

Daphnia Study - Lesson/Presentation Plan



Discover
CAYUGA LAKE

Trout in the Classroom

Audience/Grade: 4th Grade and Above, In connection with Trout

Overview: Working in small groups, students hypothesize about the nature of daphnia (or other zooplankton). Then, they will use microscopes to study daphnia anatomy and complete a lab sheet. Based on their observations, students may hypothesize about habitat characteristics that are important for daphnia survival. *This lesson compliments trout-feeding experiment using daphnia.*

Skills/Understandings/Objective(s):

- Anatomy of a small organism- recognize basic parts, systems. (4-LS1-1)
- Microscopy – getting familiar with a microscope.
- Scientific Inquiry: Assessing known information, formulating questions/hypotheses, observation.
- Scientific illustration (labeling anatomy & drawing)
- Microscopes and measurements

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

Timeframe: 30 minutes

Group Size: ~20, Observation teams of 3-4

Preferred Location(s): Classroom setting.

Materials/Preparation:

- Daphnia culture (prepare daphnia before class- see instruction below.)
- Petri dishes, pipettes, micro-filter & squirt bottle ()
- Daphnia Anatomy Labsheets
- Digital or traditional microscopes and wet mount slides.
- Option: digital projector, food coloring for daphnia, light sources....

Motivator/Warm-Up: (10-15 minutes)

1. Have class observe daphnia on digital projector: Explain that *Daphnia* is a kind of tiny animal (called “zooplankton”) that lives in lakes, ponds, puddles, streams...
2. Divide the class into work groups of 3-4: Pose a question for discussion and theory for each group- 3 minutes to discuss amongst themselves. Goal is to get them communicating ideas and accessing information they already have to generate a theory:

Questions to use (discretion of leader):

- Animal/Vegetable/bacteria: which and why?
- How do they move?
- What senses do they use? Or, How do they find food?
- How do they find food? (And/or, What do they eat?)
- Covering: what sort of body covering to they seem to have; what are your clues?
- Why are they difference sizes?
- What body parts do you think you see?

3. Each team will have a spokesperson report on their theory. Listening to each teams, the class will come to some group consensus about these creatures. The class can reconsider any new ideas, after using the microscopes.

Procedure/Activity Summary: (15 minutes)

- Divide the class into groups of 2-4, and explain procedures for microscope use, as appropriate:
 - *Microscopes: review parts and use, as appropriate – image on whiteboard?*
- Each team will need to collect a daphnia sample and prepare a wet slide with a live daphnia.
- Student teams will work together to complete the illustration and questions on their worksheets.
 - *Instructor can use Anatomy Notes provided to guide observations.*
- OPTION: When each team is ready, one student should collect a green algae sample with a pipette to feed daphnia under the microscope. Can they observe daphnia responding to food, how does it feed?

Wrap Up:

- Class discussion of observations.... If available, use projection of daphnia worksheet or digital microscope to review daphnia anatomy.
 - a. Review zooplankton body structure- did they see organs, systems, etc...?
 - i. Elements of internal anatomy/structures
 - ii. Elements of external anatomy/structures
 - b. Based on students' observations, are there any refinements to our original understanding of the creature (our original team hypotheses) that we might want to make?
 - c. Does this creature resemble any other creatures you are familiar with?
 - i. It is a crustacean, like crayfish, etc.... focus on compound eye, shell, ten sets of legs.... Segmentation is visible. Paddle, or leaf-like feeding appendages.
- Do we think that our trout fry could or would feed on these creatures? How might that play out?
 - *Linked to trout via the food web*
 - d. *An indicator of good water quality - because they can't leave*
 - e. What sort of habitat do these creatures need to survive?

Assessment Rubric:

	Needs work	OK	Good
Engagement/Participation	Most students not interested...	Most students need prompting to stay on task	Students are self-motivated, sharing ideas.
Students Understand Anatomy Features	Students cannot identify parts or explain function	Can identify 2 or more features and explain function	Students indicate understanding of some structures, and sequential relationships.
Students understand relevance to trout	Cannot explain foodweb	Understand that there is a relationship	Can name intermediate or other foodweb elements.

ADDITIONAL MATERIALS>>>>>>>>

Daphnia Collection & Filtering Procedure:

Daphnia samples will arrive in a large container. Be sure to return strained water to this container after separating a daphnia sample.

1. Gently stir the main daphnia sample, and pour a portion of the sample into a smaller container.
2. Place the microfilter over the main daphnia sample jar and pour the collected portion back through the filter. *Observe daphnia that are trapped on the filter mesh.*
3. Invert the microfilter over a clean petri dish and use the squirt bottle to rinse daphnia off the filter mesh into the petri dish. *Did you get them all?*
4. Daphnia are now swimming in petri dish in a much smaller amount of water. Instructor or students may use plastic pipettes to remove one at a time for observation under microscope. Petri dish may also be placed under a digital magnifier for observation. Lighting is OK.
5. When done, return daphnia to main jar and rinse all equipment thoroughly.

