Photosynthesis Notes

What are the main groups of plants?

- Bryophytes, Lycophytes, Pterophytes, Gymnosperms, Angiosperms

What happens when there is a hot, dry day and the plants partially close their stomata?

- Prevents water loss, but CO_2 can't get into the leaves
- Decrease in CO_2 levels in air space in leaves, which decreases photosynthetic yield
- Rubisco starts to O_2 to RuBP instead of CO_2
- New molecule splits and releases a 2-carbon compound
- Peroxisomes and mitochondria rearrange the compound and release CO_2
- **Called photorespiration – no ATP as in cell respiration, and no sugar in regular photosynthesis**

Why does Rubsico able to bind to O_2?

- Because the early atmosphere had low levels of O_2, Rubsico enzyme didn't need to exclude O_2 from its active site
- Now, it retains the ability to bind to both CO_2 and O_2

Why is photorespiration still around?

- Plants who don't do it, have been shown to be more susceptible to damage from excess light

How do some plants decrease photorespiration?

- Plants that do normal photosynthesis are called C3 because the first compound made in the Calvin cycle is 3-carbon
    - Ex: rice, wheat, soybeans
- Plants that have adapted photosynthesis are C4 and CAM plants
    - Works in times when stomata close and will supply the Calvin cycle with the stored CO_2 to prevent Rubisco from binding to O_2 instead
    - Ex: C4 = sugarcane, corn, members of the grass family
    - Ex: CAM = succulents such as cacti and pineapple

How plants modify carbon fixation?

C3 Plants

- Normal photosynthesis

C4 Plants

- Steps are separated spatially: bundle sheath cells and mesophyll cells
- CO_2 binds to PEP to make a 4-carbon oxaloacetate

CAM Plants (Crassulacean acid metabolism)

- Steps are separated temporally: night and day
- Named for the plants that the process was discovered in