

CLASS SESSION: CHARACTERISTICS OF ORGANISMS

A. Organisms (description) - a general term that refers to any life form that performs life functions and displays the characteristics of "living" that include: a common cell structure; a common biochemical composition; a constant energy requirement; a definite limit of size and shape; a life cycle that includes birth, growth, maturity, decline, and death; ability to respond to environmental changes; and the ability to continue their species through reproduction

B. Organismic Life Functions (description) - refers to the life processes that occur on the cellular and organismic levels

1. nutrition (definition) - defined as the life process that involves the taking in of organic food molecules by ingestion or making of organic food biosynthesis

a. heterotrophic nutrition (description) - refers to the form of nutrition in which preformed organic food is ingested

b. autotrophic nutrition (description) - refers to the form of nutrition in which organic food is synthesized by photosynthesis or chemosynthesis

2. digestion (definition) - defined as the life process that involves the breakdown of complex food molecules into simple and usable nutrients

a. intracellular digestion (description) - refers to the breakdown of larger molecules within the limits of a cell's membrane such as in vacuoles or cytoplasm

b. extracellular digestion (description) - refers to the breakdown of larger molecules in "spaces" or "cavities" of structures outside the limits of a cell's membrane such as in a digestive organ

3. transport (definition) - defined as the life process that involves both absorption and circulation of molecules and materials within and throughout organisms

a. absorption (description) - refers to the processes in which molecules are transported into a cell across the cell membrane from the external environment

b. circulation (description) - refers to the transport and distribution of molecules and materials around a cell or throughout an organism

4. respiration (definition) - defined as the life processes that involve the production of energy within organisms; also involves the exchange of CO₂ and O₂ gases between organisms and the environment

5. synthesis (definition) - defined as the life process that involves building complex molecules from smaller more simple molecules; described as the opposite of digestion.

a. secretion (definition) - defined as an aspect of synthesis process in which organisms produce molecules that are used for a functional purpose (eg. hormones, enzymes, mucus, etc...)

6. excretion (definition) - defined as the life process that involves the removal or elimination of chemical wastes produced by metabolism processes; also called removal of metabolic wastes

7. regulation (definition) - defined as the life process that involves coordination of the life functions and changes internally in response to changes in the environment

8. reproduction (definition) - defined as the life process that involves continuation of the organism by producing more individuals of the same life form; also refers to cell division

9. locomotion (definition) - defined as the life process that involves movement of an organism from one location to another using its own structures or mechanisms

C. Metabolism (definition) - a general term that refers to all of the life functions of organisms; all the processes done by organisms that occur continually to sustain life; different types of organisms have life functions that relate to their cellular organization and biochemistry, and are specific or unique for their own survival; diverse types of organisms demonstrate similarities in metabolic functions

1. anabolism (definition) - a term that refers to the sum of all metabolic functions in cells or organisms that are involved in synthesis or building functions; anabolic processes require energy

2. catabolism (definition) - a term that refers to the sum of all metabolic functions in cells or organisms that are involved in breakdown of larger molecules into smaller molecules; catabolic processes release energy and provide raw materials needed for anabolic reactions

D. Homeostasis (definition) - may be defined as the maintenance of internal functions of an organism within a "normal" range or level as the result of regulation processes; results from the regulation of internal processes in response to changes inside or outside of an organism; described as the maintenance of a "steady state" or balance of an organism with its environment

1. biological importance of homeostasis - all organisms must be able to maintain a balance of functions within their environment in order to survive; the mechanisms that regulate responses of the life functions to a changing environment and allow an organism to adjust to different conditions; organisms must maintain homeostasis to survive

2. examples of homeostatic functions - there are many examples on cell, organ, and organism levels; may include the following:

- maintenance of body temperature
- maintenance of blood glucose levels
- maintenance of blood and body fluid pressure
- maintenance of blood and body fluid pH
- maintenance of water balance
- maintenance of salt balance
- maintenance of blood supply and heart rate
- maintenance of oxygen supply and breathing rate
- maintenance of chemical environment for enzyme activity
- maintenance of chemical composition of cells

Note: Biosciences refer to branches of science that deal with the organization, functions, interactions, and life histories of organisms. Some representative biological sciences include Anatomy (study of internal and external structures in organisms); Physiology (study of function of structures in organisms); Zoology (study of the animal kingdom); Botany (study of the plant kingdom); Microbiology (study of micro-organisms); Genetics (study of heredity, chromosomes, and genes); Evolution (study of the natural history of organisms through geologic time); Taxonomy (study of classification of organisms); Biochemistry (study of molecules and reactions in living systems); Ecology (study of the environment and the interactions of organisms); Cytology (study of cell structure and function); and some aspects of Environmental Science (study of the impact of human societies on the habitats of the earth and the relationship of man to the environment). These examples of "sciences" are general areas that can further be described to include more specialized disciplines of study. In addition, some branches of "sciences" study similar subjects from different aspects, but may overlap in the scope of study.