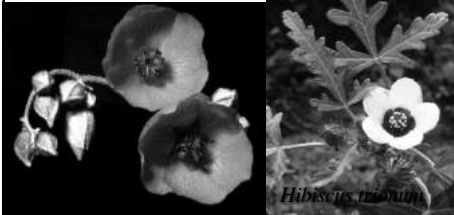


*Malvaceae - mallows

1. leaves palmately veined
(simple or compound)

2. sepals valvate - not
overlapping

3. stellate hairs



*Malvaceae - mallows

4. Many stamens, often bundled,
sometimes monadelphous into a
staminal tube

CA 5 CO 5 A (∞) G (5- ∞)



*Malvaceae - mallows

"malvoids"



Malva - mallow,
cheese



*Malvaceae - mallows

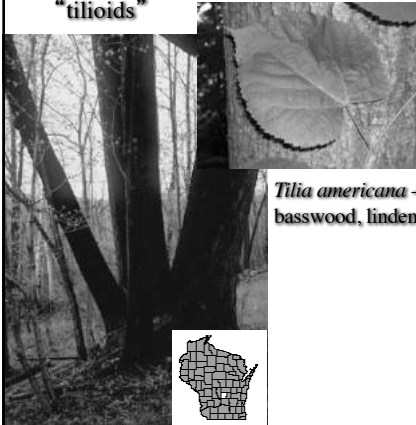
"malvoids"



• only Midwestern endemic genus

*Malvaceae - mallows

"tilioids"



Tilia americana - basswood, linden



Trichospermum - Central America



Grewia - Madagascar

*Malvaceae - mallows

"bombacoids"



Pseudobombax

Adansonia - baobabs



*Malvaceae - mallows

"sterculoids"



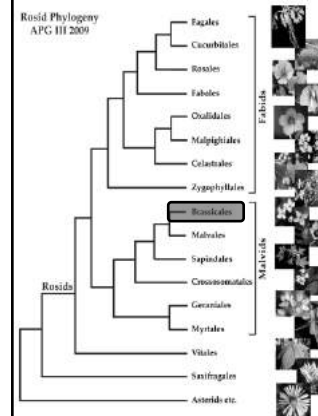
Cola



Theobroma - "food of the gods," cacao, chocolate

*Brassicales

- 17 families
- morphologically diverse!



glucosinolates

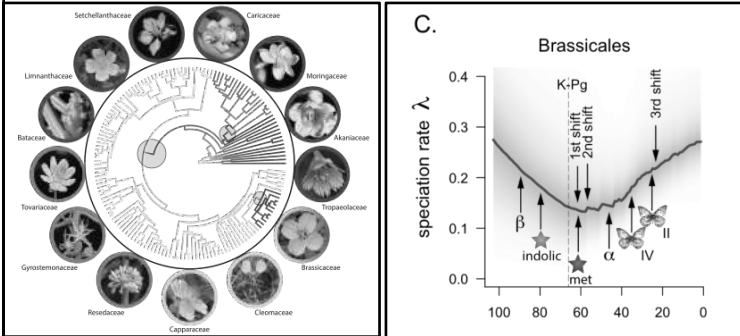


myrosinase enzyme

isothiocyanates
mustard oils

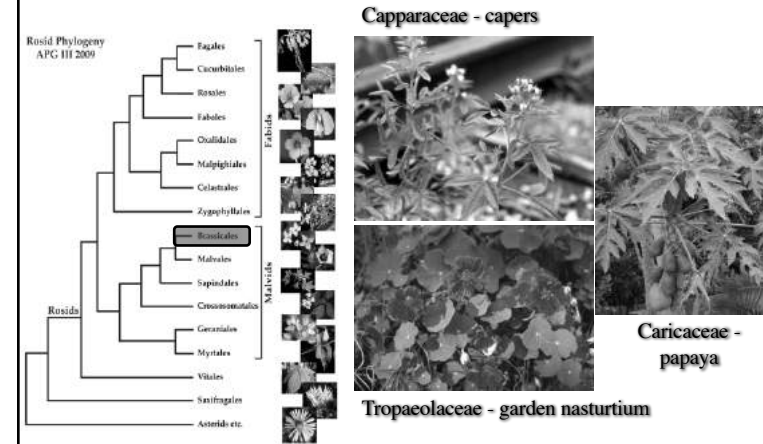


*Brassicales



Cardinal-McTeague, W. M., K. J. Sytsma, J. C. Hall. 2016. Biogeography and diversification of Brassicales: a 103 million year chronicle. *Molecular Phylogenetics and Evolution* 99: 204-224

*Brassicales



*Brassicaceae - mustard

Large (338 genera / 3710 species), complex family of mustard oil producing herbs (broccoli, brussel sprouts, cauliflower, kale, cabbage); *Arabidopsis* - genetic/genome model plant species



Brassica spp.
mustard
broccoli
kale

Arabidopsis thaliana

*Brassicaceae - mustard

CA 4 CO 4 A 4+2 G(2)

• flowers “cross-like” with 4 petals, six stamens with 2 outer ones shorter - derivation of “Cruciferae” or “cross-bearing”



