

# Sacred groves of India—A plea for continued conservation<sup>1</sup>

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(With a plate)

## INTRODUCTION

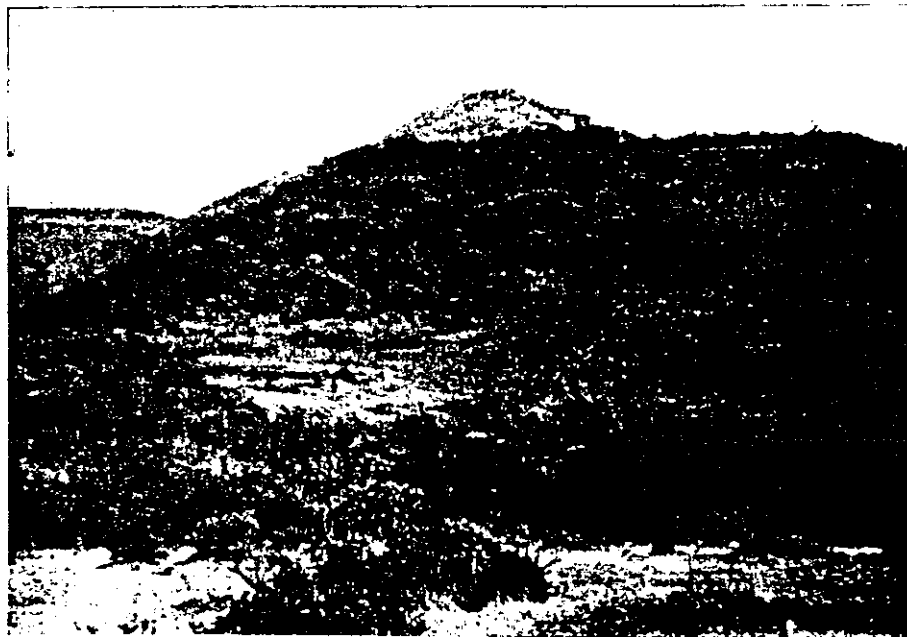
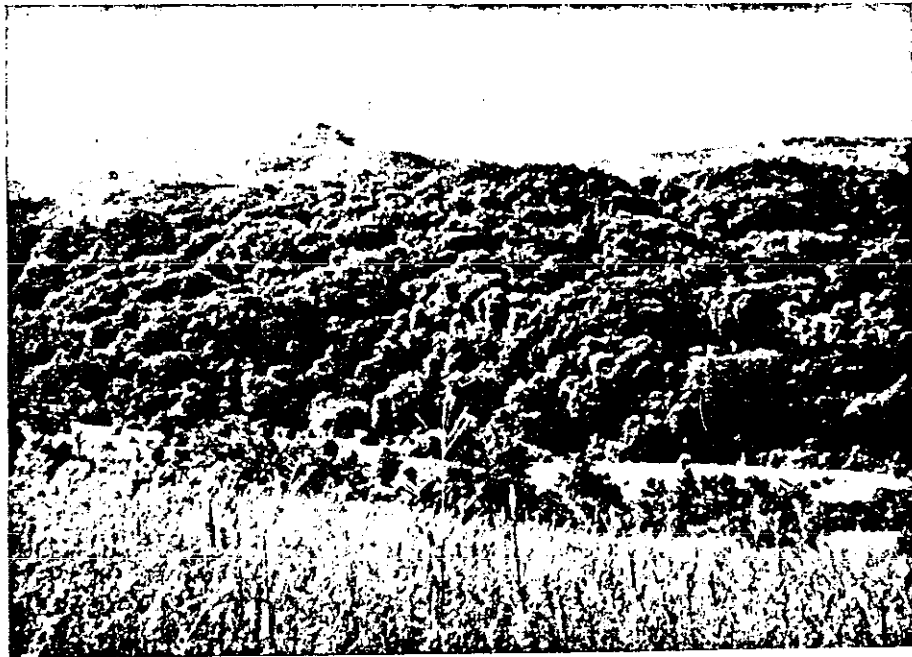
The practice of nature conservation is a very ancient tradition in India, so ancient in fact, that its roots go back to the pre-agricultural, hunting gathering stage of the society. The protection accorded to many plant and animal species such as the Peepal and Umber trees and the Langur and Nilgai is well known. There are also instances of entire biological communities such as all aquatic creatures in a rock-pool or all plant life in a patch of forest receiving protection because of their association with some deity. With the weakening of religious beliefs these creatures and communities are now in danger of losing this traditional protection. We are writing this to make a plea that we must not lose our legacies from these ancient practices, but must make every effort to incorporate them in an enlightened approach to nature conservation.

