Video Transcript - Paleobiology - Unearthing Fossil Whales

Maggy Benson: [00:00:30] A special group of scientists called Paleontologists are fascinated with fossils. They interpret the history of our planet from the fossilized remains of plants, animals, and other organisms. A Paleontologist digs to find clues about extinct life, and what those clues reveal about the organisms living today. How? We'll find out now when a Paleontologist from Smithsonian's National Museum of Natural History shares stories about his work on fossil whales.

Maggy Benson: [00:01:00] Hi, thanks for joining us. I'm Maggy Benson, host of today's show on Smithsonian Science Now. We have an awesome program planned for you today, but before we get started, I want to ask you a question. You can respond using the poll that appears in the screen to the right of your video feed. If you can't see the poll, try minimizing your video.

Maggy Benson: All right, here is the question: Do you think studying fossils is important? Yes? No? [00:01:30] or maybe you're Not Sure? Take a moment to think about it, and put your answer in the window to the right. Maybe think about fossils too. Have you ever studied them in school, seen them at a museum, or perhaps you've even found one.

Maggy Benson: Do you think it's important to know what that organism is? How old it is? All right, it looks like all of you, 100 percent say yes, studying fossils is important. That's really great because I think our guest [00:02:00] thinks that, too. Let's go to him now.

Maggy Benson: Today we have with us Dr. Nick Pyenson.

Nick Pyenson: Hi Maggy, happy to be here.

Maggy Benson: Wonderful. Nick Pyenson is a Curator here. He's a Paleontologist who studies fossil whales here at the Smithsonian's Natural History Museum. So Nick, please tell us, why fossil whales?

Nick Pyenson: Well I think fossil whales, and whales in general, and other marine mammals are fascinating examples of evolution. So if we think about marine mammals, we kind of tend to imagine the charismatic critters [00:02:30] that we see on a whale watch, or by the beach, or maybe in an aquarium. But what they are, really, are fascinating examples of how evolution works. All marine mammals, including whales, have terrestrial ancestors.

Nick Pyenson: Many millions of years ago, they had ancestors that lived on land. Today, they're these fantastic mammals that live in the ocean. So understanding how they underwent that enormous amount of evolutionary change requires studying the fossil record, including many of the examples that we have here on [00:03:00] the table.

Maggy Benson: Can show us one of these examples?

Nick Pyenson: Absolutely. I brought my friend here, this giant walrus skull. You can see that he's got a big-

Maggy Benson: Wow.

Nick Pyenson: Honking tusk. This is a walrus from the Ice Ages, and curiously enough, it was found in South Carolina. So there are no walruses in South Carolina today. Already, those two pieces of information about how old it is and where it was found, tell you something interesting about the evolution of walruses right off this seaboard. [00:03:30] Many other examples can tell you similar stories. This is part of the game that Paleontologists play, is what, where and when, and then what that tells us about evolution.

Maggy Benson: Wow, that's amazing. So we already have a student question.

Nick Pyenson: Oh.

Maggy Benson: You ready to go for it?

Nick Pyenson: Let's do it.

Maggy Benson: All right, cool. This one comes from Sydney. Sydney wants to know: "Is that a real fossil on the table?"

Nick Pyenson: Sydney, there are real fossils on the table, but there are also replicas here. Stay tuned because we'll talk a lot more about what's real and what's not. Real objects, [00:04:00] of course, are what we keep here in the museum. We also keep many replicas. But mostly real things are what museums are about, and that's why we have museums. We'll talk more about that later in this broadcast.

Maggy Benson: Cool, so it looks like you look at a lot of bones in your work, but is there any kind of technology that you use, too?

Nick Pyenson: Yes, actually I've become a big fan of 3-D digitization. I think technology is only really as important as the questions it can answer for you as a scientist. In particular, one thing I found is [00:04:30] that 3-D digitization can help visualize things that you can't really recover any other way. For example, you're watching a video of a fossil baling whale skeleton that my colleagues and I found in the Atacama Desert of Chile.

