

The Predatory Baboons of Kekopey

by Robert S. O. Harding and Shirley C. Strum

These primates, rapidly learning to exploit a new food resource that resulted from an antelope population explosion, are causing speculation about early man's meat-eating habits

The olive baboons moved slowly across the African plain that lay deep in the shadow of the cliffs on whose ledges the troop would sleep in safety for the night. Suddenly, an adult male stopped in the foot-high grass and pounced. The sharp bleat that followed betrayed the presence of a newborn Thomson's gazelle, still too weak to outrun its captor.

The baboon held the infant to the ground and tore at its soft belly with his teeth. When the antelope stopped moving, the baboon commenced eating, but perhaps intimidated by the presence of other male baboons, which had approached and were staring at the scene, he picked up the carcass in his jaws and ran twenty yards away. The others pursued. Within an hour the male had consumed most of the flesh, but as he walked away from the remains another male quickly seized the last bits of flesh and skin.

Incidents of this sort have become quite common among the baboon troops that range freely through Kekopey, a cattle ranch near the village of Gilgil, 70 miles northwest of Nairobi, in the Central Rift Valley of Kenya. Although Kekopey comprises 45,000 acres, the grass that grows sparsely in the arid climate supports only 4,500 cattle. Large portions of the ranch are covered with lava rubble, and other evidence of the volcanic activity that characterizes much of the rift valley is scattered throughout the area—steam hisses from cracks in the earth, and extinct

ash cones and craters dot the landscape.

The central part of the ranch, however, consists of open grassland broken by patches of an aromatic camphorous shrub that the Masai people call *leleshwa*. Additional grassland has been created over the years by ranch workers who cleared away some of this scrub. Water troughs for cattle are scattered over much of this open land, and many kinds of animals take advantage of the ready supply.

Impala and Thomson's gazelle are the dominant antelope species in this part of the ranch. In 1970, when we first began our study, their exact numbers were not known, but a survey on 18,000 acres of open grassland and scrub on the ranch resulted in a count of 800 impala and 1,600 Thomson's gazelle. Baboons also inhabit this part of the ranch; our 1970 census, which covered some of this area, showed seven troops ranging in size from 35 to 135 animals and living in overlapping home ranges.

Predators had been greatly reduced but not completely eliminated. To permit the raising of domestic stock, the lion population had been systematically destroyed by shooting. And in recent years, ranch owners live-trapped some of the ranch's leopards for removal to national parks in Kenya. Some cheetah remained but we sighted them only infrequently.

The ecosystem at Kekopey has thus undergone considerable modification over the years. Baboons, however, have for the most part escaped the human harassment that is their lot elsewhere in Africa, where they are trapped for medical experimentation or killed because of their fondness for human food crops. Despite the obvious alterations in the ecosystem, we decided to proceed with our research in this natural laboratory.

Although baboons subsist mostly

on grasses, seeds, roots, and other plant matter, they were known to occasionally capture and kill small animals. Shepherders in southern Africa, for instance, have long complained of baboon troops raiding their herds and taking young lambs. And a number of scientists had described baboon predatory behavior, but in no case had they reported a troop killing more than 20 animals annually.

As a result we were not surprised to learn that the baboons at Kekopey killed and ate small animals, but we did not anticipate the extent to which they engaged in this behavior. During the first year's research, we saw members of the one troop we were studying kill and eat 47 small animals—principally baby gazelles and some hares. This was a meat-eating rate higher than any then reported for a nonhuman primate group.

Baboons spend the greater part of each day feeding and moving from one foraging site to another with other members of their troop. Movements are usually unhurried, with individuals stopping from time to time to feed on the grasses and other vegetation that cover the valley floors. Our observations disclosed that it was during such leisurely progressions that many of the killings of small prey took place. Since both hares and young antelopes attempt to conceal themselves from predators by crouching in long grass or behind bushes, some of the baboons located and killed these animals by chance in the course of normal troop movement.

Yet, as we became more accustomed to the baboons' usual movement patterns, we discovered that the troop was moving deliberately through herds of grazing Thomson's gazelle. And several times, adult males left the troop to detour through nearby gazelle herds, scanning the ground on all sides as they went.

