Welcome to BIO10.01 &.02

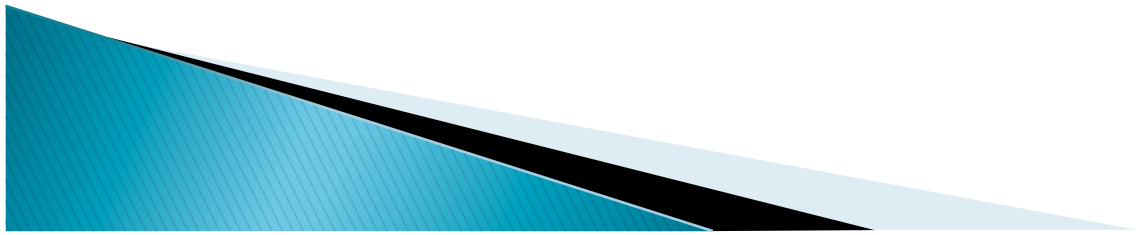
Spring 2009

Instructor: Judy Cuff-Alvarado

- cuffjudy@deanza.edu
  - Office: KC rm # 215 (408-864-8640)
- Lab: T OR Th: in S52 11:30-2:10
- Lecture: T & Th 9:30-11:10 in E35
- Greensheet Info/ Office Hrs/ http://faculty.deanza.fhda.edu/cuffjudy/
- Final Exam: 9:15 a.m.-11:15 a.m. Tuesday, June 23 in E35

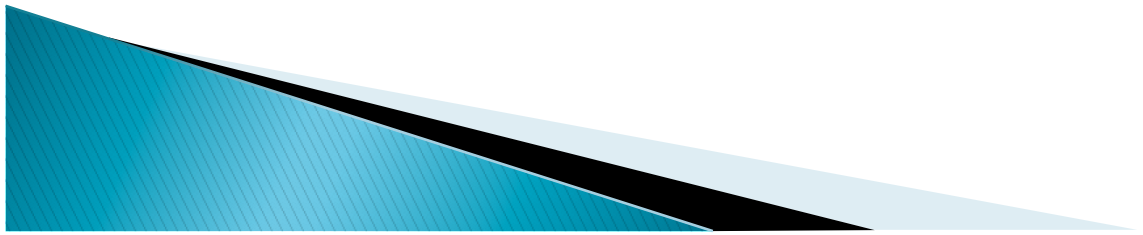
GRADES

- **500 POINTS TOTAL FOR COURSE**
- Lab 100 pts
- Articles 25 pts
- 2 out of 3 tests= 200
- lab presentation = 50 pts
- Final Exam (not cumulative) =100 pts
- Homework/pop quizzes= 25 pts
  - 500 points total



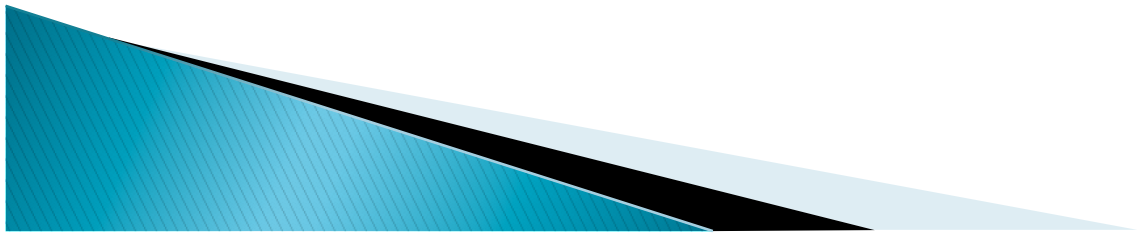
GRADE SCALE FOR THIS COURSE

A+	95%	>475
A	91-94%	455-474.4
A-	89-91%	445-454.4
B+	85-89%	425-444.4
B	82-84%	410-424.4
B-	79-81%	395-409.5
C+	71-78%	355-394.4
C	65-70%	325-354.4
D	55-64%	275-324.4
F	<55%	<275



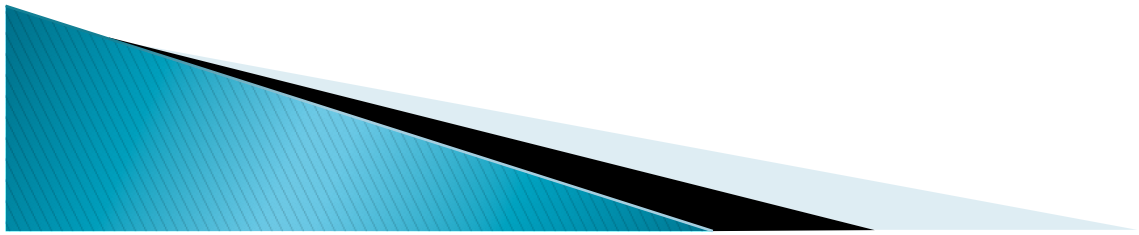
Extra Credit

- 40 pts total for the course
- Check Instructor's webpage
- Be careful of deadlines. NOT ACCEPTED AFTER DEADLINE!



