Man the Scavenger

Hominids of 2 million years ago ate meat: but were they hunters or scavengers? A scavenging hypothesis has now been fully articulated

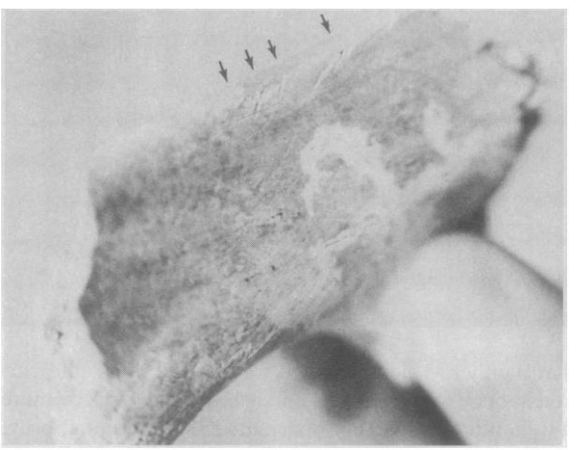
Man the Hunter has for a very long time been a persistent and, it has to be admitted, attractive theme in paleoanthropologists' scenarios of human origins. Coupled with the required wit to fashion stone tools and weapons, the keen intellect of the successful hunter is nicely consonant with the notion of the noble savage as our ancestor. This stirring image has in recent years begun to look less certain, however, and might eventually be replaced by a portrait far less flattering to our sensitive and egotistical spirit: Man the Scavenger.

Although stories of human evolution have frequently made reference to the probable occasional indulgence in scavenging, the idea that scavenging might have represented a complete ecological adaptation is only now being articulated. The principal proponents are Pat Shipman of Johns Hopkins University Medical School and Richard Potts of Yale University. Shipman considers that scavenging might even have been responsible for the evolution of upright walking, or bipedalism, in the first hominids.

Several archeologists have identified scavenging as probably being an important component of early hominid life, specifically Desmond Clark of the University of California, Berkeley, and Glynn Isaac of Harvard. Isaac, whose work at several sites in Kenya has had a major impact on the rigor with which archeological assemblages are now assessed, says of Shipman's articulation of the scavenging hypothesis: "We've all converged on this and Pat is making it stand out in bold relief." Jane Buikstra of Northwestern University is impressed by Shipman's coherent presentation. "This idea has been a long time coming. One can be right about an idea, but it is essential to have the arguments and data marshaled in a logical and testable way. Pat has now done this."

In the late 1970's Shipman and Potts were pouring over the vast collection of fossil bones from a site at Olduvai Gorge, Tanzania. They were interested in the various processes that influence the accumulation of bones at such a site, and they began to document what appeared to be tell-tale signs of stone tool use on some of the bones, made, presumably, by the hominids who lived at Olduvai almost 2 million years ago. Mary Leakey, who has been primarily responsible for excavation work at Olduvai, had from time to time noted such cutmarks, but no one had systematically studied them. This, Shipman and Potts began to do.

More or less at the same time Henry Bunn, then at the University of California, Berkeley, noticed cutmarks on fossil bones from Koobi Fora in Kenya. There ensued what one protagonist called "cutmark mania" (*Science*, 3 July 1981, p. 123). Signs of stone tool use on ancient bones had been recorded previously in the literature, but this was from much later sites, principally from paleo-Indian assemblages. Cutmarks of the antiquity of the bottom of Olduvai Gorge were new and remarkable, however, and many anthropologists took the discovery as support of the Man the Hunter hypothesis.



Cutmarks

This fossil fragment, found by Henry Bunn at Koobi Fora in northern Kenya, bears repeated narrow incisions (arrows) that have been interpreted as cutmarks inflicted by stone tool users between 1 and 2 million years ago. Bunn has identified cutmarks on many fossil bones in several Kenyan sites.

