

Scotty's discovery is important because it increases our knowledge about this fascinating but rare dinosaur and the ancient world in which it lived.

New glimpses of **T. rex** and its world



Scotty is Saskatchewan's one and only *Tyrannosaurus rex* skeleton. These fossils were found in the Frenchman River Valley, southeast of Eastend and southwest of Shaunavon in southwestern Saskatchewan. Scotty was unearthed in sediments deposited 65 million years ago, just before the extinction of the dinosaurs. Despite the name, we do not know whether Scotty was a male or a female.

Tyrannosaurus rex (*T. rex* for short) is one of the most popular dinosaurs, and the only dinosaur known to the public by its complete two-word scientific name. It is the largest meat-eating dinosaur known from North America. The more complete skeletons suggest that *T. rex* stood up to 3.5 metres (13 feet) tall at the hips and was up to 12 metres (42 feet) long from head to tail. *T. rex* lived in the western portion of North America (from as far south as Texas to as far north as Saskatchewan and Alberta) from about 67 to 65 million years ago.



T. rex dig site

How much of Scotty was found?

The RSM has collected most of Scotty's skull and lower jaws, many vertebrae and ribs, the hip bones, most of one hind leg, and various other bones. Approximately 65% of the skeleton was recovered at the site, but a final determination will not be possible until all the bones have been removed from the sandstone blocks excavated from the quarry.

The first glimpses of *T. rex*

One of the first *T. rex* skeletons was discovered in 1902 in Wyoming by Barnum Brown of the American Museum of Natural History. In a letter to the Director, Brown wrote "*Quarry 1 contains (several bones) of a large carnivorous dinosaur... I have never seen anything like it from the Cretaceous.*" Like most large carnivores, large meat-eating dinosaurs are rare—as of 2002, over 100 years after the first discovery, 32 complete or partial skeletons were known, but only a handful of those are more than 50% complete.

RSM staff started to excavate Scotty in 1994, 65 million years since these bits of *T. rex* skull last saw the sun.

Barnum Brown of the American Museum of Natural History



Image no. 338624, American Museum of Natural History

Since 1994 over 100 people have assisted in the excavation of the skeleton.

Recovering a Saskatchewan treasure



This vertebra was carefully exposed, covered with a protective glue, and then wrapped in plaster for transport to the lab for cleaning.

The discovery

The first bones of Scotty were found in 1991 by Eastend school teacher Robert Gebhardt during a prospecting trip with RSM staff. The RSM returned to the site in 1994 and determined that a *T. rex* skeleton was preserved in the side of the hill. The discovery brought worldwide attention to the Eastend area and Saskatchewan.

The dig

Excavation began in June 1994 and proceeded, on and off, over several field seasons. In August 2003 the quarry was closed when it was concluded that no additional bones belonging to Scotty were present. Since 1994 over 100 people, including RSM staff, volunteers, students, and other paleontologists, have assisted in the excavation of the skeleton.

Preparing the bones

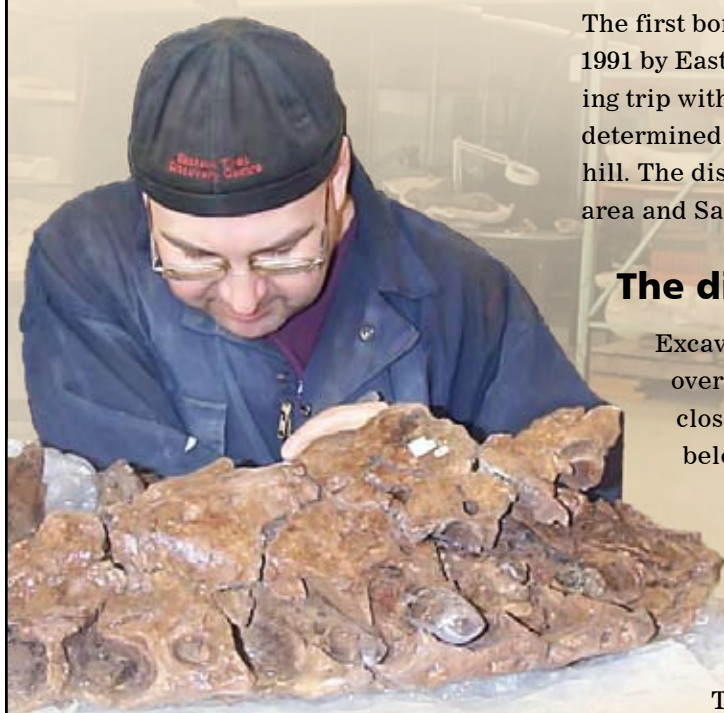
The removal of Scotty's bones from the rock that encased them has been a long and painstaking process. The bones were surrounded by very hard sandstone and ironstone and the hardness of the rock has taken its toll on both quarrying equipment and those working in the quarry.



Several of the plaster-coated blocks of rock and fossil from the quarry had to be loaded onto a trailer using a crane for transport to the lab.

Reconstruction

Scotty's skull was not found in one piece; instead the individual bones that make up the skull and jaws had separated from each other after the animal died. Each bone was cleaned and the missing parts were reconstructed. The bones were then moulded and cast to produce replicas that were used to put the skull back together. As a result, we can now see what Scotty's head looked like in life.



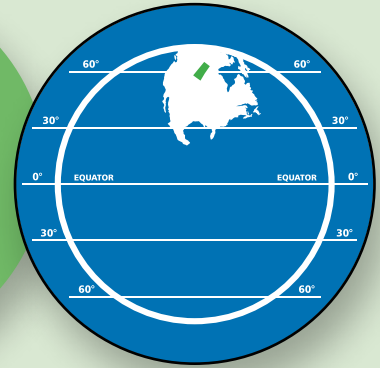
RSM technician, Wes Long, cleans the last bits of sandstone from a section of Scotty's jaw.



