

## Video Transcript - Plesiosaurs and Other Large Marine Reptiles

Maggy Benson: Hello everybody, and welcome to Q?rius, [00:00:30] our science education space right here inside the Smithsonian's National Museum of Natural History. This is where we're broadcasting today's episode of Smithsonian Science How. We are so happy to have you here. Today, we're going to be exploring real sea monsters, fossil plesiosaurs.

Emmanuel Kyei-Baffour: Whoa.

Maggy Benson: I cannot wait to start. I'm Maggy Benson.

Emmanuel Kyei-Baffour: Hello everyone. I'm Emmanuel Kyei-Baffour and I can't wait to dive into some [00:01:00] plesiosaurs.

Maggy Benson: I'm not diving into anything if there are plesiosaurs in there.

Emmanuel Kyei-Baffour: Oh yeah, that'd probably be a little scary.

Maggy Benson: All right. Like I said, we are here in our Q?rius Education Space and we are going to meet our fossil expert now. She is a paleobiologist here at the Smithsonian's National Museum of Natural History, Dr. Laura Soul. Thank you so much, Laura, for joining us today.

Laura Soul: Hi!

Emmanuel Kyei-Baffour: Thank you so much for coming. Do you study the Loch Ness monster? What do paleobiologists [00:01:30] do?

Laura Soul: So. I am a paleobiologist. I'm also the Deep-Time Education Specialist here at the National Museum of Natural History. So that basically means I get to do my two favorite things for my job. I study evolution using fossils. That's the paleobiology part that I do behind the scenes. And then I spend a lot of time in this space, Q?rius, Talking to our visitors and teaching them about my research.

Emmanuel Kyei-Baffour: I have a question. Does the Loch Ness monster exist?

Maggy Benson: Yeah, tell us what a paleobiologist [00:02:00] thinks.

Laura Soul: A paleobiologist really, really wants the Loch Ness monster to exist. Wouldn't that'd be amazing if we could see a real life plesiosaur today?

Maggy Benson: So, this isn't real?

Laura Soul: Sadly, not. And, you know, Loch Ness is just not big enough to support an animal like that. There's not enough fish in that whole loch, in the whole

lake. And I'm telling you, we definitely would've found it by now because we've been looking very carefully.

- Maggy Benson: Now, Nessie kind of looks like a plesiosaur.
- Laura Soul: Yeah, definitely. [00:02:30] The body plan of a plesiosaur and what people think Nessie looks like are definitely very similar. So that's maybe where we got that myth from.
- Maggy Benson: And that's what we're seeing here. Some of these illustrations of what sea monsters and plesiosaurs might have looked like.
- Laura Soul: Yeah, they're pretty terrifying. Would you really want Nessie to exist, if it looked like that?
- Emmanuel Kyei-Baffour: Not really, no.
- Maggy Benson: This one is actually getting it's neck chomped. Do they all have ferocious teeth like this?
- Laura Soul: They did. All of the different species in the group [00:03:00] that I study do have sharp, spiky teeth. So, we can take a look at some of those.
- Maggy Benson: You have some teeth to show us today?
- Laura Soul: I brought some teeth with me.
- Maggy Benson: Yeah, totally. Oh, are these some of the teeth?
- Laura Soul: Yeah. This is a great example of those huge, enormous, sharp, spiky teeth. This is an animal, could be a liopleuridon, and that one's got crazy teeth.
- Maggy Benson: That's terrifying.
- Laura Soul: They're really, they're pretty horrifying.
- Emmanuel Kyei-Baffour: Looks kind of like an alien.
- Laura Soul: I know people want to find Nessie, but if Nessie looked like this, I don't think I'd want to meet [00:03:30] her.
- Emmanuel Kyei-Baffour: Yeah. Nessie, stay home. (laughing) So, You said you had some fossil teeth today?
- Laura Soul: Yes. So, I can show you these.
- Maggy Benson: We can hold them?

Laura Soul: Yes.

Maggy Benson: All right.

Emmanuel Kyei-Baffour: Oh, I can't wait.