WEEK #1 Homework

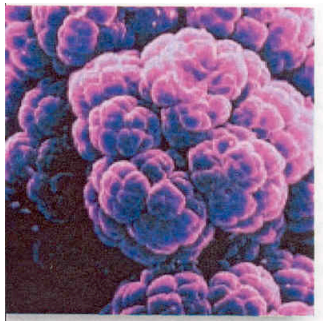
- Read Chapters 1 and 2 in text book.
- Sign onto Publisher's webpage for course support
- www.aris.mhhe.com



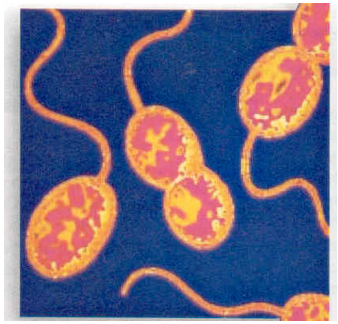
1.1 The Diversity of Life

- Biology: study of living things
- Living things can be divided into 6 kingdoms

Fig. 1.1

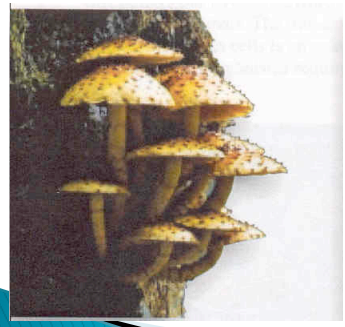


Archaea



Bacteria

Protista



Fungi

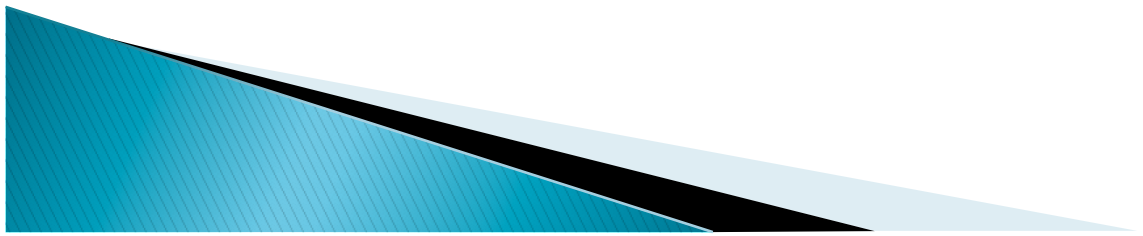
Plantae

Animalia

1.2 Properties of Life

But what does it mean to be alive?

- Living organisms and many non-living things share three properties
  - Complexity
  - Movement
  - Response to stimulation



1.2 Properties of Life

- All living organisms share 5 basic properties
  - 1. Cellular Organization: All are composed of at least one cell
  - 2. Metabolism: All use energy
  - 3. Homeostasis: All maintain stable internal conditions
  - 4. Growth and reproduction
  - 5. Heredity: All have a genetic system that is based on DNA (Deoxyribonucleic acid)

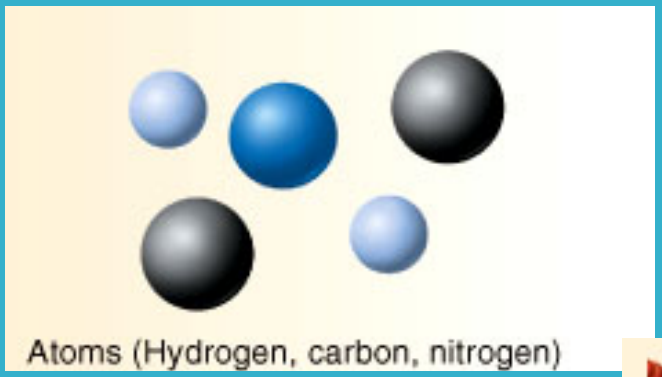
1.3 The Organization of Life

- Living organisms function and interact with each other at many levels

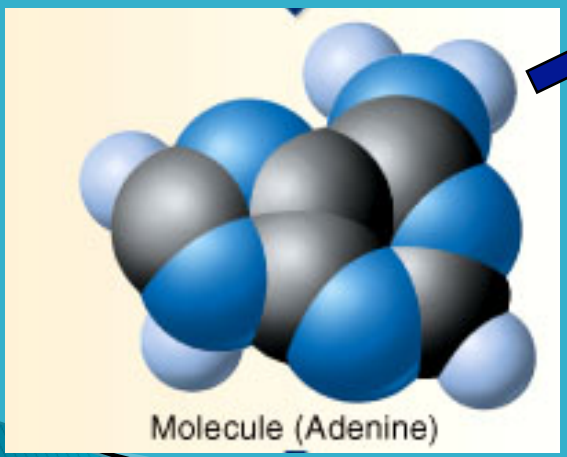
- These levels are organized in a hierarchy of increasing complexity
  - Cellular Level
  - Organismal Level
  - Populational Level

