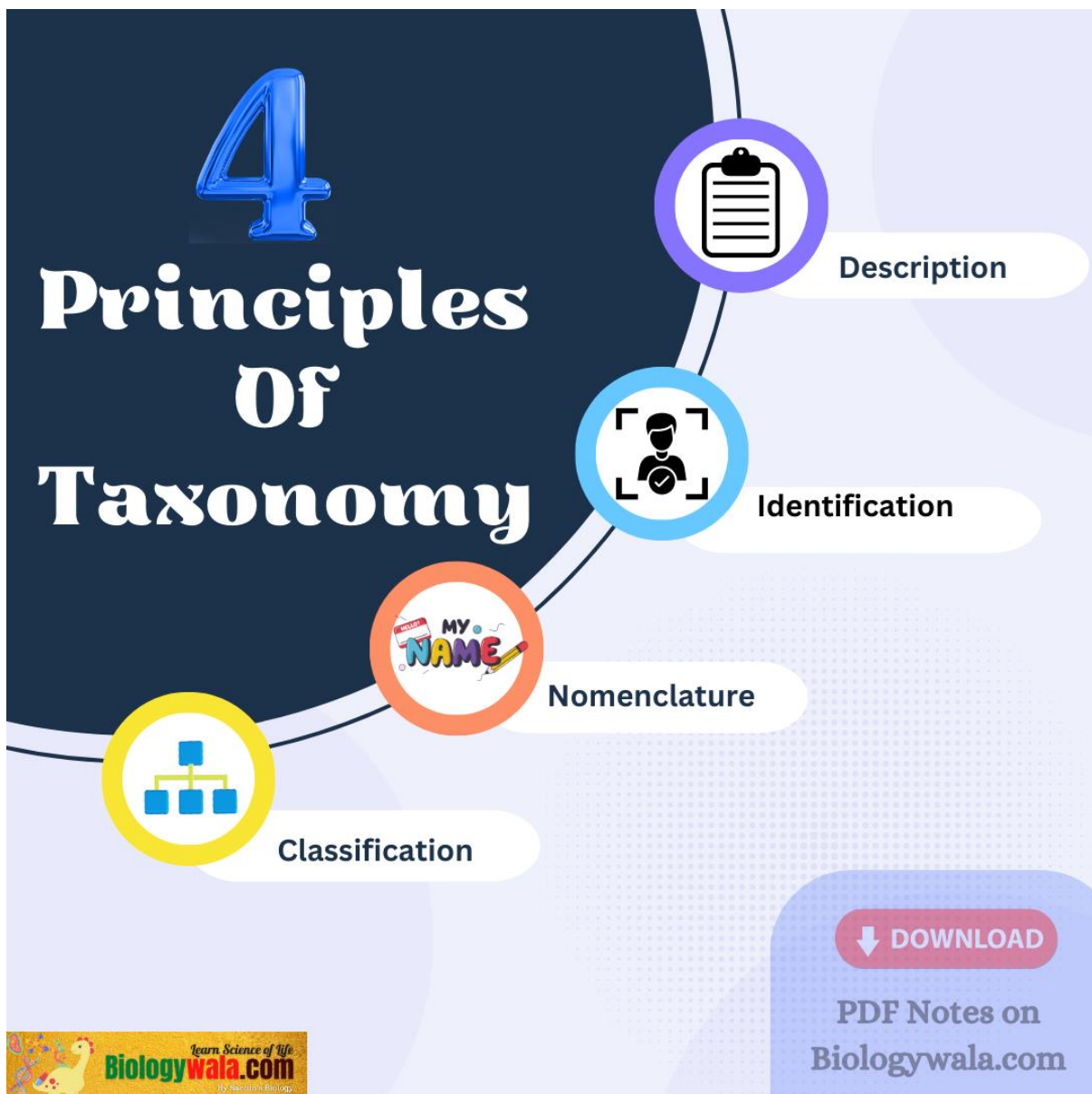


4 Principles of Taxonomy

Taxonomy

The term "Taxonomy" is given by A.P. De Candolle in 1813 in his famous work *theorie elementaire de la botanique*. It is a combination of the Greek words *Taxis* (arrangement) and *nomos* (rules). For the study of the diversity of organisms, scientists develop certain rules and principles. Taxonomy is the branch of science that deals with the identification, description, nomenclature, and classification of an organism according to certain rules and principles.



The principles of Taxonomy are used to organize and classify the enormous diversity of the living world. With an estimated 8.7 million species of plants and animals in existence, only 1.2 million have been identified and described. Many more species remain undiscovered. The recorded species show that animals comprise over 70% while plants make up only 22% of the total, including algae and fungi. Taxonomy is crucial in understanding and making sense of the diversity of life by grouping and classifying organisms in a systematic way.

