



LESSON 3

Deep Sea

Grades 4 to 7

Objectives

- Identify at least 2 different deep sea species and their adaptations.
- Describe what bioluminescence is and give ocean examples.
- List challenges to living in the deep ocean and to studying it.
- Show evidence that there is stronger pressure in deeper water.

Materials

Video: *Undersea Explorer: Oasis of the Deep*

Publication: *National Geographic Magazine*, “Way Down Deep” by Virginia Morell, page 36, June 2004

Book: *Creeps from the Deep* by Leighton Taylor

Book: *Nature Facts: Fishes* by Len Cacutt “Lights of the Fish World”, page 54

Publication: *Ocean News Issue 1: Exploring the Fluid Frontier*, Bamfield Marine Station, Bamfield, BC VOR 1B0 (*Ocean News* can be ordered from the above address. This issue includes activities and information about the deep sea, hydrothermal vents, and Meet a Scientist – Dr. Verena Tunnicliffe.)

Book: *The Winking, Blinking Sea* by Mary Batten, 2001

Book: *Oceans for Every Kid* by Janice Van Cleave, 1996, page 166 – 167.

Station 1: 2 yogurt containers, 1 with 3 holes the same size punched into the side of the container at 3 different levels and a water pitcher

Station 2: Box with blue cellophane over a hole at one end. Cut out paper fish shapes from white, yellow, red, blue, and green paper. Put the paper fish on black paper at the other end of the box. Graph of colour light absorption with water depth from book: *Oceans for Every Kid* by Janice VanCleave, page 168.

Station 3: Pictures of deep sea creatures from reference books above or other sources. Black construction paper and glitter glue.

Station 4: 2 film canisters and a container for water.

Concepts

- Water pressure increases as ocean depth increases.
- Animals in the deep sea (abyss) have adapted different ways to survive.
- There are challenges to living in and studying animals in the deep sea.

Activities

1. Introduction

Look at a map of Haida Gwaii (The map from *Gowgaia Institute* showing bathymetry around the Islands is good.) Have students notice which parts are dark blue (deeper) and which are lighter blue (shallower).

Where is the ocean very deep?

A: On the west coast of Haida Gwaii.

Watch a clip of *Under Sea Explorer* where students decorate styrofoam cups and the scientists take them to the bottom of the ocean in a net. When they re-surface, the cups are about the size of a thimble. They also show scientists examining specimens and Verena Tunnicliffe is interviewed. She talks about the deep sea hydrothermal vents.

2. Adaptations to life in the deep sea

What are some challenges for animals that live in the deep sea zone?

A: No light, no plants, can't see easily, cold, thick ooze on the ocean bottom, little food and lots of pressure. Water exerts pressure. As the depth of the water increases so does the pressure.



How are some of the creatures adapted to survive?

A: Bioluminescence, tripods (so they don't sink into the ooze), light organs, males parasitic on females, etc.

Read the book *The Winking Blinking Sea*. The description of bioluminescence and the photos are excellent. Discuss the creatures in the book – bioluminescent jellyfish, dragon fish, flashlight fish, fire worms. Talk about the fact that humans know more about the moon than they do about the ocean.

Station Activities

Station 1. Pressure (activity from *Ocean News*)

1. Put the yoghurt container with the 3 holes in it inside the other yoghurt container.
2. Fill the inside yoghurt container (one with holes) with water from the pitcher.
3. Remove the outside yoghurt container and quickly set the container with holes on the edge of the counter.
4. Observe the distance each stream of water squirts from each hole.

Why does one stream squirt farther than the others?

A: Water pressure increases with depth because of the weight of the water pushing down from above. The greater the pressure, the farther the stream of water squirts, so the stream of water coming from the bottom hole goes the farthest.

Station 2 Colours in the Ocean (activity from *Ocean News*)

Look through the blue cellophane. What colours of fish do you see? Are any of the fish easier to see?

A: There is a white, red, yellow, green and blue fish. It is easier to see the blue and green fish.

If you were a fish trying to hide in the ocean, what would be the best colour for you to be?

A: Red. A fish that is red at the surface in white light is very well camouflaged at 10 metres. Red light is missing below this depth because it is absorbed by the water and can't be reflected back to the eyes of a predator.

Sunlight is made up of colours and each colour can travel a certain distance in seawater. What colour of light reaches the greatest depth?

Look at the graph of colour light absorption from *Oceans for Every Kid* to see how far colours travel in seawater.

A: Blue travels the deepest. That is why below the ocean surface, the world looks blue.

Station 3. Deep Sea Creatures

Look at the 3 zones: the sunlight zone, the twilight zone and the midnight zone. (from: *Oceans for Every Kid* by Janice Van Cleave, 1996, page 166 – 167.)

How did you think they got their names?

A: The sunlight zone is closest to the surface so it receives the most sunlight. The twilight zone is deeper and receives less sun. The midnight zone is so deep that no sunlight reaches it.

Look at the books about deep sea creatures. Read about some of the creatures in the deep sea.

On black construction paper, draw one or two creatures from the deep sea. Add sparkle glue for bioluminescence.

Station 4. Submarines (activity from *Ocean News*)

Put a little water in one film canister and fill the other completely with water. Put them both in the pan of water. Observe what happens to these pretend submarines.



How does a submarine move up and down?

A: An object such as a submarine will descend when it is denser than the surrounding water.

To make itself heavier, the submarine can flood tanks inside it that are called ballast tanks. To rise from the depths, a submarine must be less dense than the surrounding water.

Can you describe 2 ways for the pilot to make the submersible less dense?

A: The submarine could (1) release some water from the ballast tanks or (2) pump ballast tanks with air to increase buoyancy and float.

Conclusion

- Review deep sea concepts by going over answers from the four Stations.
- Have an Abyss Art Show with the creatures from Station 3.