

Cooper, G. M., & Hausman, R. E. (2007). *The cell: a molecular approach*. Sunderland, Mass: ASM Press.

- ❖ *Prokaryotic* cells have do not have a nucleus (bacteria) while *eukaryotic* cells do.
- ❖ *Phospholipids* are the basic components of biological membranes, including plasma membranes of prokaryotic and eukaryotic cells.
  - *Ampiphatic* molecules – containing both water-insoluble (hydrophobic) hydrocarbon chains (tails) joined to water-soluble (hydrophilic) head groups that contain phosphate.
  - In water, phospholipids spontaneously aggregate into a bilayer with the phosphate-containing head groups on the outside in contact with water while the hydrocarbon tails in the interior in contact with each other.
  - The bilayer forms a stable barrier or enclosure that separates the interior of the cell from its external environment.
- ❖ *Adenosine 5'-triphosphate* (ATP) → all cells use ATP as their source of metabolic energy to drive the synthesis of cell constituents and carry out energy-requiring activities (such as movement).
- ❖ *Glycolysis* → the anaerobic breakdown of glucose to lactic acid, with the net energy gain of only 2 molecules of ATP.
  - $C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$  (generates 2 ATP)
- ❖ *Photosynthesis* → uses energy from sunlight to synthesise glucose from  $CO_2$  and  $H_2O$ , while releasing  $O_2$  as a by-product.
  - $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
- ❖ *Oxidative metabolism* → The highly reactive  $O_2$  released by photosynthesis breaks down glucose to  $CO_2$  and  $H_2O$ , yielding much more energy compared to glycolysis.
  - $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$  (generates 36-38 ATP)
- ❖ Present-day cells use oxidative reactions as their principal source of energy due to this efficiency advantage.