Maggy Benson: Yes. So, this is a fossil tooth that is millions of years old?

Laura Soul: Yep. These are real fossils that are millions of years old that are from two different species of plesiosaur. What do you notice about these teeth?

Emmanuel Kyei-Baffour: Well, this one is long and pointy, [00:04:00] but it also has these lines going up and down it.

Laura Soul: Yep.

Maggy Benson: Mine is definitely smaller, but it is also very spiky and, um, it also has lines on it.

Emmanuel Kyei-Baffour: Um hmm.

Laura Soul: Yeah, those are really great observations from looking at the fossils. What do you think teeth like this would have been used for eating?

Emmanuel Kyei-Baffour: Um, so probably like meat, fish, or maybe even a cheeseburger. (laughing)

Maggy Benson: Good guess. I would also say [00:04:30] fish, maybe birds. Could they snatch birds up with that long neck?

Emmanuel Kyei-Baffour: Or other plesiosaurs?

Laura Soul: Maybe. Well, they definitely would have been using these to eat meat, but probably not a cheeseburger. And this is actually a really good example of one of the things that we do in paleobiology research. We look at things like teeth to try and figure out what different ancient animals might have eaten, and those observations that you made about how they're sharp and spiky tell us the kinds of things that they would have eaten. So does the size of the tooth. And we can compare [00:05:00] that to other animals. So over here ... Hmmm ...

Maggy Benson: I'll put it back in here.

Emmanuel Kyei-Baffour: Put these back in. Thank you.

Maggy Benson: All right, so we have another animal over here.

Laura Soul: Yeah, this is a single tooth from a mammoth.

Maggy Benson: This right here?

Laura Soul: Yes.

Emmanuel Kyei-Baffour: Wait. Is a mammoth a plesiosaur?

Laura Soul: No, mammoths are actually a relative of elephants that live today. So, they're part of the group proboscidea, is the word, but-

Emmanuel Kyei-Baffour: So, like a woolly mammoth?

Laura Soul: Yeah. It's a woolly mammoth, not a marine reptile, not living in [00:05:30] the oceans.

Maggy Benson: So, what are we seeing? That tooth looks very different, nothing like our plesiosaur teeth that we were just holding.

Laura Soul: Yeah, exactly. So, this is a completely different type of tooth. You can see this is the chewing surface here and it has these grooves down it. But overall it's very flat. And this kind of tooth is really well adapted for grinding up grass, which is what mammoths ate. And by looking at the shape of the tooth, we can make inferences about what mammoths ate in the same way that we did for the plesiosaurs.

Maggy Benson: So these sharp, pointy [00:06:00] teeth are good for eating meat, but it doesn't necessarily mean that everything with a sharp and pointy tooth is related very closely to each other.

Laura Soul: Right, exactly. There were lots of different types of marine reptiles. There are lots of different types of animals that eat meat. Like here's the crocodile, for example. Crocodiles and plesiosaurs aren't particularly closely related, but there is a huge diversity of different marine reptiles and of different plesiosaurs.

Maggy Benson: Really?

Emmanuel Kyei-Baffour: Okay, can you explain [00:06:30] to us the different kind of plesiosaurs?

Laura Soul: Yeah, if we look at this slideshow, there's going to be a bunch of pictures coming up here showing you all of the different shapes and sizes of these things. And like we said before, these were around for millions of years. The whole entire time that the dinosaurs were living, these were living in the oceans even though they're not dinosaurs. And so there was loads of time for lots of different species that look really different from each other, to evolve.

Maggy Benson: Wow, this is so amazing. Now, we want to remind our viewers that they can [00:07:00] send in questions today. We see more people still joining us. We have Patterson, New Jersey. We have a lot of classes joining us. And you're showing us here the diversity of all of these plesiosaurs. Now, I think it's time to address the elephant, or should I say plesiosaur, in the room (laughing) that's right behind you. What is this?

