

# Plant Nomenclature Syntax

by Mike Short

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A layman's shot at demystifying the Latin naming conventions used in botany. I am by no means a botanical expert, nor do I have any botanical qualifications. What follows is information put together from the web and from books. The definitions below are by no means incontrovertible and may be over-simplified, although having botanists agree about taxonomy (the naming of plants) is like having politicians agree about taxation. The world of taxonomy is constantly changing, plants are being re-categorized regularly.

The system of binomial nomenclature in use today was started by Carl Linnaeus in 1753 with his book *Species Plantarum*. It is now governed by the International Association for Plant Taxonomy (IAPT) who administer the *International Code of Nomenclature for algae, fungi, and plants* (ICN). The naming of cultivars is governed by the International Society for Horticultural Science (ISHS) who administer the *International Code of Nomenclature for Cultivated Plants* (ICNCP). A cultivar is defined as a plant whose origin or selection is primarily due to intentional human activity.

The term "binomial" indicates that there were originally two words (in Latin) to describe a species, although many have extra words to describe their divergence from the base species. These extra (infraspecific) terms include subspecies, variety, form, and cultivar and are used to differentiate species while maintaining the relationship between species.

A better term for the complete name is the "taxonomic name", abbreviated as "taxon", plural "taxa".

The hierarchy of taxa is, in order of rank [See below for cultivars and hybrids]:

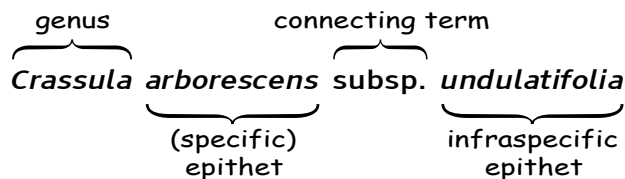
genus -> subgenus -> species -> subspecies -> variety -> subvariety -> form -> subform

A common source of confusion is that the word "**species**" is often used to refer to the second word of a taxon. However the technically correct usage is that the species is the combination of the first two words, although it is more commonly used to describe the full taxonomic name. For example for the plant *Aloe vera* it is often said that the genus is Aloe and the species is vera, however the correct usage is that the species is *Aloe vera* and the word vera is the "**epithet**" (a.k.a. specific epithet).

This document will use the term "epithet" for the second word to avoid confusion.

There are several dictionary definitions of the word species, one being "a set of animals or plants in which the members have similar characteristics to each other and can breed with each other".

## EXAMPLE



## DEFINITIONS

**Genus** (plural: **genera**, abbreviation: **gen.**):

A subdivision of Family (example Cactaceae) including plants of similar nature especially in their sexual characteristics. The genus name forms the first part of the binomial species name for each species within the genus. The first letter is uppercase the rest is lowercase. Examples: *Sedum*, *Opuntia*.

**Subgenus** (plural: **subgenera**, abbreviation: **subg.**):

Rarely used, can be used to separate plants within a genus that will eventually be moved to another new genus.

**Epithet** Also known as the **Specific Epithet, Specific Name**, or just **Species**.

"The major subdivision of a genus, regarded as the basic category of biological classification, composed of related individuals that resemble one another, are able to breed among themselves, but are not (usually) able to breed with members of another species". The epithet is the second word of a taxon and is always lowercase. An epithet can have two names which must be hyphenated, example *castello-paivae*. When the genus is known but the species is not the abbreviation **sp.** is often used, example: *Aloe* sp.

### **Connecting Terms:**

All terms are lowercase and have an abbreviation always ending with a dot. The abbreviation is preferred over the full term. These are the most commonly used (see [below](#) for rare connecting terms):

