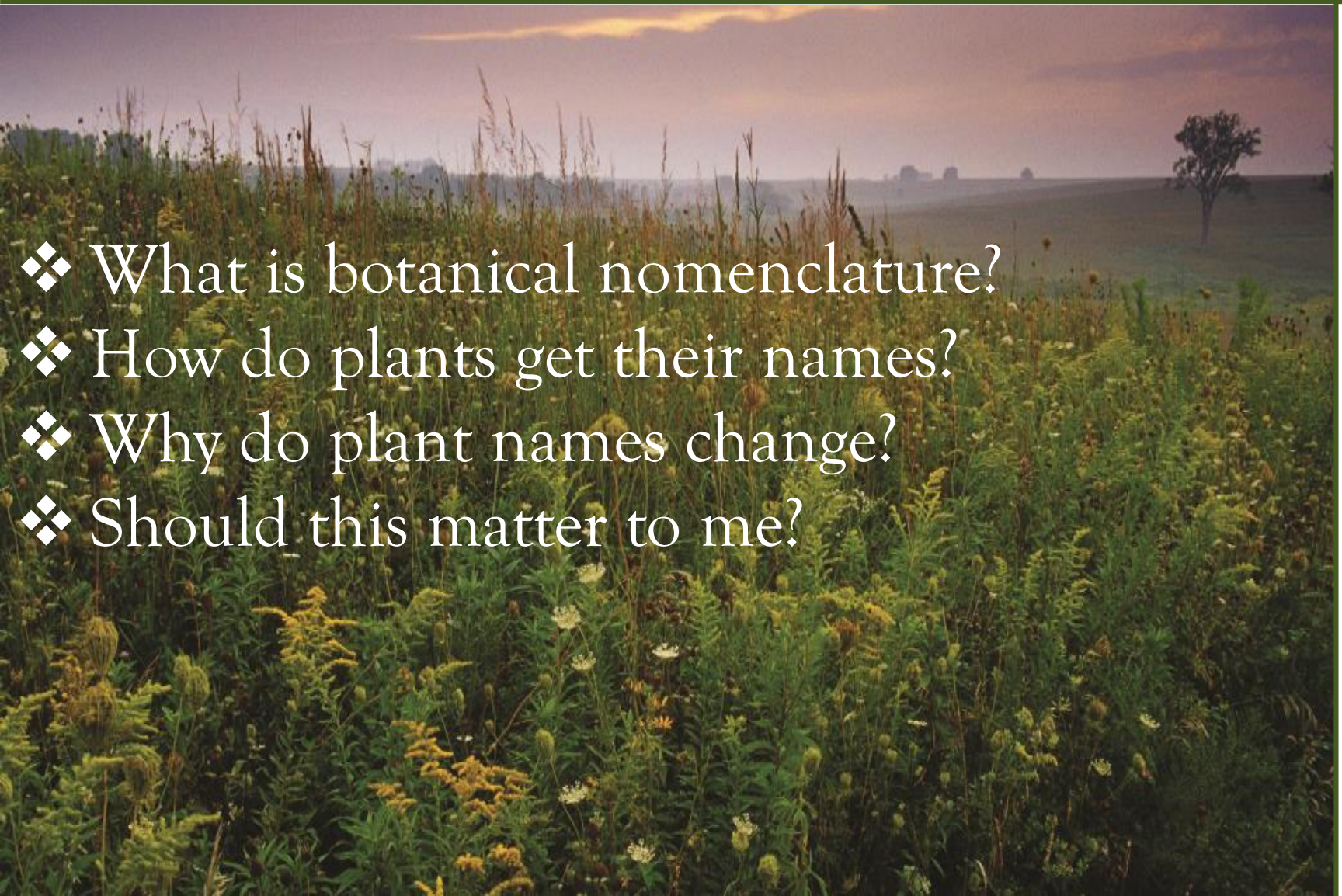
Common Questions



- What is botanical nomenclature?
- How do plants get their names?
- Why do plant names change?
- Should this matter to me?

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What is Botanical Nomenclature?

- Botanical nomenclature is the naming of plants and their related principles and rules
- The principles and rules of botanical nomenclature are developed and adapted by International Botanical Congresses (meet every 6 years)
- The principles and rules are listed in the International Code of Nomenclature for algae, fungi, & plants (ICN)
- The main goal of the ICN is to provide one correct name for each taxonomic group within a stable system of names or classification
- Differs from Taxonomy which is the classification of plants (putting in groups) according to their natural relationships

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What is a Scientific Name?

