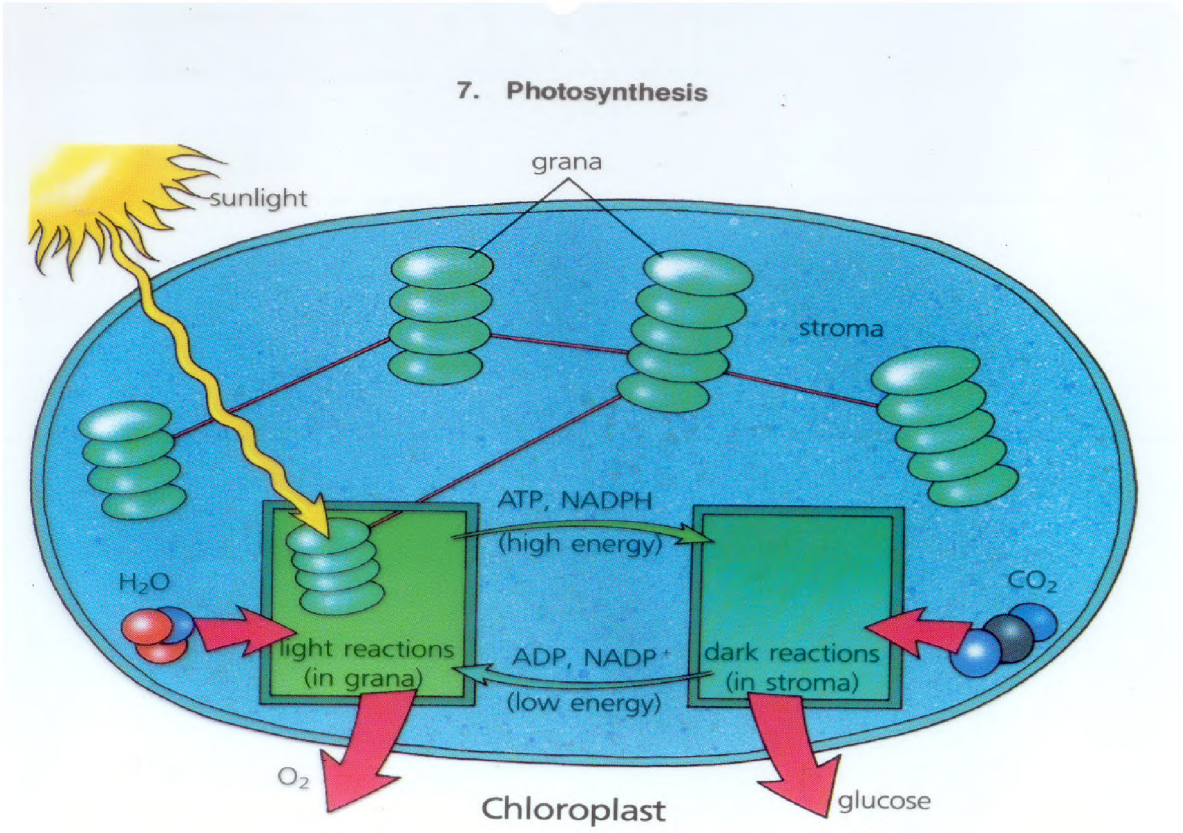
V. Chapter 2

A. **Photosynthesis: Light & Dark reactions**

1. **$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$**
2. Light striking the green leaves of a plant absorb the visible spectrum and reflects back (doesn't use) the green part of the spectrum
    a. Leaf is green due to the presence of Chloroplast
        1. Chloroplast is made up of
            a. The lamella, "Stacks of Coins" like structures called Grana
            b. Space between the grana is called the stroma
        2. Light Reaction takes place in the Grana:
            a. converts light energy into short term high chemical energy molecules
            b. **$H_2O \rightarrow O_2$**
            c. **ADP (low energy)→ ATP (high energy)**
            d. **NADP (low energy)→ NADPH (high energy)**
        3. Dark Reaction takes place in the Stroma:
            a. converts short term high energy chemical energy into long term
            b. **$CO_2 \rightarrow C_6H_{12}O_6$ (glucose)**
            c. **ATP (high energy) →ADP (low energy)**
            d. **NADPH (high energy) → NADP (low energy)**



B. Respiration

1. Cellular Respiration – cells breakdown glucose and release their stored energy for use in the cell
2. Two part process
    a. In the cytoplasm: Glucose breaks down into smaller molecules without the use of Oxygen & releases some energy.

b. In the mitochondria: the small molecules utilize oxygen and releases large quantities of energy and converts these small molecules into water.

