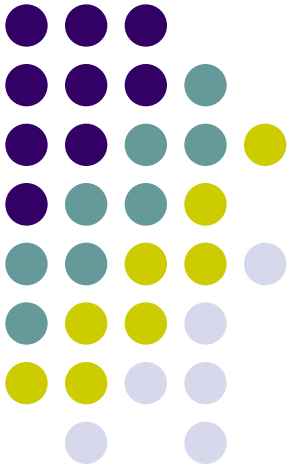
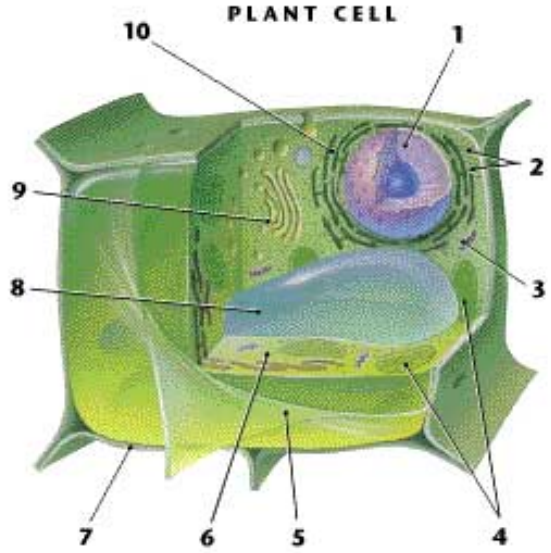
Cell Structures

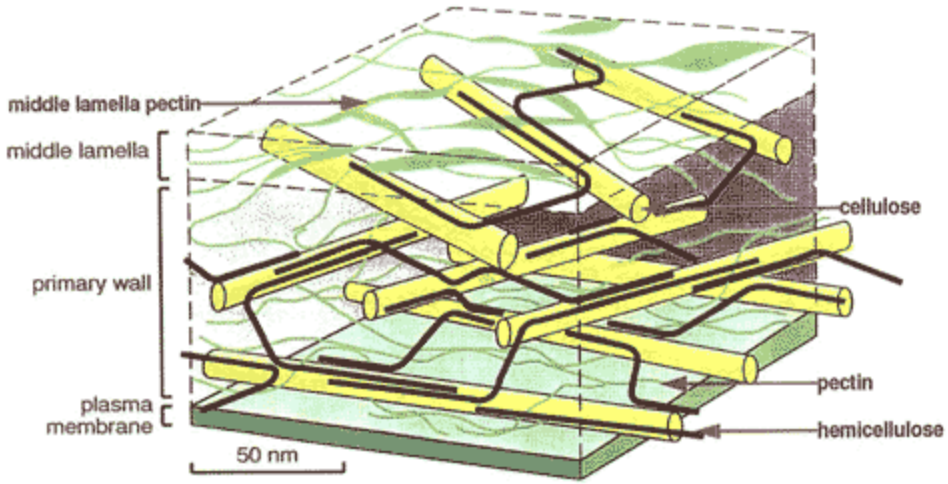
Chapter 7.2



Cell Wall

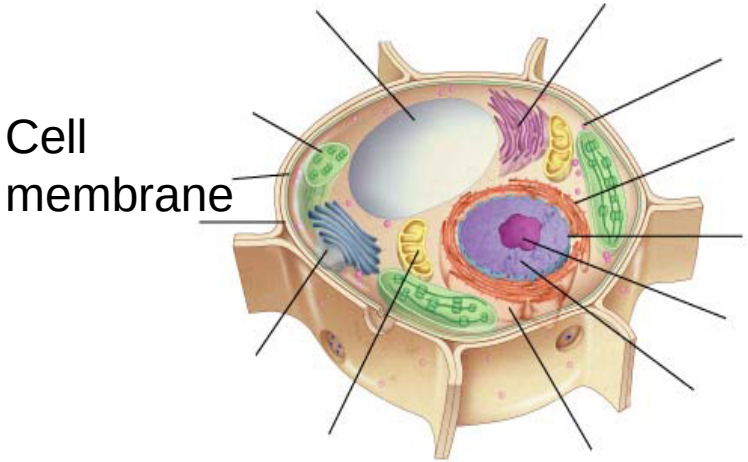
- Provides support and protection
- Present in
  - most prokaryotic cells
  - Some eukaryotic cells: Plant cells, fungi, algae
- Made from cellulose (carbohydrate) fibers



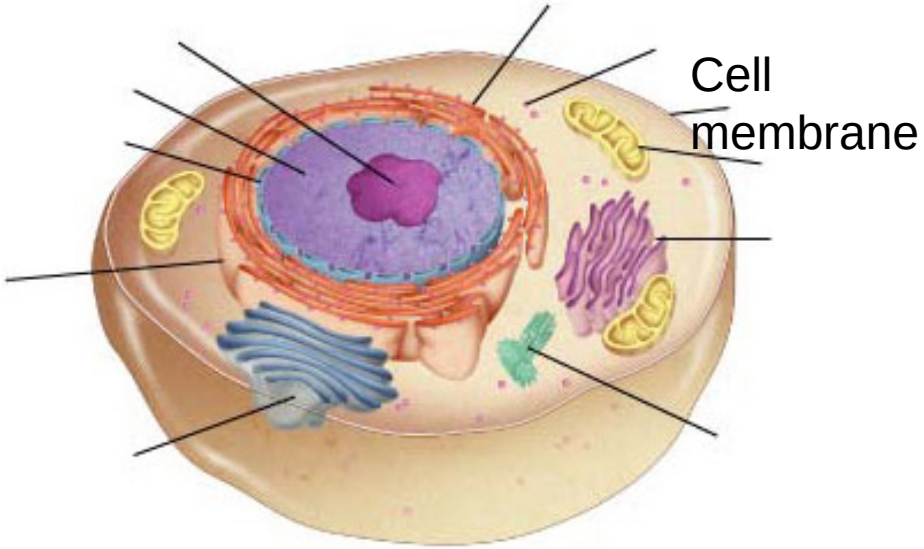


Cell Membrane

- Semi-permeable --- allows certain molecules to pass through
- Present in all cells
- Made of lipid



