

Sharks vs Bony Fish

About 400 million years ago fish split into two different classes (groups). The first is called Chondrichthyes, the sharks, rays and chimeras. The second is called Osteichthyes, the bony fish. Even though they shared a common ancestor, the two groups have taken very different evolutionary paths.

Skeleton

The biggest difference between the two groups is their skeletons. The bony fish have an internal skeleton made of calcified bones, like yours. The sharks have an internal skeleton composed of cartilage, a lightweight and flexible material found in your joints, nose and ears. The upper jaw of a shark is not attached to their skulls, it can move independently. In the bony fish, the upper jaw is attached to the skull.

External Features

The bony fish have a protective bony plate that cover their gills, however the gill slits of a shark are exposed and vulnerable to injury. Sharks have eyelids, some species even have a third eyelid called a nictating membrane. Bony fish on the other hand have no eyelids and are unable to protect their eyes. This skin of a shark is covered in modified teeth called dermal denticles, a perfect design to minimize drag while swimming. Bony fish are covered in flat scales that grow as they do, the rings on their scales can be counted to estimate age. This doesn't work with the dermal denticles of a shark as they are shed throughout their life. The fins of a bony fish have thin, bony spines and muscle that allow them to raise and lower their fins and swim backwards. Shark fins are composed of cartilage and are rigid, unable to fold down or assist a shark in swimming backwards.



Internal Features

Sharks and bony fish both have hearts with 4 compartments, but the forth compartments differ in function. In the shark it is a contractile cardiac muscle, while in the fish it's a non-contractile smooth muscle. The bone marrow of bony fish produce red blood cells which carry oxygen through the body. Since a shark is composed of cartilage there is no bone marrow, other organs like the spleen and thymus are responsible for producing red blood cells.

Bony fish have an organ called a swim bladder that they use to maintain neutral buoyancy in the water by exchanging gases between the bladder and the blood vessels. Sharks don't have a swim bladder, their cartilaginous skeleton and large livers filled with oil help them maintain neutral buoyancy in the water.

Life History and Reproduction

Sharks grow slowly and tend to reach a larger size than most fish. They take a long time to reach sexual maturity and when they do, they only give birth to a small number of well developed pups. They can repeat this multiple times over a long life. Bony fish on the other hand grow very fast and reach sexual maturity at an early age. They produce thousands of small, underdeveloped offspring. Some species of fish die after one reproductive cycle. Most fish reproduce through external fertilization, releasing egg and sperm into the water. Sharks practice internal fertilization with the embryo spending a period of time developing in the mother's uterus.

Some Common Ground

Sharks and bony fish are adapted to live in a variety of marine and freshwater environments. Both also have a 6th sense called the lateral line system that allows them to detect changes in pressure in the water environment.