# **Chapter 1:** Invitation to Biology

# Life's Unity

- Respond to environment
- Consume energy
- Reproduce
- Grown and develop
- Homeostasis
- Made of Cells
- Made of chemicals (carbohydrates, proteins, nucleic acids, lipids)

# Biology

- Scientific study of life

- Lays the foundation for asking basic questions about life and the natural world

# Levels of Organization

Cell

Organism

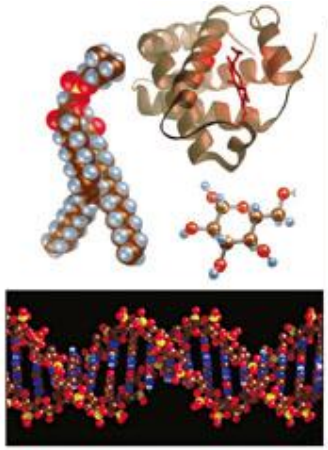
Population

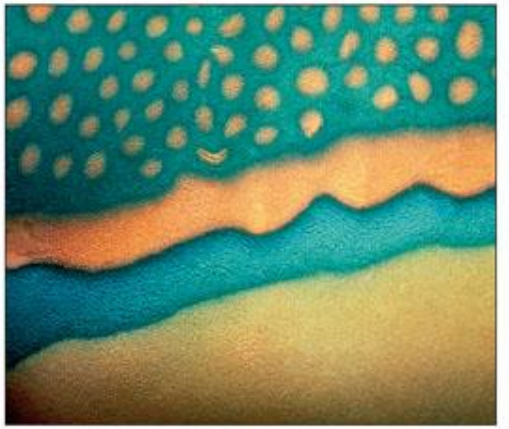
Community

Ecosystem

Biosphere

# Levels of Organization





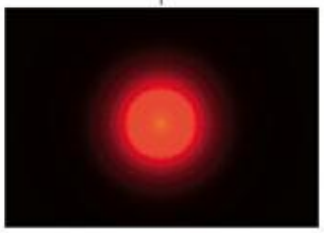
**b molecule** — Two or more joined atoms of the same or different elements. "Molecules of life" are complex carbohydrates, lipids, proteins, DNA, and RNA. Only living cells now make them.

**c cell** — Smallest unit that can live and reproduce on its own or as part of a multicelled organism. It has an outer membrane, DNA, and other components.

**d tissue** — Organized array of cells and substances that are interacting in some task. Many cells (*white*) made this bone tissue from their own secretions.

**e organ** — Structural unit made of two or more tissues interacting in some task. A parrotfish eye is a sensory organ used in vision.

**f organ system** — Organs interacting physically, chemically, or both in some task. Parrotfish skin is an integumentary system with tissue layers, organs such as glands, and other parts.



**a atom**

Elements are fundamental forms of matter. Atoms are the smallest units that retain an element's properties. Electrons, protons, and neutrons are its building blocks. This hydrogen atom's electron zips around a proton in a spherical volume of space.

# Levels of Organization


**g multicelled organism**

Individual made of different types of cells. Cells of most multicelled organisms, including this Red Sea parrotfish, are organized as tissues, organs, and organ systems.

**h population**

Group of single-celled or multicelled individuals of the same species occupying a specified area. This is a fish population in the Red Sea.

**i community**

All populations of all species occupying a specified area. This is part of a coral reef in the Gulf of Aqaba at the northern end of the Red Sea.

**j ecosystem**

A community that is interacting with its physical environment. It has inputs and outputs of energy and materials. Reef ecosystems flourish in warm, clear seawater throughout the Middle East.

**k the biosphere**

All regions of Earth's waters, crust, and atmosphere that hold organisms. In the vast universe, Earth is a rare planet. Without its abundance of free-flowing water, there would be no life.

# Diversity of Life

- Millions of living species
- Millions more now extinct
- Classification schemes attempt to organize diversity

# Scientific Names

- Devised by Carolus Linnaeus
- **First name is genus (plural, genera)**
  - ***Homo sapiens* - genus is *Homo***
- **Second name is species within genus**
- Domain, kingdom, phylum, class, order, family, genus, species

