

# Chemical aspects of the cell

The cell from a chemical point of view

# Main chemicals elements of the cells

[illegible]

Atoms in red correspond to 99% of the total number of atoms present in the human body and about 96% of our total weight.

# Constituição celular

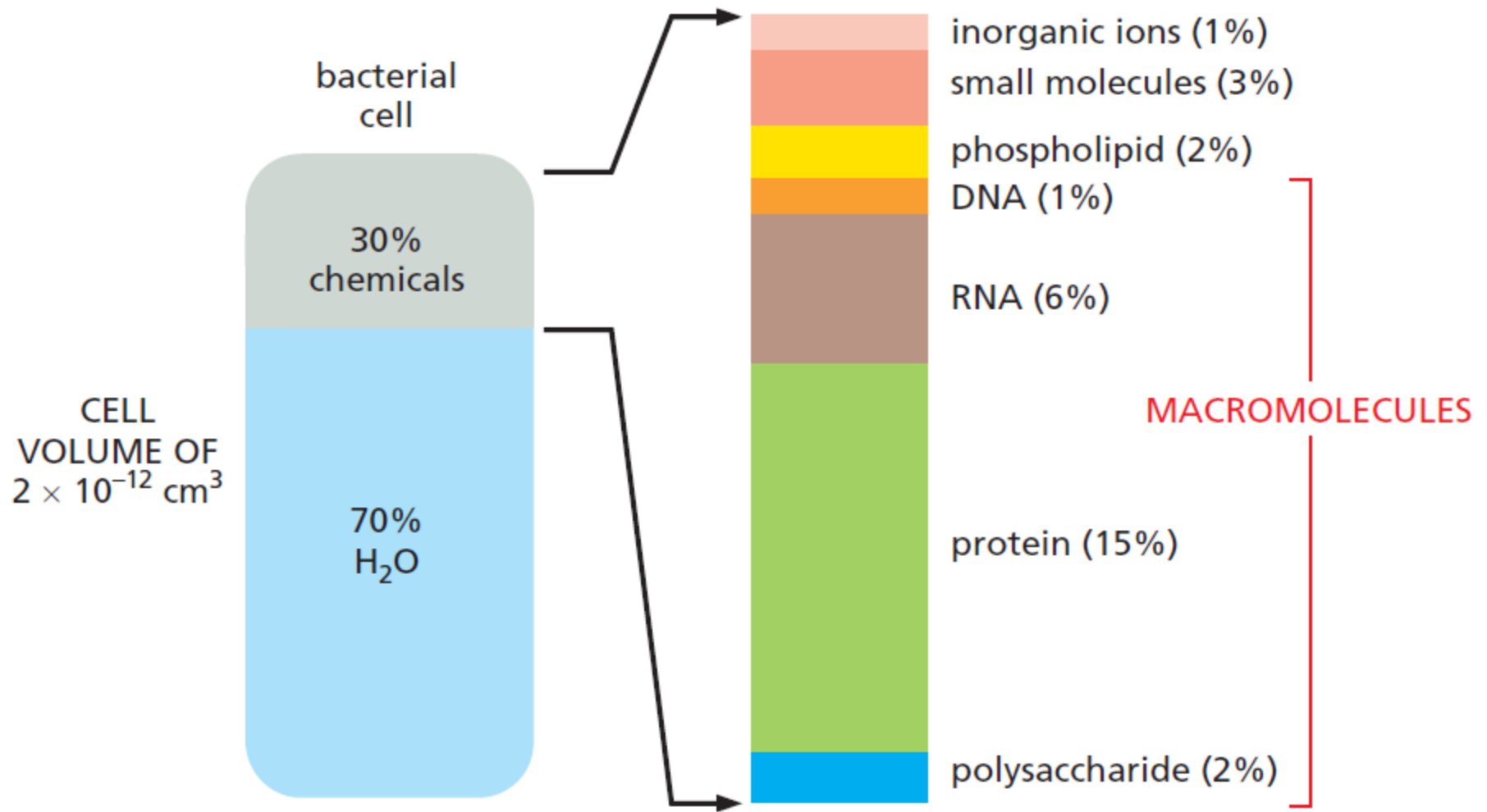


Figure 2.7 Alberts - Chapter 2

# Some energies important for cells

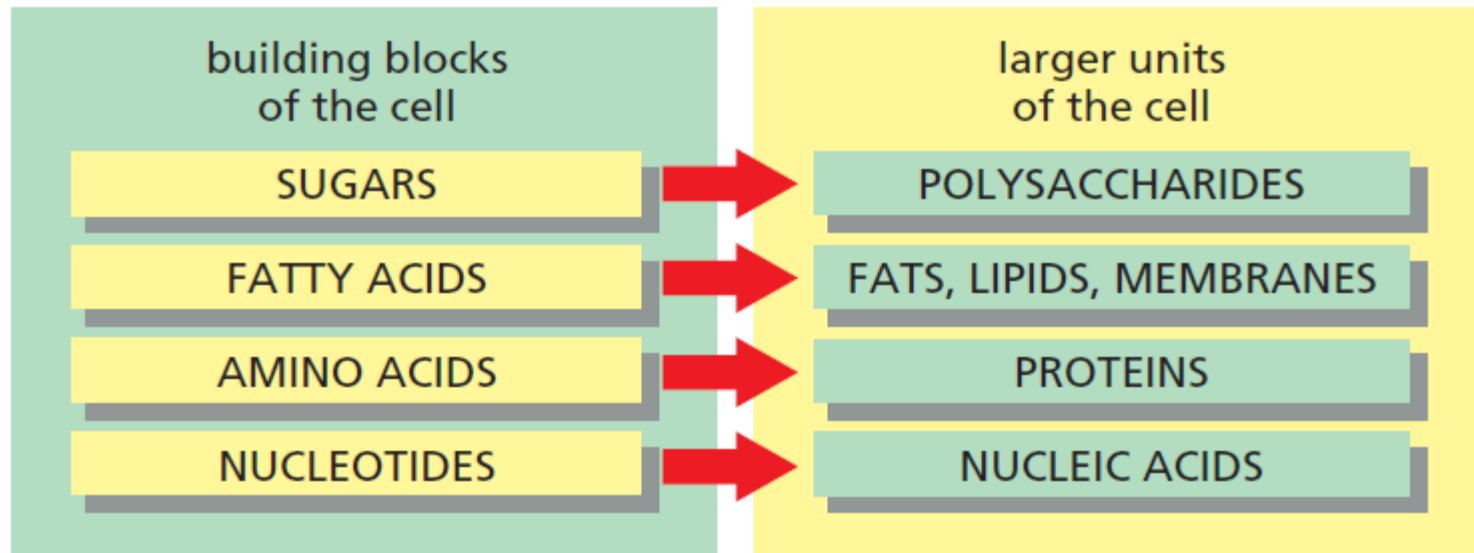
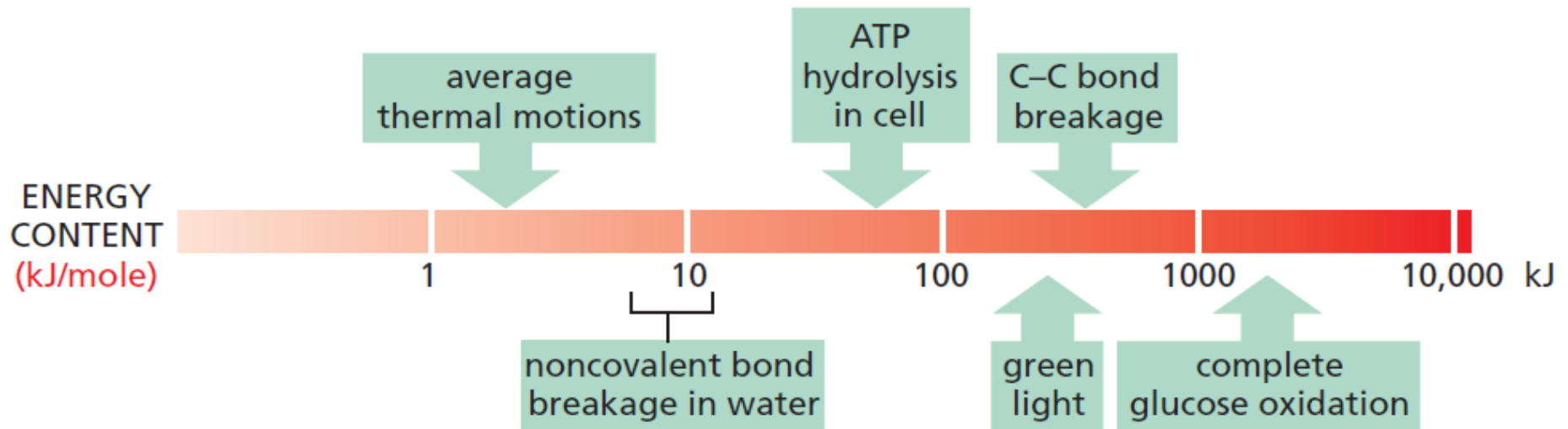


