

First hunters of the forest: Did early man learn to hunt on

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THEY ARE clearly going to hunt. They search silently for prey, following each other in a line, stopping regularly to listen and peer up into the trees. Finally, they approach trees where they hear the crashing of monkeys as they jump from branch to branch - the sound of potential prey. But they see only Diana monkeys, which they rarely prey upon. Falstaff moves on, followed by five other males. Half an hour later, they hear the characteristic cough of a red colobus. Macho and Schubert embrace each other and then all five carefully approach the tall tree in which these monkeys are foraging, oblivious to the presence of the hunters. Falstaff and his band stop to study their targets before selecting the trees they will climb. Schubert and Macho start climbing very quietly, taking care to avoid moving any branches. The others scatter out further west, anticipating the direction in which the colobus monkeys will flee once they catch sight of Macho and Schubert. Falstaff, the old hunter, moves some way in this direction, while the younger males sit and wait for things to happen.

Halfway up his tree on a liana, Schubert suddenly makes a rush and emerges among the colobus monkeys. In panic, they flee - to the west as expected - trailed by Macho and Schubert making loud hunting barks. These are the first calls since the quest for prey began. Pressed by the two 'drivers', two colobus monkeys jump onto smaller trees in the lower part of the forest canopy. Immediately, Rousseau and Kendo, two young males watching from the ground, rush up and try to grab them before they reach the safety of a taller tree. The colobus monkeys are only a third of the weight of their pursuers, however, and bridge the gap to the next emergent tree along branches too small to support the hunters. But Falstaff, playing the part of 'encircler', has anticipated this move and is waiting for them.

In the following confusion, and despite a violent mobbing by the monkeys, Falstaff seizes a juvenile and kills it with a bite to the neck. Joining the other hunters on the ground, Falstaff begins to eat the small prey, sharing the meat with Schubert and Rousseau.

Driver, pursuer, encircler . . . such hunting strategies are supposed to have appeared first among our hominid ancestors. Most palaeoanthropologists consider 'man the hunter' to be the only primate that hunts for meat in a highly organised group. A popular theory says that early hominids, which lived some 3 million years ago, evolved into superior hunters when the climate grew drier and they were forced to adapt to the thinning of the forest. They became better hunters by developing complex patterns of behaviour, including hunting in groups, cooperation and sharing the food they caught.

Unfortunately, excavations at ancient sites rarely show even a trace of such behaviour. How is it then, that this theory is so widely accepted, when its foundations are so shaky? What makes this view still more implausible is that the hunt I have described took place on 16 January 1986, and the hunters were wild chimpanzees living in the dense tropical rainforest of the Tai National Park in the Ivory Coast, West Africa.

A tougher life in the trees?

The theory that hominids had to become more efficient hunters when the forests began to shrink assumes that life on the savanna is more demanding than life in the forest, and particularly so for a hunter. But there are arguments against such an assumption: catching prey is never easy, but at least on the savanna the hunter can see its quarry from a distance and the escape routes of large mammalian prey are usually two-dimensional. Moreover, if a group is to hunt successfully, it must form

	Number of hunts	Group hunts (per cent)	Cooperation (per hunt)
Chimpanzees			
To	83	82	83
Gorilla	83	85	7
Milkfish	54	23	0
Red colobus	147	14	0
Lion	223	22	0
Human	68,784	81.22	0
Wild dogs	54	27	0
Wolf	129	86	0

Table and Worksheet: PHS, respectively

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Private and Carnivore co-operation



a cohesive unit. In dense rainforest, visibility is rarely more than 20 metres, and so members of a group cannot rely on visual signals to maintain contact. Instead, they must keep in contact by other means - such as sounds. Calls have disadvantages: if used too often, they may attract other predators, such as leopards, and the hunters may then become the hunted. Not surprisingly, many forest dwelling mammals - elephant, buffalo, some antelope, wild pigs and mongooses - live in smaller groups than their savanna counterparts, adding a further drawback to hunting in the forest.

The effect of habitat on hunting behaviour can be tested by comparing the strategies that one species adopts in different types of environment. Our closest living relative, the chimpanzee, offers such an opportunity, and is especially relevant in helping us to understand the evolution of hunting in our ancestors. Jane Goodall's study of the chimpanzees of Gombe Stream National Park in Tanzania provides a detailed picture of hunting behaviour in savanna woodland - an open grassland dotted with trees. Her observations, built up over 30 years, are reinforced by the findings of a team of Japanese biologists, led by Toshisada Nishida, which has been studying chimps since the mid-1960s in a more heavily wooded savanna in the Mahale Mountains National Park, 200 kilometres south of Gombe.

