But Why: A Podcast for Curious Kids

Why Are Mammoths Extinct?

March 12, 2021

Jane [00:00:21] This is But Why: a Podcast for Curious Kids from Vermont Public Radio. I'm the host of the show, Jane Lindholm.

Jane [00:00:30] Imagine you're running across a field trying to get to the river where you know you can catch some fish.

Jane [00:00:36] All of a sudden you notice something moving out of the corner of your eye and you look over and it's a woolly mammoth. Oh, and I should probably mention you've also traveled 12,000 or so years back into the past to see this woolly mammoth. So anyway, what does this creature you're looking at actually look like?

Ross [00:00:58] You would be seeing something that reminded you very powerfully of an elephant, but it would look different. For one thing, it would have lots of hair and very long hair which modern elephants, the surviving elephants don't have.

Jane [00:01:12] That's Ross MacPhee. He's the senior curator of mammals at the American Museum of Natural History in New York City. A curator oversees collections in a museum, in Ross's case, it's bones and teeth of mammals that are no longer alive. Ross has also written a book called End of the Megafauna: The Fate of the World's Hugest, Fiercest and Strangest Animals. That book includes a lot of information about these hairy beasts we're talking about today. Here's Ross with more about what you would have seen if you had encountered a woolly mammoth.

Ross [00:01:49] The tusks would also be weird looking to you, maybe because they would be kind of corkscrew shaped or at least curved. They had enormous, enormous tusks. And that required that they have several kinds of adaptations just to be able to move the head around. So they have muscle markings which suggested that the muscles that are responsible for making motions like this and like this were very much larger, relatively speaking.

Jane [00:02:17] And I'll just point out for our listening audience that when you say like this and like this, you're moving your head up and down and side to side. You're saying they had to have really strong neck muscles to hold up those giant tusks?

Ross [00:02:30] They did. They did. So why why did the dust get so big? Another thing that we don't know is they never know, but it's distinctive of them. The ears would be much smaller and also the trunk would end in kind of a weird not a hand, but more like a clasping claw or something like that. Modern elephants don't have that particular adaptation or it's not as good, let's put it that way.

Jane [00:02:56] What did that grasping end of the trunk do for woolly mammoths?

Ross [00:03:01] Well, if we only knew, we just have to assume that it behaved very much like modern elephants. In modern elephants the trunk is really very much like a hand or a hand plus an arm. They can do everything with it in terms of grasping and pulling and

bringing food up to their mouths. It's an amazing tool and mammoths certainly would have been similar in that. But how to distinguish things like that, you would have to have observations. And we don't have because mammoths died out a long time ago.

Jane [00:03:32] Like thousands of years ago, scientists believe woolly mammoths evolved about 400,000 years ago and they lived during what is known as the last Ice Age. They lived all over, primarily in the northern parts of Asia, Europe and North America. Their numbers started declining a lot, probably around 14,000 or 12,000 years ago. And within a few thousand years, woolly mammoths were totally gone, extinct. But they did overlap with early humans, so when I invited you to picture yourself running into one as you went about your day 12,000 years or so ago, that wouldn't have been totally impossible. We're going to learn more about woolly mammoths in today's episode and answer some of the questions you have sent us about these elephant-like mammals.

Jane [00:04:22] But we were inspired to do this episode right now because of some news about a woolly mammoth that was found right here in Vermont, where we make this show. A long time ago some people digging up land to make a new railroad found the bones of a woolly mammoth in Vermont. Those bones were given to various museums in New England and they've been on display or in storage for the last 150 years. But recently, two researchers at Dartmouth College in New Hampshire decided to see if they could find out how old this woolly mammoth is. They used a technique called radiocarbon dating on one of the rib bones.

Nathaniel [00:05:02] So the radiocarbon date that came back is about 12,700- 12,800 years old. And that is just about the same time or maybe just a little bit older than than some of the earliest radiocarbon dates we have on archeological sites, the oldest archeological sites in the region.

Jane [00:05:22] That was Nathaniel Kitchell, one of the researchers studying this mammoth bone. And he is saying that the age of this rib bone is right in line with the age of some of the evidence of early human settlements here in northern New England. Paleontologists, people who study the bones of ancient animals have known that mammoths and humans lived together in other parts of the United States and Europe and Asia. But they didn't know if humans and mammoths overlapped here. Figuring out the date of these bones shows them that, yes, humans and mammoths probably did overlap in New England. But that doesn't come as a surprise to John Moody, an ethno-historian for the Winter Center for Indigenous Traditions here in Vermont. John says native New Englanders known as the Abenaki have a word for the woolly mammoth.

John [00:06:17] The word is adebaskedan, and it means essentially lip rolled up.

Jane [00:06:21] Lip rolled up? Is that what you said?

John [00:06:25] Yeah, lip rolled up.

