Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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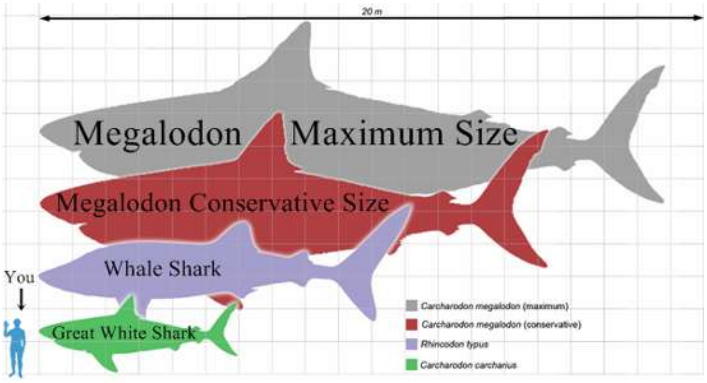
Megalodon- A Shark to be Feared



If we were to compress the entire 4.5 billion years of Earth history into a very long, 3-hour movie, our species, *Homo sapiens*, would have been around for the past one-half a second, or only about 200,000 years.

In contrast, sharks, which have often been called "living fossils", would have been in the 3-hour movie for the last 17 minutes, or for at least 420 million years. Sharks actually appeared on the evolutionary scene well before dinosaurs, and while the dinosaurs disappeared about 65 million years ago, sharks have survived and flourished.

One of the challenges facing paleontologists studying fossils of ancient sharks is that there isn't a whole lot that is usually left behind. Have you ever seen a shark skeleton on display, with all the vertebrae and ribs? Probably not, because instead of bones, sharks have a cartilaginous skeleton, like some fish, and this soft stuff decomposes too quickly for fossilization to occur.

Typically it's the teeth of these prehistoric sharks that are preserved. One shark in particular, which has been named megalodon (from the Greek words for big or mighty tooth), was so massive that it could have eaten a big great white shark of today for breakfast.

Paleontologists have dug up megalodon teeth in North America, South America, Africa, Europe, India, Japan, and Australia. Based on the ages and locations of the sedimentary rocks containing the teeth, we believe that megalodon ruled the planet's tropical seas from about 16 to 2.5 million years ago.

The teeth from these creatures are alarming huge, up to seven inches long, sort of like your hand with the fingers outstretched. Based on relationships between the size of teeth and body length and mass for modern sharks, best estimates are that megalodon was 50 to as much as 70 feet long, and weighed somewhere in the range of 60 to 100 tons. Think of a very large city transit bus with fins and seven inch teeth.

Those who study the remains of these ancient sharks believe that they probably had many physical and behavioral similarities to great whites. One of the main differences between the two was that the megalodon was no doubt more intimidating and substantially larger (mature great whites are *only* 15 to 20 feet in length).

Fortunately for us, and for everything else living in the sea today, the megalodon disappeared about 2.5 million years ago. Scientists are still trying to figure out why an animal that was so large, so fierce, and that had no predators, went extinct. Without any preserved specimens or much other information, however, the major ideas are still speculative.

Two leading thoughts revolve around the idea that the massive sharks lived in warm tropical waters. During the time when they were thriving, we know a period of global cooling took place and ocean temperatures began to drop. It could have been increasingly colder water that led to their demise, or that the prey they depended on to feed their massive hulks started to migrate to colder waters, leaving them behind, cold and hungry.

A shark 50 to 70 feet long weighing 60 to 100 tons would have required several very large meals every day, and with changing ocean conditions and migration, perhaps there just wasn't enough to eat in the shrinking tropical oceans.

While the city bus-size megalodon died out, sharks overall continued to thrive and today there are about 375 different species out there swimming around. Contrary to what many think, however, only several types are actually remotely dangerous to people. Of all of the modern shark species, only four of these have been involved

in any significant number of fatal unprovoked attacks on humans: the great white, tiger, bull and oceanic white tip shark.