- A name is simply a conventional symbol or term that serves as a means of reference and prevents the need for continual use of cumbersome descriptive phrases
- A fundamental principle of scientific nomenclature is that names must be unambiguous and universal
- The formation and use of these scientific names for nomenclatural purposes are governed by specific codes of nomenclature:

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Codes of Nomenclature

- International Code of Nomenclature for algae, fungi and plants (ICN) formerly called the International Code of Botanical Nomenclature (ICBN)
- International Code of Nomenclature for Cultivated plants (ICNCP) – specific to cultivated plants
- Int. Code of Zoological Nom. (ICZN) – for Animals
- Int. Code of Nom. of Bacteria (ICNB) – for Bacteria
- Int. Committee on Taxonomy of Viruses (ICTV) – for Viruses

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Differences Between Codes

There are differences in these codes:

- For example, the ICN does not allow tautonyms (repeat the generic name) whereas the ICZN does
- The starting points, the time from which these Codes are in effect (retroactively), vary from group to group
  - In Botany the starting point used is 1753 (the year Linnaeus first published Species Plantarum)
  - In Zoology the starting point used is 1758
  - Bacteriology has a starting point as recent as 1980

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Comparing Scientific & Common Names

- Botanical names are universal while common names are limited to a single language or to a particular geographical region
- Sometimes one vernacular name may be used for different plants or one plant may have different common names: yellow trout-lily, adder's tongue, & dog's-tooth-violet are all *Erythronium americanum*

Source: G.H.G. blog

Photo: Michael Hough (2004)

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Issues with Common Names

- Common names may be misleading
  - There are no eggs in eggplant = *Solanum melongana*
  - Indian hawthorn is not a hawthorn = *Rhaphiolepis indica*
  - Jerusalem artichoke is neither from Jerusalem nor is it an artichoke, but rather a sunflower = *Helianthus tuberosus*

Photo credit: Wikipedia

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Characteristics of Scientific Names

- Scientific species names are binomials (composed of two words: generic and specific)
- Binomial system was founded by Jean Bauhin but first used consistently by Linnaeus in Species Plantarum (1753)
- The first word of a species name is of a Genus to which the plant belongs and the second word is of a species
- The generic name is a "collective name" for a group of plants that all share similar characteristics
- The specific name, allows us to distinguish between different plants within a genus
- The specific name is not allowed to be a tautonym (repeat the generic name) as in *Benzoin benzoin* Coult.

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Characteristics of Specific Epithets

Specific epithets refer to different things:

- May refer to distinctive morphological, ecological or chemical features e.g. *Dalea purpurea*, *Zinnia elegans*, *Ipomoea aquatica*, or *Salvia officinalis*


Photo: Kansasnativeplants.com


Photo credit: Gardenia.net

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Characteristics of Specific Epithets (cont.)


Photo: Floral Encounters website


Photo: Gerald Klingaman

- Honor individual who first collected the species or a scientist who has contributed much to the botanical knowledge of a particular region or a taxonomic group e.g. *Helianthus maximiliani* (named after the German Prince Maximilian of Wied-Neuwied who explored parts of the American West in 1832-1834)
- Or may refer to a geographical origin

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Geographical Epithets

Epithet	Reflected Country or Locality
americana	of America
canadensis	of Canada (and NE America)
novae-angliae	of New England
illinoense	of Illinois
noveboracensis	of New York
oolentangiense	of the Olentangy River (Ohio)

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The Botanical Name & the Protologue

- The specific epithet may be followed by one or more Authorities
- The Authority is the person or persons who first described the species
  - *Eupatorium altissimum* L. (L. = Linnaeus)
- The protologue is all of the elements associated with the original publication of a taxonomic name
- *Eupatorium altissimum* L., Species Plantarum 2: 837 (1753). Type: Collected from "habitat in Pensylvania" (USA), Herb. Linn. No. 335.17 (Lectotype S)

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Eupatorium altissimum – tall boneset

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Ranks of Taxonomic Categories:

Category	Suffix
Kingdom	- bionta
Phylum/Division	- phyta
Class	- opsida
Superorder	- anae
Order	- ales
Suborder	- ineae
Major ranks appear in boldface	

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Ranks of Taxonomic Categories: (cont.)

