

Topic: Sexual Dimorphism

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National Science Education Standards:

Content Standard A: Science as Inquiry

Abilities necessary to do scientific inquiry

Understandings about scientific inquiry

Content Standard C: Life Science

Behavior of Organisms

MS Science Frameworks:

1. Apply inquiry-based and problem-solving processes and skills to scientific investigations.
 - a. Conduct a scientific investigation demonstrating safe procedures and proper care of laboratory equipment. (DOK 2)
 - b. Formulate questions that can be answered through research and experimental design. (DOK 3)
 - c. Apply the components of scientific processes and methods in classroom and laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development). (DOK 2)
 - d. Construct and analyze graphs (e.g., plotting points, labeling x-and y-axis, creating appropriate titles and legends for circle, bar, and line graphs). (DOK 2)
 - e. Analyze procedures, data, and conclusions to determine the scientific validity of research. (DOK 3)
 - f. Recognize and analyze alternative explanations for experimental results and to make predictions based on observations and prior knowledge. (DOK 3)
 - g. Communicate and defend a scientific argument in oral, written, and graphic form. (DOK 3)

6. Demonstrate an understanding of principles that explain the diversity of life and biological evolution.
 - a. Draw conclusions about how organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships. (DOK 2)

Objectives:

- Define sexual dimorphism
- Discuss the reasons for and potential advantages of sexual dimorphism

- Identify different types of sexual dimorphism
 - size, color, structure, behavior
- Learn how to determine sex on Crayfish
- Taking measurements and data collection
- Graphing

Engage:

I will show a series of photos of both sexes of several animal species and I will ask what some of the differences are between males and females of each species I show. I will start with obvious things, like color and structural differences, and get more difficult, for example, behavior.

Explore:

The students will measure the length and width of the first claw (Cheliped) of crayfish. This will require them to learn how to determine sex on Crayfish. I will also “suggest” that we might want to measure something else about the crayfish because ‘can’t larger individuals just have larger claws than smaller individuals’. I will demonstrate this by asking students of different heights what their shoe size is. We will pool our results and summarize them into graphs that each student will make. We will state whether our hypothesis was supported or falsified based on these results.

Explain:

We will define sexual dimorphism and discuss the reasons why we see this in many animals. We will define the different types of sexual dimorphism and go back and assign each of the species from our engage activity to the type of dimorphism that is it showing.

Evaluate:

The students will fill out a series of questions on their handout which will begin with simple concepts/definitions, and lead into some critical thinking.

Elaborate:

The final question will basically ask them what our next experiment/next step should be with regards to evaluating sexual dimorphism in Crayfish. I will point out that we only really measured one part of the body on a crayfish that might be different between males and females. We will discuss additional possibilities for future experiments. I will remind them of some additional details of crayfish behavior (e.g. that females carry their eggs on their abdomen) in order to guide them into a new question.