Day 3: Understanding the outdoors

We will teach the children why some things in nature happen and why it important to take care of it.

How clean is that water?

Materials:

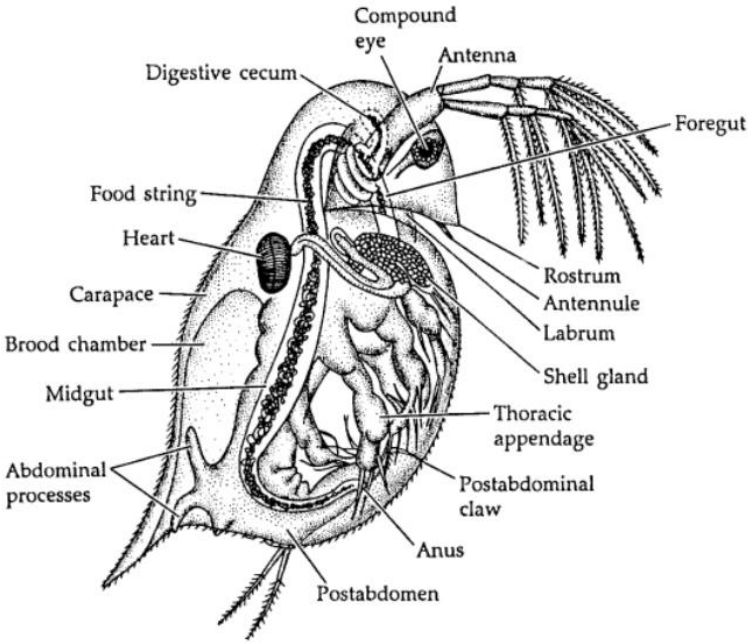
- Daphnia
- Water
- Salt water
- Water with oil
- Water with detergent
- Petri dishes with divisions
- Plastic pipettes
- Food for daphnias
- UV light
- Microscope

Activity:

Do you guys notice how many things we use on the roads that end up in the water? Like salt during the winter, soap when we clean our cars and the oil from cars? All these things are on the road and whenever it rains, all of that falls into the rivers. Do you think this is healthy for the animals that live in the water? *Wait for responses.* Not really, right? Today we will do an experiment to show how good or not so good those things are to the environment.

Here I have daphnias, they are small insects that live in the water. They will help us know if salt water, soapy water or water with oil is harmful to animals. We are going to place them in those types of water. What do you think will happen to them? *Wait for responses and have them write their hypothesis in their notebooks.* To test this, I'm going to need you guys to divide yourselves into pairs. Now each of the pairs are receiving 2 dishes that are divided and the different types of water. Write under the petri dish division only one type of water. Now add a bit of that water into the dish. You will do two types of water and your partner will do the other two. Now we are giving you daphnias and a pipette. With the pipette transfer 5 daphnias to each side of the dish. And let them swim there for a while.

We have set up small microscopes for you to see how a daphnia looks like. *Point to them different body part of the daphnia.*



Now let's see how our daphnias are doing. There is something I didn't tell you about the different types of water, we added to the water a special food that when the daphnias eat it they glow. We are handing you now UV lights. I need you to shine the light to the side of the dish and count how many daphnias are glowing. If the daphnias are glowing then they are healthy, if the daphnias are not glowing then they are sick. Write down in your notebooks how many daphnias are glowing in each type of water.

We are going to quantify all the data from the classroom in a table. *Ask each pair to tell you how many daphnias are alive in their dishes and write it down in a table in front of them.* Which water had the most daphnias healthy? *Wait for responses*. Which one had less? *Wait for responses and tell them to write it down in their notebooks.* See how what we add into the water can have effects in the life of the animals around us?

Student notebook

What do you think will happen to the daphnias?

	healthy	**sick**
Water		
Salt water		
Oily water		
Soapy water		

How many daphnias are glowing?

Your results:

	Number or glowing daphnias
Water	
Salt water	
Oily water	
Soapy water	

The classroom's results:

	Number or glowing daphnias
Water	
Salt water	
Oily water	
Soapy water	

Which water was healthier for the daphnias? _____

Which water made the daphnias sicker? _____

How animals produce light

Materials

- Container to mix solutions
- Luminol solution
- Oxidizing solution
- Plastic pipettes

Activity:

Have you guys ever seen fireflies? What makes them so cool? *Wait for responses*. Yes! They glow, this type of glow is called bioluminescence. Do you know what bioluminescence is? I'll help you a bit, *bio* means life and *luminescence* means light. Therefore, bioluminescence means light produced by a living organism. Although,

fireflies are not the only ones that can produce light. There are many more, like tiny organisms called dinoflagellates that live in the water of some lagoons around the world. And when you shake the water it shines, just like fireflies but in the water! We also have jellyfishes, worms, fungi and many more animals that glow. Most of these animals have a molecule called luciferin that whenever it interacts with the oxygen in the air it produces light.

Today we will recreate this reaction but in our tubes. Since animals aren't producing the light we can't call it bioluminescence, we call it chemiluminescence.

Here in this tube we have a chemical compound called luminol which is similar to the luciferin. And here in this other tube we have hydrogen peroxide, like the one they put on your cuts to clean them. Now hydrogen peroxide has oxygen in it, and remember that I said that oxygen helps create the light in those animals. What do you think will happen then if we add this liquid with oxygen to that one? *Wait for responses and ask them to write it in their notebooks.* Let's see!

Can someone tell me again why did this liquid turned the other one blue?

Student notebook

What will happen if you add the hydrogen peroxide solution to the luminol solution?

_____

What happen after you add the hydrogen peroxide solution to the luminol solution?

_____

How do we get winter, spring, summer and fall?

Materials

- Protractors
- Flashlights
- Graphing paper

Activity:

What season are we in? *Wait for responses.* How many seasons do we have? *Wait for responses.* That is right winter, spring, summer and fall. What characterizes them? *Wait for responses*. Yes, the temperature and the length of the day are the most striking differences. Do you guys know why the temperature changes? *Wait for responses*. The Earth goes around the Sun every year and the distance of the Earth to the Sun doesn't

really change to be responsible for the change in temperature. One thing that does make seasons possible is the tilt of the Earth. The tilt of the Earth changes how the sunlight hits Earth in a certain location. Today we will simulate how seasons happen.

Here we have a flashlight, this will be our Sun today. And here we have graphing paper, this will be the Earth today. You will place the paper in front of the flashlight and shade in the area the light is touching. Later with the using a protractor to measure different angles, we will move the paper a bit back. What do you guys think will happen whenever we move the paper? Will the area that gets light change? *Wait for responses and have them write it in their notebooks.* Let's divide into groups of three for this experiment.

Now place the flashlight in front of the paper and shade the area of the paper that gets the light. Now change the angle of the paper to 10°, shade again the area. Now do the same for 20°, 30° and 40°. Write down how many squares are shaded? Write that number in your notebook. Now count how many squares you shaded. Which angle had the most squares shaded? *Wait for responses.* Which one had less? *Wait for responses.*

Whenever the area illuminated by the sun is less direct and cover a larger area, the surface of the Earth is colder. Which angle do you think represents summer? *Wait for responses.*

Review why the changes in tilt change the seasons.

Student notebook

Will the area with light change when we tilt the graph paper? How?

_____

Degrees	Number of squares
0°	
10°	
20°	
30°	
40°	