Preface

Regardless of what particular academic track you may have followed as a college undergraduate, whether it was paleoanthropology, archaeology, biology, geosciences, or even premed, at some point you probably learned about the earlier stages of human evolution and the pivotal role played by big-game hunting (preceded perhaps by a “stage” of big-game scavenging) in transforming a bipedal ape-like ancestor into what we are today. Over the years, more and more evidence for our ancestral interest in hunting and meat-eating has accumulated and by now few would question the importance of hunting in our heritage. Hand-in-hand with Paleolithic (“Stone Age”) flaked stone tools, we find dense concentrations of broken-up animal bones, often the remains of more than one species that some ancient hominin (roughly synonymous with hominid) had transported to a single locality. And many of the bones bear unmistakable traces of human butchery in the form of cutmarks made by stone tools when the carcasses were dismembered and defleshed, as well as impact fractures produced when hominins broke open the limb bones to retrieve their content of fatty marrow and, in more recent sites, even occasional charred bones, the tell-tale evidence that early humans had begun cooking their food.

Few, however, seriously question what big-game hunting was really all about. That part of the puzzle has always seemed pretty self-evident – hunting provided a critical part of our ancestor’s diet and, through the gradual evolution of our behavioral and technological wherewithal, our ancestors became ever more effective and efficient at putting meat on the family table. In a way, the “big-game hunting” issue bears certain resemblances to issues surrounding the concept of evolution. When undergraduates ask me “is evolution a fact,” I have to respond to their question in two parts: “yes, evolution as a description of events is a fact – we can make it happen in the lab, as is routinely done in genetic experiments with fruit flies; we can see it in our environment, as so clearly demonstrated by the growing resistance of many bacteria to antibiotics; and we can see its results in the fossil record.” But I then have to hasten to add that “evolution as explanation is not fact but theory, a good one and a powerful one, but theory nonetheless.” We know it happens, few scientists would question that, but we are still far from agreement about precisely how it works. That debate will keep us busy for many years to come.
The issues surrounding big-game hunting in our evolutionary history are somewhat analogous: “yes, we can see direct evidence of our ancestor’s interest in big game and, through a variety of techniques, we can even be fairly confident that the animals were hunted.” By now I think we can safely take that as fact, although there is continuing debate and disagreement about precisely when and how humans gained sufficient technological know-how to take the really big and dangerous animals. Some would argue that humans were capable of killing animals much larger than themselves right from the first appearance of our genus, perhaps as early as 2.0 or even 2.5 million years ago, while others maintain that humans did not become competent and committed big-game hunters until the latter part of the Middle Pleistocene (“ice age”), perhaps as recently as 300,000 or 400,000 years ago. However, in either case, as I hope this book will illustrate, the explanation of “why” humans hunted (or scavenged) big game is not as self-evident as most textbook treatments of the topic would lead us to believe. The standard offering, of course, one that is often presented as though it were an irrefutable fact, is that humans hunted to put food on the table and that big-game hunting in particular offered the optimal way of acquiring a high-quality food (meat) in large packages at “least cost.” This line of thinking seems almost trivially obvious and it has guided our thinking for well over a century. But what we generally take as fact should better be taken as explanation and hence theory, one that is in need of much closer scrutiny. Big-game hunting may have emerged and developed, not as a means of bringing home food to the family, but as a form of costly signaling, a way for males to demonstrate their worth, skill, reliability, and suitability as mates and alliance partners. In other words, the meat the hunters brought home may have been ear-marked first and foremost not for wife and kids but for other members of the social group, members who often were not even related to the individuals who procured the meat. There are other possible explanations, of course, such as showing off or signaling generosity (Gurven et al. 2000), or perhaps even sexual conflict (Arnqvist and Rowe 2005), that might better account for why men devote inordinate amounts of time and effort in the pursuit of big animals. Whichever, if any, of these more socially- or politically based explanations ultimately wins out, they share in common a focus on social, demographic, and political forces in the explanatory chain, not family provisioning and nutrition. In fact, the costs in time, energy, and risks associated with big-game hunting may sometimes outweigh the nutritional benefits of what is acquired through the pursuit of big game.

I should point out immediately that the goal of this book is not to argue that hunting in our evolutionary past was unimportant as a way of providing food. Instead, the issue that I am zeroing in on is why our ancestors spent so much time and effort pursuing really big and often quite dangerous prey when they could acquire adequate, and often comparable, amounts of protein and calories on a day-to-day basis by pursuing small game, or even insects, not to mention a variety of nutrient- and energy-rich seeds, nuts, and other plant foods, at far less cost in time and energy, and at greatly reduced risk of failure or bodily harm. In many cases the detailed quantitative data now becoming available for some of our best studied hunters and gatherers – for example, the San (also called
“Bushmen”; see Bank 1998; Biesele and Royal/O/oo 1997:10; Lee 2006) and Hadza in sub-Saharan Africa – are showing that if providing the family with food were the principal goal of male hunting activities they would do better by focusing their efforts on resources other than big game. In fact, to generate a steady, predictable input of food to the family larder, they might do best by doing more or less what the women do.

