

A DAY IN LIFE AS A BIOKID TEACHER

UNIFYING THEMES ABOUT LIFE



1.4. UNIFYING THEME ABOUT LIFE



- All organisms share common characteristics that guide in defining what means by life.
- We are all surrounded by living and nonliving things, but sometimes, it is not easy to decide which ones are living and which ones are not.
- The main question that we're going to answer is: **“What characteristics do all living things share?”**

MAJOR THEMES IN BIOLOGY



Gathering and Using Energy

ENERGY - is the ability of organisms to do work that allows them to move.

CELLULAR RESPIRATION - the process by which energy is released by the breakdown of food substances.

METABOLISM - the sum of all chemical processes and energy changes happening inside the body of an organism.

NUTRITION - the process by which organisms acquire food.

In plants, they acquire energy directly from sunlight via photosynthesis. Humans and animal derive energy indirectly from sun by ingesting food. Fungi obtained energy by absorbing nutrients from dead or living organisms.



MAJOR THEMES IN BIOLOGY

✓ Maintaining Internal Balance

EXCRETION - the process of removing waste. This include carbon dioxide, water, mineral salts, and nitrogenous waste products.

Organs involved in waste elimination include **skin, lungs, kidneys, large intestine, urinary bladder.**

HOMEOSTASIS - the maintenance of body's internal environment.

At the metabolic level, the chemical reactions are processed to ensure efficient coordination via **enzymes.**

In organismal level, regulatory chemicals in the form of **hormones** control functions of activities, growth and development.





MAJOR THEMES IN BIOLOGY



Responding, Adapting and Evolving

MOTILITY OR LOCOMOTION - movement of organisms which includes walking, flying, swimming, gliding or jumping.

Corals may not appear moving all the time, which they are considered as **sedentary**. But, they can move parts of their body.

Plants show **slow movements** of body parts like flowers blooming, tendrils clinging for support, shoots bending toward light, and veins creeping as they grow.

Microorganisms also move from one place to another using their **locomotory organs such as cilia, flagella and pseudopods**.

Animals exhibit movements for a variety of reasons - in search of food, the process of reproduction and response to change.

MAJOR THEMES IN BIOLOGY

Responding, Adapting and Evolving

✓ **TROPISM OR RESPONSE** - the reaction of an organism to stimuli.

SENSITIVITY or IRRITABILITY - the ability of an organism to respond appropriately to a stimulus.

Examples:

- Houseflies are easily attracted to smelly food.
- Sunflowers bend their stalk and follow the sun's direction.
- A baby cries when hungry.



MAJOR THEMES IN BIOLOGY



Responding, Adapting and Evolving

INDIVIDUAL ADAPTATION - happens more slowly than responding to stimulus because changes need to occur in the organism.

Living things need to adapt because the environment where they live in varies and constantly changes.

Example:

Food supply can be limited, temperature and relative humidity fluctuate, and natural calamities occur.

Some plants adjust their individual adaptation depending on the length of day.



MAJOR THEMES IN BIOLOGY

Responding, Adapting and Evolving

✓ **EVOLUTIONARY ADAPTATION** - is gradual or rapid change in body structure or behavior to be better suited to survive in the new environment.

EVOLUTION - refers to the changes in the characteristics of a group of organisms (species) over time.

Example:

- **Camouflage** - is the ability of some animals to change color and body structure in order to blend with their environment.
 - Walking stick & sea horse
- **Modified beaks** as a result of adaptation due to different feeding habits.



MAJOR THEMES IN BIOLOGY



Growth and Development

Growth - is the irreversible **increase in size, mass, or number of cells** in a living organism. It usually results from cell division (mitosis) and cell enlargement.

- **Plant:** A seed germinating into a seedling and increasing in height and leaf number
- **Animal:** A puppy growing into an adult dog with increased body size
- **Microorganism:** Bacteria increasing in number through binary fission



MAJOR THEMES IN BIOLOGY

Growth and Development

✓ **Development** - refers to the **progressive changes in form, structure, and function of an organism** as it matures. It involves cell differentiation and specialization.