Figure 2.2 & 2.6 Alberts - Chapter 2

# Cell structures

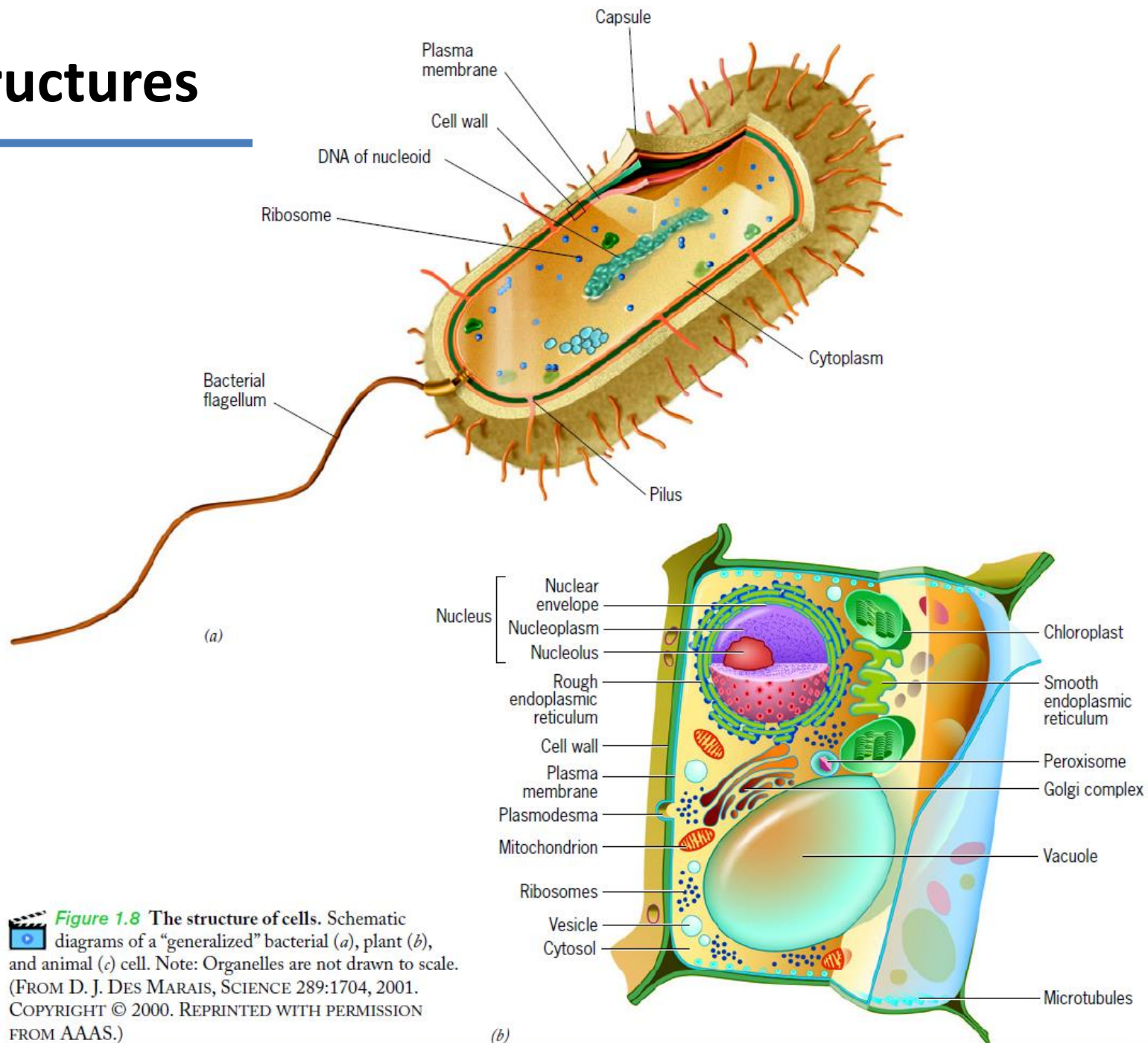
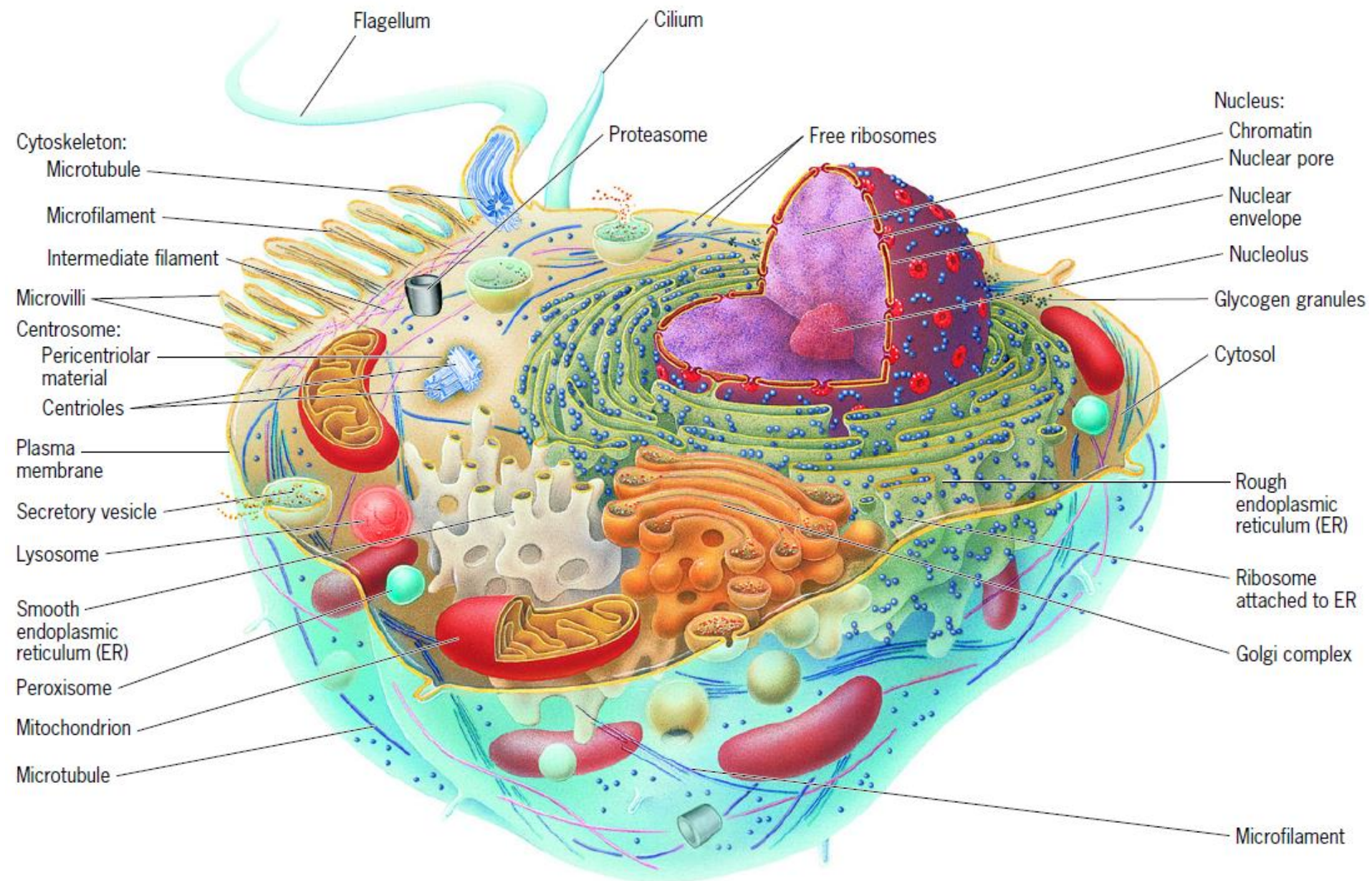


Figure 1.8  
Karp – Chapter 1

**Figure 1.8** The structure of cells. Schematic diagrams of a “generalized” bacterial (a), plant (b), and animal (c) cell. Note: Organelles are not drawn to scale. (FROM D. J. DES MARAIS, SCIENCE 289:1704, 2001. COPYRIGHT © 2000. REPRINTED WITH PERMISSION FROM AAAS.)



