**International Code of Botanical Nomenclature (ICBN)**

**The International Code of Botanical Nomenclature (ICBN)** is the set of rules and recommendations dealing with the formal botanical names that are given to plants. Its intent is that each taxonomic group ("taxon", plural "taxa") of plants has only one correct name that is accepted worldwide. The value of a scientific name is that it is an identifier; it is not necessarily of descriptive value, or even accurate.  
  
The guiding principle in botanical nomenclature is priority. **The ICBN sets the formal starting date of plant nomenclature at 1 May 1753, the publication of Species Plantarum by Linnaeus** (or at later dates for specified groups and ranks).  
  
A botanical name is fixed to a taxon by a type. This is almost invariably dried plant material and is usually deposited and preserved in a herbarium, though can be an image. Some type collections can be viewed online at the websites of the herbaria in question.   
  
Both these principles are regulated and limited. To avoid undesirable effects of priority, conservation of a name is possible. Above the taxonomic rank of family very few hard rules apply (e.g. see descriptive botanical names).

**The ICBN can only be changed by an International Botanical Congress (IBC)**, with the International Association for Plant Taxonomy providing the supporting infrastructure. The present edition is the Vienna Code (2006), based on the decisions of the XVII IBC at Vienna 2005. This was preceded by the St Louis Code (2000) and the Tokyo Code (1994), both available online. Each new edition supersedes the earlier editions and is retroactive back to 1753, except where expressly limited.   
  
Botanical nomenclature is independent of zoological and bacteriological nomenclature, which are governed by their own Codes.   
  
**The ICBN applies not only to plants**, as they are now defined, but also to other organisms traditionally studied by botanists. This includes blue-green algae (Cyanobacteria); fungi, including chytrids, oomycetes, and slime moulds; photosynthetic protists and taxonomically related non-photosynthetic groups. There are special provisions in the ICBN for some of these groups, as there are for fossils.  
  
For the naming of cultivated plants there is a separate code, the [*International Code of Nomenclature for Cultivated Plants*](https://biocyclopedia.com/index/icncp.php). This gives supplementary rules and recommendations.

**The International Code of Botanical Nomenclature - ICBN**

Becoming an expert on botanical nomenclature requires several years of study beyond graduate school, plus access to old, and often rare, literature. A knowledge of Latin is also essential because many earlier works are in Latin. What follows is a distillation of some of the keys points of the Code, points that you should endeavor to understand. Some are presented in rather simplified form; be sure to consult the Code itself, plus a nomenclatural expert, before starting a serious argument or proposing a new name.  **Principles of Botanical Nomenclature**   
There are six principles that guide decisions concerning the **International Code of Botanical Nomenclature (ICBN)**   
  
**Principle I : Straightforward Principle   
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.**The other two principles are straightforward. Principle I states that botanical nomenclature is independent of zoological and bacteriological nomenclature. If an organism is considered to be a plant, then it must be named in accordance with the *Botanical Code.* If it is considered a bacterium, it must be named according to the *Bacteriological Code.*

**Principle II : Type Principle**   
**The application of names of taxonomic groups is determined by means of nomenclatural types.**   
The type principle states, "The application of names of taxonomic groups is determined by means of nomenclatural types". For vascular plants such as grasses, a nomenclatural type is a herbarium specimen that has been deposited in a herbarium. A nomenclatural type anchors the meaning of a name. If there is an argument as to what kind of plant the author of a name meant by a particular name, one examines the type specimen. No matter what taxonomic treatment is followed, the name must be used in a sense that includes its type specimen. If, as occasionally happens, the author of a new name provides a description that does not match the type specimen, it is the type specimen, not the description, that determines what kind of plant is called by the name in question.  
  
Adherence to the type principle did not become mandatory until 1958. Prior to that time, when taxonomists published a new name they frequently simply listed several different specimens that exemplified what they meant by the name, without identifying any particular specimen as the ‘top dog’ among the examples. All the designated specimens, including their duplicates, are referred to as *syntypes*: nomenclatural types of a single name, all of which were equally important. This became a problem if later taxonomists decided that there are two or more taxa among the specimens listed. When this happens, it became necessary to determine which of the specimens listed belongs with the original name.