WHY DO BABOONS BECOME CROP RAIDERS? THE VIEW FROM KENYA

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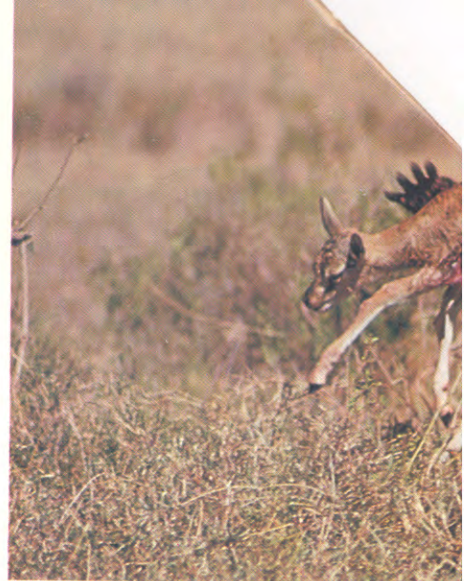
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Human/nonhuman primate conflict has accelerated during the last 15 years posing a growing danger to the future of wild primates. One type of conflict, the overexploitation of primate species in a newly commercialized bushmeat trade has received the most attention. Yet the conflict that develops over human foods, like crops, may ultimately be more widespread and devastating to groups, populations, in some cases even species. Many new studies of primate crop raiding examine its impact on local people. But why do nonhuman primates switch from natural to human foods? Common sense answers require empirical verification. In this paper we argue that tenable management strategies depend on understanding the nonhuman primate point of view. This study, conducted from 1980-1984, was an early investigation of crop raiding by wild primates. It was able to document the shift from natural forage to human foods in previously naïve monkeys. The contrast historically between naturally foraging and raiding baboons and simultaneously between raider and nonraider troops is instructive. Data on activity budgets, growth, reproduction, mortality and survivorship offer an explanation for why baboons might prefer human foods. However, the research also shows that raiding is not inevitable and offers suggestions about how to evaluate the likelihood of conflict as well as guidelines for actions that might prevent or minimize it.

Abstract # 400

AN INTEGRATED APPROACH TO MITIGATE CONFLICT BETWEEN NON-HUMAN PRIMATES AND FARMERS AROUND BWINDI IMPENETRABLE NATIONAL PARK, UGANDA

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Males also explored the heavy scrub that small dik-diks frequent.

Of the fifty baboons in the troop in 1970, four were adult males and nineteen were adult females. At first, killing was predominantly a male activity. The adult females killed only three animals—infant hares. We never saw juvenile baboons even try to catch an animal. Of the three females who killed the hares, only one succeeded in keeping any part of her prey; the other two were chased and threatened by adult males until they dropped their catch. Capturing prey was not only largely a male activity, it was a solitary one as well. Although one male baboon once successfully took up the chase of a young gazelle driven near him by another male, the baboons did not seem to cooperate in running down prey nor did a male baboon voluntarily share his catch with another troop member.

In 1970 and 1971, two-thirds of all the animals killed were newborn antelope of various species, with Thomson's gazelle the most frequent. About one-quarter of the animals consumed were Cape hare, and the balance included a button quail and several other animals that we could not identify from the scraps the baboons left. We never saw troop members eating carrion, although they had several chances to do so, nor did they try to catch every animal of the appropriate size.

Their sleeping cliffs, for instance, abounded with rock hyrax, and although baboons eat these small furry creatures elsewhere in Africa, we never saw the study troop attempt to catch them. And although an adjacent troop often caught helmeted guinea

fowl, the troop we were studying ignored flocks of these birds as they walked cackling through the baboons' midst.

By late 1972, the troop had grown to sixty baboons—the result of births and immigration of adult males from nearby troops—and the animals' meat-eating tendencies had increased. In 1,200 hours of observation between 1972 and 1974, we saw them capture 100 small animals, roughly twice as many as they killed during a similar number of hours in 1970–71.

Not only were the baboons consuming more meat; their behavior toward acquiring meat had changed as well. Adult females, which had shown little interest in meat eating during the first years of our study, began to capture prey in significant numbers—hares for the most part, but some infant antelopes as well. All females were now present at some of the kills but two, in particular, were present at more kills than several of the adult males, and always waited, patiently but persistently, at the site for the male to finish eating. While some watching males might give up and leave before the carcass was abandoned, these females remained, seemingly undaunted in their determination, and in the end, had their turn at the meat.

