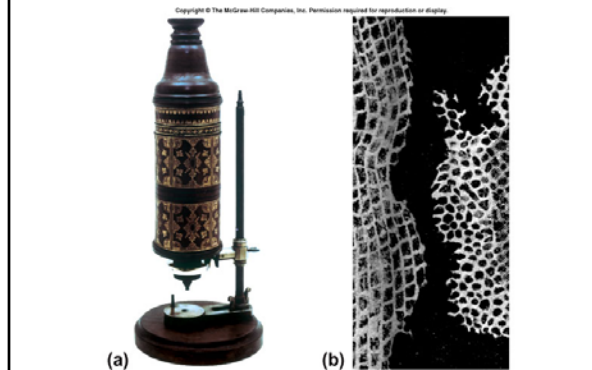


Hooke's Microscope & Cork Cells



Cell Theory

- All organisms are made of cells
- The cell is the smallest unit of life
- All cells come from pre-existing cells

Cells

- Prokaryotic cells
 - Bacteria, archaea, blue-green algae
 - No membrane-bound nucleus or organelles
- Eukaryotic cells
 - Plants, animals, fungi, protists
 - Membrane-bound nucleus & organelles

Figure 7.4 A prokaryotic cell

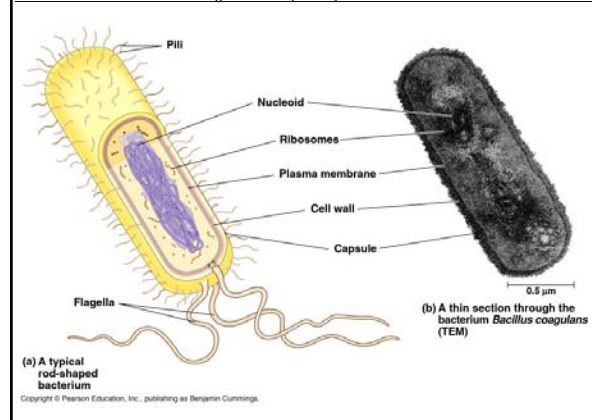


Figure 7.7 Overview of an animal cell

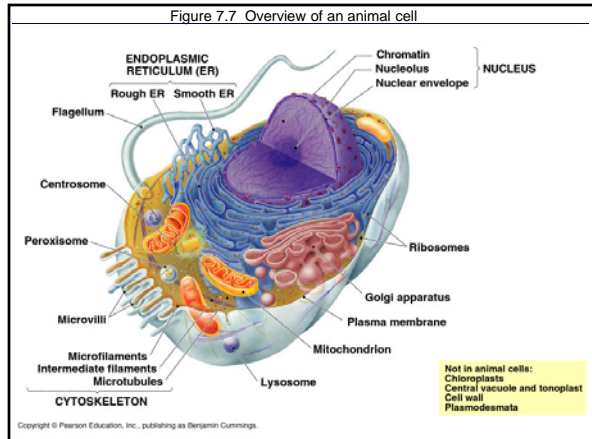
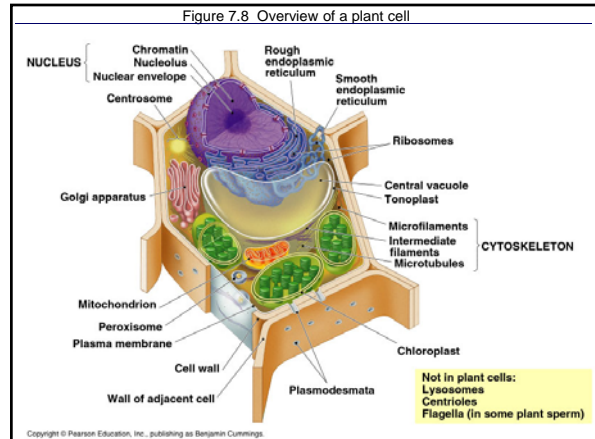
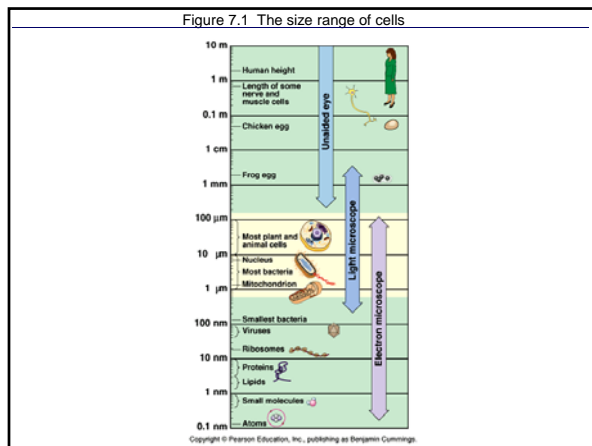


