

THE ETHNO-BIOLOGY OF THE !XO BUSHMEN,
KNOWLEDGE CONCERNING MEDIUM AND SMALLER MAMMALS

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ABSTRACT

This paper deals with the Bushmen's ethno-biological knowledge of medium and smaller sized mammals. It is based on direct observations and the correct reading and interpretation of animal spoor. The latter method, as employed by the Bushmen, becomes particularly significant in illustrating the behaviour of nocturnal animals. A check-list of common-, scientific-, !xo and Nharo names is given. Aspects of the life cycles, as far as known to the !xo, are presented for most of the animals discussed and in places mistakes are pointed out by the author. He also acknowledges that Bushmen are far off mark when the time element is introduced. This applies to onset of heat, gestation periods, time of sexual maturity etc. However, the information given shows that the !xo is highly aware of the dynamics of his ecosystem. Though some synonymy occurs among genera with smaller or insignificant species, the !xo is perfectly aware of the actual number of species represented in his area. His approach is anthropomorphic and he lacks any form of superstition regarding these mammals. This paper stresses that the !xo are concerned with all animals and spend much time in observing even the insignificant ones. Mistakes in observation or deduction are perhaps as significant as the correct interpretations.

INTRODUCTION

A previous paper was an attempt to give an insight into the depth and breadth of a Bushmen's biological knowledge, based, as it was in this case, on observations of ungulate behaviour and deductions drawn from these observations (HEINZ 1977).

The following paper, is devoted to the predators and all other mammals of which the !xo Bushman has some experience. He has a much broader knowledge of the former group because these animals may endanger him, prey upon the animals which form a part of his protein diet, or are a source of money and trade goods, insofar as he makes use of their pelts. The majority of the second group, with the exception of the spring hare, porcupine, hare and antbear, are basically of no interest to him since most of these are not eaten either being subterranean or nocturnal in their habits or taboo to him. Any biological information about these creatures which the Bushmen possessed was therefore not obtained with any utilitarian motives but for the sake of personal biological interest or as one might say "scientia gratia scientis" – science for science

sake. And here we have a trait in which the Bushmen stands out alone among all pre-literate peoples of Africa.

It is not the purpose of this paper to give an exhaustive biological inventory, but rather to show how far the Bushman has occupied his mind and interest himself with even such insignificant creatures as shrews, mice, or mole rats. Although I have made comments concerning the factuality of information, once again I invite zoologist or field biologists to submit their views concerning the factual correctness of what I have written, particularly as it effects the predators. It is intended, at a later time to evaluate all such suggestions in a comprehensive study of the Bushmen's role and place in his ecosystem.

METHOD

While I was well acquainted with the larger and medium sized mammals of the Kalahari desert, I could not say this for the smaller forms. Many of these are nocturnal and they, as well as the diurnal forms, are uncommonly encountered. It was therefore imperative to employ coloured pictures for their identification. Here ROBERT'S monograph "Mammals of South Africa" proved invaluable. I am fully aware of the shortcomings of such a picture book method but submit that my interpreter, Mr. FRED MORRIS, had a wide range of biological knowledge. With his aid we were able to identify probably the majority of the smaller mammals present. That this method had merit is shown by the fact that, for example, the Bushmen were quite sure that there were only two species of hare (*Lepus*) in their area — a fact later confirmed by SMITHERS' "The Mammals of Botswana" 1971. In most cases from a systematic point of view it was unimportant, whether the !xo were able to recognize the pictures of the three or four species of a certain genus found in their environment, because usually all four had the same Bushmen name. It appeared to be much more significant that they were aware of the existence of four separate species. (In most cases, in fact, they correctly identified the species recorded from their area or from the Kalahari proper.) All information was gleaned in daily work sessions with four or five informants whom I believe had a somewhat higher than average repertoire of biological knowledge. Leading questions were avoided but information was obtained in a systematic manner. Inasmuch as the interpreter and two informants were fluent in Nharo as well, I felt it to be of value to cite common names in !xo and Nharo.

