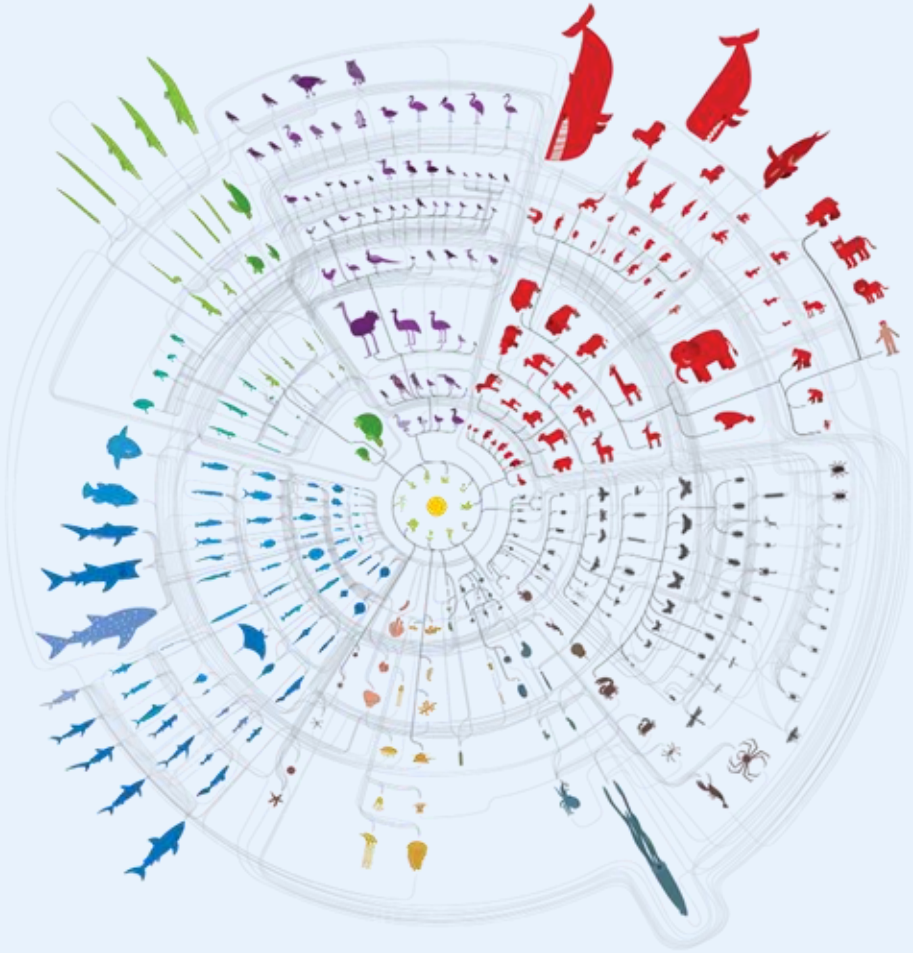
Plant Taxonomy

BIOLOGY 353



What exactly is a plant?

Plant diversity

- Plants (i.e., land plants): ~ 450,000 species
- Multicellular, generally photosynthetic with chloroplasts

