

NOMENCLATURE

Nomenclature deals with the determination of a correct name for a taxon.

Botanical Nomenclature:

The process of naming plants based on international rules proposed by International botanical Congress to ensure stable and universally accepted system of nomenclature is called botanical nomenclature.

It deals with the application of a correct name to a plant or a taxonomic group.

The activity of botanical nomenclature is governed by the **ICN**, International Code of Nomenclature of algae, fungi and plants (formerly **ICBN**) published by the International Association of Plant Taxonomy (**IAPT**).

Draft BioCode and **PhyloCode** are unified codes for all living organisms, for convenient handling of combined database for all organisms.

Importance of scientific names:

1. Common names do not provide information indicating family or generic relationship.

Examples:

Rose: *Rosa* (Rosaceae)

Woodrose: *Ipomoea* (Convolvulaceae)

Primrose: *Primula* (Primulaceae)

Oak: *Quercus* (Fagaceae)

Poison oak: *Rhus* (Anacardiaceae)

Tanbark oak: *Lithocarpus* (Fagaceae)

Silver oak: *Grevillea* (Proteaceae)

Jerusalem oak: *Chenopodium* (Amaranthaceae)

2. Two or more unrelated species are known by the same common name.
3. Vernacular names are not available for all the species known to man.
4. Vernacular names are restricted in their usage and are applicable in a single or a few languages only.
5. Many common names may exist for the same species in the same language or different localities.

Scientific names are written in Latin. Why?

(It is mandatory to have a Latin diagnosis for any new taxon published 1st Jan, 1935 onwards; Latin or English diagnosis after 1st Jan, 2012)

1. Latin is a dead language and as such meanings and interpretation remains unchanged.
2. Latin is specific and exact in meaning.
3. Latin language employs the Roman alphabet, which fits well in the text of most languages.

History of Organised Nomenclature:

For several centuries, names of plants were in polynomials i.e, long descriptive phrases which were difficult to remember. Eg: Willow was named as *Salix pumila angustifolia altera* by Clusius in his herbal (1583).

1. In the middle of 16th century (1623), **Casper Bauhin** introduced the concept of Binomial Nomenclature under which the name of a species consists of 2 words i.e, genus and species.
He gave a list of 6000 plants in his monumental work “Pinax”.
He did not use Binomial Nomenclature for all species. He could not make any permanent impression upon the botanical world of that time.
2. With the increase in no. of plants, **Carolus Linnaeus** proposed elemental rules and regulations for the nomenclature. “*Critica Botanica*” and “*Fundamenta Botanica*” (1737) were the first works dealing with nomenclature laws and regulations.
In 1751, Linnaeus modified his principles in his “*Philosophia Botanica*”.
In 1753, Carolus Linnaeus published his work “*Species Plantarum*”, where he employed the Binomial Nomenclature to name the plants in true sense.
3. **A.P. de Candolle (1813)**, further modified the principles of nomenclature in his “*Theorie elementaire de la botanique*”. In this work, for the first time, a complete and detailed sets of rules on plant nomenclature was given.
4. **E.G Steudel’s “Nomenclator Botanicus” (1821)** was published which comprised a list of Latin names of all flowering plants then known together with their synonyms.
2nd Edition of this work appeared in 1840 in “*Nomenclator*” which was used by botanist of Europe and America for a very long time.
5. **Alphonse de Candolle**, son of A.P.de Candolle circulated a copy of his manuscript “*Lois de la nomenclature botanique*” (1867), in the 1st International Botanical Congress (Paris Code) which was the first organised effort towards the development of uniform Botanical Nomenclature.

Codes of Nomenclature (History till dates):

1. Paris Code, 1867:

- The first ‘**International Botanical Congress**’ was held in Paris where laws of Botanical Nomenclature were accepted and adopted with some modifications.
- These laws are Paris Code since they were adopted at the French capital, or de Candolle rules, as they were prepared by Alphonse de Candolle.

- 150 botanists of different parts of the world met and rules and regulations were scheduled.
- Linnaeus was made the starting point for plant nomenclature and the rule of priority was made fundamental.
- Considerable attention was given to the matter of author citation. The need for valid publication and for acceptance and rejection of names were established.
- Difficulties arose as divergences and deviations due to the adoption of Kew rule set up by many English botanists.