Laura Soul: So, I brought this specimen along with me. So what this is, is a type of plesiosaur, or sauropterygian. [00:07:30] That's the group of animals that plesiosaurs belong to. And this is called *Thalassio dracon*.

Maggy Benson: *Thalassio dracon*.

Laura Soul: Yeah, you got it.

Emmanuel Kyei-Baffour: *Thalassio dracon*.

Maggy Benson: It sounds like dragon.

Laura Soul: It does.

Emmanuel Kyei-Baffour: Kind of sounds like Drake. (laughing)

Laura Soul: Yeah.(laughing) Dragon is where the name comes from.

Maggy Benson: His next stage name.

Emmanuel Kyei-Baffour: Right.

Laura Soul: Yeah, so if we look at the specimen, we can see all of the different features that a lot of these animals kind of have in common. So what we're looking at is kind of the belly side of the animal. [00:08:00] Yeah. So at the top you can see the head, it's pretty small.

Maggy Benson: Teeny, tiny head.

Laura Soul: Teeny, tiny head.

Emmanuel Kyei-Baffour: Small.

Maggy Benson: It's a teeny, tiny head.

Laura Soul: And so that's his bottom jaw there that you can see. And then if we go down, this is actually its neck. Look how many vertebrae it has in its neck.

Maggy Benson: So many more than I have.

Emmanuel Kyei-Baffour: Yeah, me too.

Laura Soul: You have seven. This definitely doesn't have seven.

Emmanuel Kyei-Baffour: Definitely more than seven.

Laura Soul: Yeah.

Maggy Benson: So, what's this?

Laura Soul: Right, if you look here you can see flippers. So they have four flippers here. All these [00:08:30] flippers are very similar to each other. But can you see that they have bones in them that are very similar? They're the same bones that we have in our arms, they're just a slightly different shape.

Maggy Benson: It looks like this one's missing its hand, but would this bone be the same as my humerus?

Laura Soul: Yes, exactly. This is the humerus of this specimen. (laughing)

Emmanuel Kyei-Baffour: That's quite humorous.

Laura Soul: Yep, and then it has all the other bones that we have on our arms and lots of finger bones down here.

Maggy Benson: Now, what's [00:09:00] going on here?

Laura Soul: Yeah, that's a bit of a weird bit, isn't it? But those are actually belly ribs. They had ribs that went around their back, but they also had some going down their stomach.

Emmanuel Kyei-Baffour: I see.

Laura Soul: And then we have this nice tail down here as well. We don't have a tail, but plesiosaurs did.

Maggy Benson: Now, I'm looking at the tail and comparing it to the neck, and the tail actually looks shorter than the neck. That's kind of weird.

Laura Soul: Yeah, these things really did have very long necks, some of them.

Maggy Benson: Wow. Now, what did you call this? You did not call this [00:09:30] a plesiosaur.

Laura Soul: Yeah, so this one is a type of plesiosaur, but it belongs to a group. I like to study all of the different species in this group, and it's called Sauropterygia.

Emmanuel Kyei-Baffour: Wait, what? Can you say that one more time?

Laura Soul: Yeah, I'll say it slowly. It's saur-op the ridge ee-ah.

Maggy Benson: Oh wow. Okay, so we have the pronunciation that's on the bottom of the screen right now, and I think it's a great idea for students to do this with us. I've been practicing saying this word for about two weeks and I'm still learning how to do it.

Emmanuel Kyei-Baffour: Let's see.

Maggy Benson: Okay, so help us out.

Laura Soul: [00:10:00] Yeah.

Maggy Benson: Okay,

[All]: Saur-op-teh-ridge-ee-ah.

Emmanuel Kyei-Baffour: Okay.

Maggy Benson: Sauropterygia.

Emmanuel Kyei-Baffour: Sauropterygia.

Maggy Benson: Practice makes perfect, we're going to get it.

Laura Soul: I think you guys have got it.

Emmanuel Kyei-Baffour: Why were these animals called sauropterygians?

Laura Soul: Well, the kind of literal translation of that word is actually lizard flippers.

