the Federation of Indian Mineral Industries (FIMI). Incidentally, Kamal Nath, the former Environment Minister, who also addressed the assembly, indicated that the government would consider raising the minimum limit at which mining companies are required to submit environment assessment reports. The limit would be raised from the present 5 ha to 50 ha. Interestingly, a forest area not exceeding 20 ha can be diverted by the competent authority of a state for non-forest use, without clearance from the MOE & F, which is mandatory for larger areas.

It was also noted during the meeting that the value of minerals produced in the country increased from Rs. 70 crores in 1950 to Rs. 29,012 crores during 1994-95, over three percent of the GDP.

The rate of growth in the mineral industry has been higher than the overall growth rate of the economy. The present rate was estimated at over 11 %. India produces 64 minerals including four fuel minerals, 11 metallic minerals and 49 non-metallic minerals. Mineral and metal exports were estimated at around Rs.17,103 crores in 1994-95, while imports were around Rs. 26,683 crores, including fuel minerals.

Current mining technology leaves destruction in its wake. Even a cursory look will convince its protagonists of the damage that is inflicted on the environment for the sake of development. It should be made mandatory to implement adequate land reclamation measures so that mined out lands are in due course made productive and useful, or at least non-polluting.

The rosy picture presented to the Federation of Indian Mineral Industries does not take into account the environmental costs of producing the minerals. For example, the forest cover that is lost to such activities, the surface and ground water resources that are not only exploited but also contaminated by the mine run-offs and the overburdens. This exploitation becomes all the more glaring when even a non-renewable or a barely renewable resource like fossil water is exploited for such ventures, especially in arid areas of the country. The standard water consumption pattern for a cement plant and its supporting infrastructure, like the housing colony and the green belt that is proposed to be set up by Sanghi cements at Narayan Sarovar, will be about 3000 cu. m. per day. This is proposed to be met from the desalination plant, which the company proposes to set up at a reported cost of



**The extent of the land degradation due to open mining is amply exhibited here.**

Rs. 9 crores. But before this plant comes into operation the ground water resources will be utilised.

In spite of such basic restraints, most of the ventures are being promoted in the arid zones of the country, without taking into account the repercussions of water intensive industries. In fact, ventures like Sanghi Cement will open the floodgates for similar eco-unfriendly industries in Kutch and adjoining areas. Most of the environmental conflicts in the country today stem from the fact that a number of protected and relatively undisturbed wilderness areas are being targeted for the fabulous mineral wealth that they conceal. Some of the areas bearing the brunt of such policies are the North Karanpura Valley, Dt. Hazaribagh, Bihar, Balpakram National Park, Meghalaya, the Narayan Sarovar Wildlife Sanctuary, Kutch, Radhanagari Bison sanctuary, Western Ghats, Kolhapur, Indravathy Valley, Dt. Kalahandi, Orissa. The minerals that are proposed to be mined in these localities include limestone, coal, lignite, bauxite, and bentonite. It is unfortunate that the protected areas which form just about 5% of the total land area of the country are being targeted so

blatantly.

Ignoring the non-protected areas which constitute the rest and also contain a variety of mineral wealth in commercially exploitable quantities, is unfortunate. In the rush to get at the mineral resources, even no-development zones like catchment areas of lakes, constituting components of hydel projects, like the 600 MW Upper Indravathy Multipurpose Project in Orissa are being blindly targeted by mining ventures. The Bafalimali complex, with a potential yield of 195.73 million tonnes of bauxite ore, constitutes nearly half of the Indravati basin catchment area, and any mining lease here will lead to the siltation of the Indravathy lake, which feeds the hydel project and will also irrigate 2.25 lakh hectares of land in the perpetually drought prone Kalahandi district of Orissa.

A MoU with M/s INDAL to mine the bauxite ore from Bafalimali top at F.R.L. 1094 m., on the fringe of the lake which is at F.R.L. 643 m. will drastically reduce the life span of the dam. Due to this steep gradient, the debris will cause siltation of the lake. Furthermore, sedimentation will also take place from Doraguda Aluminium factory on river Golaga which drains into the

**Permanent  
damage of a  
riverine habitat  
is caused by  
siltation  
due to  
mining.**

JAY SAMANT



lake. This will shorten the life span of the dam and deprive Kalahandi irrigation in 6,000,000 acres, and Orissa 600 M.W. of renewable hydel power. These conclusions have been corroborated by the remote sensing authority of Orissa, warning of premature siltation of the Indravati reservoir.

It should be noted that the environmentalists who oppose the location of the bauxite mines at Bafalimali have also suggested alternative mining sites like Niamgiri, potential yield 53 million tonnes (mt) of high grade bauxite ore near Lanjigarh, which lies on the main Raipur-Vishakhapatnam railway line, along with the Sasubahumali area, potential yield 81 mt, on the Koraput-Rayagada railway line and another 91 MT from Kudingamali. These alternative sites, with the basic transport infrastructure in place, located within the Lanjigarh-Kashipur blocks will suffice for the projected demands of the Alumina projects being proposed in the area.

Moreover, as per the Forest Conservation Act 1980, in respect of every application for diversion of forest land for non-forest use (where area of such forest land exceeds 5 ha in plains or 2 ha in hill areas), a cost benefit analysis is essential. A

simple analysis will indicate that while the mining company will benefit, the hydel power project will suffer immense harm due to the siltation of its main feeder lake !

A heavily forested locality, the North Karanpura valley, Dist. Hazaribagh, Bihar, is another ecologically sensitive locality which is being targeted by coal mining industries. The valley lies on a vital migratory route of wildlife, including the tiger, elephant and gaur. Though an Advance Environmental Management Plan For North Karanpura Coalfield of Central Coalfields Ltd. has been prepared, the question is how seriously are such plans taken by the implementing agencies.

Current mining technology is one of the most environmentally damaging industries and leaves destruction in its wake. Even a cursory look will convince its protagonists of the damage that is inflicted on the environment in the name of development.

The lignite mines in Pannandro in Kutch are a good illustration of the irresponsible behaviour of agencies which undertake mining projects. Mile after mile of the mine's overburden have been left unattended, when it is the responsibility of

these agencies to restore the mined areas. It should be made mandatory to implement adequate land reclamation measures so that mined out lands are in due course made productive and useful, or at least non-polluting and aesthetically pleasing.

Most of these ventures get a foothold by presenting a rosy development picture, especially with regard to their employment potential. According to the Govt. of Gujarat, which was widely reported in the press, at least nine other projects with a total capital investment of over Rs. 20,000 crores are in the pipeline and the Sanghi Cements, the first to be sanctioned, would provide employment to over 20,000 locals !

