Through the ages, sailors have returned to port to tell unbelievable stories of mighty sea beasts riding across the waves, baring their sharp teeth and waving their enormous fins. Legends of such mighty marine monsters have even entered the popular cultural traditions of such places as Africa, Scotland, New Zealand, North America, and China, where they rightly remain the stuff of children’s nightmares.

But what does science have to tell us about these sea monsters? The vast majority of examples have been revealed as frauds while, for others, solid evidence remains either ambiguous or completely lacking. There was a time, however, toward the end of the age of dinosaurs, when the largest, most ferocious sea monsters that ever lived thrived in our planet’s oceans. They were the mosasaurs, and their fossil remains were among the first ever to be recognized as such by scientists.

By studying the shape, length, and position of each fossil bone, paleontologists can reconstruct not only the physical appearance of extinct animals, but also their diets and the ways they moved, and scientists’ pioneering work has meant that each new fossil discovery has helped put another piece of the prehistoric puzzle into its rightful place.

The surprising discovery of the tooth of an extinct marine reptile in Cienfuegos, Cuba, now suggests that one of the kings of the primitive ocean may have lived, some 66 million years ago, in the area of the planet now occupied by Cuba and the Caribbean.

Two hundred and fifty million years ago, only a single continent existed, an immense land mass that scientists have named Pangaea, which began to break apart and spread during the Mesozoic (which includes the Triassic, Jurassic, and Cretaceous periods). A map of the world in those remote times would have depicted a nearly unrecognizable planet, and its climate would have
Chronology of the appearance and extinction of marine and flying reptiles during the Mesozoic. Courtesy of and © Manuel Iturralde-Vinent and Dmitry Bogdanov.

been markedly different. One of the consequences of the fragmentation of Pangaea was the formation of the primitive Caribbean Sea, the site of a genuine marine "Jurassic Park" that left its mark on the Western Cuban province of Pinar del Río as well. There fossil remains have been found of giant marine reptiles (long-necked plesiosaurs, ichthyosaurs, saltwater crocodiles, and primitive turtles) as well as fearsome carnivorous fish.

During the Cretaceous period, however, at the end of the Mesozoic, the vertebrate fossil record in Cuba becomes extremely sparse, and fossil evidence is limited to a shark tooth plate and assorted, unidentified skeletal elements of bony fish.

This scenario shifted when paleontologists were surprised by highly unusual discoveries of fossils of Cretaceous vertebrates in Cuba. The most recent of these finds, which took place in early June 2015, was a fossil tooth whose shape and size marked it as a species previously unknown in Cuba.

The tooth was discovered during the early phases of an archaeological expedition near Rodas, in Cienfuegos Province, Cuba. The tooth’s discoverer, Carlos Rafael Borges Sellén, handled his find with the greatest care, realizing that it clearly had not come from any primitive human community.

“We were conducting archaeological surveys on the site,” Borges Sellén recalls, “and our attention was immediately drawn to this fragment of rock in which a two-centimeter fossil tooth was embedded, alongside gastropods, rudist bivalves, and other shells from the Cretaceous.” He immediately turned the specimen over to the recently formed Office of Paleontology and Archaeology at the University of Cienfuegos.

Preliminary examination of the fossil was conducted by Borges Sellén and his colleague, Alberto Arano Ruiz (both of the Center for Sociocultural Studies at the University of Cienfuegos), who removed part of the matrix around the tooth, being careful not to compromise the structure of the specimen which today remains largely embedded in rock.

**Dinosaur or Marine Reptile?**

The discovery in Cuban Cretaceous rock was initially thought to be a dinosaur tooth, and news of the find spread quickly on digital media. Taking paleogeographic data into account, however, a more careful consideration noted that the Caribbean Sea at the end of the Cretaceous was vast, covering most of what is today Central America. As
a result, although the rocks of the Greater Antilles do sometimes conserve the trackways or bones of dinosaurs that crossed a bridge of ancient islets between the continents of North America and South America, the occurrence of a dinosaur in Cretaceous rocks in Cuba would be highly unlikely (though not entirely impossible).

According to paleontologist and geologist Manuel A. Iturralde-Vinent, the rocks in which the tooth was found belong to the Cantabria Formation, which represents a Late Cretaceous/Upper Maastrichtian marine environment of some 66-70 million years ago, and also include foraminifera, rudist bivalves, echinoderms, gastropods, and other marine organisms.

