Scientific Method

Objectives

1. Understand and explain the process of the scientific method.
2. Generate, test and evaluate hypotheses.

**Prior to this lab, you should read Section 1.5 ("Doing Biology") in your textbook (Freeman, 5th ed).

Introduction

The purpose of today’s lab is to introduce you to the process known as the scientific method. Scientists use the scientific method to answer questions and provide explanations about natural phenomena. It is a logical process based on careful observation and experimentation.

The scientific method begins with an observation that leads to a question about the observed phenomena. Based on observations scientists generate a hypothesis, or tentative explanation for the observed phenomena. Hypotheses are written as statements and they should always be testable. A good hypothesis offers only one explanation and leads to predictions (often written as an “if-then” statement). The predictions are tested using carefully designed experiments. If possible, experiments should only test one factor (variable) at a time, with all other conditions being kept constant. Data collected from the experiments are analyzed and evaluated in respect to the original hypothesis statement, and conclusions are drawn. If the experiment has been designed properly, the data should either support or reject the hypothesis. If you can neither support nor reject the hypothesis statement, then the experiment has been poorly designed.

The scientific method does not end here. If the experimental analysis leads to a rejection of the hypothesis, then a new or revised hypothesis statement is constructed and the process starts over. If the hypothesis is supported, further experimentation is still warranted. Repetition strengthens the evidence for hypotheses. It is important to remember that scientific inquiry is an ongoing process and hypotheses are never considered to be proven. New data may alter or even reject previously supported scientific explanations.

Activity

Your instructor will lead you through an activity that will require you to use the scientific method to provide an explanation for a certain problem or question. As you complete this activity, think about the methods you use and how they reflect the process of science that biologists use to provide explanations for natural phenomena. Use the data sheets provided below to record your notes.
Data Sheet

Observation:

Hypothesis:

Prediction:

Experiment:

Experimental Data:

Conclusion: