

# Biology 20

## Introduction to Life

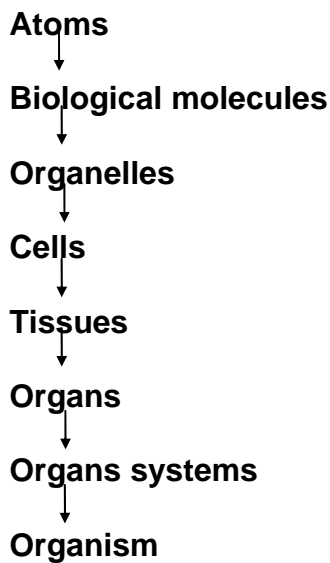
What is **Biology**?

### Unifying themes in Biology:

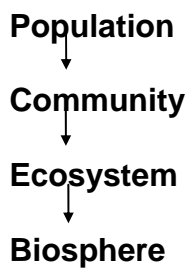
1. A hierarchy of organization
  2. Emergent properties
  3. Cellular basis of life
  4. Heritable information (biological information)
  5. Interaction of organisms with their environment
  6. Unity in diversity
  7. Evolution: The core theme of Biology
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### 1. A HIERARCHY OF ORGANIZATION

-Biological organization is based on structural levels.



Organization beyond the level of the organism:



## 2. Emergent Properties

### ATTRIBUTES OF LIFE:

a. **Order**

b. **Reproduction**

Biogenesis:

c. **Growth and Development**

d. **Energy Utilization**

e. **Performs chemical reactions:**

**Metabolism:**

Anabolism:

Catabolism:

f. **Response to environment:**

**Homeostasis:**

**a) Negative Feedback**

**b) Positive Feedback**

g. **Evolutionary Adaptations**

## 3. THE CELLULAR BASIS OF LIFE

1)

2)

3)

4)

5)

- Two major cell types:
  1. **Prokaryotic**
  2. **Eukaryotic**

#### 4. HERITABLE INFORMATION

#### 5. THE INTERACTION OF ORGANISMS WITH THEIR ENVIRONMENT

#### 6. UNITY IN DIVERSITY

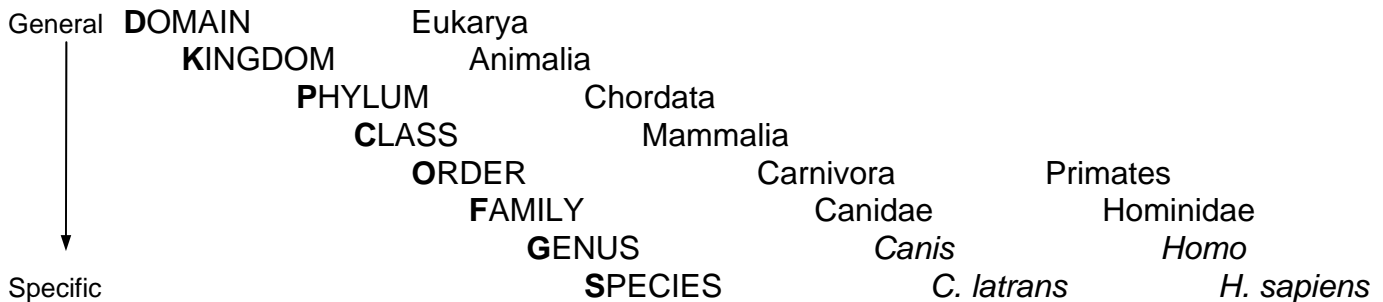
Estimated:

**1.5 million species identified**, of which:
 

- 260,000 plant species
- 50,000 vertebrates
- 750,000 insects

#### Taxonomy:

Taxonomic categories are ranked into a hierarchy from most to least inclusive.



#### Classical 5 Kingdoms scheme

- Monera =>
- Protista =>
- Fungi =>
- Plantae =>
- Animalia =>

3 Domains => Archaea, Bacteria and Eukarya.

6 Kingdoms => Monera split into: Archaea  
Bacteria

## 7. EVOLUTION: THE CORE THEME OF BIOLOGY

Life evolves and species change over time - "A change in the genes (DNA sequence)"  
All life is connected and can be traced back 3.5 billion years.

Charles Darwin = The Origin of Species

a) Descent with modification

Similarities between species:

Differences between species:

b) Natural selection and differential reproduction