Sacred groves are one of the most valuable of such legacies from the primitive practices of nature conservation. Scattered, presumably throughout India, are tracts of sacred forests which have been completely or nearly completely immune from human interference on grounds of religious beliefs. The nature of religious cults associated with such sacred groves suggests that the practices are very ancient, deriving from the hunting-gathering stages of the society. The composition of the vegetation, corresponding to the climax formation for that region, corroborates the supposition that the sacred groves have been immune from human interference for a very long period of time. These sacred groves may range in size from a clump of trees to as much as twenty hectares in area. Even the smaller groves often harbour some old and

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*Above:* Sacred grove of goddess Janni at Mangaon, Velhe Taluka, Poona District. *Below:* Sacred grove of the saint Somjibuva at Dhaman Vahal, Mulshi Taluka, Poona District.

magnificent specimens of trees and climbers. The larger groves are a veritable treasure-trove for the naturalist, supporting many species of plants which are rare in the area, and are becoming rarer and rarer with the deforestation which seems to gather pace daily. These sacred groves are also often serving as a last refuge for arboreal birds and mammals especially monkeys, and no doubt for other forest loving animals as well (Plate).

#### TWO EXAMPLES

We will illustrate the phenomenon of these sacred groves with the help of two examples from Maharashtra; one, a grove of the goddess Janni at Mangaon in Velhe taluka of Poona district and the second, a grove of the goddess Kalkai at Gani in Shrivardhan taluka of Kolaba district. Both are amongst the largest groves that we have visited, being about fifteen hectares in size, and lie along the crestline of the Western Ghats. Both lie in regions which receive about 4000 mm of rainfall during the months of June to September, and consequently support montane subtropical evergreen forests.

Mangaon lies near the southwestern edge of the Panshet reservoir and is at a distance of one km from the motor launch stop at Mangaon. The grove is about three quarters of a kilometre away from the village itself and is situated on a hill slope of about 30° to 40°. About five hectares of this grove was felled in 1948, but this was allowed to grow without further disturbance and is now a good second growth forest. The other ten hectares appear to be in their primaeval condition. This primary forest is composed almost entirely of trees about ten to thirty metres tall with little shrubby or herbaceous undergrowth. The dominating tree species are Yertu (*Dysoxylum binectariferum* Hook. f.), Jamun (*Syzygium cuminii* Skeels) and Anjan (*Memecylon umbellatum* Burm.). Particularly remarkable specimens are those of Bhorab (*Sterculia guttata* Roxb.) and Peepear (*Ficus arnottiana* Miq.). The forest is rich in woody climbers notable amongst which are Shikekai (*Acacia rugosa* Ham.) and Ombali (*Gnetum ula* Brong.).

The reigning deity of the grove is a mother goddess, *Janni*. She is now in the form of a simple icon in a primitive temple. However, even this grandeur is recent. Originally she was in the form of uniconic stone lumps smeared with minium lying out in the open. These stones are still in the temple, along with a stone representing the *mulpurusha* or the founder of the Polekar clan of the Mangaon village. The deity demands animal sacrifice and is supposed to be very ferocious in nature. It is believed that the femininity of the deity indicates that the worship originated in the hunting gathering stage of the society which was still

awed by the miracle of birth and in which there was little of male domination. The fact that the temple is fairly recent, and away from the village also supports the conjecture that the cult originated when the society was not yet settled in permanent dwellings (Kosambi 1962).<sup>1</sup>