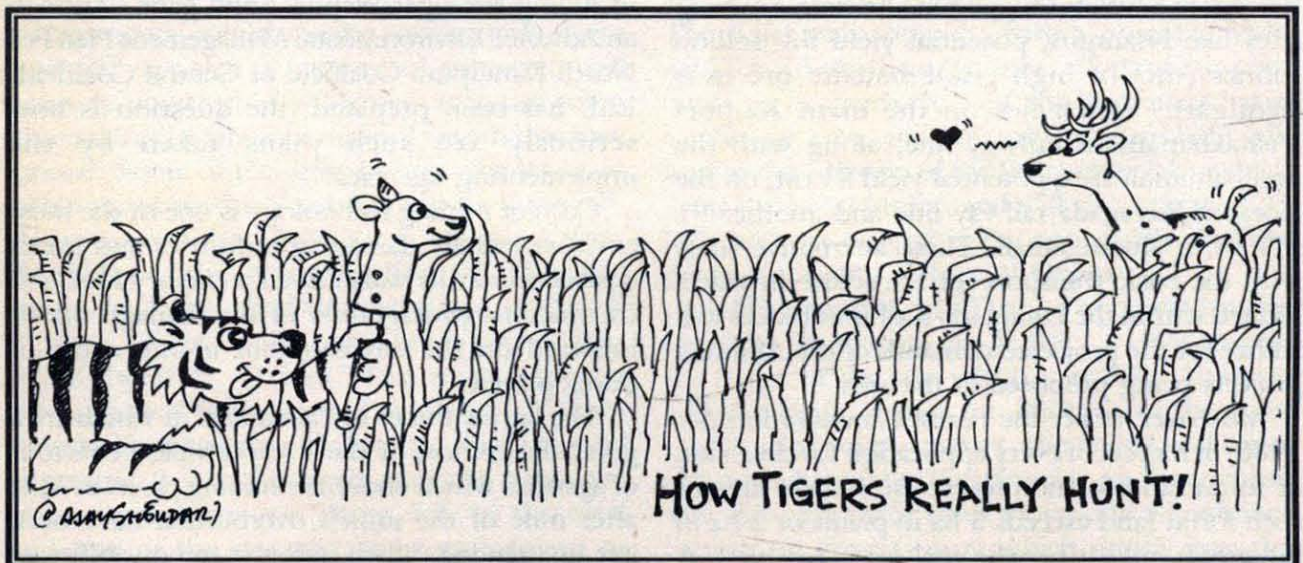
Such misleading figures confuse the public, who then wonder at the wisdom of environmentalists who oppose these development projects. The fact is that the cement plant which is being touted as the most highly automated plant in the country, will employ a maximum of 700 skilled personnel at the peak of its operation ! Obviously such personnel will not be available locally, offering no solution to the local employment problem. This grim scenario is depressing indeed. More than the local villagers, it is the policy makers who need to be educated.

The frequency with which these issues are coming up does not bode well for our environment. A recent feedback received from Meghalaya indicates that a cement plant, by Associated Cement Co. Ltd, is being proposed in the Siju area of South Garo Hills. The mining area measures about 384 ha and adjoins Rewak reserved forest, Siju Sanctuary and Balpakram National Park. The Rewak reserved forest lies on the corridor of the elephants that migrate between Balpakram National Park and Nokrek National Park.

The proposed site of the plant also lies on the same corridor. ACC Ltd. have approached the MOE&F for environmental clearance. The plant will not only disturb the wildlife in the area but also block the elephant corridor between the two National parks and consequently lead to man-animal conflicts.

It should be noted that mining not only affects the wild flora and fauna of an area, but its human denizens too. Hence, it is not blind opposition to progress but opposition to blind progress that conservationists advocate. □

Compiled by S. Asad Akhtar,  
Conservation Officer,  
BNHS.



## Sálim Ali's India An Exhibition of Rare Books

An exhibition of rare books was organised by the BNHS library at Hornbill House from 15th to 24th December, 1995. The exhibition was inaugurated by the Maharao of Kutch. During the inauguration a set of four prints was released by Maharani Priti Devi of Kutch. The exhibition was open to the public from 16th December to 24th December, 1995. There was a flow of 500 to 600 visitors each day. Efforts were made to give wide publicity through newspapers and teledia and to seek funds in order to preserve these rare and old books in our possession. The 150 years old lithographs with their bright colours as well as the contents of the books attracted the visitors. Wherever possible, selected interesting texts were printed in bold type and displayed for public information. Most of the visitors were keen to know about the way books are preserved and looked after in the BNHS. Many were also interested to know more about the history of old Bombay, and the greenery found 100 years back in Bombay. They also showed keen interest in the BNHS, its conservation activities and programmes and about 60 new members were enrolled. A counter on Dr. Sálim Ali's Collection, his publications and his photographs was also interesting to the visitors. This exhibition generated tremendous interest in the books.

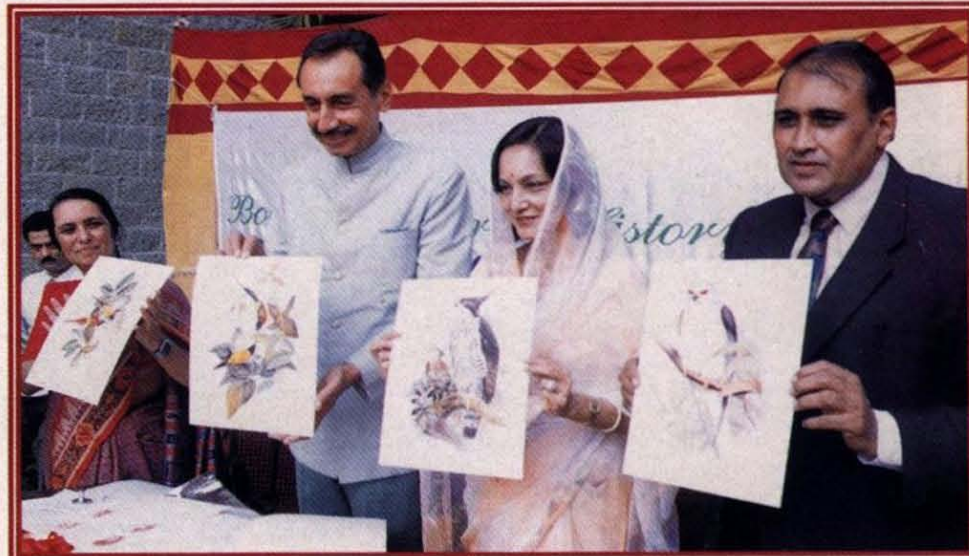
The visitors included environmentalists, amateur

naturalists, journalists, industrialists, students, teaching staff and book lovers.

