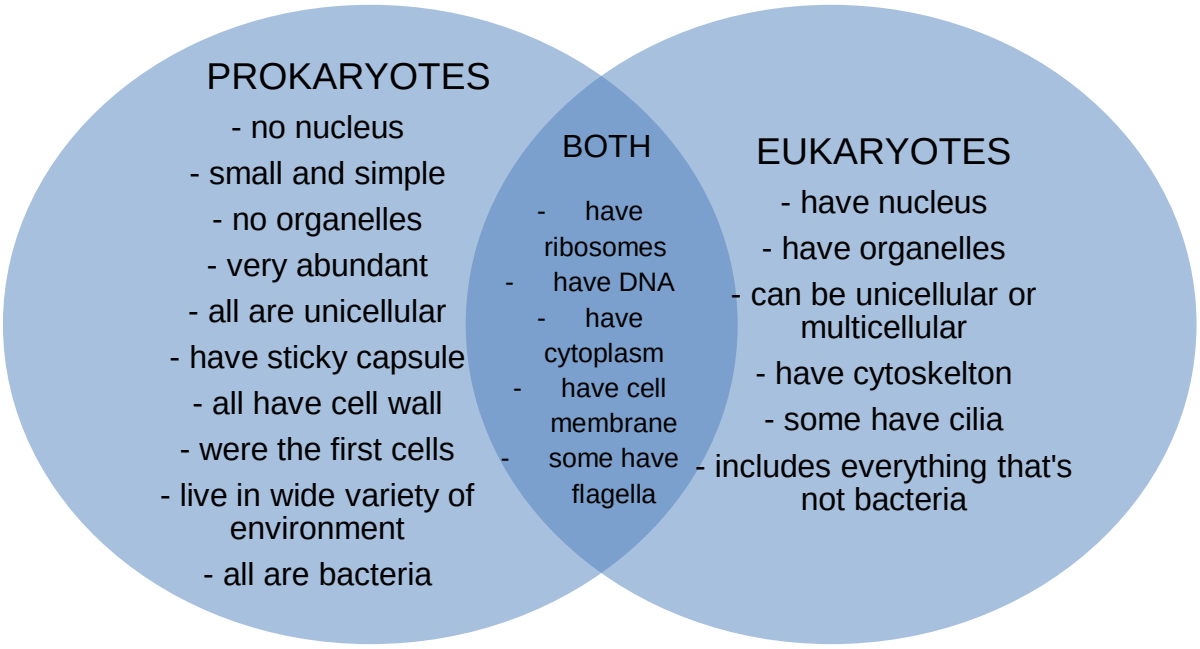
CYTOLOGY – study of cells

TYPES OF CELL

CELL THEORY

1. All living things are made up of cell.
2. Cells are the basic unit of structure and function in an organism.
3. Cells come from the reproduction of existing cells (cell division).



*PRO*KARYOTIC → nucleus
↓
no

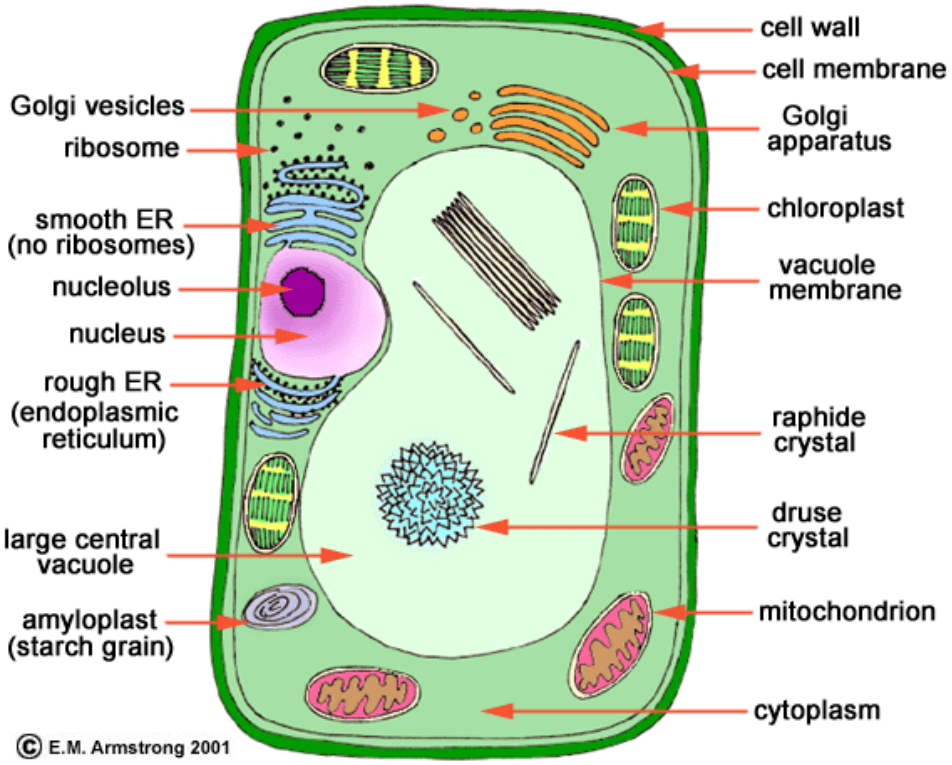
- wide variety of environment → moist, bodies of water

