

## Chapter one

### Cell structure and organisation

All living organisms share the same seven characteristics.they are:-

- Movement : Going from one place to another
- Respiration : Releasing energy from food
- Sensitivity : Reacting to the environment
- Growth : Getting bigger
- Reproduction : Making new living things
- Excretion : Getting rid of wastes
- Nutrition : Getting food

The first letters together spell the word **MRS GREN.**

The basic unit of life is the cell. The simplest living organisms have one cell only. Such organisms are described as unicellular.

**Bacteria** (singular: bacterium) are examples of unicellular organisms.

**Most other living organisms have many cells and are describe as multicellular:**

All cells have the following structural features in common.

1 A cell membrane, that is described as **partially permeable** which is made up of **lipid** and **protein**.

#### Function-

-It controls the passage of substances into and out of the cell.

2. Cytoplasm, a jelly-like substance. it is mostly **water** .

#### Function-

- Most of the chemical reactions of the cell (**metabolic reactions**) take place.

-It holds other organelles such as the nucleus, mitochondria etc.

3. The nucleus

#### Function-

- Nucleus control all cell Activities.

- it contain genetic material which control the structure and function of the cell.

It is also essential for cell division.

Cells without nucleus- **Red blood cell (RBC)**

**Plant** cells have the following additional structures

1. A (**large, central**) **vacuole**, which is a space full of **cell sap** - a solution mostly of **sugars**, salts and ions.

#### Function-

- It stores water, sugars and salts

**\*Plant cells undergoing cell division do not have a vacuole.**

2. The **cell wall** made of **cellulose** in which the cell is contained. It is **fully permeable membrane** but it is rigid and non- flexible.

#### Function-

- Supports the plant and gives it a fixed place.
- Gives the plant its shape.
- prevents the plants from bursting when they are filled with water.

3. **Chloroplasts** - it is a disk like structure .They are green in colour because they contain the green pigment called chlorophyll which trap the sunlight for photosynthesis.

#### Function-

- Stores starch.
- photosynthesis takes place.
- it absorbs carbon dioxide

#### Gene and DNA:

- DNA is the genetic material of living organism. The instructions inside the nucleus are contained in a chemical called deoxyribonucleic acid. (DNA) .
- DNA forms long chain which is called chromosome.
- Human body has 46 number or 23 pairs of chromosome.
- Instruction in each chromosome is called gene.
- To control chemistry inside the cell, the instructions in the gene must be translated into protein.
- A gene is a part of the DNA. Genes are the different parts of the DNA that decide the genetic traits a person is going to have.

gene	<ul style="list-style-type: none"> <li>• a <b>unit of inheritance</b> which is a sequence of DNA bases responsible for the protein synthesis .</li> <li>• DNA – deoxy ribo nucleic acid is divided up into sections called genes , <b>forming</b> part of a chromosome.</li> <li>• genes may be <b>copied and passed</b> on to the next generation <b>via</b> chromosomes in the nuclei of the parents gametes.</li> <li>• It is <b>responsible for particular characteristics</b>.for example-you have e gene controlling your eye colour. if it is brown then a gene in all of your cells which makes particular protein. this protien makes the broen pigment in eyes.</li> </ul>
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Similarities and differences table below: between plant and animal cells are shown in the table

	Animal cell	Plant cell
<b>Similarities</b>	Cell membrane Cytoplasm nucleus	
<b>Differences</b>	No or temporary sap vacuole	Contain large permanent vacuole
	<b>no cell wall</b>	<b>Contain Cell wall made up of cellulose</b>
	<b>no chloroplasts</b>	<b>have chloroplasts</b>
	Usually contain glycogen as stored carbohydrates but never stores starch	may contain starch as store carbohydrates
	The nucleus is situated at the centre	The nucleus is not centrally placed
	Cilia is present	Usually do not have cilia
	Round in shape ( irregular)	Rectangular ( regular / fixed ) in shape

