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HUNTING ANCIENT SCAVENGERS

Guile, rather than hunting prowess, may have served to sate the appetites of early humans as they roamed African savannas in search of fruits, stems and carcasses left behind by lions

By BRUCE BOWER

When Robert Blumenschine made his way to the Serengeti Plain of Tanzania in August 1983, the graduate anthropology student was looking for evidence of how early human ancestors — who lived up to 2 million years ago — obtained meat and used it in their diets. But Blumenschine, of the University of California at Berkeley, did not try to uncover ancient campsites containing animal bones and meat-cutting tools, as anthropologists have traditionally done. His scientific quarry was in plain view on the savanna floor — fresh animal carcasses.

For the next 10 months, Blumenschine pursued a study that he describes in his field journal as, at times, offending "all senses, save the intellectual." With the help of a government antiquities officer in Tanzania, he determined where carcasses are available for human scavenging on the Serengeti. Remaining flesh and organs from plundered animals were weighed and analyzed for nutritional content, and marrow from large bones was removed to measure its quantity and quality.

The Tanzania Wildlife Corporation, a government agency, gave him permission to shoot a number of animals, including gazelles, impalas and wildebeests, as part of a carefully monitored effort to obtain meat for residents of the Serengeti area. Flesh yields from individual bones, organ weights and further data on marrow were collected.

While not a picture of pristine anthropological fieldwork, Blumenschine's efforts represent a new approach to learning about the eating habits of hominids, the forerunners of modern humans. Some scientists believe the diet of early humans was superior to what is eaten today and could be a model for preventing "diseases of civilization" (SN: 2/9/85, p. 90). Yet many cherished assumptions about hominids have been abandoned over the past decade; this upheaval has nurtured alternative methods of reconstructing the lives of our collective ancestors.

"It's become clear that we're not going to understand early human life without a better knowledge of modern savanna environments," says anthropologist Glynn Isaac of Harvard University. "Once we know about the distribution of foods in these ecological systems, we're in a position to interpret the fossil record more accurately."

Isaac was formerly a proponent of the "home base" explanation for early hominid behavior. According to this school of thought, which until recently was dominant in anthropology, collections of animal bones and stone tools found buried in East Africa were the remains of campsites where humanlike hunter-gatherers once clustered together to share food and engage in the earliest forms of social interaction.

If early hominids were hunters who set up home bases, scientific accounts of their diets would assign central importance to those sites. In this view, prey would likely have been taken back to a central camp and doled out systematically through some form of social interaction.

But reexamination of the bones and tools, some nearly 2 million years old, with electron scanning microscopes has convinced some scientists that early humans were scavengers, not hunters. The location of minute cut marks on many bones suggests that parts of scavenged carcasses were taken back to the ancient sites, where tools were stored (SN: 12/18/82, p. 390).

If the camps were simply way stations for scavengers, hominids take on a more primitive cast. They may have eaten what they could at animal kill sites and brought some parts back for consumption later, giving little thought to sharing with others.

Fruit and other foods would have been eaten in the same way. The question becomes, What tactics did early humans use to scavenge and forage?

Some clues may be found in modern African savannas. "You need to go out to the real world and see what's available to eat and what the nutritional worth of various animal parts is," says Blumenschine. His is the first attempt to quantify the availability of animal carcasses in a savanna environment thought to be similar to that inhabited by early hominids. Using a modern savanna to shed light on what life was like up to 2 million years ago has its limitations, cautions Blumenschine. "But as far as the ratio of scavengers to carcasses, and the types of carcasses available, the Serengeti today is probably a good reflection of what it was like a couple of million years ago," he asserts.

Although he is still sifting through his data, the project clearly demonstrates that the best opportunities for scavenging by humans in the modern Serengeti occur in patches of woodland near rivers where lions abandon their prey, Blumenschine told SCIENCE NEWS. Vultures feast on the prime flesh remains at these sites, he reports, but hyenas "apparently don't frequent rivers very regularly." Large marrow bones can often be found at lion kills for two days or more.

