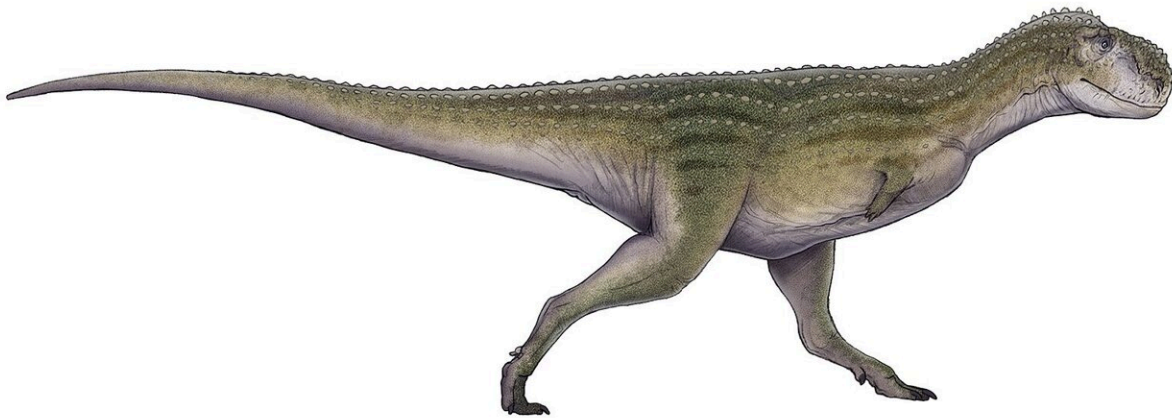


Morocco dinosaur discovery gives clues on why they went extinct

February 12 2024, by Nicholas R. Longrich



Chenanisaurus barbaricus. Credit: Paleocolour, CC BY-SA 4.0 , via Wikimedia Commons.

66 million years ago, the last dinosaurs vanished from Earth. We're still trying to understand why. New fossils of abelisaurids—distant relatives of the tyrannosaurs—from north Africa suggest that African dinosaurs remained diverse up to the very end. And that suggests their demise came suddenly, with [the impact of a giant asteroid](#).

The causes of the mass extinction have been debated for two centuries. [Georges Cuvier](#), the father of paleontology, thought extinction was driven by catastrophes. [Charles Darwin](#) thought gradual changes in the

environment and competition between species slowly drove lineages extinct.

As our understanding of the [fossil record](#) improved, it became clear that the [Cretaceous](#) period (145 million years to 66 million years ago) ended with an extraordinary wave of extinction. Huge numbers of species disappeared, worldwide, in a brief period. The discovery of the 180km-wide [Chicxulub asteroid impact crater in Mexico](#) suggested a sudden extinction of dinosaurs and other species, driven by the impact. But [others have argued](#) that a long, [slow decline in dinosaur diversity](#) contributed to their extinction.

Piecing together the story is hard. It's not just that dinosaur fossils are so rare; the fossil record is also patchy.

Most of what we know about the dinosaurs' final days is the result of intensive study of a few places in the United States, [Canada](#) and [Mongolia](#). Far less is known about dinosaurs of the southern landmasses—South America, India, Madagascar, Australia, Antarctica, New Zealand.

Partly that's down to geography; it's hard to find dinosaurs in rainforests. Partly there have, historically, just been more paleontologists and museums in the northern hemisphere. The question is whether the picture is biased.

Because it's such a huge landmass, Africa probably had far more dinosaur species than North America. Yet until recently we've known hardly anything about Africa's end-Cretaceous dinosaurs. Africa has few terrestrial rocks from this period. That's because high levels of volcanic activity [pushed sea levels up](#), submerging much of Africa under shallow seas. Dinosaurs, being terrestrial, rarely occur in marine rocks. But rarely doesn't mean never. Study enough marine fossils, you eventually find a

dinosaur.

And in Morocco, we've [studied](#) lots of marine fossils.

What we've found

The phosphate deposits of Morocco are the remains of an ancient seabed, dating to the final million years of the dinosaur era. They're full of fish bones and scales, shark teeth and marine reptiles. Vast numbers of marine reptiles—mosasaurs, plesiosaurs, sea turtles.

But once in a while, dinosaurs turn up.

It's not clear how dinosaur bones ended up in marine sediments. Dinosaurs may have swum out to islands searching for food, as deer and elephants do today, and some might have drowned. Other dinosaurs might have been washed out to sea by floods or storms, or drowned in rivers that carried them downstream to the ocean. Still others may have died on the shoreline before being carried out on a high tide. But some improbable series of events transported dinosaurs into the ocean.

And so, studying marine beds, and working over many years, we've slowly put together a picture of Africa's last dinosaurs, bone by bone.

Africa's last dinosaurs included titanosaurian sauropods, long-necked plant-eaters the size of elephants. Horse-sized duckbill dinosaurs filled the herbivore niche. But the carnivores are particularly interesting. Sitting at the top of the food chain, they tell us a lot about the ecosystem. And African predatory dinosaurs were diverse, implying diverse herbivores, and lots of them.

The top predator was a ten-meter-long animal called [Chenanisaurus barbaricus](#). So far *Chenanisaurus* is known from just a jawbone, but this

tells us it was part of the Abelisauridae, a bizarre family of carnivores found in South America, India, Madagascar and Europe, while [tyrannosaurs dominated in the north](#). Abelisaurids had short, bulldog snouts, and sometimes horns, and they had bizarre, stumpy little arms that make the arms of T. rex look massive by comparison.

Now, fossils of two new [abelisaurids](#) have appeared in Morocco.

One is known from a tibia, a shin bone. It was smaller than Chenanisaurus, about five meters long—small by dinosaur standards, but large compared to modern predators. Curiously, it resembles abelisaurids found in South America. It's possible this marks an ancient land connection that existed between the continents 100 million years ago. Or, abelisaurids may have swum the narrow seaway separating the continents.

Another bone is from the foot of an even smaller abelisaurid, just three meters long. Similar small abelisaurids occur in Europe; it may be related to them.

In recent months, more [dinosaur fossils](#) and more species have turned up. We're still writing these fossils up, so we can't say much now, but finding so many species in a handful of fossils tells us we're sampling from a highly diverse fauna.

While [fossils from the Great Plains in North America](#) may record a decline in dinosaur diversity, this may be a local phenomenon, not a global one. It's possible global cooling in the latest Cretaceous hit higher-latitude environments hard, reducing diversity. But the African dinosaur fauna hints that at low latitudes, dinosaurs were thriving, even diversifying. If so, that means dinosaurs were cut down in their prime; burning out rather than fading away.

What our findings show

Africa's last dinosaurs, especially its diverse predatory dinosaurs, suggest that immediately before their extinction, the dinosaurs thrived.

For over 100 million years, they evolved and diversified, producing a remarkable range of species: predators, herbivores, aquatic species, even flying forms, the birds. Then in a single, catastrophic moment, everything was wiped out in the months of darkness caused by dust and soot from the impact. Everything, except a half-dozen or so bird species.

Evolution is driven by rare, improbable events like asteroid impacts. Curiously, science is often driven forward by improbable events as well—like the unlikely discovery of dinosaurs buried millions of years ago, at the bottom of the sea.

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