Fossil Pushes Back The Age Of Dinosaurs

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NPR Talk of the Nation

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A fossil in Tanzania suggests dinosaurs appeared 10 million years earlier than previously thought, according to a *Nature* study. Christian Sidor, of the Burke Museum of Natural History and Culture at the University of Washington, discusses the origin of dinosaurs.

IRA FLATOW, host:

From NPR, this is SCIENCE FRIDAY. I'm Ira Flatow.

Many of the iconic dinosaurs - you know which ones I'm talking about - your T-Rex, your triceratops, well, those big guys, they all died out about 65 million years ago. But that's recent history compared to when dinosaurs first arrived on the scene and that was well over 200 million years ago. The early history of dinosaur evolution is a murky one, but a new fossil find may help flesh out the story and may even make it more complicated. These bones are 240 million years old, suggesting that dinosaurs may be even more ancient than we thought according to a new study in the journal Nature.

Let me introduce my guest. Christian Sidor is an author on the new study. He is curator of vertebrate paleontology at the Burke Museum of Natural History and Culture at the University of Washington. He joins us from KUOW in Seattle. And you can see an artist's rendition of this newly discovered relative of the dinosaur on our Web site at sciencefriday.com. Welcome to SCIENCE FRIDAY.

Dr. CHRISTIAN SIDOR (Curator, Burke Museum of Natural History, University of Washington): Thank you very much, Ira.

FLATOW: So this fossil is a - first of all, it's not a dinosaur, right?

Dr. SIDOR: No. It's - part of our study was - well, I should say, part of our study is trying to establish what are the nearest relatives of dinosaurs. And the fossil that we described in this new paper, a silesaurus, is - belongs to a group called silesaurus, which is a newly recognized group from our paper. And that group is actually what we call the sister taxa on to dinosaurs. It's the closest relative that we have of dinosaurs themselves.

FLATOW: So they were living at the same time as the dinosaurs?

Dr. SIDOR: Yeah. And so, the idea is that through speciation, these lineages split, and one of the - so the split of this type of fossil back in the middle Triassic, split into two groups. One of them was silesaurs...

FLATOW: Mm-hmm.

Dr. SIDOR: ...which is this group that we're talking about now, we just discovered the earliest member of. And the other, its sister, was dinosaurs.

FLATOW: Right.

Dr. SIDOR: And so, based on this relationship of this lineage splitting into two separate branches, we sort of - even though we don't have dinosaurs from the middle Triassic yet, we assumed that they're there because we have their closest relatives.

FLATOW: Mm-hmm. And for this split to occur when it did, you have to change how old the dinosaurs are or how old their common ancestor was?

Dr. SIDOR: Yeah. So the oldest fossil dinosaurs that we have in the - the oldest dinosaurs that we have in the fossil record are from the upper Triassic. And they're probably about 230 or so million years old.

FLATOW: Mm-hmm.

Dr. SIDOR: And by that time, we already have members of each of the major lineages of dinosaurs. But a silesaurus comes from about 243 million years -245, 243 million years ago, and so we've got a gap in the dinosaur record. We assume that we have a gap in the dinosaur record of about 10 million years.

FLATOW: Wow. Could there be other dinosaurs in that time we haven't discovered yet?

Dr. SIDOR: Well, that is - you know, that's our assumption. And so, that's -you know, part of the project is that we've been doing field work in Tanzania -not last summer, we were in Zambia last summer - but the last two summers, 2007 and 2008. And southern Tanzania, I think, is going to turn into be a very interesting place and we may be able to find the earliest dinosaurs there.

FLATOW: Yeah. You know, that...

Dr. SIDOR: Although we haven't found them yet. We haven't found them yet.

(Soundbite of laughter)

FLATOW: That doesn't get much press, southern Tanzania, about dinosaur...

Dr. SIDOR: No, no. It's - it is kind of off-the-beaten track. I mean, it's not what you think of when you think of, you know, the Gobi Desert...

FLATOW: Right.

Dr. SIDOR: ...or the badlands of Montana or Wyoming or something like that. It is - you know, it's not jungle but there is elephant grass that's up above your head. There's streams and we're in a big valley. There's the Ruhuhu River right next door to us and it's tough. I mean, it is - the area...

FLATOW: Right.

Dr. SIDOR: ...you find very limited rock outcrops, and so you spend a lot of time walking around looking just for a rock before you can even find bones in those rocks.

FLATOW: Yeah. So this is a (unintelligible) yeah, this is not (unintelligible) on the ground in the bare desert someplace.

Dr. SIDOR: No. It's very, very different.

FLATOW: Yeah.

Dr. SIDOR: But, you know, the area has been - was first discovered by economic geologists, effectively trying to map the geology of the region because there are actually coal beds there. And so I think that was the original discovery was in the 1930s...