2. Rochester code, 1892 (USA):

- Dr.N.L. Britton of New York Botanical Garden presided the meeting along with a group of botanists at Rochester, New York (USA).
- At this code, for the first time, the concept of nomenclatural types was introduced.
- Strict adherence to the principles of priority were given.
- Acceptance of all binomials resulting from the application of rule of priority even in case of tautonyms (specific epithet repeating the generic name, e.g. *Malus malus*).

3. Vienna Code, 1905: (held at Vienna; modifications based on Paris Code)

- Establishment of Linnaeus '*Species Plantarum*' (1753) as the starting point of nomenclature of vascular plants.
- Acceptance of descriptions of genera by Linnaeus in his '*Genera Plantarum*', 5th ed.1754 and to accept the generic names as valid.
- Many old generic names were conserved and listed out due to their long use over new names (*nomina generica conservanda*).
- Tautonyms was not accepted.
- Names of new groups must be accompanied by Latin diagnosis.
- The priority of name was determined by the date of publication alone.

4. American code,1907:

- It did not accept the list of conserved names and the requirement for Latin diagnosis.

5. 5th International Botanical Congress (IBC) held at Cambridge, 1930:

- Truly International Code evolved. Reconciled the basic differences between Vienna Code and American Code.
- There was acceptance of nomenclatural types and tautonyms were rejected.
- Mandatory use of Latin diagnosis after January 1, 1932.
- Conserved names were approved.

6. 6th International Botanical Congress (IBC) held at Amsterdam, 1935:

- From January 1, 1935, names of new groups of recent plants are considered as validly published only when they are accompanied by a Latin diagnosis.
- An attempt to select a list of *nomina specifica conservanda* was thwarted.

7. 7th International Botanical Congress (IBC) held at Stockholm, 1950:

- It introduced a certain number of definitions on types.
8. **8th International Botanical Congress (IBC) held at Paris, 1954:**
 - Great emphasis was laid on types, but the rule of Latin came under fire.
 9. **9th International Botanical Congress (IBC) held at Montreal, 1959:**
 - Appointed a special committee to study the question of conservation of family names.
 10. **10th International Botanical Congress (IBC) held at Edinburgh, 1964:**
 - ICBN was adopted.
 - Nomenclature rules, regulations and provisions were settled once and for all.
 - A.L.de Jussieu's *Genera Plantarum* (1789) is the starting point for family names.
 - The names included forms a ready reference providing correct names of families together with a type genus for each family (*nomina familiarum conservanda*).
 11. **11th International Botanical Congress (IBC) held at Seattle, 1969:**
 - Issues include tautonymous designations of taxa between genus and species, the perennial question of superfluous names and a reorganisation of the rules for hybrids.
 12. **12th International Botanical Congress (IBC) held at Leningrad, USSR, 1975:**
 - Individual paragraphs of all articles and recommendations were numbered in a decimal-like system; some paragraphs were rearranged.
 - The concept of organ-genera was eliminated for fossil plants.
 - The principle of automatic typification was extended above family level that were based on generic names, however, on priority basis.
 - It was made clear that code does not apply to the names of the organism treated as Bacteria.
 13. **13th International Botanical Congress (IBC) held at Sydney, Australia 1981:**
 - Conservation of names of species was accepted but was not included in the code.
 - The provisions for hybrids were thoroughly maintained.
 - Autonyms were treated as validly published having priority over the names as the same date automatically established.
 14. **14th International Botanical Congress (IBC) held at Berlin, 1988:**
 - The text is in English instead of three different languages- English, French and German which were operative since Paris code of 1956.
 - From January 1, 1990, the place of preservation of the type of the name of taxon must be mentioned.
 15. **15th International Botanical Congress (IBC) held at Tokyo, 1993.**
 16. **16th International Botanical Congress (IBC) held at St. Louis, 1999.**

17. 17th International Botanical Congress (IBC) held at Vienna, 2005.

