Fish Make Sense – NMEA 2006

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Ocean Literacy Objective:

The ocean supports a great diversity of life and ecosystems.

Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms that do not occur on land.

Activities

LIGHT IS A LIMITING FACTOR IN THE OCEAN – BIOLUMINESCENCE CAN HELP

All that Glitters… - see attached NOAA Ocean Explorer Handout.

Demonstration: Light Stick – *a light stick simulates bioluminescence. The chemical reactions in the light stick produce light similar to those that cause bioluminescence in living organisms.*

Sea Fireflies – See bioluminescence! Combine a few ostracods, *Cypridina hilgendorfii,* with two drops of water in the palm of your hand & crush. Soldiers in WWII used this blue light at night.

HOW DO FISH COMPENSATE FOR A LACK OF LIGHT?

Chemoreception – *put a drop of red food coloring into the bottle of water. Watch how quickly diffusion occurs. The physical process of diffusion is what enables fish to find food sometimes at great distances. Fish use smell not only to help them find food, but to find migration routes, schooling buddies, and mates.*

Electroperception – *Some fish can sense the electrical currents generated by living things. Use the shark (compass) to find the ray (magnet) hidden in the sand.*

Sound – *Sea World's Sound in Air vs. Water Activity. Students stand in a circle about 2 feet apart. This represents air with its molecules far apart. One student leans to the right and bumps shoulders with the next student in the circle who bumps the next student and so on. Like dominos, the sound wave travels through the circle. Next, ask students to move closer standing shoulder to shoulder. This represents water with its molecules close together. Repeat bumping shoulders and see how quickly the sound wave travels through water! Sound travels faster in water than on land.*

Lateral Lines – *Tap the tuning fork on the table and quickly place it in the container of water. See the sound waves! The lateral lines of fish detect sound waves and movements in water.*

GETTING AROUND IN A LIQUID

Swim Bladders – *A lot of fish regulate their position in the water column with a gas filled sac called the swim bladder. The more gas it has the higher the fish floats. The less gas it has the lower it sinks. Partially fill the eye dropper with water and put it into the water bottle. Tightly secure the cap. Squeezing the bottle will increase the pressure forcing more water into the dropper. This addition of water will increase the density of the dropper and cause it to sink. Release the bottle and pressure drops. The extra water exits the dropper, air fills the gap, density decreases and the dropper rises. This activity, also commonly called the Cartesian Diver Activity, represents the function of a swim bladder.*

Demonstration: Oil Density Bottle – *Replace half the water of a water bottle with baby oil. Add a few drops of food coloring. The less dense oil floats on top of the more dense, colored water. Sharks have huge livers that produce a tremendous amount of oil. Since they lack swim bladders, sharks use the oil to decrease the density of their bodies and increase their buoyancy.*

A Few Resources Related to Fish Senses

Ocean Explorer
http://oceanexplorer.noaa.gov
Explorations and related lesson plans.

Harbor Branch Oceanographic Institution - Bioluminescence
http://www.biolum.org/
Great information about bioluminescence in the ocean.

The Bioluminescence Web Page
http://www.lifesci.ucsb.edu/~biolum/
Detailed information about bioluminescence.

Sea Firefly Ostracods – Carolina Biological Supply Co.
www.carolina.com 800-334-5551
Item # 20-3430 – 500 mg, $45.95 / 1 gram, $69.95

Sea World – Fish Senses
http://www.buschgardens.org/infobooks/BonyFish/senses.html
A nice summary of senses of fishes.