# Examples of Life's Diversity

**Bacteria**



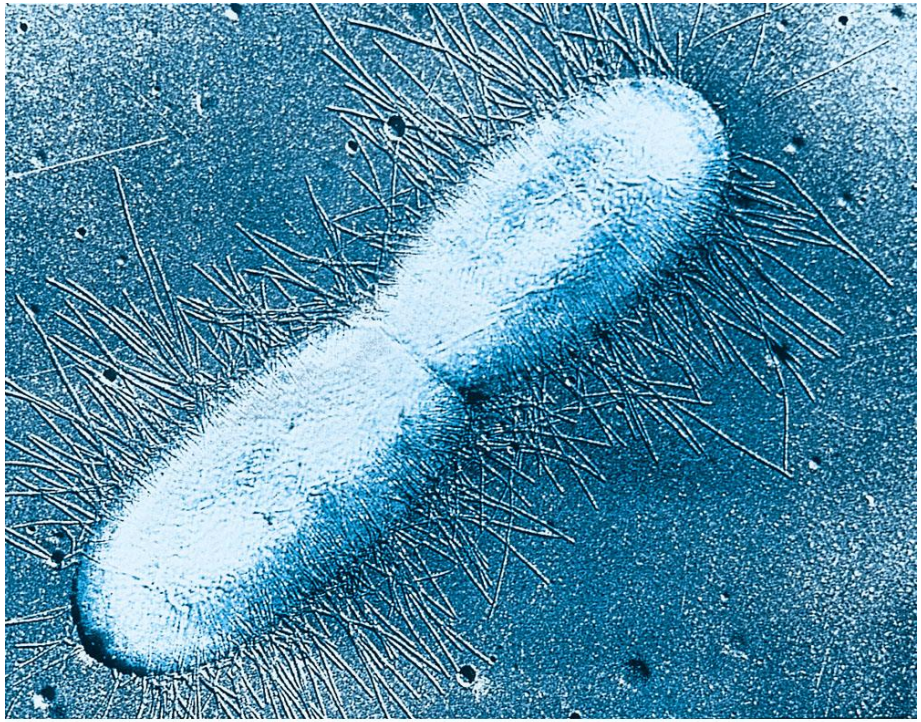
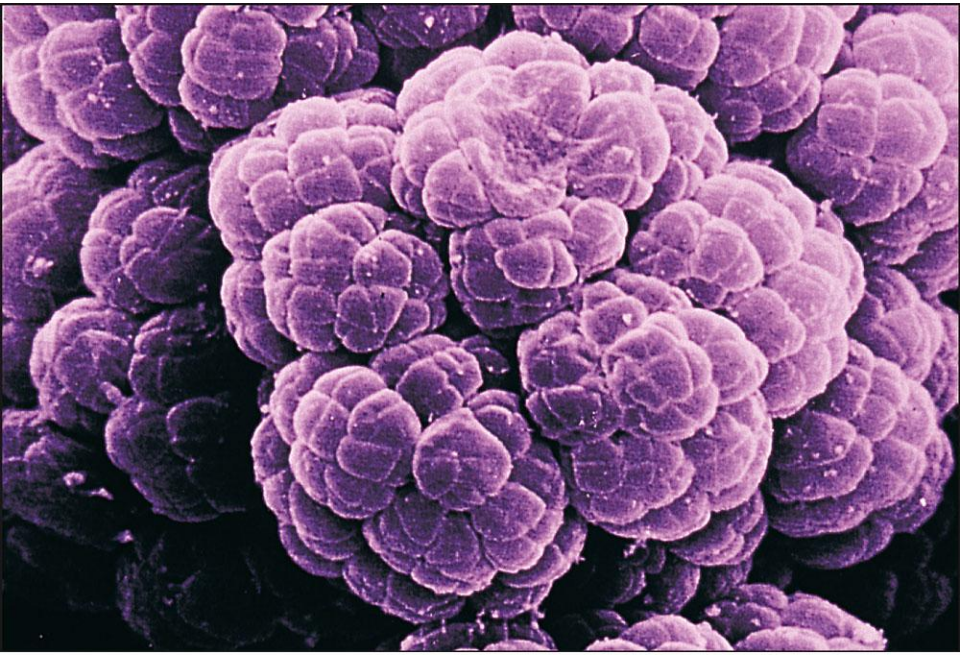




