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Article Summary: When the Rancholabrean Age began about 100,000 years ago, most of the game animals of the middle Pleistocene Epoch were still roaming Nebraska. Fossil beds widely distributed throughout the state provide evidence that the most striking addition to Nebraska's wild kingdom at that time was the bison.

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Seven-foot horncores of *Bison latifrons* dwarf the skulls of *Bison antiquus* (left) and modern *Bison bison* (right). Bison were among the last additions to Nebraska's Ice Age megafauna. The huge species became extinct 10,500 years ago, but late Pleistocene *B. antiquus* gradually evolved into modern bison.

CHAPTER SEVEN

Hooves and Horns

The Coming of the Bison



Columbian mammoth wisdom tooth, Franklin County

By Michael R. Voorhies
University of Nebraska State Museum

MOST OF THE BIG GAME and small game animals mentioned in chapter six continue from the middle Pleistocene to the late Pleistocene, in some cases getting even larger. Muskrats finally reached their modern size, and mammoths, mastodons, stag moose, bears, wolves, giant beavers and even woodrats all reached their maximum known dimensions at that time. But the most striking addition to Nebraska's wild kingdom during the late Ice Age was undoubtedly the bison.

Rancholabrean

Paleontologists define a new mammal age, the Rancholabrean (named after the famous tar pits in California), on the basis of the first appearance of bison in the American fossil record about 100,000 years ago. Another well-armed Asian immigrant — the bighorn sheep — also came to America at that time, as did lions and elk. Magnificent examples have been collected from late Ice Age gravels in the Republican River Valley. What a shame that they have retreated to the mountain peaks. Imagine hearing the clash of 30-pound sets of horns as two rams battle for dominance at the mouth of Red Willow Creek.

Two types of bison are found in Rancholabrean deposits in Nebraska, but only one species survived into modern times. Confusingly, both fossil forms are sometimes referred to as "giant" bison, but only one truly deserves the name, a great Paul-Bunyanesque beast called *Bison latifrons* with horncores measuring up to seven feet between the tips in males (females were considerably smaller). The rest of the skeleton of that rare species was not proportional to the horns, averaging only about 25 percent larger than modern bison, but a *latifrons* family (they apparently did not form large herds) must have been an impressive sight, nevertheless.

The smaller and more common species usually is called *Bison antiquus*. It was larger and longer-horned than living bison, officially called *Bison bison*,

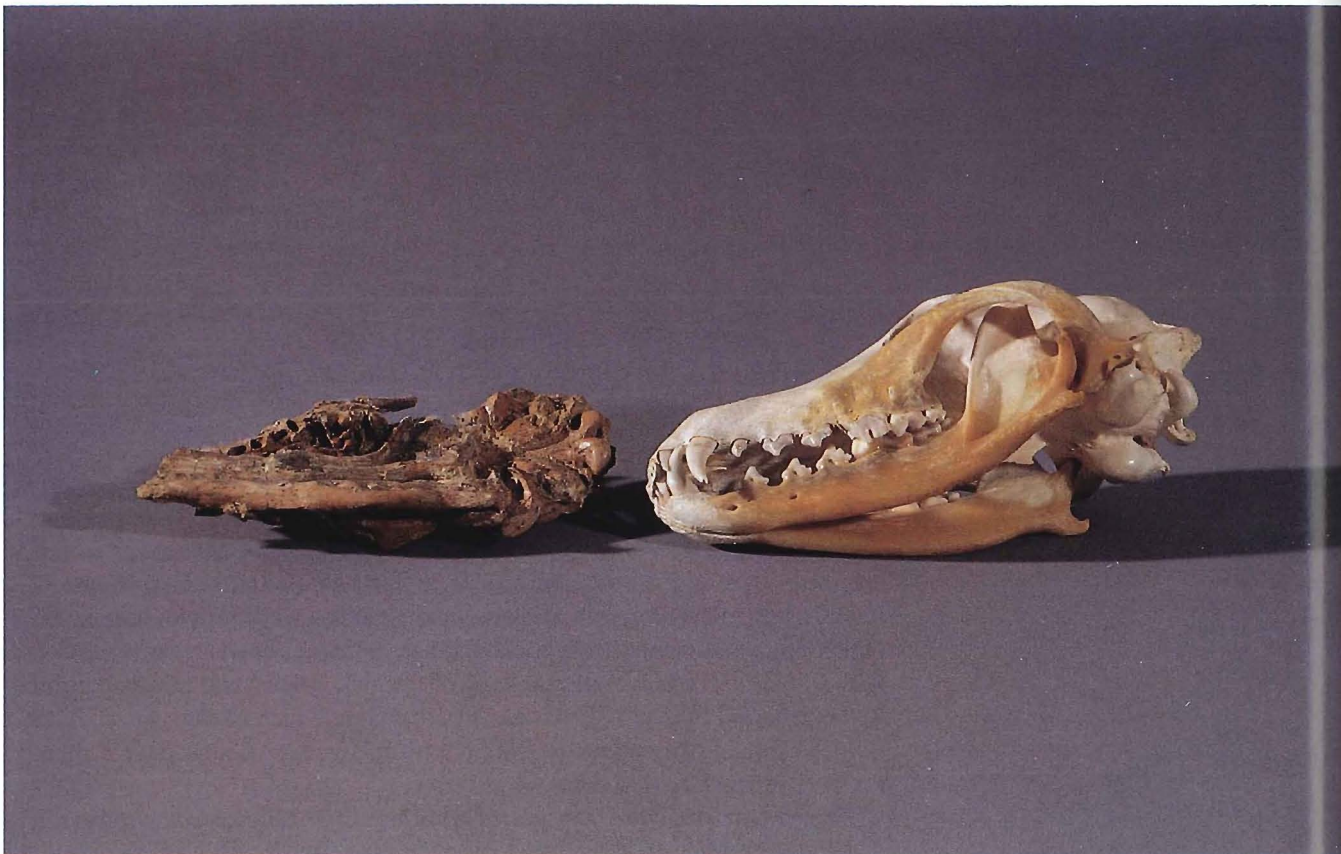
but otherwise very similar. Male horncores average about three feet from tip to tip compared to about two feet in the modern species. Scholars disagree about the details of the relationship between Ice Age and recent bison populations, but there is a consensus among paleontologists that average size decreased over time, especially during the past 15,000 years or so, since the most recent glaciation of the Midwest.