Removal of any plant material, even of dead wood from the grove is taboo. The villagers seem to respect this taboo with near-complete sincerity even today. Wood from the grove was however occasionally removed in the past with special permission from the deity in case of a disaster such as a major fire in the village. Apart from such, presumably very rare violations, the grove must have been in a completely primeval condition till 1948. In that year there was a dispute regarding the ownership of the grove between two clans in the village. The dispute was settled by the Government by the entire grove being auctioned for felling. A coal merchant from Poona bought the grove in the auction and commenced felling with the help of imported tribal *katkari* labourers. The villagers, who were at first unhappy about the destruction of their sacred grove, decided that they should at least make some money if destruction was inevitable. They also felt that it was the merchant who will be subjected to the wrath of the goddess. They therefore refused to let the *katkaris* do the felling and volunteered to do the felling themselves but on wages higher than those demanded by the *katkaris*. This dispute lasted for quite a while, but finally the merchant gave in and the villagers completed about five hectares of felling. At this point there was a further dispute which was terminated with the merchant dying a sudden death vomiting blood. The villagers decided that the death was a just punishment meted out by the goddess because of the violation of her sacred grove. Felling was stopped, and the rest of this magnificent grove was saved from disaster. Today, the rest of the region has been completely deforested and the grove of Janni stands as the last refuge of the magnificent vegetation that covered the entire region till only twenty years ago.

Our second example is from Konkan. The village of Gani is about twenty kilometres from Shrivardhan isolated atop a hill plateau. The base of the hill may be reached by a bus, or jeep but one has to climb a distance of five kilometres before reaching the village. The sacred grove of Kalkai lies about half a kilometre from the village itself and is situated on a gentle slope. The grove is about fifteen hectares in area and all of it is in its primeval state; there has never been any felling in the grove within human memory. The forest is dominated by *Terminalia paniculata* Roth, *Mangifera indica* Linn., *Holegerna grahami* Hook. f., *Alstonia scholarae* R. Br. and is about twenty to forty metres in height. There is little shrubby undergrowth, but a rich growth of

<sup>1</sup> KOSAMBI, D. D. (1962): Myth and Reality. Popular Book Depot, Bombay.

climbers of species *Gnetum ula* Brong. *Acacia rugosa* Ham, *Combretum ovalifolium* Roxb and *Schefflera venulosa* Harms. The most remarkable specimen in the grove is a magnificent tree of Garud (*Ficus* sp.) which has a girth exceeding fifteen metres.

The reigning deity of the grove is like that in Mangaon a mother goddess, Kalkai. She is in an uniconic form and lies open to the sky. She demands blood sacrifice. In all these features as well as in lying at a distance from the village, the cult at Gani resembles the Mangaon cult. Removal of any live wood from the grove is taboo. However the taboo on the removal of dead wood and leaf litter appears to have been relaxed within recent times. As with Mangaon, all the region surrounding the village Gani has been completely deforested. The effects of this deforestation which has been more thorough at Gani, are being felt much more acutely by the villagers. They now have no source of fuel-wood or of leaf litter for preparing the paddy fields except for the grove. Moreover, apart from a village well, the only perennial source of water is a spring in the grove. Deforestation has led to the drying up of all the other perennial springs in the vicinity of the village. The spring in the grove is therefore the only perennial water source for the cattle or for the people working in the field.

The villagers of Gani are now acutely aware of the crucial role of the grove in their economy. This grove, as many others, is classified as temple land in the revenue records, and therefore cannot be exploited except at the initiative of the temple trust. The villagers, as trustees, have no wish to destroy this last source of fuel and water. It so happened, however, that part of the grove was classified as forest land. As this coupe was due for felling by rotation in 1972, some of the trees from the grove were marked for felling by the departmental personnel. The villagers were very unhappy at this, and on being informed by some forest department official of our interest in the sacred groves wrote to us for help. We visited the grove and were convinced of the merit of the villagers' case. We are very happy to state that the forest department very considerably halted the felling in the grove at our request.

