BIOLOGY 2404a
FLORA AND VEGETATION OF ONTARIO
http://instruct.uwo.ca/biology/2404a
Fall 2009
Lecture 2

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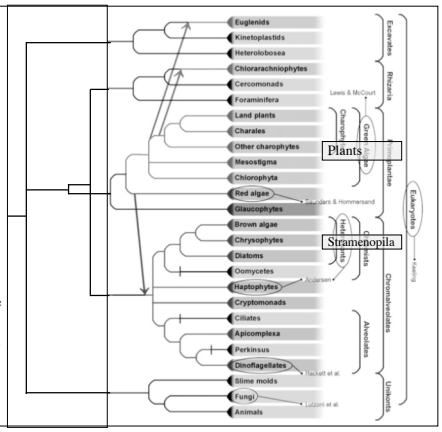
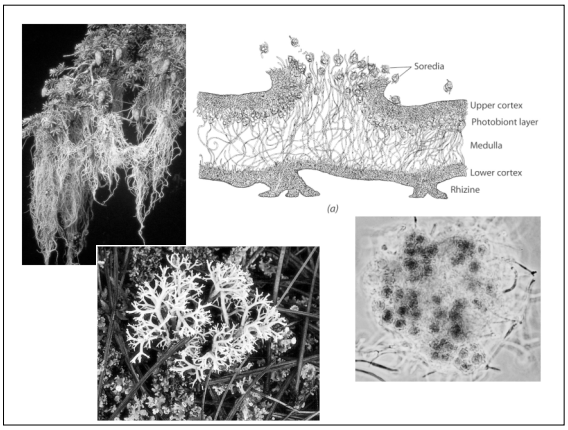
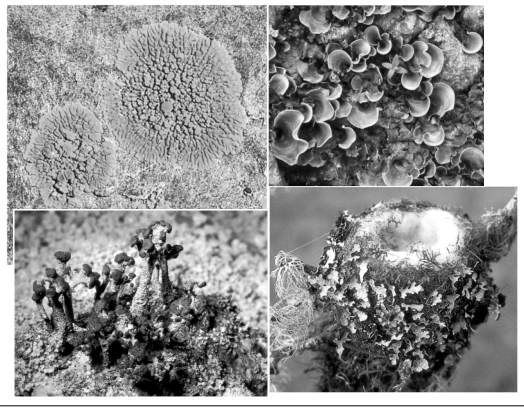
Plant and Flower Parts

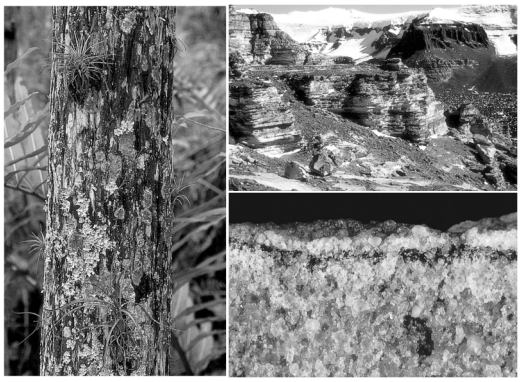
- We will see more of this in Lab, but this introduction will be useful preparation for our next Field Trips
- Lichens
- Bryophytes
- Ferns
- Gymnosperms
- Flowering Plants

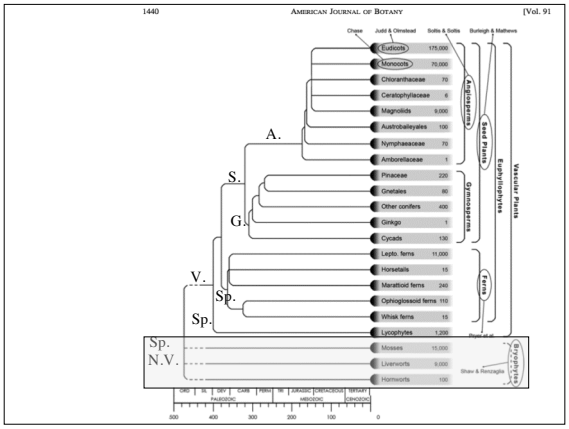
A slight revision based on evidence from sequences of more genes, showing the linkage of the SAR (Stramenopila, Alveolates & Rhizaria), and of these with the Plants ("Primoplantae" in this figure); the Unikonts and Excavates remain as distinct lineages.