It is difficult to define exactly where *Bison antiquus* leaves off and *Bison bison* begins, however, because there is so much variability within bison populations. Not only are males larger than females, but individuals vary with age, nutrition and genetic makeup. To further complicate the situation there is a north-to-south size decrease from Canada to Texas. It may be convenient to draw the line between “extinct” *Bison antiquus* and “modern” *Bison bison* at the end of the Rancholabrean 10,500 years ago, but we should realize that the name change hides an almost imperceptible gradation between the fossils and the modern form.

Archaeologists are especially interested in bison remains because of the close relationship between Native Americans and the great herds. Some of Nebraska’s oldest archaeological sites, such as Hudson-Meng and Scotts Bluff, yielded Paleoindian artifacts along with abundant remains of larger-than-modern bison. Slightly older human populations also hunted mammoths.

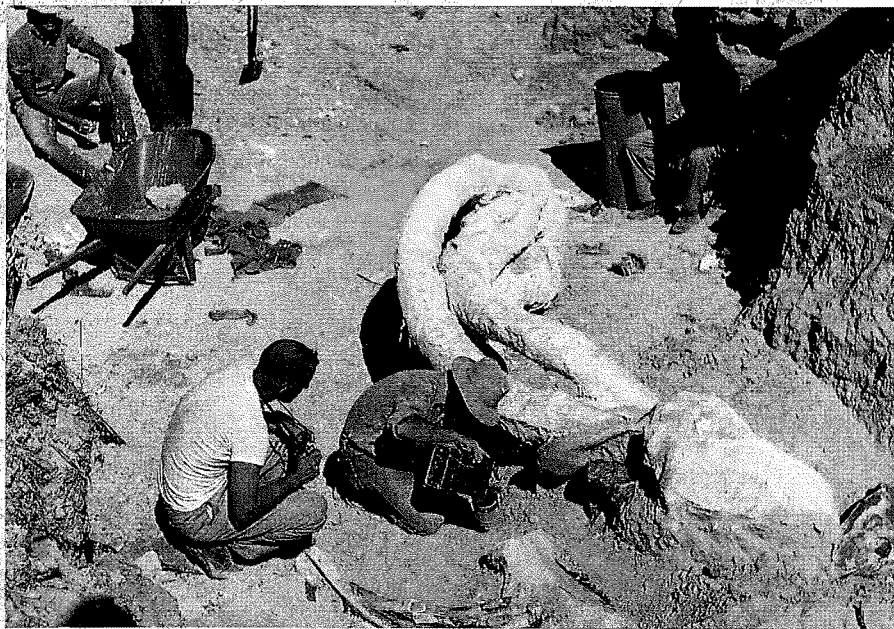
Nebraska’s latest Ice Age fossil beds are widely distributed throughout the state and, because they are geologically so young, most are not deeply buried. The accessibility of those deposits probably accounts for the fact that the majority of the fossil vertebrates brought to our museum for identification date back to the Rancholabrean, a time when our biggest big game animals were making their last stand. Most of those fossils originally were buried in one of two ways: in stream deposits, usually sand and gravel, or in upland deposits of windblown dust (loess).