#### GEOGRAPHICAL DISTRIBUTION

Such sacred groves are a very ancient and widespread phenomenon in the old world cultures. They are mentioned in Greek and Sanskrit classics and are reported to exist today in a number of countries besides India e.g. Ghana, Nigeria, Syria, Turkey. We have not come across any comprehensive account of the sacred groves, and this list based on personal conversations with other naturalists is definitely very incomplete. It appears, however, that this phenomenon is entirely unknown in the

New World (R. E. Schultes, personal communication) In India they have been reported to us from the entire length of the Western Ghats, in Maharashtra, Mysore and Kerala. The reigning deities of the groves in Mysore and Kerala are cobras rather than mother goddesses as in Maharashtra. Aravalli hills in Rajasthan have groves dedicated to a mother goddess Jogmaya (I. Prakash, personal communication). Sacred groves are also found in the hill states of northeastern India, and in fact are notable for harbouring rare species of orchids (A. G. Raddi, personal communication).

The finest sacred groves of India presumably occur in the Sarguja district of Madhya Pradesh (G. G. Takle, personal communication). Here every village in the area has a grove about 20 hectares in extent. What is remarkable is that not only plant, but also animal life receives absolute protection in these groves. The groves therefore serve as sanctuaries for herds of ungulates as well. These groves are locally known as sarana forests, a word which probably derives from the Sanskrit "sharana" or sanctuary.

#### ECONOMIC SIGNIFICANCE

It is well known that the climax form of vegetation in any locality often tends to be richer in species than the earlier stages of succession. As climax forests, the sacred groves are particularly diverse in species of trees and the life forms dependent for their existence on trees, namely climbers and epiphytes. With the felling of forest all around them, the sacred groves have become the last refuge of many plant species. Many of the plant species which depend for their very survival in the region on the sacred groves are of considerable practical value. A striking example of this was provided by the grove at the village of Tunbad in Shrivardhan Taluka. This rather small grove harboured a magnificent specimen of Garabi or Gaidhari (*Entada phaseoloides* Merr.) a leguminous climber. The local inhabitants use the bark of this climber in treating cattle against snakebite. We were told that this was the only specimen of this species within a radius of 40 kilometres, and people came up from considerable distances to this grove for the medicinal bark. It is certain that many species now preserved in the sacred groves possess such medicinal properties and may prove to be of considerable economic value if properly studied and exploited.

Apart from the preservation of rare species the sacred groves may be serving the function of preservation of biological diversity even in the case of commoner species of trees. Thus we have been told of two groves in Maharashtra which support ancient Teak (*Tectona grandis*) forests although teak has disappeared from the vicinity of those groves

(1) Dhamani in Junnar Taluka of Poona district; (Shri U. K. Mavin-kurve, personal communication) and Dapora in Wani Taluka of Yeotmal district (Shri M. G. Gogate, personal communication). It is very likely that the teak specimens in these groves represent genetic variants which are peculiar to that geographical region. Experience with forest tree breeding programmes in North America has shown that the success of such programmes depends crucially on the availability of abundant genetic variation over the entire geographical range of the species. The genetic variation of species like Teak likely to be preserved in the sacred groves may therefore prove to be of great value in a future forest tree breeding programme in India.

#### CONSERVATION

Continued conservation of these sacred groves is obviously desirable both from a practical and an aesthetic point of view. Unfortunately, the religious beliefs on which this conservation was based are beginning to weaken at the same time as the need for their conservation is becoming more and more urgent with the deforestation of the surrounding regions. Both the sacred groves described in detail above have been just saved from threats of destruction. Many others have succumbed. The larger, more valuable sacred groves are in fact more susceptible because they can fetch considerable money in the short run for the poor farmers. For example, there were originally four sacred groves of an area greater than five hectares in the Panshet reservoir catchment area. Two of these, one at Shirkoli and the second at Gondekhal, both of fifteen hectares each, were felled in 1956. A third, at Tav is likely to be felled in the next one or two years. That at Mangaon continues to be coveted by charcoal merchants. We were told that just last year a merchant offered the village headman a bribe to agree to bid as a dummy in an auction the merchant was hoping to arrange.

