TCE Techniques Of Communication and Expression

University of Jijel
1st year Biology

1. Types of communication
2. Scientific Terminology
3.Text analysis and comprehension
4. Study of proposed texts (observe, analyze, take stock, expression written)
5.Techniques of written and oral expression: Report writing, synthesis, and use of modern communication media

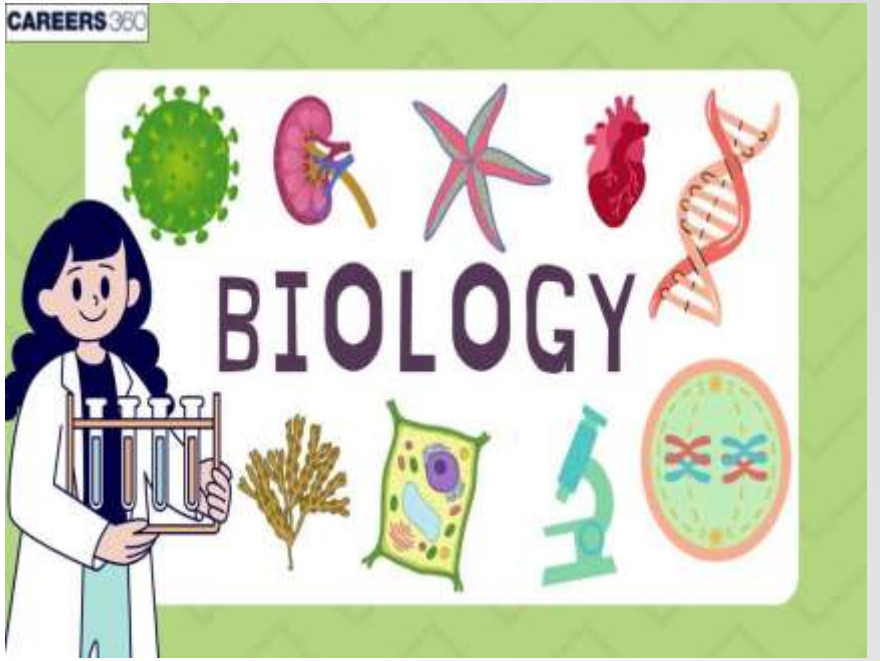
Done by Dr. Aliouche N

Chapter II. Scientific Terminology

What is biology???

Bios = Life

Logos = Study of

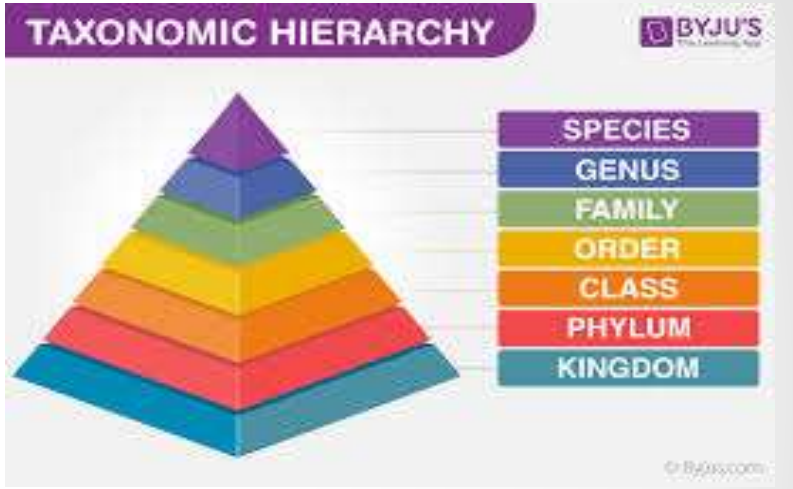


Biology is the study of living organsims

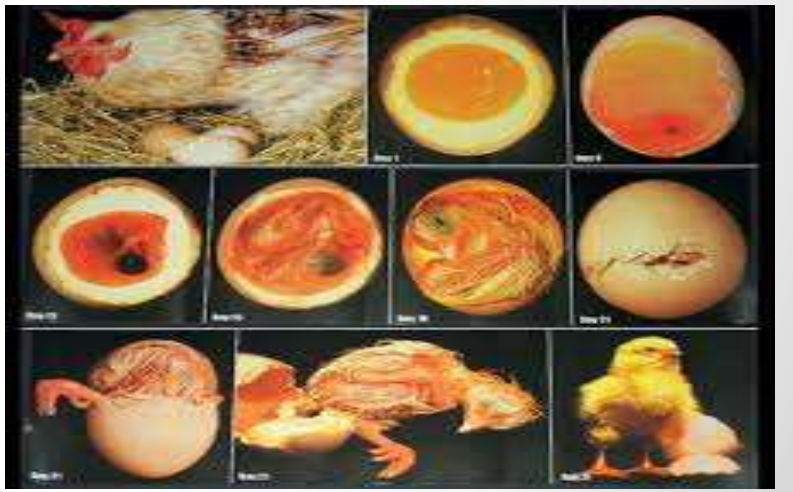
- Animals
- Plants
- Microorganisms

Field of study in biology

Taxonomy : Branch of biology in which we study about classification and naming of living organisms.



Embryology: Study of embryo (unborn baby under the process of developpment).



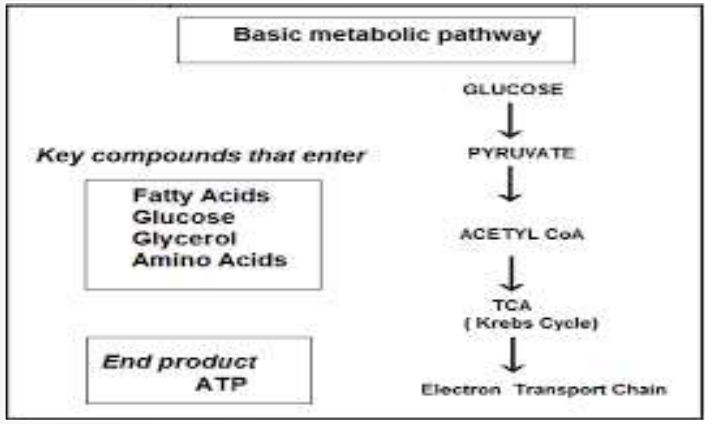
Genetics : Study of transmission of characteristics from parents to offspring

Physiology: Study of functions

Anatomy: Study of internal structure

Morphology: Study of form, shape and structure of any part of organisms

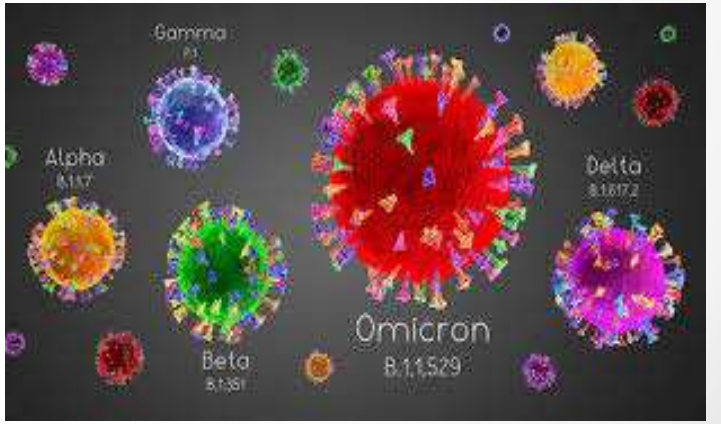
Biochimestry: Study of biochemical process in the body



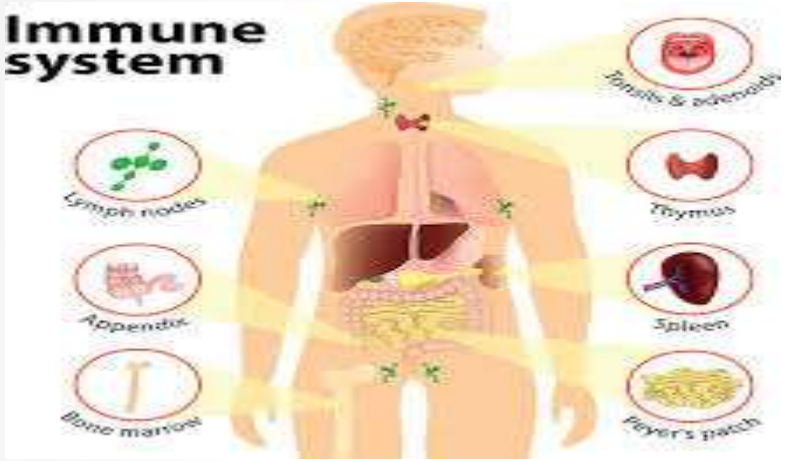
Mycology: Study of fungus

Bacteriology: Study of bacteria

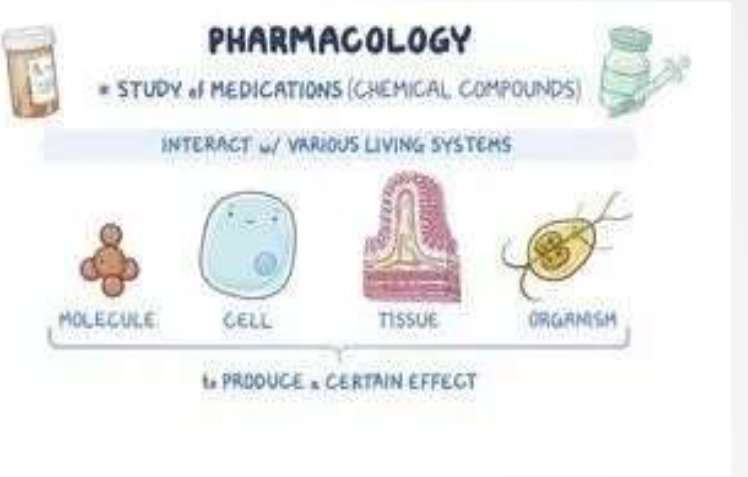
Virology: Study of viruses



Immunology: Study of immune system



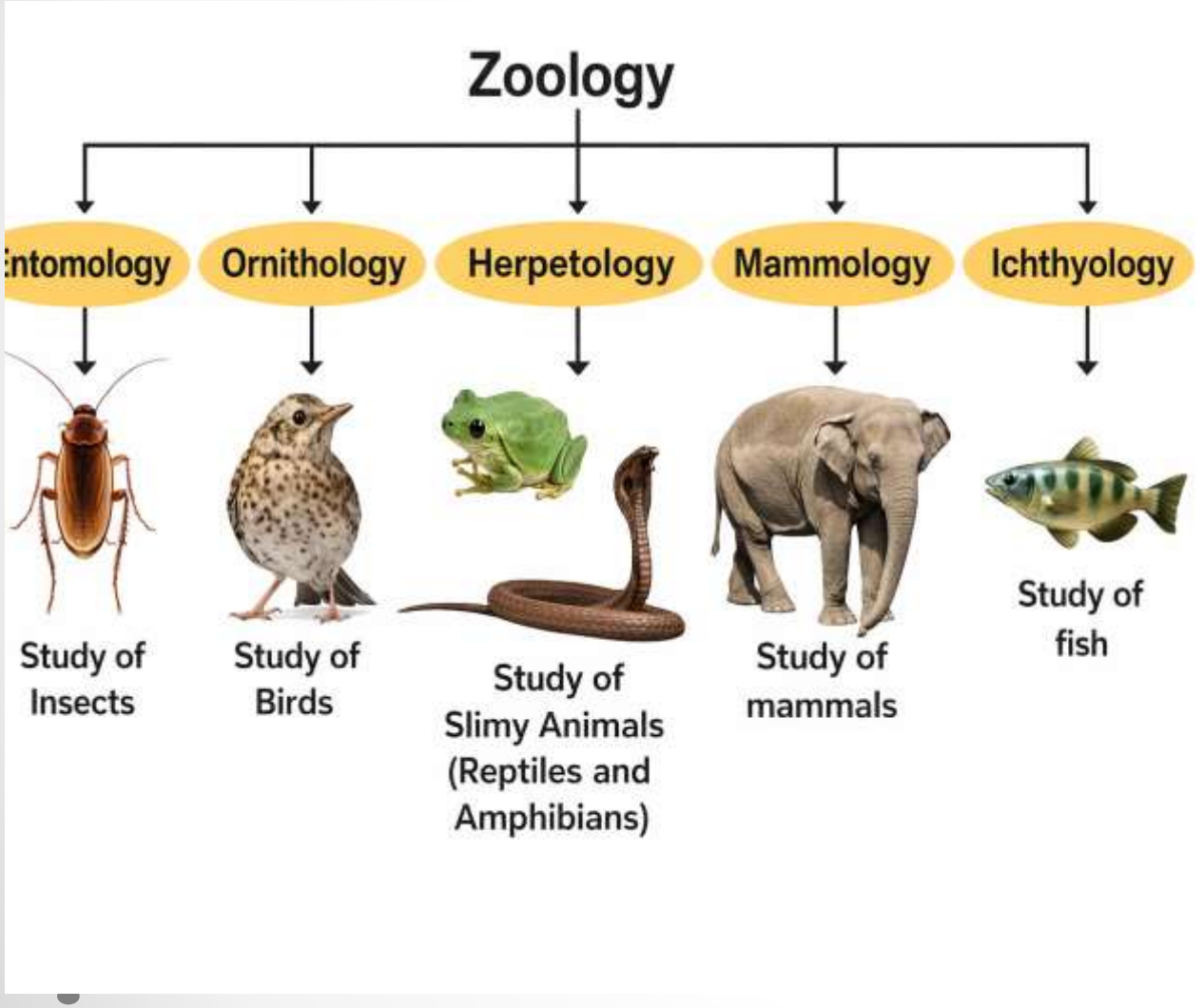
Pharmacology: Study of drugs (defense system)