CHECK LIST OF MAMMALS AND THEIR !XO AND NHARO NAMES

Common name	Scientific name	!xo name	Nharo name
1. Vervet monkey	<i>Cercopithecus aethiops</i>	—	djiri
2. Baboon	<i>Papio ursinus</i>	galave	/oara
3. Shrew	Probably <i>Crocidura hirta</i>	to /ote	!oma lou
4. Shrew	Probably <i>Crocidura bicolor</i>	!olo kei	—
5. Hedgehog	<i>Etinaceus frontalis</i>	//ona	/xana
6. Bat	<i>Chiroptera</i> sp.	<u>dahn</u> dakei	!eijn <u>ata</u>
(All bats have the same name.)			
7. Genet	<i>Genetta</i> sp.	n!ala	djamga
8. Civet	<i>Viverra civetta</i>	n!ala	djamga
9. Banded mongoose	<i>Mungos mungo</i>	gelisheto	dauhanga
10. Dwarf Mongoose	<i>Helogale pervula</i>	/goli	dchadam n/oli
11. Selous mongoose	<i>Parecynictis selousi</i>	/goli	ŋ/ou n/oe
12. Suricate Mongoose	<i>Suricata suricata</i>	gahna	!ai
13. Slender mongoose	<i>Herpestes sanguineus</i>	gahna	?
14. Yellow mongoose	<i>Cynictis penicillata</i>	/goli	ŋ/ou n/oe
15. Striped polecat	<i>Ictonyx striatus</i>	<u>daa</u>	<u>daa</u>
16. Hyena (brown)	<i>Hyaena brunnea</i>	/ <u>u</u>	nucha
17. Hyena (spotted)	<i>Crocuta crocuta</i>	g//au	//au
18. Aarwolf	<i>Proteles cristatus</i>	/ <u>i</u>	/ <u>i</u>
19. Wildcat	<i>Felis libyca</i>	Øxuh	ŋ/ <u>oah</u>
20. Black-footed cat	<i>Felis nigripes</i>	/am da ŋ//ale	dareūh
21. Caracal	<i>Felis caracal</i>	kafoe	†emē
22. Cheetah	<i>Acinonyx jubatus</i>	!au	!au
23. Leopard	<i>Panthera pardus</i>	//ui	!oē
24. Lion	<i>Panthera leo</i>	/ai	xam
25. Wild dog	<i>Lycaon pictus</i>	†xoi	//aru
26. Black-backed jackal	<i>Canis mesomelas</i> ¹⁾	gause	/ixī
27. Silver fox	<i>Vulpes chama</i>	†ou	†xana
28. Bat-eared fox	<i>Otocyon megalotis</i>	//ei	//a
29. Honey-badger Ratel	<i>Mellivora capensis</i>	!galocē	!garocē
30. Elephant	<i>Loxodonta africana</i>	—	†xoa
31. Scaly anteater	<i>Manis temmincki</i>	//um	n†imī

Common name	Scientific name	!xo name	Nharo name
32. Antbear	Orycteropus afer	/xeije	!o
33. Rhinoceros (black)	Diceros bicornis	-	/ih
34. Zebra, Burchells	Equus burchelli	-	†hadibia
35. Hippopotamus	Hippopotamus amphibius	-	!xoh
36. Warthog	Phacochoerus	//x̄u	//x̄u
37. Giraffe	Giraffa camelopardalis	//uh	n†abē
38. Buffalo	Syncerus caffer	/ih̄	/au
39. Porcupine	Hystrix africaeaustralis	ŋ/u	ŋ/ōē
40. Spring Hare	Pedetes capensis	/noe	†oḥ
41. Ground squirrel	Xerus inauris	chana	ŋ//au
42. Arboreal dormouse	Graphiurus murinus	gulukey	ŋ†olu
43. Desert rat	Zelotomys woosnami	gulukey	ŋ†olu
44. Damara mole	Cryptomys damarensis	/x̄u	shugu
45. Namaqua gerbil	Desmodillus auricularis	n†oije	//ou
46. Bushveld gerbil	Tatera leucogaster (prob.)	n†oije	//ou
47. Brant's gerbil	Tatera griquae	n†oije	//ou
48. Several species of mice		n†oije	//ou
49. Hare, Cape	Lepus capensis	ŋ!u	!ua
50. Hare, Scrub	Lepus saxatilis	ŋ!u	!ua

MEDIUM SIZE MAMMALS. CANINES

The BROWN HYENA is a monogamous nocturnal scavenger which pairs for life. The females come in heat during the summer and have a gestation period of eight months. The young are sexually mature within five months so that the first litter is born, usually in an antbear hole, when a female is just over one year old. She has two to three cubs once a year which are born during the winter just like the young of the cat family. When the cubs are about eight months old, they are chased away by the mother.

8 months is almost certainly too long a gestation period. Young are not sexually mature after five months, probably after about 2 years. They don't breed every year and I have found young born in summer months as well as winter. Cubs stay at dens for about 15 months (M. MILLS).

There is a desire to make their presence known in an area because both males and females defecate under a certain tree and the male marks his environs with a scent material, but they don't have a confined territory. Females also mark with a scent

material. Often males which meet at night, fight and create a lot of noise. They can often be easily shot by moonlight. During the day these animals remain in a hole which they generally dig under a tree, or they may even cover themselves with sand.

During the night they travel great distances in search of food, covering a distance of twenty miles or more. Their hunting usually begins at about 4 pm. (pointing to the sun). The !xo say that they have watched hyenas sleeping in their lairs and seen them wake up, rise and observe the flight direction of vultures in the sky before trotting off in a similar direction.²⁾ Hyenas are also attracted to kills by the baying of jackals. Being very fast walkers they are able to reach the location of the disturbance very quickly even though, to get there they traverse thick bush. They move silently lest they be attacked by a lion or leopard at the site of the kill. Whether it be light or a dark night they are equally active at any time, often they will follow a car track for miles, attracted only by the unfamiliar smell. Antelopes take flight at the scent of a hyena since it will kill small buck as well as vultures if it can succeed in catching them.

The SPOTTED HYENA is a carnivore which kills for its food, since it does not eat decayed meat. The !xo admit that they do not know much about it because it is rare in their area. The Bushmen say that they do not follow this hyena when they hear its cry because it travels far and is usually gone the next day. While hunting it attacks buck by the tail, first, they say, eating this before biting pieces out of the hind leg. The spotted hyena can run as fast as many buck and easily outpaces a horse.³⁾ It hunts alone and is never accompanied by its mate. Pairing is not for life and after mating male and female each go their individual ways. They have seen evidence of a fight with a leopard and judging by blood and tracks both were injured badly.