All of this obviously points to the need for immediate measures to conserve all the remaining sacred groves of substantial extent. Most of these are classified as lands reserved for a temple. The land may be owned either by the Government or privately. Where the land is under governmental control the logical measure is to turn it over to the forest department which can classify these groves as preservation plots. It is, however, the privately owned groves that are in more imminent need of protection. Those mentioned above as already felled at Shirkoli and Gondekhal were privately owned, and so is that at Tav likely to be felled very soon. Such privately owned groves could probably be best preserved through the good offices of charity commissioners who regulate the functioning of the religious trusts. This could be accomplished by

the charity commissioners adopting the view that the grove associated with a temple is an important asset that the trustees must preserve. We are also happy to note that the Flora Wing of the Indian Board of Wild Life is considering the possibility of setting up a system of nature preserves to protect the sacred groves of northeastern India. It would be obviously desirable to extend the scope of such a system to embrace all of India

#### SUMMARY

Scattered, apparently throughout India, are a large number of forest tracts which have remained immune from human interference because of religious beliefs. As deforestation has been taking place at a rapid rate in many areas, such forests have come to be the only remnants of the original forest in a number of cases. Because of the absence of human interference the sacred forests support the climax vegetation appropriate for their particular locality. Such a climax vegetation is very rich in species of trees, climbers and epiphytes. As such these sacred groves serve the vital function of preservation of plant species which have become very rare or extinct elsewhere. Preservation of these species could be of great economic significance. Some of the species so preserved are already of medicinal significance; others could acquire such a significance in future. Even in the case of species not in any danger of extinction, the sacred forests may serve to preserve genotypes which may be useful in a future forest tree breeding programme. The sacred forests are also of great silvicultural interest as indicators of the natural productivity of the region. It is, therefore, imperative to survey these sacred forests and properly assess their role in nature conservation so that these forests may continue to be preserved even if the religious beliefs associated with them weaken and may disappear

#### ACKNOWLEDGEMENTS

It is a pleasure to acknowledge the willing help received from many officials of the Maharashtra State Forest Department in our survey of the sacred groves of Maharashtra. We would particularly like to mention Shri V. D. Mehendale, Additional Chief Conservator of Forests for Maharashtra, without whose interest this project could not have been pursued. Many others have helped with information and these have been acknowledged in the text. We are also thankful to Drs. G. B. Deodikar and T. S. Mahabale for their encouragement and for generously supporting this research through the facilities of the Maharashtra Association for the Cultivation of Science.



# Hunting and feeding in wild dogs<sup>1</sup>

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(With a graph)

These observations are based on our preliminary study of the Indian Wild Dog (*Cuon alpinus*) in the Mudumalai Sanctuary, Tamil Nadu.

Wild Dogs at Mudumalai usually hunt in the early hours of the morning between 6 and 8 a.m. They generally avoid strenuous activity during the heat of the day, seeking shade under rocks, dense underbrush or lying in along the banks of a river. This behavioural thermoregulation greatly influences the daily activity and movements of these dogs living in the tropical and subtropical regions. In cooler seasons they may be active and hunt at any time of the day. They rarely hunt at night but are most active on moonlight nights. This implies that they rely greatly on the sense of sight for hunting. But, in fact, all senses including those of sound and smell, are used flexibly without any particular specialization on any one modality.

During our two month study we were lucky to see a vain attack by wild dogs on a gaur calf which was protected by the determined mother and other members of the herd. Yet the agility and tenacity of the wild dogs gave us an idea of how they tackle a large prey such as the spotted deer or sambar. Further, four fresh kills were discovered before the vultures and other scavengers had arrived to remove everything. They were in varying degrees of mutilation and by the various signs that the dogs had left it was possible to piece together how the prey is brought down and dismembered.

