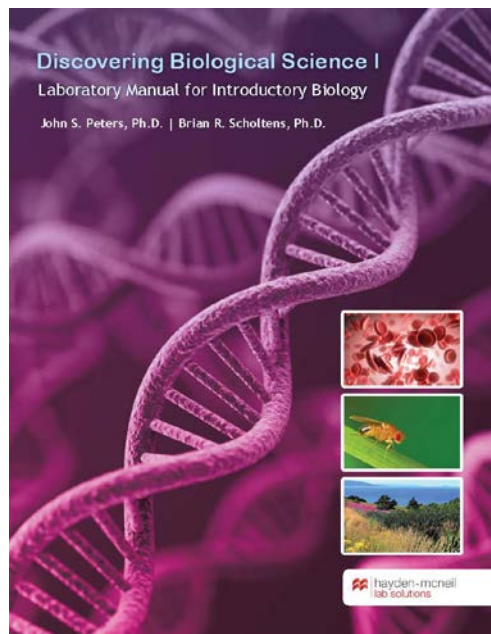


Discovering Biological Science I Experiments

- 1. Termite Trails: Exploring Scientific Inquiry** - This lab sets the tone for the student-directed and inquiry-based nature of the lab experience. Students observe termite behaviors and then pose hypotheses explaining an observation and then design an experiment to test their hypothesis. The lab reveals students' conceptions of scientific exploration and provides explicit feedback and opportunities to refine their conceptions. **In-person or online.**
- 2. What's Alive?** - This case-based "practicing-inquiry" lab challenges students' conceptions of what it means to be alive. Students then design and conduct an experiment to test for signs of metabolism in something which students are unsure as to whether or not it is alive.
- 3. Exploring Osmosis & Diffusion** - This case-based lab begins by exposing students to people who died from hyponatremia (excessive water consumption) and has students testing hypotheses about water and solute movement across simulated cell membranes (dialysis tubing) to understand and devise proper treatments for a person experiencing hyponatremia.
- 4. Exploring Plant Metabolism** - Students go outside to explore the interrelations between photosynthesis and cellular respiration in the leaves of plants by exploring the uptake/release of CO₂.
- 5. Exploring Metabolic Diversity in Plants: Independent Team Projects** - This multi-week lab has students proposing, designing, conducting, writing, and presenting a scientific research project related to factors they hypothesize may influence plant metabolism.
- 6. Exploring the Genetics of Eye Color in Fruit Flies (*Drosophila melanogaster*)** - This multi-week guided-inquiry has students establish fly cultures, conduct crosses and extract eye pigments to test hypotheses about the genetics and molecular biology of how eye color is determined in fruit flies.
- 7. Lost in Timbuktu: A Case Study-based Inquiry** - This case-based inquiry has students using genetic concepts and simulated DNA profiling to resolve a dispute among three couples whose children were potentially placed with the wrong family after birth. A biology major's version of the lab has students simulating the DNA profiling analysis using plasmid DNA. The non-major's version uses scientific stains and dyes to simulate the DNA profiling analysis.
- 8. Discovering the Genetics & Molecular Biology of Sickle Cell Anemia** - In this case study-based lab, students explore the genetics/molecular biology of sickle cell anemia and its relationship to the evolution of resistance to malaria. Students use two kinds of simulated protein electrophoresis (Native PAGE & SDS PAGE) to test hypotheses about the nature of the mutation inherited by individuals in the case. The final assignment for this lab has students writing a stakeholder letter that requires them to apply molecular, genetic and evolutionary knowledge to educate, and provide assistance in helping an African couple (known to be a carrier for sickle cell anemia) decide on whether or not to have a child.



About the Authors:

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