Lesson 1: Cells and Life

Revision Notes

Key Words:

1. **Cells –** basic functioning unit of living things
2. **Microscope –** a device used to magnify (make bigger) any specimen (object under observation)
3. **Magnification** – the number of times the object gets bigger under the microscope (e.g. 1000x means the object gets bigger 1000 times)
4. **Light microscope –** a microscope that uses light to see the specimen and has a lower magnification
5. **Electron microscope –** a microscope that uses **beam of electrons** and has a higher magnification
6. **Living things –** include all forms of bacteria, fungi, protists, plants, and animals and have characteristics of life (MRSGREN)
7. **Hierarchy –** arrangement from simple to complex
8. **Unicellular –** made up of one cell
9. **Multicellular –** made up of many cells
10. **Prokaryotic –** cell without the nucleus and the genetic information (DNA) is freely floating on the cytoplasm
11. **Eukaryotic –** cell where the DNA or the genetic formation is within the nucleus
12. **Homeostasis –** ability to maintain constant body conditions
13. **Stimuli –** anything that causes a response
14. **External stimulu/stimuli –** changes that happen outside the body and is passes to us through our sense organs (eyes, nose, ears, tongue, skin) e.g. levels of sunlight
15. **Internal stimuli –** any change that happens within the body e.g changes in blood sugar levels

CHARACTERISTICS OF LIVING THINGS

- For a living thing to be called living thing, it must possess certain characteristics.
- Such characteristics are:
  - **M**ovement
  - **R**espiration
  - **S**ensitivity
  - **H**omeostasis
  - **G**rowth & Development
  - **R**eproduction
  - **E**xcretion
  - **N**utrition

1. Living things are organized.

- Living things are organized from simple to complex.
- Organization starts from **cells→ tissues→ organs→ organ systems → organism**

2. Living things grow and develop.

- Living things grow and develop.
- **Growth refers to the increase in size.**
- **Development refers to the growth in mental and other skills.**

3. Living things reproduce.

- Reproduction is the ability to make offsprings similar to the parents.
- It can be **sexual and asexual reproduction.**

4. Living things respond to stimuli.

- **Stimuli** are changes that happen either inside or outside the body that the living things have to respond to.
- **Internal stimuli** are changes that happen inside the human body such as hunger, changes in blood sugar levels etc
- **External stimuli** are changes that happen outside the human body such as temperature, light levels, sound etc
- **Response** is the result or the outcome of the stimulus

5. Living things maintain internal conditions.

- **Homeostasis** is the ability to maintain stable internal conditions
- Humans need to maintain constant conditions such as: water levels, blood sugar, pH, temperature in order to survive

6. Living things use energy.

- Living things need energy to survive.

- Plants use the energy from the sun in the process of photosynthesis.
- Animals get the energy by feeding or eating from the producers or plants.

MICROSCOPE



Types of Microscope



Light Microscope



Electron Microscope

1. **Light Microscope**
   - Uses a light source to focus the object
   - It only has a magnification up to 1500 x which means that the object will only be bigger by 1500 times the original size.
2. **Electron Microscope**
   - Uses beam of electrons to focus the object

- It can magnify up to 100,000 x the original size of the object

TYPES OF ELECTRON MICROSCOPE

1. **Scanning Electron Microscope (SEM)**
    - Here the electrons pass the object and after reflected or bounce off the specimen to create a 3-D image

2. **Transmission Electron Microscope (TEM)**
    - Here the electrons are transmitted or is absorbed by the object

