Diversity and Evolution of Asterids

... milkweeds, nightshades, and morning glories ...
Asterids

(1) fused petals
(2) stamens = or less than number of petals
(3) stamens fused to petals
(4) pistil of 2 (rarely more) carpels
**Apocynaceae - dogbane family**

Mainly tropical family of trees and vines with opposite leaves. Milky latex commonly poisonous and source of medicinal drugs.

*Vinca minor* - periwinkle
Introduced ground cover, often spreading
**Apocynaceae - dogbane family**

Apocynum androsaemifolium
Spreading dogbane

Apocynum sibiricum
Hemp dogbane

Flowers 5 merous, small, and with 2 separate carpels.
Apocynum androsaemifolium
Spreading dogbane

Fruits are follicles with cottongy seeds for wind dispersal.

Apocynum sibiricum
Hemp dogbane

**Apocynaceae - dogbane family**
**Apocynaceae - dogbane family**

Milkweeds different!

Flowers are highly modified for specialized insect pollination.
**Apocynaceae - dogbane family**

Note 2 free carpels slightly fused at top

CA (5)  CO (5)  X 5  A 5  G 2

**Corona** = hood + crest

**Gynoestegium** = A + G

**Pollinia** = pollen mass
**Apocynaceae - dogbane family**

Unusual corona structure for nectar reward

CA (5)  CO (5)  X  5  A  5  G  2

- **Corona** = hood + crest
- **Gynoestegium** = A + G
- **Pollinia** = pollen mass
**Apocynaceae - dogbane family**

Fusion of 5 stamens and top of gynoecium

\[
\text{CA (5) CO (5) X 5 A 5 G 2}
\]

- **Corona** = hood + crest
- **Gynoestegium** = A + G
- **Pollinia** = pollen mass
**Apocynaceae - dogbane family**

Gland is attached to two pollinia

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Corona = hood + crest
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**Apocynaceae - dogbane family**

- **Corona** = hood + crest
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**Apocynaceae - dogbane family**

Bee removing pollinia or inserting pollinia into stigmatic cleft

- **Corona** = hood + crest
- **Gynoestegium** = A + G
- **Pollinia** = pollen mass
**Apocynaceae - dogbane family**

“Las Vegas” strategy of pollination; but when occurs, all $\infty$ ovules are fertilized. Typically few follicles are produced per plant. Note seeds with coma attached for wind dispersal.

*Asclepias amplexicaulis* - Clasping milkweed
**Apocynaceae - dogbane family**

*Asclepias syriaca* - Common milkweed

*Asclepias incarnata* - Swamp milkweed

*Asclepias tuberosa* - Butterfly weed
**Rubiaceae - coffee family**

Opposite or whorled leaves **Inter-petiolar stipules**

All species in Wisconsin are 4-merous; species in the tropics are largely 5-merous

Important & large family of trees/shrubs in the pantropics

*Coffea arabica* - coffee

*Galium* - Bedstraw
**Rubiaceae - coffee family**

Opposite or whorled leaves

*Inter-petiolar stipules*

All species in Wisconsin are 4-merous; species in the tropics are largely 5-merous

![Image of Galium - Bedstraw]

The family has inferior ovary.

*Galium - Bedstraw*
**Rubiaceae - coffee family**

*Galium aparine* - cleavers

Cleavers and bedstraws are numerous; separated by number of whorled leaves and fruit type
**Rubiaceae - coffee family**

*Galium obtusum*
Wild madder

*Galium lanceolatum - wild licorice*
**Rubiaceae - coffee family**

*Cephalanthus occidentalis* - buttonbush

Only shrub in Wisconsin; restricted to riparian forest or lake edges. Note “heads” of tiny flowers.
**Rubiaceae - coffee family**

*Houstonia caerulea* - azure bluets

Special concern
*Rubiaceae - coffee family*

*Mitchella repens*
Partridge berry, twin-berry

Note: paired flowers above with connate pistils; “twin” berry to right
*Solanaceae - nightshade family*

- Large cosmopolitan family of alternate-leaved herbs, vines, or shrubs with cyme inflorescences
- Important family for nasty compounds (and drugs)
- Important for source of foods (potato, tomato, pepper)

_Solanum dulcamara_
Bittersweet
*Solanaceae - nightshade family

edible fruits include . . .

Capsicum - pepper

Solanum - tomato & eggplant
*Solanaceae - nightshade family

drug plants include . . .

Nicotiana tabacum

Atropa belladona  Brugmansia  Datura innoxia
*Solanaceae - nightshade family*

- 5- merous flowers
- axile placentation
- berry fruited

**CA (5) CO (5) A 5 G (2)**

- *Capsicum* - pepper
- *Solanum carolinense* - Horse nettle
- *Solanum dulcamara* - Bittersweet
*Solanaceae - nightshade family

- stamens often terminal pored for buzz pollination by bees

*Solanum carolinense - Horse nettle
*Solanaceae - nightshade family

CA (5)  CO (5)  A 5  G (2)

- berry fruited - often with persistent calyx

Physalis alkekengi - Japanese lantern
*Solanaceae - nightshade family

*Solanum dulcamara - bitterweet
*Solanaceae - nightshade family

*Solanum carolinense - Horse nettle
*Solanaceae - nightshade family

*Physalis virginiana*
Ground cherry
Note: calyx surrounding berry
**Solanaceae - nightshade family**

*Datura stramonium*
Jimson-weed (Jamestown weed)

Introduced, hallucinogenic roadside weed
... also called *thorn-apple*
**Convolvulaceae - morning-glory family**

Largely tropical family of 55 genera and nearly 2000 spp. Twining herbs with alternate leaves.

*Ipomoea purpurea*  
Flowers strongly funnelform with plicate corolla tube (with fold lines). Fruit usually capsular.

*Convolvulus - bindweed*

CA 5  CO (5)  A 5  G (2)

*Ipomoea purpurea*  
Morning-glory: cultivated
**Convolvulaceae - morning-glory family**

*Calystegia sepium*
Hedge bindweed
Note: 2 large bracts below calyx

*Convolvulus arvensis*
Field bindweed
Note: no floral bracts
Cuscuta (Cuscutaceae) is actually part of the Convolvulaceae!

- Twining habit (for support) has gone one step further and species are now parasitic (support + food + water; no chlorophyll)

*Cuscuta* spp. - dodder
*Cuscutaceae - dodder family*

*Cuscuta gronovii*
Common dodder

*Cuscuta glomerata*
Rope dodder