18. 18th International Botanical Congress (IBC) held at Melbourne, 2011:

- **Renaming the International Code of Botanical Nomenclature (ICBN) as International Code of Nomenclature of algae, fungi and plants (ICN).**
- From January 1, 2012, it allows English diagnosis or description for making publication valid, and allowing Electronic publication for making it effective.

19. 19th International Botanical Congress (IBC) held at Shenzhen, China in July 2017.

International Code of Nomenclature of algae, fungi and plants (ICN)

[Formerly International Code of Botanical Nomenclature (ICBN)]

It is the set of rules and recommendations that govern the scientific naming of all organisms traditionally treated as algae, fungi or plants, whether fossil or non-fossil, including blue-green algae, chytrids, oomycetes, slime moulds and photosynthetic protists with their taxonomically related non-photosynthetic groups. Its main aim is that each taxon or taxonomic group has only one correct name and that is accepted throughout the world.

Before 2011, it was called ICBN, adopted by the 10th International Botanical Congress of Edinburgh in 1964. The renaming of ICBN as ICN was adopted at the 18th International Botanical Congress (IBC) held at Melbourne, 2011.

The current version of the code called ICN or the Shenzhen Code was adopted by the 19th International Botanical Congress (IBC) held at Shenzhen, China in July 2017. It became effective from 26 June 2018.

The Code is divided into 3 divisions: -

- 1) Principles**
- 2) Rules and recommendations**
- 3) Provisions for the governance of the code**

In addition, the code includes the following appendices:

- i. Names of hybrids**
- ii. Nomina familiarum algarum, fungorum, pteridophytorum et fossilium**
- iii. Nomina familiarum bryophytorum et spermatophytorum conservanda**
- iv. Nomina generica conservanda et rejiciendas**
- v. Nomina specifica conservanda et rejicienda**
- vi. Nomina utique rejicienda (Algae, Fungi, Bryophyta, Pteridophyte and Spermatophyta)**
- vii. Opera utique oppress**

- The Principles form the basis of the system of botanical nomenclature. There are 62 main rules (set as Articles) and associated recommendations. The aim of the rules is to put the nomenclature of the past into order and to provide for that of the future; names contrary to a rule cannot be maintained. The Recommendations bring about greater uniformity and clarity, especially in future nomenclature; names contrary to a recommendation cannot be rejected.
- The **International code of nomenclature for cultivated plants** is prepared under the authority of the **International Commission for the Nomenclature of Cultivated Plants** and deals with the use and formation of names for special plant categories in agricultural, forestry and horticultural nomenclature.
- The appendix (i) gives rules regarding rules of hybrids. Appendices (ii) and (iii) gives the rules of the list of conserved names of families. The appendices (iv) and (v) includes the names of conserved and rejected generic and specific names. Appendix (vi) includes list of the names and combinations based on these names, which are ruled as rejected under Article 56, and none is to be used. Appendix (vii) includes the list of publications which are not validly published according to the code.

PRINCIPLES OF ICN (ICBN)

Principle I: Botanical nomenclature is independent of zoological and bacteriological nomenclature. The code applies equally to names of taxonomic groups treated as plants whether or not these groups were originally so treated.

Principle II: The application of names of taxonomic groups is determined by means of nomenclatural types.

Principle III: The nomenclature of a taxonomic group is based upon priority of publication.

Principle IV: 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, except in specified cases.

Principle V: Scientific names of taxonomic groups are treated as Latin regardless of their derivation.

Principle VI: The rules of nomenclature are retroactive unless expressly limited.

RULES OF NOMENCLATURE

1. Principle of Priority (Rule of Priority)
2. Nomenclatural Type
3. Rank of Taxa

4. Names of Taxa
5. Effective and Valid Publication
6. Retention of Specific and Infra-specific Epithets
7. Rejection of Names
8. Splitting of a Genus
9. Synonym and Basionym
10. Author Citation
11. Names of Hybrids
12. Names of Cultivated Plants

Principle of Priority (Rule of Priority):

The nomenclature of any taxonomic group is based on priority of publication, according to which each taxon is known by its earliest name. The principle of priority is concerned with the selection of a single correct name for a taxonomic group. It is used to determine whether the name given is correct or incorrect. After identifying legitimate and illegitimate names, and rejecting the later, a correct name has to be selected from among the legitimate ones. If more than one legitimate names are available for a taxon, the correct name is the earliest legitimate name in the same rank. Article 11 (Art 11.1 to Art 11.10) of the ICN (2018) deals exclusively with the Priority of Publication.

