

First dinosaurs arose in an evolutionary eye-blink

Fossil-bearing rocks in Argentina show a quick transition from pre-dinosaurs to true dinosaurs.

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Before dinosaurs ruled Earth, they had to come from somewhere. Research now suggests that dinosaurs arose more quickly than scientists had thought.

Palaeontologists who analysed fossil-bearing rocks in northwestern Argentina have found evidence that the [transition from pre-dinosaurs to dinosaurs](#) was 5 million to 10 million years shorter than was previously believed.

The work suggests that dinosaurs spread quickly and effectively into the ecosystems in which their ancestors lived, says Claudia Marsicano, a palaeontologist at the University of Buenos Aires who led the research team. “They appear and they start to diversify quite rapidly,” she says. “They evolved quite successfully.”

Marsicano and her colleagues describe the work in a paper released on 7 December by the *Proceedings of the National Academy of Sciences*¹.

The team studied a rock formation known as the Chañares, which contains fossils of dinosaur ancestors. This rock lies beneath the Ischigualasto formation, which has preserved remains of some of the earliest known dinosaurs, around 230 million years old. By dating the Chañares rocks precisely, the scientists hoped to better understand when the dinosaur ancestors preserved there gave way to [Ischigualasto dinosaurs](#).

“If you’re looking to understand the origin of dinosaurs, this is the place to go,” says team member Randall Irmis, a palaeontologist at the Natural History Museum of Utah in Salt Lake City.



Victor Leshyk

Dinosaur ancestors are shown in this artist's conception of life in the Chañares formation approximately 235 million years ago.



Adriana Mancuso

Researchers dated rocks in Argentina's Chañares formation to investigate dinosaur origins.

Fast break

The researchers studied two rock samples from the Chañares. Analysing the ratio of uranium to lead inside zircon crystals in the rocks gave the team the first precise date for the rocks' formation: between 236 million and 234 million years ago.

Palaeontologists had thought the Chañares fossils were between about 247 million to 237 million years old, based on matching them with similar fossils in rock layers at other locales. The new dates make the Chañares about 5 million to 10 million years younger than previously believed.

The finding suggests that dinosaurs appeared and spread quickly through the same leafy, humid environment that their ancestors inhabited, says Marsicano. It discredits earlier ideas that dinosaurs did not arise **until environments changed** and gave them a new ecosystem to move into.



Beloved Brontosaurus makes a comeback

There is little physical difference between the last dinosaur ancestors and the first dinosaurs, says Irmis. Both would have been relatively small, two-legged creatures that ran around the landscape, eating mostly meat. True dinosaurs have hip-socket configurations different from those of their ancestors, but the main definition of a dinosaur is any of a group of animals that gave rise to the later creatures known so well, from *Triceratops* to *Tyrannosaurus rex*.

Dating the time of evolutionary changes is as important as understanding what those changes were, says Diego Pol, a palaeontologist at the Museum of Paleontology Egidio Feruglio in Trelew, Argentina. "Surely in the near future we will be able to gather an accurate timetable of the key evolutionary steps that resulted in the dominance of dinosaurs on our planet," he says.



The truth about T. rex

The work has implications for palaeontology in other parts of the world, says Marsicano. Rocks that carry fossils similar to those in the Chañares, such as some in southern Brazil, may be the same age, 236 million to 234 million years old — further scrambling the time tables in those places.

"It reinforces that there's still a lot to figure out," says Irmis. "That's the really exciting part."

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References

1. Marsicano, C. A., Irmis, R. B., Mancuso, A. C., Mundil, R. & Chemale, F. *Proc. Natl Acad. Sci. USA* <http://dx.doi.org/10.1073/pnas.1512541112> (2015).