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Brine Shrimp Feeding

Abstract: Following the Brine Shrimp Anatomy Lesson, this lesson helps students to understand how brine shrimp eat and the size their food has to be. This lesson introduces the measurement unit of a micrometer. Students will be constructing a brine shrimp model mouth. Rice, lentils, macaroni, sugar, etc .will be used as models that imitate the size of brine shrimp food. To assess students' prior knowledge, they will make predictions on a graph in their Science Journals on what model "food particles" they think will filter into the model of the brine shrimp mouth. Students will learn that brine shrimp need correctly sized portions of food in order to eat and survive..

Grade Level: 3rd Grade

Utah Elementary Core Curriculum Standards:

STANDARD: 3030 - 01

Students will explore ecosystems and discover relationships among living organisms and the nonliving world.

OBJECTIVES:

3030-0102

Identify the relationships among living organisms in a habitat.

- Describe different food chains within a given habitat.

In-class instructional time: 20 minutes

Terminology:

Micron-1/10th of a millimeter
Micro algae-algae that can be seen under a microscope that lives in water
Bacteria-One-celled microorganisms that come in three forms: spiral, cocci, and bacilli.

Intended Learning Outcomes:

- Students will predict and record what model food particles can be eaten by the model brine shrimp mouth.
- Students will learn about the measurement of a micron through use of a real ruler and visuals written on the board

Background Knowledge:

It is important to understand how brine shrimp eat and the size of their food in order for them to survive. Since artemia are non-selective filter feeders (meaning they don't care what they pick out of the water), a wide range of food has been successfully used. The criteria for food selection should be based on particle size, digestibility, and solubility (powdered milk wont work). Feeds that have been used include live microalgae such as nanochloropsis and a wide variety of inert foods, which are far more practical for us aquarists. One caveat with inert foods is to be careful not to overfeed. Inert feeds include yeasts, both active and inactive (a brewers supply is the best source, bread yeast is expensive!) micronized rice bran, whey, wheat flour, soybean powder, fish meal, egg yolk, and homogenized liver. Food is not directly consumed, but rather transferred to the mouth in a packaged form. The space between an artemia's legs widens as the legs move forward. Water is sucked into this space from below, and small filtering hairs collect particles including food from the incoming stream. On the back stroke the water is forced out and the food remains in a groove at the base of the legs, this groove has glands that secrete an adhesive material that clumps the food into balls, and microhairs move the food packages toward the mouth. The optimal size for food should be less than 50 - 60 microns.

Materials:

Six clear plastic trays
Food Particle Models: macaroni, rice, yeast, sugar, lentils, shell pasta
Brine Shrimp mouth model: small Dixie cups, netting with holes less than 3 centimeters wide, elastic bands, scissors
Microscopes (dissecting or compound)

Procedures:
Hook: Sea Monkeys explanation
1. Review the size and anatomy of a brine shrimp
2. The measurement of a micron will be introduced and shown over the overhead projector so it will be big enough for the students to see.
3. Students will be asked to predict what brine shrimp eat, what size the food needs to be, how Brine Shrimp eat, and were they are on the food chain.
4. The students then will be given a Dixie cup, glue, scissors, and netting. They will be instructed on how to make a model of a Brine Shrimp mouth.
5. Students will be asked to copy down a graph that will be provided. The instructors will model how to fill it out with the food particles being on the left side and yes/no category on the right side.
6. Before testing their model mouths, they will predict what food particles might go through the mouth and which ones will not.
7. Students will take their model mouths and test them in the trays of model food particles and record their data on their record sheet. Students that finish early will be asked to go back to their seats and draw what a brine shrimp looks like.
8. Discussion will take place on the student's findings. The food chain will be discussed addressing that Brine Shrimp are at the bottom and need the appropriate size of food to survive.

Closure: The students will review the chart. The instructors will then restate that the "food particles" they just put in their model's mouths are not what real brine shrimp eat, but that they are models, just like the brine shrimp model and mouths are models. The instructors will then ask, "What do brine shrimp really eat? Is it important to have the correct size of food particles for brine shrimp to eat, why?" The micrometer will then be reviewed on the overhead with a clear ruler. Students will copy down what a micrometer looks like in their Science Journals.

Assessment Strategies:

Recording Sheet and Model of Brine Shrimp mouth
The criteria should include:

Recording Sheet: Predictions, chart of food particles and information
Model: Completeness and understanding of model

Resources:

http://members.home.net/wmdawes/angels/artemia.htm
http://www.captain.at/artemia/index.html