The BNHS could successfully organise this exhibition because of the kind assistance from the Prince of Wales Museum and the Asiatic Library, as also the tremendous help and support from the staff and the members of the Library Sub-Committee. □



Mr. S.P. Godrej admires a lithograph by John Gould



L to R: Mrs. D.S. Variava, Vice-president, BNHS, The Maharao and Maharani of Kutch and Dr Ashok Kothari, Chairman, Library Subcommittee, releasing the prints







The inaugural session was attended by (L to R) Dr. M.S. Swaminathan, Mr. B.G. Deshmukh, President BNHS, Shri Mohan Dharia. Dr. Jay Samant, Director, addressed the gathering.

## Sálim Ali International Seminar on the Conservation of Avifauna of Wetlands and Grasslands

As part of the Sálim Ali Centenary celebrations, the BNHS held an international seminar on **Conservation of Avifauna of Wetlands and Grasslands** from 12th-15th Feb., 1996, at the Indira Gandhi Institute for Development Research, Mumbai.

This was the most important event of the Centenary year, when 44 scientists from 18 foreign countries including the neighbouring SAARC countries and 118 Indian scientists participated. Scientists and representatives from institutions like the Smithsonian Institution, IUCN, International Crane Foundation, Birdlife International, Wetlands International, Royal Society for the Protection of Birds, Russian Academy of Sciences, Tel Aviv University, USFWS, WWF, Government of India, State Department of Forests and Bombay University participated. This international seminar brought together experts and planners from the world over to identify and recommend options for the conservation and sustainable use of wetlands and grasslands to ensure the future of this valuable natural resource.

During the four days, eight technical sessions were held, when 94 presentations were made by experts on wetlands,

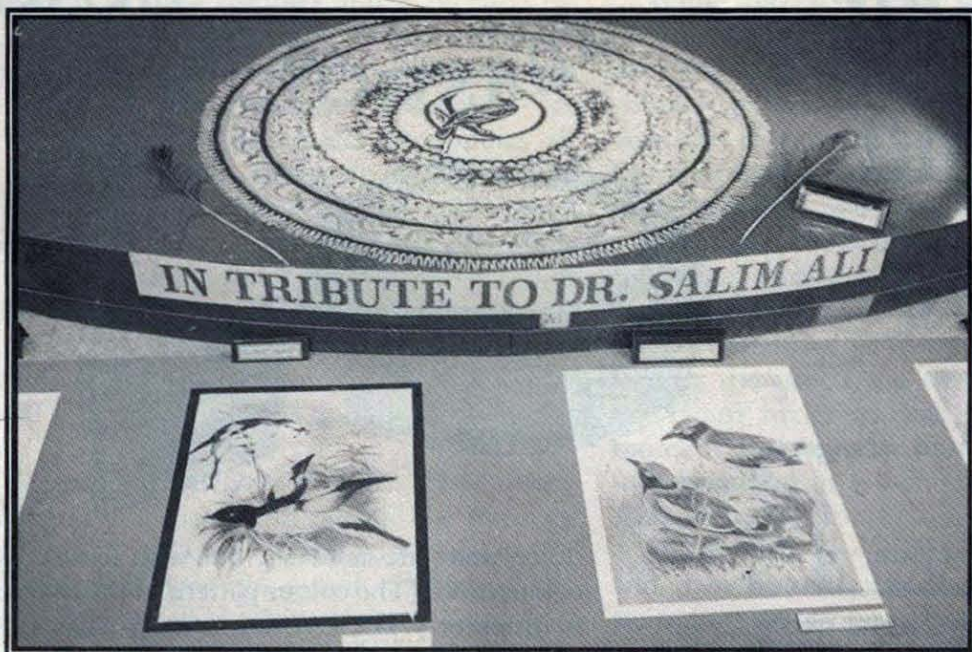
grasslands, wildlife management, conservation and legislation. Four special meetings were held on topics concerning cranes, bustards, Central Asian Flyway and the Red Data Book on Endangered Avifauna of Asian Region. In the Plenary Session, ten resolutions were passed on various issues regarding radio telemetry tracking of the Siberian Cranes, conservation of grasslands and Jayakwadi as a Ramsar Site.

This international seminar brought together experts and planners from the world over to identify and recommend options for the conservation and sustainable use of wetlands and grasslands to ensure the future of this valuable natural resource.

The seminar was inaugurated by Shri Mohan Dharia, ex-deputy Chairman, Planning Commission, while Dr. M. S. Swaminathan, FRS, delivered the keynote address on **Building a National Ecological Security System**. During the seminar, a special issue of the *Hornbill* dedicated to Dr. Sálim Ali was released by Shri Mohan Dharia. Another BNHS publication, *A Guide to the Cranes of India*, by Mr. Prakash Gole was released by Dr. George Archibald, Director and Co-Founder of the International Crane Foundation. The third publication *Ornithobotany of the Baya Weaver Bird* by Dr. Satish Kumar Sharma, Range Forest Officer, Rajasthan Forest Department was released by Dr. M. S. Swaminathan. The seminar concluded with a two day excursion to a proposed Ramsar site, the Jayakwadi wetland near Aurangabad, where several thousand migrant birds arrive in winter. □