There are sufficient records that hyenas hunt, either in packs or pairs, however very marked local differences are also recorded.

The AARDWOLF is a harmless animal eating only ants and termites which it digs from their nests. It is a nocturnal animal that wakes at sunset and emerges from its hole. There it usually sits a while before setting out on its search for food. These animals are monogamous and both male and female live in the same hole which they either dig themselves or take over from an antbear. The female has a gestation period of four months and during the summer usually whelps three to four pups in a litter. When the young are 4 - 5 months old they are chased away by the mother.

The aardwolf has a confined territory even though this is rather small, extending about a thousand paces in any direction from its lair. It probably wishes to mark only the area of the lair, but it does so by digging holes and defecating into these. Trespassing males are fiercely fought, and such encounters are commonplace. Fights are very common, otherwise this creature is extremely peaceful. It marks with a scent from anal glands.

The CAPE HUNTING or WILD DOG is a true hunter, not a scavenger, which hunts nocturnally in packs of three to fifteen animals, during the day sleeping under bushes. They skin killed animals neatly, starting from the rear and pulling the skin towards the head. While one is doing this the others are already consuming the rest of the carcass. Such a pack can easily devour the entire body of a small buck. While feeding they sometimes bite another one's leg or snout, but they are eating so eagerly that this passes unnoticed.

The females are sexually mature at about five months. Males mate with any and as many females as the opportunity presents, there being no attachment to any one particular female. Young are born during the winter when the bitch is about one year old. She usually throws three pups in an antbear hole where she remains for only a short time, before going off in search for food.

When the pups attain the size of a small dog they leave with their mother to occupy a new hole and it is at this time that the young begin to hunt with the dame. Because several females have puppies at the same time, the pack stays more or less together. The males will not enter the holes of the females but sleep outside. It is not until the young are ready to accompany the older dogs that the pack hunts together again.

These dogs do not confine themselves to any special territory but roam widely over vast areas. Nevertheless they mark their passage by urination and defecation. If one animal urinates, all males and females will then do likewise. They exude a very strong scent which can easily be detected by the other animals. When a pack is near, all the buck will leave the vicinity and disperse in the bush. Pans, in which game collects at night, are left instantaneously deserted. They can literally eat a buck alive while running and there is no escape. While chasing a buck, they work in a line and when the foremost pursuer tires he emits a high gurgling noise as a sign and the next hunter takes over the chase. They are known to attack even the dangerous gemsbok to get at its young and by coming forward one at a time they distract the mother. Cape

hunting dogs are not afraid to attack a leopard and XAMN!UA has seen a pack attack a lion. MIDUM tried to fight off a pack from a gemsbok that the dogs had killed but they almost killed and devoured him in the process. Leopards have a mortal fear of these dogs. DAUSA once came upon a camelthorn tree in which a leopard had died of starvation. Before the leopards face hung a dead dog, which, while attempting to spring into the tree, had hooked itself under the jaw on one of the sharp broken branches. The leopard did not dare to come down evidently thinking the dog would still attack it.

GOCHOLU⁴⁾ reports a similar case. A leopard, while killing a duiker, was surprised by a pack of dogs and quickly climbed a tree with its kill. The dog pack swarmed around the tree so much that the ground was swept clean by their feet. He saw that a dog which had jumped up, was caught in a sharp branch, this piercing the throat and emerging in the soft parts near the nose. The leopard, confronted by the transfixed body was so frightened that he, though not short of food, had not dared to eat for over 24 hours. Only when GOCHOLU approached was the spell of the dead dog broken, the leopard then jumped off the tree and disappeared.

The usual cry of the hunting dog is a "whure-whure-whure" but when it has killed, the cry changes to "thxulu-thxulu-thxulu". When game has been killed and a man arrives, a deep warning bark is sounded.

BLACK-BACKED JACKAL. This is both a scavenger and a hunter. The male is monogamous and mates for life with a single female who is sexually mature at the age of 3 - 4 months. After mating her gestation period is 2 months. Once a year during spring she whelps four to five puppies in a hole chosen for nursery. Six weeks later these pups emerge and are taught to hunt by their mother who catches rabbits and opens them so that the young can eat. While she hunts with her mate the young sleep. When the pups are almost full grown they are chased away to live independently.

Sometimes it appears as if jackals are hunting in packs but this only consists of the male and female and their pups. At night jackals frequently call to each other. They do not have territories but travel widely, and jackals seen yesterday at Lone Tree (22 miles away) may be seen here today. Though they have no territories males still fight much amongst themselves. They have a very good sense of smell and hunt only by nose.

They are, moreover, very clever and when attacked by a lion or leopard will play dead, the attacker then losing interest in the dead jackal. "He is a clever old man", XAMN!UA said, "When he has annoyed a lion too much and the lion goes for him, he will run straight past a hyena waiting in the bushes. The lion now attacks the hyena and forgets about him." Vultures and jackals will eat together at the same kill, and never fight.

SILVER FOX (jackal). These foxes are not scavengers but hunt and kill rabbits, korhaan and other birds for food. They avoid the black-backed jackal, being smaller in size.

