Basal Eudicots

... transition from basal angiosperm to advanced eudicot ...
Basal Eudicots

- basal eudicots are a grade at the base of eudicots - paraphyletic
- morphologically are transitionary between basal angiosperms and the core eudicots

core eudicots

- examine two orders only:
  - Ranunculales - 7 families
  - Proteales - 3 families

• *Ranunculaceae (Ranunculales) - buttercup family
  - largest family of the basal eudicots
  - 60 genera, 2500 species
  - distribution centered in temperate and cold regions of the northern and southern hemispheres
**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

- perennial herbs, sometimes woody or herbaceous climbers or low shrubs
- leaves, alternate sheathing, usually basal and cauline, often divided or compound, or palmately lobed; no stipules.

*marsh marigold*  
*anemone*

---

**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

- floral diversity enormous except for stamens and separate carpels
- insect (bird) pollination! nectar or pollen reward, radial or bilateral symmetry

*anemone*  
*columbine*  
*anemone*

---

**Basal Eudicots**

*Ranunculaceae (Ranunculales) - diverse fruit types buttercup family*

- Follicles = infinite seeded dehiscent fruit
- Berries = infinite seeded fleshy fruit
- Achenes = 1 seeded indehiscent, dry fruit

*columbine*  
*baneberry*  
*buttercup*

---

**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

- Aconitum columbianum - monks' hood
- Actaea rubra - red baneberry
**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

- *Anemone patens* - pasque flower
- *Anemonella thalictroides* - rue anemone

- only sepals!

---

**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

- *Aquilegia canadensis* - american columbine

- Sepals + petals, achenes

---

**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

- *Caltha palustris* - marsh marigold

- Sepals only, follicles

---

**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

- *Ranunculus* - buttercup, crowfoot

- Sepals + petals, achenes
**Basal Eudicots**

*Ranunculaceae (Ranunculales) - buttercup family*

Dioecious - with separate male and female plants, wind pollinated

*Thalictrum dioicum - early meadow-rue*

**Basal Eudicots**

*Berberidaceae (Ranunculales) - barberry family*

- 13 genera, 660 species; widespread in temperate regions of Northern hemisphere - ArctoTertiary relict distribution
- small shrubs (*Berberis*) or herbs (rest of family).

*Podophyllum - mayapple*  
*Berberis - barberry*

**Basal Eudicots**

*Berberidaceae (Ranunculales) - barberry family*

- all genera attacked by same family of rusts

*Podophyllum - mayapple*  
*Podophyllum peltatum - mayapple*

**Basal Eudicots**

*Berberidaceae (Ranunculales) - barberry family*

- 3 merous flowers, 1 superior carpel, marginal placentation, berry

*Podophyllum - mayapple*  
*Berberis - barberry*
**Basal Eudicots**

*Berberidaceae (Ranunculales) - barberry family

*Podophyllum hexandrum*  
eastern Asia

*Basal Eudicots*

*Berberidaceae (Ranunculales) - barberry family

*Berberis vulgaris*  
European barberry  
*Berberis thunbergii*  
Japanese barberry

**Basal Eudicots**

*Berberidaceae (Ranunculales) - barberry family

*Caulophyllum thalictroides*  
Blue cohosh  
4-merous!

*Jeffersonia diphylla* - twinleaf

*Basal Eudicots*

*Berberidaceae (Ranunculales) - barberry family

*J. dubia*  
Eastern Asia
Menispermaceae (Ranunculales) - moonseed family
- mainly tropical family, arrow poisons, usually viney
- dioecious; separate carpels each produce one seeded drupes = fleshy with one bony seed

*Papaveraceae (Ranunculales) - poppy family
- 25 genera and about 200 species mainly of north temperates
- herbaceous, alternate compound leaves with colored latex, narcotics
**Basal Eudicots**

*Papaveraceae (Ranunculales) - poppy family

*Sanguinaria canadensis* - bloodroot

**Basal Eudicots**

*Papaveraceae (Ranunculales) - poppy family

*Eschscholzia* - California poppy

**Basal Eudicots**

*Papaveraceae (Ranunculales) - poppy family

*Stylophorum* - celadine poppy

**Basal Eudicots**

*Papaveraceae (Ranunculales) - poppy family

• family Fumariaceae now in Papaveraceae = zygomorphic poppies with 2 carpels

*Dicentra cucullaria* - Dutchman’s breeches

**Basal Eudicots**

*Papaveraceae (Ranunculales) - poppy family

• family Fumariaceae now in Papaveraceae = zygomorphic poppies with 2 carpels

*Corydalis*
Basal Eudicots

- Proteales - unusual order of 3 families
  - Nelumbonaceae - lotus lily family
  - Platanaceae - sycamore family
  - Proteaceae - macadamia family

- all 3 share unusual fruiting structures
  - 1 carpellate fruits in “heads”

Nelumbonaceae (Proteales) - lotus lily family

- one genus and two species - one North American and the second East Asian (sacred oriental lotus lily)

- Nelumbo lutea - lotus lily
- Nymphaea odorata - water lily

once considered related to water lilies of Nymphaeaceae - now known to be convergence

Habit is an aquatic, floating or emergent leaved, perennial herb. Leaves are simple, peltate. Inflorescence is a solitary flower.

Nelumbo lutea - lotus lily
**Basal Eudicots**

Nelumbonaceae (Proteales) - lotus lily family

- separate, superior one-seeded carpels but held in the cavities of the obconical receptacle

* Nelumbo lutea - lotus lily

- "fruit" is a woody receptacle cone with a nut-like seed laying loose in each cavity

* Nelumbo lutea - lotus lily

**Basal Eudicots**

Platanaceae (Proteales) - sycamores

- 1 genus with 10 species of northern hemisphere trees, distinctive bark

* Platanus occidentalis - sycamore

- monoecious, female flowers apocarpic in spherical heads - wind pollination

- fruit = head of achenes (one seeded)

- achene with coma - ant dispersed

* Platanus occidentalis - sycamore
**Basal Eudicots**

Platanaceae (Proteales) - sycamores

- European plane tree - *Platanus x hybrida* - important urban shade tree

**Basal Eudicots**

Proteaceae (Proteales) - proteas

- Large southern hemisphere family of 75 genera, 1400 species - ecologically and morphologically diverse
  - Inflorescences of 4 merous flowers with single superior carpel

**Basal Eudicots**

Proteaceae (Proteales) - proteas

- Large southern hemisphere family of 75 genera, 1400 species - ecologically and morphologically diverse
  - Infrafructescence - often woody “cone” with single seeded fruits; serotinous