Plant Cell

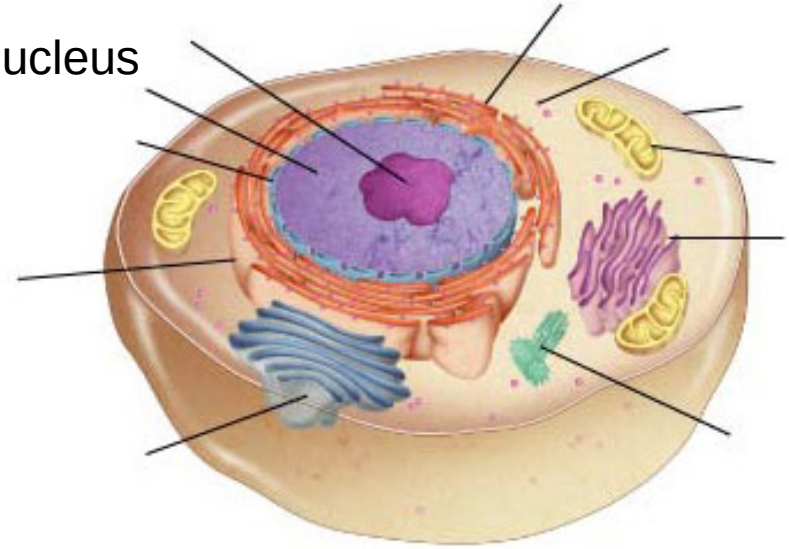


Animal Cell

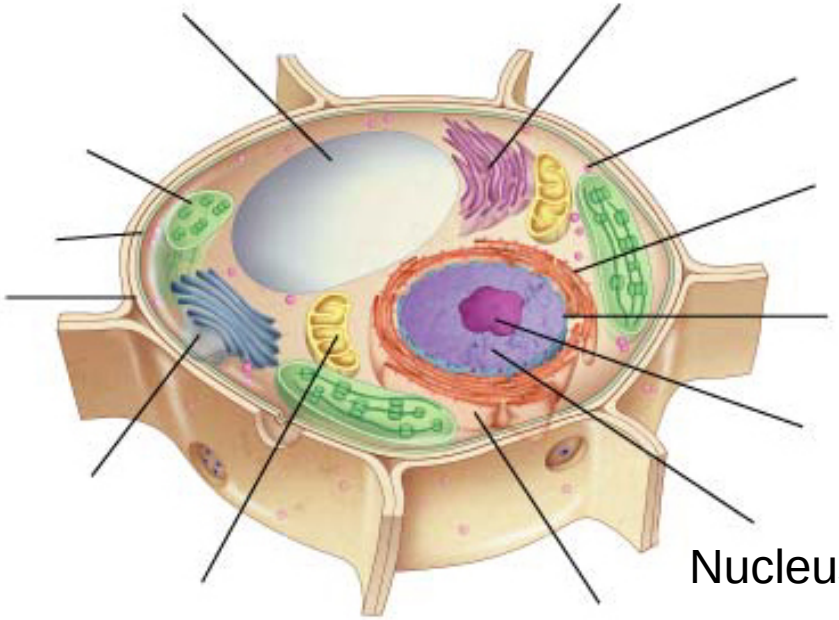
Nucleus

- Controls cell processes
- Contains DNA
- Present in all eukaryotic cells

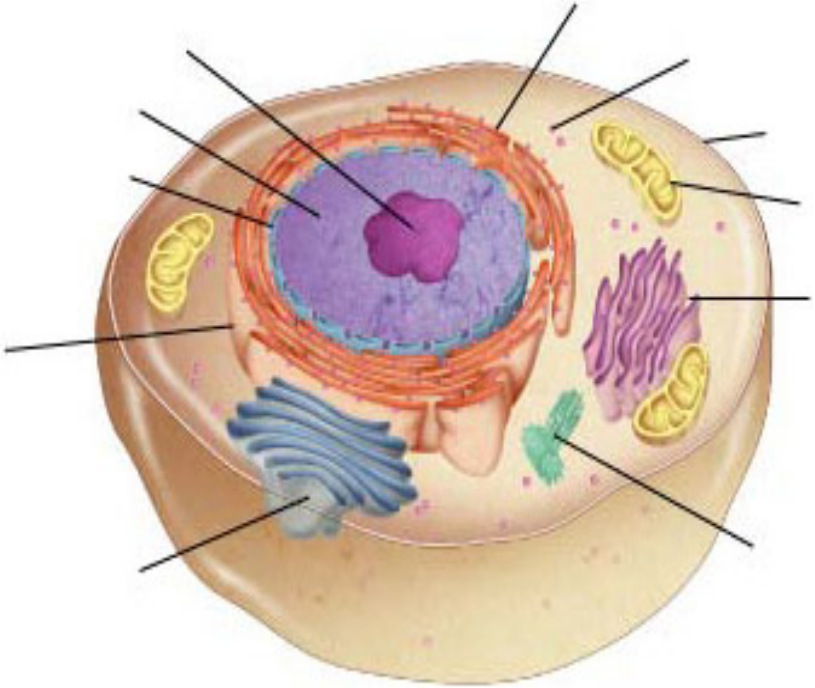
Animal Cell



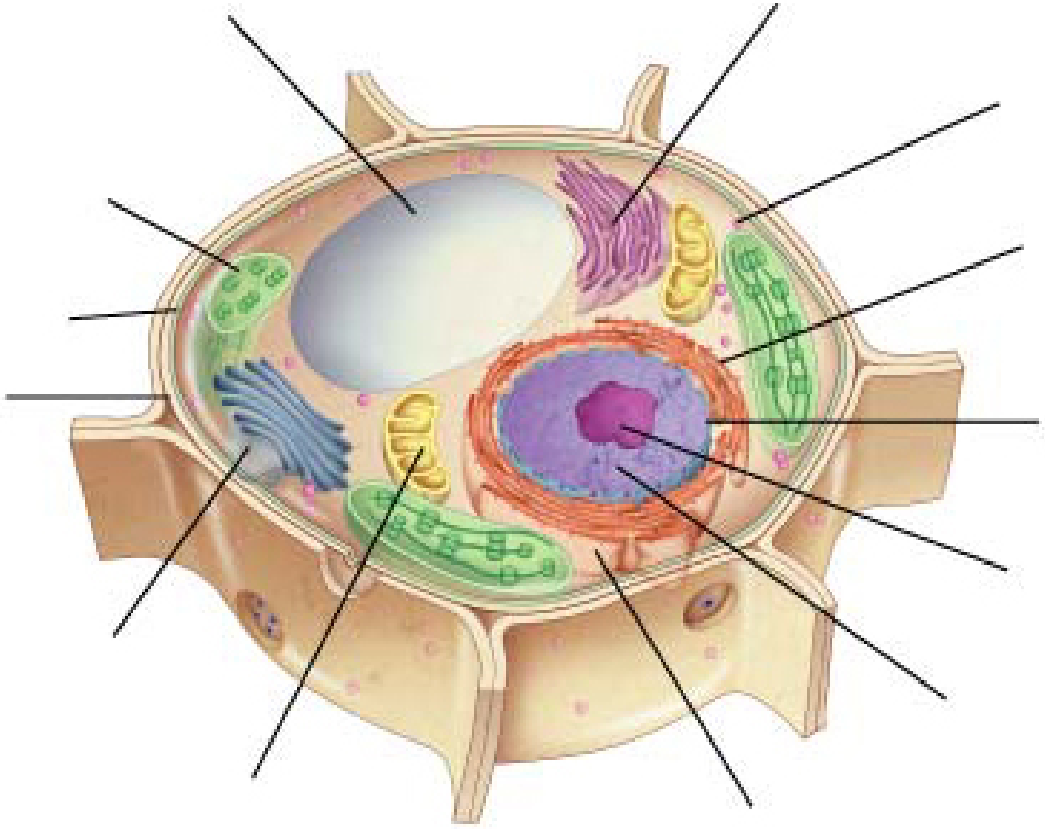
Plant Cell



Animal Cell

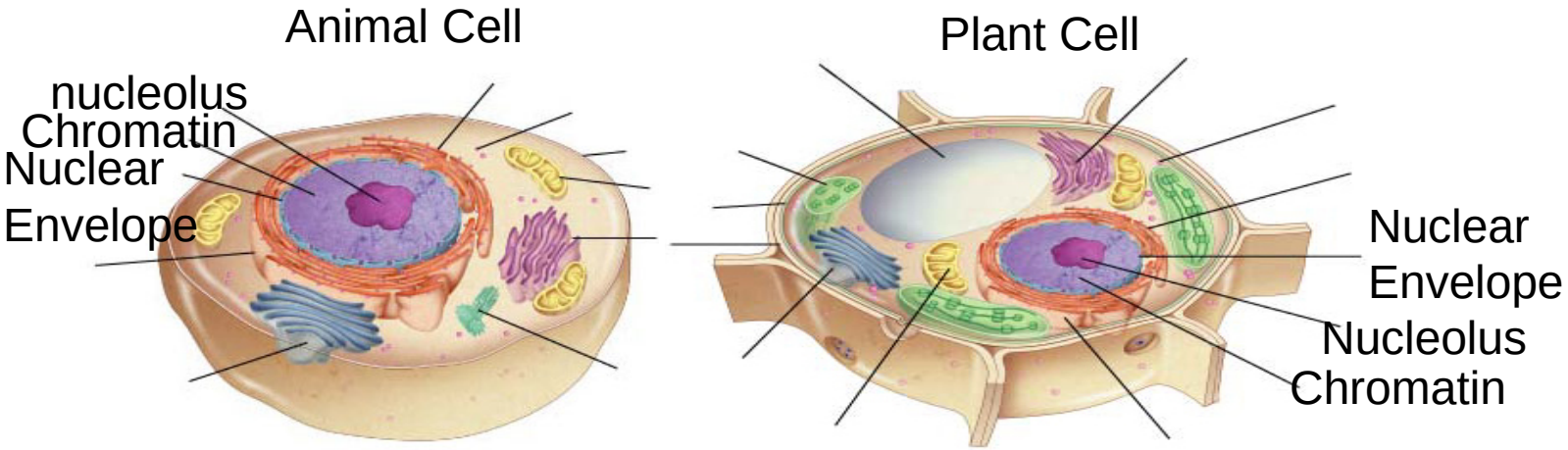


