MEAT THROUGH THE AGES

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We take meat for granted today, but there was a time in the history of our planet when carnivory was rare or even nonexistent. This probably seems surprising since eating meat is one of the most efficient ways to provide our bodies with necessary nutrients. As with many other animals, it is usually most straightforward for humans to convert the nutrients from the animal matter we ingest in meat into the components our bodies must have to sustain our lives. Meat provides proteins, fats, vitamins, minerals, and other substances our bodies require. Since meat generally comes from other animals, these substances are usually delivered in a form that our bodies can readily process and put immediately to use. And if we cook meat, as our ancient ancestors discovered, it becomes much easier to ingest, digest, and assimilate the molecular components of meat into our bodies. Even with all of these benefits, carnivory was a relatively recent development in the history of life on Earth, albeit one with far-reaching consequences that continue to drive the evolution of life on our planet today.

THE EARLIEST CARNIVORES

To understand why carnivory was so long in coming, we must turn to evidence from geology and paleontology, sciences that study the history of our planet and its life forms. According to paleobiologists, the first known organisms on our planet were bacterial mats called "stromatolites," a type of layered structure found in certain kinds of aquatic environments. The bacteria that formed the earliest stromatolites were not carnivores; they would have been "primary producers" or "autotrophs," organisms that use solar energy to drive chemical reactions that support the organism's life.

Stromatolites are among the earth's great survivors and can be found in small numbers even to this day in places such as Shark Bay in Western Australia. The oldest unequivocal evidence for stromatolites in the fossil record dates back some 3.4 billion years, and certain chemical signals present in ancient rocks suggest that these organisms may have evolved shortly after the formation of oceans on the ancient earth's surface some 4.4 billion years ago. Stromatolites have been the dominant form of life on Earth for most of our planet's geological history, holding sway for several billion years before larger and more complex life forms evolved.

Next likely came the grazers—simple creatures that fed on the bacteria in the stromatolites and lived freely in the earth's oceans. The earliest true carnivores—animals that subsist principally by feeding on other animals—are thought to have arisen some 800 million years ago and may have included passive filter feeders similar to sponges.

I pause now to note the parallels between this simplified account of the history of life on earth, as provided by modern geological science, and traditions such as those recorded in the Jewish and Christian scriptures, in which carnivory is likewise a later addition to the created universe. I am not a theologian, but I find these sorts of alignments between ancient traditions and the findings of modern science to be quite fascinating.

To return to the geological narrative, the world of carnivores took off in the so-called Cambrian explosion. During the 50-plus million years of the Cambrian geological period, most of the major groups of animals made their first appearances in the fossil record, ranging from jellyfish to worms to arthropods to chordates—the latter group includes humans and many of our most familiar animals and fish species. Scientists have theorized that this explosion of organisms was driven by several factors, including rising oxygen levels in the atmosphere, the evolution of eyes and light-sensing structures, and yes, carnivory. The ability to consume other organisms made it possible for entirely new groups of organisms and complex food webs to arise. Also during this period, the first "super-predator" appeared. It was a giant fearsome arthropod known by the name Anomalocaris, which means "weird shrimp" and in no way begins to characterize this bizarre terror of the ancient seas adequately. Anomalocaris had long grasping arms, bulging compound eyes, a weird segmented body, and a crushing mouth that could likely overpower most other organisms in its environment. Fossils of Anomalocaris and relatives have been found in rock formations worldwide, most notably in the Burgess Shale in the Canadian Rockies. Harvard paleontologist Stephen Jay Gould's book *Wonderful Life* introduces Anomalocaris and its weird world.

***Anomalocaris canadensis* found in British Columbia, Canada, in 1892.**

See page 40 for the nutrition content of wild game.

THE SUPERPREDATOR

Moving forward in geological time, we find a steady procession of amazing "super predator" carnivores, including the colossal placoderm fish Dunkelosteus, the terror of Devonian seas. Dunkelosteus was roughly the size of a modern great white shark and had sharp, shearing blade-like projections from its jaws instead of true teeth. Predators and superpredators evolved rapidly in multiple lineages as animals moved onto land, including giant spiders, scorpion-like creatures, and huge flying dragonflies. The early vertebrates too got into the action, with a line of predators culminating in the fearsome sail-backed reptile Dimetrodon toward the end of the Paleozoic era. Dimetrodon was truly an amazing beast; studies of bone isotopes have indicated that some Dimetrodon species subsisted on sharks, which they apparently hunted from the shores of shallow lakes and rivers. Imagine a large male Dimetrodon waiting patiently on a sandy bank for the right shark to come in view, then lunging into the water and pulling out a hefty shark in its toothy jaws, reminiscent of the behavior of modern-day bears fishing for salmon along rivers in Canada and the United States.

Once we reach the Mesozoic era, the cast of carnivores and superpredators gets increasingly more familiar, from the Triassic Coelophysis to the Mesozoic Allosaurus and the late Cretaceous Tyrannosaurus rex and its gargantuan relatives. We know these animals from displays of their bones in museums, the world of plastic and stuffed toys, and the numerous depictions of them on television and in movies. As our scientific knowledge of the dinosaurs and their relatives improves, their exquisite adaptations for predation and carnivory increasingly stand out.

The Jurassic Allosaurus, for example, could open its jaws exceptionally wide, all the better to slash its prey during an attack. In the movies, Tyrannosaurus rex has poor vision; in contrast, a recent study found that this dinosaur's gigantic grapefruit-sized eyes would have had 13 times the visual acuity of a human being (exceeding even the visual acuity of modern eagles), with better binocular vision than modern hawks, and the ability to separate distinct objects from the horizon at a distance of 3.7 miles (compared with one mile in modern humans). They also had remarkably developed senses of smell and a relatively large braincase compared with other dinosaurs. There is also some evidence of pack hunting and other group interactions. Some scientists have concluded that Tyrannosaurus may have had mental capabilities similar to some modern primates. The recent discoveries about Tyrannosaurus rex and its extraordinary predatory abilities tend to make one somewhat grateful for the demise of this species and its relatives.

This most famous carnivorous dinosaur and the Boone and Crockett Club have an interesting connection. The name Tyrannosaurus rex was coined by Honorary Life Member Henry Fairfield Osborn, the American Museum of Natural History director and one of the world's premier vertebrate paleontologists. Along with Tyrannosaurus, Osborn also coined the name Velociraptor, a presumably ferocious predatory dinosaur—although the real Velociraptor was only about the size of a turkey, substantially smaller than the versions shown in the movies.

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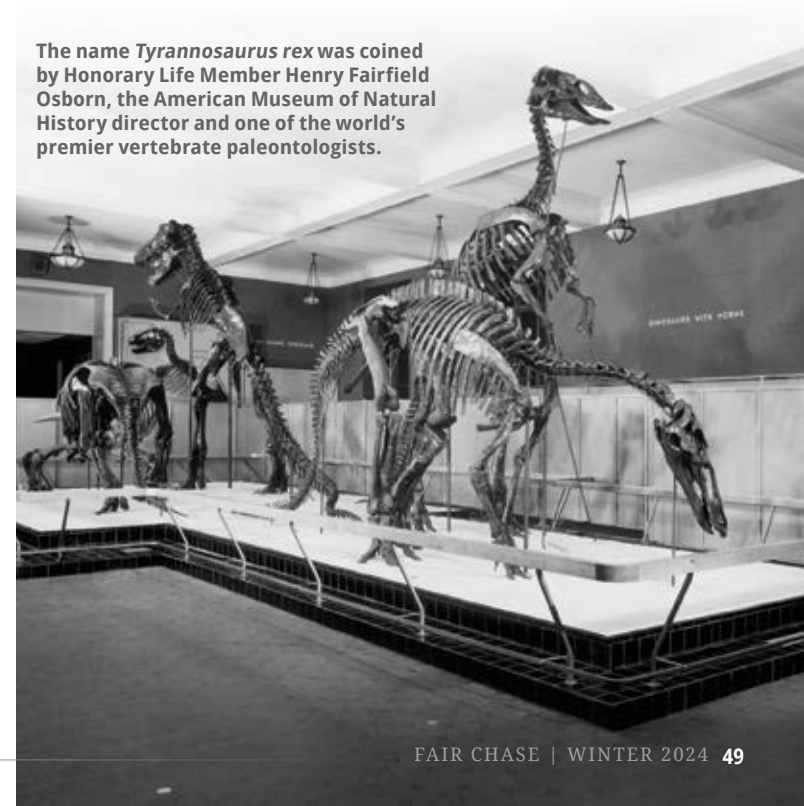
THE MOST EFFECTIVE CARNIVORE