4 Principles of Taxonomy:

1. Identification:

Identification is recognizing the unknown specimen and giving a correct rank and position in the classification. The specimen is identified by comparing it with the specimen stored in the herbarium. An expert in the field can also help in the identification of specimens. Various types of literature such as floras, monograms, or manuals can also be used for identification. The specimen is identified by comparing it with the description of the taxon provided in the literature source. In recent years uploading photos of plants and their parts on the website becoming the popular method for identification. The members of the community can thus help each other in identification. This is 1st Principles Of Taxonomy.

2. Description:

It is the listing of features of a taxon by recording the appropriate character states. The taxonomic characteristics which help in separating a taxon from other closely related taxa are called diagnostic characters. Diagnostic characters are shortened descriptions and it determines the circumscription (limit) for a taxon. For recording the description a set of a pattern is followed i.e. habit, stem, leaves, flower, sepals, petals, stamens, carpels, fruits, etc. Each character has an appropriate character state. For example, flower colour is a character while red, yellow, white, etc are its states. Each character state has a specific term for proper documentation of data. This is the 2nd Principles Of Taxonomy.

3. Nomenclature:

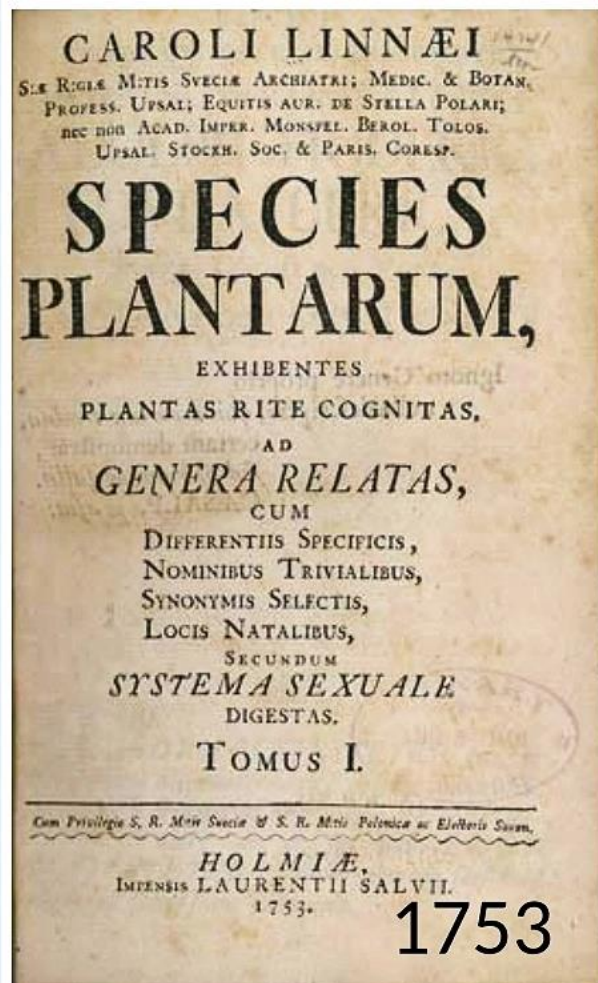
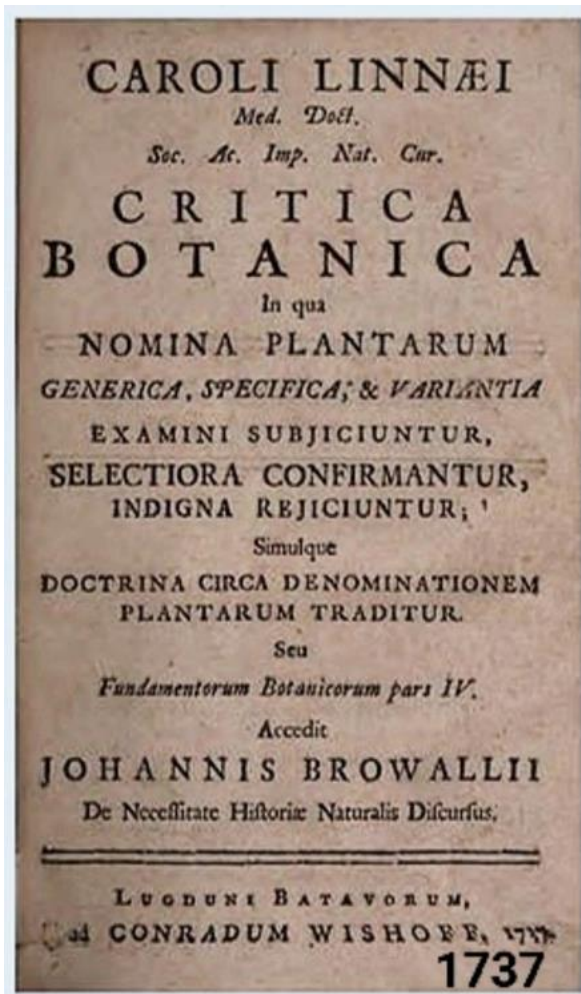
Nomenclature is the formal naming of an organism by some standardized system. The main objective behind the nomenclature is that each organism must have only one scientific name. The nomenclature of plants is governed by rules and recommendations from the International Code Of Nomenclature (ICN). Previously it was named the International Code Of Botanical Nomenclature (ICBN). The name was changed in July 2011 at the International Botanical Congress. This is the 3rd Principles Of Taxonomy.

