

BIOLOGY 2e

Chapter 1 THE STUDY of LIFE

PowerPoint Image Slide Show

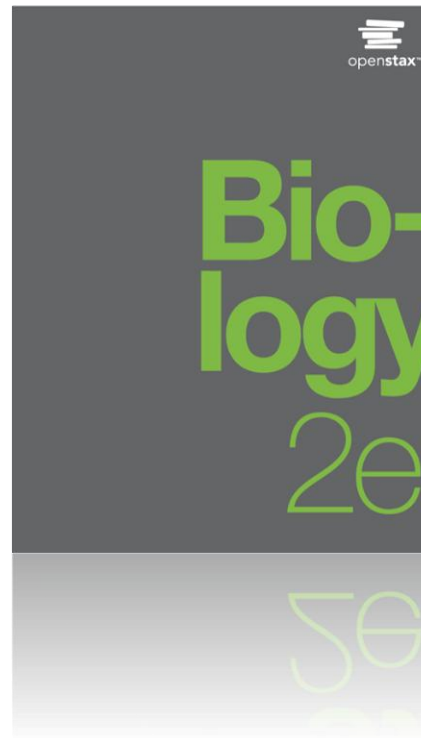


FIGURE 1.1



This NASA image is a composite of several satellite-based views of Earth. To make the whole-Earth image, NASA scientists combine observations of different parts of the planet.

(credit: NASA/GSFC/NOAA/USGS)

FIGURE 1.2



(a)

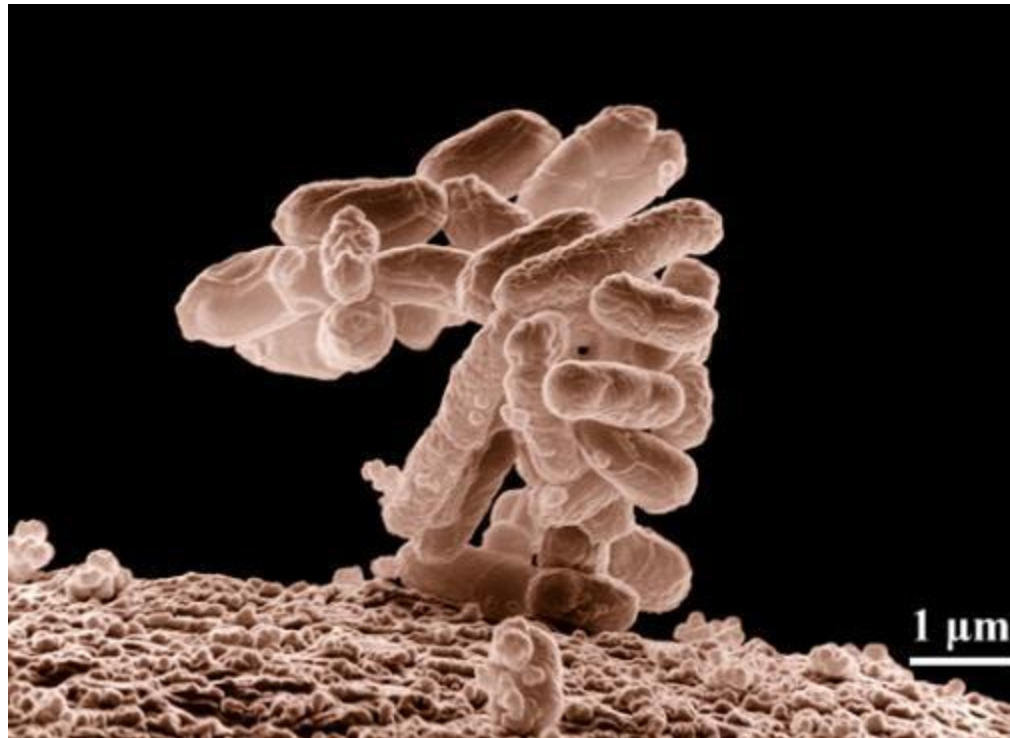


(b)

Formerly called blue-green algae, these (a) cyanobacteria, shown here at 300x magnification under a light microscope, are some of Earth's oldest life forms. These (b) stromatolites along the shores of Lake Thetis in Western Australia are ancient structures formed by the layering of cyanobacteria in shallow waters.

(credit a: modification of work by NASA; credit b: modification of work by Ruth Ellison; scale-bar data from Matt Russell)

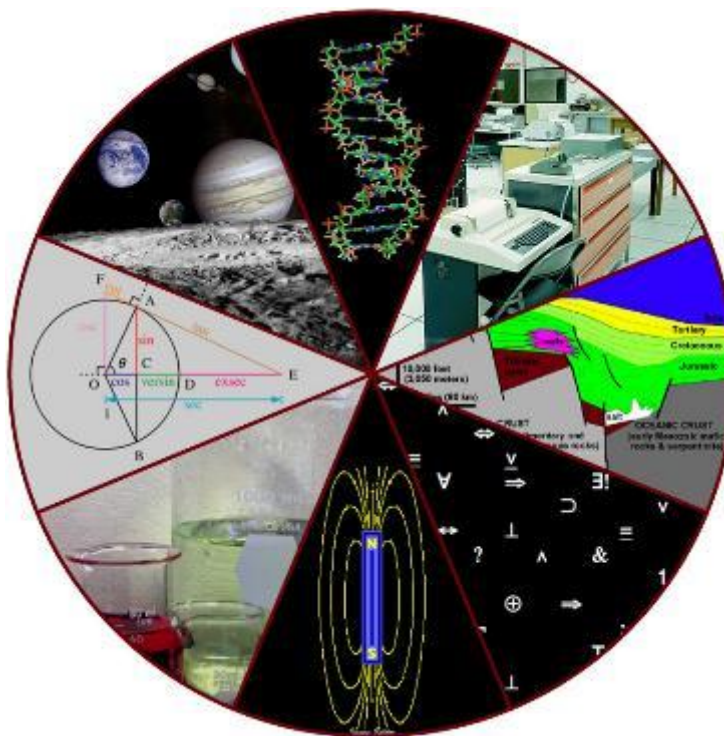
FIGURE 1.3



Escherichia coli (*E. coli*) bacteria, seen in this scanning electron micrograph, are normal residents of our digestive tracts that aid in the absorption of vitamin K and other nutrients. However, virulent strains are sometimes responsible for disease outbreaks.

(credit: Eric Erbe, digital colorization by Christopher Pooley, both of USDA, ARS, EMU)

FIGURE 1.4



The diversity of scientific fields includes astronomy, biology, computer science, geology, logic, physics, chemistry, mathematics, and many other fields.

(credit: "Image Editor"/Flickr)

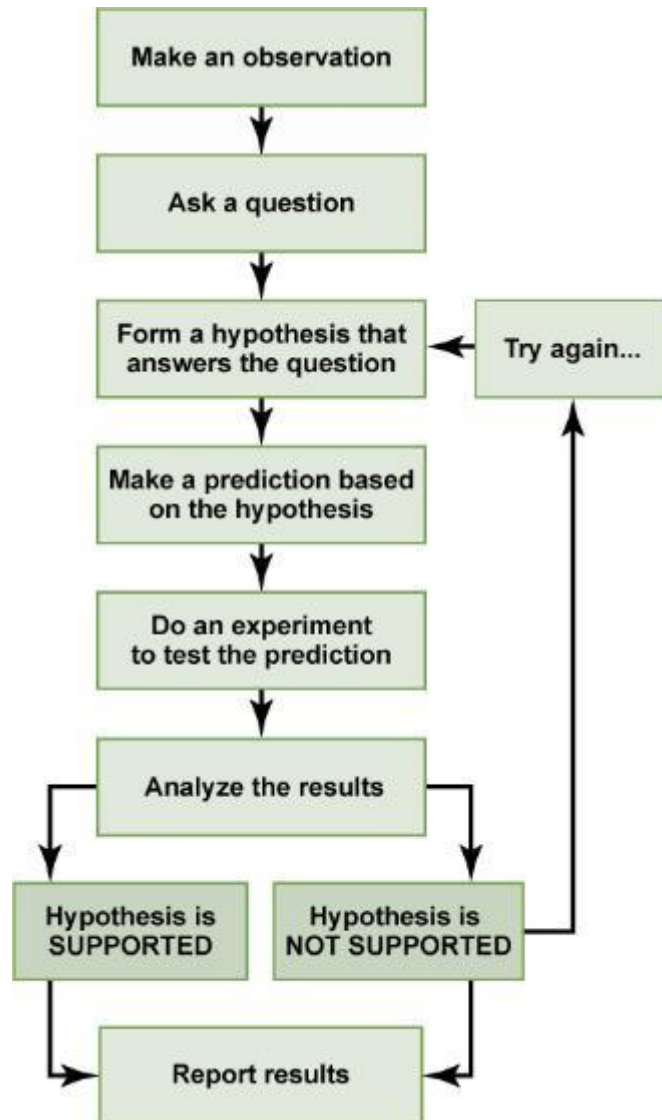
FIGURE 1.5



Historians credit Sir Francis Bacon (1561–1626) as the first to define the scientific method.

