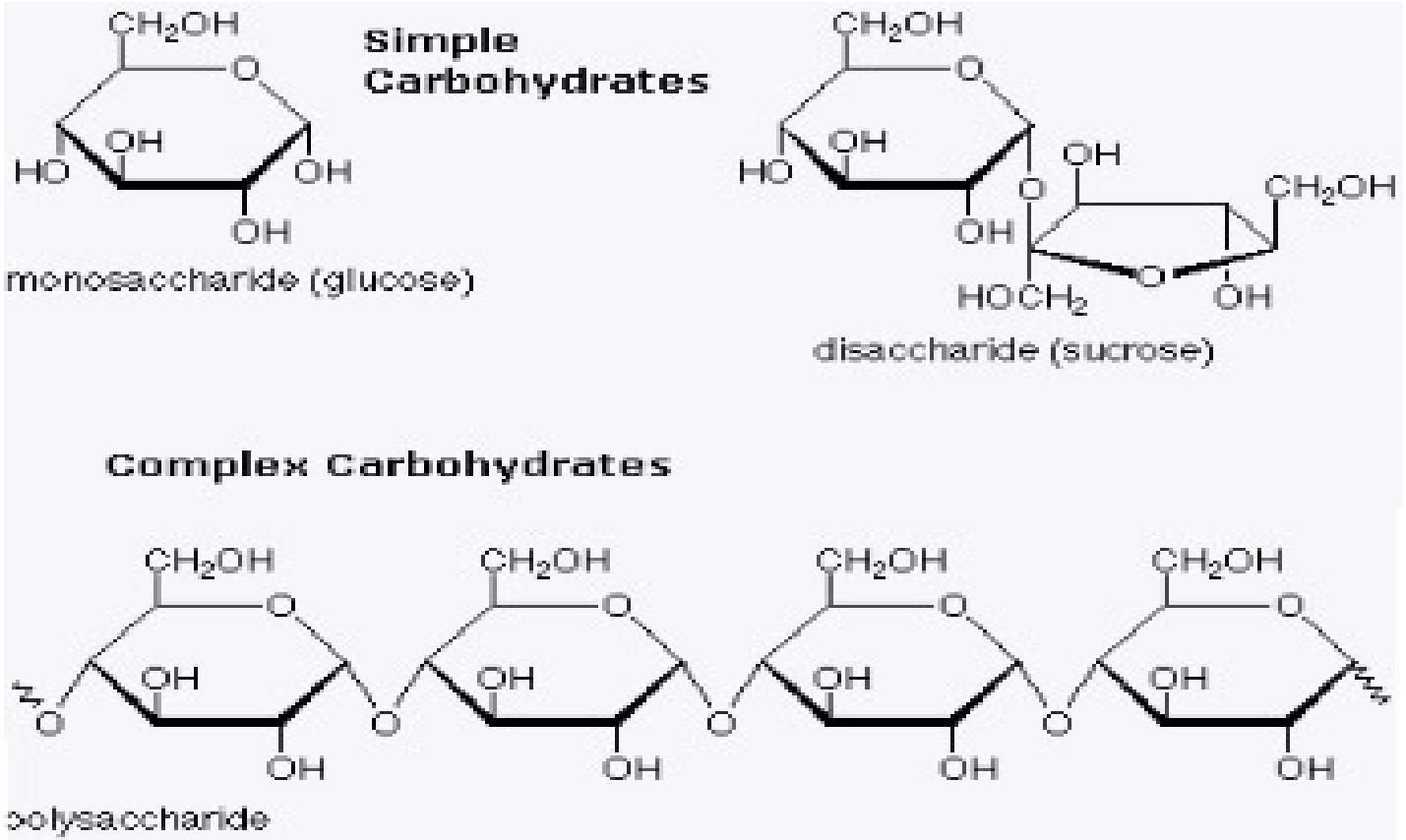
Carbohydrates

✓Carbohydrates include both sugars and polymers of sugars

