

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

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The world's largest animals



135 million year old dinosaur footprints preserved in sandstone along the Algarve coast of Portugal. Tracks are about 16 inches across.

I think we all have a fascination with extremes, which is why the Guinness Book of Records provides so much entertainment. When it comes to the animal kingdom, most of us probably think of dinosaurs as the biggest creatures that ever inhabited the Earth. And some of them were truly massive.

While exploring along the south coast of Portugal in April, we had read about the existence of some Cretaceous Age (115 to 95 million years old) dinosaur tracks exposed in rocks along the coast somewhere near the small town of Salema. I decided I was going to find them. So we headed towards Salema, about 4 hours

south of Lisbon on the Algarve coast, found a place to stay overlooking the Atlantic Ocean and headed down the hill to the beach. Beautiful rock formations, waves gently lapping on the sand, and an incredible blue sky surrounded us. Even if I didn't find the dinosaur footprints, it would have been worth the trip.

Hiking along the beach, I climbed up onto every ledge, and scoured every slab of rock I could reach. After about an hour of searching, there they were - a trail of ten perfectly preserved, very large footprints embedded in a sandstone slab about ten feet above the beach. There were no signs or any indication that they were there, and no one seemed to know anything about them; just a short vague reference in one of the two Portugal guidebooks we had with us.

As a geologist, I have to say this was pretty exciting. You just don't find Cretaceous dinosaur footprints in your backyard every day. After showing the photographs to two paleontologist colleagues back at the University, they both told me they were most likely hadrosaur tracks. Hadrosaurs are one of the large ornithipod (bird-hipped) dinosaurs that evolved in central Asia about 100 million years ago, spread west across Europe and also migrated east across a land bridge and into North America.

These were duck-billed, vegetarian dinosaurs, and some species were up to 40 feet long. Even at five tons they could walk upright on their large muscular hind legs. They had three toes and the footprints I found were about 16 inches across. These were big animals, but there have been much larger dinosaurs discovered.

While reconstructing a dinosaur's length and weight is difficult, especially when all you have is a few bones, there have now been nearly complete skeletons of most species unearthed so that we have some degree of confidence that we are getting a reasonably accurate picture of their size. There is some agreement that the largest dinosaur that has been discovered to date is the *Argentinosaurus*, named after the country where the bones were recovered. It was also a plant eater, and is believed to have been about 120 feet from head to tail, and the best estimate is that it would have weighed about 100 tons - the equivalent of 40 Hummers. Pretty impressive.

So what do we have around today that even comes close to *Argentinosaurus*? You might be surprised to know that the largest animal that ever lived that we know of, in terms of weight, is still alive in the ocean today - the blue whale. A full-grown blue whale can weigh 175 to 200 tons, nearly twice the weight of the largest

dinosaur! A blue whale can reach a maximum length of 110 feet, nearly as long as the *Argentinosaurus*. Interestingly, the female is typically larger than the male.

Everything about a blue whale can be expressed in superlatives. Their tongues alone can weigh as much as an elephant; their hearts, as much as an automobile. And they reach this massive size on a diet composed almost exclusively of tiny shrimplike animals, known as krill. When feeding actively, an adult blue whale can consume 3-4 tons of krill a day. Blue whale calves are huge when born, being about 25 feet long and weighing as much as 3 tons. They feed completely on their mother's milk for their first year and gain an impressive 200 pounds a day.

Blue whales are also among the Earth's longest living animals. Biologists have discovered that by counting the layers of a deceased whale's wax-like earplugs, they can get a close estimate of the animal's age. The oldest was believed to be about 110 years old, although more typically they will live to be 80 to 90, much like us.

Whalers in the 1900s seeking whale oil nearly drove the blue whale to extinction. Between 1900 and the mid-1960s, about 360,000 were slaughtered. The establishment of the International Whaling Commission in 1966 finally provided protection, although recovery has been modest. There are now only about 10,000 to 25,000 blue whales swimming throughout the world's oceans.

For reasons still unknown, a large blue whale washed ashore near Pescadero on September 6, 1979. After several days of jurisdictional uncertainty, biologists and students from UC Santa Cruz began the long and unpleasant task of flensing, or removing the blubber and flesh from the whale. The task took about a month, and then with a helicopter and a large truck, the bones were transported to Long Marine Laboratory. It took about a year for natural processes to clean away the remaining flesh and oil.

There is more to this story about Ms. Blue that I'll complete in the next column, but at 87 feet long, the blue whale skeleton standing beside the Seymour Marine Discovery Center today is believed to be the largest on display anywhere in the world. So not only is the blue whale the biggest animal that ever lived on Earth, we have the largest displayed skeleton in our own backyard.