It is highly probable that one of the dogs seizes the deer by the nose, which, like a twitch on a horse, must greatly inhibit its movements. Other dogs attack the hind end, biting the thighs, buttocks and flanks. One dog may secure a hold on the tail and with the other on the nose, one or two dogs on the ears and the rest of the pack pulling at the prey's flanks and hind quarters, a tug-of-war ensues. The prey is pulled down and if it is a fawn it is literally torn apart. There is no killing bite as in the big cats to dispatch the prey swiftly. The wild dogs, although they

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have powerful jaws, have relatively short canine teeth which could not be used to serve the spinal cord of larger prey. These shorter canine teeth, aided by the outer upper incisors which are curved and have evolved into a pair of secondary canines, enable the wild dog to secure a hold on the prey. The sight of several dogs securely attached to the prey and pulling, twisting and tearing at it, has shocked many a hunter who sees the wild dog as bloody killers. They are indeed messy, having no clean and efficient way of killing their prey.

When the flanks are torn open, the prey may be eviscerated as it struggles or is dragged along the ground by other dogs at the head end. The liver, kidneys and the lungs may be eaten and some sections of the intestines except the stomach and rumen which are torn out and left untouched. Similarly with the wildpig, the stomach was untouched by the dogs. The dogs may eat portions of the animal that are torn off as it struggles. Hence the frequent observation that the wild dog will even eat their prey while it is still alive.

The eyelids and eyes may also be eaten. It has been said that the dogs bite out the eyes of the deer and blind them first. Considering the difficulty a wild dog would have in seizing the eyeball, retracted deep into the orbit by retractor oculi muscles as a defensive reflex, this interpretation is unlikely. Rather the dogs remove the eyes when the prey is dead or immobilized in shock, prior to death.

In the absence of a killing bite, what physical stimulus kills the prey? Young fawns suffering from multiple bite injuries have been rescued from wild dogs and they have recovered; others have 'played dead' (the tonic immobility reaction) and suffering from less extensive injuries, were able to run off, once the dogs were chased away. (Davidar: personal communication). Presumably the prey goes into a state of shock, death ensuing rapidly after evisceration, this latter not being the major physical stimulus that kills the prey. In the absence of evisceration, the onset of shock may be prolonged and wild dogs would have to fight with the prey longer and, possibly, sustain injuries themselves during the attack. What more efficient method then, in the absence of more effective weapons, than to disembowel the prey? An understanding of these facts will hopefully give to the hunter and naturalist a clearer understanding of why the wild dogs seem to be such bloody killers.

Analysis of wild dog faeces shows the presence of fur, skin, hooves, and teeth of fawns and large quantities of digested bone, which has the consistency of fine chalk. It would be highly adaptive for the wild dogs to ingest fur to protect the alimentary tract from possible injury, especially from the extremely sharp bone spicules from small mammals. It was often with much difficulty that we were able to remove the matted fur that formed tight wads and balls around these splinters of bone. Clearly, if carnivores in captivity are fed on small mammals such as

hares, the carcass should not be skinned but left intact so that the ingested fur may be used to form a protective bolus around any fragments of ingested bone.

The composition of successive stools passed by one dog reflected even more of their eating habits. Some stools contained little or no hair, but mainly dark digested meat protein and occasional strips of partially digested muscle and tendon. Other stools contained fur and a lower proportion of digested protein and bones. Bone fragments were never found in those stools that contained no hair. From this we may conclude that the dogs either purposefully ingested quantities of hair when they also crushed and swallowed bones or in the process of digestion the fur aggregates around the bone fragments and are usually voided together and separate from the meat portion of the meal. Fragments of skull, teeth, claws and ocular lenses embedded in fur attested the fact that small mammals were eaten whole.

A high proportion of sambar remains included ingested grass (*Iseil-ema prostratum*). One faecal sample contained only grass and twigs; this dog was probably sick since the stool was liquid. The only other vegetable matter ingested in a significant amount was the fruit of *Zizyphus*, which was present in one sample. This fruit is commonly eaten by langur, bonnet macaque, porcupine, spotted deer, pigs and bear. Some fragments of grass, seeds, twigs and bamboo leaves were found in many of the faeces and their presence was probably accidental since a wild dog eating its prey on the ground is bound to pick up such material.