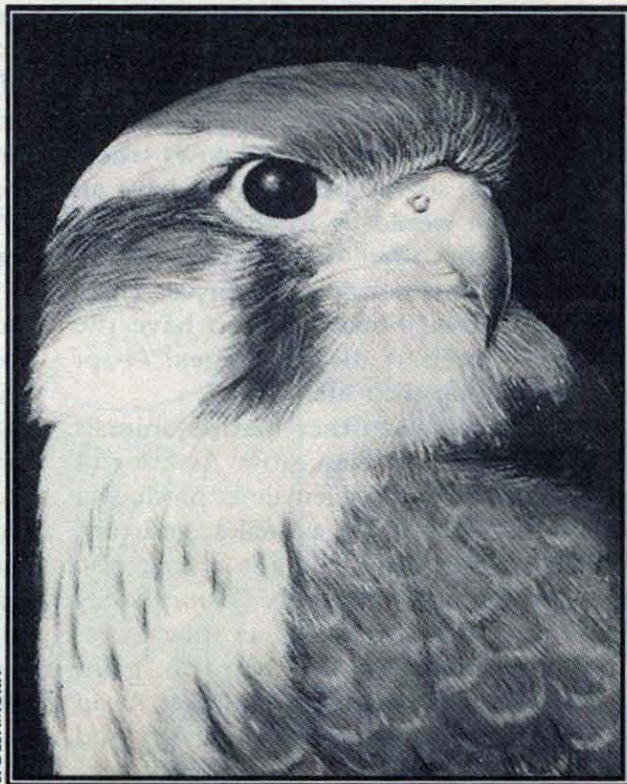
## Rangoli of Birds



S. DESHMUKH

This exhibition which started on 22nd January, 1996 was a tribute to Dr. Salim Ali from a group of 21 professional artists called the Rangavalli Kala Darshan. The artists have used the powders as one would use paints or water-colours to make a painting. Taking three days and three nights for its completion, the exhibition put on display portraits of various rare birds. Though most of the works were done using coloured powders, there was one of Lord Ganesha made of sago (sabudana) and another one of the Indian maroon oriole (a rare bird) using rice grains. The pictures were copied from old lithographs from the BNHS library, especially from the John Gould classic "Birds of Asia".

In response to popular demand, the exhibition was extended for several days. Special arrangements were made for students to visit the exhibition in groups. □



S. DESHMUKH

A finely detailed bird study in rangoli by A. Dhupkar

# Have your cake, and eat it too

A sea change  
into something rich and strange.

*Shakespeare.*

## Beefsea

The debate between the two goes on — which sex is more fortunate? Men curse their luck for having to shave every day, and envy women who have a clean chin and are spared this daily chore. And women blame the injustice of having to undergo the pains of childbirth — something which, they complain, men are spared. Only the wearer knows where the shoe pinches, so the best way to have an unbiased opinion would be to change sex and find out what the other one has to endure. Unfortunately, this is not possible for us. There are other creatures, however, who have the advantages — or is it disadvantages? — of changing sex during their lifetime.

Many sea fishes and other marine animals routinely change sex as they grow. As a lot of energy has to be spent by a female in producing eggs, many fishes start life as males, and turn into females as they grow. But the reverse also happens; for example, groupers (*Epinephalus*) change from females to males as they grow. Among marine animals other than fish, giant clams (*Tridacna gigas*) start life as males. At an age of about six years, they change sex and become females.

Parrot fish seem to be a confused lot; some start life as females and later become males, while

## SEASHORE LORE



others start life as males, but with female body colouration. (The colour pattern in the two sexes is different.) The coloration in wrasses is still more puzzling. Some wrasses have two different types of male and a number of intermediate colour phases as they change their sex. The result is that there are so many forms with different colour patterns, and unless one traces their life history as they grow, the various colour forms can mistakenly be thought to be different species.

The moon wrasse (*Thalassoma lunare*) of our seas has a complicated love pattern. They are born as females or as primary males, both being dark green and not aggressive to others of their kind. Some of the females change into secondary males. They change their body coloration to bright blue, with bright pectoral (shoulder) fins and grow long filaments on their tail borders. They also become aggressive. Each secondary male bullies the primary males and controls a harem of females. As high tide comes in, he swims above the reef, performing loops in the water, flaunting his pectoral fins and quivering his body. The females, no longer able to resist him, rush up and mate with him. He may thus mate with eight or more females in a day. On a large reef, a secondary male is not able to control all the primary males, so that these too join the proceedings while he is busy with the females.

The change of sex in cleaner fish (*Fissilabrus dimidiatus*) is more complex and is dictated by social order in the population. Within a territory is an adult male, three to six mature females and several sexually immature fish. The male — let us call him king — dominates and bullies all the females, giving a characteristic aggressive display as he tours his kingdom and comes across a female. Females dare not face up to him but have a pecking order. Female No.1 — let us call her the queen — bullies all females in the territory but does not use the “male” aggressive display. Female No. 2 is subdued by No. 1, but bullies No. 3 and down along the line.

The fun starts when the king dies. If the queen is not strong, a male from outside the territory may invade it and then becomes the new king. If this does not happen, the queen, now free of the king’s nagging, starts changing sex. For about half an hour after the king’s death, the queen behaves normally — bullying all other females. Thereafter she starts giving the characteristic male aggressive display to all females. Within a few hours, her maleness increases, and she (now “he”) starts visiting females in his territory. Within two to four days, he starts courting females and

mating with them.

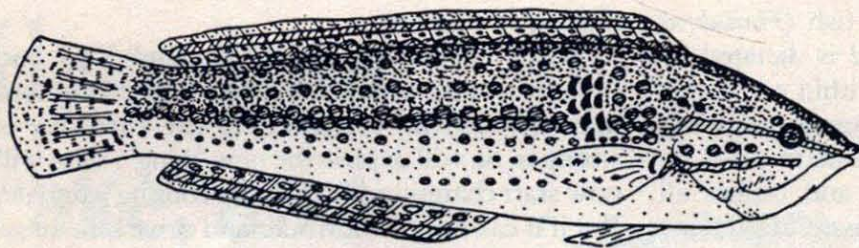
While “he” is beginning to change sex and become a male, a male from outside the kingdom may invade the territory. If the intruder is stronger, he will depose the new “king”, who will now start changing sex, again becoming a female. But if it can face the intruder and drive him away, it will remain a male, becoming the new king.

If we see the sex organs of a female, we shall find that enclosed within the ovary is the rudiment of a testis — spermatogenic crypts filled with spermatids (the forerunners of sperms). As long as the queen was dominated by the king, the latent maleness was suppressed, but the moment the restraint was lifted her maleness increased, and in a fortnight the former queen (now “king”) became a full-fledged potent male.

Clown fish (*Amphiprion*) start life as males, and then become females as they grow. They swim in small groups of a dominant female and several males. As in the cleaner fish (but with reversed sex roles), she bullies all the others in her group, so that they remain immature or subadult males. If the dominant female dies, the largest male of the group starts bullying all the other fish in his group and, in a month, turns into a female, thereafter dominating all others.

