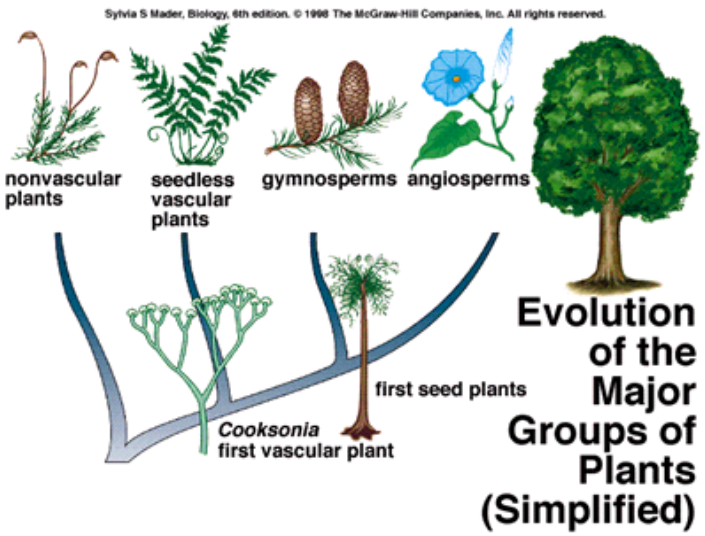
Introduction to Plants

Plants represent the evolutionary link from life that was purely aquatic to terrestrial organisms...evidence for this is documented in the various adaptations that plants possess to allow them to live on land...as you read..

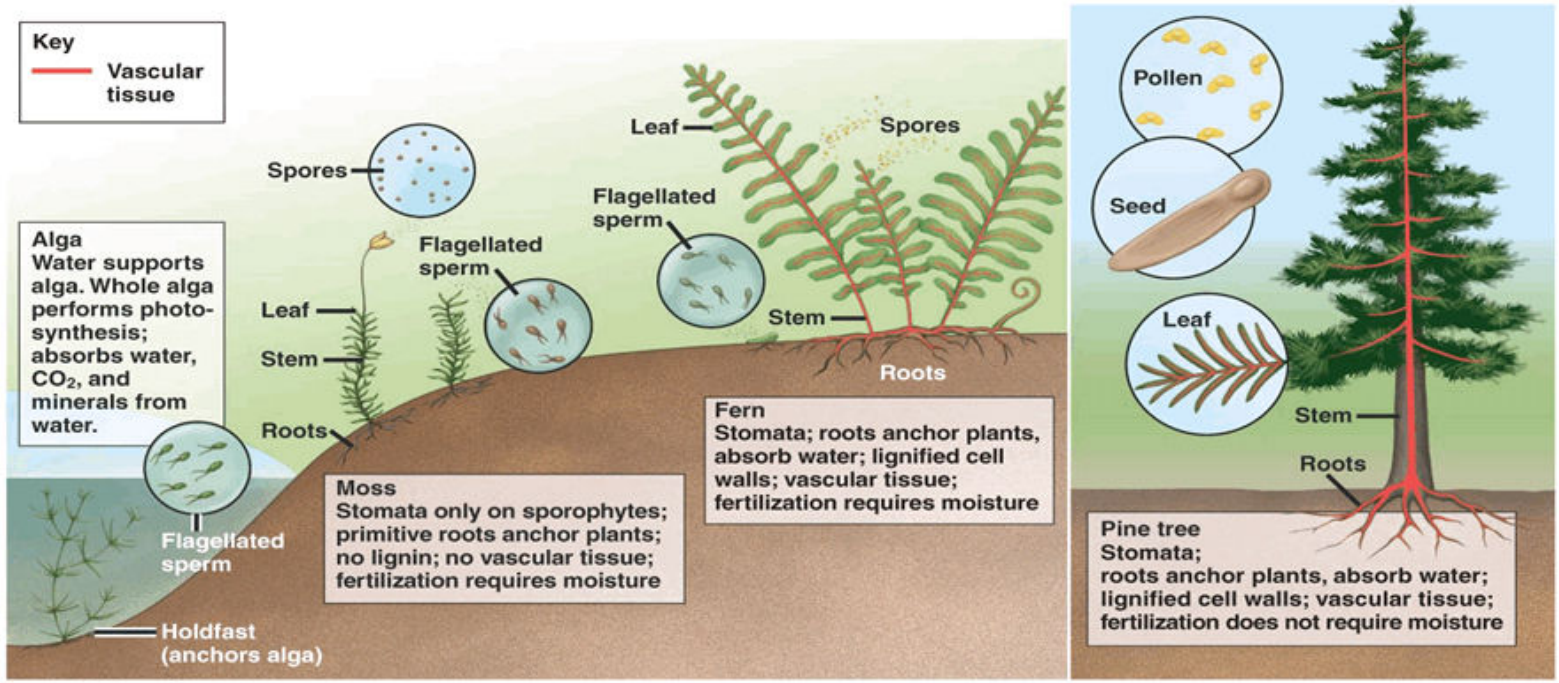
-How is life different on land as opposed to in an aquatic environment?

-What are these various adaptations and functions and why are they needed?

-How is plant diversity categorized?



Evolutionary Progression →



The origin of life dates to approx 3.5 Billion years ago...yet the first terrestrial organisms didn't appear until 475 Million years ago...that's almost 3 Billion years worth of life that was exclusively aquatic

We've discussed part of this evolutionary progression in previous units...prokaryotes to eukaryotes to colonialization to multicellularity

What distinguishes land plants from their closest aquatic relatives (algae)

-Both are autotrophic...can photosynthesize, and both can exhibit alternation of generation (all plants, some algae)

However...these features set land plants apart:

- Walled spores (haploid cell) produced in sporangia (structures where meiosis occurs producing spores)
- Male and female gametangia (gamete producing cells)
- Multicellular, dependent embryos

Challenges to Life on Land:

Maintaining moisture...not a problem in aquatic systems

-Most land plants have a waxy cuticle that prevents water loss in their above-ground structures...but this also prevents gas exchange (pores called stomata needed)

Obtaining Resources...water "brings all" in aquatic systems

-Land plants must get chemical nutrients from two very different media...air (carbon from CO_2)and soil (water and mineral nutrients). Roots, stems, and leaves possessed by most land plants perform "connecting" functions in vascular plants

-Growth from apical meristems increases elongation and maximizes exposure to these resources

Challenges to Life on Land:

Support...ever been in a swimming pool?...your body is supported by water

-Land plants are not surrounded by this medium and require supportive structures...vascular plants are supported by lignified cell walls that allow them to reach heights well above the ground.

-Nonvascular plants (bryophytes) lack this support and can only grow in small mats or clumps, as they pile on top of one another