*EU*KARYOTIC → nucleus
↓
true

- cytoskeleton → inside the cytoplasm
- cilia → hair-like projection

BOTH

- ribosomes → protein synthesis
- DNA → genetic material
- flagella → tail


cell wall
cell membrane
Golgi vesicles
Golgi apparatus
ribosome
chloroplast
smooth ER (no ribosomes)
vacuole membrane
nucleolus
nucleus
rough ER (endoplasmic reticulum)
raphide crystal
druse crystal
large central vacuole
mitochondrion
amyloplast (starch grain)
cytoplasm
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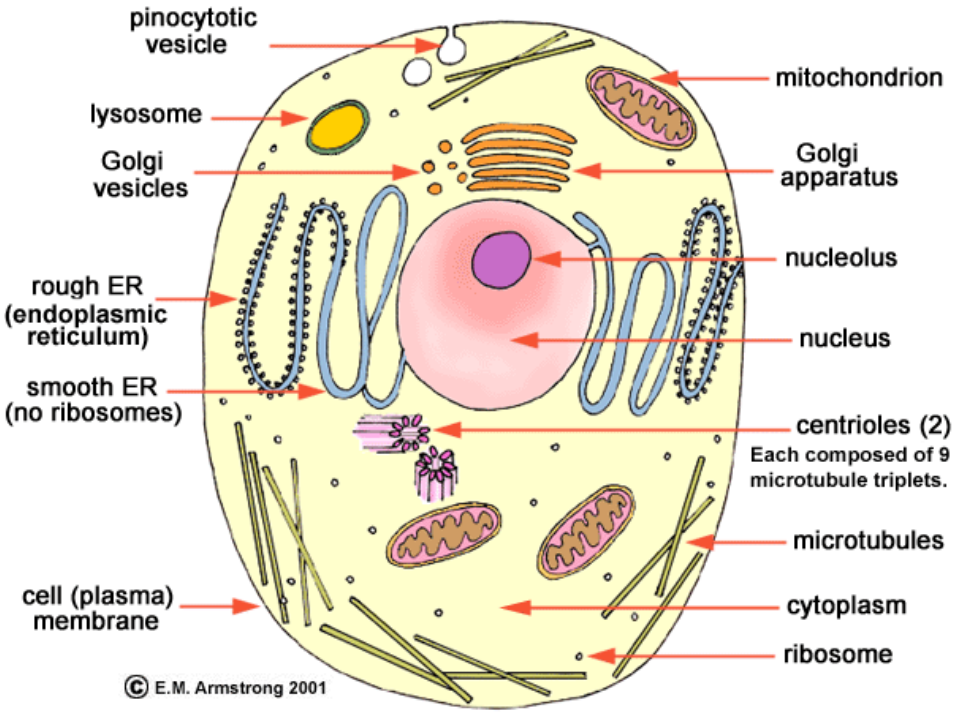
pinocytotic vesicle
mitochondrion
lysosome
Golgi vesicles
Golgi apparatus
nucleolus
rough ER (endoplasmic reticulum)
nucleus
smooth ER (no ribosomes)
centrioles (2)
Each composed of 9 microtubule triplets.
microtubules
cell (plasma) membrane
cytoplasm
ribosome
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THE ORGANELLES OF THE CELL

- ORGANELLES – very small; microscopic
    - performs various functions for a cell
- CELL MEMBRANE – composed of double layer of phospholipids and proteins
    - surrounds outside of the cell; controls what enters and leaves the cell
- PHOSPHOLIPIDS – *head*: glycerol and phosphate ; hydrophilic (attracts water)
    - *tail*: fatty acids ; hydrophobic (repel water)
    - make up a bilayer where tails point inward towards each other
- PROTEIN – help move large molecule or aid in cell recognition
    - *peripheral protein*: attached on the surface
    - *integral protein*: embedded completely through the membrane
- CELL WALL (plant cell) – outside the cell membrane
    - supports and protects cell
- CYTOSOL – fluid present in cell membrane
- CYTOPLASM – cell component present inside the cell membrane; region
- NUCLEUS – controls cell's activities
    - contains the DNA chromosomes
- CYTOSKELETON – helps cell maintain shape
    - *microfilaments*: threadlike, made of actin
    - *microtubules*: tubelike, made of tubulin
- CENTRIOLES – paired structure near the nucleus
    - made up of bundle of microtubules
    - appear during cell division forming mitotic spindle; helps to pull chromosome pairs apart to opposite ends of the cell
- MITOCHONDRION – powerhouse
    - generate cellular energy
    - site of cellular respiration
    - folded inner membrane → cristae – increases surface area for more chemical reaction
- ENDOPLASMIC RETICULUM

SMOOTH ENDOPLASMIC RETICULUM	ROUGH ENDOPLASMIC RETICULUM
does not bear ribosomes over the surface of its membrane	possess ribosomes attached to its membrane
main function: synthesis of lipids	main function: synthesis of proteins
formed of vesicles and tubules	formed of cisternae and few tubules
usually found in periphery	found deep inside the cytoplasm
may develop from RER	may develop from nuclear envelope

- RIBOSOME – proteins and rRNA
    - protein factories
    - join amino acids to make protein through protein synthesis

- VACUOLE – fluid filled sacs for storage
- CHLOROPLASTS – surrounded by <u>double membrane</u>
  → outer: smooth – inner: modified into sacs called thylakoids
  - ✓ Grana → thylakoids in stacks; interconnected
  - ✓ Stroma → gel-like material surrounding thylakoids
- CILIA and FLAGELLA – function in moving cells, moving fluids or in small particles across the cell surface
  - ✓ CILIA – shorter and more numerous
  - ✓ FLAGELLA – longer and fewer (1-3)