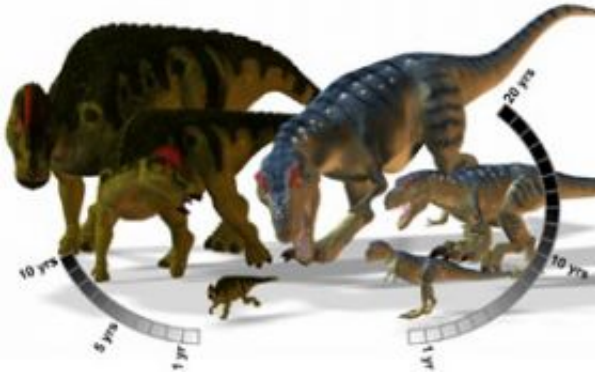


Duck-billed dinosaurs outgrew predators to survive

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Hypacrosaurus grew three to five times faster than predators such as tyrannosaurs. Art by: Drew Lee/Ohio University

With long limbs and a soft body, the duck-billed hadrosaur had few defenses against predators such as tyrannosaurs. But new research on the bones of this plant-eating dinosaur suggests that it had at least one advantage: It grew to adulthood much faster than its predators, giving it superiority in size.

In a study published online today in the *Proceedings of the Royal Society of London B: Biological Sciences*, scientists compared growth rate data from the hadrosaur, Hypacrosaurus, to three predators: the tyrannosaurs *Albertosaurus* and its gigantic relative *Tyrannosaurus rex*, as well as the small Velociraptor-like *Troodon*.

The research suggests that it took 10 to 12 years for Hypacrosaurus to become fully grown. Tyrannosaurs, however, reached adulthood after 20 to 30 years, said Drew Lee, a postdoctoral fellow in Ohio University's College of Osteopathic Medicine who co-authored the paper with Lisa Noelle Cooper, a doctoral student at Kent State University and a researcher with the Northeastern Ohio Universities College of Medicine.

"Our duck-billed dinosaur grew three to five times faster than any potential predators that lived alongside it," Lee said. "By the time the duck-billed dinosaur was fully grown, the tyrannosaurs were only half grown – it was a huge size difference."

Hypacrosaurus also reached sexual maturity early, at only two or three years of age, Cooper said.

"That's another added bonus when facing predators – if you can keep reproducing, you're set," she said. "It's the stuff of evolution."

Cooper conducted the original analysis of the hadrosaur while an undergraduate student at Montana State University. Working with scientists Jack Horner and Mark Taper, Cooper looked at thin sections of the long leg bones of a specimen of Hypacrosaurus and counted and measured the growth rings, which each represent one year of life.

"We were shocked at how fast they grew. If you look at a cross section of the bone of a nestling or even from within the egg, there are huge spaces in which blood supply was going through the bone, which means they were growing like crazy," she said.

Hypacrosaurus was one of three common prey for the meat-eating tyrannosaurs, but was the most vulnerable, Lee said. He described the animal, which lived 67 million to 80 million years ago, as the "Thomson's gazelle of the Late Cretaceous." The other two had horns or had stout, tank-like bodies that would have provided some physical protection from their enemies. But even those creatures show faster growth rates than the predators, Lee noted, with the hadrosaur boasting the quickest growth spurt.

At least one study suggests that living animals employ this survival strategy as well, Lee said. Scientists have found that killifish, a tiny freshwater fish found mainly in the Americas, mature faster

when predators lurk. Anecdotal evidence suggests that creatures such as African ungulates grow big to create an advantage over lions, cheetahs and hyenas, he said. And researchers also see signs of this phenomenon in butterflies, toads, salamanders, guppies and some birds, Cooper added.

"Over evolutionary history, this pattern seems to be prevalent," she said.

Though scientists are careful to preserve dinosaur fossils, they've also learned much more about growth rates, life spans, behavior and sexual reproduction of dinosaurs in the past decade by cutting up the bones and taking a closer look at the clues they contain, Lee and Cooper noted. Such research has offered a much more detailed picture of the relationships between different dinosaur species, including predator and prey. Cooper also has used the same bone analysis techniques to confirm the ancestor of whales, a study she co-authored last year in Nature.

Lee, who recently published a study in the Proceedings of the National Academy of Sciences on the sexual maturity rates of dinosaurs, hopes to conduct more research on communities of dinosaurs, such as those of Allosaurus, Stegosaurus and Apatosaurus, to draw further conclusions on the fast growth survival strategy.

"This study is a stepping stone to a larger comparative study on community changes that impacted dinosaur evolution," Lee said.

Source: Ohio University

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