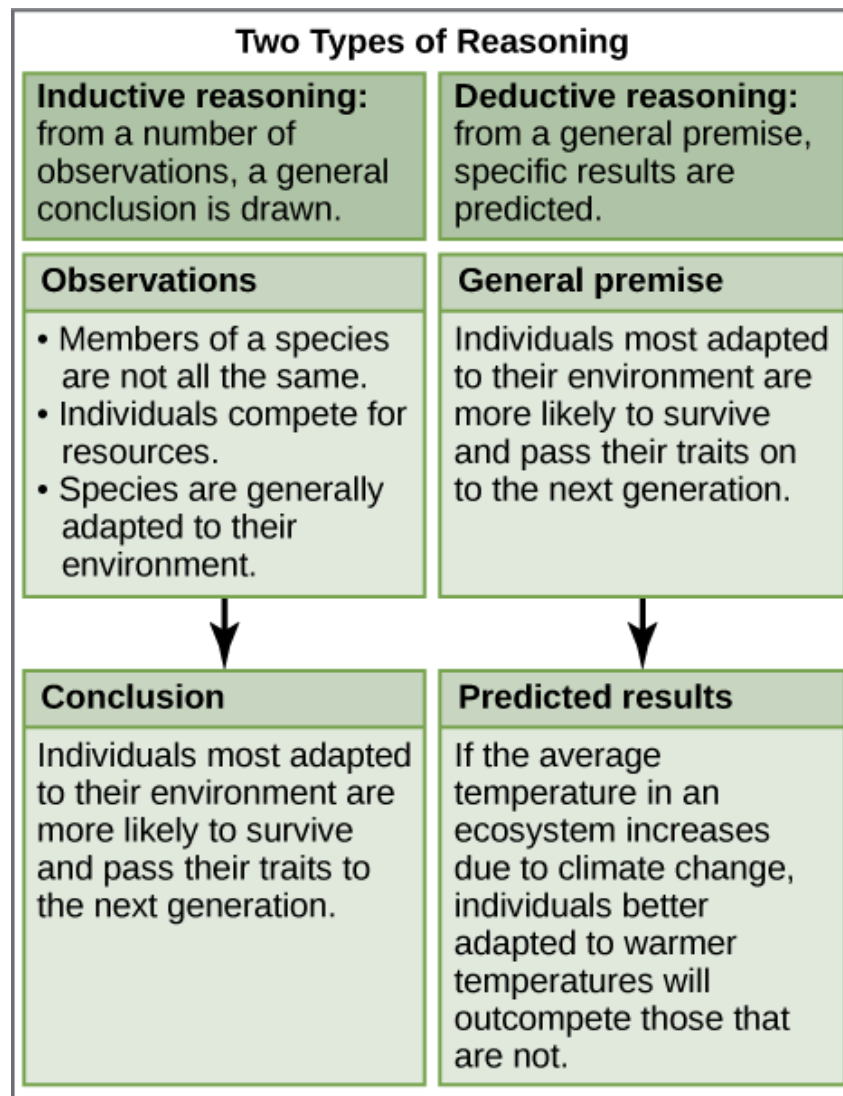
(credit: Paul van Somer)

FIGURE 1.6



The scientific method consists of a series of well-defined steps. If a hypothesis is not supported by experimental data, a new hypothesis can be proposed.

FIGURE 1.7



Scientists use two types of reasoning, inductive and deductive reasoning, to advance scientific knowledge. As is the case in this example, the conclusion from inductive reasoning can often become the premise for deductive reasoning.

