

Introduction to Life Science ▪ Section Summary

Scientific Inquiry

Key Concepts

- What is a scientific inquiry?
- What makes a hypothesis testable?
- What attitudes are important in science?

Thinking and questioning can be the start of the **scientific inquiry** process. **Scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on evidence they gather.** Scientific inquiry often begins with a problem or questions about an observation. Questions come from experiences you have and from observations and inferences you make. A scientific question is one that can be answered by making observations and gathering evidence.

A **hypothesis** is a possible explanation for a set of observations or answer to a scientific question. **In science, a hypothesis must be testable. This means that researchers must be able to carry out investigations and gather evidence that will either support or disprove the hypothesis.**

A scientist designs an experiment to test a hypothesis. All factors that can change in an experiment are called **variables**. The variable that is purposely changed to test a hypothesis is called the **manipulated variable** (also called the independent variable). The factor that may change in response to the manipulated variable is called the **responding variable** (also called the dependent variable). All other variables must be exactly the same. An experiment in which only one variable is manipulated at a time is called a **controlled experiment**. A well-designed experiment has clear operational definitions. An **operational definition** is a statement that describes how to measure a particular variable or define a particular term.

A controlled experiment produces data. **Data** are facts, figures, and other evidence gathered through observations. Data tables and graphs are organized ways of presenting data. After gathering and interpreting data, a scientist draws conclusions about the hypothesis. A conclusion is a summary of what a scientists has learned from an experiment.

An important part of the scientific inquiry process is communicating the results. **Communicating** is the sharing of ideas and experimental findings with others through writing and speaking.

Successful scientists possess certain important attitudes, or habits of mind, including curiosity, honesty, open-mindedness, skepticism, and creativity. An important attitude is curiosity. Successful scientists are eager to learn. Good scientists always report their results truthfully. Scientists need to be open-minded, or capable of accepting different ideas. Open-mindedness should always be balanced by **skepticism**, which is an attitude of doubt. When a problem arises scientists use creativity to find a solution. Creativity means coming up with inventive ways to solve problems or produce new things.