Emmanuel Kyei-Baffour: Lizard flippers. That's a lot easier to remember than Sauropterygia.

Maggy Benson: Totally.

Emmanuel Kyei-Baffour: Yeah.

Laura Soul: [00:10:30] Yeah, it's a really good way to remember it. Although it is a little confusing, because they're not actually a type of lizard, but some of them look a bit like lizards. I think that's how they got their name. The flipper part though, definitely correct. All of them had flippers.

Emmanuel Kyei-Baffour: I see.

Maggy Benson: So, they're not lizards. So, lizards are a kind of reptile, like these are?

Laura Soul: Yes, these are a kind of reptile, so are lizards. These are marine reptiles, lizards aren't. But they're also not dinosaurs, which a lot of people, I think, think they are. They're a completely different group to the dinosaurs [00:11:00] and they're not any of these other things that lived in the ocean as well, like whales or sharks or anything like that. They're their own group, Sauropterygia.

Emmanuel Kyei-Baffour: Okay.

Maggy Benson: Awesome.

Emmanuel Kyei-Baffour: So sauropterygians, were they like teeny tiny little lizard flippers? Or were they like medium-size kind of deals like our sauropterygian friend in the back that we just visited?

Laura Soul: Well, I think actually most people think of them as being these huge, ferocious ocean predators, right? And it's definitely true that some of them were like that. But lizard flippers [00:11:30] being teeny tiny also works as well, because we've got specimens that are from quite early in their evolution where they were very, very small.

Maggy Benson: I see some very, very small fossils here on this table. Are these some of them?

Laura Soul: Yes, so these are called *Neusticosaurus*. So we've got two little specimens here. And these, as you can see, are incredibly tiny, but they have all those features that the other sauropterygians had.

Maggy Benson: And these are actually [00:12:00] how big they are, it's not like they were scaled down.

Laura Soul: Yep, exactly. This is an exact replica of the real fossil that comes from Italy.

Maggy Benson: Oh my gosh. It's actually really, really cute.

Emmanuel Kyei-Baffour: Yeah, these guys are super cute. I would definitely have one as a pet.  
(laughing)

Maggy Benson: Only they haven't been around for millions of years.

Laura Soul: Yeah, sadly we can't keep these as pets any longer.

Maggy Benson: Um, so, I'm looking over Emmanuel's shoulder and it looks like you've prepared an activity for us.



Laura Soul: Yes, I thought that'd be fun to test out whether or not you know which [00:12:30] one of these is a sauropterygian and which aren't.

Maggy Benson: Awesome. So students, here's an activity for both us and you. We're going to do the first three together, and you can just shout out your answer in your classroom. Sorry, teachers. (laughing) And then, on the last one, on the fourth one, we're going to open it up as a poll. And to help me out, I'm going to remember that all of these animals are marine reptiles. Emmanuel, what are you going to use?

Emmanuel Kyei-Baffour: Okay, sauropterygian means lizard flippers, so I'm going to remember the lizard [00:13:00] flippers. Got it.

Maggy Benson: Okay, we're ready for our activity.

Laura Soul: Okay, this is number one. Is this a sauropterygian?

Maggy Benson: So using my cue, I think it looks marine. It's swimming, looks like a reptile. I'm gonna say yes.

Emmanuel Kyei-Baffour: Okay, so it looks a bit lizard like, I see flippers, so I'm going to say sauropterygian.

Laura Soul: Yep, correct. This is a sauropterygian. Nice job.

Emmanuel Kyei-Baffour: Woo. (hand clap)

Maggy Benson: All right.

Laura Soul: That's one down. You ready for the next one?

Emmanuel Kyei-Baffour: Umm hmm.

Maggy Benson: Yes.

Laura Soul: Okay. [00:13:30] So, here we go. Here's your next one.

Emmanuel Kyei-Baffour: Umm. Okay, so, I'm seeing no flippers. It does look a little lizard-like, long neck, but I don't know. I'm gonna have to say not a sauropterygian.