Botany: Study of plants

Paleontology: Study of fossils of past organisms (Paleozoology & paleobotany)

Zoology: Study of animals

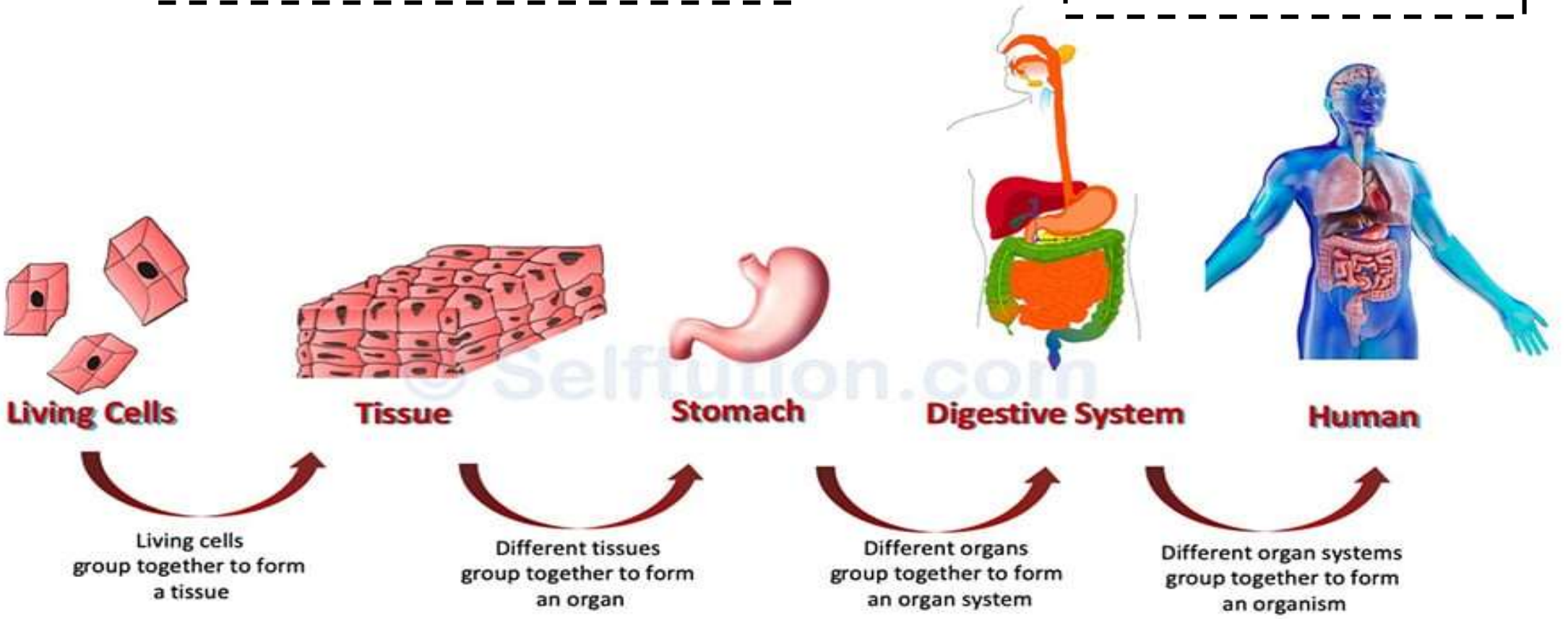


Biotechnology: Using of living organisms for benefits

Cell biology: study of cells, also called, cytology

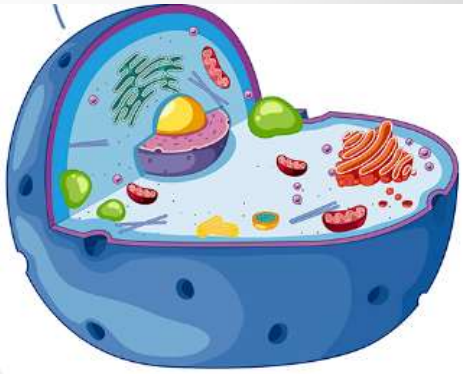
Cyto : Cell
Histo: Tissue
Osteo: Bone
Dermato: Skin
Cardio: heart

Levels of organization



Cell biology or cytology is a branch of biology that deals with studies related to the structure and function of a cell-based on the concept that the cell is the fundamental unit of life.

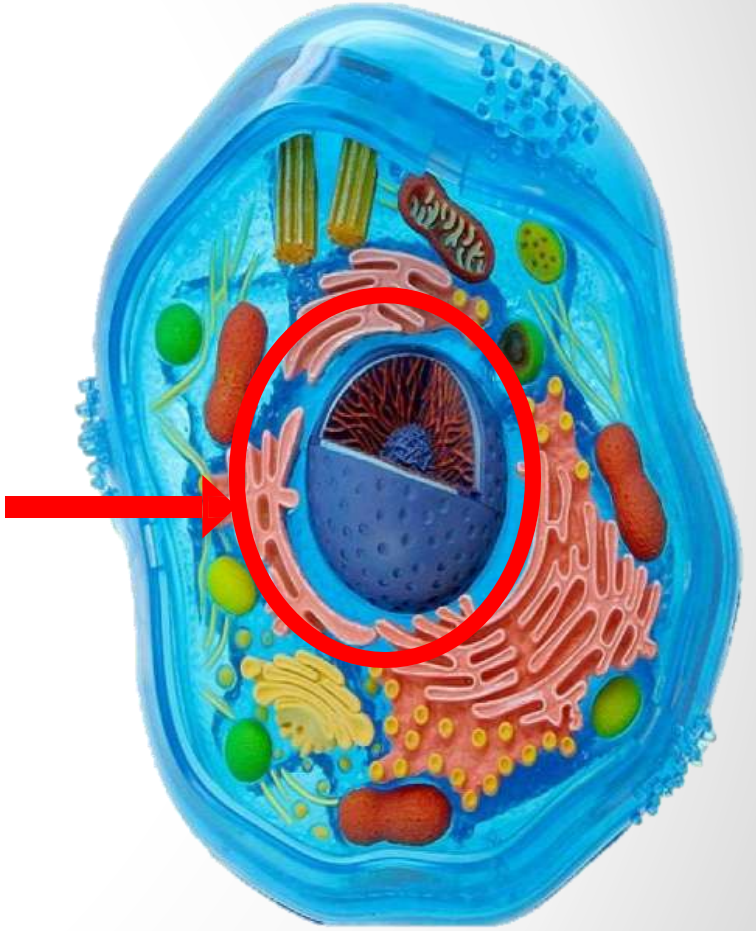
- ✓ All living organisms are made up of cells
- ✓ The cell is the structural and functional unit of all living things.
- ✓ All cells come from pre-existing cells through division.
- ✓ All cells carry genetic information, which is passed from cell to cell during cell division.



What are the main organelles of plant and animal cells?

Nucleus

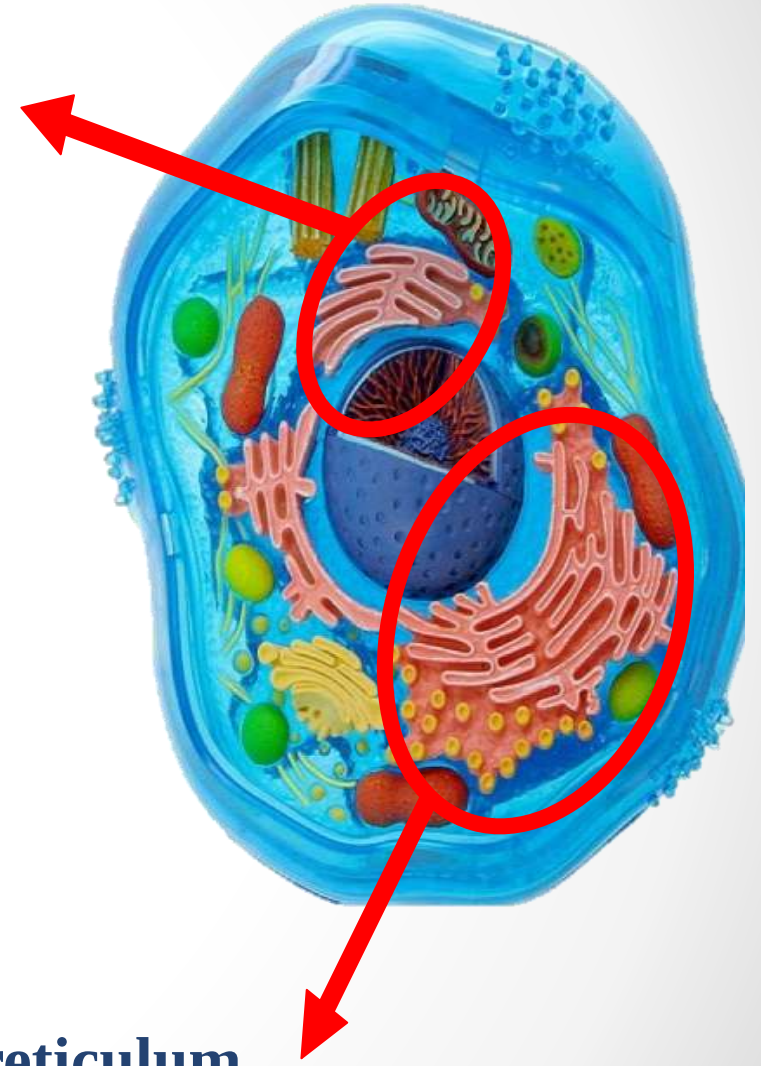
- The nucleus is the largest organelle in the cell.
- It acts as the control center, regulating all cellular activities.
- It is responsible for cell growth and metabolism.
- It contains and protects the genetic material (DNA).
- Each cell usually has one nucleus, while other organelles are present in multiple copies.



Endoplasmic reticulum (ER)

- It consists of an interconnected network of membrane-bound channels containing fluid.

- It functions as the cell's internal transport system, moving substances from one part of the cell to another



The smooth ER

- ✓ No ribosomes
- ✓ Produces lipids, cholesterol, hormones

The rough ER

- ✓ Contains ribosomes
- ✓ produce protein.
- ✓ Transport proteins to Golgi apparatus using vesicles

Golgi apparatus

- It receives proteins from the endoplasmic reticulum.
- Proteins are modified by the addition of lipids and carbohydrates.
- The modified proteins are sorted, stored, or packaged into vesicles for transport to different parts of the cell

Ribosome

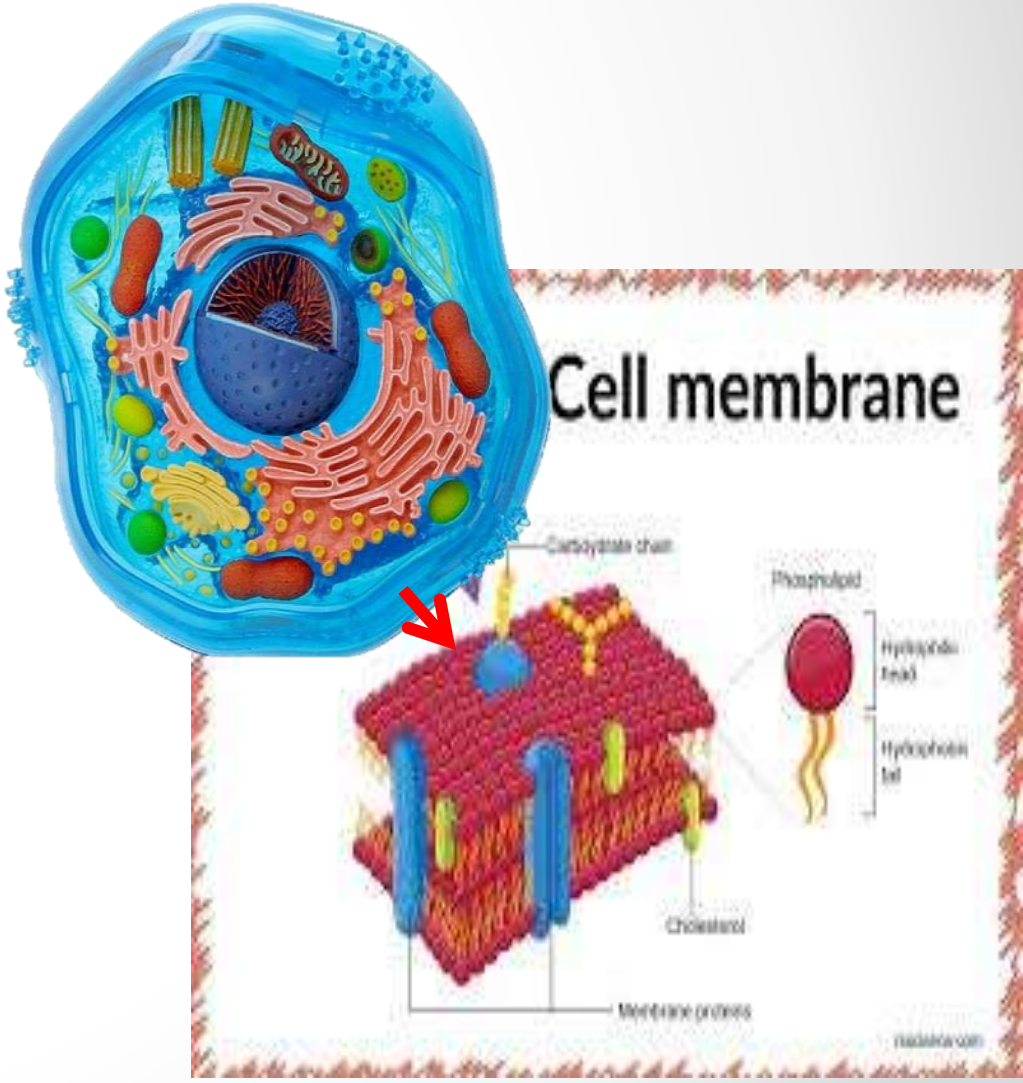
- A cellular structure that synthesizes proteins

- It makes proteins by translating mRNA
- Free ribosomes in the cytoplasm (make proteins for cytoplasm, nucleus, mitochondria).