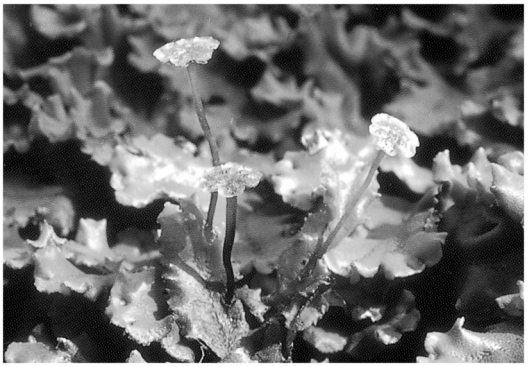


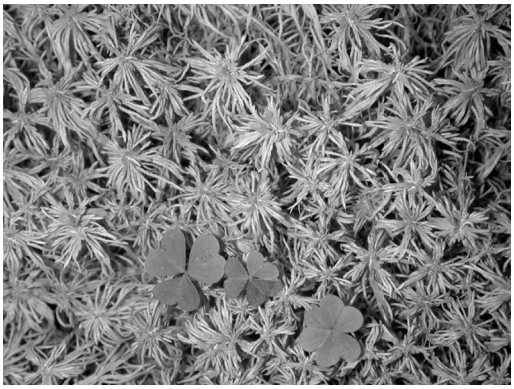


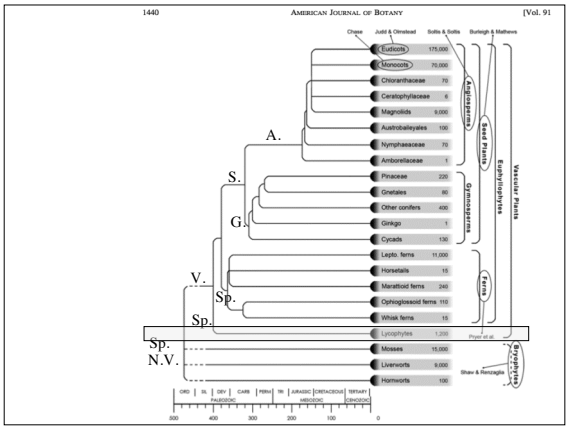





1440 American Journal of Botany [Vol. 91
Chase
Judd & Olmstead
Soltis & Soltis
Burleigh & Mathews
Eudicots 175,000
Monocots 70,000
Chloranthaceae 70
Ceratophyllaceae 6
Magnolids 9,000
Austrobaileyales 100
Nymphaeaceae 70
Amborellaceae 1
Pinaceae 220
Gnetales 80
Other conifers 400
Ginkgo 1
Cycads 130
Lepto. ferns 11,000
Horsetails 15
Marattioid ferns 240
Ophioglossoid ferns 110
Whisk ferns 15
Lycophytes 1,200
Mosses 15,000
Liverworts 9,000
Hornworts 100
Angiosperms
Seed Plants
Gymnosperms
Euphyllophytes
Ferns
Vascular Plants
Bryophytes
Pryer et al.
Shaw & Renzaglia
A.
S.
G.
V.
Sp.
Sp.
Sp.
N.V.
ORD SIL DEV CARB PERM TR JURASSIC CRETACEOUS TERTIARY
PALEOZOIC MESOZOIC CENOZOIC
500 400 300 200 100 0