The rules of priority are:

- 1) Each family or taxon of lower rank with a particular circumscription, position and rank can bear only one correct name.
- 2) For any taxon, family to genus inclusive, the correct name is the earliest legitimate one with the same rank.
- 3) A name of a taxon has no status under this code unless it is validly published.
- 4) If a taxonomist decides that a given species includes the types of two or more previously published names, then the oldest legitimate name is selected for use. The other names that have been applied to the same taxon are synonyms of the accepted name.
- 5) Each of the taxonomic synonyms has a separate type.
- 6) On certain occasions where a taxonomist makes a new combination by transferring a species name from one genus to another, the name of the original author is placed in parentheses followed by the name of the person making the transfer.
- 7) Homonyms are illegitimate according to the code and cannot be used as correct names.

Limitations of Principle of Priority:

- 1) Species plantarum of Linnaeus published on 1-5-1753 is taken as the earliest date for all plants excepting the Fungi, some Algae and the Musci other than the Sphagnaceae.
- 2) The principle of priority is applicable only up to the family rank, and not above.

- 3) In choosing a correct name for a taxon, names or epithets available at that rank need to be considered. Only when a correct name at that rank is not available, can a combination be made using the epithet from another rank.

NOMENCLATRURAL TYPE/ TYPE METHOD/ TYPIFICATION:

The application of names of taxa from family and below it (i.e. genus, species) is determined by means of nomenclatural types (Article 7). A nomenclatural type is that constituent element of a taxon to which the name of taxon is permanently attached. The application of type method is called Typification. According to Article 9 of ICBN, the type of a genus is a species (eg: *Papavar somniferum* is the type species of the genus *Papaver*), and the type of a family is a genus (eg: *Euphorbia* is the type genus of the family Euphorbiaceae).

Types (nomenclatural types) are usually physical specimens that are kept in a museum or herbarium or as research collection, but in its absence due to compelling circumstances an image of an individual of that taxon may also serve as a type.

Type method is a legal device to provide the correct name for a taxon. The holotype prepared gives a ready reference for taxonomic studies. However, the principle of type method does not apply to names of taxa above the rank of family.

The different kinds of 'type' or 'elements' designated by ICN (ICBN) are as follows:-

- 1) **Holotype:** A particular specimen or illustration designated by the author as the nomenclatural type i.e. the element to which the name of the taxon is permanently attached.
- 2) **Isotype:** It is a specimen which is a duplicate of the holotype, collected from the same place, at the same time and by the same person. Often the collection number is also the same, differentiated as a, b, c, etc.
- 3) **Syntype:** It is one of the two or more specimens cited by the author when no holotype was designated, or any one of the two or more specimens originally designated as types. Duplicate of a syntype is an **isosyntype**.
- 4) **Paratype (Cotype):** It is a second specimen from the same plant from where the holotype was collected. A paratype is a specimen cited in the protologue that is neither holotype nor an isotype, nor one of the syntypes.
- 5) **Lectotype:** It is a specimen selected from the original material, when no holotype was designated at the time of publication or as long as it is missing or destroyed.
A lectotype is selected from isotypes or syntypes. If no isotype or syntype is extant, the lectotype is chosen from among the paratypes. If no cited specimens exist, the lectotype must be chosen from among the uncited specimens and cited and uncited illustrations which comprise the remaining original material, if such exist.
- 6) **Neotype:** It is a specimen selected to serve as a substitute of holotype when all the material on which the name of taxon was based is missing.
- 7) **Topotype:** It is a specimen collected from the same locality from where the holotype was collected.

- 8) **Epitype:** A specimen or illustration selected to serve as an interpretative type when the holotype, lectotype, neotype, or all original material associated with a validly published name, is demonstrably ambiguous and cannot be critically identified for purposes of the precise application of the name of a taxon.
- 9) **Merotype:** It is a fragment of original holotype which has been divided into two or more pieces after having been used as a basis for description.
- 10) **Schizotype:** Any fragment of a type is known as schizotype.
- 11) **Clastotype:** The portion of the same clone.
- 12) **Paralectotype:** The specimens which were left after the selection of lectotype out of syntypes.
- 13) **Synonymotype:** It is that constituent element of a taxon quoted by the author as being identical with the newly described taxon.

