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The Science of Biology

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.