Fig. 1.4

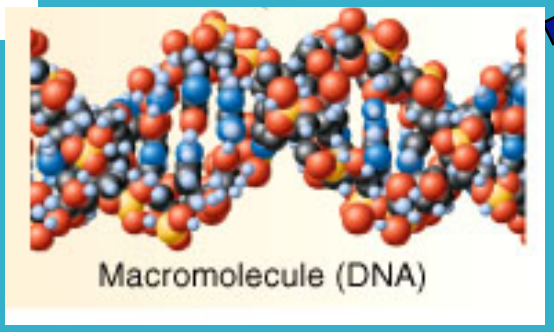
CELLULAR LEVEL



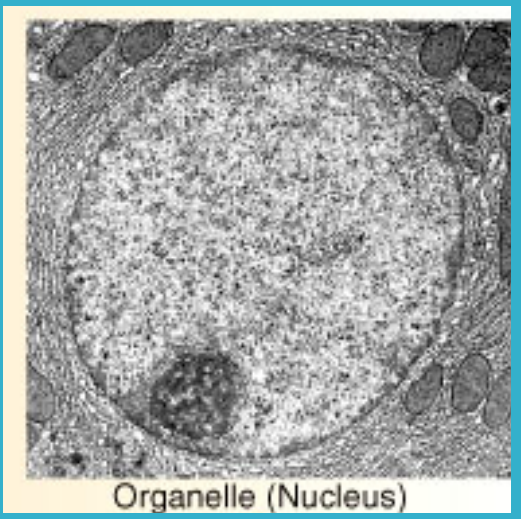
Atoms (Hydrogen, carbon, nitrogen)



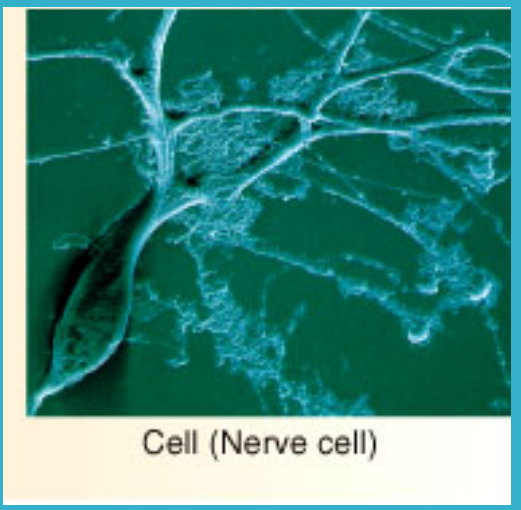
Molecule (Adenine)



Macromolecule (DNA)



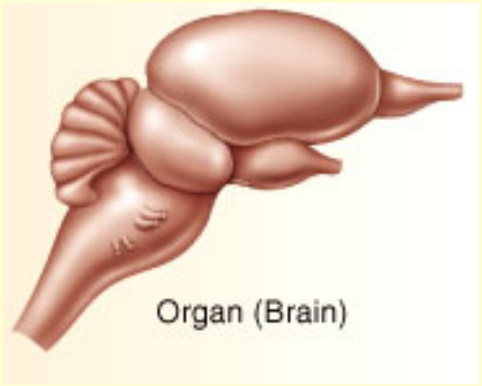
Organelle (Nucleus)



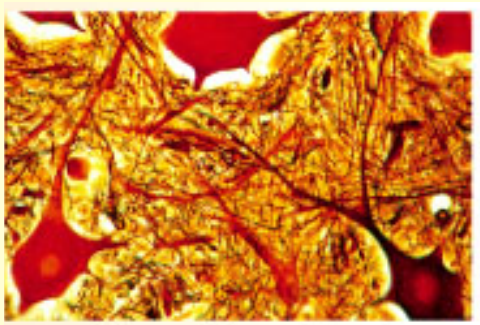
Cell (Nerve cell)

Fig. 1.4

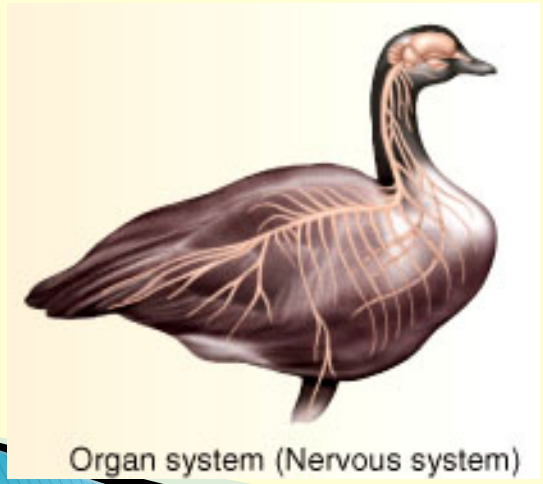
ORGANISMAL LEVEL



Organ (Brain)



Tissue (Nerve tissue)



Organ system (Nervous system)

Organism

Fig. 1.4

POPULATIONAL LEVEL

Ecosystem

Population

Species

Community

1.3 The Organization of Life

- Each higher level contains novel properties not present at the simpler level of organization
- These properties are termed emergent properties

