Nomenclature – what’s in a name?

Two of the goals for Systematics:

1. Identify and name species
2. Classify or place the species in groups

Plantae Kingdom
Magnoliophyta Phylum
Liliopsida Class
Asparagales Order
Orchidaceae Family
Cypripedium Genus
Cypripedium acaule Species

Common Names

Advantages?

• descriptive, colorful
• easy to remember
• only names for most people

Disadvantages?

• one species = many common names

Moccasin flower
Pink lady’s slipper
Stemless lady’s slipper

Nomenclature – what’s in a name?

Cypripedium reginae
Showy lady’s-slipper
Cypripedium hirsutum
Queen lady’s-slipper
Cypripedium spectabile

Two of the goals for Systematics:

1. Identify and name species
2. Classify or place the species in groups

Cypripedium acaule
Stemless lady slipper

Nomenclature - Using Names

• descriptive, colorful
• easy to remember
• only names for most people

Advantages?

• one species = many common names

Disadvantages?

Moccasin flower
Pink lady’s slipper
Stemless lady’s slipper
**Common Names**

- 15 names in English
- 44 in French
- 81 in Dutch
- 105 in German

245 common names but only 1 Latin name

* *Nymphaea alba* L.

**European white waterlily**

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**Common Names**

**Advantages?**
- descriptive, colorful
- easy to remember
- only names for most people

**Disadvantages?**
- one species = many common names
- one common name = 2+ species
  - e.g., fireweed

*Chamerion* — evening primrose family

*Erectites* — aster family

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**Common Names**

**Advantages?**
- descriptive, colorful
- easy to remember
- only names for most people

**Disadvantages?**
- one species = many common names
- one name = 2+ species
- names can be confusing
  - Sweet fern
    (not a fern!)

*Lythrum* — loosestrife family

*Lysimachia* — primrose family
Common Names

Advantages?
- descriptive, colorful
- easy to remember
- only names for most people

Disadvantages?
- one species = many common names
- one name = 2+ species
- names can be confusing

Pineapple
(not a conifer or apple!)

-- Welcome home husband no matter how drunk ye be
(also called Hen & chicks)

Common Names

Advantages?
- descriptive, colorful
- easy to remember
- only names for most people

Disadvantages?
- one species = many common names
- one name = 2+ species
- names can be confusing

Carex buxbaumii

Scientific Names

Necessary
- all species need names
- uniform system of naming to avoid confusion

Carex buxbaumii

Wahlenb.
Scientific Names

Necessary

- all species need names
- uniform system of naming to avoid confusion
- facilitates information retrieval

Scientific Names

Descriptive! (at least some times)

May-apple

*Podophyllum peltatum* - “umbrella foot leaf”

Scientific Names

- International Code of Nomenclature for fungi, algae, and plants (ICN) adopted – 2011 Melbourne

Scientific Names

Scientific names - why binomials?

Carolus Linnaeus on a field trip – using polynomials – describing the New York ironweed
Scientific names - why binomials?

Serratula foliis lanceolato oblongis serratis pendulis

“The species of Serratula with leaves oblong to lanceolate shaped, serrate edged, and drooping.”

Carolus Linnaeus on a field trip - using polynomials – describing the New York ironweed

Scientific Names

Serratula noveboracensis

Scientific name = binomial (2 names): Serratula noveboracensis

Genus name: Serratula
- capitalized
- italicized or underlined
- plural = genera

Specific epithet or trivial name: noveboracensis
- not capitalized
- italicized or underlined
- Latin ending agrees in gender with genus name
**Scientific Names**

The scientific name

Scientific name = species name + authority: *Serratula noveboracensis* L.

**Species name:** *Serratula noveboracensis*

**Authority:** Linnaeus

• (abbreviated “L.”) - the name of the person or persons who provided this binomial for this species

**Synonyms - duplicate names**

French botanist Andre Michaux transfers New York ironweed to genus *Vernonia*

*Serratula noveboracensis* L.

*Vernonia noveboracensis* (L.) Michx.

Authority = Michaux (came up with this binomial)

Parenthetical authority = Linnaeus (first used the specific epithet for this species)

**Type Method**

Because of synonymy - proliferation of scientific names - the type method is used to track names and lessen confusion

Every species name must be linked to an herbarium specimen and deposited in an herbarium

**Holotype:** the particular specimen designated by the author, which automatically fixes the application of the name

----type: other specimens to replace holotype when lost or unknown

The Berlin Herbarium – 3rd largest herbarium in the world – lost over 20,000 holotypes in May 1944 due to Allied bombing

**Holotype:** the particular specimen designated by the author, which automatically fixes the application of the name

----type: other specimens to replace holotype when lost or unknown
Required steps in authoring a name for a putative new species of *Cannabis*:

- Find binomial not already taken

Specific epithets occupied in *Cannabis*:

- *Cannabis americana*
- *Cannabis chinensis*
- *Cannabis erecta*
- *Cannabis fortescens*
- *Cannabis generalis*
- *Cannabis gigantea*
- *Cannabis indica*
- *Cannabis interstis*
- *Cannabis kafristanica*
- *Cannabis lupulus*
- *Cannabis macrospora*
- *Cannabis ruderalis*
- *Cannabis sativa*

Find binomial not already taken:

- *C. obamaei*
- *C. trumpii*
Type Method

Required steps in authoring a name for a putative new species of *Cannabis*:

- Published
- Accepted

Specific epithets occupied in *Cannabis*:
- *Cannabis americana*
- *Cannabis chinensis*
- *Cannabis erratica*
- *Cannabis foetens*
- *Cannabis generalis*
- *Cannabis gigantea*
- *Cannabis indica*
- *Cannabis interista*
- *Cannabis kafiristanica*
- *Cannabis lupulus*
- *Cannabis macrosperma*
- *Cannabis ruderalis*
- *Cannabis sativa* – only accepted
- *Cannabis trumpii* – ?

Type Method

The type method means that there is a type specimen for every named species.

*Solidago canadensis* L. has a type specimen in the Linnean collection in London.

Type Method

The type method continues up the hierarchical system of classification!

*Solidago canadensis* L. is the first named species of the genus *Solidago*.

the Linnean type specimen for the species is also the type specimen for the genus *Solidago*.

Type Method

*Solidago* belongs to family Asteraceae, typified by the genus *Aster*.

This herbarium specimen of *Aster amellus* also typifies the order Asterales and the subclass Asteridae.

*Italian aster*

*Aster amellus* L. - type specimen from Linnaeus’ collection in London.

*Aster amellus* - type species of the genus *Aster* AND family Asteraceae.
Aster renaming

...and here the story gets messy!

What if "Aster" is not “natural”? – only Aster amellus and relatives remain in genus Aster

Aster amellus L. - type specimen from Linnaeus' collection in London

Aster renaming

North American asters related to other North American genera

Aster novae-angliae - New England aster

Italian aster related to other genera in Eurasia

Aster amellus - aster

Aster renaming

Erigeron - daisy fleabane
Heterotheca - golden aster
Grindelia - gumweed
Solidago - goldenrod
Euthamia - grass-leaved goldenrod
Aster amellus - aster

Aster novae-angliae L. (New England aster)

= Symphyotrichum novae-angliae (L.) Nesom

Confusion can be an issue with ICN rules of synonymy and ranks
**Phylocode – lessens confusion?**

- Alternative nomenclatural code enacted in Paris, 2004
- **Rankless**, only phylogenetic lineages or clades named above species level
- Therefore, no genus, family & therefore no “binomial” necessary
- More on this later . . .

Kevin DeQueiroz & Phil Cantino
2 architects of the Phylocode

**Type Method**

*In this classification system, what species is the type for flowering plants?*

*Magnolia virginiana* L.

A special species from SE United States — represents the type specimen for the phylum Magnoliophyta or flowering plants

. . . as well as other “groups” in the hierarchy (Magnoliopsida, Magnoliidae, Magnoliales, Magnoliaceae, *Magnolia*)

**Rules of Botanical Nomenclature**

1. Names based on nomenclatural types

<table>
<thead>
<tr>
<th>Species</th>
<th>Genus</th>
<th>Family</th>
<th>etc.</th>
</tr>
</thead>
</table>

Family names based on type genus:

*Magnoliaceae* for *Magnolia*

8 families are allowed to keep old names not based on type method:

- Asteraceae
- Poaceae
- Brassicaceae
- Apiaceae
- Fabaceae
- Lamiaceae
- Clusiaceae
- Arecaeae

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*Compositae*

*Gramineae*

*Cruciferae*

*Umbelliferae*

*Leguminosae*

*Labiatae*

*Guttiferae*

*Palmae*
Rules of Botanical Nomenclature

2. Only one accepted name for a taxonomic group:

*Vernonia noveboracensis* (L.) Michx.

Others are synonyms:

*Serratula noveboracensis* L.

*Vernonia noveboracensis* (L.) Michx.

*Serratula noveboracensis* L.

Rules of Botanical Nomenclature

3. Names must be treated as Latin, but a lot of latitude!

*Allium* *Mailla* by Sereno Watson

Rules of Botanical Nomenclature

4. Nomenclature based on rule of priority

- 1st published binomial for a species in a genus is the accepted name (starting point: *Species Plantarum* 1753)

**Penstemon brachyanthus** Bauhin 1688

**Penstemon formosus** Linnaeus 1753

**Penstemon micranthus** Nutt. 1829

**Penstemon procerus** Gray 1835

**Penstemon tolmiei** Cronquist 1938
Rules of Botanical Nomenclature

5. Botanical nomenclature independent from zoological nomenclature

Cecropia

Pieris

Anisoptera

Mallotus
5. Botanical nomenclature independent from zoological nomenclature

*Pavonia*