

Chapter 7: Where it Starts – Photosynthesis

Organisms, Carbon, & Energy

- All life forms must obtain _____ and _____
- Autotrophs are “ _____ ”
 - They get energy from _____ or chemicals
 - They get carbon from _____
- Heterotrophs feed on _____ or organic _____
 - Energy & carbon come from _____

Photosynthesis Overview

- _____ reactions convert _____ energy to chemical energy stored in _____ or NADPH
- _____ reactions convert stored energy (_____ & NADPH) into _____ energy
- For glucose: $12\text{H}_2\text{O} + 6\text{CO}_2 \rightarrow 6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O}$
- Photosynthesis occurs in _____
- Light-dependent reactions occur in the _____ (thylakoid membranes)
- The interior of each granum contains _____ ions used in making ATP & _____
- Light-independent reactions occur in the _____ surrounding the grana

Light-Dependent Reactions

- _____ of Reactions:
 - Plant pigments _____ light energy and give up _____
 - Electron- and hydrogen- _____ form ATP and NADPH
 - Electrons are then _____ in the _____ molecules
- Light _____:
 - _____ pigments absorb red & blue; but reflect _____
 - _____ pigments absorb violet & blue; but reflect yellow, _____, & red
 - Pigment molecules cluster together into “ _____ ”
- Photosystems:
 - A photosystem absorbs _____, and uses the energy to boost an electron to a higher _____ level
 - The electron quickly returns to its _____ level and releases the energy, which is trapped by _____
 - The energy passes a chlorophyll e^- to an _____ molecule

- _____ Photosystems (“_____ style”):
 - This type of photosystem uses _____ photophosphorylation
 - The chlorophyll’s e- is passed through a _____ system, each e- transfer allows an _____ molecule to form _____
 - The spent e- eventually is returned to its original _____
- _____ Photosystems (“_____ style”):
 - This type of photosystem uses _____ photophosphorylation
 - _____ is split by _____ energy, and an e- enters the chlorophyll
 - The chlorophyll’s original _____ is used to form _____
 - _____ is also formed; this is a much more _____ use of the energy

Light-Independent Reactions

- _____ of Reactions:
 - ATP and NADPH from LD reactions provide _____, H⁺, and e-
 - Carbon dioxide is converted into _____ compounds such as _____
 - This process is often called “carbon _____”
 - The main part of the LI reactions are referred to as the _____ - _____ cycle
- The Calvin-Benson Cycle:
 - _____ attaches to ribulose biphosphate (_____) to form a 6-carbon intermediate
 - The intermediate splits into two molecules of _____
 - Each PGA receives a phosphate from _____, plus H⁺ and e- from NADPH to form _____
 - Two molecules of PGAL join to form a _____, which can be modified to form _____, starch, or cellulose
 - Sucrose can be used to _____ fuel
 - Starch is for fuel _____
 - Cellulose is _____ in plants
 - Photosynthesis can also be used to form _____ or _____ acids

C₄ Plants

- Plants in hot, _____ environments close their _____ to conserve _____, but in doing so slow _____ entry and allow O₂ buildup
- Photosynthesis continues improperly; this leads to “_____”
- Crabgrass, _____, and others (C₄ plants) fix carbon _____ to make a _____ molecule for the Calvin-Benson cycle

Chemosynthesis

- Chemosynthetic _____ get energy from the oxidation of _____ substances
- Some soil bacterial strip p⁺ and e⁻ from _____