

chapter01

Section Outline

Section 1-1

1-1 What Is Science?

A. *What Science Is and Is Not*

B. *Thinking Like a Scientist*

C. *Explaining and Interpreting Evidence*

D. *Science as a Way of Knowing*

E. *Science and Human Values*

Observation and Inference

Section 1-1

Statement	Observation	Inference	
Object A is round and orange.		X	
Object A is a basketball.			X
Object C is round and black and white.		X	
Object C is larger than Object B.		X	
Object B is smooth.		X	
Object B is a table-tennis ball.			X
Each object is used in a different sport.		X	X

Object A is a basketball.

Object B is a table-tennis ball.

Object C is a soccer ball.

Section Outline

Section 1-2

1–2 How Scientists Work

A. *Designing an Experiment*

1. *Asking a Question*
2. *Forming a Hypothesis*
3. *Setting Up a Controlled Experiment*
4. *Recording and Analyzing Results*
5. *Drawing a Conclusion*

B. *Publishing and Repeating Investigations*

1. *Needham's Test of Redi's Findings*
2. *Spallanzani's Test of Redi's Findings*
3. *Pasteur's Test of Spontaneous Generation*
4. *The Impact of Pasteur's Work*

C. *When Experiments Are Not Possible*

D. *How a Theory Develops*

Flowchart

Section 1-2

Designing an Experiment

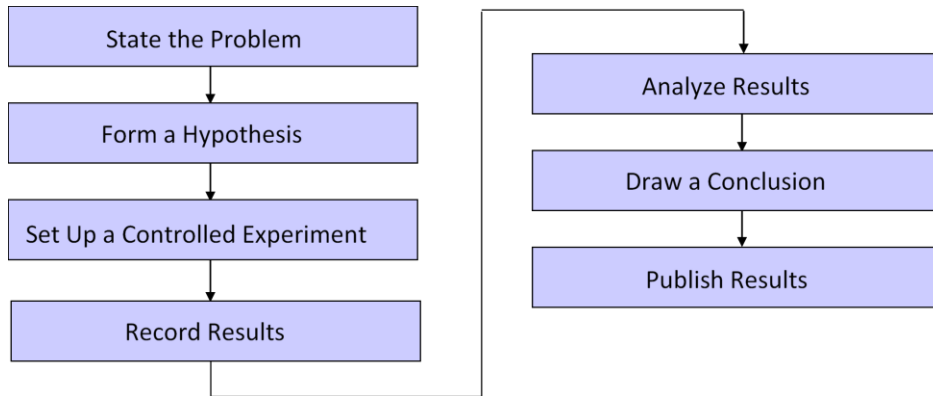


Figure 1-8 Redi’s Experiment on Spontaneous Generation

Section 1-2

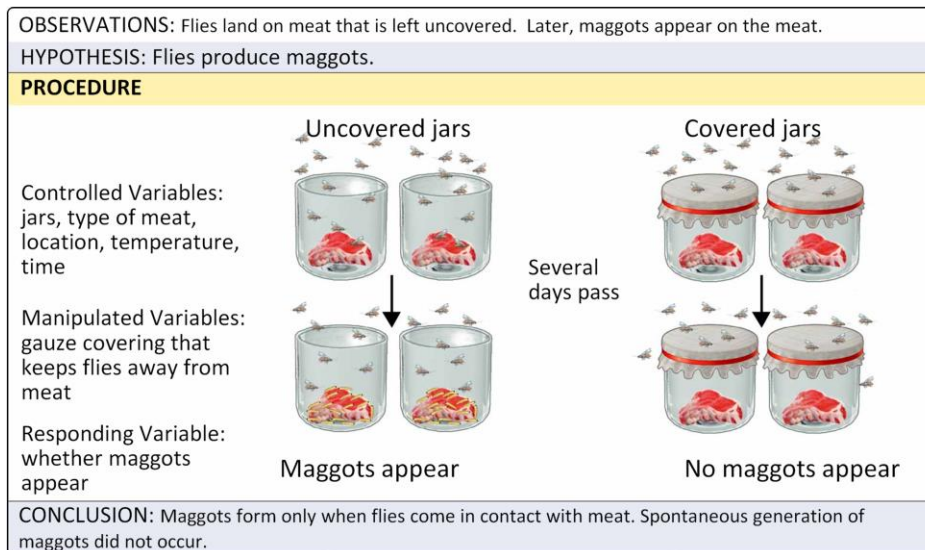
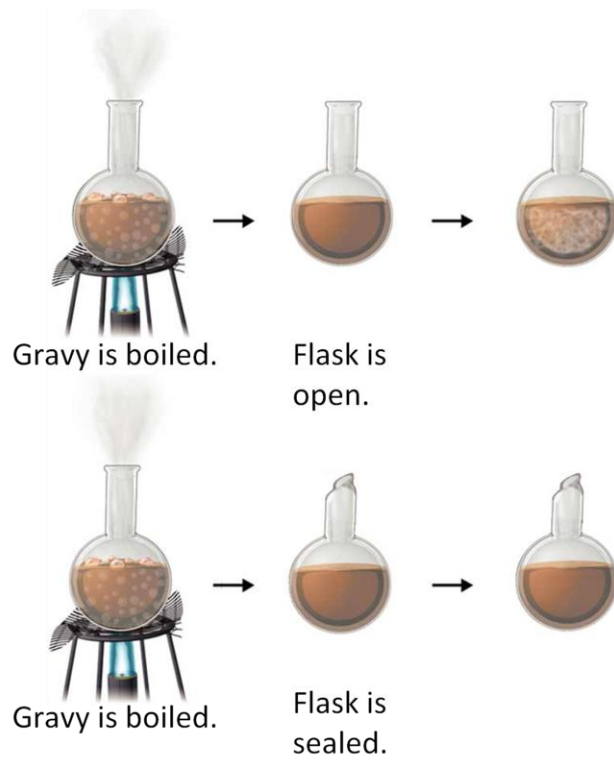