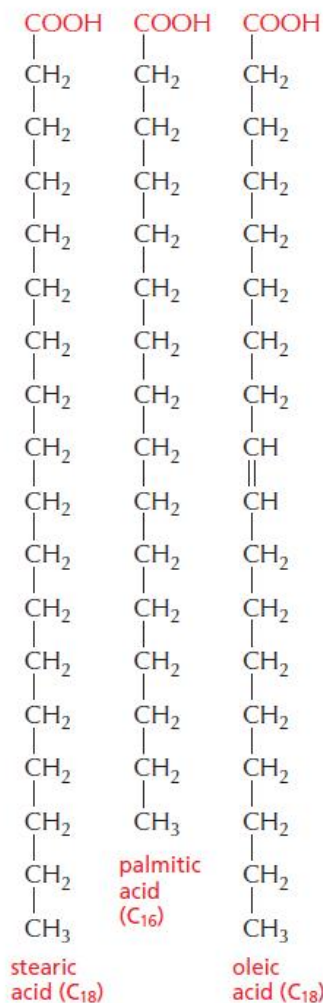


(c)

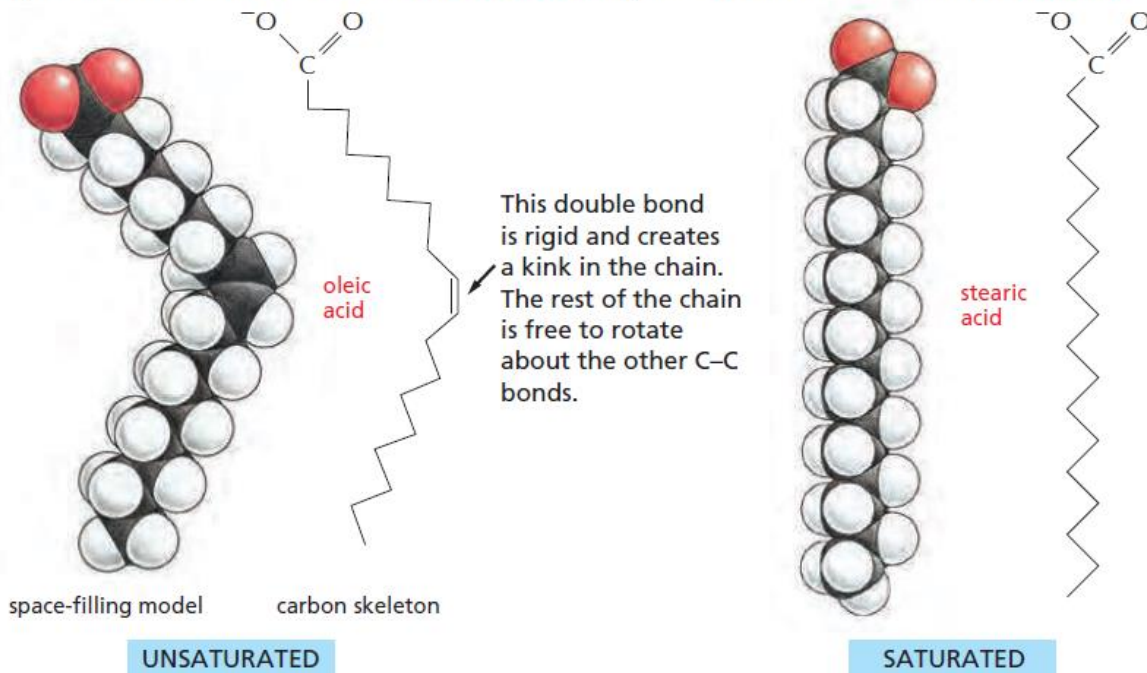
**Figure 1.8** (continued)

These are carboxylic acids with long hydrocarbon tails.

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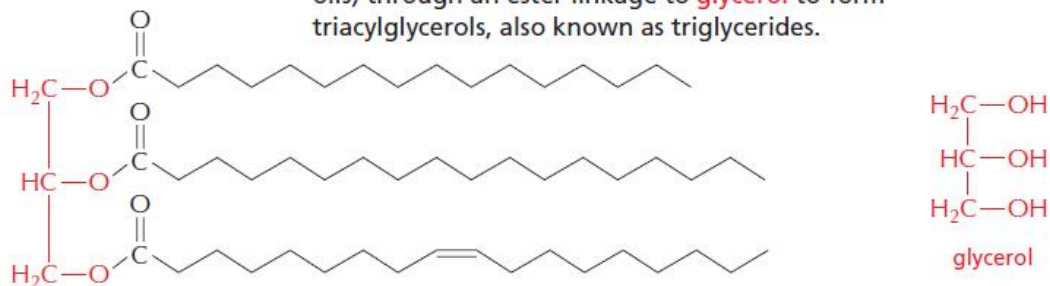


Hundreds of different kinds of fatty acids exist. Some have one or more double bonds in their hydrocarbon tail and are said to be **unsaturated**. Fatty acids with no double bonds are **saturated**.



## TRIACYLGLYCEROLS

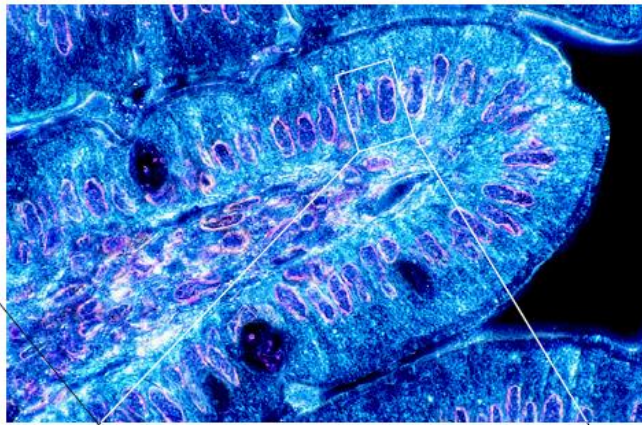
Fatty acids are stored as an energy reserve (fats and oils) through an ester linkage to **glycerol** to form triacylglycerols, also known as triglycerides.