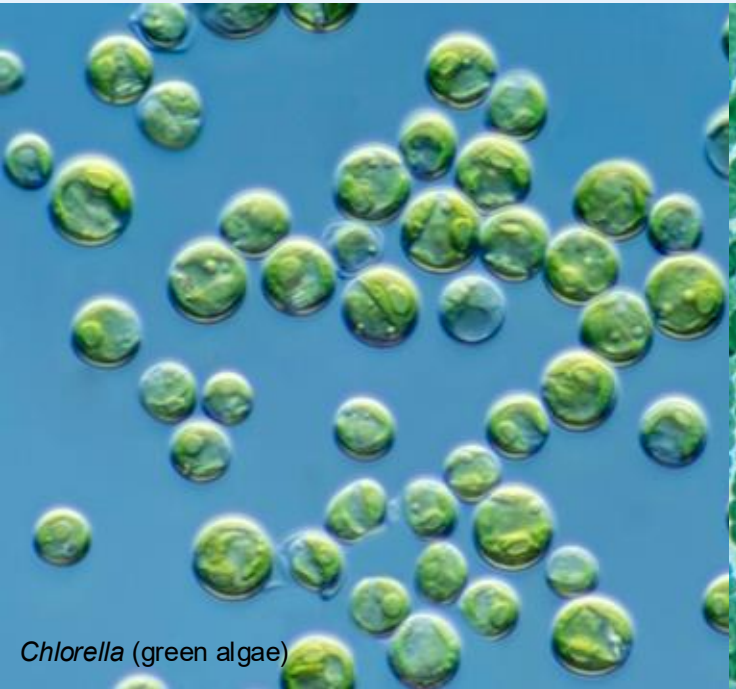

Fern


Moss

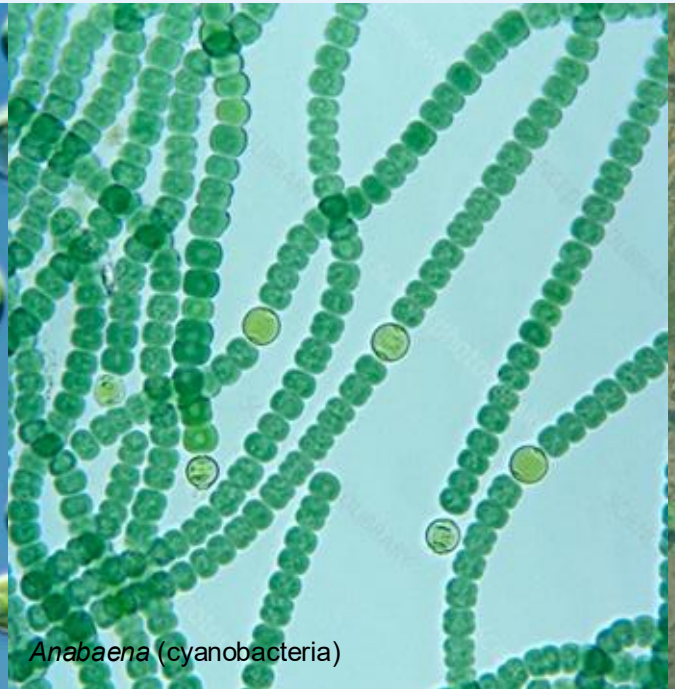

Conifer

Plant diversity

- Other photosynthetic organisms include cyanobacteria (prokaryotes) and algae and phytoplankton (mostly one- or few-celled eukaryotes)



Chlorella (green algae)



Anabaena (cyanobacteria)

Chara (green algae)