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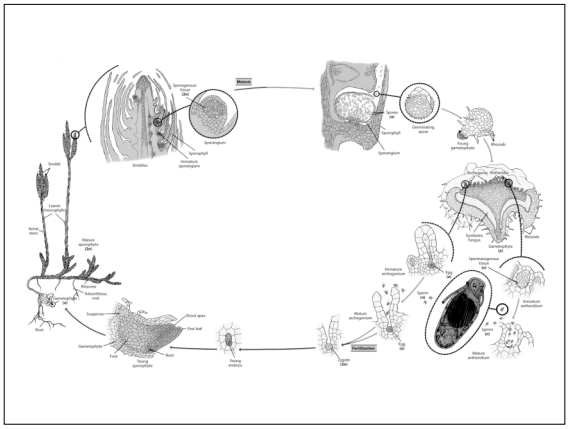
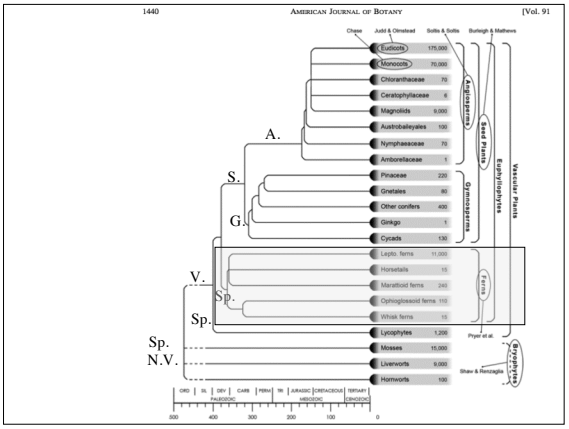
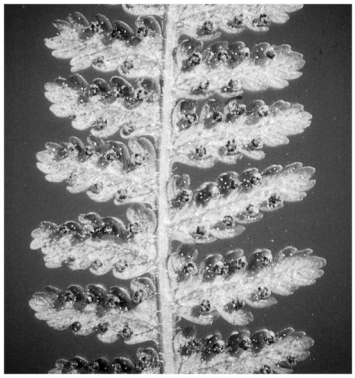
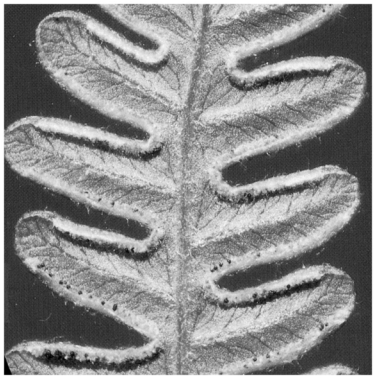






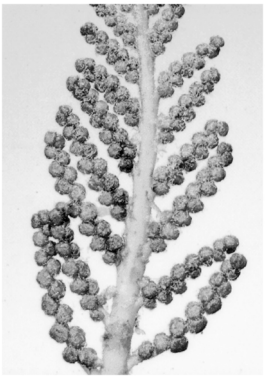
Naked sori (clusters of sporangia) in *Dennstaedtia*



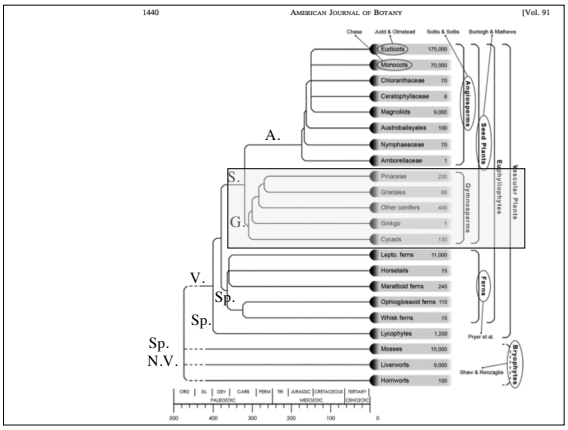
Bracken fern, *Pteridium aquilinum*

Sori arranged along leaf margins, protected by "false indusium"

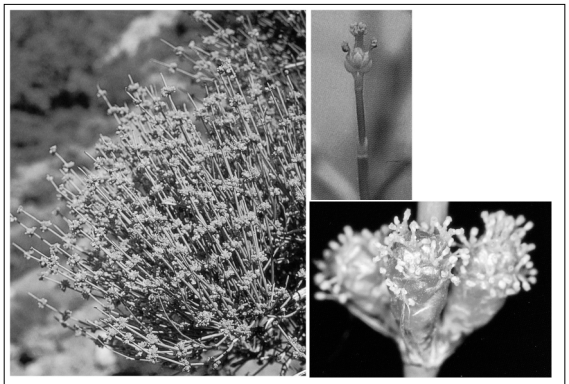
Botrychium and *Ophioglossum*, eusporangiate Ophioglossales



