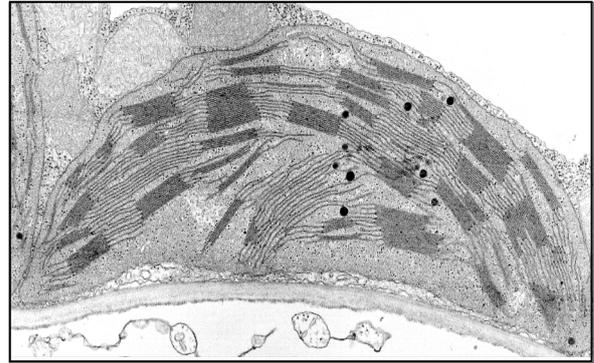
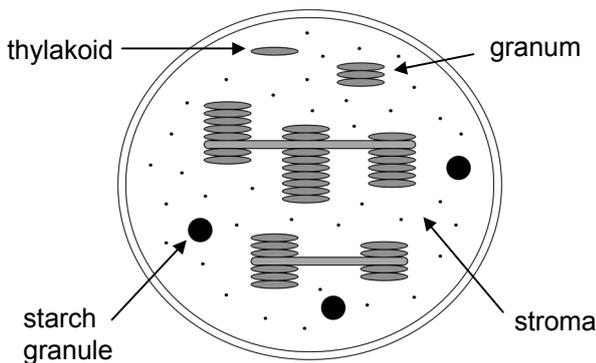


Photosynthesis (8.2)

Draw and label a diagram of a chloroplast (8.2.1)



Explain the light dependent and independent reactions (8.2.2 / 8.2.3 / 8.2.5)

Light Dependent Reactions (occur in thylakoids)

- Light stimulates electron release from chlorophyll clustered in photosystems
- Electrons lost from photosystem I (P700) reduce NADP^+ to form NADPH
- Electrons lost from photosystem II (P680) go through an electron transport chain (making ATP) before replacing the electrons lost from photosystem I
- Light splits water (photolysis) to create oxygen gas and release electrons which replenish photosystem II (non-cyclic photophosphorylation)
- Alternatively, electrons lost from photosystem II may be recycled after the ETC instead of replenishing photosystem I (cyclic photophosphorylation = no NADPH is made)

Light Independent Reactions (occur in stroma)

- The light independent reactions synthesise sugars via three steps:
 1. Carbon Fixation: *RuBP* is converted into *GP* by the enzyme *rubisco* in the presence of CO_2
 2. Reduction: *GP* is reduced to *TP* in the presence of ATP and NADPH
 3. Regeneration of *RuBP*: Some *TP* is converted to sugar, the rest is used to restore stocks of *RuBP*

Explain photophosphorylation in terms of chemiosmosis (8.2.4)

- **Photophosphorylation** involves using energy from *light* to *phosphorylate* ADP and make ATP
- As electrons move through an electron transport chain they lose energy which is used to pump hydrogen ions (H^+) from the stroma into the thylakoid
- This generates a proton motive force which drives the hydrogen ions back into the stroma at specialised transmembrane pumps (*ATP synthetase*) - this is known as **chemiosmosis**
- ATP synthetase uses the energy released by the movement of H^+ ions to synthesise ATP from $\text{ADP} + \text{Pi}$

Chloroplast structure & function (8.2.6)

- **Grana:** Thylakoids arranged into many stacks, increasing SA:Vol ratio (\therefore more ETC)
- **Thylakoid:** Small volume means changes in the number of H^+ ions have a big effect
- **Stroma:** Contains necessary enzymes and a suitable pH for the Calvin cycle

Law of limiting factors (8.2.8)

- **A factor nearest its minimum value determines the rate of a reaction**