To determine the true nature of the tooth found in Rodas, paleontologist Anne S. Schulp (Natuurhistorisch Museum Maastricht, the Netherlands) was consulted in 2015 and again more recently for this article. In her opinion, the fossil is a “reptile tooth,” and that similarities to the teeth of mosasaurs could not be excluded.

For mosasaur expert Michael Caldwell (University of Alberta, Canada), meanwhile, the photographs are reminiscent of genus *Mosasaurus*, and specifically of *Mosasaurus hoffmanni*, but he adds that it is difficult to make concrete identifications from photos.

Photographs of the fossil were also sent to paleontologist Michael J. Everhart, a mosasaur expert at the Sternberg Museum of Natural History in Hays, Kansas, who wrote, “As the photographs show, the tooth is similar to those of mosasaurs. In one photo, certain surface features may indicate *Mosasaurus*. However the tooth appears very flattened in the pictures and not as round as I would expect in a mosasaur tooth. This may be due to the fact that the specimen has been incompletely prepared.”
Dr. Iturralde-Vinent agrees that adequate preparation of the specimen is essential for the identification of the tooth and stresses “the importance of freeing it from the rock. We need to be able to clearly see the shape and form of the specimen as well as the edge of the tooth to determine whether it is serrated or smooth.”

**The Tooth of the Beast**

Some 90 million years ago, mosasaurs were the true Leviathans of the Late Cretaceous, flourishing at the top of the oceanic food chain. Like many other animals and plants, however, they became extinct at the end of the Cretaceous. Mosasaurs are related to modern monitor lizards and snakes, and, in reconstructions, seem to resemble a giant lizard with an oversized head, strong jaws, and limbs transformed into powerful paddles that served mainly as stabilizers. Certain species did reach seventeen meters in length, but most were between eight and ten meters. Still, as the mosasaur’s image came to be known to the public, it may have helped fuel new legends of sea serpents and monsters and revived old ones.

Fish constituted the mosasaur’s principal diet, but they also ate aquatic birds (Hesperornis), turtles, plesiosaurs, and smaller marine reptiles. Some species were equipped with rounded teeth that were apparently used to crush the shells of mollusks and extract the flesh, and the shells of some Cretaceous ammonites exhibit circular perforations that have been interpreted as bites inflicted by mosasaurs.

Although there is no evidence so far to suggest that these creatures were generally cannibalistic, it is known that Tylosaurus, one species of mosasaur, did include other mosasaurs in its diet. The idea that mosasaurs lived a violent and aggressive lifestyle is additionally supported by evidence from their skeletons of common injuries as well as other physical traumas (spondylitis, bone necrosis and fractures, tumors, and osteomyelitis, for example).

Even if the Cuban tooth did belong to one of these ancient beasts, there is no way to know whether it was detached for some reason while the animal was alive, during a fatal encounter (such as combat with another mosasaur), or after death. Nor do we know whether the animal to whom the tooth belonged was a temporary visitor, whether it lived in the area, or whether its corpse was dragged or floated there.
Frequent loss of teeth and rapid replacement is characteristic of living predatory reptiles, and isolated mosasaur teeth have thus traditionally been considered to have broken off during feeding. Whole teeth and jaw fragments, conversely, are more commonly interpreted as partial remains of floating bodies.

Unlike other marine reptiles, the teeth of mosasaurs are highly specialized. In the past, scarce attention was paid to their teeth, however, and descriptions in scientific journals were frequently vague and incomplete, making them difficult to use as a basis of comparison. Classification instead tended to be based on descriptions of skulls, but more recent studies of isolated mosasaur teeth have demonstrated the potential of such teeth to assist in meaningful identifications even to the species level.

By comparing the Cuban tooth to other specimens of genus Mosasaurus described in the scientific literature, it can be inferred that it may belong to an adult animal. At the same time, the amber color of the specimen, which was present when it was found (it appears on the specimen as a sort of glossy varnish) is not unusual in this kind of fossil. Iturralde-Vinent believes the color and patina may be the result of the intrusion of a combination of organic acids, minerals, or other substances during fossilization.

If the identity of the Cuban tooth were to be confirmed, the existence of mosasaurs in Cuba would be highly significant, extending Cuba's vertebrate fossil record at the end of the age of dinosaurs, linking Cuba and the Antilles to finds from Venezuela and Colombia, and confirming definitively that this group of marine reptiles lived in the waters of the primitive Caribbean.

— Carlos Rafael Borges Sellén, Alberto F. Arano Ruiz, and Yasmani Ceballos Izquierdo. English translation by Wendell Ricketts.