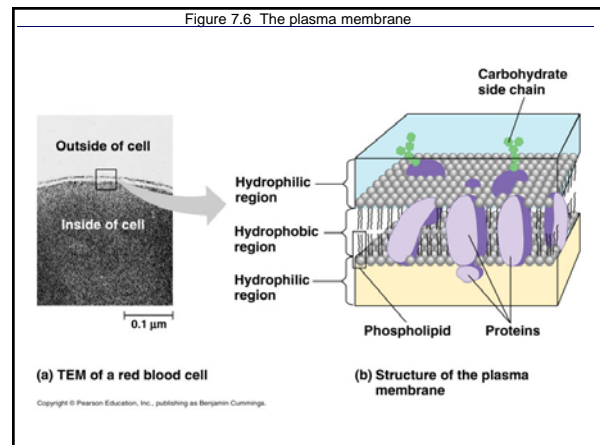
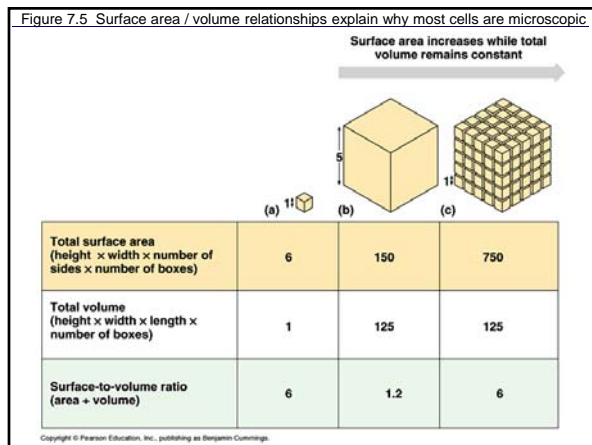
Figure 7.8 Overview of a plant cell





Surface Area/Volume Relationships

- Surface area increases as square of diameter
- Volume increases as cube of diameter
- Therefore, volume increases more rapidly than surface area as size of cell increases



Organelles

- Nucleus
- Nucleolus
- Ribosomes
- Endoplasmic reticulum
- Golgi complex
- Lysosomes
- Mitochondria
- Chloroplasts
- Cytoskeleton
- Cilia & flagellae
- Centrosomes
- Vacuoles

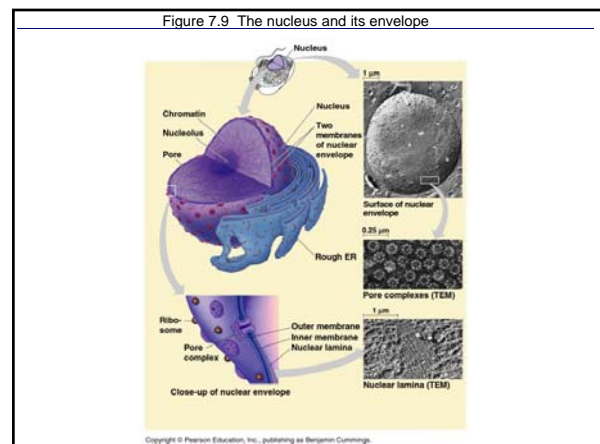
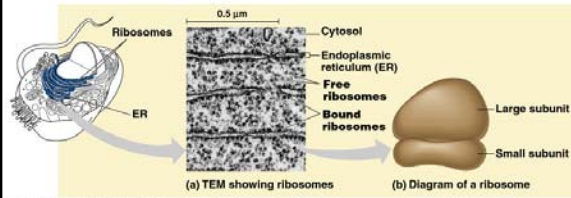
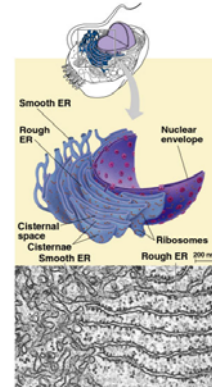