To prevent such situations arising, the rules for designating a type specimen were made more explicit. Since 1990 it has been necessary to identify the exact specimen that is to be the nomenclatural type of the taxon, and the herbarium in which the specimen is located. Between 1958 and 1990 it was enough to specify who collected the specimen, where it was collected, the date on which it was collected, and the collection number it was given, if any. The problem was that, if the collector made several duplicate specimens, each of the duplicates is a *syntype*. In most instances this is not a problem, but occasionally the supposed duplicates turn out to belong to different species. Requiring that an author state exactly which of the specimens is to be regarded as the nomenclatural type helps prevent even this kind of problem. If possible, the accession number of the type should be specified as well as the name of the herbarium in which it is located, but many older herbaria do not give their specimens accession numbers.  
  
There are several different kinds of type specimen, but the most important are holotypes, lectotypes, neotypes, and epitypes. The next most important are isotypes, syntypes, and paratypes. The first four kinds of type refer to specimens that are, unequivocally, the nomenclatural type of a name. A *holotype*is a specimen that has been designated the nomenclatural type of a name by the person creating the name. If the person who originally published a particular name did not designate a holotype, a later taxonomist may select a specimen to serve as the nomenclatural type. This specimen then becomes what is called the *lectotype*of the name. If the holotype or lectotype is destroyed or lost, a new type specimen can be selected. Such replacement types are called *neotypes.*

An *epitype* is a specimen selected to be the nomenclatural type of name for which there is a holotype, lectotype, or neotype available. Why would it be necessary to select another specimen as a nomenclatural type? Sometimes the holotype, lectotype, or neotype simply does not show the features that are needed to determine, unequivocally, to which of two taxa it belongs. In such a case, it cannot be used to fix the meaning of a name. In such situations, another specimen can be selected as the ‘anchoring’ specimen; it is this specimen that is the *epitype.*  
  
**Principle III : Priority Principle**   
**The nomenclature of a taxonomic group is based upon priority of publication.**  
This principle states, in essence, that if a taxonomic group has been given two or more names, the correct name is the first name that meets the *Code’s*standards for publication*.*Basically, this means that the priority of a name dates from the time that it was first published and made known to other botanists. Writing the name in a letter (or Email) to a colleague does not count, nor do notes made on herbarium sheets.

Taxonomic groups may end up with two or more names for several reasons. The most common reason is taxonomic disagreement, about which the *Code*says nothing. Sometimes, the person publishing a later name is simply unaware that the group has already been named. In other cases, two (or more) names were given to different looking specimens of what was later treated as a single group. Whatever the reason, the priority principle states that only the first name validly and legitimately published for a particular taxonomic group is correct.  
  
In determining priority, the date that matters is the date on which the material was actually mailed to other institutions; this is not always the same as the year on the cover of a book or journal.  
  
**Principle IV : Uniqueness Principle**   
**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.**  
The uniqueness principle states that there is only one correct name for a particular taxonomic group within a given taxonomic treatment. It is the central principle upon which all the remainder of the code is based. If people disagree on the taxonomic treatment, they will consider different names to be correct but, within any treatment, each taxonomic group has only one correct name.

**Principle V : As-it-should-be Principle   
Scientific names of taxonomic groups are treated as Latin regardless of their derivation.**Principle V states that scientific names are to treated as if they were Latin, regardless of their derivation.   
  
**Principle VI : Retroactivity Principle   
*The Rules of nomenclature are retroactive unless expressly limited.***This principle states, “The Rules of nomenclature are retroactive unless expressly limited”. The Retroactivity Principle means that anyone proposing a change in the *Code* needs to consider the effect that the proposed change will have on names published in a wide range of literature and over a considerable period of time. This is an intimidating requirement. It is why all proposed changes to the Code undergo committee scrutiny before being voted on. If the committee has a problem with a proposed change, one of its members will get in touch with the person proposing the change. The committee member may point out unforeseen consequences of the proposed change. Alternatively, he or she may suggest examples that will make a stronger case for the change, or suggest modifications that will avoid some undesirable consequences.   
  
All proposals to change the *Code*are published in *Taxon*, but they remain proposals until they are voted on at the next International Botanical Congress.

**OTHER KEY PROVISIONS OF THE CODE**1. Any changes in the Code should be designed to increase the stability of plant nomenclature. No one likes name changes, not even the taxonomists that propose them.   
  
2. Every plant belongs to a species, every species to a genus, every genus to a family, every family to an order, every order to a class, every class to a division (also called a phylum nowadays - a concession to the greater number of zoologists in the world). This is the taxonomic hierarchy. Note that the Code *assumes* the existence of species. It does NOT state what constitutes a species, let alone discuss whether species are real. The Code also *requires* that plant diversity be summarized in a hierarchical structure. Again, it is not a question of whether such a structure really exists. The fact that the Code assumes the existence of species and a hierarchical structure does not mean that that the assumptions are correct, merely that, in naming plants (and the zoological code is similar in this regard), one must act as if species are real and nature is hierarchical. Many people object to this, but no one has provided a persuasive argument for dropping the system.  
  
**PUBLISHING SCIENTIFIC NAMES**   
Before a name, even a name that has a Latin form, can be accepted as a scientific name, it must satisfy several criteria. Some of these have to do with its form, others with how its existence and meaning are made known to others.   
  
**Form**Principle V states that a scientific name must be treated as if it were Latin, but the Articles 16-28 of the *Code*also specify what form the name must take. I have summarized them in the table below:

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| --- | --- | --- |
| **Rank** | **Ending** | **Examples** |
| Division (Phylum) | -phyta | Pinophyta, Magnoliophyta |
| Class | -opsida | Pinopsida, Liliopsida, Magnoliopsida |
| Order | -ales | Pinales, Liliales, Magnoliales |
| Family | -aceae | Pinaceae, Liliaceae, Magnoliaceae |
| Tribe | -eae | Pineae, Lilieae, Magnolieae |
| Genus | A noun | *Pinus*, *Lilium*, *Magnolia* |
| Species | Depends | *Pinus flexilis*,*Lilium grandiflorum,* *Magnolia grandiflora* |
| Variety | Depends | *Pinus flexilis* var. *humilus* |

Family names must be formed by combining a generic name with the suffix –aceae, but there are eight exceptions to this rule. Each of the eight exceptional names was almost universally used, and used in the same sense, throughout the world when the first edition of the *Code*was prepared and so, in accordance with the overriding goal of achieving nomenclatural stability, it was agreed that they would continue to be used. The eight names are Gramineae (Grass Family, alternative *Poaceae*) *Palmae* (Palm Family, alternatively *Arecaceae*), *Cruciferae* (Mustard Family, alternatively *Brassicaceae*), *Leguminosae* (Pea family, alternatively *Fabaceae*), *Guttiferae* (St. John’s Wort Family, alternatively *Clusiaceae*), *Umbelliferae* (Carrot Family, alternatively *Apiaceae*), *Labiatae* (Mint Family, alternatively *Lamiaceae*), and *Compositae* (Daisy Family, alternatively *Asteraceae*).

The name of a species is ALWAYS a binomial. 'Grandiflora' is not the name of a species. It has to be combined with a generic name to form the name of a species, as in *Magnolia grandiflora*. The word 'grandiflora' is what we call the specific epithet. It states which species of *Magnolia* is under discussion. Specific epithets are often adjectives that describe some attribute of the plant (it helps to learn a little Latin - 'grandiflora' means large flowered), but may refer to the habitat of a species (pratensis -of fields, lacustris - of lakes, saxicola - of rocky places), the place where the species occurs (chinensis, europaea, canadensis), or a person that is somehow connected to the species (the connection may be remote) - wrightii (referring a single, male person named Wright), wrightiae (referring to a single female person named Wright), wrightorum (refering to 2 or more people, one of whom - and possibly only 1 out of a 100 - was male) or wrightarum (referring to 2 or more people with not even one male among them - the Romans were sexist).  
  