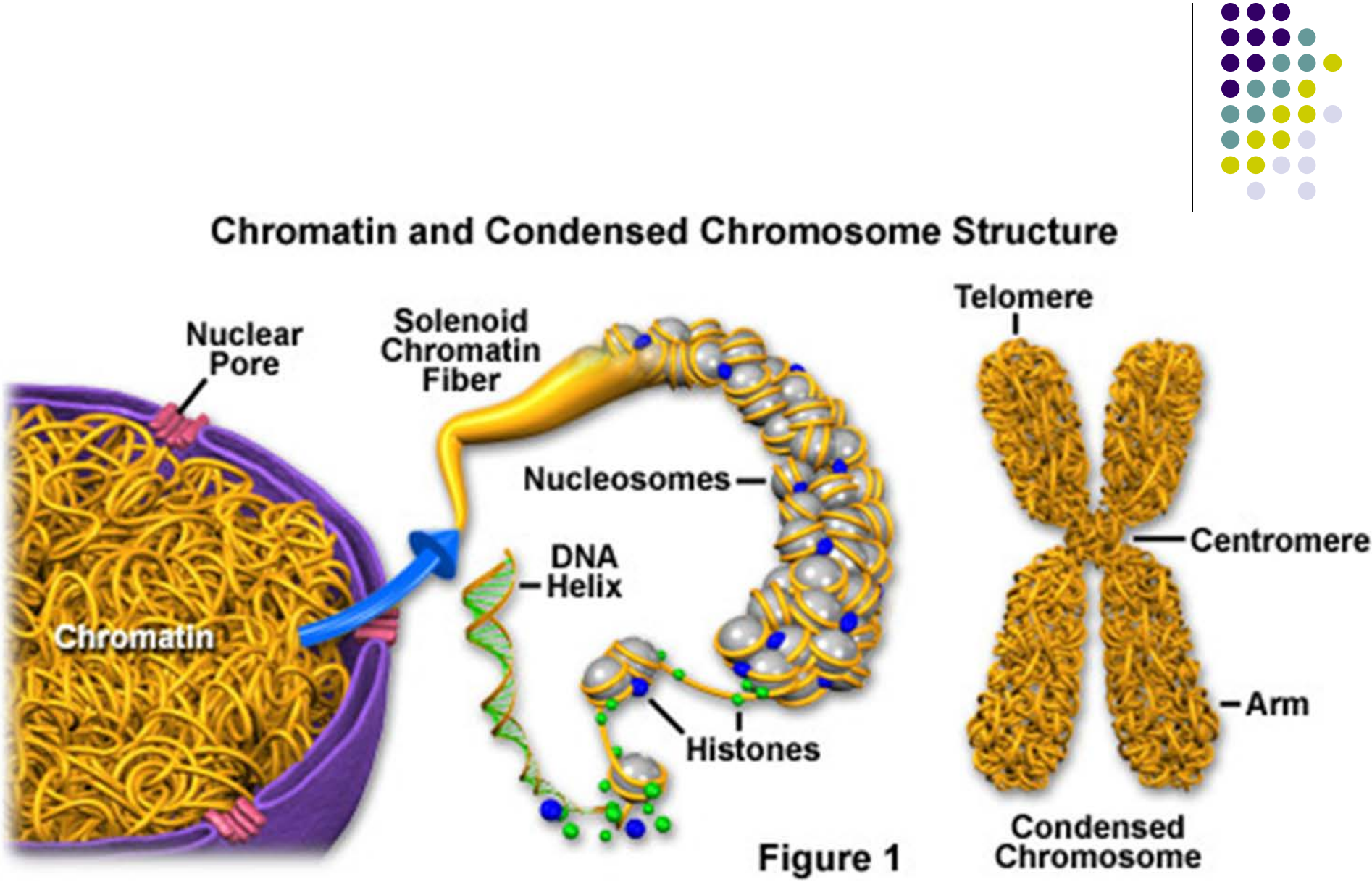
Plant Cell



Nucleus structure

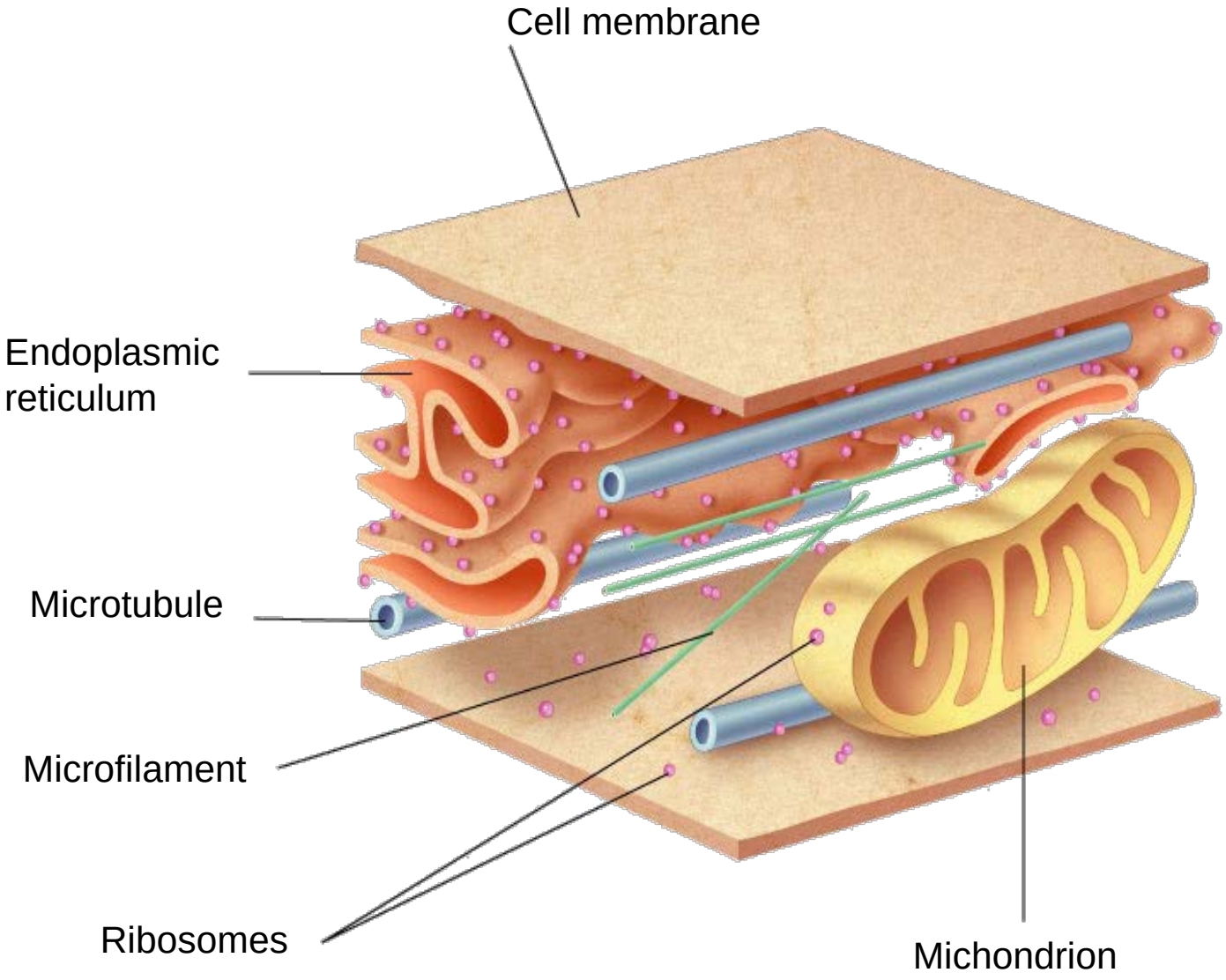
- Chromatin – DNA wrapped around proteins
- Chromosomes – organized DNA, formed right before cell division
- Nucleolus – makes ribosomes
- Nuclear Envelope
  - Surrounds nucleus
  - Contains pores to allow material to flow in and out