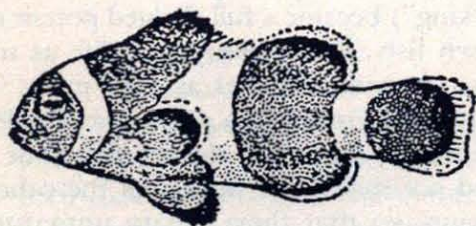
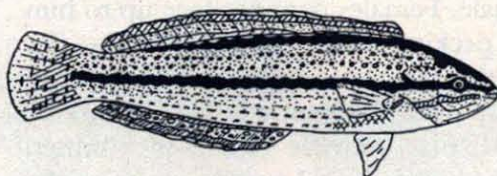
One of the most embarrassing incidents in my life was related to sex — not mine but of fishes. In the forties, the freshwater fishes catla, rohu and mrigal — collectively called Bengal carps as they occur in the Ganges river, were introduced into Powai, a lake in the city’s suburbs. In those days, the technique of artificially breeding the Bengal carps by giving pituitary gland injections was unknown. Moreover, they normally breed only in running waters. But somehow they



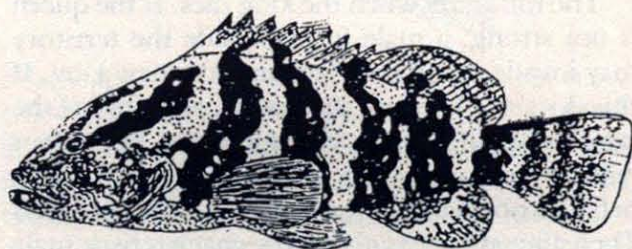


An adult male wrasse.  
Some wrasses have two different  
types of male colour phases

A fully mature female wrasse



The clown fish *Amphiprion percula*



The grouper *Epinephelus striatus* changes from  
female to male

settled down in Powai lake and, in the sixties, even bred there.

The mass breeding of these fishes, locally called *wulgun*, is a sight not easily forgotten. Tens of thousands of the fish breed in unison and their frenzied frolicking froths the water surface as if the lake is boiling. After their energy is exhausted in mating, they come to the lake's periphery to rest in water hardly fifteen centimetres deep. And then the massacre starts. Hundreds of nearby slum-dwellers, joined by hungry dogs descend on the lake with an assortment of sticks and baskets and collect the fish which meekly allow themselves to be picked up.

To the State Fisheries Department, the *wulgun* was an easy opportunity to collect the fish's eggs, to be reared at a fish farm at the nearby Aarey milk colony. Preparations were made on a war footing. The drivers of the department's vehicles were given addresses of the technical staff, while junior scientists took turns day and night to watch

for signs of breeding and report to headquarters. The breeding of the Bengal carps takes place when there is incessant heavy rain for many hours, and is preceded by that of smaller fish like barb, and this is an indication that *wulgun* would soon follow.

I was an Assistant Director in charge of a fleet of 45' and 36' trawlers, but as manpower was short, I was one of the team of scientists assigned to participate in the egg collection.

As the eggs were in waist-deep water, one of my colleagues and I found it more convenient to work in swimsuits. Our shirts and trousers were neatly folded and placed in one of the vehicles. But, as the lake bed was strewn with the stalks of palmyra palm leaves, with their horrible thorny spikes, I kept my slippers on, as also my raincoat and waterproof hat, in case there was a shower.

The fish eggs from the lake were transported to the fish farm, where I was busy placing them

in nylon enclosures to hatch. As the tanks at the fish farm were full, later batches of eggs were sent to our fish nursery at Bandra (a western suburb of Mumbai).

The two of us suddenly realised that the flow of our vehicles to Aarey had stopped. And our clothes were in one of these! So I telephoned the Bandra nursery to ask the vehicle to come back to Aarey. I was told that the jeep had left Bandra for the Aquarium. On telephoning the Aquarium, I learnt that the jeep had reached the Aquarium, and that the driver had locked it in the garage and left for home after a tiring day, little realising that our clothes were in it. To make matters worse, our purses and identity cards were with our clothes, and we were stranded without any money.

We borrowed some money from our fieldmen and hailed a taxi. The way around Powai in those days was risky at night, as it was deserted and vehicles were often robbed. Added to that was our state, clad only in bathing costume, hat and shoes. Taxi after taxi refused to take us, so we finally decided to wear our raincoats, fully buttoned up, even though it was no longer raining, and persuaded a taxi driver to take us home. Our ordeal was finally at an end.

*Many sea fishes and other marine animals routinely change sex as they grow. As a lot of energy has to be spent by a female in producing eggs, many fishes start life as males, and turn into females as they grow.*

stopped, he was very suspicious and asked us to get out of the taxi and unbutton our raincoats. He was not amused at our state of semi-undress and marched us off to the nearby police station. The inspector there was more polite and patiently heard our tale of woe. We had asked him that he could telephone our director who would prove our bonafides. He burst out laughing and offered us a cup of tea and some hot snacks. We had been shivering at the prospect of having to pass the night in a lock-up. He was magnanimous and arranged a police wireless jeep to reach us home.

Our day-long drama of sex, suspense and a brush with the law-and-order machinery had ended on a bright note, though you should have seen the look of horror and disbelief on my mother's face when I finally reached home, well past midnight, escorted by a policeman and dressed as I was! □

## OBITUARY

**M.**Krishnan, aged 83, naturalist, wildlife expert, photographer, writer, story teller par excellence, passed away on 17th February, 1996, after a brief illness. He was associated with our Society all his life and had contributed articles and photographs for our publication. He was awarded the Jawaharlal Nehru Fellowship for an ecological survey of the animals in Peninsular India in 1968, the Padmashri in 1970 and the Global 500 Roll of Honour of the UNEP in 1995. He was a member of several wildlife committees, at the Centre and in several States and had undertaken wildlife surveys in 14 States. In his passing away, the country has lost one of the most committed naturalists and conservationists.



Mr. Faizal Parish, Executive Director, AWB and Dr. Jay Samant, Director BNHS sign the MoU while Dr. Derek Langslow, Chairman, AWB looks on.

## Asian Wetland Bureau signs agreement with BNHS

Water is one of the most crucial and scarce resources essential for living systems. There has been unprecedented degradation in the wetlands, freshwater as well as marine all over the world.

An "International Conference on Wetlands and Development" was held at Kuala Lumpur, Malaysia from 8th to 14th Oct, 1995. Around 300 scientists, government officials, NGOs and experts from 100 countries participated in the historic event which was inaugurated by Mr. Mohatir Mohammad, Prime Minister of Malaysia.

Along with the vital issue of the preservation of the world's wetlands, the future of sustainable human development by the wise use of natural resources associated with wetlands, was discussed in great depth during the Conference.

