TINY T. REX-LIKE TYRANTS

Fossil find suggests peculiar features weren't limited to the biggest dinosaurs

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From *Science News* magazine
Published online: October 10th, 2009; Vol.176 #8 (p. 12)
http://www.sciencenews.org/view/generic/id/47453/title/Tiny_T._rex-like_tyrants

HEAD AND ARMS Although considerably smaller, the skull and 8-inch-long forelimb of the newly discovered Raptorex share many uncanny features with those of a full-grown Tyrannosaurus rex. From top: Paul Sereno; Mike Hettwer

A miniature version of *Tyrannosaurus rex* is throwing a bone to paleontologists interested in how the king of dinosaurs evolved.

The newly discovered species, called *Raptorex kriegsteini*, lived tens of millions of years before *T. rex* and shares many similar features, suggesting it could be a direct ancestor of *T. rex*, researchers report online September 17 in *Science*. *Raptorex* possessed a *Tyrannosaurus* body plan — with a large head, strong legs and jaws, and puny forelimbs — which reveals that traits once thought particular to large predators could have been useful to smaller animals who had them as well.

"It was the common perception that the arms got smaller as the animals grew bigger," says study author Paul Sereno of the University of Chicago. "No one had any idea there was something like *Raptorex* lurking around."

The findings are based on a nearly complete 125-million-year-old fossil unearthed in China. Though it doesn't represent a full adult, Sereno says the fused bones indicate that this *Raptorex* was almost full-grown. At full size, *Raptorex* would have been about 90 times lighter than *T. rex*.

MINI T Though only one-ninetieth the size of its descendent Tyrannosaurus rex, the new species Raptorex kriegsteini, shown in an artist's illustration, had a body plan similar to the king of dinosaurs, with small forelimbs, a massive head and powerful legs specialized for running. Todd Marshall

Despite its size, *Raptorex* shared many of the features peculiar to the*Tyrannosaurus* dinosaurs, which were the dominant predators during the Late Cretaceous period, from 90 to 65 million years ago. In addition to a large head and tiny arms, *Raptorex* had long legs and specialized running feet, as well as large cavities in the head linked to a keen sense of smell, the researchers report.

"We see this all to our great surprise in an animal about the size of a human," Sereno says.

In contrast, other dinosaurs thought to be ancestors of *T. rex* were lankier, with long arms, small heads and a more primitive type of foot not specialized for running.

Raptorex's features suggest to the authors that *Tyrannosaurus'* ancestors adapted earlier than thought to their role as runners and hunters.

With a greater need for powerful legs and a larger head with strong jaw-closing muscles, *Tyrannosaurus*-like dinosaurs would have had little use for forearms. Instead, the dinosaurs could have become a "running set of jaws" with puny forelimbs "along for the ride," says Sereno.

Paleontologist Thomas Holtz of the University of Maryland in College Park says the discovery of the dinosaur is strong proof that *Tyrannosaurus* relatives had their monstrous features long before reaching six tons. However, he says, "There's still a gap of a few tens of millions of years before we pick up the classic tyrannosaurids," and it is not clear how the body plan changed during that time.

The fact that *Raptorex* could have made a successful predator despite its small size implies to Sereno that a young *T. rex*, which has features similar to the adult, might also have been a potent killing machine. The presence of precocious youngsters could explain why *T. rex* was the dominant predator in Asia and North America for 25 million years.