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# Snails? Incorporating the Nature of Science and Primary Literature into the High School Biology Classroom

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# Incorporating the Nature of Science and Primary Literature into the High School Biology Classroom

Elizabeth Smith

## Methodology

### Research Questions:

1. How does the nature of science benefit high school biology students? How do I incorporate the nature of science in the high school biology classroom?

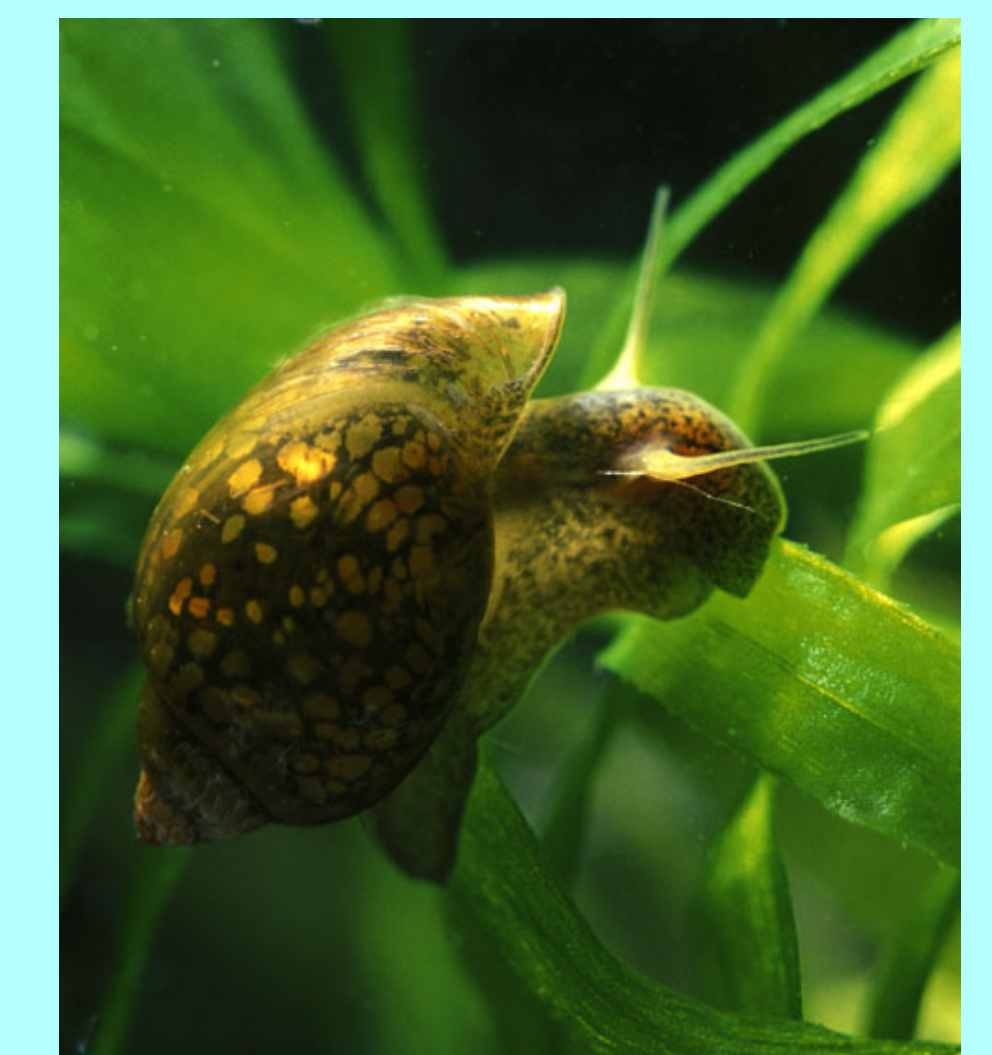
2. Is the use of primary resources in the high school biology classroom beneficial to students?

- The nature of science includes aspects of the origin, nature, methods, and limits of human knowledge in the science classroom. Emphasis was placed on hands-on experiments and primary literature because these two areas incorporate many aspects of the nature of science.

Unit	Purpose	Description
Part 1	Background information about <i>Physa acuta</i>	Read a section from "The Ecology of Freshwater Molluscs." <sup>1</sup>
	Importance of a laboratory notebook and the scientific method	Look at examples of laboratory notebooks.
Part 2	How to collect and safely cut egg masses	Collect early-stage embryos (recently laid egg masses).
	Conduct trials for 4-5 weeks	Record when each snail hatched at each temperature. Students will conduct new trials about once a week.
Part 3	Compile data	Create graphs, posters, etc., and come to conclusions about how temperature effects the development of <i>Physa acuta</i> .
	Read a scientific research article	Students are encouraged to ask questions and think critically about the article.
	Students will present their experimental findings	Use a variety of methods to present findings. Compare to those of the scientific research article read in class.

<sup>1</sup>Dillon, Robert T. Gastropod autecology. In Dillon (author), *The Ecology of Freshwater Molluscs* (66-70). Cambridge; New York: Cambridge University Press, 2000. Print.

