

## BOTANICAL NOMENCLATURE (PLANT NAMES)

Organisms known to science have a name that consists of two words, a generic name and a specific epithet. The two words combine to form a binomial suitable for scientific or international communications. In *Quercus garryana*, *Quercus* is the genus or generic name, and *garryana* is the specific epithet. The recognition of a scientific name that is acceptable and known throughout the world for a plant species eliminates confusion and enables reliable communication. Common or colloquial names are best used on a local basis. They are not widely applicable because of the numerous instances where several common names have been used for a single species or where the common name has been applied to several different species.

In the early 1700's, plant names found in scientific publications were polynomials consisting of a generic name and up to twelve descriptors. When Carolus Linnaeus published *Species Plantarum* in 1753, he included in the margin of each species description a single descriptive word that he called a 'trivial name'. It was cumbersome to remember and mention ten words when referring to a single species. The trivial name simplified communication and was soon combined with the generic name to form a 'binomial,' which, of course, later became recognized as the scientific name of the organism.

For a long period of time, names were treated or published in arbitrary ways. Some people announced plant names by public lectures or placed them in ephemeral publications, others arbitrarily changed names they did not like or changed names proposed by people they did not like. There was no agreement regarding how to publish names or the starting dates for plant names. There was inconsistency in the application of plant names until botanists adopted a code of botanical nomenclature. In 1867, a botanical congress held in Paris accepted a code of nomenclature (*Lois de la nomenclature botanique*) prepared by Alphonse de Candolle. Although there have been additions to the code since then, the general principles, aims, and categories of this first code are basically the same as those in use today. The International Code of Botanical Nomenclature continues to be refined; new editions are published about every six years, after revisions are adopted at an international botanical congress. There are three basic tenets to the code: **typification, valid publication, and priority**. All three of these must be met before a name can be adopted and used.

Typification involves the designation of a nomenclatural type for a name. A nomenclatural type is a single herbarium specimen with one or more plants on it. The type method was adopted in 1930 as part of the International Code of Botanical Nomenclature and established the one type--one specimen idea; it applies only to families and all taxonomic ranks below it. The type of a name of a species is a specimen. The type of a name of a genus is a species. The type of a name of a family is a genus. A genus or family cannot be described without simultaneous or previous description of included species. It is important to keep in mind that a type specimen represents only a portion of the variability that usually exists in a taxon. When a given specimen is designated as a holotype (the actual specimen to which a name is attached), all

replicates of the specimen become isotypes. To typify a plant name described prior to the requirement for holotype designation (1958), a specimen cited by the author in the original description can be selected as the type. When this happens, the specimen is referred to as a lectotype since the type was designated after the initial publication. If a holotype is lost or destroyed, an isotype, if it exists, must be selected as a lectotype; if an isotype does not exist, then one of the other specimens cited in the original description is selected. A syntype is one of two or more specimens cited in the publication of a new taxon when a holotype was not designated. A paratype refers to a specimen, other than the holotype or isotypes, cited in the publication of a new taxon, or to the specimens remaining after a lectotype has been selected from syntypes. For example, when Kükenthal described *Cyperus pseudovegetus* Steudel var. *megalanthus* Kükenthal, he cited two specimens, which were syntypes. One of these (*Pringle 3716*) was selected by Denton to be a lectotype of the varietal name, leaving the remaining specimen (*Türckheim 975*) as a paratype. If all the specimens and their replicates cited in the publication of a new name have been lost or destroyed, then a neotype may be selected by a specialist in the particular group; neotypes, however, actually have little authority since they represent one person's interpretation of a description or illustration.

Valid publication includes each of the following points. If a name is first published without meeting all of these criteria, then the name cannot be used until the requirements are met. 1) Effective publication refers to the distribution of a new name in a printed, permanent, readily accessible form, such as a book or a journal. Ephemeral publications, such as magazines or newspapers, cannot be used. 2) The name must be in a proper form. A binomial or scientific name is published with a generic name plus the specific epithet followed by the authority (the author of the name). In *Ranunculus aquatilis* L., the L. stands for Linnaeus, who serves as the authority of the name. Scientific names are typically selected on the basis of a special feature of the organism, geographic or ecological occurrence, or recognition of a collector or specialist in a given plant group, but there is no strict rule that has to be followed so long as the words are Latinized and in the Roman alphabet, and are provided the appropriate ending. The words do not have to be easy to spell or easy to pronounce! 3) Since 1 January, 1935, descriptions of plants (except fossils and algae) must be in Latin. Fossils require an illustration since 1 January 1912, and algae must have an illustration and a Latin description or diagnosis since 1 January, 1958. A diagnosis usually provides one or a few characters that differentiate closely related taxa, while a description describes the whole organism. 4) Since 1 January, 1958, a holotype and the place where it is kept must be cited when a species is described as new to science. 5) The intent to publish new taxa must be clearly stated by the author.