Maggy Benson: Yeah, it has that long neck like the last one, but it does not look Marine. I'm going to say no, not a sauropterygian.

Laura Soul: You both got that right as well. And I think probably our viewers knew that it is a dinosaur.

(laughing)

Laura Soul: Okay, next one is this one.

Emmanuel Kyei-Baffour: [00:14:00] Okay, so it looks lizard-like. I see the flippers. So sauropterygian is my guess.

Maggy Benson: Yeah, it looks marine; it's definitely swimming. It looks like a reptile. I'm going to agree. I'm going to say that yes, this is another sauropterygian.

Emmanuel Kyei-Baffour: Umm hmm.

Laura Soul: Well, I've caught you out with this one. So, this is actually a mosasaur, which is a different type of marine reptile.

Emmanuel Kyei-Baffour: A mosasaur?

Maggy Benson: That was like a trick question.  
  
(laughing)

Laura Soul: I'm sorry. There are lots of different types of marine reptiles, so you need to [00:14:30] learn to tell them apart.

Maggy Benson: All right, let's just do our last one for our students.

Laura Soul: Okay, ready? Last one for the students is this.

Maggy Benson: All right.

Emmanuel Kyei-Baffour: Okay, let us know in the poll if you think this is a sauropterygian, a lizard flipper or not. Let us know.

Maggy Benson: Use your clues. Is it a marine reptile? Does it look like it has flippers?  
  
(Musical interval)

Emmanuel Kyei-Baffour: [00:15:00] ... 59% of our viewers think that that image was a sauropterygian.

Laura Soul: Oh, clearly all paleontologists in the making. They are right. That was a sauropterygian as well.

Maggy Benson: All right, well done students.

Emmanuel Kyei-Baffour: Umm hmm.

Maggy Benson: All right, let's get to some of our student paleontologists who are doing really great with observation. And now let's get to some of their questions. I know we have a bunch.

Laura Soul: Great.

Emmanuel Kyei-Baffour: Okay, our student paleontologists, Fanwood, would like to know: Where did you find plesiosaur fossils?

Laura Soul: [00:15:30] So, plesiosaur fossils are actually found all over the world, so we have them from every continent, even Antarctica. But when I go find them, I always try and find them in North America.

Emmanuel Kyei-Baffour: Okay, Elizabeth Wood would like to know: what is the difference between plesiosaurs and mosasaurs?

Laura Soul: There are a lot of differences between them. So, they are both marine reptiles, so they have a lot of similarities and we're gonna talk a bit more about that later. But they have important differences as well. Mosasaurs [00:16:00] are actually a type of lizard. Sauropterygians are a separate group to them. And they have differences in the way that their bones are shaped, their size, and the way that they eat. Certainly, the way that they swim was different, too.

Emmanuel Kyei-Baffour: Okay, And our third graders from The Little Flower School would like to know: When did you get interested in paleobiology?

Laura Soul: So, I was always very interested in evolution and trying to understand more about that. But really, I got [00:16:30] extra interested in paleontology when I got to college and I found out a lot more about it.

Emmanuel Kyei-Baffour: Our students at the Fanwood School would like to know: Were sauropterygians deaf? They are actually a school of all deaf children and they're getting the livestream interpreted to them in ASL as we speak.

Maggy Benson: Awesome. Thank you so much.

Laura Soul: Okay. Hi. So I think as far as we know, sauropterygians would have been able to hear. [00:17:00] So, if we look at living reptiles today, they can hear, so we can infer that sauropterygians, extinct reptiles in the past, would have been able to, too. Although, because they live in the water, they probably had a slightly different way of hearing than the ones that live on land.

Maggy Benson: Interesting. So, what about this flipper? Let's get back to that. Was there a period of time where they didn't have flippers? If they were reptiles, did they come from land to sea?

Laura Soul: Yeah, so this group actually evolved from ancestors that lived on the land. [00:17:30] And I think if we can take a look at some of the pictures that we have, so, like this guy here, what do you notice about its limbs?

Emmanuel Kyei-Baffour: Umm, they kind of look like fingers and not flippers.