Adds Blumenschine, "It's often assumed that hominids mainly ate animal flesh, but it's rare to find much flesh on a lion kill." He suggests that fat and bone marrow were usually consumed, with bits of flesh remaining on the face and lower limbs as a bonus. Brains may also have been part of the hominid scavengers' diet.

"These are highly significant findings," says J. Desmond Clark of the University of California at Berkeley. They provide an important explanation for why sites containing hominid tools and animal bones are found near streams and lakes. Another possible reason for these locations is that early humans could have stored meat underwater, "as hyenas not infrequently do," notes Clark, who along with Isaac encouraged Blumenschine to conduct the Serengeti study.

Other attempts to use the ecology of modern African savannas as a window to the past are under way. One of Isaac's graduate students, Jean Sept, recently completed what Isaac calls "a pioneering study." She found that the highest densities of plant foods that may have been crucial to early hominids are located along rivers in wooded areas of savanna — the same wooded patches that Blumenschine describes as good locations for scavenging lion kills. Sept looked for proportions of fruits, seeds and roots that have been associated with some early hominid sites.

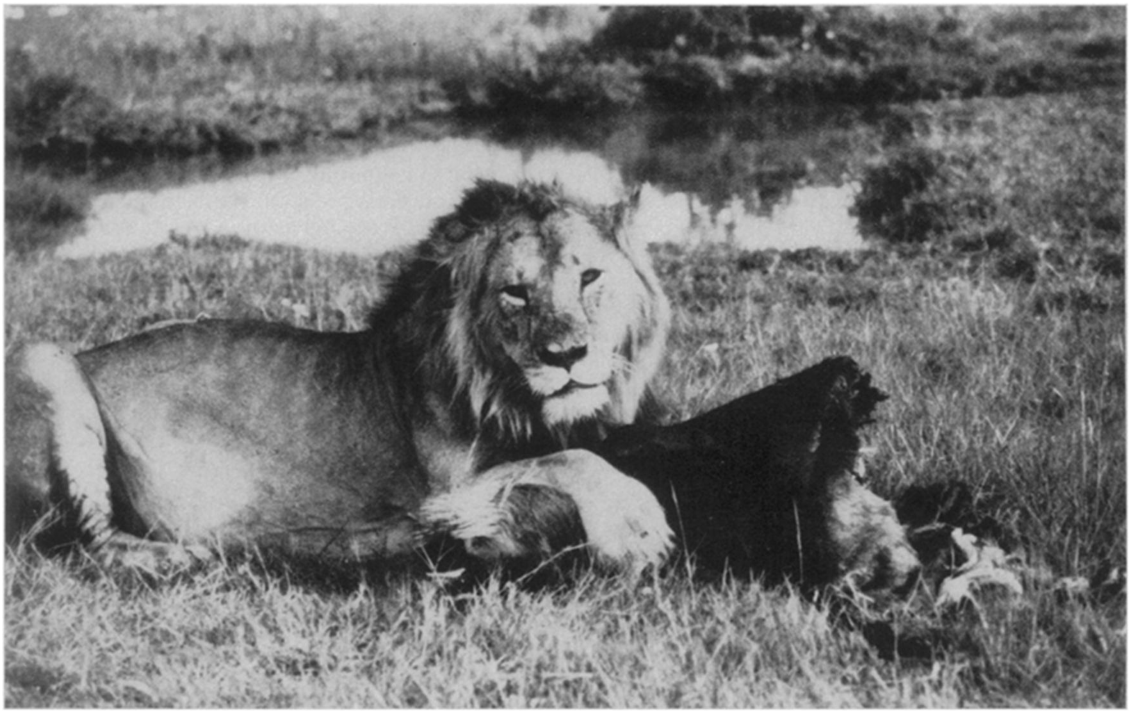
Another of Isaac's students, Ann Vincent, is now in Tanzania studying the distribution of deeply buried tubers and bulbs in the savanna. Like Blumenschine and Sept, she is attempting to quantify the energy needed to get the food and the energy obtained from it, a type of cost-benefit analysis of food use known as energetics. By chance, Vincent came across a group of savanna dwellers who still harvest wild tubers, says Isaac; she plans to chart the energy costs and gains associated with collecting the underground stems. Although energetics dates to the 1950s as a tool to study foraging strategies of mobile animals, it has only recently been picked up by anthropologists, adds Isaac.