- Bound ribosomes on the rough ER (make proteins for secretion or membranes).

Cell membrane

- Thin, flexible layer surrounding the cell.
- Regulates entry and exit of materials.
- Supports and protects the cell.



Mitochondria

- They contain their own DNA and RNA.
- They are the site of cellular respiration.
- They convert molecules like glucose into ATP (adenosine triphosphate), the cell's main energy source

Lysosomes

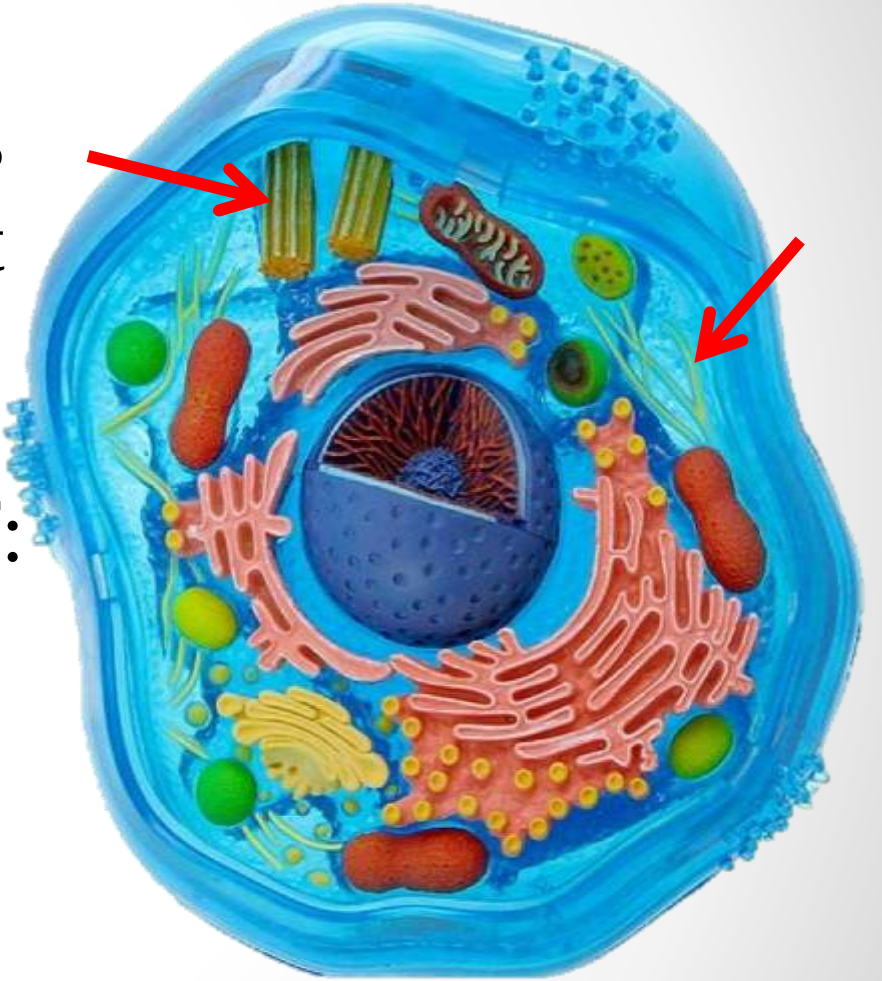
- Also known as “suicidal bags”
- Responsible for intracellular digestion
- Eliminate cellular waste
- Degrade dead, damaged, or worn-out cell components

Cytoskeleton

- System of fibers that not only maintains the structure of the cell but also permit it to change shape and move.

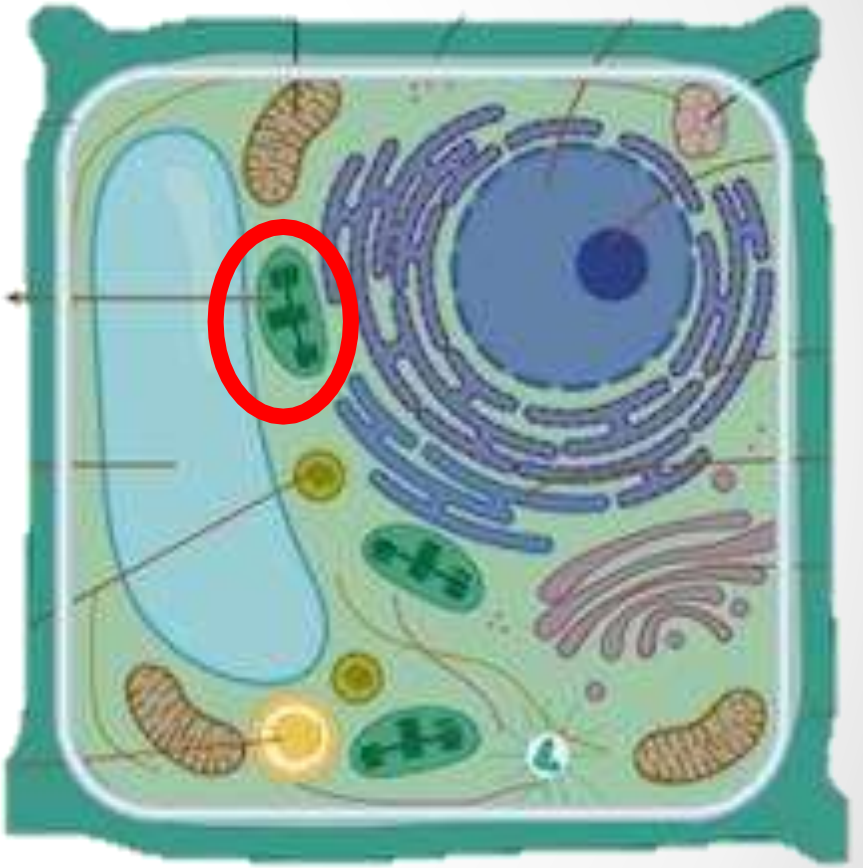
- The cytoskeleton is made up primarily of:

✓ Microtubules.
✓ Intermediate filaments.
✓ Microfilaments along with protein that anchor tie them together.



Chloroplast

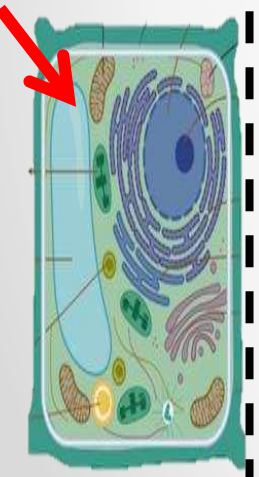
- Found in plant and green algae cells.
- Contains chlorophyll, the pigment that captures sunlight.
- Site of photosynthesis where glucose is produced.



vacuole

- A vacuole is a membrane-bound organelle filled with cell sap (water + dissolved substances). It plays important roles in storage, regulation, and cell stability.

Vacuole in plant cells



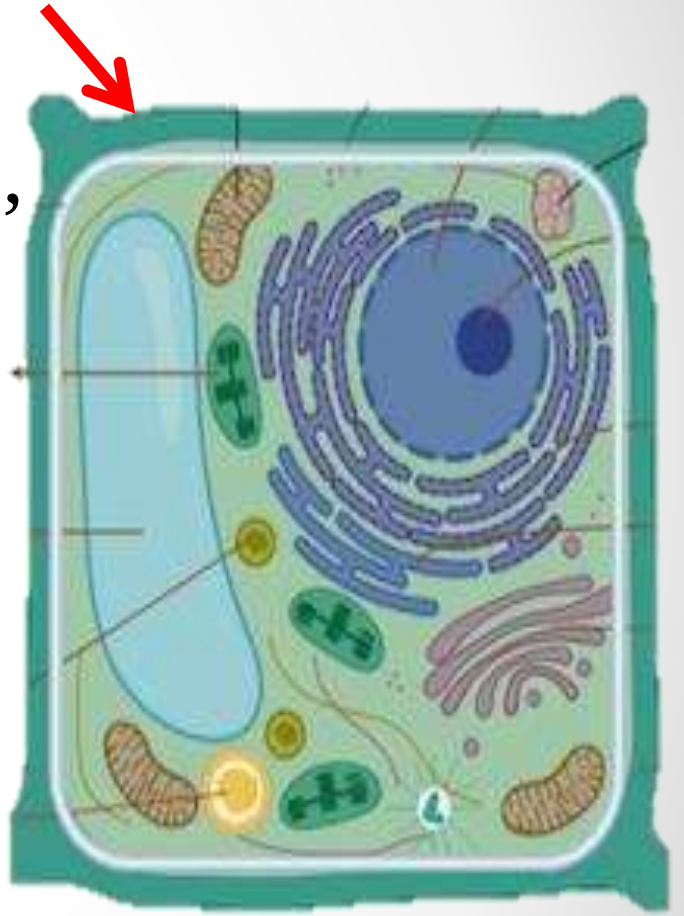
- Usually one large central vacuole.
- Occupies up to 80–90% of the cell volume.
- Surrounded by a membrane called the tonoplast.
- Stores water, nutrients, pigments, and waste.
- Maintains turgor pressure (keeps the plant cell rigid and supports the plant).

Vacuole in animal cells

- Small and usually temporary vacuoles.
- Used for storage and transport of substances.
- Not as large or important as in plant cells.

Cell wall

- Rigid outer layer surrounding the cell membrane
- It is present in plants, fungi, bacteria, and algae, but absent in animal cells.
- Mainly composed of cellulose
- Also contains hemicellulose and pectin
- May contain lignin in mature cells
- Provides shape and structural support
- Protects the cell
- Prevents bursting due to osmotic pressure
- Contains plasmodesmata for cell communication



Types of cells

Prokaryotic cells

Unicellular organisms with small and simple cells, typically measuring about 0.1–5 µm in diameter

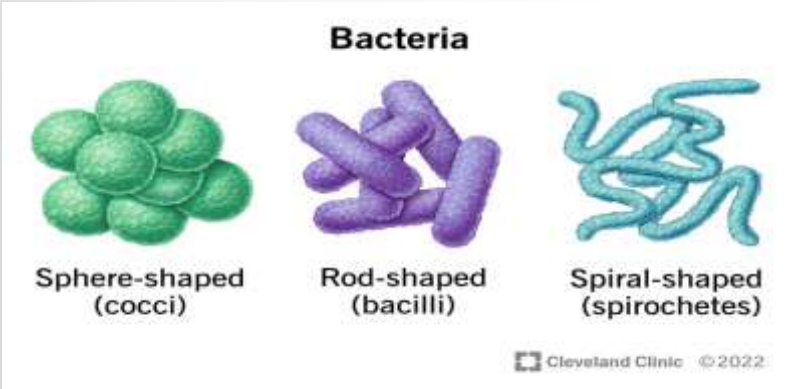
Eukaryotic cells

Eukaryotic cells are larger and more complex, usually measuring about 10–100 µm in diameter, and may be unicellular or multicellular.

Types of prokaryotic cells

Bacteria

Bacteria are simple, and they come in various shapes. Including spherical, filamentous, or spirally twisted form



Archea

- Archaeal cells also have diverse shapes, including spheres, rods, and spirals.
- Many of Archea are extermophiles, meaning that resiste in harsh enviromental conditions

Cyanobacteria

Cyanobacteria are aquatic and photosynthetic organisms

They live in the water, and can manufacture their own food.

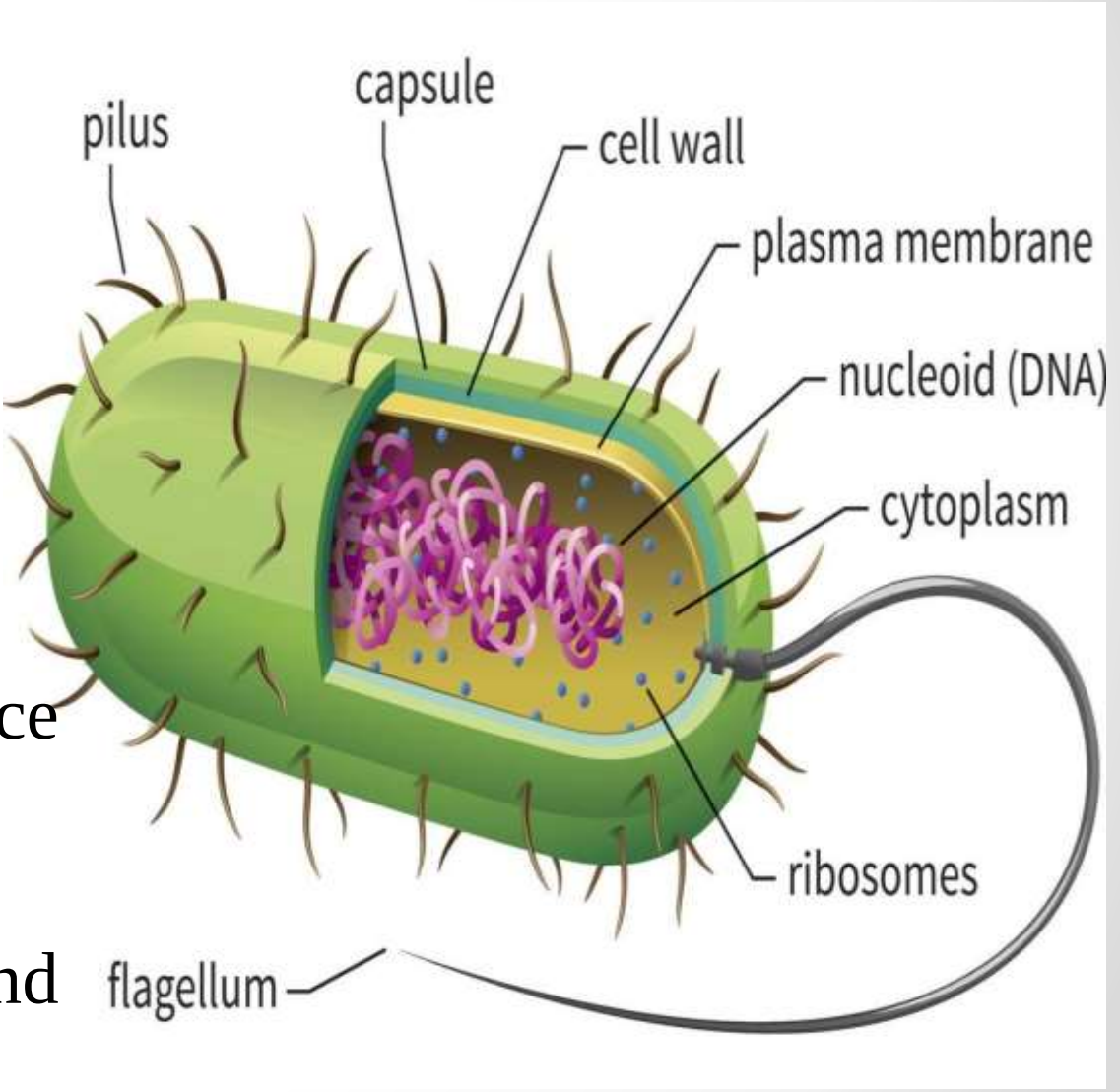
Prokaryotic cell structure

Cell wall:

- Provides shape and mechanical strength
- Protects against osmotic lysis
- The cell wall consists of peptidoglycan in bacteria, whereas in archaea it is made of pseudopeptidoglycan or S-layer proteins

Plasma membrane:

- Selective barrier controlling substance entry/exit
- Site of respiration and ATP production
- Contains enzymes for metabolism and nutrient transport

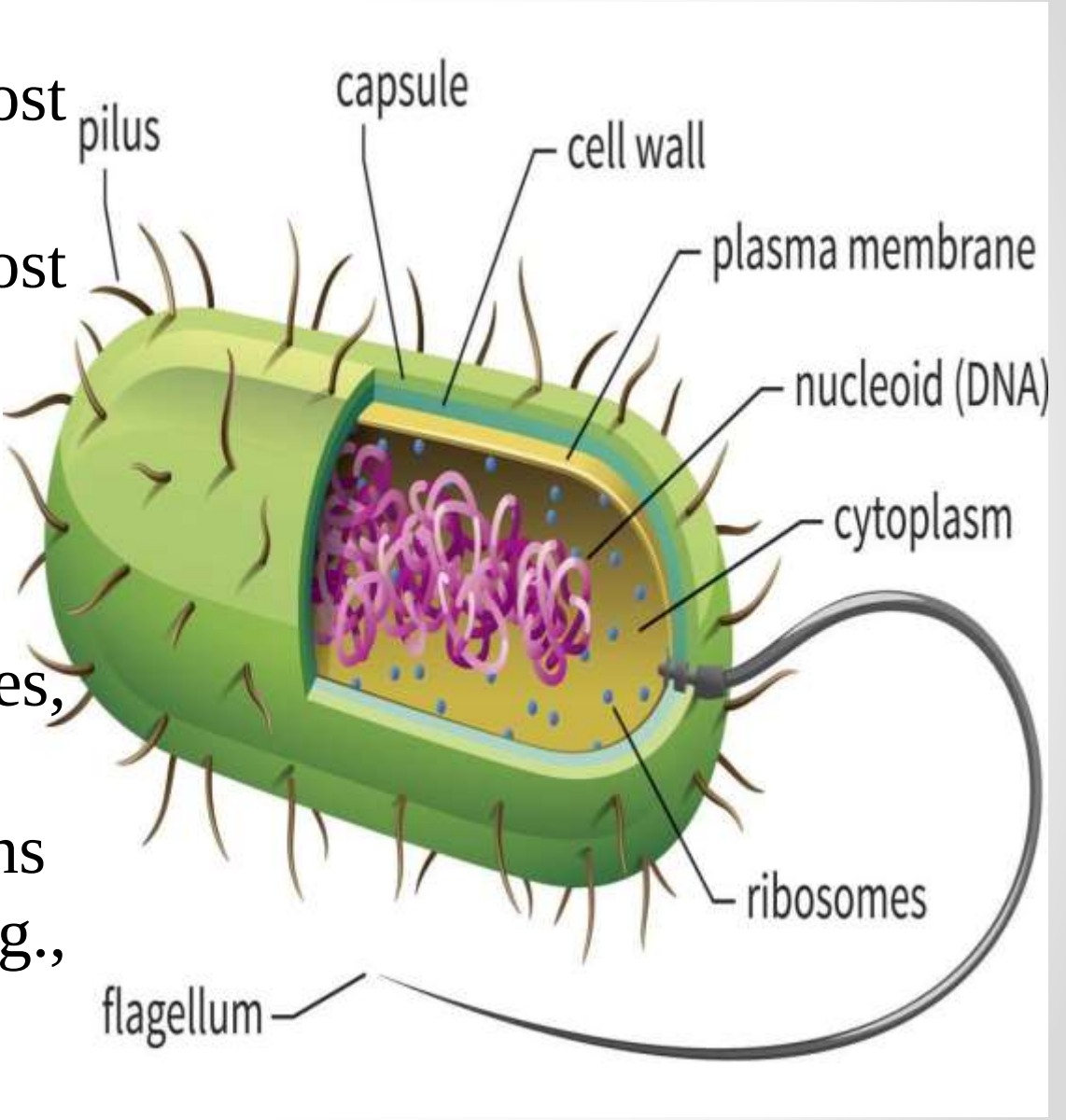


Capsule:

- Protects against desiccation and host immune defense
- Promotes adhesion to surfaces and host tissues
- Increases virulence of pathogenic bacteria

Cytoplasm:

- Gel-like matrix containing enzymes, metabolites, and ribosomes
- Site of metabolic and biochemical reactions
- Contains storage granules for nutrients (e.g., glycogen)

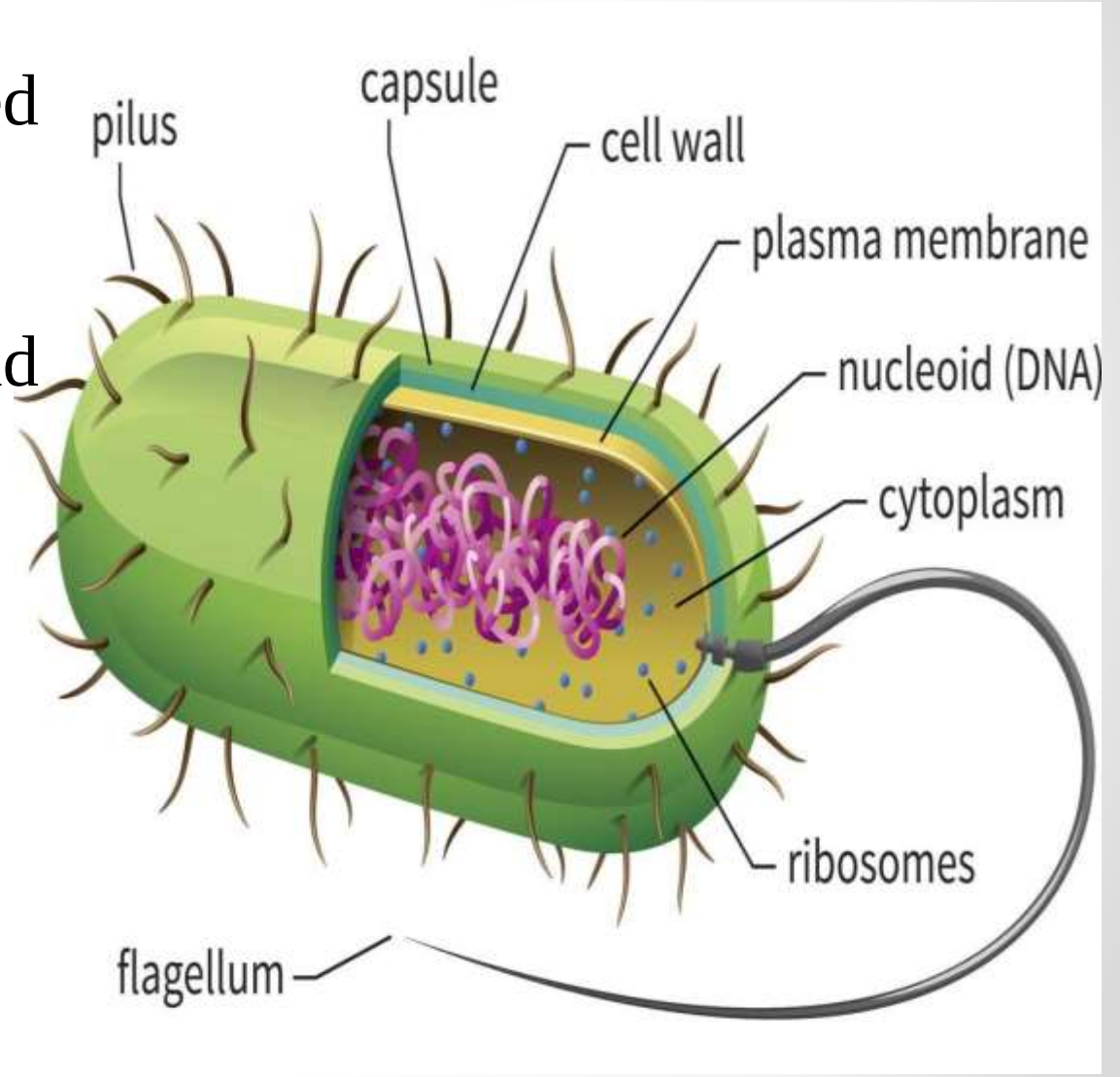


Nucleoid:

- Region with circular, double-stranded DNA
- Not membrane-bound
- Controls cellular functions and reproduction

Ribosomes:

- Site of protein synthesis
- Free in cytoplasm

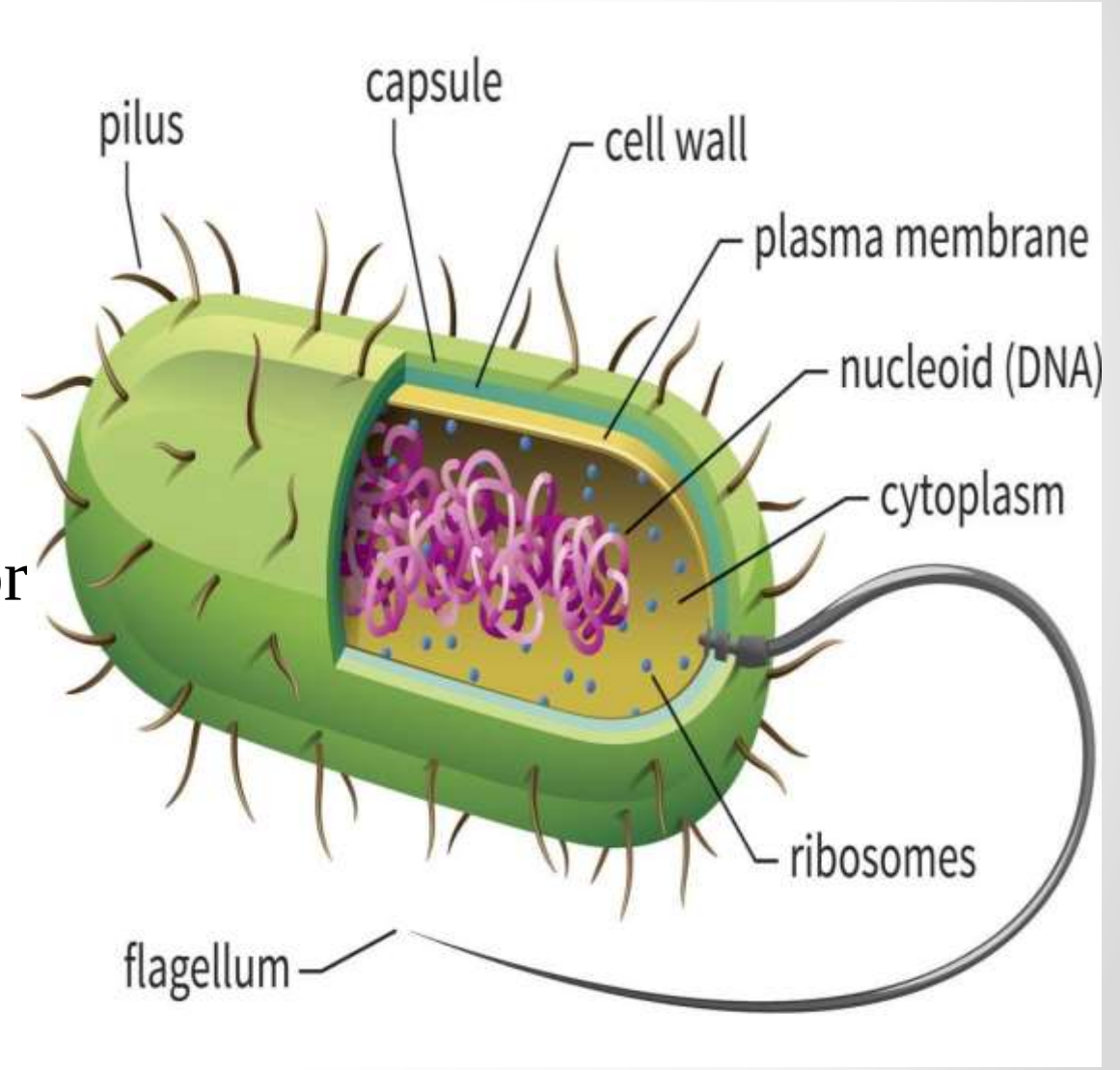


Pilus (pili/fimbriae):