Category	Suffix
Family	- aceae (with some exceptions)
Subfamily	- oideae
Tribe	- eae
Genus	(italicized, start with capital letter)
Species	(genus name plus specific epithet, italicized)
Subspecies/Variety/Forma	(genus name, species and sub. name, italicized)
Major ranks appear in boldface	

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Features of the Taxonomic Hierarchy

- Names above the rank of GENUS are based upon the name of an included genus. Each rank has a distinctive ending attached to the stem of the name of that genus
  - *Staphylea* is a genus in the family Staphyleaceae
- The word TAXON is used to refer to a taxonomic category of any rank. The plural of taxon is TAXA
- The name of a genus is always italicized and the first letter is capitalized. The plural of genus is GENERA
- The scientific name of a species is the combination of the genus with the specific epithet. To be complete, the scientific name includes the authority
  - *Staphylea trifolia* Linnaeus

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Staphylea trifolia – American Bladdernut

- 8-15’ tall native shrub with unique flowers & fruit

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Features of Scientific Species Names

- The word species is both singular and plural
- It is always correct to write the specific epithet in all lower case (species named after people and after old generic names may be capitalized)
- The specific epithet is usually considered to be an adjective that modifies the genus (noun), and it agrees in gender with the genus
- When several species of one genus are given in sequence, the name of the genus can be abbreviated to its first letter
  - *Silphium integrifolium*, *S. laciniatum*, *S. perfoliatum*, and *S. terebinthinaceum*

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Silphiums


Photo: Bobby Hattaway (2011)


Photo: Prairie Moon Nursery


Photo: R. Schipper [michiganflora.net]


Photo: iowaplants.com

- *Silphium integrifolium*, *S. laciniatum*, *S. perfoliatum*, and *S. terebinthinaceum* (rosinweed, compass plant, cup plant & prairie dock)

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Features of Taxonomic Ranks (cont.)

- The authority can be abbreviated to save space, esp. for authors who described numerous species
- The author's name is never italicized or underlined
- The names of subspecific ranks (subspecies, variety, or form) consist of the name of the species followed by an abbreviation of the rank, then the subspecific epithet, and the authority for the subspecific name
  - *Solidago rigida* subsp. *humilis* (Porter) S.B. Heard & Semple

Photo: Lauritzen Gardens

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Principles of Botanical Nomenclature

- The naming of plants is covered by the ICN
- New edition of ICN is published after each International Botanical Congress, referred to by the city where the Congress took place
  - Most current is the Melbourne Code (2011)
  - Upcoming will be Shenzhen (2017)
- Application of botanical names is determined by nomenclatural types
- Nomenclature is based upon priority of publication

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Principles of Botanical Nom. (cont.)

- Each taxonomic group can have only one correct name, which is the earliest that is in accordance with the rules, except in specified cases
- Scientific names are in Latin or English*
  - (a recent change to the code)
- Rules of nomenclature are retroactive unless expressly limited

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Transfer Between Ranks

- When a genus, species, or subspecies is described at one rank and then transferred to another rank, the original author is placed in parentheses followed by the author who made the transfer
- Asa Gray named a milkweed: *Asclepias verticillata* var. *pumila* A. Gray. But, Anna Murray Vail thought it was deserving of species status: *Asclepias pumila* (A. Gray) Vail
- The name "pumila" is called the basionym and has priority
- The type for *Asclepias pumila* is that of *Asclepias verticillata* var. *pumila* A. Gray

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Asclepias pumila (A. Gray) Vail

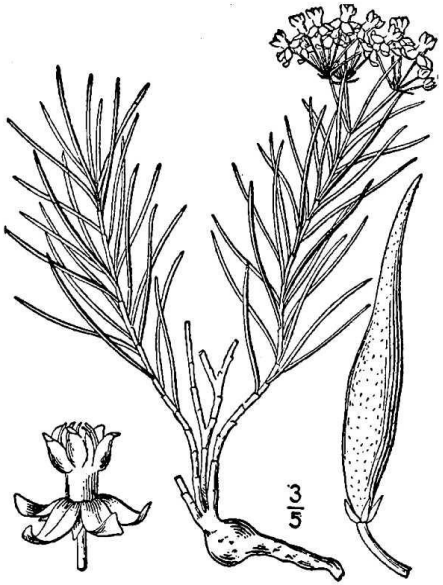

Image Source: USDA-NRCS Plants database

Photo credit: easterncoloradowildflowers.com

Photo: easterncoloradowildflowers.com

- The plains milkweed/dwarf milkweed
  - Nebraska native approx. 12” tall

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Transfer Between Ranks (cont.)

