

The Microscope

 Biologists use different tools to help them study living organisms. One of the most important is the microscope..

Seeing cells

 **There are two main types of microscopes in use,**

 The light microscope

 The electron microscope

The Light Microscope

 The light microscope uses a beam of light to form the image of an object, while the electron microscope uses a beam of electrons to form an image.

 Chemicals known as stains are added to the tissue on the slide to make it easier to see particular cells, or parts of a cell.

Magnification and resolving power

 Magnification means increasing the size of an object.

 The best light microscopes will magnify up to around 2000 times.

 An electron microscope can give you a magnification of around 2 000 000 times.

 **Resolution** is the ability to distinguish between two separate points

 **Resolving power** how much detail the microscope is able to show

Stains

 chemicals added to slide tissues to make the cells easier to see

Type of stain

Haematoxylin

 In the animal and plant cells

Main organelles stained

Nuclei stained blue purple or brown.

Methylene Acetocarmine

 Only in the animal cells

Main organelles stained

 Nuclei stained blue

Iodine

🔑 Only in the plant cells

🔑 Main organelles stained

Staining the Chromosomes in dividing Any material containing starch.

🧠 Advantages of the light microscope

🔑 One of the biggest advantages of using a light microscope is that we can see living plants and animals or parts of them directly.

🔑 Light microscopes can also be used without electricity, which means they can be used anywhere in the world.

🔑 Light microscopes are relatively small and not very heavy, so they can be moved around easily.

🧠 Disadvantages of the light microscope

🔑 The biggest disadvantage of light microscopes is that their resolving power is limited by the wavelength of light.

🔑 Also we can't usually magnify living cells as much as we can dead tissue.

🧠 The Electron microscope

🔑 that uses a beam of electrons to form an image.

🔑 The electrons behave like light waves, but with a much smaller wavelength.

🧠 Advantages of the electron microscope

🔑 We can see much more detail using an electron microscope than with a light microscope.

🔑 It gives us much higher magnification and resolution.

🧠 Disadvantages of the electron microscope

🔑 All the specimens are examined in a vacuum because air would scatter the electron beam.

🔑 Electron microscopes are very expensive.

🔑 They rely on a constant source of electricity.

🧠 Cell

🔑 are the basic unit of life.

🔑 All living organisms are made up of units called cells.

🧠 Cell theory

🔑 The first cell discovered by Robert Hooke in 1665 about 300 years ago.

 **The seven life process that common to most living organisms.**

1.Nutrition

2.Respiration

3.Excreation

4. Growth

5. Irritability

6. Movement

7. Reproduction

 **Cell structure and function**

 All Cells have cytoplasm, Cell membrane, and nuclear materials.

 Almost all Cells have mitochondria, ribosomes, and endoplasmic Reticulum.

 **Only in plant Cell**

 Cell wall

 Chloroplast

 Large vacuoles

 **Only in animals Cell .**

 Lysosome

 Centriole (centrosome)

 **Nucleus:** controls all the activities of the cells.

 **Chromosome :** strand of DNA carring genetic information.

 **Cytoplasm :**is liquid gel (70% water)

 Contains organelles except Nucleus.

 Chemical reactions take place here.

 **Cell membrane** controls passage of materials (Co₂ O₂ H₂O) in and out of the cells.

 **Mitochondria** is the energy house of the cells It is where respiration take place

🔑 Muscles cells and secreting cells have lots of mitochondria.

🔑 **Endoplasmic Reticulum** used for transportation

🔑 Link the nucleus and the Cell membrane

🔑 It could be rough or smooth

🔑 It's a three-dimensional system

🔑 Rough contains ribosomes and so synthesis

🔑 Smooth lacks ribosomes and synthesis lipids.

🔑 Ribosomes used of protein synthesis

🔑 Golgi Bodies discovered by Camillo Golgi

🔑 Packing folding modifying and processing.

🔑 Protein and lipids for transport.

