ADHIKAANSH ACADEMY

(IITJEE NEET IX X XI XII)

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BIOLOGY NOTES

(CLASS 11TH)

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Life is a unique, complex organization of molecules that expresses itself through chemical reactions which lead to growth, development, responsiveness, adaptation and reproduction.

The objects exhibiting growth, development, reproduction, respiration, responsiveness and other characteristics of life are designated as living beings.

Unique features of living organism:-

(a) Growth- Living organisms grow in mass and number. A multicellular organism increases its mass by cell division. In plants growth continuous throughout life in their meristemtic area but in animals, growth occurs to a certain age. Unicellular organisms also grow by cell division. Living organisms show internal growth due to addition of materials and formation of cells inside the body. Non living organism like mountains, boulders, crystals also grow but due to addition of similar materials to their outer surface.

(b) Reproduction- It is the formation of new individuals of the similar kind. Reproduction is not essential for survival of the individuals. It is required for perpetuation of the population. In sexual reproduction two parents are involved to produce more or less similar kinds of individuals. In asexual reproduction single parent is involved and individual is copy of the parent. Asexual reproduction may occurs by fission, fermentation, regeneration, vegetative propagation etc. In unicellular organism, growth and reproduction are synonyms. Many organisms like mules, sterile worker bees, infertile human couples. Therefore, reproduction is not an all-inclusive characteristic of living organism. However, no nonliving object has the power to reproduce or replicate.

(c) Metabolism- The sum total of all types of chemical reactions occurring in an individual due to specific interactions amongst different types of molecules in the interior of cells is called metabolism. All activities of an organism including growth, movements, development, reproduction etc. are due to metabolism. There are two types of metabolism- Catabolism and Anabolism. Anabolism includes all the building up reactions to increase the mass of the organism like photosynthesis. In catabolism breakdown reactions are involved, such as respiration, digestion etc. no nonliving object show metabolism.

(d) Consciousness- It is the awareness of the surroundings and responding to external stimuli. External stimuli may be physical, chemical or biological. Plants also responds to stimuli like light, water, gravitation, pollution etc. All living organisms prokaryotic to eukaryotic responds to different kinds of stimuli. Human being is only organism who is aware of himself. Consciousness therefore, becomes the defining property of living organisms.

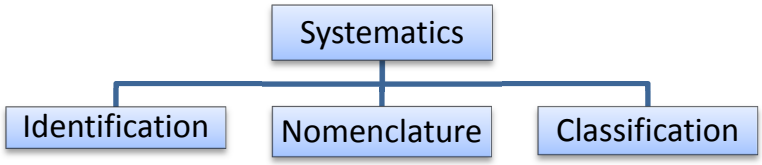
(e) Life span- every living organism has a definite life span of birth, growth, maturity, senesce and death.

Living organisms are therefore, self-replicating, evolving and self-regulatory interactive systems capable of responding to external stimuli.

BIODIVERSITY

Diversity in the living world or biodiversity is the occurrence of variety of life forms differing in morphology, size, colour, anatomy, habitats and habits. Each different kind of plant, animal or microorganisms represents a species.

Currently there are some 1.7 – 1.8 million living organisms known to science. Out of which 1.25 are animals and about 0.5 millions are plants.



- Systematics is branch of biology that deals with cataloguing plants, animals and other organism into categories that can be named, compared and studied.
- Identification is the finding of correct name and place and place of an organism in a system of classification. It is done with the help of keys. This is carried out by determining similarity with already known organisms.
- Nomenclature is the process of standardize naming of living organism such that a particular organism is known by the same name all over the world. For plants scientific names are based on international code of botanical nomenclature (ICBN) and animals names on international code of zoological nomenclature (ICZN). Scientific name ensures that each organism has only one name.

  Biological nomenclature- It is the universally accepted principles to provide scientific name to known organisms. Each name has two components- generic name (genus) and specific epithet (species). This system of nomenclature was provided by Carolus Linnaeus.

  Mango- *Mangifera indica*.

  Human beings- *Home sapience.*

  Universal rules of nomenclature:-

  (a) Biological names are generally in Latina and written in italics.

  (b) The first word in a biological name represents the genus while the second component denotes the specific epithet.

  (c) Both the words in biological name, when handwritten, are separately underlined, or printed in italics.

  (d) The first word denoting the genus starts with a capital letter while the specific epithet starts with small letter.
- Classification- It is the process by which anything is grouped into convenient categories based on some easily observable characteristics. Classification makes the study of organisms convenient.

- Taxonomy- The process of classification on the basis of external and internal structure along with internal structure of cell, development process and ecological information is known as taxonomy.

Taxonomic categories

A taxonomic category is a rank or level in the hierarchical classification of organism. There are seven obligate categories and some intermediate categories. Since the category is a part of overall taxonomic arrangement, it is called taxonomic category and all categories together constitute the taxonomic hierarchy.

Taxonomic hierarchy is shown below:-

KINGDOM

DIVISION/PHYLLUM

CLASS

ORDER

FAMILY

GENUS

SPECIES

- Species- Species are the natural population of individuals or a group of population which resemble one another in all essential morphological and reproductive characters so that they are able to interbreed freely and produce fertile offspring. Mango is a species *indica* of genus *Mangifera* (*Mangifera indica*).
- Genus- it is a group of related species which resemble one another in certain correlated characters. All species of genus presumed to have evolved from a common ancestor. Lion, Tiger, Leopard are closely related species and placed in same genus *Panther*.
- Family- It is a taxonomic category which contains one or more related genera. All genera of a family have some common features or correlated characters. Family Solanacaeae contains a number of genera like *Solanum, Withania, Datura* etc.
- Order- This category includes one or more related families. Families felidae and canidae are included in same order carnivore.
- Class- A class is made of one or more related orders. The class dicotyledoneae of flowering plants contains all dicots which are grouped into several orders like roales, polemoniales, renales etc.

- Division/Phylum- The term phylum is used for animals while division is used for plants. They are formed of one or more class. The phylum chordate of animals contains not only the mammals but also aves, reptiles amphibians etc.
- Division- It is the highest taxonomic category. All plants are included in the kingdom Plantae while all animals belong to kingdom Animalia.

Taxonomic Aids:- Techniques, procedures and stored information that are useful in identification and classification of organisms are called taxonomic aids.

- **Herbarium-** Herbarium is a place where dried and pressed plants specimens, mounted on sheets are kept systematically according to a widely accepted system of classification. The herbarium sheets also carry a label providing information about date and place of collection, English, local and botanical names, family, collector's name etc.
- **Botanical garden-** They are specialized gardens having collection of living plants for reference. Plants in these gardens are grown for identification purpose and each plant is labelled indicating its scientific name and family. The famous botanical garden includes Royal botanical garden, Kew (London), Indian botanical garden, Kolkata and National botanical garden, Lucknow.
- **Museums-** Biological museum is set up in educational institution like colleges and school for reference purposes. Specimens are preserved in the containers or jars in preservative solutions or as dry specimens. Insects are preserved in insect boxes after collecting, killing and pinning.
- **Zoological parks-** These are the places where wild animals are kept in protected environments under human care and which enable us to learn about their food habits and behavior. Natural habitats are provided as far as possible.
- **Key-** Taxonomic key is an artificial analytic device having a list of statements with dichotomic table of alternate characteristics which is used for identifying organisms. Usually two contrasting characters are used. The one present in the organism is chosen while other is rejected. Each statement of a key is called lead. Separate taxonomic keys are used for each taxonomic category like species, genus, family etc. Keys are generally analytical in nature.

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