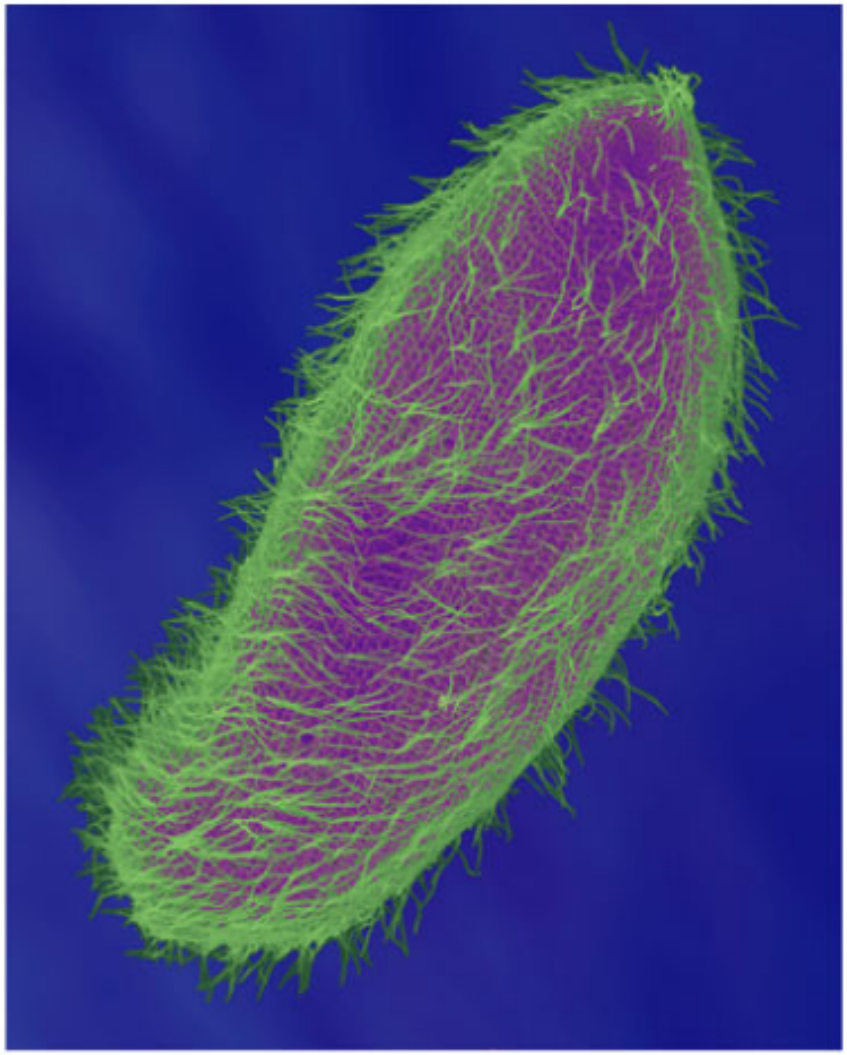

Chromatin and Condensed Chromosome Structure
Nuclear Pore
Solenoid Chromatin Fiber
Nucleosomes
DNA Helix
Chromatin
Histones
Telomere
Centromere
Arm
Condensed Chromosome
Figure 1

Cytoskeleton

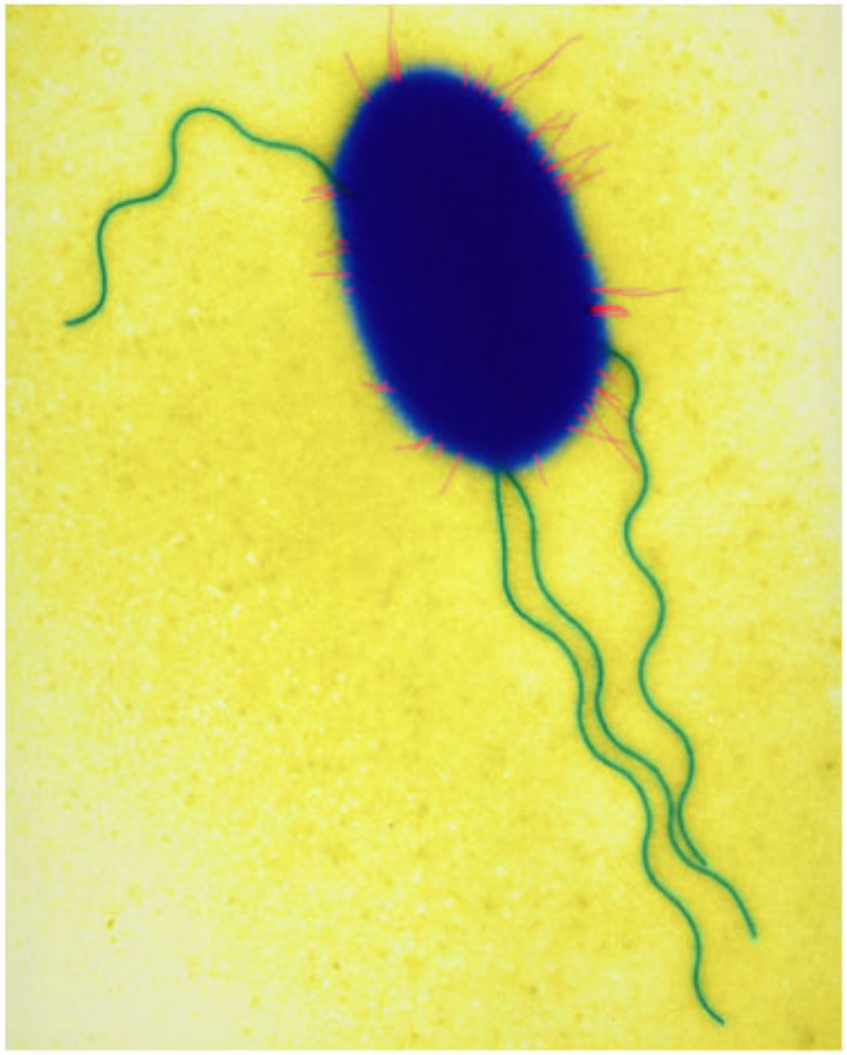
- Protein filaments
- Found in Eukaryotic cells (plant and animal)
- Microtubules – 25 nanometers diameter
  - Maintain cell shape (support beams)
  - Tracks that organelles are moved along
  - Form centrioles (animal cells only) used in cell division
  - Flagella – “whip” that helps some cells move
  - Cilia -- “oars” that help some cells move
- Microfilaments – 9 nanometers diameter
  - Framework (cross beams) in cell