Jane [00:06:26] John Moody says that while it's important to use new kinds of technology that can tell us about, say, the age of a bone, it's also really important to pay attention to oral tradition, the stories handed down from the earliest people in this area and to preserve the language, Abenaki using the stories and culture of the people who have been here for thousands of years, can deepen our understanding of what the scientific data tells us.

John [00:06:53] You know, it it adds material to our understanding it in the life and that eliminates it makes it more three-dimensional.

Jane [00:07:02] But New Englanders aren't the only people interested in woolly mammoths and what the world was like when they were alive. Many of you are, too. So let's get to your questions with help from the Museum of Natural History, Ross MacPhee.

Karen [00:07:16] Hi, my name is Karen and I live in Wilmington, Delaware, and I'm four years old. Tomorrow I'm turning five. And my question is, what is the Ice Age?

Jane [00:07:31] Karen wants to know what was the ice age? That might help us place woolly mammoths.

Ross [00:07:38] Hi, Karen. The most recent Ice Age lasted from about 120,000 years ago to something like 15,000 years ago. Slow to begin. Slow to end. And it really means what it says, that ice on land became a huge thing. You know, in wintertime right now, at least in this part of the world, we got snow.

Ross [00:08:05] But as we go, as we now are from winter into into spring, the amount of snow declines and eventually it's gone. The idea is that depending on orbital characteristics of the earth and by that I mean the actual position and its tilt and other features of the globe of Earth relative to the sun, there are times when it gets warmer and times when it gets colder. And one of the ways in which it gets colder - so it's thought this is the theory - is that the winters never ended or the snow never, it never ended. Meaning that you'd have snow falls in the winter and it never really got warm enough to get rid of it completely, so you'd have snow in some places, right. The next year that would be built on and built on and built on. And the thing about snow, as we all know, who live in snowy regions is that it kind of makes its own local weather. If you have enough snow, then it's very cold and that tends to preserve the snow pack for a very long period of time. So now you have to think in terms of hundreds of years, if that process continues over a very long period of time, then what you're going to get is not just snow, but the snow is going to be compacted because it's water, it weighs something. And as it compacts, it turns to ice. And that gives us the ice at the Ice Age.

Jane [00:09:30] So it's like when you go sledding, if the sledding hill has a lot of fluffy snow, but you sled down it enough times and then walk up it enough times, that snow gets harder and harder and harder and pack down and packed down and it gets more and more slippery over time. Eventually that would kind of turn into ice. Is that sort of like what we're talking about?

Ross [00:09:48] That's exactly what we're talking about. So that's the ice of the Ice Age. The last thing to just visualize, if you can, or look at a map, all of North America north of about, well, the Canadian border, all of that was ice, little pockets here, little pockets there of land for one reason or another without ice, but, of course, very cold. It was the same in Western Europe. There was a big ice sheet there, as we call it, and smaller ice sheets as you go off into Russia and Siberia.

Jane [00:10:20] Giant ice sheets covering much of what is now dry land was one feature of the ice age. But another important thing you should understand is that because so much of the water on Earth was in these ice sheets, the level of the ocean was much lower, about 300 feet lower. There was less water in the ocean, so lots of land was exposed that is now covered by sea water. Animals and humans could actually walk across a land

bridge between Alaska and Russia. You can't do it now because it's covered by the ocean, but animals and people could do it then. Let's talk about some of those animals. Here's a question from Quentin.

Quentin [00:10:59] I'm four years old. I live in Quito, Ecuador. Were there giraffes in the ice age?

Jane [00:11:06] Were there giraffes in the Ice Age?

Ross [00:11:08] There were giraffes, but they had a distribution very similar today, meaning they're in Africa from various times the giraffe group did manage to cross into Eurasia because the continents were connected at this time, but they've all disappeared. So you only see living giraffes in Africa and just in parts of Africa. It's not like they're everywhere at all.

Jane [00:11:31] Here's Finlay from Scotland.

Finlay [00:11:34] I'm Finlay. And I come from Scotland. I'm five. Were there any birds in the woolly mammoth time?

Jane [00:11:45] Finlay's question is, were there any birds in the woolly mammoth time?

Ross [00:11:49] Yes, back in the ice ages. Let's talk about a couple of the ones that lived in North America and disappeared at roughly the same time as woolly mammoths. So let's consider condors. Condors are very large birds. One species still lives in California. They're distantly related to things like hawks and vultures and so on. And during the last Ice Age, there was an enormous species of condor that lived not only in California, but had a range that went as far east as where we are now, where I'm speaking from. And like condors, they probably largely lived on dead animals. These are scavengers. And the idea was that when you have a lot of very big animals, as we did 10,000 years ago, then you had a lot you had a lot of available food. And the idea is that scavenging was a good way to earn a living at the time, but then all of these big guys disappeared, almost all of them, and the ideas that had had an effect on other species like these birds I just described, who had a very specific kind of feeding adaptation so they didn't have enough to eat. Did they disappear for that reason? Well, probably many other reasons as well. But it couldn't have made life any better not to have your preferred diet, right?