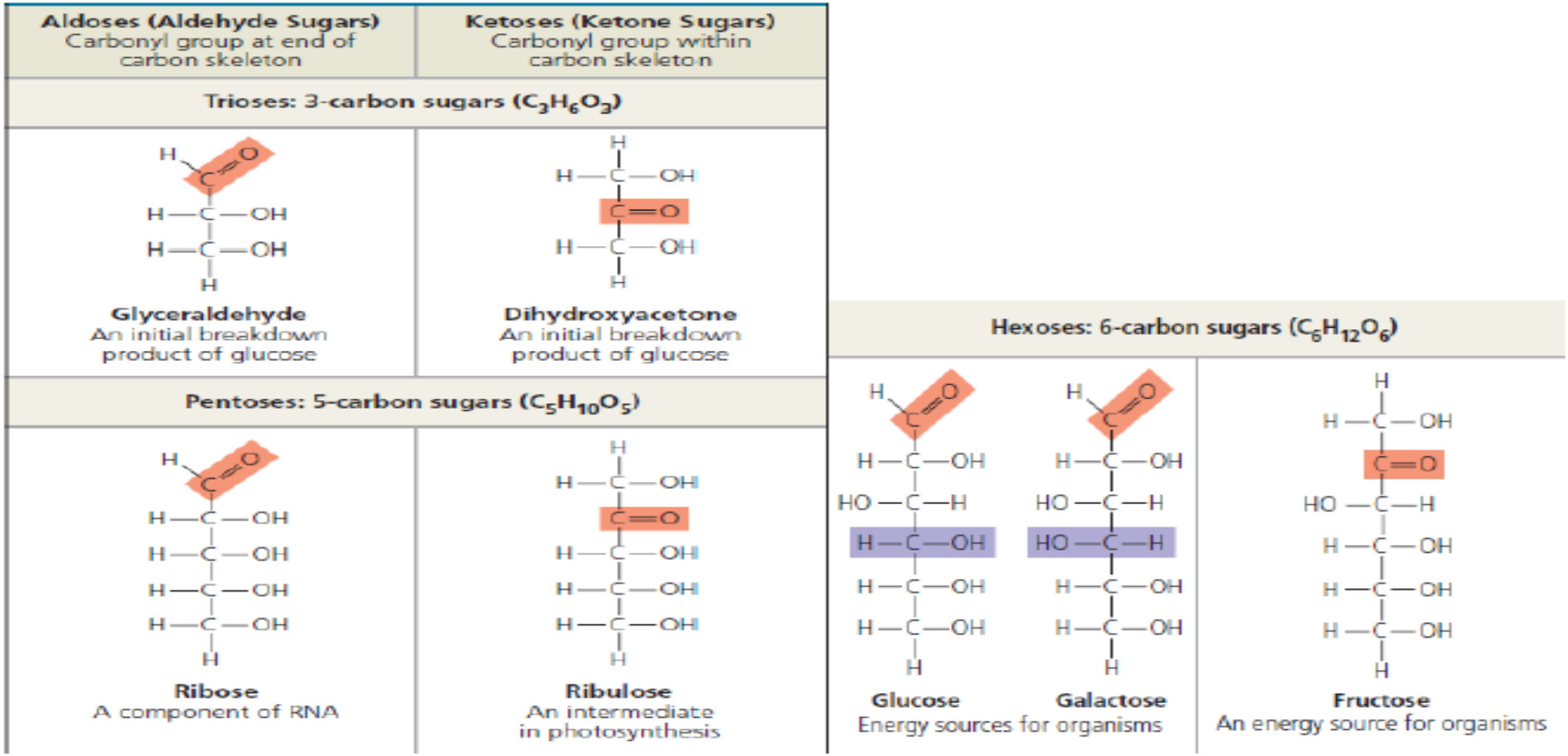
✓Simplest form (Monosaccharides)

✓Disaccharides (formed by two monosaccharides)