A female is sexually mature at 4 months. She generally comes on heat late in summer and has a gestation period of four months. Being polygamous a male mates with several females and lives with two in the same lair. They, nevertheless, pair up for life. In their love play they nip each other gently. During the first rains a litter up to four pups in a spring hare hole selected for the purpose are born. There is only one litter annually and when the young have grown a little bigger this hole is abandoned. Puff-adders and mambas will often attack the adult foxes so that they can devour the puppies. This species of fox is not as clever as his black-backed cousin. There is no territoriality and each animal hunts on its own, starting in the late afternoon from about 5 pm. until 11 pm. The adults call to each other while hunting in a sort of laugh while the puppies also keep in contact by means of a high pitched whistle. The main enemies are the leopard and the caracal cat.

BAT EARED FOX. This is a nocturnal insect eater but will devour birds if they are caught in a snare, being unable to catch them on its own. A female has her first heat when about five months old, and shares a male with several other females, all living together. Like the silver jackal (fox) the male also often bites the female gently in love play, but males will frequently fight fiercely over females. The gestation period of the female lasts for four months and then three to five young are born in a spring-hare nursery hole. The adults normally only lie up under bushes. When the young are two and a half months old the mother takes them out and teaches them to seek for their food. These foxes search for food in packs between about 5 pm. and 11 pm. in the evening, calling to each other in a sort of laugh. They will eat flying ants from the ground or dig them from their nests.

Like jackals the long eared foxes do not have any particular territories but travel over great distances. They are clever animals and will often run away downwind. Their chief enemies are the caracal cat and the leopard.

MEDIUM SIZE MAMMALS. FELINES.

LION. This is a dangerous animal and thus one which is not closely watched by the Bushmen who only read the spoor. For this reason they know nothing concerning the sexual maturity. A male may have two mates, the young being born in the winter after the gestation period of four months, usually in a nest under a dead tree. The male may be there with his mate but leaves for short periods to hunt. Cubs are often born in the summer. The male usually leaves the mate. Later the female teaches the growing cubs to hunt. Adults hunt in prides and big fights can sometimes occur at a kill when a male is chased away by the others.

Lions prefer to sleep during the daytime especially during the heat of midday. They do not like to burn their paws on the hot sand and get angry quickly when forced to do this on being chased.

Lions sleep so soundly that one may step on them asleep quite accidentally. They are very curious and will follow the Bushmen for miles without any intention of attacking. Sometimes they come right into a Bushmen village at night, stepping over people without waking or harming them. At Takatshwani there was a very friendly male lion that would approach humans with his ears flapping like a dog, but the Bushmen were afraid to trust him too far. He, however, never killed or harmed anyone though women would encounter him while they were collecting veldfood.

The Bushmen generally avoid the lions completely, but MIDUM was asked to kill one when he was young. By accomplishing this feat with a spear he established great prestige for himself.

LEOPARD. This animal only eats what he hunts and kills. The female is five, the male six months old when sexually mature. Before mating there is a prolonged courtship. This has never been directly observed but is deduced from tracks in the sand. Evidently there is much activity during the course of which the female jumps into a tree. The male follows and coaxes her down again, this procedure being repeated

many times in different forms before mating occurs. Kittens are born in some appropriate depression or nesting hole in the winter — after a gestation period of six months. When the young are one and a half months old the mother leaves the hole to look for food for her family. She kills a hare or some other small animal and brings it to her offspring where she opens it so that they can feed. Later she returns with a live animal and lets the kittens kill it.

The male remains with his mate until the young are half grown, after which time they separate, for female leopards take a new mate each season. Hunting is done at night, and they sleep under a tree during the day time. They are not territorial but they mark the areas they have covered by digging holes and defecating and urinating in them. At night like the lion, the leopard will not remain near a road if it sees lights approaching. A leopard's attack can be warded off by rigorously fighting back. GRUCHA had such an encounter, the leopard ultimately fleeing. This animal feeds mainly on steenbok and smaller cats.

CHEETAH. The !xo know little about these felines because they are so rare. They are diurnal except on moonlight nights and they feed mainly on the young of the large or small antelopes. They mate monogamously once a year and stay together for that season. The female throws two kittens at the end of winter in a suitable hole in the ground. The older animals hunt with the younger so that prides of three or four are commonly seen, but when they find game, only one of the group makes the kill. While leopards capture their prey by biting through the neck, the cheetah bites through the chest. Because of this hunting habit of pursuing game, they don't like bushy country, and prefer the open plains or pans. The noise emitted by a cheetah is a high pitched fast growl.

The **CARACAL** is generally a nocturnal animal but which sometimes hunts late in the afternoon. They mate during both winter and summer and have litters twice annually. The informants have not seen the love play but have located the places where it took place. This courtship evidently lasts over a period of four days. After copulation the male leaves the female and does not return until the kittens are born, usually under a bush or some dead tree. The Bushmen have read these events from spoors in the sand. A litter usually consists of two kittens which keep in touch with each other at night by means of a birdlike cry. Caracal feed on small animals up to the size of young female springbok. They neither claim territories nor have the

informants seen them marking places. The caracal will avoid meeting the human eye, and besides man, their main natural enemies are leopards. Neither the lion or a wild dog can catch them because they climb trees when pursued, but the leopard is able to follow up after them.