Jane [00:13:22] If I'm picturing one of these condors that are no longer alive and I, let's say I'm a kid who has about a four foot wingspan, if I push my arms out as far as they'll go, how how much bigger would the condor have been with its wingspan?

Ross [00:13:39] About three times that size.

Jane [00:13:40] Oh, my gosh.

[00:13:41] I can remember many years ago when I was doing an archeological dig in Nevada and I didn't know much at that time, I came across a bone of one of these very large condor relatives. This was an enormous organism, just utterly huge. I would not want to have been just sort of laying on the beach with one of those condors hanging around in case he got a bit hungry, right?

Jane [00:14:07] Me neither. There were also small birds during the last Ice Age. Birds have been around for millions of years and many bird species survived the extinction that killed those massive condors. There were a lot of species, especially of really big animals called megafauna that went extinct during this time period just as the last Ice Age was ending. We're going to talk in a little while about why scientists think so many large animals didn't survive. But first, we want to hear about another animal that used to exist. How about a giant sloth.

[00:14:43] Back in the Pleistocene, back in this Ice Age, there were sloths that had to live on the ground because they were as big as elephants and the same size as elephants. And this is an amazing thing. And these were very successful in the sense that they they evolved in South America, but got up the Isthmus of Panama into North America, the same kind of land bridge thing that we were talking about for the Bering Sea between Asia and Alaska, that we have one today that is still well above water in Central America. And they use that to get up here into into North America. And during warm periods one kind of sloth got all the way to Alaska and Yukon. I wish we could put a slide up or something off of a ground sloth because they're the weirdest looking animals you've ever seen. And the idea that they were so successful that they could go all the way to northern North America during more warm periods, they were not cold-adapted. This is just astounding.

Jane [00:15:48] Ross says he thinks these sloths were probably not as slow moving as the sloths we know about today, partly because they probably had to avoid predators like these.

Ross [00:16:01] Saber tooth cats are actually in the same family as lions and tigers and domestic cats if you have cats. But their outstanding feature was these enormous front teeth called canines. Canines are again, if you have a dog or a cat and you just open the mouth, you see that there are two teeth right at the front that are longer than the others. Well, we call them Saber tooth because it was sort of like that sword, a saber. They were so large that they hung out of the jaw and on on either side of the lower jaw.

Ross [00:16:40] Now, here's another weird fact. So you think, OK, big canines, that these were predators. So they must have used these to bring down their prey. They probably did. But exactly how they use them iis peculiar because although they're very long, they're not very, very wide.

Jane [00:16:58] So these teeth wouldn't have been useful in helping the cats catch prey the way a modern lion or tiger does. But saber toothed cats were highly successful predators until, you guessed it, they went extinct. So why did all of these large animals like mammoths, giant condors, enormous sloths and saber toothed cats all disappear around the same time period? What happened? We'll talk about that coming right up.

Jane [00:17:27] This is But Why: a Podcast for Curious Kids, I'm Jane Lindholm, and today we're talking with Ross MacPhee, he's a paleontologist, a scientist who works with fossils and he specializes in Ice Age animals that went extinct. We've been talking about how big some of these now extinct animals were, they're called megafauna and around the end of the last Ice Age, a whole lot of large animals and some small ones as well all went extinct around the same time. Among the animals that didn't survive this time period were woolly mammoths.

Fiona [00:18:06] My name is Fiona, I live in Arlington, Massachusetts. My question is why are the woolly mammoths extinct? And I'm age six.

Sam [00:18:21] I'm Sam, I'm four and I live in Georgia in the United States of America. Did woolly mammoths die. or what happened with them? If they got eaten?

Jane [00:18:35] Fiona is six and says, why are woolly mammoths extinct? Sam is four and lives in Georgia and says, what about woolly mammoths? Why did they die? What happened? So we've got a couple of kids who want to know specifically about woolly mammoths. But as you've said, Ross, there were a lot of animals that died out around the same time. So what the heck happened?

Ross [00:18:58] Well, Fiona and Sam, I spent a large part of my career trying to answer that question, and it's complicated. So I'm going to give you just things to think about. There's two major ideas. One is the climate did it. Climate change in particular, just like we're experiencing now, in a way. The idea is that a lot of these big guys were adapted to Ice Age conditions. So this is what they had evolved in. This is where they expected to be and the kinds of food supplies that were connected with those conditions. So what happened?

Ross [00:19:40] Well, we had ice, big ice, I guess, is what I'm talking about, where most of Canada was covered up until about 18,000 years ago and then progressively thereafter it disappeared.

