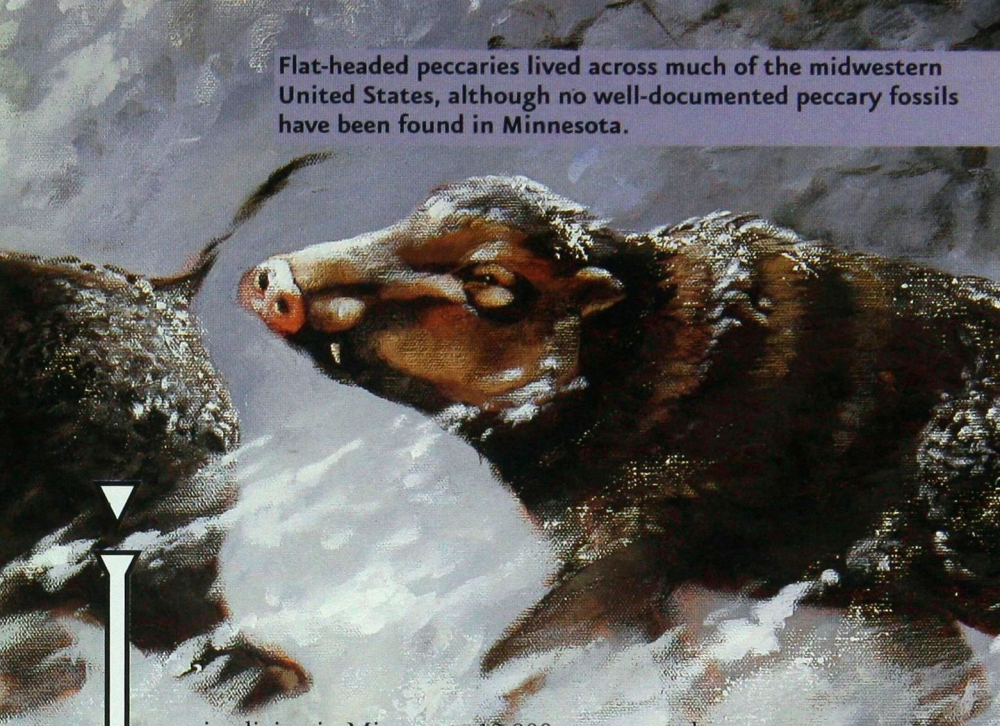
Young Naturalists

Art by GIJSBERT VAN FRANKENHUYZEN

# GIANTS of the ICE AGE

Huge animals once roamed Minnesota.



**Flat-headed peccaries lived across much of the midwestern United States, although no well-documented peccary fossils have been found in Minnesota.**

Imagine living in Minnesota 12,000 years ago when massive glaciers dominate the landscape. This frosty climate resembles Minnesota's winters today. You share this prehistoric world with strange and wonderful creatures: mammoths, mastodons, elk, bison, musk oxen, horses, giant beavers, ground sloths, and perhaps even saber-toothed cats. You rely on such animals for food, tools, clothing, and shelter. It is your natural lifestyle to track and hunt them when the need arises. You have only simple tools made of wood, stone, and bone. But, as one of the earliest humans in the region, you also have the intellectual advantage of stealth and cunning. When necessary, you can hunt even the most imposing of beasts—the giant woolly mammoth.

By JON KRAMER

Does such a scene sound like fiction? Scientists have uncovered direct proof that PaleoIndians were living in the area now known as Minnesota and Wisconsin at the end of the Ice Age some 12,000 years ago. And we also know they witnessed the perplexing extinction of mammoths, mastodons, and other large animals.

# GLACIAL HABITAT

Glaciers shaped the land of Ice Age animals. These massive sheets of ice formed across the continent as snow fell, piled up, and packed down over the years. Eventually, gravity caused the glaciers to spread under their own weight.

Continental glaciers covered our region many times during the past 2 million years, a period of time we call the Pleistocene Epoch. Each time the climate cooled, the glaciers expanded beyond their source in the Arctic, extending south as they grew. When the climate warmed again, the glaciers melted and retreated toward the pole.

Many broken rocks and other debris were mixed into these huge ice fields. In some cases the glaciers did not simply retreat, but as ice melted—mostly from the top down—the debris piled up on the glacier's top. Eventually simple plants and shrubs grew on the rocky surface. If you walked there, you'd never suspect a glacier was underneath your feet.