In cases where the type of a name is a culture permanently preserved in a metabolically inactive state, any living isolates obtained from that is referred to as ex-type (ex-typo), ex-holotype (ex-holotypo), ex-isotype (ex-isotypo), etc.

When an infraspecific variant is recognised within a species for the first time, it automatically establishes two infraspecific taxa. The one, which includes the type specimen of the species, must have the same epithet as that of the species, e.g. *Acacia nilotica* ssp. *nilotica*. Such a name is called an **autonym**, and the specimen an **autotype**.

- Publication on or after 1 January, 1958 of the name of a new taxon of the rank of genus or below is valid only when the type of the name is indicated.
- For the name of a new taxon of the rank of genus or below published on or after 1 January, 1990, an indication of the type must include one of the words 'typus' or 'holotypus', or its abbreviation, or even its equivalent in a modern language.
- On or after 1 January, 2001, lectotypification or neotypification of a name of a species or infraspecific taxon is not affected unless indicated by use of the term 'lectotypus' or 'neotypus', its abbreviation, or its equivalent in a modern language.
- Names published on or after 1 January, 2007, would require a specimen (and not a mere illustration) as type, except only for microscopic algae or microfungi for which preservation of a type was technically difficult, and where illustration is accepted as type.

RANKS OF TAXA:

A taxon is referred to as a taxonomic group of any rank. Every individual plant is treated as belonging to a number of successively higher ranks with the species as the basic unit. Taxonomic rank means a relative position within the taxonomic hierarchy of the traditional Linnaean System of taxonomic nomenclature. The ranking of species within the taxonomic hierarchy is essentially based on similarities and presumed evolutionary relationships.

The seven principal obligatory ranks of taxa in descending sequence are: **Kingdom** (regnum), **Division** or **Phylum** (divisio, phylum), **Class** (classis), **Order** (ordo), **Family** (familia), **Genus**

and **Species**. Above kingdom, the term **Domain** is more commonly used to denote an even higher category of taxonomic classification.

Below the species (infra-specific), only five ranks are formally accepted, **subspecies**, **variety** (varietas), **subvariety** (subvarietas), **form** (forma) and **subform** (subforma). In Fungi, an additional rank, the special form (**forma specialis**) can also be used to distinguish different taxa by their host.

The prefixes **Supra-** and **Sub-** are sometimes used to introduce additional ranks, e.g. subfamily, subspecies. The prefix **notho-** is used for hybrid taxa.

Tribe is added as an additional rank between family and genus, but its use is optional. It is used in large families. However, family, tribe, genus and species do not provide true levels. '**Super**' can be added as prefix to indicate a higher rank. '**Infra**' can be added as a prefix indicating a rank below the 'Sub'.

Species is considered as smallest taxon and Kingdom is the highest taxon.

Names of Taxa:

The endings of the names of taxa indicates its rank as follows-

Kingdom – bionta
Division – phyta
Sub-division – phytina
Class – opsida
Subclass – opsidae or -idea
Order – ales
Suborder – inae
Family – aceae
Subfamily – oideae
Tribe – eac
Subtribe – inae

Stevens (2005) describes this system of naming where endings determine ranks of taxa and suggest relative positions of groups in local hierarchy as **flagged hierarchy**.

❖ The following 8 families of angiosperms although not complying with the rules are treated as valid because of old traditional usage. The type genus of each family is listed –

1. Cruciferae – Brassicaceae (*Brassica*)
2. Guttiferae – Clusiaceae (*Clusia*)
3. Leguminosae – Fabaceae (*Faba*)
4. Umbelliferae – Apiaceae (*Apium*)
5. Compositae – Asteraceae (*Aster*)
6. Labiatae – Lamiaceae (*Lamium*)
7. Palmae – Arecaceae (*Areca*)
8. Graminae – Poaceae (*Poa*)

The endings for ranks, subclass and above are recommendations, whereas for order and below these are mandatory rules.

