
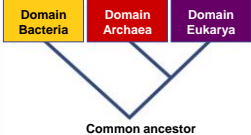


## Chapters 28-29

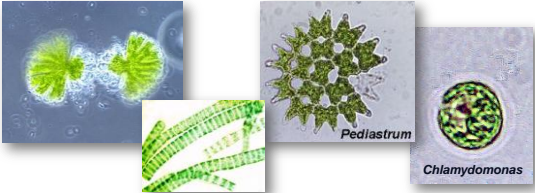
### Kingdom: Plants

Domain Eukarya







## The First Plants...

- For more than 3 billion years, Earth's terrestrial surface was lifeless
  - ◆ life evolved in the seas
  - ◆ 1st photosynthetic organisms were aquatic green algae


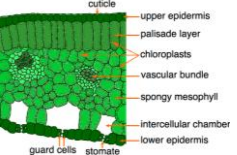
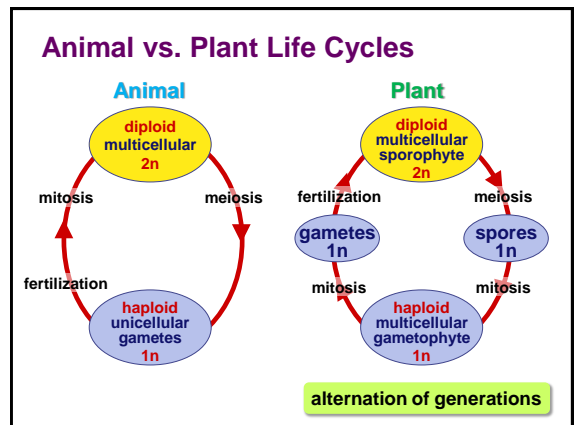
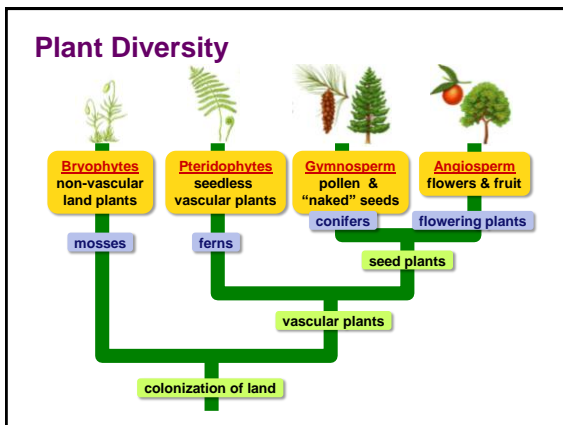


## ...and their Present Day Relatives

## Evolution of Land Plants

- 500 mya land plants evolved
  - ◆ special adaptations for life on dry land
    - protection from drying = **desiccation**
      - ◆ waxy **cuticle**
    - gas exchange (through cuticle)
      - ◆ **stomates**
  - water & nutrient conducting systems
    - ◆ **xylem** & **phloem**
  - protection for embryo
    - ◆ seeds

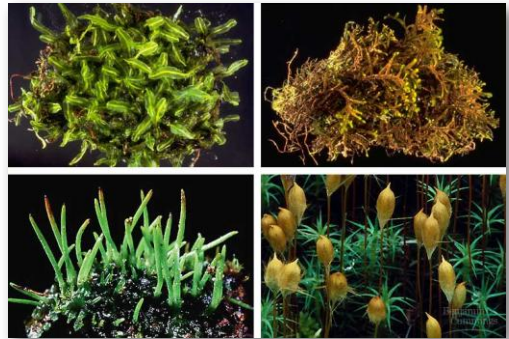
### First Land Plants

#### ■ Bryophytes: mosses & liverworts

- ◆ **non-vascular**
  - no water transport system
  - no true roots
- ◆ **swimming sperm**
  - flagellated sperm
- ◆ **lifecycle dominated by haploid gametophyte stage**
  - fuzzy moss plant you are familiar with is **haploid**
- ◆ **spores** for reproduction
  - haploid cells which sprout to form gametophyte



### Bryophytes: Mosses & Liverworts



### First Vascular Plants

#### ■ Pteridophytes: ferns

- ◆ **vascular**
  - water transport system
  - xylem, phloem, roots, leaves
- ◆ **swimming sperm**
  - flagellated sperm
- ◆ **life cycle dominated by sporophyte stage**
  - leafy fern plant you are familiar with is **diploid**
  - fragile gametophyte
- ◆ **spores** for reproduction
  - haploid cells which sprout to form gametophyte



