THE LIVING WORLD

What is Growth

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

Growth: All living organisms can undergo the process of growth and development that results in an increase in the mass and number of cells. Multicellular organisms grow by cell division. The growth of plants and animals takes place with the help of cell division. In the case of plants, the cell division occurs throughout their life while in the case of animals the cell division occurs up to a certain age, and then the cells lose their capability to divide.

It results in an increase in body mass and increases in the number of cells.

Examples: Mountains, boulders, sand mounds, etc grow by the accumulation of the materials although they are non-living. So, growth cannot be taken as the factor which categorizes the organism as living.

Metabolism: As the body and organs are the constituents of different chemicals, they perform various metabolic functions that result in the conversion of chemicals into other biomolecules. All plants, animals, and microbes exhibit metabolism. It is absent in the case of non-living organisms but may be introduced through the in-vitro method.

Sensitivity: The living organisms whether prokaryotes or eukaryotes respond according to their surroundings and the stimuli present around them, it may be physical, chemical, or biological. The living organisms are sensitive about their surroundings and are responsible in accordance with their stimuli. The stimuli can either be biological, physical, or chemical.

Cellular Organization: It is the defining characteristic of living organisms since all living organisms are made up of cells that help in performing various cellular functions resulting in the growth and development, reproduction, metabolism, etc in the body. Since non-living organisms are not made up of cells so they do not have cellular organization.

Movement: The lining organisms show movement and locomotion and more specifically plants move according to the movement of the sun.

Example: The flame of a candle and a crystal do not show movement while if we take mango trees then we can see they undergo movement, growth, and development along with reproduction and results in the production of more trees through their seeds. Thus mango trees are said to be alive as they show movement while candles flame and crystal are not alive.
Also, the organisms that are aware and are conscious of their surroundings will be living organisms.

What is Living?

We do know that all living organisms reproduce, grow and metabolize. But when we look at the microscopic realm, the actual definition of life is rather blurred. For

instance, viruses are basically a nucleic acid that is protected by a protein coat. They exhibit no typical characteristics of living organisms such as reproduction, until and unless it is inside a host.

Another "organism" that borders between the living and non-living are Prions. These are essentially misfolded proteins can reproduce by making other healthy proteins to misfold. These entities are responsible for causing diseases such as Spongiform Encephalopathy, fatal familial insomnia, which are almost always fatal. In conclusion, the realm between the living and the non-living differs even now as the definition of "life" is ambiguous.

Characteristics of Life

Living organisms exhibit undisputable signs of life – such as growth, reproduction and metabolism. Higher organisms such as humans showcase consciousness – where we become aware of our surroundings. Similarly, consciousness may be observable in many lower forms of life such as bacteria and protozoa. When these organisms engulf food or react to their environment, it is done primarily to ensure survival.

Diversity in the Living World

In response to the sheer number of organisms discovered to date, a system of standardizing names was implemented. Binomial nomenclature assigns a two-part scientific name to an organism. Botanists and zoologists follow set principles and criteria when assigning a scientific name to an organism. For instance – plant names are assigned based on the principles and criteria set by the International Code for Botanical Nomenclature (ICBN). Similarly, animal names are assigned on the basis of the International Code of Zoological Nomenclature (ICZN).

Classification of organisms according to the aforementioned conventions involved a hierarchy of steps, with each step representing a category or a rank. The most basic unit of classification is species. A species is a group of individual organisms with fundamental similarities.

Reproduction

Reproduction, a characteristic of living organisms is the process of producing off springs, possessing features similar to those of parents. In multicellular organisms, the mode of reproduction is generally sexual. Living organisms also reproduce by asexual means.

Some examples are given below.