Whole ecosystems of plants and animals—and prehistoric human populations—followed the glaciers' movements. Earth is likely still in a natural postglacial warming trend that started more than 10,000 years ago when the last glaciers retreated from Minnesota.

## SUPER-SIZE THAT, PLEASE!

**Why did the giants of the Ice Age get so big? The simple answer is—because they could! When plants and animals first enter a new environment, they encounter few predators or other dangers. As long as the food supply is plentiful, animals may simply evolve bigger and bigger until nature eventually balances their size against what the environment can provide.**

**Is it possible to have the reverse effect in places where animals become too big for the food supply? Absolutely. Scientists have discovered several examples of "dwarfing" in prehistoric elephant populations, which resulted in full-grown adults only 3 feet tall.**

***Jon Kramer***

**As the last ice sheet to cover Minnesota melted, it left behind a landscape of rivers, lakes, spruce forests, and grasslands where huge animals lived.**

ILLUSTRATIONS BY GREGORY R. WIMMER
G. Wimmer

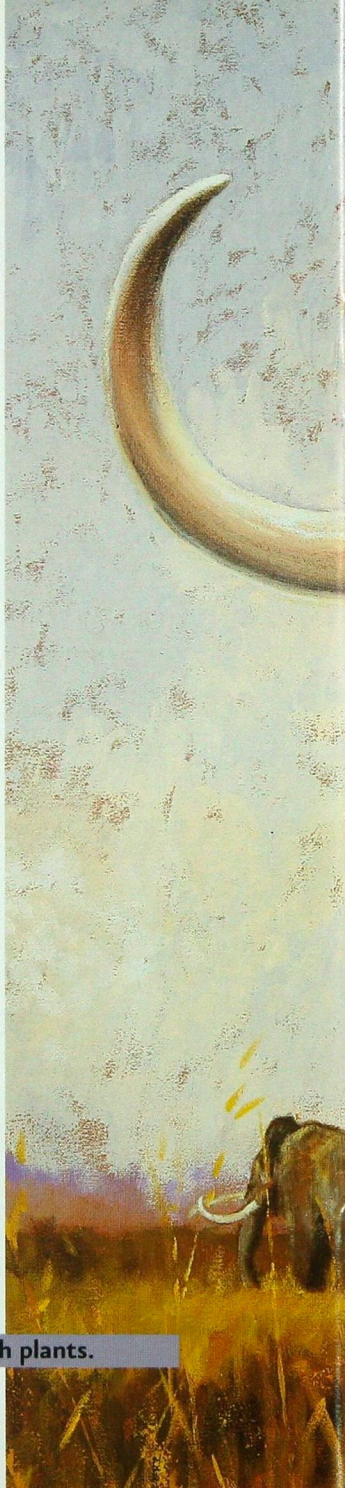
# ICE AGE GIANTS

During the Pleistocene, nature favored large animals (megafauna) that had adapted to the colder climate. Many of the animals we see today—deer, beaver, wolves, cats, bears, moose, and several species of birds such as loons—moved into the area at the close of the Pleistocene and adapted to the warmer temperatures of today. Others such as musk oxen lived here awhile and then moved north, east, or west as the glaciers retreated. Still others such as mammoths, giant beavers, sloths, and horses thrived here, but for unknown reasons became extinct.

Researchers know these animals lived in our area because we find their fossils scattered among sediments (sand, gravel, and muck) left by the glaciers or in lakes and bogs that formed on the glacial plains. Mammoth and mastodon teeth and tusks are occasionally found in gravel pits. Several years ago in Golden Valley during construction of an office building, workers discovered many well-preserved bison and deer bones in the remains of an old bog. Occasionally, divers find bones of bison, elk, or elephants on the bottom of a lake.

**Elephants.** The most immense and powerful creatures of the Pleistocene were undoubtedly the giant mammoths—the largest elephants of all time. Our area had two main elephant types during the Ice Age: the mammoth and the mastodon.

Mammoths grew more than 14 feet tall with curved tusks nearly as long. The most common mammoth in our region was the woolly



**Specialized molars allowed the mammoth to grind tough plants.**

mammoth. As its name suggests, this mammoth had a coat of woolly hair, an adaptation that insulated against cold.

Modern Asian elephants are closely related to mammoths and may have descended from them. At an average height of about 9 feet, however, Asian elephants are not nearly as large as their mammoth ancestors were.

Both mammoths and Asian elephants have large molars that are similar in size, structure, and function. Mammoths were grazing animals, consuming vast quantities of vegetation. They ate mostly grasses, but also fed on low shrubs, brush, and small trees. Some mammoth tusks have been found with "wear patterns" on their lowest points—a sign that they may have used their tusks to brush aside snow and debris to feed on the plants beneath.

