

GENERAL BIOLOGY Lecture 16 - Mitosis & Meiosis Part I

- I. Reproduction and the life cycle**
- A. Reproduction - production of a new generation of cell(s) that may or may not be identical to those of the parents**
 - B. The life cycle: cell division - growth - DNA duplication - prepare for division - cell division**
 - C. What structures and substances are necessary for inheritance?**
 - 1. DNA - RNA - protein**
 - D. How are substances divided?**
 - 1. Prokaryotic fission - bacteria (binary fission - two parts)**
 - 2. Mitosis & cytokinesis - eukaryotes (asexual reproduction, bodily growth, and repair - can differentiate for specialization; i.e., photosynthesis, support, etc.)**
 - 3. Meiosis & cytokinesis - eukaryotes (sexual reproduction)**
 - E. General trend of division**
 - 1. Sexual reproduction begins with meiosis**
 - a) Formation of sex cells [gametes - sperm (anther) & egg (ovary)]**
 - 2. Union of gametes results in a zygote (fertilization)**
 - 3. Zygote grows through mitosis - result is an organism**
 - F. General differences between meiosis & mitosis**
 - 1. Meiosis**
 - a) Two parts - Meiosis I & Meiosis II**
 - b) Result is half the chromosome (DNA and associated protein) number (haploid)**
 - 2. Mitosis**
 - a) One part**
 - b) Result is full chromosome number (diploid)**
- II. Mitosis (the simplest of the two) and the cell cycle**
- A. Occurs primarily in regions of actively dividing cells (meristems)**
 - B. The cell cycle (which includes mitosis)**
 - 1. Interphase (the longest phase)**
 - a) "G₁" or gap - accumulation of enzymes needed for DNA synthesis**
 - b) "S" or synthesis - DNA duplicates**
 - c) "G₂" or gap - premitosis phase (mitosis proteins produced)**
 - 2. MITOSIS**
 - a) Prophase**
 - 1) Chromosomes visible & "thick"**
 - 2) Nucleolus disappears**
 - 3) Spindle apparatus (microtubules) develops**
 - b) Metaphase**
 - 1) Chromosomes move to equilateral plane of the cell**
 - 2) Kinetochores [protein near "middle" (centromere)] attach to spindle fibers from sister (duplicate DNA's) chromatids to pole of spindle**
 - 3) Nuclear membrane is gone**
 - c) Anaphase**
 - 1) Sister chromatids of each chromosome migrate to opposite poles**
 - d) Telophase**
 - 1) Chromosomes group at opposite poles**
 - 2) New nuclear membrane forms**
 - 3) Each nucleus has same number of chromosomes as the original one**
 - 4) Spindle dissolves**
 - 3. Cytokinesis**
 - a) Division of cytoplasm**
 - b) Cell plate (plants) or cleavage furrow (animals) forms**
 - c) Coincides with late anaphase through telophase**