Nature Watch

A Horde of Indian Deer

T R Shankar Raman

T R Shankar Raman studied the ecology and breeding seasonality of chital for three years in Guindy National Park. Interested in natural history and conservation, he later went on to study the impact of shifting cultivation on wildlife in the tropical rainforests of Mizoram, northeast India.

Deer are some of the commonest, most visible, and attractive mammals in many forests and grasslands of India. They display a fascinating variety in their antlers, social systems, herd-forming behaviour, and ecology. Unfortunately, several factors have brought some species to the brink of extinction today.

The loud, throaty bellow of the chital stag resounded through the fresh morning air. Hidden behind a few trees and bushes, I watched silently as it stood on an open grassland near a small herd of chital does and their young fawns. Further away, there were two other herds of deer. One herd had larger animals than the other and comprised about a dozen individuals. Their tawny, orange-tinted coat, and the highly-branched antlers of the males in the herd, indicated that this was a herd of swamp deer or barasingha. The second herd was a group of three hog deer grazing at the edge of a patch of tall grass. From that particular vantage point in Dudhwa Tiger Reserve, I could thus observe, at a glance, three species of deer. But this was not all. Later that day, I saw two more species, the sambar and the barking deer, in the dense sal forests within the sanctuary. Dudhwa, on the Indo-Nepal border in Uttar Pradesh, is one of the few places where one can observe, even today, five of India's eight deer species (*Box 1*). The Indian sub-continent has an unusual bounty of deer species, each unique in appearance, ecology, behaviour, and geographical distribution.

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How Many Deer?

Deer belong to the group of herbivorous, hoofed mammals or ungulates called artiodactyls, which includes camels, pigs, antelope, cattle, and hippopotamuses. The deer are characterised by an even number of toes, the presence of antlers (bony outgrowths of the frontal bones of the skull) in males of most species, and a four-chambered stomach. Of the 40 existing deer species in the world, nine occur in India, of which the true deer or cervids (Family: Cervidae) account for eight species (see below).

Class: Mammalia; **Order:** Artiodactyla

Family: Tragulidae

1. Indian mouse deer ***(Tragulus meminna)***

Family: Cervidae

Sub-family: Cervinae

1. Chital or Axis deer (***Axis axis***)
2. Hog Deer (***A. porcinus***)
3. Swamp deer or Barasingha (***Cervus duvauceli***)
4. Hangul or Kashmir Stag (***C. elaphus hanglu***)
5. Sangai or Manipur brow-antlered deer (***C. eldi eldi***)
6. Sambar (***C. unicolor***)

Sub-family: Muntiacinae

7. Muntjac or Barking deer (***Muntiacus muntjak***)

Sub-family: Moschinae

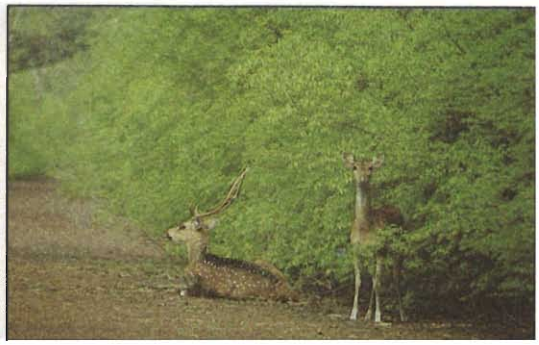
8. Himalayan musk deer (***Moschus moschiferus***)

A Head for Courtship and Combat

A characteristic of the deer, that strikes an observer watching a herd, is the pair of branching antlers on the heads of some individuals. Males of most deer species carry antlers, which are often mistaken for horns (*Box 2*). The growth and development of antlers plays a major role in the life cycle and reproductive behaviour of deer. In the chital or spotted deer, the first pair of antlers appears from stub-like pedicels on the head,

Figure 1 (a) (bottom left) An adult chital male (stag) with growing antlers in velvet;

(b) (bottom right) An adult stag with mature hard antlers rests at a forest edge beside a watchful female (doe).



What is an antler?