Mastodons flourished here as well, but they were not nearly as common as woolly mammoths. They were about the size of elephants today and had less hair than mammoths—perhaps offering them less thermal protection. Rather than grazing on grass as mammoths did, they mostly browsed on shrubs and the tips of tree branches.

**Musk Oxen.** Though the huge, hairy musk ox is closely related to a goat, it looks more like a shaggy bison. The Ice Age musk ox grew 6 feet tall, larger than today's 4-foot-tall ox. Some weighed more than 1,500 pounds.

Although not as plentiful as bison in our region, musk oxen were at least as common as mammoths. Unlike many giant Ice Age species, the musk ox survived and lives today on the tundra of northern Canada and Greenland, where it is making something of a comeback.

When threatened, musk oxen form a protective circle around their young.

**Horses.** Wild horses thrive in the western U.S. plains today and have for hundreds of years. You might have learned in history class that during the 1500s Spaniards introduced the stock that has become our present horse population. But few people know that horses actually originated in North America about 55 million years ago and then spread to the rest of the world. Horses suddenly disappeared from North America at the end of the Pleistocene, about 10,000 years ago.

**Ground Sloths.** During the Ice Age these slow, lumbering beasts grew more than 20 feet long. Although strictly herbivorous, these ground-dwelling animals sometimes had claws more than 12 inches long. Sloth fossils found in Pleistocene sediments in the Twin Cities are not as big as those from the southeastern United States, but they're a lot heftier than today's sloths, which are usually no more than 2 feet long and live in trees in Central and South America.

The sluggish behavior of the sloth has left an impression on us. The word *sloth* comes from the word *slow* and now means *laziness.* Some sloths move so slowly that algae and moss grow in their hair! Yet slowness hasn't stopped modern sloths from becoming one of the most successful, abundant, widespread mammals in tropical forests.

**Giant Beavers.** Rodents were bigger in the Ice Age too—especially beavers. The largest rodent in North America was the giant beaver. It measured 8 feet long and weighed 480 pounds—around the size of today's black bear! Compare that to the modern beaver, which weighs around 65 pounds.

The giant beaver had cutting teeth up to 6 inches long, which may have been used for cutting wood. Its tail was not as wide as a modern beaver's, but it probably helped the giant beaver to be a good swimmer.

In 1938 construction workers found the skeleton of a giant Pleistocene beaver in St. Paul. Today, you can see it at the Science Museum of Minnesota.

***Jon Kramer** is a geologist and director of Potomac Museum Group, a Twin Cities research and educational organization. He has dug fossils as "young" as 10,000-year-old bones from California's tar pits to as old as 2.2 billion-year-old stromatolites from the Iron Range (see "The Rise and Fall of Stromatolites," July–August 1996* Volunteer).

A fossilized skeleton shows the long teeth of a saber-toothed cat.

CHIP CLARK, NATIONAL MUSEUM OF NATURAL HISTORY, SMITHSONIAN INSTITUTION

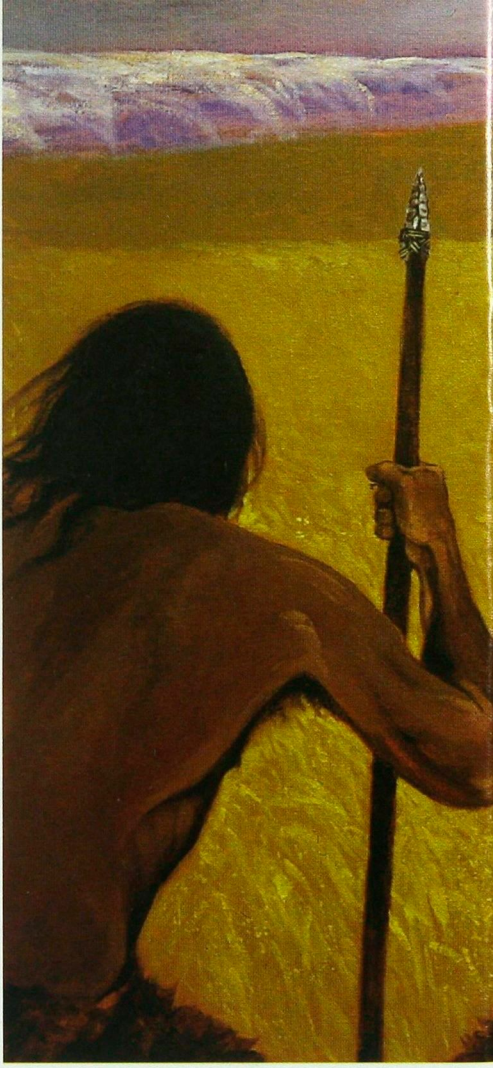
**Saber-Toothed Cats?** Enormous saber-toothed cats ranged across much of North America during the Ice Age. Their remains have been found in Pleistocene deposits from coast to coast. It seems likely these big cats would have found their way into Minnesota, although no fossil evidence has yet been discovered here. Some of these huge cats had "sabers"—upper canine teeth—more than 10 inches long and could prey on rabbits, deer, bison, musk oxen, and other animals. Saber-toothed cats are perhaps most well-known from the tar pits of southern California, where they preyed upon all kinds of animals.