5 general themes unify and explain biology as a science

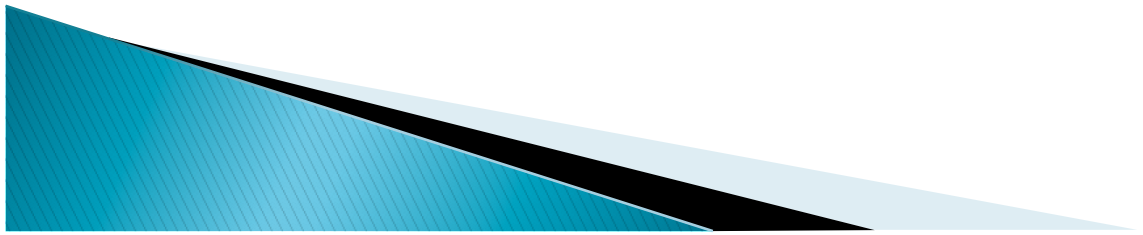
Refer to Table 1.1 in text

- Evolution
- Energy flow
- Structure determines function
- Cooperation
- homeostasis

1.4 Biological Themes

- 1. Evolution
  - The genetic change in a species over time
  - It is a result of a process termed natural selection
  - Variation may also be caused by artificial selection

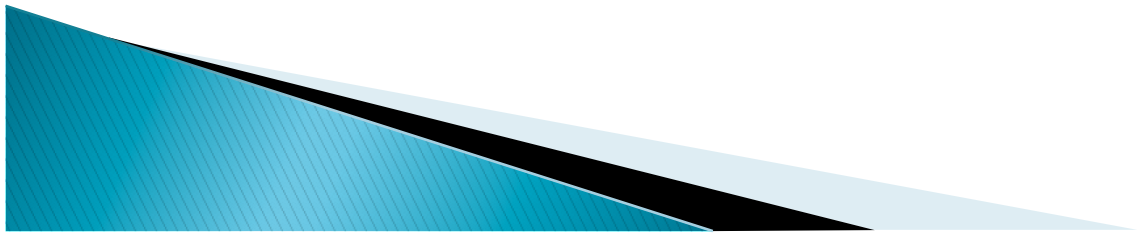
- 2. The Flow of Energy
  - All living organisms require energy
  - The sun is the source of energy for ecosystems
  - Plants capture energy via photosynthesis
    - They then act as an energy source for other organisms



1.4 Biological Themes

- 3. Cooperation
  - Cooperation between organisms is critical for evolution
  - Symbiosis occurs when two organisms of different species live in direct contact

- 4. Structure Determines Function
  - Biological structures are well suited to their function
    - This is true at every level of organization



