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## *The Science of Biology*

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### Concept Outline

#### 1.1 Biology is the science of life.

**Properties of Life.** Biology is the science that studies living organisms and how they interact with one another and their environment.

#### 1.2 Scientists form generalizations from observations.

**The Nature of Science.** Science employs both deductive reasoning and inductive reasoning.

**How Science Is Done.** Scientists construct hypotheses from systematically collected objective data. They then perform experiments designed to disprove the hypotheses.

#### 1.3 Darwin's theory of evolution illustrates how science works.

**Darwin's Theory of Evolution.** On a round-the-world voyage Darwin made observations that eventually led him to formulate the hypothesis of evolution by natural selection.

**Darwin's Evidence.** The fossil and geographic patterns of life he observed convinced Darwin that a process of evolution had occurred.

**Inventing the Theory of Natural Selection.** The Malthus idea that populations cannot grow unchecked led Darwin, and another naturalist named Wallace, to propose the hypothesis of natural selection.

**Evolution After Darwin: More Evidence.** In the century since Darwin, a mass of experimental evidence has supported his theory of evolution, now accepted by practically all practicing biologists.

#### 1.4 This book is organized to help you learn biology.

**Core Principles of Biology.** The first half of this text is devoted to general principles that apply to all organisms, the second half to an examination of particular organisms.



**FIGURE 1.1**

A replica of the *Beagle*, off the southern coast of South America. The famous English naturalist, Charles Darwin, set forth on H.M.S. *Beagle* in 1831, at the age of 22.

You are about to embark on a journey—a journey of discovery about the nature of life. Nearly 180 years ago, a young English naturalist named Charles Darwin set sail on a similar journey on board H.M.S. *Beagle* (figure 1.1 shows a replica of the *Beagle*). What Darwin learned on his five-year voyage led directly to his development of the theory of evolution by natural selection, a theory that has become the core of the science of biology. Darwin's voyage seems a fitting place to begin our exploration of biology, the scientific study of living organisms and how they have evolved. Before we begin, however, let's take a moment to think about what biology is and why it's important.