Nomenclature – what’s in a name?

Read Payne 2016

Two of the goals for Systematics:
1. Identify and name species
2. Classify or place the species in groups

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
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

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

Common Names

**Advantages?**
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Lythrum — loosestrife family
*Lysimachia* — primrose family

e.g., loosestrife

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!)
**Common Names**

**Advantages?**
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**Disadvantages?**
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Pineapple (not a conifer or apple!)

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**Common Names**

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

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**Common Names**

**Advantages?**
- descriptive, colorful
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**Disadvantages?**
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? Buxbaum's sedge

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**Scientific Names**

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

**Necessary**

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

**Scientific Names**

- all species need names
- uniform system of naming to avoid confusion
- facilitates information - retrieval
- International Code of Nomenclature for fungi, algae, and plants (ICN) adopted – 2011 Melbourne

**Scientific Names**

Descriptive! (at least some times)

May-apple

*Podophyllum peltatum* - "umbrella foot leaf"

**Scientific Names**

Scientific names - why binomials?

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

New Yorker Matthew Pace - Botany 2015 Ph.D. grad
Scientific Names

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

Scientific names - why binomials?

Which would you rather learn?

Serratula foliis lanceolato oblongis serratis pendulis

or

Serratula noveboracensis

Scientific Names

The species name

Species 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*

- *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.

Type Method

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 furtens*
- *Cannabis generalis*
- *Cannabis gigantea*
- *Cannabis indica*
- *Cannabis intersita*
- *Cannabis kafiristanica*
- *Cannabis lupulus*
- *Cannabis macroperma*
- *Cannabis ruderalis*
- *Cannabis sativa*

- Name after someone important?

*C. obamaei*  
*Cannabis trumpii*  
*Cannabis trumpii* Sain & Zaborsky

- Make a type specimen & deposit in Wisconsin State Herbarium: Sain & Zaborsky 3162 (WIS)

- Latin or English description of new species

- Publish in journal or visible paper product seen in libraries OR now electronically!

= VALID species name, but not necessarily "good" or ACCEPTED species name!
**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 intersea*
  - *Cannabis kafiristanica*
  - *Cannabis lupulus*
  - *Cannabis macrosperma*
  - *Cannabis ruderalis*
  - *Cannabis sativa* – only accepted
  - *Cannabis trumpii* – ??

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**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.

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**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*.

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**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.

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**Type Method**

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

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**Type Method**

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

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**Type Method**

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

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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 amellus - aster

Italian aster

North American asters related to other North American genera

Italian aster related to other genera in Eurasia

*Aster novae-angliae* - New England 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

Rules of Botanical Nomenclature
1. Names based on nomenclatural types
   Species
   Genus
   Family
   etc.

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, Magnoliidales, Magnoliaceae, Magnolia)

Rules of Botanical Nomenclature
Family names based on type genus:
Magnoliaceae for Magnolia

8 families are allowed to keep old names not based on type method:
Asteraceae ——— Compositae
Poaceae ——— Gramineae
Brassicaceae ——— Cruciferae
Apiaceae ——— Umbelliferae
Fabaceae ——— Leguminosae
Lamiaceae ——— Labiatae
Chusiaeeae ——— Guettiferae
Arecaeeae ——— Palmae
Rules of Botanical Nomenclature

2. Only one accepted name for a taxonomic group:
   *Vernonia noveboracensis* (L.) Michx.

   Others are synonyms:
   *Serratula noveboracensis* L.

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

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)
5. Botanical nomenclature independent from zoological nomenclature

Cecropia

Pieris

Anisoptera

Mallotus
Rules of Botanical Nomenclature

5. Botanical nomenclature independent from zoological nomenclature

*Pavonia*