

Dynamic Nature of Science: An Inquiry Approach

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Why Study *Daphnia*?

Researchers use organisms like *Daphnia* to study larger theories and hypotheses that are difficult to test on other organisms in addition to studying the organisms themselves.

The question addressed in this lesson is under active investigation by researchers.

Daphnia are readily available to instructors.

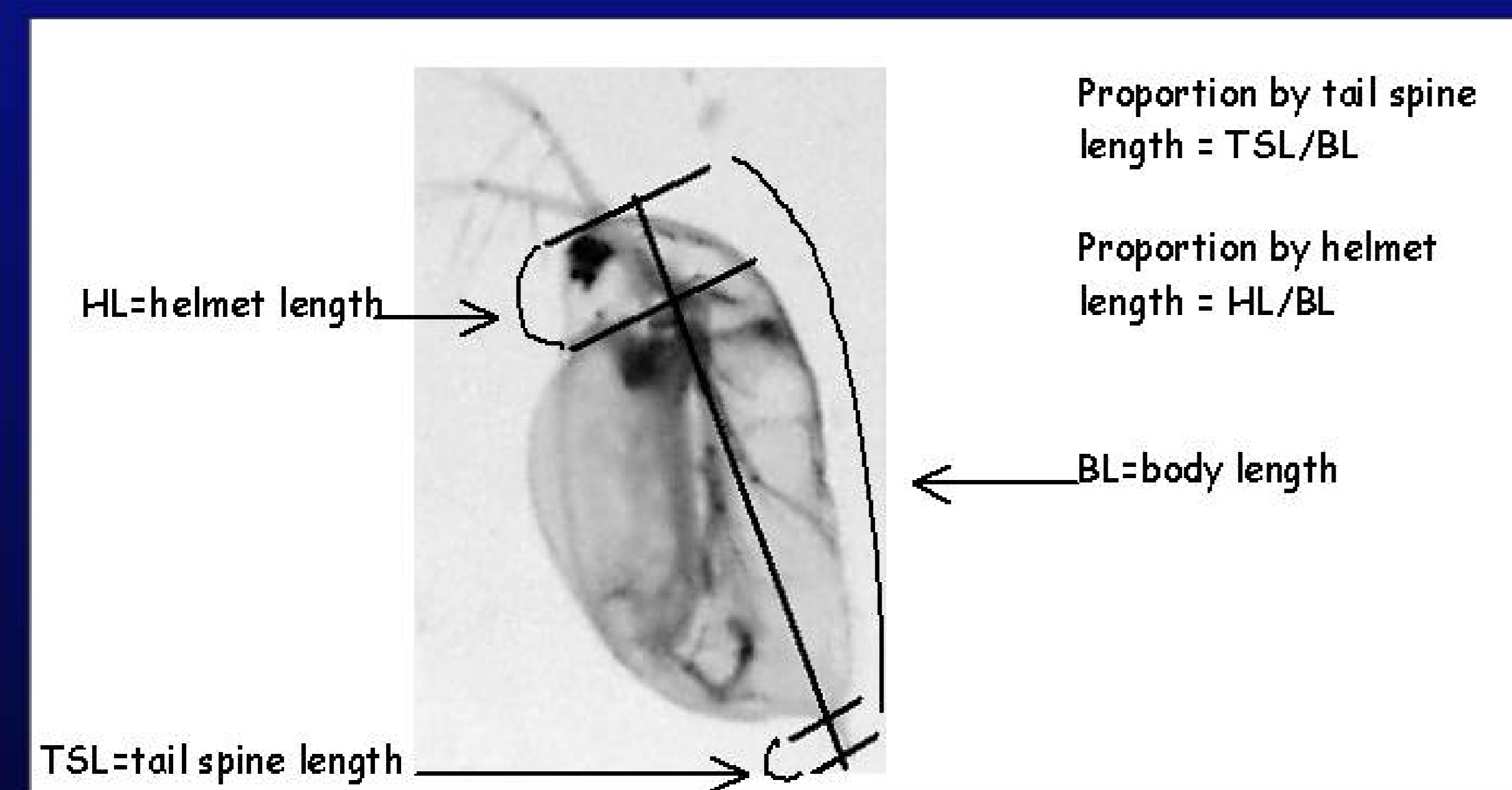
Student experiments run approximately a week and are relatively simple to conduct.

The students can experience how science is conducted and its dynamic nature by exploring how the questions and knowledge of a current research topic have evolved and then participating in the debate themselves

Approach

The most important aspect of this lesson is its approach to teaching the nature of science and scientific thought.

Instead of lecturing at students about a particular topic and having them conduct experiments in which they already know "the answer," students engage in an interactive presentation of the history of a question and then design their own experiments to conduct and test the alternative hypotheses.



The measurements the students will be taking of the *Daphnia*. Proportions will be important when analyzing the data.



Why are their tail spines different lengths?



Lesson

The lesson is split into two main parts: History and Experimentation.

Part I: History

A brief history of researchers' quest, which has lasted more than a century, to understand why *Daphnia* develop tail spines and helmets is discussed.

The discussion emphasizes the evolution of scientific thought regarding the question given.

This culminates with the latest two alternative hypotheses that researchers are currently debating being presented and a summary of an experiment recently published.

Time Length: Approximately 3-5 days

Part II: Experimentation

Students get into groups and decide which hypothesis (or both) to test.

They design and conduct their own experiments.

Afterwards, they have a classroom "conference" in which they present their findings and discuss their conclusions.

Time Length: Approximately 2-3 weeks

For full lesson, see << gk12.asu.edu >>



What Students Learn (According To The Objectives)

How to:

Design and conduct a scientific investigation to analyze alternative explanations for a phenomenon.

Use appropriate tools to analyze, interpret, and display data (e.g. microscopes, measuring devices, proportions, graphs, etc.).

Communicate scientific procedures and explanations.

Describe how scientists develop an understanding of our world through repeated experiments and debates that change over time.

Explain how genes and the environment can interact to produce a trait in *Daphnia* (specifically, tail spines and helmets).

Use critical thinking skills to analyze and evaluate evidence.

What Students Learned (According To A Survey)



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