The name of a **family** is a plural adjective used as noun. The name of a family is derived from the name of the genus which is the type for the family.

The **generic** name is a uninomial singular word treated as a noun. The genus may have a masculine, neuter or feminine form as indicated by the ending: -

- Masculine: -us, -pogon
- Feminine: -a, -is
- Neuter: -um

(The generic name of a tree, whatever be the ending, takes a feminine form, since trees are generally feminine in classical Latin; names commemorating a person, man or woman also takes the feminine form)

The first letter of the generic name is always capitalised. The name may be based on any source such as –

Commemoration of a person/author (*Bauhinia* from Bauhin), based on a place (*Caucasia* for Caucasus), based on an important character (trifoliate leaves of *Trifolium*), aboriginal names (*Vanda* a Sanskrit aboriginal name).

The name of a **species** is a binomial, consisting of two words, a generic name followed by a specific epithet. All specific epithets should begin with a lower-case initial letter. A specific epithet may be derived from any source or composed arbitrarily –

Name of a person (*wallichii* after Wallich; *hookeri* after Hooker), Place (*indica* after India; *Rosa indica*), Character (*alba* for white plant part; *Rosa alba*), Noun in apposition i.e. carrying its own gender (*Pyrus malus* is based on the Greek name *malus* for common apple).

The names of **subspecies** are trinomials and are formed by adding a subspecific epithet to the name of a species. Example: *Angelica archangelica* ssp. *himalaica*.

A **variety** within a subspecies may accordingly be quadrinomial.

Example: *Bupleurum falcatum* ssp. *eufalcatum* var. *hoffmeisteri*.

A **forma** is assigned a name in a similar manner.

Example: *Prunus cornuta* forma *villosa*.

Infraspecific name may sometimes be a polynomial.

Example: *Saxifera aizoon* var. *aizon* subvar. *brevifolia* f. *multicaulis* subf. *surculosa*.

EFFECTIVE AND VALID PUBLICATION:

When the name is published in a medium appropriate to the requirements of the code, the name is said to be ‘effectively published’ and when the name is published in accordance with the provisions of the code, the name is said to be ‘validly published. The date of a name is that of its

valid publication. Article 37 (Art 37.1 to 37.7) of the ICN (2018) deals exclusively with the validity of publication.

The criteria of Effective and Valid Publication are:

- 1) Publication of a name is effective only by distribution of a new name in a printed, permanent, readily accessible form, such as a book or a journal. Thus, publication in a local newspaper, magazines, handwritten manuscripts, etc are not effective.
- 2) It must be accompanied by a description of the taxon or by a reference to previously and effectively published description.
- 3) The name of the taxon must be accompanied by a Latin diagnosis or reference to a previously and effectively published Latin diagnosis.
- 4) A new name published after 1 January, 1953 must have clear indication of the rank of the taxon concerned.
- 5) Publications on or after 1 January, 1953, of a name of a new taxon of the rank of a family or below must indicate nomenclature type.
- 6) Since 1 January, 1958, a holotype when described and published must mention the place where it is kept.
- 7) For the name of a taxon of the rank of genus or below published on or after 1 January, 1990, indication of the type must include one of the words “*typus*” or “*holotypus*”, or its abbreviation, or its equivalent in a modern language.
- 8) The intend to publish new taxa must be clearly stated by the author.

Important Points of Effective and Valid Publication: -

- ❖ Publication of handwritten material, reproduced by some mechanical or graphic process (**indelible autograph**) such as lithography, offset, or metallic etching before 1 January, 1953 is effective.
- ❖ In order to be accepted, a name of a new taxon of fossil plants published on or after 1 January 1996, must be accompanied by a Latin or English description or diagnosis or by a reference to a previously and effectively published Latin or English description or diagnosis.
- ❖ Effective from 1 January, 2012, Electronic material published online in Portable Document Format (PDF) with an International Standard Serial Number (ISSN) or an International Standard Book Number (ISBN) will also constitute effective publication as additional option to hereto requirement of printed hard copy.
- ❖ Starting from 1 January, 2012, only one correct name will apply to all fungi like other groups within this code.
- ❖ From 1 January, 2013, all new names of fungi shall have to cite an “identifier issued by a recognised repository” in order to be validly published. Since 2004, whenever a new fungal name is published, “the online database Mycobank (www.mycobank.org) registers the description and illustrations.

