



NEET 2025

THE LIVING WORLD

LECTURE 2

+1 BIOLOGY

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Diversity in the Living World

- ❖ Every year about 15,000 new organisms are discovered.
- ❖ Thousands are still unknown and are yet to be identified and described.
- ❖ It is practically impossible to study each and every individual.



Systematics

- ❖ Scientists who study and contribute to the classification of organisms are known as systematists or taxonomists, and their subject is called systematics (Latin Systema: order or sequence).
- ❖ The terms 'systematics' was coined by **C. Linnaeus**.



Systematics

- ❖ It is the study of diversity of organisms and all their comparative and evolutionary relationship, based on comparative
 - ❑ Anatomy
 - ❑ Physiology
 - ❑ Biochemistry
 - ❑ Ecology

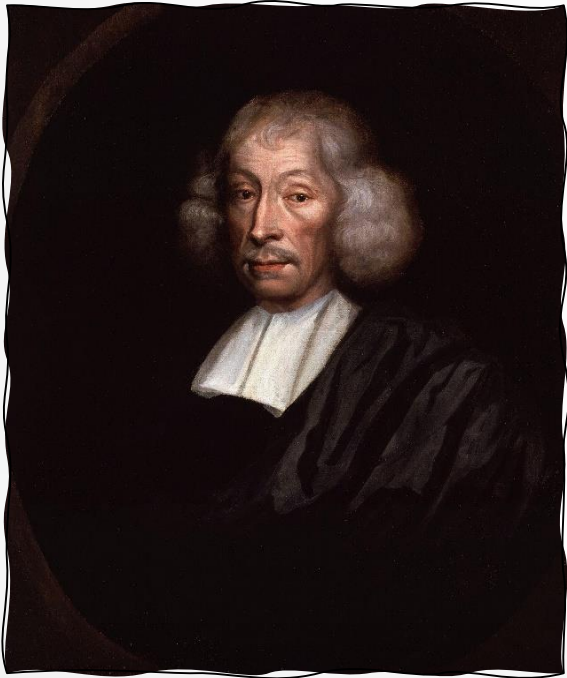
Systematics

- ❖ **Simpson** regarded classification as a subtopic of systematics that deals with ordering of organisms into groups and taxonomy as the study of principles and procedures of classification.



Systematics

- ❖ **John Ray**, an English naturalist coined the term **species** for a group of morphologically similar organisms and also tried to differentiate between genus and species.
- ❖ The terms, 'monocotyledons' and 'dicotyledons' were also coined by him.



Systematics

- ❖ **Carolus Linnaeus**, a Swedish naturalist, often referred to as 'Father of Taxonomy' published *Systema Naturae* and described 4326 species of animals.

Systematics

- ❖ **Species Plantarum (1753) contained description of 5900 species of plants and these were arranged according to his system of classification based on sexual character.**
- ❖ **Linnaeus also introduced a system of nomenclature of plants and animals known as the **Binomial Nomenclature**.**

Characterization & Identification

- ❖ To identify and characterize an unknown organism by comparing it with known organism.
- ❖ It is done with the help of taxonomical aids.

Classification

- ❖ It is the arrangement of organisms into groups or categories on the basis of their affinities or relationships.

Nomenclature

- ❖ It is the science of providing distinct and proper names to organisms as per the established universal practices and rules so that they can be easily recognized and differentiated from others.
- ❖ Each organism is given a two word name generic and specific.

Nomenclature

- ❖ The method of giving names to living beings.
- ❖ Two types of names are given to the organisms,
 - Common
 - Scientific.

Common or Vernacular Names

- ❖ **Common names are local names, which are given to the animals and plants in a particular language and region of the world by local persons.**

Scientific Names

❖ The following have been the practices of providing scientific names to the organisms:

☐ Polynomial Nomenclature

☐ Trinomial Nomenclature

Rules of Nomenclature

- ❖ Names are generally in Latin and printed in Italics.
- ❖ If Latin version is not available then names are Latinized.
- ❖ Binomial consists of genus and specific epithet.
- ❖ Name of genus always start with a capital letter while names of species start with small letter.

Rules of Nomenclature

- ❖ If names are handwritten, name of genus and name of species are separately underlined.
- ❖ The name of author comes after the names of species generally written in abbreviated form in Romans.
- ❖ Binomial along with name of author is referred as 'Binomial Epithet'.
- ❖ Maximum and minimum number of alphabets in Genus and species is from 12 to 3 respectively.

