

Of Mammoths and Men: A Case Study in Extinction

by

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Raising the Dead

The 26-ton ice block containing the frozen carcass of the mammoth was safely set down on the airport tarmac. The helicopter, which had lifted it out of its snowy grave in the Taimyr peninsula of Siberia and flown it over 200 miles to Khatanga, landed a few minutes later. A small group of reporters stood nearby, huddled against the cold. They had been awaiting the arrival of the expedition's leader. Now they surged forward to question him.



“Are you claiming this as some sort of scientific first?” asked one of the reporters.

“Maybe not a scientific first,” replied Derek, the leader of the recovery team. “But if this mammoth is intact and its internal organs have been preserved, it will be a significant find.”

“Why is that? What do you hope to learn from a mammoth frozen in the ground for more than 20,000 years?” asked another reporter.

“We could learn a great deal—not only about its anatomy and physiology, but also about the time and place in which it lived and maybe how it died. The extinction of the woolly mammoth, in fact the mass extinction of all the large Ice Age mammals at the end of the Pleistocene, is the subject of intense controversy among scientists. Some believe they were hunted to extinction. Others think they were killed off by a rapid change in climate or a deadly virus. This mammoth may provide us with clues to that mystery. Of course, we’re also interested in the mammoth because of the role it played in the evolution of modern man.”

“You spoke of clues just now. What kind of clues?” asked a reporter from the Associated Press.

“Pollen in the mammoth’s hair and the permafrost surrounding it could provide us with insights into the type of vegetation in Siberia 20,000 years ago, but also possibly verify the mammoth’s cause of death. Right now we are speculating that this animal crashed through the ice and either drowned or starved to death, trapped in a crevasse.

“Its teeth and tusks can provide us with other clues. The teeth can help us estimate the age of the animal. And the rings on the tusks, although they may not strictly speaking reflect annual growth like tree rings, can tell us something about how healthy the animal was during its lifetime and the environmental conditions in which it lived. Faster growth would indicate times of plenty, and slower growth times of food scarcity.

“Then there are the internal organs. Its stomach is likely to contain what it ate just before it died. Sixty-five percent of the plants in the diet of Siberian mammoths match up to the fossilized pollen at mammoth sites in Utah, down to the family level. It looks like they were eating the same things and that mammoths ate fairly specific foods. This may have something to do with the extinction of mammoths in Siberia, where the grasslands turned to wetlands when the Ice Age ended.”

“What are you going to do with the carcass?” interrupted the Associated Press reporter.

“We’re going to keep it frozen in an ice cave here in Khatanga, where we plan to study it as we slowly thaw it out. It’s going to be a slow process, but we’ll be sure to keep the press up-to-date on our progress,” said Derek.

A Deadly Duet of Evolution and Extinction

“So, you would like to know what the woolly mammoth has to do with the evolution of man.” Derek was inside one of the airport hangars having a cup of coffee with a journalist who had stayed on after the press conference. “What paper are you with?”

“I don’t work for a newspaper. My name is Michael Shreve. I’m a science writer. My publisher sent me. We think there might be a book in all of this.”

Derek sipped his coffee and then said, “Well, humans and mammoths go back a long way—and they both have their beginnings in Africa. The ancestors of woolly mammoths probably split off from the ancestors of today’s African and Asian elephants five million years ago, about the time of the rise of the first hominids. Then, around 3 to 2.5 million years ago, the first mammoths appeared in Europe. Eventually their range extended from the British Isles to eastern Siberia, and from there into North and South America.”

“I understand they were specialized for the cold,” interjected Michael.

“Yes, they were. They had a thick skin and a heavy, woolly coat. When we dug this one out of the permafrost we were able to see and touch its hair, which was golden brown in color. The woolly mammoth also had small ears and a small tail to conserve body heat. It was highly specialized for the Ice Age world, like the Neanderthals they shared that world with. But, by the end of the Pleistocene, both the Neanderthals and the mammoths had disappeared. I should add that other large animals of the period went extinct, too, including mastodons, woolly rhinos, and the giant ground sloth. So did their predators, like the sabertoothed tiger and the cave bear.”

“Who, or should I say *what*, survived?” asked Michael.

“Middle-sized and smaller animals. And man, of course. Modern man, that is. *Homo sapiens*. But keep in mind that the disappearance of the Ice Age mega-fauna didn’t just happen in Eurasia. It was repeated around the globe, in North and South America—and in Australia, too. Some of the large flightless birds, like the giant moa, also died out during this period.”

“But what has all this got to do with humans?” Michael asked.

“For humanity, the Ice Age was the ‘crucible of evolution,’ as one paleontologist has rather poetically put it. It was the time of our origins. At the start we’re Australopithecines—ape-like creatures living in Africa. At the end of the Ice Age, only 10,000 years ago, we’re humans, *Homo sapiens*, living on every continent except Antarctica.”

