

T. rex grew beefier than museum fossils suggest

Structure of bones' superficial layers suggests most dinosaurs were still growing when they died.

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Computer artwork by Mark Gartick/SPL/Corbis

Even as adults, *Tyrannosaurus rex* and other dinosaurs may have never stopped growing, adding mass to their bones if not inches to their length.

Big bones belong to adults that have finished growing, smaller bones to juveniles that are still sprouting up. It seems like the safest of assumptions, but it is one that is fraught with peril when applied to dinosaurs.

Presenting this week at the Society of Vertebrate Paleontology's meeting in Los Angeles, California, palaeontologist Jack Horner of the Museum of the Rockies in Bozeman, Montana, revealed that when he cut open the fossilized bones of dinosaurs in the museum's collection and studied the layers of bone within, he found signs in most specimens that the animals were still growing at the time of their death.

In fossils labelled as juveniles, the outer bone layers contained canals that would once have held blood vessels, as well as large groups of osteocytes — cells that are important for bone formation. But Horner was surprised to find similar signs of growth in adult fossils, because in most animals that are alive today, the skeleton tends to stop growing once adulthood is reached.

The key thing that Horner was looking for was arrested growth: closely packed bone layers bereft of osteocytes and blood vessels. Such layers are almost always found in skeletons that have finished growing. He did find them in a few fossils, indicating that dinosaur bones had the potential to eventually stop growing. But the vast majority of the bones he looked at did not have them.

Key among the fossils that he studied was the largest *Allosaurus* in his collection, an animal of 10 metres in length that was 13 at the time of its death. "It's a big one, and it was undeniably still growing — ripping along, really — when it died," says Horner.

Included in the fossils were six *Tyrannosaurus rex* specimens, all showing continuing growth. When asked whether any of the bones of the famed species have ever been found to contain layers of arrested growth, Horner gives a telling smile and says, "I think all the *T. rex* specimens found so far were still growing when they died."

As to what continued growth looked like, Horner argues that it involved larger, rather than longer, bones that bulked the dinosaurs up as they got older. Thus, a larger *T. rex* would not be much taller or longer, just more massive overall.

“For years we’ve been finding robust and gracile forms of skeletons that are otherwise very similar,” says Kevin Padian, a palaeontologist at the University of California, Berkeley, who was not involved in the work. “Some have suggested the robust ones were males and the gracile ones were females. Others have argued they were different species. Now it looks like they were actually just different ages.”

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