Ross [00:19:53] So this is a long period of time. Why would there be a concentrated series of losses right around 11,000? Well, here's the idea, there was an event, its actual cause is disputed, but it seems this is for certain because we've got lots of evidence for this beginning about 12,800 years ago and for about a thousand years. It was getting warmer, the ice was disappearing. It was looking good, and then suddenly within the space of just a few decades the northern part of the world plummeted back into the ice age. So it got terrifically cold almost immediately. Suddenly we went back to tundra, very, very different. So the idea was that this was such a catastrophic event that suddenly you had extinctions that the populations just couldn't survive.

Jane [00:20:57] What could have happened that would have made a gradually warming climate get really cold again all of a sudden?

Ross [00:21:04] I know you know this kids, that the dinosaurs disappeared because there was a huge meteorite or comet that hit the Earth 66 million years ago. There's also an argument that at roughly the same time as this cold snap, there was a comet or meteorite or something like that that hit the earth, maybe in northern Greenland. And what it did was force this particular change that I was just talking about, the really cold conditions.

Jane [00:21:34] It wasn't just that the climate shifted, it's that it shifted so quickly. This shift may have affected the bigger animals, more than the smaller animals, because big animals often take longer to reproduce. So a cold snap of many years would have made it hard for them to have babies. And as older animals died, there weren't enough younger animals alive to replace them. Humans wouldn't have been as affected, Ross says, because we lived in a lot of different parts of the world by then and would have probably been able to survive in the warmer parts. But Ross says many of these other big animals also had wide ranges, so there are a lot of questions about why they would have just died out instead of some animals surviving in places that were warmer.

Ross [00:22:22] But there is another idea, and that's that we did it, not us personally, but members of the human race, especially when humans first came over to the new world again from Asia, probably across the land bridge or maybe by boat, doesn't it really matter. When they came here they came to a place that had never seen humans before. Why is that important? It's important because animals learn, mammals in particular learn. And when they know they're going to be attacked or predated upon by a particular species, say, a saber toothed cat or something like that, they've learned that these are dangerous and they pass that on in one way or the other by learning to their offspring. So over time, the prey species learn who the predators are and they develop all kinds of behavioral and other ways of trying to keep the predation low down. So here's the deal. When humans first got here, let's just say 16,000 years ago, they came to a continent that was full of these large beasts, lots of meat, lots of fur coats, all of this kind of thing. And the argument is that these animals would not have recognized us as dangerous. And you've got to look at it from the animal's point of view, what could be less dangerous than an animal that has no canines about its person stumbles around on its two hind legs? How weird is that? And, you know, is so naked that it requires furs and so on that they've taken off other animals even to survive in places. So idea is that early humans in North America, and elsewhere that the same pattern arguably applies elsewhere, would come up to a herd of mammals. The elephants would look over and say, oh, yeah, that's that weird guy that just recently arrived. No worries. Let's just keep eating. And they could come in and cause any level of destruction that they wanted.

Jane [00:24:36] The trouble with this theory, Ross says, is that it's hard to believe there were enough humans to kill more than 50 species of animals in North and South America that all went extinct over a relatively short time frame.

Ross [00:24:50] Another view, of course, is to combine the two so humans were here causing destruction. We had this Younger Dryas event, this called event, as it's called, and through a combination of those really bad times for the animals, it resulted in all of these losses. And people like me have spent a lot of effort to try and decide which of either of these makes sense. There are other ideas as well, but they're even less successful than those two.

Jane [00:25:23] What do you think happened? Was it humans or was it climate change or was it, as Ross MacPhee believes, a combination of factors that led to the end, led to the demise, of so many of these huge and interesting animals? Maybe you'll become a paleontologist or an anthropologist and work to find more information so we can someday know the answer. As we've learned in so many of our But Why science episodes there is still a lot to learn about our past, our present and our future. You could make the next great discovery.

Jane [00:26:02] That's it for this episode. Thanks so much to Ross MacPhee at the American Museum of Natural History in New York City. His book is called End of the Megafauna: The Fate of the World's Hugest, Fiercest and Strangest Animals.

Jane [00:26:17] If you have a question about anything, tell us about it. You can get an adult to help you record yourself asking your question. Most smartphones have a free voice memo or recording app that comes with the phone. Get up nice and close to the phone and try not to have a car engine or the dishwasher or anything else noisy around you while you're recording. Tell us your first name, where you live and how old you are. Then your adult can email the file to questions@butwhykids.org. Even though we aren't

able to use all of your questions Melody and I listen to each of them and we love hearing what you're curious about.

[00:26:56] But Why is produced by Melody. That's Melody Bodette and me, Jane Lindholm at Vermont Public Radio. Our show is distributed by PRX and our theme music is by Luke Reynolds. We'll be back in two weeks with an all new episode. Until then, stay curious!