- Short, hair-like projections
- Attachment to surfaces or host cells

Flagellum:

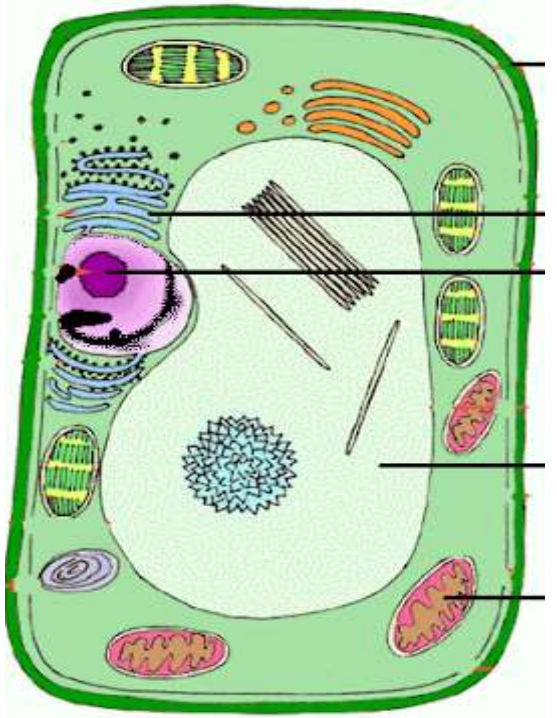
- Long, whip-like structure for motility
- Enables movement toward nutrients or away from toxins (chemotaxis)
- Helps bacteria colonize environments



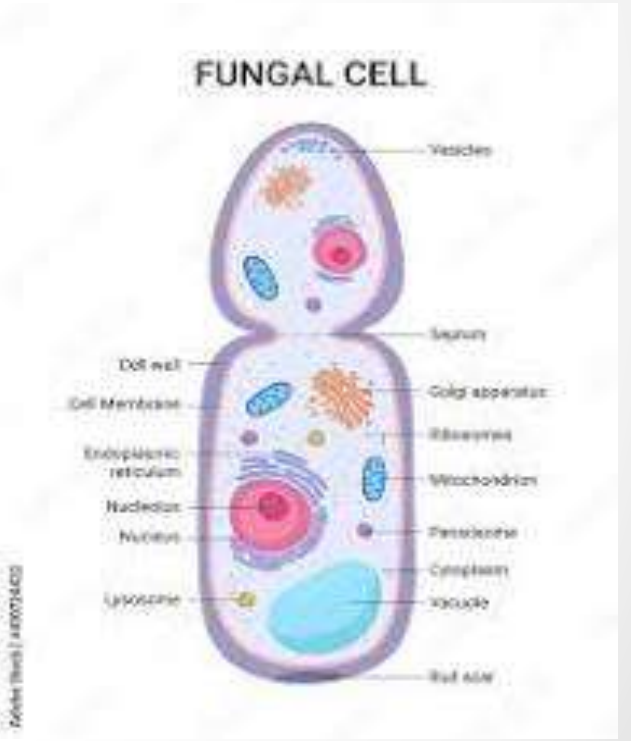
Types of Eukaryotic cells

Animal cells

Plant cells

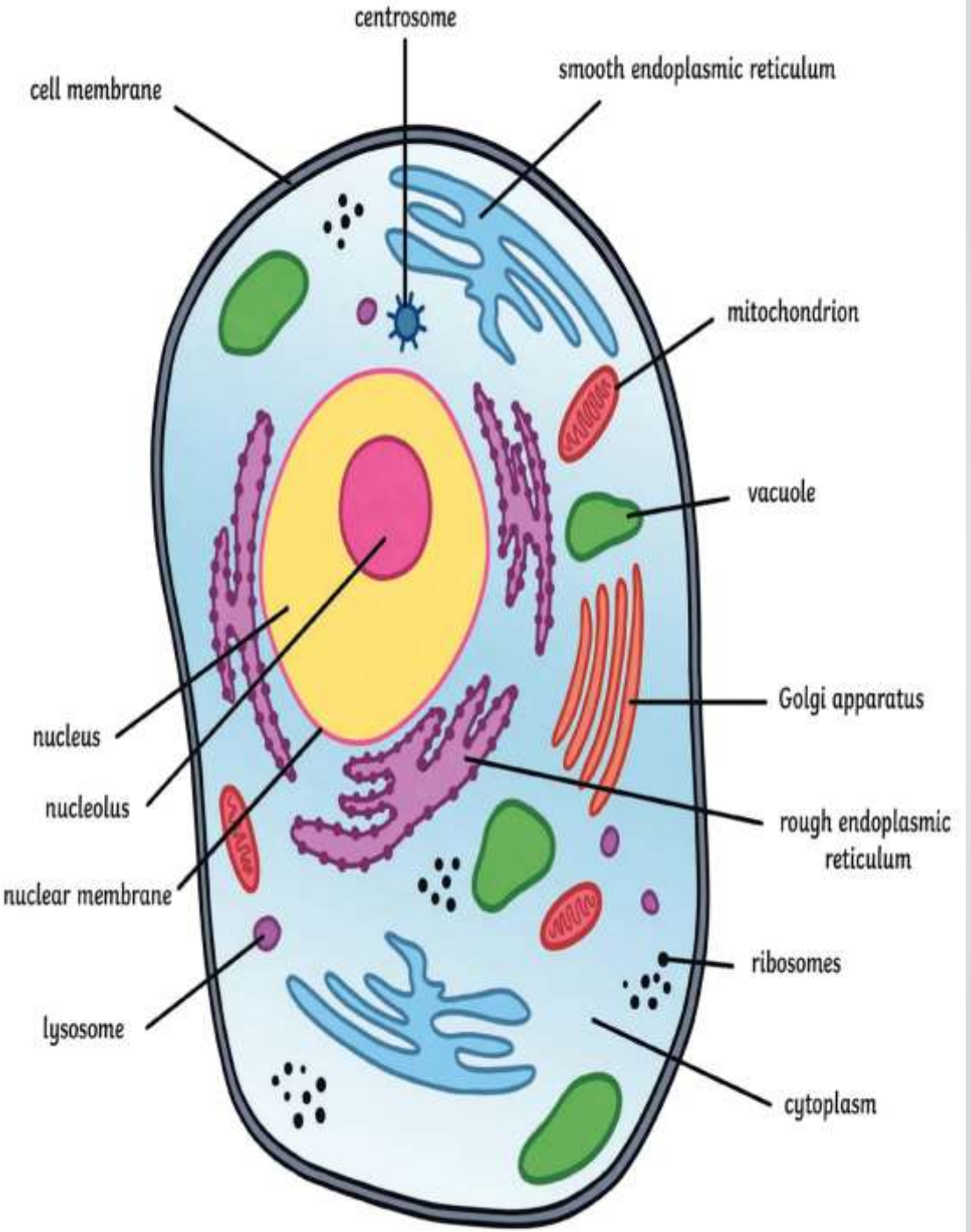


Fungal cells



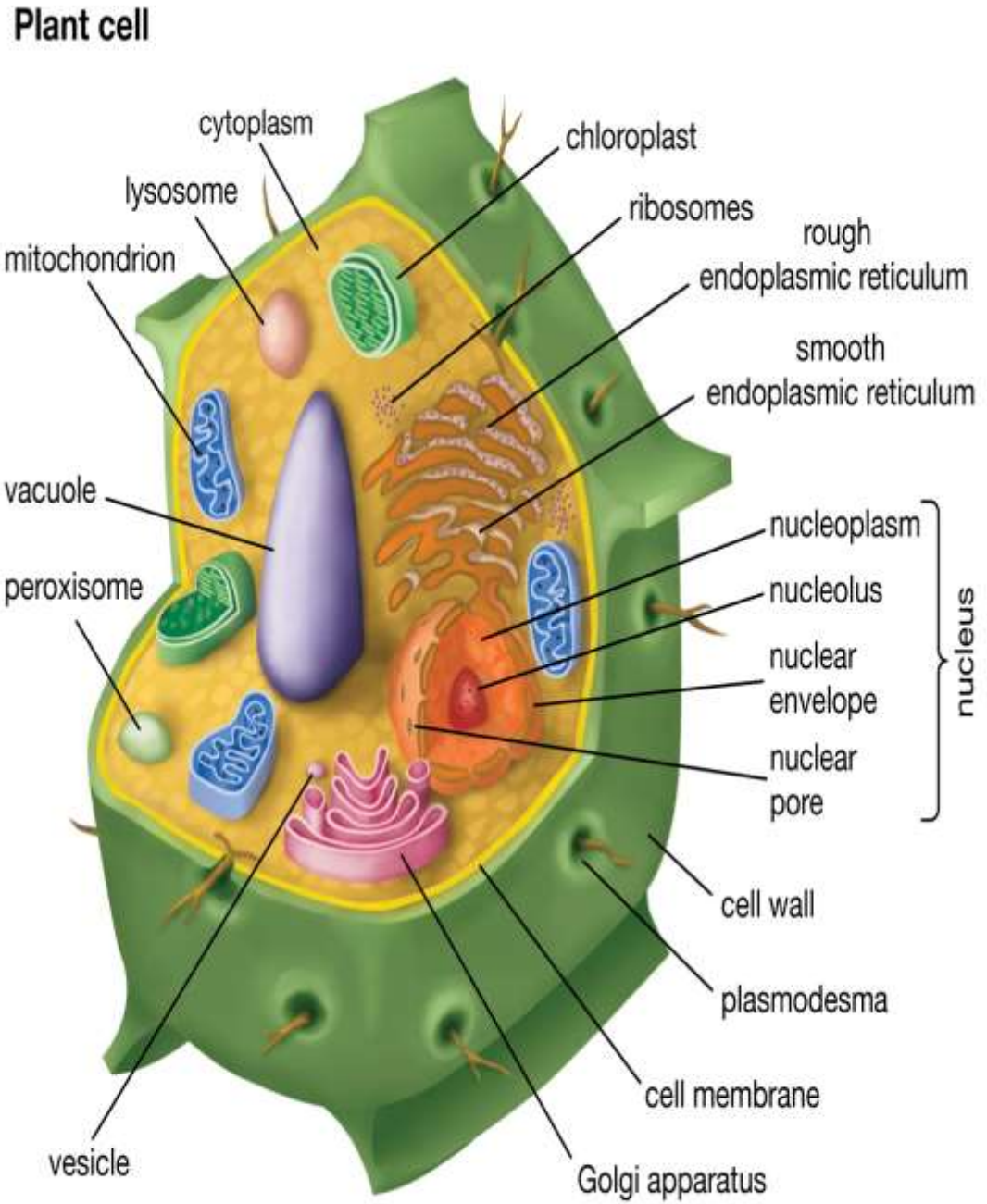
Animal cells:

- Eukaryotic cells with a **true nucleus**
- **No cell wall** → flexible shape
- Plasma membrane only
- Contain **mitochondria, ER, Golgi apparatus**
- **Lysosomes** well developed (intracellular digestion)
- **Centrioles** present (cell division)
- Vacuoles small or absent
- Store energy as **glycogen**



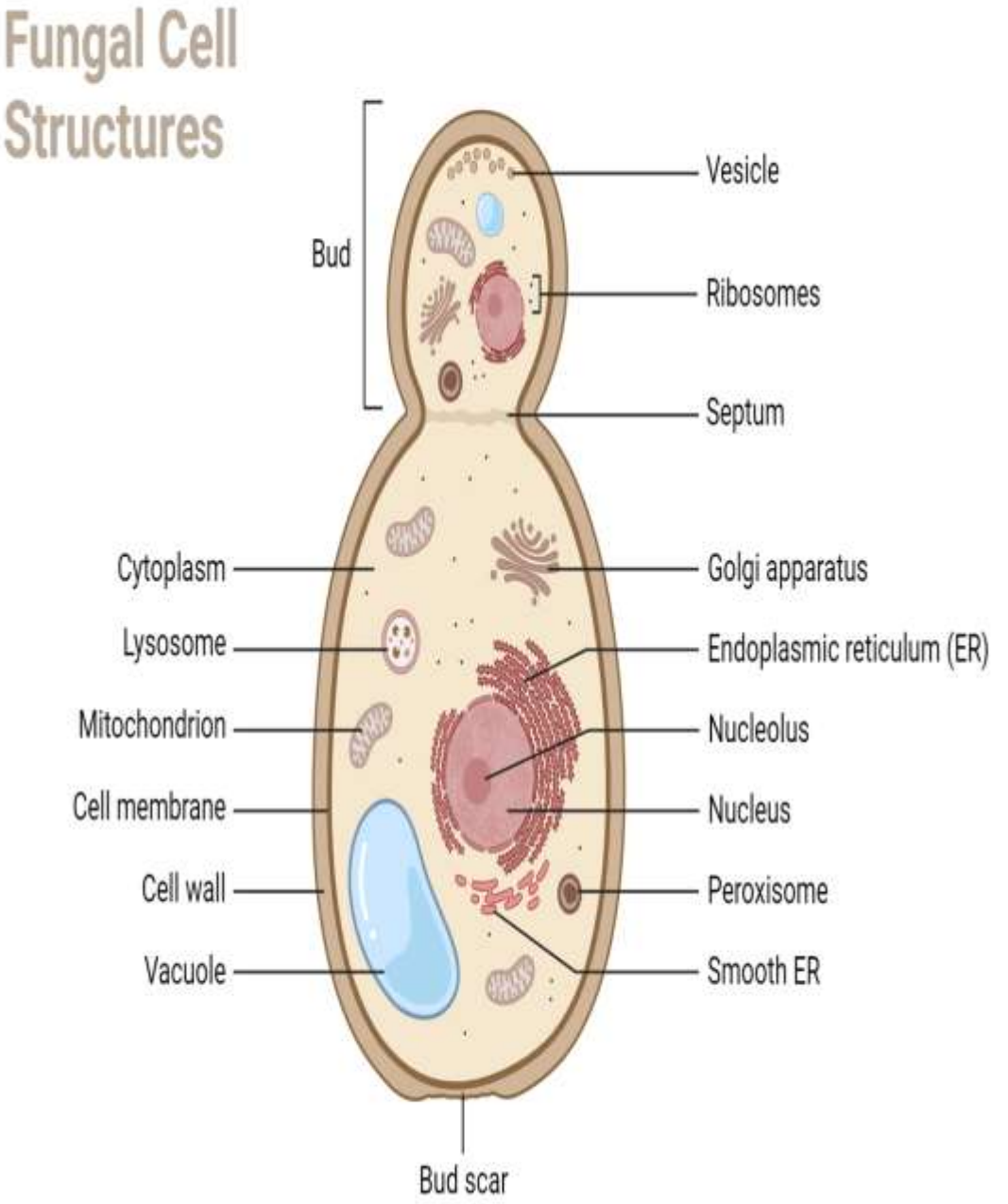
Plant cells:

- Eukaryotic cells with a **true nucleus**
- **Cell wall present** (made of **cellulose**)
- Contain **chloroplasts** → photosynthesis
- Large **central vacuole** (storage, turgor pressure)
- Plasma membrane beneath the cell wall
- Contain mitochondria, ER, Golgi
- Store energy as **starch**



Fungal cells:

- Eukaryotic cells with a **true nucleus.**
- **Cell wall present** (made of **chitin**).
- No chloroplasts (non-photosynthetic).
- Plasma membrane with **ergosterol.**
- Vacuoles present.
- Contain mitochondria, ER, Golgi apparatus.
- Store energy as **glycogen.**
- Can be unicellular (yeast) or multicellular (molds).