**Fig. 1-8, p.8**

# Examples of Life's Diversity

**Archaea**





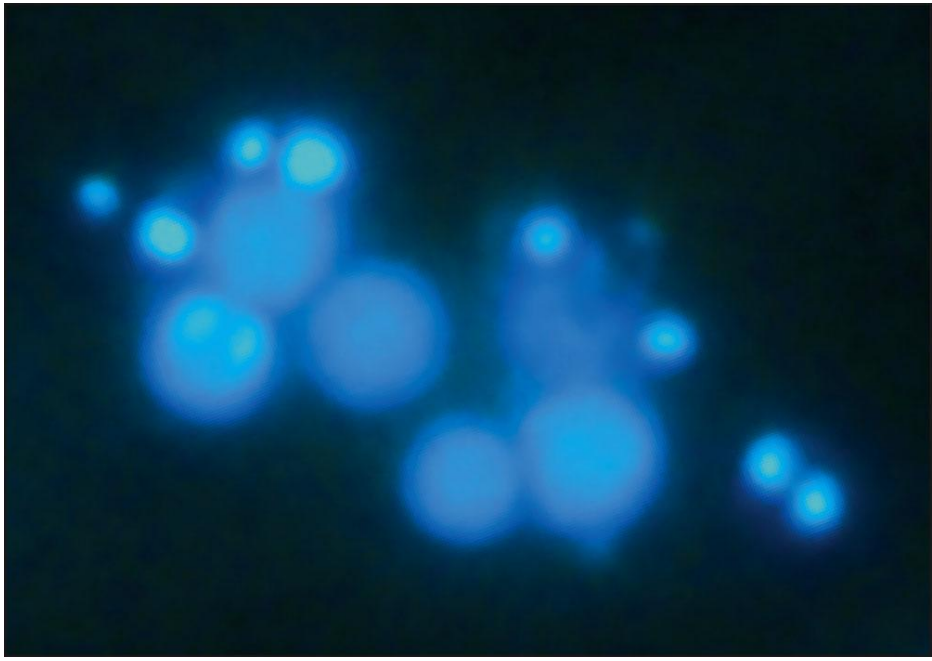




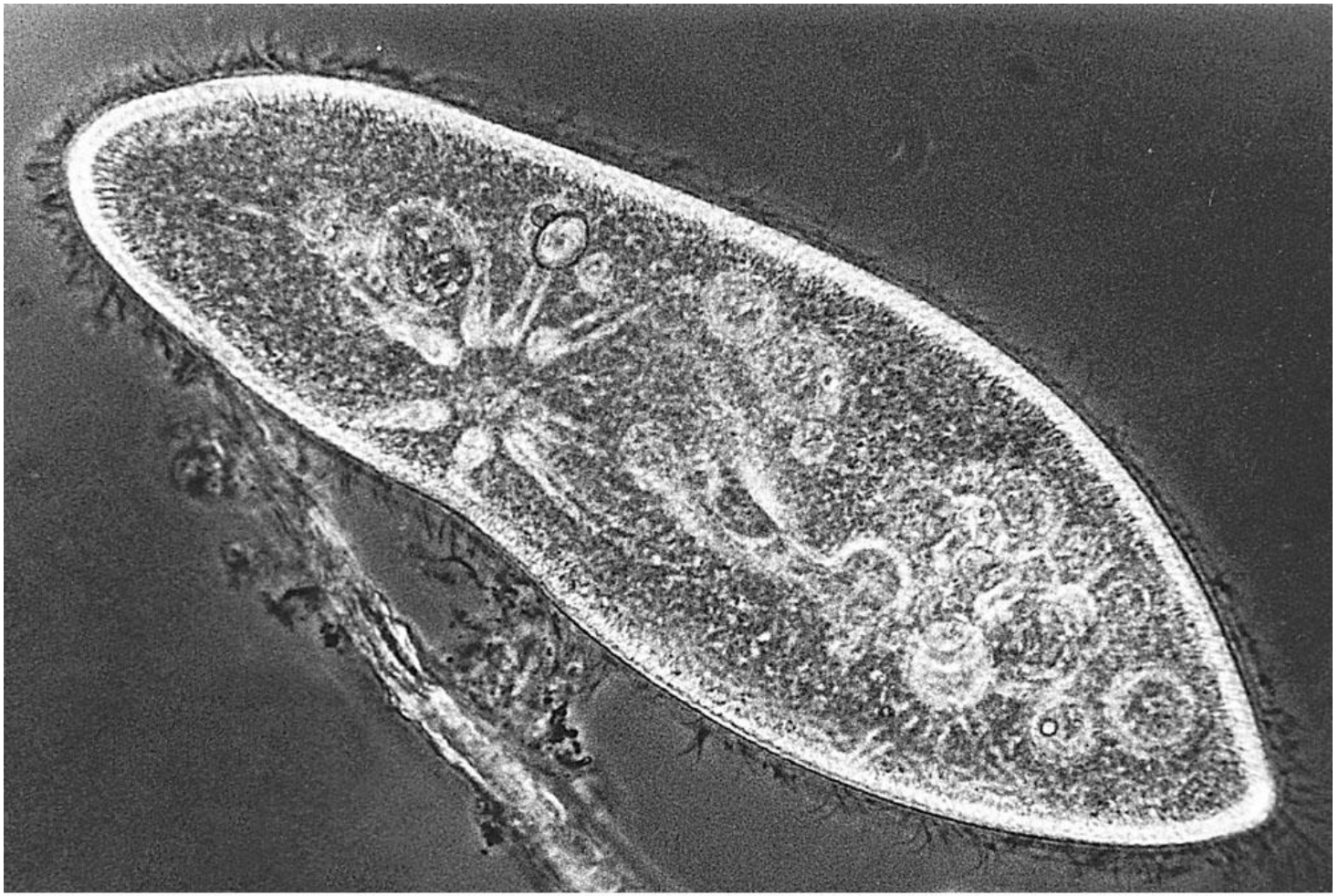
**Fig. 1-8, p.8**

# Examples of Life's Diversity

**Protists**

# Examples of Life's Diversity

**Protists**



# Examples of Life's Diversity

**Protists**

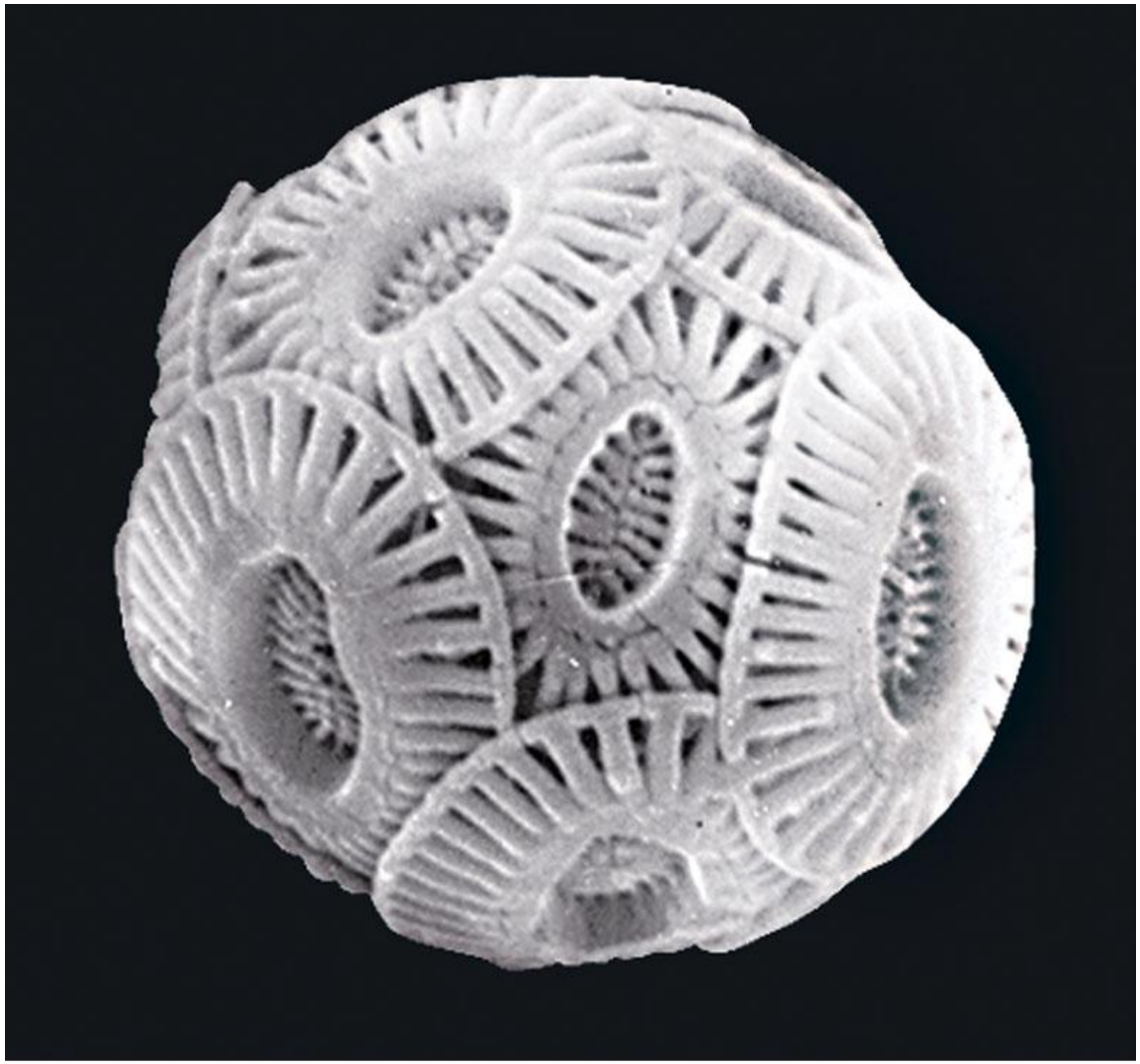