Figure 7.10 Ribosomes



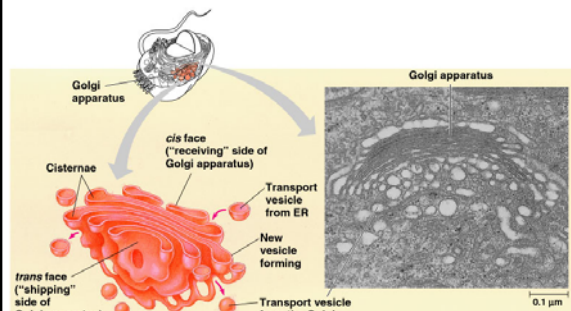
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Figure 7.11 Endoplasmic reticulum (ER)



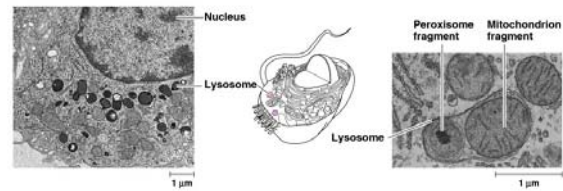
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Figure 7.12 The Golgi apparatus



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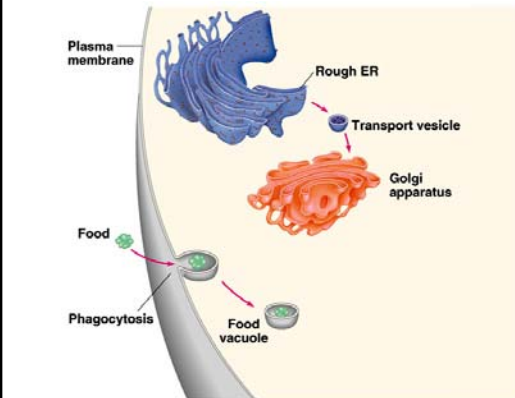
Figure 7.13 Lysosomes



(a) Lysosomes in a white blood cell
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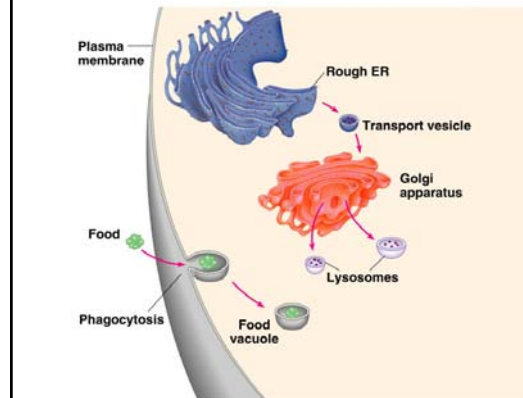
(b) A lysosome in action

Figure 7.14 The formation and functions of lysosomes (Layer 1)



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Figure 7.14 The formation and functions of lysosomes (Layer 2)



