Poales II: wind pollinated families

4 main groups:

- Acorales - sister to all monocots
- Alismatids
  - Inc. Araceae - jack in the pulpit
- Lilioids (lilies, orchids, yams)
  - Non-monophyletic
  - Petaloid
- Commelinids
  - Arecales - palms
  - Commelinales - spiderwort
  - Zingiberales - banana
  - Poales
    - Pineapple
    - Grasses & sedges

Evolutionary trends:

- Nectar to pollen gathering to wind pollination
- Reduced flowers - loss of perianth
- Unisexuality sometimes
- Bracts become important
- Flowers to florets in spikelets
Poales II: wind pollinated families

* “grade” centered in the Guayana Shield and distinctive in tepui-top flora

* +/- reduced flowers, insect or wind pollinated

Xyridaceae - yellow eye grass

Small family (5/260) of rush-like leaves with terminal spike of small but showy yellow (or blue) petalled-flowers with no nectar. Inflorescence with spirally arranged bracts.

- Xyris difformis
- Xyris torta - yellow-eyed grass

Xyridaceae - yellow eye grass

Subfamily with *Xyris* is widespread and includes northern hemisphere species.

- *Xyridoidae (Xyris)* distribution

Xyridaceae - yellow eye grass

Other subfamily is diverse only on Guayana Shield and Brazilian cerrados.

- Abolboideae distribution
- Orectanthe
- *Abolboda*
**Eriocaulaceae - pipewort**

Small family (10/1400) of aquatic emergents, often rosette leaved.

Primarily pantropical, centered in Guayana Shield and Brazilian cerrados, with 1 species in Great Lakes.

**Eriocaulaceae - pipewort**

Flowers dimerous, unisexual, but crowded together on whitish terminal head of an elongated scape - “pipebrush” inflorescence

Various *Eriocaulon* - pipeworts

**Eriocaulaceae - pipewort**

*Eriocaulon* - pipewort

**Mayacaceae - bog moss**

Mayacaceae are small herbs (10 species) of marshes looking like a club-moss

Flowers are pink to white with differentiated calyx and corolla

*Syngonanthus* - Florida sand wetland

*Paepalanthus* - Brazilian cerrados

*Rhodonanthus* - Roraima tepui

*Mayaca* - bog moss
Poales II: wind pollinated families

- Look at cattails and bur-reeds - one of 3 separate shifts to reduced flowers and wind pollination
- One (then Typhaceae) or two families

Typhaceae - cattails

- Typhaceae are robust, rhizomatous herbs (only 10 species of *Typha*) that like damp conditions and have erect, linear leaves
- Terminal cylindrical spike with distinct female flowers below and male flowers above

- Reduced flowers, wind pollinated

Typhaceae - cattails

- Male flowers essentially 3 stamens
- Female flowers of one carpel with a single seed
- Wind pollinated

Achenes with copious amounts of white hairs near the base of each; wind dispersed
**Typhaceae - cattails**

- *T. latifolia* × *T. angustifolia*
  - *Typha X glauca* - hybrid cattail
  - the hybrid is invasive and replaces other cattails and other emergent aquatic plants

**Sparganiaceae - bur reeds**

- rhizomatous, short statured, perennial emergent aquatics
- unisexual heads
  - male
  - female

- Male flowers essentially 3 stamens plus 3 tepals
- Female flowers of one-ovuled 3-carpellate gynoecium plus 3 tepals.