- **Subgenus** (abbreviation: **subg.**)  
A subdivision of genus, rarely used.
- **Subspecies** (abbreviation: **subsp.**)  
A subdivision of a species, grouping plants that have an appearance distinct from other plants within the same species especially due to the geographical region or ecological conditions in which they grow. Plants in a subspecies are able to breed with other plants from the same species, including those in a subspecies or variety of that species.  
Note that the abbreviation ssp. is only used in zoology.
- **Variety** (Latin **varietas**, abbreviation: **var.**)  
A subdivision of a species or subspecies, grouping plants that have an appearance distinct from other plants within the same species even though they grow in the same geographical region or ecological conditions. Plants in a variety are able to hybridize with other plants from the same species, including those in a subspecies or variety of that species. There are several opinions as to the difference between variety and subspecies, although it is mostly agreed that variety should be subordinate to subspecies. It is not common to have both.
- **Subvariety** (Latin **subvarietas**, abbreviation: **subvar.**)  
A subdivision of a variety, rarely used although not as rare as subgenus.
- **Form** (Latin **forma**, abbreviation: **f.**)  
A subdivision of a species, subspecies, or variety, grouping plants with a noticeable morphological deviation. Examples of forma are *minor* for smaller, *undulata* for having wavy leaves, and *alba* for the white flowered variant. Plants named with the same forma but within different species bear no relation to each other apart from the nature of their deviation.
- **Subform** (Latin **subforma**, abbreviation: **subf.**)  
A subdivision of form, rarely used.

### **Intraspecific epithet**

The part of a taxon following a connecting term. A taxon with one is known as an infraspecies, the full name may be termed the infraspecific name. Example "*Aloe officinalis* var. *angustifolia*" where *angustifolia* is the infraspecific epithet. Unfortunately it's common to see the specific epithet omitted when there is also an infraspecific epithet, this is not good practice because the infraspecific epithet may not be unique among the genus. For example "*Euphorbia polygona* var. *minor*" might be written as simply "*Euphorbia minor*" but that could also refer to "*Euphorbia lydenburgensis* var. *minor*".

**Cultivar** (historically abbreviated **cv.**, now enclosed in quotes, see SYNTAX below)

A variation of a species, subspecies, or variety, being created by man and not found in nature. They can be created by means that include, selection, cross-pollination, and various forms of hybridization. A cultivar is usually given a name in English which is written between single quotes, for example *Aeonium* 'Sunburst' or *Crassula* 'Tom Thumb'. Cultivars are given names by the growers that create them but those names are not accepted as species by authorities like IPNI (International Plant Names Index) or WCVP (World Checklist of

Vascular Plants). Cultivar names are random in that they are not related to the genetics of a plant but often describe some feature of a plant, like 'Black and Blue' or 'Gollum'.

#### *Cultivar Registration:*

Cultivars are considered to be the “Intellectual Property” of the creator and the names can be registered with the International Society for Horticultural Science (ISHS) to avoid duplication. The ISHS appoints a number of International Cultivar Registration Authorities (ICRAs) each covering a group of genera. Many cultivars are of food crops and are important financially to the creator. However many (maybe most) cultivar names are not registered and, although popularly known, cannot be considered official.

#### **Hybrid** (abbreviated ×, unicode 00D7)

A crossbreed between two species, subspecies, varieties, or occasionally genera. They can exist in nature but most are man-made. Many man-made hybrids are given cultivar names and lose the record of their parentage.

#### **grex** (plural **greges** or **grexes**; abbreviation **gx**)

Derived from the Latin noun *grex*, *gregis*, meaning 'flock', used in botanical nomenclature to describe hybrids of orchids, based solely on their parentage. Grex names are governed by the *International Code of Nomenclature for Cultivated Plants*.

## **SYNTAX**

Syntax is important for effective communication, including the case and slant of any text. The rules below are applied to the full names of species, but are optional when only referring to a part of a name, like the genus.

**Genus** names are always written in italics (or underlined), the first letter is capitalized, example *Crassula*.

**Subgenus** if present is used instead of Genus using the same syntax.

**Specific epithet** and **infraspecific epithet** names are always written in italics (or underlined) all lowercase, example *ovata*.

**Connecting terms** (subsp., var., f., etc.) are abbreviated and always include the dot, they are not written in italics, example *Crassula arborescens* subsp. *undulatifolia*.

