Blue whales are mammals and must come to the ocean's surface to breathe.

How You Are Like a Blue Whale

If anybody tells you blue whales are the largest fish on Earth, they don't know what they're talking about. Blue whales may live in the ocean with fish, but they aren't fish at all. There are many important differences between the body structures of whales and fish. Fish are covered in shiny scales, while whales have smooth skin. Fish lay eggs, while whales give birth to live young. Fish fins are made of many tiny bones, but whale flippers are supported by just a few bones. In fact, whales are mammals, just like dogs, elephants, and humans. Blue whales share many more body structures with you than they do with fish!

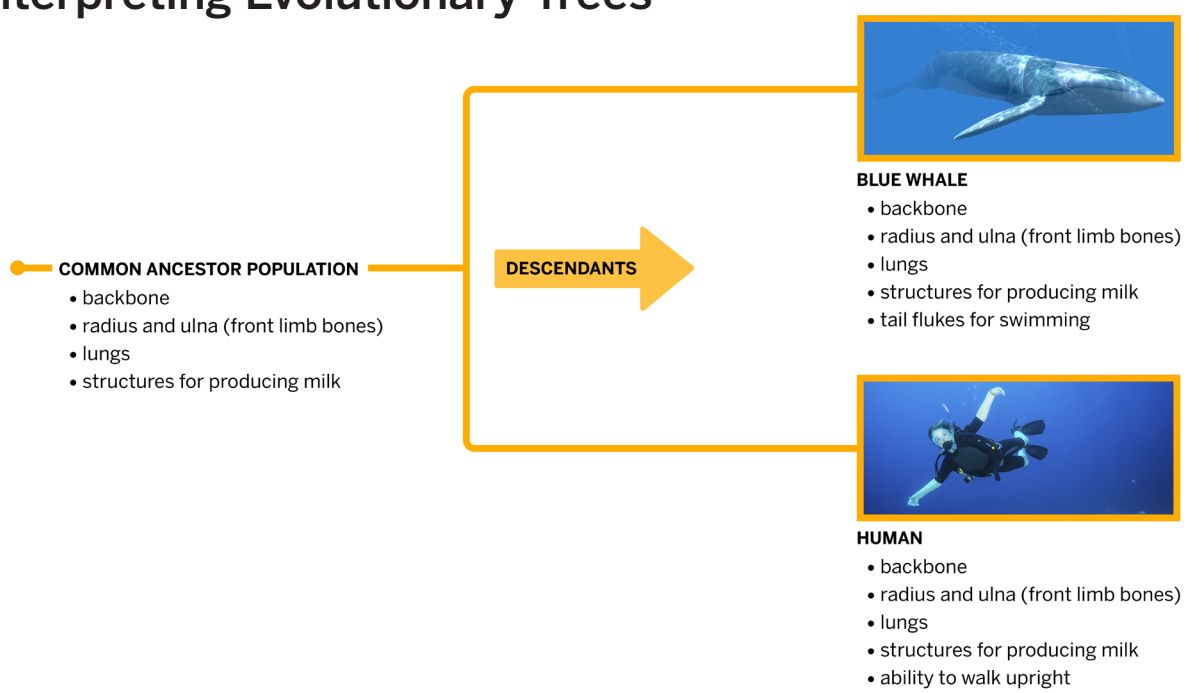
Just as whales and fish look similar but are actually very different, humans and blue whales look different but have a surprising amount in common. Mother whales produce milk for their babies, just as human mothers do. Like humans, whales have lungs instead of gills. Whales can't breathe underwater: they must come to the surface to breathe. And if you look at the bones in a human arm and the bones in a blue whale flipper, you can see that they fit together in similar ways. Blue whales even have leg bones, just like humans. However, in whales, these bones are so tiny that the skin, fat, and muscles of the whale's body hide them. You might not call them real legs, but they are leftovers from a time when whales' ancestors had legs and walked on land.

To figure out how two species are connected, scientists can study the skeletons of both species. Scientists studying present-day animals can use x-rays of living animals or sets of bones from animals that have died recently. Paleontologists studying species that are now extinct use fossils to compare species. Comparing skeletons tells us about how species are connected because organisms get their body structures the same way they get all their other traits. Body structures are determined by the code of DNA and are passed down from generation to generation over millions of years. By comparing the skeletons of different species, scientists can see patterns of how traits have been passed down. When two species' body structures are made from bones that are in the same pattern and roughly the same position in the body, scientists consider them to be shared body structures. Shared body structures in two very different species can be evidence that both species evolved from a common ancestor population that had those body structures long ago.

The shared body structures found in a common ancestor population didn't necessarily look very much like they do now. They may not even have been used for the same function! To see how two descendant species are connected, paleontologists examine the fossil record. In the case of whales and humans, they look for evidence of a species that had front limbs with the same pattern of bones, structures for producing milk, and lungs for breathing air. All of these things are true of both whales and humans today.

Paleontologists have used evidence from fossils, DNA, and other sources to conclude that the common ancestor of whales, humans, and all other mammals was a tiny animal that lived about 65 million years ago. Fossils from that time show evidence of mouse-like creatures that had four legs with claws, long tails, and long noses good for sniffing out insects. Similarities in body structures allow paleontologists to infer that whales,

Interpreting Evolutionary Trees



Humans and blue whales have many shared structures. Based on this information, paleontologists know that these species descended from a common ancestor population that also had those body structures.

Whales, humans, and other mammals alive today are all descendants of a common ancestor population that lived about 65 million years ago. Paleontological artists use what they know about the skeletons of these animals to make educated guesses and create drawings that show what they probably looked like.

humans, and all other mammals evolved from a common ancestor similar to this tiny animal, even though it looked very little like blue whales or humans do today.

Just as whales have lost the function of their back legs, but still have remnants of the bones, you also have old structures that have lost one or more of their functions. For example, our ancestors had tails, and we still have short tailbones in the place where tails would be. The bone structures and other traits we share with whales provide evidence of our shared evolutionary history: the ancestor population we have in common, from which we both evolved.

If you think about it, you can come up with structures that we share not only with whales, but with a lot of other animals, too. Can you think of all the animals that have a skull, eyes, teeth, and a backbone? All living things are related and share some basic traits like cell structure and DNA. By looking at evidence in the fossil record, scientists have learned that all living things inherited cell structure from the very first single-celled organisms on Earth. That population of single-celled organisms is a common ancestor we share with all other cellular life on the planet! Humans, whales, fish, and billions of different species all evolved from a common ancestor population that was made of just one tiny cell and lived about 4 billion years ago. The family of living things is much greater than we could have imagined, connecting us not only to close relatives such as whales and other mammals, but also to fish, worms, plants, bacteria, and all other life on Earth. We all share a common evolutionary history.