I have no illusions that the arguments I present in this book will instantly sway my readers to the view that big-game hunting evolved more for social and political reasons than for nutritional ones. In all honesty, I am still having trouble convincing myself. The traditional view seems so simple and compelling. Meat from large animals has always held a position of prominence in Euro-American culture. So it is no surprise that those same values have been extended to our explanations of how we as a species evolved. I still remember the catchy TV commercials from the late 1980s when actor James Garner touted the value of beef as “real food for real people.” That simple ad captured the essence of what underlies the big-game hunting perspective even today. What we then called “real” food would in today’s more academic parlance be referred to as “high-quality” food. Bolstered by the theoretical elegance of diet breadth models and empirically by a lot of archaeological and taphonomic data, and despite some important but only marginally successful attempts to redirect our attention to the food-getting activities of women (e.g., Slocum 1975), big-game hunting is still seen by most today as the core of what hunter–gatherer foraging is all about.

My own path to the arguments presented in this book has been anything but direct. I have been interested in hunter–gatherer subsistence strategies ever since the late 1960s when I was a graduate student in anthropology and archaeology, but in those days I saw no reason to question the nutritional primacy of big-game hunting. While Richard Lee’s famous Bushman studies of the 1960s emphasized the importance of plant foods and women’s foraging activities in the subsistence practices of foragers outside of the arctic, to this day I am still struck by the irony of the fact that the most famous publication to emerge from those studies was entitled *Man the Hunter* (Lee and DeVore 1968), not *Woman the Gatherer* as one might have expected given the revelations of Lee’s research. *Woman the Gatherer* (Dahlberg 1981; see also Chap. 7 in Martin and Voorhies 1975:178–211), a reaction to the androcentric big-game hunting bias of the *Man the Hunter* era, did not appear for another decade. As Fedigan (1986:62) puts it: “*Man the Hunter*, a model drawn from primate, ethnographic, and archaeological evidence, became the dominant theory of the 1960–1980 period.”

*Mand the Hunter* [Lee and DeVore, 1968] never addressed the question of why women also evolved. Because of its failure to take the female sex into account in human evolutionary models, the book created a backlash against sexism that was centuries overdue in the study of humanity. Whole schools of anthropological thought coalesced, partly in reaction to the blatant failure of Washburn and Lancaster [1968] even to consider women in the evolutionary process. Female biological anthropologists in turn have taken *Man the Hunter* apart, analyzed its approach, and asked what role females played in human origins.

Stanford (2002:108)
Despite the lip service paid to the importance of plant foods in hunter–gatherer diet during the 1960s and 1970s, undergraduates in virtually every introductory anthropology course offered at universities across the USA and Canada were weaned on the images from John Marshall’s classic film, *The Hunters* (shot in 1952–1953, and released in 1957). In this fascinating glimpse into the lives of traditional African hunters and gatherers, students were treated to over an hour of footage documenting the uncanny skill of Bushman hunters and trackers as they relentlessly pursued a wounded but very mobile and uncooperative giraffe across the vast expanses of the Kalahari Desert (the film is actually a composite of several different giraffe hunts pieced together to create what appears to be a documentary of a single 5-day-long hunt; see Barnard 2007:57; Henley 2003:47–48). If plant foods played any significant role in the lives of the Bushmen, it was certainly not evident in this film.

My interest in big-game hunting continued following my graduate studies, and one of my first serious excavations as a young PhD was a late prehistoric (fifteenth century AD) bison kill – the Garnsey site – in southeastern New Mexico (Speth 1983). At the time I was digging the site, it never occurred to me that social forces, not just food, might have played an important role in the kill events that I was uncovering. The first inkling that all was not what it seemed came during the analysis of the masses of bones that I recovered from the site. These studies revealed that the hunters had done things that didn’t make sense to me in terms of the conventional wisdom of the day. First, the hunters killed the bison in the spring and focused on bulls instead of cows, in striking contrast to the predominant pattern that had been documented over and over again in Northern Plains bison kills, where most events took place in the fall or winter and where the focus was clearly on cows, not bulls (e.g., Frison 1978).