Nick Pyenson: You're zooming here actually a 3-D model that's been computed from many 2-D images. There's a 30-centimeter scale bar there. That's about a 10-meter, 30-foot whale. Here, I have actually in my hands here, and you have one over there, a 3-D print. And that's actually a 3-D print of the same one that you [00:05:00] just saw in the video right there.

Maggy Benson: Wow.

Nick Pyenson: Pretty amazing, huh? That we can ... it's miniaturized so it's five times the scale, but here in your hands you hold research in action. I think that's one of the great powers of 3-D is being able to see something in your hands.

Maggy Benson: Yeah, that's incredible. A full whale right here.

Nick Pyenson: Absolutely.

Maggy Benson: Cool. I feel like I already know a lot more about what a Paleontologist is, and what you do for your work.

Nick Pyenson: Great.

Maggy Benson: Let's go and learn a little bit more about your research out in the field here at the Smithsonian.

Nick Pyenson: Okay.

Maggy Benson: So I've heard that you worked in Panama. Can you [00:05:30] tell us a little bit about what you've done there?

Nick Pyenson: Absolutely. Panama is a country that connects North America and South America together via a land bridge. It's kind of this S shaped curved body of land. Above, to the above on the graphic, you'll see the Atlantic Ocean to the bottom is the Pacific. It splits the two oceans. But, it wasn't always that way. As recently as three million years ago, the Atlantic and Pacific Oceans were connected.

Nick Pyenson: There was no Panama. Actually, it was all under water. So there is [00:06:00] very complex geologic history there of continental plates pushing and scraping against each other, causing that land bridge to rise. And once it does, it separates two oceans and allows animals to traverse across from North America to South America. It's a very interesting evolutionary story.

Maggy Benson: Have you found fossils there?

Nick Pyenson: We have. Actually, I have one of those fossils right here that was recovered in collaboration with scientists from the Smithsonian's Tropical Research Institute in Panama.

Maggy Benson: Very cool. What is it?

Nick Pyenson: [00:06:30] What you have on your table is a brand new species of fossil dolphin. So new, we haven't even finished the scientific study to name it.

Maggy Benson: Wow.

Nick Pyenson: It's a very toothy critter. But I didn't know that at the time, what we found was actually ... I had received an email from a colleague in Panama who said, "I think we found a fossil dolphin. Would you come down here and recover it for us?" And I said, "Sure. Absolutely. Let me bring my grad student and we'll go do it." That turned out to be a big race against time because we didn't have much time to work before the tides were coming in and washing away this very important possible, as it turned out. [00:07:00] Here we are wrapping plaster around the fossil-

Maggy Benson: Like you see here.

Nick Pyenson: Absolutely. Like right over there. So what we do is we take plastic burlap bandages, dig a hole around the fossil and then wrap those bandages around. They dry up and encase the delicate fossil and the rock around it so that it can be transported back to the museum. Here is a time lapse of us actually doing that. This is all sped up very rapidly.

Nick Pyenson: The idea is that you want to encase the fossil because some of the bone is still delicate and you actually don't have time in the [00:07:30] field to do the delicate work of preparation: scraping away the rock from the bone, so that you can then see before your eyes what actually you want to know, which is the anatomy, the skull and the jaws, in this case, of this fossil dolphin.

Maggy Benson: So I'm not familiar with this kind of fossil. Do you know how old it is?

Nick Pyenson: That's a great question. We know about the age of fossils from a variety of different ways. If you're really lucky, you can tell about the age of something directly. So if a fossil is found in between volcanic layers, [00:08:00] then you might be able to date the volcanic layers directly and bracket how old that fossil is. Most of the time we have to indirectly figure it out, based on what a fossil is found with. For example, we found a variety of fossil shells nearby this fossil dolphin here, and we could then connect that to other places where we've found that similar fossil that then can tell us how old this particular animal was.

Maggy Benson: Wow. That's great. You actually just answered one of our student questions-

Nick Pyenson: Oh, great.

