Biology- Chapter 1

I. Living organisms have the ability to:
   A. Reproduce
      1. Organisms can produce *almost* exact copies of themselves.
      2. Organisms evolve because the reproductions aren't *exactly* the same.
   B. Have complex organization
      1. Organisms are more highly structured than their environment
      2. The metabolism maintains this structure in the face of entropy.
      3. Entropy= measure of disorder in a system.
   C. Have a metabolism
      1. Extracting energy and raw materials from the environment to maintain homeostasis and build complex materials and structures
      2. The energy comes from the sun or chemical compunds
   D. Maintain homeostasis
      1. The internal environment of an organism actively maintained in a stable state
      2. Must be maintained even if the external environment changes.
   E. Respond and alter their environment
   F. Have the capacity to evolve over many generations

II. 2nd Law of Thermodynamics
   A. The degree of disorder(entropy) in the universe tends to increase over time.
   B. Building and maintaining an organisms complex organization requires a lot of energy. This results in the production of heat.

III. Cell Theory
   A. Cell= the simplest self-replicating entity that can exist as an independent unit of life
   B. All living organisms are composed of one or more cells.
   C. All cells come from pre-existing cells
   D. All cells have features that correlate with characteristics of life:
      1. Plasma Membrane: a selectively permeable physical barrier between the external environment and the internal environment
      2. DNA in Chromosomes: cells contain genetic information that encodes instructions for making a cell like itself
      3. Ribosomes: Factories that use energy and raw materials to build complex proteins.

IV. Molecules that are signatures of life:
   A. DNA
      1. Genetic material in all cells that stores and transmits information.
      2. DNA encodes information to make RNA and proteins .
         a. DNA-> transcriptions-> RNA-> translations-> proteins
   B. Proteins

1. A large class of molecules that carry out many essential roles in cells.
    a. enzymes- regulate metabolism
    b. transcription factors- regulate the decoding of DNA
    c. cytoskeletal proteins- form rods and fibers that shape the cell.
    d. Receptors- sense the environment
    e. Channels/ Transports- regulate the movement of materials.

C. Phospholipids
    1. Form a barrier membrane around the cell (plasma membrane) and around some cell organelles (cell organs).

D. Carbohydrates
    1. Used for energy storage and transportation from cell to cell.

V. Genes
    A. Genes: DNA sequence that encodes information to make a specific RNA or protein (genetic product)
    B. Genes encode information by the order of nucleotide bases used to intersect the ribosome to make a particular protein.
    C. The DNA sequence is transcribed to RNA
    D. The RNA is decoded by ribosomes to produce a protein.

