

**PowerPoint Lecture Outlines  
to accompany**

**Hole's Human  
Anatomy and Physiology  
Tenth Edition**

**Shier ♦ Butler ♦ Lewis**

**Chapter 3**



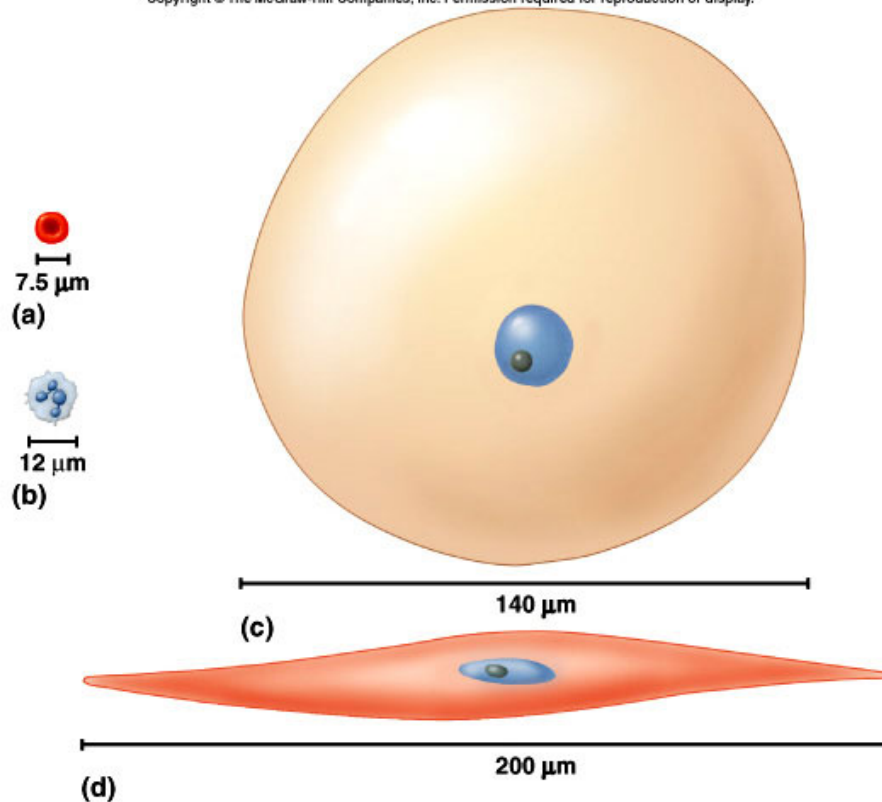
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# Chapter 3

## Cells

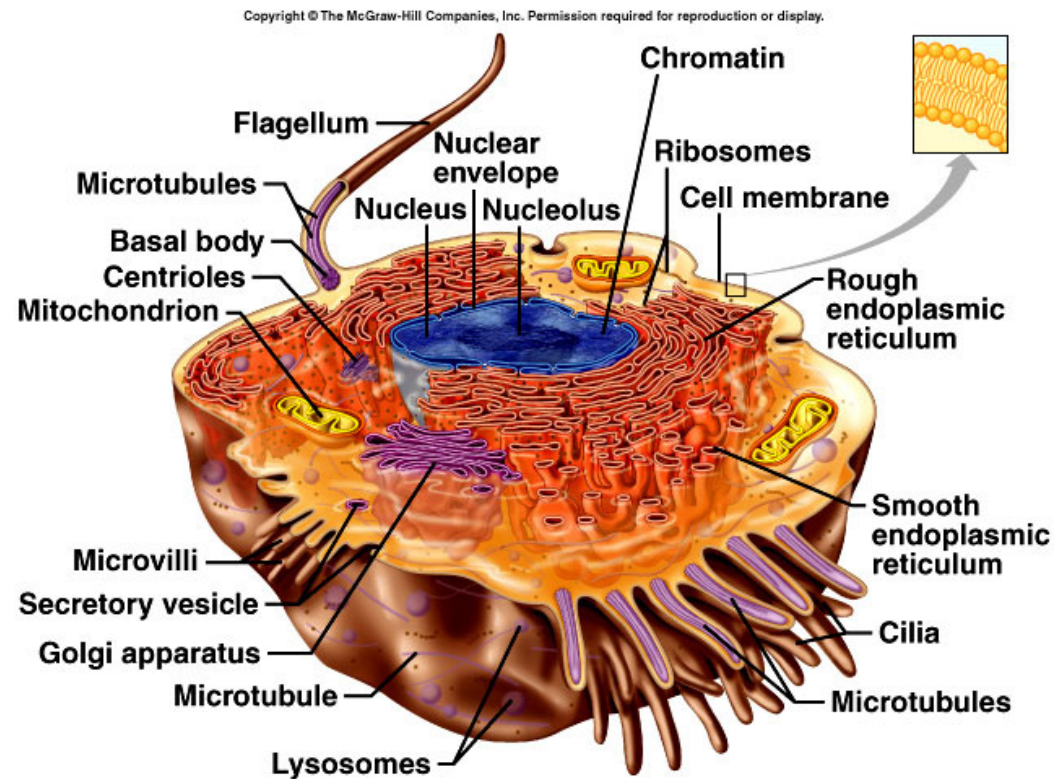
- vary in size
- vary in shape
- measured in micrometers