Sori in sensitive fern (*Onoclea sensibilis*) are on separate fertile fronds, enclosed in spherical capsules formed by lobes of the leaflets



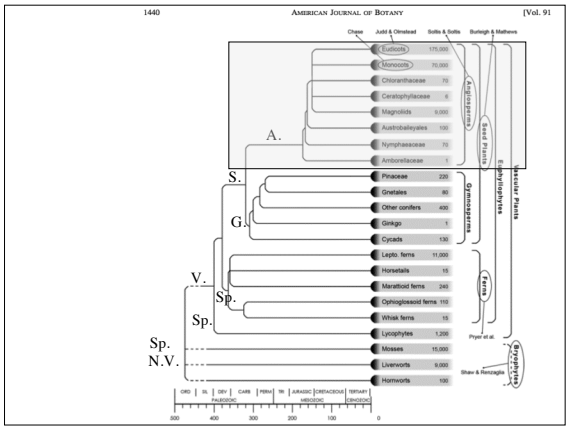
Female *Cycas siamensis* with seeds on upper surfaces of sporophylls



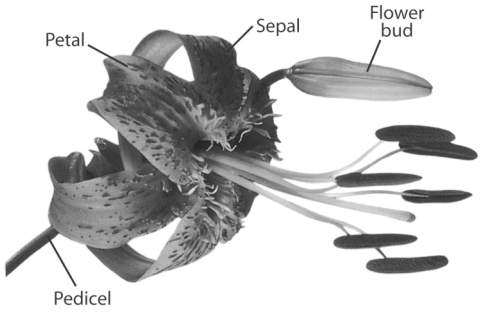
Ephedra, male plants and "microsporangiate strobili"

Bristle-cone pine, *Pinus longaeva*, needles in fascicles of five, and young (left) and mature (right) ovulate cones

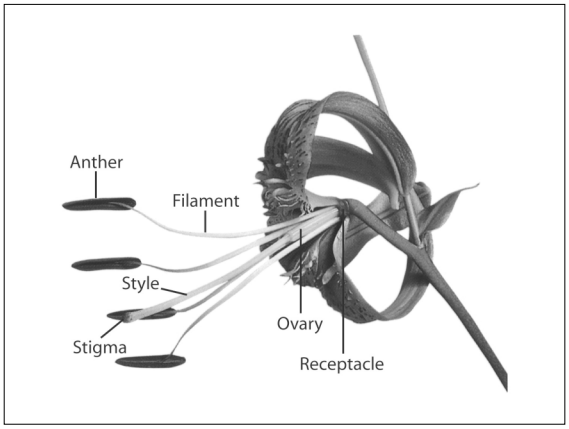
Pinus radiata microsporangiate cones shedding pollen

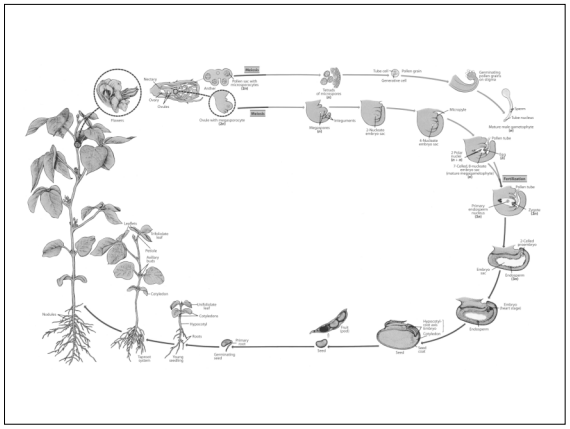


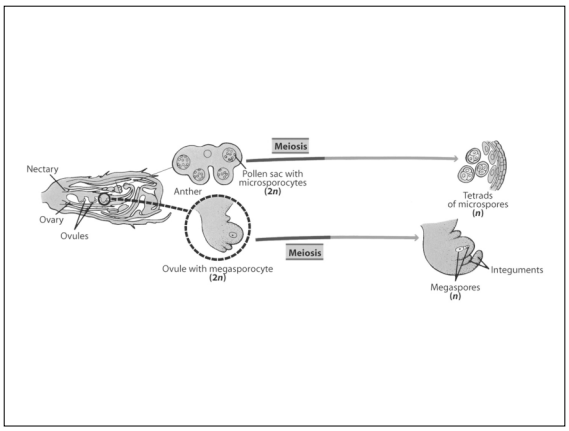
Hepatica americana (Ranunculaceae, a basal eudicot)