WILDCAT. A nocturnal monogamous and very shy animal showing activity from the late afternoon until early in the morning, and sleeping in thick bushes during the day. Twice during the year they have young usually in January and again in late April or May. A litter consists of four kittens. The male stays with his mate the entire year. Copulation takes place after love play lasting about three days. Their food consists of mice, lizards, korhaan, guinea fowl, partridge, spring hare and rabbits. They hunt wherever they please and have no sense of territoriality. Their main natural enemies are caracal, and leopard which can follow them into trees. Eagles also prey on them. Some Bushmen eat wildcats but this is a matter of individual taste.

BLACK-FOOTED CAT. This is a rare nocturnal feline species. After two days of love play in a chosen area copulation takes place. Kittens are born twice a year. Those conceived of a spring mating arrive in summer while those conceived during February after rains, are born in May-June. A litter consists of two to three kittens and the nest is usually found in an antbear hole but may be in any other suitable den. The males do not stay with their females all the time. They will go out hunting but always come back to look for her. This cat is not a fast runner and does not climb a tree. It rather rolls on its side for defence and in this position it can put up a good fight. A sense of territoriality is not developed amongst these cats which live mainly on mice, rats, lizards, korhaan and other small birds such as larks, which sleep on the ground. The informants professed to know of no other enemies except the caracal, dog and man. It can be eaten by Bushmen without fear of a taboo.

OTHER MEDIUM SIZED MAMMALS

ANTBEAR. This is a very shy, silent, nocturnal animal which only emits a cry when it is being killed. There is not special mating season, copulation taking place at any time of the year. This was never observed, taking place at night, but the copulation places have been found. The single young is born sometime between summer and spring. They live in a circumscribed territory in which they have several lairs, but the nest hole is large and deep with a pile of excavated sand outside the entrance. The

!xo do not follow them into their holes, but other Bushmen tribes may do so. The former prefer to set traps i.e. snares, and another type of trap in which a large quantity of sand is suspended above the animal and which when released drops thus burying and trapping its victim. When caught, antbears do not bite but scratch viciously. They subsist on termites and ants which they lick up with their long sticky tongues. Their natural enemies are mainly lions and leopards.

SCALY ANTBEAR (pangolin). This is a rare usually nocturnal monogamous animal which sometimes is also encountered during the day. Mating must take place at any time during the year since the single young may be born at any season. The Bushmen have neither seen the copulation process nor the mating places and think that it must take place under ground. Every year a new mate is taken. They live generally in antbear holes or lie up under grass or leaves. They walk only on their hind legs but when in danger, they roll up rather than run, and they do not fight. They feed only on ants and make a little hole near an ant nest. The ants accumulate there and the antbear licks them up. Scaly antbears are preyed upon principally by the brown hyena and the leopard.

PORCUPINE. This is generally a monogamous nocturnal animal which begins its activities in the late afternoon and ends in the arly morning. They live in lairs which they take away from antbears by contaminating the hole with their own urine. This hole then stinks so badly that the antbear is forced to leave. However if the warren has side branches the porcupine may occupy one branch while the antbear remains in another. Sometimes porcupines live alone but two or more may be found in an enlarged warren. Though monogamous, males sometimes pair up with a young and an old female. Before copulation, porcupines play extensively at different places. After mating a union lasts for life. The Bushmen have killed porcupine females and seen the male set forth to fetch another female and returning to his own lair with her.

There are two heats a year so that copulation may take place both in summer and winter and litters with four young may be expected at either time, usually there are one or two young in a litter, which are looked after by the mother. As the young get larger they play outside the hole during the day time.

These animals do not lay claim to any territory by marking or fighting except when they are with young. Then both are vicious defenders of their land. The porcupine make regular runs on which they travel from their holes to their grazing places before foraging at random, but they have no hesitation in leaving their territory completely when there is a shortage of food.

Porcupines eat many types of roots, and are particularly fond of the bitter varieties. While grazing they cry "djhe-he-he-he djhe-he-he-he" or "djeheee djeheee". They are slow runners and if attacked they can shoot out their quills. Usually they retreat into some corner exposing only their quills to the assailant. Their main enemies are the lions and leopards which may become sorely wounded or lamed from quills in their paws.

HONEY BADGER. This diurnal and nocturnal animal lives mainly in disused antbear, porcupine or springhare holes so it never makes it own lair. Copulation takes place twice a year, in the summer and again in winter and they produce young during these two seasons. My informants did not know the gestation period but say that only one or two cubs are born. The male is monogamous and pairing is for life. The male and female always hunt together, usually in the vicinity of their hole if they have one and always chase other males away from their territory. Otherwise they forage widely and sleep under any convenient bush. When fighting they emit a "chirr-chirr-chirr" sound. Honey badgers have a wide range of food extending from snakes, scorpions, tortoises, gerbils and small rodents to small antelopes. The Bushmen have seen this badger drag a duiker for two miles to his lair. They can even kill a python which they intoxicate with their scent. In addition a snake's fang cannot penetrate the hard skin on their backs.

They are very fond of honey and will dig all around a hollow bee tree until they find a hole underneath into which they can climb to get at the honey, otherwise they tear away the bark and wood. Bee stings do not disturb this animal which will seek honey in old termitaria eating their fill on the spot and later coming back for more. Only leopards and domestic dogs kill these animals, other predators, even wild dogs leaving them alone because of their smell. The Bushmen knew of no honey badger ever having been attacked by wild dogs.