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# A Composite Cell

- hypothetical cell
- major parts
  - nucleus
  - cytoplasm
  - cell membrane

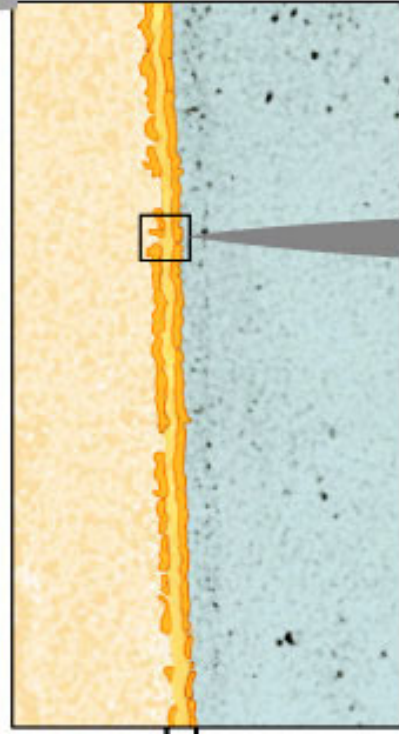
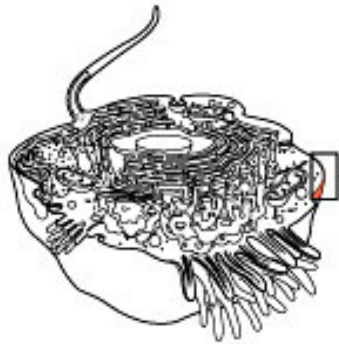


# Cell Membrane

- **outer limit of cell**
- **controls what moves in and out of cell**
- **selectively permeable**
- **phospholipid bilayer**
  - **water-soluble “heads” form surfaces**
  - **water-insoluble “tails” form interior**
  - **permeable to lipid-soluble substances**
- **cholesterol stabilizes the membrane**
- **proteins**
  - **receptors**
  - **pores, channels, carriers**
  - **enzymes**
  - **CAMS**
  - **self-markers**

