

Mammals began their takeover long before the death of the dinosaurs

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An example of an early therian mammal, *Purgatorius unio*. Credit: © Nobu Tamura

It's a familiar story—the mighty dinosaurs dominated their prehistoric environment, while tiny mammals took a backseat, until the dinosaurs (besides birds) went extinct 66 million years ago, allowing mammals to

shine. Just one problem—it's not true. A new article in the *Proceedings of the Royal Society B* reports that mammals actually began their massive diversification ten to twenty million years before the extinction that ended the age of the dinosaurs.

"The traditional view is that [mammals](#) were suppressed by the dinosaurs' success, and that they didn't really take off until after the dinosaurs went extinct. This study shows that therian mammals, the ancestors of most modern mammals, were already diversifying before the dinosaurs died out," says lead author David Grossnickle, a Field Museum Fellow and PhD candidate at the University of Chicago.

The old hypothesis hinged upon the fact that many of the early mammal fossils that had been found were from small, insect-eating animals—there didn't seem to be much in the way of diversity. But over the years, more and more early mammals have been found, including some hoofed animal predecessors the size of dogs. The animals' teeth were varied, too. Grossnickle, along with his co-author Elis Newham at the University of Southampton, analyzed the molars of hundreds of early mammal specimens in museum fossil collections. They found that the mammals that lived during the years leading up to the dinosaurs' demise had widely varied tooth shapes, meaning that they had widely varied diets. These different diets proved key to an unexpected finding regarding mammal species going extinct along with the dinosaurs.

Not only did mammals begin diversifying earlier than previously expected, but the mass extinction wasn't the perfect opportunity for mammal evolution that it's traditionally been painted as. Early mammals were hit by a selective extinction at the same time the dinosaurs died out—generalists that could live off of a wide variety of foods seemed more apt to survive, but many mammals with specialized diets went extinct.

The scientists involved with the study were surprised to see that mammals were initially negatively impacted by the [mass extinction event](#). "I fully expected to see more diverse mammals immediately after the extinction," said Grossnickle. "I wasn't expecting to see any sort of drop. It didn't match the traditional view that after the extinction, mammals hit the ground running. It's part of the reason why I went back to study it further—it seemed wrong."

The reason behind the mammals' pre-extinction diversification remains a mystery. Grossnickle notes a possible link between the rise of mammals and the rise of flowering plants, which diversified around the same time. "We can't know for sure, but flowering plants might have offered new seeds and fruits for the mammals. And, if the plants co-evolved with new insects to pollinate them, the insects could have also been a food source for [early mammals](#)," he says.

The article comes at a time when paleontologists are debating whether dinosaurs were already declining before the mass extinction, notes Grossnickle. "If you believe that [dinosaurs](#) were already on the downswing before the asteroid hit, this is an interesting counterpoint, that mammals were already on the upswing."

Grossnickle notes that the study is particularly relevant in light of the mass extinction the earth is currently undergoing—"The types of survivors that made it across the [mass extinction](#) 66 million years ago, mostly generalists, might be indicative of what will survive in the next hundred years, the next thousand."

More information: Therian mammals experience an ecomorphological radiation during the Late Cretaceous and selective extinction at the K-Pg boundary, *Proceedings of the Royal Society B: Biological Sciences*, [rspb.royalsocietypublishing.org1098/rspb.2016.0256](https://rspb.royalsocietypublishing.org/doi/10.1098/rspb.2016.0256)

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