Angiosperm diversity

- Angiosperms (i.e., flowering plants): ~ 350,000 species

Angiosperm diversity

- Flowering *and fruiting* plants

Opium poppy
Papaver somniferum
Papaveraceae

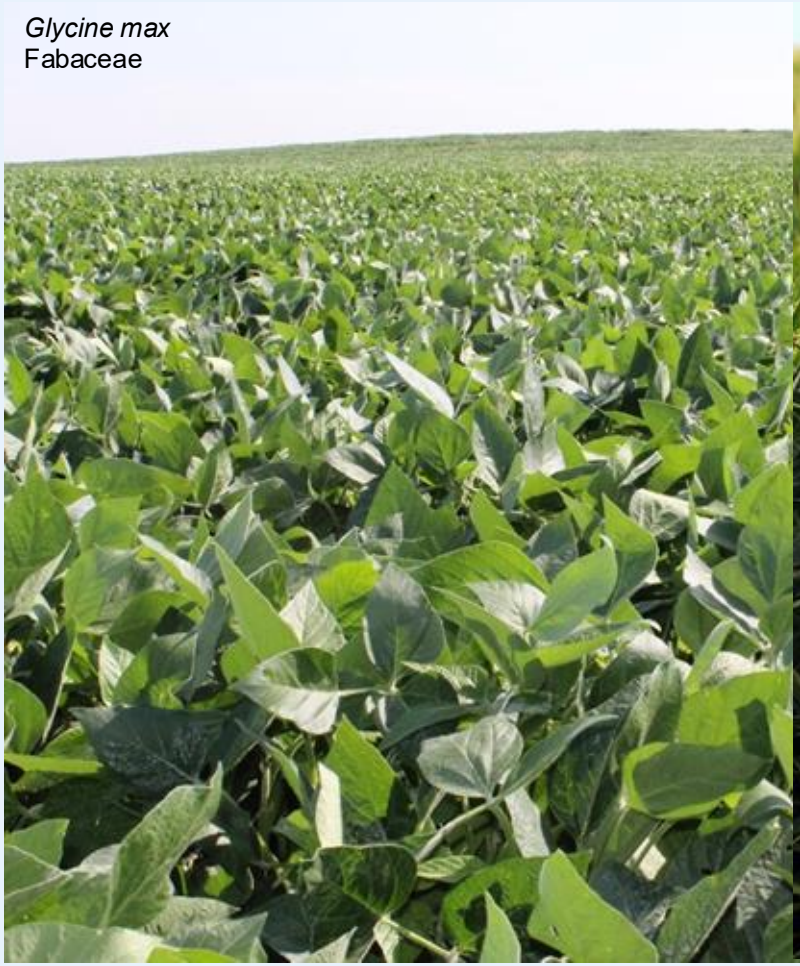
Peyote
Lophophora williamsii
Cactaceae

Coca
Erythroxylum coca
Erythroxylaceae

Marijuana
Cannabis sativa
Cannabaceae

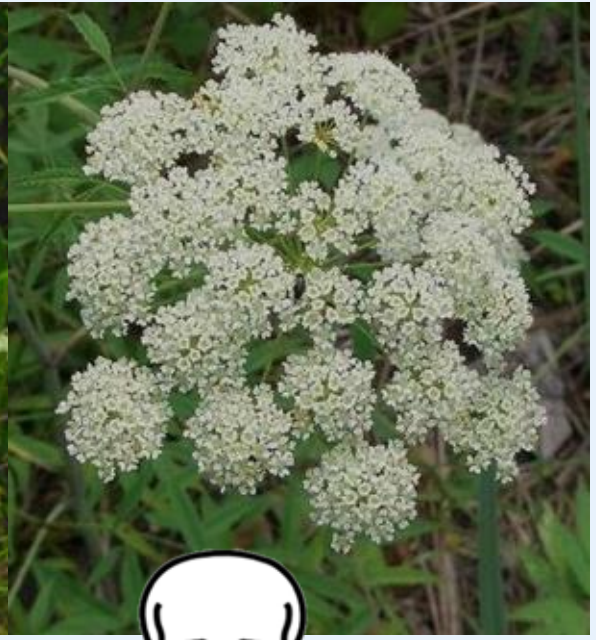

Tea
Camellia
Theaceae
Cacao
Theobroma cacao
Malvaceae
Sugarcane
Saccharum officinarum
Poaceae
Coffee
Coffea arabica
Rubiaceae

Glycine max
Fabaceae



Zea mays
Poaceae

The importance of correct identification



Carrot
Daucus carota
Apiaceae

Hemlock
Cicuta maculata
Apiaceae

Not everyone is a good botanist

Cotton plants are in the genus *Gossypium* (family Malvaceae)

…but this image shows *Clematis vitalba* (family Ranunculaceae)

Animal taxonomists

Orangutan in the wild applied medicinal plant to heal its own injury, biologists say

MAY 3, 2024 · 1:55 PM ET

https://doi.org/10.1038/s41598-024-58988-7

https://www.npr.org/2024/05/03/1248879197/orangutan-wound-medicinal-plant-treatment

Plant ecology

Plants are cool!

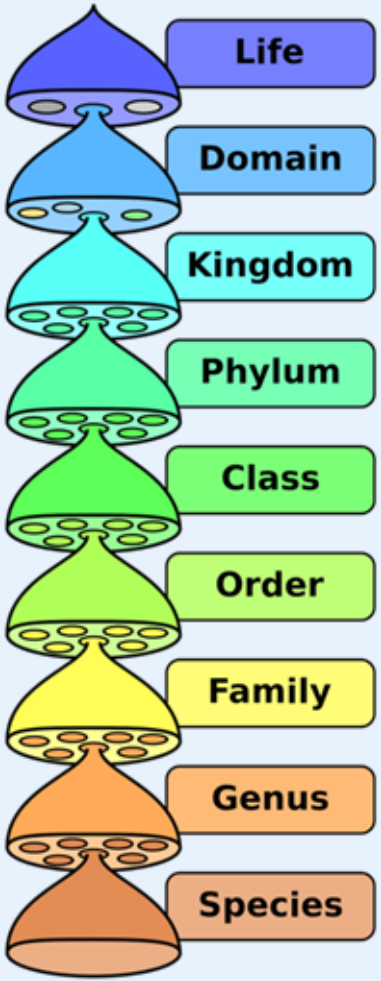
Course objectives

- General plant morphology – vegetative and reproductive
- Phylogenetic relationships among species
- System of classifying plant species
- Survey of plant diversity
- Methods to identify plant species