**Fig. 1-8c(3), p.9**

# Examples of Life's Diversity

**Protists**

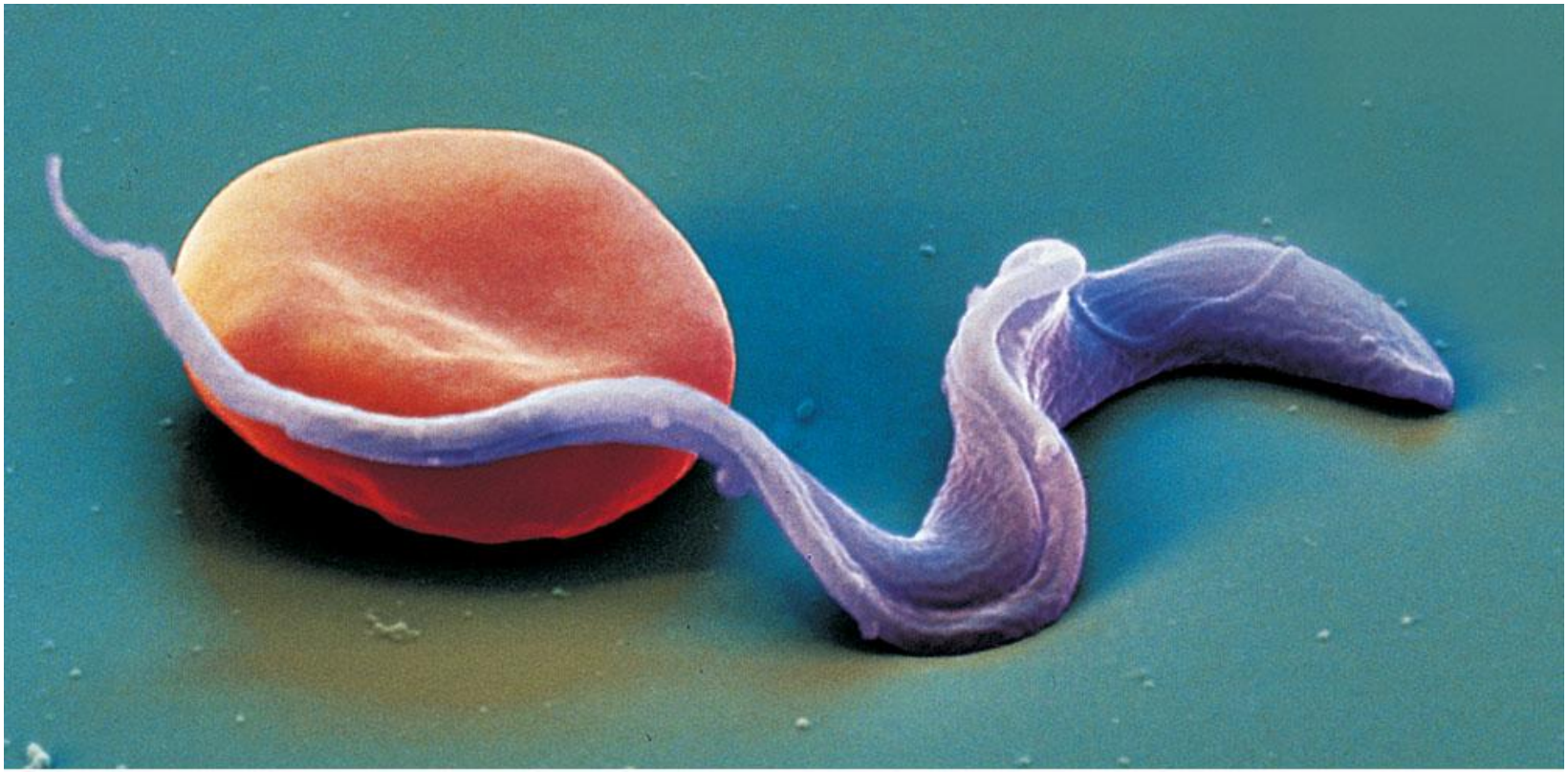




Fig. 1-8c(4), p.9

# Examples of Life's Diversity

**Plants**



**Fig. 1-8c(6), p.9**

# Examples of Life's Diversity

**Plants**



**Fig. 1-8c(7), p.9**

# Examples of Life's Diversity

**Fungi**



**Fig. 1-8c(8), p.9**

# Examples of Life's Diversity

**Fungi**



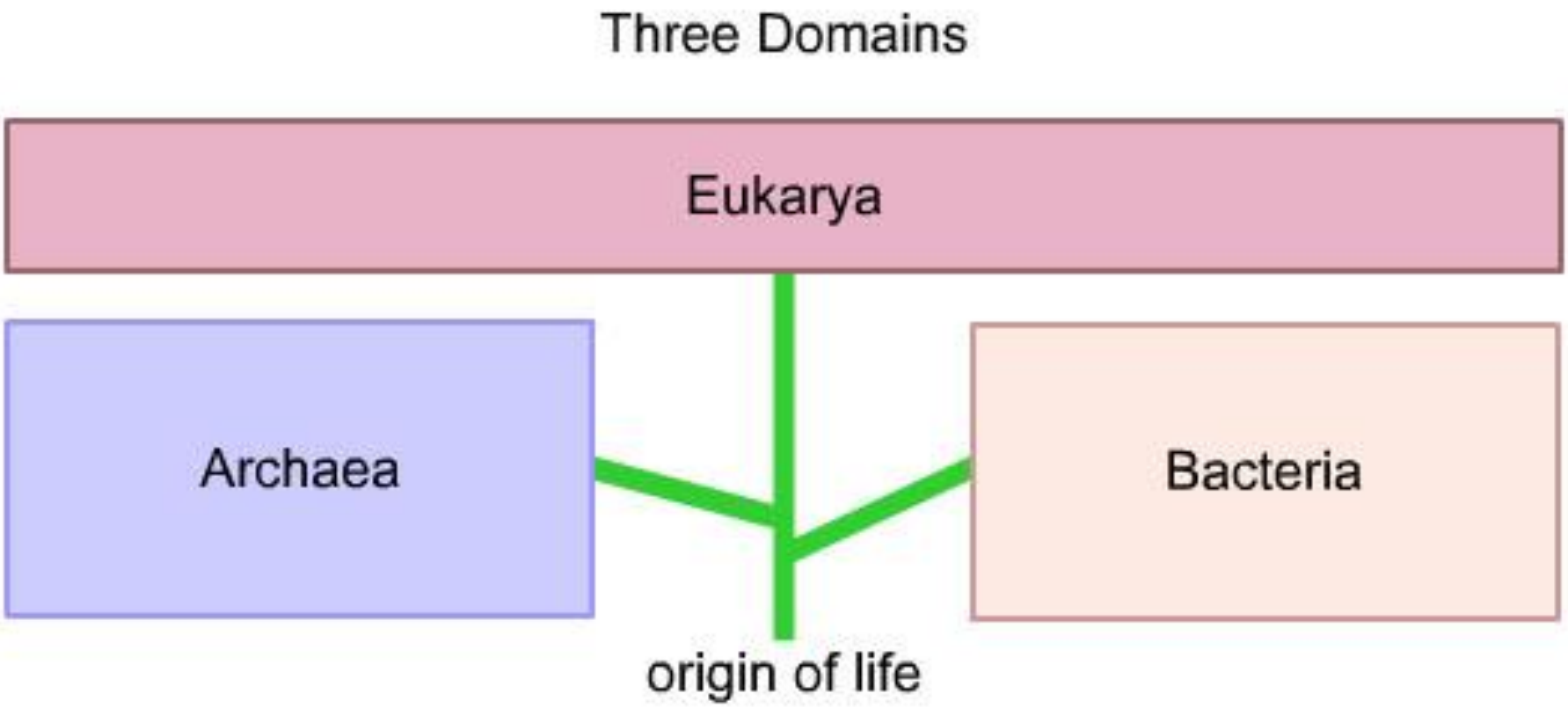
