Topic 03
Overview of Plant Taxa

Lecture Reading:

II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants
   - Angiospermous: carpels & fruits.
   - Flowers (perianth).
   - Vessels.
   - Sieve tubes.
   - Endosperm (a 3n tissue from "double fertilization")
II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

- Angiospermous: carpels & fruits.
- Flowers (perianth).
- Vessels.
- Sieve tubes.
- Endosperm (a 3n tissue from "double fertilization")

- monocots
  - Ranunculids
  - & other primitive
- rosids
  - caryophyllids
- asterids

nymphaeids
  - (water-lilies & friends)
magnoliids

II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

1. Primitive Dicots or Basal Angiosperms

- Retain dicotyledonous condition common to some gymnosperms

- Ginkgo embryo
  - Avocado embryo (Websters Dictionary)

- Retain eustele of gymnosperms
II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

1. Primitive Dicots or Basal Angiosperms

   - Retain monoaperturate pollen of gymnosperms

   - Flower parts generally spiral & numerous or trimerous, or whorled &
   trimerous.

   - Various floral whorls poorly differentiated from one another.

a. Nymphaeids (water-lily & friends)

   Family to know: Nymphaeaceae

   - aquatic herbs; floating leaves w/ palmate venation
   - flowers solitary, scapose
   - floral parts spiral; petals, stamens and carpels numerous
   - stamens laminar
   - Ca²⁺₄(6-14) Co⁵-many A many, laminar G [3-many]

Nuphar, Nymphaea & Nate in MD.  Nymphaea at Longwood.
Victoria at Longwood
(Nymphaea in the background)
Nuphar

Nymphaea
b. magnoliids

Families to know: Magnoliaceae & Lauraceae
Magnoliaceae

1. Trees & shrubs w/ ethereal oils

< Liriodendron Magnolia >

2. Showy, solitary flowers

Liriodendron tulipifera  Magnolia kobus
Magnoliaceae

- P many or Ca³ Co₆-many
- A many, laminar
- G many

3. Ca & Co in 3’s

Liriodendron tulipifera  Magnolia kobus

4. Many spiraled, laminar stamens
Magnoliaceae

5. Many spirally arranged, pistils

Liriodendron tulipifera  Magnolia kobus

6. Elongate receptacle
Tropical members of Magnoliaceae

Michelia
(50 spp.; Tropical, subtropical; S & SE Asia)

Lauraceae

Sassafras

Lindera
Lauraceae

1. Trees & shrubs with ethereal oils

Sassafras

Laurus

Cinnamomum

Lauraceae

2. Small, yellowish to whitish flowers

sassafras

bay laurel

avocado
Lauraceae

3. Parts in 3’s

- sassafras
- bay laurel
- avocado

4. Parts whorled

- sassafras
- bay laurel
- avocado
5. 1 pistil, 1 carpel

6. Anthers valvate
II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

2. Monocots

- Loss of second cotyledon.
- Retain monoaperturate pollen of basal angiosperms.
- Eustele transformed into atactostele (lose vascular cambium)
II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

2. Monocots

- Loss of second cotyledon.
- Retain monoaperturate pollen of basal angiosperms.
- Eustele transformed into atactostele (lose vascular cambium)
- Most with parallel leaf venation.

- Flowers merosity becomes fixed in 3’s.
Alismataceae (water-plantain family)

*aquatic or marsh herbs with basal leaves
*pinnate or palmate venation
*Ca 3  Co 3  A 3,6-many  G 3,6-many
Alismataceae (water-plantain family)

Sagittaria
Araceae (arum or aroid family)

* terrestrial to aquatic herbs or vines
* leaves with pinnate venation
* flowers minute
* spathe & spadix
* P 2+2, 3+3, or 0  A 4 or 6  G [3]
Araceae (arum or aroid family)

Symplocarpos >

Zantedeschia >
(calla-lily)
Zantedeschia aethiopica  Calla-lily

Amorphophallus titanum
Largest inflorescence in world
Liliaceae (lily family)

- bulbous herbs
- parallel venation
- $P^{3+3}$, $A^{3+3}$, $G^{[3]}$

Lilium

Tulipa
Orchidaceae (orchid family)

- 2nd largest family
- Terrestrial or epiphytic, +/- succulent herbs
- \( P^{3+3} [A^1 G^3], \) inferior
- Bilateral flowers, labellum, column
- Pollinia

< Vanilla
Orchidaceae (orchid family)

Orchidaceae (orchid family)

Longitudinal section of a vanilla flower

Orchidaceae (orchid family)

Cymbidium
Orchidaceae (orchid family)

- Unbranched trees or shrubs
- Terminal rosette of large, sheathing, plicate lvs
- Large, spathed panicles
- Perianth tiny

Arecaceae or Palmae (palm family)

- Unbranched trees or shrubs
- Terminal rosette of large, sheathing, plicate lvs
- Large, spathed panicles
- $P^{3+3} A^{3+3} G^3$ or [3]
- Perianth tiny
Arecaceae or Palmae (palm family)

- Plicate lvs

Arecaceae or Palmae (palm family)

- Sheathing lvs
- Panicles
- Tiny fls
Arecaceae or Palmae (palm family)

< Cocos

< Phoenix
Arecaceae or Palmae (palm family)

- Rhizomatous or stoloniferous herbs or bamboos
- Internodes hollow
- Lvs distichous, sheathing, linear
- Fls minute, wind pollinated

Poaceae or Gramineae (grass family)

- Rhizomatous or stoloniferous herbs or bamboos
- Internodes hollow
- Lvs distichous, sheathing, linear
- Fls minute, wind pollinated
Poaceae or Gramineae (grass family)

**distichous leaf arrangement**

Poaceae or Gramineae (grass family)

**open sheath**
Poaceae or Gramineae (grass family)

Bamboos

Poaceae or Gramineae (grass family)
Poaceae or Gramineae (grass family)

- Panicles of “spikelets”
  - Ca\(^2\), palea & lemma Co\(^2-3\), lodicules A\(^2-3\), pendulous G\([2-3]\)

- Poaceae or Gramineae (grass family)

- Poaceae or Gramineae (grass family)
II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

3. Primitive Eudicots

- Many stamens and carpels
- Perianth reduced in number, though still poorly differentiated
- Parts generally free (some with fusion in G)
- Triaperturate pollen.

