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CLASS 11 & 12th



Learning Inquiry
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CLASS 11th

The Living World

misostudy



01. Introduction

- Biology; Bios = life, Logos = Study, means study of life is biology.
- “**Biology** is the science of life forms and living processes”
- **Systematic** and **monumental** description of life forms made human to make a detailed system of identification, nomenclature and classification of organisms i.e. **Taxonomy**.
- Hence the study of identification, nomenclature and identification is called taxonomy.
- All the organisms have been evolved by a very long and complex process of **evolution**, so they all are related to each other by sharing of some **common genetic material** but up to varying degrees. This sharing may be less or more among different cases..
- When human came to know this fact then he humbled and led to cultural movements for conservation of **biodiversity**.
- Sharing of common characters was also proved when human studied the similarities among living organisms both **horizontally** and **vertically**.
- The living world is full of amazing diversity of living organisms.
- The diversity of habitats of organisms is also very vast and amazing.
- This diversity makes us deeply reflect on “What indeed is life” ? This question actually asks to solve two problems.
 - (i) First is a technical → What living is as opposed to the non living means **Living v/s Non living**.
 - (ii) Second is a philosophical one → what the **purpose of life** is?
As scientists we will try to solve the first question, because the second question is more related to philosophy rather science.

02. Characters of Living Organism

Following are the main characters of “living”-

GROWTH } Not the defining properties/characters/features
REPRODUCTION }

METABOLISM } Defining properties/characters/features
CELLULAR ORGANISATION }
CONSCIOUSNESS }

The character which has no exception is called as **defining property** of life.

Growth

- Increase in mass or overall size of a tissue or organism or its parts is called growth.
- Increase in mass and increase in number of individuals are twin characters of growth.
- Growth is an irreversible permanent increase in size of an organ or its parts or even of an individual cell.
- Growth is of two types :
 - (a) **Intrinsic growth** :- This growth is from inside of the body of living organisms.
 - (b) **Extrinsic growth** :- This growth is from outside i.e. accumulation of material on any body surface Non living exhibits this type of growth.

- Growth is of two types :
 - (a) **Indeterminate growth = Unlimited growth** → Growth which occurs continuously throughout their life span is indeterminate growth or unlimited growth. It occurs in plants and not in animals.
 - (b) **Determinate growth = Limited growth** → Growth which occurs only up to a certain age is determinate growth or Limited growth. It occurs in animals. However, cell division occurs in certain tissues to replace lost cells.
- In majority of higher plants and animals, growth and reproduction are mutually **exclusive events**.
- Because both living and nonliving exhibit growth so it can not be taken as defining property.
- Growth from inside (intrinsic growth) can be taken as **defining property**.

Reproduction

Reproduction is one of the fundamental characteristics of living organisms. It can be defined as the production of new individuals of same kind by the grown up individuals. It is characteristic exhibited by living organisms which can produce new young ones of their own kind. There are two modes of reproduction — **asexual** and **sexual**.

- In lower organisms like yeasts and Hydra, budding takes place in which new individuals are produced by the formation of an outgrowth known as ‘bud’.
- Fragmentation is another mode of asexual reproduction, as in this, body of an organism (parent body) breaks up into two or more parts (known as fragments) each of which grows into a new individual. It is also quite common in filamentous algae, fungus, bryophytes (at protonema stage which occurs during life cycle in mosses).
- Planaria (flat worms) exhibit an extraordinary ability to regenerate its lost body parts completely (which is known as true regeneration).
- This is a method of reproduction as new planarians develop by splitting of parent planarian body either lengthwise or transversely. In higher organisms like plants, animals sexual mode of reproduction is quite common which involves formation of gametes (i.e., sex cells) from two parents of opposite sexes but same species. These gametes then fuse to form zygote (2n) which develops to form a new organism of same kind.
- Hence, reproduction is shown by all living organisms except a few which are either sterile or infertile, like mule, worker-bees, infertile human couples, etc. do not reproduce at all.
- Hence, reproduction can be regarded as characteristic of living organisms but it is not their exclusive defining characteristic.

Metabolism :

- The sum total all the chemical reactions occurring in our body is metabolism.
- All living organisms, both unicellular and multicellular exhibit metabolism.
- No non-living object shows metabolism.
- In this way metabolism is a defining character of living organisms because it has no exceptions.
- Now we have known most of the chemical or metabolic reactions occurring in our body so we can demonstrate many of them in a cell free medium or in a test tube in lab.