

Chapter 2 : Cell Structure and Cell Organisation

Subtopic : Cell Organisation

Unicellular – A single cell performs all the basic life process. Example: *Amoeba sp.*, *Paramecium sp.*,

Multicellular – An organism consists of more than one cell. Each group of cell specialized to carry our life processes. Example: *Homo sapien* (human), animals and plants. It has five levels of organisation

1. **Cells:** basic units of structure and function.
Example: Red blood cells and xylem vessel cells.
2. **Tissues:** made up of cells with similar in structure and function.
Example: Epithelial tissues and vascular tissues.
3. **Organs:** made up of tissues that perform a specific function.
Example: Heart and flower.
4. **System:** two of more organs that perform a specific function.
Example: Digestive system and root system.
5. **Organisms:** whole living thing that carry out all the basic life processes.
Example: Human and durian tree.

Cell Organisation (Unicellular) in *Amoeba sp.* (lives in freshwater ponds) and *Paramecium sp.* (lives in soil and moist area)

1. Cell structure

- *Amoeba sp.*: plasma membrane, food vacuole, contractile vacuole, pseudopodium, nucleus, ectoplasma, endoplasm.
- *Paramecium sp.*: food vacuole, posterior contractile vacuole, cytostome, gullet, oral groove, cilia, macronucleus, micronucleus, anterior contractile vacuole.

2. Locomotion

- *Amoeba sp.*: Pseudopodium (false foot) helps it to move forward slowly and it is known as amoeboid movement.
- *Paramecium sp.*: Hair-like cilia to beat against water. It beats its cilia backwards diagonally (swim forward) and it rotates on its axis. It beats its cilia forward (swim backwards).

3. Feeding

- *Amoeba sp.*: Omnivore. Eat bacteria, plant cells, algae and other microscopic organisms.

1. Entrapment – extend pseudopodium.
2. Engulfment – engulf tiny food (phagocytosis) with its pseudopodia.
3. Digestion – food enclosed in food vacuole
4. Absorption – enzyme digests the bacteria
5. Egesting – expel indigestible material.

- *Paramecium sp.*: Eat bacteria, organic material and other microscopic organisms.

1. Sweeping – movement of cilia. Food moves along the oral groove into the gullet and cytostome.
2. Digestion – food vacuole circulates round the cell.
3. Elimination – undigested food is eliminated at the anal pore.

4. Reproduction

- *Amoeba sp.*: two types of reproduction.

1. Binary Fission – nucleus divides (favourable condition) and then follows by division of cytoplasm. Two daughter cells are formed (mitotic division).
2. Spore Formation – spores form (bad condition) and germinate into new amoeba under favourable condition.

- *Paramecium sp.*: two types of reproduction.

1. Binary Fission – micronucleus undergoes mitosis (favourable condition). Macronucleus begins to elongation and form two. Cell content divide and two daughter cells are formed.
2. Conjugation (Sexual reproduction) – two same species parent paramecia exchange genetic material of their micronuclei. Each parent divides and forms four daughter cells.

5. Osmoregulation

- *Amoeba sp.*: water moves into the cell by osmosis and prevention of bursting, it has a contractile vacuole.
- *Paramecium sp.*: water moves into the cell by osmosis and prevention of bursting, it has two contractile vacuoles.

6. Respiration

- *Amoeba sp.* and *Paramecium sp.* (both): exchange gases throughout the whole cell membrane

7. Excretion

- *Amoeba sp.* and *Paramecium sp.* (both): waste products are ammonia and carbon dioxide by diffusion. Solid waste in paramecium is expelled through its anal pore.

Cell Organisation (Multicellular) in Human

1. **Cells:** Epithelial cells, muscle cells, white blood cells, red blood cells, sperm, nerve cells.
2. **Tissues:** Epithelial tissue, smooth muscle tissue, connective tissue, skeletal tissue, nerve tissue.
3. **Organs:** Stomach, heart, kidney, lung, liver.
4. **Systems:** Circulatory system, respiratory system, digestive system, excretory system, muscular system, lymphatic system, integumentary system, skeletal system, nervous system, endocrine system, reproductive system.
5. **Organisms:** Human.

Cell Organisation in Plant

1. **Cells:** Parenchyma cells, collenchyma cells, sclerenchyma cells, epidermal cells.
2. **Tissues:** Epidermal tissue, meristem tissue, vascular tissue.
3. **Organs:** Leaf organ, flower organ, stem organ, root organ.
4. **Systems:** Shoot system, root system.
5. **Organisms:** Plant.