There is no satisfactory answer as to why carnivores eat grass. Like fur it may be an anti-irritant. Grass may also be an important source of vitamins and trace elements not available in the all meat diet, since the stomach contents of chital and pig were not eaten. We were not able to ascertain whether or not the wild dog eviscerated small mammals before eating them but this was certainly the case with the deer and the wild pig.

To determine the predation by wild dog on the deer population of our study area we collected the pelvises and lower jaws of deer. Of the sixty-three pelvises collected fifty-six were chital and the remaining seven sambar. Sex ratios were 23 male to 33 female chital and 5 female to 1 male sambar. (One fragment of pelvis could not be sexed)

In order to gain some insight into the degree of maturity of these kills pelvic index was taken by measuring the distance from the top (anterior rim) of the acetabulum or hip joint and the bottom of the obturator foramen. This index was chosen since it was the most intact region—the ilium and ischium usually being chewed and splintered by the dogs (text figure).

From the figure, it appears that pelvises with an index less than 7.5 cm would be ingested entirely by the wild dogs, since no remains were

found in the field (with the exception of a 2-3 month old fawn killed by three dogs near our camp). This conclusion may not be warranted since a pelvis of 7.5 cm index would be well ossified especially at the region of the acetabulum and could not therefore be easily ingested. It is quite possible then, that wild dogs do not kill many sub-adult fawns with a pelvic index of 6.5-7.5 cm. But this conclusion also may not be warranted, since the field samples were taken in the spring and most fawns would not attain this pelvic index until late summer or autumn. The absence of such remains in the spring collection in this study is an open question. We do not know how long moderately calcified bones remain intact. Their half life may be as short as 2-3 months, since many scavengers, notably porcupines and small rodents, will ingest such bones which constitute a rich source of mineral salts essential to their diet.

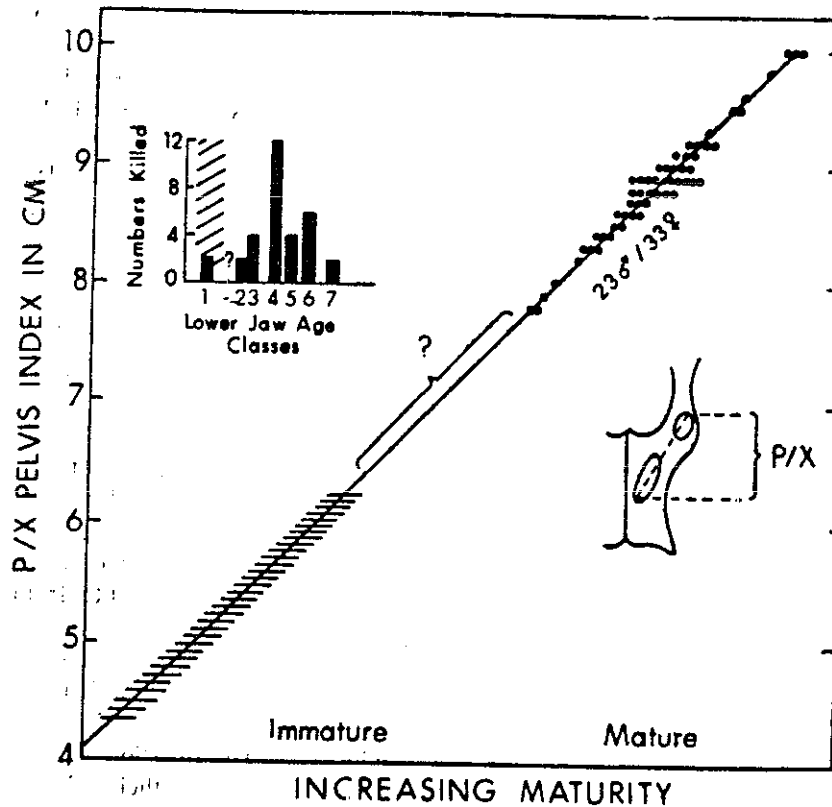
A similar age gap was found in the samples of lower jaws. The same arguments posed above hold for the absence of sub-adult jaws in the collection. Interestingly enough the greatest proportion of kills was in the 4-6 year (prime) age group. This may not be an indication that the wild dogs selectively kill animals of this age, but rather that the majority of animals in the herds fall (with the exception of the large annual fawn crop) within this age group. This conclusion is supported indirectly by the Nilgiri Game Association records of the number of chital shot each year. The numbers have increased greatly over the last few years, indicating that there must be more individuals in the herds which fall into this highly productive age range.