Examples:

- Plant: A flowering plant developing from vegetative growth to producing flowers and fruits
- Animal: A tadpole developing into a frog
- Microorganism: A bacterium forming spores under unfavorable conditions



MAJOR THEMES IN BIOLOGY



Growth and Development

- **Intussusception** is a type of growth in living organisms where new living material is added within the existing structure through internal cell division and differentiation. This is a characteristic feature of living organisms, as growth occurs from within, not by surface addition.
- **Accretion** is the increase in size of nonliving objects by the external addition of materials to their surface. This process does not involve cell division or metabolism.

Examples:

- Formation of layers of rock or sediment
- Growth of crystals by deposition of particles
- Rusting of iron, where layers build up on the surface



MAJOR THEMES IN BIOLOGY



Reproduction

- **Reproduction** is the biological process by which living organisms produce new individuals of the same species, ensuring the continuity and survival of life.
- **Sexual reproduction** involves the fusion of male and female gametes, resulting in offspring that are genetically different from their parents.
- **Asexual reproduction** involves only one parent and no fusion of gametes, producing offspring that are genetically identical to the parent.



MAJOR THEMES IN BIOLOGY

Heredity: Unity Amidst Diversity

- **DNA** is the molecule that carries genetic information in living organisms. It contains the instructions for growth, development, functioning, and reproduction of cells and organisms.
 - DNA is found mainly in the nucleus of eukaryotic cells and in the cytoplasm of prokaryotes.
- Proteins are responsible for the diversity of structures and functions in living organisms.
- DNA explains the unity of life because all living organisms use the same genetic code.



MAJOR THEMES IN BIOLOGY



Living and Interacting

- **The vertical organization of life** refers to the hierarchical levels of biological organization, arranged from the simplest to the most complex.
- **Atoms** (such as carbon, hydrogen, oxygen, and nitrogen) are the basic chemical units of life. They combine to form molecules essential for living organisms.
- **Molecules** are formed when atoms bond together. Important biological molecules include water, carbohydrates, lipids, proteins, and DNA, which carry out vital life functions.



MAJOR THEMES IN BIOLOGY



Living and Interacting

- **Organelles** are specialized structures within cells that perform specific tasks.
- **Cell** is the basic unit of life. All living organisms are made of one or more cells. Cells carry out essential processes such as metabolism, growth, and reproduction.
- **Tissue** is a group of similar cells working together to perform a specific function.
- **Organ** is made up of different tissues working together for a specific function.
- **Organ system** consists of organs that cooperate to perform major body functions.





MAJOR THEMES IN BIOLOGY



Living and Interacting

- An **organism** is an individual living thing capable of carrying out all life processes independently.
- A **population** is a group of organisms of the same species living in the same area at the same time.
- A **community** includes different populations of different species interacting within an area.
- An **ecosystem** consists of a community of organisms interacting with their abiotic (nonliving) environment, such as water, air, and soil.
- The **biosphere** is the highest level of organization, encompassing all ecosystems on Earth where life exists.

MAJOR THEMES IN BIOLOGY



Living and Interacting

Horizontal Dimension of the organization of life show the diversity and richness of organism inhabiting the planet.

1. Domain Bacteria (prokaryotes)

- Kingdom: **Eubacteria**
- Characteristics: unicellular; cell wall contains peptidoglycan; diverse metabolism; found in almost all environments

2. Domain Archaea (prokaryotes)

- Kingdom: **Archaea**
- Characteristics: unicellular; no true nucleus; cell walls lack peptidoglycan; often live in extreme environments (hot, salty, acidic)



MAJOR THEMES IN BIOLOGY



Living and Interacting

3. Domain Eukarya (eukaryotes)

- Kingdom: **Protista**
- Characteristics: mostly unicellular; aquatic; some autotrophic, some heterotrophic

- Kingdom: **Plantae**
- Characteristics: autotrophic; photosynthetic; cell wall made of cellulose.

- Kingdom: **Fungi**
- Characteristics: mostly multicellular; heterotrophic by absorption; cell wall made of chitin

- Kingdom: **Animalia**
- Characteristics: heterotrophic by ingestion; no cell wall; capable of movement