# Levels of cellular and molecular organization

Villus of the small intestinal wall



Apical microvilli



Mitochondria

Inset 1

10 μm

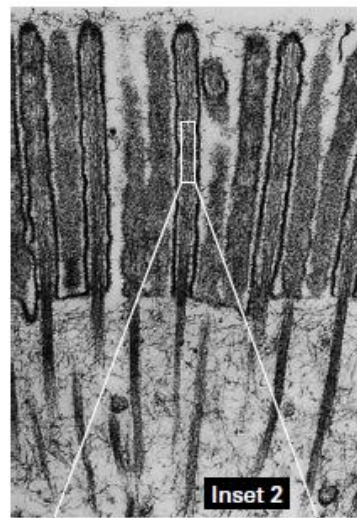
Electron micrograph of the epithelial layer of cells

Figure 1.3 - Karp – Chapter 1

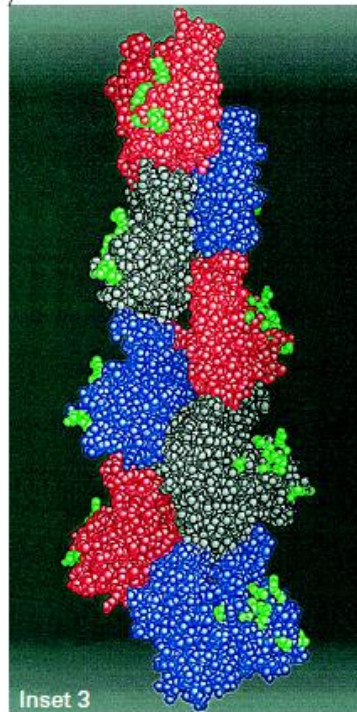


# Levels of cellular and molecular organization

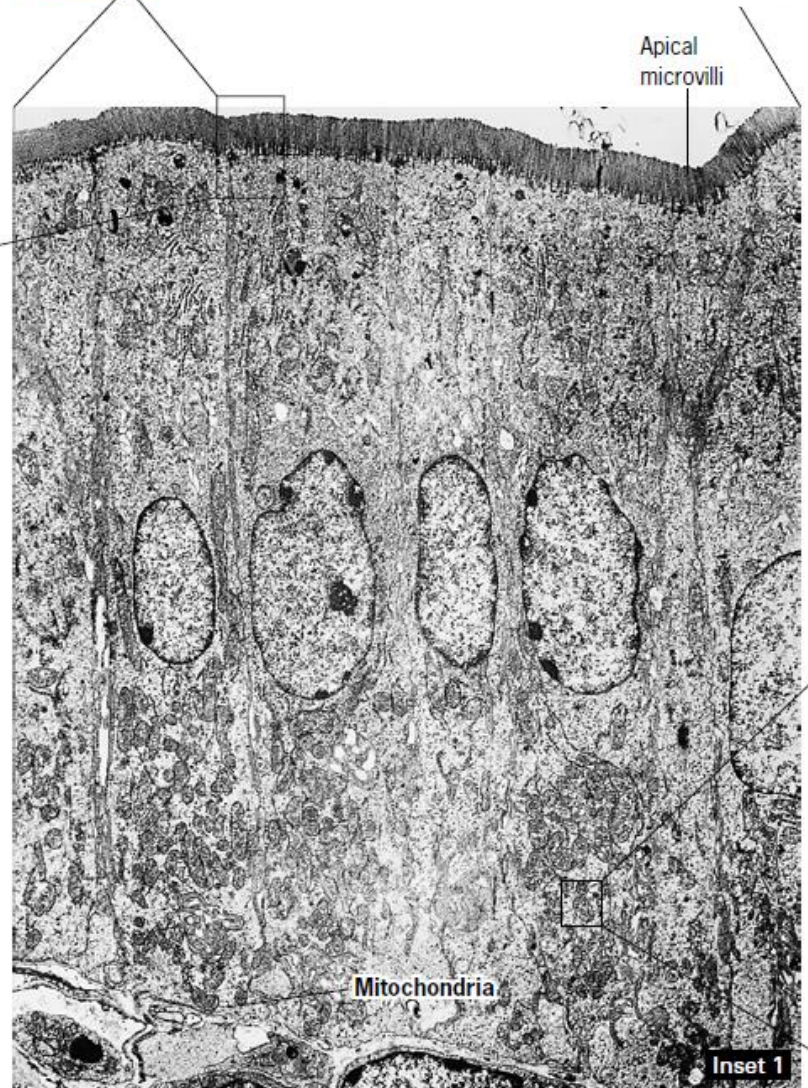
Apical microvilli



0.2 μm



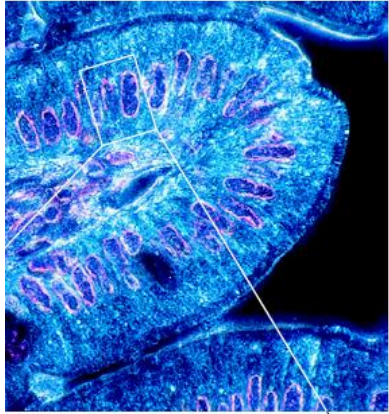
35Å



10 μm



the small intestinal wall



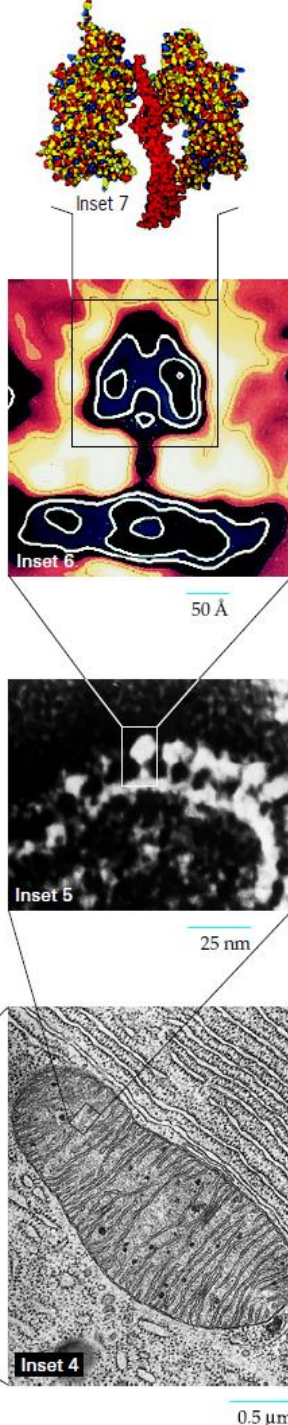
Apical microvilli



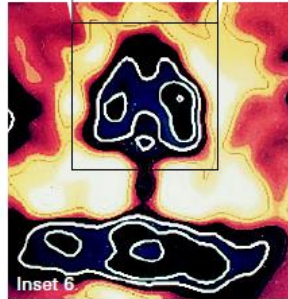
Mitochondria

Inset 1

10 μm

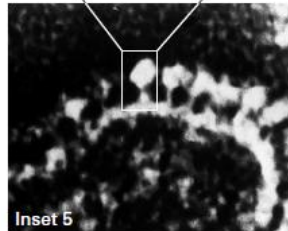


Inset 7



Inset 6

50 Å



Inset 5

25 nm



Inset 4

0.5 μm

# Levels of cellular and molecular organization

Molecular models of the ATP-synthesizing machinery

Inner membrane of a mitochondrion including the stalked particles (upper arrow) where ATP is produced

