**Binomial nomenclature and taxonomic hierarchy**

**Binomial nomenclature**

Taxonomy is the science of classifying and identifying plants. Scientific names are necessary because the same common name is used for different plants in different areas of the world. Latin is the language used for scientific classification.

Binomial nomenclature system is the one where the name of the plant consists of two parts – genus name and species name. It is developed by Carolus Linnaeus.

**Some rules framed under these codes as well as the rules set by Linnaeus are as follows:**

1. The scientific names of plants and animals should be in Latin or Greek because it is officially dead language. The use of Latin for naming also means that no-one can be offended by being forced 10 use someone else’s language.
2. The scientific names prior to the 1.8.1758 for animals of Systema Naturae (10th Edition) and 1.5.1753 for plants of Species Plantarum by Linnaeus are not recognized.
3. These names should be in italics when printed or separately underlined when hand written to indicate their Latin origin.
4. The genus starts with capital letter, while species in small letter.
5. The name of the author, first reporting it should remain in abbreviated form at the end of the scientific name and it is printed in Roman, e.g. Oriza sativa Linn. The scientific name with name of the author at the end is called complete scientific name.
6. Only one valid name for one species is permitted and it is based on the rule of priority that is the author first effectively and validly publishing the name will be considered.
7. In case of changing a scientific name that is double citation, the name of the second author is placed in bracket after the scientific name and the first author’s name in abbreviated form comes after that, the new name is always based on the older name and it is called the basionym.
8. To avoid confusion no two generic names in any kingdom can be same. Specific names can however be repeated as they often qualify the generic name. For example, the specific name of both mango (Mangifera indica) and tamarind (Tamarindus indicus) are the same which mean Indian.
9. The reporting of a new species of plant should be accompanied by a Latin description or Diagnosis.
10. When a plant species is reported, the author should submit a herbarium sheet of the specimen (Dried plant with reproductive part placed on a sheet of paper). This is designated as type specimen (holotype, isotype, paratype, topotype, lectotype etc.). Holotype is the type specimen submitted by the original author at the time of publication. All other specimens of the same species collected at the same time are called isotypes.
11. The specimen cited with the original description other than holotype or isotype(s) is called paratype. When the same specimen is collected from the same locality from where the holotype was collected is called topotype. In absence of a holotype, the type specimen selected from the original material by a subsequent author is called lectotype. In the absence of original type specimen, a new specimen selected from a new location by a new author is called neotype. This concept of permanent naming to a type specimen is called typification and the type specimens should be preserved in the Herbaria of all international Botanic Gardens.

**Generic name:** Generic name is the first word of the Binomial name. The first letter is capital. It is singular noun. The generic names are coined from different sources.

1. The genus may be named in honor of a botanist

For ex: Linnea for Linnaeus

Adansonia- Michel Adanson

Bauhinia – Casper Bauhin

1. In many cases generic names express some features of a plant

For ex: Pterospermum (winged seeds)

Trifolium – plant having three leaflets.

Acanthospermum- Spiny fruit

1. Some generic names are mythological or poetic.

For ex: Theobroma (Gods food)

1. Sometimes generic name is given after a name of a place (country, mountain or river)

For ex: Araucaria – Arauca province of Chile

Cassia – Mountain cassia from N.Syria

Salvadora – El. salvadore

**Specific name:** It is the second word of the Binomial name. Its first letter is small and is an adjective. The generic names are coined from different sources.

1. It may be description of a plant.

Color of the plant or plant part, For example: alba (white), nigra (black)

Habitat of the plant, For example: aquatica(in water), arvensis (in fields)

1. It may be in the honor of some botanist, For example: roxburghii (Vanda roxburghii)
2. Specific name may be constructed from noun, For example: bignoniodes (Bignonia)
3. It may be a descriptive adjective, For example: cordifolia (heart shaped leaves)

**Advantages of Binomial names**

These names are simple

1. These are universal names and hence remain constant in different places, languages. This avoids confusions, effective in   communication.
2. Names are governed by rules and recommendations.
3. The names are easy to remember compared to polynomials.
4. These names are self-explanatory.
5. The names are in Latin which is a dead language not used in any country, so there is no controversy.

**Taxonomic hierarchy**

**Introduction**

The term Taxonomy was coined by Augustin Pyramus de Candolle. Taxonomy is the science of classification of organisms. Classification of organisms is done by Biologists based on evolutionary relationships and shared features among the organisms.

The fundamental unit of life on Earth is refers to as the species. The species is a population or series of populations whose members are able to interbreed freely under natural conditions and who do not breed with other species.

Closely related species are grouped as genus (pl. genera); while closely related genera are grouped as family and so on. This type of grouping makes up the classification hierarchy. The genus and species names are always either *italicized* or underlined, with the genus name Capitalized and the species name in lower case.

Species are grouped into more comprehensive taxa, these taxa are grouped into larger taxa so that the classification is a hierarchy of a system of units that increase from first level to the next higher level.

**Taxonomic hierarchy**

Taxonomic Hierarchy or Linnaean hierarchy categories are introduced by Linnaeus. It is defined as arrangement of categories in a decreasing or increasing order from kingdom level to species level and vice versa. Kingdom is the highest rank given in the hierarchy then the levels division, class, order, family, genus and species follow. Species is the lowest rank given in the Hierarchy.

The hierarchy has two categories namely, obligate (main) and intermediate (intra).

* In obligate category, hierarchy is followed strictly. Here the levels range from kingdom to species.
* In intermediate category, hierarchy is not followed strictly. The levels are added in between the list such as sub-division, super-family, super-class, sub-order, sub-species and so on.

The following are seven main or obligate categories used in any plan of classification. They are known as the supra-specific groups.

**1. Kingdom**

**2. Division**

**3. Class**

**4. Order**

**5. Family**

**6. Genus**

**7. Species**

* **Species:**

Group of organisms which are similar in form, shape and reproductive features are called species.  This similarity is important so as to produce fertile offsprings. Offsprings are sterile when a hybrid is produced. The level species is followed by subspecies, clines and demes. These categories are inferior when compared to species.

* **Genus:**

Genus is a group of related species. Some genera may have only one species (Monotypic) whereas some may have more than one species (polytypic).

* **Family:**

Family is the collection of related genera.

* **Order:**

One or more than one related families form an order.

* **Class:**

One or more than one related orders form a class.

* **Division:**

Division is the term used for plants while its synonym phylum is used for animals. It is a collection of related classes.

* **Kingdom:**

Kingdom is the uppermost taxonomic category. For example all the plants are included in Kingdom Plantae. Taxon is the unit of classification that denotes group of organisms based on observable features.

Under species we have other groups termed as infra specific groups. The following is the list of intermediate or infra specific groups,

**1. Species**

**2. Subspecies**

**3. Clines**

**4. Demes**

Various methods used to recognize and categorize organisms are called as Taxonomic aids. Identification of organisms is a tiresome process. Taxonomic keys are used for identification of organisms. Taxonomic key is a long table of statements with different features to recognize the organisms. The features which are related to a particular organism are chosen and then the organism is grouped into the relevant category.