Maggy Benson: I agree.

Laura Soul: So, these things did live in the sea and they swam around, and do kind of have flippers, but they're not the same as those big ones on the casts that we were looking at, or some of the other species that we see that have really large flippers. So these ones that were early on kind of have things that look more like legs even though they were [00:18:00] using them for swimming.

Maggy Benson: I see that there looks to be a flipper on this table here. Is that real?

Laura Soul: Yes, this one is a real flipper.

Maggy Benson: Awesome. Can we see it?

Laura Soul: Yeah, for sure. So, over time, new species evolved that had much larger flippers that were more stiff and more streamlined, and were more effective for swimming very long distances. So what we've got here is actually just the end of a flipper, it's just like [00:18:30] right at the end. There would've been a lot more of it than this, and it was from a very, very large Marine reptile title, a very large plesiosaur.

Maggy Benson: It's so much bigger than your hand and it's even incomplete.

Laura Soul: Yeah, exactly. This is just the ends of the fingers basically.

Maggy Benson: Wow. Now, you showed us a gigantic flipper that is here on display at the National Museum of Natural History in the Sea Monsters Unearthed exhibit. And we took a video so that we can show our viewers.

Laura Soul: Yeah, I think we should take a look.

Maggy Benson: So viewers, take a look.

Laura Soul: Right now we're in an exhibit in the museum that's called Sea [00:19:00] Monsters Unearthed. And in this exhibit space we have lots of marine reptiles on display, lots of different species, and they all come from Angola. Behind me there's the flipper of a type of plesiosaur called *Cardiocorax*, and here you can see all the bones that make up plesiosaur flippers.

Laura Soul: So, this is a back flipper and at the top there is a big bone and that's kind of equivalent to the top bone in your leg. That's a femur. And then, the next two bones down are the tibia and fibula. So those are like the [00:19:30] bones that are in your shin. And then, all of those bones down there are modified phalanges, so those are like the bones that make up your toes or your fingers.

Maggy Benson: Wow. That is so cool, and it's so crazy to see how many different bones get added as that adaptation changes to being in the water.

Emmanuel Kyei-Baffour: What features of the plesiosaur help you to study the plesiosaurs, how they [00:20:00] lived back then?

Laura Soul: Yeah, that's a really interesting question. And we've kind of looked at a few things that you can use to understand how they lived and how they evolved. So, things like teeth and flippers. But one thing you might have noticed in the slideshow that we saw before, is that they have very different body plans. And what that means is just the overall shape of their body. So, if you think back, do you remember what those shapes were?

Emmanuel Kyei-Baffour: They were kind of like long neck and round body, a little bit. Like, the bodies were definitely smaller than the necks.

Maggy Benson: [00:20:30] Yeah, just look at how long that neck is that we're looking at here.

Emmanuel Kyei-Baffour: Yeah.

Laura Soul: Yeah, so we have these ones with really long necks and tiny heads. But we also have other ones that have enormous heads and very short necks. This thing was probably about the same size as a school bus.

Emmanuel Kyei-Baffour: Whoa.

Laura Soul: So they were enormous. And when researchers first started finding sauropterygians, they kind of categorized them into those two different groups.

Maggy Benson: Well, what does this one fit into? Because that looks like it's huge and ferocious and has a long neck.

Laura Soul: Yeah, this one has a really long neck [00:21:00] and it has a big head. So what we found out, as we found more fossils, was that the story was much more complicated than just those two different shapes. There were lots of in between ones as well. And those two shapes evolved multiple times over time, over the millions of years that they were around.

Emmanuel Kyei-Baffour: So we have students in Wyoming, New Jersey, Maryland. Were there plesiosaurs there too?

Laura Soul: So, we actually find plesiosaurs in many of those places. Definitely, we get plesiosaurs from Wyoming, Kansas, [00:21:30] and Maryland, as well.

Maggy Benson: How?