FLATOW: Right.

Dr. SIDOR: ...when there were British paleontologists and German paleontologists who went there. And so, they - the beds have been known for a long time, but not many people work there.

FLATOW: Yeah. Well, that's what discovery is all about, isn't it? It's seeing something simple and saying, hey, there's something useful there.

Dr. SIDOR: Yeah. Exactly...

FLATOW: And did somebody stumble over it? Was there an outcropping that somebody just took a little, you know, geology hammer and said, oh, look, something interesting?

Dr. SIDOR: Well, it's funny. When you talk to paleontologists - when geologists who are looking for minerals or for economic purposes for the rocks find fossils, you have to assume they're pretty common...

(Soundbite of laughter)

Dr. SIDOR: ...because they're not looking for that. They - you know, whereas we have a totally different search image from when a geologist is looking. They're looking for, you

know, what are the age of the rocks, what's the mineral composition of the rocks, different things like that. We're - we are - we want to make sure that we're in the type of rock that we're looking for. We want to make sure we're not in, for example, volcanic rocks or something, you know, that we're never going to find dinosaurs in.

So we need to be on the right type of rock, but we're not concentrating as much on the deposition of these rocks. We're looking for what are the inclusions in those rocks, and the inclusion we're looking for those dinosaur fossils or whatever fossils we're looking for.

FLATOW: And what made you decide to search on that spot?

Dr. SIDOR: Well, the last team that went there was a joint team from the British Museum of Natural History and University of London, I believe, in the 1960s.

FLATOW: Mm-hmm.

Dr. SIDOR: And a lot of that - so those collections are primarily in London. And we just knew that there was interesting fossils that they had in those collections that had never been published on. And secondly - oh, I totally forgot (unintelligible)...

FLATOW: It's okay. You're acting like me now. That's not good to have both of us (unintelligible) to get anywhere.

Dr. SIDOR: Yeah, getting old. I'm getting old a bit.

FLATOW: That's all right.

(Soundbite of laughter)

FLATOW: I'll ask you another question. I have other questions to go. Now, let's talk about - if these are not dinosaurs, right, they don't look like the stuff - they're not going to like the stuff we see on exhibit or are they going to look like something else? What would they look like in life today, or crocodiles, or anything like that?

Dr. SIDOR: They wouldn't really look like much around today. I mean, I think you would - if you saw one living today, if you saw a silesaurus walking around today, you would probably think it was a dinosaur.

FLATOW: Yeah.

Dr. SIDOR: But it would not be the - like you said at the intro of the show, it would not be one of those iconic tyrannosaurus or triceratops or stegosaurus. It's not very big, you know? We're talking about a dinosaur - a proto dinosaur, effectively, that is only maybe three feet high, walks on all four legs which is an interesting finding.

FLATOW: Yeah.

Dr. SIDOR: You know, dinosaurs are typically thought to have come from bipedal ancestors, so we've got a quadripedal animal. It's got a long tail. It's got a long neck. The thing though that, sort of, lines it up with dinosaurs is it's got features of the hips and of the ankles that show that the legs are held directly underneath the body.

FLATOW: Right, right.

Dr. SIDOR: So it's not like a crocodile or like a lizard where the legs are stuck out to the side. And so, it's got the, sort of, precursor to walking on two legs.

FLATOW: Right, right. As I said, we have a photo with it - artist rendition on our Web site at sciencefriday.com. But, you know, that make sense because weren't the early dinosaurs smaller animals also?

Dr. SIDOR: Yeah. Dinosaurs probably evolved from a really - a relatively small animal. And all of the - not just silesaurds(ph), but all of those other, you know, there's a whole bunch of stuff in the Triassic that most people don't think about when they think about dinosaur evolution that are relatively small.

And so, we think that dinosaurs did actually evolve from relatively small animals, and they evolved from a group, now, we think in the middle Triassic that wasn't, sort of, dominant at first. They rose to dominance through the middle Triassic and late Triassic. And so by the time they get to the end of the Triassic and into the Jurassic...

FLATOW: Right.

Dr. SIDOR: ...they are really those dominant animals that you think of. They are the biggest animals on the scene.

FLATOW: 1-800-989-8255 1-800-989-8255 is our number, talking with Christian Sidor about the silesaurus which probably most people, I don't think, have ever. They're not on exhibit in many museums - anywhere.

Dr. SIDOR: No, and it's actually a very recently discovered group. I mean, the first silesaur was only published on, I would say, probably less than - about five years ago or so.

FLATOW: Really?