My analysis of the Garnsey material showed that even those cows that had been killed were treated differently than the bulls: if a part was to be discarded, the chances were that the abandoned part was from a female, not a male. I began to ask myself why? If the hunters had gone through all the trouble of killing a cow, why would they throw parts of it away while keeping the equivalent parts from bulls? Perhaps it was simply a matter of bulk. Bison are very dimorphic animals (i.e., the males are much bigger than the females); hence, body parts from males were bigger and had more meat and marrow than the analogous parts from cows. But upon closer scrutiny it turned out that size wasn’t the only factor. As I probed the data further, and at the same time began to explore the wildlife literature and the voluminous reports of early North American explorers, military officers, and fur-trappers, it became evident that the Garnsey hunters had preferentially targeted males over females because males in the spring generally were in better condition (i.e., they had more body fat) than females, most of which were either pregnant or nursing and as a consequence in much poorer shape.

The hunters were also selecting specific female body parts that were most likely to have significant reserves of fat in them at the time of the kill (spring). Body fat in wild ungulates (hoofed animals) that are nutritionally stressed is mobilized in an ordered sequence. The first to go is the fat under the skin, the so-called “back-fat” or subcutaneous deposits. If the stress persists, the fat around the kidneys and other
internal organs is the next to be mobilized. If conditions remain stressful or deteriorate further, the next fat deposits to go are in the marrow cavities of the limb bones, often starting close to the body (proximally) and then gradually progressing toward the feet (distally). The Garnsey hunters seemed well aware of this depletion sequence because the bones they discarded in greatest numbers were not only from cows but the bones that were least likely to retain significant reserves of fat in the spring. In other words, fat, not protein, seemed to play a very prominent role in the hunters’ decisions about what animals (male vs. female) to kill and which body parts to discard or take away.

These observations gave rise to the first small crack in my perception of why foragers hunted, a perception that was squarely though implicitly founded upon the assumption that men hunted big game because it was the most efficient way to acquire protein in large quantities. The Garnsey work showed that, at least in the spring, fat may have been more important to the hunters than protein. Excess protein would not simply be converted to calories or “love handles” as I had assumed; instead, protein intake above a certain threshold might lead to loss of body weight, something that is unlikely to be beneficial to most hunter-gatherers, and ultimately might be detrimental to their health. At first, of course, this realization did not seriously compromise the structural integrity of the big-game-hunting-equals-food-provisioning perspective that had been so deeply ingrained in my psyche since my graduate student days. The crack in the edifice remained relatively small. The Garnsey insights simply meant that protein might not always be the high-quality food that most paleoanthropologists at the time (1980s) assumed it to be.

So when I began thinking about this book several years ago I envisioned the arguments as a detailed exploration of the circumstances under which hunters might be more interested in the fat provided by big animals than by the lean muscle tissue. And a lot of the arguments my readers will find here are just that – evidence drawn from a wide range of medical, nutritional, and health science literature documenting the drawbacks, costs, and negative consequences that can arise from sustained high-protein intakes. But as I continued to pursue these issues and arguments, one nagging problem kept surfacing: if large intakes of protein can be costly and risky to acquire, and above a certain threshold even deleterious to health, then why do hunters devote so much time and effort to killing big animals that yield protein in quantities that they and their families can’t possibly consume safely?

Over the past two decades or so, paleoanthropologists have increasingly come to accept the idea that meat, because of its high-protein content, may be an inefficient way to provide calories and at times even deleterious to health. Instead, many paleoanthropologists now suggest that hunters went after big animals, not just for meat, but especially for their fat content, particularly the fat in their brains and marrow. But this begs the question of why African foragers like the San and Hadza spend so much time and effort pursuing big animals when most of these animals remain lean throughout the year (e.g., Ledger 1968; Ntiamoa-Baidu 1997:65; Smith 1970; see also Burchell 1822:187; Burton 1860:281; Burton et al. 1873:27; Dane 1921:75; McKiernan 1954:99; Shostak 1981:76)? Does it make sense to go after
them when the tissue that may be most vital to the hunter – the fat – is only a small fraction of the total yield? If fat is so critical, why not go after oil-rich nuts and seeds or grubs and other fatty insects? Why spend 5 days chasing a recalcitrant giraffe across a waterless landscape, like in John Marshall’s movie The Hunters, when other resources could provide the same nutrients far more quickly and at considerably less cost and risk?

These thoughts led me to reexamine the wonderful body of detailed, quantitative subsistence data that has been generated by behavioral ecologists over the past decade or so for modern hunter–gatherers in Africa, the New World tropics, and elsewhere. This literature is a real eye-opener. Although we have known for years that foragers share big animals more widely than small game or plant foods, these recent studies have shown that much of the sharing of big animals is with non-kin, and not uncommonly with a distinct bias in favor of unrelated adult men. In other words, the hunters aren’t necessarily provisioning their spouse or kids, as all of us had assumed, but other members of the group who may not be closely related to them.