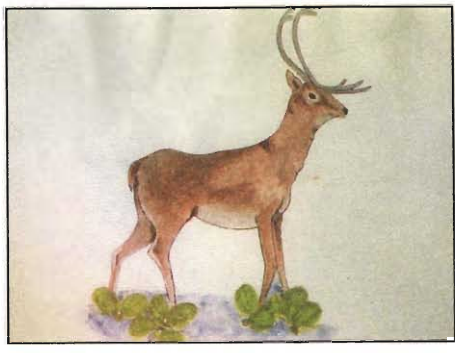
Antlers occur in 36 of the 40 existing deer species in the world. Three species of musk deer (***Moschus spp.***) and the Chinese water deer (***Hydropotes inermis***) lack antlers. Antlers are different from horns that other ungulates such as buffaloes, antelopes, goats, and sheep have. Unlike horns, antlers are composed of bone and not keratin, and they are shed and regrown every year, whereas horns grow continuously throughout the life of the animal. Antlers are mainly used in serious and playful fights between males, though they may also play a role as status symbols that indicate dominance. Antlers occur only in males, except in the reindeer (***Rangifer tarandus***), where even females carry them. Female reindeer attain hard antlers in winter when males are in the vulnerable velvet antler stage. They use their antlers to ward off males that compete with them for food in their cold tundra habitat in North America and Eurasia.

when the male is almost a year old. These antlers grow to be simple and spike-like, about ten centimetres long. The following year, as the male grows in body size, these antlers are cast off (shed) from the pedicels. A new pair of antlers begins to grow, attaining a final length of 25-30 centimetres in a few months. This process of shedding antlers and growing new ones recurs annually, and the antler size increases roughly in proportion to the animal's age.

A layer of skin and hair, called the 'velvet', richly supplied by blood vessels, covers the growing antlers (*Figure 1a*). With the onset of the breeding season, the levels of the male hormone testosterone increase in the blood, and the antler undergoes mineralization (calcification). The velvet gradually peels off, or the male rubs it off on shrubs and branches. This exposes

Figure 2 (bottom left) Two hardground barasingha stags in a parallel-walk aggressive display.

Figure 3 (bottom right) The Manipur brow-antlered deer or dancing deer occurs only in the marshy habitat with floating islands in Keibul Lamjao Sanctuary.



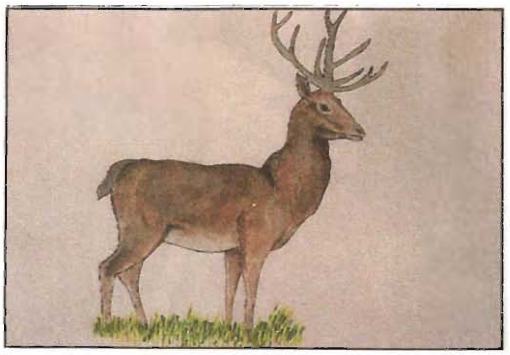
Painting by Sumana Rao

the underlying bony, hard antler (*Figure 1b*). The antler of an adult has a branch called the *brow tine* (emerging just above the pedicel and curving forwards and upwards) and the *main tine* or *beam*. The main beam again branches at the top to produce the *bez* branch. In other deer, such as the barasingha, there may be a further *trez* branch and many tines, giving it a highly-branched appearance (Hindi: *bara* - twelve, *singha* - branches; *Figure 2*). The antler of the Manipur brow-antlered deer is peculiar, as the brow tine and main beam form a continuous, sweeping arc over the head (*Figure 3*).

The time of year when most adult males are in hard antler, forms the peak of the breeding season or rut. The peak rut differs according to the species. Over most of India, adult chital stags attain hard antlers between April and June, whereas sambar rut during the winter (*Figure 4*). Spurred by the testosterone, the neck and body muscles develop, making the animals appear larger than usual. Males begin to rove widely in search of oestrous females and court them avidly. In other deer, such as the swamp deer or barasingha and the Kashmir stag or hangul (*Figure 5*), males defend territories during the breeding season. By means of displays such as roaring and herding, they attempt to attract females to their territory and guard their harem jealously from other males. The females may not be mere passive spectators of male prowess; anecdotal observations suggest that females actively choose the males they mate with.

Figure 4 (bottom left) An adult sambar female at a waterhole raises her tail - a characteristic alarm posture of many deer species.

Figure 5 (bottom right) The Kashmir stag or hangul population is today confined to Dachigam sanctuary in Kashmir.