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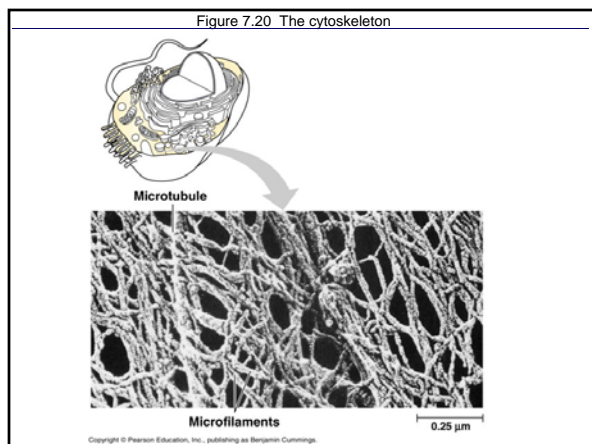
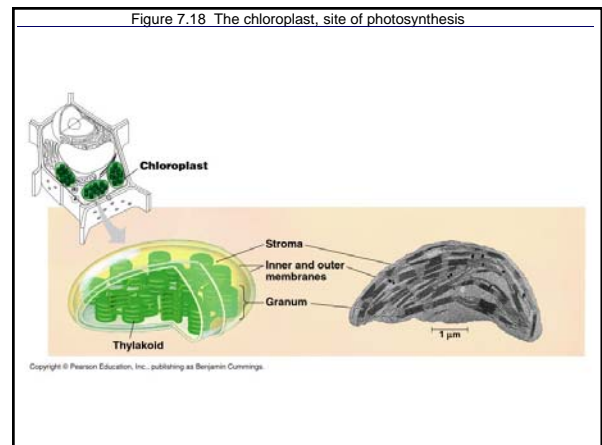
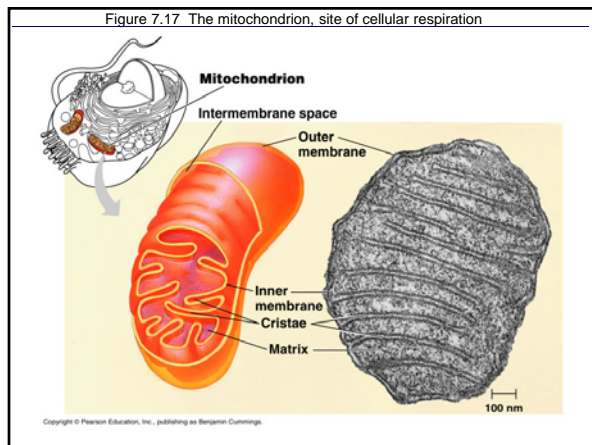
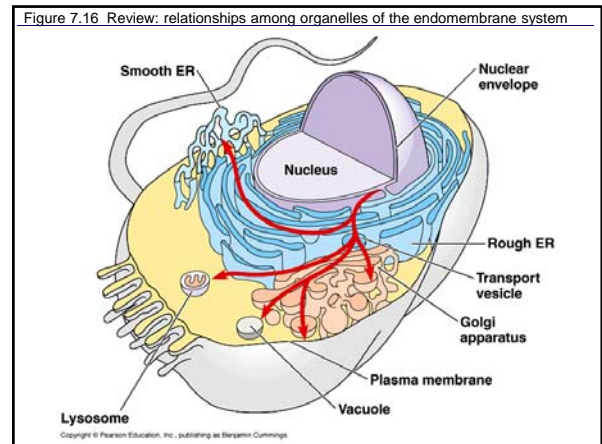
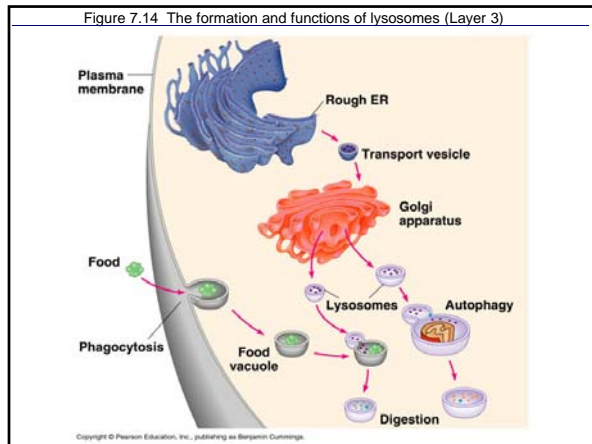


Table 7.2 The structure and function of the cytoskeleton

Property	Microtubules	Microfilaments (Actin Filaments)	Intermediate Filaments
Structure	Hollow tubes; wall consists of 13 subunits of tubulin molecules	Two intertwined strands of actin	Fibrous proteins supercoiled into thicker cables
Diameter	25 nm with 15-nm lumen	7 nm	8–12 nm
Protein subunits	Tubulin, consisting of α -tubulin and β -tubulin	Actin	One of several different proteins of the keratin family, depending on cell type
Main functions	Maintenance of cell shape (compression-resisting "spindles") Cell motility (as in cilia or flagella) Chromosome movements in cell division Organelle movements	Maintenance of cell shape (tension-bearing elements) Changes in cell shape Muscle contraction Cytoplasmic streaming Cell motility (as in pseudopodia) Cell division (cleavage furrow formation)	Maintenance of cell shape (tension-bearing elements) Anchorage of nucleus and certain other organelles Formation of nuclear lamina

10 μm

Tubulin dimer

25 nm

10 μm

Actin subunit

7 nm

5 μm

Protein subunits

Fibrous subunit

10 nm

SOURCE: Adapted from W. M. Becker, L. I. Kleinsmith, and L. Hardin, *The World of the Cell*, 4th ed. (San Francisco, CA: Benjamin Cummings, 2006), p. 733.