Also, only certain hunters become really accomplished at what they do, creating an asymmetry in these sharing relationships that may persist for years, if not an entire lifetime. This observation challenges the traditional idea that meat-sharing served over the long run to even out the day-to-day variability in individual hunting success (“pooling risk” in the parlance of behavioral ecologists). Moreover, our quintessential hunters, the San and Hadza, fail to acquire prey far more often than they succeed, and when they manage to wound an animal they spend hours, even days, tracking it, often failing to find it or get to it before carnivores have devoured the carcass. And finally, a number of hunter-gatherer studies have shown that men would do better in terms of overall day-to-day returns if they did what women did rather than engaging in costly and unpredictable hunts of large game. These and other arguments, spelled out at some length in the pages to follow, raise serious doubts about big-game hunting as primarily a food-getting enterprise. While hunting of large animals certainly produces edible returns, the motivating factor underlying the evolution of big-game hunting more likely lay in the sociopolitical realm, not in putting food on the family table.

I feel compelled to comment briefly here on how this book actually came into being, since the process was totally unlike anything I’d done before and has changed forever the way I do scholarly research. For better or for worse, this book is entirely a child of the Internet – lock, stock, and barrel. When I began to put the ideas that form the core of this book to (digital) “paper,” I happened to be on Hebrew University’s Givat Ram campus in Jerusalem coding mountains of Middle Paleolithic (Neanderthal-period) animal bones. Each afternoon, when the aches in my back told me I had been sitting hunched over a microscope long enough, I retired to a little bed-and-breakfast a few hundred meters from the lab, stretched out on the bed, propped my laptop up with a pillow, connected to Hebrew U’s WiFi network, and commenced downloading literally hundreds of articles – god knows how many different scientific and technical journals – via a link to the University of Michigan’s main library system (I literally never set foot in a library during the
entire process of writing this book). When Michigan didn’t have the online version of a particular periodical, which was true for the early issues of a number of them, and for some of the more obscure applied food- and animal-science literature, I would purchase online versions directly from the publishers (at up to $30 a pop, this ultimately turned into quite an expensive venture). When that wasn’t possible either, I approached the authors directly via email, and sometimes had a pdf of the article on my (computer) “desktop” within 5 min, and a “long” wait might mean 12 h, or, god forbid, 24 h. I could accomplish in an hour or two from my bed thousands of miles away from my real office what would have taken me months in the “good old days,” combing the stacks of the more than 20 divisional libraries on Michigan’s main campus, thumbing through journals, hauling teetering piles of massive bound tomes to the nearest copy machine (which was invariably already in use, out of order, or out of paper), quietly cursing when an issue was checked out, misshelved, or missing, and sometimes driving all the way to East Lansing, Michigan, 60 miles away, in a blinding snow storm with a stack of dog-eared 3×5 cards to use Michigan State University’s library. As a last resort, I would try to get the item through interlibrary loan, which often took weeks.

In the process of Web surfing from the quiet comfort of my guest room, I discovered lots of unfamiliar but interesting journals, and even entire disciplines that I never knew existed. As virtual articles accumulated on my virtual desktop, I entered them into a bibliographic database which by now contains more than 17,000 entries, each reference accompanied by a string of searchable keywords and detailed notes on the content with appropriate page numbers. So when it came to actually writing a section of the book, a quick keyword search brought up all of the relevant references and from there it was an easy matter to compose the text. When I encountered an obvious gap in my argument – for example, some piece of missing data or a case study that would provide an example of a particular phenomenon – I went back on the Web. When I encountered an unfamiliar technical term, or when I needed to know the full name of an early African explorer or the dates of his expedition, a few seconds searching the Web and I had the information.