**Cultivar** names are written between single quotes. The quotes can be either: (1) Apostrophe (´ unicode 0027), or (2) Curly quotes: Left Single Quotation Mark (‘ unicode 2018) and Right Single Quotation Mark (’ unicode 2019), or (3) Prime (´ unicode 2032).

Even Grave Accent (` unicode 0060) and Acute Accent (´ unicode 00B4) are accepted.

Each word is capitalized (except words like and), examples 'Blue Flame', 'Black and Blue'. Note that single quotes can create problems on computers, especially when the name contains one ex: 'Hummel's Sunset', using curly quotes with an apostrophe inside the name is a solution. Also note that many word processors will insert curly quotes when apostrophe is tapped on the keyboard.

**Hybrid** names use the symbol for the multiplication sign (×), unicode 00D7, although if the multiplication sign is not available it can be approximated by the lower-case letter “x” (not italicized).

There are three ways of writing hybrids.

- 1) When a hybrid is between two genera (intergeneric) and the result has been given a combined name (nothogenus) the name is preceded by a multiplication sign, example: × *Gasteraloe*. The space after the multiplication sign is optional. Although incorrect the multiplication sign is often omitted.
- 2) When both parents are of the same genus (interspecific) the symbol is placed between the names, example: *Aloe capitata* × *A. marlothii* where the A is the abbreviation for Aloe and is often omitted.
- 3) When an interspecific hybrid has been given a new specific epithet the symbol is placed between the common genus and the epithet, example: *Quercus* × *deamii* (an oak hybrid).

When a hybrid is between plants where one plant has infraspecific information, the prefix “notho” may be used with the connecting term making nothof., nothosubsp., and nothovar., example: *Aloe ciliaris* nothof. *Gigas*.

It is possible to denote an F2 hybrid by doubling the multiply signs, ex: *Anacamptis* × × *olida* nothosubsp. *Olida*.

## WORD ENDINGS

Latin epithets (Specific, Variety, Form, etc.) are often adjectives in which case they should if possible use the same Latin gender as the Genus name, -a -us, or -um. Examples: *Crassula ovata*, *Cereus peruvianus*, *Conophytum bilobum*. Many plants have genus names derived from Greek, in which case gender is more complicated.

## COMPOUNDING

Stringing together epithets in a name is popular and informative, however such names are rarely found in the official lists like the WCVF (World Checklist of Vascular Plants) supplied by Kew Gardens.

An example of compounding is *Lithops schwantesii* subsp. *schwantesii* var. *rugosa* 'Blue Moon' which has two infraspecies epithets and a cultivar name. Often seen is a species that uses 'subsp' is further divided by variety or form using 'var' or 'f' terms. Recent trends discourage compounding preferring 'subsp' alone.

## RANK

The above dissertation only covers binomial naming which is just a part of the ranking of a plant. The principal ranks of taxa for plants in descending sequence are: kingdom, division (or phylum), class, order, family, genus and species, of which the species is usually considered the basic rank. Only the final three ranks are in general use for the nomenclature of cultivated plants.

In addition there are subdivisions of the principle ranks which, apart from subfamily, are too complex for this document, examples are superkingdom, subclass, infratribe. Also note there are differences between the taxonomy of the plant kingdom and the animal kingdom.

More information at [https://en.wikipedia.org/wiki/Taxonomic\\_rank](https://en.wikipedia.org/wiki/Taxonomic_rank)

Ranking of *Crassula ovata* (Jade):

|                   |   |
|-------------------|---|
| Kingdom           | Plantae                                   |
| Division (Phylum) | Tracheophyta (always ends with "ophyta")  |
| Class             | Magnoliopsida (always ends with "opsida") |
| Order             | Saxifragales (always ends with "ales")    |
| Family            | Crassulaceae (always ends with "aceae")   |
| Subfamily         | Crassuloideae (always ends with "oideae") |
| Genus             | Crassula                                  |
| Species           | ovata                                     |

## Clade

Many publications replace the ranking 'Class' with 'Clade' defined as a group of organisms composed of a common ancestor and all its direct descendants. A single plant can be a member of multiple clades and a clade can itself contain multiple clades, therefore clades are not considered hierarchical. The main use of clade is to indicate the evolutionary history of a plant.

