



C R I T I C A L F O C U S

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The Microscope and the Caveman

“Dad,” asked the boy. “Where did I come from?” Father knew that eventually he’d face this momentous question. And so, with a deep breath he told his son, as gently as he could, about those overwhelming urges and instincts, the power of love and desire, the moist intimacies of copulation and everything he knew of conception in a way that omitted nothing. When he finally accounted for the explosive miracle of childbirth, his son looked at him with eyes that still grew wider every second. The little lad looked astonished, open-mouthed. There was silence.

“Does that answer your question?” father muttered. His son gasped: “It’s just that the new boy in school said he came from Baltimore, which had me wondering where I came from.”

Nobody can be sure of our origins, though we couldn’t have originated as we think. The hunter-gatherer is the accepted concept, but that cannot be the

The hunter-gatherer is the accepted concept of our origin, but before humans were able to hunt, they exploited the hunting abilities of predatory creatures.



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whole truth. Humans would have been too vulnerable to survive. With thin skin, small teeth, weak muscles, low speed and no claws, we would have been a victim for anything larger than a rat. Once humans were sufficiently social to live in communal colonies, and smart enough to figure out how to hunt for their food, then success would be assured. But, prior to that, they would have been prey to any passing carnivore and powerless to survive. To me, this poses the greatest question of all: What did humanity do before the hunter-gatherer? As the little boy wisely enquired, “Where did we come from?”

By the Paleolithic era, humans were successful hunters. We have their evocative and revealing rock paintings that encapsulate many of the key elements of their lives. There are even (less well known) clay models of their prey. Further substantiation lies in the excavation of the exquisitely produced spearheads that



This ancient Egyptian wall painting, dating back about 3,350 years ago, shows the scribe Nebamun at the temple of Amun at Karnak with his wife Hatshepsut and their daughter hunting wildfowl in the marshes of the Nile. The tawny cat that is catching birds represents the sun god Ra, which explains why it has been finished with a gilded eye.



Near Santa Cruz, Argentina, lies the Cueva de Las Manos in which these remarkably evocative images have survived. These wall paintings, interspersed with more than 700 outline images of human hands, date back 9,000 years and depict cooperative hunting of wild animals.

Neolithic humans fashioned from flint and fixed to wooden staves with binders made from leather or entwined plant stems. Travel back several million years earlier and we have fossil remains of apes with sufficient physical attributes to make them brutally successful hunters. Both versions make good evolutionary sense and stand scrutiny — but we have to bridge the gap between the two.

The progressive development of ape-like creatures

into early humans is marked by successive fossils that show steady cranial development at the expense of the physical strength and ferocity of the apes. As evolution neared the pre-humanoid form of *Australopithecus* and eventually *Homo sapiens*, it would have passed through a phase of development in which the brain power was developing to plan ahead in a way with which we can identify, but at that early stage they were unable to run fast enough to catch prey, yet no longer possessed the brute force to pursue wild animals for food. In that period prior to pre-humanity, but after our ape-like antecedents, we have no model that reconciles feasting on flesh with our inability to catch it.

The evolution of a high-powered brain places large nutritional demands upon the body that call for a diet rich in proteins and B-group oil-soluble vitamins. In 1999, Dr. Katharine Milton at the University of California at Berkeley argued that meat-eating was crucial if these rapidly evolving humans could nourish themselves well enough to acquire an advanced brain. Perhaps *H. erectus* contented themselves with a predominately herbivorous or vegetarian diet, supplementing it with grubs and nutritious insects (as modern-day chimpanzees still do). Those by the shore could have consumed mollusks. They also ate meat, though nobody can say how they obtained it, in an era before the hunter.

Humans eat meat by tearing flesh from bone (if you doubt this, watch someone eating ribs) and in archaeological sites you can find teeth-marks on bones. The bones on which we find these marks may have been fractured in the act of being brought down by predators. I am advancing the view that the earliest proto-humans contrived to survive by eating the meat from carcasses of creatures that were not hunted by them, but were chased, hunted and brought down by other predatory animals. This provided me with a crucial concept.