Dr. SIDOR: Yeah. And it - they've been a problematic group for paleontologists, because they look so dinosaur-like that some of them had been thought to be dinosaurs, maybe they're related to prosauropods, maybe some of these other ones are related to something else. And, you know, part of our study was showing that, actually, this is its own little radiation. And this group evolved first in the middle Triassic and it spread and was around, almost worldwide, by the late Triassic.

FLATOW: And we don't know why they died out, while the dinosaurs kept living for another, what, 200, 160 million years - something like that.

Dr. SIDOR: Yeah. The why question is always the tough one in paleontology. It's - you know, it's a historical science and so we're looking backwards. There's lots of theories on why dinosaurs took off a long time ago. And back in the '60s, people would say that dinosaurs were competitively superior because they were bipedal.

FLATOW: Mm-hmm.

Dr. SIDOR: And we know - and then some dinosaurs went back down on four legs, like triceratops and things like that - or brontosaurus-type things. But now, you know, the finding that we have is that, actually, these animals perhaps started off or their nearest relatives were quadripedal. And so that sort of throws a little bit of a curve into the story.

FLATOW: So it's minor differences in anatomy that would make the silesaurus different than dinosaurs if you were trying to pick them apart and classify them?

Dr. SIDOR: Yeah. So I always get asked the question, you know, what makes a dinosaur - you know, how do you decide what the dinosaur is? Because I think for most people, dinosaur is basically anything that's big and dead, right?

(Soundbite of laughter)

Dr. SIDOR: I mean, everything is a dinosaur. You know, terrasaurs are dinosaurs. You know, the Loch Ness Monster is a dinosaur. You know, plesiosaurs are dinosaurs. Everything the dinosaur. But for paleontologists, dinosaurs actually is a specific type of reptile. And we can - you can think of it in sort of two ways.

One is, you know, what are the features that all dinosaurs share. And the easiest example I can give you is that they have an open hip socket. So, you if you looked, you know, if you took your femur out of your hip right now and looked in, you would see that it's got a depression...

FLATOW: Right.

Dr. SIDOR: ...where the head of the femur fits in and it's solid bone. Dinosaurs, actually, you could look through that, and there's actually...

FLATOW: Oh, really?

Dr. SIDOR: ...a hole there. Yeah. So next time you are at the American Museum of Natural History in the Upper West Side, you go take a look, and you can look through the hip socket of a lot of dinosaurs.

FLATOW: All right. Let me ask you this question, then. If birds are dinosaurs, would I find that in my roast chicken tonight?

Dr. SIDOR: You will not, you will not.

(Soundbite of laughter)

Dr. SIDOR: Actually yeah, evolution, you know, there are certain features that are really good features that actually, you know, you evolve a certain feature and it seems to be just hard wired in.

FLATOW: Right.

Dr. SIDOR: But most features, most anatomical features - I mean, we're talking about, you know, the first dinosaurs, remember, we're talking, like you said, over 200 million years ago. And there's plenty of opportunity between now and then to have, you know, re-evolve a closed hip for example.

FLATOW: I see. I see, so - but the other bones looked really stunningly like dinosaur bones.

Dr. SIDOR: Oh yeah. I mean, and that's...

FLATOW: And then we could (unintelligible) - yeah.

Dr. SIDOR: That's why these animals have been sort of confused for awhile. And actually, it took a fossil, sort of - of this completeness. Now, we don't have a nice road kill specimen that shows the entire animal laid out like you, sort of, imagine, you know, most dinosaurs are found - or dinosaurs or other fossils are found.

We actually have an animal that was assembled from at least 12 individuals, and so we have, effectively, a bone bed. And they range in size from, sort of, sub-adults - from juveniles to, sort of, sub-adults. We don't think we have the full size of this animal. But between all 12 of those different animals - or actually, more than 12, I mean, we have, sort of, like, 12 right femora, right? That's how we know that we have at least 12 animals there.

FLATOW: Right.

Dr. SIDOR: But we have a whole smattering of the skeleton. We're able to put back almost the whole thing except for parts of the skull and parts of the hand.

FLATOW: Mm-hmm. Sure.

Dr. SIDOR: And with all that information, then you can really say, you know, this is what this original, sort of, dinosaur precursor look like.

FLATOW: Mm-hmm. You're listening to SCIENCE FRIDAY from NPR. I'm Ira Flatow, talking with Christian Sidor, the curator of vertebrate paleontology at the Burke Museum of Natural History and Culture at the University of Wisconsin - of Washington.

I want to thank you very much for taking time to be with us today.

Dr. SIDOR: My pleasure.

FLATOW: And good luck. That was - I think we all got a great education with silesaurus today.

(Soundbite of laughter)

FLATOW: All right. Thanks.

Dr. SIDOR: Yup. Yup.

FLATOW: Thanks a lot. We'll be in touch.

Dr. SIDOR: My pleasure, Ira.