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Shark Facts

There are an estimated 350 species of sharks, ranging in size from 8 in. (dwarf dogshark) to 40 ft. in length (whale shark). All of these sharks belong to the class Chondrichthyes. Sharks and their relatives rays, skates, and guitarfish have skeletons made out of cartilage, not bone. Another difference between sharks and bony fish are the exposed gill slits (5-7) of sharks that are covered on bony fish by an *operculum*. Shark skin is covered with modified scales called *dermal denticles*, which literally means "skin teeth". The dermal denticles are what gives some sharks the characteristic feeling of sandpaper. As the shark grows, the smaller denticles are shed and replaced by larger ones (similar to the replacement of the teeth in their mouth). Sharks have 3 to 7 rows of teeth in their mouth, of which only one row is used at a time. The others are replacement teeth that will fill the gap when a tooth is lost, as is done after nearly every meal. The teeth aren't attached to the tough cartilage of the jaw, rather they lie in a tooth bed from which they easily come loose. Most sharks replace each tooth individually as they fall out, but some sharks replace an entire row of teeth at a time.

SHARK SENSES

Sharks share our 5 general senses: sight, hearing, smell, taste and touch. They also have two additional senses that allow them to detect movement – the lateral line system and the ampullae of Lorenzini.

SIGHT- The location of sharks' eyes on either side of the head allow for a wide field of vision. The eyes are also developed to adjust to the limited amount of light underwater, allowing some sharks to see rather well. A shark's pupil will expand and contract depending on the amount of light, unlike most bony fishes. This enables the shark to use all available light to see clearer images. Sharks have photoreceptors (cones) which provide color vision and the ability to see good detail in daylight.

SOUND- Sharks and rays have acute hearing, despite their lack of external ears. The inner ear is well developed, allowing sharks to respond to low frequency sounds. Receptors within the ear, which are connected to sensory pores on top of the shark's head, pick up sounds. Sharks are most receptive to irregularly pulsed sounds. Distressed fish, an easy target, will swim in erratic patterns that produce the noise that attracts sharks.

SMELL- Two chambers that lie inside the shark's nostrils aid only in smell, not in breathing. When the shark swims forward water passes through the nostrils to the sensitive tissue that detects odor. A shark's sense of smell is impressive: a shark can detect one drop of fish blood diluted 1 part blood per 100 million parts per water.

TASTE- Sharks have small bumps in their mouths that contain numerous taste buds. This means that sharks do taste their food and will refuse a meal if it isn't palatable.

TOUCH- All sharks have free nerve endings beneath the skin's surface that are touch receptors. These receptors allow a shark to feel movement in the water. Some sharks, mostly bottom dwellers like nurse sharks, have *barbels*. These protrusions near the mouth aid in the detection of food.

AMPULLAE OF LORENZINI- These small gel-filled pores located around the snout can be seen when looking at a shark closely. The pores are electroreceptor organs, which means they are an electrical means by which sharks detect movement. Living animals produce weak electric fields from muscle movement and electrochemical reactions inside their body. Ampullae of Lorenzini contain nerve cells that respond to electrical stimuli. This is only effective when the shark is close to the object producing the electric field.

LATERAL LINE- The lateral line is a thin line that extends from the snout down the side of the body to the tail. It can be found on bony fish and sharks. This line contains many sensory cells. These are actually pores filled with water and each pore has one hair in it. The hair is stimulated by movement, therefore detecting motion in the water. When an object moves through water it creates compression waves, which are detected by the ear, and displaces water, which is sensed by the lateral line.

Both AMPULLAE OF LORENZINI and the LATERAL LINE are systems that work by tiny hairs located in canals under the skin vibrating with the impact of electric currents. Once the movement is detected a message is sent to the brain.