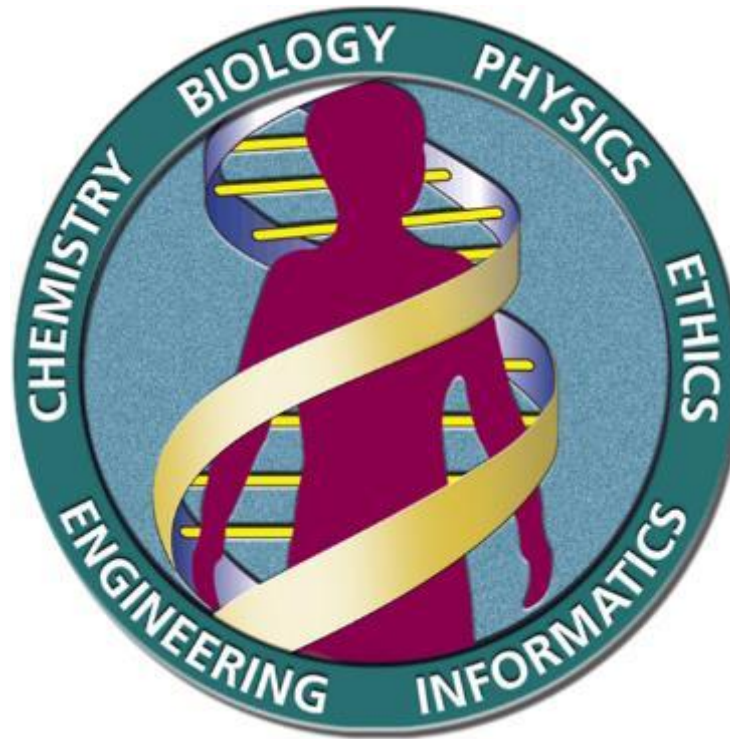
FIGURE 1.8



After Hurricane Irma struck the Caribbean and Florida in 2017, thousands of baby squirrels like this one were thrown from their nests. Thanks to applied science, scientists knew how to rehabilitate the squirrel.

(credit: audreyjm529, Flickr)

FIGURE 1.9



The Human Genome Project was a 13-year collaborative effort among researchers working in several different fields of science. The project, which sequenced the entire human genome, was completed in 2003.

(credit: the U.S. Department of Energy Genome Programs (<http://genomics.energy.gov>))

FIGURE 1.10



A toad represents a highly organized structure consisting of cells, tissues, organs, and organ systems.

(credit: "Ivengo"/Wikimedia Commons)

FIGURE 1.11



The leaves of this sensitive plant (*Mimosa pudica*) will instantly droop and fold when touched. After a few minutes, the plant returns to normal.

(credit: Alex Lomas)

FIGURE 1.12



Although no two look alike, these kittens have inherited genes from both parents and share many of the same characteristics.

(credit: Rocky Mountain Feline Rescue)

FIGURE 1.13



Polar bears (*Ursus maritimus*) and other mammals living in ice-covered regions maintain their body temperature by generating heat and reducing heat loss through thick fur and a dense layer of fat under their skin.

(credit: "longhorndave"/Flickr)