The age classes of kills identified from lower jaws are shown in the figure and this follows Schaller's (1967) age classification based on the wear on various teeth. Class I represents the fawns and in most of these kills the jaws are eaten by the dogs, since we found only two specimens. Classes 2 and 3 are yearlings and young adults and classes 4, 5 and 6 represent prime adults. Class 7 is past prime. Interestingly no really aged specimens were found, indicating that chital in the Nilgiris rarely live over 8 or 10 years of age.

Only eight lower jaws of the Sambar were collected in contrast to 31 lower jaws of the chital and all of these were subadults. Analysis of faeces confirmed the fact that the chital was the most commonly killed prey during the period of study. We were wary about collecting too many faecal samples from the packs because this might have had some effect on their marking behaviour since the faeces were deposited mainly at communal dunging areas.

The ratio of chital to sambar remains found in the faeces was very close to the ratio of chital to sambar pelvises that were collected in the field (approximately 10:1.5 or for every twenty chital killed three sambar). This ratio accords with the lower population of sambar and with the fact that these deer are very large and powerful and difficult for the

wild dogs to bring down. Presumably the wild dogs kill mainly fawns and subadult sambar since no adult lower jaws were found in the study area.



Graph showing age classes of lower jaws and pelvises

With greater expertise we might have been able to distinguish between the fur of chital fawns, subadults and adults but this was not possible. Judging from the number of faeces containing digested calcium (from the bones of ingested fawns) the ratio of fawns to adults during the period December-February in the samples was in the ratio of 2:1. A complete tail of a fawn, many small tarsal and carpal bones and undigested hooves were commonly found in these faeces.

It has been said that on a long chase the wild dogs run after the prey in relays and this may be a misinterpretation of canid hunting behaviour and has been clarified somewhat by Hugo & Jane van Lawick's observations of cape hunting dogs in their book *THE INNOCENT KILLERS*. As the prey zig-zags in front of the pack it comes closer to some dogs than to others; the closest dog takes up the chase until the prey

again turns wide and another dog closer to it will take over. The open plains of Serengeti where the cape hunting dog lives is very different from the jungle habitat of the wild dog, although a few small clearings have the park-like appearance of this great African plain. Consequently the hunting strategy of the wild dogs would be adapted to the terrain. Running in relays would result when the prey in front of the lead dog turns wide and the dogs in the rear could intercept it by taking a short cut along one of the many narrow game trails that labyrinth through the dense scrub.

Often chital and sambar kills are found near water and this has led to the common deduction that deer at bay will run to water in their attempt to escape. Many kills, however, are made when deer come to water or at traditional crossing points along the river which they use while travelling from one browsing area to another. Another reason for so many kills being made near a river is that the prey takes the swiftest route away from the dogs, which is down hill where, coincidentally, lies the river.

Beyond doubt, our study confirms that the wild dogs are to be left in peace in the Nilgiris as they are the remaining major predators regulating the deer population. Shooting by sportsmen for 'trophy stags' has little value in maintaining the deer population as the fawn, does, young stags and aged stags would rapidly produce a situation of overpopulation, overgrazing and ultimately, enormous deer mortality from starvation and stress disease (aggravated also by competition with indigenous domestic cattle). As the wild dogs kill on a random-chance basis and as they rarely take sub-adult deer, 1-2 years old, which will be highly productive, their predation is ecologically more adaptive than the human pattern of hunting only trophy stags. The question is whether we are going to allow these graceful hunters to do their job undisturbed.

#### REFERENCE

- SCHALLER, G. B. (1967): *The Deer and the Tiger*. University Press, Chicago