I. The **Evolution land plants**

A. Shared traits between Plants / charophyceans and algae

1. multicellular

2. eukaryote

3. Photosynthetic

4. Cell walls (cellulose)

B. shared traits between plants and charophyceans

1. Rose-shaped complexes for cellulose synthesis

2. Peroxisome enzymes

3. Formation of phragomoplast

C. Shared traits between all plants

1. Apical meristems

2. Alternation of generations

3. Walled spores in sporangia

4. Multicellular gametangia

5. Multicellular dependent embryo

D. Shared traits of all **SEED** plants (***seed*** – sporophyte embryo packed within food and encased

in protective coat)

1. Reduced gametophyte stage (microscopic and contained w/in sporophyte. Spore does

not disperse!)

2. Heterospory – produce megaspore and microspore, that develop into female / male

gametophyte

3. Ovules - female structure containing megasporangium, megaspore and integument.

Megaspore divides via meiosis, 1 nucleus -> egg, 1-> food supply, 2 -> bar bodies.

4. Pollen - male structure containing microspore; transferred via wind or animals;

dispersal is water independent.

2. Evolution of Seed plants

A. Evolved ~350mya (carboniferous period)

B. Two groups: Gymnosperms (naked seed) and Angiosperms (contained seed)

3. Gymnosperms (ovule not surrounded by ovary or fruit; hence the term ‘naked’ seed)

1. general life cycle
2. Phyla
   1. Ginkophyta
      1. Only one species in phylum
      2. Used in traditional medicine for circulatory disorders, memory enhancement and dementia
   2. Gnetophya
      1. Only Gymnosperm to exhibit ‘double-fertilization’, but the second fertilization degenerates and does not form endosperm (see angiosperms below for double fertilization).
   3. Cycadophyta
      1. Known as cycads. Crown of stiffcompound leaves with a short trunk. Dominant tree during Mesozoic. Often mistaken as “palms”, which are angiosperms. Are diocecious.
   4. Coniferophyta
      1. Examples are pine and fir trees (most are evergreen).
      2. Most species rich gymnosperm.

4. Angiosperm (ovule surrounded by ovary or fruit; flowering plants)

1. Flower structure

1. Stamen - male pollen producing structure

a. filament

b. another – produces pollen

2. Carpel - female ovule producing structure

a. stigma – place of pollen deposition

b. style

c. ovary – contains ovules

3. Petal and sepal – petals attract pollinators

1. Fertilization

1. Pollen lands on stigma; creates pollen tube along style

2. Pollen contains 2 sperm nuclei. Both fertilize separate nuclei (double fertilization)

a. one sperm fertilizes egg (becomes embryo)

b. one sperm fertilizes polar nuclei (becomes endosperm)

1. Fruit development
   1. Once ovule is fertilized, ovary matures into fruit
   2. Dry versus fleshy
      1. Both fruit types are designed for dispersal by:
         1. Wind
         2. Water
         3. Animal
2. Monocot versus dicot (know for you lab, not lecture)