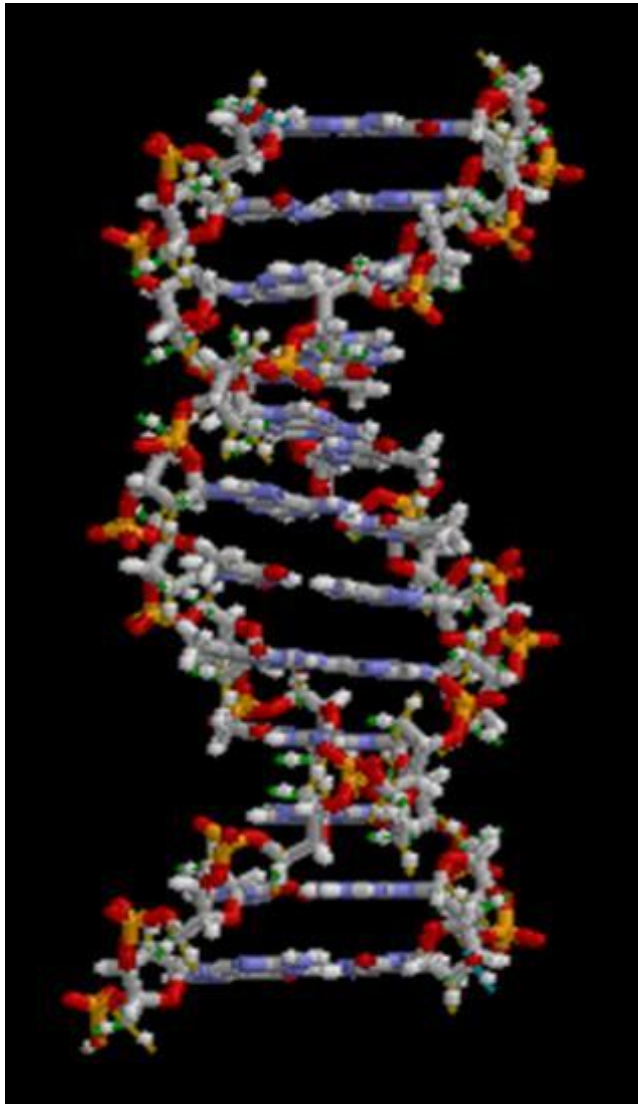
FIGURE 1.14



The California condor (*Gymnogyps californianus*) uses chemical energy derived from food to power flight. California condors are an endangered species; this bird has a wing tag that helps biologists identify the individual.

(credit: Pacific Southwest Region U.S. Fish and Wildlife Service)

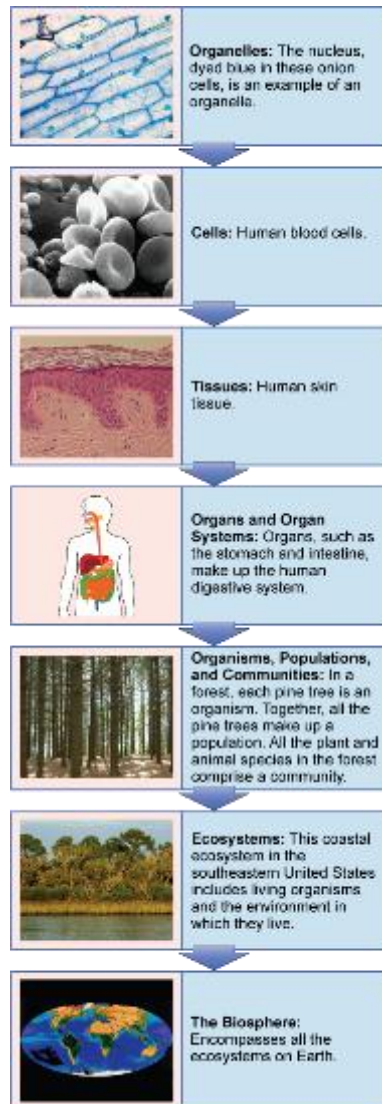
FIGURE 1.15



All molecules, including this DNA molecule, are composed of atoms.

(credit: "brian0918"/Wikimedia Commons)

FIGURE 1.16



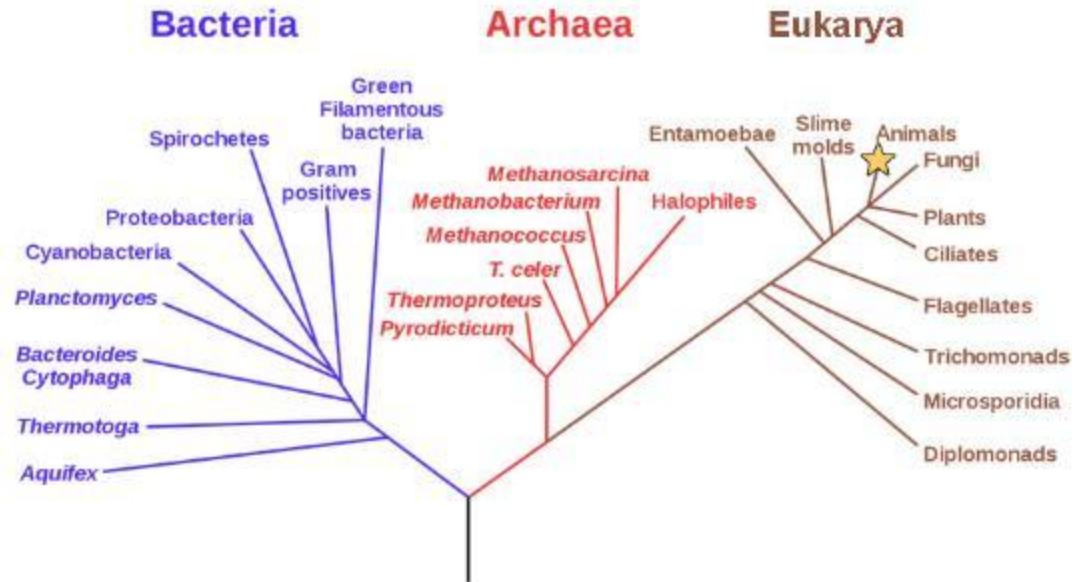
The biological levels of organization of living things are shown. From a single organelle to the entire biosphere, living organisms are parts of a highly structured hierarchy.

