

GENERAL BOTANY Lecture 6 - Biological molecules

- I. Types of biological molecules
 - A. Inorganic - cofactors, catalysts, equilibria, etc., many participate as part of or with organic molecules
 - B. Organic - carbohydrates, lipids, proteins, nucleic acids, porphyrins, and secondary plant products
- II. Classification, structure, and function of major biological molecules
 - A. Carbohydrates
 - 1. Sugars and related compounds - ENERGY
 - a) Glucose & fructose
 - 1) Hexoses of central importance in cell metabolism
 - b) Sucrose - a disaccharide composed of glucose and fructose - major translocated carbohydrate in plants
 - c) Polysaccharides
 - 1) Starch - branched polymer of glucose
 - a) Amylose - linear polymer (α -1,4)
 - b) Amylopectin - branched polymer (α -1,6)
 - c) Easily hydrolyzed to glucose
 - d) Major storage carbohydrate
 - 2) Cellulose - linear polymer of glucose
 - a) Glucose units connected differently (β -1,4)
 - b) Difficult to hydrolyze
 - c) Structural carbohydrate (along with hemicellulose, {xylose, arabinose}, lignin {coniferyl, coumaryl, synapyl alcohols}, and pectin {galactose})
 - B. Lipids
 - 1. Glycerol and related compounds - FAT STORAGE, COATING, & MEMBRANES
 - a) Triglycerides (fat) - linoleic and linolenic acid
 - b) Coating (wax, cutin) - ester (RCOOR) of above with 20 - 28 carbons
 - c) Membranes (phospholipids) - fatty acid replaced by phosphate (hydrophilic & hydrophobic) membrane fluidity
 - C. Proteins
 - 1. Enzymes - CATALYZE REACTIONS; METABOLISM
 - a) Amino acids - from translation of RNA
 - a) Peptide bonds
 - D. Nucleic acids - GENETIC INFORMATION
 - 1. DNA: Adenine, guanine (purines), thymine, & cytosine (pyrimidines)
 - 2. RNA: Adenine, guanine (purines), uracil, & cytosine (pyrimidines)
 - E. Porphyrins
 - 1. Chlorophyll - PHOTOSYNTHESIS
 - a) absorb photons
 - b) transfer electron to acceptor - then photolysis to replace it
 - F. Secondary products
 - 1. Phenolics (anthocyanins, tannins) - PIGMENTATION, RESISTANCE
 - 2. Steroids & terpenoids - SCENTS, RESISTANCE, (used by man for RUBBER)
 - 3. Alkaloids - RESISTANCE (used by man for DRUGS such as CAFFEINE, COCAINE, MORPHINE, etc.)