# Scientific Theories

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Printed: September 26, 2016

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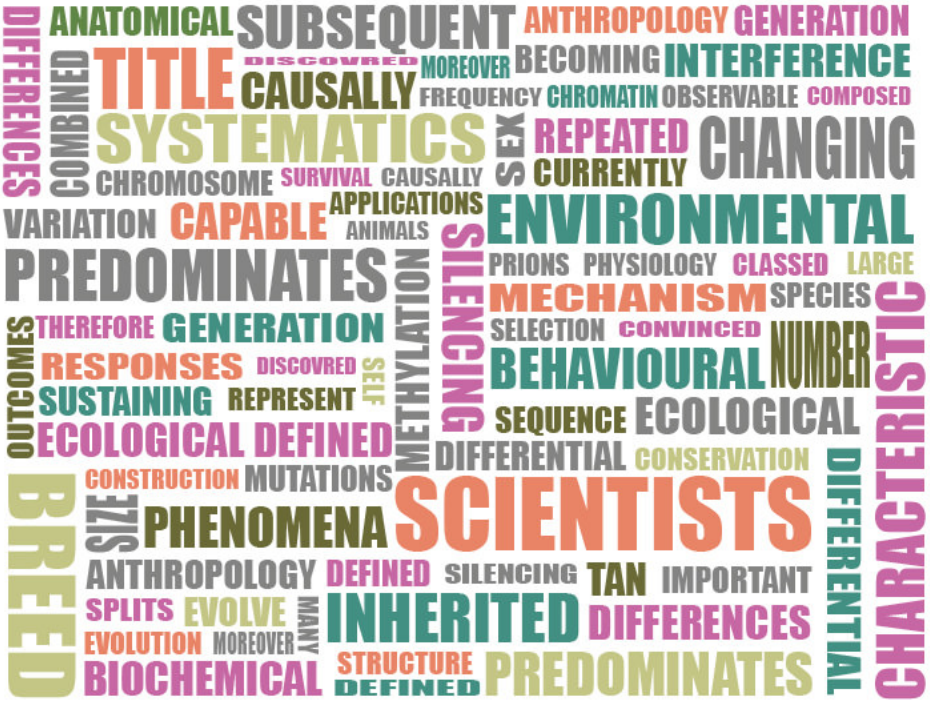
CHAPTER 1

# Scientific Theories

- Define scientific theory.
- Name several well-known theories in biology.




**Theory vs. theory. Is a scientific different from the everyday use of the word**

A scientific theory is accepted as a scientific *truth*, supported by evidence collected by many scientists. The theory of evolution by natural selection is a classic scientific theory.

## Scientific Theories

With repeated testing, some hypotheses may eventually become scientific theories. Keep in mind, a hypothesis is a possible answer to a scientific question. A **scientific theory** is a broad explanation for events that is widely accepted as true. To become a theory, a hypothesis must be tested over and over again, and it must be supported by a great deal of evidence.

People commonly use the word *theory* to describe a guess about how or why something happens. For example, you might say, "I think a woodchuck dug this hole in the ground, but it's just a theory." Using the word *theory* in this way is different from the way it is used in science. A scientific theory is more like a fact than a guess because it is so well-supported. There are several well-known theories in biology, including the theory of evolution, cell theory, and germ theory.

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As you view *Know the Difference (Between Hypothesis and Theory)*, focus on these concepts:

1. the controversy surrounding the words ”hypothesis” and ”theory”,
2. the scientific use of the words ”hypothesis” and ”theory”,
3. the criteria for a ”hypothesis,”
4. the National Academy of Sciences definition of ”theory”, and
5. the meaning of the statement, ”theories are the bedrock of our understanding of nature”.

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### The Theory of Evolution

The theory of evolution by natural selection is a scientific theory. **Evolution** is a change in the characteristics of living things over time. Evolution occurs by a process called **natural selection**. In natural selection, some living things produce more offspring than others, so they pass more genes to the next generation than others do. Over many generations, this can lead to major changes in the characteristics of living things. The theory of evolution by natural selection explains how living things are changing today and how modern living things have descended from ancient life forms that no longer exist on Earth. No evidence has been identified that proves this theory is incorrect. More on the theory of evolution will be presented in additional concepts.

### The Cell Theory

The cell theory is another important scientific theory of biology. According to the **cell theory**, the cell is the smallest unit of structure and function of all living organisms, all living organisms are made up of at least one cell, and living cells always come from other living cells. Once again, no evidence has been identified that proves this theory is incorrect. More on the cell theory will be presented in additional concepts.

### The Germ Theory

The **germ theory** of disease, also called the pathogenic theory of medicine, is a scientific theory that proposes that microorganisms are the cause of many diseases. Like the other scientific theories, lots of evidence has been identified that supports this theory, and no evidence has been identified that proves the theory is incorrect.

## Summary

- With repeated testing, some hypotheses may eventually become scientific theories. A scientific theory is a broad explanation for events that is widely accepted as true.
- Evolution is a change species over time. Evolution occurs by natural selection.
- The cell theory states that all living things are made up of cells, and living cells always come from other living cells.
- The germ theory proposes that microorganisms are the cause of many diseases.

## Review

1. Contrast how the term theory is used in science and in everyday language.
2. Explain how a hypothesis could become a theory.
3. Describe the evidence that proves the cell theory is incorrect.