Complete but flattened coyote skull, with modern coyote (white) for comparison, was found beneath the shoulder of a Crawford mammoth. It might have been crushed while scavenging or when the dying elephant fell.



ENTANGLED GIANTS

By Michael R. Voorhies, University of Nebraska State Museum



State Museum crew members preparing entangled mammoths for removal.

Two bull mammoths, among the last of their breed in America, fought to the death in the badlands north of what is now Crawford in northwestern Nebraska as the Ice Age drew to a close. We know that thanks to a chain of fortuitous events. The massive skeletons of the combatants, skulls still locked together, were quickly blanketed by a layer of silt at least eight feet thick. Luckily, the entombing sediment was limy rather than acidic, so the bones remained in superb condition for more than 10,000 years. Even more fortunately, when erosion began to expose the evidence, someone noticed and alerted the museum. Add to that the generosity of the landowners and other residents who helped unearth and preserve the one-of-a-kind fossil and you have the ingredients for an against-all-odds rescue story.

Two Soil Conservation employees, Bennie Ferguson and George McMillan, were laying out an electrical line for a stock dam on the ranch of Tom and Jim Moody in July 1962 when they noticed an enormous bone protruding from the side of a gully. They wrapped a loose piece of the bone in a feed sack and brought it to nearby Fort Robinson, where our museum crew was camped.

It was a community project from the start. The Moodys and many neighbors offered help, even bringing in a backhoe to take off the first six feet of overburden. Howard Dodd, taxidermist and local historian, kept the digging crew lively with hammer coffee ("it floats

the head and dissolves the handle") and tall tales of the Pine Ridge country. Two weekends later we not only had lots of leg bones showing, but had uncovered the back of the skull. Probing showed that the lower jaw was in place. Inch by inch we excavated farther into the bank, hoping to discover the tusks, but were disappointed to find what seemed to be the tip of one tusk pointed the wrong way — poking into the eye socket of the mammoth. How could this happen? Had the animal broken its tusk by falling headfirst?

As we continued to brush the silt away from the skull it finally dawned on us what we had: the "broken" tusk was the intact weapon of another elephant coming from the other direction. Our job was only half over. It took two more weeks to uncover the other mammoth. Like the first, its skeleton was scattered, strung out behind the skull. The two skulls, locked solidly together by their overlapping tusks, could not be separated. We encased them in a protective plaster jacket and bolted together a wooden frame to prevent flexing when we broke the nearly two-ton fossil loose and rolled it onto the back of a flatbed truck.

While removing the other bones from the ground we had some more surprises. The flattened skull and jaws of a coyote were found beneath the shoulder of the first mammoth. We'll never know for sure whether it was a scavenger crushed as the huge carcass shifted. One of the mammoth shoulder blades was also noteworthy because of a perfectly round hole

puncturing it — probably a tusk wound.

The skeletons were shipped to the museum laboratory in Lincoln to be stabilized and analyzed. Both animals were adult male Columbian mammoths estimated to stand about 13 feet tall at the shoulder. All but a few of their limb bones had stopped growing by the time they died, and they were probably within a few inches of reaching maximum size. Their wisdom teeth had completely emerged, but were not badly worn. We estimate their age at about 40 years, an age when modern bull elephants reach maximum sexual maturity.

Each mammoth had one full tusk and one much shorter tusk that had been broken during life. A modern single-tusked elephant is regarded as more dangerous than one with a matched set because it can inflict much deeper wounds, using the tusk as a spear. When elephants with a pair of long tusks fight, the opponents are kept at a distance by the closeness of the tusk tips. There is lots of head wrestling and shoving but few cases of one elephant killing another have been reported.

The Crawford mammoths are unique in the world; no such dramatic evidence of mammoth behavior has ever been found elsewhere. Plans are being made to exhibit the specimens at a new interpretive center to be constructed by the U.S. Forest Service near Crawford. One mammoth skeleton (with a reconstructed skull) is already on display at Fort Robinson State Park's Trailside Museum.