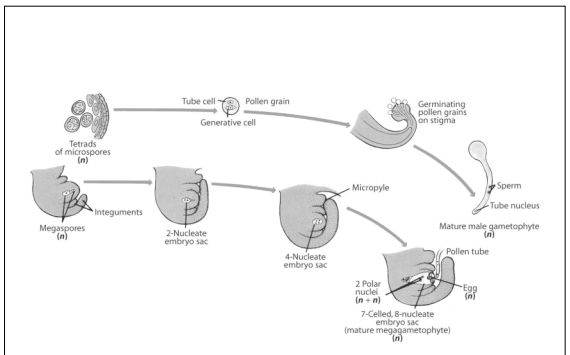


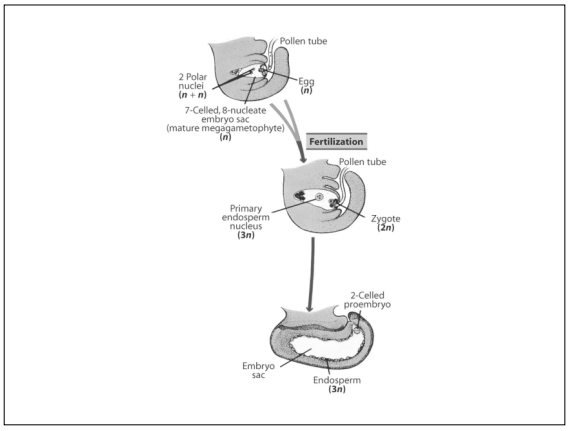
Parts of a lily flower

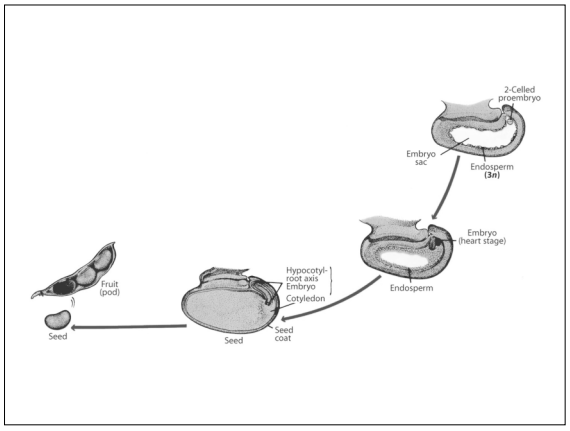

Anther
Filament
Style
Ovary
Stigma
Receptacle

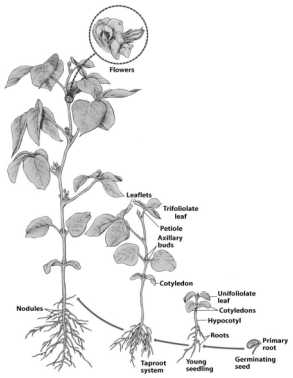


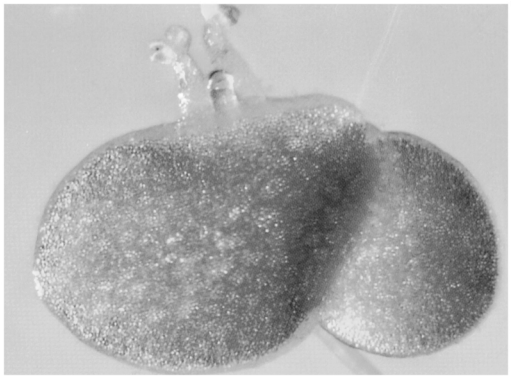

Meiosis
Nectary
Pollen sac with microsporocytes (2n)
Anther
Ovary
Ovules
Tetrads of microspores (n)
Ovule with megasporocyte (2n)
Meiosis
Integuments
Megaspores (n)