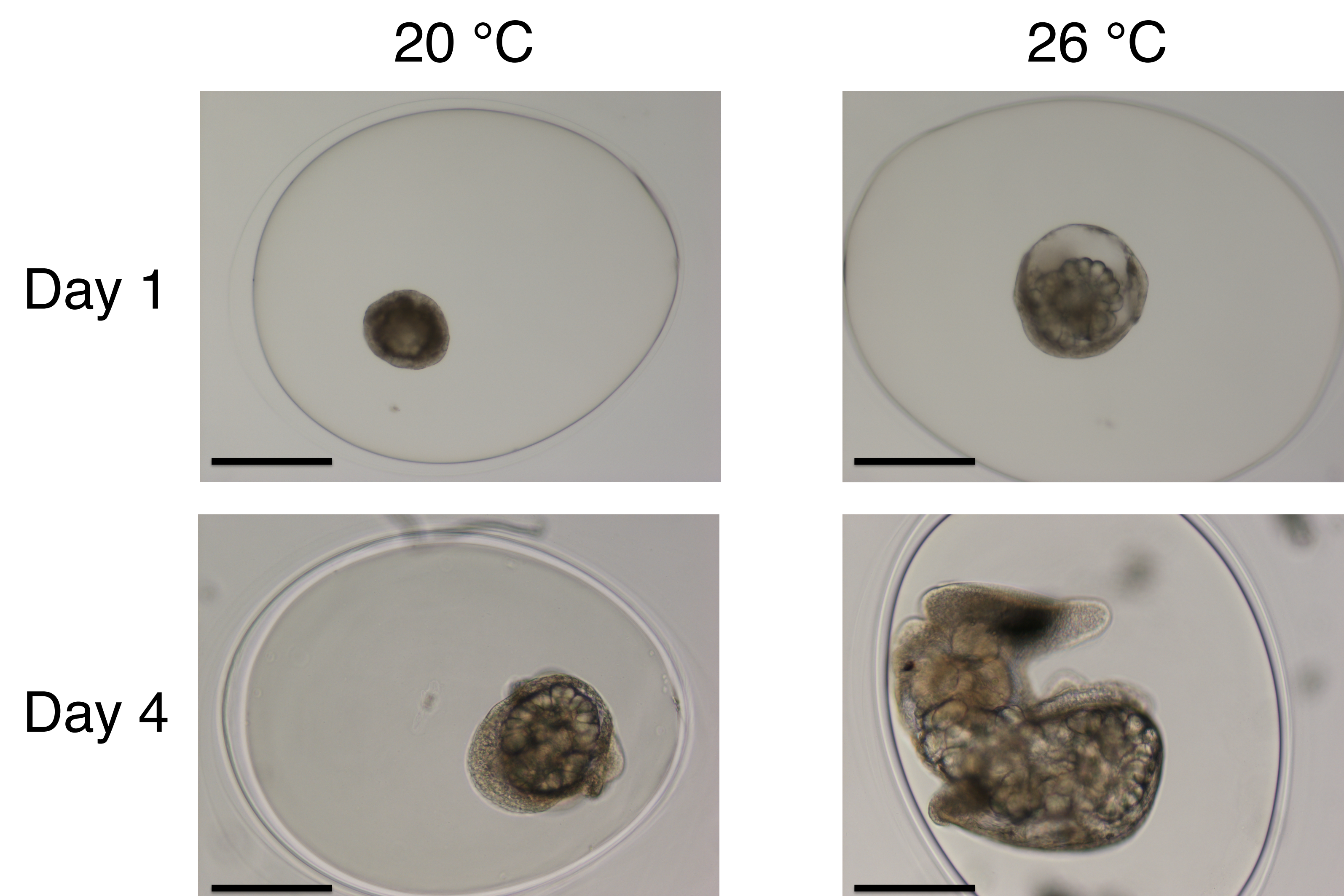
**Table 1** A unit plan was created to test the effect of temperature on the development of *Physa acuta*, a species of freshwater snail (figure 1). This unit plan incorporates hands-on experiments as well as primary research articles. The unit plan is divided into three parts. In the first section, students will learn about *Physa acuta* as well as proper scientific procedures. In the second section, students will be conducting trials (figure 2). In the third section students will compile their data and present their findings.



**Figure 1** Adult *Physa acuta*.  
Image from: <http://www.fwgna.org/>

## Literature Review

- By incorporating hands-on experiments, students are able to retain more information (Handler & Duncan, 2006).
- Hands-on experiments allow students to learn and comprehend more information than they otherwise would have by taking notes in a classroom (Mulkerrin & Hill, 2013).
- Incorporating primary resources into the high school biology classroom allows students to ask more in-depth, thought-provoking questions (Yarden, Brill, and Falk, 2001, 2003).



**Figure 2** Pictures of *Physa acuta* egg masses were taken daily to analyze the effects of temperature on the development of the egg masses. The pictures display an individual embryo within a capsule. There are multiple capsules within each egg mass. Day 1 pictures represent egg masses that were less than 24 hours old when they were cut and photographed. Therefore the two capsules are at the same developmental stage. The masses were then placed in either 20°C or 26°C incubators. It is clear that after four days, the mass in the 26°C has developed faster than the mass in the 20°C incubator. Scale bars = 200µm