

Five Senses Background

Introduction

Like humans, fish have all five senses.

Five Senses

The five senses include sight, smell, taste, hearing, and feeling. In fish, the hearing and feeling senses work together.

Sight

The eyes of a fish are not much different than that of a human. However, they lack true eyelids. Why? Because their eyes are under the water at all times, and thus no need for eyelids. Some fish have better vision than others. Some only have the ability to see light and dark and others can see in colorⁱ. The main difference between the human eye and a fish eye is the shape of the lens. Humans have a flat or dish-like lens, while a fish lens is spherical or globularⁱⁱ.

Smell

Fish have nostrils, four to be exact, called nares, which are located on the snout above their mouths. Under the skin just below the nare openings, are small sacs, which contain smell receptors. Water, carrying scent, moves through the sacs. The sacs are connected to the brain of the fish by olfactory nerves, allowing the fish to smellⁱⁱⁱ. Some fish, like sharks, have an extremely acute sense of smell.

Taste

Fish are able to taste with their snout, mouth, tongue, and throat. A fish's tongue has taste buds just like a human; however they are unable to retract their tongue. Walleye have taste buds located on their heads, as well as in their mouths, and can actually taste lures or bait by bumping into them with their face. Catfish have whiskers, called barbells, loaded with taste buds. They use their whiskers to feel around in the mud and when they find something tasty they stop and bite it! For fish, the tongue can only move when the lower jaw of the fish moves^{iv}.

Hearing/Feeling

Fish have two ways in which they can hear; via otoliths and a lateral line. Fish have inner ear bones, called otoliths, in their skull that allow them to hear. Tiny cilia like hairs located on the otolith are stimulated by the movement of the fish through the water and interpreted as sound by the fish's brain. Some fish have higher sensitivity hearing. This is determined by the proximity of the swim bladder to the otolith. In carp and catfish, the swim bladder is located close to their inner ear and connected to the otolith by a system of bones called the Weberian ossicles, thus giving them better auditory skills. Fish with reduced swim bladders, such as flat fish, have a lowered hearing ability due to the greater distance between the swim bladder and otoliths. The vibrations in the water cause a pulsing movement in the swim bladder, which can stimulate the otolith, giving fish the ability to hear^v.

Fish have another sensory organ called the lateral line, which allows them to hear and feel things in the water. The lateral line is a mucus-filled tube along the fish's body, which connects with the outside environment through tiny microscopic holes^{vi}. The lateral line can

extend the entire length of the fish's body from their skull to their tail. Located just under the skin, the lateral line consists of patches of neuromasts or sensory receptors. When the hair cells, or cilia, in the neuromasts are displaced, the fish can feel^{vii}. This organ can assist the fish in determining water currents, finding direction in turbid or dark water, and feeling the presence of nearby objects.

Vocabulary

- Gills: Organ a fish uses to obtain oxygen from the water
- Lateral Line: Organ a fish uses to “feel” low vibrations; tiny microscopic pores
- Nares: Organ a fish uses to smell; similar to nostrils
- Scales: Protective cover on a fish; similar to skin
- Slime: Covers scales; layer protects from bacteria, parasites, etc.

ⁱ Braun, Linda and C.B. Bylander. Minnesota Department of Natural Resources (MN DNR). *Young Naturalist*. “Fish Sense.” May-June 1996. 10 October 2008
<http://www.dnr.state.mn.us/young_naturalists/fishsense/index.html>.

ⁱⁱ Maryland Department of Natural Resources (MD DNR). “Fisheries Biology and Management” 10 October 2008
<<http://www.dnr.state.md.us/education/envirothon/FISH%20ANATOMY.pdf>>.

ⁱⁱⁱ Pennsylvania Fish & Boat Commission. “Catching Fish Requires a Little Fish Sense.” 10 October 2008 <<http://www.fish.state.pa.us/water/fish/senses.htm>>.

^{iv} Braun, Linda and C.B. Bylander. MN DNR. *Young Naturalist*. “Fish Sense.” May-June 1996. 10 October 2008
<http://www.dnr.state.mn.us/young_naturalists/fishsense/index.html>.

^v Office of Marine Programs. Discovery of Sound in the Sea (DOSITS) “Animals and Sound in the Sea.” 10 October 2008
<<http://omp.gso.uri.edu/dosits/animals/produce/2f.htm>>.

^{vi} Maryland Department of Natural Resources

^{vii} Parmly Hearing Institute of [Loyola University Chicago](http://www.parmly.luc.edu). “Lateral Line Physiology and Anatomy.” 10 October 2008
<http://www.parmly.luc.edu/parmly/lat_line_phys_anat.html>.