Rules of Nomenclature

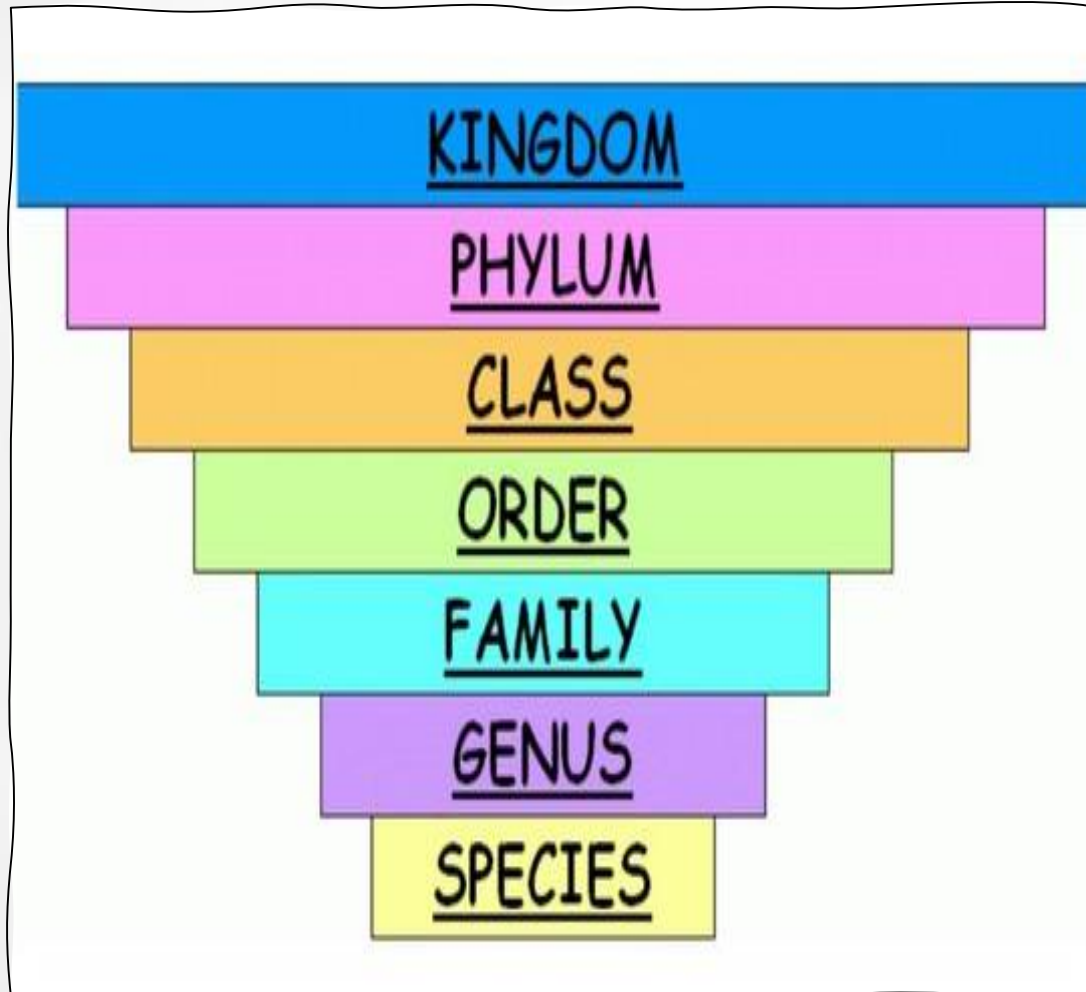
- ❖ If name of species consist of two words then two words are joined by putting a hyphen (–) between the two words
- ❖ e.g. Hibiscus rosa – sinensis (china rose).
- ❖ Principal of priority ,
 - ❑ The first valid published name is accepted as binomial and rest are considered as synonyms.

Taxonomic Hierarchy

- ❖ It is the framework by which taxonomic groups are arranged in definite order, from higher to lower categories.

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Taxonomic Hierarchy

- ❖ The botanists use Division in place of Phylum as a category in the classification of plant kingdom.



Taxonomic Hierarchy

❖ In order to make taxonomic position of species precise, certain subcategories and super categories have been added to this list and they are called **intermediate categories**. e.g.,

- ☐ Sub kingdom,
- ☐ Super phylum or super division,
- ☐ Sub division,
- ☐ Super class, sub class,
- ☐ Super order, sub order,
- ☐ Super family, sub family,
- ☐ Tribe, subspecies, variety, etc.