A wonderful benefit of this procedure is the fact that I not only ended up with thousands of keyword-searchable references in my bibliographic database, but I have most of the articles as well (as pdf files), and yet the computer still weighs the same miniscule 5 lbs that it did when I bought it. Wherever I go now – be it my lab, an airport waiting lounge, motel room, train, or in front of a tent on a rockhounding trip – the “library” is right there with me. So when I’m stranded somewhere waiting for an overdue flight, instead of going into mental “veggie” mode to wile away the hours, I can pull out the computer and get some work done (accompanied by an endless variety of music if I feel so inclined). I’ve taken real paper, the kind made from trees, almost totally out of the loop. In fact, most of my journals, many “board feet” worth, recently went to a needy university library in Ho Chi Minh City, Vietnam. Other journals are lined up, ready to go, as soon as they become available online. Even my clumsy banks of four-drawer filing cabinets are rapidly being purged of their contents and disappearing. The world’s forests are breathing a collective sigh of relief…
There is another real value of the Internet age. Virtually every book in the libraries of a number of major research universities in the USA – and we’re talking about millions of volumes – has been scanned, or will be scanned by Google™ in the not-too-distant future, and most of these are now searchable at some level (i.e., snippet, limited preview, full view). Likewise, many research museums and other scholarly institutions are systematically digitizing their own publications and making them available to the public, often for free. Each year more and more of these become available online. Many of the older books digitized by Google™ and other organizations, particularly those written in the eighteenth and nineteenth century, are now in the public domain and can be downloaded in their entirety and, with a little OCR magic from Adobe Acrobat® Pro, can be converted to a form that is keyword-searchable. For example, many years ago I read an early twentieth-century monograph published by New York’s American Museum of Natural History that contained an interesting description of Plains Indians eating the fetus of a bison. The circumstances under which people eat such immature individuals is of interest in the present context because fetuses and newborns of most ungulate species have very little body fat and, for that reason, are often ignored. So I wanted to find that particular quote in order to see if the author happened to mention the time of year when the behavior had been observed. I discovered that in the interim the monograph had become available in digital form. So I downloaded the entire document, a process that took all of about 2 min, and searched for the word “fetus,” which took at most another couple of seconds. No result. On a hunch, I changed the spelling from “fetus” to “foetus” and, bingo, there it was. Only a few years ago finding that quote might have taken hours, if you include the time it took to drive into the university, find a place to park (utterly hopeless after 9:30 AM), walk from there to the library, thumb through the card catalog to get the call number (which often meant trying to figure out how the item in question had been indexed, a nightmare with monographs), check a map of the library to figure out what floor it was on, find the book in the stacks or rummage the reshelving carts in hope of finding it, photocopy the relevant pages, and then return home again, perhaps to find that you had forgotten to jot down a critical part of the citation.

There is another truly invaluable benefit of the digital age to the scholarly enterprise. How often over the years I have heard one of my colleagues bemoan the fact that none of the present generation of graduate students ever reads anything that is more than 10 years old (I’m sure that same accusation was leveled at me years ago, and justifiably so) – “if it isn’t new, it probably doesn’t have anything worth reading in it, so why bother” (in archaeology the notable exceptions to this are site reports; these are timeless because you can only dig a site once). But with so much of the early literature now almost instantly at one’s finger tips online, in a matter of minutes you can keyword-search hundreds, maybe thousands, of tattered, leather-bound treasures that have been locked away for decades in the dusty bowels of “rare book rooms.” While some number of these decaying tomes have been reprinted, so they aren’t truly inaccessible, until now the only way you could search them was to sit down in a cramped library carrel hidden away somewhere in the stacks, and painstakingly thumb through them cover to cover. Now, in a matter of seconds you can plow through them and download the ones that look interesting.
A few examples will illustrate just how wonderful and revolutionary this new information technology is. Just searching on the word “pemmican,” a topic I will return to later, instantly brings up hundreds of nineteenth-century accounts that mention the word in some context, and among these are many gems – extremely informative descriptions of precisely how to make pemmican, the proper mix of dried meat and fat, which cuts of meat and which types of fat are most useful, and the difficulties an explorer or trapper or fur trader might experience if the pemmican didn’t have the right mix of ingredients. While these nineteenth-century accounts obviously don’t couch their discussion in terms of amino acids, rate-limiting enzymes, or urea synthesis and excretion, they nonetheless make it patently clear that the traveler who for whatever reason had to rely on lean meat without an adequate supply of fat or some alternative source of carbohydrates was in for tough times. In the process I discovered charqui, a South-American variant of jerky and probably the word from which “jerky” was derived, bringing up hundreds of additional references, and that led me to Kavurme or Kavurma, a Near Eastern cousin of pemmican, and again many new references and insights. Even as this book went to press I was still finding more interesting threads to follow in what has become an almost limitless digital universe.

Here’s another interesting example of the kinds of insights that await discovery in this newly emerging digital world. As first pointed out to me by Michael C. Wilson of the Department of Geology at Douglas College (New Westminster, BC), and amply confirmed by a search of Google™ Books, these early accounts hint at the possibility that elk fat, at least under certain circumstances, is less palatable than fat from other North American cervids, and that explorers like Lewis and Clark had more difficulty preserving its meat:

The hair is usually of a sandy red; and they are frequently called by the English who visit the interior parts of the country, red deer. Their flesh is tolerable eating; but the fat is as hard as tallow, and if eaten as hot as possible, will yet chill in so short a time, that it clogs the teeth, and sticks to the roof of the mouth, in such a manner as to render it very disagreeable.

