Cell Types

• **Prokaryotes**
  – before nucleus
  – no membrane-bound nucleus
  – only organelle present is the ribosome
  – all other reactions occur in the cytoplasm
  – not very efficient
  – Ex.: bacteria
Cell Types

- **Eukaryotes**
  - cells with a membrane-bound nucleus
  - division of labor is used
  - very efficient
  - Ex.: plants, animals, protists, fungi

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**eukaryotic cell organelles**

![Cell Organelles Diagram](image-url)
Cytoplasm

- ~ 70% H₂O and ~ 30% proteins, fats, carbohydrates, nucleic acids and ions
  - consistency of gelatin
  - exact composition varies and is constantly changing

Nucleus

(The purple sphere)
**Nucleus**

- Central control area separated from the rest of the cell by a plasma membrane (nuclear envelope) with pores
- Contains **chromatin** which is composed of **DNA** and protein (wound up)
- Chromatin contains the genetic code of life (genes)

**Nucleus**

- Chromatin condenses to make chromosomes
- DNA contains code for making proteins and other important molecules
- That code leaves nucleus on mRNA (Messenger RNA) through the pores.
nucleolus (pl. nucleoli)

• Location where ribosomes are synthesized and partially assembled before leaving the nucleus

Ribosomes (The little brown dots)
Ribosomes

- composed of RNA and protein
- site of protein synthesis (making proteins)
- some are free and the proteins are used in cytoplasmic reactions
- are the most common organelle in a cell
- can be up to 15,000 in a prokaryotic cell, more in eukaryotic cells

endoplasmic reticulum (ER)

- Transport and processing area
- Network of interconnected flattened or tube-like structures
- Where lipid components of the cell membrane are assembled
- Where proteins and other materials are exported from the cell
Rough ER

- ER where ribosomes are connected

- Proteins made by ribosomes on rough ER enter the ER and are transported to other parts of the cell

Smooth ER

- ER without attached ribosomes
- May have enzymes present to break down harmful substances
  - ex.: liver → alcohol
- may have enzymes present to manufacture substances
  - ex.: phospholipids
- Sometimes connected to the rough ER, then it may aid in transport
Smooth ER

Rough ER

golgi apparatus

(The pink stuff)
golgi apparatus

- Flattened, slightly curved sacs located close to the ER
- Modify, sorts, packages and ships proteins and other materials from the ER for storage in the cell or secretion outside the cell.

lysosomes (mainly animal cells)
lysosomes (mainly animal cells)

- Vesicles formed by the golgi bodies
- Contain digestive enzymes that break down materials
- Also used in recycling of old/worn cell parts
- May be connected with the aging process
- More lysosomes in older people (break open & digest the cell?)

Vacuoles
Vacuoles

- Plant cells have one large vacuole
- Storage areas
- Fluid-filled, membrane structures that store food, H₂O, and minerals
- Many unicellular freshwater protists have **contractile vacuoles** to remove excess H₂O

Mitochondrion
(pl. mitochondria)

(The orange foldy things)
**Mitochondrion**
(pl. mitochondria)

- Powerhouse of the cell
- Where aerobic respiration occurs
- Sugar molecules are broken down in the presence of oxygen to release energy
- Convert energy stored in food to usable form
- Vary in number, size and shape
- Composed of a double membrane
- Passed on from mother

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**Chloroplasts (some plant & algae cells)**

(These capsules with green things inside)
**Chloroplasts (some plant & algae cells)**

- Contain chlorophyll and other pigments used in photosynthesis
- Has a double membrane surrounding it
- Filled with liquid and numerous internal membranes used to trap light and produce simple sugars

**cytoskeleton**

- Composed of long, thin protein structures that support the cell
- Located in the cytoplasm
- Also involved in movement
microfilament

- Composed of **actin** (protein) fibers
- Used for support of the cell
- Can be used in the movement of the cell

**Microfilament Structures**
**microtubule**

- Usually longer & thicker than microfilaments
- Help some organelles move about the cell
  ex.: vesicles & mitochondria
- Also may serve as components of other organelles

**centrioles (animals)**

(yellow barrel-shaped thing)
centrioles (animals)

- Are in pairs & important in cell reproduction
- Located near the nucleus
- Microtubules are arranged to form cylinders

cilia and flagella

- Cilia: Hair-like organelles that extend from the surface of a cell
- Used to assist the cell in movement
- Flagella are usually longer and fewer in number than cilia