Individual mitochondrion

# Structures of an eukariotic cell

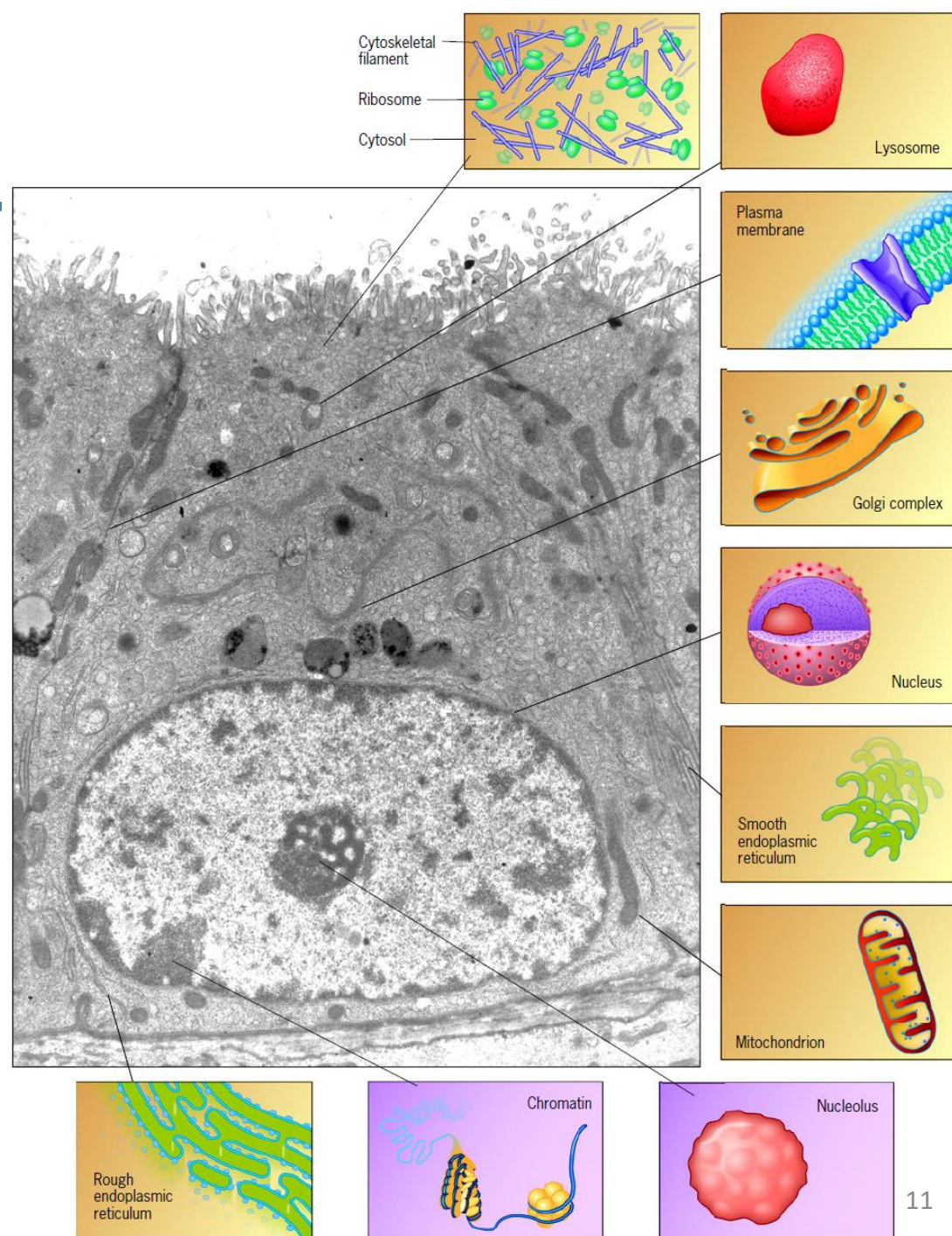
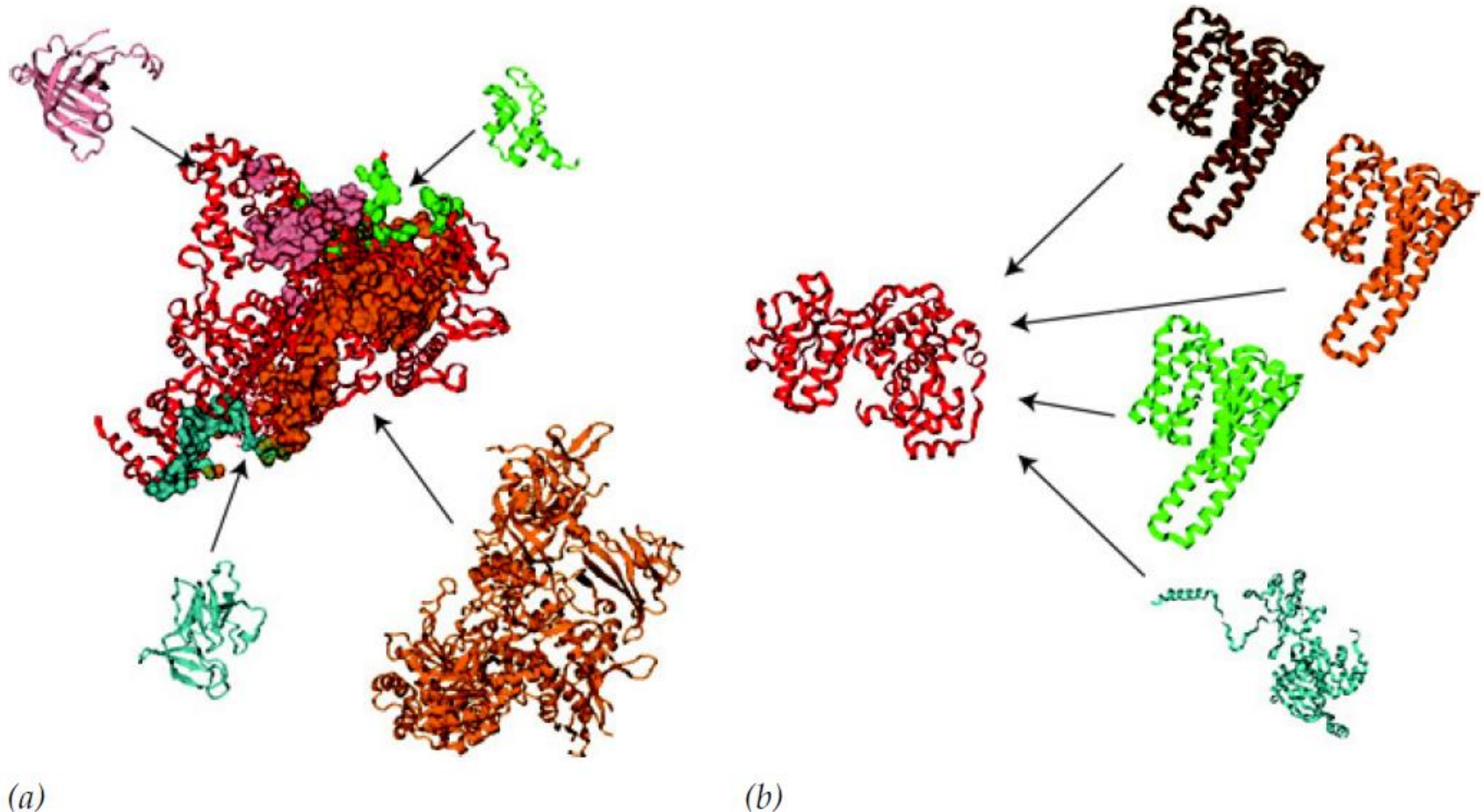


Figure 1.10 - Karp – Chapter 1



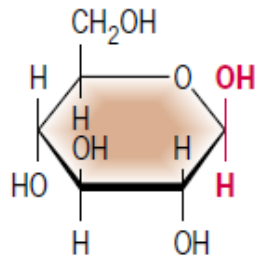
# Protein–protein interactions of hub proteins



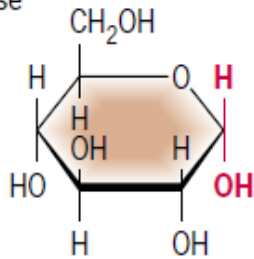
(a) The enzyme RNA polymerase II, which synthesizes messenger RNAs in the cell, binds a multitude of other proteins simultaneously using multiple interfaces. (b) The enzyme Cdc28, which phosphorylates other proteins as it regulates the cell division cycle of budding yeast. Cdc28 binds a number of different proteins (Cln1-Cln3).