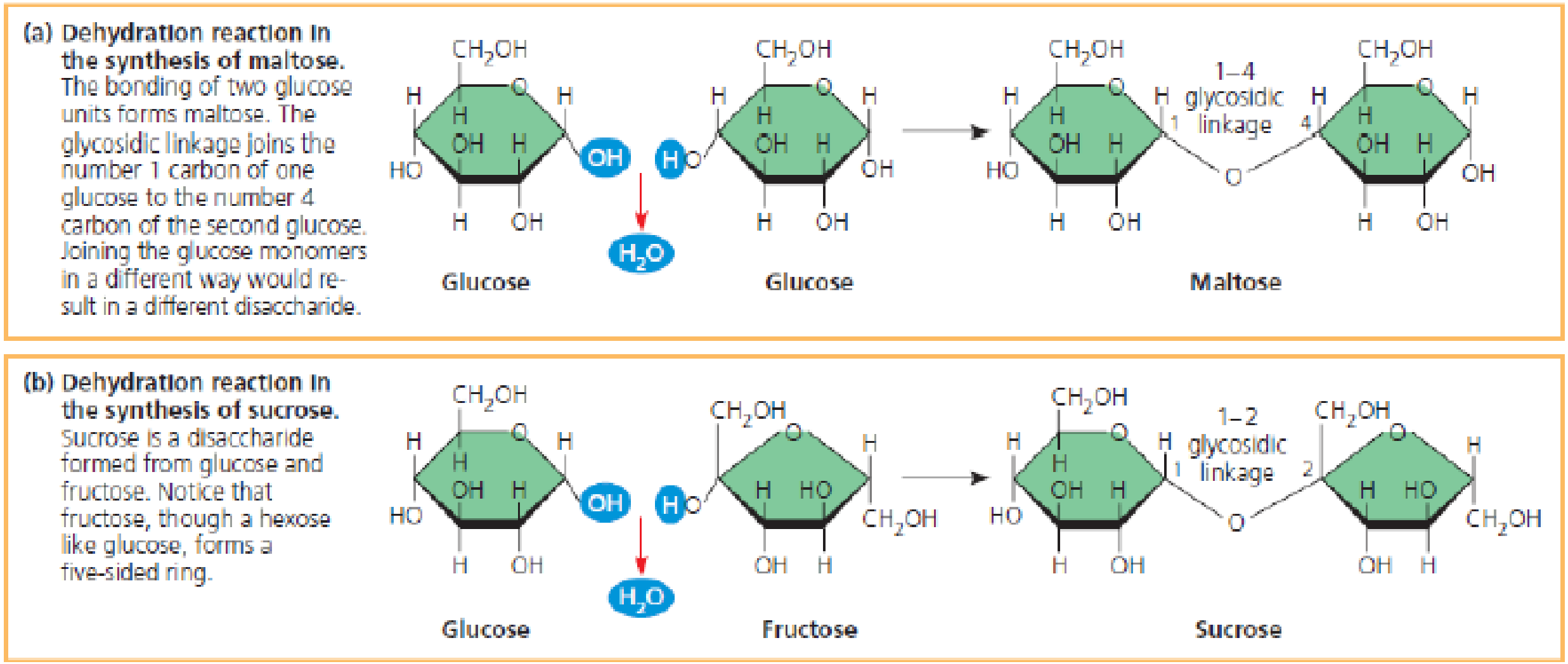


✓ **Carbohydrates also include macromolecules called polysaccharides**

- Monosaccharides (from the Greek monos, single, and sacchar, sugar)
- monosaccharide, is of central importance in the chemistry of life
- Emperical formulas unit CH2O. Glucose (C6H12O6)(multiples of 6)



Bonds forming Glycosidic linkages Bond Breaking: Hydrolysis, Dehydration

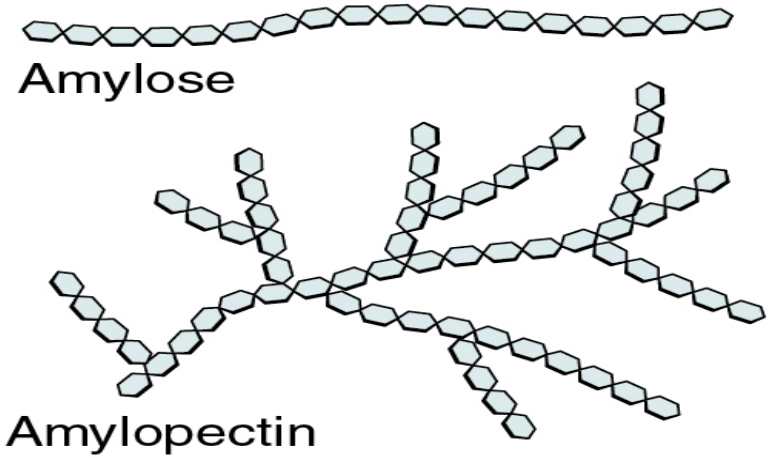


- Polysaccharides are macromolecules, polymers with a few hundred to a few thousand monosaccharides
- Organisms build strong materials from structural polysaccharides

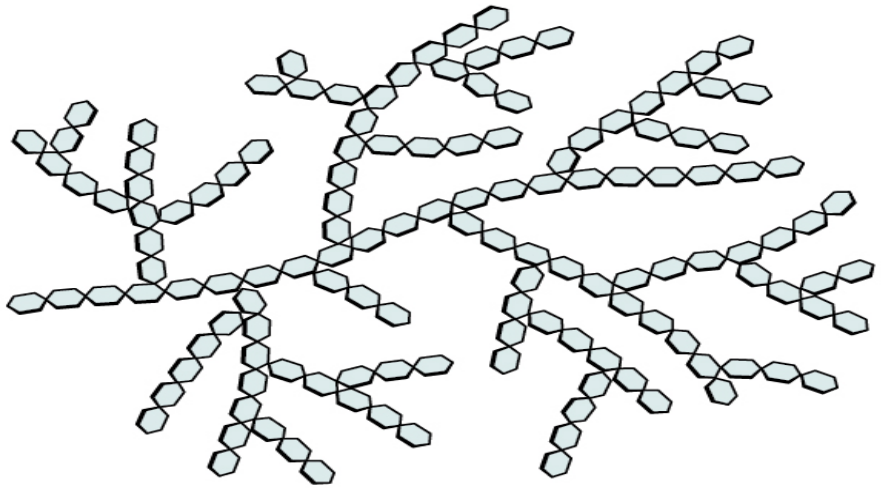
polysaccharides serve as storage material

polysaccharides serve as building material for structures

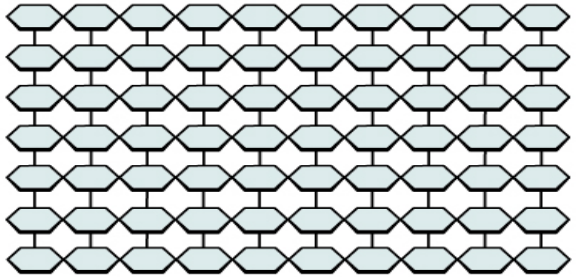
architecture and function of a polysaccharide are determined by its sugar monomers