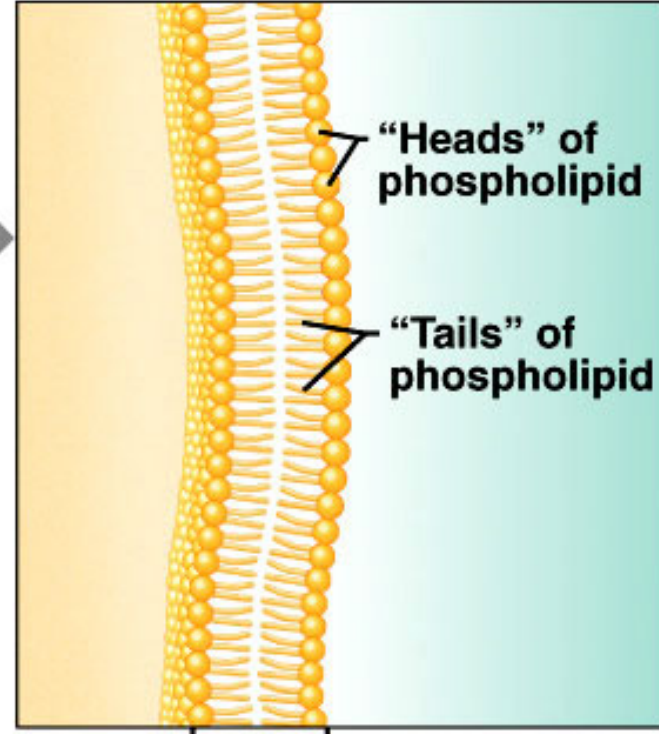
# Cell Membrane

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Cell membrane

(a)