Technically speaking, subspecies is a higher rank than variety. A subspecies may include several varieties. In practice, most taxonomists nowadays use one rank or the other, but not both. Europeans tend to use subspecies and expect subspecies to occupy somewhat different areas whereas Americans use variety to denote plants that are different from the plants first put in the species. In practice, the two ranks are used almost interchangeably.   
  
There are several optional ranks that are not listed above. For more information, consult the Code.

**Writing Scientific Names**   
In North America it is customary to write names at the rank of genus and below in italics or some other font that sets them apart from the rest of the text. The most recent edition of the Code recommends that all scientific names, no matter what their rank, be in a different font from the rest of the text. Either practice makes it easy to scan for taxonomic information.  
  
The names of all ranks from subgenus up MUST be capitalized. In most instances, the specific epithet - and epithets for lower rankings, must NOT be capitalized. There are some exceptions to this rule, cases where it is permissible, but not required, to capitalize the specific or varietal epithet, but you need to be careful. Personally I recommend always using lower case for epithets (names distinguishing species and lower ranks). That way one is never wrong.  
  
**Authorities**  
You will notice that scientific names are often followed by a word or a capital letter and a period, or one or more unintelligible (to the uninitiated) sets of letters. To join the initiated, read on.  
  
The letters and/or words that follow a scientific name (sometimes they may be within a name - more on that later) are a shorthand reference to the name of the person or person that first gave a name to the entity involved and, in some instances, to the person of persons who first treated it at the rank being used. This is probably easier to understand through some examples.

Consider *Oryzopsis exigua* Thurber   
  
Note that only the first two words are italicized. This means you are looking at the name of a species. 'Thurber' is the last name of the person who first gave a name to this species - and the name he gave to it is the one shown.   
  
Consider "*Oryzopsis asperifolia* Michx."   
  
Again, you are looking at the name of a species in the genus *Oryzopsis*. This species was first named by a fellow whose name is abbreviated to Michx. The period tells you that his name has been abbreviated. His full name was Michaux.   
  
To whom do you think "L." refers to in "*Triticum aestivum*L."?  
  
"*Dichanthelium lanuginosum* (Elliott) Gould"

The name is *Dichanthelium lanuginosum.*As you immediately recognize (because the name is a binomial), the entity being named is being treated as a species. The first person to give a name to this species was a chap whose last name was Elliott, but he named it *Panicum lanuginsoum*. An inner circle of initiates could tell you that Elliott refers to Walter Elliott, who lived from 1803 to 1887, in eastern North America (There is a book called Authors of Plant Names that provides such insight).  
  
"Gould" stands for Frank W. Gould came along later and decided that, although Elliott was right in describing the species, he should have put it in a different genus, the genus *Dichanthelium.*Elliott's name is in parentheses to show that he was the first person to say "Aha, these plants are different"' Gould's name is outside the parentheses because he said, yes, Elliott was right - these plants are different - but they should be included in the genus *Dichanthelium*, not *Panicum*  
  
Consider "*Distichlis spicata*(L.) Greene

Linnaeus [L. stands for Linnaeus] first described the entity, but as *Uniola spicata*, not *Distichlis spicata*. Greene was the first person to say no, these plants should be in *Distichlis*and then publish the combination "*Distichlis spicata".*Linnaeus gets credit for being the first person to describe the entity, Green for being the person to give it the name shown.   
  
Most journals, and consequently many professors, ask that you cite the authorities for a name when it is first used. It is a rather meaningless exercise. It is meant to say "I am using this name in the sense that it was used by Greene (in the last example)", but really you are probably using it in the sense that it is used in some flora - or based on what your boss told you. The 1999 Congress encouraged editors to be more rational about when it was useful to cite authorities and when not, but I suspect that most journals will continue to require them for some time to come.