



# SCIENCE DISSECTED

## *Teaching Hypothesis, Theory, & Law*

Many science teachers begin the school year with a review of basic nature of science terminology. The definitions for a hypothesis, theory and law are often reiterated to students as they pass through their school careers. The scientific meanings of these terms are different from their use in everyday language. Students are often confused over the everyday use of a term compared to its use in a scientific context. In addition, there are major misconceptions associated with the way hypothesis, theory, and law are presented by teachers.

Often, teachers and some textbooks present hypothesis, theory, and law incorrectly. **There is not a natural progression from a hypothesis to a theory to a law.** This approach to teaching the terms is rooted in the misconception that as evidence is compiled, there is a sequence through which scientific ideas pass along their way to final acceptance. This misconception is common among nonscientists, science teachers, and some scientists.

It is time to revise the way this fundamental information is presented to students. For example, a hypothesis is **not** an educated guess. A **hypothesis** *is a testable statement based upon research.* In many lab experiences, when a teacher asks their students to write a hypothesis for the lab, they are actually asking for a prediction. When asking students to write a hypothesis, teachers can use the, "If..., then... because..." format to encourage students to write a hypothesis instead of a prediction.

---

**"Not only does a theory not become a law, but the law usually precedes the theory that provides an explanation for how the law works as it does."**

-Alan Colburn

---

Over time, a hypothesis does not become a theory. A **scientific theory** *is a logical explanation for events that occur in nature and is supported by empirical evidence.* Theories can be modified as more evidence is discovered. A theory is not a prediction of what may occur. Once again, students often confuse the definition of a scientific theory with the everyday use of the term. Theories are the foundation to scientific concepts. Imagine teaching biology without the germ theory or teaching chemistry without the atomic theory. If a student exclaims that evolution is "just a theory," it may be time to revisit the scientific definition of a theory.

As evidence accumulates, a theory does not naturally progress to become a law. In fact, theories and laws are very different. A **scientific law** *describes a specific phenomenon that occurs under specific conditions or circumstances,* compared to a theory which provides an explanation of a broad range of observations.

Examples of laws include the law of conservation of mass or the laws of thermodynamics. Not only does a theory not necessarily become a law, but laws in nature are typically accepted in less time than theories. The universal law of gravitation was well accepted before a theory that explains how gravity works.

---

### **DID YOU KNOW?**

The Science **CRT** and **HSPE** do not use the phrase "educated guess" to define a hypothesis.