It did not take long before the females also became bolder; rather than drop an animal when a large adult male approached, a female might try to outrun or outmaneuver him and the attempt was often successful. During the period from 1972 to 1974, adult females caught 14 percent of all prey; we also noticed that immature

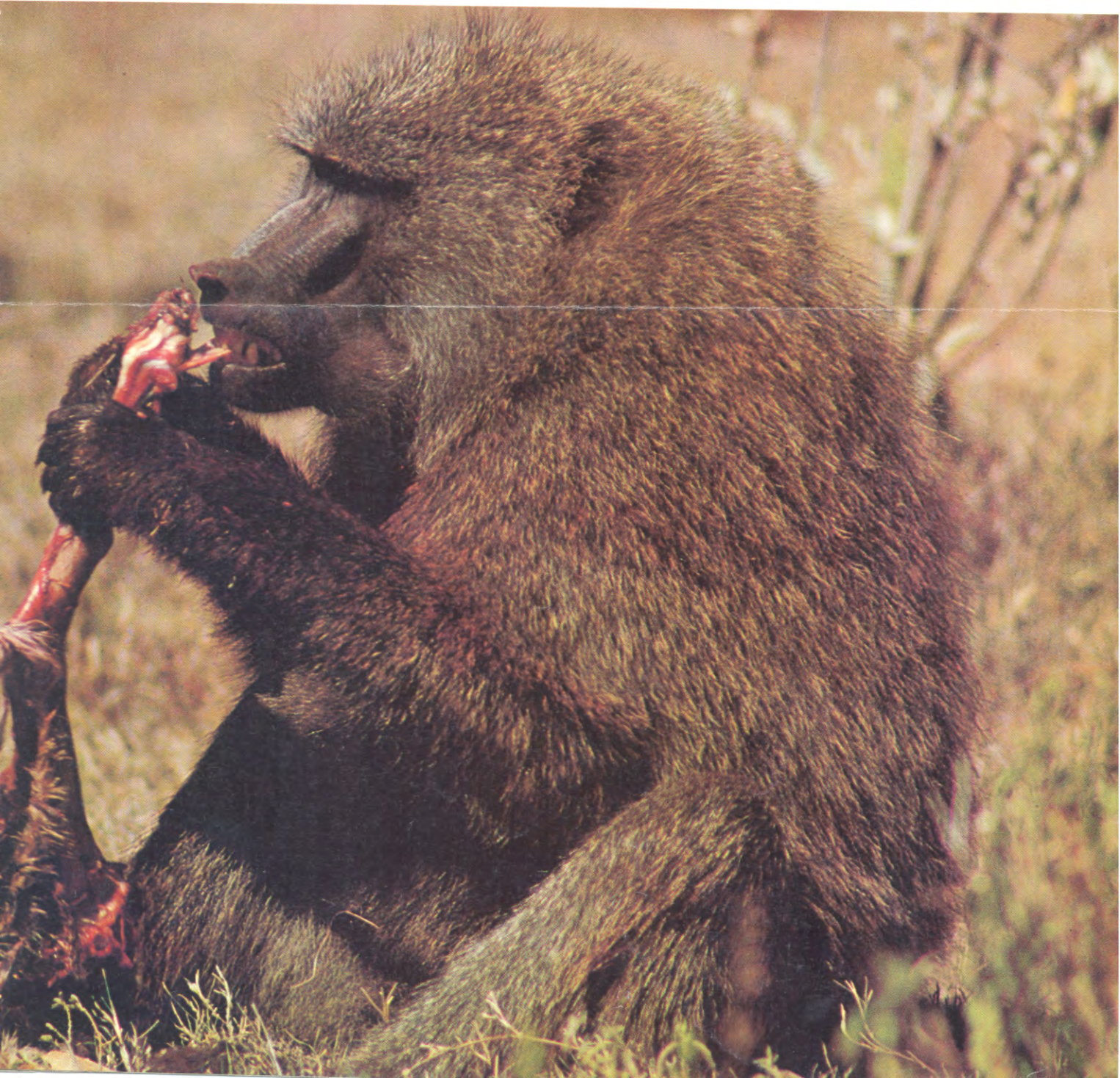


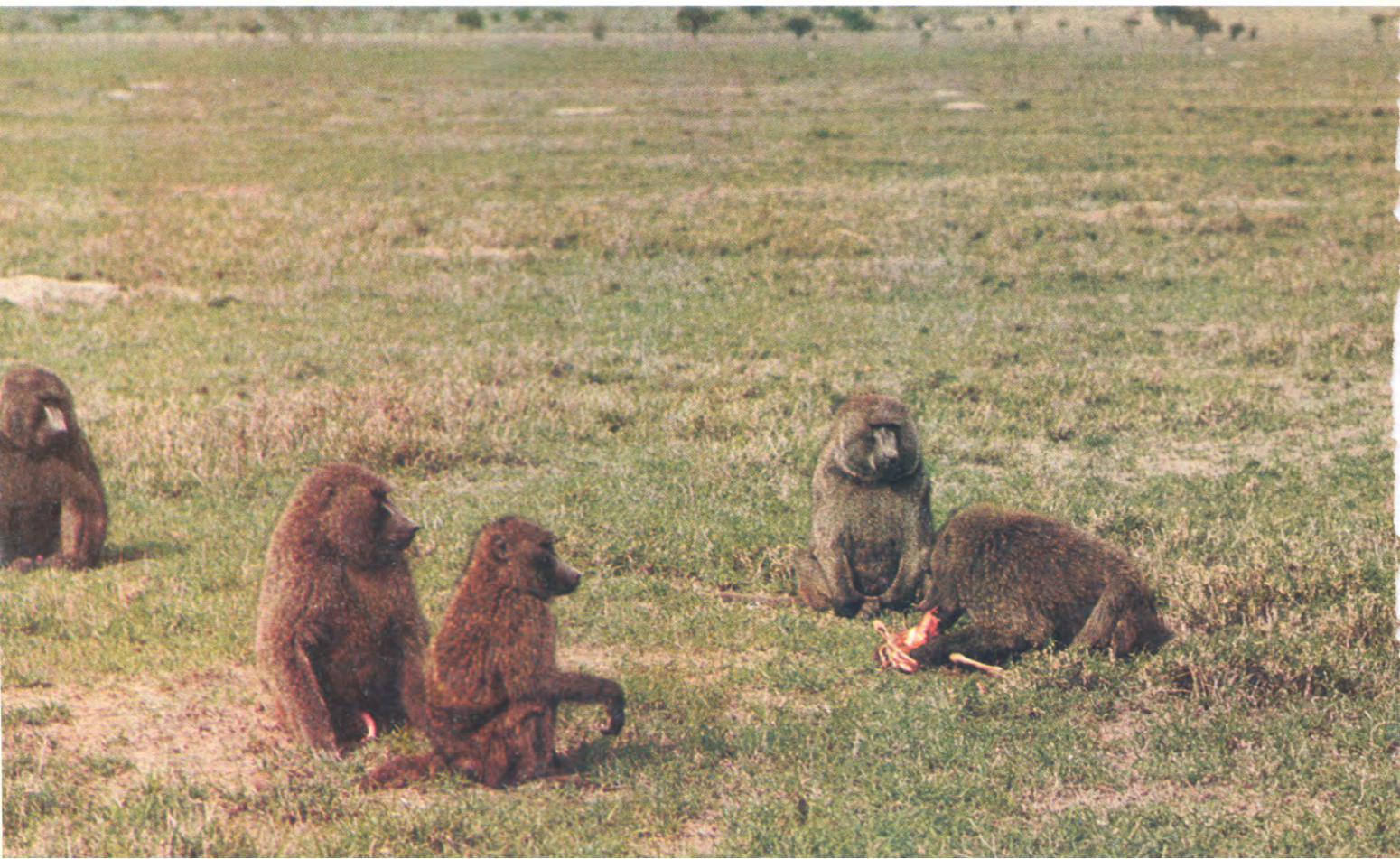
Timothy W. Ransom





When her young is attacked by baboons, an antelope often will charge to within about five feet of the predators (far left). However, she seems to lose interest after the infant stops bleating. Baboons most often begin eating by tearing open the underbelly of the prey with their incisors, rather than with their sharper canines. They usually consume the meat on the head and legs last.





This baboon mother was one of the first females observed to eat meat. And her infant was among the first to learn the new behavior.

baboons were becoming involved in meat eating. The offspring of the two females that seemed particularly interested in meat frequently had the opportunity to investigate prey, and predictably, they were the first immature baboons to eat meat. At first their presence in the vicinity of kills simply reflected their mothers' interest. But as they grew older and became more independent, their interest continued whether or not their mothers were present at a particular episode.

It was not only maternal bonds that helped meat-eating behavior to spread among the younger baboons; long-term male bonds with infants and juveniles also created opportunities for meat eating among the young baboons even when their mothers had no special interest in meat. Many young baboons thus began their meat-eating behavior as a result of their special, close relationship with a male.

Older juveniles often began eating meat by chance—stumbling across a meat-eating episode while chasing one another in play. Such incidents seemed to make little impression on the young baboons, unless one chanced to get a scrap or two of meat. Behavior changed markedly in such a case; the young baboon would begin to join the hangers-on at kills until, through patience and persistence, it too got some meat. Juveniles then began to seek out and capture prey on their own, to the point that in the period from 1972 to 1974, they caught 16 percent of the prey.

Over the years the tactics used by adult male baboons to obtain meat changed dramatically. They began to

supplement fortuitous captures and occasional detours through grasslands rich in prey with more concerted and systematic efforts. Upon sighting a herd of gazelles as much as a quarter of a mile away, one or more males often left the troop and approached the herd. By January 1974, this was an almost daily event. At first each male acted independently, but adult males always remain constantly aware of each other's location and actions; as a result, when one male made a kill or seemed about to do so, the others often abandoned their own efforts and converged on the successful hunter.

In one such incident, three males noticed another male chasing a gazelle and ran toward him. To get to the scene of the chase, they had to ascend a small hill that concealed their approach from both predator and prey. Just as he was about to abandon the chase, the baboon in pursuit of the gazelle suddenly found the three other males blocking the prey's escape route. The closest male then took up the effort, and when he appeared to flag, another continued it. For a moment the gazelle appeared to be outrunning its pursuers, but it changed direction in response to a similar movement from the baboon chasing it, and in so doing, ran into the third of the newly arrived males. The gazelle almost escaped when the pursuing baboon momentarily hesitated, but a quick bite to the underbelly put an end to the chase.

From that point on, the male baboons gradually adopted this relay system as a regular stratagem, chasing their prey toward a nearby male instead of out on the open plain. Such joint ventures appeared to be more successful than those carried out by lone males.

Adult male baboons also began to scatter antelope herds more frequently in an apparent attempt to find young animals of suitable size. This tactic often revealed a young antelope breaking from cover in the grass to run after its mother. The baboons might then spend as much as two hours covering large amounts of ground in attempts to close in on the antelope mother and her infant. As this tactic became more successful, deliberate searching for other prey in different habitat—such as dik-dik in

brushy areas—became less frequent.

The persistence of the male baboons' efforts was impressive. On several occasions the troop moved through one particular area for a number of consecutive days, and each time males unsuccessfully pursued the same young gazelle. Each venture lasted up to two hours and took the baboons as much as two miles from the rest of the troop, out of sight and, apparently, out of contact. Once, after hunting the same herd for three days, the males finally captured and consumed a young antelope.

In the beginning of 1973 the male baboons could not seem to discriminate between all-male herds and mixed or all-female herds of Thomson's gazelle. Since only those including females contained potential prey animals, the baboons at first wasted considerable time and energy in scattering male herds. Later, however, the baboons were able to assess the herds, ignoring all-male ones and pursuing only female groupings within a mixed herd.

For their part, the Thomson's gazelle began to show vigilance toward baboons, especially those herds that had been hunted several times in a row. Once a baboon of any size appeared, the gazelles became alert and moved off, the adult females herding their infants away from the baboons. This vigilance, in turn, created new difficulties for the baboons and may have offset, at least partially, the advantage they had gained through their innovations in hunting behavior.

During the first year's observations, baboons did not share meat voluntarily; indeed, the adult males who did most of the killing at that time were highly intolerant of other baboons in their vicinity. As predatory behavior spread through the troop over the years, however, we observed the animals eating simultaneously from the same piece of meat or pile of scraps and even moving aside to make room for other baboons. We saw none of the gestures that chimpanzees use in begging for meat nor did we see food items other than meat ever shared, even between a mother and her infant. Such meat-sharing relationships appear to coincide with already existing long-term bonds, such as those between mothers and infants or individual males and females.

Initially, individuals closely guarded their kills and tried to escape the presence of other baboons. Now each kill attracts spectators, some of whom share in the meat eating.

Over the past five years, the troop appears to have developed more efficient and sophisticated methods of capturing and consuming prey. We shall never know how the predatory behavior began for the baboons were already eating meat when we began to study the troop, but we can make some educated guesses about why predation has developed to such an extent. The most plausible has to do with the apparent antelope population explosion that resulted when the natural ecosystem of Kekopey was altered for raising cattle. Thomson's gazelle, predominantly grazing animals whose preferred habitat is open grassland, have benefited the most from these changes.