Maggy Benson: From Louisa. So Louisa, we hope you have a [00:08:30] good answer for how he figures out how old that is. We do have another question for you, are you ready?

Nick Pyenson: All right, yep.

Maggy Benson: All right. This one is coming from Ramona, and Ramona wants to know:" Why do you have to use plaster?"

Nick Pyenson: Okay Ramona, so that's a great question. Plaster is one, cheap; and two, it's very hard, and it gets hard very quickly. That's kind of the idea, is that we want to protect what's inside it so that we can transport it. Sometimes we have to hand carry it, throw it in the back of a pickup truck that bounces over [00:09:00] desert terrain, or on an uneven road. That's the key idea here, is that fossils found in the world out there and in the field, undertake this enormous journey, from wherever they're found back to a museum before you see what happens in the museum.

Nick Pyenson: We have many skilled technicians here at the Natural History Museum whose job it is to reveal the bone from the rock around it. What you see here are the skull and jaws that are now on the table, but they are actually covered in rock. It takes a very long time, a lot of artistic skills, to pull away that rock [00:09:30] to reveal bone.

Maggy Benson: Wow, that's fascinating.

Nick Pyenson: Thank you.

Maggy Benson: So you've told us about how old this is, and where it was found, and the significance of Panama. Does that make this fossil very significant?

Nick Pyenson: We think so, and that's part of science in action here. We still don't even have a scientific name for it. But one thing I can tell you is that we think this is very closely related to the living Amazon River dolphin. Immediately, that tells you there's a story because Panama is not the Amazon, and so there is a complex story about how this six to seven million year old fossil [00:10:00] dolphin ended up Panama. And whether, if it's a new species, how closely is it related to the Amazon River dolphin? And that amount of time tells you some interesting geology, geological events also took place, that may have impacted the evolution of this group.

Maggy Benson: Wow, so that sounds like once in a lifetime find. I know that you've done some work in Vancouver Island. Have you had similar finds there, or had similar scenarios in which you found fossils?

Nick Pyenson: That's a great question. My work, off the Coast of British Columbia, takes place on Vancouver Island, which [00:10:30] is a large block of land. Along the Coast, we find a lot of fossils of marine mammals. Here I am actually using a rock saw. A 14 inch rock saw (is) as large as you can handle, without it having to be some huge piece of excavator equipment. The waves are crashing against us. This is really a race against time, just like it was in Panama, but on the other side of the world.

Nick Pyenson: I'm documenting it, as you can see, on the tripod with a camera because I like to archive what I'm doing. I like to know what I'm doing. I take field notes. But now with digital cameras, you can actually see what you're doing [00:11:00] and make sure that I didn't say, saw through part of the beak, or cut away part of a bone that I didn't want to do. It was really hard work under difficult conditions. But the idea is that you still want to recover that important piece of knowledge about earth's history. We want to understand the history of life on Earth, and this is one way we do it.

Maggy Benson: Wow, that's so cool. What were you actually recovering there?

Nick Pyenson: Great question. What we were looking for were specifically some early baleen whales - baleen whales, like blue whales, and humpback whales. [00:11:30] We actually found several skeletons of their ancestors, about 28 million years old. Fortunately, I have one of the first examples here, we have right on the table. One of the fossils that we actually prepared from all the rocks that we've collected is here before us. You can see it's right here in this box.

Maggy Benson: Wow, very cool. What are those marks on it?

Nick Pyenson: Oh, that's a great question. You know, maybe we should ask the students that question.

Maggy Benson: That's a good idea.

Nick Pyenson: Okay.

Maggy Benson: Students, we have a question for you. We want you to take a look at this fossil that Nick [00:12:00] has pointed out, and take a look at those marks on it. Let us know what you think those marks were caused from. Again, you can use the poll that appears in the window to the right of your video feed. If you can't see it, try minimizing your video. So, do you think that those marks [on this whale arm bone] were caused by: A, Pickaxe chipping, when it was recovered? Or Dog bite marks? Or Shark bite marks? or maybe Spear point damage? Nick, can you give us some clues on what you think this might be?

