



**FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES**

**INTRODUCTORY BIOLOGY UGR-121**

## LECTURE- 03

### NOMENCLATURE

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- **Nomenclature** is giving distinct scientific names to various structures including living organisms for their identification.
- The names are of two types - **vernacular** (common name) and **scientific names**.
- The vernacular names are based on some peculiarity of the organisms, e.g., Kandali (a plant having spines).
- Scientific names are distinct and specific, they have particular spellings which are not changed.

### TYPES OF NOMENCLATURE

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Three types of nomenclature are polynomial, binomial and trinomial.

#### POLYNOMIAL SYSTEM

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According to this system, name of any plant consists of many words.

For e.g., *Caryophyllum saxatilis folis gramineus umbellatus corymbia* which means *Caryophyllum* growing on rocks, having grass like leaves and umbellate corymb flowers.

#### BINOMIAL SYSTEM

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- **Carolus Linnaeus** used this nomenclature system for the first time and proposed scientific name of all the plants and animals. He is the founder of binomial system.
- Linnaeus proposed scientific name of plants in his book "Species plantarum".
- In binomial nomenclature, each scientific name has 2 components - **generic name (genus)** and **specific name (species)**. E.g., *Solanum tuberosum* (potato), *Mangifera indica* (mango)
- The name indicates relationship of a species with others present in the same genus.

#### TRINOMIAL SYSTEM

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- This system was proposed by Huxley and Stricklandt.
- According to this system, name of any plant or species is composed of three names-
- Subspecific name (Name of variety)
- When members of any species have large variations then trinomial system is used. On the basis of Generic name
- Specific name
- dissimilarities, this species is classified into sub-species.

Eg. *Brassica oleracea* var. *botrytis* (Cauliflower)

*Brassica oleracea* var. *capitata* (Cabbage)

*Brassica oleracea* var. *caulorapa* (Knol-Khol)

## ICBN - INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE

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- Collection of rules regarding scientific - nomenclature of plants is known as ICBN.
- ICBN was firstly proposed by Sprague, Hitchcock, Green (1930).
- ICBN was first accepted in 1961.
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- **MAIN RULES OF ICBN**
- According to binomial system name of any species consists of two names.
- E.g., *Solanum tuberosum* (Potato)
- ↓        ↓
- Generic name        Specific name
- In plant nomenclature (ICBN), tautonyms are not valid i.e. generic name and specific name should not be same in plants E.g., *Mangifera mangifera*
- But tautonyms are valid for animal nomenclature
- (ICZN-International Code of Zoological Nomenclature)  
E.g., *Naja naja* (Indian cobra), *Rattus rattus* (Rat)
- Length of generic name or specific name should not be less than 3 letters and not more than 12 letters  
E.g., *Mangifera indica*.
- Exception : *Riccia pathankot ensis* - More than 12 letters
- First letter of generic name should be in capital letter and first letter of specific name should be in small letter, E.g., *Mangifera indica*.
- When written with free hand or typed, then generic name and specific name should be separately underlined. But during printing, name should be italicized.
- Name of scientist (who proposed nomenclature) should be written in short after the specific name
- E.g., *Mangifera indica* Lin.
- Name of scientist should be neither underlined nor written in italics, but written in roman letters (simple alphabets).
- If any scientist has proposed wrong name then his name should be written in bracket and the scientist who corrected the name should be written after the bracket.
- E.g., *Tsuga canadensis* (Lin.) Salisbury
- **Notes:-** Linnaeus named this plant as *Pinus canadensis*.
- The ICBN recognises several kinds or types, depending on the way in which a type of specimen is selected.
- Type specimen (Herbarium Sheet) of newly discovered plant should be placed in herbarium (Dry garden).
- Standard size of herbarium sheet is 11.5 × 16.5 inches.
- Type specimen (herbarium sheet) are of different types



- **Suffix for taxa (Taxon)**

Division – phyta

Sub division – phytina

Class – opsida, phyceae, ae

Order – ales

Sub-order – inae

Family – aceae

Sub family – oideae

Tribe – eae

Sub tribe – inae

*Notes:* There is no suffix for Genus, Species and Kingdom.

## **SPECIES**

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Species is the smallest taxonomic category. It is the basic unit of classification.

John Ray proposed the term and concept of species (1942).