In 1979, my wife Hedwige and I began a study of the chimpanzees of the tropical rainforest in the Ivory Coast that led us to compare the hunting strategies of these three different populations of chimps, and to suggest how habitat might influence the way they hunt. The chimpanzees of Tai are different from those of Gombe or Mahale in four main ways.

First, the forest chimpanzees are more highly specialised hunters than those of the savanna. In Tai, prey is exclusively primate, whereas primates form only 69 per cent of the prey taken in Gombe, and 38 per cent of prey in Mahale. Similarly, 91 per cent of prey in Tai belongs to two species, the red colobus (*Colobus badius*) and the black-and-white colobus (*Colobus polykomos*), whereas three species form this proportion in Gombe and nine in Mahale. This difference is not because there are fewer species of potential prey in the forest. On the contrary, Tai chimpanzees have a choice of 27 species that would be suitable prey, while in Mahale the corresponding figure is 23 and in Gombe 16. The implication is that the different groups of chimpanzees are using different hunting strategies.

The second important difference is that forest chimpanzees hunt in groups while savanna chimpanzees are solitary hunters. In Tai, 93 per cent of the hunts observed involved a minimum of two individuals acting in concert. This proportion is much smaller in Gombe (36 per cent) and Mahale (24 per cent). These differences are at least partly explained by the fact that Tai chimpanzees hunt by deliberately seeking out prey more often than savanna chimpanzees do.

For forest chimpanzees, the critical factor in initiating a hunt seems to be the presence of other members of the group who are ready to hunt. Only then will they search for prey, and they restrict themselves to quarry that brings the greatest return and which can usually be found within 20 minutes. In Tai forest, there are 66 red colobus and 15 black-and-white colobus per square kilometre, and the average adult weights are 13 and 20 kilograms respectively. Other species of monkey are either smaller or rarer, and forest antelope are much harder to find. The Tai chimpanzees specialise in hunting colobus monkeys because these provide the best returns.

A third crucial difference between the groups of chimpanzees is that cooperation in hunting is the rule among forest chimpanzees whereas it is the exception in savanna chimps. In Tai, 63 per cent of all observed hunts involved a minimum of two hunters, each performing a different but complementary role. Some hunters act as drivers; others may try a capture by pursuing the prey, another may block a possible escape route simply by sitting in the way, while yet others encircle the prey and wait in ambush for the animal to come to them. Such sophisticated strategies account only for 7 per cent of the hunts seen in Gombe and have never been seen in Mahale. Why should wild chimps hunt in such different ways? In Gombe, chimps do not seem to be any more successful if they hunt in larger groups. In Tai, however, we found that the chance of success increased both with the number of hunters and how well they were organised. The forest seems to force hunters to act together, and to coordinate their actions.

The fourth and final difference between the chimps is that the forest-dwellers share meat more consistently than those that live on the savanna. In Tai, the chimpanzees share meat more than five times as often as the chimps at Gombe do. A Tai chimp in possession of meat is more generous than a Gombe chimp, often holding meat out towards another chimp in a gesture of giving. Males in particular seem to share meat more readily at Tai. There may be a simple explanation for their generosity: hunters must have some reward for their contributions to the catch or they would not cooperate in the future. Without this readiness to share, cooperative hunting would not have become a feature of life in the forest. In Tai, hunters are granted greater access to meat than other members of the group, whereas in Gombe, old males seem to have access to more meat than younger ones, irrespective of the part they played during the hunt.

Contrary to the prevalent anthropological theory, forest chimpanzees are much more organised hunters than the chimps of the savanna. In part, this is because living in the forest is a much bigger challenge to chimps than life on the savanna. Opportunistic hunting probably provides too small a return to become a regular event. In the dense undergrowth of a tropical forest, unexpected

encounters with potential prey on the ground are too rare or too fleeting to rely on. (On one occasion a forest antelope rushed between the arms of a chimp hunter and was gone before the chimps even realised it.) Solitary hunters suffer a second disadvantage when pursuing monkeys in trees: they are heavier and less agile than their prey and stand little chance of catching up with it high in the forest canopy. Organised group hunting seems to be the only solution.

The prey's reactions to the hunter also influence the technique chimps must use to capture it. A prey animal may freeze, hide, flee or attack, or adopt a combination of such responses, depending on whether it is alone or in a group. The response also depends on the prey's physical and cognitive capacities, that is, its understanding of the danger a predator represents and of the way to counter it: a newborn antelope, for example, can do nothing but freeze. The more powerful and intelligent a potential prey species is, the more difficult it will be to catch. In Gombe, the chimpanzees grab baby bushbucks using the simplest technique, 'rush and catch'; they collaborate only when facing powerful and more intelligent baboons.