Nick Pyenson: I think so. I think we should help the students out there. [00:12:30] First off, I can tell you that this whale is 28 to 24 million years old, thereabouts.

Maggy Benson: Wow.

Nick Pyenson: Much older than humans have been on the planet, so we can definitely exclude the spear point. And unless that dog was biting through rock, this bone was covered in rock when I found it, so it's definitely not dog bites, either. And fortunately I can tell you, I wasn't the cause of those marks. Sometimes there are discovery marks that Paleontologists make, but that wasn't me this time. So we can eliminate every possibility except for [00:13:00] shark bite marks. One of

the most interesting things is, is that you can see these gouges are very sharp, deep and regular. You can actually take shark teeth and match it to those bites. We find many modern examples of whale bones that are bitten up by sharks.

Maggy Benson: Wow, that's incredible. So I would say that our students are pretty much all correct in saying that they're shark bites.

Nick Pyenson: Absolutely. But the new question is that whether this little whale was chewed to death by a shark, or whether the shark came after it'd [00:13:30] died and gnawed on its bones on the sea floor. Unfortunately, we can't really tell the difference right now, and that's one of the challenges with working with fossils. Sometimes you don't have all the answers.

Maggy Benson: Wow, sounds like more detective work.

Nick Pyenson: Absolutely.

Maggy Benson: So we have another student question for you.

Nick Pyenson: All right.

Maggy Benson: This one is coming from Branson Heights High School. They want to know: "Do you think any of those whales are bigger than a blue whale?"

Nick Pyenson: Boy, that's an excellent question. One of the things we told you is that this fossil arm bone on the table actually belongs [00:14:00] to the flipper, to the arm. We can actually find the same bone in our own body, and I can tell you that bone is shorter than my own arm bones, and it's shorter than yours. This belonged to an ancient whale that was probably about the size of a bottlenose dolphin, so it really would have looked about the same size as some of these dolphins that we have today. But, it's the ancestor of blue whales. So blue whales get to be 100 feet long, 100 tons. There's a fascinating story here about how whales evolved to such large body sizes that we see today when [00:14:30] their ancestors were small, yet their living relatives are so enormous.

Maggy Benson: What are their living relatives? I mean, I think a whale is a mammal, so what does that say?

Nick Pyenson: One of the things that says is that mammals have a very interesting story about how they're able to evolve (to be) so big. It probably has a lot to do with their physiology. Maybe it has to do with migrating long distances. One of the most important facts that we can find from studying fossil whales is that they're mammals. That's something that people sometimes forget. They haven't always been in the water.

Nick Pyenson: Before [00:15:00] you see an image of a reconstruction of an early whale, even earlier than this fossil from Vancouver Island, many of the earliest fossil whales

we found are found in countries that we can no longer go to, including this specimen here. This is a plaster cast, plastic cast actually, reconstructed, and so all the bones are lined up, of the foot of an early whale. It was found in Pakistan and published in 2001. So there're some things you can see about this [00:15:30] hind limb, this rear foot of an early whale. One, early whales had hind feet, and that's pretty remarkable. Two-

Maggy Benson: That looks just like my foot.

Nick Pyenson: Yeah, absolutely. What else do you see about that?

Maggy Benson: Longer toes.

Nick Pyenson: Longer toes. It really wouldn't fit into a tennis shoe.

Maggy Benson: Maybe one less toe.

Nick Pyenson: Right. And so that's really interesting. We find four toes on the hind limb of these early whales. The other really important clue, and this was the tale tell sign, was the ankle bone, with double pulleys here. Here's the first pulley, and [00:16:00] the second pulley is actually linked into the other foot bones that are all articulated. What that tells us is that among all mammals living and extinct, whales are most closely related to even-toed, one, two, three, four, hoofed mammals. And that's something we didn't know before we found this skeleton. It was an open question. So when you find fossils like this, they have the ability to really transform our understanding of how organisms evolved.

Maggy Benson: Wow, that's incredible. So we can understand the evolution of whales through the fossil record?