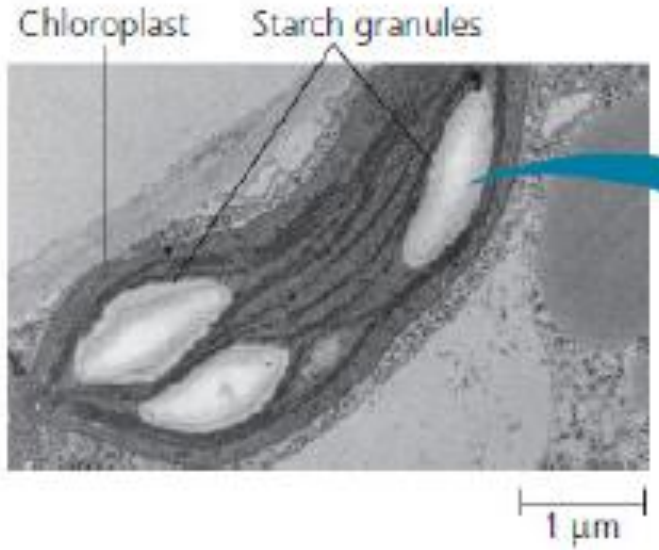
Starch

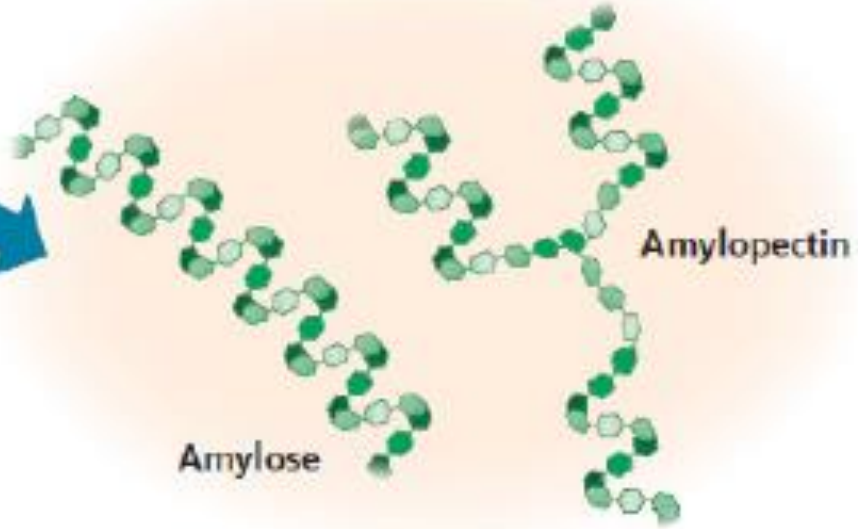


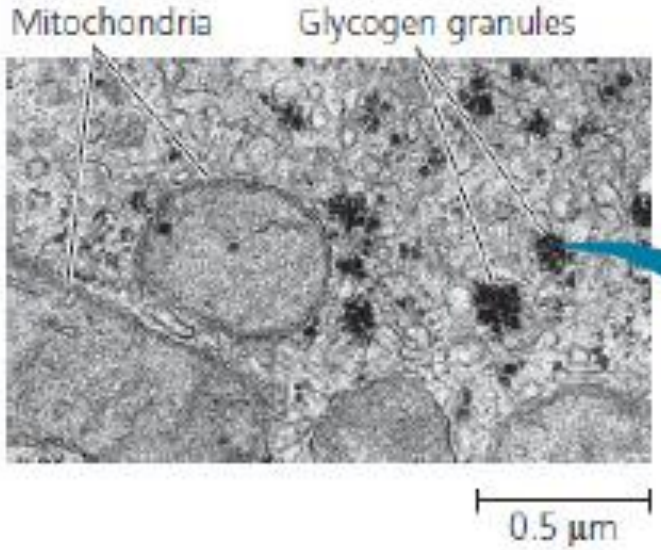
Glycogen

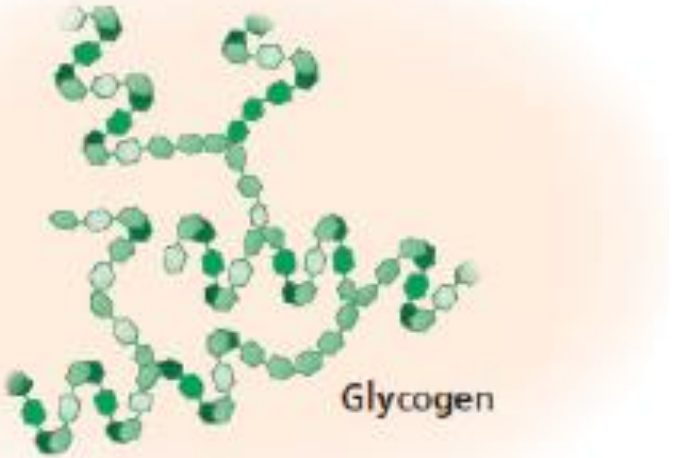


Cellulose (fiber)