Green Algae (if available): A small tube of green algae will be provided with your daphnia population.

When you are ready to feed you daphnia, mix the algae culture, remove the cap, and use a pipette to collect a drop or two to transfer to the individual sample daphnia.

Math

Other:

5th Grade:

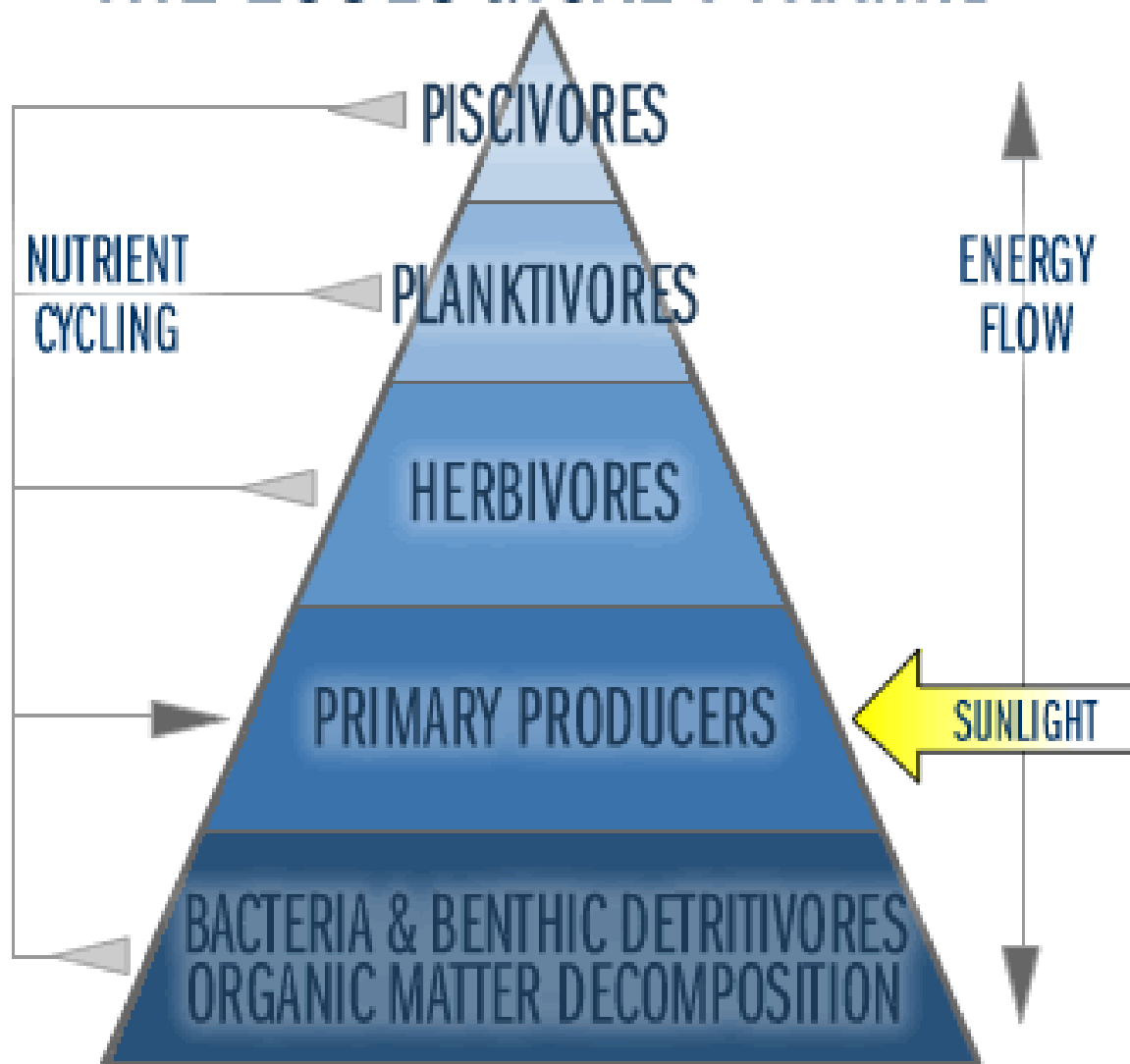
6th Grade: MS-LS2 (Ecosystems: Interactions, Energy & Dynamics)

- MS-LS1-4,5,6,8 (Structures of Organisms)

7th Grade:

NGSS....

THE ECOLOGICAL PYRAMID



FRESH WATER LAKE FOOD/ENERGY WEB

(Lake Meade, USA)

