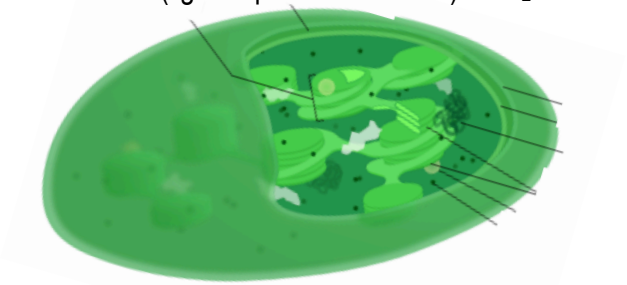
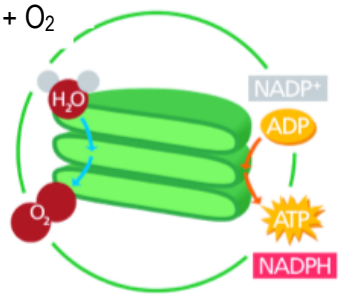
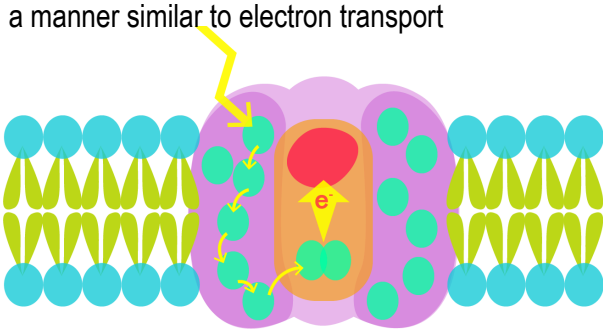
**CONCEPT:** PHOTOPHOSPHORYLATION

- Chloroplasts – organelles in which photosynthesis occurs, have electron transport chains and ATP synthases
    - □ Thylakoids – membrane bound compartments in which the light reactions occur
    - □ Stroma – the fluid in the chloroplast, surrounding the internal structures
- Hill reaction (light-dependent reaction) – $2H_2O + 2NADP^+ \rightarrow NADPH + 2H^+ + O_2$






- Photosystem – complexes of proteins, photopigments, and organic molecules embedded in the thylakoid membrane
    - □ Light harvesting complex – system of many chlorophyll, carotenoids, and other photopigments, acts as antennae
        - Pigment antennae transfer light energy to reaction center in thylakoid membrane
        - Light energy excites an electron into an excited state, and this excitement can be transferred to a neighboring antenna molecule electron
    - □ Reaction center – contains chlorophylls, cytochromes, quinones, and pheophytin (chlorophyll without Mg)
        - Energy transferred by excited electrons causes an electron in the reaction to be ejected and picked up by electron carries, in a manner similar to electron transport




- Electrons can come back to reaction center in a process that creates proton gradient
- Electrons can be used to reduce NAD(P)+ → NAD(P)H via ferrodoxin, and must be replaced by splitting water