POLECAT. There are two known varieties, both of which live in springhare holes or sometimes dig their own. They are monogamous nocturnal animals coming out late in the afternoon. Males and females remain together the entire season. During the summer they usually have a litter of two young. They have territories, and the males fight for possession of these. Their diet comprises mainly scorpions, large spiders, snakes, beetles, beetle grubs, and small birds. Their chief enemies are lion, leopard, caracal, and jackals.

BABOON. During the winter these animals sometimes come down the Okwa valley from the north at Tshwane. The Bushmen knew nothing of how the baboons live because of their migratory habits, and hence are not concerned about them. These apes are very clever and they can not easily be caught in a trap. Their method of digging for food is very humanlike. Sometimes a single male travels about alone, but baboons usually travel in a troop with a big male as their leader. The females usually have one offspring at a time. Bushmen do not eat baboons because they are „little people“.

SMALLER MAMMALS

SHREWS — live like mice and can be seen by night or during the daytime. They live in holes in the ground into which they take grass that has been chewed to prepare a soft nest. From their holes they move along small runs which they make. On the ground they often move by jumping but they also climb into trees springing from one branch to the other. Their nest always has two entrances to allow for escape. The informants did not know when the young are born or more details about their social habits because no one ever digs them out, since they are not eaten. They have about four young, and the Bushmen have not observed any population fluctuations. Shrews live mainly on roots but the informants could not say whether insects form a part of their diet. They are preyed upon by wild cats, jackals, and silver jackals, snakes and genets. The !xo know of three species, one lives in tree holes and is darker grey, one has a furry tail. The latter is distinguished by name (!olokē). According to SMITHERS (1971) only two species are likely to occur in the area of the !xo.

HEDGEHOG. This is a nocturnal insect eater which lives in holes or rotted thickets of grass. The !xo have never seen them with young and though a female with milk was caught they could not estimate how many young she had. They are, in fact,

seldom seen at all except during the winter months when they appear, but in the summer most of them cannot be found.

When in danger, the hedgehog curls up and it is preyed upon by the honey badger, brown hyena, and the giant owl (*Nyctaeus lacteus verreauxi*) but not by snakes. Their main diet consists of ants and termites though they eat other insects as well. Only Bushmen that wish to become doctors will eat this animal.

FRUIT BATS. These are nocturnal animals which live in porcupine or antbear holes in the ground. There always being several together. The porcupine nest chamber has a small hole on one side and it is here that the !xo think that these bats breed, but they have never seen them do so. Within the nesting places many moths wings can be found suggesting that the bats eat these, however they live mainly on the berries of the *Boscia albitrunca*-tree.

This rendition seems to be very confusing. I know of no fruit bats that are also insectivorous. SMITHERS (1971) does not record fruit bats from the area of the !xo, nor even south of Ngamiland in Botswana, though they occur in the Transvaal. It would appear that the !xo are confusing an insectivorous — with a fruit bat.

BATS. Besides fruit bats there are three other species all of which have been found drowned in the water reservoir at Takatshwane. These live in tree holes or under loose bark and all are nocturnal, their activity extending mainly from sunset to about 11 pm. All are insectivorous and are preyed upon by owls and snakes but Bushmen will not eat them. Bats are not subject to population fluctuations, though they are apparently more commonly seen during the winter than the summer months. (I presume that this was meant to be: more common in summer than winter.) Sometimes bats enter the Bushmen dwellings and except for chirping they do not annoy anyone, and so are left in peace.

MONGOOSE. There are a number of different species all of which are diurnal but differ in their habits. The Banded Mongoose kill snakes and eat beetles, scorpions, caterpillars and large spiders. They live in colonies and when they go out to hunt in troops they are always in communication with each other. When they run, their tails are held stiffly erect.

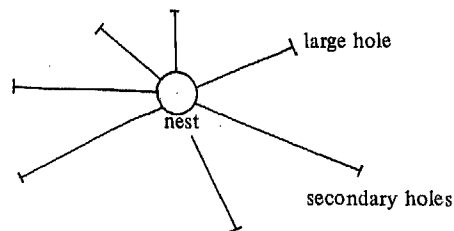
The Slender Mongoose lives in ground or tree holes and eats birds, lizards and mice. These creatures are not colonial but have been seen hunting in pairs.

The Yellow Mongoose (probably) lives in ground holes or under bushes or these creatures make warrens in the flats and pans. Their nests usually have several entrances. They do not fight snakes but eat flying ants, scorpions and beetles. Mongooses have young generally in December, a litter consisting of 2 - 3 cubs. All mongooses are very jealous of their territory and fight for it. Those pairs living in trees, especially are chased when they come down to the ground. They all leave their mark by defecating in a special place. Each one has its own latrine to which it always returns. All these animals are preyed upon by the caracal, giant owl and eagles. Bushmen of all age and sex groups eat them.

GENET. A nocturnal animal which breeds in the summer. The black and white genet lives in tree holes or in mongoose holes, while the rusty-spotted species prefers to go under a fallen tree which is overgrown with grass. The male remains in the vicinity of the female when she has her 3 - 4 young but does not stay with her. When the female wants the little ones to come to her she emits a peculiar call. Females claim territories but so also do the males which engage in violent fights. Their food consists of mice, hedgehogs, crested korhaan and other birds. The caracal, leopard, cheetah and brown hyena prey upon them.

