REVIEW UNIT 3: Biochemistry **AP Biology**

Key Concepts from this unit

1. All living matter is made up of CHONPS
    a. Relative amounts
    b. Trace elements

2. Bonds
    a. covalent bonds are strong
    b. hydrogen bonds are weak
    c. polar molecules (water) vs. non-polar molecules (hydrocarbons, lipids)
    d. reaction with water (cytoplasm & extracellular solution) vs. cell membrane
        i. hydrophobic vs. hydrophilic

3. Reactions of life
    a. dehydration synthesis
        i. releases water
        ii. synthesis: builds covalent bonds
        iii. anabolic, endergonic
    b. hydrolysis
        i. uses water
        ii. digestion: break covalent bonds
        iii. catabolic, exergonic

4. Water
    a. polar molecule leads to special properties
        i. cohesion, adhesion == transpiration
        ii. high specific heat == evaporative cooling. moderates local temperatures
        iii. less dense as solid == sustain life in frozen ponds & lakes
        iv. good solvent == water-based cellular fluids

5. Macromolecules
    a. carbohydrates
        i. sugar monomer
        ii. short term energy, structure
        iii. examples: glucose, starch, cellulose, chitin
    b. lipids
        i. phospholipids (cell membrane)
        ii. energy storage (fat, oils)
        iii. steroid hormone
        iv. examples: phospholipids, fat, cholesterol, testosterone, estrogen
    c. proteins (amino acids)
        i. amino acid monomer

ii. 4 levels of structure
iii. bonding at each level: covalent, H bonds, hydrophobic interactions, van der Waals forces, ionic bonds, disulfide (covalent) bridges
iv. many functions: enzymes, structure, regulatory molecules
v. examples: pepsin, myosin, actin, hemoglobin, insulin, ATP synthase, aquaporin

d. nucleic acids
i. nucleotide monomers
ii. genetic information storage
iii. examples: DNA, RNA

6. Excretory system
a. function:
i. water balance, filtration of blood, excretion of cellular nitrogenous waste (protein digestion)
b. structure:
i. kidney, glomerulus, nephron, Bowman's capsule, Loop of Henle, collecting duct
c. adaptations / evolutionary trends:
i. based on osmosis, diffusion & active transport
ii. reclaim water & solutes as needed, excrete urea
iii. ammonia vs. urea vs, uric acid = type of waste product vs. habitat & type of organism
d. regulation:
i. ADH = reduces blood osmolarity (high solutes); osmoreceptors in hypothalamus
ii. aldosterone = increases low blood pressure; monitored by JGA (near kidney