Wisconsin plant diversity

- Families
  - 99 dicot
  - 32 monocot
  - 3 gymnosperm
  - 16 ferns and relatives
- Genera
  - 586 dicot
  - 172 monocot
  - 8 gymnosperm
  - 33 ferns and relatives
  - 240 non-vascular

we'll cover these mostly



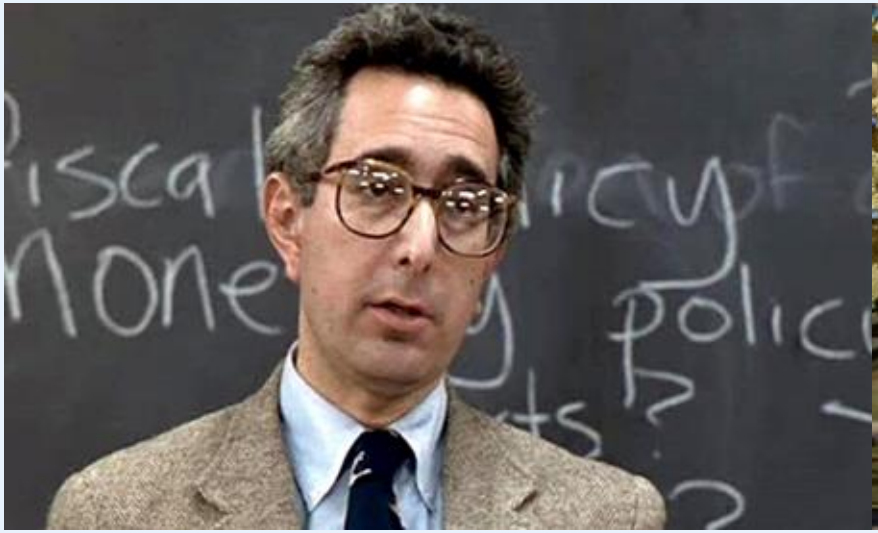
What you'll learn

- At least a passing mention of all terrestrial seed plant families in Wisconsin
  - Terrestrial: not aquatic (see BIOLOGY 359 - Aquatic Plant Biology)
  - Seed plants: not ferns, mosses, etc., but some mention of these
- About 50 families to know by name (common or scientific)
- Tools for identifying plant families, genera, species
- Practice identifying

Too many to learn/memorize!

- About 50 family names you should know
  - Families with > 30 species
  - Around 4 per class, 20 per exam

New this year



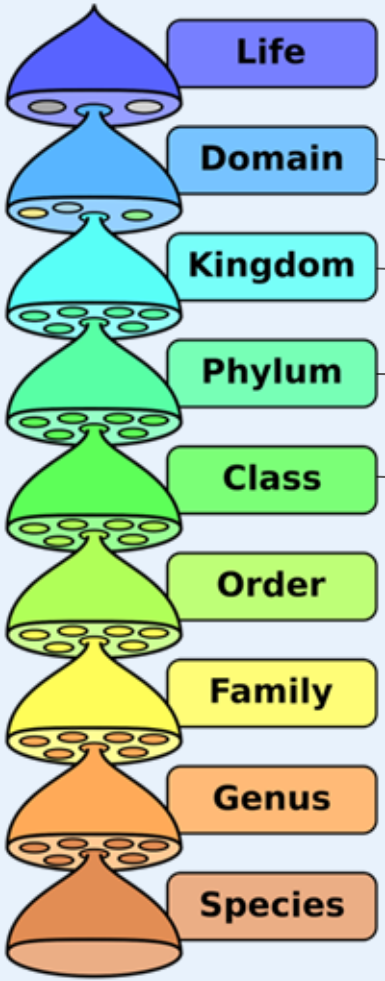
- Traditional format: family names, morphology terms, memorization
  - Organized by taxonomy
- Our approach: connections, practice, modern tools
  - Organized by features

‘Plant Taxonomy’

