Minnesota Now (MPR) | Minnesota Now Why shark teeth are some of Minnesota's most common fossils 01GJGEP03S8MBFNKP08C24CBMX

CATHY WURZER: Hey, it's *Minnesota Now,* here on MPR News. I'm Cathy Wurzer. This is an understatement. Minnesota is not what it used to be.

More than 80 million years ago when dinosaurs walked the Earth, a sea covered much of Minnesota, and one of its most successful predators is still with us in today's oceans.

Jim Cotter is professor of geology at the University of Minnesota, Morris. Every month on *Minnesota Now,* Professor Cotter tells the story of our state through geology. Hello, and welcome back, Professor Cotter. How have you been?

JIM COTTER: I've been really good, Cathy. Thank you. It's nice to be back.

CATHY WURZER: Say, tell us about this ocean, this seaway.

JIM COTTER: The Cretaceous Seaway, it's the last ocean to cover Minnesota. But Minnesota is almost in the exact position, plate tectonically speaking, as it is now.

And it seems odd that there would be an ocean that extended from what is now the Arctic Ocean all the way down to the Gulf of Mexico. It was the width of the Dakotas, and it literally split North America into two parts.

CATHY WURZER: Wow. What did it look like? Do we know?

JIM COTTER: Yeah, it would have been relatively shallow, as you would expect, because there's no ocean there now, and it would have been fairly muddy, but it was warm.

The Cretaceous was a time where the entire planet was warm. So there were no glaciers, no snow. It would have been kind of a tropical environment.

CATHY WURZER: Where in the state can we find these Cretaceous rocks-- that's the word, Cretaceous rocks-- that point back to what this was, this marine environment?

JIM COTTER: You can find the rocks at depth almost throughout the western part of the state. But finding them on the surface is kind of tricky because they've either been eroded by the glaciers or covered up by glacier sediments.

One of the great places to find them is up on the Iron Range, where there are excavations. You can also find them in Western Minnesota, not far from where I am, again, in excavations. And then in southwestern Minnesota, they occur in river cuts and things like that.

CATHY WURZER: Perhaps a silly question, but do we find any fossilized oysters and clams and other typical marine organisms that might have been in that muddy coastline area?

JIM COTTER: Not a silly question at all. In fact, just get me started. It was a really interesting time in terms of animal life. And kind of parallel to what was going on land with the dinosaurs, animals were big in that ocean.

So there were leatherback turtles that were eight or nine feet in diameter, and there were large oysters. Oysters could grow up to six feet.

CATHY WURZER: Wow.

JIM COTTER: What an amazing thing, yeah.

CATHY WURZER: Wow, oh, my gosh.

JIM COTTER: And crocodiles. It was an interesting time, yeah.

CATHY WURZER: OK, so I kind of teased this in the lede. Tell us about one of the best known predators of this inland seaway.

JIM COTTER: It's sharks. Yeah, the Cretaceous was a big radiation time for sharks. Sharks had existed, but during the Cretaceous they kind of took off and found different ecological niches.

People always say, oh, you have the Cretaceous out there. Can we find dinosaurs? And the answer is no, it's ocean sediments, but the sharks are better.

It's the time when sharks started to go out into deeper water. And so there was a shark-- Cretoxyrhina is its name-- it kind of rivaled-- later on in geologic time, the megalodon comes in. That's a really, really big shark that lived 40 million years ago.

But this one would have come close, and those big, big teeth, they were covered with an enamel so they could chomp through like a large turtle or even maybe even a mosasaur, a swimming reptile.

CATHY WURZER: Oh, my gosh.

JIM COTTER: There were-- yeah, yeah, but the niches they occupy are really, really interesting. There's one called Scapanorhynchus who was probably so deep that it couldn't see, and so it uses sensors to catch fish.

And the teeth that it left behind-- and that's how we know most about sharks-- are really long and needle-like, and just an interesting animal. Probably was considered a relative of today's goblin shark.

One of the ones that people always talk about is Squalicorax. It probably wasn't much bigger than five, eight feet long, but it took on much bigger animals. It had serrated teeth.

And so when you find dinosaurs in Minnesota, there's only just pieces of them, really. The question is, was it Squalicorax that was chomping on them? And it had the serrated teeth that could take on an animal much larger than it.

I have a favorite, though. My favorite is Ptychodus. It's got these really, really interesting teeth that are like a pig's, and the animal evolved to eat shellfish.

So it was a near-shore creature, and it grew to be close to 30 feet long.

CATHY WURZER: Oh, my gosh.

JIM COTTER: And it would chomp on these six-foot oysters. Can you imagine being on the shoreline and hearing this giant shark chomping on giant oysters? What a great thing to think about.

CATHY WURZER: This is like something out of a movie, I'm telling you-- well, *Jurassic Park,* obviously. I mean, I can't get my head wrapped around creatures found in Minnesota. Have there been any signs of these sharks in Minnesota?

JIM COTTER: It turns out that shark's teeth in Western Minnesota is one of the most common fossils.

CATHY WURZER: Get out.

JIM COTTER: Yeah, it's really kind of fun. When you bring students out to-- and I'm trying to convince them that the Cretaceous is interesting for sedimentology and stuff-- if I mention shark teeth, they're done listening. They're looking for shark teeth, and they're not paying attention to me.

But there's a state park, Hill Annex Mine State Park, where some really interesting fossils have been found, including a dinosaur claw. But shark's teeth-- and that state park will, on occasion, have collecting tours where you can be led by a park ranger and you can keep what you collect.

CATHY WURZER: That's amazing. OK, so what happened to this ancient waterway?

JIM COTTER: At the end of the Cretaceous, you start to get really active uplift of the Rocky Mountains. And so as a result of that, most of the continent kind of gets squeezed and uplifted, although not deformed.

And the end result is you gain slight amounts of elevation, and the ocean goes away. By the time the big impact event occurs at the end of the Cretaceous, that ocean is gone, so we don't have a record of that in Minnesota, either.

CATHY WURZER: Wow. You know, I always learn something from you. It's so much fun. Thanks for painting this picture. It's kind of mind-blowing.

JIM COTTER: It's really great stuff.

CATHY WURZER: I wish you all well. We'll talk to you again next month. Thank you.

JIM COTTER: Thank you, Cathy.

CATHY WURZER: Jim Cotter is professor of geology at the University of Minnesota, Morris.