(laughing)

Laura Soul: Yeah, so it seems very strange now, right, because places like Wyoming, it's very dry, and these are marine reptiles. Bbut there actually used to be a very big seaway that went across North America called the Western Interior Seaway. This was when the earth was much warmer and the sea level was higher.

Maggy Benson: Oh my gosh, that's amazing.

Emmanuel Kyei-Baffour: Yeah, what kind of animals lived in the Western Interior Seaway?

Laura Soul: It was a pretty nice place to live, so [00:22:00] there were lots of different species that lived there. So not only were there sauropterygians, there were also mosasaurs. There were things like lots and lots of sharks, we find lots of shark tooth fossils. And ammonites, which is the thing that you can see swimming across the back of the screen there right now. Yeah, it was very diverse.

Maggy Benson: Is that a plesiosaur?

Laura Soul: Yeah, [inaudible 00:22:19] that's a plesiosaur.

(laughing)

Laura Soul: We get some turtles as well.

Maggy Benson: Wow, that's amazing. Are these places that you go to, to find fossils? Do you go to where this inland [00:22:30] sea used to be?

Laura Soul: Yes, so that is actually where I do my field work. And I'm very interested in this period of time because it's interesting to look at what happened when you go from it being land to being marine. You can see how the ecosystems changed. So yeah, I go out into Wyoming, into the Wind River basin and the Big Horn Basin.

Emmanuel Kyei-Baffour: Is that where you are in these pictures?

Laura Soul: Yes, all of these pictures, I'm out in Wyoming.

Emmanuel Kyei-Baffour: Oh nice.

Maggy Benson: So we saw you collecting some of those fossils. What happens when you collect [00:23:00] them?

Emmanuel Kyei-Baffour: Yeah, how do you collect them and then bring them back here to the museum?

Laura Soul: Well, so fossils are often very delicate. So we have to be very careful. And the first thing that we do when we find a bone fossil that we'd like to bring back to the museum, is put plaster on it.

Maggy Benson: So Is this plaster kind of like the same plaster that you would get if you broke your arm?

Laura Soul: Yes, it's the exact same plaster that you would get if you broke your arm. I bandaged this like a broken arm.

(laughing)

Maggy Benson: So are you protecting this fossil just like you would be [00:23:30] protecting your broken arm?

Laura Soul: Yeah, exactly. So you can see here, I've kind of started to open it up. And I know, because I put the plaster on it, that there is a bone just under here. But I can't open it just yet because we have to make sure that all this around the edge is very well glued solidly together so that it doesn't crumble and break when we open it up. We want to protect the bone.

Emmanuel Kyei-Baffour: I see.

Maggy Benson: Now, you showed us behind the scenes what a fossil looks like after you've separated all of the rock from the real fossil to be [00:24:00] able to really keep it protected for perpetuity here in the museum collection.

Laura Soul: Yeah.

Maggy Benson: Let's take a look.

Laura Soul: Even though fossils are made from rock, they can be very delicate. And some of the specimens that we have here we'll have stored for hundreds of years. So we need to find a way to keep them safe. And that's what these plaster jackets are. So, these are specially designed and made here at the museum so that they cradle the fossils and have the weight of the fossil evenly distributed all over them. We've also designed them so that you [00:24:30] can use them to flip the fossil over, so that researchers can look at whichever side they want to and the fossil will still stay safe.

Laura Soul: Now, the specimen that we're actually looking at here is a type of pliosaur. It's called *Brachauchenius lucasi*, and this specimen is a very special one. It's the type specimen for the species. What that means is it defines what this species looks like. So, when other researchers find a new fossil and they want to try and work out what it is, they can compare it to this one to see if it's the same kind [00:25:00] of animal.

Laura Soul: What you can see here is actually the underside of the skull, so this is upside down at the moment. So the vertebrae here, in the neck. They attach to the head there, and then, this is the lower jaw that you can see here. There are some of the teeth poking through this way. So it's like you're looking at its skull from this direction.

Maggy Benson: What happened to the sauropterygians? We know that there are no sea monsters today, but where did they go?

Emmanuel Kyei-Baffour: Yeah, why can't I have one as a pet?