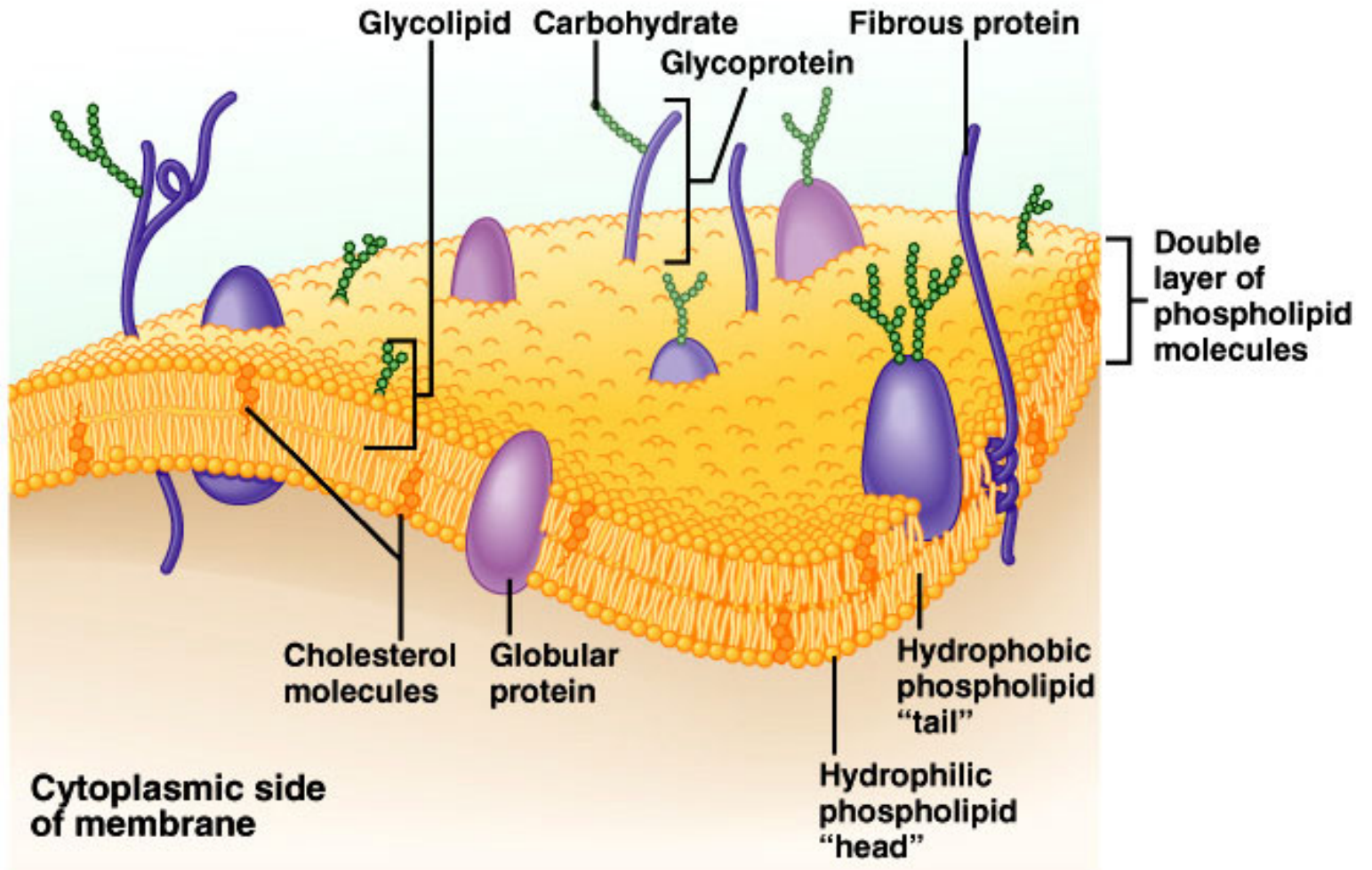
Cell membrane

(b)

# Cell Membrane

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**Extracellular side  
of membrane**