WOLF AND MAN

I conclude that pre-humans used wolves to do their hunting for them. Before they were able to hunt, early humanoids exploited the hunting abilities of predatory creatures, and wolves were the clear choice. No wonder we have such an intimate relationship with dogs to this day. They and their antecedents have been with us since the dawn of humanity. Wolves made humanity possible.

We are more closely linked to our antecedents than we tend to think. We speak of cave dwellers and we watch documentaries about tribes that live in the

jungle, but we are tribal people ourselves (even if we do not care to reflect on the fact). Look at television programs on ancient communities, where people spend hours painting traditional pigments on their faces before joining with others for a ritual. And when the TV commercial appears, you'll see advertisers extolling the latest "pure mineral cosmetics" that women painstakingly apply. Don't give a superior smile at films of age-old tribes where they pierce their lips or don costumes to exaggerate their attributes unless you are similarly self-critical when selecting earrings, painting your nails or adding eyelash extensions. If you have ever watched programs about jungle dwellers waving ritual clubs in a time-honored ritual, then just think of them when you watch batons twirling over a marching band, or see weekend businessmen brandishing golf clubs in a bunker. (They must be exactly the right kind of clubs, featuring the fashionable logo of the day). Next time you watch age-old ceremonies with dancers swathed in gaudy costumes, colorful headpieces radiant with the plumage of jungle fowl and with all their faces traditionally adorned, ask yourself whether it's so different from "Dancing with the Stars," or high-kicking girls with ostrich feathers in sequined dresses twinkling round the stage. The 21st century urban tribes have dyed hair, pierced noses, and tribal tattoos. Look at today's country clubs and learned societies or at the gangs crowding the side streets, and — whether it's the need to declare allegiance to the local tough guy, or an initiation ceremony for fraternities — we are all tribal people and are doing just what our ancestors did before recorded time.

Truly, we have so much in common with cave dwellers and when we look at the way that our ancestors cooperated with other species in the quest for food, we can travel back even further in our evolutionary past, for such exploitation is widespread in the animal world. Ants utilize the nectar produced by aphids that they manage. Termites have elaborate methods of cultivating fungus colonies in beds of fermenting vegetation, using the fungus protein as a food source and harnessing the metabolic heat energy that is released to power the air conditioning that draws fresh air through the complex chambers they construct. Sharks and whales interact with cleaner fish that help maintain their health. Some examples are close to what I postulate has occurred in the development of humans. Gulls steal food brought up by diving birds, which the gulls would be otherwise unable to obtain; skuas and frigate birds do the same. Many insects steal food from other species, as do flies of the milichiidae and chloropidae families, and five families of spiders do



Micrographs taken at Oxford University in 2009 revealed these deliberate cut marks showing where humans had harvested meat from Mesolithic human bones. The specimens, dating back 9,000 years, were in a collection of animal bones that had been stored at the Torquay Museum until curator Barry Chandler noticed that some were human long bones. Microscope analysis has revealed that these cave people were cannibals.

the same. In mammals, the best known examples are the hyena and the jackal, which circle prey brought down by lions in the hope of darting in to steal some of the meat. That is kleptoparasitism, and it is close to what early humans must have done. Throughout the realms of nature we can identify examples where one species harnesses the abilities they lack through the activities of another. We are far from unique.

Where will we find scientific evidence to substantiate this theory? There are footprints, though they do not tell enough of the story. Stone tools have been found, but we cannot be certain about how they may have been used. We may not be able to rely on the behavior portrayed in prehistoric cave paintings because the procedures I am postulating predate the span of artistic creativity. So where can we find the archaeological evidence? The microscope has the clue.

To observe the birth of the evolutionary line that led to humans, we must travel back 7 million years ago to Millennium Man, *Orrorin tugenensis*, whose remains have been found in Kenya. *Orrorin* was very like a chimpanzee, but the larynx was more like that of humans and this could offer the beginning of speech. Cut the time to 3.5 million years and you would encounter *Ardipithecus* and *Australopithecus*, with a pelvis that suggested they could walk, though with a braincase not much different from that of a chimpanzee. One million years later *Homo* had appeared, with a highly developed brain, full bipedalism, and little body hair — this was *Homo erectus*, who had increased cranial volume though they still had too little brain to



Microscopical evidence of stone tools used by pre-humans has given a date of 2.5 million years ago, but research published by *Nature* in 2010 moves the date back further — to more than 3 million years. These cuts were found on bones excavated at Dikika, Ethiopia, and are believed to have been made by harvesting meat from a carcass by *Australopithecus afarensis*.