(credit “organelles”: modification of work by Umberto Salvagnin; credit “cells”: modification of work by Bruce Wetzel, Harry Schaefer/ National Cancer Institute; credit “tissues”: modification of work by Kilbad; Fama Clamosa; Mikael Häggström; credit “organs”: modification of work by Mariana Ruiz Villareal; credit “organisms”: modification of work by “Crystal”/Flickr; credit “ecosystems”: modification of work by US Fish and Wildlife Service Headquarters; credit “biosphere”: modification of work by NASA)

FIGURE 1.17

Phylogenetic Tree of Life

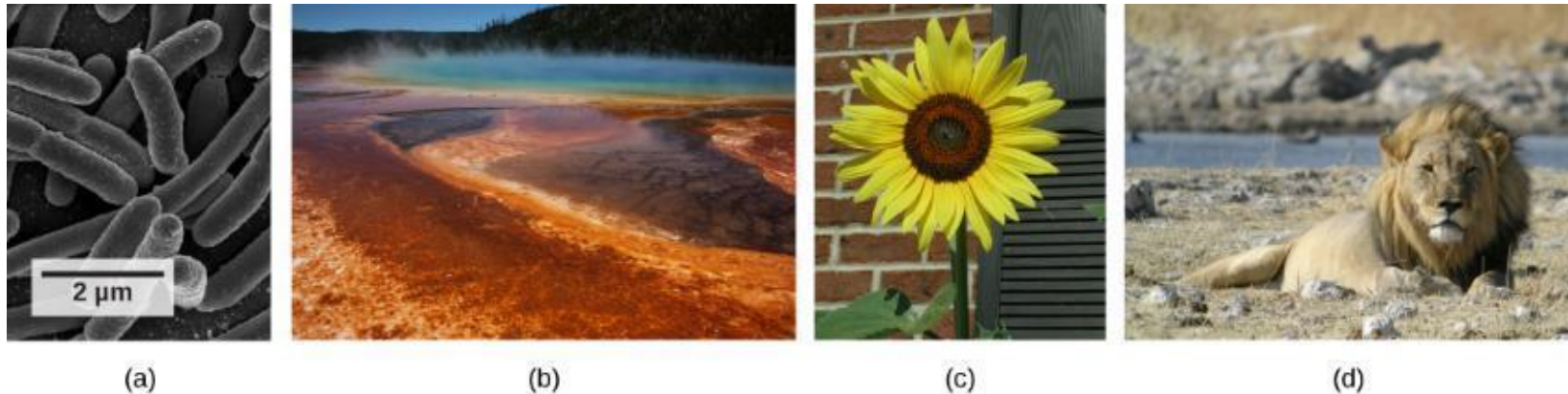
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Microbiologist Carl Woese constructed this phylogenetic tree using data that he obtained from sequencing ribosomal RNA genes. The tree shows the separation of living organisms into three domains: Bacteria, Archaea, and Eukarya. Bacteria and Archaea are prokaryotes, single-celled organisms lacking intracellular organelles.

(credit: Eric Gaba; NASA Astrobiology Institute)

FIGURE 1.18



These images represent different domains. The (a) bacteria in this micrograph belong to Domain Bacteria, while the (b) extremophiles (not visible) living in this hot vent belong to Domain Archaea. Both the (c) sunflower and (d) lion are part of Domain Eukarya.

(credit a: modification of work by Drew March; credit b: modification of work by Steve Jurvetson; credit c: modification of work by Michael Arrighi; credit d: modification of work by Leszek Leszcynski)

FIGURE 1.19



This forensic scientist works in a DNA extraction room at the U.S. Army Criminal Investigation Laboratory at Fort Gillem, GA.

(credit: United States Army CID Command Public Affairs)

FIGURE 1.20



Researchers work on excavating dinosaur fossils at a site in Castellón, Spain.

(credit: Mario Modesto)