Diversity of Caryophyllids

...carnations, cacti, chenopods...

[Tues lab –
you will finish mayapples, poppies, lotus lily, sycamores in lab]
Caryophyllids

The caryophyllid group is a strange mixture of plants including cacti, carnations, and some carnivorous families.

Specialists of deserts, salt environments, nutrient poor sites, and weedy areas – often with interesting physiological adaptations.
Caryophyllaceae - pink family

Huge family, widespread but characteristic of temperate and warm temperate regions of the Northern Hemisphere.

In Wisconsin we have 18 genera and 63 species

Caryophyllaceae includes the pinks, catchflies, and carnations of garden fame

Dianthus deltoides
Maiden pink
Caryophyllaceae - pink family

Many of the species are **introduced** (either by Native Americans or Europeans or later)

- either **naturalized** – well-established, often widespread plant that is not originally in our flora
- or **adventive** – only casually established, not persistent.

*Gypsophila paniculata*

Baby’ s-breath
Caryophyllaceae - pink family

- Mostly herbs with simple, opposite, entire leaves; nodes usually swollen
- Inflorescence a **dichasium** - determinate inflorescence - or **cyme** (compound dichasium)

Note 3 way split, middle branch is oldest flower
The dichasium inflorescence is terminated (i.e., determinate) by the oldest flower and flanked by two lateral younger flowers.
Caryophyllaceae - pink family

Free central placentation = free standing placental column in single locular pistil on which ovules are attached, or axile, or both at same time!

Capsule opens by valves or teeth

- Some fused sepals, others not
- Petals often differentiate into a limb and claw, the apex is often notched

CA 5, (5) CO 5 A 5, 10 G (2-5)
Caryophyllaceae - pink family

*Minuartia michauxii*

(= *Arenaria stricta*)

sand rockwort
Caryophyllaceae - pink family

Cerastium
mouse-ear chickweed
Caryophyllaceae - pink family

Stellaria longifolia - long leaved stitchwort

Stellaria meadia - common stitchwort
Caryophyllaceae - pink family

Silene latifolia - white campion

Silene vulgaris - bladder campion with vespid wasp pollinator
Caryophyllaceae - pink family

European species becoming invasive

*Saponaria officinalis* - bouncing bet, soapwort
Phytolaccaceae - pokeweed family

Family that is chiefly tropical and subtropical in distribution

In Wisconsin we have 2 species of Phytolacca - one native

Shrub with alternative simple leaves

Inflorescence typically an indeterminate raceme

Phytolacca americana - pokeweed
• simplest inflorescence type is **indeterminate**

• oldest flowers at the base

• younger flowers progressively closer to the apical meristem of the shoot

= a **raceme**
Phytolaccaceae - pokeweed family

- No petals
- 2x as many stamens as sepals
- fused carpels but only 1 ovule per carpel
- berry fruited, bird dispersed, and a source of dye

Phytolacca americana - pokeweed
Alice Tanksley Brown's Poke Salad

Alice Tanksley Brown grew up in Mississippi, a state rich in pokeweed. She remembers Dr. Pruett telling her mother, “Widow, if you give your children a mess of poke in the spring and some sassafras tea, you’ll save yourself doctor bills for a year.” The good doc was probably referring to pokeweed's leaves purgative powers as they contain toxic alkaloids that should not be eaten in large amounts. Most recipes call for the green to be parboiled, at least once and sometimes twice, and for the water to be discarded.

The genus is poisonous, containing a dense array of chemicals used in a variety of medicinal treatments.
Phytolaccaceae - pokeweed family

Phytolacca acinosa – Indian pokeweed

our non-native species – achenes!
Portulacaceae - purslane family

Family comprises small **succulent** herbs with small flowers except for cultivated species.

*Portulaca grandiflora*
Rock rose (Argentina)
Portulacaceae - purslane family

*Portulaca oleracea* – little hogweed, purslane

Prostrate herb, leaves succulent; has been cultivated as a salad [‘oleracea’ = edible]

Flowers are small, yellow, 5-merous

Capsule opens via a cap or lid
Montiaceae – spring beauty family

- 2 sepals, 5 showy petals, 5 stamens
- 3 fused carpels (note the 3 stigma)
- **Basal** placentation
- Fruit is a capsule “with a lid”
Montiaceae – spring beauty family

*Claytonia virginica* - spring beauty

*Claytonia caroliniana* - spring beauty
Cactaceae - cactus family

A New World family; xeromorphic trees, **stem succulents** and sometimes epiphytic

In Wisconsin we have 1 genus, *Opuntia*, with 3 recognized species

- Shoots are green and the leaves (typically) are modified into short shoots spines

- Spines are borne in distinctive areas called **areoles**

- Associate with irritating hairs called **glochids**.