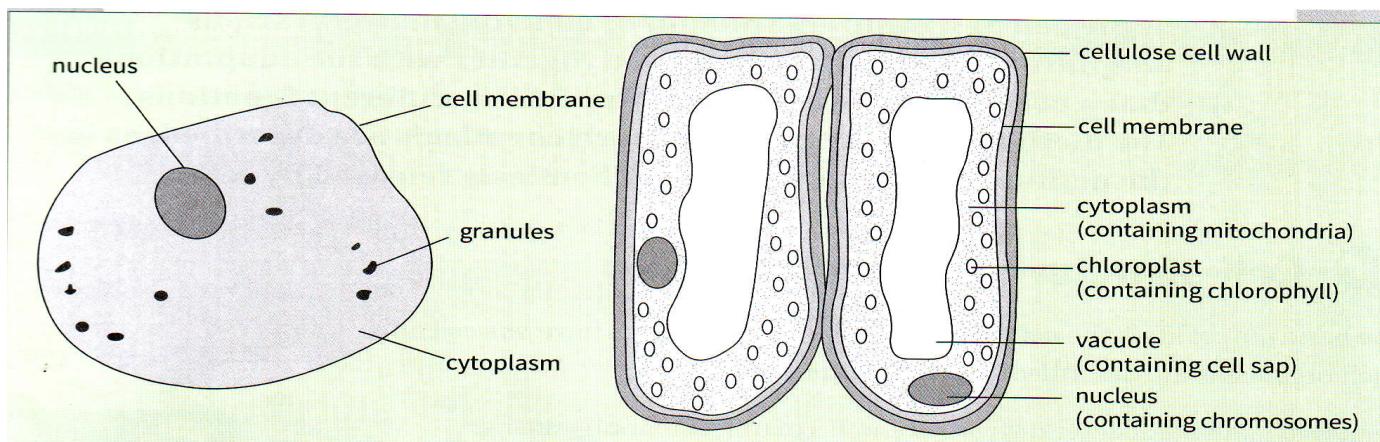


Fig-Animal cell and plant cells

### **How cells combine to improve their efficiency**

**Many similar cells working together and performing the same function are called a tissue.**

Examples of tissues

- \* xylem and phloem tissue in the vascular bundles of a plant
- \* muscular tissue in the intestine wall of an animal
- \* Nervous tissue carries information from the brain and reach to the muscles tissue giving instruction whether to squeeze or to relax.

Different types of tissue often work together in order to achieve a combined function.

**Several tissues working 'together to produce's particular function form an organ**

Examples of organs

- \* the leaf and The root of a plant.

The heart

Several different organs maybe necessary in order to carry out a particular fuction.

**A collection of different organs working together in order to perform a particular function is called an organ system.**

Examples of organ systems

The breathing system - (nose, wind pipe, lungs)

The excretory system - (kidney,ureter, bladder and urethra)

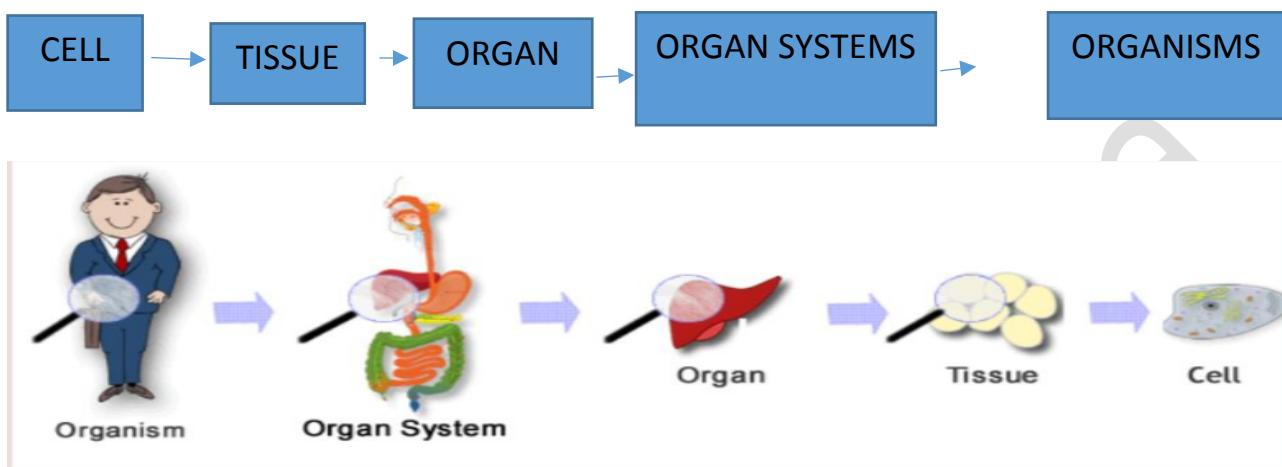
The nervous system - ( nerve cell)