CIVET CAT. According to SMITHERS (1971), the civet only occurs in the northern part of Botswana, though one record is given in the eastern area. It is noteworthy, that the !xos had no difficulty in identifying this creature as depicted by ROBERTS' illustrations. Of it, they say that it behaves like the genet and also has four young, but that it lives in springhare holes.

SPRINGHARE. This is a nocturnal animal mating twice a year in summer and winter. Mating takes place at night in the open pans and valleys, my informants therefore disclaim having seen it. They live in colonies but each male has only one female. Within a springhare nest are usually four animals, two males and two females. Each female bears only one young. They build on one side of pans or valleys, never within them. A warren has specific structure:



There are at least two openings on opposite sides.

The males engage in frequent fights but it is not certain whether this is to defend a territory or has some association with females. These conflicts are not dangerous and they never kill each other. Their diet consists of certain bulbous roots, rotten wood, the roots of bushes, grass and the wood of small bushes. When food near their warren gets scarce they are known to travel extensively to satisfy their needs. While grazing they chatter a cry "heh heh heh heh". They are preyed upon by caracal, wildcats, jackals, honeybadgers, eagles, and large owls but not the giant owl. Bushmen of both sexes and all ages eat this rodent.

GROUND SQUIRREL. These are colonial animals, very active during the day. They can be easily recognized by the way their tail swishes back and forth while running. They mate twice a year and have their young in winter and summer. While mating the male chases the female with his tail bristling and she encourages their romping until she finally lays down. They usually have four young but sometimes as few as one. Ground squirrels make warrens like springhares but with many more entrances, the nest is situated where the crossburrows meet. Two to six animals are found within such a nest. They never crawl - but always jump out of their holes even when dug out. Their curiosity is a well known feature and though they run for their hole when danger is apparent, they immediately turn around and come up to look. They are silent except when they see danger, then they warn each other with a whistle. Snakes, especially cobras like squirrel holes and often enter. The squirrels, knowing that they will be eaten, promptly vacate their warren. They live on roots, devilkies, and the dry dung of wildebeest, gemsbok, hartebeest and even cattle. They are preyed upon by eagles and domestic dogs but not by hawks. Bushmen never eat ground squirrels when adult, though children sometimes catch them.

DORMICE. These are generally active during the day but sometimes at night. They nest in tree holes and within such a nest is always a single male and female. The male does not leave his mate. They copulate at least twice a year and at any season. The litter contains from two to four young. Dormice are dispersed over a wide area and communicate with a "rrrrr" noise. The Bushmen don't think that they have territories. Their food consists of tsama melon pits, roots, grass-seeds, and berries and they are preyed upon by wildcats, black-footed cats, snakes and owls. Bushmen do not eat them.

MOLE RAT. This large rat lives underground and seldom comes out. (One was caught at our fire.) Heaps of sand thrown up outside their burrows are very commonly seen. Because of their subterranean existence their biology is virtually unknown. Of their foods, the informants knew only *Citrullus* sp. roots. When caught they emit a "zhek zhek zhek" cry. They are a common food of the mole snake.

GERBILS and TATRAS. The habits of all of these rodents are alike and all are nocturnal. They live in or near pans and flats. Because they form large colonies they build extensive warren systems with many nests, tunnels and openings. The informants could not say how often they reproduce nor whether they are monogamous or polygamous. Litters consist of from three to four young. Population fluctuations are very much in evidence. During the year 1967 they were prolific and many of them died. All of those which had died were well nourished, and it is therefore probable that they succumbed to some disease. They eat roots, melon pits, berries and berry pits and their chief enemies are snakes, jackals, wild cats, caracal, black-footed cats, and genets. Bushmen do not eat them.

SPINY MOUSE. Their life is essentially like that of the gerbils.

FIELD MICE. Nocturnal and diurnal, these animals are found in great numbers but they are not as numerous as the gerbils. They live in warrens like gerbils and are also colonial. Their homes are situated on the edge of pans and valleys. Their food habits and their enemies are similar to those of the gerbils.

HARES. These are active late in the afternoon at night and early in the morning. They like to lie up under bushes where they make little depressions in which they relax with their ears back and head looking out. Males are solitary except during breeding time when each stays near his mate. Their copulation has not been seen, but while doing so both sexes emit a sort of laugh, "chwāi chwāi chwāi chwāi". A female throws two or four young once a year during the summer. At this time she is without the male. They make well defined runs under trees and bushes along which they travel. Bushmen take advantage of these runs to prepare their snares. Hares feed on grass, small bushes, or soft rotting wood as well as ashes from fires. Their main enemies are birds of prey, jackals, caracal, wild cats and man. All Bushmen eat hares.

CONCLUSION

The foregoing and the above mentioned paper on the behaviour of ungulates give us already at this stage a unique insight into the Bushmen's approach to and his role in his environment. This statement, therefore merits discussion.