Comparison of plant, fungal, and animal cells

	PLANT 	FUNGUS 	ANIMAL 
Cell Wall	Yes (cellulose)	Yes (chitin)	No
Chloroplasts	Yes	No	No
Vacuoles	Yes	Yes	Small, temporary
Centrioles	No	No	Yes
Cilia / Flagella	No	No	Yes
Nutrition	Photosynthesis	Absorption	Ingestion

Plant Cell

Animal Cell

Cell Wall

Central Vacuole

Chloroplasts

Ribosomes

Endoplasmic Reticulum

Plasma Membrane

Golgi Apparatus

Mitochondria

Nucleus

Small or No Vacuole

Centrioles and Centrosomes

Flagella

Prokaryotic

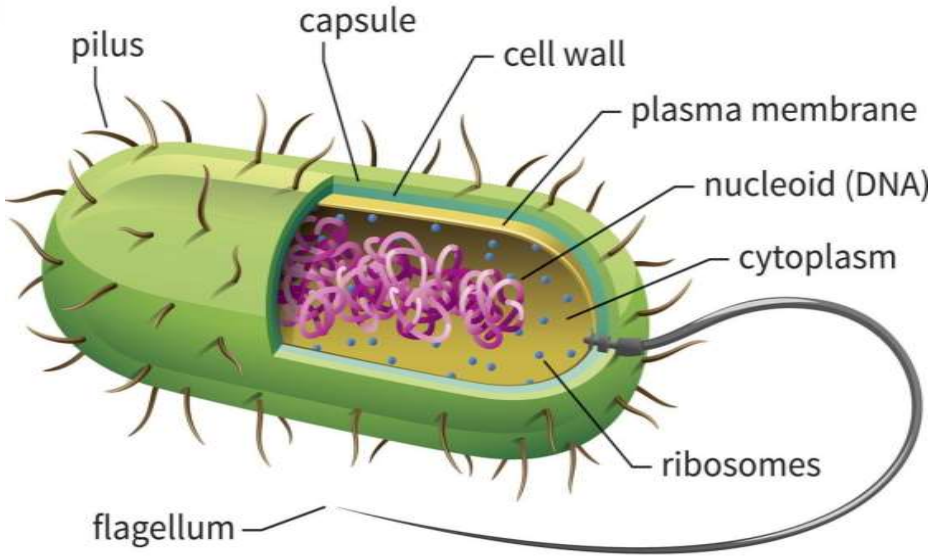
- no membrane bound organelles
- no true nucleus
- unicellular
- 0.1-5 micrometers
- has cell wall
- asexual reproduction

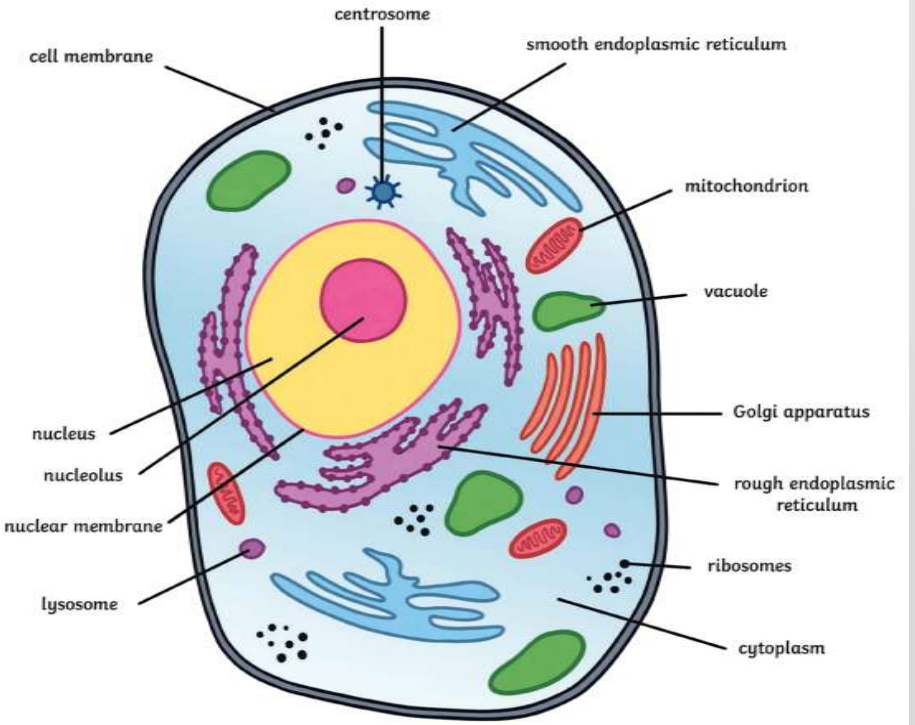
Both

- Ribosomes
- Cell membrane
- Has DNA
- Cytoplasm

Eukaryotic

- contains membrane bound organelles
- contains true nucleus
- uni-, multicellular
- 10-100 micrometers
- asexual and sexual reproduction





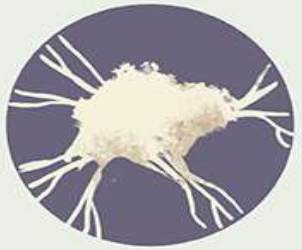
Activity 1: Fill in the table to compare the structures and features of plant, animal, and bacterial cells????

Feature	Plant cell	Animal cell	Bacterial cell
Cell wall			
Organelles			
Nucleus			
Chloroplasts			
Vacuole			
Mitochondria			
Lysosomes			
Reproduction			
Special structures			

Feature	Plant cell	Animal cell	Bacterial cell
Cell wall	Present (cellulose)	Absent	Present (peptidoglycan)
Organelles	Present (ER, Golgi, mitochondria)	Present (ER, Golgi, mitochondria)	Absent (except ribosomes)
Nucleus	Present	Present	Absent
Chloroplasts	Present	Absent	Absent
Vacuole	Large central vacuole	Small or multiple	Small or absent
Mitochondria	Present	Present	Absent
Lysosomes	Rare	Present	Absent
Reproduction	Asexual (mitosis)	Asexual (mitosis) & Sexual	Asexual (binary fission)
Special structures	Plasmodesmata	Centrioles	Capsule, pili, flagella

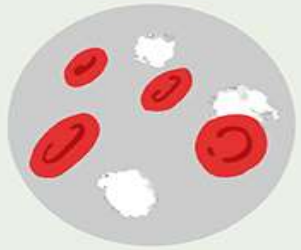
Types of human cells

Types of Cells in the Body



Stem Cells

Bone Cells



Blood Cells

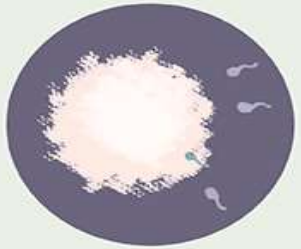
Muscle Cells

Fat Cells

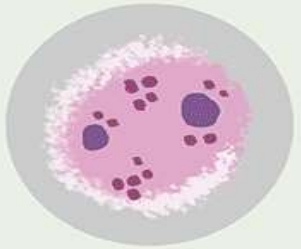
Skin Cells

Nerve Cells

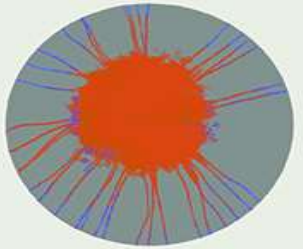
Endothelial Cells



Sex Cells



Pancreatic Cells

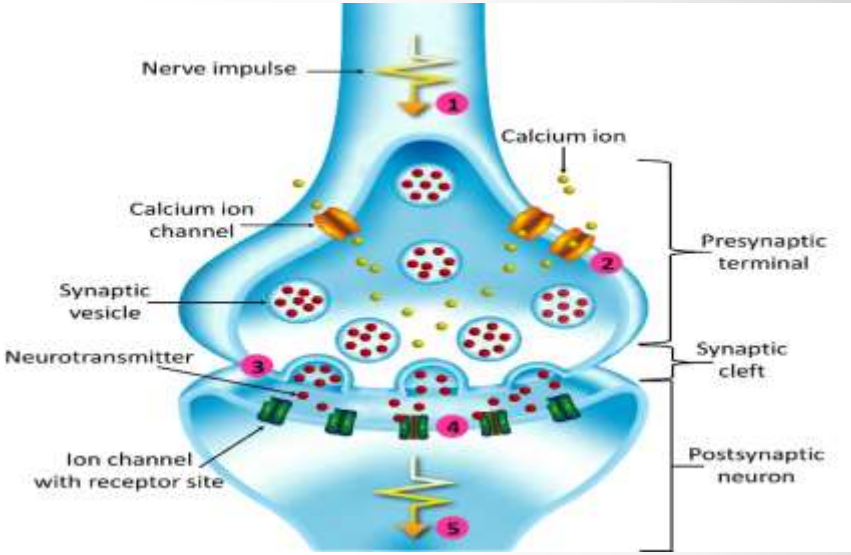


Cancer Cells

Nerve cells (Neurons)

Function: Transmit electrical signals in the body.

Location: Brain, spinal cord, nerves.

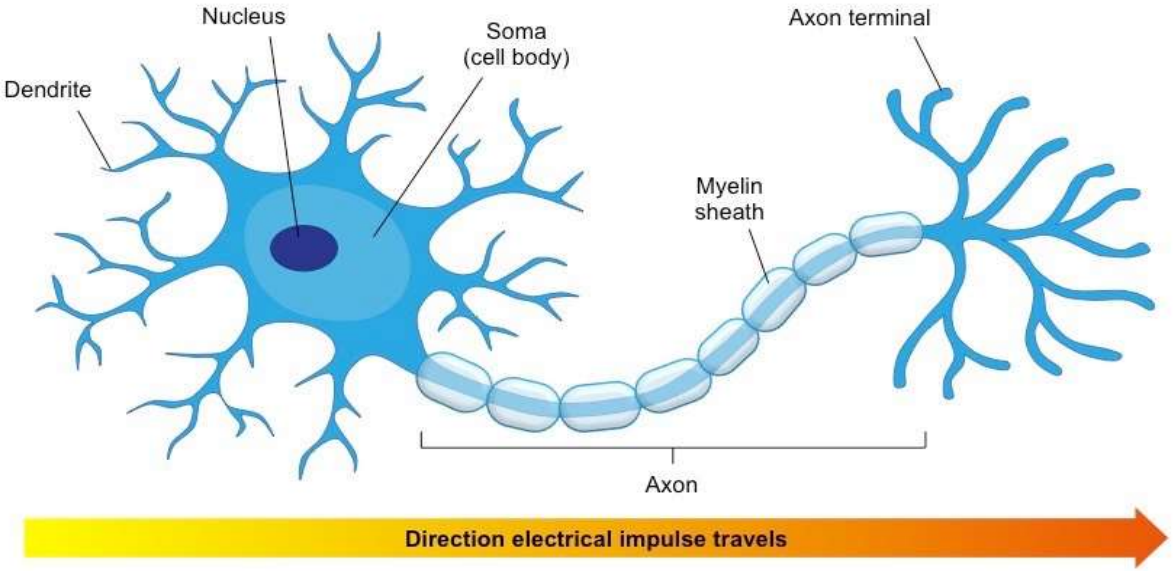


Special features:

- ✓ Long extensions (axon and dendrites)
- ✓ Can transmit impulses very quickly
- ✓ Do not divide easil

Neuron Structure:

- ✓ Cell body (soma)
- ✓ Dendrites (receive signals)
- ✓ Axon (transmit signal)
- ✓ Synapse (communication junction)



Blood cells

There are three main types:

Red Blood Cells (Erythrocytes)

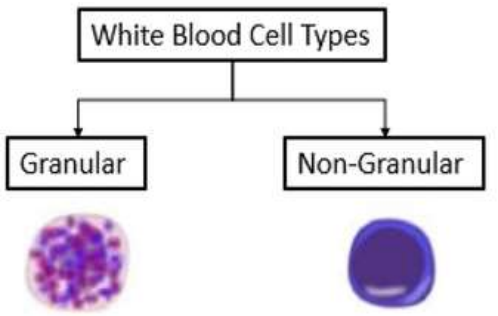
- ✓ Carry oxygen using hemoglobin
- ✓ No nucleus
- ✓ Lifespan: ~120 days

White Blood Cells (Leukocytes)

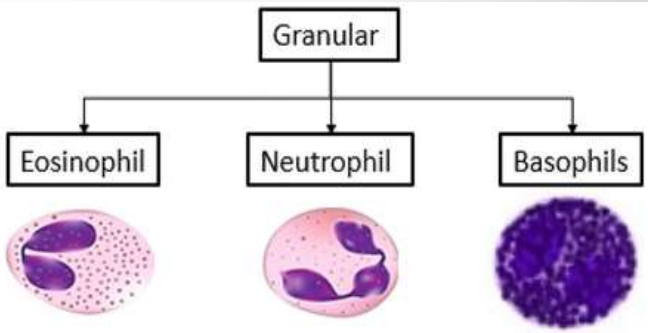
- ✓ Fight infections,
- ✓ Have a nucleus
- ✓ Different types (lymphocytes, neutrophils, etc.)