Palaeoanthropologists say that cooperation, hunting in groups and sharing food are characteristics of the early hominids. I believe that such behaviour is a direct result of the 'arms race' between the hunters and their prey, which is influenced, in turn, by the environment in which the animals live. Both nonhuman and human individuals adapt to their environment: only if hunting proves a successful strategy will they become hunters. Forest chimps face conditions that favour the emergence of cooperation and group hunting; the savanna does not demand such elaborate techniques of chimps. When our ancestors first began to hunt, they must have adapted to their conditions in much the same way. Cooperation or group hunting might not have been necessary to begin with. But until we know more about the environments in which our ancestors hunted and the type of prey they sought, we can only guess at the strategies they employed.

Chimpanzees hunt for meat throughout their range, and it is likely that our common ancestor was a hunter from the very first. Some aspects of 'hominisation' - the development of human characteristics - might have begun before the first true human ancestors appeared. We know that the Rift Valley in East Africa, where most hominid fossils have been found, was forested. If monkeys and antelopes lived in those forests, some of our observations in the Tai forest may apply to our ancestors who inhabited those regions between 5 to 3 million years ago. Although the earliest australopithecine, *Australopithecus afarensis*, walked upright, it apparently retained some skill at climbing. Such a capability would have been an advantage not only in escaping from predators, but also in chasing monkeys in the trees. If the chimps of Tai are a model of how hunting strategies develop, then group hunting, cooperation and the sharing of food could have evolved during the period when hominids dwelt in the forests, and not, as we used to think, on the plains.

* * *

MODELS OF COOPERATION: CHIMPS OR CARNIVORES?

SOME palaeoanthropologists suggest that the chimpanzee is not the best model for understanding the evolution of group hunting. In part, this is because studies of chimpanzees in savanna woodland suggest that they rarely hunt in organised groups. But another reason is that early hominids were supposed to have lived in drier environments than chimpanzees do today.

Some researchers suggest that the social carnivores - the hyenas, jackals and lions for example - provide a better model for cooperative hunting: most of them live in the dry savannas of East Africa and most do hunt mainly in groups.

Our recent observations in the Tai forest alter this picture somewhat: in the forest chimpanzees consistently hunt in groups. Moreover, the hunting strategies of social carnivores seem to differ considerably from those of primates. This suggests that primates might be better models for understanding how cooperation evolved in early hominids after all.

Cooperation, as I see it, requires that individuals hunt in a group in which there is some organisation between the hunters. Simply hunting in a group is not enough. Other biologists consider hunting to be cooperative only if the outcome of the hunt is better for each participant than it would be if they acted alone. I see two problems with this approach. First, cooperative behaviour must be learnt, and animals may have to try out their technique many times before there is any improvement in the overall result. And secondly, cooperation could bring benefits other than an increased supply of meat - improved social status for example. The table compares the performance of the social carnivores with that of hunting primates (baboons and chimpanzees).

Group hunts by carnivores seem to be an adaptation to how well prey can defend themselves. Hyenas, for instance, hunt in groups mainly when they are after zebra which, social themselves, always present a coherent group defence. When hyenas hunt wildebeest, which are easy to single out, they often hunt alone. Similarly, wolves form a larger group to hunt moose than they do for much smaller deer.

Another difference between the social carnivores and chimps is that an increase in the number of group hunts corresponds to an increase in cooperation. This is not true of social carnivores.

A drier environment does not necessarily lead to the development of group hunting, as the proponents of the carnivore model suggest. Baboons, which live in the same dry savannas as the carnivores, do not hunt cooperatively. For chimps, it seems to be the forest environment that favoured the emergence of cooperation.

Although carnivores commonly hunt in groups and share the kill, they rarely cooperate in a hunt. Evolution of cooperation between members of a group is not, then, a direct by-product of these behaviours. I believe that cooperation may evolve only in certain conditions, and that those conditions may be lacking in the present-day East African savanna.

	Number of Group hunts		Cooperation hunts (per cent)	
	----- PRIMATES -----			
Chimpanzee Tai	80	92	63	Gombe
	86	36	7	Mahale
	34	23	0	
Baboons	147	14	0	
	----- CARNIVORES -----			
Lion	523	52	5	Hyena*
	46,164	91,35	0	Wild dogs
	54	91	0	
Wolf	103	86	3	
	----- * Zebra and Wildebeest prey, respectively -----			

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