The clades shown in Wikipedia for *Crassula ovata* are:

|               |                              |
|---------------|------------------------------|
| Tracheophytes | - vascular plants            |
| Angiosperms   | - flowering plants           |
| Eudicots      | - having two seedling leaves |

## Strain

The term has no official ranking status in botany but is used to refer to a group of descendants produced by modification or mutation from a common ancestor that are similar in form. Plants within a strain show enough difference to each warrant a cultivar name. For example the group of *Echinopsis* known as Schick Hybrids. The strain name itself is not used in the binomial nomenclature.

## CHECKLISTS

The two main checklists for species are the *World Checklist of Vascular Plants* (WCVP) supplied by Kew Gardens and the *World Flora Online* (WFO). Checklists for cultivars are kept by various International Cultivar Registration Authorities, of which there are many, each being responsible for a small number of genera.

WCVP has an online interface at Plants of the World Online (POWO) at <https://powo.science.kew.org/>

WFO is online at <http://www.worldfloraonline.org/>

Non-cultivar plant names are registered at the International Plant Names Index (IPNI) <https://www.ipni.org/>

Cultivar names, as described above, are registered through the authority responsible for the particular genus.

The overseeing body is the International Society for Horticultural Science (ISHS) at <https://www.ishs.org/>.

However finding lists of the registered cultivar names can be difficult.

## COMMON NAMES

Common names are local names for plants and are usually in the local language. Although fun they cause confusion when trying to communicate between nationalities, even between regions within a nation. For example a web search for images of “Bluebell” will reveal at least a dozen different species.

## RENAMING

Driven by the results of molecular analysis (DNA), many species have been re-named recently. In the past, plants might have been given a unique name just because they didn't look like any species known to the person naming them. DNA can find plants that are really the same species leading to one of them being renamed.

Name changes have been dubbed with the terms lumping and splitting, used by Charles Darwin back in 1857.

**Lumping** is when it is found that two plants are actually the same species, resulting in both being given the same (scientific) name.

**Splitting** is when it is found that two plants that had been given the same name are different, one of them is given a different name, possibly an already existing name.

## LUMPING vs. SPLITTING

The choice depends on which is thought most important, similarities or differences.

A potential problem with lumping is the recovery of a previous name when future discoveries find that the differences really were important and they need to be split again. Once plants have the same name, nobody except the DNA analysts will know which are to be split unless there are visible differences. Whereas maintaining the extra information in the name, like the place of origin, can avoid such problems later.

Lumping can also end up with a lay person finding it hard to understand how two obviously different looking plants have the same name.

Through time the number of accepted species has grown so much that lumping seems a good option. Someone may have given a plant an extra infra-epithet (especially var) because it looked different from the main species. Then it turns out that the visible differences can be reproduced when a plant from the main species is grown in the same place as the plant that was thought different.

The current trend seems to be lumping, much to the chagrin of many collectors and producers who need to print new labels. Also difficult for book authors whose heavily researched offerings become out of date.

Today we are much better positioned to correct some of the past mistakes, we have better communication and online databases accessible to all. Someone deciding if they have discovered a new plant can see a vast array of photos online to help with their decision.