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Figure 7.22 Centrosome containing a pair of centrioles

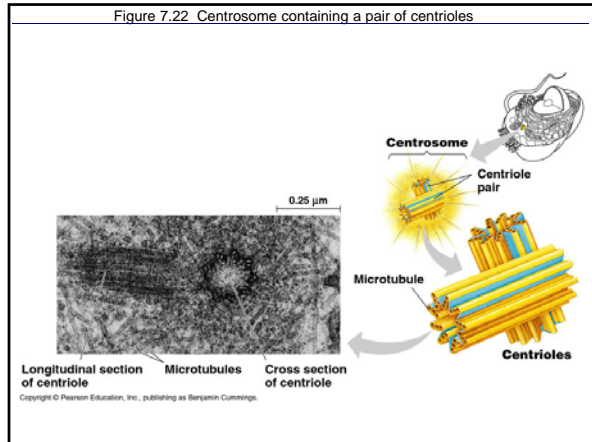


Figure 7.23 A comparison of the beating of flagella and cilia

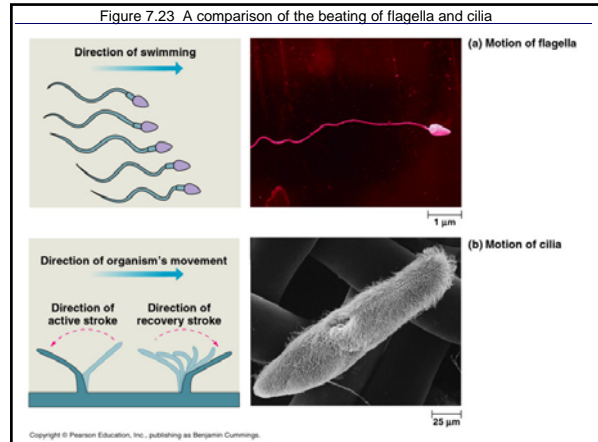
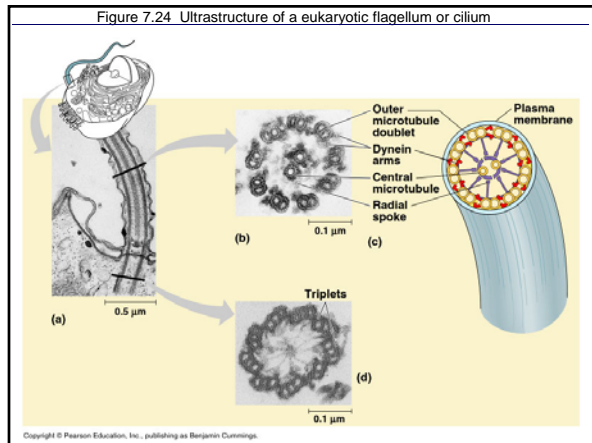


Figure 7.24 Ultrastructure of a eukaryotic flagellum or cilium



Cell Contacts & Junctions

- Cell walls: plant cells, fungal cells
- Extracellular matrix: animal cells
- Intercellular junctions
 - Tight junctions
 - Desmosomes (Anchoring junctions)
 - Gap junctions (Communicating junctions)

Figure 7.28 Plant cell walls

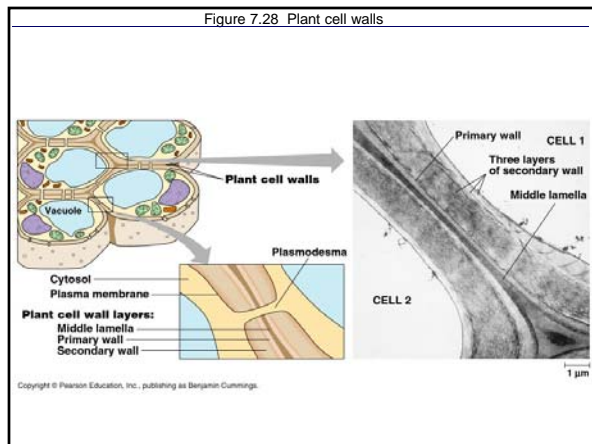


Figure 7.29 Extracellular matrix (ECM) of an animal cell

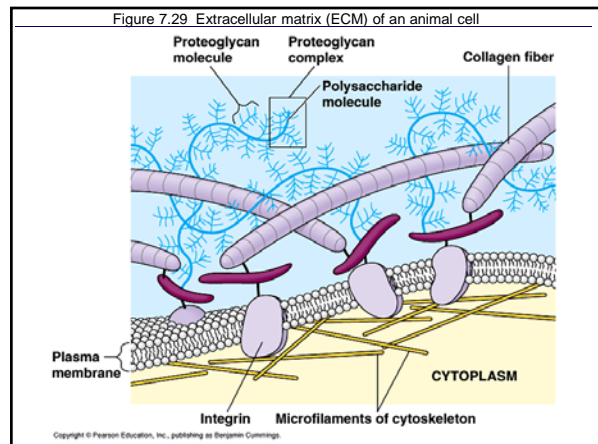


Figure 7.30 Intercellular junctions in animal tissues

