

SHARKS

The fossil record suggests that sharks are among the oldest of vertebrates (animals with backbones). Their ancestors can be traced back at least 300 million years. There were sharks on earth even before the dinosaurs!

Although there are many differences between the various species, sharks have many characteristics in common. Very often the first thing people think about when it comes to sharks is their teeth. Sharks shed thousands of teeth in their lifetime. When the teeth become worn or break off, new ones from the row behind replace them.

Sharks can see, hear, taste, smell and feel. They also have an additional sense that allows them to detect weak electrical voltages. Sharks have small sensory pores located in the snout called *ampullae of Lorenzini*. These pores help them navigate the oceans during long-distance migration. This sense also helps them locate nearby prey.

Sharks have a strong sense of smell. Although they don't breathe through their noses, they can detect odors in the water such as chemicals and blood. Sharks are able to obtain oxygen from the water with the use of gills. The water flows through the shark's mouth and passes over the gills, where oxygen is absorbed into the blood stream. The water, along with carbon dioxide, is expelled through the gill slits. Most sharks have five gill slits, but some species have six or seven.

The skin of a shark is rough, like the texture of sandpaper. It consists of tiny tooth-like projections called dermal denticles. As the shark grows larger, the denticles are shed and are replaced by larger ones.

The typical shark has a streamlined body, a long snout, pectoral (side), and dorsal (top) fins, and a tail. Its cylindrical body, fins and tail are streamlined for swimming with ease. The tail propels the shark through the water by moving it from side to side. The pectoral fins, similar to an airplane's wing, provide lift to keep the shark from sinking and when tilted can also act as brakes. The dorsal fin keeps the shark from rolling.

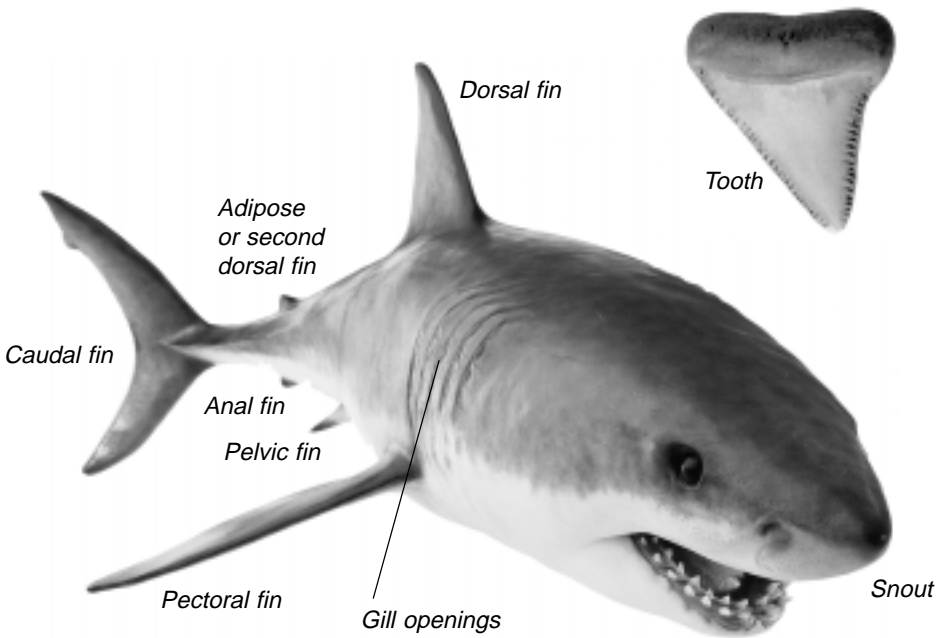
A shark's body is designed to be lighter in water to keep it from sinking to the bottom of the ocean. To maintain buoyancy and keep it from sinking, the shark has an oil-rich bladder that reduces its weight in water. It also has a lightweight skeletal

system. Its skeleton is made up of cartilage, which is much lighter and more flexible than bone.

At present, there are over 375 species of sharks living in the oceans of the world. While all sharks have some characteristics in common, every species has its own unique physical and behavioral features. Some species of sharks grow to be only 8 inches (0.2 meters) long (lantern shark) while others are as large as 40 feet (12.1 meters) (whale shark). Approximately 40% of species have a different body form than the “typical” shark. Some sharks have long tail fins; while others have short fins. Some sharks have anal fins; others don't. Some sharks are flat and wide; others are long and narrow. Some sharks have two dorsal fins; others have only one. These species have become specialized, their bodies have adapted to their individual ways of life.