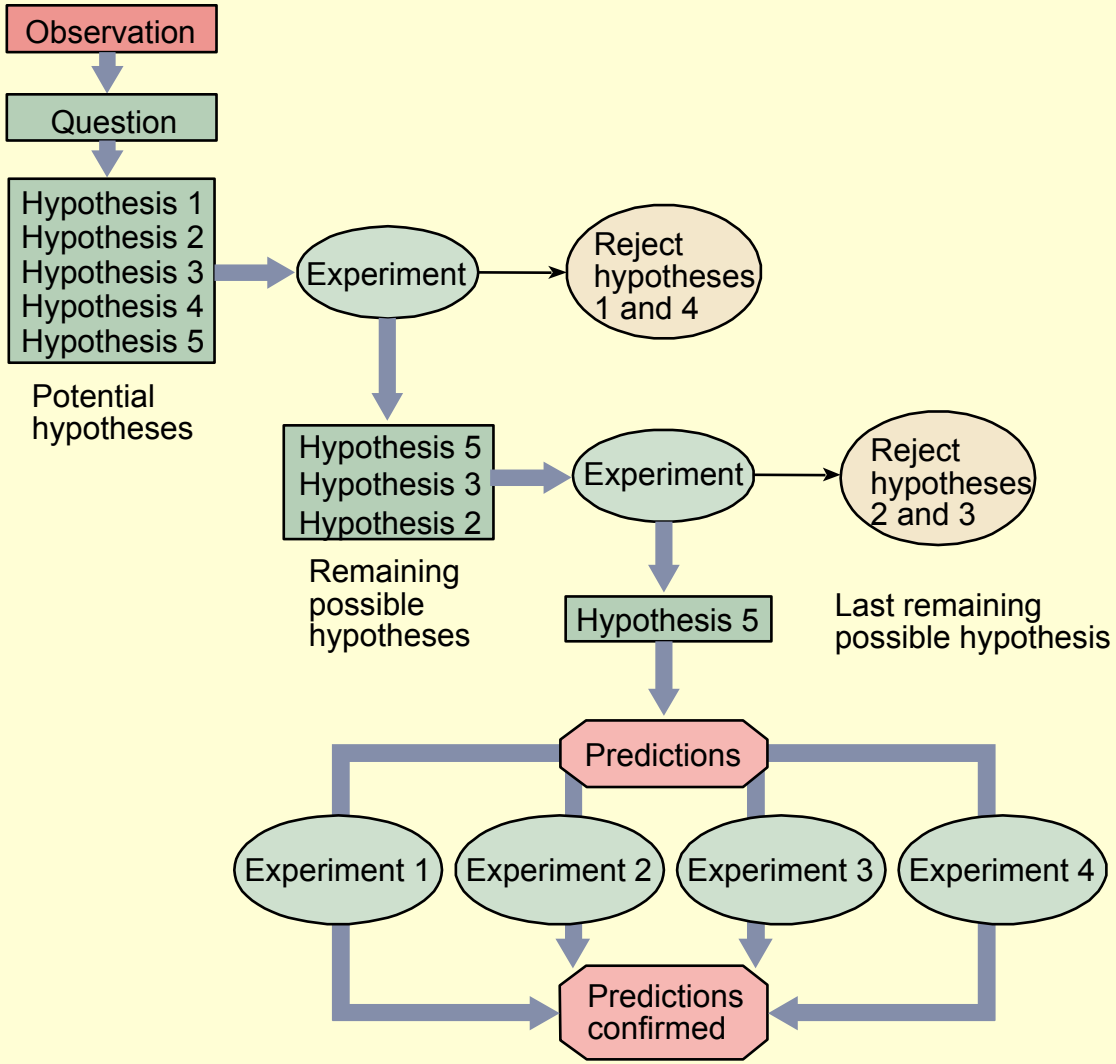
1.4 Biological Themes

- 5. Homeostasis
  - All living organisms act to maintain a relatively stable internal environment
  - Maintaining homeostasis requires a lot of signaling back-and-forth between cells

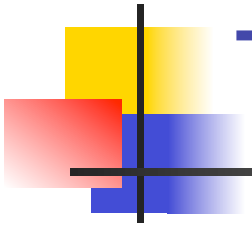
1.7 6 Stages of Scientific Investigation

- 1. **Observation**
- 2. **Hypothesis**: a potentially falsifiable statement (Guess regarding the observation)
  - If more than 1 guess, alternative hypotheses
- 3. **Prediction**: Expected consequences
- 4. **Test**: experiment
- 5. **Control**: A factor that influences a process is called a variable
  - In a control experiment, all variables are held constant
- 6. **Conclusion:** reject or accept hypothesis

Fig. 1.7


Observation
Question
Hypothesis 1
Hypothesis 2
Hypothesis 3
Hypothesis 4
Hypothesis 5
Potential hypotheses
Experiment
Reject hypotheses 1 and 4
Hypothesis 5
Hypothesis 3
Hypothesis 2
Remaining possible hypotheses
Experiment
Reject hypotheses 2 and 3
Hypothesis 5
Last remaining possible hypothesis
Predictions
Experiment 1
Experiment 2
Experiment 3
Experiment 4
Predictions confirmed

Facts, Hypotheses and Theories



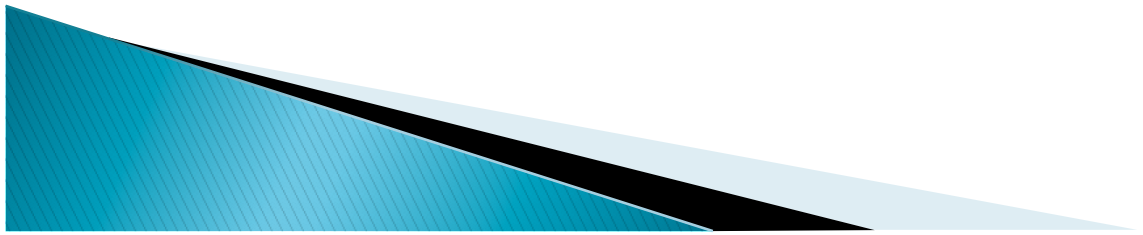
- Observable, verifiable truths are facts
- Testable explanations for them are hypotheses
- And well, supported hypotheses are theories

1.8 Theory and Certainty

- Theory: a set of hypotheses that have been tested many times and not rejected
- It indicates a higher degree of certainty
- However, there is no absolute truth in science
  - So the acceptance of a theory is provisional

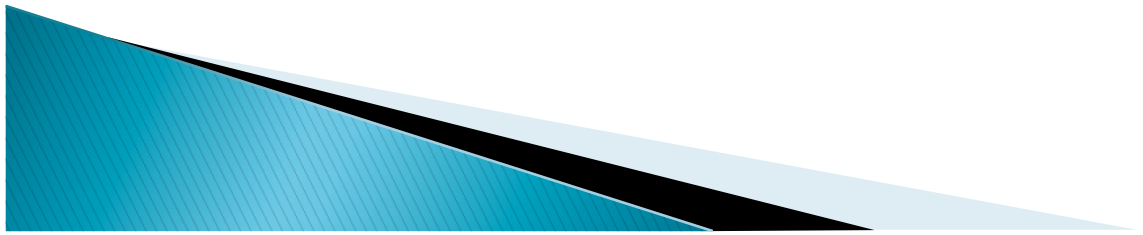
1.8 Theory and Certainty

- Note:
  - To scientists, a theory represents that of which they are most certain
  - To the general public, a theory represents *lack* of knowledge or a guess



1.8 Theory and Certainty

- **The scientific "method"**
  - A series of logical "either/or" predictions tested by experiments to reject alternative hypotheses