Cell membrane
Endoplasmic reticulum
Microtubule
Microfilament
Ribosomes
Michondrion

Cilia

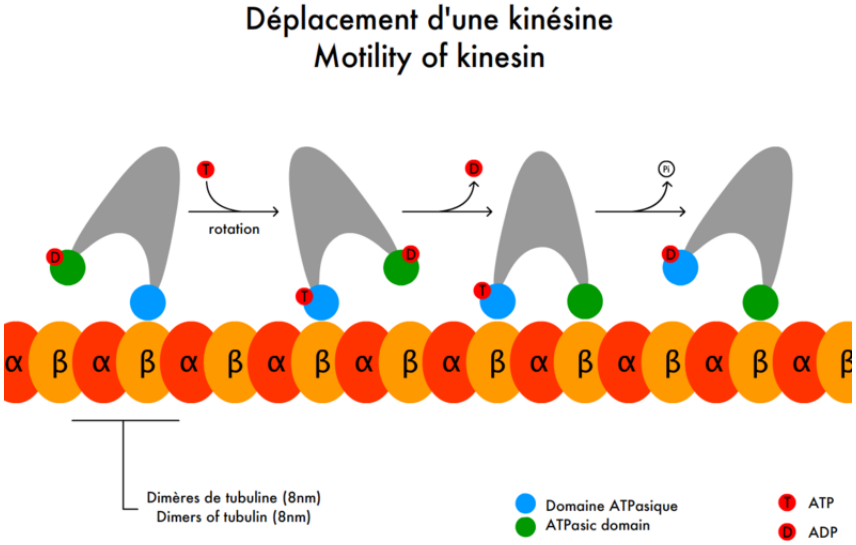


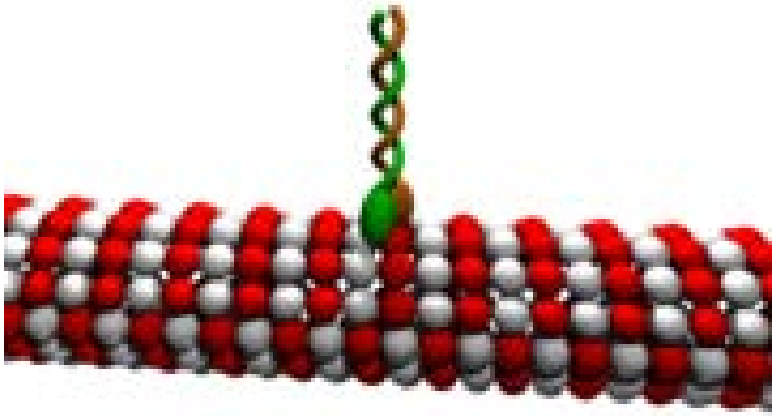
Flagella



Motor proteins

- Move organelles along cytoskeleton tracks
- Check out this cool video of motor proteins

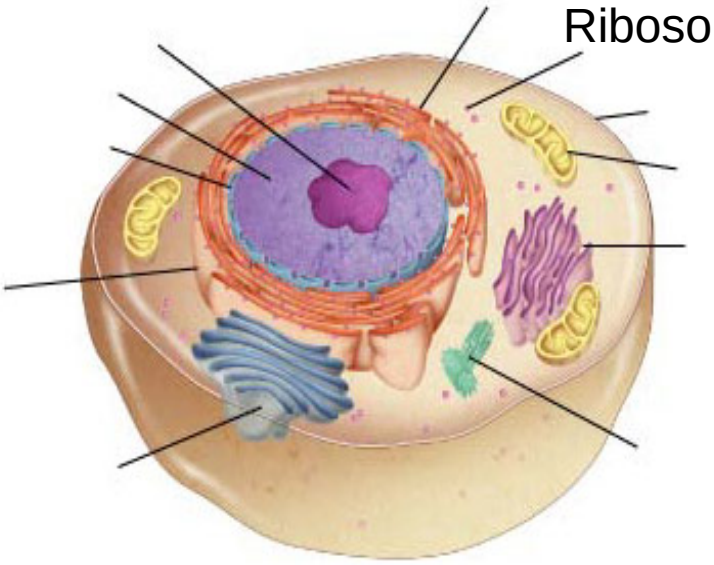




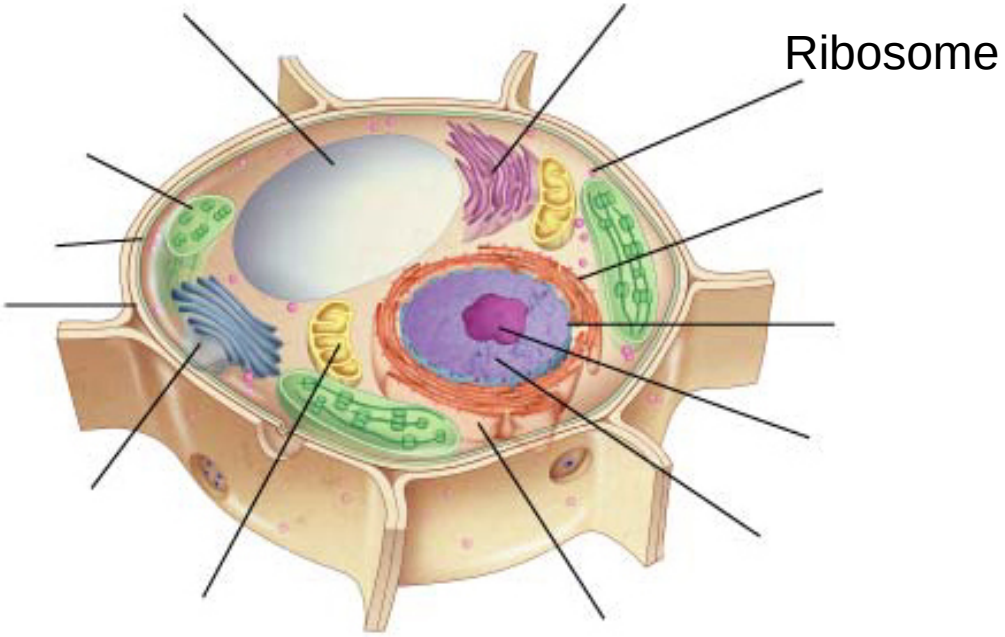
Ribosomes

- Found in all cells (prokaryotic and eukaryotic
- Made of RNA and protein
- Make proteins using instructions from nucleus (DNA and RNA)

