4.1. Comparison between prokaryotes and eukaryotes cell

Characteristics	Prokaryotes	Eukaryotes
Type of Cell	Always unicellular	Unicellular and multi-cellular
Cell size	Ranges in size from 0.2 µm – 2.0 µm in diameter	Size ranges from 10 µm – 100 µm in diameter
Cell wall	Usually present; chemically complex in nature	When present, chemically simple in nature
Nucleus	Absent. Instead, they have a nucleoid region in the cell	Present
Ribosomes	Present. Smaller in size and spherical in shape	Present. Comparatively larger in size and linear in shape
DNA arrangement	Circular	Linear
Mitochondria	Absent	Present
Cytoplasm	Present, but cell organelles absent	Present, cell organelles present
Endoplasmic reticulum	Absent	Present
Ribosome	Small ribosomes	Large ribosomes
Lysosome	Lysosomes and centrosomes are absent	Lysosomes and centrosomes are present
Cell division	Through binary fission	Through mitosis
Flagella	The flagella are smaller in size	The flagella are larger in size
Reproduction	Asexual	Both asexual and sexual
Example	Bacteria and Archaea	Plant and Animal cell

4.2. characteristics of living things (organisms)

Life process	Explanation
Movement	All living things move in some way. This may be obvious, such as animals that are able to walk, or less obvious, such as plants that have parts that move to track the movement of the sun.
Respiration	Respiration is a chemical reaction that happens within cells to release energy from food.
Sensitivity	The ability to detect changes in the surrounding environment.
Growth	All living things grow.
Reproduction	The ability to reproduce and pass genetic information onto their next generations .
Excretion	Getting rid of waste.
Nutrition	The intake and use of nutrients. This occurs in very different ways in different kinds of living things.

4.3. Homeostasis : any self-regulating process by which biological systems tend to maintain stability while adjusting to conditions that are optimal for survival. If homeostasis is successful, life continues; if unsuccessful, disaster or death ensues. The stability attained is actually a dynamic equilibrium, in which continuous change occurs yet relatively uniform conditions prevail. The general idea of this self-regulating process was explored by French physiologist Claude Bernard in 1849 and the word homeostasis coined by American neurologist and physiologist Walter Bradford Cannon in 1926.

4.3.1. Elements and components maintains homeostasis

Name	Function
Platelets	It assists blood clotting.
Red blood cells	Helps in transporting hydrogen and oxygen ions.
White blood cells	It fights against infections.
Nutrients	Required for cellular metabolism.
Proteins	Create osmotic pressure, aids clotting, and helps buffer blood.
Hormones	Known as chemical messengers.
Water	Provides fluid environment.
Salts	Helps in metabolic activity and aids the buffer in blood.
Wastes	Produced by cellular metabolism.

4.3.2. Examples of Homeostasis

- Blood glucose homeostasis.
- Blood oxygen content homeostasis.
- Extracellular fluid pH homeostasis.
- Plasma ionized calcium homeostasis.
- Arterial blood pressure homeostasis.
- Core body temperature homeostasis.
- The volume of body water homeostasis.
- Extracellular sodium concentration homeostasis

4.4. Metabolism : The chemical changes that take place in a cell or an organism. These changes make energy and the materials cells and organisms need to grow, reproduce, and stay healthy, there are the two broad classes of biochemical reactions that make up metabolism.

4.4.1. Anabolism : is the synthesis of complex molecules from simpler ones. These chemical reactions require energy.

4.4.2. Catabolism : is the breakdown of complex molecules into simpler ones. These reactions release energy.

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