The digestive system. - (gullet, stomach, small and large intestine )

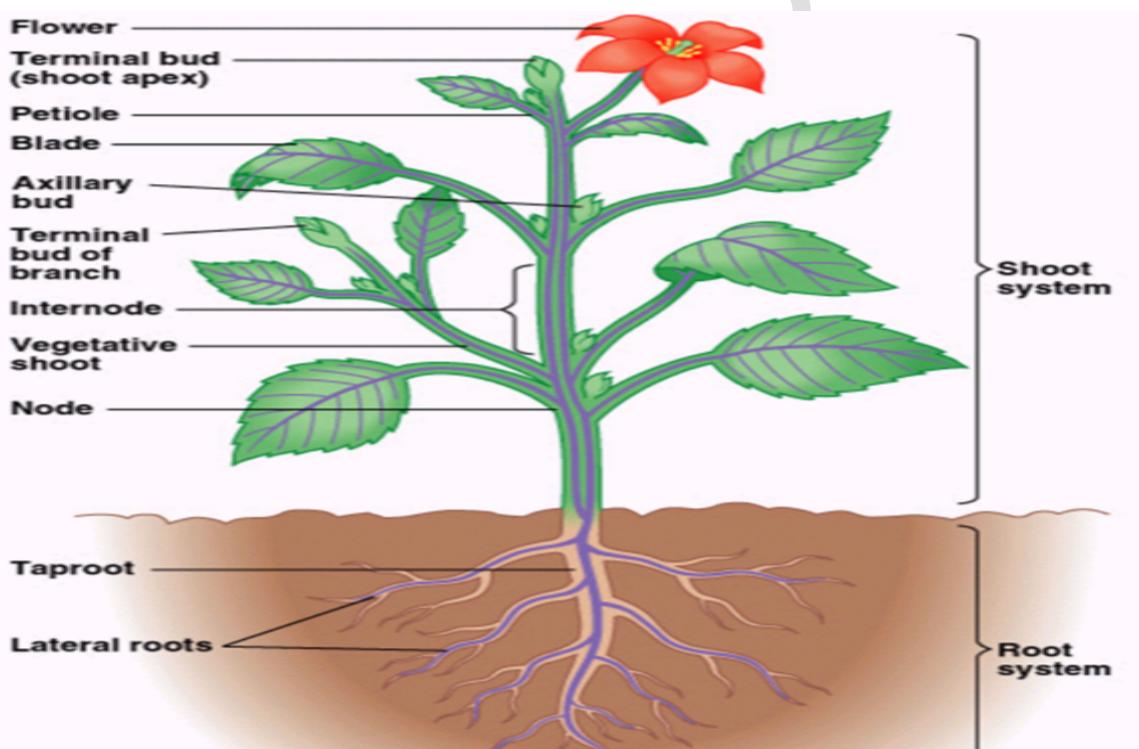
The circulatory system- (heart and blood vessel)

**An organism is a collection of organ systems working together.**

The increasing order of cell organisation found within any living organism is thus:



## Organs of a plants



### 1.Flowers-

It contains the reproductive organs of the plant which make the seeds that grow into new plants.

### 2. Bud-

makes new leaves and flowers

### **3. leaf-**

It makes food using light energy.