A validly published name only can be treated as “**legitimate**” or “**illegitimate**”.

Legitimate name: A validly published name that is in accordance with all the rules is termed as legitimate name.

Illegitimate name: A validly published name that is contrary to one or more Articles of the code is referred as illegitimate name. an illegitimate name must be rejected under the Code. Some of the illegitimate names are **synonyms**, **homonyms** and **tautonyms**.

- ✓ **Synonym:** Synonyms are the different names used for the same taxonomic group or taxon. Synonyms may be **Nomenclatural synonyms** (names based on the same type) and **Taxonomic synonyms** (names based on different types considered to belong to the same taxon).
- ✓ **Homonym:** A name spelled exactly like a validly published name for a taxon of the same rank based on a different type.
- ✓ **Tautonym:** A binary name in which the specific epithet exactly repeats the generic name. Eg: *Malus malus*

Author Citation:

Articles 46-50 of the International Code of Nomenclature (ICN) states about the Citation of Author's name. According to the Code, the name of a taxon is incomplete unless accompanied by the name of the author or authors who first published the name validly. The names of the authors are commonly abbreviated, e.g –

L. for Carolus Linnaeus

Benth. for G. Bentham

Hook. for William Hooker

Hook.f. for Sir J.D. Hooker (f.stands for filius, the son; J.D. Hooker was son of W. Hooker.

R.Br. for Robert Brown

Lam. for J.P. Lamarck

DC. for A.P. de Candolle

Wall. for Wallich

A.DC. for Alphonse de Candolle

Scop. for G.A. Scopoli

Pers. for C.H. Persoon

Some of the important conditions related to author citation are undermentioned –

- 1) The name of a single author follows the name of a species (or any other taxon) when a single author proposed a new name or who first validly published the concerned name.
Example: *Solanum nigrum* L.
- 2) When two or more authors publish a new species or propose a new name, their names are linked by *et*.
Example: *Delphinium viscosum* Hook.f. *et* Thomson.
- 3) If a genus or taxon of lower rank is altered in rank or position, but retains its name or epithet, the name of the author who first published the name or epithet (basionym) must be cited in parenthesis (bracket) followed by the name of the author who effected the change. This is called double citation.

Example: *Cynadon dactylon* (Linn.) Pers. Basionym: *Panicum dactylon* Linn.

- 4) When the name of a taxon is proposed but not validly published by one author, and is later on validly published by another author, the names of two authors are linked by *ex*.
Example: *Gossypium tomentosum* Nutt ex Seem.
- 5) The names of authors are linked using *in* when the first author published a new species or a name in a publication of another author.
Example: *Carex kashmirensis* Clarke *in* Hook.f. (Clarke published this new species in the Flora of British India whose author was Sir J.D. Hooker).
- 6) The names of two authors are linked using *emend.* when the second author makes some change in the diagnosis or in circumscription of a taxon without altering the type.
Example: *Phyllanthus* Linn. *emend.* Mull.
- 7) Square brackets are used to indicate prestarting point author.
Example: *Lupinus* [Tourne] L. (*Lupinus* was effectively published by Tournefort in 1719, but as it happens to be earlier than 1753, the starting date for botanical nomenclature based on Species Plantarum of Linnaeus).
- 8) When naming an infraspecific taxon, it is necessary to cite the author for the subsidiary rank of the taxon in question, and not lower than a taxon.
Example: *Rosa gallica* L. var. *gallica*, and not *Rosa gallica* var. *gallica* L.

Rejection of name:

1. Name not effectively published, not properly formulated, lacking typification or without a Latin diagnosis.
2. **Nomen nudum (nom.nud.):** The names which are published without any description and are rejected until published with proper description.
3. **Tautonym:** It is the specific epithet that repeats exactly the generic name and is rejected.
4. **Later homonym:** Just as a taxon should have one correct name, the Code similarly does not allow the same name to be used for two different species (or taxa). Such, if existing, constitute homonyms, the one published at an earlier date is termed the earlier homonym and that at a later date as the later homonym. The code rejects later homonyms even if the earlier homonym is illegitimate.
5. **Later isonym:** When the same name, based on the same type, has been published independently at different times by different authors, then only the earliest of these so-called 'isonyms' has nomenclatural status. The name is always to be cited from its original place of valid publication, and later isonyms may be disregarded.