The Bushmen, as a people, are unique observers of the life as it exists around them, even of that which is economically insignificant to them. To do this, they have a singular ability at their disposal. They are not only able to read spoor of animals, not only able to associate a particular spoor with a certain animal – they learn spoor reading in earliest childhood when they are taught to follow that of their own mother – but above all else, they can correctly estimate the comparative ages of spoor. Thus from those animal tracks that lie next to each other, even though they may not be superimposed on each other, they are able to determine which was imprinted first, second etc. They obviously do not merely 'take note' of what they happen to see, but quite on the contrary they must have sat down for hours on end, observing. This will become particularly apparent in a later paper on the entomological knowledge of the !xo. But nature does not so readily reveal its mysteries and secrets. It hides and mantles much. Only some of these secrets can be uncovered by adding two and two together, i.e. by drawing correct deductions after the empirical data has been considered. Where observations and deductions fail him in giving a plausible explanation, the !xo turns to God (Gu/e) saying: "Gu/e made things to be/act that way." (see HEINZ 1975).

Obviously mistakes are made, for the Bushmen have no other aids than their five senses, but then, our botanical study (HEINZ & MAGUIRE 1973) shows that even with our sophisticated Western aids such as the microscope we are not always nearly as certain of the identity of a species as the Bushmen is, who unlike we, does not only apply two of his senses but all of them. If he is often hopelessly incorrect regarding onset of heat, gestation period, and time of sexual maturity, I am not disturbed. The time element in this vast expanse of bushveld means little to him. Much more important appears to be his mental record of the dynamics of his ecosystem, i.e. population fluctuations, climatic variations, major and minor alterations in the plant cover and species profusion etc.

I can not fully agree with SILBERBAUER (1973), when he draws concentric circles with man at the centre and various groups at varying distance from man. He intends to show that the greater the radial distance, the less the Bushman is concerned with these creatures and the less he knows about them. Indeed, SILBERBAUER says, the further the group is from man radially, the greater is the likelihood of the Bushman using 'generic' rather than 'specific' taxa. I believe that this and subsequent material shows that the Bushman is concerned with all creatures around him. If individual taxa give way to group terms, then because there is a considerable degree of similarity or because these are difficult to unravel. There is no such similarity between antelopes as between gerbils and tatas or the various mongooses. However, he is perfectly aware of the number of species of each 'generic' group which occur in his area.

He approaches the animal and perhaps even the botanical world anthropomorphically. When relative stoutness of a plant is considered to be a female attribute and slenderness a male attribute, when seeds are the result of intercourse between the plant stem and the rain, when plants are said to eat, drink and breathe, the !xó has himself in mind and identifies his actions with those of plants and conversely. In his anthropomorphic approach to his biological environment he may particularly stress the one or other creature. Thus the black-backed jackal is praised for his cleverness, and is the source of great mirth for the Bushmen. But is he not doing what we do in Europe when we tell all the tales of Reinecke Fox?

It seems to be singularly significant but all the more indicative of his pragmatic approach that despite his anthropomorphism the !xó has not given any animal other than the gemsbok and the eland any ceremonial significance. The former is the symbol of the exorcising – the latter of the female initiation dance. Other animals may play a role in games such as the ostrich or the honey badger but there is no ceremonial, mythical significance to these games. Indeed the Bushman is not burdened with such superstitions as we are regarding cats, bats, owls or spiders.

It is clear that the !xó have demonstrated a degree of general biological knowledge, even of insignificant animals, which is far greater than would be expected among average representatives of their or of any other society. The men say that children begin to pick up information as they play in the bush, observe, and subsequently ask older children. What women know is not much more than the knowledge of the children, the men say, adding that the only one who had extensive knowledge was a

certain Bushmen in t e r s e x . Biological knowledge is, they claim, concentrated among the men. Though there appears to be some substance to what they say, I do feel that the male ego is inclined to exaggerate. On numerous occasions I observed women make perfectly valid interjections, or sometimes they would make corrections. This was seen when men were asked to imitate snake spoors or give the names of certain insects. Women had extensive knowledge of food plants eaten by young and adult forms of herbivorous animals. It is therefore safe to say that biological information is a part of the repertoire of a broad spectrum of people. The men say that they do not teach their children but that larger ones teach smaller ones and so down the line. Biological knowledge is therefore not acquired through any form of formal education given to children by the adults and this applies to girls as well as boys. Children are free to ask questions, girls ask their mothers, or are corrected when they return with the wrong object. Insofar as girls spend more time in the veld with their mothers than boys with their fathers, they benefit more directly from the experiences of a grown up. Boys going off on little hunting trips with older boys do not have the same benefits. As they get older they do join older men and when hunting cover vastly greater areas and are presented with many more observations than the women. It is here that they accumulate the bulk of their knowledge.

Life histories generally are rendered impartially with little personal comment. Lively discussions, however, are sparked off the moment someone has similar or additional information. Discussions can then become so involved that my presence is completely forgotten. It is then that I realize how personally involved the Bushmen really can become.

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NOTES

- 1) There are 2 types, a short legged- and a long legged one. The small legged one is more black on the back, the sides are more red.
- 2) This information was obtained long before JANE and H. VAN LAWICK-GOODALL'S "Innocent Killers" appeared (see 1968 pp. 27,39).

- 3) This information was obtained several years before HANS KRUUK surprised naturalists by showing the spotted hyena as a predator and hunting even zebra. (Nat. Geogr. Mag. 1968.) It also predates JANE VAN LAWICK-GOODALL'S similar observations given in "Innocent Killers" p. 18.
- 4) GOCHOLU and DAUSA live miles apart, neither knew of the other's experience with a leopard and wild dogs.

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