CELL THEORY

Robert Hooke

- First person who investigated the cells using a **cork stem**

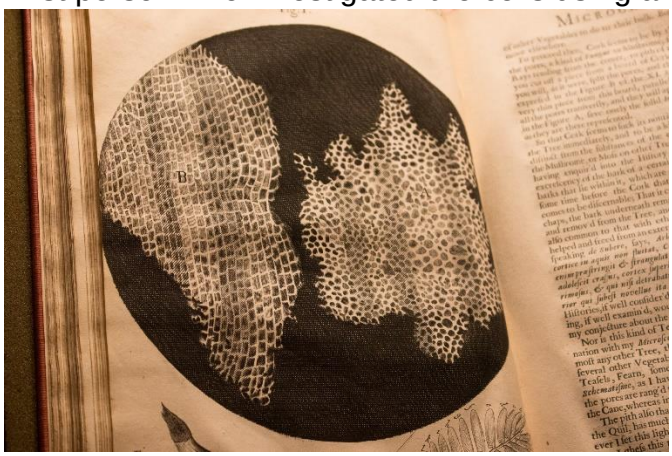


Image of Robert Hooke "Cork" cells

Anton van Leeuwenhoek

- Made the microscope that is more powerful than the one used by Robert Hooke
- He also studied cells from rain water and discovered **animal cules**

CELL THEORY

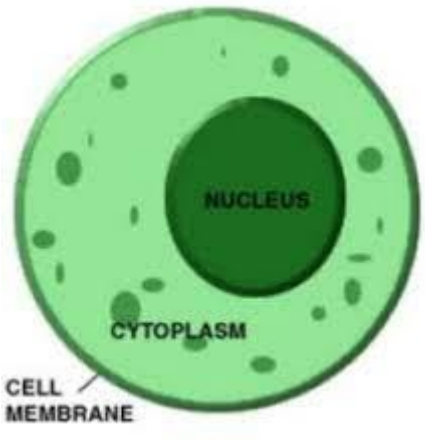
1. **All thing things are made up of cells.**
2. **Living things are the basic functioning unit of life.**
3. **All cells come from pre-existing cells. (**e.g. when we are wounded, the wounds heal)

TYPES OF CELLS according to Number

1. **Unicellular –** only one cell, **bacteria** are the best example of unicellular organisms
2. **Multicellular –** consists of many cells, cells of plants, animals, protists, and fungi are all multicellular.

THREE BASIC PARTS OF THE CELL

1. **Nucleus**
    - the central part of the cell, the “control center” or the “brain” of the cell because it is the one that controls all the activities within the cell
    - it contains the genetic information called the **DNA** that is responsible for the traits that parents pass to the offspring
2. **Cytoplasm**
    - The fluid or the watery part of the cell
    - This is where all the parts of the cell are found.
    - In the cytoplasm, all chemical reactions take place such as the photosynthesis and respiration.
3. **Cell Membrane**
    - The outer part of the cell
    - It is the one that controls what comes in and out of the cell (including oxygen, carbon dioxide, waster materials etc)
    - It is like a security guard



TYPES OF CELLS ACCORDING TO THE LOCATION OF DNA

1. **Prokaryotic**
    - These are organisms that do not have nucleus but they do have the DNA or the genetic material
    - The genetic material or the DNA is not surrounded by the nucleus but it is located on the cytoplasm
    - Moreover, they do not have organelles (or parts)
    - They are typically smaller than eurkaryotes
    - Bacteria are the example of prokaryotic
2. **Eukaryotic**
    - They have a definite nucleus where the DNA is found inside
    - They also have membrane-bound organelles
    - All forms of plants, animals, fungi and protist are eukaryote

CLASSIFICATION

- All living things need to be classified
- The biggest level of classification is the **Domain.**
- **Kingdom** is the next level of classification to **Domain.**
- There are **three domains:**
    - **Domain Archaea**
    - **Domain Bacteria**
    - **Domain Eukarya**
- There are **Six Kingdoms** of Living Things:
    - **Kingdom Archaea**
    - **Kingdom Bacteria**
    - **Kingdom Protista**
    - **Kingdom Fungi**
    - **Kingdom Plantae**
    - **Kingdom Animalia**

SUMMARY OF THE CHARACTERISTICS OF EACH KINGDOM

Domains and Kingdoms						
Domain	**Bacteria**	**Archaea**	**Eukarya**			
Kingdom	**Bacteria**	**Archaea**	**Protista**	**Fungi**	**Plantae**	**Animalia**
Example						
Characteristics	Bacteria are simple unicellular organisms.	Archaea are simple unicellular organisms that often live in extreme environments.	Protists are unicellular or multicellular and are more complex than bacteria and archaea.	Fungi are unicellular or multicellular and absorb food.	Plants are multicellular and make their own food.	Animals are multicellular and take in their food.