

BURKE FROM HOME

WHALES

WHAT'S INSIDE

- Whales are mammals, just like us! Solve the evolution of whales puzzle to learn about the ancient relatives of modern whales.
- Learn about different whale species and how they eat.
- Want to take a deep dive? Check out more resources on our website.

INTRODUCTION

Whales live in every major ocean, from the freezing cold waters of the Arctic and Antarctic to the warm tropical waters near the equator. Whales travel, hunt, socialize, and even sing. Whales belong to a group of animals called cetaceans, which also includes dolphins and porpoises. **There are about 90 known species of cetaceans.**

Have you ever seen a whale? Where did you see it? What was it doing?

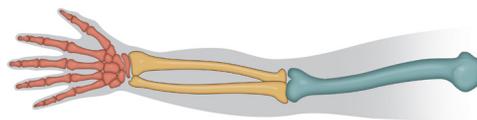
If you've never seen a whale, where could you go to see one? What could you bring with you to help find a whale?

A good place to start is to learn more about whales and what they do. Let's dive in!

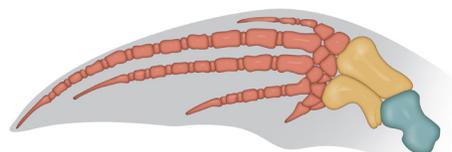
EVOLUTION OF WHALES

TAKE A LOOK at this picture showing the bones in a human arm and the bones in a whale fin. What do you see? How are they similar? How are they different?

HUMAN ARM BONES



WHALE FIN BONES



WHALES

Can you feel the bones in your arm? There is one large bone from your shoulder to your elbow. From your elbow to your wrist, there are actually two bones that sit side-by-side. There are many small bones that make up your wrist and hand. The small narrow bones in your fingers are called phalanges. Whales have these same bones in their fins, but they cannot move their fins like we move our arms.

LOOK CLOSELY at the bones in the whale fin. Why do you think we have the same bones as whales?

Well, whales are mammals like us!

Mammals are animals that:

- breathe air
- give birth to live young
- nurse their young
- are warm blooded
- have hair or fur



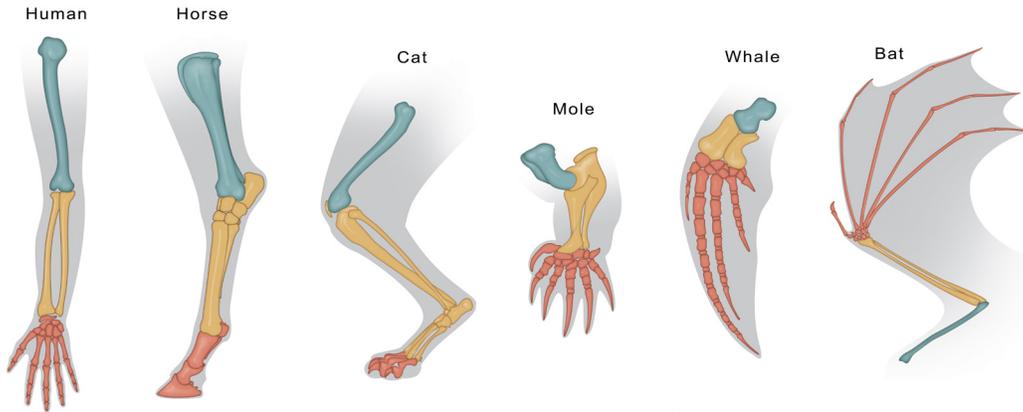
A mother humpback whale and her calf.

Humans do all of those things. Can you think of any other animals that are mammals?



WHALES

Here are more limb bones of animals that are mammals:



CHECK OUT these two mammal specimens. How many phalanges (finger bones) does each animal have? How does each animal use their body part?