- *Sparganium eurycarpum* - giant bur-reed
  - fruits a head of 1-seeded achenes

**Sparganiaceae - bur reeds**

- *Sparganium americanum* - bur-reed

**Poales II: wind pollinated families**

- look at 2 independent evolutions of "graminoid" habit, reduced flowers, and wind pollination
- reduced flowers, wind pollinated
### Graminoids: grasses, sedges, rushes

<table>
<thead>
<tr>
<th></th>
<th>Juncaceae (Rushes)</th>
<th>Cyperaceae (Sedges)</th>
<th>Poaceae (Grasses)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leaves</strong></td>
<td>Generally inrolled or round in cross-section, hollow or with cross-partitions (you can feel these with your fingernail)</td>
<td>3-ranked (in 3 rows): Flat, W-shaped in cross-section, or apparently lacking (e.g. in Eleocharis, Schoenoplectus)</td>
<td>2-ranked (in 2 rows), sometimes appearing leafless</td>
</tr>
<tr>
<td><strong>Sheaths</strong></td>
<td>Margins overlapping</td>
<td>Margins fused</td>
<td>Margins overlapping or (less often) fused</td>
</tr>
<tr>
<td><strong>Ligules</strong></td>
<td>None</td>
<td>A flap of tissue at the junction of the sheath and blade, partly fused to the blade</td>
<td>A flap of tissue at the junction of the sheath and blade, not at all fused to the blade</td>
</tr>
<tr>
<td><strong>Floral scales</strong></td>
<td>No scales beneath flowers, 6-meroses perianth (looks a little like a lily flower)</td>
<td>1 below each flower</td>
<td>2 surrounding each flower (palea and lemma)</td>
</tr>
<tr>
<td><strong>Flowers</strong></td>
<td>Usually bisexual. Three(six)'s merous</td>
<td>Bisexual or unisexual</td>
<td>Bisexual</td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td>Capsule filled with 3 to many seeds</td>
<td>Achenes (a hard nutlet)</td>
<td>Grain</td>
</tr>
</tbody>
</table>

### Juncaceae - rushes
- largely two genera - *Juncus* (rush) and *Luzula* (wood rush)
- often tussock forming, leaves usually 3-ranked on round, solid stems
- inflorescence congested, often terminal or appearing lateral

*Juncus* - rushes
- *Juncus arcticus* - Baltic rush
- *Juncus effusus* - Common rush
- *Juncus tenuis* - Path rush

*Juncus greenei* - Green's rush
*Juncus occidentalis* - Wood rush

*Juncus effusus* - Common rush
Note rhizome with vertical stems

*Juncus tenuis* - Path rush

Note rhizome with vertical stems

*Juncus arcticus* - Baltic rush
Juncaceae - rushes

Luzula acuminata - Wood rush

Luzula multiflora - Common wood rush

Cyperaceae - sedges

100 genera and 4,500 species primarily of moist habitats. Carex with 2,000 species is one of the largest of all angiosperm genera. Most species have triangular stems in cross section - "sedges have edges" - and thus leaves are 3-ranked.

Cyperus lupulinus - Sand cyperus or sedge

Cyperus has bisexual flowers: 3 stamens and 2 fused carpels. A single bract sits below each floret. The spikelets are generally symmetrically arranged.

Scirpus validus (Schoenoplectus tabernaemontani) - Soft-stem bulrush

Scirpus and relatives (bulrushes) often have roundish stems. Florets are bisexual with 3 stamens, 3 fused carpels, 6 perianth bristles, and 1 subtending bract. Florets are generally whorled in the spikelet.
Carex is a genus of roughly 2000 species worldwide, over 150 in Wisconsin alone. It becomes easier to understand if you think of it in terms of two smaller subgenera:

**Carex subgenus Carex**
- Spikes usually 3, sometimes 2
- Spikes almost always elongate or staked
- Spikelet usually triangular in cross section, sometimes flattened (only if spike is 2)
- Plants sometimes strongly reddish at base

**Carex subgenus Vignea**
- Spikes always 2
- Spikelets usually flattened or plane-vexed in cross section
- Spikelets usually short, inflorescence may be elongated
A common woodland species
Carex pensylvanica
Pennsylvania sedge

Cyperaceae - sedges

Other genera . . .

Eriophorum angustifolium
cottongrass

Eleocharis ovata - spike rush