Cardamine concatenata -
cut leaf toothwort

Cardamine pratensis -
cuckoo flower

*Brassicaceae - mustard

CA 4 CO 4 A 4+2 G (2)

- gynoecium of 2 fused carpels separated by thin membrane with ovules in a parietal fashion

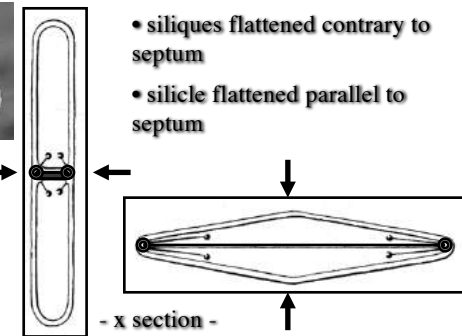
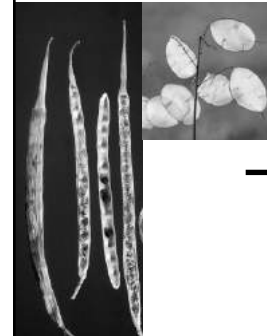


- fruit is a capsule that peels off the two outer carpel walls exposing the papery membrane or septum attached to the persistent replum

*Brassicaceae - mustard

CA 4 CO 4 A 4+2 G (2)

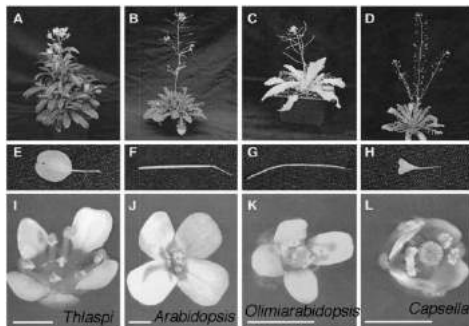
- fruits are called siliques or silicles based on how the fruit is flattened relative to the septum



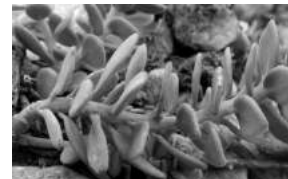
- siliques flattened contrary to septum
- silicle flattened parallel to septum

*Brassicaceae - mustard

- shape of fruits appear to have diversified rapidly in the family - unfortunately infra-familial classification has been largely based on the fruit



*Brassicaceae - mustard



- *Aethionema* - Mediterranean region - is sister to rest of family



***Brassicaceae - mustard**



Cardamine concatenata -
cut leaf toothwort

- Common spring flowering woodland herbs

Cardamine douglasii -
purple spring cress

***Brassicaceae - mustard**



Nasturtium officinale - water
cress

- edible aquatic native
with a mustard zing



***Brassicaceae - mustard**



Hesperis matronalis -
Dame's rocket



Barbarea vulgaris - yellow
rocket, winter cress

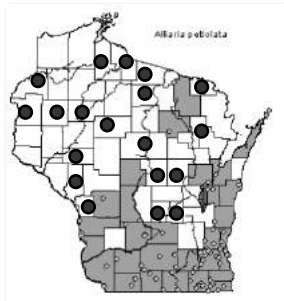
- Introduced or
spreading

***Brassicaceae - mustard**

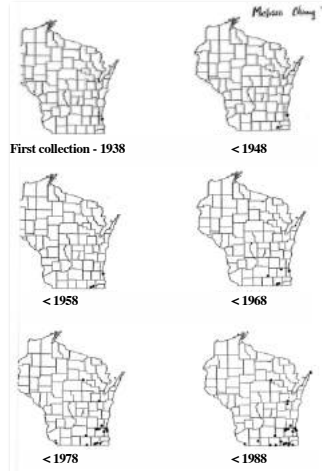


Alliaria petiolata -
garlic mustard

*Brassicaceae - mustard

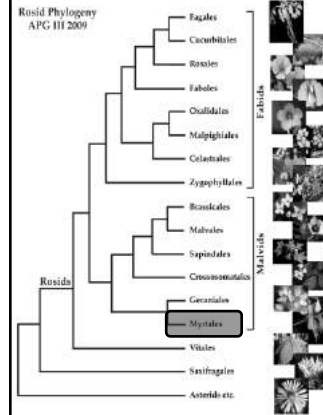


Garlic mustard distribution - 2006
 Garlic mustard distribution - 2007
 Garlic mustard distribution - 2008
 Garlic mustard distribution - 2009-2016