# Intercellular Junctions

## Tight junctions

- close space between cells
- located among cells that form linings

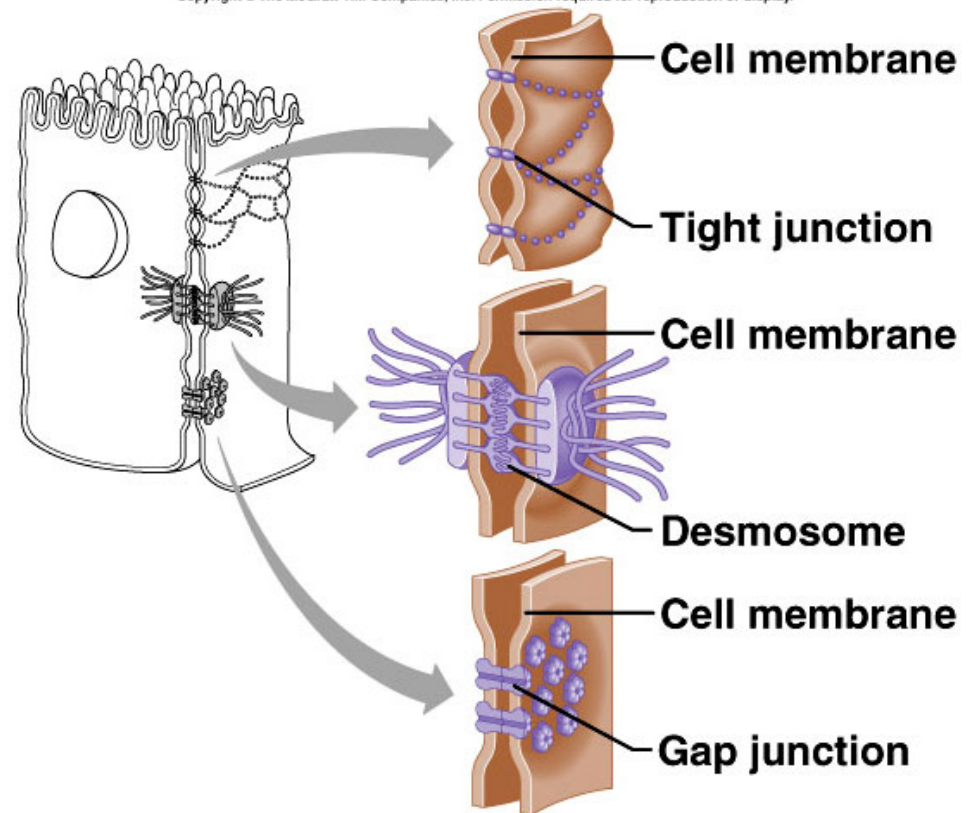
## Desmosomes

- form “spot welds” between cells
- located among outer skin cells

## Gap junctions

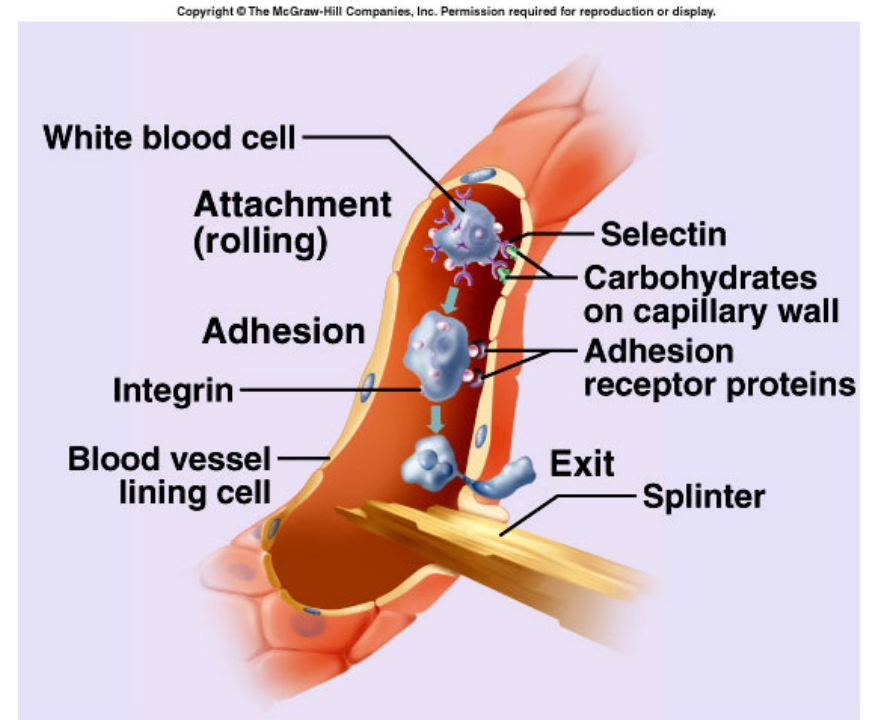
- tubular channels between cells
- located in cardiac muscle cells

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# Cell Adhesion Molecules

- guide cells on the move
- selectin – allows white blood cells to “anchor”
- integrin – guides white blood cells through capillary walls
- important for growth of embryonic tissue
- important for growth of nerve cells





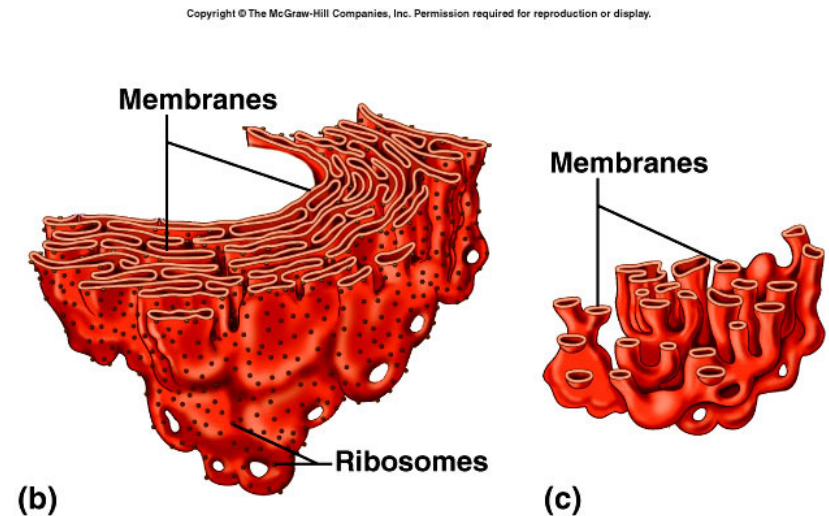
# Cytoplasmic Organelles

## Endoplasmic Reticulum

- **connected, membrane-bound sacs, canals, and vesicles**
- **transport system**
- **rough ER**
  - **studded with ribosomes**
  - **protein and lipid synthesis**
- **smooth ER**
  - **lipid synthesis**
  - **break down of drugs**