Savanna studies employing energetics are an important complement to fossil examinations, says Pat Shipman of Johns Hopkins University in Baltimore, one of the first to analyze remains at hominid sites with a scanning electron microscope. Her recent study of overlapping cut marks on 1.7-million-year-old animal bones suggests that the ancient prey were scavenged by hominids. Close inspection reveals that most of the cut marks created by hominid tools were made after overlapping sets of carnivore tooth marks were imprinted. Only 13 sets of overlapping marks have been studied, however.

"There are precious few rules by which organisms operate," says Shipman. With information obtained from energetics, scientists can propose testable theories about hominid behavior, she says, rather than using the fossil record to write "intuitively satisfying stories."

Not all anthropologists, however, are confident that modern savanna studies can replace stories with solid data. "We'll learn more about hominids from the fossil record," says Richard Klein of the University of Chicago. "Modern environment analogies are interesting, but they're guesswork; they give you 'might-have-beens.'" For example, he asks, how do we know if a modern savanna is comparable to a savanna with roaming humanlike scavengers? Would the hunting strategies of lions change without hominids around?

This drawback is outweighed by the need for data on carcass use and seasonal variation of carcasses in modern savannas, says Lewis Binford of the University of New Mexico in Albuquerque. "It gives you a window to see how hominids could have behaved," he says. Energetics, however, tends to obscure the view, adds Binford, by



A contented lion digs into a meal near a water source. Two million years ago, could early human ancestors have been far behind, on the prowl for leftover marrow bones, fat, brains and bits of flesh? This is a likely scenario, according to a scientist who has studied scavenging opportunities in the modern Serengeti.

Hominid brains: Advanced or apelike?

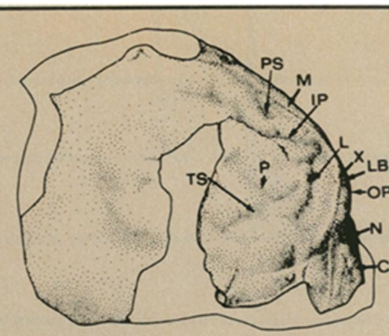
Questions about early hominids are not limited to foraging and scavenging strategies. Scientists are of two minds, for example, concerning the development of the early hominid brain.

The disagreement centers on two researchers, Ralph L. Holloway of Columbia University in New York and Dean Falk of the University of Puerto Rico in San Juan. In the Jan. 3 NATURE, Falk reports that the bumps and grooves made by the outer, or cortical, layer of the cerebrum on the inside of a 3-million-year-old *Australopithecus afarensis* skull indicate that the brain was "small, simple and apelike." Australopithecines who came after this earliest known hominid had larger brains but similar cortical patterns, adds Falk. Hominid brains probably got larger before they became more complex, she argues.

In a previous analysis of the same hominid skull, Holloway came to a drastically different conclusion. Although the brain was rather small, there is evidence that its outer layer was undergoing reorganization, he explains. "There appears to have been enlargement of the posterior parietal, or 'association' area," says Holloway. This section of cortex integrates visual stimuli with other stimuli and would have played an important role in the development of social behavior. He further suggests that an increasingly complex brain was associated with the emergence, around 3 million to 4 million years ago, of walking on two feet.

Holloway, along with William Kimbel of the Institute of Human Origins in Berkeley, Calif., claims that Falk "misoriented" the cast she took of the hominid brain case. "Falk improperly rotated the cast forward and down by approximately 30 degrees," says Kimbel, who has studied casts of the same skull. When rotated back, the skull tells a different story. The cerebellum, a primitive part of the brain located under the cerebrum, moves under the occipital poles of the cortex into a humanlike position, says Holloway. In Falk's version, the cerebellum juts beyond the occipital poles, suggesting a less developed brain.