6. **Nomen superfluum (nom.superfl.):** The name which is given to a taxon when already some name is present is called superfluous name. The superfluous names are rejected.
7. **Nomen ambiguum (nom.ambig.):** A name is rejected if it is used in a different sense by different authors and has become a source of persistent error.
8. **Nomen confusum (nom.confus.):** A name is rejected if it is based on a type consisting of two or more entirely discordant elements, so that it is difficult to select a satisfactory lectotype.
9. **Nomen dubium (nom.dub.):** A name is rejected if it is dubious, i.e. it is of uncertain application because it is impossible to establish the taxon to which it should be referred.
10. **Name based on monstrosity:** A name is rejected if it is based on monstrosity.

Names of Hybrids:

- Hybridity is indicated by the use of multiplication sign, or by the addition of the prefix '**notho**' to the term denoting the rank of the taxon, the principal ranks being **nothogenus** and **nothospecies**. A hybrid between the names of the taxa, the whole expression is called a **hybrid formula**. It is usually preferable to place the female parent first.
Example: *Salix aurita* × *Salix caprea*
- A hybrid may be either **interspecific** or **intergeneric**. A binary name may be given to the interspecific hybrid or nothospecies by placing the cross sign before the specific epithet.
Example: *Salix* × *capreola* (*S. aurita* × *S. caprea*)
- The variants of interspecific hybrids are named **nothosubspecies** and **nothovarieties**.
Example: *Salix rubens* nothovar. *basfordiana*.
- For an intergeneric hybrid, the name is formed as a **condensed formula** by using the first part (or whole) of one parental genus and last part (or whole) of another genus. A cross sign is placed before the generic name of the hybrid.
Example: ×*Triticosecalis* (*Triticum* × *Secale*)
- The nothogeneric name of an intergeneric hybrid derived from four or more genera is formed from the name of a person to which is added the termination **-ara**.
Example: ×*Potinara* (*Brassavola* × *Cattleya* × *Laelia* × *Sophronitis*)
- The grafts between two species are indicated by a plus sign between two grafted species.
Example: *Rosa webbiana* + *Rosa floribunda*

Names of Cultivated Plants:

The names of cultivated plants are governed by the International Code of Nomenclature for Cultivated Plants (ICNCP). Most of the rules are taken from ICN with additional recognition of a rank cultivar (cv.) for cultivated varieties. The name of a cultivar is not written in italics, it starts with a capital letter, and is not a Latin but rather a common name.

Example: *Rosa floribunda* cv. Blessings or *Rosa floribunda* ‘Blessings’

Nomina Conservanda (nom.cons.):

Strict application of the principle of priority has resulted in numerous name changes. To avoid name changes of well known families or genera, especially those containing many species, a list of conserved generic and family names has been prepared and published in the Code with relevant changes. Such **nomina conservanda** are to be used as correct names replacing the earlier legitimate names, which are rejected and constitute **nomina rejicienda (nom.rejic.)**.

Examples of some conserved names:

1. *Triticum aestivum* L. (first species conserved)
2. *Lycopersicon esculentum* Mill.
3. *Allium ampeloprasum* L.
4. *Amaryllis belladonna* L.
5. *Bombax ceiba* L.
6. *Carex filicina* Nees.
7. *Hedysarum cornutum* L.
8. *Magnolia kobus* DC.
9. *Silene gallica* L.

Retention of Specific and Infra-specific Epithets:

(Epithet: The final name in a binary combination)

When a species is transferred to another genus without change of rank the specific epithet must be retained. If the name of a genus is changed being illegitimate, the binary combinations for all the species under that genus should be changed also and in doing so the new generic name should be used retaining the older specific epithets.

Splitting of a Genus:

When a genus is divided into two or more genera the original generic name must be retained for one of the smaller genera which includes the type species of the undivided genus. This rule applies equally to case of division of species.