Kingdom

Phylum

Class

Order

Family

Genus

Species

Taxonomic Hierarchy

- ❖ Categories in the hierarchy are in ascending order.
- ❖ As we go from the lowest rank i.e., Species towards Kingdom the number of similar characters decreases.

Taxonomic Hierarchy

- ❖ Of various categories of classification, only the species have a real existence in nature, others are merely man made convenient and arbitrary groups without actual existence in nature.
- ❖ Species is regarded as the basic unit of classification.

Species

- ❖ It is a natural population of individuals or group of populations, which resemble one another in all essential morphological and reproductive characters, Carry same type and amount of genetic material so that they are able to breed freely among themselves under natural conditions in order to produce fertile offspring.

Genus

- ❖ It is the first higher category above the level of species.
- ❖ It is a group of species which are related and have less characters in common as compared to species.

Genus

- ❖ For example, potato (*Solanum tuberosum*) and brinjal (*S.melongena*) though they constitute different species, belong to the same genus *Solanum*.
- ❖ Similarly lion (*Panthera leo*), leopard (*P. pardus*) and tiger(*P. tigris*) have several common features and are included in the same genus *Panthera*.



Family

- ❖ Family is represented by a group of related genera that are more similar to each other than with the genera of other families.
- ❖ Families are characterized on the basis of both vegetative and reproductive features of plant species.

Family

- ❖ The genera like Solanum, Petunia, Datura, Atropa, etc. based on the similarities are placed in the family Solanaceae.
- ❖ In animals such as lion, leopard, tiger from genus Panthera, and cat from genus Felis are included in the family Felidae.

Order

- ❖ Order is an assemblage of families resembling one another in a few characters.
- ❖ Order Carnivora contains related families of Canidae, Felidae.
- ❖ An order ends in suffix - ales in plants.

Class

- ❖ It is a taxonomic category made up one or more related orders.
For example, class Mammalia has a number of orders like Carnivora, Rodentia, Insectivora, etc.
- ❖ It ends in suffixes - phyceae, - opsida and - ae in plants.
- ❖ The suffix is not fixed in case of animals.

Phylum Or Division

- ❖ **Phylum or Division consists of one to several Related classes having some similar correlated characters.**
- ❖ **Among the animals, the phylum Chordata includes classes Pisces, Amphibia, Reptilia, Aves and Mammals.**
- ❖ **All classes at some stage in their lives have common characters like**
 - ☐ **Presence of a notochord.**
 - ☐ **Dorsal hollow neural system.**
 - ☐ **Pharynx perforated by gill slits.**

Kingdom

- ❖ In general, it includes all organisms which share a set of distinguishing common characters.
- ❖ This is the highest category of biological classification.
- ❖ Plants are put in Plant Kingdom and animals are included in the Animal Kingdom.

Scientific names of some organisms

Scientific names of some organisms

Example

Select the correctly written scientific name of Mango which was first described by Carolus Linnaeus. (NEET 2019)

- (a) *Mangifera Indica*
- (b) *Mangifera indica* Car. Linn.
- (c) *Mangifera indica* Linn.
- (d) *Mangifera indica*

Example

Which of the following is against the rules of ICBN? (Odisha NEET 2019)

- (a) Hand written scientific names should be underlined.
- (b) Every species should have a generic name and a specific epithet.
- (c) Scientific names are in Latin and should be italicized.
- (d) Generic and specific names should be written starting with small letters.

Example

Nomenclature is governed by certain universal rules. Which one of the following is contrary to the rules of nomenclature? (NEET-I 2016)

- (a) The names are written in Latin and are italicised.
- (b) When written by hand the names are to be underlined.
- (c) Biological names can be written in any language.
- (d) The first word in a biological name represents the genus name and the second is a specific epithet.

Example

The common characteristics between tomato and potato will be maximum at the level of their **(Karnataka NEET 2013)**

- (a) family (b) order
- (c) division (d) genus.

Example

Which one of the following organisms is scientifically correctly named, correctly printed according to the International Rules of Nomenclature and correctly described? (Mains 2012)

- (a) *Musca domestica* - the common house lizard, a reptile
- (b) *Plasmodium falciparum* - a protozoan pathogen causing the most serious type of malaria.
- (c) *Felis tigris* - the Indian tiger, well protected in Gir forests.
- (d) *E.coli* - full name Entamoeba coli, a commonly occurring bacterium in human intestine.

Example

Which of the following is less general in characters as compared to genus?

(a) Species (b) Division

(c) Class (d) Family

(2001)