3. Fermentation: Respiration in the absence of Oxygen – 2 types
   a. Alcohol fermentation – yeast, a fungi converts sugars into alcohol & releases energy
   b. Lactic Acid Fermentation – muscles without enough Oxygen convert sugars into lactic acid to release the needed energy for contractions.

C. Mitosis – Cell Division – The Cell Cycle – IPMAT & Cytokinesis

A. Interphase
   a. Between cell divisions
   b. Cell grows and develops
   c. DNA Replication (Chromosome doubles, held together at centromere)
   d. Organelle synthesis

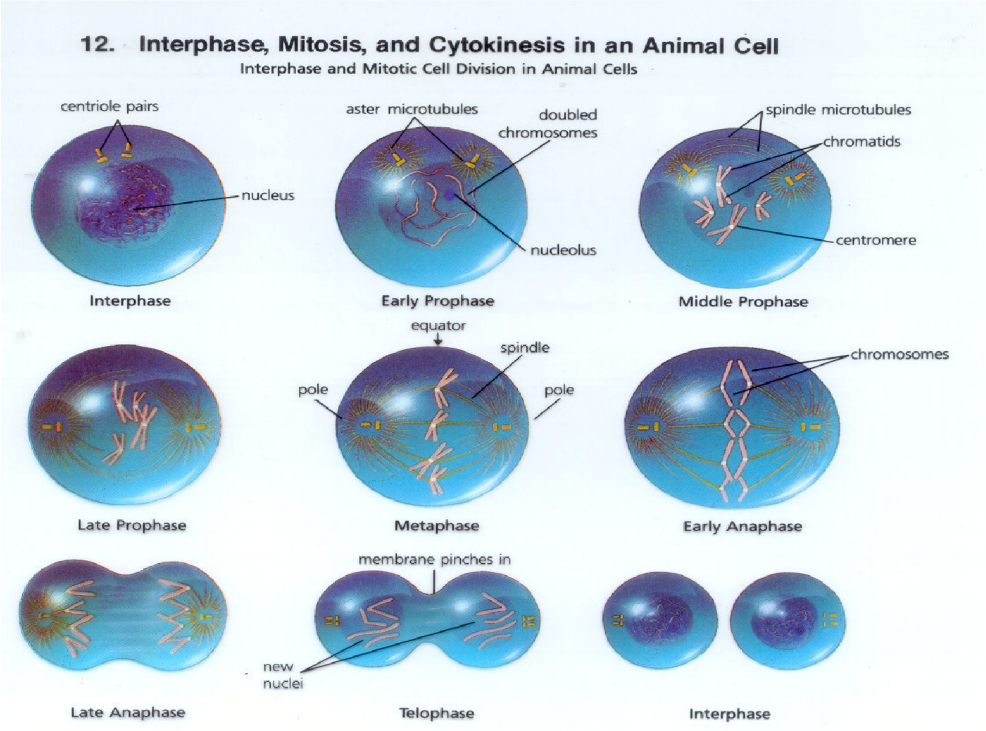
B. Prophase
   a. Chromosomes condense and coil
   b. Centrioles (in animal cells) move toward poles w/ spindle fibers (Fishing Line) attached to centromeres
   c. Longest of the phases (except for Interphase)
   d. Nucleolus and nuclear membrane dissolve

C. Metaphase
   a. Shortest of the phases
   b. Duplicated chromosomes line up at the equator

D. Anaphase
   a. Centromeres splits allowing Chromotids to be pulled towards the poles
   b. Phase ends when chromosomes reach the poles and stop moving