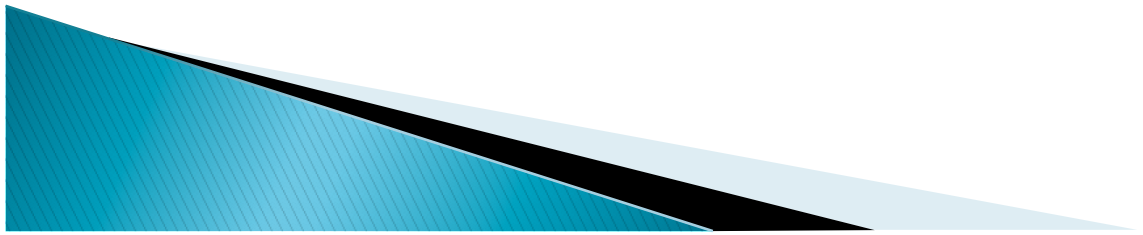


1.9 Four Theories Unify Biology

1. The Cell Theory
2. The Gene Theory
3. The Theory of Heredity
4. The Theory of Evolution

The Cell Theory: Organization of Life

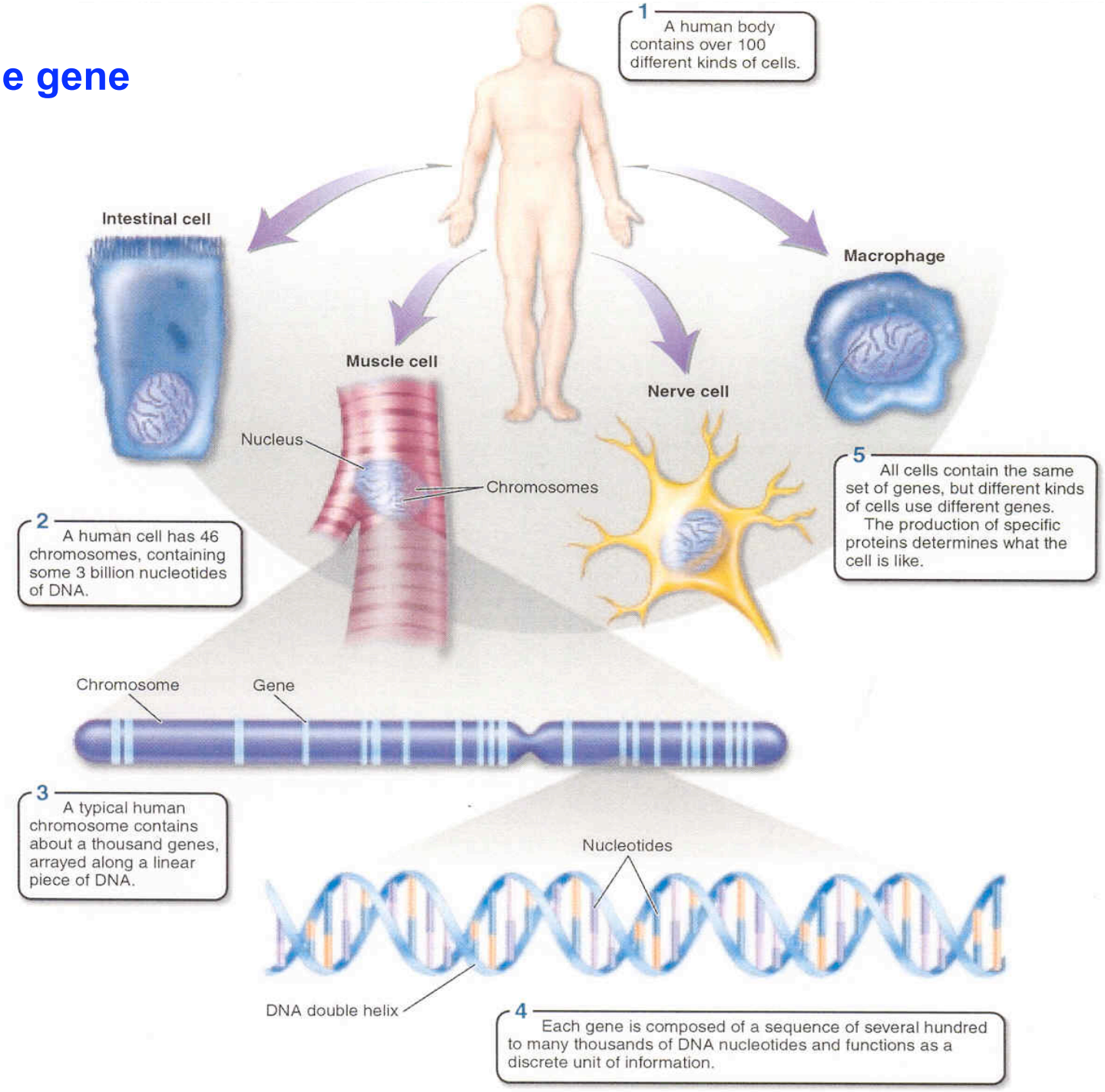
- Robert Hooke, 1665
  - Discovered cells
- Anton van Leeuwenhoek, 1670s
  - Discovered single-celled life
- Matthias Schleiden & Theodor Schwann, 1839
  - All living organisms are composed of cells
  - Cells are the basic units of life
- Rudolf Virchow, 1866
  - All cells come from other cells