Three interesting and diverse sharks are the great white, the hammerhead, and the thresher shark.

GREAT WHITE SHARK



The Great White Shark is probably the most notorious shark of all the species. The hit movie “Jaws” gave the general public

the impression that the huge shark purposely stalked human beings. Tales of the monster from the deep have filled newspapers around the world describing the occasional shark attack with all its gruesome details. This giant creature may have been wrongly accused of being one of man's aquatic predators. It probably can't tell the difference between one of its regular meals (seals) and a person who might be in the water. If its hungry, it will try to eat anything that appears in front of it.

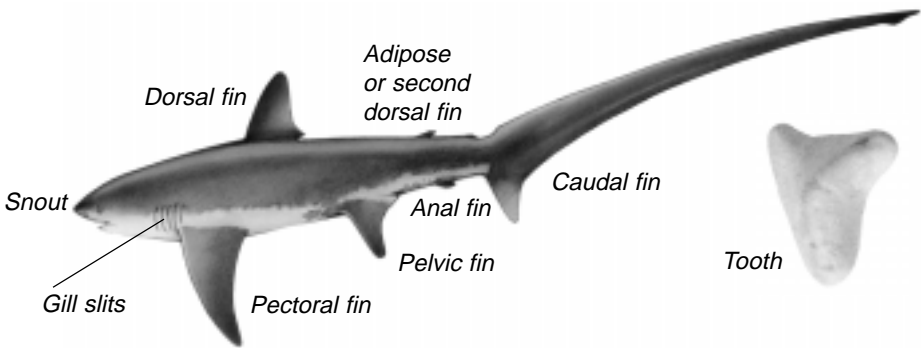
The Great White is a member of the *Lamnidae* family. Sharks in the *Lamnidae* family are also known as Mackerel sharks. These sharks are among the few species of warm-blooded sharks. Warm-blooded sharks are able to maintain a body temperature higher than the surrounding waters. Being warm blooded is important to a predator that has to rely on speed to catch its prey. It has a highly efficient predatory lifestyle. Its body design is almost perfectly hydrodynamic, built for speed and strength. It has a long conical snout and a large mouth with triangular shaped teeth. The teeth are serrated (edged like a saw) and are best suited to grab, cut, and tear prey that is too large to swallow whole.

The great white has large gill slits located directly in front of the pectoral fins. It has very strong caudal keels. The Great White's tail or caudal fin is relatively short and nearly symmetrical. The shark relies on its tail for both low speed cruising and high-speed dashes after fast moving prey.

An adult Great White can grow as large as 23 feet (7 meters) long and can weigh as much as 3000 pounds. This gigantic shark needs a great deal of food to survive. It hunts in the open seas, primarily offshore, searching for anything and everything to eat. Its diet consists mainly of seals, sea lions, sea turtles, birds, and the occasional unfortunate human being who happens to be in the water. The shark's finely tuned sensors (*ampullea of Lorenzini*), located on his snout, lead him to a potential meal. The Great White is one of the few sharks that can stick its head out of the water before and sometime during an attack on its prey. After taking a large tearing bite of flesh, the shark will wait while its prey bleeds to death nearby. Upon consuming an entire carcass, a great white can last two months before needing another one.

The Great White shark can be found in open ocean waters as well as near the coastline. It swims in both warm and cold water. This giant shark roams a large area from the surface, inter-tidal, surf line, and enclosed bays, to a depth of 4,000 ft.