Platelets (Thrombocytes)

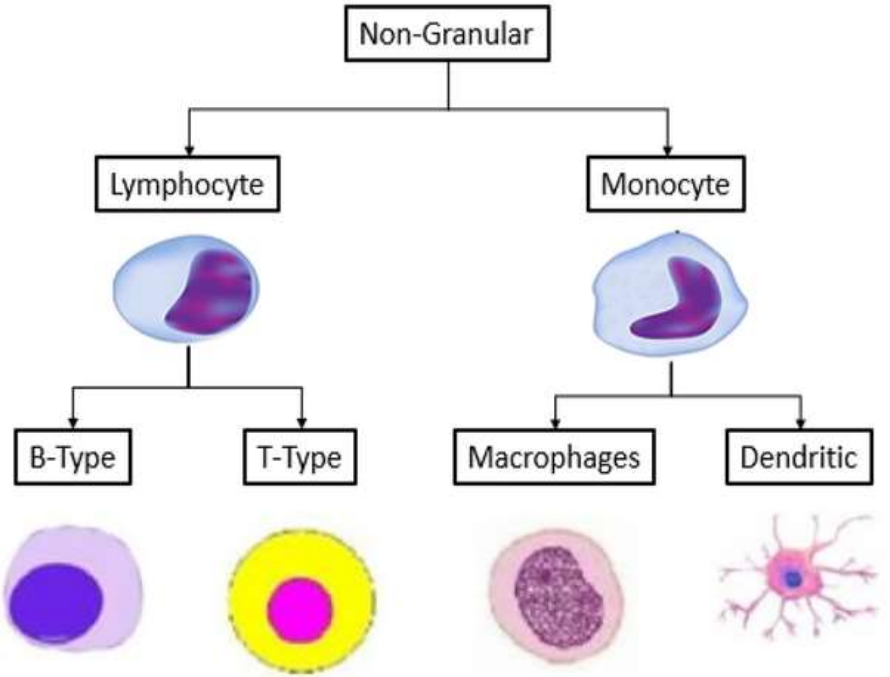
- ✓ Help in blood clotting



(a) Classification of white blood cells



(b) Classification of Granular WBCs



(c) Classification of Non-Granular WBCs

Muscle cells

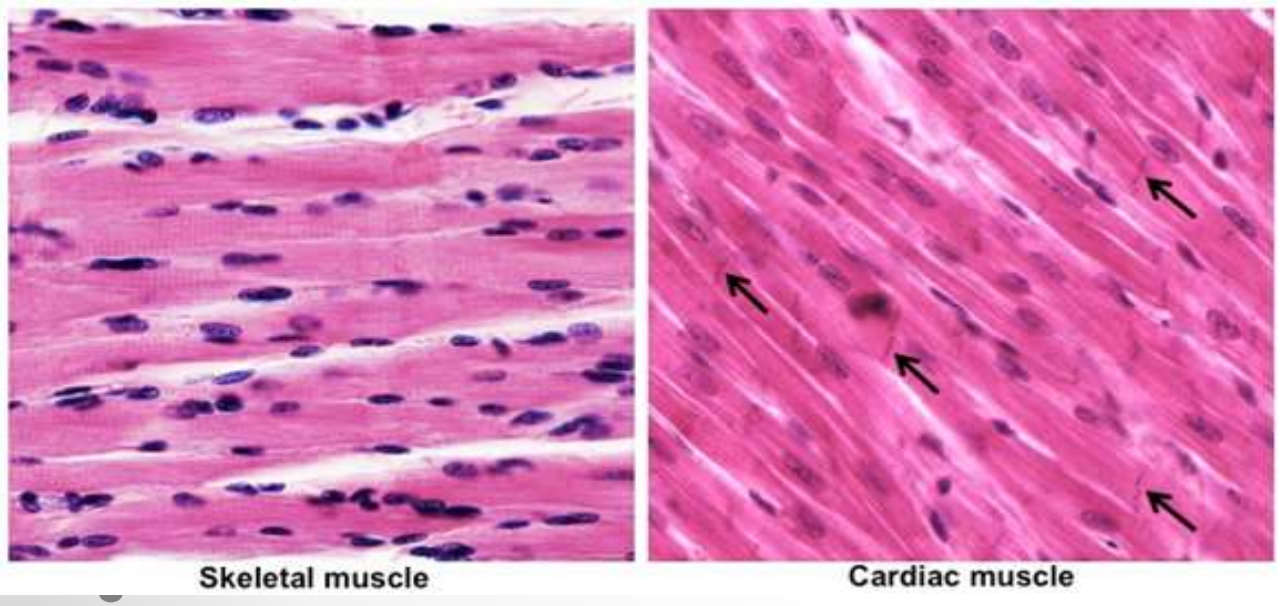
Function: Movement (contraction via actin and myosin filaments)

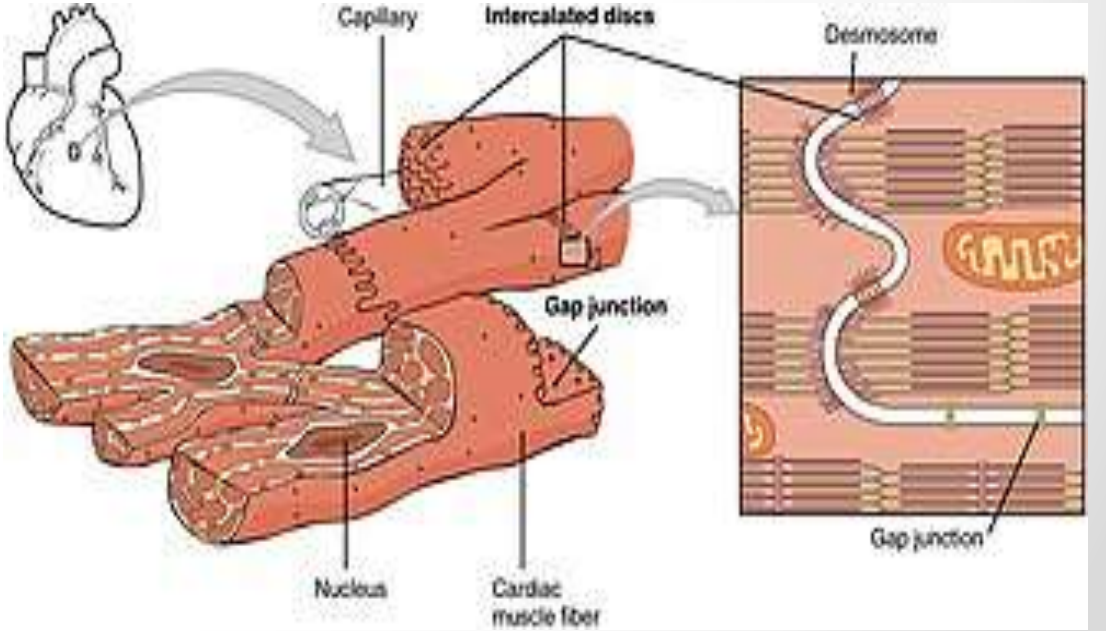
Three types:

Skeletal muscle cells: Voluntary movement

Cardiac muscle cells: Heart contractions

Smooth muscle cells: Internal organs (intestine, blood vessels)



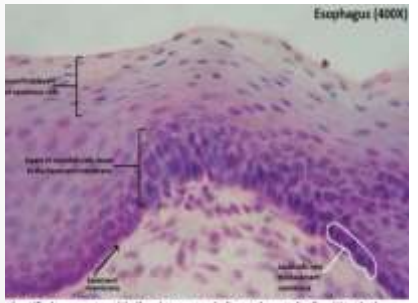


Epithelial cells

Epithelial cells make up epithelial tissue, which is classified according to **cell shape** (squamous, cuboidal, or columnar) and **number of layers** (simple, stratified, or pseudostratified). These tissues function mainly in **protection, absorption, and secretion**.

Squamous (Flat cells)

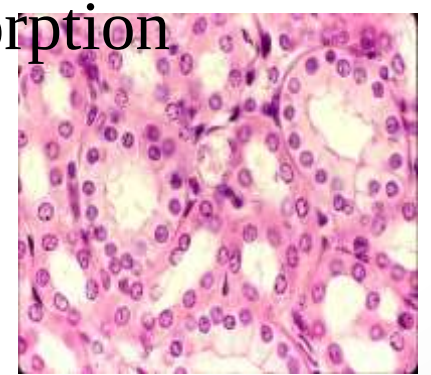
- ✓ Thin and flat
- ✓ Found in lung alveoli and capillaries
- ✓ Function: diffusion and gas exchange



Stratified squamous epithelium is composed of many layers of cells with only the bottom layer of cells (known as basal cells) contacting the basement membrane. Basal cells are typically large with a roundish shape and act as epithelial stem cells as they continually divide by mitosis and push older cells "up" toward the apical surface.

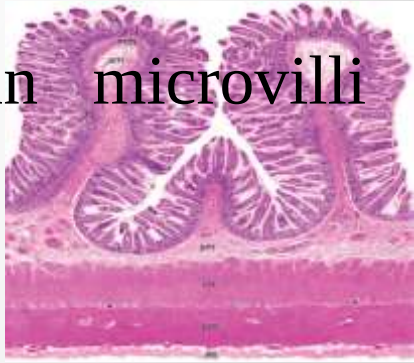
Cuboidal cells

- ✓ Cube-shaped
- ✓ Found in kidney tubules and glands
- ✓ Function: secretion and absorption



Columnar cells

- ✓ Tall cells
- ✓ Found in intestine and respiratory tract
- ✓ Function: absorption and secretion
- ✓ May contain microvilli or cilia



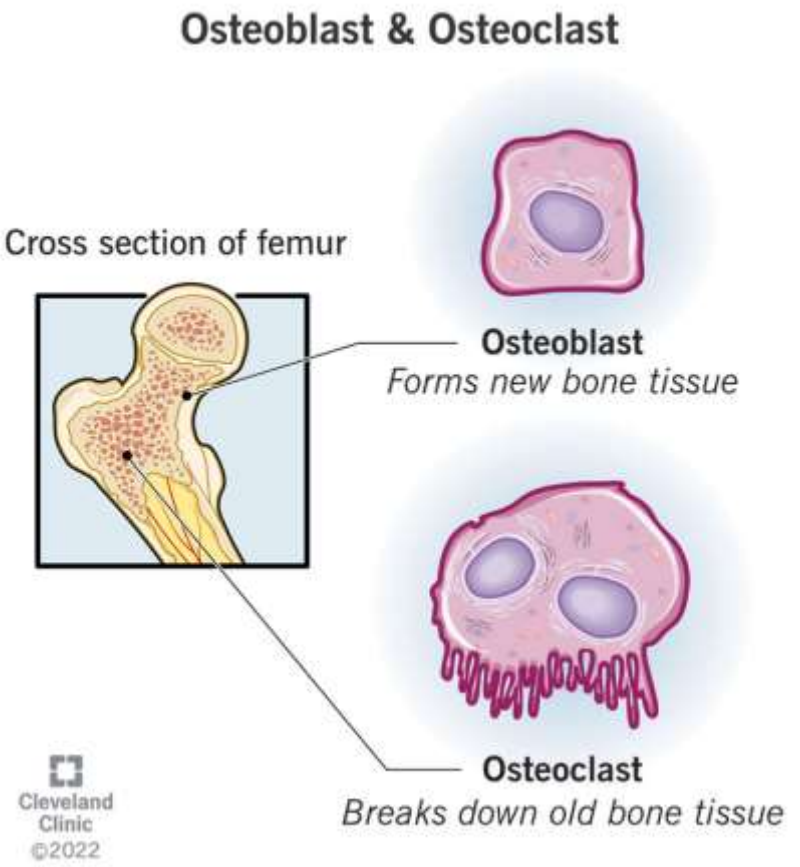
Bone cells

Bone tissue is a specialized **connective tissue** composed of cells embedded in a mineralized **extracellular matrix** rich in **collagen and calcium phosphate**

Osteoblasts: build bone ⟶ Formation

Osteocytes: mature bone cells ⟶ Maintenance

Osteoclasts: break down bone ⟶ Resorption



A balance between osteoblast and osteoclast activity maintains bone density.