- The same occurs when a species is transferred from one genus to another:
- Andre Michaux named little bluestem: *Andropogon scoparius* but George Nash thought it deserved a different generic status, so it became: *Schizachyrium scoparium* (Michx.) Nash

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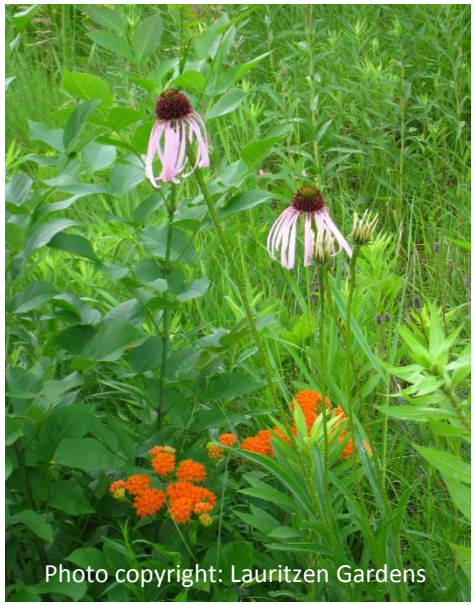
Transfer Between Ranks (cont.)

- Example 2:
- Thomas Nuttall named pale coneflower: *Rudbeckia pallida* but later decided it deserved a different generic status, so it became: *Echinacea pallida* (Nutt.) Nutt.



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Transfer Between Ranks (cont.)

- Example 3:
- Linnaeus named New England aster: *Aster novae-angliae* but Guy Nesom felt it's generic status should be changed to: *Symphyotrichum novae-angliae* (L.) G.L. Nesom

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Autonyms

- When a subspecific taxon is named, another subspecific taxon of the same rank is automatically created that repeats the name of the species. This is known as the Autonym

Examples:

- Authorities Gandhi & Smeins created *Schizachyrium scoparium* subsp. *neomexicanum* (Nash) Gandhi & Smeins. By so doing, *S. scoparium* (Michx.) Nash subsp. *scoparium* was automatically created
- Robert Woodson Jr. created the subspecies: *Asclepias incarnata* subsp. *pulchra* (Ehrh. ex Willd.) Woodson, this automatically lead to creation of another subspecies: *Asclepias incarnata* subsp. *incarnata*

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Names of Hybrid Taxa

- Hybrids are indicated with a "×" (multiplication sign)
- The sign may be given in two forms:
  - Where the parental taxa are indicated:
    Quercus alba L. × *Quercus robur* L.
  - Where the hybrid taxon is given a new name:
    Quercus × *bimundorum* E.J. Palmer

[Both Photos: J. Frank Schmidt & Son Co. website (2017)]

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Priority of Names and Synonyms

- Nomenclature is based upon priority of publication i.e. the earliest legitimate name is the correct name (but note exceptions below)
- Each taxonomic group can have only one correct name, which is the earliest in accordance with the rules, except in specified cases
- Priority begins with the publication of Linnaeus' Species Plantarum on May 1, 1753 and applies to the rank of family and below
- The correct name of a species is the combination of the earliest published valid generic name with the earliest published valid specific epithet

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How Synonyms Occur

- In some instances, the original author who describes the plant may place it in a particular genus but subsequent authors, with a more complete understanding of the taxon and its representatives, may move that species into a new genus, reflecting a more accurate classification
  - *Echinacea purpurea* (L.) Moench
  - *Rudbeckia purpurea* L. (1753)
  - *Rudbeckia serotina* (Nutt.) Sweet (1823)
  - *Echinacea serotina* (Nutt.) DC. (1836)
  - *Brauneria purpurea* (L.) Britton (1894)

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How Synonyms Occur (cont.)

- Another instance is for highly variable or wide-ranging species. Such species are often described independently & unknowingly under different names. Or, slight variations in a species can be named as new species before it is understood that these are merely the result of natural variation within the species:
  - *Schizachyrium scoparium* (Michx.) Nash. Flora of the Southeastern United States 59 (1903)
  - *S. acuminatum* Nash
  - *S. praematurum* (Fernald) C.F. Reed
  - *S. spadiceum* (Swallen) Wipff
  - *S. triaristatum* Nash
  - *S. villosissimum* (Kearney) Nash

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Synonyms

- If the same taxon has often been described and named more than once. The later names are called synonyms and are illegitimate
  - *Andropogon gerardii* Vitman (1792) - This same species was also published under other different names:
  - *Andropogon furcatus* Muhl. ex Willd. (1806)
  - *Andropogon glomeratus* Britt., Sterns & Poggenb. (1888)
  - *Andropogon tennesseensis* Scribn. (1899)