# Three polysaccharides with identical sugar monomers



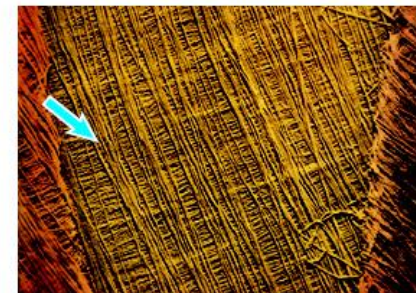
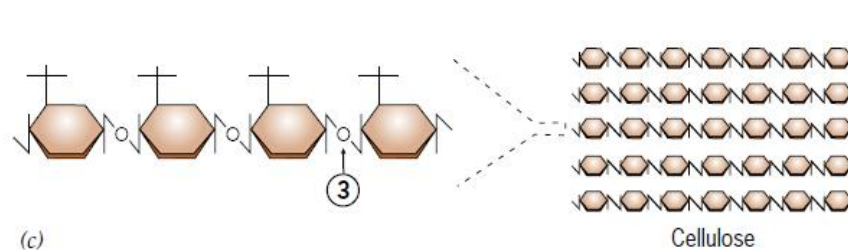
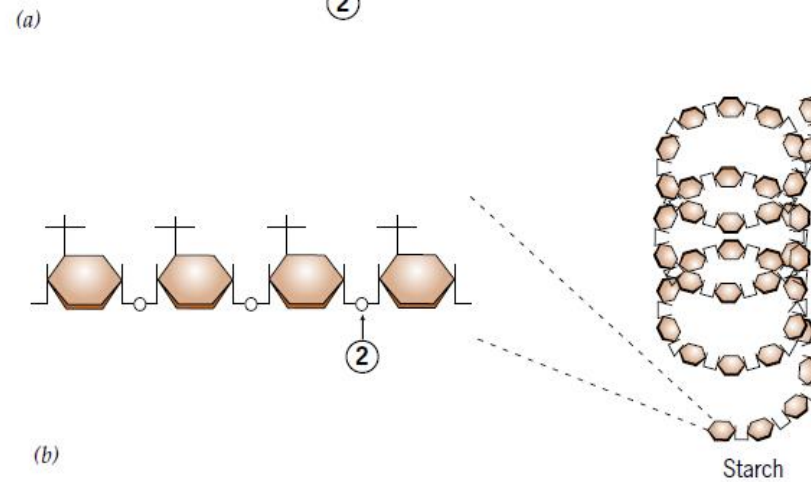
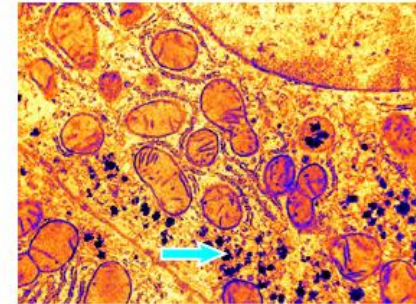
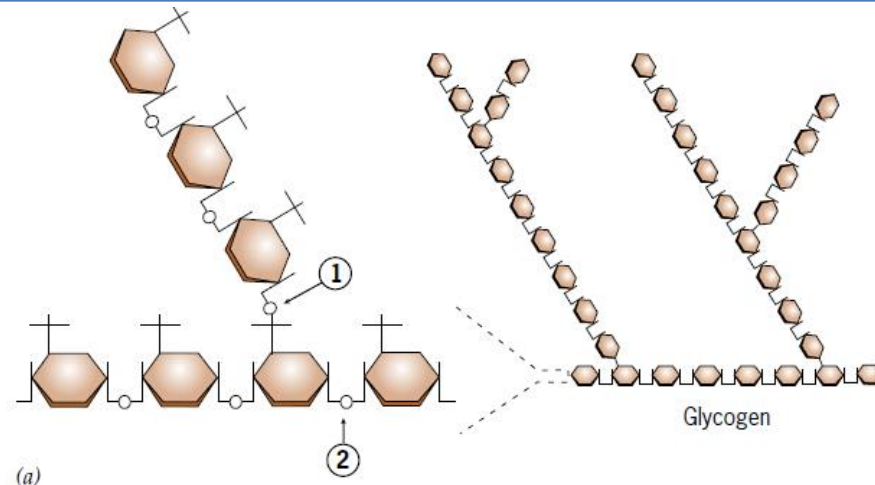
$\beta$ -D-Glucopyranose



$\alpha$ -D-Glucopyranose

Glycogen (a), starch (b), and cellulose (c) are each composed entirely of glucose subunits

Figure 2.17 – Karp  
Chapter 2



# Nucleic acid

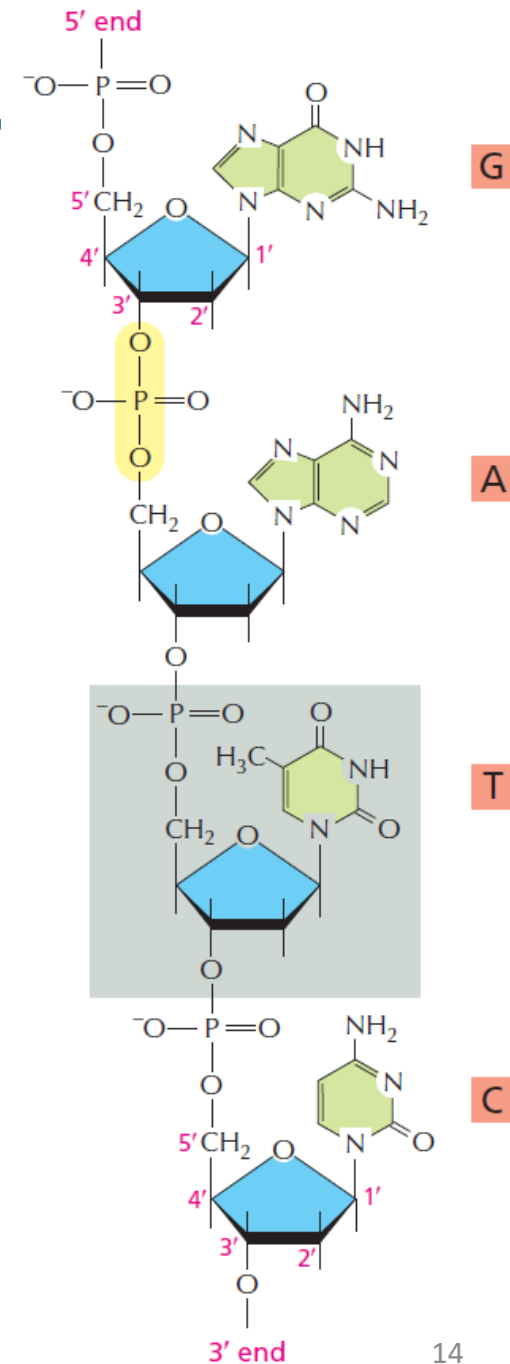
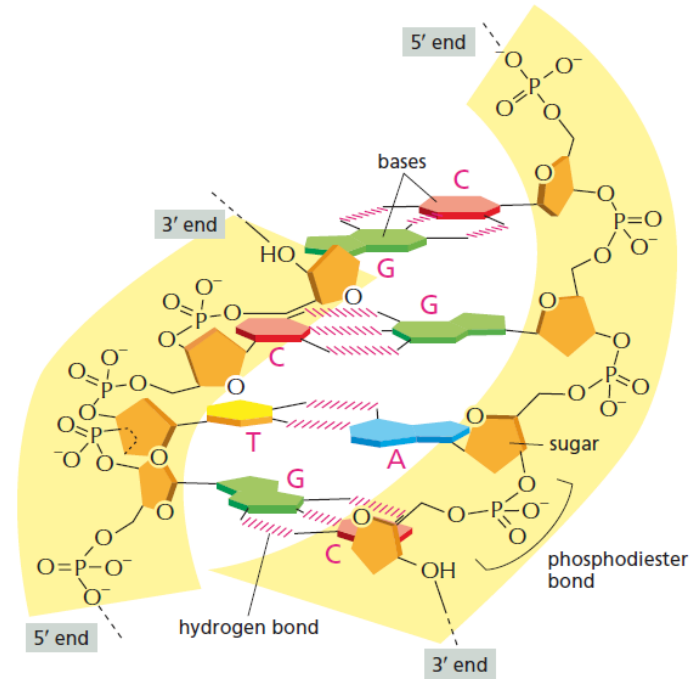
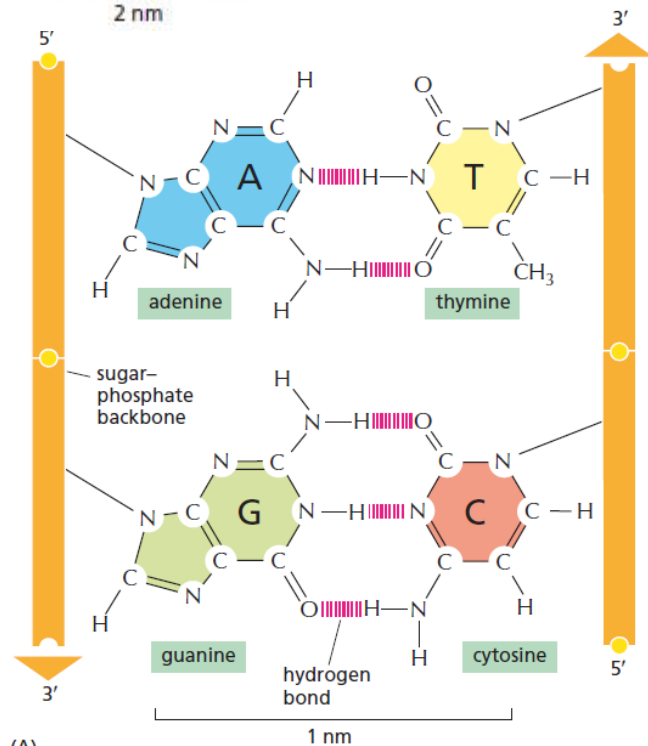
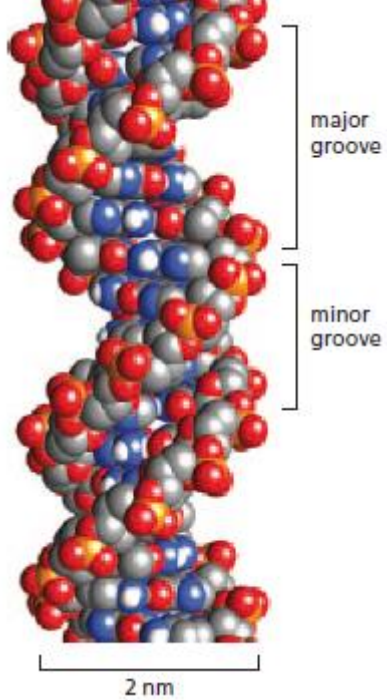


