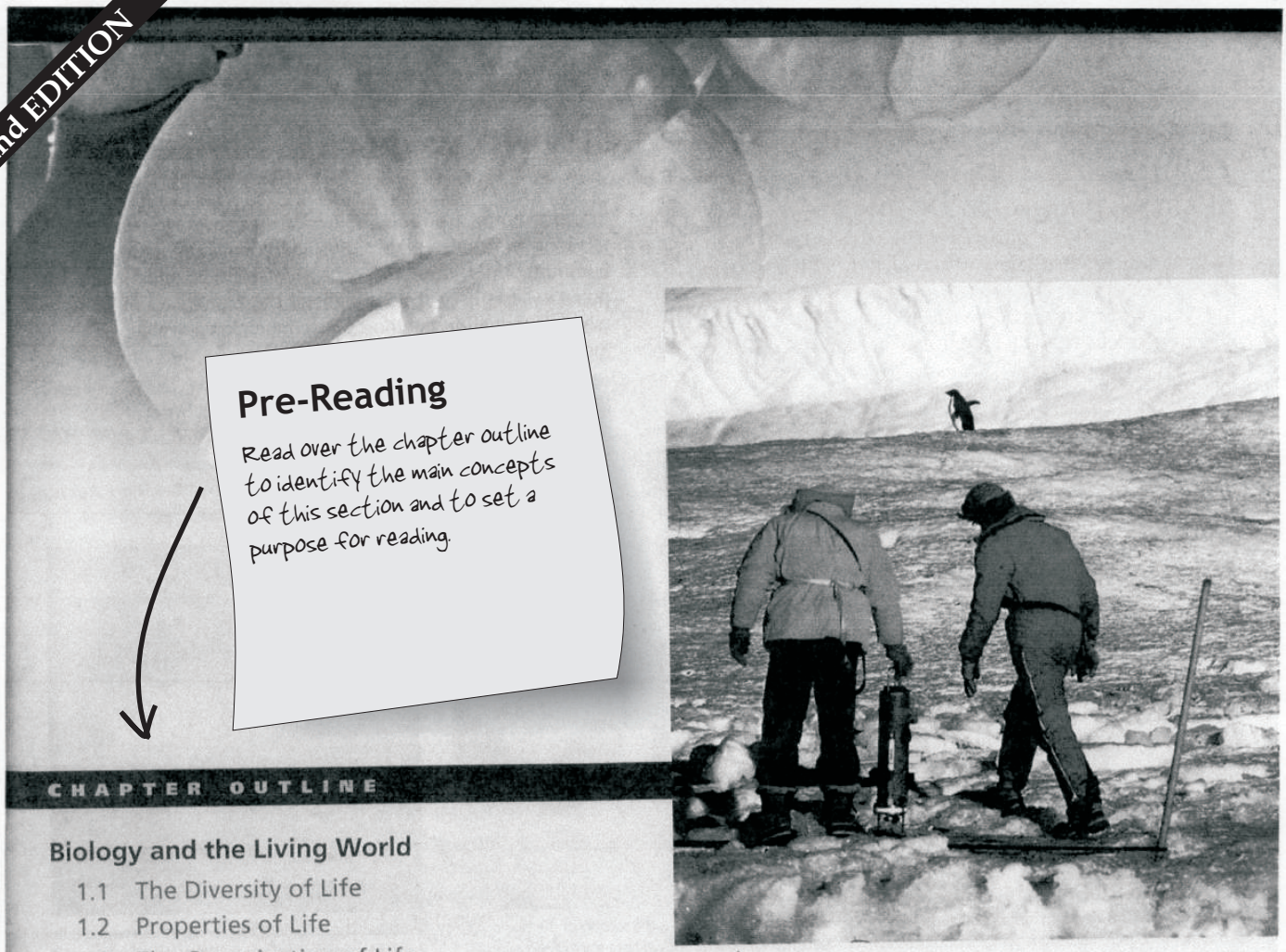
2nd EDITION



Pre-Reading

Read over the chapter outline to identify the main concepts of this section and to set a purpose for reading.

CHAPTER OUTLINE

Biology and the Living World

- 1.1 The Diversity of Life
- 1.2 Properties of Life
- 1.3 The Organization of Life
- 1.4 Biological Themes

The Scientific Process

- 1.5 The Nature of Science
- 1.6 Science in Action: A Case Study
- 1.7 Stages of a Scientific Investigation

Using Science to Make Decisions

- 1.8 Theory and Certainty

HIGHLIGHTS

Figure 1.1 Scientists at work.
These atmospheric scientists are collecting ice cores in the Antarctic in an attempt to understand climatic change.