(laughing)

Maggy Benson: There [00:25:30] are other reasons for that. (laughing)

Laura Soul: So, sadly, from my perspective, they all went extinct at the Cretaceous Paleogene mass extinction, which is one you might have heard of because it's when almost all the dinosaurs went extinct, as well. So, a huge asteroid hit the Earth and wiped out loads and loads of different species, caused pretty widespread devastation. We never saw a sauropterygian again after that.

Maggy Benson: Wow, and now you're hunting for fossils before that asteroid [00:26:00] impact. When did that asteroid hit the earth?

Laura Soul: Yeah, that was 66 million years ago, and we know that from looking at layers in the rock. We can figure out how long ago that actually was.

Maggy Benson: Wow, that's incredible.

Emmanuel Kyei-Baffour: Before we go, if we had future paleobiologists out there, what would be their first step to get started?

Laura Soul: So, I think the best first step to get started in paleontology, or paleobiology, is just to keep asking lots and lots of questions. However annoying your parents find it, just keep going [00:26:30] 'cause that's all being a scientist is really, is asking questions.

Maggy Benson: And let's get to some of these scientists now. Dakota Smith wants to know what she should do to find a fossil.



Laura Soul: So, there are actually fossils all over North America. So if you're watching from anywhere in North America, there's probably fossil sites near you. And you can find out where those are online, but they're usually places like beaches or stream beds.

Emmanuel Kyei-Baffour: Awesome. Andrew would like to know: Did all marine reptiles have teeth?

Laura Soul: Yes, [00:27:00] they did all have teeth. So, they're reptiles, and I don't - I'm trying to think now - I don't think any of them evolved to not have any teeth. They were all swimming around with teeth in their mouths.

Emmanuel Kyei-Baffour: Awesome. One of our friends would like to know: Did sauropterygians lay eggs?

Laura Soul: That's a great question, actually. Yeah, it's very interesting. It took us a while to work that out, and we actually found a fossil where it has a baby inside it —

Emmanuel Kyei-Baffour: What?!

Laura Soul: - that's just about to be born. So we know it didn't lay eggs because we found this amazing, [00:27:30] beautifully preserved fossil. They actually gave birth to live young, like dolphins do.

Maggy Benson: Wow,

Emmanuel Kyei-Baffour: That's pretty cool.

Laura Soul: Yeah.

Maggy Benson: That's totally cool.

Emmanuel Kyei-Baffour: Back to our friends from The Little Flower School: How many plesiosaurs have you found?

Laura Soul: How many plesiosaurs have I found? I think I would probably say ... So, I found a lot of different bones in the field last year, and I'm not sure yet whether or not they're plesiosaurs, but I think probably three.

Maggy Benson: You know, this follows [00:28:00] up on another great question that somebody asked. How does it feel when you find a fossil?

Laura Soul: Oh, it's the most exciting thing ever.

[All] (laughing)

Laura Soul: You know, 'cause it's really hard to find these things and you spend hours walking around -in Wyoming, in the hot sun, and there's snakes and bears ...

Maggy Benson: It sounds dangerous.

Laura Soul: It can be pretty dangerous. But then sometimes you see like a little bit of bone poking out the ground and it's the best thing ever.

Emmanuel Kyei-Baffour: Awesome.

Maggy Benson: Really keeps you going.

Laura Soul: Yes, absolutely.

Maggy Benson: Laura, thank you so much for being here today [00:28:30] and sharing your amazing sauropterygians with us. Are we going to be able to display any sauropterygians in our new Deep Time hall?

Laura Soul: Yep. So the hall is opening in a couple of months and this one that you can just see on the screen there is going to be in the hall, so you can come see it as well.

Maggy Benson: So, everybody, mark your calendar. We will have a new Hall of Deep Time, lots of fossils, including our new friends, the sauropterygians.

Maggy Benson: Thank you so much for joining us and we will see you next time on Smithsonian Science How?

Emmanuel Kyei-Baffour: Bye-bye.

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