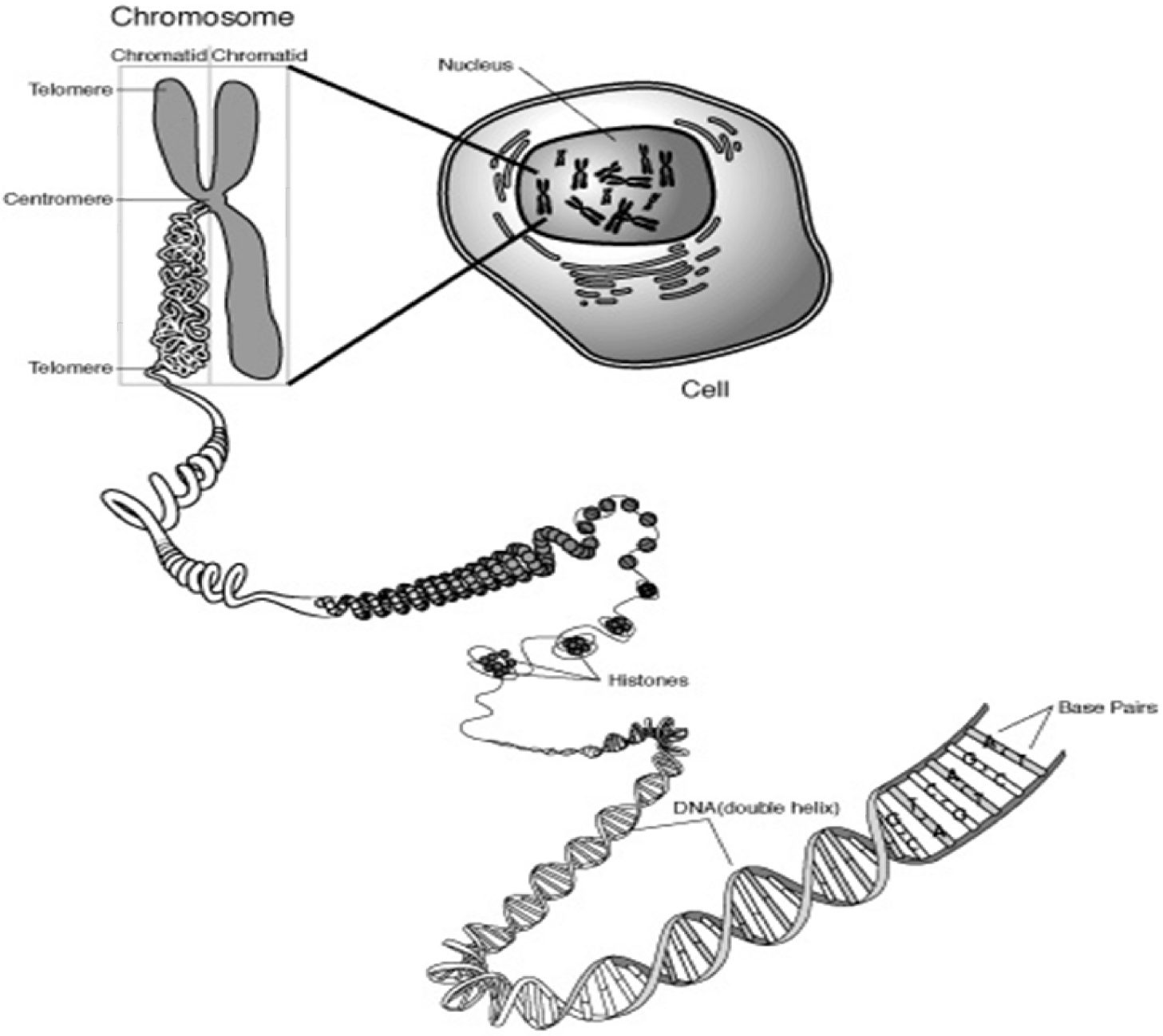
E. Telophase
   a. Chromosomes uncoil and becomes "thready" chromatin material again
   b. New nuclear membrane and nucleolus develop

F. Cytokinesis
   a. "Water balloon" pinches off the cell forming two separate daughter cells
   b. Cell plate separates cells in plants



