



Why do sharks have fins?
How do sharks find their food?
In *Shark*, you'll discover how
sharks hunt using their super
senses. You'll also learn some
safety tips on how to avoid
a shark attack.


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SHARK

by Frances Chan





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Sharks From Long Ago

Sharks have been on Earth for a very long time. Some shark **species** lived before the dinosaurs! Scientists have found many **fossils** of teeth from sharks that lived long ago. This is because sharks are constantly growing new teeth. A single shark can go through about 30,000 teeth in its lifetime.

By studying fossils, scientists know that the sharks of the past were very similar to today's sharks. This shows that sharks must be well suited to Earth's ocean **habitats**.

The cladoselache shark is now extinct. It is an ancestor of today's sharks.

The hybodont shark lived at the same time as the dinosaurs. It was about six feet long.

Diary of a Fossil Hunter



Mark Renz is a fossil guide who takes groups to dig for fossils in Florida's rivers. Over the years, he has made many amazing discoveries.

March 15, 1997, Peace River, FL
Today, I went snorkeling for fossils of mako and megalodon shark teeth. The recent rain has washed away a layer of the riverbed, exposing these ancient treasures. It's hard to believe that this freshwater river was once a saltwater bay, teeming with sharks.



What Is a Shark?

Sharks are fish. There are more than 375 species of shark. Sharks have a skeleton like other fish, but it is not made of bone. It is made of bendable, lightweight cartilage, similar to what people have in their outer ears and nose. Cartilage is more flexible than bone, but not as strong.

When people think of sharks, they usually think of huge jaws and sharp teeth. However, not all sharks are large or fierce. The spined pygmy shark grows to only 10 inches long. The whale shark is huge – the size of a school bus – but it eats only **plankton** and tiny fish.



Whale shark



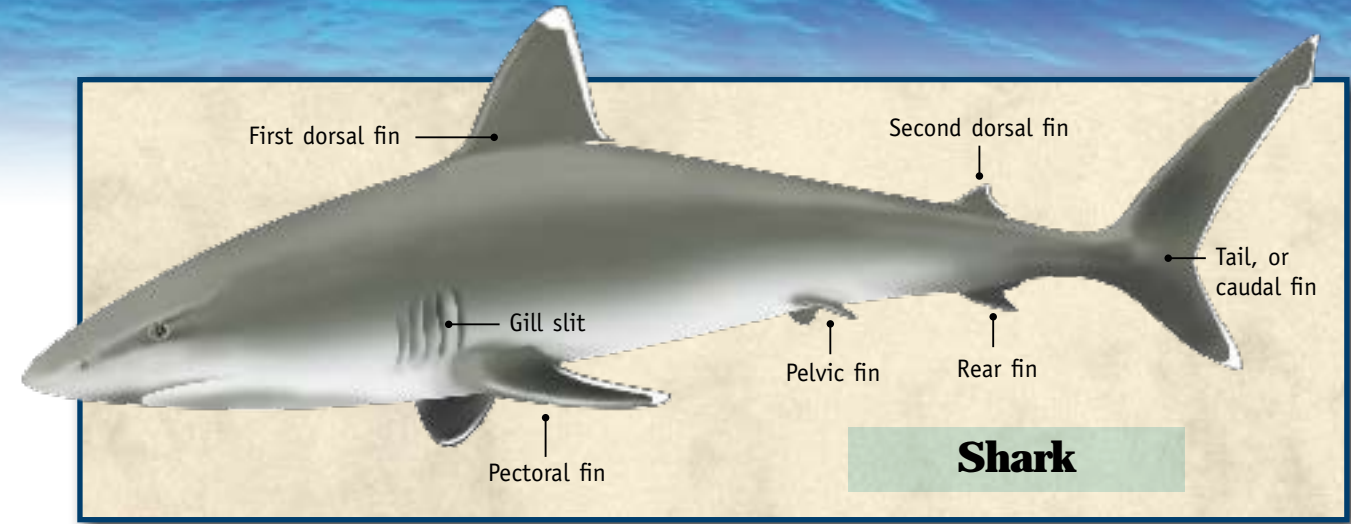
Did You Know?

Sharks are carnivorous. The word *carnivorous* means *meat-eating*. It comes from the Latin word for meat or flesh – *caro*.





Body Basics

All sharks have fins on the sides of their body and a powerful tail. Some sharks also have one or two fins on their backs, called dorsal fins. These prevent sharks from rolling while they swim. Sharks have at least five pairs of **gills**, which they use to breathe underwater. Like all fish, sharks need oxygen to live. They get this from the water that flows over their gills.