- Ongoing effort to describe and categorize life on earth
- Evolutionary context: how did things get to be the way they are?
- Useful features for describing and identifying plants

https://doi.org/10.1038/s41586-024-07324-0

Taxonomy: classification



Eukaryotes

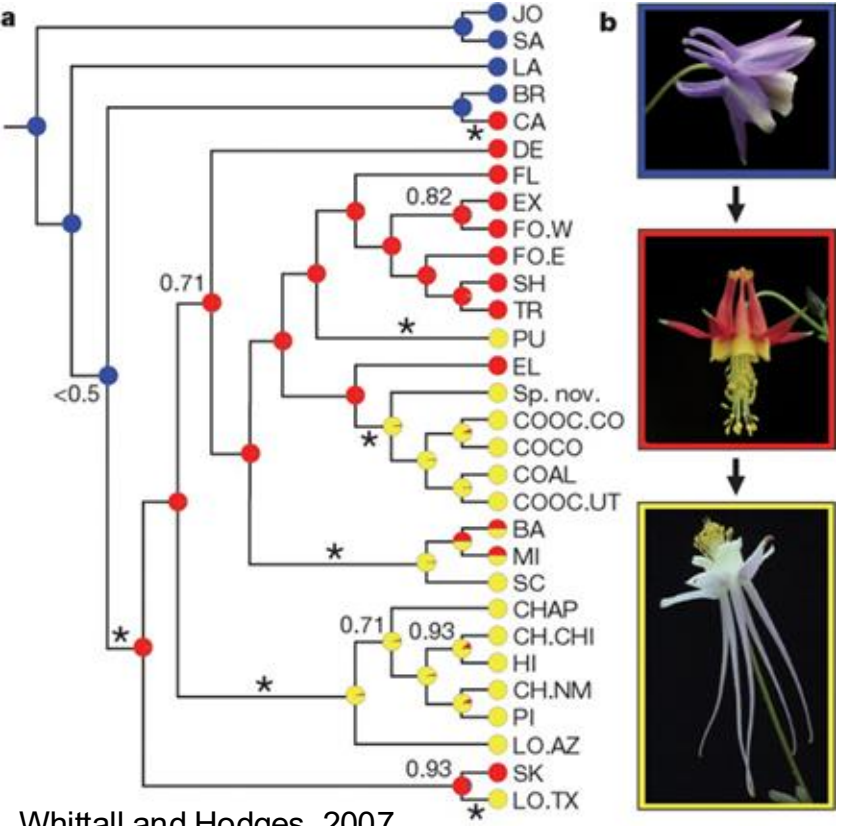
Plants (land plants)

Flowering plants

Monocots / Eudicots / other

Nomenclature: rules for *names*

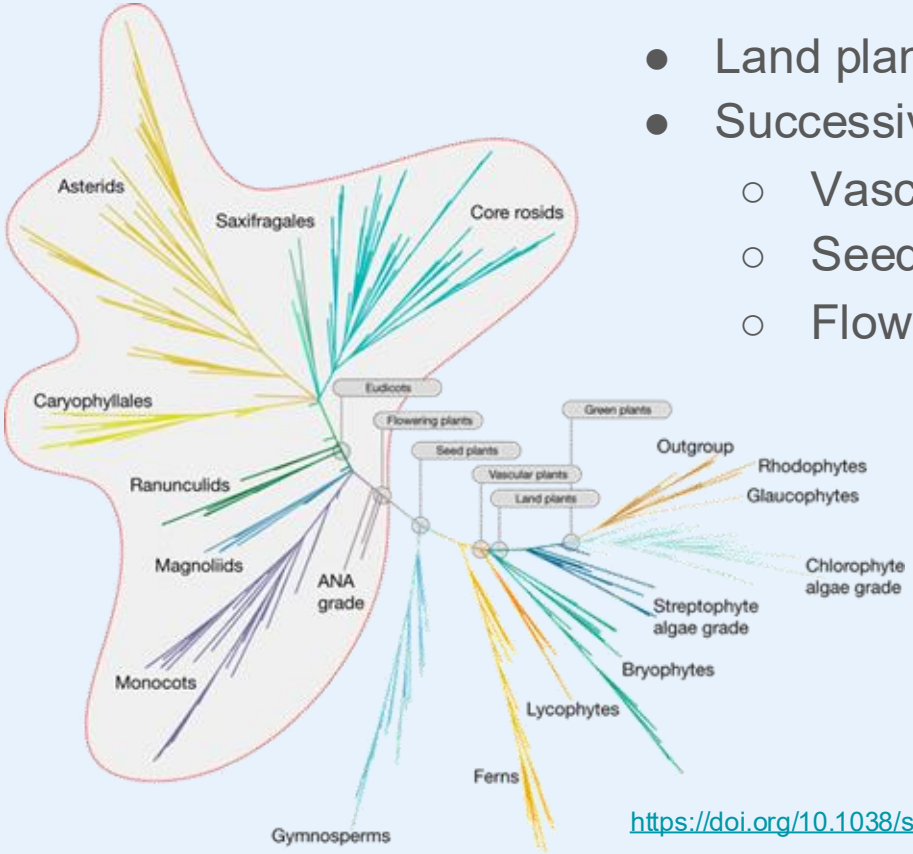
Phylogenetics: depicting evolution with trees