II. DNA

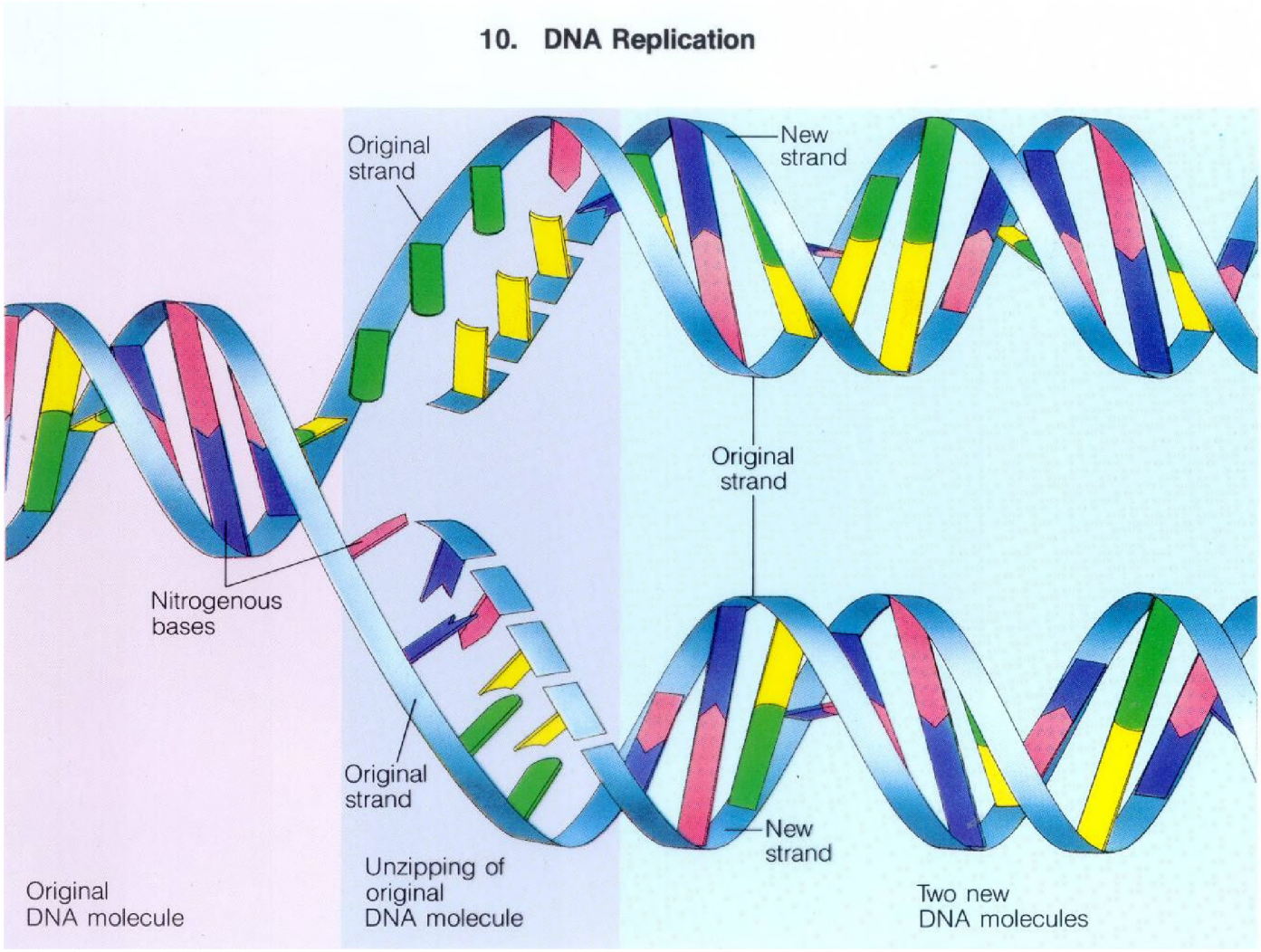
A. Carries all of the genetic information needed to carry on all of the cells day-to-day requirements
B. During Mitosis DNA is replicated into two identical strands then distributed into each daughter cell.
C. DNA is found on chromosomes which are located in the nucleus.
D. One chromosome consists of two chromotids held together by a centromere.
    a. Each upper & lower half of a chromotid is a telomere



A. Structure
    a. DNA is made up of segments called nucleotides.

b. Nucleotide made up of Phosphate group, Deoxyribose Sugar and Nitrogenous base
    i. Nitrogenous bases:
        1. A = Adenine,
        2. G= Guanine,
        3. T= Thymine
        4. C= Cytosine
    ii. A only binds w/ T
    iii. G only binds w/C
    iv. Bases (ladder rungs) held together by hydrogen bonds
c. Double helix – Twisted ladder, Structure identified by Watson and Crick

B. Replication
a. Occurs when enzyme "unzips" DNA
b. Millions of new nucleotides floating thru the nucleus
c. More enzymes brings nucleotides to attach them correctly to the exposed strands of DNA
d. Creates two identical strands of original DNA molecule



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