After the end of the world of the dinosaurs, mammalian species populated the earth in increasingly varied and wonderful forms. Predation and carnivory evolved in multiple lineages, culminating in such amazing animals as the saber-tooth cat (Smilodon), the American lion, the short-faced bear, and the dire wolf. All of these predators vanished at the end of the Pleistocene epoch, along with a remarkable cast of megaherbivores such as the mammoths, mastodons, and woolly rhinoceroses.

And this is where things start to get interesting because the extinctions of these megafaunal species correspond roughly (in geological time) with the advent of new carnivores on the scene: human beings armed with spears, spear-throwers, and carefully crafted stone blades and tools capable of killing



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and processing the meat from large mammals. Archaeological finds of stone spear points near animal bones and carcasses have long suggested to anthropologists and paleontologists that humans were in some way responsible for the extinction of these animals. One widely-held version of this hypothesis—called Pleistocene overkill—contends that humans were primary drivers of the extinction of the large megafaunal animals by being too efficient at hunting, killing, and consuming big mammal species.

There are other competing hypotheses, of course. The end of the Pleistocene was a time of rapid continental-scale change, with the melting of the giant glaciers and rapid revegetation affecting much of the earth's surface. Sea levels and weather patterns also changed dramatically as vast quantities of water were liberated from the melting glaciers. Together, these changes undoubtedly impacted animal populations around the world, and very likely hastened the extinction of the large megafaunal species.

I find the Pleistocene overkill hypothesis deeply compelling, if for no other reason than it parallels the much more recent saga of wildlife devastation wrought by uncontrolled harvest in North America in the nineteenth and early twentieth centuries. The difference, of course, is that this time around, human beings recognized what they were losing. They understood the potential for complete extinction of species if market hunting was left unchecked. As late as the beginning of the nineteenth century, scientists were just becoming aware of the possibility that animals could in fact become extinct. By the early twentieth century, there was unequivocal evidence that humans could drive species such as the great auk, Carolina parakeet, and the passenger pigeon to complete and utter extinction.

The founding members of the Boone and Crockett Club hold a unique place in the planet's evolutionary history in their efforts to protect and conserve the last of the North American megafauna. To paraphrase Club member Aldo Leopold, such a thought would never have occurred to our Cro-Magnon ancestors, who thought only of steaks. If we have learned one thing after centuries of uncontrolled wildlife slaughter, it is that we must do everything in our power to conserve our remaining wildlife species, especially if we are to enjoy the pursuit, harvest, and consumption of these species in the future. We can no longer take practical steps to conserve the woolly rhinoceros, the woolly mammoth, or the American mastodon, but we can (and have) taken steps to save the American bison, the pronghorn, and the American elk from following the fate of extinct species.

It is a credit to the founders of the Boone and Crockett Club for having the wisdom and vision to see the effects of unrestricted harvest of the continent's remaining large mammals and then taking the concrete steps necessary to secure an alternative future for these species. They saw the opportunity for carefully balancing hunting and harvest with the needs of the species, maintaining populations of these majestic animals while at the same time providing opportunities for sportsmen and women to hunt and harvest these species for years to come. Let us take this opportunity as we celebrate our hunting heritage to renew our commitment to the noble and far-sighted vision laid out by our Club's founders, that these magnificent animal species, their habitats, and the opportunity for Fair Chase hunting might not vanish from the earth. ■

LEFT: Club member, Henry Fairfield Osborn, opens the NYC Aquarium in 1957. Osborn and the Zoological Park were increasingly preoccupied with endangered species being perpetuated as "living treasures" in zoo wards and with the development of new methods through which animal life could be more sensitively and imaginatively maintained in captivity. The animals within the zoo were referred to as "the living collection." RIGHT: Dr. Fairfield Osborne opens The American Bison Society.

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