

Chapter 1 The living world

The assembly of molecules is the special process that is life. These molecules go through a variety of chemical processes known as metabolism to carry out their distinct roles. Energy is produced and used as a result of this. Through the synthesis of several biomolecules, metabolism leads to the growth, development, reproduction, adaptations, etc. of living things.

It has been discovered that all living things, whether they are terrestrial, or aquatic, found in mountains, deserts, oceans, forests, etc., have some genetic similarities.

Important traits shared by living things include development and growth, homeostasis, body organization, reproduction, adaptability, and energy use.

What is Growth

To differentiate whether an organism is living or not, various characteristics need to be checked in the case of living organisms.

Characteristics of Living Organisms

The characteristic of living organisms is given below -

GROWTH

Any living thing can grow and expand, which increases the mass and quantity of cells in the body. Cell division is how multicellular creatures proliferate. Plants and animals grow because of the process

of cell division. In plants, cell division happens continuously throughout their existence, however in mammals, cell division happens only until a specific age at which point the cells lose their ability to divide.

Both the number of cells and body mass increase as a result of it.

Examples include sand mounds, mountains, and boulders that grow by the accumulation of materials despite not being live things. Therefore, growth cannot be considered the determining factor of an organism's status as living.

METABOLISM

Because the body and its organs are made of numerous chemicals, they carry out a variety of metabolic processes that transform chemicals into other biomolecules. Every animal, including bacteria, and plants, has a metabolism. In non-living creatures, it is absent, but it can be added using the in-vitro technique.

SENSITIVITY

All living things, including prokaryotes and eukaryotes, react to their environment and external stimuli, which might be chemical, biological, or physical. Living things respond appropriately to their stimuli and are sensitive to their surroundings. There are three types of stimuli: chemical, physical, and biological.

REPRODUCTION

The process of reproduction, which is only seen in living things, is the capacity to create offspring. Fungal reproduction happens through spores, whereas hydra reproduction happens through budding, and

planaria reproduction happens through regeneration. These are all examples of asexual reproduction.

In contrast to the absence of reproduction in mules, infertile human couples, etc., reproduction is the growth in the number of cells. Therefore, growth and reproduction are interchangeable and should not be used to differentiate between different living things.

CELLULAR ORGANIZATION

As all living things are composed of cells that aid in carrying out different cellular tasks leading to the growth and development, reproduction, metabolism, etc. in the body, the cellular organisation is the defining feature of all living things. Non-living things lack cellular organization since they are not composed of cells.

MOVEMENT

All of the living organisms can move, and plants in particular follow the path of the sun.

Example: A candle's flame and a crystal's crystal do not move, but mango trees may be seen to move, grow, and develop as well as reproduce, which leads to the production of additional trees from their seeds. Mango trees are therefore considered to be alive since they exhibit movement, in contrast to crystals and candles, which do not.

Living things are also those that possess awareness and consciousness of their environment.

Diversity in the Living World

The primary habitat of all living things is Earth. There are millions of living things on Earth that we occasionally are unable to perceive with the naked eye. It is discovered that these organisms can be found residing in a variety of environments, such as lakes, mountains, hot springs, woods, and deserts.

The Earth is home to a variety of plant, animal, and insect species. This is crucial, and their adaptability is essential to their existence. There are 1.7-1.8 million species that have been recognised and investigated. Collectively, they constitute the world's natural diversity of life, sometimes known as biological diversity or biodiversity.

TAXONOMY

Taxonomy is a scientific field that involves the study of the identification, nomenclature, categorization, and characterization of species. Another field of research that looks at an organism's taxonomy, nomenclature, identification, and evolutionary history is called systematics. Systematics, then, is the study of organisms' taxonomic traits and evolutionary background. While systematics was first introduced around the dawn of human civilization, taxonomy was first used by A.P. de Candolle in 1813.

The Latin word "systema," which refers to the orderly arrangement of organisms, is where the word "systematics" originates. In his work *Systema Naturae*, Linnaeus introduced taxonomy as a means of classifying plants and animals.