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Homonyms

- A homonym is a name that has been used for more than one taxon
  - *Callicarpa americana* L. (1753)
  - *Callicarpa americana* Lour. (1790)
  - *Callicarpa americana* Blanco (1837)

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Conservation of Names

- To avoid the disadvantages of a strict application of the rule of priority, the International Botanical Congresses have authorized the conservation of some widely used names, even though they are NOT the oldest names. These conserved names may be at the family, genus, and species ranks.
- Conservation of the name *Chrysanthemum* over the name *Dendranthema*

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Nomenclatural Types

- The names of taxa of a rank of a family and below are based on nomenclatural types, which permanently fixes a name to a specific physical specimen
- The nomenclatural type (or typus) of a taxon is an element to which the name of a taxon is permanently attached, whether as a correct name or a synonym
- The nomenclatural type is not necessarily the most typical or representative element of a taxon

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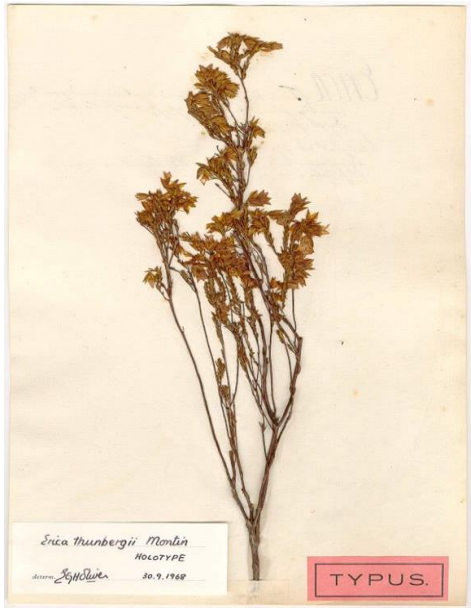
Nomenclatural Types (cont.)

- Holotype is the specimen or illustration designated by the author as the nomenclatural type
- A lectotype is a specimen or illustration selected from the original material to serve as a nomenclatural type when no holotype was indicated at the time of publication (or is missing)



[Photo: Swedish Museum of Nat. History – Linn. Herb. (1999)]

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Other Nomenclatural Types

- Isotype- any duplicate of the holotype, it is always a specimen
- Syntype- any one of two or more specimens cited by the author when no holotype was designated, or any one of two or more specimens simultaneously designated as types
- Paratype- a specimen or illustration cited in the protologue that is neither the holotype nor an isotype, nor one of the syntypes if two or more specimens were simultaneously designed as types
- Neotype- a specimen or illustration cited in the protologue selected to serve as a nomenclatural type as long as all of the material on which the name of the taxon was based is missing

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Why Plant Names Typically Change

- Taxonomic reasons:
- Sometimes taxonomists disagree over the circumscription of a plant and the application of the type specimen
- Taxonomy is shifting away from a system based on flower morphology to a phylogenetic system
  - This is where the DNA studies comes in
  - Angiosperm Phylogeny Group (APG) (first pub. 1998)
  - Most recent version = APG IV (2016)

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Why Should This Matter to Me?

- Knowing how and why plants get their names is helpful in understanding how plants are related to one another
- The story behind the botanical names is often as interesting as the story behind a plant's common name
- Many plants are named after interesting horticulturists who might otherwise be lost to history
- Many of their names relate to their original uses or where they may be found which can be quite interesting and in some cases misleading, if not thoroughly researched
- Understanding a plant's name gets us a step closer to truly understanding these plants that are so thoroughly entrenched in our lives

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Useful Websites:

- USDA/GRIN Taxonomy
- The Plant List (www.theplantlist.org)
- Tropicos (www.tropicos.org)
- List of Names (www.internationalplantnames.org)
- Mobot Plant Finder
- Denver Botanic Gardens Navigator (navigate.botanicgardens.org)

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Definitions

- Effective publication is publication which is in accordance with the rules (printed material has to be distributed to the general public or at least to botanical institutions with libraries accessible to botanist generally)
- Valid publication is publication in accordance with the rules:
  - Has a Latin or English description and
  - Gives a clear indication of rank
  - Designates a type and its location
  - Published in a scientific journal*
  - Follows the rules of nomenclature according to the most recent Code
- A legitimate name is a name that is fulfills the rules of the Code
- An illegitimate name is a name which violates the rules
- The correct name of a taxon is one that is the legitimate name

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