- Fungi spread and multiply fast by producing millions of asexual spores. Some fungi, the filamentous algae and the protonema of mosses multiply by fragmentation.
- In yeast and Hydra, budding occurs to produce new organisms. While, in Planaria (flatworm),
- regeneration of fragmented body parts occur. These parts in turn grow as a new organism.
- Unicellular organisms like bacteria, algae and Amoeba reproduce by

increasing the number of cells, i.e., through cell division (growth is synonymous with reproduction).

- Some organisms like mules, sterile worker bees, infertile human couples, etc., do not reproduce. Hence, reproduction also cannot be an all-inclusive defining characteristic of living organisms.

Metabolism

Metabolism is an another characteristic and defining feature of all living things. The sum total of anabolic or constructive reactions (anabolism) and catabolic or destructive reactions (catabolism) continuously occurring inside the body is called metabolism.

Metabolism: Anabolism + Catabolism Metabolism occurs in all unicellular and multicellular organisms. Its two stages include, i.e., anabolism, the process of building up or synthesis of complex substances from simpler ones, e.g., Photo synthesis and catabolism, the process of breakdown of complex substances into simpler substances, e.g., Respiration, releasing waste outside.

Metabolic reactions can also be demonstrated outside the body in cell free systems, which are neither living nor non-living. Thus, these reactions in vitro are surely living reactions not living things. Hence, metabolism can be considered as a defining feature of all living organisms without exception.

The important differences between anabolism and catabolism are:

Catabolism	Anabolism
Catabolism breaks down big complex molecules into smaller, easier to absorb molecules.	Anabolism builds molecules required for the body's functionality.
The process of catabolism releases energy.	Anabolic processes require energy.
Hormones involved in the processes are adrenaline, cytokine, glucagon, and cortisol.	Hormones involved in the process are estrogen, testosterone, growth hormones and insulin.
Examples of catabolic processes are proteins becoming amino acids, glycogen breaking down into glucose and triglycerides breaking up into fatty acids.	Examples include the formation of polypeptides from amino acids, glucose forming glycogen and fatty acids forming triglycerides.
In catabolism, potential energy is changed into kinetic energy.	In anabolism, kinetic energy is converted into potential energy.
It is required to perform different activities in living entities.	It is required for maintenance, growth, and storage.

Cellular Organization

The cells are the building blocks of all living things whether plants, animals or humans. The unicellular organisms are made of a single cell, while multi cellular organisms are formed by millions of cells. The cells contain protoplasm (living

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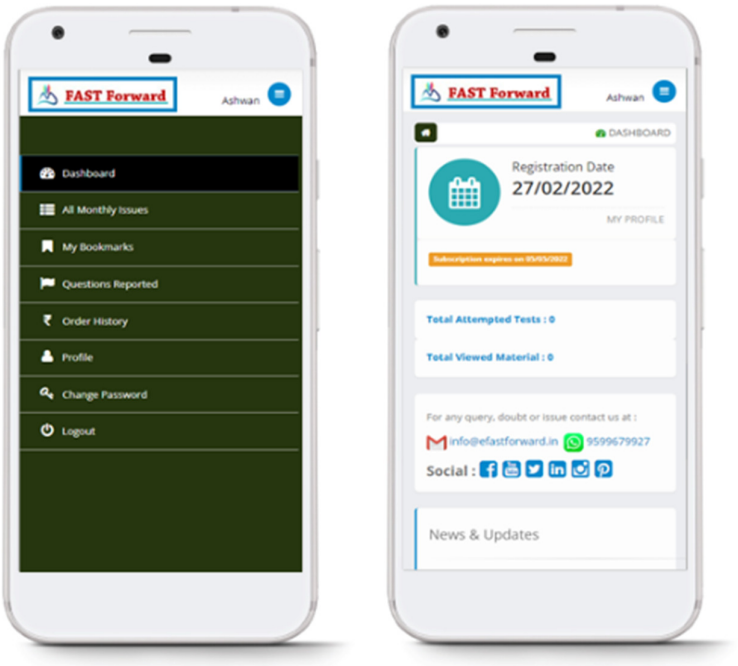

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