Bone Study Shows T. rex Bulked Up With Massive Growth Spurt

*Tyrannosaurus rex* was a creature of superlatives. As big as a bull elephant, *T. rex* weighed 15 times as much as the largest carnivores living on land today. Now, paleontologists have for the first time charted the colossal growth spurt that carried *T. rex* beyond its tyrannosaurid relatives. “It would have been the ultimate teenager in terms of food intake,” says Thomas Holtz of the University of Maryland, College Park.

Growth rates have been studied in only a half-dozen dinosaurs and no large carnivores. That’s because the usual method of telling ages—counting annual growth rings in the leg bone—is a tricky task with tyrannosaurs. “I was told when I started in this field that it was impossible to age *T. rex*,” recalls Gregory Erickson, a paleobiologist at Florida State University in Tallahassee, who led the study. The reason is that the weight-bearing bones of large dinosaurs become hollow with age and the internal tissue tends to get remodeled, thus erasing growth lines.

But leg bones aren’t the only place to check age. While studying a tyrannosaur called *Daspletosaurus* at the Field Museum of Natural History (FMNH) in Chicago, Illinois, Erickson noticed growth rings on the end of a broken rib. Looking around, he found similar rings on hundreds of other bone fragments in the museum drawers, including the fibula, gastralia, and the pubis. These bones don’t bear substantial loads, so they hadn’t been remodeled or hollowed out.

Switching to modern alligators, crocodiles, and lizards, Erickson found that the growth rings accurately recorded the animals’ ages. He and his colleagues then sampled more than 60 bones from 20 specimens of four closely related tyrannosaurs. Counting the growth rings with a microscope, the team found that the tyrannosaurs had died at ages ranging from 2 years to 28.

By plotting the age of each animal against its mass—conservatively estimated from the circumference of its femur—they constructed growth curves for each species. *Gorgosaurus* and *Albertosaurus*, both more primitive tyrannosaurs, began to put on weight more rapidly at about age 12. For 4 years or so, they added 310 to 480 grams per day. By about age 15, they were full-grown at about 1100 kilograms. The more advanced *Daspletosaurus* followed the same trend but grew faster and maxed out at roughly 1800 kilograms.

*T. rex*, in comparison, was almost off the chart. As the team describes this week in *Nature*, it underwent a gigantic growth spurt starting at age 14 and packed on 2 kilograms a day. By age 18.5 years, the heaviest of the lot, FMNH’s famous *T. rex* named Sue, weighed more than 5600 kilograms. Jack Horner of the Museum of the Rockies in Bozeman, Montana, and Kevin Padian of the University of California, Berkeley, have found the same growth pattern in other specimens of *T. rex*. Their paper is in press at the *Proceedings of the Royal Society of London*, Series B.

It makes sense that *T. rex* would grow this way, experts say. Several lines of evidence suggest that dinosaurs had a higher metabolism and faster growth rates than living reptiles (although it’s not as fast as birds’). Previous work by Erickson showed that young dinosaurs stepped up the pace of growth, then tapered off into adulthood; reptiles, in contrast, grow more slowly, but they keep at it for longer. “*Tyrannosaurus rex* lived fast and died young,” Erickson says. “It’s the James Dean of dinosaurs.”

Being able to age the animals will help shed light on the population structure of tyrannosaurs. For instance, the researchers determined the ages of more than half a dozen *Albertosaurus* that apparently died.

Los Alamos’s Woes Spread to Pluto Mission

The impact of the shutdown of Los Alamos National Laboratory in New Mexico could ripple out to the distant corners of the solar system. The lab’s closure last month due to security concerns (*Science*, 23 July, p. 462) has jeopardized a NASA mission to Pluto and the Kuiper belt. “I am worried,” says S. Alan Stern, a planetary scientist with the Southwest Research Institute in Boulder, Colorado, who is the principal investigator.

That spacecraft, slated for a 2006 launch, is the first in a series of outer planetary flights. In those far reaches of space, solar power is not an option. Instead, the mission will be powered by plutonium-238, obtained from Russia and converted by Los Alamos scientists into pellets. But the 16 July “stand down” at the lab has shut down that effort, which already was on a tight schedule due to the lengthy review required for any spacecraft containing nuclear material.

The 2006 launch date was chosen to make use of a gravity assist from Jupiter to rocket the probe to Pluto by 2015. A 1-year delay could cost an additional 3 to 4 years in transit time. “It won’t affect the science we will be able to do in a serious way, but it will delay it and introduce risks,” says Stern. Some researchers fear that Pluto’s thin atmosphere could freeze and collapse later in the next decade, although the likelihood and timing of that possibility are in dispute.

Los Alamos officials are upbeat. “Lab activity is coming back on line,” says spokesperson Nancy Ambrosiano. Even so, last week lab director George “Pete” Nanos suspended four more employees in connection with the loss of several computer disks containing classified information, and Nanos says that it could take as long as 2 months before everyone is back at work. NASA officials declined comment, but Stern says “many people are working to find remedies.”

—ANDREW LAWLER