Animal Cell

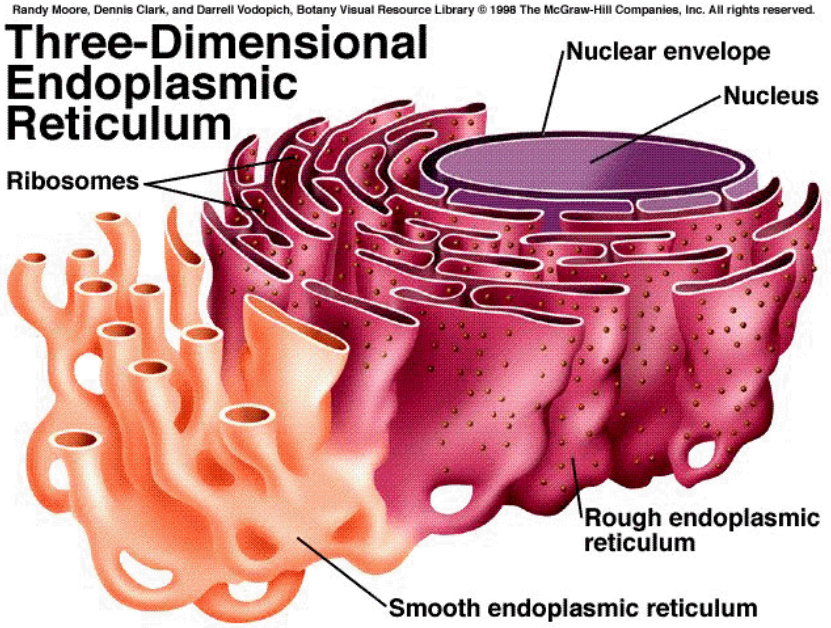


Plant Cell



Endoplasmic Reticulum

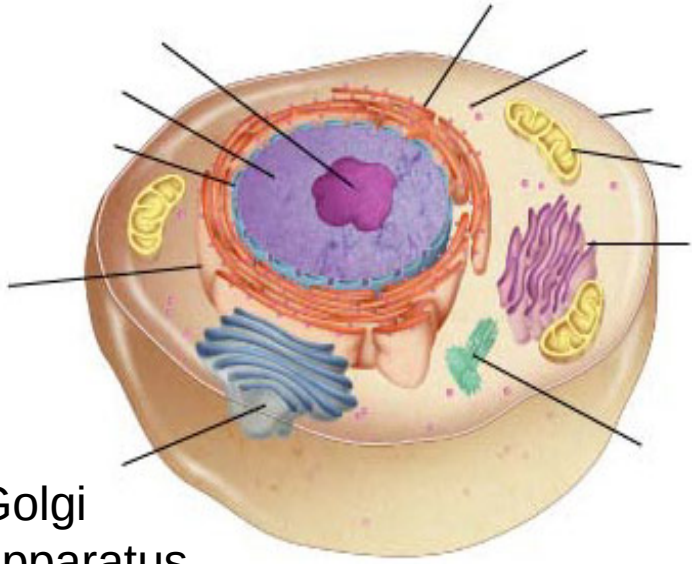
- Membrane system in cell (conveyor belt)
- Eukaryotic cells (plant and animal)
- Rough Endoplasmic Reticulum (rough ER)
  - where proteins are modified
  - Ribosomes are attached
- Smooth ER
  - Makes lipids for cell membranes



Golgi Apparatus

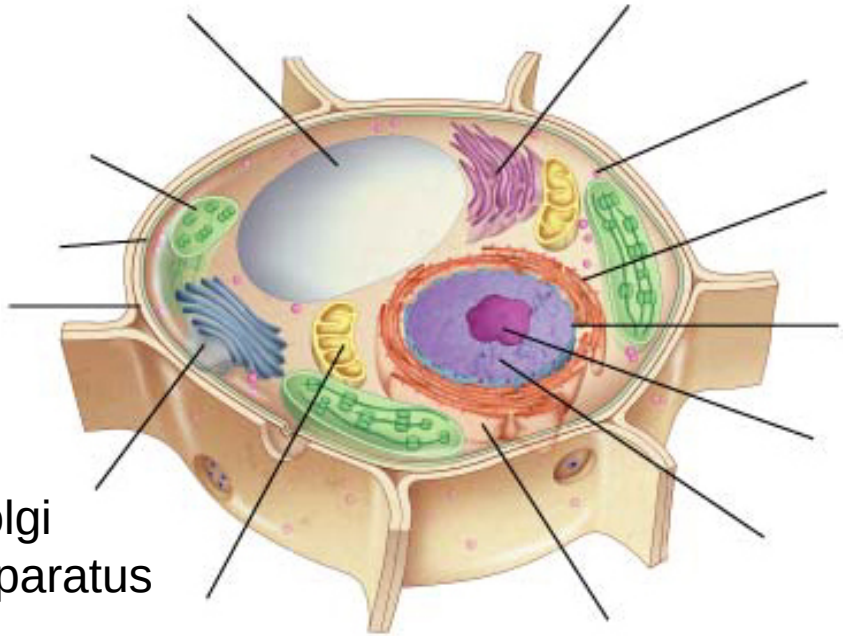
- Stack of membranes
- Attach carbohydrates and lipids to proteins
- Sends proteins to other cells
- Final touches and Shipping center

Animal Cell



Golgi apparatus

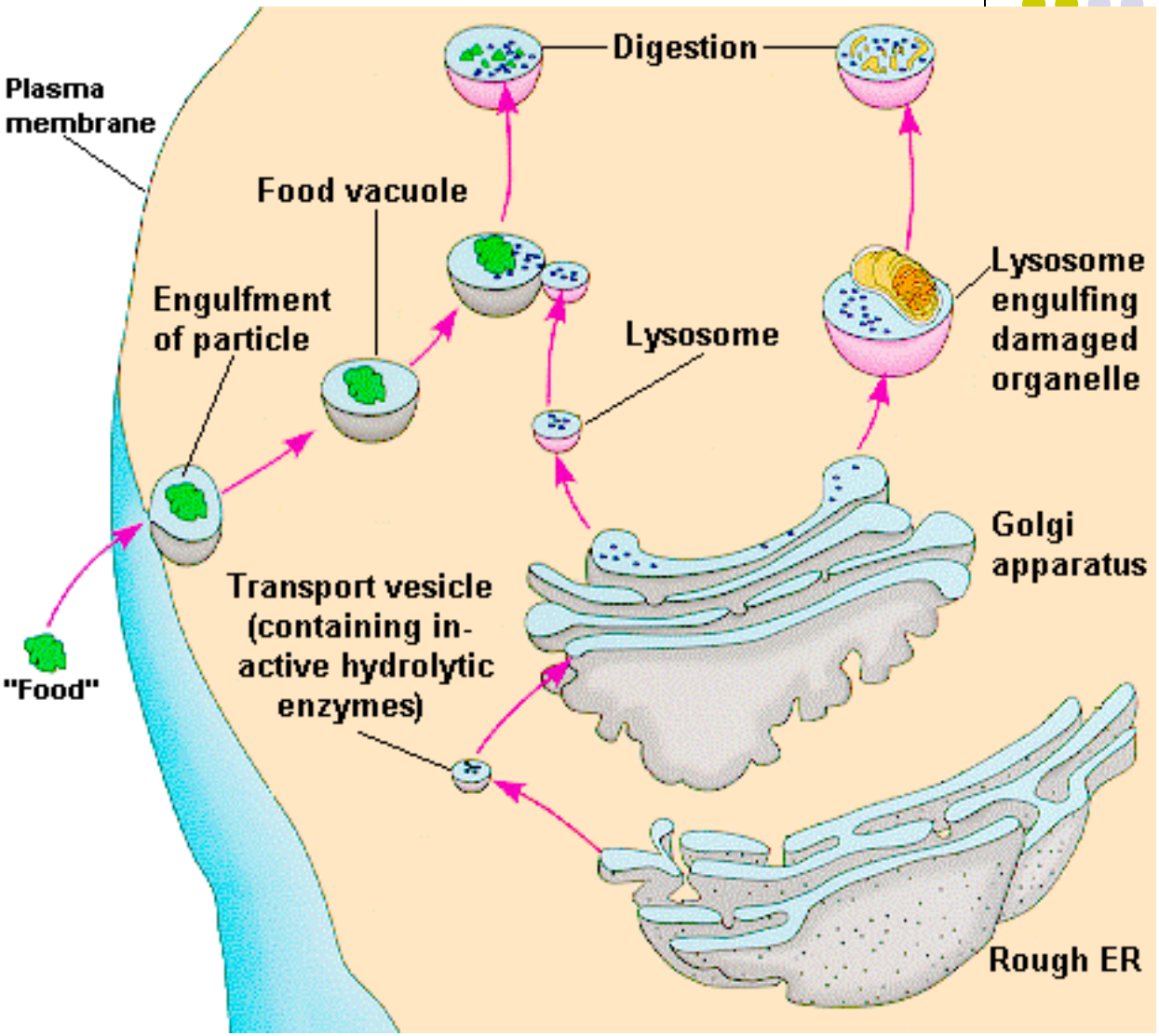
Plant Cell



Golgi apparatus

Lysosomes

- Filled with enzymes and acids
- Break down food particles
- Break down old organelles
- Custodians of the cell

