



EARTH

Fossils: Vertebrates

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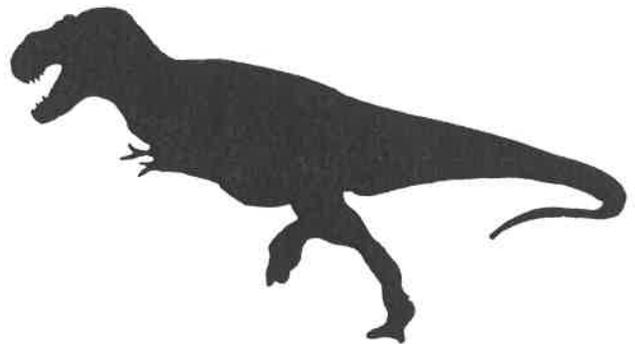
# TYRANNOSAURUS

(*Tyrannosaurus rex*)

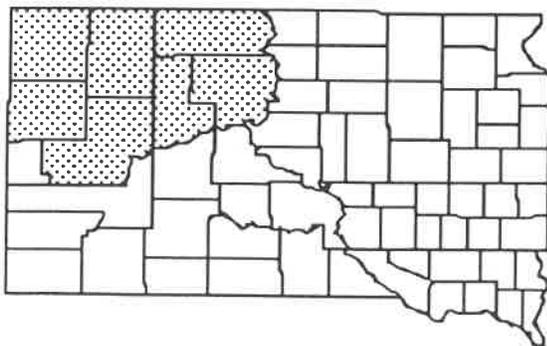
## Description

*Tyrannosaurus rex*, described by Osborn in 1905, is the most famous of all dinosaurs for a variety of reasons. It is one of a very few organisms that is known solely by its scientific name. Even its nickname, *T-rex* is derived from the Latin, *Tyrannosaurus* meaning tyrant lizard and *rex* meaning king.

Discovery of the first *Tyrannosaurus rex* is shrouded in mystery. Professor Cope described two *vertebrae* from Northwest South Dakota and named them *Manospondylus gigas*. One of the *vertebrae* seems to be from a horned dinosaur, but the other, now lost, may have belonged to a *Tyrannosaurus rex*. Later, Henry Fairfield Osborn named *Tyrannosaurus rex*. Osborn's name will



be preserved because his description of *T-rex* has stronger scientific basis, and there is little doubt about the identification.



**Fossil Distribution**

*Tyrannosaurus rex* was a very large, *bipedal carnivore*. It reached lengths of up to 15.2 yards (14 meters) from tip of snout to tip of tail, and weighed between 8,800 and 11,000 pounds (4,000 to 5,000 kilograms). In addition to its large size, *T. rex* is famous for its ferocious, *serrated teeth*.

## Distribution

*Tyrannosaurus* fossils have been found in the following sedimentary rocks: the

Lance Formation of Eastern Wyoming; the Hell Creek Formation of Eastern Montana, Southwestern North Dakota, and Northwestern South Dakota; the Livingston Formation of Montana; the Javelina Formation of Big Bend Texas; the Laramie Formation of Colorado; the McRae Formation of New Mexico; the Scollard and Willow Creek formations of Alberta, Canada; and the Frenchman Formation of Saskatchewan, Canada.

The species is known by approximately 15 skeletons with skulls in varying degrees of completeness. The best fossils have been found in Montana and South Dakota.

## How Old Are *Tyrannosaurus Rex* Fossils?

*Tyrannosaurus* fossils are found in rocks that formed during the late Cretaceous Period, about 68 to 66 million years ago.

## Natural History

Our knowledge of the natural history of fossil creatures comes from the study of the geological deposits in which the specimens were found and from analyses of the anatomical structures of the fossilized remains.

The *sedimentary* rocks that preserve the bones of *Tyrannosaurus* are typical of coastal lowlands, similar to that ranging from the present Southeastern Atlantic Coast to the Gulf Coast of the United States. Bald cypress and sequoia-like conifers, ferns, *cycads*, palms, and many shrubs of flowering plants dominated this environment. The presence of these plants suggests that the climate of South Dakota, during the time of the dinosaurs, was much warmer and moister than it is today.