Nick Pyenson: [00:16:30] Absolutely. That is one of the most important points.

Maggy Benson: Cool. So you said that whales have gotten bigger over time, but I know that you found some really big whales in some of your research in Chile.

Nick Pyenson: Absolutely.

Maggy Benson: How did you collect those, or did you find those?

Nick Pyenson: Well, let's pick them right here. Actually, this is a really fun story. So, my colleagues and I were working in the Atacama of Chile, and we had word of an unusual site that was found by expanding the Pan-American Highway. A road construction company was actually widening [00:17:00] the highway, and in the process of doing that, they exposed a cliff side that littered with dozens and dozens of whale skeletons. We actually have some of these miniature versions of the whale skeletons right here. It's pretty amazing to be able to hold this in the palm of my hand.

Nick Pyenson: We didn't have much time to document these fossil skeletons, so what we did is we brought a team from the Smithsonian, who specializes in 3-D digitization using a variety of digital tools, to capture information about an object [00:17:30] and translate that into a 3-D model. That can then made into a 3-D print or shared online. So students, you can actually go to 3D.si.edu after this webcast, and see a lot of these fossil whales as they've been rendered in three dimensions. You can take measurements and see all sorts of fascinating things about them.

Maggy Benson: Oh, that's incredible. Did you actually collect the fossils that you found?

Nick Pyenson: That's a great question. We did save the original bones, and that's one of the things [00:18:00] we like to do as museum scientists, is save the original thing. But, we can also create these digital avatars with these kinds of 3-D data sets that we create. You can take measurements just as much as you might be able to measure them with a caliper like we have on the table, but you can't answer questions that to do with the real specimen. For example, if we want to know about the chemical history of the bone itself, or maybe if we could find DNA. We don't think we can find DNA in bones this old, but there're many questions [00:18:30] about the bone itself that we may want to ask in the future, and that's why we keep the real object.

Maggy Benson: Wow, that sounds incredible.

Nick Pyenson: Yeah.

Maggy Benson: So from looking at the videos, it looked like there were just a bunch of cameras. What's so special about this 3-D digitization?

Nick Pyenson: Well, what it involves is thinking about how we can document the natural world. There's a variety of different tools you can use in different circumstances. Sometimes we can use a laser surface scanner. Other times, actually you can just use the camera on your smartphone. As long as you take the pictures in [00:19:00] the right sequence, you can generate both a very accurate and very precise 3-D model. This video shows some Smithsonian staff actually using one of the laser arm scanners to document, in very precise detail, one of these skeletons that was found in the Atacama Desert.

Maggy Benson: How long does it take you to digitize a full whale?

Nick Pyenson: Well, that particular whale it took us about six days, working 20 hours a day to document.

Maggy Benson: Wow.

Nick Pyenson: So we had so little time to capture that information, [00:19:30] but if you had a camera phone, it could take you as much as a few minutes. It all depends on how precise and how high resolution of digital information you want to capture.

Maggy Benson: Wow. That's great. We have another student question.

Nick Pyenson: All right.

Maggy Benson: All right. This one comes from Ms. Howard's class. Ms. Howard's class would like to know: "Could that fossil, or maybe any of these fossils, be found at the same time as the dinosaurs?"

Nick Pyenson: Wow, that's a great question. All these fossils on the table, [00:20:00] they all belong to fossil mammals. Marine mammals, in particular, all evolved after the extinction of the dinosaurs, around 66 million years ago. All these fossils on the table are much younger than 66 million years ago, because the story of how marine mammals evolved happened mostly after the oceans became emptied, after that great mass extinction. During the Age of the Dinosaurs, we had plesiosaurs, and mosasaurs, and marine reptiles, big toothy fearsome things. They all went extinct with the dinosaurs. What was left were empty oceans [00:20:30] that mammals evolved in, and that's the story here.

Maggy Benson: Wow, that's incredible.

Nick Pyenson: Thanks.

Maggy Benson: All right, so I think we had another question about the Atacama.