Figure 1-10 Spallanzani’s Experiment

Section 1-2



Gravy is free of microorganisms.

Gravy is teeming with microorganisms.

Figure 1-11 Pasteur's Experiment

Section 1-2



Figure 1-11 Pasteur's Experiment

Section 1-2



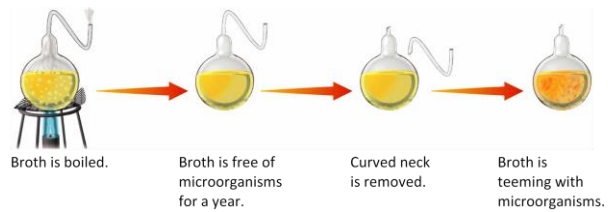
Figure 1-11 Pasteur's Experiment

Section 1-2



Figure 1-11 Pasteur's Experiment

Section 1-2



Section Outline

Section 1-3

1-3 Studying Life

A. Characteristics of Living Things

1. Made Up of Cells

2. Reproduction

3. Based on a Genetic Code

4. Growth and Development

5. *Need for Materials and Energy*

6. *Response to the Environment*

7. *Maintaining Internal Balance*

8. *Evolution*

B. *Branches of Biology*

C. *Biology in Everyday Life*

Characteristics of Living Things

Section 1-3

Characteristic	Examples
Living things are made up of units called cells.	Many microorganisms consist of only a single cell. Animals and trees are multicellular.
Living things reproduce.	Maple trees reproduce sexually. A hydra can reproduce asexually by budding.
Living things are based on a universal genetic code.	Flies produce flies. Dogs produce dogs. Seeds from maple trees produce maple trees.
Living things grow and develop.	Flies begin life as eggs, then become maggots, and then become adult flies.
Living things obtain and use materials and energy.	Plants obtain their energy from sunlight. Animals obtain their energy from the food they eat.
Living things respond to their environment.	Leaves and stems of plants grow toward light.
Living things maintain a stable internal environment.	Despite changes in the temperature of the environment, a robin maintains a constant body temperature.
Taken as a group, living things change over time.	Plants that live in the desert survive because they have become adapted to the conditions of the desert.

Figure 1-21 Levels of Organization

Section 1-3







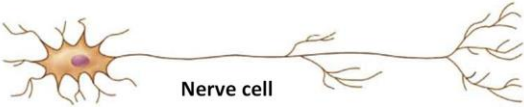
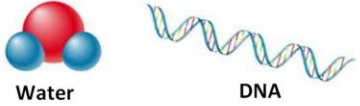
Biosphere	The part of Earth that contains all ecosystems	
Ecosystem	Community and its nonliving surroundings	
Community	Populations that live together in a defined area	
Population	Group of organisms of one type that live in the same area	

Figure 1-21 Levels of Organization *continued*

Section 1-3

Organism	Individual living thing	
Groups of Cells	Tissues, organs, and organ systems	
Cells	Smallest functional unit of life	
Molecules	Groups of atoms; smallest unit of most chemical compounds	

Section Outline

Section 1-4

1-4 Tools and Procedures

A. A Common Measurement System

B. Analyzing Biological Data

C. Microscopes

1. Light Microscopes

2. Electron Microscopes

D. Laboratory Techniques

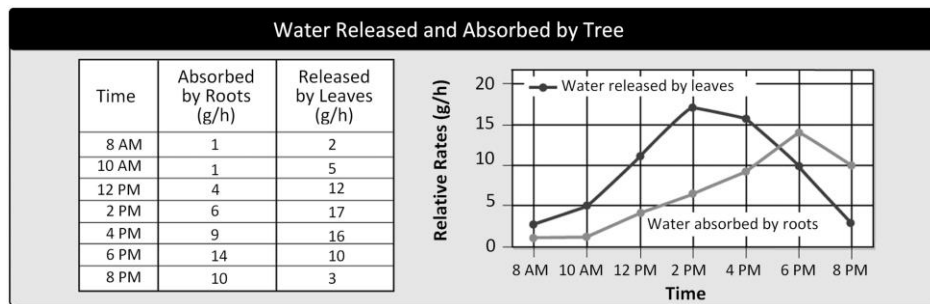
1. Cell Cultures

2. Cell Fractionation

E. Working Safely in Biology

Making a Graph From A Data Table

Section 1-4



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