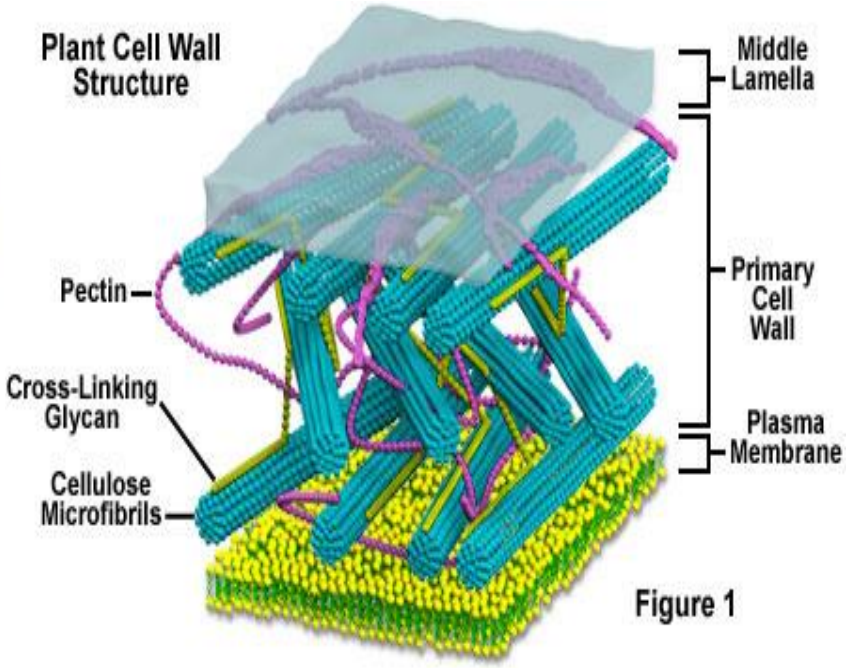


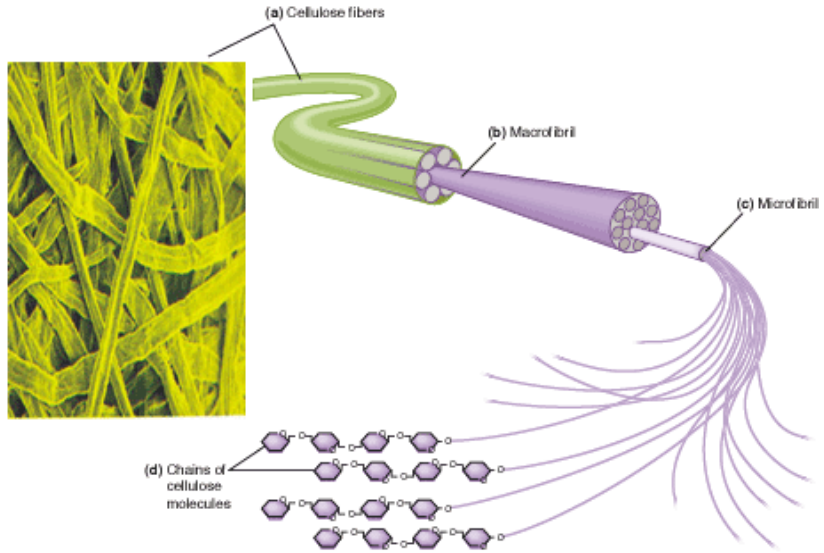






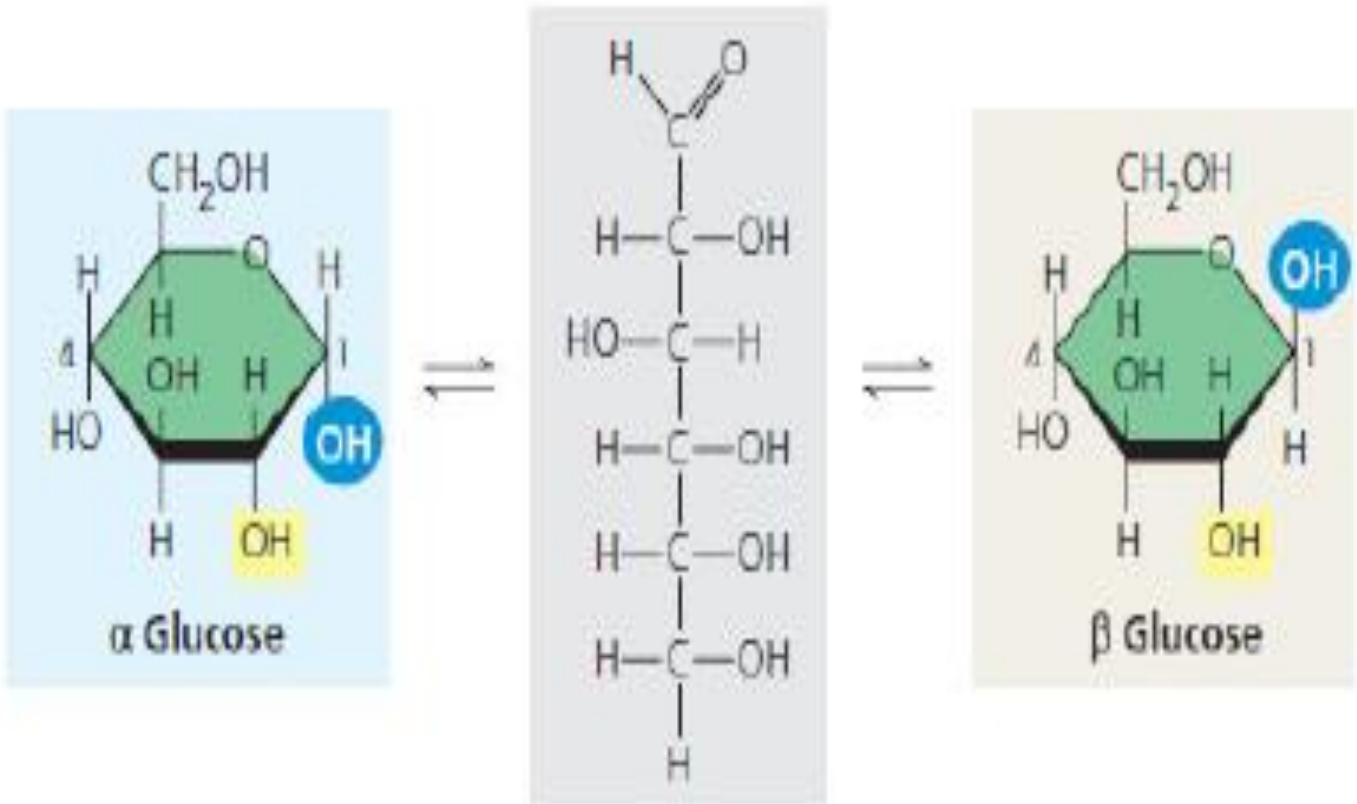
Structural Polysaccharides





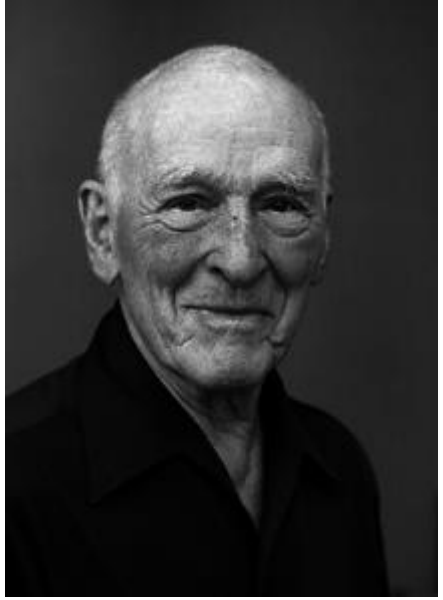
cellulose is a major component of the tough walls that enclose plant cells

(a) **α and β glucose ring structures.** These two interconvertible forms of glucose differ in the placement of the hydroxyl group (highlighted in blue) attached to the number 1 carbon.