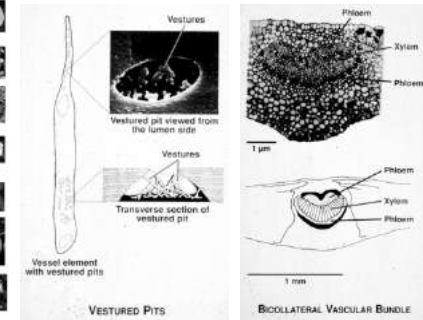


*Myrtales

Rosid Phylogeny
 APG III 2009

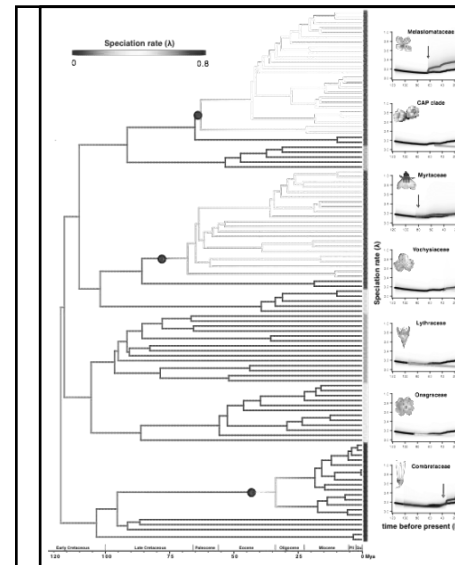


- strongly supported order of 12 families
- defined by 2 anatomical features



*Myrtales

- this combination placed the anomalous Vochysiaceae within Myrtales
- 3 very large tropical families



- Diversification analyses identify three significant shifts in speciation
- Near or just within the crown radiations of these three families

*Onagraceae - evening primrose



A moderate sized family of 17 genera and about 650 species - most diverse in western N. America

CA 4 CO 4 A 4,8 \bar{G} (4)

• 4 merous flowers, epigynous, and often well developed hypanthium



*Onagraceae - evening primrose



• *Ludwigia* is sister to remainder of the family

• tropical *Fuchsia* is diverse in South America

*Onagraceae - evening primrose



Chamerion angustifolium - fireweed



Epilobium hirsutum - willowherb



*Onagraceae - evening primrose



• Circumboreal *Circaea* is sister to woody southern hemisphere *Fuchsia*



Circaea lutetiana - enchanter's nightshade



Fuchsia

• 2 merous flowers; fruit is one-seeded and bristly

Lythraceae - loosestrife



Lythrum alatum - winged loosestrife

Close relative of the evening primrose family; mainly tropical in distribution

CA 4-6 CO 4-6 A 8-12 G (4)

- flowers 4, 5, or 6 merous with stamens double the number of sepals and in two distinct sets
- exhibits tristylous heterostyly
- hypanthium well developed but with superior pistil = perigynous

Lythraceae - loosestrife



Lythrum salicaria
purple loosestrife

Ecologically invasive in wetlands; from Europe



Geraniales: Geraniaceae



Geranium family: 800 species of temperate herbs

Poorly understood order of 6 families – now placed next to Myrtales



Geranium maculatum - wild geranium

Geraniaceae - geranium



CA 5 CO 5 A 10 G (5)

- 5 merous flowers with a superior pistil made up of 5 carpels each with a single ovule

• fruit is a schizocarp = dehiscent fruit into one-seeded mericarps



Geraniaceae - geranium

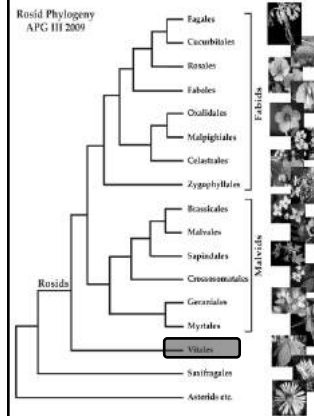


Erodium cicutarium - stork' s-bill
The stork' s-bills of genus *Erodium*
drill their mericarps into the ground

Geranium robertianum
Herb robert

Vitales: Vitaceae - grapes

Rosid Phylogeny
APG III 2009



Order with one family: sister to all other Rosids



Vitis - grape

Vitales: Vitaceae - grapes

Small family (800 species) of vines in the tropics and temperate areas - includes *Vitis vinifera* the wine grape

- flowers small and clustered in more showy inflorescences
- fruits: berries with several seeds



Parthenocissus tricuspidata - Boston ivy



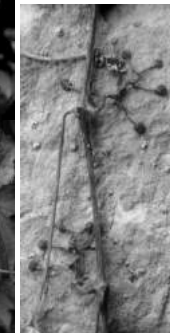
Vitis - grape

Vitaceae - grapes

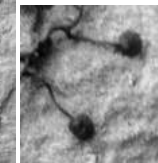


Parthenocissus - Boston ivy

• leaves simple or compound;
venation and lobing usually
strongly palmate



• plants climb by
tendrils =
modified
inflorescences, or
by holdfasts

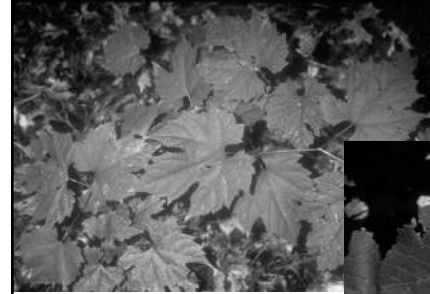


Vitaceae - grape



Parthenocissus quinquefolia - Virginia creeper, woodbine

Vitaceae - grape



Vitis riparia (+ *V. vulpina*)
River, frost grape



Vitis aestivalis
Summer grape