Ranunculaceae (buttercup family)

- Herbs to vines or woody vines
- Lvs simple, compound, to dissected, all with sheathing bases; basal rosette of lvs common.
- $Ca^{4}$-many $Co^{4}$-5-many $A^{\text{many}}$ $G^{\text{several-many}}$
II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

4. Core Eudicots

- Perianth parts fixed in 4’s or 5’s
- Stamens & carpels reduced in number
- Parts whorled
- Perianth well differentiated
- Triaperturate pollen.

a. Rosids

- Habit variable
- #Stamens > #petals (often 2x or more)
- Petals free.
Rosaceae (rose family)

- Herbs w/ trifoliate lvs, or shrubs & trees w/ simple (compound) leaves.
- Lvs toothed.
- Ca^5 Co^5, clawed A^10-many G^1-5] – many, sup or inf
- Hypanthium often well developed
Apple

Cherry

Rose

hypanthium w/ 1 carpel

hypanthium w/ many free carpels

Cherry

Rose

Apple
hypanthium fused around 5 fused carpels

Cherry  Rose  Apple

Cherry (drupe)  Rose (hip)  Apple (pome)
Fabaceae or Leguminosae (legume family)

- Plants with compound (simple) lvs with pulvinus at petiole (petiolule) base and apex.
- Lvs usu entire.
- Hypanthium more or less developed
- Legume

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Fabaceae

Subfamily Faboideae (pea-type flowers)

**Ca**[^5] **Co**[^1+2+[2]], banner + wings + [keel]

Irregular (monosymmetric, zygomorphic)

**A**[^9]+1 **G**, superior
**Trifolium**

Subfamily Caesalpinioideae

Ca$^5$  Co$^5$  A$^{10}$  G$^1$, superior

Irregular or regular (radial) symmetry

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**Fabaceae**

Subfamily Caesalpinioideae

Cercis  Senna  Chamaecrista
Fabaceae

Cercis (redbud)

Subfamily Mimosoideae (mimosa-type flowers)

Ca\(^5\), inconspicuous A\(^{10}\), conspicuous G\(^1\), sup

Regular (radial) symmetry

Lvs often bipinnate

Albizia (mimosa tree)
Fabaceae

Acacia tortuosa (acacia)

Fagaceae (beech & oak family)

- Monoecious trees
- Fls tiny
- Male: P⁴-6 A⁴-2⁰ G¹ pistillode, catkin
- Female: P⁴-6 A staminodes G³⁻⁶ cupule
- Nut(s) w/ subtending cupule
Not all oak leaves are lobed, but all have acorns.
Genus: *Fagus*
Shown here: American beech (*Fagus americana*)

Genus: *Castanea*; 9 species; north temperate
Shown here: American chestnut (*Castanea dentata*)
**Genus:** *Lithocarpus*; 334 species; eastern Asia & California  
**Shown here:** tan-oak, stone-oak (*Lithocarpus densiflora*)

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**The Cupule is Diagnostic for the Fagaceae**

- Beech (*Fagus*)
- Oak (*Quercus*)
- Chestnut (*Castanea*)
- Stone-oak (*Lithocarpus*)
II. Seed plants (spermatophytes)

B. Angiosperms or flowering plants

4. Core Eudicots

- Perianth parts fixed in 4’s or 5’s
- Stamens & carpels reduced in number
- Parts whorled
- Perianth well differentiated
- Triaperturate pollen.

b. Asterids

- Habit variable
- #Stamens < #petals
- Petals fused
- Stamens fused to petals

Ericaceae (heath family)

- Evergreen or semievergreen shrubs or trees (herbs)
- \( Ca[5] \quad Co[5] \), funnelform or urceolate \( A^{10} \), epipetalous, poricidal \( G[5] \), sup or inf
- Capsule from sup ovary or berry form inf ovary
Pieris

Rhododendron
Vaccinium

Lamiaceae or Labiatae (mint family)

- Aromatic herbs or shrubs with opposite lvs and square stems
- $\text{Ca}^5 \, \text{Co}^5$, bilabiate $A^{2+2}$, epipetalous $G^2$, gynobasic style
- Fruit a schizocarp splitting into 4 nutlets
Lamium

Mentha
Solanaceae (nightshade family)

- Habit variable
- \( \text{Ca}^5 \text{ Co}^5 \text{ A}^5 \), epipetalous \( \text{G}^2 \)
- Psychoactive chemistry
- Many seeded berry or capsule with persistent and more or less enlarged calyx

Solanum
Petunia

Petunia
Nicotiana tabacum

Physalis
Asteraceae or Compositae (composite family)

- Largest plant family
- Habit variable
  - **C₃**pappus **Co**[5], regular or irregular **A**₅, connivent anthers, epipetalous **G**[2], inf
- Head with involucre
- Fruit an achene
Types of Heads in the family

Radiate Head
Ligulate Head
Discoid/Disciform Head
**Taraxacum**

**Cichorium**
**Symphyotrichum**

**Solidago**

**Erigeron**