**Topic 2. Organisation of the organism**

**2.1 Cell Structure & Organisation**

* **Describe and compare the structure of a plant cell with an animal cell, as seen under a light microscope, limited to cell wall, nucleus, cytoplasm, chloroplasts, vacuoles and location of the cell membrane**
* **State the functions of the structures seen under the light microscope in the plant cell and in the animal cell**

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 **Plant cell (palisade cell) Animal Cell (liver cell)**

PARTS OF A CELL

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| --- | --- | --- | --- |
|  | **PART** | **DESCRIPTION** | **FUNCTION** |
| **Animal & plant cells** | Cytoplasm | Jelly-like, 70% is water | Chemical reactions take place hereContains cell organelles and ribosomes on rough endoplasmic reticulum & vesicles |
| Membrane | Surrounds the cell; partially permeable  | Controls what substances enter & leave the cell. |
| Nucleus | Contains DNA in the form of chromosomes | Controls cell division;Controls cell development;Controls cell activities. |
| Mitochondria | Site of aerobic respiration |
| Rough endoplasmic reticulum | Has ribosomes on it |
| **Plant cells only** | Cell wall | Tough layer made of cellulose, surrounds the cell membrane | Freely permeable (allows water and salts to pass through);Protects and supports the cell;Prevents plant cells from bursting |
| Sap vacuole | Fluid-filled space surrounded by a membrane | Contains salts and sugars (cell sap);Helps keep plant cells turgid (firm) |
| Chloroplast | Organelle containing chlorophyll | Chlorophyll taps light energy for photosynthesis |

The differences in structure between typical animal and plant cells:

|  |  |
| --- | --- |
| **PLANT CELLS** | **ANIMAL CELLS** |
| Have a cellulose cell wall outside the membrane | No cell wall |
| Often have chloroplasts containing chlorophyll | No chloroplasts |
| Often have one large vacuoles containing cell sap | Have only small vacuoles (vesicles) |
| Often have starch grains | Never have starch grains; sometimes have glycogen granules |
| Often regular in shape | Often irregular in shape |

* **State that the cytoplasm of all cells contains structures, limited to ribosomes on rough endoplasmic reticulum and vesicles**
* **State that almost all cells, except prokaryotes, have mitochondria and rough endoplasmic reticulum**
* **Identify mitochondria and rough endoplasmic reticulum in diagrams and images of cells**
* **State that aerobic respiration occurs in mitochondria**
* **State that cells with high rates of metabolism require large numbers of mitochondria to provide sufficient energy**

**2.2 Levels of organisation**

* **Relate the structure of the following to their functions:**

 **– ciliated cells – movement of mucus in the trachea and bronchi**

 **– root hair cells – absorption**

 **– xylem vessels – conduction and support**

 **– palisade mesophyll cells – photosynthesis**

 **– nerve cells – conduction of impulses**

 **– red blood cells – transport of oxygen**

 **– sperm and egg cells – reproduction**

|  |  |  |
| --- | --- | --- |
| **Structure** | **Special features** | **Functions** |
| **P:\imagesCAJF4Z5T.jpg** | The ‘hair’ gives a large surface area due to its elongated shape | Absorbs water and mineral ions;Anchor the plant firmly in the soil |
| **P:\imagesCAGJA1S3.jpg** | Have no nucleus;contain hemoglobin;biconcave shape (for greater surface area);flexible (so they fit through small capillaries). | Transport oxygen around the body. No nucleus so more room for oxygen bound to hemoglobin.  |

**Define tissue** - a group of cells with similar structures, working together to perform a shared function

**Define organ** - a structure made up of a group of tissues, working together to perform specific functions

**Define organ system** - a group of organs with related functions, working together to perform body functions

**State examples of tissues, organs and organ systems from sections 6 to 16**

**Identify the different levels of organisation in drawings, diagrams and images of both familiar and unfamiliar material**

**2.3 Size of specimens**

* **Calculate magnification and size of biological specimens using millimetres and micrometres as units**

Magnification (X) = Measured length (mm) ÷ Actual length (mm)