

**17. Tyrannosaurus, l/ Cretacepis 22.3 m (pronounced tie-ran-of-sore-us-rex)**

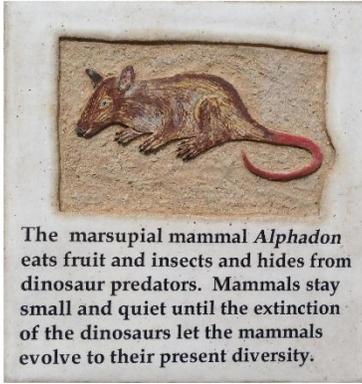
*Tyrannosaurus rex* ('tyrant lizard king') is probably the best-known dinosaur. For good reason. This predator stood 5 meters tall, was 12 meters long, had 10 to 20-centimeter-long banana-shaped teeth and could run perhaps as fast as 20 miles an hour. It had a huge head and powerful jaws that could crush bone. We do not know if *Tyrannosaurus rex* was an active predator, as suggested by its large size, fearsome jaws and good speed, or was just a big scavenger, as suggested by its large olfactory (sense of smell) lobes and tiny arms, useless for grasping. Most likely it did both, just like large modern predators, like lions. It probably ate carrion but also ate fresh meat when it was able to ambush or run down prey.

The end Cretaceous mass extinction is what the public thinks of when extinction comes up in conversation. But there have been at least four other, more severe extinctions in the last half billion years, and numerous smaller extinction events. Extinction is an ongoing process among all species; the average species lasts for about one to two million years. There is good evidence that a 6-to-10-mile-wide asteroid hit the Earth at the end of the Cretaceous. A widespread layer of iridium (an element rare on Earth but more common in asteroids) occurs at the exact boundary in the rocks. There are also many bits of 'shocked' quartz, a feature only created under intense conditions of heat and pressure. There is also a gigantic crater, (called Chicxulub (shix-a-lub) which is more than 100 miles wide) in Mexico that is the right age and size. Many geologists believe this huge asteroid caused Cretaceous extinction. But other geologists point to widespread volcanism of the time as the cause. These volcanic deposits occur in India, which at that time was on the opposite side of Earth from the impact site. Together, these catastrophes may have been enough to cause mass extinction.



**18. Triceratops, U. Cretaceous 22.2 m (pronounced try-sera-tops)**

*Triceratops* sp. ('three horn face') was one of the horned dinosaurs with a bony head frill (known as ceratopsians) that evolved toward the end of the Cretaceous Period. In rocks from the last part of the Cretaceous, in certain parts of North America, *Triceratops* fossils can be more than half of all dinosaur fossils found. This is true because they were probably the most common large herbivore of the time, or perhaps only because their massive skulls were easily fossilized. The distinctive horns and bony frill are thought now to have been mostly used in courtship displays, but they could have also been used in defense from predators. *Triceratops* lived at the same time and in the same areas as *T. rex*, and healed *T. rex* bite marks on a *Triceratops* fossil pelvis show they interacted as prey and predator.



The marsupial mammal *Alphadon* eats fruit and insects and hides from dinosaur predators. Mammals stay small and quiet until the extinction of the dinosaurs let the mammals evolve to their present diversity.

### 19. Alphadon, U. Cretaceous 21.9m

*Alphadon sp.* ('first tooth') was one of several small mammals that found ways to thrive among the dominant reptiles of the time. It may have looked and acted something like an opossum, with a prehensile (grasping) tail and feet and claws adapted for climbing trees. It probably ate fruit and insects, and other small invertebrates. Mammal fossils from this time are commonly teeth and jaws and not much more. From these paleontologists can construct a reasonable image of the whole animal, based on closely related forms for which more complete skeletons are known. Teeth can be very distinctive in shapes, sizes and ornamentation, and from even a few well-preserved teeth, much can be deduced about the animal they came from.