**Unit 1: Living things**

**1.1 What is biology?**

It’s the study of all organisms we find in nature.

**1.2 Characteristics of living organisms**

All organisms are characterize as being able to do seven things:

* Movement
* Respiration
* Sensitivity
* Growth
* Reproduction
* Excretion
* Nutrition

Remember it with the acronym **MRS GREN.**

**Movement** is any action that changes an organism’s position

**Respiration** allows our cells to receive energy from glucose or any other organic reaction in our bodies that turns food into energy.

**Sensitivity** is the ability to perceive, react or respond to changes in our surroundings.

**Growth** all organisms get larger in size by producing more cells or by cell enlargement. However this growth only persists until maturity.

**Reproduction** is the ability to produce offspring of the same species, by transmitting DNA to the new organism giving it similar characteristics as the parent.

**Excretion** means getting rid of poisonous waste products the body produces, these products are harmful if they remain the body for extended period of time e.g. we can’t breathe in carbon dioxide.

**Nutrition** means being able to retrieve energy from their surroundings in order to maintain growth, respiration, movement and other functions of the organism.

**Non-living organisms**

Non-living organisms lacks or have stopped showing the characteristics of a living organisms.

**Hierarchy of biological organization**

**Domains**

Groups are classified into broad groups.

The three domains are:

1. **Archaea** – contains Archaebacteria kingdom (bacteria living in harsh conditions)
2. **Bacteria –** contains Eubacteria kingdom (all other bacteria causing harm)
3. **Eukarya –** contains kingdoms Protista, Fungi, Plantae, Animalia

**Kingdoms**

The broadest level is known as a kingdom.

There are 6 kingdoms:

1. **Archaebacteria**
2. **Eubacteria**
3. **Protista**
4. **Fungi**
5. **Plantae**
6. **Animalia**

Other taxonomy categories include:

* **Phylum**
* **Class**
* **Order**
* **Family**
* **Genus**
* **Species**

Ranging from least to most specific.

Memorization tool: **D**r. **K**ing **P**hilip **C**ame **O**ver **F**or **G**ood **S**paghetti

**Details of each kingdom**

1. **Archaebacteria**

Domain: **Archaea**

* Believed to be one of the first cells to evolve.
* Unicellular
* Autotrophs
* Live in harsh conditions such as found in sewage, thermal or volcanic vents, hot springs, very salty water, etc.
* E.g. methanogens

1. **Eubacteria**

Domain: **Bacteria**

* Some may cause diseases
* Not found in harsh environments
* Considered essential decomposers in the environment
* Commercially important in making cheese, yogurt, etc.
* Unicellular
* E.g. Streptococcus

1. **Protista**

Domain: **Eukarya**

* Comes from Greek word meaning “*the very first”*, reflects they were the first eukaryotes to evolve.
* Eukaryotes; single-celled or simple multicellular
* Live in damp places or water.
* Consists of organisms which doesn’t really fit anywhere else.
* E.g. amoeba.

1. **Fungi**

Domain: **Eukarya**

* Eukaryotes; multicellular, except yeast (unicellular)
* Absorptive heterotrophs.
* Body is made up of a network of threads
* E.g. mushrooms, yeast, mold

1. **Plantae**

Domain: **Eukaryote**

* Eukaryotes
* Autotrophic
* Cell walls made of cellulose
* Immobile
* E.g. mosses, flowering plants, ferns.

1. **Animalia**

Domain: **Eukaryote**

* Eukaryotes; multicellular
* Heterotrophic
* Require oxygen for aerobic respiration.
* Animals reproduce sexually in most cases.
* Mobile
* Have nerves and muscles in their bodies
* E.g. mammals, worms, fish.

**Scientific naming convention**

***Genus species***

For example: ***Panthera leo,*** is the scientific name of a lion, “Panthera” is the genus name and “leo” is the species name.

**Justifications for classifying organisms**

1. We use the same language for all organisms, which offers some consistency and fairness.
2. Biologist are able to organize their knowledge and research if organisms are classified into different groups and sub-groups.

**Viruses**

Viruses do not fall under the 6 kingdoms of classification, as they do not exhibit the typical characteristics of living organisms e.g. respiration, reproduction, nutrition, etc. – unless they are inside of the cells of another organisms.

**Characteristics of angiosperms and gymnosperms**

**Angiosperms**

A group of plants which have the ability to produce seeds enclosed with “fruits”, which also include the normal fruits humans eat. These plants mostly also have flowering parts attached to the plant.

**Gymnosperms**

Usually have seeds unprotected by an ovary or fruit.

**Characteristics Monocots and Dicots**

|  |  |
| --- | --- |
| **Monocots** | **Dicots** |
| Flower parts in **4’s** or **5’s** | Flower parts in **3’s** |
| Seed with **two** cotyledon | Seed with **one** cotyledon |
| Has a ***parallel*** venation(veins in leafs) | Have a net-***veined*** venation |
| ***Fibrous*** roots are ***numerous***, thin, branching, with no ***main root***(taproot) | Have a ***taproot*** system, the ***large*** main root grows ***vertically*** downward. |

**Invertebrates and Vertebrates characteristics of animals**

**Invertebrates**

* No backbone
* Most are aquatic
* E.g. octopus, sponges, flatworms.

**Vertebrates**

* Have a backbone, consisting of individual bones called vertebrae.
* E.g. crocodile, lion, humans.

**Characteristics of different types of Chordates**

A chordate is an animal which comprises of vertebrates, lancelets and sea squirts.

**Agnathan**

* Are jawless fish
* Cold blooded
* Are parasites to other fish

**Chondrichthyes**

* Fish whose skeletons are made of cartilage
* Cold blooded
* E.g. sharks, rays.

**Osteichthyes**

* Fish whose skeleton is made of bone
* Cold blooded
* Have thermal mouths and gills are covered with a bony flap
* E.g. tuna, salmon

**Amphibians**

* Cold blooded
* *Amphibian* means two-life; lives on land and water.
* Semi-aquatic
* Water is essential to breed.
* Have smooth, wet skin
* E.g. frogs, salamander.

**Reptiles**

* Cold blooded
* Dry, scaly skin with horny scales
* Lay eggs on land
* Lay leathery shelled eggs
* E.g. snakes, crocodile, turtle

**Aves**

* Warm blooded
* Have wings and feathers
* Legs have scales on the lower part
* Light, hollow and large lungs allow for flight
* E.g. ducks, eagles

**Mammals**

* Warm blooded (endothermic)
* Give birth to live offspring
* Provide nutrition to babies with their own milk
* More or less covered with hair.
* Advanced nervous system
* Differentiated teeth
* E.g. lion, cheetah.