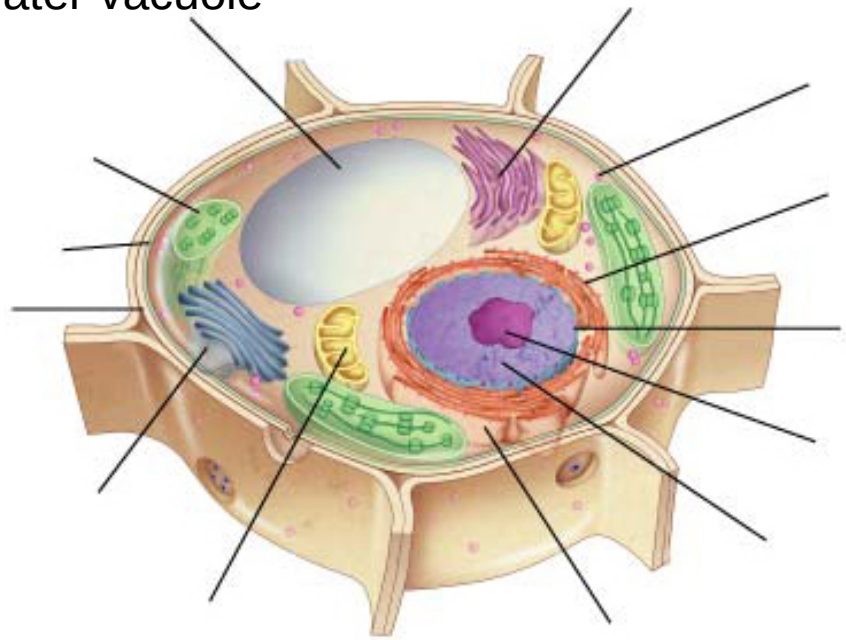


Vacuoles

- Storage compartments
- Store salts, proteins, water, carbohydrates
- Large water vacuole in plant cells
  - Turgor pressure gives plants support

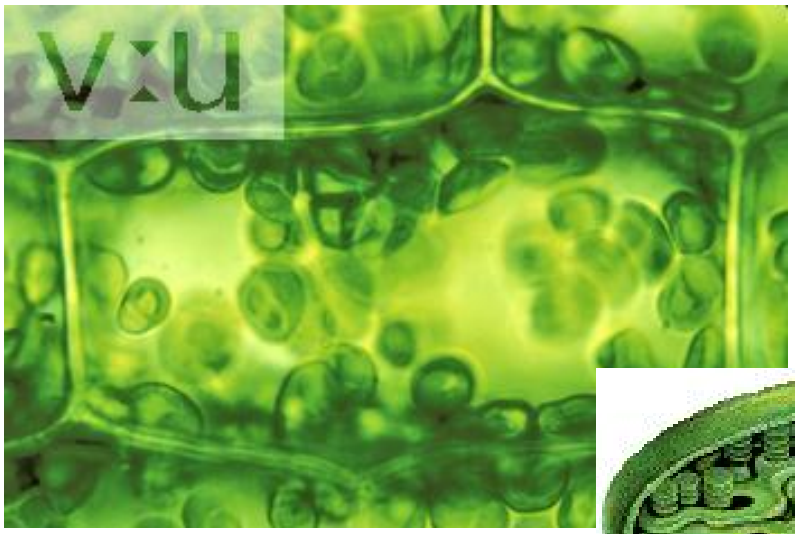
Plant Cell

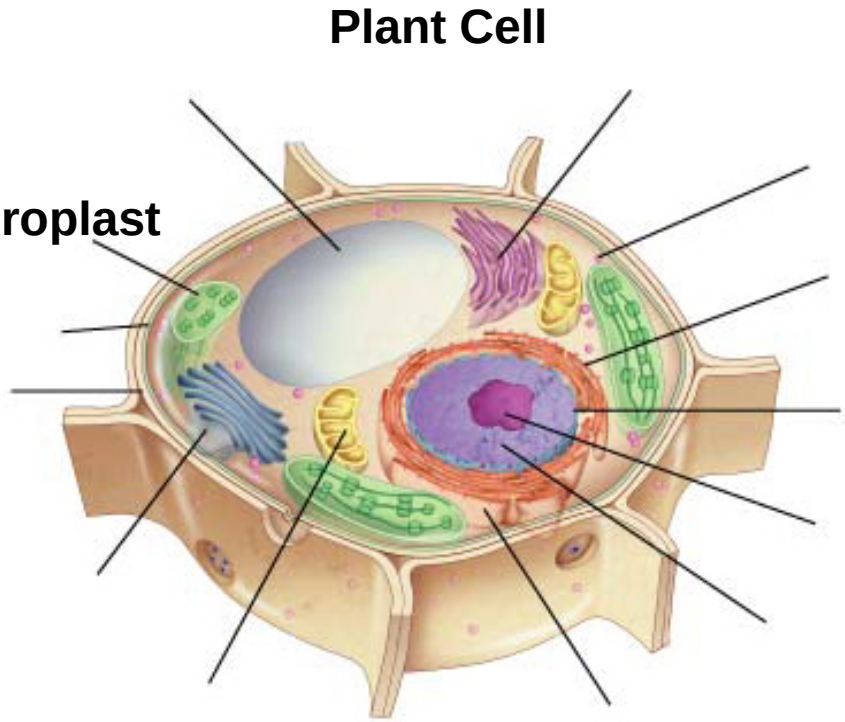
Water vacuole



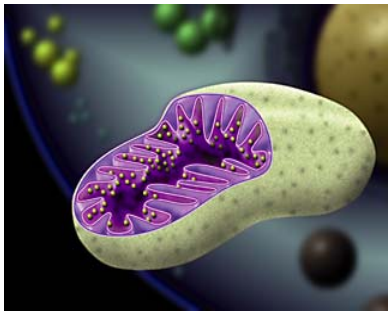
Chloroplasts

- Contains green pigment chlorophyll
- Photosynthesis – uses energy from the sun to make carbohydrates
- Highly folded membranes
- Contain their own DNA