Nick Pyenson: Oh, wow.

Maggy Benson: Somebody wants to know what the field site looked like.

Nick Pyenson: Oh, that's great. Well the field site was actually a part of ... here, we're actually pulling it up right now. You can see the pan across ... Here were in the Atacama Desert in 2011. You can see the Pan American Highway coming right up the edge, and the construction equipment [00:21:00] is actually the road construction company expanding the highway, going into the hillside. And each one of those black tarps is another fossil whale skeleton. We had the scale of a few weeks to document what we could before those skeletons were pulled out of the earth.

Nick Pyenson: Paleontology is a lot like CSI. We're all detectives trying to figure out something that happened in the past that nobody saw. With 3-D digitization, we can actually capture that moment in time that allows us to see how bones are arranged, how they're oriented, how they're [00:21:30] connected to one another. That is key information about the context that the fossils are found in. By documenting that with 3-D, we can reproduce that and go back and measure

it, we can go back and see it with these kinds of 3-D prints, and share it with anybody. I think that's one of the most exciting things about 3-D is being able to put this in the palm of your hand. Here, you're holding a whale.

Maggy Benson: I can be a Paleontologist today.

Nick Pyenson: Absolutely.

Maggy Benson: Wonderful. All right, let's go to another question.

Nick Pyenson: Okay.

Maggy Benson: Mrs. Maxwells class wants to know: "How do you guys decide where [00:22:00] to start looking?"

Nick Pyenson: That's a great question. Paleontologists are ... wear kind of two hats. Sometimes they wear a Biologist hat, other times they wear a Geologist hat. If you want to know where fossils are found, you've got to put on your Geologist hat. That involves reading, looking in the library, looking at geologic maps, reading up about what Geologists have found about the right kinds of rocks.

Nick Pyenson: That's really what you want to be able to look at, is to find fossils, finding the kinds of environments in which they might be [00:22:30] preserved. For example, if we're looking for marine mammals, marine rocks are a very good place to start looking. You wouldn't want to look inside continents because that's probably not the best place. Although, the earth has changed so much over time, it requires a good reading of earth's history to know exactly where to look.

Maggy Benson: Interesting. How do you actually extract the rock from the fossil?

Nick Pyenson: That's an excellent question. We have a variety of skilled preparators here at the Natural History Museum, that have an expertise. [00:23:00] It's almost like being an artist. You have to sculpt out and remove rock away from the actual bone, which in many cases can be very delicate. You can see on this fossil dolphin right here, some of the bone is so delicate it's actually missing. We used a lot of glue, and it uses a lot of different kinds of mechanical tools, both little tiny drills, sometimes we use very large tools like a sawzall or even a rock saw as you saw earlier.

Maggy Benson: Wow, so I guess you must have to be careful not to break anything in the preparation and extraction of these fossils.

Nick Pyenson: [00:23:30] That is absolutely true. Although accidents sometimes happen. So we just try to do the best job we can.

Maggy Benson: And get 3-D prints.

Nick Pyenson: Absolutely.

Maggy Benson: We have another question.

Nick Pyenson: Okay.

Maggy Benson: All right, this one comes from Smallwood Middle, and they want to know: "What do you do with fossils after you finish looking at them?"

Nick Pyenson: That's a great question. Here at the Natural History Museum, we're a storehouse of information about the natural world of all different kinds, and in particular for fossils, we have millions of fossil specimens that have been collected over 150 years from every continent [00:24:00] on the earth.

Maggy Benson: Wow.

Nick Pyenson: What we do is keep all those things because we never know when we might want to study them to understand the great history of life on Earth. That's an ongoing process. When we recover fossils from the world out there, and have them all prepared, and remove all the rock from the bone, we then put them into our collections. (That way) they're cared for, not just in the here and now, but for generations to come because you never know what kinds of questions you may want to be able to answer.

Maggy Benson: And maybe more discoveries to make.

Nick Pyenson: Absolutely. [00:24:30] I like to think of it with our 137 million specimens in the Natural History Museum here, I like to think that's 137 million mysteries to be solved.