As an attempt to face the growing challenge

of conservation of wetlands, the world's premier wetland organisations, namely the Asian Wetland Bureau (AWB), the International Waterfowl and Wetlands Research Bureau (IWRB) and Wetlands of America expressed their commitment to work together to promote the sustainable use and conservation of wetlands worldwide by creating an umbrella organisation "Wetlands International".

This apex organisation will generate cooperative and collaborative programmes to initiate

wetlands conservation action through research and education. They will create awareness, with the participation of states, NGOs, experts and local communities for the sustainable and equitable utilization of wetland resources.

During this conference, a Memorandum of Understanding was signed between the Asian Wetland Bureau (now Wetlands International) and Bombay Natural History Society, considering their common interest in the conservation of wetlands and natural resources in the Indian Subcontinent. The memorandum was signed by Dr. Jay Samant, Director BNHS and Mr. Faizal Parish, Executive Director AWB and witnessed by Mr. Boparai, Addnl Secretary, Ministry of Environment and Forests, Govt. of India, and Dr. Derek Langslow, Chairman AWB.

The cooperation between the two premier organisations will further the cause of wetland conservation in India, by undertaking research and wetland conservation activities in this region. □



## Friends of Butterflies

### An Appeal

There has been an alarming increase in trade in butterflies, and equally upsetting is the destruction of habitats in various parts of the Subcontinent. The Indian Subcontinent has been home to more than 1500 species of butterflies. Many have adapted to drastic climatic changes since the latest glaciation. However, all this has changed due to the greed of butterfly trappers who want to convert everything into dollars, and spare no effort to turn this earth into an industrial garbage dump in the name of development, with drastic changes in the habitats of various rare and endangered species.

Butterfly trappers have been busy in various parts of the Subcontinent. They have not spared even the remotest parts like the Trans-Himalayan zone of Lahaul Spiti and Ladakh; Andaman and Nicobar Is., Sikkim and northeast India. Even central India and the Western Ghats have reported trade in some rare species of butterflies. In August 1994, some foreign nationals were detained at Delhi Airport, while trying to smuggle out 14000 insects, which included about four hundred rare species of butterflies. The investigation revealed that many species of butterflies from this consignment were protected under the Wild Life (Protection) Act 1972, namely *Parnassius epaphus hillensis*, *P. chaltionius chaltionius*, *P. acco grey*, *P. jacquemonti jacquemonti*, *Hipporchia hubneri hubneri* and *Minola pulchi*.

It is in July to September every year that rare swallowtail butterflies are collected from Ladakh and Lahaul Spiti. A concerted effort is required for the checking of this trade. I have already written to the Ministry of Environment & Forests, seeking implementation of preventive measures. On behalf of the *Friends of Butterflies* I seek the help of nature lovers, scientists and the general public to join our campaign to eradicate this trade from the Subcontinent, lest India become another Taiwan.



Kaiser-i-hind butterflies, female and male, victims of habitat loss.

*Friends of Butterflies* is also concerned about the wanton destruction of habitats in various parts of the Subcontinent. Danger is reported to the Travancore Evening Brown and the Malabar Tree Nymph due to destruction of habitats in the Western Ghats. Bhutan Glory and Kaiser-e-Hind are also listed as endangered. The situation has become alarming with the reckless use of pesticides, chemical fertilizers by ecodevelopment projects which are being thrust upon national parks and Sanctuaries. The increasing use of chemicals might be endangering butterflies in your neighbourhood. The best way to begin will be to save your own garden butterflies by stopping the use of chemicals.

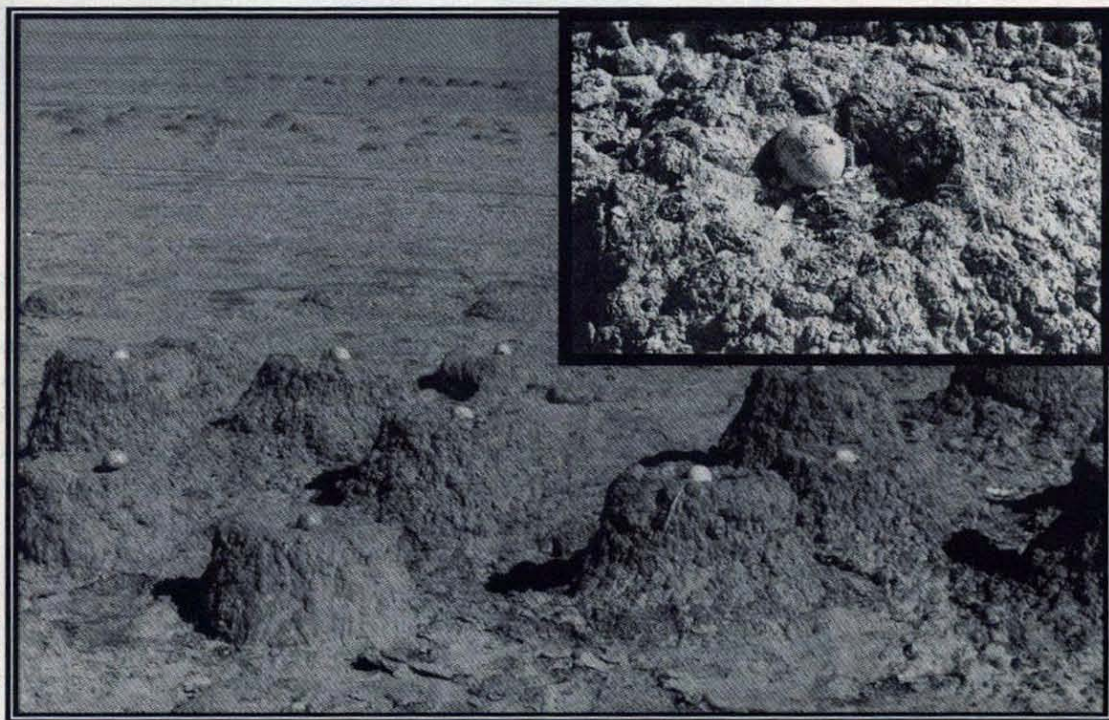
Like tigers, butterflies are symbols of environmental health and their absence indicates the degradation of habitats. One of the earliest inhabitants of the earth which have flourished for millions of years are endangered due to the destruction of their habitat. Butterflies are symbols of the beauty of nature, but are victims of human greed. Let us save them. For details contact: Dr. Virinder Singh, Friends of Butterflies, B-1/297 Janakpuri, New Delhi 110 058.