Figure Numbers

These indicate visuals, graphics, charts and/or diagrams that support the text. (Ex: Fig 1.1 is the first figure in the chapter)

The men trudging through the snow in figure 1.1 are scientists working in Antarctica. In 1985, the scientist Joseph Farman was part of a team of such scientists studying the earth's atmosphere over Antarctica. While not a biologist, his work has had a profound influence on biologists the world, for he discovered the "ozone hole." k at his work later in this chapter. The important ocus on now, as we begin our journey into the sci- logy, is how interrelated all of science is. Biology, of life, is part of an even larger and richer tapes- e we learn about how the world influences life, the many creatures with which we share the nce each other, the better we can understand the world in which we live. The science of bi- ted to this larger vision. It provides knowl- e living world of which we are a part, while mbarding us with questions like those asked seph Farman.

1.5 The Nature of Science

Deductive Reasoning

Science is a particular way of inve
all investigations are scie
want to know how to get to
not conduct a scientific inve
a map to determine a route.
applying a "map" of accepte
deductive reasoning. Deducti
of mathematics, philosophy, p
reasoning is also the way a cor
on deductive reasoning to make
general principles as the basis fo
these decisions.

Inductive Reasoning

Where do general principles come Religious and ethical principles often have a religious foundation; political principles reflect social systems. Some general principles, however, are not derived from religion or politics but from observation of the physical world around us. If you drop an apple, it will fall, whether or not you wish it to and despite any laws you may pass forbidding it to do so. Science is devoted to discovering the general principles that govern the operation of the physical world.

How do scientists discover such general principles? Scientists are, above all, observers: they look at the world to understand how it works. It is from their observations that scientists determine the general principles that govern our physical world.

g general principles by careful ex-
s is called **inductive reasoning**
oning first became popular about
Newton, Francis Bacon, and oth-
ments and from the results infer
w the world operates. The experi-
simple. Newton's consisted sim-
om his hand and watching it fall
bservation is the stuff of science.
servations, each no more compli-
apple, Newton inferred a general
all toward the center of the earth.
sible explanation, or **hypothesis,**
ks. Like Newton, scientists today
formulate hypotheses, and observations are the materials on which they build them.

1.5 Science uses inductive reasoning to infer general principles from detailed observation.

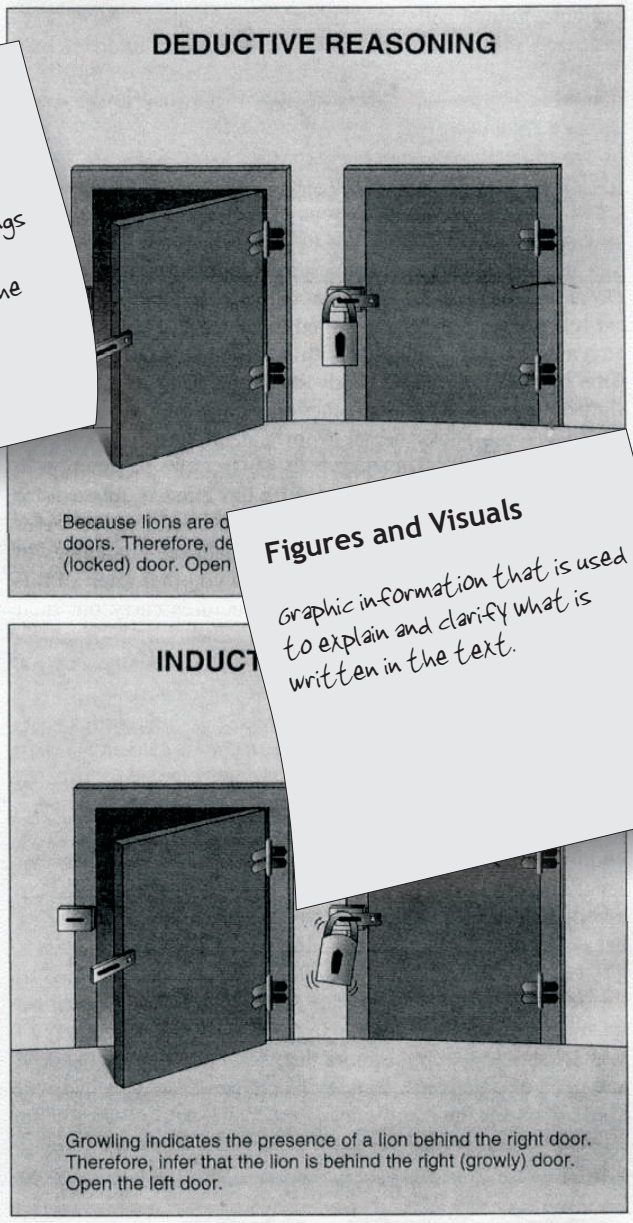


Figure 1.11 Deductive and inductive reasoning.
A deduction is a conclusion drawn from general principles. An inference is a conclusion drawn from specific observations. In this hypothetical example, a gladiator is forced to choose between two doors in a coliseum. Behind one of the doors is a deadly lion; behind the other door is freedom. How can the gladiator make the choice? He can use either deductive or inductive reasoning.