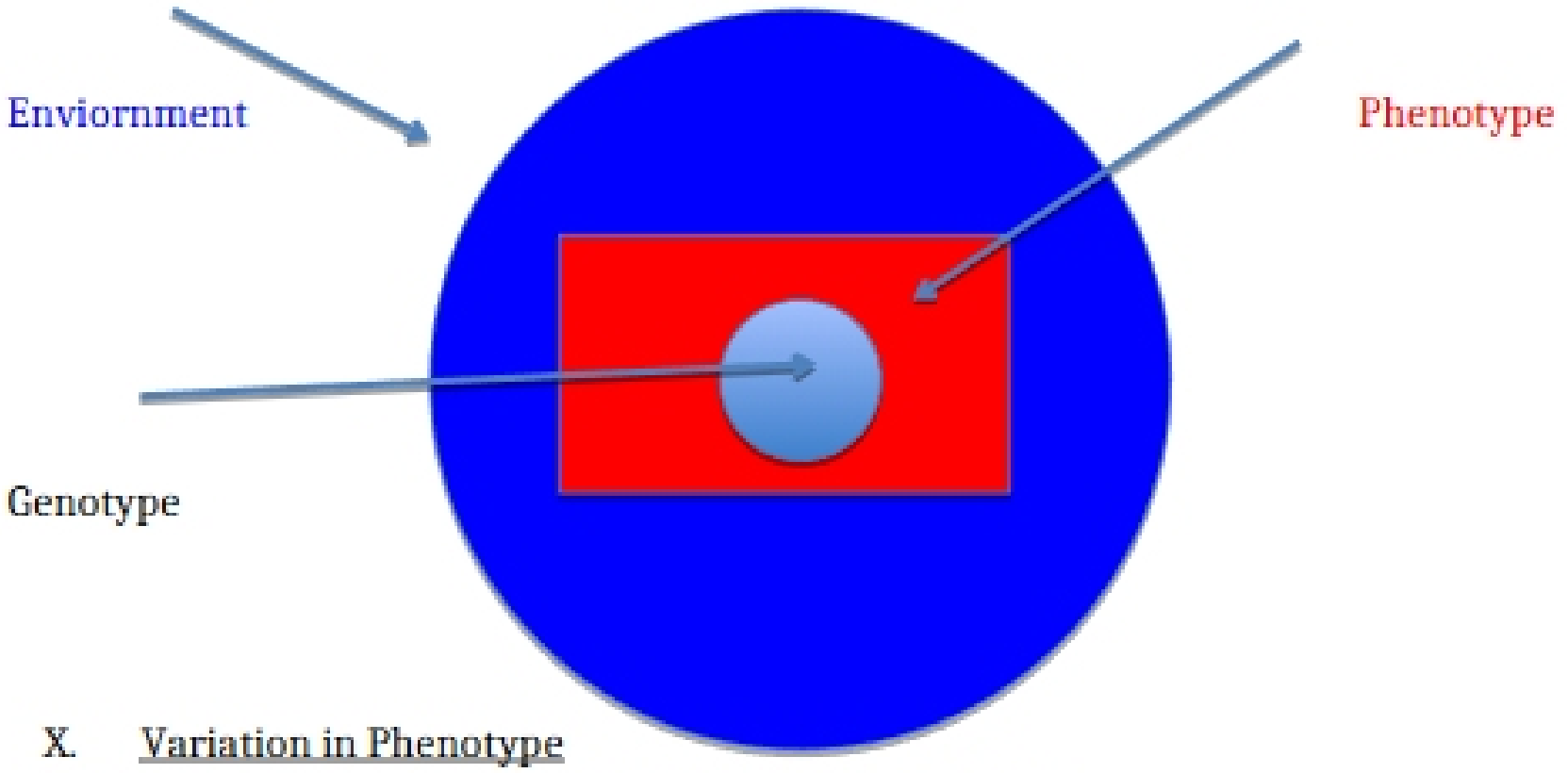
VI. Mutations
    A. Mutations change the DNA sequence of a gene. This forms a new allele.
    B. Different alleles can result in the production of variant forms of the encoded protein.

VII. Diploid Organisms
    A. Diploid organisms have 2 copies of each gene
        1. One allele of each gene is inherited from the mother and the other from the father.
    B. For each gene, a diploid organism can be homozygous or heterozygous.
        1. Homozygous: 2 alleles are the same
        2. Heterozygous: 2 alleles are different
    C. Meiosis in diploid organisms results in the production of a haploid
    D. Fertilization results in the new diploid organism

VIII. Genotype and Phenotype
    A. Genotype: the particular alleles within a particular individual
    B. Phenotype: The structure and function of a cell is determined by the specific proteins in the cell.
        1. The detectable structure and functions of an individual is the phenotype.
        2. Phenotype depends on genotype.

IX. Determining Adaptaion
    A. Phenotyoe interacts with the environment

B. Adaptaion of an individual to its environment depends on the phenotype. But remember the phenotype is determined by the genotype.
C. Alleles that an individual carries determines how well adapted an individual is.
D. Alleles that provide an advantage in a environment will become more common in that environment.



X. Variation in Phenotype

A. Comes from mutations an reproduction
B. Can be environmental or genetic
C. Ferilization produces unique combinations of alleles, even in offspring of the same parents.
D. Evolution: change over time
E. Mutations increase variations
F. Selection favors reproductive success of better adapted variantsc