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In the more primitive deer, such as the Himalayan musk deer and the barking deer or muntjac (*Figures 6 and 7*), the male secondary sexual characteristics and breeding systems are different. Musk deer and muntjac are forest-dwelling, relatively sedentary, and territorial species. The musk deer lack antlers, but instead carry a pair of nasty-looking tusks, which are merely the elongated upper canines of the males. Muntjac males also have tusks but, in addition, carry a pair of small, spike-like antlers on their head, often with only a small protuberance representing the brow tine. They are therefore considered an intermediate form between the primitive deer that lack antlers and the more advanced cervids, such as the chital or barasingha.

Bones of Contention

Males use their antlers for playful or serious combat with each other. Being hard, bony, and not covered by any soft tissue, the antlers are less prone to undue damage when males interlock, shove, and clash against each other. Broken antlers do result at times, but these can be shed at the end of the season, and new ones grown the following year. Biologists have proposed that antler casting may have evolved to enable such repair. This way, antler size can also increase in tandem with body size.

Actual combat is infrequent compared to the number of occasions when there is some form of aggressive (antagonistic) interaction between males. This is because each species of

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Figure 6 (bottom left) A musk deer male, with its dagger-like upper canines (tusks), at a feeding site in a captive breeding facility in Kedarnath sanctuary. The deer are being bred for reintro- duction into the wild.

Figure 7 (bottom right) A female muntjac or barking deer. The deer are named after their characteristic alarm call, which is a loud bark.

Painting by Sumana Rao

Figure 8 The hog deer is a specialised species of the tall grasslands, called the terai, in the Ganges and Brahmaputra flood plains .

deer has evolved certain characteristic assessment displays by which males size-up each other before combat. Roaring rates, body and antler size, and parallel walks are displays of this kind (*Figure 2*). After males have several such encounters with other males, they establish a dominance hierarchy or peck-order. Subordinate individuals learn to avoid or merely spar playfully with dominants. Serious fights do occur, however, between males that are almost evenly matched, and may lead to death or life-long injury.

A Season for Fawns

The net result of the competition and courtship during the breeding season is the annual crop of fawns. In most deer species, females give birth to fawns during the season when food resources are abundant. Thus, hog deer in wet grasslands of Nepal fawn mostly during April and May when, after the burn and the pre-monsoon showers, there is a flush of new grass sprouts (*Figure 8*). In contrast, chital, which are close relatives of hog deer, produce most fawns between December and March, during the onset of the dry season. It is not clear why they do this. Perhaps, this helps the chital does to coincide their energetically-expensive late-lactation period with the onset of rains and flush in food availability in May and June. It also entails pregnancy during the wet season,

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enabling does to meet the needs of the developing embryo, while storing resources for the following dry season. When the fawns are born, they are usually kept in hiding for a few days or weeks as they are vulnerable to predators. Soon the fawn begins to follow its mother; gradually, it also learns to forage on its own after weaning. During the fawning season, one can commonly see small herds of does and fawns forming and foraging together. The tendency to form herds varies, however, with the social system and the habitat of the species.

The Herd Mentality

Herding or group-forming behaviour is a characteristic of many ungulates or hoofed mammals, including several species of deer. Some species, such as the small, forest-dwelling musk deer and muntjac, occur solitarily or in pairs male-female or female-young pairs. Other species, such as the chital and barasingha form large herds of a hundred individuals or more. Usually, forest species form smaller herds compared to species of open grasslands or the forest-grassland interface. In chital, average herd sizes vary widely in different months of the year, from about two to over thirty or so individuals. Groups of a hundred or more individuals occur sometimes during the wet season. In scrub and grassland habitats, herd size and density of chital directly relates to the amount of rainfall and grass growth.

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Besides the availability and dispersion of food items, the need for safety in numbers influences herd size when facing predators. Larger herds can detect predators earlier as many animals are simultaneously watchful. On detecting predators, such as a pack of wild dogs, a large herd of chital will often bunch up into a compact group and face the predator. They give calls and stamp their feet on the ground in alarm (glands between the digits of the feet deposit a substance that serves as a warning). In such a situation, large males often muscle their way to a secure position in the centre of the herd, leaving the females and young on the periphery. So much for

chivalry in the species! While predators do take a regular toll of individuals, there are more potent threats to the survival of deer, and many species are today at the brink of extinction.

