UNIT SIX

BIOLOGICAL NOMENCLATURE

- **Biological nomenclature** is a formal system of naming species of living things by giving a name composed of two parts (binominal).
  - The first part of the name identifies the **Genus to which the species belongs;**
  - **the second part** identifies the **species within the genus.**
- **For example, humans belong to the genus *Homo and*** within this genus to the species *Homo sapiens.*

- The **adoption** of a system of binomial nomenclature is due to Swedish botanist and physician C. Linnaeus (1707-1778)

The purpose of giving names to organisms

- The purpose of a name is to act as **vehicle of communication.**
- Names should be **unambiguous and universal.**
- Vernacular names are

What is the purpose of the binomial nomenclature system?

- To provide a consistent way to name species
- To ensure that each species has a different and unique name
- To avoid confusion that can occur when using common names

Why not just use common names?

Vernacular names

- There are many languages in the world, and many of them use different alphabets,
- Even within a single language the same name is often used in different senses to denote different kinds of organisms, or

¬ There are no hard and fast rules for common names

¬ Common names are not standardized for organisms;

- **same names can refer to more than one species and**
- **same species/ organism can also have different common names.**

- ♣ The same kind of organism is known by more than one name.
- ♣ It is not advisable to use the common name in scientific documents rather for clarification
- Thus, the Code tries to avoid the defects of vernacular names and for this reason sets of rules have been drawn up.

Scientific Names

- θ Names must be unambiguous and universal;

) to be universal, scientific names must

- Therefore, the Code requires that all scientific names of plants (including fungi, lichens and fossil plants) should be:
  - **Latin** in form
  - Written in **Latin Alphabet** and
  - Subject to the rules of **Latin** grammar. The above three are filled it is called the **convention of formulation.**

- The scientific names of all living organisms are therefore **Latin** or are **treated** as **Latin** even if they are derived from **other languages**.

- Derivation of names is ordinarily from Latin words but some times from person, place, local languages, etc. but **treated** as **Latin**

Why **Latin**?

- As that time it was serve as international language
- Many scholars language
- Latin language is specific and exact meaning
- To creat a common understanding

Value of binomial nomenclature

1. **uniqueness-** The same name can be used all over the world in all languages by avoiding confusion
2. **Stability-** scientific names are stable

The codes of nomenclature

- Scientific names of organisms follow internationally agreed rules which are published as their respective codes of nomenclature.

1. **Animals (1758)** – International Code of Zoological Nomenclature (ICZN)
2. **Plants (1753)**- International Code of Botanical Nomenclature (ICBN)
   - International Code of Nomenclature for Cultivated Plants (ICNCP)
3. **Bacteria (1980)** – International Code of Nomenclature of Bacteria (ICNB)
4. **Viruses** – International Committee on Taxonomy of Viruses (ICTV)

ϖThese rules are largely the same, but there are some differences

- Eg. The scientific name of each species is formed by the combination of two words i.e. the genus name and the second word identifies the species with in that genus
  - specific descriptor- general term
  - Specific epithet-botanical
  - Specific name-zoological

- **Names of taxa above the rank of genus**
  - They consist of one term only and called **uninomial, uninominal or unitary.**
  - They are **plural nouns (or adjectives used as nouns).**
  - They are written with a **capital initial letter. E.g. Asteraceae.**
- **Names of genera**
  - They are **uninomial.**
  - They are **singular nouns.**
  - They are written with **capital initial letter. E.g. *Hagenia***

Classification ranks and their standard endings in plants.

Category	Ending (Naming) in scientific world	Examples
Domain		Archea,Eubacteria, Eukaryote
Kingdom	Animalia/Plantae/ Fungi	Animalia/ Plantae/ Fungi
Phylum	-a	Magnoliophyta, bryophyta, chlorophyta
Class	-ae	Angiospermae
Order	-ales	**CELASTRALES**
Family	-aceae	CELASTRACEAE
Genus	The normal name that you give a plant	*Catha*
species	This is the level that defines an individual	*Catha edulis*

Plant nomenclature in practice

Species names ("scientific names") are Latin binomials

***Lewisia rediviva* Pursh.**

- Genus (pl. genera)
- Always capitalized
- Abbreviated on 2nd use (*L. rediviva*)

