

Immature skull led young Tyrannosaurs to rely on speed, agility to catch prey

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Skull of a 2-year-old juvenile Tarbosaurus, a Cretaceous tyrannosaur from Mongolia, with an adult skull at right and a teenage skull behind for comparison. Credit: WitmerLab at Ohio University

While adult tyrannosaurs wielded power and size to kill large prey, youngsters used agility to hunt smaller game.

"It's one of the secrets of success for tyrannosaurs—the different age groups weren't competing with each other for food because their diets shifted as they grew," said Ohio University paleontologist Lawrence Witmer.

Witmer is part of an international team of scientists from Japan, Mongolia and the United States that analyzed the youngest and most-complete known skull for any species of tyrannosaur, offering a new view of the growth and feeding strategies of these fearsome predators. The 70-million-year-old skull comes from a very young individual of the

Mongolian dinosaur species known as Tarbosaurus bataar, the closest known relative of T. rex.

The analysis of the 11.4-inch skull, published in the [Journal of Vertebrate Paleontology](#), revealed changes in skull structure that suggest that young tyrannosaurs had a different lifestyle than adults.

"We knew that adult Tarbosaurus were a lot like T. rex," said lead author Takanobu Tsuihiji, a former Ohio University postdoctoral fellow who is now a postdoctoral researcher at the National Museum of Nature and Science in Tokyo. "Adults show features throughout the skull associated with a powerful bite—large muscle attachments, bony buttresses, specialized teeth. The juvenile is so young that it doesn't really have any of these features yet, and so it must have been feeding quite differently from its parents."

The skull was found as part of an almost complete skeleton, missing only the neck and a portion of the tail. Based on careful analysis of the microstructure of the legs bones, co-author Andrew Lee of Ohio University (now at Midwestern University) estimated that the juvenile was only 2 to 3 years old when it died. It was about 9 feet in total length, about 3 feet high at the hip and weighed about 70 pounds. In comparison, Tarbosaurus adults were 35 to 40 feet long, 15 feet high, weighed about 6 tons and probably had a life expectancy of about 25 years, based on comparison with T. rex.

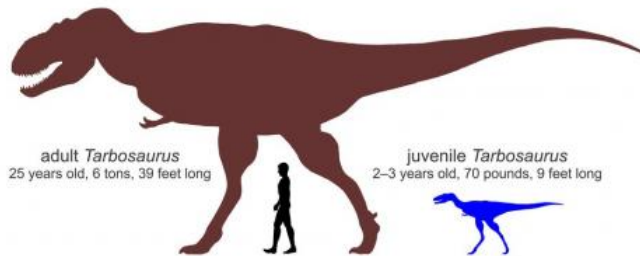
"This little guy may have been only 2 or 3, but it was no toddler—although it does give new meaning to the phrase 'terrible twos,'" said Witmer, Chang Professor of Paleontology at the Ohio University College of Osteopathic Medicine. "We don't know to what extent its parents were bringing it food, and so it was probably already a pretty capable hunter. Its skull wasn't as strong as the adult's, and would have had to have been a more careful hunter, using quickness and agility rather than raw power."

The different hunting strategies of juveniles and adults may have reduced competition among *Tarbosaurus* and strengthened their role as the dominant predators of their environment.

"The juvenile skull shows that there must have been a change in dietary niches as the animals got older," Tsuihiji said. "The younger animals would have taken smaller prey that they could subdue without risking damage to their skulls, whereas the older animals and adults had progressively stronger skulls that would have allowed taking larger, more dangerous prey."

"The beauty of our new young [skull](#) is that we absolutely know for many good reasons that it's *Tarbosaurus*," Witmer said. "We can use this known growth series to get a better sense of whether some of these more controversial finds grew up to be [Tarbosaurus](#), *Tyrannosaurus* or some other species."

Provided by Ohio University



These are silhouettes of an adult *Tarbosaurus* and the newly discovered juvenile, along with a human for scale. Credit: Hayashibara Museum of Natural Sciences.

The late Cretaceous environment offered plenty of options for prey.

"*Tarbosaurus* is found in the same rocks as giant herbivorous dinosaurs like the long-necked sauropod *Opisthocoelicaudia* and the duckbill hadrosaur *Saurolophus*," said Mahito Watabe of the Hayashibara Museum of Natural Sciences in Okayama, who led the expedition to Mongolia in 2006 that uncovered the new skull. "But the young juvenile *Tarbosaurus* would have hunted smaller [prey](#), perhaps something like the bony-headed dinosaur *Prenocephale*."

The juvenile skull also is important because it helps clarify the identity of small, potentially juvenile specimens of other [tyrannosaur](#) species previously found.

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