Hearne (1971[1795]:360)

The fat of the elk partakes of the nature of tallow, and is much less fusible than that of other animals, so that unless eaten very hot it consolidates and adheres to the mouth.

Keating (1825:16)

The external fat is so hard as to make special precautions necessary to prepare this venison for the table in order to appreciate its full excellence. It must be served hot and kept hot, or else if there be much fat in it one will find a thin scale of the fat coating the roof of the mouth, which to most persons is very disagreeable…

Caton (1877:407)

The Elk or what the Canadians call Biche rut &c &c about the same time as the others – they make a curious whistlening [sic] noise when uneasy about or looking after their mate – they are reckoned the handsomest of all wood animals, & they become by far the fattest, but the least that their fat or Grease is exposed to the air it congeals in a moment & becomes exceeding [sic] hard….

Nelson (2002:159)
They resolved, therefore, to remain 1 day where they had killed [the elk], so that the skin might be dried and receive a partial dressing. Moreover, they intended to “jerk” some of the meat – although elk-venison is not considered very palatable where other meat can be had. It is without juice, and resembles dry short-grained beef more than venison. For this reason it is looked upon by both Indians and white hunters as inferior to buffalo, moose, caribou, or even the common deer. One peculiarity of the flesh of this animal is, that the fat becomes hard the moment it is taken off the fire. It freezes upon the lips like suet, and clings around the teeth of a person eating it, which is not the case with that of other species of deer.

Reid (1889:148)

Another peculiarity is that this is the most difficult of all to preserve. The difficulty of curing Elk meat, is first mentioned by Lewis and Clarke, at their winter camp near the mouth of the Columbia River, about Christmas in 1805. They say. “Our Elk meat is spoiling in consequence of the warmth of the Weather – though we have kept a constant smoke under it.” Again, “The whole stock of meat being now completely spoiled our pounded fish became again our chief dependence.”

Caton (1877:407)

There was also a want of meat, for the buffaloe were not to be found, and though the elk are very abundant, yet their fat and flesh is more difficult to dry in the sun, and is also much more easily spoiled than the meat or fat of either the deer or buffaloe.

Lewis and Clarke (1815:345–346)

Interestingly, these early reports receive support from a relatively recent forensic study, also kindly furnished by Mike Wilson, which shows that the fatty acid composition of elk meat is clearly distinguishable from that seen in other North American cervids (McClymont et al. 1977). Incidentally, I have found no mention of a comparable problem with the meat or fat of red deer, a close cousin of the American Elk. Perhaps the distinctive properties of the fat in elk meat may help account for the seeming underrepresentation of elk bones in archaeological sites in many parts of western North America, despite the abundance of these animals encountered by eighteenth- and nineteenth-century travelers.

Could there be similar differences in the properties of the fat among the many species of African antelopes that might influence a hunter’s decisions about which to exploit and which to avoid when circumstances permit? A comment by Frederick Selous, a nineteenth-century explorer and hunter in southern Africa, suggests that the answer is “yes,” and the antelope in question – the wildebeest – is one of the more common denizens of the African grasslands (see also Earl of Suffolk and Berkshire 1911:319; Oliver 1993:217–218):

In the evening, being rather short of meat, I shot a tsessebe antelope, in very fine condition. Though the meat of these antelopes is tolerably good, the fat, like that of the wildebeest, turns hard, unless very hot, and sticks to the palate in a most disagreeable manner.

Selous (1907:220)

I was also amazed at some of the surprisingly informed taphonomic insights that I found buried in these ancient digitized tomes, insights that I naively thought we owed entirely to twentieth- and twenty-first century paleontologists and zooarchaeologists. Taphonomy had its formal beginnings in paleontology in the 1940s largely
through the pioneering work of Russian-born Ivan Efremov (1940). Then, over the next three to four decades, taphonomy found its way into mainstream archaeology, introduced by scholars such as C. K. (Bob) Brain (1967, 1969), Kay Behrensmeyer (1975), and Lewis Binford (1981), and by the mid- to late-1980s had assumed a central position within the discipline. Anticipating issues that I will discuss more fully a little later in the book, taphonomy is the study of what happens to the bones of animals from the time they die until their bones become part of the fossil or archaeological record. Much current taphonomic work looks at what modern bone-crunching and bone-schlepping predators like hyenas do to bones. To my astonishment the Rev. William Buckland did precisely that almost 200 years ago in his famous *Reliquiae Diluvianae* (1824). I had certainly heard of the book—it gets mentioned frequently in discussions of the development of ideas about the antiquity of humans and their association with the remains of extinct animals. But I had never read it—in part because it was too old to bother with, in part because the Latin title was so off-putting—and I certainly had no idea that Buckland thought about taphonomy, let alone in such a sophisticated way:

Since this paper was first published, I have had an opportunity of seeing a Cape hyaena at Oxford, in the travelling collection of Mr. Wombwell, the keeper of which confirmed in every particular the evidence given to Dr. Wollaston by the keeper at Exeter ’Change. I was enabled also to observe the animal’s mode of proceeding in the destruction of bones: the shin bone of an ox being presented to this hyaena, he began to bite off with his molar teeth large fragments from its upper extremity, and swallowed them whole as fast as they were broken off. On his reaching the medullary cavity, the bone split into angular fragments, many of which he caught up greedily and swallowed entire: he went on cracking it till he had extracted all the marrow, licking out the lowest portion of it with his tongue: this done, he left untouched the lower condyle, which contains no marrow, and is very hard. The state and form of this residuary fragment are precisely like those of similar bones at Kirkdale; the marks of teeth on it are very few, as the bone usually gave off a splinter before the large conical teeth had forced a hole through it; these few, however, entirely resemble the impressions we find on the bones at Kirkdale; the small splinters also in form and size, and manner of fracture, are not distinguishable from the fossil ones. I preserve all the fragments and the gnawed portions of this bone for the sake of comparison by the side of those I have from the antediluvian den in Yorkshire: there is absolutely no difference between them, except in point of age. The animal left untouched the solid bones of the tarsus and carpus, and such parts of the cylindrical bones as we find untouched at Kirkdale, and devoured only the parts analogous to those which are there deficient.

Buckland (1824:38)

In 1863 the renowned geologist, Charles Lyell, while commenting on the archaeological remains recovered by Édouard Lartet from a cave near Aurignac in southwestern France, makes another astute taphonomic observation concerning the probable role of hyenas in the formation of ancient faunal assemblages:

The bones of the herbivora were the most numerous, and all those on the outside of the grotto which had contained marrow were invariably split open, as if for its extraction, many of them being also burnt. The spongy parts, moreover, were wanting, having been eaten off and gnawed after they were broken, the work, according to M. Lartet, of hyenas, the bones and coprolites of which were plentifully mixed with the cinders, and dispersed through the overlying soil… These beasts of prey are supposed to have prowled about the spot and fed on such relics of the funeral feasts as remained after the retreat of the human visitors, or
during the intervals between successive funeral ceremonies which accompanied the interment of the corpses within the sepulchre.

Lyell (1863:185–186)

Another example of the marvelous things one can stumble into when keyword searching the “virtual” editions of books that have been quietly guarding their secrets for years or, in this case, for millennia. Years ago, in the 1970s, when I first began working on faunal remains, I wondered why immature animals were so strikingly underrepresented in many archaeological assemblages. Following upon the pioneering work of people like Bob Brain (1967, 1969) and Kay Behrensmeyer (1975), the 1970s was also the decade when the field of taphonomy began making its grand entry into mainstream zooarchaeology and it offered a very simple and compelling answer – the unfused elements of young animals were fragile and easily destroyed by ravaging carnivores, trampling, and other natural processes like weathering and chemical dissolution (e.g., Lyman 1994). But I noticed in several of the assemblages I was analyzing that the limb bones of the youngest animals not only displayed very few signs of carnivore damage, many were also intact, or nearly so, while those from fully adult animals had almost invariably been broken open for marrow. In my search for an explanation, I began perusing the contemporary wildlife literature and came upon what seemed to be a consistent difference between the bones of adult animals and immature ones – the marrow of very young animals often contains much less fat than the marrow of adults. In my naïve exuberance, fostered no doubt by the thrill of “discovery” after sitting cross-legged for days on end on the floor of the science library thumbing through unfamiliar journals, I thought I had stumbled on to something that was genuinely new; my recent Web surfing revealed that Aristotle had already made that same observation quite explicitly in his “Historia Animalium” in 350 BC!

Concerning marrow, for this is one of the fluids which exist in some animals. All the natural fluids of the body are contained in vessels, as the blood in the veins, and the marrow in the bones, and others in membranes, skin, and cavities. The marrow is always full of blood in young animals; but when they grow older, in the adipose it becomes adipose, in fat animals fatty.