Bear foot bones and claws



Dolphin fin bones replica

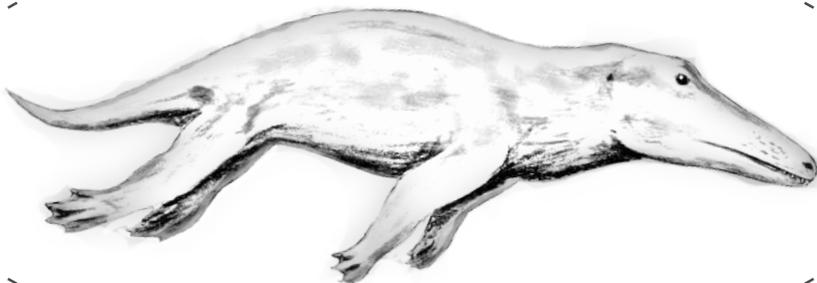
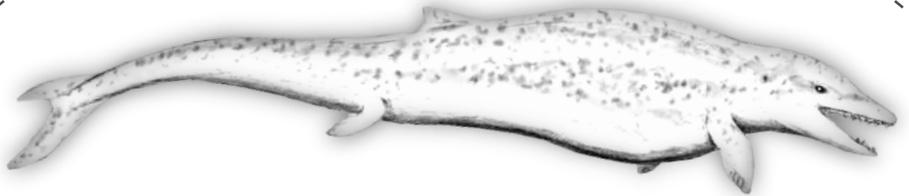
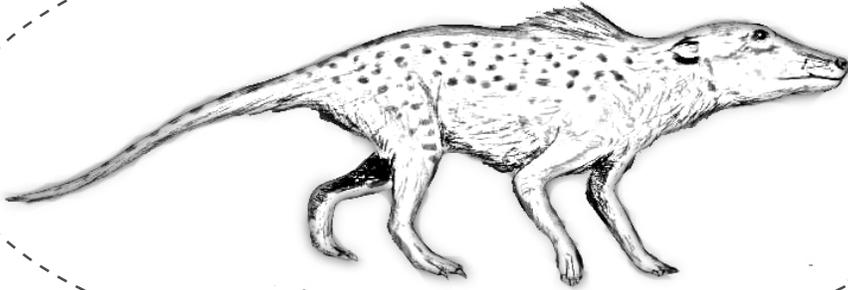
If whales are mammals, why do they live in the ocean? Modern whales live entirely in the ocean today, but that wasn't always the case. Their ancient relative, *Pakicetus*, was a wolf-sized, fish-eating mammal that lived on land 50 million years ago. Over millions of years, the descendants of *Pakicetus* spent more time in the water, evolving flippers. Eventually, they became the sea-dwelling creatures we know today!

CAN YOU PUZZLE OUT WHALE EVOLUTION? Print and cut out the pictures on the next page (or look at them on your screen) and color them in if you would like. Put them in evolutionary order from ancient land-dwelling *Pakicetus* to a more recent ocean-dwelling whale species. The answer key can be found on page 5 (page after puzzle pieces).

Hint! How did each animal move around? (look at their legs and fins) How do you think each animal was able to breathe? (look at their noses or blowholes)

After you solve the puzzle, watch the Smithsonian Whale Evolution Animation [here](#).

Answer key is next page! (page 5)



WHALE EVOLUTION PUZZLE ANSWER KEY

ANCIENT ANIMAL	SPECIES	FACTS
1 	<i>Pakicetus</i>	<i>Pakicetus</i> lived 50 million years ago. They were a wolf-sized land animal that lived by the sea and swam to catch fish. Today their closest living cousin is the hippopotamus.
2 	<i>Ambulocetus</i>	<i>Ambulocetus</i> lived 49 million years ago. They evolved flipper-like feet, which made them better at swimming and catching fish. They moved on land much like a walrus and swam much like an otter.
3 	<i>Rodhocetus</i>	<i>Rodhocetus</i> lived 47 million years ago and could drag themselves around on land, but spent most of their time in the water. They grew much bigger than <i>Pakicetus</i> , up to 1,000 pounds!
4 	<i>Dorudon</i>	<i>Dorudon</i> lived 41 million years ago entirely in water, and sometimes ate small sharks! They moved from their home in Central Asia to spread all around the world.
5 	<i>Cetotherium</i>	<i>Cetotherium</i> lived 33 million years ago and was an early baleen whale. Instead of teeth, their mouth was full of baleen—a filter that strains tiny, shrimp-like animals out of the water for food. The biggest animal in the world is a baleen whale.

WHALES

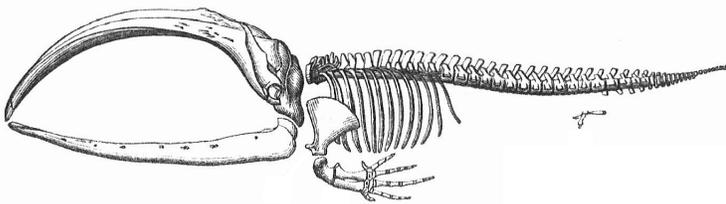
MODERN WHALES

Great work solving the whale evolution puzzle! Now it's time to learn about modern whale species.