The Gene Theory: Molecular Basis of Inheritance

- The information that determines what an organism is like is encoded in its genes
- Genes are located along DNA molecules
  - Refer to Fig. 1.11
- The entire set of DNA instructions that specifies a cell is termed its genome

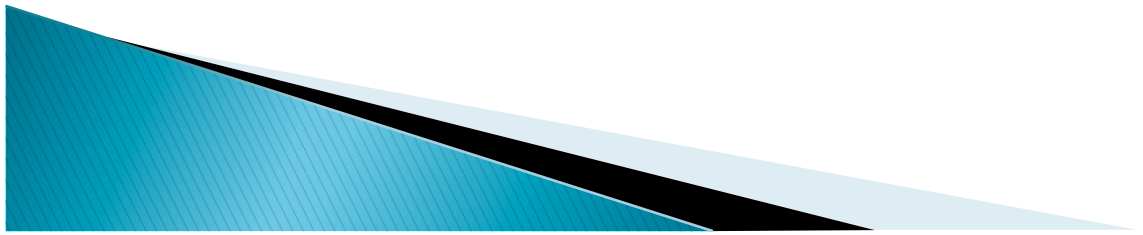
Fig. 1.12 The gene theory



The Theory of Heredity: Unity of Life

- This theory was first advanced by Gregor Mendel in 1865
  - genes of an organism are inherited as discrete units

- Later, other biologists proposed the chromosomal theory of inheritance
  - Genes are physically located on chromosomes

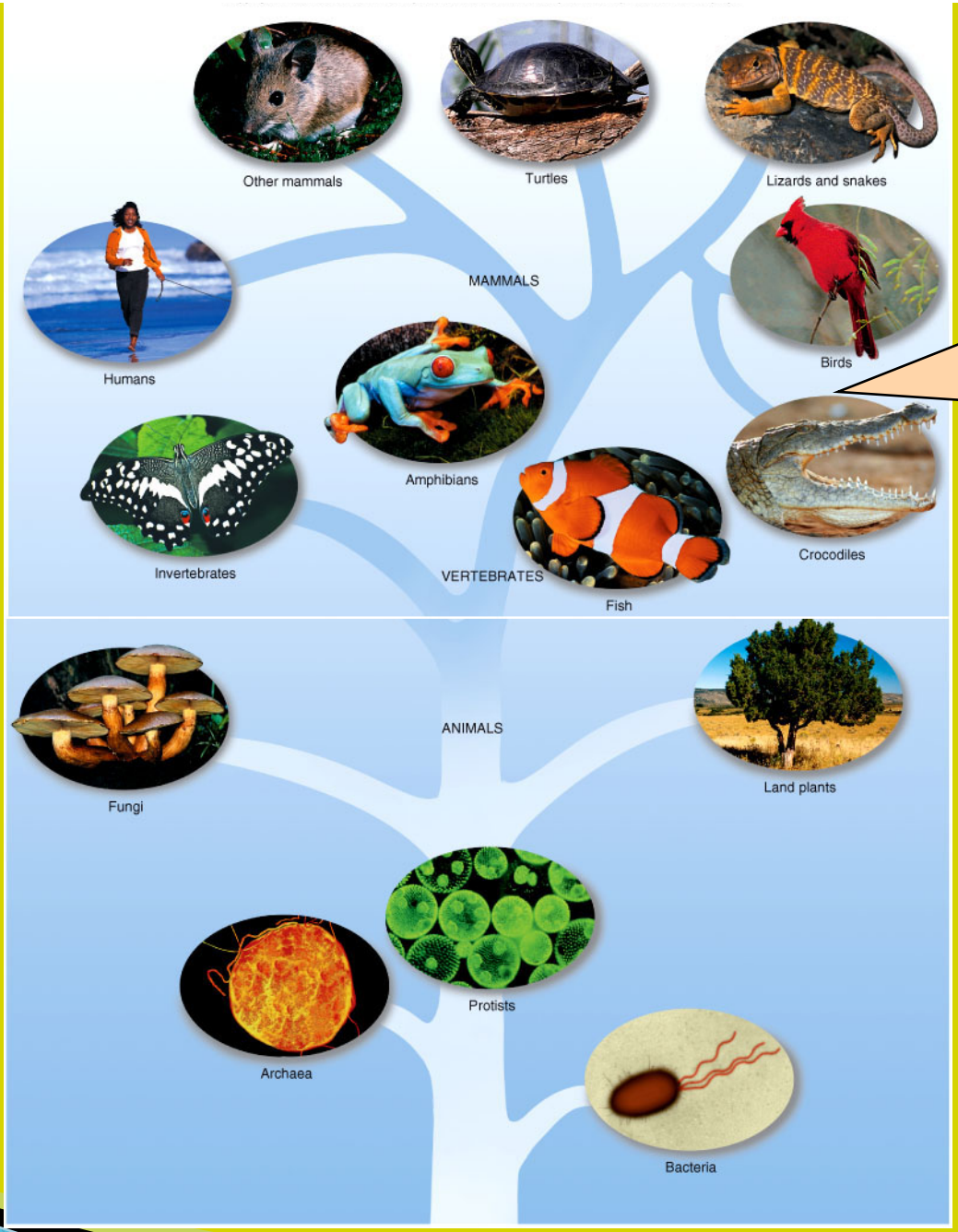


The Theory of Evolution: Diversity of Life

- This theory was first advanced by Charles Darwin in 1859
  - the diversity of the living world is due to **natural selection**