Chapter and Section Headings

Before reading the entire section, read all of the headings to become familiar with the topics to be learned. Turn the headings into questions.

Figures and Visuals

Graphic information that is used to explain and clarify what is written in the text.

Bolded Words

Definitions for the key vocabulary words will be located within the text usually directly before the bolded word. The definition can also be found in the glossary.

Concept Statement

After reading the section, take note of the one-sentence summary to review the main idea.

CHAPTER 1

HIGHLIGHTS

BIOLOGY AND THE LIVING WORLD

Key Terms

kingdoms 4
natural selection 8
artifical selection 8

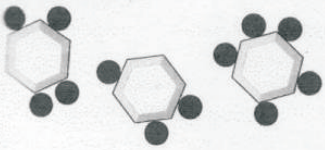
Key Concepts

- All living things share eight fundamental properties:
  - *complexity*
  - *movement*
  - *response to stimulation*
  - *cellular organization*
  - *metabolism*
  - *homeostasis*
  - *reproduction*
  - *heredity*
- There are many ways to study biology. Five general themes often used to organize the study of biology are
  - *evolution*
  - *the flow of energy*
  - *cooperation*
  - *structure determines function*
  - *homeostasis*

Pre-Reading

Read over the Key concepts on the chapter highlights to identify the main concepts of this section and to set a purpose for reading. Take note of key vocabulary terms.

THE SCIENTIFIC PROCESS



- The discovery of how CFCs are reducing levels of ozone in the atmosphere is a good example of science in action.
- The scientific process is founded on careful observation.
- In a control experiment, only one variable is allowed to change.
- Scientific progress is made by rejecting hypotheses that are inconsistent with observation.

USING SCIENCE TO MAKE DECISIONS

scientific method 14

- The acceptance of a hypothesis is always provisional.
- Well-tested hypotheses are often combined into general statements called theories.
- There is no surefire way to do science and no foolproof "method."
- One of the most creative aspects of scientific investigation is the formulation of novel hypotheses.

CONCEPT REVIEW

1. Metabolism refers to an organism's ability to
   a. reproduce.
   b. use energy.
   c. pass on genes.
   d. move.

2. Key terms for homeostasis are
   a. external environment, stable.
   b. internal environment, unstable.
   c. internal environment, stable.
   d. external environment, unstable.

3. Select the smallest level of organization among the following.
   a. cell
   b. organ
   c. organ system
   d. tissue

4. The change in a species through time is
   a. cooperation.
   b. evolution.
   c. homeostasis.
   d. metabolism.

5. Chlorofluorocarbons (CFCs) are used in
   a. foaming agents.
   b. air conditioners.
   c. aerosols.
   d. all of the above.

6. One of the main functions of the earth's ozone layer is to
   a. prevent global warming.
   b. filter out ultraviolet rays.
   c. absorb pollution.
   d. all of the above.

7. The 3% drop in ozone concentration that has already occurred worldwide has led to an estimated increase in skin cancers of
   a. 1%.
   b. 10%.
   c. 20%.

8. A guess in a scientific process is called a(n)
   a. hypothesis.
   b. observation.
   c. prediction.
   d. test.

9. A collection of hypotheses that have been repeatedly tested without rejection is called a(n)
   a. control.
   b. observation.
   c. test.
   d. theory.

10. Factors that influence a process in a scientific study are
    a. controls.
    b. tests.
    c. theories.
    d. variables.

11. List the six kingdoms of life.

12. List the five fundamental properties that are shared by all living organisms on earth and that are not exhibited by nonliving things.

13. _____ is the complex linear molecule responsible for heredity.

14. A _____ is a tiny living compartment covered with a membrane.

15. At each level of organization, _____ determines function.

16. In the _____ air over Antarctica, CFCs adhere to crystals and catalyze a reaction that destroys _____.

17. Any good scientific investigation begins ... ful _____.

18. A _____ variable is ...

Chapter Review

Read over the concept review questions **before** reading the lesson to set a purpose for your reading. **After** reading, reread the vocabulary and answer the questions to check your understanding.