Today, there are two major types of whales: **toothed** and **baleen**. They evolved from the ancient relatives we learned about in the evolution puzzle, and are only distantly related to each other. The differences between baleen and toothed whales tell us what food they eat.

BALEEN WHALES

Their mouths have layers of baleen that work like a bunch of combs filtering tiny animals into their mouths. They take large gulps of water and spit the water back out through the baleen, leaving them with a mouthful of food.



Baleen whale skeleton



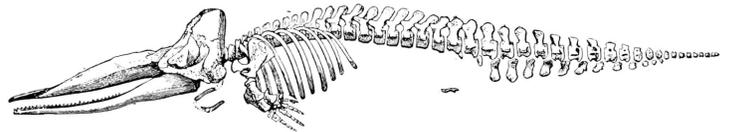
Baleen



Comb

TOOTHED WHALES

Some whales have teeth that they use to grip their prey like a pair of tongs. Some whales use these teeth to rip and tear meat, but most toothed whales do not chew their food; they swallow small bites of food whole.



Toothed whale skeleton



Whale tooth



Tongs

WHALES

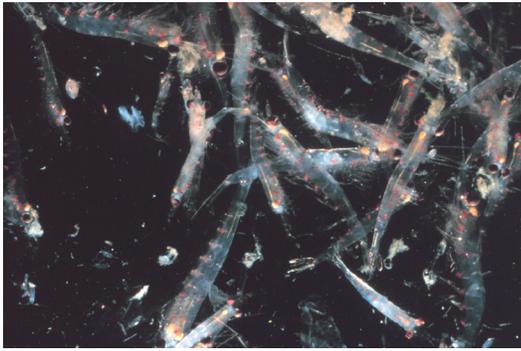
WHAT DO WHALES EAT? Whales are carnivores (meat eaters) and eat many different kinds of animals. The next page includes some things they might eat. Now that we know about baleen and toothed whales, what food do you think they'd pick from the menu on the next page?

FIGURE OUT which foods are eaten by which type of whales. Imagine that you had a mouth full of baleen. What could you catch and eat? Imagine if you had teeth like a whale. What could you catch and eat?

Solve on paper or print and cut out the food cards on the next page, and put them in one of the columns below. The answer key can be found on page 9.

BALEEN WHALES EAT

TOOTHED WHALES EAT



KRILL

Krill are small crustaceans related to shrimp. There are billions in the polar oceans that swim in swarms of thousands of individuals.



BAIT FISH

Bait fish is a generic name for a lot of types of small fish, like sardines and herring, that travel in large groups.



CRUSTACEANS & MOLLUSKS

Many animals, like amphipods (crustaceans) and clams (mollusks), live in the sandy bottoms of the oceans, and can be scooped up in large numbers.



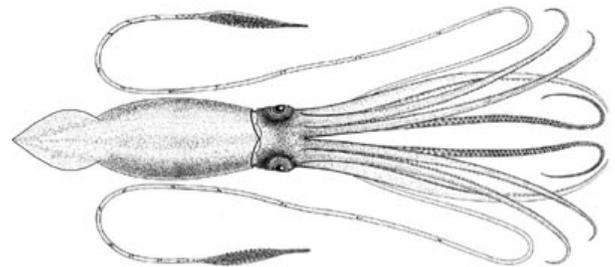
SALMON

Salmon are a food source for many animals during their lives, but are particularly tasty when they are large, fat adults.



MARINE MAMMALS

Sea lions, seals and even small whales can be food but require intelligence and teamwork to catch.



GIANT SQUID

Giant squid are huge, strong, intelligent and live in deep oceans, which means catching them is a specialized challenge.

WHAT DO WHALES EAT ANSWER KEY

BALEEN WHALES EAT

- Krill
- Bait fish
- Crustaceans & mollusks

TOOTHED WHALES EAT

- Salmon
- Marine mammals
- Giant squid

TYPES OF WHALES

Nice work figuring out what baleen and toothed whales eat! Earlier we learned that there are about 90 known species of cetaceans.

Now that we know the differences between baleen and toothed whales, let's look at different whale species. On the next page there are six species of whales and there are both baleen and toothed whales in the mix.

