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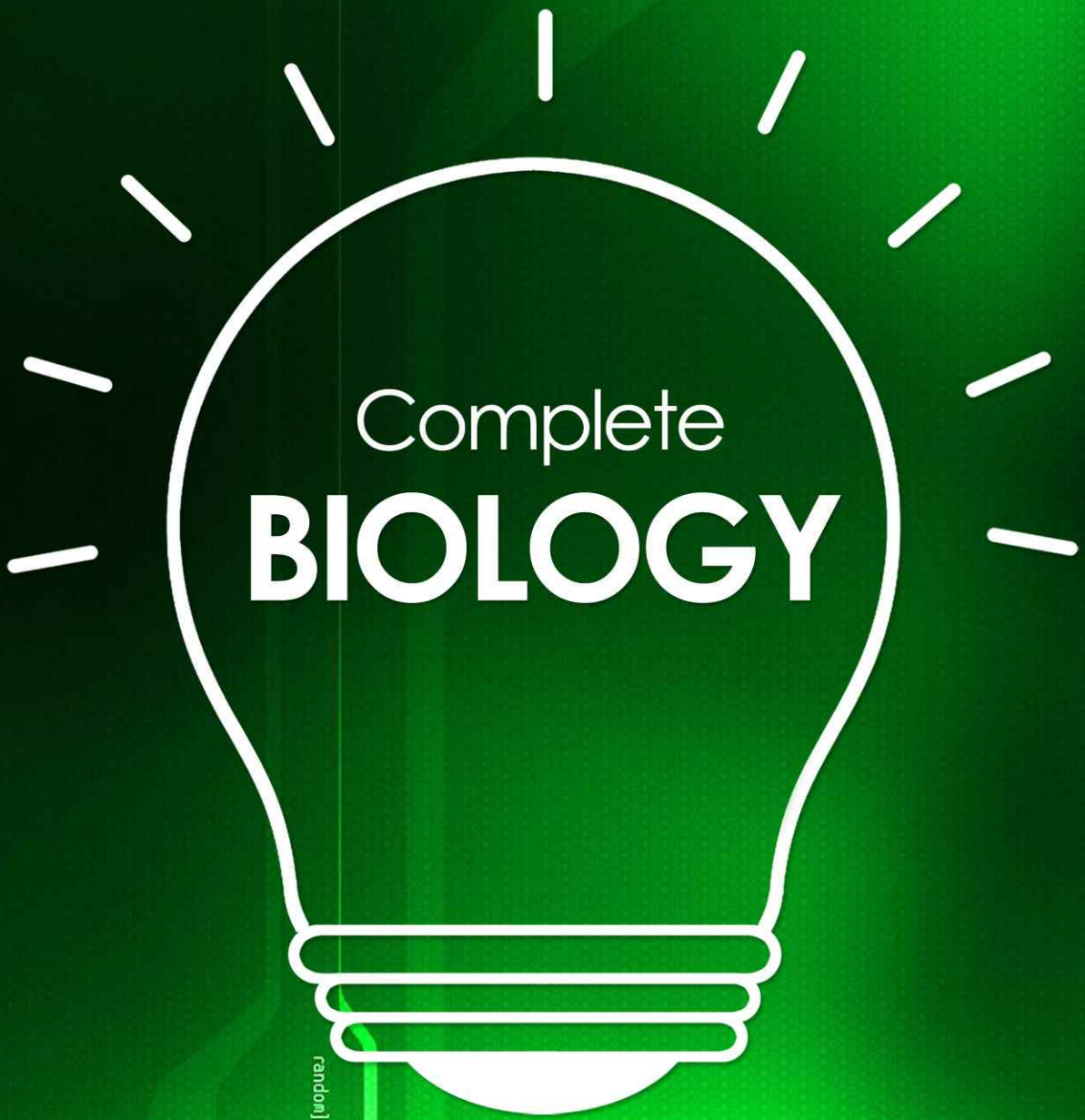

Complete BIOLOGY

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CLASS 11th

The Living World

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, REPRODUCTION } Not the defining properties/characters/features

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

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 exhibts 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 occuring 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 occuring in our body so we can demonstrate many of them in a cell free medium or in a test tube in lab.

- The isolated metabolic reaction outside the body of an organism, performed in a test tube (in-vitro) is neither living nor nonliving.
- These isolated reaction can be regarded as living things, but they are definitely living reactions because they are similar to the reactions performing in our body.
- Here we should not forget the fact that metabolism is the total sum of all the chemical reactions performing in our body, it is not the sum of few or more living reactions.
- All organisms are made of small or big chemicals perform thousands of reactions and form some other chemicals also in the bodies of living organisms.
- All plants, animals, fungi and microbes exhibit metabolism.

Consciousness

- Most obvious and technically complicated feature of all living organism. All living organisms are able to detect changes, i.e., sense their surroundings and can also respond to them. This is known as sensitivity which is defined as the ability to detect changes in the environment and to give response towards it accordingly. Any change that can be detected by an organism is called stimulus. This can be physical (like intensity, duration, direction of light, sound, change in temperature, duration of day length, i.e., photoperiod, etc.), chemical (like acids, pollutants, etc.) or biological (like other organisms).
- Besides, human being is the only organism, who is aware of himself. He has self-consciousness too with awareness of the surroundings. He relate his mind to the changes taking place in the world. He is an intelligent animal with thoughts, feelings and self-hood. sensitivity or awareness is regarded as defining property of living organisms as non-living things do not have power of sensing their surroundings and give response according to it. However, patients lying in coma in hospitals virtually supported by machines which replace heart and lungs are neither living nor dead otherwise brain-dead.

03. Diversity In The Living World

- We consider vast areas like forest, desert, plateau etc. we find that number and kinds of living organisms increase many folds. These different kinds of plants, animals and other organisms are referred to as '**Biodiversity**' of this earth.
- **Biodiversity** is the number and various kinds of organisms found on earth. It stands for the variability found among living organisms inhabiting this world.
- **Biodiversity (Greek word bios = life; diversity = forms) or biological diversity** can be defined as the vast array of species of microorganisms, algae, fungi, plants, animals occuring on the earth either in the terrestrial or aquatic habitats and the ecological complexes of which they are a part.
- According to IUCN (International Union of Conservation of Nature and Natural resources), currently known and described species of all organisms are between **1.7-1.8 million**. These millions of plants, animals and other organisms in the world cannot be recognised, studied or described by an individual on its own.