### **BIOLOGICAL CONCEPT OF SPECIES**

- Mayr proposed the biological concept of species.
- According to Mayr "all the members that can interbreed among themselves and can produce fertile offsprings are the members of same species"
- But this definition of Mayr was incomplete because this definition is applicable to sexually reproducing living beings. There are many organisms that have only asexual mode of reproduction. E.g., Bacteria, Mycoplasma.
- The main character in determination of any species is interbreeding. But this character is not used in taxonomy. In taxonomy, the determination of species is based on other characters. E.g., mainly morphological characters.

### **STATIC CONCEPT OF SPECIES**

- The static concept of species was proposed by Linnaeus.
- According to Linnaeus "species is unchangeable" i.e. there is no change in the character of species. The species of present day are same as they were in past and they will remain same in future.

## DYNAMIC CONCEPT OF SPECIES

- This concept was proposed by "Lamarck".
- According to this concept, "species is always changeable". Changes always occur in the characters of species from one generation to next generation. And these changes are known as "**evolution**".

## TYPOLOGICAL CONCEPT

- This concept was proposed by "Aristotle" and "Plato".
- According to this concept, "there is a definite type or pattern of characters in each species of every living organisms and all the members of species show maximum resemblance with this pattern". (Typological concept is based on single individual of species).
- **Biotype** : Members of same species inhabiting similar environment and having some genetic variations are known as biotypes. Variations found in these members are permanent. These members cannot interbreed among themselves.
- E.g., Cauliflower, cabbage, knol-khol are three biotypes of one species.
- **Ecotypes** : Members of same species inhabiting different environment and having some genetic variations are known as ecotypes. Variations are permanent. These members can interbreed among themselves but due to geographical barrier they cannot interbreed.  
E.g., Crow (*Corvus splendens*) found in different regions are ecotype of one species.
- **Ecads or Ecophenes** : Members of same species having some non genetic variations due to environment is called Ecads. These variations are temporary.
- Definition related to species
- **Allopatric species** : Those species that are found in different geographical regions and have geographical barriers between them are known as allopatric species. Geographical barriers are hills, oceans, himalayan mountains.
- **Sympatric species** : The species found in similar geographical regions are sympatric species.

## GENUS

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- Genus is an assembly of related species which involved from a common ancestor and have certain common characters called correlated characters.
- Potato, tomato and brinjal are three different species but all belong to the genus *Solanum*. Lion (*Panthera leo*), leopard (*P. pardus*) and tiger (*P. tigris*) with several common features, are all species of the genus *Panthera*. This genus differs from another genus *Felis* which includes cats.

## FAMILY

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- Family, has a group of related genera with still less number of similarities as compared to genus and species.

- Families are characterized on the basis of both vegetative and reproductive features of plant species.
- Three different genera Solanum, Petunia and Datura are placed in the family Solanaceae. Among animals for example, genus Panthera, comprising lion, tiger, leopard is put along with genus, Felis (cats) in the family Felidae.

## ORDER

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- Order being a higher category, is the assemblage of families which exhibit a few similar characters. The similar characters are less in number as compared to different genera included in a family.
- Plant families like Convolvulaceae, solanaceae are included in the order polemoniales mainly based on the floral characters.
- The animal order, Carnivora, includes families like Felidae and Cancidae.

## CLASS

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- A class is a subdivision within a phylum made of one or more related orders.
- Order Primata comprising monkey, gorilla and gibbon is placed in class Mammalia along with order Carnivora that includes animals like tiger, cat and dog. Class Mammalia has other orders also.

## PHYLUM

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Classes comprising animals like fishes, amphibians, reptiles, birds along with mammals constitute the next higher category called phylum. All these based on the common features like presence of notochord and dorsal hollow neural system, are included in phylum Chordata. In case of plants, classes with a few similar characters are assigned to a higher category called **Division**.

## KINGDOM

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All animals belonging to various phyla are assigned to the highest category called **Kingdom Animalia**. The **Kingdom Plantae**, on the other hand, is distinct, and comprises all plants from various divisions.

*Table : Organisms with their Taxonomic Categories*

Common Name	Biological Name	Genus	Family	Order	Class	Phylum/Division
Man	<i>Homo sapiens</i>	<i>Homo</i>	Hominidae	Primata	Mammalia	Chordata
Housefly	<i>Musca domestica</i>	<i>Musca</i>	Muscidae	Diptera	Insecta	Arthropoda
Mango	<i>Mangifera indica</i>	<i>Mangifera</i>	Anacardiaceae	Sapindales	Dicotyledonae	Angiospermae
Wheat	<i>Triticum aestivum</i>	<i>Triticum</i>	Poaceae	Poales	Monocotyledonae	Angiospermae