

## **Biological Themes**

Biology: the science of living organisms and the interactions among them

### **1. The Seven Major Themes of Biology**

- Evolution
  - Evolution: the theory that species change over time
  - Scientists suggest that evolution occurs by a process called natural selection.
  - Organisms that have certain inheritable traits (adaptations) are better able to survive in specific environments than organisms that lack those traits.
- Reproduction and Inheritance
  - Reproduction: asexual (no exchange of genetic information between organisms) or sexual (genetic information is exchanged between organisms)
  - Inheritance: the acquisition of traits by offspring
- Development
  - Development: the process by which an organism grows
  - Unicellular vs. Multicellular Development
- Structure and Function
  - Morphology: the internal and external appearance of an organism
  - Anatomy = Internal Morphology
  - STRUCTURE DETERMINES FUNCTION
- Energy Relationships
  - All organisms use energy
  - Autotrophs vs. Heterotrophs
- Ecology
  - Ecology: the study of the relationship between organisms and their environments
  - Interdependence
- Science and Society
  - Knowledge from biological science can be applied to specific problems in society to improve human life.
  - How biological knowledge should be used involves decisions based on ethics (bioethics)

### **2. The Seven Characteristics of Life**

- Cells: all living things are composed of cells
- Organization: all organisms are organized at both molecular and cellular levels
  - atoms → molecules → organelles → cells → tissues → organs → organ systems → organisms
- Metabolism: all organisms use energy for growth and maintenance
- Response to the Environment: a response is a reaction to a stimulus
- Growth: all living things grow, growth occurs through cell division and cell enlargement
- Reproduction: all organisms have the ability to reproduce, reproduction is necessary for the continuity of life
- Adaptation: organisms have adaptations that give them an advantage in an environment