**ELECTION TO THE BNHS EXECUTIVE COMMITTEE 1996-1997**

The following persons will constitute the BNHS Executive Committee for 1996-1997:

- |                                  |                                       |
|----------------------------------|---------------------------------------|
| 1. Mr. Humayun Abdulali          | 8. Maj. Gen. E. D'Souza (Retd.)       |
| 2. Mr. M. R. Almeida             | 9. Mr. Prakash Gole                   |
| 3. Vice Adm. M. P. Awati (Retd.) | 10. Mr. K.P. Karamchandani (Co-opted) |
| 4. Dr. Ashok M. Bhagwat          | 11. Mr. Sunjoy Monga                  |
| 5. Dr. Erach K. Bharucha         | 12. Mr. Ulhas Rane                    |
| 6. Dr. B. F. Chhappgar           | 13. Dr. Rachel Reuben (Co-opted)      |
| 7. Mr. J. C. Daniel              | 14. Mr. Sunil Zaveri                  |

**New Flamingo Breeding Ground at Sambhar Lake**



SANJEEV KUMAR

Flamingo breeding ground at Sambhar Lake with nest (inset)

*Sanjeev Kumar of the Desert Regional Station, Zoological Survey of India, Jodhpur, writes on his discovery at Sambhar lake:*

With the discovery of a new breeding ground and successive nest building process recorded in 1995 and 1996 it has become important to focus attention on India's largest inland saline Lake Sambhar, a wetland of international importance. It is necessary to protect and conserve this unique

waterfowl habitat for breeding and wintering of flamingos in India. In January 1995, the evidence of breeding of flamingoes was recorded and again in January 1996, a large colony of mud nests was found. A sizeable population of chicks, about 1500, was also recorded in January 1996, along with nearly 20,000 adult flamingos of both *Phoenicopterus roseus* and *Phoeniconaias minor*. Since flamingo breeding in the Rann of Kutch

has diminished, these birds have apparently searched for an alternate and more suitable breeding ground in the Sambhar lake. Due to the availability of food and vastness of the area, flamingoes are not only wintering but have started breeding at Sambhar lake which is evident from our two years observations. Since the water recedes very quickly in this lake, the flamingoes have also adapted to simplify the nest building process. The birds scrape away the soil around a circular form, leaving a central elevated portion for laying eggs.

The Sambhar lake has great potential to support large populations of water birds, and there is an urgent need to declare it as a Wetland Reserve. This has become all the more necessary because Sambhar lake is facing a serious threat due to large scale soil removal by private salt industries, heavy vehicles, trespass by villagers, small dam construction in the catchment area restricting the water supply of the lake, mushrooming of private salt industry from Nawa to Gudha in Nagpur district, air and noise pollution due to these industries and biotic interference, including human pressure.

These threats may affect the process of

establishment of the breeding ground. To develop or to promote this favourable ecological niche for the breeding of flamingos in this lake, the international scientific community should take up this issue at the highest level, to implement conservation measures in the interest of safeguarding the water-fowl habitat. The following measures are suggested:

1. Restriction on the removal of top soil from the lake by private salt industries.
2. Restriction on trespass by vehicular traffic.
3. Restriction and removal of private salt industries from the periphery of the lake in Nagaur district.
4. Restriction on small dam construction in the catchment area of Sambhar lake.
5. Minimization of biotic interference including human activities through bio-fencing the area.
6. Afforestation of the border areas of the lake to create a buffer zone for protection of avifauna.
7. Declaration of Sambhar lake as a wetland reserve.

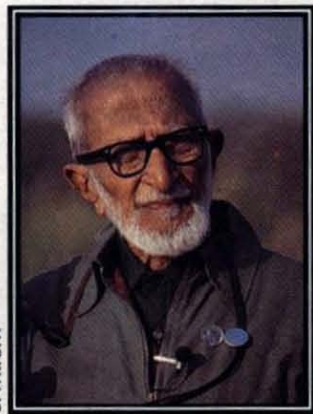
## SÁLIM ALI SPECIAL ISSUE



A.R. RAHMANI

The centrespread photograph of Dr. Sálím Ali was wrongly credited to S.A. Hussain.

Our apology to A.R. Rahmani who took the photograph.



B. WRIGHT

The credit for the cover photograph of the *Hornbill* 1995(4), Dr. Sálím Ali commemorative issue goes to Belinda Wright. This was inadvertently omitted.