🔑 **Structure in unspecialized plant Cell**

🔑 Cell wall

🔑 made up of cellulose

🔑 Strengthens the cell

🔑 Chloroplast contain chlorophyll

🔑 Food preparation site

🔑 Premante (large)vacuoles fluid with cell sap found in adult plant cells

🔑 **Structure in unspecialized animals Cell**

🔑 Lysosome also called suicide bag

🔑 Produce digestive enzyme involved in breaking down bacteria and worn-out cells

🔑 Centriole (Centrosome)involved in cell division to form spindle fibers.

🔑 Chlorophyll they can absorb energy from sunlight to make food by photosynthesis

🔑 Vacuole a fluid filled cavity inside a cell.

Human Cell Specialization

 Embryonic stem cells the early that have the potential to form almost any the type of Cells.

 Unspecialized cell cells that have not yet assumed their final function characteristics.

 Specialized cell adapted to carry out a particular body function.

 **Epithelial cells** one cell thick arranged in thin sheet

 The cover our internal and external body parts protection.

They are specialized cells.

 **Reproductive cells**

 **There are two types of Reproductive cells**

 Egg

 Sperm

 **Neurons (Nerve cells)**

 Nerve cells or Neurons are a parts of communication and controls system of your Body.

 Dendrites are small hairy structure that can communicate with neighboring Nerve

 Cell can receive and transfer messages.

 Axon long Nerve fiber that conduct impulse covered by myelin sheath

 Cell body contains the nucleus recives impulses from dendrites.

 Myelin sheath it is a fatty acid substance that acts as an insulators It speed up the rate off messages transfer It is a source of fat.

 Muscles cells there are about 600 Muscles in our body.

 We have three types of Muscles.

 Cardiac Muscles is an involuntary Muscles the heart.

 They are striated (striped)Striated Muscles are the most common one in our Body.

🔑 Smooth Muscles is an involuntary Muscles found on viscera organs (intestine)

🔑 skeletal Muscles is attached to bones and allows movement

🧠 There are two proteins actin and myosin w/c help the Muscles to contract Our muscles contain lots of mitochondria.

🧠 Transportation in Organisms

🔑 Active is a type of transportation that need energy

🔑 Passive is a types of transportation that doesn't need energy

🔑 Diffusion

🔑 Osmosis

🧠 Diffusion

🔑 Due to random movement of particles Is the net (overall) movement of particles along concentration gradient (from higher Concentration to lower concentration).

🔑 Concentration is the way of measuring how many particles are at one place.

🔑 It's for gases and solution.

🧠 Factor that affect the rate of Diffusion

🔑 If it's temperature increased Diffusion also increases.

🔑 If it's concentration gradient increased Diffusion also increased

🔑 If it's surface area increase Diffusion also increased

🔑 If its Density increase Diffusion decreased

🧠 Diffusion in living organisms

🔑 The helps for the body to move important substance across the cell membrane e.g O₂ CO₂ glucose Amino acid

🔑 Individual cells may be adapted to make Diffusion easier and more adapted. E.g microvilli of the small intestine.

🧠 Osmosis Is a special types of Diffusion where only water moves across cell membrane.

🔑 This movement continues until the solution becomes the state isotonic condition.

🔑 **Isotonic** solution of equal solute concentration

🔑 **Hypotonic** a, solution with a greater solute concentration than another

🔑 **Hypertonic** a, solution with a lesser solute concentration than another.

🔑 **Solvent** liquid in which a solute is dissolved

🔑 **Solute** chemical that is dissolved in a solvent.

🔑 **Turgor** when the cytoplasm of a plant Cell is pushed hard against the cell wall by Vacuole which is filled with water 🔑 **Plasmolysis** when the cytoplasm of a plant Cell shrinks away from the cell wall due to Osmotic movement of water.

🔑 **Active transport** allows cells to move substance from an area of low concentration to An area of high concentration, completely against the concentration gradient.

🔑 **Active transport** uses energy produced by cellular respiration.