Figure 2.26-Alberts  
Chapter 2

# Nucleosome

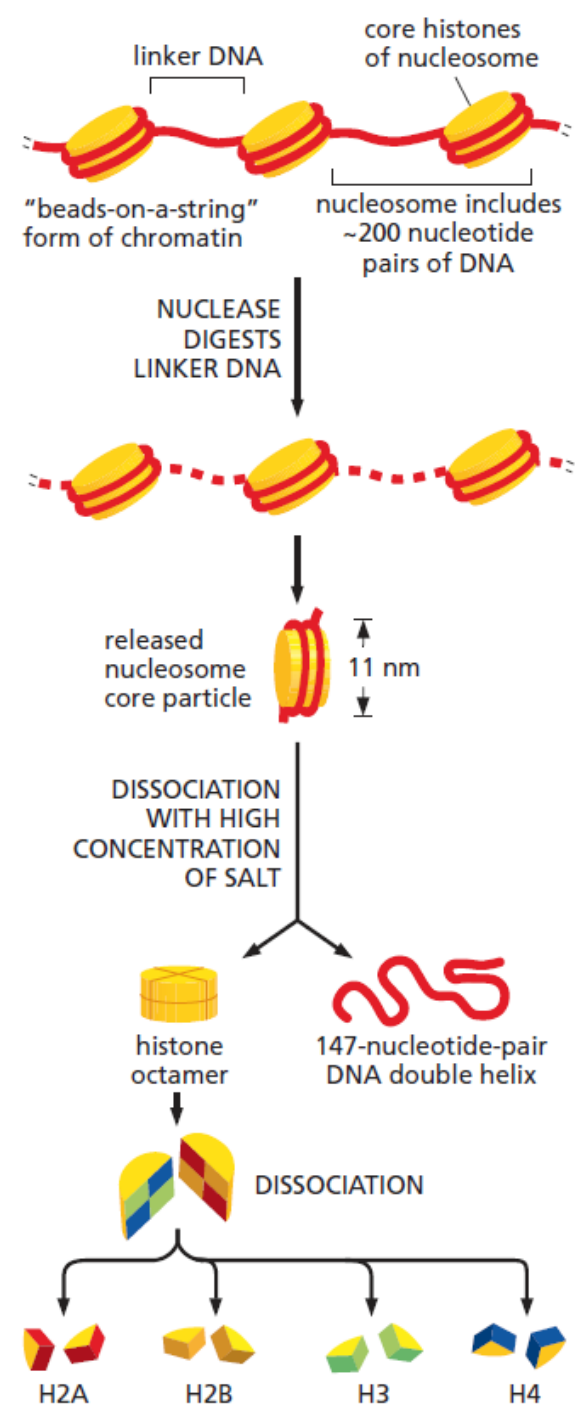
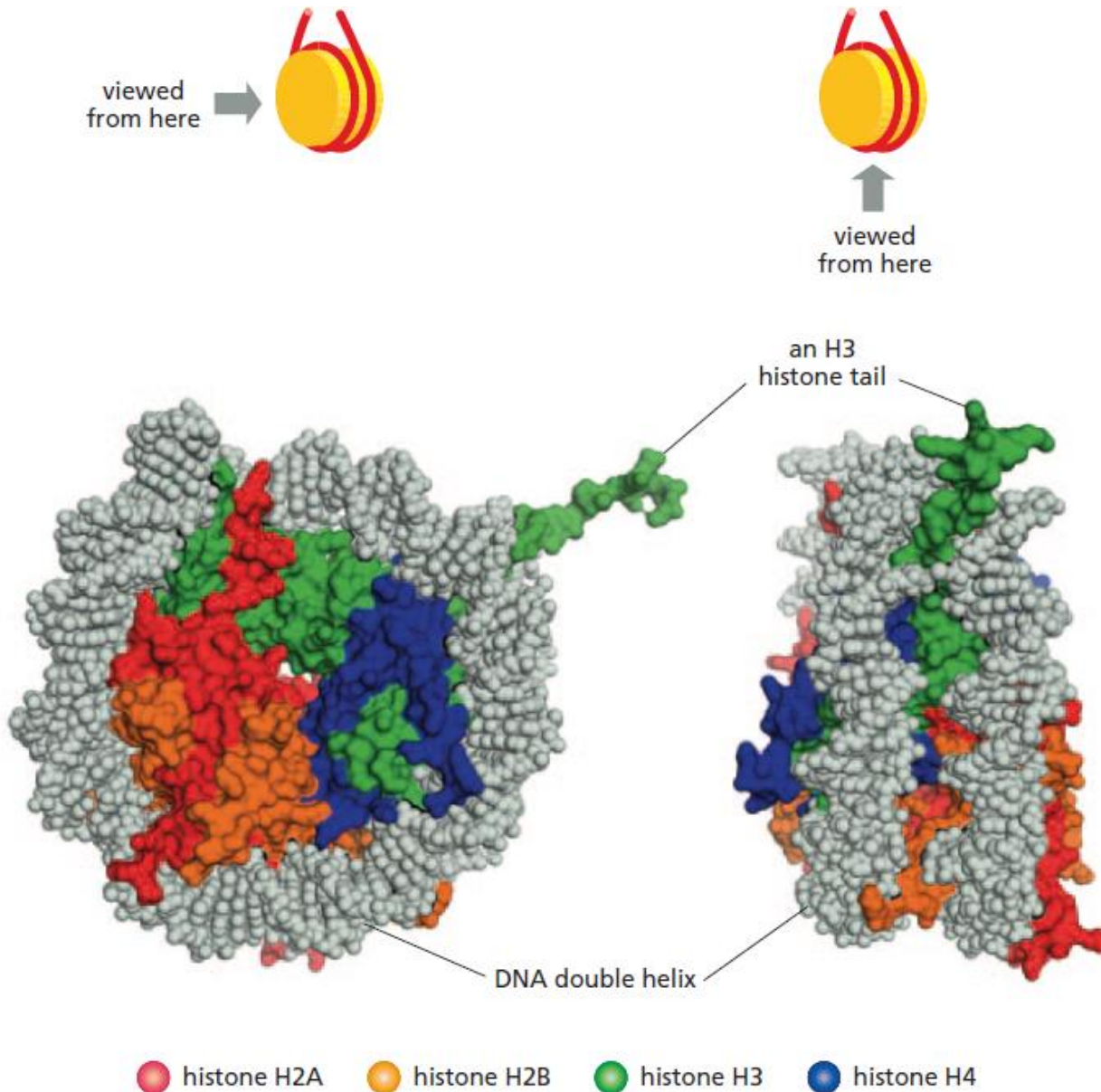