The latest finds from Dikika include these cut-marked animal bones dating back 3.4 million years. There is no evidence of marks from hunting in these bones, but pre-humans were clearly using sharp stones to deflesh bones. Were tools specially sharpened or were naturally occurring rocks used? Currently, no handmade stone tools have been found, and the evidence is strongly in favor of meat being eaten from animals brought down by carnivores.

think about detailed hunting strategies. The fossils that have been found on the isle of Java and elsewhere give a reasonable insight into this curious creature: sharing our genus but not yet having the fully human attributes of our species.

BONES AND STONES

The microscope can help us decipher traces on pre-historic bones. Research from Oxford University shows that there are cut marks from stone implements on Mesolithic human bones dating back 9,000 years.

They were originally excavated more than a century ago in Kents Cavern, near Torquay, England, and were stored away as a collection of miscellaneous animal bones. A museum curator, Barry Chandler, recently noticed that there were human bones among them and analysis suggested that they were part of the forearm of a human adult. Seven diminutive cut marks were found that seem to have been deliberately made with a stone tool — it now seems that flesh was cut off for food using flint implements. These cave dwellers were probably cannibals.

Far more ancient is another British example, when ancient bones dating back 700,000 years ago were excavated in East Anglia in 2002. They also retained the microscopical traces of the evidence that I sought. The bones have been broken apart, and the fractured edges are consistent with their being opened for the marrow. There are fine marks apparent upon the surface, small scratches that were caused by the edges of sharpened stones. These are parallel, progressive indentations made by a being that was scratching at the bone — procedures devoted to removing the meat, and not the kind of visible marks that result from fatal stab wounds.

Those pre-humans — needing meat in large amounts — were incapable of sophisticated thought processes and it is clear that they cannot have obtained meat through the accepted means. Something else was going on — the answer I propose is that the earliest humans were more than scavengers. At first, pre-human apes would have snatched what they could from the carcasses of creatures already killed by predators. In time this would have changed. Acting in concert, pre-humans would have worked together to drive off the hunting animals when the bulk of the meat was still left intact for the human community to consume. The first great achievement of *Homo* would have been to work together to drive away packs of hunting animals and leave enough of the carcass for their families to devour. Following packs of hunting animals and working in concert with wolves would have provided a revolutionary form of commensalism and the opportunity for readily available sources of fresh meat. If so, then we would expect to find evidence of tools being used to obtain meat before our ancestors had developed weapons with which to hunt. Recent research fits this model perfectly.

In August 2010, *Nature* published a paper that showed how hominid pre-humans may have been using stones to cut flesh from a carcass 3.4 million years ago. This is long before true humans had evolved; the creature who left these traces was *Australopithecus*

afarensis. The bones were found in the Dikika region of Ethiopia. Small marks were discovered on them, and the scanning electron microscope reveals that they are cuts deliberately made by hand-held implements. The key conclusion of the Ethiopian research was that the tools were not used to hunt prey but only to remove meat from a carcass.

It was *Homo habilis*, the earliest species of our present-day genus, who first fashioned tools by chipping away at larger stones some 3 million years ago. The oldest artifacts that remain from our earliest ancestors are chipped stones associated with the act of stripping meat. These tools cannot be accounted for by natural phenomena. They are not fragmented stones broken by rock falls or tumbling stream beds or shattered by frost — they have clearly been chipped away. The makers were early humans who, with ever greater refinement, changing flinty stone from its rough, rounded appearance found in nature into something with sharp edges — sufficient to help these pioneering people remove the last scraps of edible flesh from the bones of the prey brought down by wolves. This was not the human hunter. It was the intelligent human commensalist at work.