Tools used to chip away the rock around the fossils wear out quickly.

Research on the plants has changed our view of what southwestern Saskatchewan looked like 65 million years ago.

New information on Saskatchewan's environment



Saskatchewan's position 65 million years ago.

A few of the other fossils found in the quarry with Scotty:



Champsosaur vertebra

The quarry where Scotty was found is unusual. The conditions that favour the preservation of bone usually differ from those that preserve plant remains. However, at the *T. rex* quarry Scotty was preserved together with not only the bones of other animals, but also the remains of a variety of plant species. Research on the plants has changed our view of what southwestern Saskatchewan looked like 65 million years ago.



Turtle shell



Leaves from a Broadleaf tree



Limb bone from a young *Triceratops*

Also in the neighbourhood...

Other animals found in the quarry include fish, salamanders, crocodiles, turtles, crocodile-like reptiles called champsosaurs, mammals, and other dinosaurs. The diversity of both the plants and animals provides us with a detailed picture of what this part of the province was like at the very end of the age of dinosaurs.



Palm seed

Southwestern Saskatchewan, 65 million years ago

The geology of the site and the plants in the quarry suggest that Scotty lived in a broad river valley with forested lowlands. Both broadleaf and coniferous trees were present, including palms and bald cypress-like conifers. The occurrence of palms and crocodiles suggests that freezing temperatures were rare or absent. In fact, temperatures at that time were warm from the equator to the poles. Saskatchewan was warm despite the fact that it was situated in an even more northerly position than it is today. So, although Saskatchewan "winters" were warm, they were also dark, with few hours of daylight—a combination that does not occur anywhere on earth today.



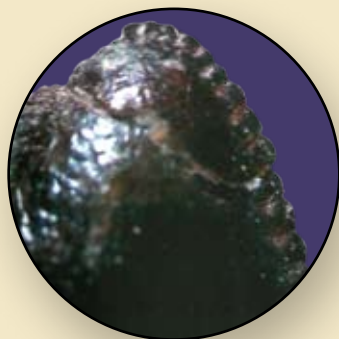
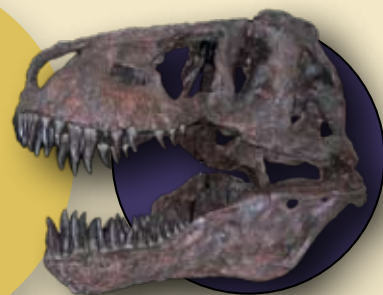
We now know *T. rex* lived in a more open environment as shown in this display in the RSM's Earth Sciences Gallery, completed in 2006.



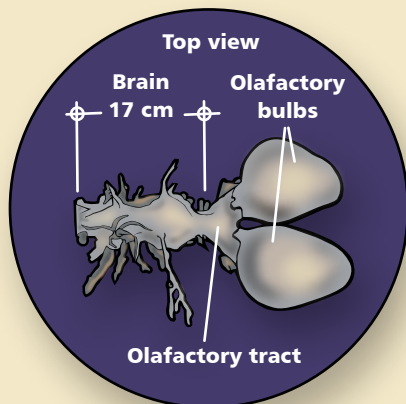
Twig of Bald Cypress-like conifer

Examining Scotty's skull

The teeth have serrated edges similar to those on a steak knife—certainly ideal for a diet consisting of meat.



Seen through a microscope, the serrated edge of Scotty's teeth makes the animal seem even more ferocious.



T. rex's brain was small—approximately 17 cm (6¾ inches) long, but the organs responsible for smell, called the olfactory bulbs and tract, were huge—about 20 cm (8 inches) long!

Scotty's skull is of average size (at least for a *T. rex*!); it is 1.33 metres (4.5 feet) in length. Notice the “open” look of the skull—unlike the more solid human skull, it has many holes. The holes at the front end of the skull are the nostrils and the eyes were located at the top of the second hole from the back. The holes at the back of the skull contained the strong jaw muscles, while the function of the holes in front of the eyes is uncertain.

Quite a bite

T. rex had approximately 50 teeth in its mouth. The teeth vary in shape and size but the largest teeth are up to 30 cm (1 foot) long; approximately two thirds of the tooth was root. The teeth are curved backwards and were designed for grabbing, stabbing and crushing prey, but not for chewing. The teeth have serrated edges similar to those on a steak knife—certainly ideal for a diet consisting of meat.



Scotty's senses

If you stand facing the front of the skull you will notice that Scotty's eyes faced forward. The overlap in the areas viewed by each eye improved Scotty's ability to judge distance. Try this experiment: close or cover one eye; you should notice that this reduces your ability to sense depth. Depth perception provides an advantage in catching prey, but it does not prove that *T. rex* was a hunter. Some scientists have suggested that *T. rex* was primarily a scavenger.

The idea that *T. rex* was a scavenger is based in part on the fact that the part of the brain associated with the sense of smell was very large. In other words, Scotty may have had the ability to locate rotting carcasses from considerable distances.

There's more to discover at the RSM!

In 2006 the Royal Saskatchewan Museum turned 100 years old! During that time, scientists have learned a lot about Saskatchewan. The Museum's galleries hold many more exciting creatures, fascinating First Nations stories and amazing animals. Come discover them all!

P (306) 787-2815
F (306) 787-2820
E info@royalsaskmuseum.ca
W www.royalsaskmuseum.ca