A Short Note on Sensory Systems in Fish

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Perspective

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DESCRIPTION

The sensory organs of most fishes are highly developed. The colour vision of nearly all day fish is at least as effective as that of humans. Chemoreceptors, which are responsible for remarkable perceptions of taste and smell in many fish, are also present. Many fish, despite having ears, may not be able to hear very effectively. The lateral line mechanism, which senses gentle current flow and vibrations as well as the motion of neighboring fish and prey, is found in most fish. Sharks can detect frequencies between 25 and 50 Hz using their lateral line.

For most fish species, vision is a key sensory system. The eyes of fish are comparable to those of terrestrial vertebrates such as birds and mammals, but they have a more spherical lens. Most species have colour vision and have both rod and cone cells in their retinas (for scotopic and photopic vision). Some fish are able to sense ultraviolet light, whereas others are able to see polarised light. The lamprey has well-developed eyes among jawless fish, whereas the hagfish has just primitive eyespots.

Aquatic animals and fish have a distinct light environment than terrestrial animals. Because water absorbs light, the intensity of light accessible falls rapidly as depth increases. Varying wavelengths of light are absorbed to different degrees due to the optic properties of water. For example, light of long wavelengths is absorbed very quickly compared to light of short wavelength (blue, violet), while ultraviolet light is also absorbed quite quickly. Aside from these fundamental properties of water, salts and other compounds in the water can cause various bodies of water to receive light of different wavelengths.

For most fish species, hearing is an important sensory system. Underwater, where sound travels quicker than in air, the hearing threshold and capacity to locate sound sources are lowered. Underwater hearing is based on bone conduction, and sound localisation appears to be based on amplitude variations perceived by bone conduction. As a result, aquatic organisms such as fishes have a more specialised underwater hearing system. Fish use their lateral lines and otoliths to detect sound (ears). Some fish, such as carp and herring, have swim bladders that allow them to hear.

Although it is difficult to test sharks' listening, they may well have a keen ability to hear and can detect prey from great distances. Through a tiny canal, a small aperture on each side of their head leads straight into the inner ear. The lateral line has a similar structure and is exposed to the environment through a series of lateral line pores. This serves as a reminder of the common ancestor of the acoustico-lateralis system, which consists of two vibration- and sound-detecting organs. The external aperture into the inner ear has been removed in bony fish and tetrapods.

The lateral line, which is seen in fish and other aquatic amphibians, is a water current detecting system made up largely of vortices. Low-frequency vibrations also affect the lateral line. Its primary functions are navigation, hunting, and learning. Hair cells serve as mechanoreceptors, and the same hair cells serve as mechanoreceptors for vestibular sensation and hearing. A lateral line is used by fish and some water amphibians to detect hydrodynamic stimuli. This system is made up of neuromasts, which are a series of sensors that run the length of the fish's body. Based on whether the hair cells from which they originate are deflected in the desired or opposing direction, afferent nerve fibres are either activated or inhibited. Within the brain, lateral line neurons produce somatotopic maps that tell the fish of the direction and magnitude of flow at various points.