

LESSON PLAN FOR BOTTLE BIOLOGY AQUARIUM

Episode One 201 – Creepy Crawly Science (Life Science)

Indiana is home to some very creepy, and sometimes very dangerous, creatures. You may not see them, but our state harbors poisonous snakes and other critters with a bite that can do some serious damage. Host Rick Crosslin explains why even the lowly mosquito can have a large impact on life. Best of all, you'll learn how science teaches us to live in harmony and safety with the creepy-crawlies. Imagine a critter that can grow back an arm! Many of these strange animals have great benefits for people.

Funded by:

Dr. Laura Hare Charitable Trust
Indiana Department of Education – Center for School Improvement and Performance
Veolia Water Indianapolis

Overview

Students will gain an understanding of the

Background information

Layers of rock, sand, soil balls will serve as the habitat for aquatic plants, snails and small fish. Life cycles, growth, development and reproduction of many organisms can be observed.

Connections to the Indiana Academic Standards for Science, Grades 4 - 7

4.1.5, 4.1.9, 4.2.5, 4.4.2, 4.4.3
5.2.3, 5.2.4, 5.2.7, 5.4.4, 5.4.7
6.2.4, 6.4.1, 6.4.2, 6.4.8, 6.7.2
7.1.3, 7.4.2, 7.4.8, 7.4.9



Science Process Skills

- Calculating
- Classifying
- Communicating
- Hypothesizing and predicting
- Inferring
- Interpreting data
- Measuring
- Posing questions

Estimated Time Requirement

One 45- minute session

Materials for building the bottle container

- Recycled clear plastic bottle – small or large (16 – 24 oz)
- Marking pen
- Shoe box or straight edge
- Scissors
- Strong string or twine – about 3 feet
- Sharp pin
- Paper hole punch

Materials for building a terrarium

- 50 cc of gravel – from a creek or stream if possible
- 50 cc of sand
- Water
- Dechlorinator – from a pet store
- Fish food
- Aquatic plant material
- Critters of interest: snails, fish, pond water creatures

Objectives

Students will be able to

1. identify some of the living creatures in an aquatic habitat,
2. create a habitat for a living creature,
3. create a model of a living habitat.

Procedure

Anticipatory set:

- Visit the website: www.IndianaExpeditions.org
- View the *Creepy Crawly Science* Indiana Expeditions segment
- View the video lesson from the this episode
- If available, observe other aquariums and terrariums

Preparation prior to the lesson: Make a bottle container

- Collect and rinse a clear plastic bottle
- Remove the label by running it in hot water, or by using a hair dryer – careful not to burn your hands
- Measure about two thirds up the bottle and make a mark
- Place the clean bottle inside a shoebox
- Push it to the bottom of the box
- Locate the mark made – use this as the guide to make the line around the bottle
- Roll the bottle inside the box – while holding the marker to the bottle
- This will create a line around the bottle
- Remove the bottle from the box
- Use a sharp pin to make a hole along the line
- Place the scissors in the hole and cut along the line
- Save the two parts of the bottle – the top and the bottom section
- Use scissors to make five tabs on the cut edge of the top section of the bottle
- Bend the five tabs outwards
- Use the paper hole punch to make two holes on the top section of the bottle near the cut
- Set aside
- Use the paper hole punch to make two holes on the bottom section of the bottle near the cut
- Tie one end of the twine on the bottom section of the bottle
- Thread the other end of the twine through the hole on one side of the top section
- Thread the twine from the inside of the bottle to the outside
- Then thread the twine into the outside of the other hole on the top part of the bottle
- Pull the thread from the inside of the bottle and then tie it to the empty hole on the bottom section
- This completes the twine hanger for the two parts of the bottle container
- The bottle container is now ready to be filled.

Lesson sequence:

- Inform the students that today they are all going to create a habitat for some aquatic creatures. Elicit from the students some of the things they will need in order to do this. For example, how does the size of the habitat limit the creatures? What types of organisms can be used in the habitat?
- Start the terrarium by collecting the materials listed
- Use the bottom section of the bottle
- Roll up three or four soil balls – and place them in the bottom of the bottle
- Add the 50 cc of gravel
- Add 50 cc of sand
- Carefully add several inches of water
- Plant small pieces of each kind of aquatic plant near the inside wall of the bottle
- Carefully fill the bottle with water
- Add several snails or small fish
- Add other critters of interest from pond water
- Add a small amount of dechlorinator to neutralize the chemicals in tap water
- Slid the top section of the bottle container down – interlocking the tabs

Closure:

- Place or hang the bottle aquarium near a window where it will receive indirect light each day
- Direct sun for hours will overheat the organisms

- Under a lamp is also a good location
- Keep the aquarium filled with tap water
- Water every week or so as needed
- Feed a very, very small amount of fish food each day – only feed what will be eaten in 5 minutes
- Do not over feed – if food from the day before is present – do not feed
- Sow bugs and other organisms; bacteria, fungi, slime molds, mites, insect larvae, worms, nematodes, millipedes, snails, etc may appear in the decomposing leaves
- Observe and measure the plants and animals that grow in the aquarium
- Over time – thin the aquatic plants
- Discuss, as a class and then ask the students how this relates to real-world habitats.

Suggested Student Assessment

Objectives:

Ask students to write and/or illustrate what they did during this activity and what they learned from their participation in the activity.

Extending the Lesson

- Ask students to create other bottle biology containers for different creatures.
- Encourage students to do some research on the different decomposers.
- Other organisms may appear in the aquarium – make note of them.
- Use a hand lens to observe the aquarium. Draw to scale the critter you see.
- Make a TerrAqua column:
 - Use the completed terrarium and aquarium
 - Untie the twine from both the aquarium and terrarium
 - Use all parts of the aquarium
 - Use the bottom part of the terrarium
 - Make a small hole in the bottom of the terrarium
 - Cut a section of thick twine
 - Use a straightened paperclip to push the twine (wick) up into the bottom of the terrarium section
 - The twine will act as a wick to draw moisture up from the aquarium
 - Reassemble the column – by adding the terrarium inside the bottom section of the aquarium
 - Place the TerrAqua column in indirect light



Source of Lesson

Bottle Biology

Adapted from

Paul Williams, PhD.

To learn more, visit the website at www.IndianaExpeditions.org