The skull can be as long as 4.2 feet (1.3 m). It is actually a framework of bones that provides a light and strong base for the powerful muscles that close the lower jaws. The eyes looked forward to aid in the capture of food. The upper and

lower jaws were massive and armed with approximately 64 teeth. The teeth varied in size and function. The front teeth were excellent for grasping prey, and especially for grasping flesh. With a powerful twist of the head, meat was easily stripped for eating. Some individual teeth were quite large and serrated. A complete tooth, with root and crown, may have exceeded 12 inches (30 cm) in length. The crown was less than half the length. The tooth *serrations* on two edges aided in cutting through thick skin, muscle, and ligaments.

The backbone included 10 neck, 12 body, 5 sacral, and about 40 tail *vertebrae*. The forelimb was quite reduced in size and had a hand with two claws representing digits I & II (or I & III according to some paleontologists). The forelimbs that have been found vary due to differences in the size of the *humerus* in various individuals. The hind limb was very large, with a robust *femur*, a *tibia* of nearly equal length, and a massive foot. The legs suggest that *Tyrannosaurus rex* was not a fast runner.

The tail was an important balancing device so that the backbone could be held in a nearly horizontal position rather than the sloping position shown in many reconstructions. The skeletal features suggest that *T. rex* was an *opportunistic predator* and *scavenger*.

## Significance

*Tyrannosaurus* was one of the largest known *terrestrial carnivores*. *Allosaurus* was almost as large, and an 8 million year old alligator from the Amazon Basin may have been as big or bigger. Because of its large size and ferocious appearance, *Tyrannosaurus* has fascinated both adults and children. *Tyrannosaurus rex* does present some interesting problems biologically because of its size. Many structural, growth, behavioral, and habitat questions remain to be solved. Continued exploration and discovery will contribute to the answers and raise new issues for *paleontologists* of the future.

## Conservation Measures

Fossils are documents of the past and are valuable to museums for current and future study, and as a resource for the public. People are encouraged to participate with museums in protecting South Dakota's fossil heritage. Often, much of the valuable information about a fossil is lost if the specimen is removed from the rock deposit before accurate records are made. In addition, amateur collectors could inadvertently damage specimens when trying to remove them from surrounding rock and soil. If you locate any significant fossil deposits, contact the

Museum of Geology before disturbing the site.

Collectors must have permission from landowners in order to look for and collect specimens from private land. It is illegal to collect fossils from Tribal lands without permission from the Tribal authorities. For permission to fossil hunt along highway right-of-ways, contact the nearest Department of Transportation Office (see the Rose Quartz fact sheet for addresses). Regulations on public lands vary. People always should contact the land manager before disturbing geological formations.

## Glossary

**Bipedal** - locomotion on two feet, almost always the hind legs.

**Carnivore** - meat eater.

**Cycads** - large tropical plants resembling a palm and having fern-like leaves.

**Femur** - the bone of the upper leg.

**Humerus** - the bone of the upper arm.

**Opportunistic predator** - a carnivore that will go after any prey species that is available.

**Paleontologists** - scientists who study prehistoric forms of life through the study of plant and animal fossils.

**Scavenger** - animal that eats dead animals, garbage or decaying organic matter.

**Sedimentary** - rocks formed generally in one of three ways: by accumulation and solidification of eroded rock fragments i.e. sandstone; by precipitation from a saturated water solution, i.e. rock salt; or by the secretion of organisms, i.e. coral limestone.

**Serrations** - a series of saw-like notches on the edge.

**Terrestrial** - land dwelling.

**Tibia** - the largest bone in the lower leg; shinbone.

**Vertebrae** - the bones of the backbone; they protect the spinal column.

## References

- Horner, John R. and Don Lessem. 1993. *The Complete T. rex*, Simon and Schuster Publishing Co.  
Weishapel, D.B., P. Dobson, and H. Osmolska, ed. 1990. *The Dinosauria*, University of California Press, 733 pp.

### **Selected Resources for Teachers**

*Dinosaurs of North America* by Helen R. Sattler, 1981. Lothrop, Lee and Shephard Books, New York.  
*Illustrated Encyclopedia of Dinosaurs* by David Norman, 1994. Crescent Books. This volume has excellent pictures of skeletons and reconstructions.

**Museum of Geology Field Paleontology** offerings are available to teachers for credit and high school students for no-credit each summer. Participants spend one to two weeks working at a fossil dig. For details and costs contact the Museum of Geology for a brochure.

*The Dinosaur Society Dinosaur Encyclopedia* by Don Lessem and Donald Glut, 1993. Random House, New York. This book is great for information relating dinosaurs and world geography.

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Publication of the *Tyrannosaurus* fact sheet was funded by the South Dakota Department of Game, Fish and Parks, Division of Wildlife, Pierre, SD.