Whittall and Hodges, 2007

Columbine

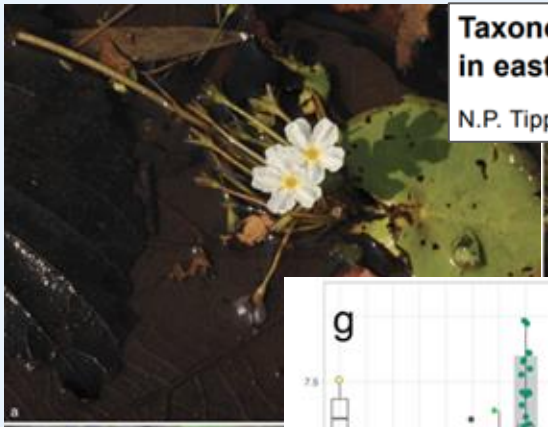
Phylogenetic overview



- Land plants originated from green algal ancestor
- Successive evolution of
  - Vascular tissue (water-conducting)
  - Seeds
  - Flowers / fruits

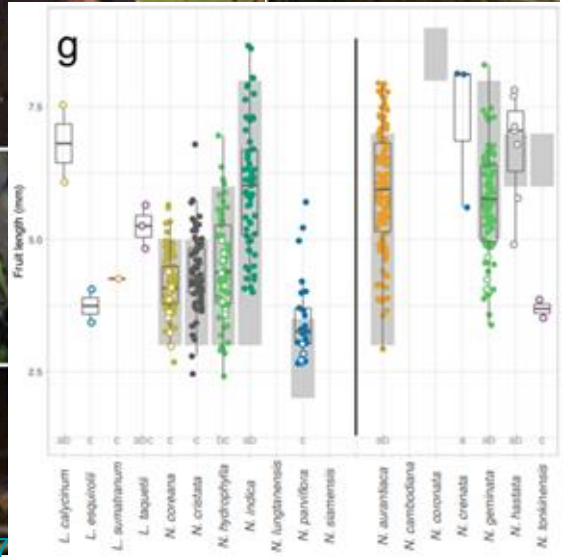
https://doi.org/10.1038/s41586-019-1693-2

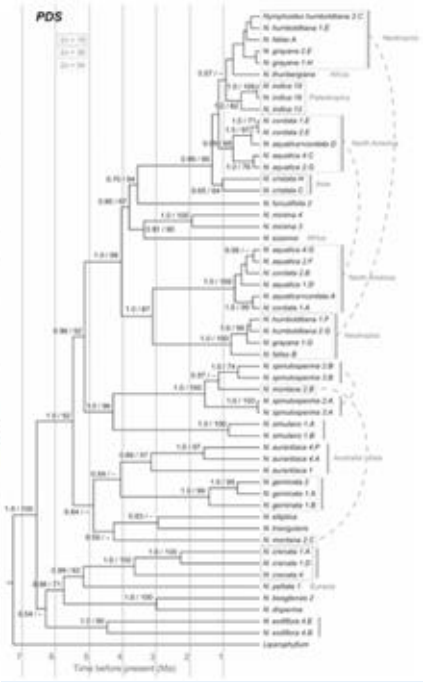
Systematics - considering all evidence at once



Taxonomic evaluation of *Nymphoides* (*Menyanthaceae*) in eastern Asia

N.P. Tippery[1*], K.C. Pawinski[1], A.J. Jeninga[1]





1. *Nymphoides aurantiaca* (Dalzell) Kuntze

Nymphoides aurantiaca (Dalzell) Kuntze (1891) 429. — *Limnanthemum aurantiacum* Dalzell (1850) 136. — Type: *Dalzell s.n.* (holo K000832797), India, Mumbai.