**Fig. 1-8c(9), p.9**

# Examples of Life's Diversity

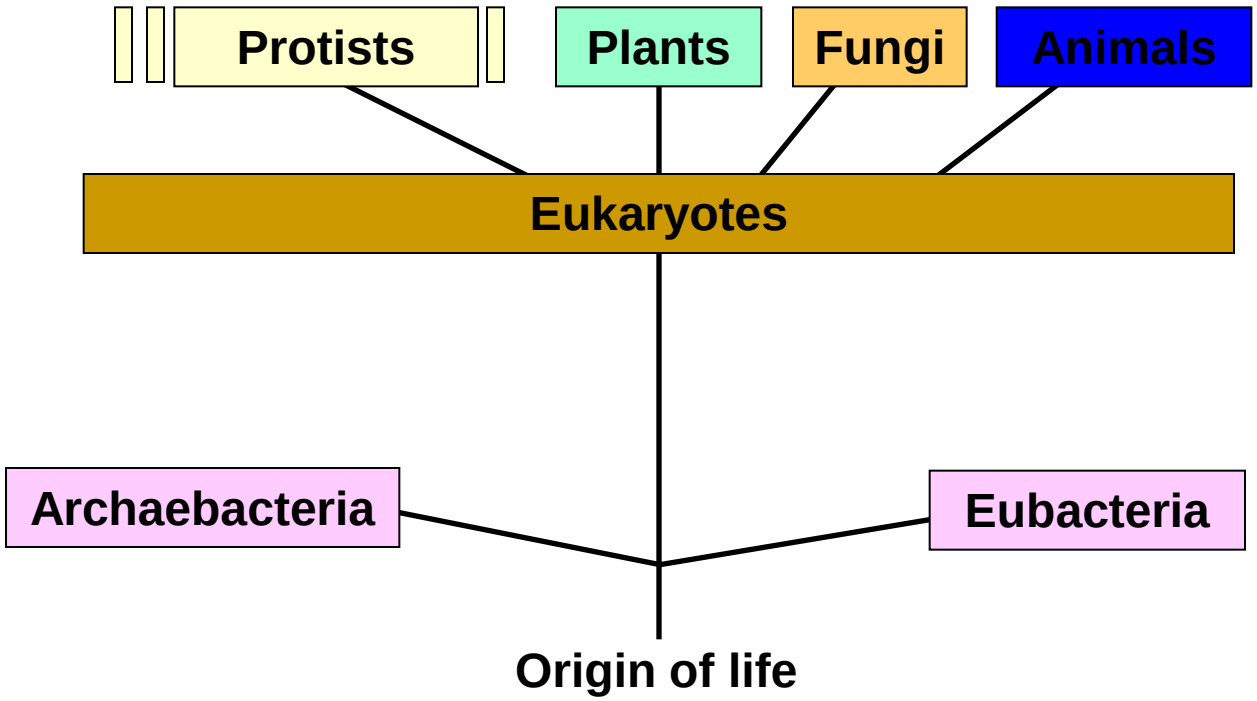
**Animals**



Fig. 1-8c(10), p.9


Three Domains
Eukarya
Archaea
Bacteria
origin of life

# 6 Kingdoms


Protists
Plants
Fungi
Animals
Eukaryotes
Archaebacteria
Eubacteria
Origin of life

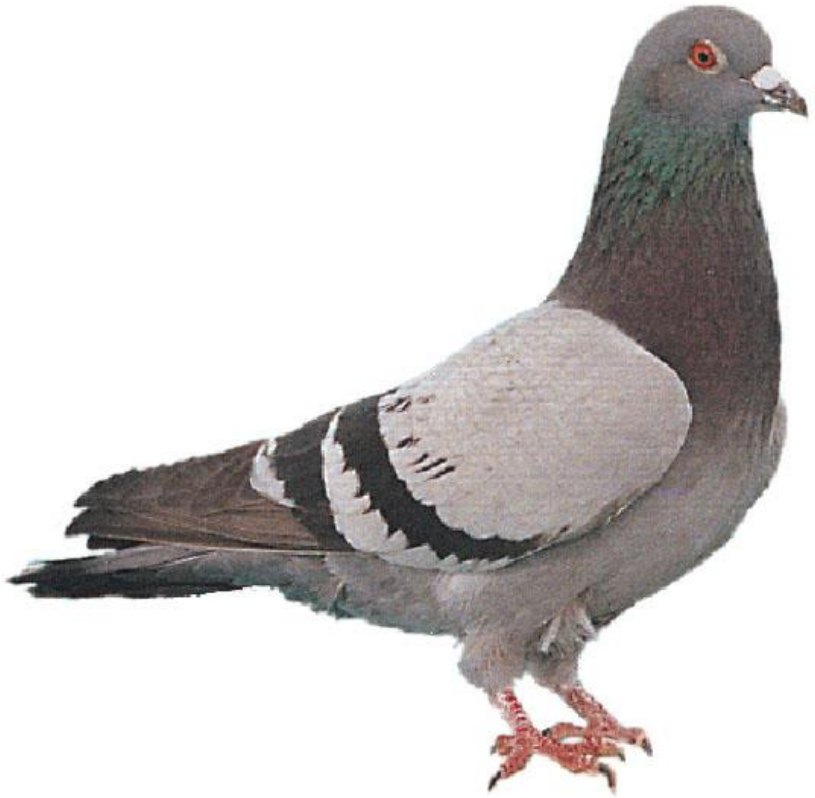