Priority means that the oldest legitimate name for a taxon must be selected for use. A name only has priority in its own rank, so subspecies names do not have priority in situations where a correct name is sought for a species. The starting date for priority of vascular plants is based on Linnaeus' *Species Plantarum* published 1 May, 1753. As an exception to the general rule of priority, alternate family names with an -ae ending and a long history of use are permitted by the Code for a few families (as in Leguminosae = Fabaceae or Compositae = Asteraceae). In some instances, names that are not the

oldest for a family, genus, or species can be conserved against an earlier name. For example, *Arctostaphylos* (heather family, Ericaceae), published in 1763, is conserved against *Uva-ursi*, published in 1755. The common wheat species, *Triticum aestivum* Linnaeus, is conserved against another name, *Triticum hybernum* Linnaeus, published in the same book. Names that have been conserved are generally widely used and cited. Conservation of family and generic names has been possible since 1930. Not until 1981 did it become possible to conserve species names. Proposals to conserve names are voted upon by professionals attending nomenclatural meetings at an international botanical congress.

In the course of carrying out a taxonomic study of a group of plants, species limits are determined by an assessment of the characters. Once a taxonomist decides which taxa to recognize and the extent to which each taxon varies (the taxonomic process), then names need to be correctly assigned to the taxa (nomenclature). Names that have been previously published for the group are determined and the types of those names are examined. 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 taxonomic synonyms of the accepted name. Each of the taxonomic synonyms has a separate type. In the following example, two names are available for a species name: *Oxalis tetraphylla* Cav., published in 1795; and *Oxalis deppei* Lodd., published in 1828. As the oldest legitimate name, *Oxalis tetraphylla* must be selected as the correct name of the species; *Oxalis deppei* Lodd. is a taxonomic synonym. In taxonomic studies and floras, synonyms are listed under the recognized name. Nomenclatural synonyms are names with the same type.

On those 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. The previous name serves as the basionym for the new combination. For example, in *Sedum laxum* (Britton) Berger, Berger transferred the specific epithet originally described by Britton as *Gormania laxa* Britton; the latter name serves as the basionym. Transfers of species names to a second genus cannot be made if the given species name already has been used for an entirely different species in the second genus. In this case, a taxonomist selects the next available name among the legitimate synonyms, if one is available. In cases where a species name cannot be transferred to a second genus and other names are not available, a new specific epithet can be provided based on the type of a previously published name (which becomes a nomenclatural synonym). For example, Clausen decided that *Cotyledon glandulifera* L. F. Henderson should be classified as a species in the genus *Sedum*, but he could not transfer the species name 'glandulifera' because Gussone had already published the name *Sedum glanduliferum* in 1827 for an entirely different species. Since there was no other name available for the taxon, Clausen published the name *Sedum moranii* Clausen as a new name based on the type of *Cotyledon glandulifera* L. F. Henderson.

Illegitimate names apply to validly published names that are in violation of some aspect of the Botanical Code of Nomenclature. Homonyms, superfluous names, and tautonyms

are illegitimate and must be rejected. In nomenclature, a homonym is a name that is spelled exactly like a validly published name, but is based on a different type. For example, *Rosa caroliniana* Greene, published in 1796, is a later homonym of *Rosa caroliniana* Linnaeus, published in 1753. Homonyms are illegitimate according to the Code and cannot be used as correct names of plants. A superfluous name is a name that was published when another name or epithet was readily available and should have been used. Superfluous names can be recognized when a type specimen of a legitimate name is cited in a publication of a new taxon. For example, Gandoger described *Cyperus guatemalensis* in 1920 and cited the type as *Türckheim 128*. In the protologue (everything associated with a name at its first publication), Gandoger cited the specimen, *Lorentz & Hieronymus 1086*, which serves as the type for *Cyperus tucumanensis* Boeckeler, published in 1886. The taxon should have been called *Cyperus tucumanensis* Boeckeler; *Cyperus guatemalensis* Gandoger is a superfluous name. A tautonym is a binomial in which the genus and species names are the same, such as *Linaria linaria*.