IDENTIFY which species of whales have baleen and which have teeth. Use the cards on the next page (print and cut them out or look on your screen) and group them into the two groups. Answer key can be found on page 11.

Hint! Read about the kinds of foods they eat and look at their body shape for clues.



Humpback whale breaching (leaping) out of the water



Sperm whales have a unique shape. Their big, square-shaped head makes up about one third of their body length! Most of their food lives deep underwater, so they are excellent divers and can hold their breath up to two hours. Using echolocation to scout around the dark ocean depths, they hunt for fish, small squids, octopuses and crustaceans. Their favorite food, however, is the 30-foot-long giant squid, which requires a lot of effort to catch.

SPERM WHALE

Physeter macrocephalus



Humpback whales are known for their ability to travel long distances throughout the year. They spend half the year in cold waters, where they focus on eating food and building up their fat. For the rest of the year, they prefer warmer waters, where they gather in groups and socialize. Although humpback whales are larger whales, their diet of choice are small creatures such as plankton, tiny crustaceans like krill and groups of very small fish.

HUMPBACK WHALE

Megaptera novaeangliae



True to their name, gray whales are large whales of gray color, though they can be spotted with white speckles. They spend their summers in cold waters to eat a lot

of food. In the winter, they swim south to warmer waters. These whales are bottom feeders, meaning they eat foods found near or on the bottom of the water. They can actually roll over on their side and slowly swim along the seabed, sucking up sand and mud and all the creatures in it.

GRAY WHALE

Eschrichtius robustus



Orcas are part of the dolphin family, and are found all over the world. They hunt in groups that can be a few orcas up to hundreds, and communicate by sound.

Orcas in different parts of the world specialize in hunting fish, squid, octopuses, sharks, seals, sea lions, and even other types of whales. This leads to groups having different behaviors. Groups can sound very different from one another and they will choose not to spend time around each other.

ORCA WHALE

Orcinus orca



Beluga whales are very social whales who live in cold arctic waters. In order to tolerate the temperatures, belugas have a thick layer of blubber, a type of fat

designed to keep them warm. Belugas live in large groups, called pods, which are often made up of their family members. For food, they prefer to eat a lot of different things. This might include fish such as salmon, herring or cod, but also other marine animals like squid, shrimp, and crabs.

BELUGA WHALE

Delphinapterus leucas



Growing up to 100 feet in length, blue whales are the largest animal on Earth. They prefer to live in the deep ocean and are rarely seen near coasts. They are great travelers, moving between cold and warm waters throughout the year. They talk to each other by singing songs at volumes louder than jet planes, which can be heard over hundreds of miles away. Despite their size, they eat very tiny krill, and can eat as many as 40 million krill a day!

BLUE WHALE

Balaenoptera musculus

IDENTIFY WHALES ANSWER KEY

BALEEN WHALES

- Blue whale
- Humpback whale
- Gray whale

TOOTHED WHALES

- Beluga whale
- Orca whale
- Sperm whale

WANT TO TAKE A DEEP DIVE?

BURKE RESOURCES

Learn more about [Whales of Washington State](#) on the Burke's website.

Take a look at our Mammalogy collections [here](#).

OTHER RESOURCES

[Hibulb Cultural Center: The Seal Hunting Brothers](#)

[Killer Whale Tales](#)

[Smithsonian Digital Lesson: Pacific Northwest Fish Wars](#)

[Lushootseed Sea Life Coloring Pages](#)

[Smithsonian Whale Evolution Animation](#)

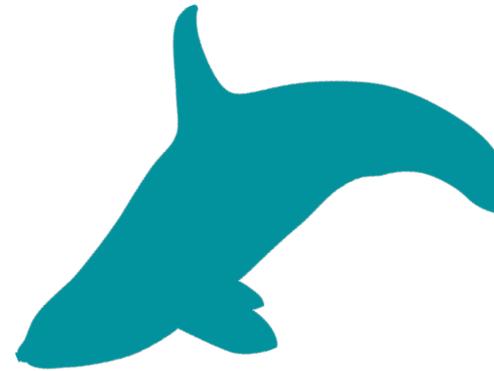
[Blue Whale Feeding Behavior Video](#)

[Whale and Dolphin Conservation](#)

[Seattle Aquarium Cetacean Fact Sheet](#)

[NOAA Fisheries Whale Explorer](#)

[World Wildlife Whales](#)



Orca skeleton in the Burke Mammalogy collections

Photo: Jeff Bradley/Burke Museum