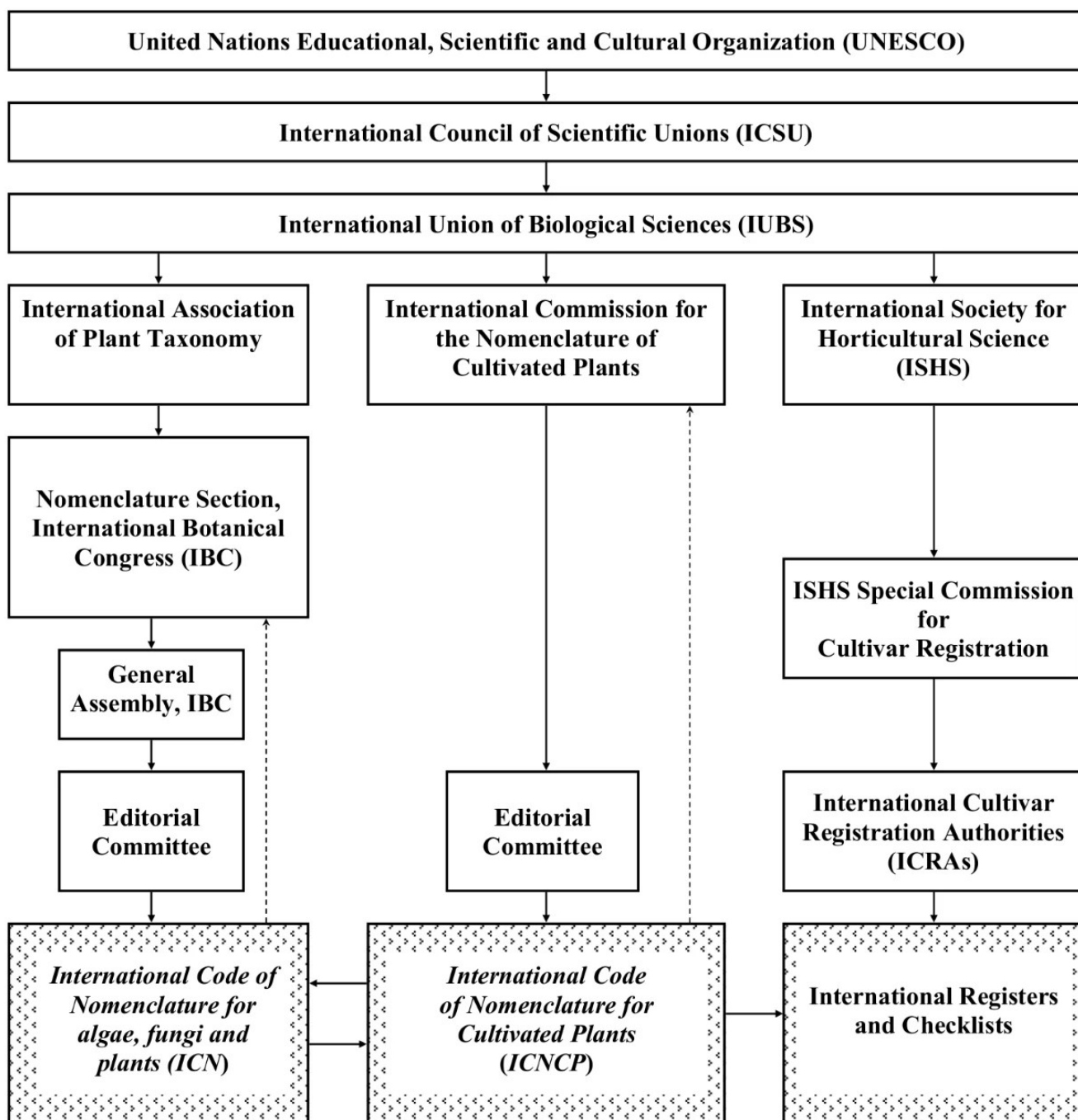
It seems that we need to accept renaming, assuming that it will lead to improved accuracy, and with the hope that those making the changes get it right.

Confused yet?

## Flow Chart of Nomenclatural Bodies and Processes

The chart below is from the “International Code of Nomenclature for Cultivated Plants” ninth edition by ISHS.

This chart demonstrates the relationships between the various international bodies that govern the international nomenclature of plants, resulting in the provision of a correct nomenclature.



## Rare Connecting Terms

In addition to the common connecting terms mentioned [above](#) there are these less common ones:

'agamosp.', 'convar.', 'ecas.', 'group', 'lusus', 'microf.', 'microgene', 'micromorphe', 'modif.', 'monstr.', 'mut.', 'nid', 'nothof.', 'nothosubsp.', 'nothovar.', 'positio', 'proles', 'prole', 'prol.', 'provar.', 'psp.', 'sect.', 'ser.', 'stirps', 'subgen', 'sublusus', 'subproles', 'subsect.', 'subser.', 'subspecioid'.