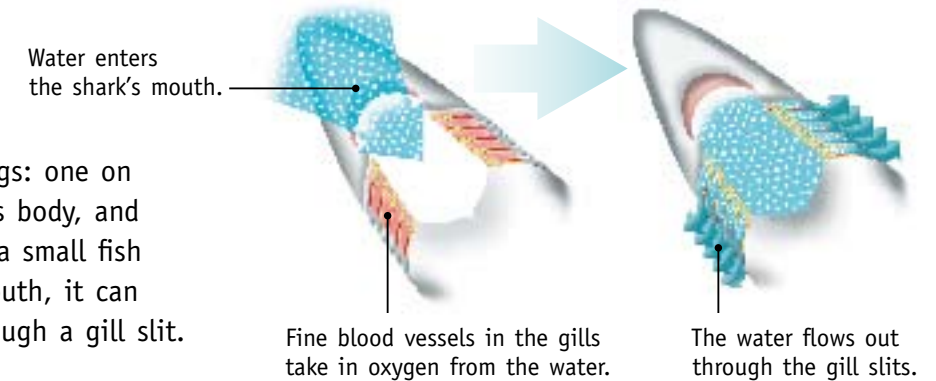


How Are Sharks Different From Bony Fish?

	Sharks 	Bony Fish 
Skeleton	Cartilage only	Bones and cartilage
Gills	Uncovered gills	Covered gills
Skin	Rough scales like sandpaper	Slippery scales
Swimming	Can swim only forward	Can swim backward and forward

Breathing With Gills

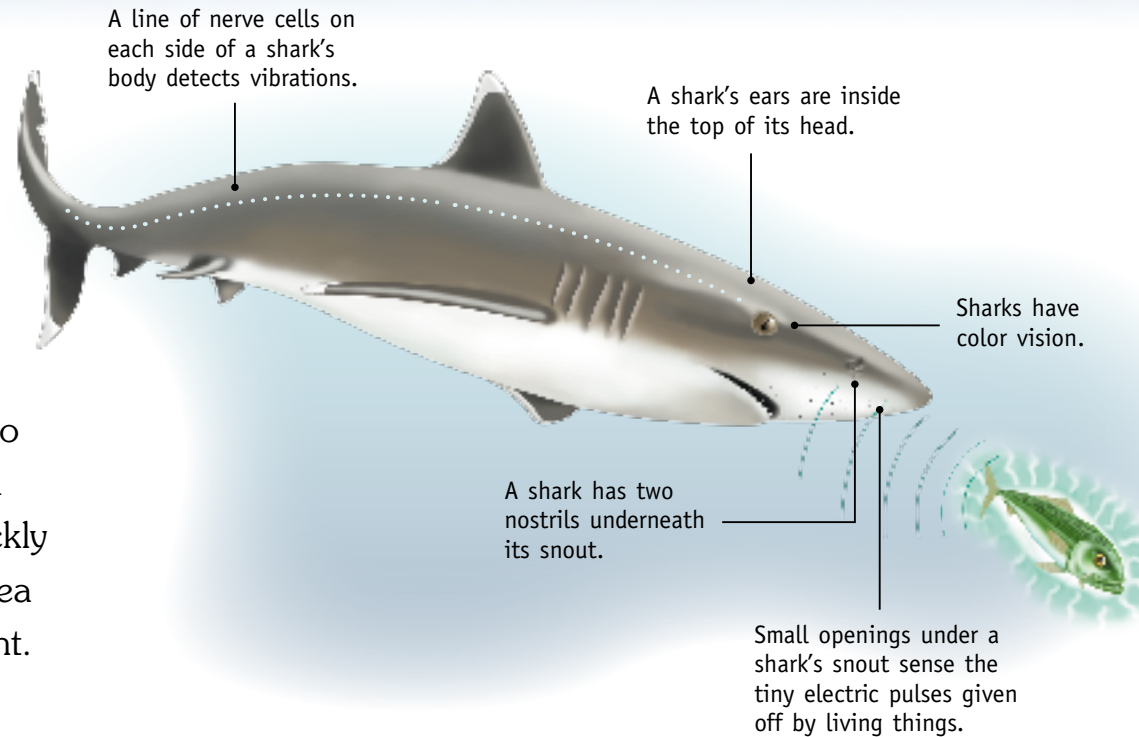
Each gill has two openings: one on the outside of the shark's body, and one inside its mouth. If a small fish is caught in a shark's mouth, it can escape by swimming through a gill slit.