"This is a continuation of an ongoing disagreement," says Falk (SN: 7/2/83, p. 11). "I've carefully checked my orientation of the skull and am satisfied with it." Kimbel, she adds, has written that depressions made by the cerebellum on the same skull are deeper than those made by the cortex. Falk says this supports her contention that the cerebellum projects back farther than the occipital poles. Kimbel, however, says his observation does not necessarily buttress her conclusion.



Falk's orientation of an early hominid skull, viewed from the left side, shows the cerebellum (labeled C at the lower right) projecting farther than the occipital pole of the cortex (labeled OP). This suggests that advanced brain reorganization had not yet occurred.

It is a bit baffling that the same skull could produce such varying interpretations, but science marches on. "In a way, Falk has done a valuable service," says Holloway. "We now can test her assertions." —*B. Bower*

measuring optimal energy costs and benefits involved in foraging and scavenging, even though organisms rarely operate at peak efficiency.

"If you look only at an optimal foraging strategy, you don't know if you're dealing with snails or leopards," he contends. "You need to evaluate the nature of the ecological niche occupied by early hominids to learn about their behavior."

Both Klein and Binford have attempted to get a grasp of that ecological niche by studying collections of animal bones left at hominid sites in South Africa dating to the Middle Stone Age, about 100,000 years ago. Their interpretations of the same remains differ markedly.

Klein's views are more traditional and widely accepted. He argues that the types and ages of the animals whose bones are scattered at numerous hominid sites, particularly in several caves at the mouth of the Klasies River in South Africa, indicate that Stone Age people were active hunters, although they were only competent enough to kill mostly young or weak animals. Hunting techniques gradually improved during the Stone Age, he says, and big-game hunting entered the picture around 40,000 years ago when the first modern humans appeared.

Klein points out in the summer 1982 PALEOBIOLOGY that hominids of 100,000 years ago probably killed fleet animals such as elands and small antelopes in large groups. At the Klasies River Mouth fossil site, the age distribution of members of these species is the same as is found among living populations — progressively fewer individuals in older age categories. This "almost certainly" reflects the discovery that large numbers of the animals could have been driven over the nearby cliffs or into traps, he explains.

Stone Age humans also hunted animals such as giant buffalo, whose remains are dominated by extremely young individuals, says Klein. The youngsters' relative weakness and frequent isolation from social groups, which has been observed among modern Cape buffalo, probably rendered them vulnerable to hunters. "Scavenging would account for the abundance of very young individuals only in the unlikely event that people could regularly locate carcasses before other predators did," he notes.

But the age profiles of animal remains can be misleading, counters Binford in a controversial analysis of the same material (*Faunal Remains From Klasies River Mouth,* 1984, Academic Press, Inc.). Most of the bones of larger animals are from the head or lower limbs, he says, indicating that hominids scavenged prey after the prime parts had been eaten. Scavenging probably centered on lion kills around water sources, much in the fashion described by Blumenschine, he adds.

Smaller individuals and the young of large species apparently were hunted and partially eaten at the kill site, according to Binford. Small parts of these prey, mainly less choice sections such as the head and scapula, were taken back to the Klasies River sites.

The bottom line, in Binford's opinion, is that hominids did not gradually develop their hunting skills during the Stone Age. The Klasies River fossils suggest that scavenging, with some hunting of small animals, was the regular strategy of a group of hominids living perhaps as late as 40,000 years ago, he holds. Although the emergence of modern humans and big-game hunting was imminent, these hominids still did not have "home bases," says Binford; the ancient sites were probably used for midday rests, sleeping and some feeding.

Binford's emphasis on hominid scavenging throughout the Stone Age is a bone of considerable contention among scientists. His methods remain to be tested by other investigators at other hominid sites. But methods of recapturing the lives of human ancestors through fossil remains are also open to criticism, says Blumenschine.

"You can guess all day long about the lifestyles of ancient hominids," Blumenschine argues. "But you need to know how modern ecological systems are characterized and how scavenging works. Without contemporary landscape study, it's a lot harder to interpret the archaeological material already uncovered."

Adds Binford, "Hominids must have gotten food in many ways we still don't know about." □