Reproductive cells (gametes)

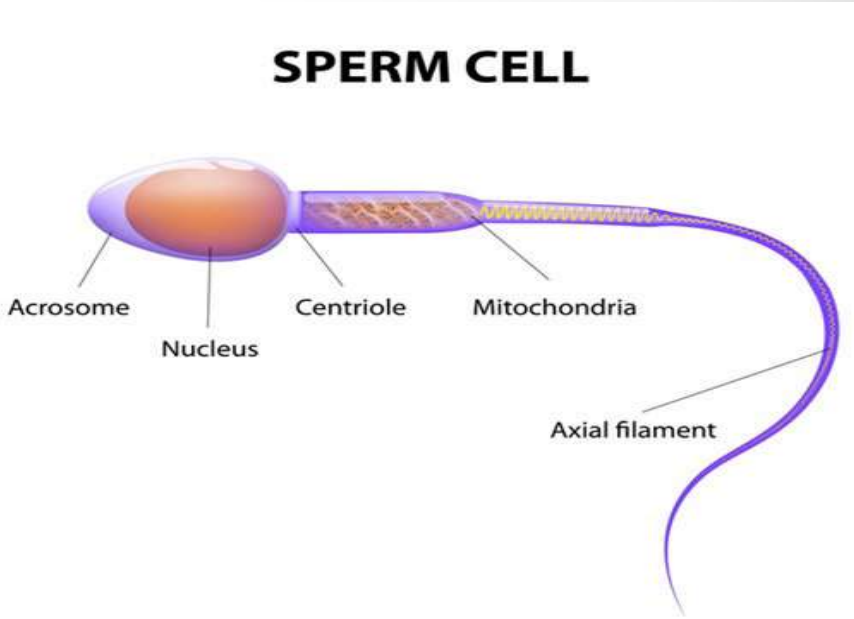
- ✓ Haploid (n)
- ✓ Produced by meiosis

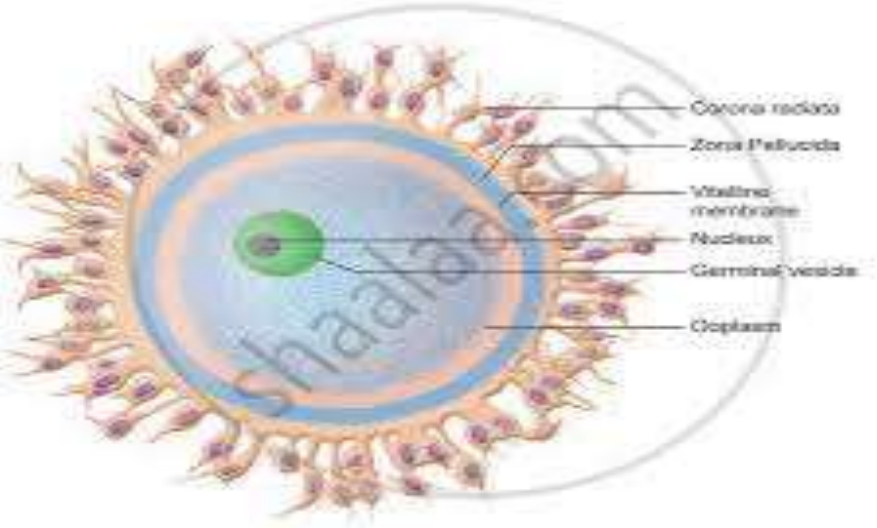
Sperm cell (male)

- ✓ Small and motile

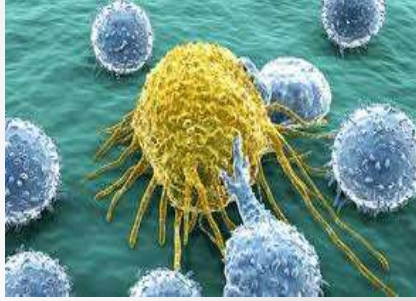
Ovum (egg cell) (female)

- ✓ Large and non-motile



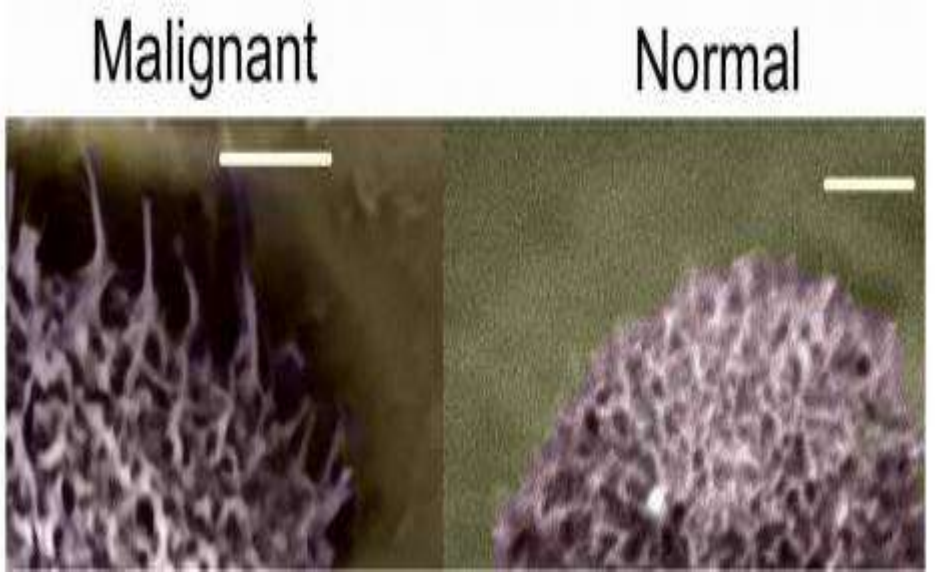


Cancer cells



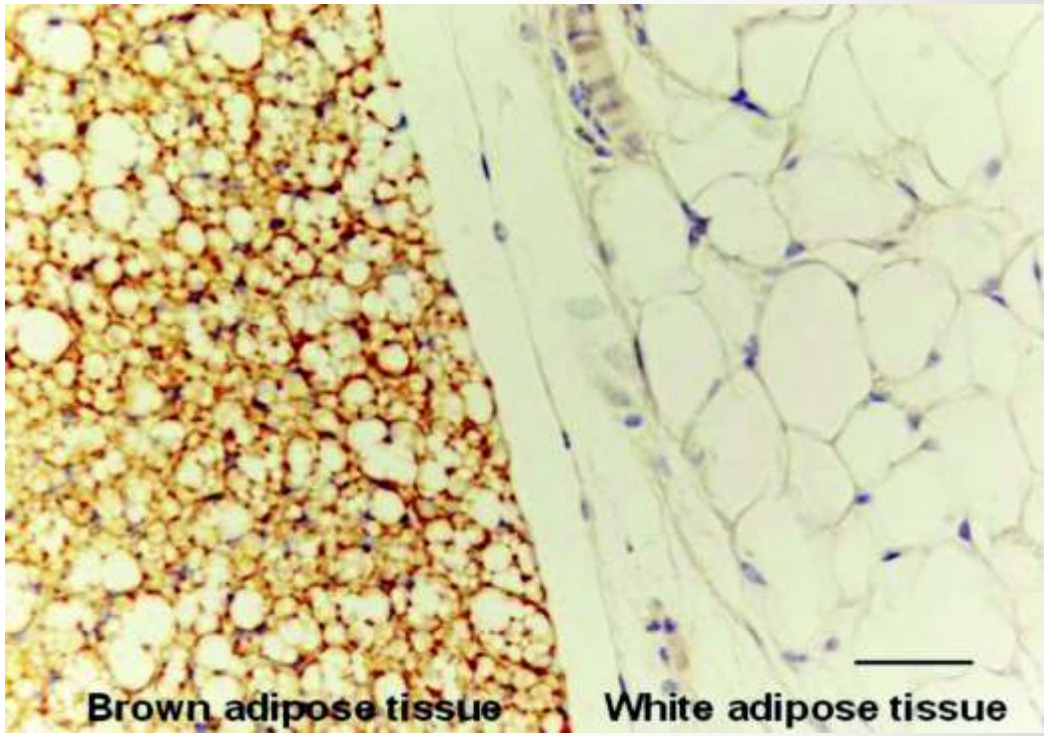
- ✓ Cancer cells are abnormal cells characterized by uncontrolled growth and division.
- ✓ Cancer cells can develop from genetic mutations caused by exposure to various factors, including chemicals, radiation, ultraviolet light

Benign → Non-invasive, localized
Malignant → Invasive, metastatic



Fat cells

- ✓ Fat cells are an important cellular component of adipose tissue.
- ✓ Fat cells store energy in the form of triglycerides. When the body needs extra energy, such as during fasting or increased physical activity, fat cells release stored triglycerides.



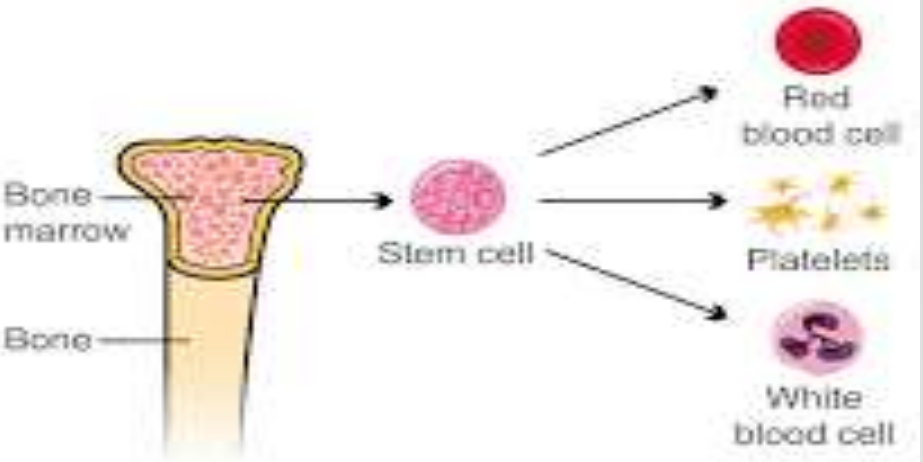
Stem cells

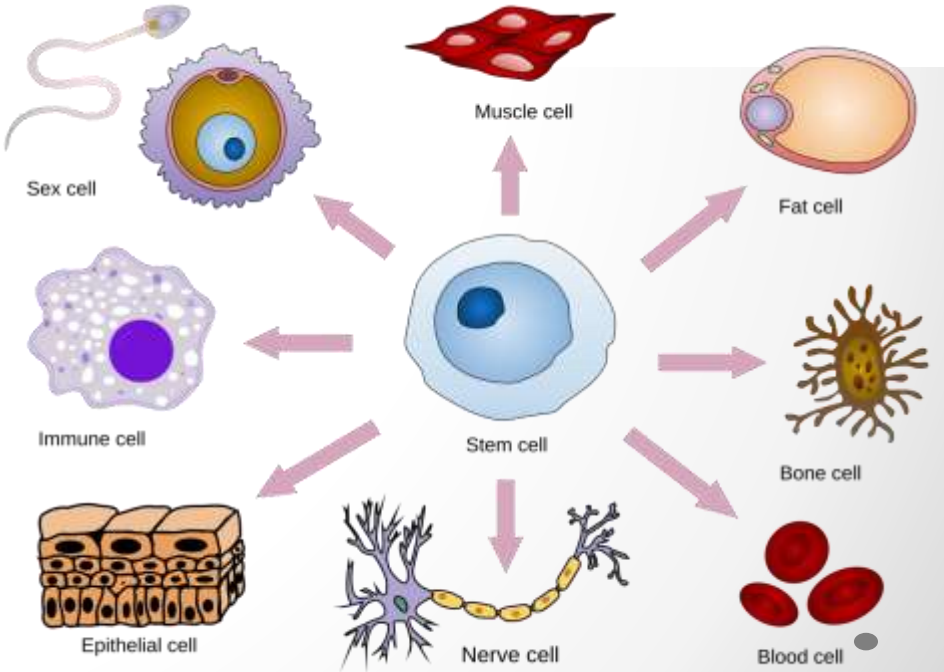
Stem cells are special cells in the body that can:

- ✓ Self-renew – make copies of themselves.
- ✓ Differentiate – develop into different types of specialized cell.

Use it in:

- ✓ Growth
- ✓ Repair damaged tissues (heart, liver, nerves)
- ✓ Medical research (treat diseases and test new drugs)





Activity 2. Match the Following organelle with its function

Organelle	**Function**
- Nucleus	- Site of translation; can be free or attached to RER
- Ribosome	- Modifies, sorts, and packages proteins)
- Mitochondria	- Control center of the cell
- Lysosome	- Breaks down waste and damaged cell parts
- Glogi apparatus	- Produces lipids and cholesterol
- Smooth Endoplasmic Reticulum	

Activity 3. **Complete the blanks using the appropriate words from the list below:** energy, bones, different types of cells, infections, lignings, oxygen, movement, electrical signals.

- A neuron is a type of cell that transmits _____ in the brain and spinal cord.
- Red blood cells carry _____ from the lungs to the body tissues.
- White blood cells help protect the body from _____.
- Muscle cells are responsible for _____ of the body.
- Epithelial cells form protective _____ for organs and the skin.
- Fat cells store _____ in the body.
- Stem cells can develop into _____.
- Bone cells maintain the structure and strength of _____

Activity 4. Complete the blanks using the appropriate words:

- Plant cells have a rigid cell wall made of _____.
- A large central _____ stores water, nutrients, and helps maintain turgor pressure.
- Chloroplasts are present in plant cells and are the site of _____
- Plant cells have _____ that produce energy for the cell.
- Animal cells do not have a _____.
- Animal cells have small or no _____.
- Lysosomes in animal cells contain _____ to break down wastes.
- Animal cells have _____ that help in cell division.
- Energy in animal cells is produced in the _____

•Bacteria are _____ cells, meaning they do not have a nucleus.
•Most bacteria have a _____ made of peptidoglycan.
•Bacteria reproduce mainly by _____.
•Many bacteria have _____ or pili for movement and attachment.
•Archaea are also _____ cells but are genetically different from bacteria.
•The cell wall of archaea does not contain peptidoglycan; instead, it may have _____ or other polymers.
•Archaea often live in _____ like hot springs, salty lakes, or acidic water.
•Cyanobacteria can may their own food by _____.

The end