Super Senses

Sharks have special senses that help them track **prey**. They feel **vibrations** in the water using a line of nerve cells that runs along each side of their body. They can also sense electricity through many tiny, jelly-filled openings under their snout.

Sharks have a sense of smell about 10,000 times better than what humans have. They can detect one drop of blood in a million drops of seawater. Their hearing is also very sensitive. A shark can hear low-pitched sounds from a mile away. Once a shark detects its prey, it swims quickly toward it. Seeing underwater is often difficult, but deep-sea sharks have especially large eyes that see well in dim light.



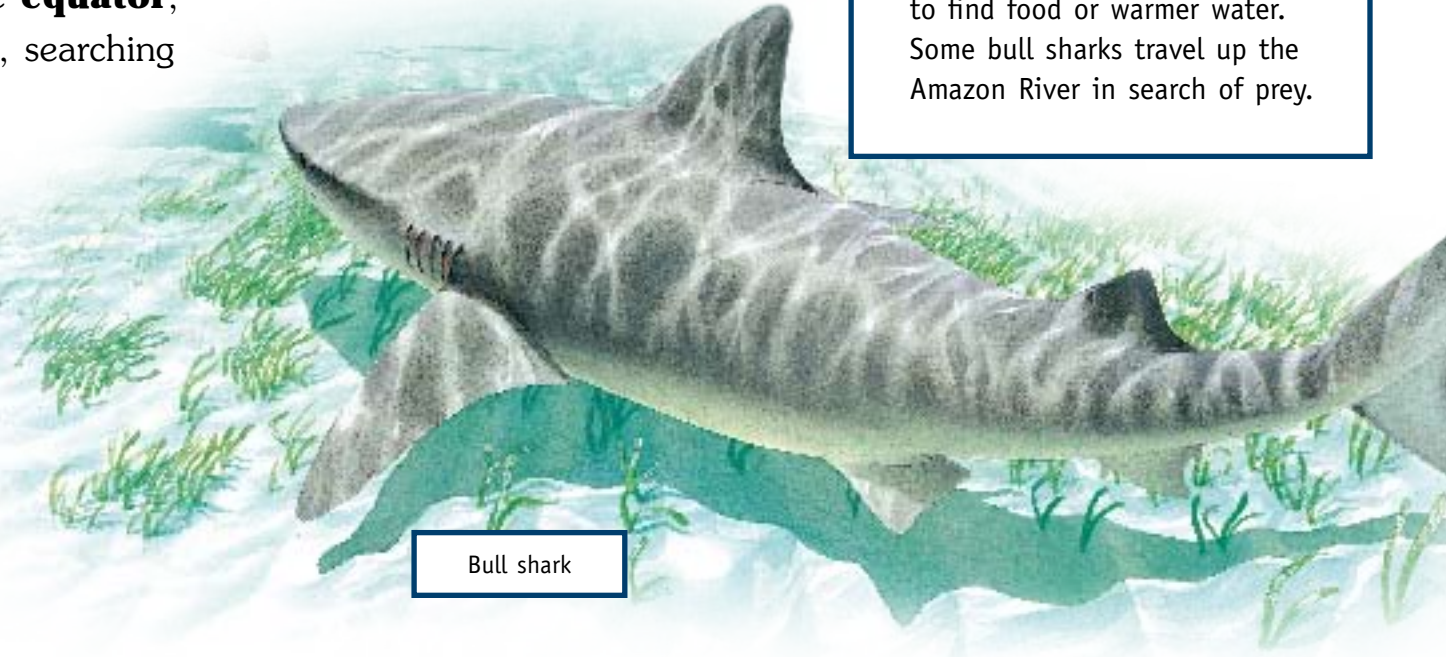
Face to Face

Shark aquariums do not have any sharp angles. This stops the sharks bumping into corners and harming themselves. The walls of aquariums are also kept free of electric cables. Sharks will knock into a wall if they sense an electric current behind it.



Where Do Sharks Live?

Sharks are found in oceans all around the world. Many live in tropical waters near the **equator**, where they cruise around coral reefs, searching for prey. Other species of shark live in cooler waters. Some prefer shallow water, while others live in the **midwaters**, or even on the deep ocean floor. The bull shark can live in fresh water as well as seawater. It swims from the ocean into rivers.



