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

Cypripedium acaule
Stemless lady's slipper

Moccasin flower
Pink 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

Common Names

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

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

Chamerion — evening primrose family

Erectites — aster family

Lythrum — loosestrife family

*Lysimachia* — primrose family
Common Names

Advantages?
- descriptive, colorful
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- 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!)

Common Names

Advantages?
- descriptive, colorful
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Disadvantages?
- one species = many common names
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- names can be confusing

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

Common Names

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

most plants have no common name

? Buxbaum’s sedge

Scientific Names

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

Carex buxbaumii

Carex buxbaumii Wahl.
Scientific Names

Necessary
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Scientific Names

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

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

The species name – 2 names

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 - 3 names

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.

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Scientific Names

Synonyms - duplicate names

*Serratula noveboracensis* L.

*Vernonia noveboracensis* (L.) Michx.

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

**Authority =** Michaux (came up with this binomial)

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

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Scientific Names

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.

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type: other specimens to replace holotype when lost or unknown (e.g., syntype, neotype, lectotype, paratype)
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.

Type Method

So, how do you name a new species?

Melody thinks she collected a new species of Cannabis.

Type Method

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 eratica
Cannabis foetens
Cannabis generalis
Cannabis gigantea
Cannabis indica
Cannabis kafiristanica
Cannabis lupulus
Cannabis macrosperma
Cannabis ruderalis
Cannabis sativa

Type Method

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

• Find binomial not already taken

Name after someone important?

C. obamaei

C. trumpii
Type Method

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

• Find binomial not already taken
  Cannabis trumpii Sain

• Make a type specimen & deposit in Wisconsin State Herbarium
  Sain 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

Published = Accepted

Specific epithets occupied in Cannabis

Cannabis americana
Cannabis chinensis
Cannabis eratica
Cannabis foetens
Cannabis generalis
Cannabis gigantea
Cannabis indica
Cannabis interseia
Cannabis kafristanica
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

Canada goldenrod

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

Canada goldenrod
**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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**Aster renaming**

... and here the story gets messy?

What if “Aster” is not “natural”? — then only *Aster amellus* and relatives remain in genus Aster.

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**Aster renaming**

North American asters related to other North American genera

Italian aster related to other genera in Eurasia

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**Aster renaming**

Italian aster

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**Aster renaming**

New England aster

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**Aster renaming**

Grindelia - gumweed

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Aster renaming

*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 De Queiroz & Phil Cantino  
2 architects of the Phylocode

Rules of Botanical Nomenclature

1. Names based on nomenclatural types

   Species
   
   Genus
   
   Family
   
   etc.

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, Magnoliiales, 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
- Poaceae
- Brassicaceae
- Apiaceae
- Fabaceae
- Lamiaceae
- Clusiaceae
- Arecaceae

Rules of Botanical Nomenclature

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

Others are synonyms:
Serratula noveboracensis L.

Rules of Botanical Nomenclature

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

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)
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 1958

Rules of Botanical Nomenclature

5. Botanical nomenclature independent from zoological nomenclature

- *Cecropia*
- *Pieris*
- *Anisoptera*
Rules of Botanical Nomenclature

5. Botanical nomenclature independent from zoological nomenclature

Mallotus