## A SPECTACLE IN THE SKY

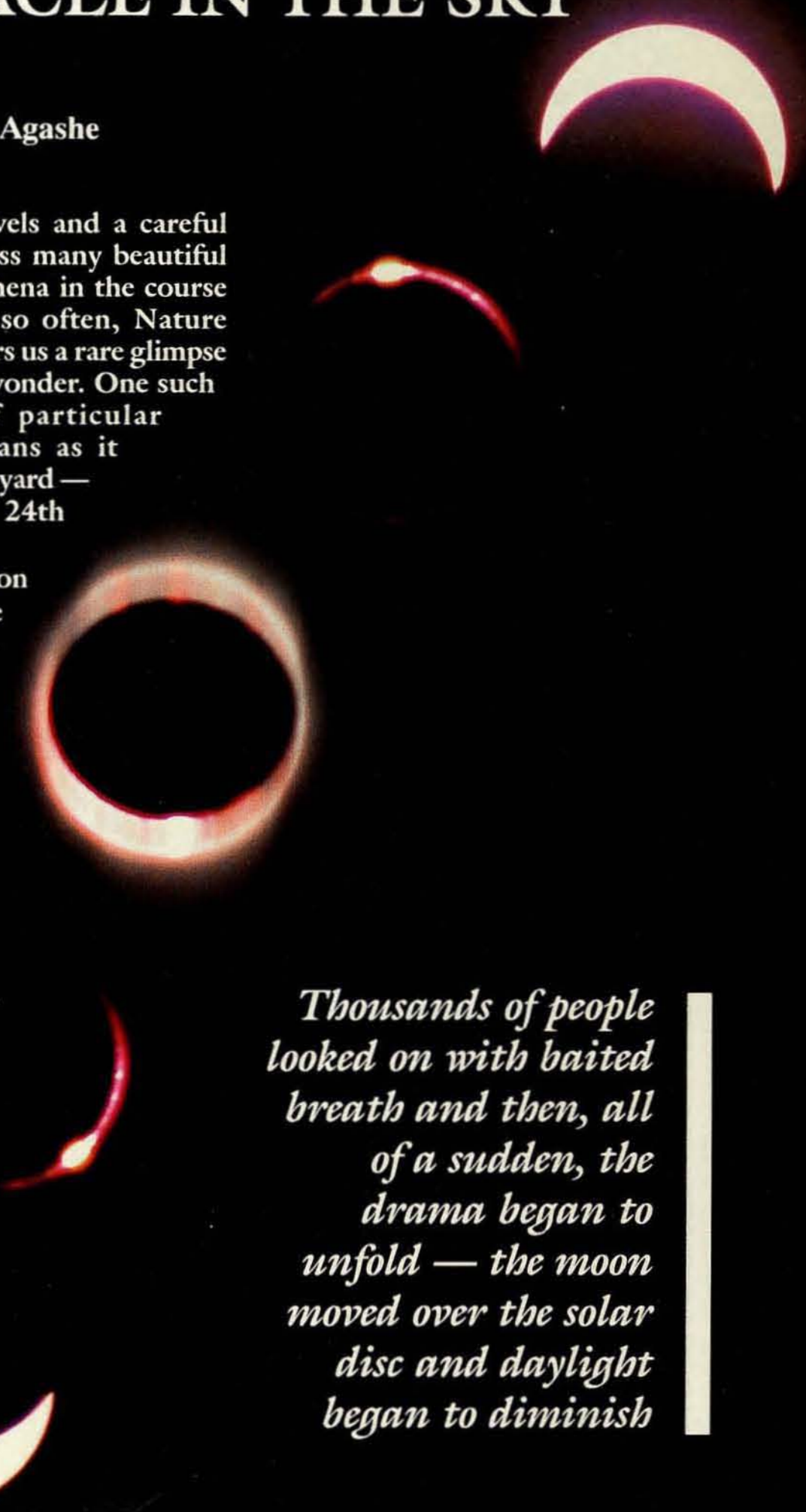
Text: Heema Rao

Photographs: Sudheer Agashe

Nature is full of marvels and a careful observer may come across many beautiful and outstanding phenomena in the course of a lifetime. But ever so often, Nature surpasses herself and offers us a rare glimpse of unparalleled natural wonder. One such phenomenon was of particular importance to us Indians as it occurred in our own backyard — the total solar eclipse of 24th October, 1995!

All sights were centred on the sun as the eclipse started from Central Iran and progressed to Rajasthan, Southern U.P. and Bengal, before passing on to Myanmar and then to Indonesia.

*Thousands of people looked on with baited breath and then, all of a sudden, the drama began to unfold — the moon moved over the solar disc and daylight began to diminish*



Let us first see what the phenomenon is all about. An eclipse is a play of darkness and light. The word originates from the Greek word *ekleipo* meaning 'to fail to appear'. A solar eclipse occurs when the sun, moon and earth fall in a straight line and the moon blots out the sun, as viewed from the earth. For obvious reasons, a solar eclipse can occur only on a new moon day (Amavasya) while a lunar eclipse must occur on a full moon day (Poornima). A lunar eclipse has the earth between the sun and the moon and a solar eclipse is due to the moon coming between the earth and the sun.

Watching a lunar eclipse is never as exciting as watching a solar one and the reason is simple. We see the waxing and waning of the moon regularly and a shadowed moon does not arouse more than fleeting interest. But to watch the mighty sun grow smaller and smaller, disappear and then reappear — that is a different cup of tea altogether!

As the path of totality of this year's eclipse covered a large region from Rajasthan to Bengal, this belt saw a crowd of astronomers, photographers, men of science and curious laymen, all making a beeline for the best viewing points.

Sudheer Agashe, a BNHS member and an avid photographer was one such lucky individual, whose observations from the tiny hamlet of Neem-ka-Thana, near Jaipur, are described in this article.

The group formed by the Marathi Vigyan Parishad, Bombay, assembled at the site by 6 a.m. on 24th October, 1995. The clear skies and cool

air did not give any hint of the spectacular show that was to follow when the sun rose majestically from behind a hilltop. Here we reproduce some of the series of pictures taken by Sudheer Agashe. He used heavy filters to cut out the intense solar radiation to be able to take these photographs.

As one of the observers put it — 'It was worth every moment of my life just to have seen this spectacle!' For those who were unable to watch this year's eclipse, there is still hope. The next total solar eclipse visible from India will be on 11th August, 1999 and 22nd July, 2009. There will also be two annular eclipses in December 2019 and January 2020, followed by another total eclipse on 29th March, 2034. So there's plenty of time to plan ahead for the next 40 years!

A point worth noting is that the moon is drifting away from the earth at a rate of 5 cm per year. A few million years from now it will have drifted away to such an extent that both lunar and solar eclipses will be a thing of the past. A sad thought indeed — for the future inhabitants of our planet!

The groups boarded their buses for the return journey of about 100 km to Jaipur, when they found themselves trapped in the midst of a traffic jam, under the heat of the blazing mid-day sun. Huge crowds of colourfully dressed Rajasthani men and women were swarming towards a muddy river for the ritual 'holy dip.' It was a study in contrasts — the visitors waiting patiently for over an hour while the locals merrily 'washed away their sins'! □

## TOTAL AND ANNULAR SOLAR ECLIPSES VISIBLE IN INDIA IN THE NEXT TEN YEARS

Date	Type	Regions
11th August, 1999	Total	Central India
22nd July, 2009	Total	Central and Northeastern India
26th December, 2019	Annular	Annular from Kerala and Tamil Nadu. Partial elsewhere.
21st January, 2020	Annular	Annular from Punjab, Haryana, Northern U.P. Partial elsewhere
29th March, 2034	Total	Jammu and Kashmir, partial elsewhere.

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## GIANT TIGER CENTIPEDE



MAHESH SABNE

This centipede which can grow upto 20 cm is a forest dweller. It is usually seen after sunset when it is actively hunting for food, which consists of crickets, cockroaches, earthworms and small frogs. The centipede's daytime is spent under damp bark or rocks. Its long segmented body has one pair of legs on each segment. The first pair of legs near the mouth are modified into venom bearing claws. Its striking orange and black colour pattern probably warn predators of painful encounters. The bites of all centipedes to humans cause painful swelling.

The centipede is a caring mother. Eggs are laid safely in a burrow underneath a stone or log, where she remains curled up, cradling the eggs and keeping them clean by licking them to keep off fungus attack.

Its close relative, the slow-moving millipede, is a strict vegetarian. It differs from the centipede in having two pairs of legs on each segment. Centipedes and millipedes are classified in the Phylum Arthropoda under Class Myriapoda, meaning many-legged animals. □

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