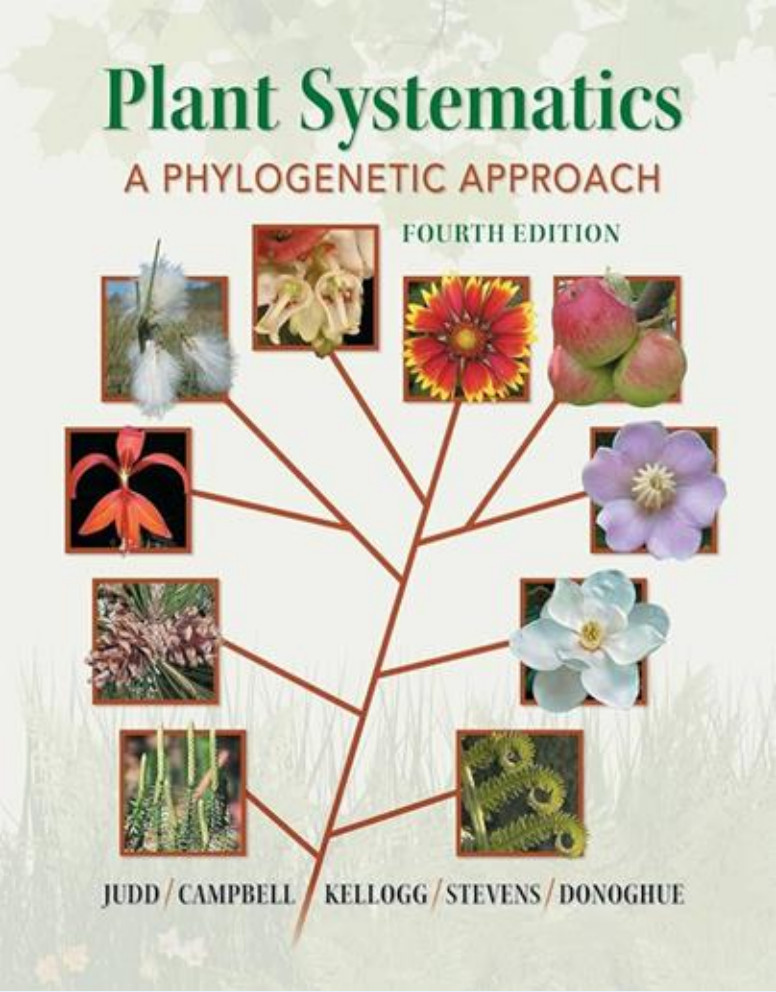
Villarsia hydrocharoides F.Muell. (1868) 139. — *Limnanthemum hydrocharoides* (F.Muell.) F.Muell ex Benth. in Benth. & F.Muell. (1868) 380. — *Nymphoides hydrocharoides* (F.Muell.) Kuntze (1891) 429. — Lectotype (designated by Aston 2009): *Dallachy s.n.* (lecto MEL no. 1505007), Australia, Queensland, Rockingham Bay.

Villarsia aurantiaca Ridl. ex C.B.Clarke in King & Gamble (1906) 90. — Lectotype (designated by Aston 2009): *Ridley s.n.* (lecto CAL no. 303131), Malaysia, Kuala Pahang.

Limnanthemum coronatum Dunn in Dunn & Tutcher (1912) 175. — *Nymphoides coronata* (Dunn) Chun ex Y.D.Zhou & G.W.Hu in Y.D.Zhou et al. (2014) 171. — Lectotype (designated here): *Hong Kong Herb. 1651* (lecto K000832799; isolecto TAIF20213, TAIF20214), China, Guangdong, Kwangtung, Kwai Sin; see note 1.

Limnanthemum tonkinense Dop (1912) 147. — *Nymphoides tonkinensis* (Dop) P.H.Hộ (1993) 1007. — Lectotype (designated here): *Bon 5904* (lecto P00623166; isolecto P00623167), Vietnam, Phùng Dực; see note 2.

https://doi.org/10.3767



The textbooks

- Electronic textbook – access through VitalSource link on Canvas

The textbooks

- Physical books – bring these for field trips and certain labs