While we can only speculate about the origins of the baboons' predatory behavior at Kekopey, we know a great deal about the social dynamics underlying its spread through the troop. The behavior clearly proceeded along preexisting lines of social bonding—from mother to offspring, male to juvenile, and between male and female. We do not know whether the behavior was initiated by one or several individuals, but it seems to have become firmly established and is at this time independent of any one individual.

In a series of experiments involving the introduction of new foods to groups of macaques, Japanese anthropologists have documented the importance of individual behavior and social bonds in the diffusion of new behavior patterns involving different food items in a primate group. At Kekopey we witnessed a natural experiment in which, once again, individual behavior and social relationships played crucial roles in determining which animals acquired the new behavior.

There is no reason to think that we have seen the full development of the

baboons' potential for predatory behavior, but of course there are limits to its expansion. Chief among these is probably the size of the prey animal, for nonhuman primates usually prey upon animals smaller than themselves; the anatomy typical of monkeys and apes allows for the easy capture and consumption of such prey. We would be greatly surprised if these baboons began to capture adult impala or even adult Thomson's gazelle.

Just as social factors facilitated the spread of predatory behavior within the troop, they may also set limits. Most troop members are physically capable of capturing prey and eating

meat, but females and immature animals will probably not become involved in the hunting behavior that takes adult males far away from the troop for long periods. Adult males are relatively mobile, often transferring from troop to troop. Females and young baboons, however, would have to abandon old behavior patterns, which have important integrative functions within the troop, and acquire new ones if they were to take part in extended hunting forays. As evidence of this behavioral difference between adult males and other baboons, females and young approached only those kills that occurred near the troop. They usually



In the early years of predation by the troop, confrontations (mostly bluffing) between adult males over prey were common. Such incidents occur much less frequently now and adult males seem to be more tolerant of each other.

ignored those that took place at a distance, unless the prey was carried close to the troop.

Anthropologists have traditionally believed that only humans among the primates kill and eat animals as a regular part of their diets. Some have even felt that the hunting, meat-eating adaptation has been so important in human evolution that we would be better advised to turn to social carnivores—such as lions—rather than nonhuman primates as models for early human populations. Documentation of hunting and meat eating by chimpanzees at the Gombe National Park in Tanzania and elsewhere in Africa, however, has forced a modifi-

cation of this position. With predatory baboons now added to the equation, we can identify a primate potential for predation, one that our earliest hominid ancestors must have shared. The baboon and chimpanzee studies demonstrate how sophisticated and successful predation can be among primates without any of the unique attributes of the human hunting adaptation, such as the ability to manufacture tools.

There are many differences, of course, between the predatory behavior of human and nonhuman primates, for while the diet of the earliest hominids may have resembled that of today's baboons or chimpan-

zees, archeological evidence suggests that early man took part in organized hunting forays. The killing of large animals in large numbers is unique to humans among the primates, and it is tempting to speculate that the ability to manufacture tools and the development of sophisticated communication methods may have been the key to successful hunting of this nature.

As far as primates are concerned, however, there is no doubt that the capture, killing, or consumption of even a single large animal poses problems that are of a wholly different order from those encountered in the hunting of small animals. By comparing human and nonhuman primate hunting patterns, we can learn much both about the behaviors and behavioral potentials we share and those that are unique.

Predatory behavior in primates probably did not have a single origin but may have developed at many different places and at many different times, possibly even under widely varying environmental conditions. This notion is important in considering human evolution for it suggests that basic human adaptations may also have had multiple origins. Considering the speed with which the baboons elaborated their predatory behavior, it is also possible that after an initial adaptive shift to a new behavior in early human populations, further development of this behavior proceeded more rapidly than we think. The behavior of the baboons also shows that individual and social factors could well have had an important influence on the perpetuation of new behavioral adaptations.

The spread of predatory behavior among the Kekopey baboons prompts us to appreciate the complexity of adaptive shifts, both behavioral and anatomical, and adds to our growing realization that simple hypotheses tend to retard, rather than advance, an understanding of human evolution. The realization brings us back to the original insights of Darwin and Huxley, who theorized that all primates are linked along a single evolutionary continuum, one in which artificial barriers erected by humans to assure their own unique status have no rational grounds for existence. □