## Ribosomes

- **free floating or connected to ER**
- **site of protein synthesis**



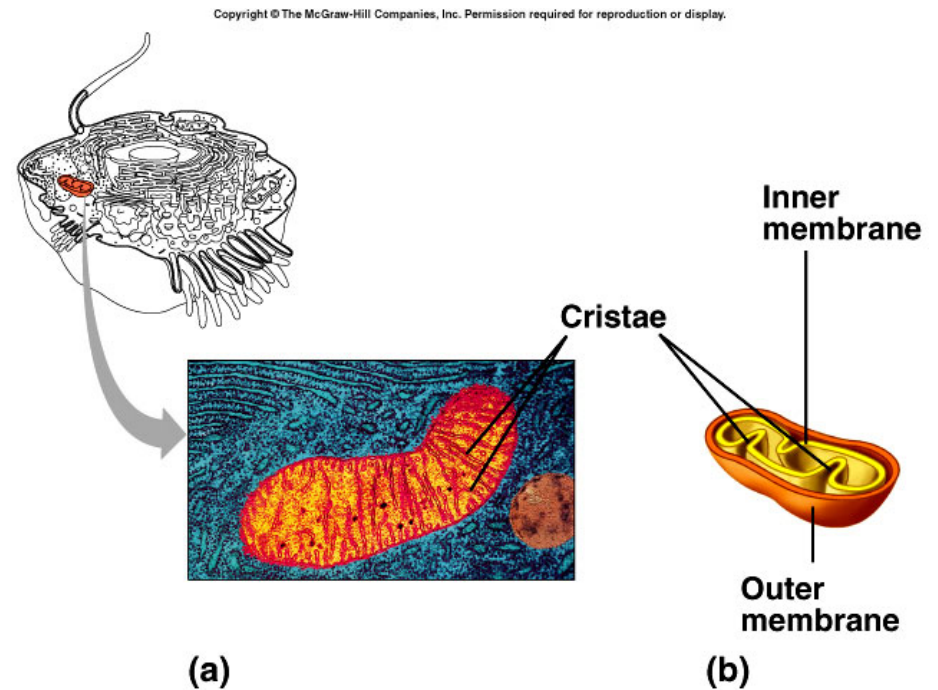
# Cytoplasmic Organelles

## Golgi apparatus

- group of flattened, membranous sacs
- packages and modifies proteins

## Mitochondria

- membranous sacs with inner partitions
- generate energy



# Cytoplasmic Organelles

## Lysosomes

- enzyme-containing sacs
- digest worn out cell parts or unwanted substances

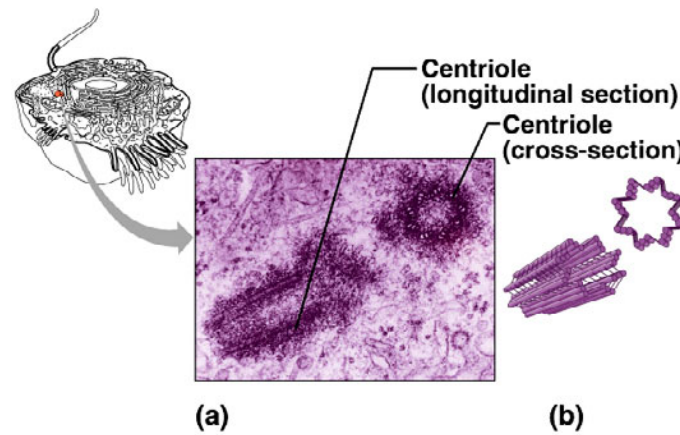
## Peroxisomes

- enzyme-containing sacs
- break down organic molecules

## Centrosome

- two rod-like centrioles
- used to produce cilia
- distributes chromosomes during cell division