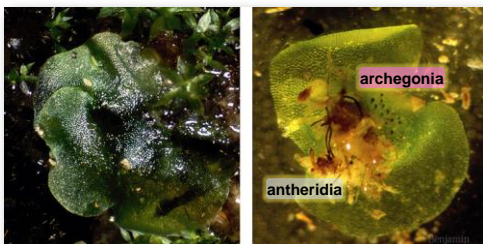
### Pteridophytes: Ferns



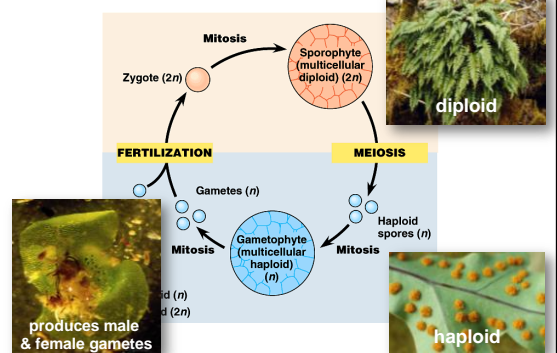
### Alternation of Generations

#### ■ Fern gametophyte (1n)

- ◆ small haploid plant which produces gametes
- ◆ **homospory**: male & female on same plant



### Alternation of Generations



### Early Pteridophytes: Tree Ferns



Carboniferous forest – 290-350 mya  
Forests of seedless plants decayed into deposits of coal & oil.

### Pteridophytes: Tree ferns



### First Seed Plants

#### ■ Gymnosperm: conifers

- ◆ **vascular**
- ◆ **heterospory**
  - male vs. female gametophytes
- ◆ **seeds**
  - naked seeds (no fruit)
- ◆ **pollen**
  - contain male gametophyte
- ◆ **life cycle dominated by sporophyte stage**
  - coniferous trees you are familiar with are diploid
  - reduced (microscopic) gametophyte
  - reduction of gametophyte protects delicate egg & embryo in protective sporophyte
    - ◆ protected from drought & UV radiation



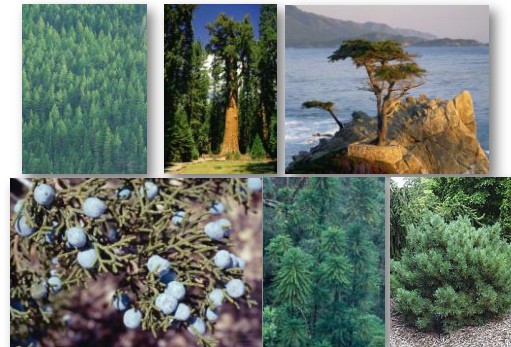
### Early Gymnosperm: Ginkgo

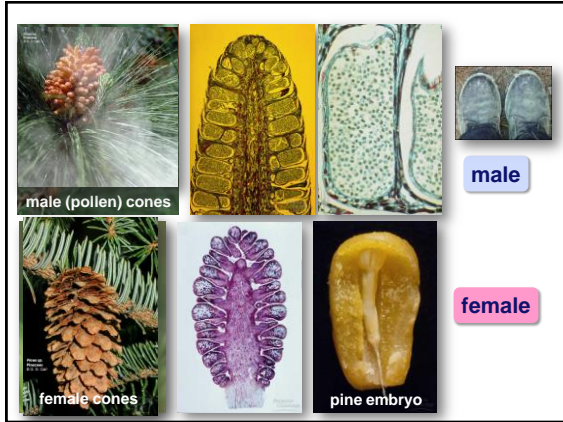


### Early Gymnosperm: Cycads



### Gymnosperm: Conifers







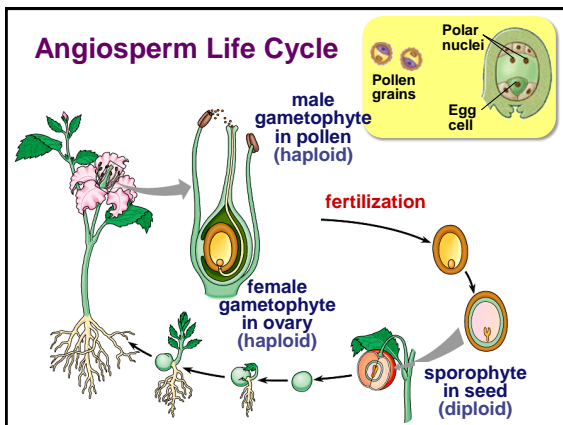
### Pollen

- Pollen eliminated the requirement for water for fertilization
  - ◆ spread through wind & animal



