CHAPTER 7

The Basis of Life

Focussing Questions

- What is the cell theory and how was it developed?
- How did the cell theory revolutionize the way scientists study life?
- How has technology advanced the understanding of cell structures and functions?
What is the scientific basis of life? Driven by the desire to answer the question, people have observed the world around them for millenia. Over time, theories about how organisms function have changed. Today scientists agree that all living things share five characteristics.

Living organisms:
- need energy
- produce wastes
- respond and adapt to their environment
- reproduce
- grow

Where does life come from? You might have asked yourself that question after finding mould on an orange. Centuries ago, some scientists asked that question after encountering maggot-infested meat. Early investigators, such as the Greek philosopher Aristotle (384–322 B.C.E.), used creative thinking, philosophy, and logic to explain such observations.

Aristotle observed that some organisms reproduce asexually and others sexually. However, he was unable to observe any reproductive process in some small organisms. Aristotle therefore hypothesized that, under the right conditions, some life forms could arise from non-living matter. **Spontaneous generation,** as this concept came to be known, provided a way of explaining how new generations of organisms came about.

Some scientists questioned the principles of spontaneous generation. Was there another way to explain the source of new organisms? Gradually, advances in technology enabled scientists to test these questions in new ways.

Seen under a microscope, as shown on page 256, the mould growing on an orange turns out to be composed of many individual cells. Further investigation would show that single-celled spores made by the mould could spread to other food sources and produce more mould.

A new theory began to take shape that would eventually replace the concept of spontaneous generation. Scientists recognized that living organisms share another important characteristic: they are composed of cells.

**Looking Ahead**

How can the functioning of entire organisms be explained by cell activities? Later in this unit, you will build on your ideas as you investigate the structures and functions of plants. In “Design Your Own Investigation: Inside Out: The Parts of Plants,” you will look for evidence that cells are related to tissues and organs in plants. Read the investigation now and prepare for it by recording and assembling relevant information in files.