*Opuntia humifusa* eastern prickly-pear
Cactaceae - cactus family

- Tepals
- Ovary is inferior and consist of 4 fused carpels with parietal placentation
- Fruit a **berry** (jam, wine!)

![Image of Opuntia humifusa - eastern prickly-pear](image1)

![Image of Opuntia macrorhiza - plains prickly-pear](image2)

\[ P \sim A \sim G (4) \]
Cactaceae - cactus family

Some species are threatened

Opuntia fragilis - brittle prickly-pear
Amaranthaceae - amaranth family

large family (now includes Chenopodiaceae)
abundant in desert and semi-desert regions & weeds here!

*halophytic* - salt-loving,

many species exhibit *xerophytic* adaptations (succulence, C4 or CAM photosynthesis)

*Bassia scoparia* - summer cypress

*Chenopodium album* - lamb’s quarter
Amaranthaceae - amaranth family

C₄ and Crassulacean Acid Metabolism
Flowers very small, greenish, **perfect or imperfect** (both monoecious and dioecious); congested inflorescences; wind pollinated

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- Sepals only – persist in fruit
- Pistil with 1 locule and 1 ovule – **achene**;

*Chenopodium album* - lamb’s quarter
Amaranthaceae - amaranth family

*Amaranthus retroflexus* - rough amaranth, pigweed, redroot

*Froelichia floridana* - cottonweed
Polygonaceae - smartweed family

Large, difficult family especially common in northern temperate regions – lots of generic changes!

In Wisconsin we have many *Persicaria* (smartweeds), *Fallopia* (bindweeds, giant knotweeds), *Polygonum* (knotweeds), *Rumex* (sorrels, docks)

*Persicaria amphibia* - water smartweed  
*Persicaria hydropiper* - water pepper
Polygonaceae - smartweed family

Herbs, shrubs with swollen nodes; leaves typically alternate and simple

Ocrea is a good character for the family – membranous sheath (connate stipule)
Polygonaceae - smartweed family

- Flowers usually bisexual,
- Flowers are small often white to red
- 5 or 6 sepals (tepals) that often become large and membranous in fruit
- No petals
- Fruit is a triangular one-seeded achene (derivation of family name)

CA 5-6  CO 0  A 5-8  G (3)
Polygonaceae - smartweed family

*Rumex acetosella* - sheep or red sorrel

Ubiquitous weed around the world, especially in pastures; distinctive leaf bases (*sagittate* or *hastate*); acetic acid taste (sour = ‘sorrel’ )
Polygonaceae - smartweed family

*Rumex crispus*
Curly dock

*Rumex orbicularis*
Water dock

One-seeded fruits with 3 persistent sepals or wings

*Polygonella articulata*
Jointweed
Polygonaceae - smartweed family

*Rheum rhabarbarum*
Garden rhubarb - locally adventive
Droseraceae - sundew family

Insectivorous family including snap traps (Venus fly trap) and sticky fly papers (sundews). In Wisconsin we have 4 species of *Drosera* (sundews) in nutrient poor soils or peat.

The sticky tentacles are modified leaves with gland tipped hairs that capture the insects. Digestion and then absorption of amino acids follows.

*Drosera rotundifolia* - round leaved sundew
Droseraceae - sundew family

Different species vary in leaf shape

Flowers are small in a terminal raceme

*Drosera anglica* - English sundew (threatened in WI)

*Drosera intermedia* - narrow-leaved sundew (threatened in WI)
Droseraceae - sundew family

Unusual origin of *Drosera anglica*

- all *Drosera* are 2n = 20
- *D. anglica* is 2n = 40
- *D. anglica* is hybrid of *D. rotundifolia* and *D. linearis*
- *D. anglica* is allopolyploid (tetraploid)
Droseraceae - sundew family

**Drosera** – Sundews: sticky flypaper

**Dionaea** – Venus fly-trap: steel trap

**Nepenthes** (Nepenthaceae) – Asian pitcher plants: Pitfall trap
Droseraceae - sundew family

Family shows convergence in insect capture

*Drosera* – Sundews: sticky flypaper

*Dionaea*– Venus fly-trap: steel trap

*Pinguicula* (Lentibulariaceae) – Butterwort: sticky flypaper