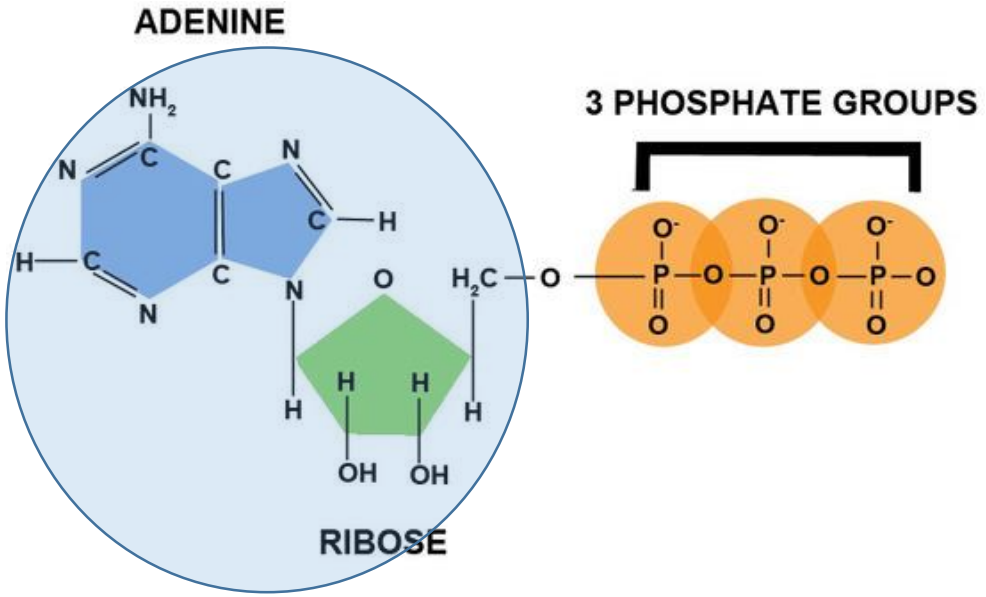
ATP (Adenosine Triphosphate)

"beautiful little machine"



Paul Boyer
Nobel Prize in Chemistry (1997)

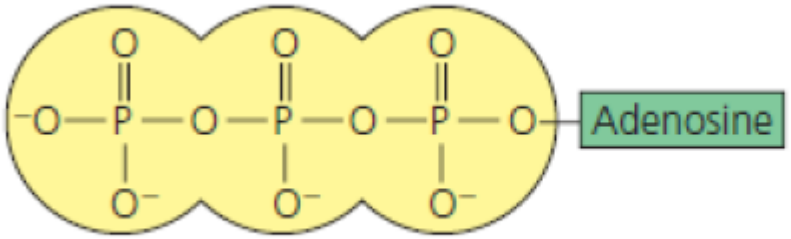
- $C_{10}H_{16}N_5O_{13}P_3$

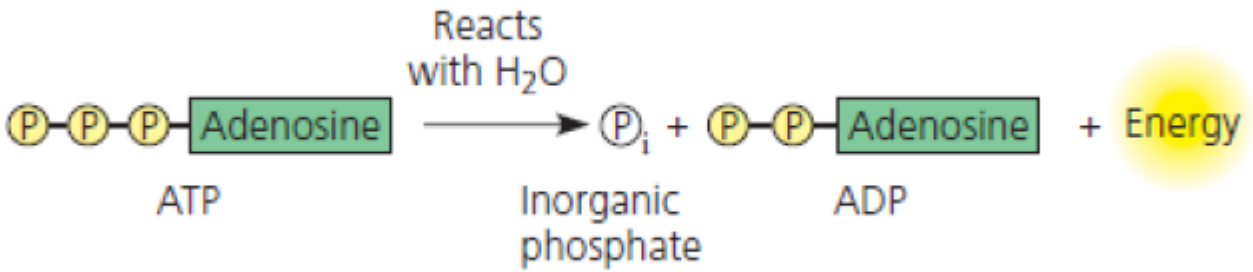


- ✓ **ATP is an important source of energy for cellular processes**
- ✓ **consists of an organic molecule called adenosine attached to a string of three phosphate groups**
- ✓ $HOPO_3^{2-}$, **is often referred as a phosphate group**

- ✓ **While losing this group, it releases energy equivalent to 7.3 Kcal/mol**

- Energy required for most of the chemical reactions in the cell is produced by releasing a phosphate group
- Energy is also stored in the form of ATP by the cell





Reference

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