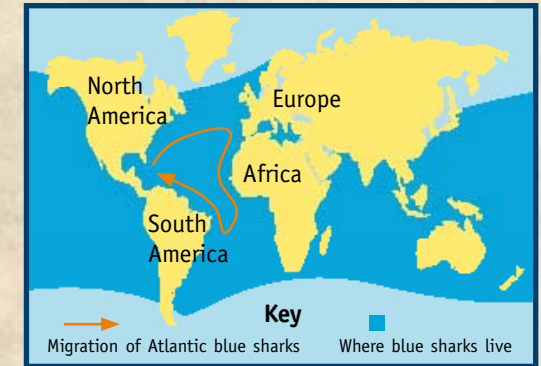
Bull shark

Some sharks stay in the same area all year, while others **migrate** to different places to find food or warmer water. Some bull sharks travel up the Amazon River in search of prey.

The Great Traveler



Blue sharks are found in all the oceans of the world. The Atlantic blue shark is one of the most well-traveled sharks. It migrates thousands of miles around the Atlantic Ocean every year.



Munch and Crunch

Sharks hunt fish and other sea creatures for food. They are **predators**. Most sharks feed about once or twice a week. Some species of shark hunt in packs to attack large schools of fish. The great white shark and the mako shark often hunt alone. They eat large prey, such as dolphins, seals, and other sharks. The whale shark, basking shark, and megamouth shark are filter feeders. They swim with their mouths open to catch huge amounts of plankton and tiny fish.



Sand tiger shark

What Sharks Eat

Fish, stingrays, dolphins, and seals are favorite foods for some sharks, such as the mako shark. Some sharks also catch young seabirds that crash into the sea while learning to fly. Many large sharks crunch easily through turtle shells and often eat small sharks. Slow swimmers, such as angel sharks, eat shellfish from the ocean floor. Hammerhead sharks enjoy squid and octopuses.



Fish



Octopus



Lobster



Squid



Seabird



Stingray



Turtle



Seal



Dolphin



SHARK ATTACK!

On October 31, 2003, 13-year-old Bethany Hamilton went surfing with friends on Kauai Island, Hawaii. Bethany was lying on her surfboard, watching the waves, when suddenly a shark came out of the water. It bit off her left arm and also took a large chunk of her surfboard.

"A shark bit me!" she yelled. Her friends swam quickly to help. They wrapped a surfboard leash around Bethany's left shoulder to try to stop the bleeding.

Nobody actually saw the shark, but judging by the size of its bite,



Bethany Hamilton

it was probably a tiger shark about 12 to 15 feet long.

Did the shark attack mean the end of Bethany's surfing career? No way! Less than a month later, she was back on a surfboard, paddling with one arm.

Did You Know?

If a shark attacks a person, it is usually by accident. Sharks don't like the taste of humans. They prefer fish. There are around 60 shark attacks a year worldwide, but only a few of these cause death. Florida has the most shark attacks in the world. Some beaches in Florida have nets to stop sharks from swimming close to shore.



Swim Smart

1. Don't go into the water if you know sharks are in the area.
2. Always swim with someone else, and stay close to the shore.
3. Avoid swimming at dawn, dusk, or night because many sharks feed at these times.
4. Do not go into the water if you are bleeding.
5. Do not wear shiny jewelry because it may look like fish scales to a shark.

Bethany was determined to surf again. She wrote a book about her experience and amazing recovery. She continues to surf competitively, and, in 2005, she won her first U.S. national championship.



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A Shark Is Born

A young shark is called a pup. Unlike bony fish, which hatch from eggs, most shark pups grow inside their mother. They are born after 6 to 12 months.

The size of a shark **litter** varies among species. Great white sharks and tiger sharks have up to 15 pups in a litter. Blue sharks and whale sharks can give birth to about 100 pups at a time. However, not all of the pups survive. Many are eaten by larger sharks and fish. Some pups have **camouflage** markings that help them to hide from predators.



This lemon shark pup has just been born. It is about 18 inches long. It will grow to about 10 feet long.

Shark Egg Cases

Some sharks, such as swellsharks, lay soft egg cases instead of giving birth to live young. The egg is laid on the ocean floor, hidden among rocks and seaweed.



The shark pup develops inside the egg. It gets its food from the yolk.



A swellshark pup may take up to a year to hatch. When it is ready, the pup splits open the egg case. It then swims quickly to somewhere safe.