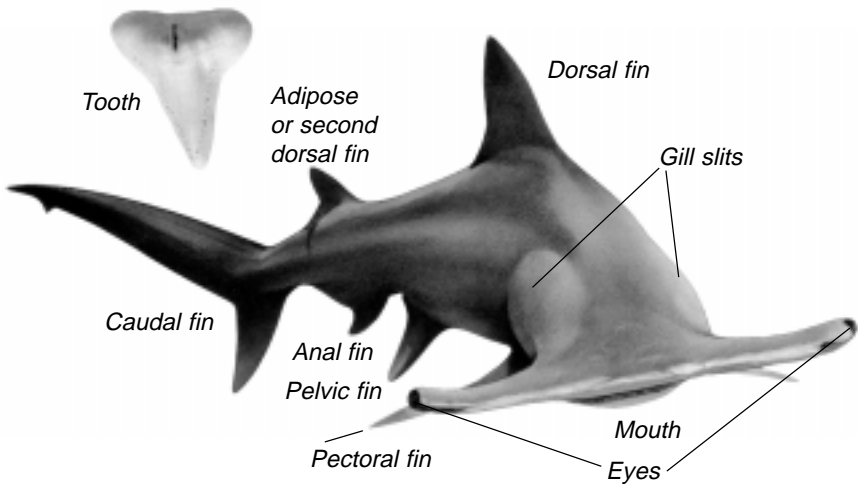
THRESHER SHARK



The Thresher shark is a member of the *Alopiidea* family. Like the Great White, it is warm-blooded. The thresher can grow to be 20 feet (8.7 meters) long. Its unique feature is its gigantic caudal, or tail fin. This caudal fin is as long as its body! The thresher's tail is its principal means of obtaining food. Its jaws and teeth are relatively weak, making it difficult for the shark to catch its prey. A thresher has been seen lashing a fish again and again with its tail to stun it so it could be swallowed. It is the only shark known to use its tail in this way. Threshers are powerful swimmers and can jump completely out of the water. Because of their power and jumping abilities, recreational fishermen consider thresher sharks prized catches.

The thresher has large eyes, a short conical snout, and a small mouth with small blade-like teeth. It lives in temperate and tropical waters. The thresher is considered an active swimmer, following the water currents as the temperature changes. In the winter it tends to be closer to the equator. It can be found swimming in open waters as well as near the coast. Thresher sharks swim near the bottom as deep as 1600 feet (484.4 meters). They feast on small fish, bottom-schooling fish and squid, octopuses, and crustaceans.

HAMMERHEAD SHARK



The hammerhead, one of the most unusual looking sharks is a member of the *Sphyrnidea* family. There are nine different species of hammerhead. They are easily identified when seen from above or below the surface of the water. By their expanded and flattened head which has the appearance of a hammer. Their eyes are located on the tips of either side of the head. It is thought that the shape of the head aids the sharks maneuverability and sensory capabilities. By moving the head it can quickly turn, dive, and ascend. As it swims, it moves its head from side to side to get a wide view of its surroundings. The hammerhead is always looking for a good meal and with the help of the many sensors on its snout (*ampullae of Lorenzini*) it finds its prey. Also located on the snout are the organs that detect scent. It is believed that hammerheads use the sensory organs on their head to navigate over long distances at sea. They may actually be able to detect the Earth's magnetic field to accomplish this.

Although there have been few reported attacks on humans, hammerheads are on a list of extremely dangerous sharks. Most attacks occurred in shallow water when the sharks are hunting for food. They swim in warm temperate and tropical waters. Hammerheads are very active swimmers and follow the warm water currents. They can be found in coastal and offshore and insular waters. Hammerhead sharks feed on bony fish, squid,

crustaceans, and stingrays. They are apparently immune to the poison in the stingray's sting.

Great White Color

Slate brown to black on back. White to gray on bottom. Teeth are creamy white.



Thresher Color

Gray to dark gray on back. White to gray on bottom. Teeth are creamy white.