# Evolution

- Genetically based change in a line of descent over time
- Population changes, not individuals
- Mutations
- Natural Selection

# Artificial Selection

- Breeders are selective agents
- Individuals exhibiting favored traits are bred
- Favored traits become more common in population

# Domesticated Pigeons



WILD ROCK DOVE



Fig. 1-9a, p.10

# Domesticated Pigeons



Fig. 1-9b, p.10

# Domesticated Pigeons



**Stepped**

**Fig. 1-9b, p.10**

# Natural Selection

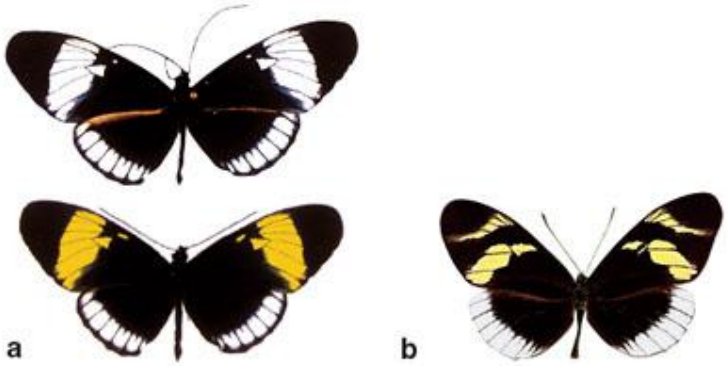
- Individuals vary in some heritable traits
- Some forms of heritable traits are more adaptive
- Natural selection is differences in survival and reproduction among individuals that vary in their traits
- Adaptive forms of traits become more common than other forms