From Pup to Grown-Up

Shark mothers do not raise their pups. As soon as a shark is born, it must take care of itself. Like humans, sharks grow bigger and go through body changes as they get older. Some sharks change the color of their skin. For example, a zebra shark is born black with yellow stripes. As it grows, its body turns yellow with dark brown spots. Some sharks eat different foods when they become adults. Their teeth change shape to suit their new diet.

Some smaller sharks are fast growing and become adults within a year. Larger sharks, such as the great white shark and dusky shark, take up to 10 years to reach adulthood. Then they are ready to have pups of their own.



Newborn

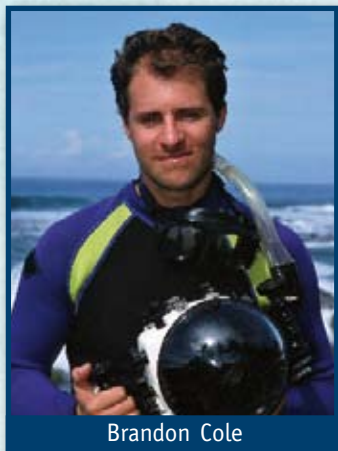
A newborn human baby is about 20 inches long. It needs constant care from its parents or other adults. A mako-shark pup is about 2 feet long. It finds food for itself.

Ten Years Later

A 10-year-old girl is about 5 feet tall. A girl is still a child and needs some care from adults. A 10-year-old female mako has already reached 9 feet in length. She started having pups of her own at 4 to 6 years of age.

Twenty Years Later

Most humans are independent adults by 20 years of age. The average height of a male is 5 feet 9 inches. Mako sharks are nearing the end of their lives after 20 years. They grow up to 12 feet long.



Brandon Cole

SWIMMING WITH SHARKS

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Imagine looking into the mouth of a great white!
Brandon Cole's job is to travel the world and photograph marine life of all kinds.

Q. How long have you been an underwater photographer?

A. Since 1992. I learned how to scuba dive while studying marine biology at college. I began taking snapshots underwater. I loved it so much I wanted it to be my full-time job.

Q. What's the best part of your job?

A. Traveling to new places, photographing sharks, swimming with dolphins, and searching for rare fish. It's always fun to see the pictures when I return home – it's like opening presents!



Great white shark

Q. What's so special about sharks?

A. Sharks are so cool because they have been swimming in our seas for a long time. They serve very important roles in the web of life. We still have so much more to learn about sharks.

Q. Have you ever been attacked by a shark?

A. No, but once when I was snorkeling in Hawaii, I encountered a large whitetip shark way offshore. I took a few photos, while it calmly circled me. Then I think the camera's flash irritated the shark. It arched its back, pointed its fins downward, and began to zigzag back and forth in jerky movements. I knew the shark was angry, so I moved away pretty quickly.



Great white shark



Save the Sharks

About 80 shark species are **endangered**. Each year, more than 100 million sharks die because of human activities. Many sharks are caught so their fins can be made into shark-fin soup. Some people hunt sharks for sport. Many sharks become trapped in fishing nets. Other sharks are dying because their coral-reef habitats are being destroyed. Ocean pollution from trash and chemicals can also kill sharks.

The more we learn about sharks, the more we can do to save them. Scientists and shark conservation groups help teach us about sharks.



This tiger shark is caught in a net. A diver is setting it free.

Playing Tag

Some scientists tag sharks to learn more about them.

- Plastic tags are coded to show when and where a shark was located and the shark's measurements.
- Electronic tags transmit a shark's position by radio signal.
- **Satellite** tags transmit data about a shark's location, depth, and speed and also about the temperature of the surrounding water.

This diver is attaching a tag to a whale shark. The shark does not feel any pain because its skin is about 4 inches thick.



Glossary

- camouflage** the colors and shapes of an animal that help it blend into its surroundings
- endangered** close to being one of the last of its kind left on Earth
- equator** an imaginary line around Earth, halfway between the North and South poles
- fossil** the remains or traces of a living thing from long ago that have turned into stone
- gill** a body organ used to get oxygen from water
- habitat** the area where an animal or a plant lives naturally
- litter** a group of young animals born at the same time to the same mother
- midwaters** the layer of water 1,000 feet below the surface but not as deep as the ocean floor
- migrate** to move to different places at different times
- plankton** tiny living things that drift in ocean currents
- predator** an animal that hunts other animals
- prey** an animal that is hunted by another animal
- satellite** a human-made object that orbits Earth
- species** a group of animals of the same kind
- vibration** a very fast back-and-forth movement

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