Red Willow County as it might have looked at the height of the most recent glaciation 18,000 years ago, based on fossils collected from late Pleistocene gravel beds near McCook. American lions feed on a caribou as bighorn sheep climb the chalk bluffs of the Republican River Valley.



Considered the most perfectly preserved fossil jaguar skull ever collected, this fossil, excavated from a bonebed on the north branch of the Middle Loup River in Cherry County, is larger than that of modern jaguars but is otherwise identical.



Unlike most of the older fossil beds discussed so far, the late Pleistocene water-deposited fossil beds occupy valleys carved by still-flowing streams. Often the deposits are arranged in a series of stairsteps, called terraces, leading down toward the stream. The Platte, Elkhorn, Loup, Republican and virtually all other major rivers are flanked by commercial gravel pits where deposits laid down during the past 100,000 years or so are being mined. Fossil bones often are uncovered during gravel mining, and the large ones occasionally are salvaged by an alert operator. Unfortunately, many fall apart for lack of treatment or end up being sold to dealers as curios. Many, however, have been donated to public museums where they constitute a permanent record of Nebraska's rich heritage of prehistoric big game animals as well as an indelible tribute to the donors who took the time to rescue them from oblivion.

It happens that such a donation is being catalogued into the museum collection as I write these words, an exceptionally useful consignment of mammoth, bison, muskox and elk material from Mr. and Mrs. L.H. "Beck" Becker. Mr. Becker worked for many years at a gravel pit in Saunders County and was able to save many important fossils, often at considerable inconvenience to himself, before they were devoured by the mining equipment. Perhaps the most significant of the items in the Becker donation is a battered but still recognizable cranium of the great sabercat *Smilodon*, the only one of its age in the State Museum collection.

SLICES OF TIME

By Michael R. Voorhies
University of Nebraska State Museum

Wherever the topsoil is removed we get a glimpse into an ancient world. Nebraska's exposed bedrock varies widely in age from place to place, but it is all sedimentary in origin and therefore potentially fossil-bearing. These scenes from across the state reveal some of the diversity of Nebraska's fossil-bearing beds.

Alternating layers of Pennsylvanian-age limestone and shale (right, top) contain abundant marine invertebrate fossils, including corals, sea lilies and lamp shells. Nearly 300 million years old, they are the oldest rocks and fossils exposed at the surface in Nebraska. They occur only in the southeastern corner of the state.

Nebraska's Mesozoic rock record, which accumulated mostly below sea level, contains abundant marine fossils rather than dinosaurs. The Greenhorn Formation (opposite, top) is well known for its fossil clams, oysters, saltwater fish such as sharks and for marine reptiles such as plesiosaurs.

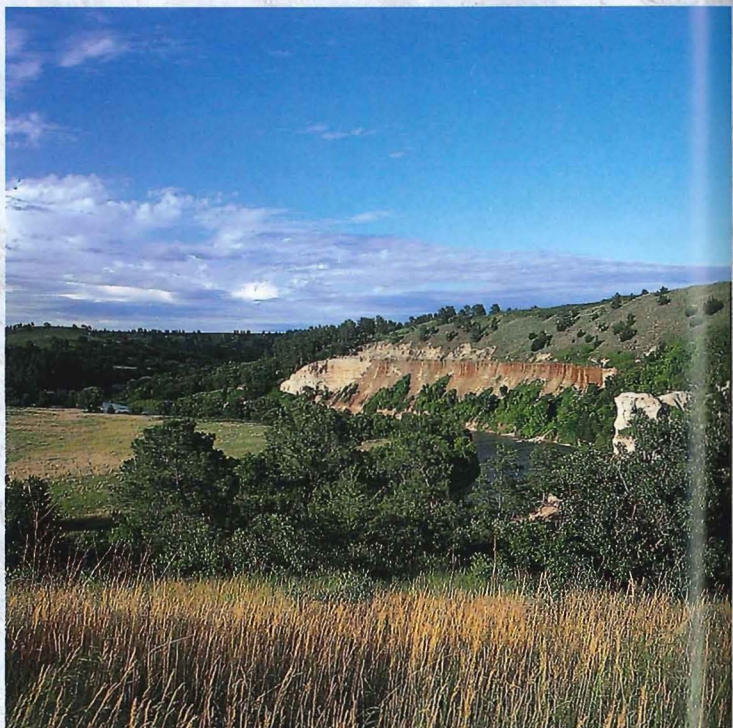
Nebraska's oldest mammals are found in the Chadron Formation (opposite center, foreground) of late Eocene age. The Pine Ridge (on the skyline) is made of Arikaree sandstone of late Oligocene age. Between the Chadron Formation and the Pine Ridge are layers of volcanic mudstone with fossils typical of the Orellan and Whitneyan mammal ages. Geologists date the layers at 35 million to 25 million years old.