# Scientific Method

- **Observe** phenomenon
- Develop **hypotheses**
- Make **predictions**
- Devise **test** of predictions
- Carry out test and **analyze** results

# Role of Experiments

- Used to study a phenomenon under known conditions
- Allows you to predict what will happen if a hypothesis is not wrong
- Can never prove a hypothesis 100% correct
- Take a look at page 12-13



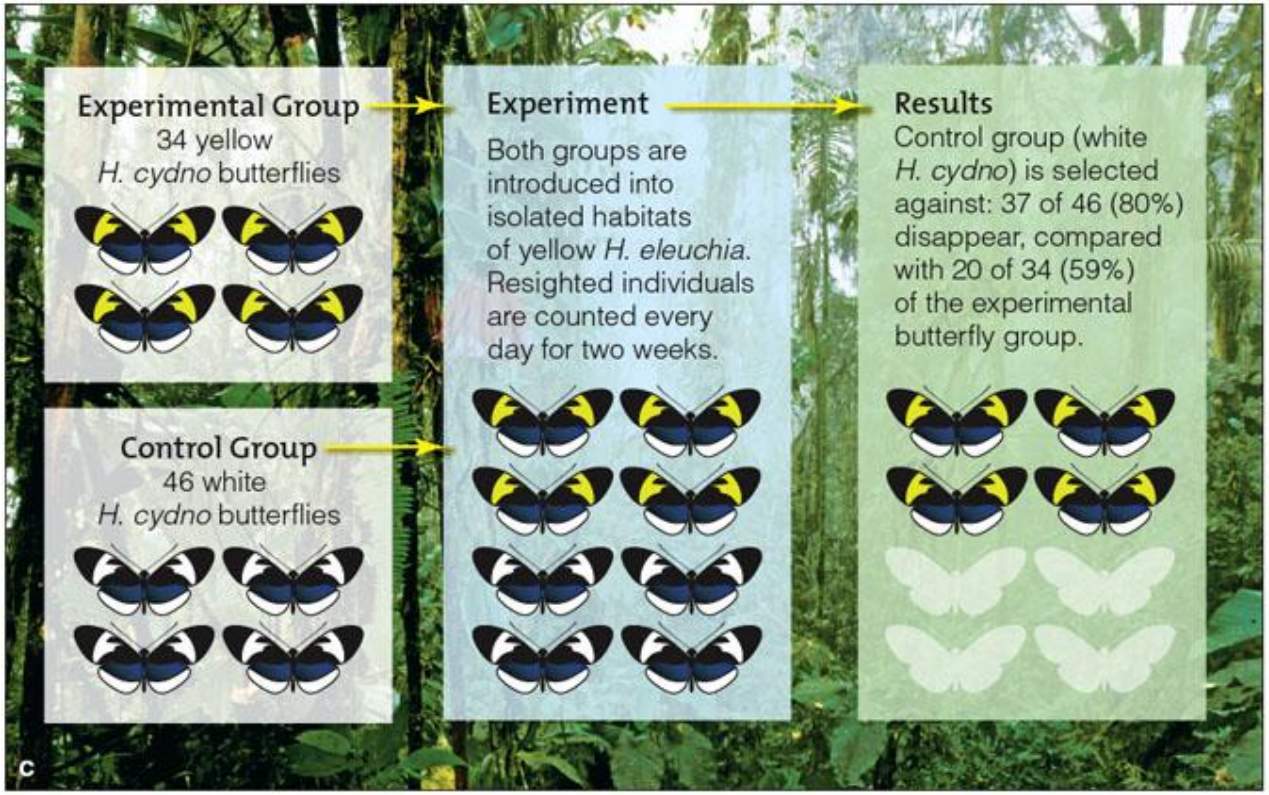







**Fig. 1-11, p.13**

a

b



Fig. 1-11a-b, p.13

**Experimental Group**

34 yellow
*H. cydno* butterflies

**Control Group**

46 white
*H. cydno* butterflies

**Experimental**

Both groups are introduced into isolated habitats of yellow H. eleuchia. resighted individuals are counted every day for two weeks.

**Results**

Control group (white *H. cyndo*) is selected against: 37 of 46 (80%) disappear, compared with 20 of 34 (59%) of the experimental butterfly group.



Fig. 1-11c, p.13




Fig. 1-11d, p.13