- "descent by modification"
  - All living organisms are related to one another in a common tree of life

Fig. 1.15
The tree of life



Crocodiles are more closely-related to birds than to other reptiles

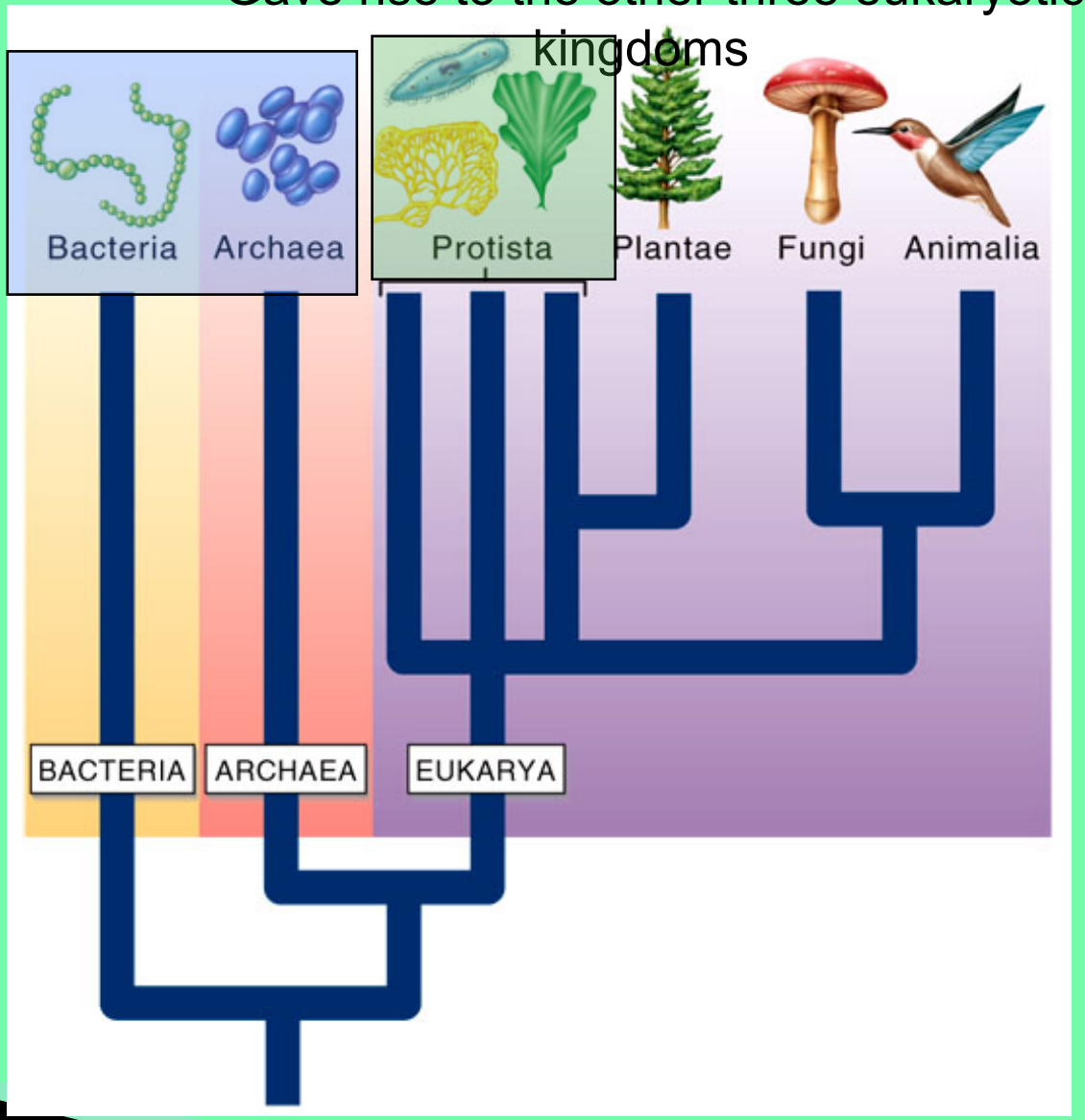
The Theory of Evolution: Diversity of Life

- Biologists divide all living organisms into domains
  - Prokaryotes and Eukaryotes
    - Bacteria
    - Archaea
    - Aka Kingdom Monera
    - Plant
    - Animal
    - Fungi
    - Protista

Fig. 1.16

Simplest and most diverse;
Gave rise to the other three eukaryotic kingdoms

Prokaryotes



See you Thursday!

- Don't forget to sign onto publishers webpage.
- Read chapters 1 and 2.
- GO to instructors webpage and download Greensheet