# PALEOINDIANS AND THE HEBIOR MAMMOTH

In 1994, during the installation of a drainage ditch in his cornfield, Wisconsin farmer John Hebior stumbled upon a fossil elephant that has become one of the most important Ice Age discoveries in North America. He enlisted professional help, and over the next two years, archaeologists carefully excavated the site. In addition to a nearly complete mammoth skeleton, the team found three stone tools. Then, while cleaning the mammoth bones in a lab, the archaeologists made a startling discovery: Many of the bones had cut and scrape marks on them, and some had chop marks. The evidence was indisputable: PaleoIndians had butchered the Hebior mammoth.

The Hebior bones reveal other interesting clues. For example, the mammoth suffered chronic pain and had a disease. Several backbones show unnatural deterioration. The toes on one leg are malformed due to an injury. It is reasonable to speculate that the Hebior mammoth was sick and not able to function properly.

This 12,500-year-old fossil site is one of the oldest sites in North America where humans have left



stone tools along with butchered bones as positive evidence of their use of Ice Age mammals. More important, it shows that despite their seemingly crude tools and weapons, these people likely preyed on even the largest animals. However, we cannot be sure they

**As this painting suggests, early humans may have hunted mammoths, roaming across meadows in the shadow of glaciers. Fossil records show humans butchered a mammoth 12,500 years ago, but this does not prove they killed the beast.**

hunted and killed the beast. We know for certain only that they butchered it. As far-fetched as it may sound, it is possible they happened to run into the mammoth *after* it died. If the Hebior mammoth was sick, humans would have been more likely to attack it. To attack a healthy animal of such size would have been dangerous.

# THE QUESTION OF EXTINCTION

Why did these fantastic beasts, which thrived in our region for so long, suddenly disappear at the end of the Ice Age? Pleistocene animals became extinct about the same time humans appeared on the scene. Did hunters drive them to extinction, as some scientists speculate?

Not likely, say other researchers. The overwhelming majority of fossils we find of these animals show no sign of human interaction, much less telltale butchering marks like those found in the Hebior mammoth. It's hard to imagine that PaleoIndians could have hunted every last mammoth, mastodon, horse, giant beaver, musk ox, and ground sloth.

Some of the scientists who don't believe humans killed off the Ice Age megafauna argue that the warming climate that melted the glaciers made the world unsuitable for these giants.

Some scientists have argued that widespread diseases—caused by microbes carried by humans or their domestic dogs—may have killed many of the Ice Age animals.

People have a hard time understanding extinction. Yet the ebb and flow of species has been evident since the first organisms appeared on Earth some 3.5 billion years ago. In fact, more than 99 percent of all species ever to inhabit this planet are now extinct. Extinction is a natural process.

## TRAVEL TO THE ICE AGE

**Learn more about the Ice Age and its giants by visiting the ELEPHANTS! display at Dinofest at Mall of America this May and June. Call the Potomac Museum Group at 763-424-0377 for more information.**

**The Science Museum of Minnesota will offer children's classes on Ice Age mammals March 23 and 30: Wild Woolies and Real Cool Cats for ages 4–5 and 6–8, and Ice Age Encounters for ages 9–12. The museum exhibits pieces of a mastodon tusk that can be touched, a giant beaver skeleton, and an Ice Age diorama that includes woolly mammoth bones found in 1923 on a southern Minnesota farm. For more information on these exhibits, classes, and spring fossil-finding trips, call 651-221-9444.**

PaleoIndians hunted the larger relative of today's bears, the giant short-faced bear. No fossil record of this bear has been found in Minnesota.