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Poised on the Brink

Several aspects of deer biology have contributed to the precarious position that some species are in today. Species such as the swamp deer and the hog deer (*Figures 2 and 8*), being specialized to grassland habitats, have suffered from habitat loss to agriculture and development activities. Three subspecies of swamp deer exist today, all critically endangered: the hardground barasingha of Central India (*C. duvauceli branderi*); and the swamp subspecies (*C. d. duvauceli* in Northern India and *C. d. ranjitsinhji* in Eastern India). Several thousand hardground barasingha probably existed in the Central Highlands of India, in grassland habitats along the Vindhya and Satpura hill ranges. Hunting and loss of their habitat brought down their numbers drastically this century, until in 1970, only 66 survived in Kanha Tiger Reserve in Madhya Pradesh. After ecologists attracted attention to the hardground barasingha's plight, wildlife managers took several restorative measures, including the relocation of villagers occupying and cultivating some grassland areas. The species appeared to respond positively to these measures and, within a decade, there were about 280 animals again at Kanha. The swamp subspecies of the barasingha occurs in the unique, marshy, tall grassland habitat, called the *terai*, along the Indo-Gangetic and Brahmaputra plains. This habitat occurs today in a few sanctuaries and protected areas in Uttar Pradesh, Nepal, West Bengal, and Assam. Similar threats as faced by the hardground barasingha and hog deer have contributed to the decline of these subspecies in north and east India.

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Two other deer species occur in single, isolated, protected areas, hovering at the brink of extinction in the wild. These are the Kashmir stag or hangul (Figure 5) and the Manipur brow-antlered deer (Figure 3). A combination of habitat loss and hunting for trophies and meat has reduced them to this plight. The hangul is a subspecies of the European red deer. Another subspecies that occurred in the eastern Himalayas, the Sikkim stag or shou, is now perhaps extinct. From over 2,000 hangul that existed around 1947, probably less than 300 exist today in a single sanctuary. This sanctuary, Dachigam, was reserved as a game preserve by the last Maharaja of Kashmir, Hari Singh, and today occupies some 141 km^2 in the Kashmir Himalayas. The hangul population thrives in subtropical forests, migrating between the higher slopes of the mountains and the autumn rutting grounds in the main Dachigam valley.

The Manipur brow-antlered deer, also called the sangai or thamin, is perhaps the most endangered subspecies of deer in the world. Its population declined from about 100 individuals in 1959 to only 20 individuals or so in two decades. Today, the only existing wild population occurs in the Manipur valley of northeast India, occupying a very peculiar habitat in Keibul Lamjao Sanctuary, a part of the Logtak lake. Many floating islands, called the *phum* or *phumdi*, occur in this marshy habitat. The *phumdi* is a mass of decaying organic matter about one to four feet in depth. It floats on water during the wet season, and settles on hard ground when water levels fall. Sangai have modified, split hooves that enable them to move over the floating vegetation with a fluid gait that has earned them the name dancing deer. There are substantial numbers of this deer in captivity in various zoos today. Conservationists have therefore suggested establishing free-ranging populations in other areas using captive stock. This can stave off the threat of extinction, which can speedily dispose of a single, small population.

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Another endangered species is the Himalayan musk deer. The species is famous for the aromatic musk, contained in a pouch under the male's abdomen. As musk is costlier than gold by weight in today's markets, it attracts poachers who hunt and trap the deer. Often, females and young ones are also trapped in snares, taking a heavy toll of the species. Today, the law protects the musk deer and programmes for captive breeding and re-introduction of the species in the wild are in the offing (*Figure 6*).

India is fortunate to have such a diverse array of deer species, ranging from the small musk deer to the huge sambar, occupying a variety of habitats. For thousands of years, they have thrived in India as an essential component of various ecosystems. Today, their future appears uncertain. Will the hangul, the hog deer, the sangai, and the barasingha vanish like the Sikkim stag? Or will conservation efforts enable them to persist through the next century? While we can only guess the answers, it is certain that if these species disappear, India's forests and grasslands will lose an irreplaceable element of their charm.

Suggested Reading

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