Tube cell
Pollen grain
Generative cell
Germinating pollen grains on stigma
Tetrads of microspores (n)
Sperm
Tube nucleus
Integuments
Micropyle
Megaspores (n)
2-Nucleate embryo sac
4-Nucleate embryo sac
Mature male gametophyte (n)
Pollen tube
2 Polar nuclei (n + n)
Egg (n)
7-Celled, 8-nucleate embryo sac (mature megagametophyte) (n)


Pollen tube
2 Polar nuclei (n + n)
Egg (n)
7-Celled, 8-nucleate embryo sac (mature megagametophyte) (n)
Fertilization
Pollen tube
Primary endosperm nucleus (3n)
Zygote (2n)
2-Celled proembryo
Embryo sac
Endosperm (3n)

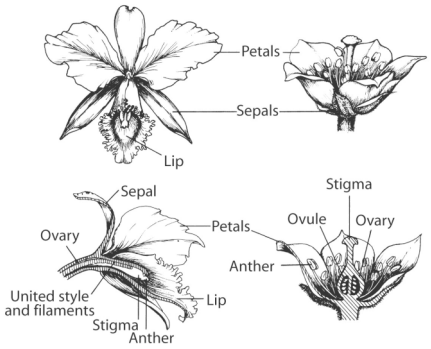

2-Celled proembryo
Embryo sac
Endosperm (3n)
Embryo (heart stage)
Endosperm
Fruit (pod)
Hypocotyl-root axis
Embryo
Cotyledon
Seed
Seed coat
Seed



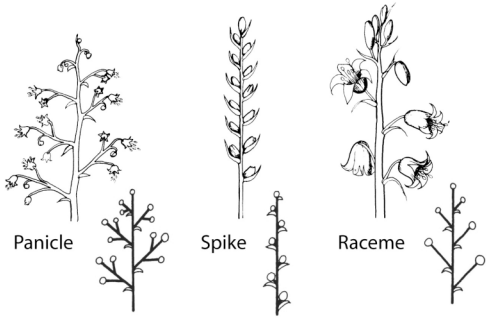


Lemna gibba: flowering plant with two stamens and one style

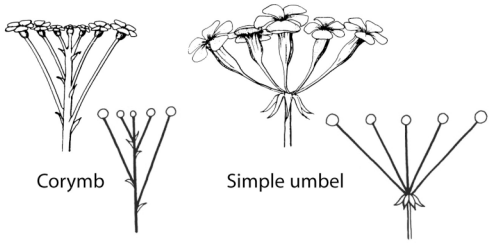
An orchid flower (*Cattleya*)



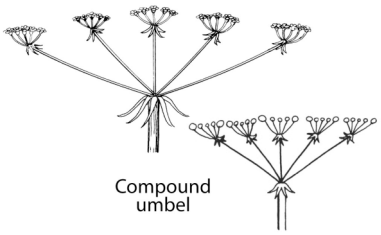
An orchid flower (l) compared to a radially symmetrical flower (r)



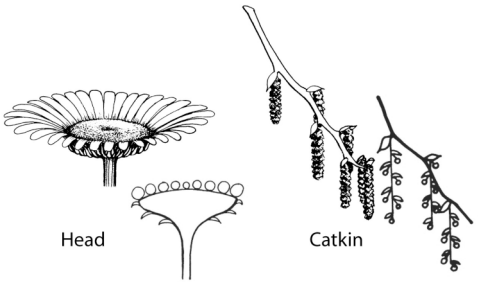
Types of inflorescences (arrangements of flowers). I



Types of inflorescences (arrangements of flowers). II



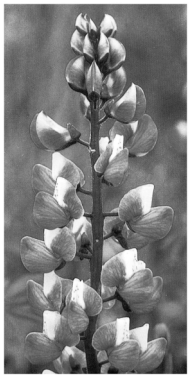
Types of inflorescences (arrangements of flowers). III



Types of inflorescences (arrangements of flowers). IV

Switchgrass (*Panicum virgatum*)

Quackgrass (*Elymus repens*)



Lupine (*Lupinus*)