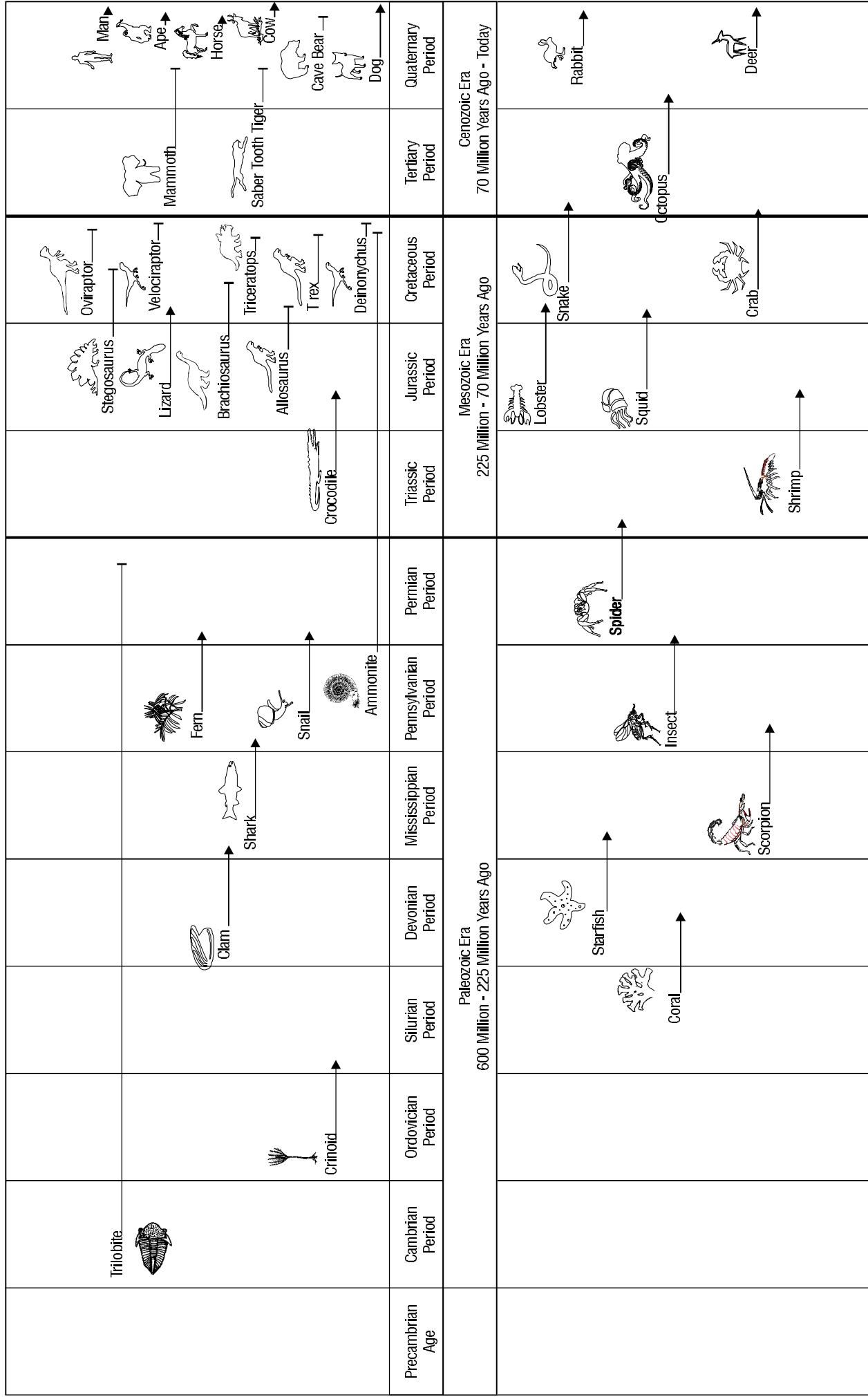


Hammerhead Color

Ash-gray on back. White to gray on bottom. Teeth are creamy white.



Time Line



Still Exists
 Extinct

Origin and extinction dates are approximate and should only be used for general estimates.

BIBLIOGRAPHY

- Allen, Thomas B. (1996), *Shadows in the Sea: the Sharks, Skates and Rays*, Lyons & Burford, New York
- Banister, K. (1985), *The Encyclopedia of Aquatic Life*, Facts on File, New York
- Cousteau, Jean-Michel; Richards, M. (1992), *Cousteau's Great White Shark*, Harry N. Abrams, Inc., New York
- Halstead, B. (1992), *Dangerous Aquatic Animals of the World: A Color Atlas*, Darwin Press, Princeton, New Jersey
- MacQuitty, M. (1992), *Eyewitness, Shark*, Dorling Kindersley Limited, UK
- Migdalski, E.; Fichter, D. (1976), *Fresh & Salt Water Fishes of the World*, Alfred A. Knopf, New York
- Stevens, John D. (1987), *Sharks*, Facts On File, New York
- Wheeler, A. (1975), *Fishes of the World*, Macmillan, New York

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