### **4. Stem-**

- It holds the plant upright.
- It transports water and food around the plants.
- It also makes small amount of food.

### **5. Root**

- hold the plants in the ground.
- It absorbs water and minerals from the soil.
- It has epidermal tissue through which absorption happens. Root hair cells are part of the epidermal tissue.
- It has xylem tissue to carry water from the soil to the rest of the plant.

### **Organ transplants: (In Human)**

The function of our kidney is to clean our blood and to remove the waste. When it fails to do its work either dialysis or kidney transplant is the treatment.

**Dialysis:** Dialysis machine can work as artificial kidney. The blood leaves whole body through a tube passes through the machine and returns to body. Inside the machine blood is clean by removing all waste and additional nutrition is added which is needed by body.

**Disadvantages:** Costly and Time-consuming.

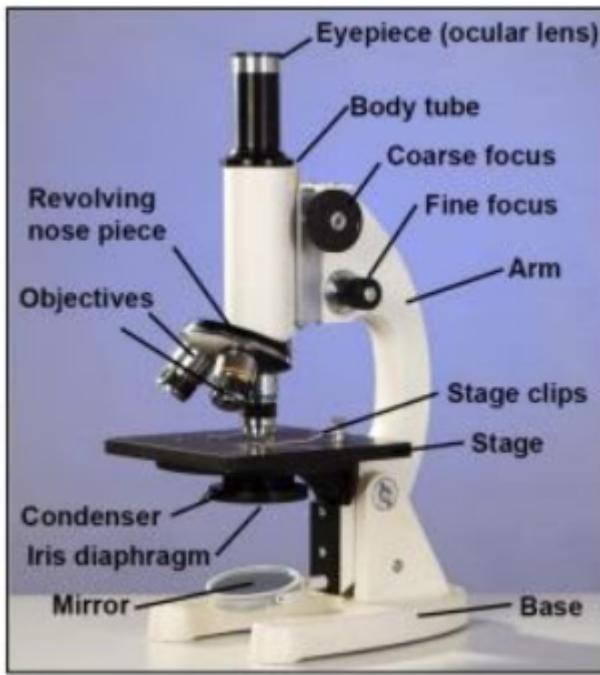
**Transplant:** Patient can have a new kidney if blood group matches with donor.

**Disadvantages:** Not easy to get donor as there is great possibilities of tissue rejection.

### **Organ transplants: (In Plant)**

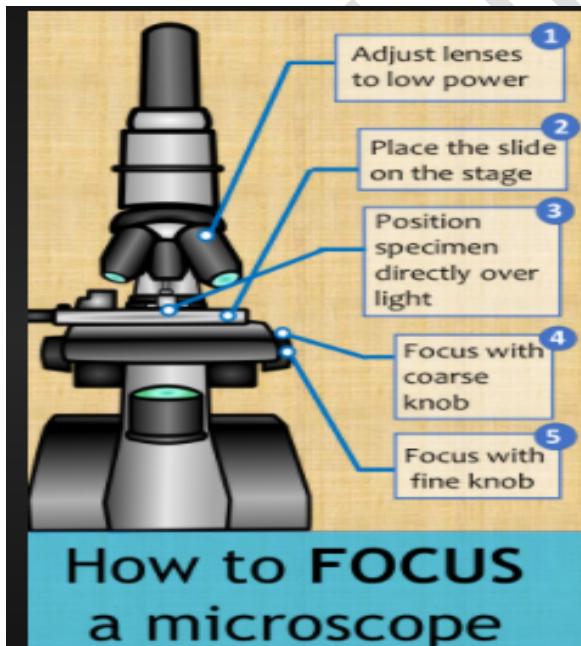
Gardeners use transplants on plant. In this process bud from one plant is attached to another plants. A small hole is cut in the plants and it is then pushed to that plant. Then gardeners wrap tape around the two until they grow together.