One of the researchers at the Dikika project was Shannon McPherron, who in August 2012 was reported as saying: “Increased nutrients of meat allow you to grow a larger brain, which allows you to come up with novel solutions to make better stone tools, which allow you to get more meat. But here we’re looking at meat consumption long before we’re seeing increases in brain size.” This is where my paradox becomes apparent. The dentition of *A. afarensis* was characterized by large molars and thick enamel, which point to a predominately herbivorous diet. Any meat could not have been obtained by hunting but by cutting flesh from carcasses brought down by predatory animals. Therefore, I believe that before the hunter-gatherer came the opportunist, using hunting animals to perform a task that pre-humanity had yet to master.

HUNTING PARTNERS

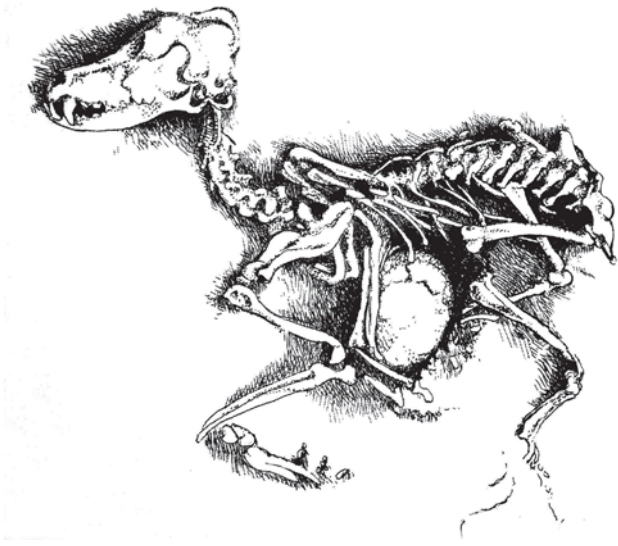
Wolves were not the only animals used in ancient times by humans to find their food. They became our partners because they are peculiarly amenable to human interaction: The cat family is not so easily trained, as any cat owner knows. In modern times, cats are brought in to catch mice that elude their human owners, and in ancient Egypt, they were used by hunters to capture water fowl. In my book, *Images of Science* (1992) I published a vivid wall painting from ancient



In a program that I made for the BBC in April 1965, these exquisite clay models of bison were described. They were found in caves at Le Tuc d'Audoubert, France, and date back 15,000 years. Bison were a staple item of food, and these may have been instructional models for young hunters. It remains a mystery to me why they are not better known.

Egypt, dating from 1,400 B.C., which portrays a fowler out with his cat. The animal is leaping into the air to bring down the prey that the master desires. Eagles and other winged raptors have similarly been harnessed, and to this day, the great golden eagle is the raptor of choice in Mongolia, where teenagers in nomadic communities start their adult lives by climbing precipitous cliffs and lifting fledgling eaglets from the nest. These powerful birds are painstakingly trained to hunt for their owners, bringing supplies of meat and the bodies of beautiful mountain foxes from which the people make their warm clothing, which is necessary for survival in those inhospitable mountains. Other cultures use falcons and hawks to the same end; so the concept of early people relying on the resourcefulness of other hunting species is not unique. Driving away the wolves from their kill can more easily be envisaged as humankind's first intelligent, social skill with these other examples in mind.

We can envisage so many reasons why the wolf would have been the choice of early pre-humans. Wolves are perceptive and highly cooperative creatures with a complex and hierarchical social structure. Their vocalization would have revealed their whereabouts to their humanoid relationship and a close dependence can easily be seen to have developed. Let us not imagine that the relationship was initially one of mutual benefit; it began as a one-way trade. Humans used the wolves to catch and hunt the prey



This is the earliest archaeological evidence of wolves (or early dogs) and humans cohabiting, dating back some 7,000 years. The discovery, excavated from a site at Lake Baikal, Siberia, shows the burial of a wolf with its paws protectively holding a human skull. It was reported by *Discovery News* in 2011.

that they needed to survive, and the response of early humans would be to drive off the wolf pack so that meat could be harvested. This will have underpinned the early contact between the wolf pack and the tribes of people.