Aristotle (1897:69)

Here is one final example of the marvels that one can discover searching the Web: I was surprised to find that Frederich Engels anticipated by more than three-quarters of a century one of Richard Lee’s more important insights about the role of plant vs. animal foods in the foraging strategies of hunting and gathering societies like the San. In Lee’s (1968:41) words: “…the Bushmen of the Dobe area eat as much vegetable food as they need, and as much meat as they can.” Frederich Engels, writing in 1884, doesn’t sound all that different:

Exclusively hunting peoples, such as figure in books, that is, peoples subsisting solely by hunting, have never existed, for the fruits of the chase are much too precarious to make that possible. (Engels, 1972:40) [Ausschliessliche Jägervölker, wie sie in den Büchern figuri- eren, d.h. solche, die nur von der Jagd leben, hat es nie gegeben; dazu ist der Ertrag der Jagd viel zu ungewiss.] (Engels, 1884:30)
The two most obvious downsides of this wholesale shift from paper to digital bits and bytes, aside from a serious case of eye-strain and a cabinet full of DVDs devoted to backing up the many gigabytes of pdf files now in my computer, is reflected by the length of my bibliography – what one reviewer referred to as “Speth’s missionary zeal” – and the number of direct quotes in the text. First, a comment about the number of references. When all of this literature is so readily available at one’s finger tips, there is no excuse not to use it. Why should others have to reinvent the wheel? One obligation of any piece of research is to situate the work within the broader context of existing knowledge, and the references are an essential part of that.

The citations are also a way of giving credit where credit is due. All too often people cite only the work of a very limited circle of familiar authors – the “old boy” network – giving the (false) impression that they are the only ones who have worked on a problem or, worse yet, that they are the only ones whose ideas are interesting or worthwhile enough to cite. There’s an unbelievable wealth of interesting and creative thinking out there and the Web allows one to find it easily and get one’s hands on it at lightning speed, regardless of where it originates.

The other downside – the number of quotes in the text – is undoubtedly in part a reflection of my laziness and the fact that one can now “cut and paste” text so easily in this computer age that it becomes a quick way of piecing together an argument. However, using a fair number of quotes is not all bad either. It’s a way of letting the author who came up with an idea express it in his or her own words, which in all probability will be clearer, more succinct, and in the long run more compelling than my not so elegant attempts to paraphrase it.

Unfortunately, there is one area where the Internet still seems woefully antiquated, almost helpless – online translation. While OCR has made incredible strides in digitizing text, the gobbledygook that I usually got back when I attempted to translate some portion of a text, even when the text of concern was written in an academically mainstream language like French, German, Spanish, Italian, or Russian, was (putting it politely) pathetic. Using the Web I was able to access publications in an amazing number of different languages, but my linguistic skills are often not up to the task, and the online translators available on the Web, as well as through software that I (unfortunately) invested a considerable amount of money in, produced results that, at best, were less convincing than my attempts with a dictionary, and, at worst, amounted to pure (and sometimes hilarious) gibberish. That has led to a clear bias in what I have been able to read and use effectively – a reasonable amount of French, a smattering of Spanish, Italian, and German, and not much else. For that I apologize. I hope that in the not-too-distant future computer translators improve to the point where language is no longer a major barrier.

I write a book of this nature with considerable trepidation. I am an archaeologist by training, not a nutritionist or a behavioral ecologist. So I am pulling together arguments from diverse fields that have their own complex methodologies, assumptions, histories, and conventional wisdom. I can only hope that in doing so the insights that emerge here outweigh the many blunders I undoubtedly make along the way. Of course, nutritionists and behavioral ecologists interested in the
evolution of human diet face much the same dilemma in the opposite direction. While nutritionists are fluent in the concepts, methods, assumptions, and data of biochemistry, nutrition, and health sciences, and behavioral ecologists are experts in evolutionary theory and behavioral modeling, these specialists are confronted by a body of archaeological, taphonomic, and fossil data, and associated theoretical baggage, that is not only voluminous but complex, not uncommonly contradictory, and often quite contentious. Wading unwittingly into paleoanthropology and archaeology can be akin to wandering into a minefield without a detailed map of exactly where, and where not, to step…

As I waded through many hundreds of papers on countless different issues related to human origins and evolution, hunter–gatherer subsistence practices, and human health, diet, and nutrition, what became increasingly clear to me was the pressing need for more direct interaction and exchange between scholars in paleoanthropology, archaeology, primatology, behavioral ecology, human nutrition, and genetics. Each of these fields has become too vast and too complex for any single individual to correctly and productively integrate the data and insights from such a broad and multifaceted landscape of scholarly knowledge. But without such interchange and integration our understanding of our origins, our evolution, and our present condition will remain woefully incomplete. Of course, there have been such attempts at integration in the past, a number of them, but not enough and not recently enough. My hope is that this book will encourage scholars from the many different disciplines that share a common interest in human evolution to find new ways, and more permanent ways, to cross the disciplinary boundaries that presently divide us. There is so much we can yet learn from each other…
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