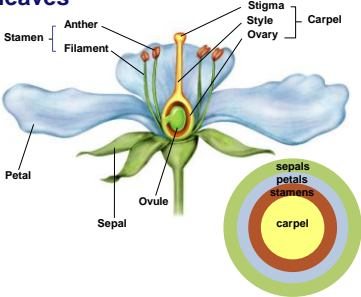
### First Flowering Plants

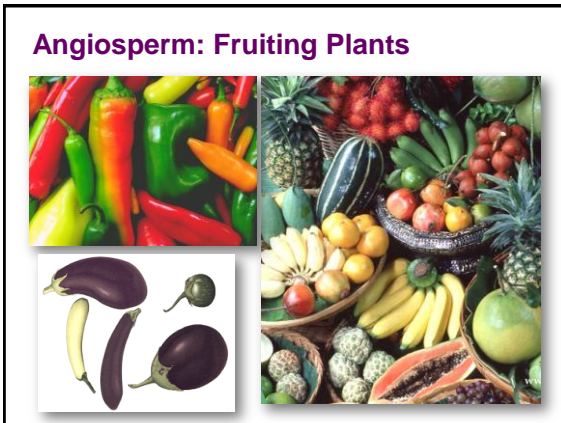
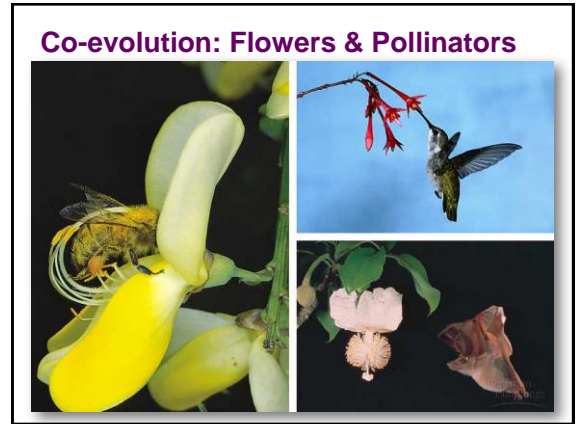
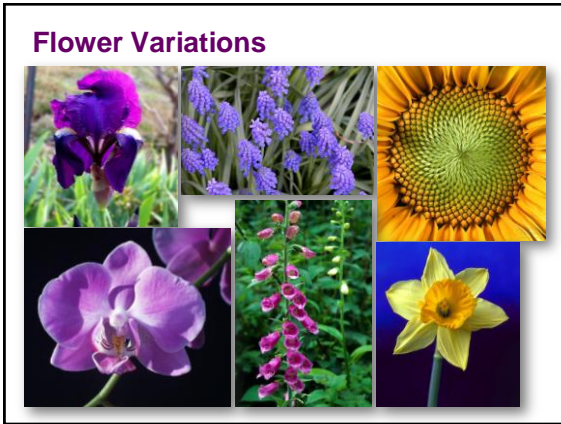
- Angiosperm: flowering plants
  - ◆ **vascular**
  - ◆ **heterospory**
    - male vs. female gametophytes
  - ◆ **flower**
    - specialized structure for sexual reproduction
  - ◆ **seeds within fruit**
  - ◆ **pollen**
  - ◆ **life cycle dominated by sporophyte stage**
    - trees & bushes you are familiar with are diploid
    - reduced (microscopic) gametophyte

### Flower

- Modified shoot with 4 rings of modified leaves
  - ◆ **sepals**
  - ◆ **petals**
  - ◆ **stamens**
    - male
  - ◆ **carpel**
    - female





### Seed & Plant Embryo

- Seed offers...
  - ◆ protection for embryo
  - ◆ stored nutrients for growth of embryo

**seed coat**

**endosperm**



**cotyledons**

**embryo**

**cotyledons = "seed" leaves, first leaves of new plant**



### Monocots & Eudicots

- Angiosperm are divided into 2 classes
  - ◆ **dicots (eudicot)**
    - 2 cotyledons (seed leaves)
    - leaves with network of veins
    - woody plants, trees, shrubs, beans
  - ◆ **monocots**
    - 1 cotyledon
    - leaves with parallel veins
    - grasses, palms, lilies

**Monocotyledon (corn)**

**Dicotyledon (bean)**

MONOCOTS	DICOTS
one cotyledon	two cotyledons
floral parts in threes	floral parts in fours or fives
parallel leaf veins	netlike leaf veins
pollen grain has one pore or furrow	pollen grain has three pores or furrows
vascular bundles throughout stem & ground tissue	stem's vascular bundles arranged in a ring