

Dinosaurs were in decline long before Chicxulub asteroid finished them off

By Los Angeles Times, adapted by Newsela staff on 04.26.16

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A replica of a 122-foot-long dinosaur skeleton is displayed at the American Museum of Natural History in New York City, Jan. 14, 2016. Photo: AP/Mary Altaffer

Sixty-five million years ago, a massive asteroid slammed into Earth, causing tsunamis, earthquakes, fires, a global winter and the end of the age of the dinosaurs.

But what if the asteroid had glided safely past our planet? Would dinosaurs still be here today?

New research suggests the answer is probably not. Instead, scientists have found evidence that dinosaurs were in the midst of a long, slow decline that began millions of years before the asteroid struck.

Species Vanished Faster Than New Ones Arrived

In a study just published in the Proceedings of the National Academy of Sciences, researchers report that at least 40 million years before the Chicxulub asteroid slammed into what is now modern-day Mexico, dinosaur species were becoming extinct faster than new species were emerging. A catastrophe like the Chicxulub impact could only contribute to the dinosaurs' challenge to survive.

“There is no doubt that the Chicxulub impact was the final nail in the dinosaurs’ coffin — with the exception of birds,” said British scientists Manabu Sakamoto and Chris Venditti. They speculated that if the rate of the dinosaurs’ decline continued as it was at that time, the number of species would have diminished to the point of extinction.

Dinosaurs were already in an evolutionary decline tens of millions of years before the asteroid impact that finally wiped them out, the scientists said.

Asteroid's Role Long Debated

Whether dinosaurs were already in decline before the asteroid abruptly ended their reign has been debated by scientists for decades. Recent attempts to address this question relied mostly on counting the number of fossils in the different geological time bins, Sakamoto said.

“The dispute has continued unresolved because of a lack of statistical rigor and appropriate evolutionary framework,” the authors wrote.

In their statistical analysis, the scientists looked at phylogenetic trees. They are branch-like diagrams that show the evolutionary relationships of different species. This allowed them to study the rates at which dinosaurs became extinct and the rates at which new species developed in the three groupings of dinosaurs through time. The development of new species is known as speciation.

A Time Of Drastic Geologic Changes

The researchers found that speciation was in a long-term decline across all dinosaurs. It was exceeded by extinction rates between 48 million and 53 million years before the Chicxulub event.

The authors are not sure what caused the development rate of new dinosaur species to slow down, but they have a few ideas. They explain that the Cretaceous Period (145.5 million to 65.5 million years ago) was a time of drastic geological changes. The global climate was cooling down, there was prolonged volcanic activity, and the continents were breaking apart.

“Any combination of these processes could have affected dinosaur speciation,” Sakamoto and Venditti said.

Alternatively, it is possible that competition from mammals — which were just small, rodent-like creatures at the time — had something to do with it.

“Recent studies show evidence that mammals were on the rise prior to the (asteroid event), so this scenario would be consistent with our findings,” the scientists said.

Quiz

- 1 Read the selection from the article.

Dinosaurs were already in an evolutionary decline tens of millions of years before the asteroid impact that finally wiped them out, the scientists said.

Which of the following can be inferred from the selection?

- (A) Millions of years ago, dinosaurs were less affected by asteroid impacts.
 - (B) Before the asteroid, dinosaurs were increasing in number.
 - (C) After the asteroid impact, dinosaurs immediately disappeared.
 - (D) Over time, dinosaurs were less successful staying alive as a species.
- 2 Which piece of evidence BEST explains how new research methods are used to learn about dinosaurs?
- (A) Recent attempts to address this question relied mostly on counting the number of fossils in the different geological time bins, Sakamoto said.
 - (B) “The dispute has continued unresolved because of a lack of statistical rigor and appropriate evolutionary framework,” the authors wrote.
 - (C) In their statistical analysis, the scientists looked at phylogenetic trees. They are branch-like diagrams that show the evolutionary relationships of different species.
 - (D) The researchers found that speciation was in a long-term decline across all dinosaurs. It was exceeded by extinction rates between 48 million and 53 million years before the Chicxulub event.

- 3 Because the number of dinosaur species declined during the Cretaceous period, they were certain to go extinct.

Which selection BEST supports the main idea above?

- (A) Dinosaurs were already in an evolutionary decline tens of millions of years before the asteroid impact that finally wiped them out, the scientists said.
- (B) A catastrophe like the Chicxulub impact could only contribute to the dinosaurs' efforts to survive.
- (C) Whether dinosaurs were already in decline before the asteroid abruptly ended their reign has been debated by scientists for decades.
- (D) The authors are not sure what caused the development rate of new dinosaur species to slow down, but they have a few ideas.

4 Which of the following sentences from the article BEST develops a central idea?

- (A) In a study just published in the Proceedings of the National Academy of Sciences, researchers report that at least 40 million years before the Chicxulub asteroid slammed into what is now modern-day Mexico, dinosaur species were becoming extinct faster than new species were emerging.
- (B) Whether dinosaurs were already in decline before the asteroid abruptly ended their reign has been debated by scientists for decades.
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Answer Key

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