A community of humans would inevitably come to know the behavior of their neighborhood wolf pack, and it is easy to imagine how the relationship would have prospered. The benefit for millions of years would have been predominately one-sided, with humans taking meat from the wolves that had captured their prey. But it cannot have been long before the wolves began a closer association, benefiting from food discarded by the cluster of humans, perhaps even tossed to a wolf that seemed curious. They may have gathered close to human communities for supplies of food that were easier for them to find rather than chasing prey, and perhaps they shared the community of a cave or were warmed by a fire in the depths of night.

Although the sole benefit that the wolves brought to their first human contacts was a source of meat, in the end, mutualism would have emerged. Some present-day people keep wolves as pets and will demonstrate how these seemingly fearsome beasts can learn to interact in a way that shows mutual respect and even affection. And when we start to consider the

influence of selective crossbreeding of wolves carried out by our earliest ancestors, new and remarkable possibilities begin to emerge.

CLUES FROM CROSSBREEDING

To inquire into research on crossbreeding, we should look to Russian science, which has a lengthy track record in the behavioral sciences. Pavlov's conditioning experiments with dogs are well known; less familiar are the controlled breeding trials that have been carried out with arctic foxes. As if to prove the pre-eminence of the genotype, these animals, when raised by hand and in intimate contact with human family groups, develop into ravenous, wild, uncontrollable adult foxes. Living with them at home has proved impossible. Furniture was destroyed, curtains and carpets torn, owners intimidated. No matter how thorough their training, the foxes remained obdurately true to their wild nature.

This changes dramatically when selective crossbreeding is brought into the equation. The Russian experimenters took from each generation the most gentle and easily handled fox from each litter and bred from them. Within six or seven generations, a subset of the foxes had emerged that were easier to train, quicker to adapt, more amenable to domestication. If such a change can be induced in a short time with the arctic fox, then how much easier would it have been for our ancestors to commence the domestication of wild wolves, a process taking hundreds of thousands of years?

Mitochondrial DNA suggests that dogs and wolves diverged 100,000 years ago, though the oldest dog-like remains found in Europe are from Bonn-Oberkassel in Germany and date back only 14,000 years, the same age as bones excavated in the U.S. at the Agate Basin site in Wyoming. In the quest to find the earliest signs of domestication, archaeologists have evidence from several sites — Predmosti in Moravia, now part of the Czech Republic, which dates back 27,000 years, the Goyet Cave in Belgium (31,700 years ago) and Chauvet cave in France (32,000 years ago). The exploitation of the wolf's hunting ability does not require cohabitation, which may have dated back far longer, of course. These are signs of wolf-like creatures being found in association with human remains — and in one case dating back 7,000 years on the shore of Lake Baikal, Siberia, the ritualistic burial of a wolf has been unearthed, with its limbs wrapped around a human skull. Some commentators have even described it as a husky-like dog, for by this time we can conclude that the se-

lective breeding of wolves was beginning to show the emergence of dogs as a subset of the species.

From tentative attempts at domestication to selective breeding is a small step. Once this began, our predecessors mastered the crossbreeding that would give us the crops and farm animals on which present-day agriculture depends. The shift from wolf to breeds of dog would not have been hard to accomplish. We can infer that the wolf was the earliest species to be selectively bred because of the extraordinary diversity that we have inherited. From the mastiff to the Chihuahua, from the Pekinese to the greyhound, the variety of dog breeds is extraordinary. In the current era of genetic modification, people often say that they feel uneasy about the new steps being taken in today's laboratories; but what we can now do with our research is feeble compared what our ancestors achieved with their astonishing new breeds of dogs over the last few centuries.

Cultural resonances in the modern world are not hard to find. Dogs have long been used as a source of meat; they were also used as a means of transport, and to this day they remain a mainstay of the Inuit communities of the arctic. Dogs as hunters are abundantly obvious: The elk hound was bred from wolves specifically for domestication by humans and for use in hunting. Deer and foxes are hunted with hounds to the present day in many countries; when it is outlawed on humanitarian grounds, we should pause to reflect on the severing of a living link with our prehistoric past. Humans have cooperated with wolves for a million years, and our current conventions are a direct connection to a past we have ignored — the age of mankind, the quick-thinking opportunist.