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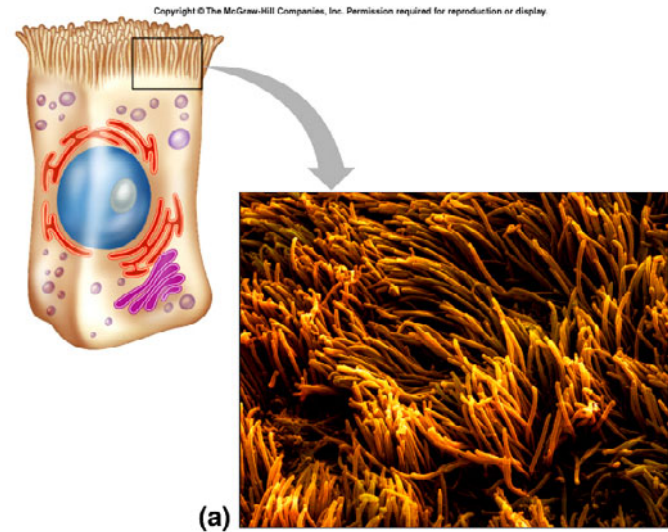
# Cytoplasmic Organelles

## Cilia

- short hair-like projections
- propel substances on cell surface

## Flagellum

- long tail-like projection
- provides motility to sperm



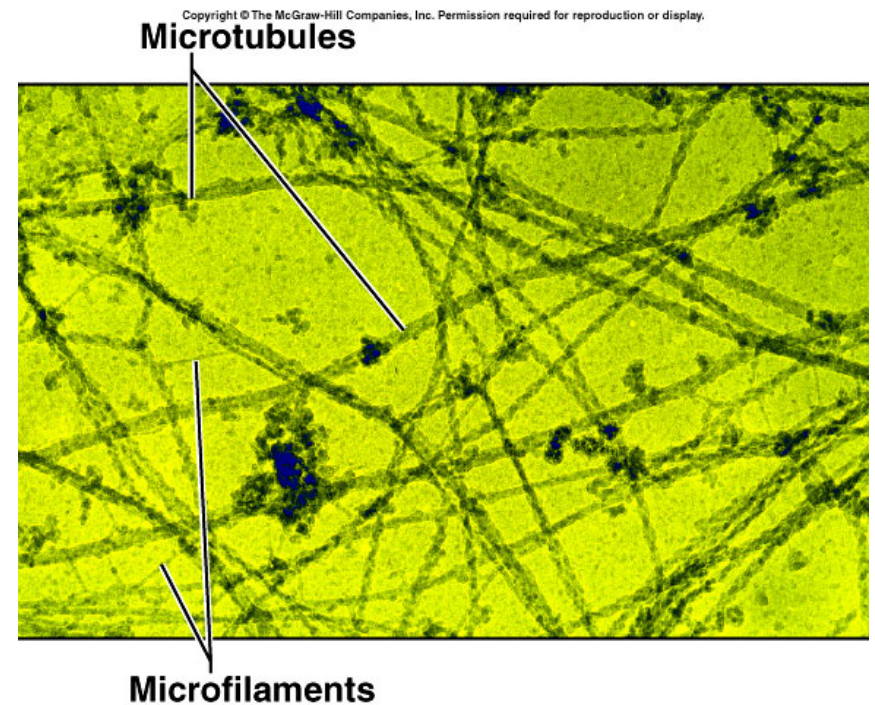
# Cytoplasmic Organelles

## Vesicles

- membranous sacs
- store substances

## Microfilaments and microtubules

- thin rods and tubules
- support cytoplasm
- allows for movement of organelles



# Cell Nucleus

- **control center of cell**
- **nuclear envelope**
  - porous double membrane
  - separates nucleoplasm from cytoplasm
- **nucleolus**
  - dense collection of RNA and proteins
  - site of ribosome production
- **chromatin**
  - fibers of DNA and proteins
  - stores information for synthesis of proteins