The area of systematics that studies species thought to be the result of evolution is called neo-systematics. It was Julia Huxley who

created this idea in 1940. It includes established traits of an organism as well as established data from several biological domains.

Binomial Nomenclature

With his work in the 1753 book *Species Plantarum*, Carl Linnaeus is credited with introducing the binomial nomenclature of plants and animals. The biological system of identifying organisms known as binomial nomenclature uses two terms to describe each organism: the first term designates the organism's genus, and the second term designates its species. For instance, *Mangifera indica* Linn.

The species name is *Indica*, and the genus name is *Mangifera*. This discipline of biology deals with the identification, nomenclature, and categorization of organisms. Linn denotes that Linnaeus was the first person to describe this species.

1. A scientific name often consists of two Latin words, or is derived from Latin, regardless of the terms' original language.
2. The genus name is indicated by the first word in the biological name, and the species name is indicated by the second.
3. The species name is scrawled in italics or independently underlined when using the binomial nomenclature system.
4. A specific name should begin with a tiny letter, whereas a generic name must begin with a capital letter.
5. The author's name appears at the end, following the name of the species, either in Roman or shortened form.

6. Each taxonomic group should only have one correct name assigned to it.

7. The scientific name that is chosen should be brief and simple to pronounce.

For instance, *Mangifera indica* is the name of the species; *Mangifera* is the genus name.

Rules

Generic Name	Specific Epithet	Common Name
Mangifera	indica	Mango
Solanum	tuberosum	Potato
Solanum	nigrum	Nightshade
Panthera	leo	Lion
Panthera	tigris	Tiger
Homo	sapiens	Man

Taxonomical Aids

Taxonomical tools are helpful in industry, forestry, and agriculture as well as in the study of our bioresources. It can be applied in the lab as well as in the field. Taxonomists use a variety of taxonomical tools to assist them in the identification, nomenclature, and classification of species.

Herbaria, botanical gardens, museums, zoological parks, and keys are among the significant taxonomic areas.

Museum

The museum serves as an archive for artistic and informative plants and animals that are displayed for public viewing. There are many different kinds of museums, such as the science, zoological, and natural science museums.

Every museum owned by the college is kept up to date by the departments of zoology and botany. Animals can also be kept for a longer period of time by being placed in jars or other containers with chemical solutions. After the catalogue is created, the specimens are labelled, recognised, and kept.

Additionally preserved as dry specimens are the plant and animal specimens. For example, insects are collected, killed, and pinned before being preserved in insect boxes, but birds and mammals are first stuffed before being preserved. In museums, the animal's skeletons are kept intact.

Botanical Gardens

These are the gardens that are in charge of raising and conserving a diverse array of plants. These plants are designated as reserved, marked with their botanical names on a label. It is an assortment of numerous plant species, including garden herbs, succulents, and many more exotic plants.

Educational exhibits, art shows, and outdoor theatre musical performances with tours and other entertainment are available for

visitors. They operate under the jurisdiction of academic institutions or scientific research groups that link herbaria with botanical science research initiatives. Around the world, there are more than 600 botanical gardens.

The Hanging Gardens of Babylon, one of the World's Wonders, is the oldest botanical garden in existence.

Known as the botanical capital of the world, the Royal Botanical Garden at Kew in England is the biggest botanical garden worldwide. Bentham and Hooker made the discovery.

The largest botanical garden in India is the Indian Botanical Garden in Kolkata, while the largest tropical botanical park in Asia is the Tropical Botanical Park in Thiruvananthapuram, Kerala.

Herbarium

A collection of dried, labeled, and preserved plant specimens is called a herbarium. Following their collection, the plant species are first dried, pressed, mounted, and labeled on herbarium sheets.

The following are the steps in the herbarium technique:

gathering diverse specimens from diverse locations.

Drying the specific specimen either by iron drying it or by sandwiching it between several newspaper folds.

Poisoning is accomplished by dipping the specimens in mercuric chloride.

The dried specimens are mounted on the herbarium sheets using cello tape or glue.

Some specimen parts, such as stems, are sewed to remain in place on the sheet even when they are challenging to connect to.