Bunn noted at the time that the presence of cutmarks "enables us to dismiss models of human evolution which do not incorporate meat-eating as a significant component of early hominid behavior." Shipman and Potts were more circumspect, restricting themselves simply to noting that the evidence supports the conclusion "that there is a direct causal association between the stone artifacts and fossilized bones [at Olduvai Gorge]." The reason for their restraint was that in addition to simply recording the existence of putative cutmarks Shipman and Potts analyzed their distribution over the bones.

The distribution, it transpired, was not what might have been expected if the Olduvai hominids had simply been removing meat for consumption either on the spot or after being transported back to some kind of home base. Almost half the cutmarks were in regions where there would have been little meat to be had, such as the distal ends of limbs. By contrast, only 25 percent of carnivore tooth marks are found in these locations. These meatless parts of the limbs would, however, have given access to skin and tendons, for which the hominids might have had nondietary uses. In any case, Shipman and Potts inferred that they were definitely not seeing signs of systematic butchering that would be expected from practiced hunters.

Shipman has since extended the study and has compared the distribution of cutmarks with those recorded by University of California, Santa Cruz, anthropologist Diane Gifford at a 2300-year-old site, known as Prolonged Drift, in Kenya. Of the cutmarks at this site most (some 75 percent) were on bones that would have had little meat, and have been associated with skinning and tendon removal, much like the Olduvai bones. But of those marks on meat-bearing bones 90 percent are clearly related to disarticulation of the carcass, which is dramatically higher than that at Olduvai. Shipman interprets these data as being consistent with the scavenging hypothesis for the Olduvai hominids.

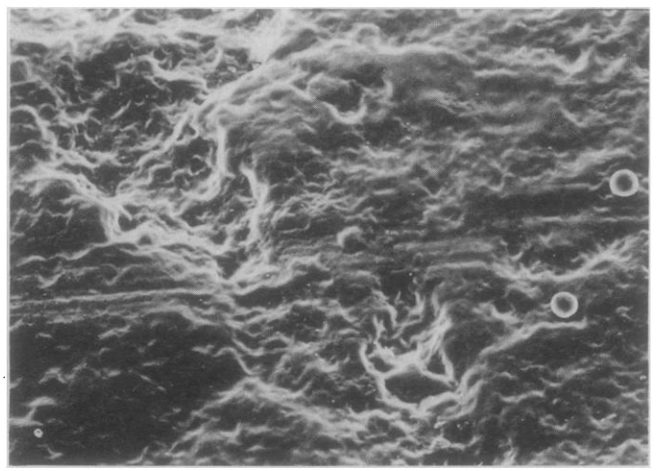
Another intriguing piece of evidence that nods in the same direction comes from the discovery of a small number of sets of overlapping cutmarks and carnivore tooth marks. If the hominids were proficient hunters one would expect carnivores to have moved onto carcasses after the hominids, thus leaving their tooth marks over any stone tool cut-

marks made on the bones. If the Oldowans were scavengers, however, they would have had to try to snatch their share from the carnivore spoils, in which case cutmarks would have run over tooth marks.

Now, cutmarks are rare enough on fossil bones—about 3 percent at the Olduvai site—and so the number of overlapping sets found so far is frustratingly small: just 13. Of these, eight fall into the scavenging category and five with hunting. Too small to be of statistical significance, the distribution is nevertheless suggestive.

In developing the scavenging hypothesis, Shipman has documented the various physical and behavioral characteristics among carnivores and compared them to hominids of 2 million years ago.

Tooth mark



Scanning electron micrograph (×60) of fossil bone surface shows a broad, smooth carnivore tooth mark running from top left to bottom right and overlaid by a stone tool cutmark running horizontally through the middle of the picture. The fine striations of the cutmark run down into the tooth groove, showing that the carnivore had first access to the bone.

For a start, she notes that neither hunting nor scavenging is an easy occupation as a full-time strategy: hunting requires high speed and a high degree of certainty at each hunting attempt; and scavenging carries severe costs related to long distance locomotion and competition with other scavengers.