### **Microscope:**



- Different types of microscope: Light and electron microscope.
- Lenses are used to magnify the specimen.
- How much larger the specimen appears than its actual size is called the total magnification.
- Total magnification = eyepiece lens magnification × objective lens magnification.

### How to use microscope:



### How to Use A Microscope

- Step 1:** Turn microscope ON.
- Step 2:** Rotate **low power objective** into place.
- Step 3:** Place slide onto **stage** – center the specimen over the hole in the stage. Secure the slide with **stage clips**.
- Step 4:** Look  through the **eyepiece** and turn the **coarse adjustment knob** until the specimen comes clearly into view. Adjust slide if necessary.
- Step 5:** Diagram what you see in the field of view. 
- Step 6:** Rotate **medium power objective** into place and repeat steps 4-5.
- Step 7:** Rotate **high power objective** into place and repeat steps 4-5 using the **fine adjustment knob** only.

# Parts of the microscope

Part of microscope	Function
Eyepiece Lens	Magnifies the specimen
Coarse Adjustment Knob	Used to focus on Low Power
Fine Adjustment Knob	Used to focus on Medium and High Power
Objective Lens	Magnifies the specimen
Nosepiece	Allows the objective lens to be changed
Stage Clips	Holds the slide in place on the stage
Diaphragm	Controls amount of light entering condenser
Condenser	Concentrates light into a beam
Light Source	Projects light upwards through microscope

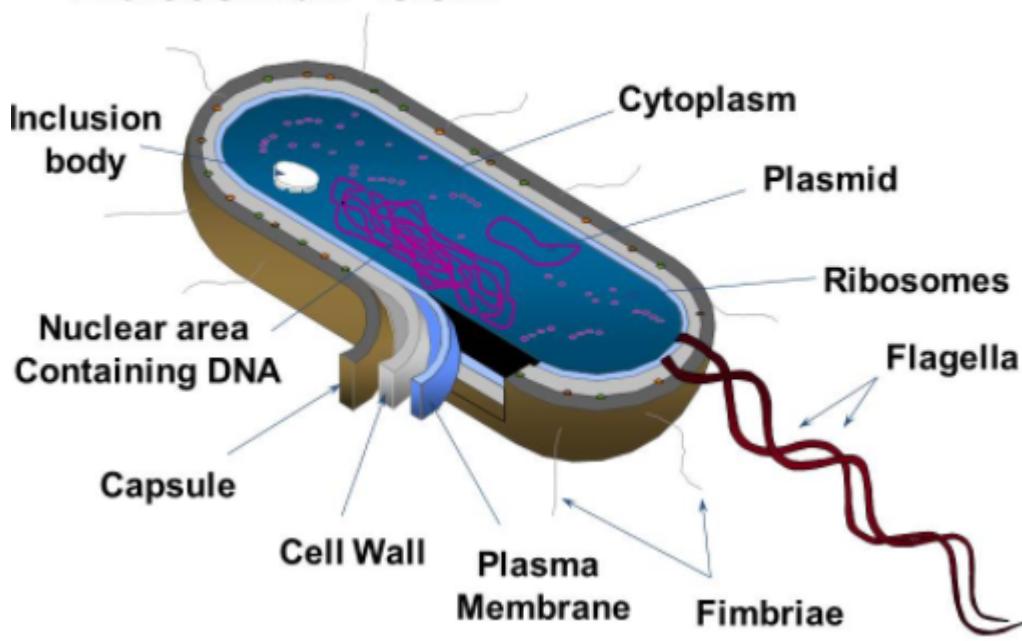
## # What is called Cell theory?

**Ans-** Plants and animals are made up of cells . Individual cells are alive and can reproduce. This is called cell theory. Cell theory states that it is the basic unit of living organisms.

## # Cells without a nucleus

- Another name of bacteria is prokaryotes ( means before nucleus).

# Bacterial Cell



- Bacteria are living things that cause disease and make things go mouldy.
- It is Unicellular that means have only one cell.
- Have no nucleus, instead of having a nucleus the instructions are found in the cytoplasm.
- Have no vacuole.