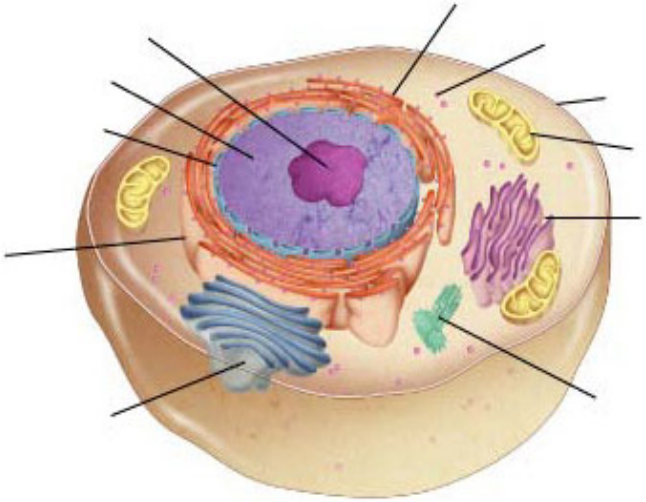


Mitochondria



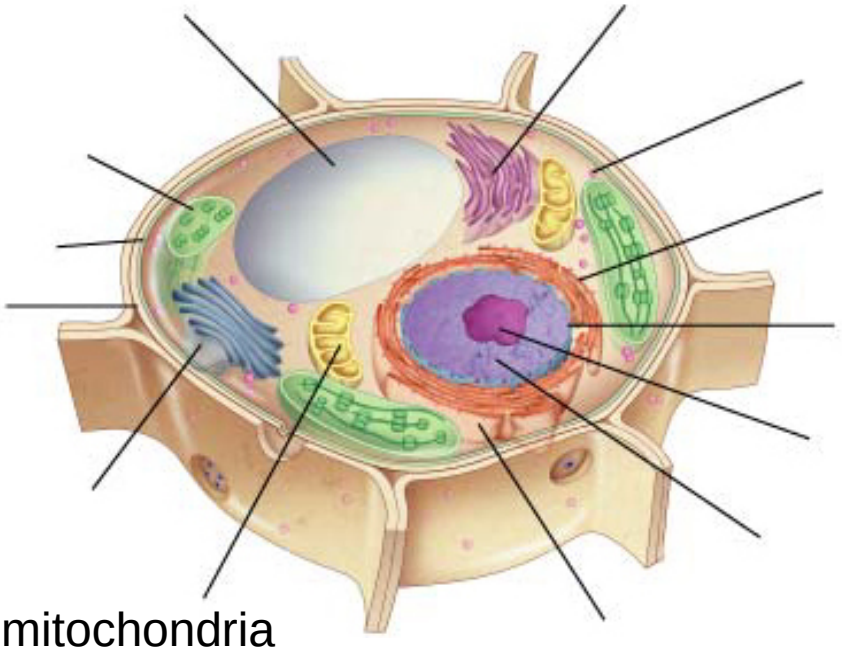
- Burn carbohydrates to make energy (ATP)
- Highly folded membrane
- Contain their own DNA

Animal Cell

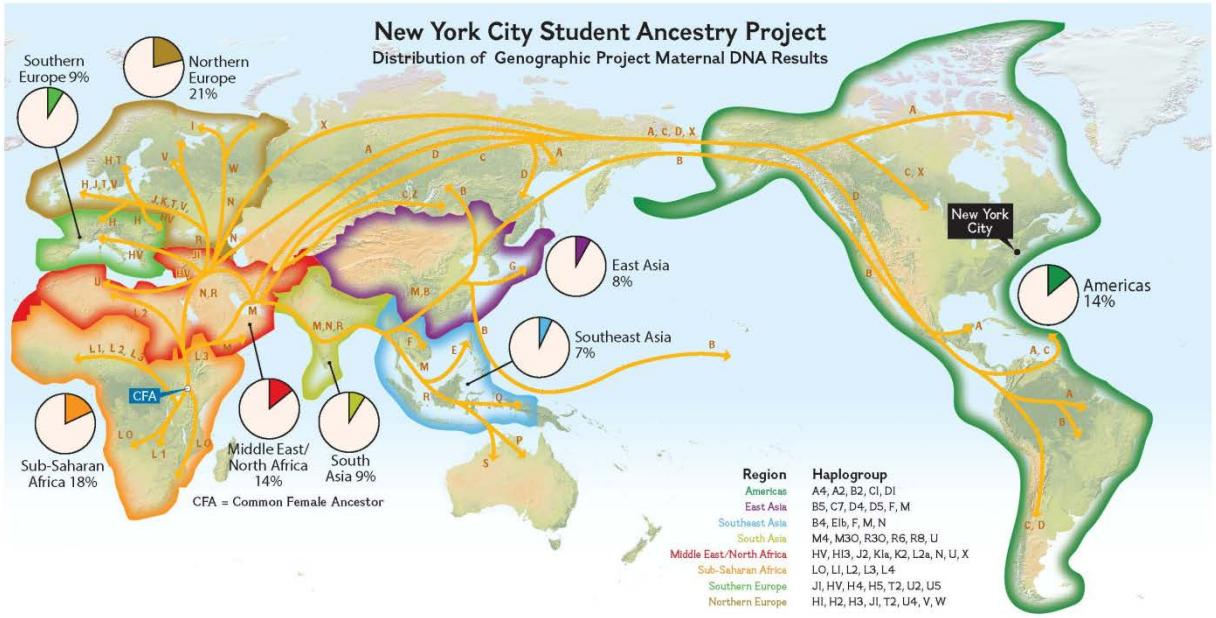


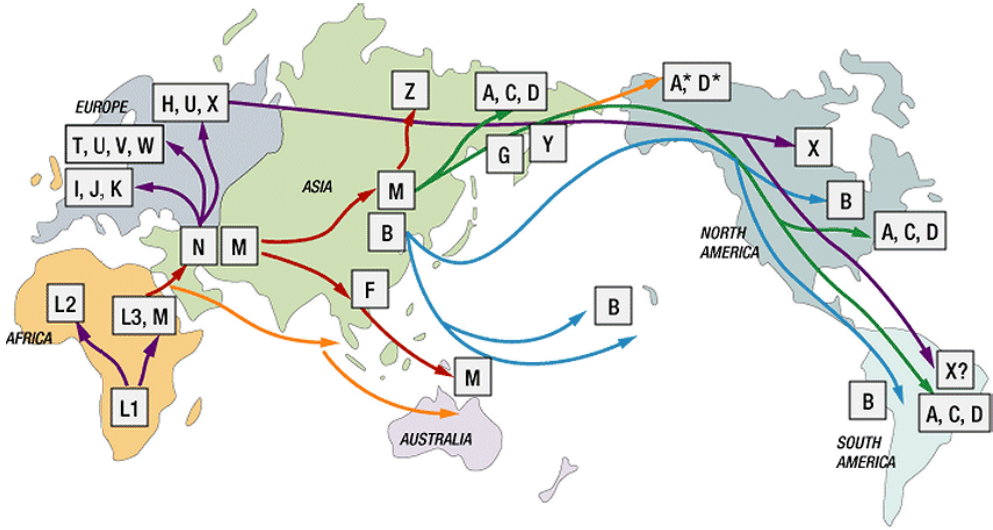
mitochondria

Plant Cell



mitochondria





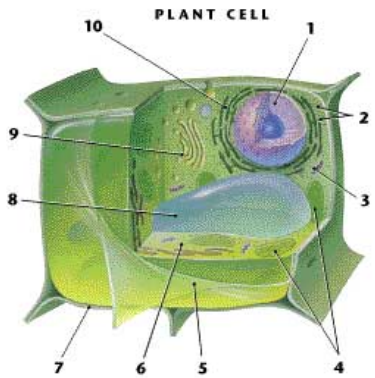
EXPANSION TIMES *(years ago)*	
Africa	120,000 - 150,000
Out of Africa	55,000 - 75,000
Asia	40,000 - 70,000
Australia/PNG	40,000 - 60,000
Europe	35,000 - 50,000
Americas	15,000 - 35,000
Na-Dene/Esk/Aleuts	8,000 - 10,000

FamilyTreeDNA
mtDNA Migrations Map

Plant Cells vs Animal Cells

Plant cells

- Cell Wall for support and protection
- Cell membrane
- Chloroplasts for photosynthesis
- Large vacuoles



Animal Cells

- No cell wall
- Cell membrane
- No chloroplasts
- Small vacuoles