Of the nine species of medium to large carnivores in the Serengeti Plains of East Africa today, which includes three species of jackal, only two rarely scavenge: these are the cheetah and the hunting dog. The great predators of the plains—the lion, the leopard, and their smaller cousins the jackals—all scavenge to some degree. Similarly, the superscavengers—the hyenas—also hunt from time to time. "They scavenge when they can and hunt when they must," notes Shipman. And for the smaller meat-eaters—the jackals and striped hyenas—the usual alternatives when scavenging opportunities are poor are fruit and insects, which can often make up a substantial part of the diet, because they are unable to compete effectively with the larger carnivores.

Hominids lacked the speed to be full-time predators and the body size to be unbowed by competition from the most successful and fierce scavengers. They would have had to fit into the part-time scavenger niche, with a diet heavily supplemented with nonmeat foods, such as fruit. Indeed, Alan Walker and Mark Teaford of Johns Hopkins University have shown that the microwear patterns of hominids of this era indicate a diet that was predominantly fruit.

There is in Africa today only one full-time scavenger, and it does give a clue to these early hominids' possible exploitation of the scavenging opportunity: the vulture. This unloved creature, which is almost as reviled as its fellow scavenger the hyena, has a very cheep method of locomotion, which also provides an efficient vantage for spotting available carcasses. As carcasses will always be more sparsely distributed than potential prey, a sustainable method of long distance travel is at a premium for scavengers.

Although hominids' bipedal gait is pathetically slow compared with that of quadrupedal carnivores—our fastest is barely 15 to 20 miles per hour compared with a cheetah's 70—it is sustainable for very long periods at a strolling pace. As Shipman points out, foraging for carcasses would be highly compatible with foraging for fruits, which, like corpses, are usually widely distributed and highly concentrated food sources. Working with estimates of hominid body size and carcass availability of 2 million years ago in East Africa, Shipman calculates that such a strategy could supply the hominids' energetic demands with a comfortable margin of excess.

Compared with other meat-eaters, hominids are poorly equipped for tearing flesh from a carcass, and without the aid of a sharp implement of some sort, the task would be virtually impossible. In East Africa the archeological record begins some 2.5 million years ago, with crude flakes and cobbles from a site in Ethiopia. This date is, of course, at least a million years later than the first record of bipedalism. Now, if bipedalism is an adaptation to scavenging and scavenging requires tool use, then that gap between almost 4 million years ago and the first appearance of the archeological record will have to be filled with new discoveries.

Shipman acknowledges, however, that although bipedalism is suitable for a scavenging life-style, it may have arisen for some other reason long before this type of life-style was adopted. In which case, bipedalism would be called a predaptation, or more properly, an exaptation, to scavenging.

While the beginning boundary of a scavenging strategy might always be unclear in the mists of time, the end should be more distinct. There are after all some persuasive records of systematic hunting later in human history. One of the oldest of these is at Olorgesailie in Kenya, where hominids repeatedly killed and butchered giant baboons, *Theropithecus oswaldi*, half a million years ago. The hominids of the time were *Homo erectus*, which had first appeared in Africa some million years earlier than the Olorgesailie site.

As there are no equivalent records of systematic hunting between 1.5 million and 0.5 million years ago, the question of when the practice began and when the scavenging mode ended remains a matter of speculation. There are, however, threads of evidence that indicate that the boundary coincided with the appearance of *Homo erectus*. For instance, the toothwear patterns change dramatically with the appearance of *Homo erectus*. The body size was substantially bigger in this species than in its predecessors. And the geographical range of hominids expanded suddenly and substantially at this point, encompassing a move into various parts of the Old World. All of these hints are consistent with an animal that is a much more successful meat-eater than earlier hominids.

One excellent site at which to test the nature of the transition from *Homo habilis* to *Homo erectus* is, again, Olduvai Gorge. The virtually unbroken sequence from almost 2 million years ago onwards provides a background of geological and ecological consistency against which to look at changes in the pattern of cutmarks on the fossil bones. The question to be asked is, when does the pattern switch from one that is redolent of scavenging to another that reflects systematic hunting and butchering?—**Roger Lewin**