Code for animals – International Code Of Zoological Nomenclature (ICZN)

Cultivated plants - International Code Of Nomenclature For Cultivated Plants (ICNCP)

Bacteria – International Code For Nomenclature Of Bacteria (ICNB) Now called Bacteriological Code (BC).

Virus – International Code Of Virus Classification And Nomenclature (ICVCN)



The scientific names of species are binomials (two names). Casper Bauhin in 1623 introduced the concept of Binomial nomenclature. Although he did not use binomial nomenclature for all the species and thus it is left to Carolus Linnaeus (father of taxonomy). The Swedish botanist Carolus Linnaeus firmly established the system of binomial nomenclature in his book *Species Plantarum* in 1753. However, the early rules of nomenclature were set forth by Linnaeus in his book *Critica Botanica* (1737).

According to the botanical nomenclature, the first name is called a genus or generic name, and the second name is the specific epithet. The first letter of a genus should start with a capital letter and the specific epithet starts with a small letter. These names are always underlined or Italicized for showing their Latin origin. For example, the scientific name of Onion is *Allium cepa* where *Allium* is the generic name and *cepa* is a specific epithet.

Principles of ICN:

The International Code Of Nomenclature based on set of 6 Principles –

6 Principles Of ICN



- 1. Botanical nomenclature is independent of zoological and bacterial nomenclature.**
- 2. The application of names of taxonomic groups is determined by means of nomenclatural types.**
- 3. The nomenclature of a taxonomic group is based upon priority of publication.**
- 4. Each taxonomic group with a particular circumscription, position and rank can bear only one correct name, the earliest that is in accordance with the rules.**
- 5. Scientific names are treated as Latin regardless of their derivation.**
- 6. The rules of nomenclature are retroactive unless expressly limited.**

4. Classification

There are millions of different species on Earth. Some are very similar to each other and some are different. If there was no proper mechanism for grouping it will be chaos to study and document the information. The solution that scientists come up with is to use a classification system. It is a scientific method of grouping all life in an orderly and logical manner. Classification helps in studying the organism and understanding the pattern of evolution. The classification includes a hierarchy of steps and each step represent a rank and is called a taxon. A taxon is a Greek word meaning 'group' and its plural is taxa. These are the 4 Principles Of Taxonomy.

There are seven taxonomic categories – Kingdom, Division, Class, Order, Family, Genus, and Species. The organisms with similar characteristics are included in the same rank. The largest unit of classifications is the kingdom and the most fundamental unit is species. The kingdom divides into divisions, divisions into classes, classes into orders, orders into families, families into genera, and genera into species. This hierarchical system of classification is known as the Linnaean classification system.

Taxonomic Rank	Taxa
Kingdom	Plantae
Division	Tracheophyta
Class	Magnoliopsida
Order	Poales
Family	Poaceae
Genus	<i>Triticum</i>
Species	<i>Triticum aestivum L.</i>

As we go down the hierarchy [kingdom to species] the similarities between the organisms in each taxon increase and the number of organisms in each taxon decrease.

All the names must have the suffix – to indicate the level of classification except for genes and species. E.g. Division names end in -phyta, class – opsida, order- ales, and family – aceae. The taxonomic categories higher than the genus are not italicized in the Linnaean system of classification.

The endings of ranks above subclass are recommendations whereas for order and below these are mandatory rules. The family names end in –‘aceae’ however names of 8 families are not in accordance with the rules of ICN.

These four principles of taxonomy help scientists organize and classify the vast array of living organisms, facilitating our understanding of biodiversity and evolutionary relationships.

Must read For Taxonomy Enthusiasts:

[Role of Anatomy in Taxonomy](#)

[\[Download\] A Text Book Of Practical Botany 2 | Bendre Kumar Practical Botany PDF Book](#)

[\[Download\] Plant Systematics by Gurcharan Singh PDF Book 3rd edition](#)

[BSI Research Associate Fellowship Programme 2023: A Comprehensive Guide](#)