HOW HUMANITY EVOLVED

We have a near-complete picture that substantiates my theory: from the rapid enlargement of the brain as apes developed into hominids to the finding of small scratches on bones that correspond to cuts made by stone implements and which we can trace some back to a time, several million years ago, that predates true hominids. The hunting species could be birds, like eagles; they could be cats, either catching wildfowl or — as large cats — hunting herbivores just as lions do today; or they could most likely be with canids. This explains so much: how humanity evolved and how we developed such a close relationship with domestic dogs. The available evidence gave me the encouragement I needed to publish my theory, and there was much media interest when I announced



The Clovis people have long been regarded as the earliest inhabitants of North America, dating from 12,600 years ago. However, microscopical examination of this femur bone of a 1-ton ground sloth from 1,000 years earlier has disclosed marks made by prehistoric meat eaters. These stone age people, who predate the Clovis, move the history of America back to 16,000 years ago, when they crossed the land bridge from Russia.



The microscope clearly reveals cut marks made by the removal of meat from the bone. Published in *World Archaeology* in 2012, this research at the University of Manitoba shows that the long-extinct ground sloth was among the creatures used as a food source by our distant forebears. The bone specimen was originally collected a century ago, and the marks have only recently been recognized.

it in July 2011. It was widely reported, and I was interviewed by a number of popular programs, including those of the BBC.

Then the phone rang. A friend said: "Your theory about humans taking meat that animals have hunted makes a lot of sense — and there has recently been a TV program about something similar." I looked it up,



Cut marks on bones dating back 300,000 years have been found at Gran Dolina, Spain. In this instance, the microscopic traces were found on the bones of an extinct lion, showing that humans consumed carnivore meat. This does not mean that our antecedents hunted the animal — it may have been killed during a fight over food. The findings were reported by *National Geographic News* in 2012.



Vivid paintings are found in the caves of Lascaux in Montignac France. Fossilized skeletons were found of the same animals portrayed in these remarkable stone-age images. Some of the pictures are of now-extinct creatures, including the auroch. The cave complex was discovered in 1940, and the images date back 17,300 years.

and sure enough there was a BBC documentary filmed in Africa that began with the words: “How do mere humans, without fangs or claws, who can’t outrun a wildebeest, get a meal around here?” We saw three Dorobo tribesmen stalking prey through the African bush. “First they had to find the tracks of a pride of hunting lions,” said the BBC commentary. Eventually, we saw a large group of lions feeding from the carcass of a wildebeest. The tribesmen crept closer, and then stood up, three of them, walking straight toward the lions.

“Confidence is everything,” says the commentary. “This is the ultimate face-off.” The commentator pauses, then: “Suddenly the lions back off.” And they do — as the trio approaches, the lions nervously scattered into the bush. Quickly, the men cut a leg from the carcass and carried it away before the lions returned. This is a little-known phenomenon, said the program, and it was the perfect present-day example of what I had envisaged. The BBC film looked impressive — the patience of the stalkers, their bravery as they faced the lions unarmed and the diligence of the production team patiently to follow the hunters’ quest.

As is often the case, the reality was less glamorous. The film had originally been made by a team from the “Living Planet” unit and their commentator was much more honest. “The very first story in the Human Planet ‘Grassland’ series is a filming first. We went to Kenya to film a practice that is still carried out by the Dorobo tribe.” So far so good; and then the truth came out. No, they had not followed the tribesmen as they searched diligently for tracks in the bush. The reality was more prosaic: “This can take weeks, and we had only a few days ... we knew we were up against it,” said the commentary. “The whole production team worked day and night to find a lion pride with a fresh kill.” Aha! This is a very different way of telling the tale — it was not the tribesmen that found the kill, but the television company. “We found our pride, but we were worried. It was huge, with over 15 hungry lions.” This time the film of the tribesmen seemed very different. “We were all so pleased that we had captured and recorded this story for posterity,” concluded the commentary. By the time the BBC re-edited the story, the facts had been radically altered.