Maggy Benson: That's wonderful. We have another question, and this one comes from PVCICS. They want to know: "Do you always have to look at the seaside for marine fossils?"

Nick Pyenson: That's a very interesting question. A lot of our fossil sites tend to be located along the Coast, and a lot of it has to do with Geology. So geologic forces [00:25:00] are what is driving up ancient sea floor and raising it onto land so that we can actually find fossils because we can't go out in boats and look for fossils. We have to use the best tools we have which are our feet and our eyes. After that, once we find fossils, then we can do more delicate stuff and the actual hard work of excavating the fossil like you see on that still.

Maggy Benson: Wow, that's great. I think we've learned a lot about your work, your research, and some of the tools that you use to do that. [00:25:30] I think it's time to go back to our students and ask them a question.

Nick Pyenson: Let's do that.

Maggy Benson: All right. What do you think studying fossils tell you? Do you think it tells you about Earth's history? Whale evolution? Relationships of whales? or All of the above? Take a moment to think of everything that Nick's told us. So Nick, do you think you can clue in the students a little bit? Give them a couple of hints.

Nick Pyenson: Well, absolutely. First, I hope that you learned that earth does have a history and that fossils tell us about life a long, long time ago. Not just [00:26:00] thousands of years, but millions of years ago. In particular, whales are part of that history. They evolved from land ancestors, and whales are related to other mammals. So there's a way that we can actually tease out the family tree of whales. You know what I would say? I think the answer is probably all of the above.

Maggy Benson: Wow, that's great. So we got 90 percent of you that said all of the above, so great job. You're budding Paleontologists. I think we've learned [00:26:30] so much that I want to open it back up to the students to ask you some more questions.

Nick Pyenson: All right, let's do it.

Maggy Benson: Are you ready?

Nick Pyenson: Yeah.

Maggy Benson: All right. Let's go. One student wants to know: "What's your favorite fossil that you've ever found?"

Nick Pyenson: Boy, that's a great question. What's my favorite fossil? I would say this fossil right on the table is one of my favorite fossils ever found. It was a very long, hard day on the Coast of Panama. The sun was beating down on our backs, we didn't have much time to recover this fossil. I was working with my grad student at [00:27:00] the time, and there was nothing more enjoyable than putting in hard day's work, digging around a fossil that's a little mystery before your eyes, then relaxing with your colleagues over dinner and a hot meal to talk about the hard day's work. So the satisfaction gets carried over to when you find out what this fossil is.

Maggy Benson: Kate and Issac want to know: "How long have you been a Paleontologist, [00:27:30] and what made you want to become one?"

Nick Pyenson: That's a great question. Kate and Issac, I've wanted to be a Paleontologist ever since I was an eight year old and I first went to this museum. I remember being eight years old and walking into the Hall of Dinosaurs, and peering in behind the fossil lab through the window and seeing those Paleontologists working, using mechanical tools to dig away very carefully, chipping rock from a dinosaur bone.

Nick Pyenson: That was one of those key moments of visiting a museum that really made me want to become a Paleontologist. Why [00:28:00] did I want to become a Paleontologist? Because I think it's tremendously exciting to learn about the deep, deep history of life on earth. And to be able to hold it in your hands. It's so thrilling to be able to hold something that's millions of years old, thousands of years, millions of years old, in your hands. And it actually tells you something about the evolution of life on Earth. That's why I like being a Paleontologist.

Maggy Benson: Thank you all for such wonderful questions, and thank you, Nick, for being here today.

Nick Pyenson: Absolutely.

Maggy Benson: [00:28:30] Hopefully we'll see you again here on Smithsonian Science Now.

Nick Pyenson: I'd love to.

Maggy Benson: Thanks again, students, for all of your fabulous questions. We're sorry that we couldn't get to them all. If you missed part or some of today's broadcast, then you can tune into the archive on our website at qrius.si.edu. Tune in next time to Smithsonian Science Now.