Porous sands of the Valentine Formation (right, bottom) rest on the impermeable Rosebud Formation, the red band that forms the lower two-thirds of this cut bank on the Niobrara River. The base of the 14-million-year-old Valentine Formation marks a turning point in the history of the Great Plains; four-tusked and mastodons are abundant in the Valentine Formation but have not been found in older rocks.

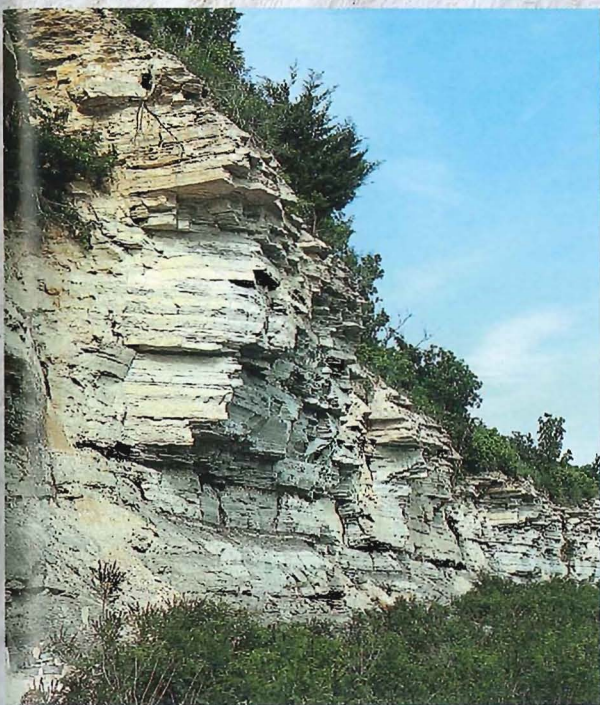
Some of the world's thickest deposits of loess, or windblown silt (opposite, bottom) occur in south-central Nebraska. Many mammoths, including the giant nicknamed Archie, have been discovered in Nebraska's loess beds. Dark streaks crossing the cliff at lower left are ancient soils. Such soils often contain enough organic material for radiocarbon dating and frequently are riddled with burrows of Ice Age rodents.



Pennsylvanian limestone and shale beds, Sarpy County.



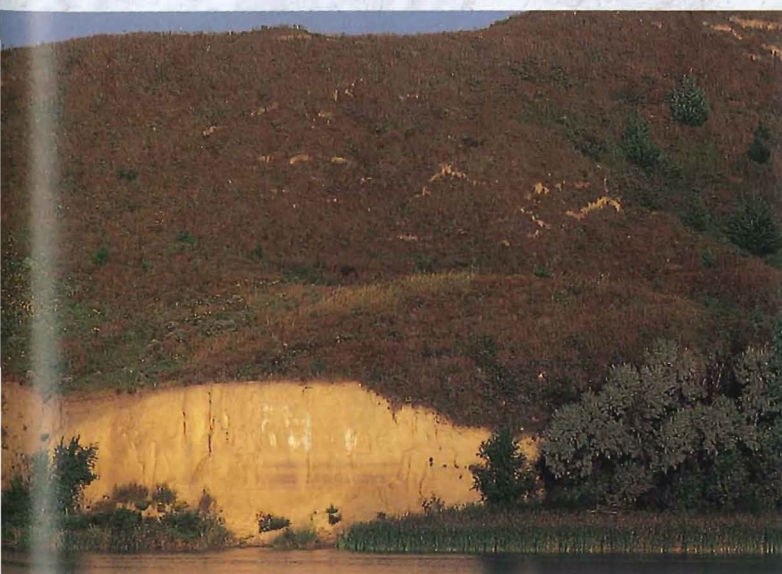
Contact of Rosebud and Valentine formations near Valentine.



Greenhorn limestone, Little Blue River near Alexandria.



Nebraska badlands and the Pine Ridge, Sioux County.



Ice Age loess, Jeffrey Reservoir.