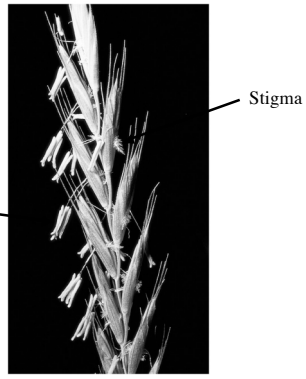
Mertensia

Water hemlock (*Cicuta maculata*)

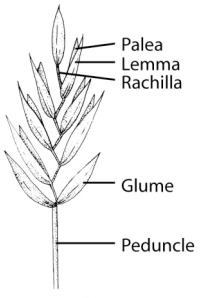
A catkin, of birch (Betulaceae)

Staminate catkins and acorns of tanbark oak (*Lithocarpus*)

Flowers of many grasses, including corn (*Zea mays*), are wind-pollinated. Staminate flowers (left) and ovulate flowers (right)

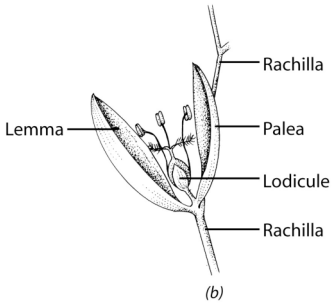


Inflorescences of *Elymus* (= *Agropyron*) a grass related to wheat

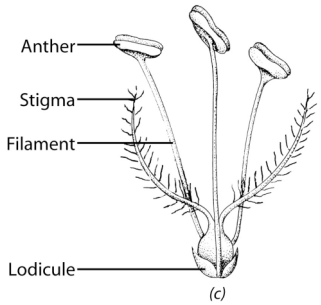


(a)

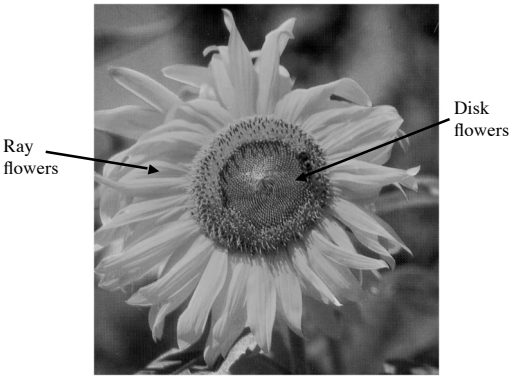
A grass spikelet, a cluster of florets. Spikelets may be arranged in a variety of inflorescence types (see slides #41-42)



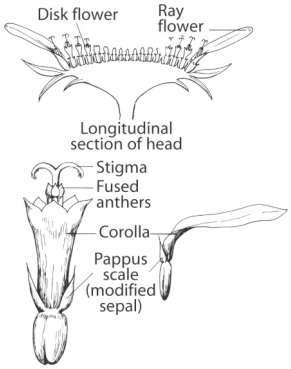
An individual grass floret dissected out of a spikelet



The grass floret dissected still further, to show the androecium and gynoecium

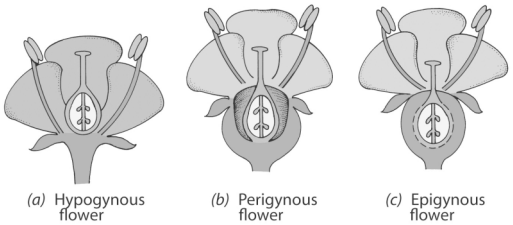


A typical inflorescence of a composite (Asteraceae)

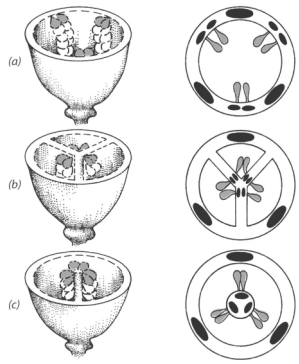


Composite inflorescence and flowers dissected and explained

Thistles have only disk flowers



Positioning of the ovary within a flower, from ancestral (left) to derived (right)



Placentation, the arrangement of ovules within the ovary

Floral Formulae

- KCAG system (Smith 1977)
- *, 5, 5, ∞, 10, capsule (Judd et al 2002)
- * = radial symmetry
- X = bilateral symmetry
- $ = asymmetry

(Judd et al 2002)