“According to that same paleontologist, the Pleistocene was the backdrop against which a ‘deadly duet of evolution and extinction’ first played itself out between humans and elephants. That humans were responsible, at least in part, for the demise of the large mammals of the Ice Age ought not to surprise us. There are several modern cases in which overhunting by man has nearly exterminated a species. You’re an American. Think of the American bison. And the problem continues today for African rhinos and for the mammoth’s closest living relatives, Asian and African elephants.”

“So, what’s the mystery then? It was us—we brought about the mammoth’s demise, right?” said Michael.

“Not necessarily,” replied Derek. “Mass extinctions are complex phenomena. As the ice retreated at the end of the Pleistocene, the plant communities upon which mammoths depended became increasingly fragmented, less diverse, and less able to support a variety of animals. Many scientists believe that mammoths may have been in decline during the last four millennia of the Pleistocene and that the change to a warmer climate, combined with the stress of predation by man, pushed them over the edge.”

In the Crucible of Evolution

“You mentioned the Neanderthals earlier. What about them?” Michael inquired.

“Ah, for that I’ll have to turn you over to our visiting paleoanthropologist.” Derek called toward the back of the hangar. “Hey, Susan, I have a journalist over here asking about Neanderthals, your great Ice Age hunter. Can you field some questions from him?”

“Sure,” said Susan, as she joined the two men at the table. “What would you like to know?”

“To begin with, who were the Neanderthals? What were they like?” asked Michael.

“Maybe I should start by saying that we know what we know about them primarily from studying the fossil record, though techniques used in molecular biology have recently begun to provide us with some new information.” With a wry look at Derek, Susan added, “We can’t hope to find a Neanderthal preserved in the permafrost like Derek here with his frozen woolly mammoth, you know.”

Susan continued. “I’ll give you my mini-lecture, okay? The first Neanderthal specimen recovered was found in 1856 in a cave in the Neander Valley in Germany. The fossilized remains of several hundreds of individuals have been discovered since then. Based on the current evidence, they flourished in Europe and Western Asia from about 150,000 to 30,000 years ago. For a long time we thought that they lived until about 35,000 years ago, but recent discoveries have pushed that date back, suggesting they may have survived up until 24,000 to 28,000 years ago, depending on who you’re talking to.”

“Derek mentioned earlier that they were specialized for the cold,” Michael said.

“Yes, they were the first humans to live in Ice Age conditions, surviving by hunting—some say by scavenging—the big Pleistocene mammals, including the woolly mammoth. Like the woolly mammoth, they were built for the cold—short and stocky with strong powerful limbs and jaws. We know they fashioned tools out of stone and clothing from animal skins, and that they used fire and lived in caves.”

“I grew up in New York City,” Michael interrupted, “and I remember that the natural history museum had an exhibit on the Neanderthals that made them look like the stereotypical caveman—stupid and savage.”

“I know. They’ve since revamped that. You should see how different it is now.”

“But I’ve read that the Neanderthals were incapable of symbolic thought, and that they didn’t have any culture to speak of—at least not compared with early moderns,” countered Michael.

“Oh, I don’t know about that,” said Susan. “Their average brain size, you know, was slightly larger than ours. There is evidence that they buried their dead. And some of them lived to middle age and older, a few with crippling diseases or injuries, suggesting that the old and sick were not cast out but were cared for.”

“Were Neanderthals some sort of intermediate form in the evolution of modern man then?” asked Michael.

“I’m sure you know there are different theories. Some scientists believe they are a closely related subspecies of modern human, which would make them *Homo sapiens neanderthalensis* to our *Homo sapiens sapiens*. Others think that they represent a side branch of *Homo erectus*, related but not ancestral to modern humans. We do know that Neanderthals and modern man lived at the same time for about 5,000 to 10,000 years in Europe. In the Middle East, the fossil record suggests they coexisted for much longer. So, some people argue that if they lived together, they must have exchanged culture, at least traded with one another, maybe even interbred.”

“What happened to them?” asked Michael.

“We’re not really sure. *Homo sapiens* migrated to Europe and then from there to Asia somewhere between 40,000 to 30,000 years ago. Five thousand to 10,000 years later, the Neanderthals have disappeared. Their disappearance may have been due to the dramatic changes in climate at the end of the Pleistocene. Or maybe with our more sophisticated tools and culture we simply ‘out-hunted’ them, outcompeted them. I think there’s a good chance we killed them off—you know, genocide. Of course, there’s a more benign view that they ‘disappeared’ because they became us, through interbreeding. What we do know is Neanderthals, like the woolly mammoth, pass into history—or rather prehistory—at the end of the Pleistocene, until their bones are discovered tens of thousands of years later and scientists begin to piece together for the first time ideas about the extinction—and evolution—of species.”



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