This was crucial evidence, and was a perfect parallel to the form of opportunistic scavenging I had put forward. Another example, dating from 10,000 years ago, was reported in 2012. A mummified mammoth had been found by local ivory hunters in Siberia. They sold it to Bernard Buigues for scientific study, and it was given the name Yuka. Parts of the body had been

removed after death, and there were many signs of a traumatic end for the young mammoth. One of the specialists reached a startling conclusion. “There is dramatic evidence of a life-and-death struggle between Yuka and some top predator, probably a lion,” said Dr. Daniel Fisher, professor of Earth and Environmental Sciences at the University of Michigan. He then added the crucial conclusion: “There are hints that humans may have taken over the kill at an early stage.”

EXCAVATING THE EVIDENCE

Professor Fisher found a “long, straight cut that stretches from the head to the center of the back,” and he noted that most of the spine and three-quarters of the ribs were missing. Marks seem to be made by sawing movements of a tool, he concluded, and there were striking cut marks on the long bones of the legs. He mused: “Were humans using the lions to catch mammoths and then moving the lions off their kill ... was that what happened?” This was the kind of evidence I sought.

I first lectured on the topic at the London School of Economics in October 2011. Since then, a series of scientific papers have begun to appear that provide the scientific substantiation the theory needs. In February 2012, a paper in *World Archaeology* showed that early humans cut flesh from the body of a ground sloth. This gigantic creature, *Megalonyx jeffersonii*, was a 1-ton giant dating back 13,500 years and excavated in Ohio. A series of 41 incisions appeared on the animal’s left femur, and microscopic examination of the marks suggested that they were produced by stone tools. The muscles of the leg were filleted to provide food. According to Dr. Brian Redmond, curator of archaeology at the Cleveland Museum of Natural History, “This provides the first scientific evidence for hunting or scavenging of the Ice Age sloth in North America.”

We can next move back 50,000 years, to the Paleolithic era. More than 10,000 bone fragments have been recovered from the Lingjing site of Henan Province, China. Scientists from the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences and the Henan Provincial Institute of Cultural Relics and Archaeology find that the bones came primarily from the horse *Equus caballus* and the now-extinct auroch *Bos primigenius*. Once again, small cut marks were found on the bones that were consistent with the butchering of meat. This paper also appeared in 2012 in the Chinese *Journal of*

Science: Earth Sciences.

To step back further, we can find remains dating back 300,000 years that were discovered in the Sierra de Atapuerca, Spain, from the European Middle Pleistocene period — research described in *National Geographic News* in June 2012. Microscopic examination of marks on bones shows that flesh had been removed from carcasses by cutting with stone implements. Dr. Ruth Blasco of the Universitat Rovira i Virgili in Tarragona reported in the *Journal of Archaeological Science* that the marks were found on bones of horse, deer, bison, lion, and several other animals from the Atapuerca site. The pre-human responsible was *Homo Heidelbergensis*, Heidelberg Man. Opinions on the fate of the lion are confused, though it seems to me that the humanoid scavenger might have stripped flesh from the carcasses of carnivores that had been killed by fighting among themselves.

We thus have a new concept to bridge that gap: Pre-humans came to realize that they could obtain supplies of meat captured by animal predators, so we now have a behavioral missing link that explains how strong, unimaginative apes became weak, if ingenious, humans. We certainly became hunter-gatherers in the fullness of time but owe our progress towards that phase to a kind of opportunistic kleptoparasitism carried out by commensalist pre-humans. Which brings us to a crucial consideration: What do we call this kind of relationship? It is not parasitism, which is defined as living on the body of a host, from the tissues of which the parasite derives its nourishment (like dodder or a tapeworm). It is not kleptoparasitism, which we see in skuas, for that involves the theft of food from a creature that is, therefore, deprived of its nourishment. Today’s tribes-people show that they took only a small portion of the meat for their needs, leaving most of the carcass for the predators and this seems to have been true in the case of Yuka the mammoth. They were not even commensals, for this implies two species that feed from the same food in a manner that causes no loss to either party. I am going to designate this as “kleptocommensalism.” In either event, we can conclude that our ancestors developed because they were kleptocommensals. The remains of their meals bear traces that, even today, the microscope can reveal. It’s an incredible saga.

I imagine the same boy asking his father another question: “Dad, where did the dog come from?” This time, father would be prepared: “From the pet store in the mall,” he’d reply. Ah, if only he had have known the whole truth. He does now.