Figure 5.22 - Alberts - Essential... Chapter 5

# Relative sizes of cells and cell components

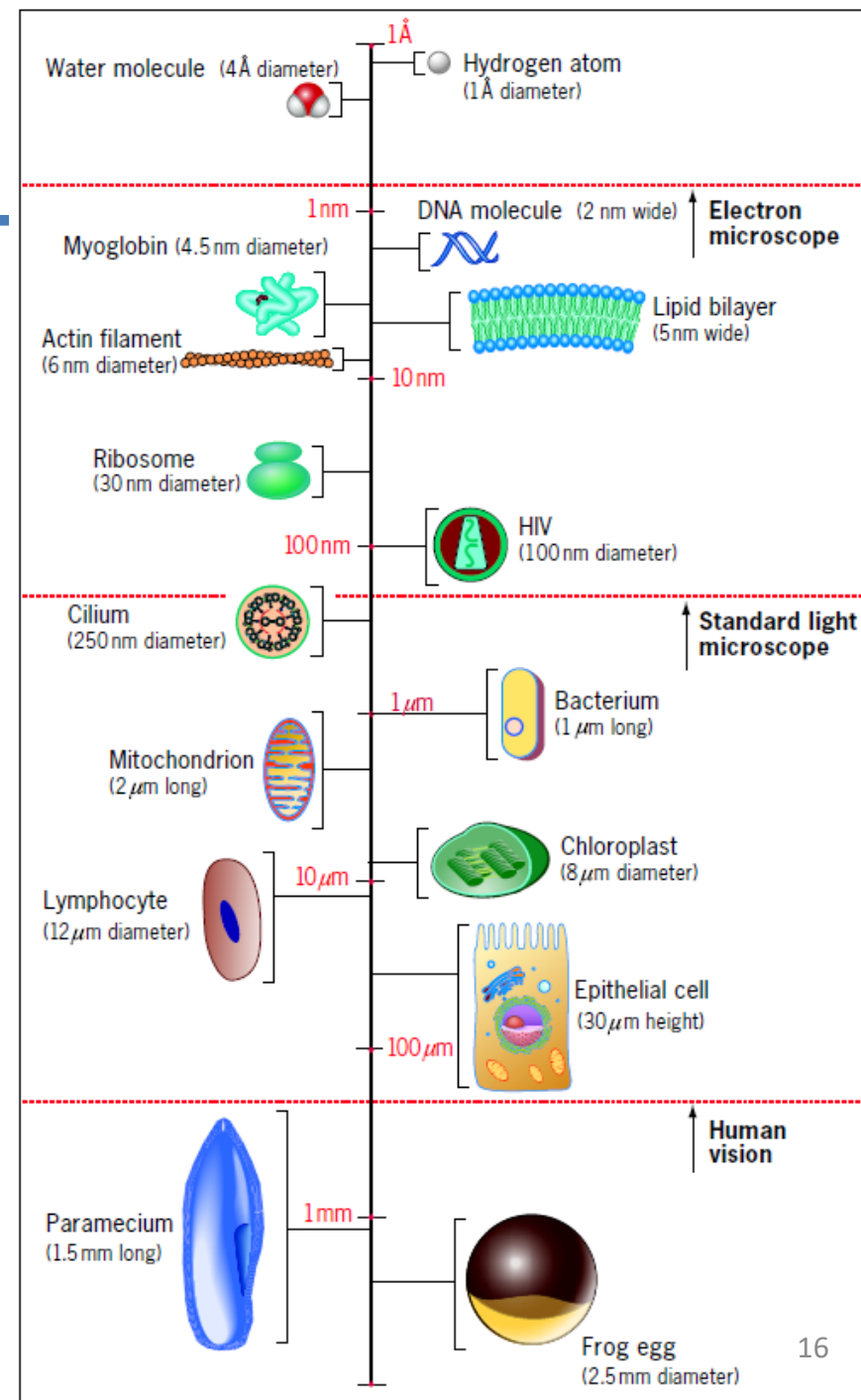
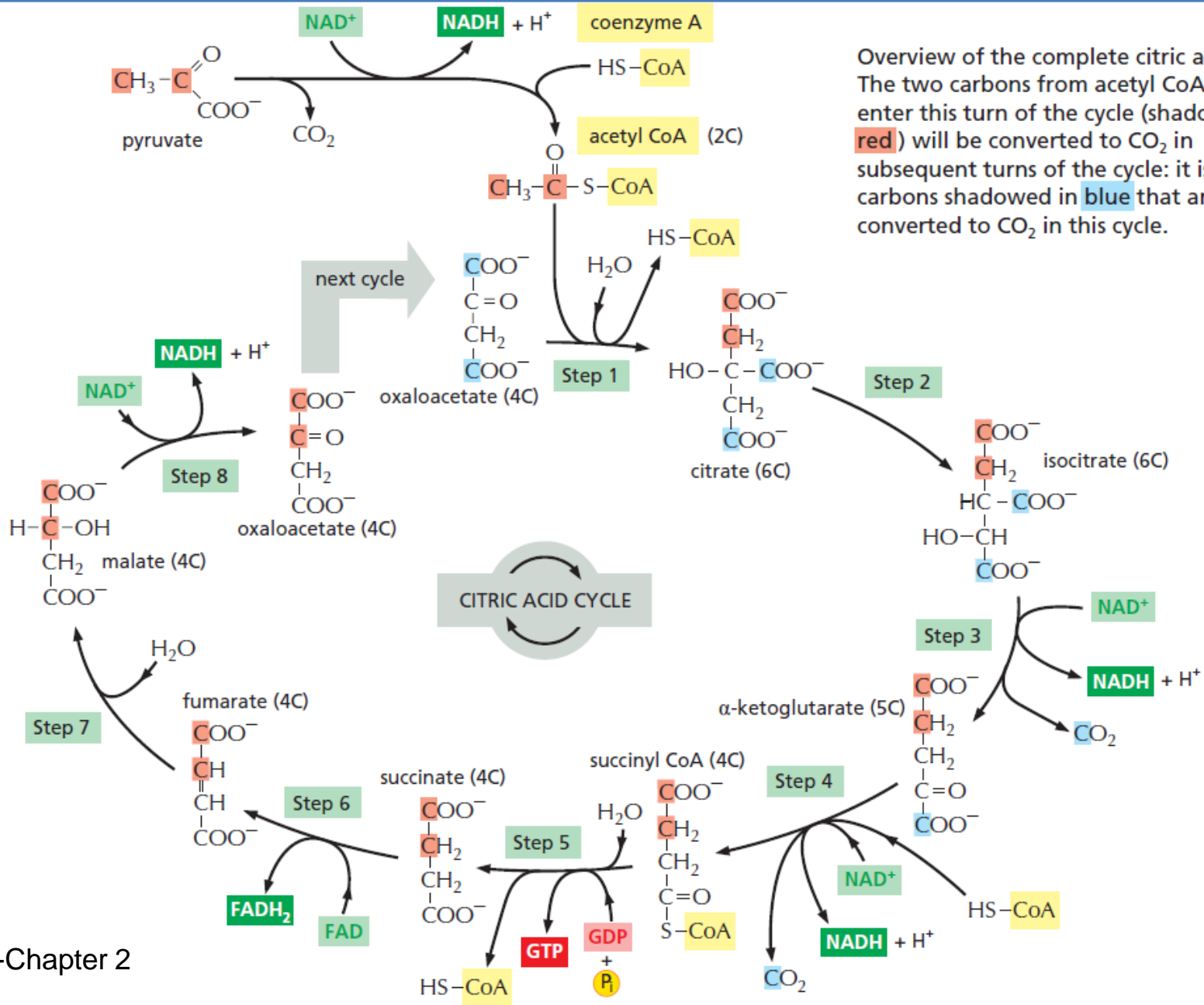


Figure 1.19 - Karp – Chapter 1



# Biochemical process at the cell



# Cell context

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- [Video](#)