

Preface

In "***Tyrannosaurus rex*** **A Highly Important and Virtually Complete Fossil Skeleton**" **Southeby's, New York. 1997.**

I owe a debt of gratitude to a box of cereal, at the bottom of which I found a dinosaur toy when I was six years old. That little piece of plastic was the beginning of an all-consuming interest that led to a career hunting dinosaurs, often in some of the most remote corners of the Earth. After the initial discovery, I had my parents buy many, many boxes of the same cereal. I really wanted to acquire the elusive *Tyrannosaurus rex*, unquestionably the neatest and most desirable model of the series. The strategists of the cereal company understood their market well, and the *T. rex* was hard to get. When the promotion ended, I was very disappointed because I had not found one, although I have to admit that I was getting very tired of the cereal. The story has a happy ending, however, because years later I bought the whole series of models in a toy store. That plastic *Tyrannosaurus* still has a warm spot in my heart, even though it is not a very accurate depiction by today's standards.

Over the years, I have been lucky enough to find several well-preserved skeletons of the tyrannosaurs *Daspletosaurus* and *Gorgosaurus*, and have supervised the excavation of more than a dozen other specimens. The two most difficult, however, were the Tyrrell Museum skeletons of *Tyrannosaurus rex*. Both were enormous animals, and I convinced myself in the field they must be the largest specimens of this species ever collected. Measurements subsequently showed them to be two of the smallest known. Little wonder that I was totally awed by the size of "Sue" when I saw her skeleton at the Black Hills Institute of Geological Research. And I was even more impressed by the exquisite preservation of the bone, which came out of the rock so much easier than either of our own specimens.

With the collection of many new skeletons in recent years, there has been a lot of research interest in *Tyrannosaurus*. Although challenged in size by giant carnivores from the southern continents, *T. rex* remains the most sophisticated of all the big flesh-eaters. Its banana-like teeth are disproportionately long, and were driven by the most powerful jaws known. Guided by a relatively large brain and keen senses of smell, sight and hearing, its reputation as the "king" of the dinosaurs is well-deserved. But the size of "Sue" suggests that perhaps the "queen" was more to be feared.

It is usually assumed that tyrannosaurs are descended from large Jurassic meat-eaters like *Allosaurus*. However, close examination of skeletal anatomy shows that *Tyrannosaurus* and its kin are more closely related to small theropods like *Velociraptor*, *Troodon* and *Ornithomimus*. All of these animals lived in the Cretaceous Period, and are much more advanced than the Triassic and Jurassic theropods. Even though tyrannosaurs were huge animals, their legs are much longer in relation to body length than those of *Allosaurus*. The lower parts of the legs are long in comparison with the upper leg, strongly suggesting they were fast animals. This is especially evident in young animals, which had long, slender, bird-like legs. In addition to lengthening the legs, tyrannosaurs have lightened up the front part of the skeleton by shortening the vertebrae and arms, and by hollowing out and filling more skull bones and vertebrae with air from the throat and lungs. Some paleontologists have suggested that tyrannosaurs were too bulky to be hunters. But these skeletal changes made tyrannosaurs into faster, more agile animals than hadrosaurs and ceratopsians. If tyrannosaurs were simply scavengers, it would not have been necessary for them to be faster than their potential prey. Changes in the orientations of the eyes and ears of *Tyrannosaurus* also show that they had improved their visual depth perception, and had increased the range of sound frequencies that they could hear. These charac-

teristics would have improved their hunting ability, but would have been of little use to them as scavengers. Tyrannosaurs would have eaten carcasses when they found them. In Dinosaur Provincial Park in Alberta, we have found evidence in bonebeds of thousands of individuals of the horned dinosaur *Centrosaurus* that died in mass death events. They possibly perished because they panicked when a herd tried to cross a river in flood. But after their bodies were washed up on the river banks, they were scavenged by tyrannosaurs, which trampled and broke bones, and left tooth marks and broken teeth as evidence. Most of the time, however, there would not have been enough dead carcasses available to feed the massive bulk of *T. rex*. Tyrannosaurs would have been forced to hunt, just as hyaenas, the best mammalian scavengers, are forced to hunt for a third of their food.

The remains of more than one *Tyrannosaurus rex* were found with "Sue," and nine individuals of the related *Albertosaurus* were identified in a single quarry near Drumheller. Both sites have individuals of different sizes, and may represent family groups. If this is the case, then tyrannosaurs probably hunted cooperatively in packs. This would have made them much more formidable as predators.

Recent research has shown that tyrannosaurs are more interesting animals than we previously suspected. But there is so much more that we can learn. *Tyrannosaurus rex* has become a standard against which other animals are measured, but its anatomy has never been thoroughly described, and its relationships to other tyrannosaurs are undetermined. "Sue's" pathologies, and fossils associated with her, provide evidence of *T. rex* behavior, and her superb preservation will encourage research on subjects such as biomechanics, growth, physiology and sexual variation. In fact, shortly after the discovery of "Sue," I was involved in a proposal to see how much interest there would be in assembling an integrated team to study this one specimen. The response was overwhelming, and so many colleagues were interested that a very heavy book could have been produced. But interest by the paleontological community is a drop in the bucket compared with that shown by the general public. *Tyrannosaurus rex* is the most famous dinosaur, and "Sue" is undoubtedly the most famous specimen of this species. She represents far more than just another dinosaur skeleton, and will remain a focus for scientific, legal, and ethical discussions long into the future. But perhaps most important, she is stunningly beautiful and will inspire new generations of dinosaur enthusiasts like myself.

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