- Specific epithet
- Not capitalized
- Often a descriptive adjective

- Authority

¬ Always underline or *italicize* species names (genus + specific epit

Names of species

- They consist of **two terms, and called binomial, binominal or binary.**
- The name of a species consists of the **name of the genus in which the species is classified followed by a second term which is peculiar to the species.**
- The second term may be **adjective or a noun.**
- The second term which is known as **specific epithet or trivial name is written in a small initial letter.**
- Since several categories of taxa are recognized below the rank of subspecies, the inclusion of a **word indicative of**

- The abbreviation "**sp**." is used when the actual specific name cannot or need not be specified.
- The abbreviation "**spp**." (plural) indicates "**several species.**" These are not italicized (or underlined).
- For example: "*Canis sp.,*" *meaning* "*one species of the genus Canis.*“
- Easily confused with the foregoing usage is the abbreviation "**ssp**." (Zoology) or "**subsp**.“ (Botany) indicating an **unspecified subspecies.**

- (Likewise, "**sspp**." or "**subspp**." indicates "a **number of subspecies**".)
- The abbreviation "**cf**." is used when the identification is not confirmed.
- For example *Corvus cf. splendens indicates "a bird similar to the house crow (Corvus splendens) but* not certainly identified as this species."

Names of Taxa below the rank of species

- Names of **subspecies** consist of **three terms and called trinomial, trinominal, or ternary.**
- The name of a subspecies consists of the name of the species in which it is classified followed by a third term which is peculiar to the subspecies.

Operative Principles of Nomenclature

The Aims of the Code

- The ICBN tries to ensure, that with any given **circumscription, position and rank, a plant taxon can have one, and only one, name by which it may be properly known.**
- The Code also tries **to avoid, or reject, the use of names likely to cause ambiguity or confusion.**

- To achieve these aims, the **Code** lays down certain **provisions** which may be followed in the giving of names to taxa and in the use of names.

- These **provisions** are based on a number of what may be called **Operative Principles of Nomenclature,** of which the chief are:

1. Publication

¬ The means by which scientific names enter Biological Nomenclature.

¬ Legitimate names are those in accordance with all the relevant rules of the respective nomenclatural code and are therefore available for consideration as the acceptable name of a taxon.

- **Two basic conditions** must be fulfilled before a properly formulated scientific name can have any status in biological nomenclature.
  - A name must be **published** in **works that are printed, reasonably permanent and made generally available to the interested public;**
  - A name must be **accompanied by a written matter** – some descriptive matter (a reference to such description), available for consultation by others, should be associated with a name when it is first given to a taxon.
- If the first condition is fulfilled, the name is regarded as **effectively published.**

2. Priority

- Each taxon with a given circumscription and taxonomic position bear only valid name, the **earliest**, that is in accordance with the rule of nomenclature.
- According to the rule of priority, whoever publishes the name validly and effectively first will be given the credit and all subsequently published names will be rejected.
- The **principle of priority** requires that when **two or more names apply to the same taxon,** in general, it is by the oldest one (**validly published name**) that it should properly be known.

3. Typification

- It is the process of designating a nomenclatural type, or it is the means by which types are allocated to taxa.
- What is a type? A **type** is an element on which the description associated with the original publication of a name was based or is considered to have been based.
- Type is designating representative (voucher) for an organism name.

Taxonomic “Types”

- Type Specimen -
  - one representative of the taxon
- Holotype -
  - specimen designated by the author in the original publication (nomenclatural type)
- Isotype -
  - a duplicate specimen of the holotype collected at the same time and place (may be in other herbarium)
- Lectotype -
  - a specimen chosen from the author’s original material when no holotype has been designated.
- Neotype-
  - selected when all original specimens have been destroyed

Kinds of Types

- The Code recognizes several kinds of types, of which the following are the most important.
- **Holotype** – It is either the **sole specimen** used by the author of a name or the one/single specimen designated by him/her as a type.
- **Isotype** – are a specimen believed to be duplicates of a holotype, often being sent to other herbaria
- **Syntype** – It is either any one of two or more specimens used by the author of a

- **Lectotype** –It is a specimen selected subsequently from amongst syntypes to serve as the nomenclatural type/ holotype.
- **Neotype** – It is a specimen designated/selected to serve as a nomenclatural type/holotype when through loss or destruction no holotype, lectotype or syntype exists.

Author citations

- Citation of authors name for purpose of precision is necessary to cite the author who first published the name in question in order that the date may be verified
- Eg. E. coli, Jhon, 1927

Name change

- Scientific name is **unique** and **stable** but due to taxonomic change (due to change in taxonomic opinion)
- By mistake name of a given taxon may given to the other
- If it is not based on the rules of nomenclature there will be nomenclatural change