

Concepts of Biology

Guided Reading Notes

Chapter 6

1 Photosynthesis Produces food and Releases Oxygen

6.1 Photosynthesizers are autotrophs that produce their own food

- Photosynthesis converts _____ to _____.
- Producers (_____) produce food for themselves and for consumers (_____).

6.2 In plants, chloroplasts carry out photosynthesis

- CO₂ enters a leaf through small openings called _____.
- Chlorophyll and other pigments within the _____ absorb _____.
- Conversion of CO₂ to carbohydrate occurs in the _____, the enzyme-containing interior of _____.

6.3 Photosynthesis is a redox reaction that releases O₂

- _____ is the loss of electrons, and _____ is the gain of electrons.
- During photosynthesis, CO₂ is _____ and water is _____, resulting in _____ and _____ and an _____ molecule:

Illustrate this process (found on p. 109)

6.4 Experiments showed that the oxygen released during photosynthesis comes from water

- Two separate experiments using isotopes proved that oxygen comes from _____, not from _____.

6.5 Photosynthesis involves two sets of reactions: the light reactions and the Calvin cycle reactions

- Light reactions only occur in _____ during the day when _____.
- Calvin cycle reactions are _____ that reduce CO₂ to a _____ in the _____.

Illustrate this reaction (p. 109)

2 First, Solar Energy Is Captured

6.6 Light reactions begin: Solar energy is absorbed by pigments

- Chlorophylls *a* and *b* and _____ absorb _____, _____, and _____ light better than other portions of visible light

6.7 Fall temperatures causes leaves to change color

- Less sunlight in fall means not as much solar energy to rebuilding _____, which _____, leaving yellow and orange pigments visible.

6.8 Solar energy boosts electrons to a higher energy level

- Within _____ membranes, pigments complexes in _____ absorb solar energy, which excites _____ in the complex.
- Energized electrons are passed by a reaction center _____ molecule to an _____.

6.9 Electrons release their energy as ATP forms

- Electron acceptors send energized _____ down an electron _____, a series of _____ - _____ electron carriers.
- An _____ - _____ reaction occurs at each transfer, and _____ is released.
- Carriers of the electron transport chain are found in the _____ of _____.
- ATP is formed from the _____.

6.10 During the light reactions, electrons follow a noncyclic pathway

- During the noncyclic electron pathway, electrons move from _____ down an electron transport chain to _____, where they are re-energized and passed to _____, which becomes _____.

6.11 The thylakoid membrane is organized to produce ATP and NADPH

- Get-ready phase:
 - ✓ PS II: Pigment complex plus _____. Water splits, releasing _____ and _____.
 - ✓ Members of the electron transport chain pump H^+ from the _____ to the _____ space; _____ gradient results.
 - ✓ PS I absorbs _____; _____ eventually tet passed to _____ reductase.
- Payoff phase (_____)
 - ✓ NADP reductase passes _____ to $NADP^+$ and _____ results. H^+ flows down concentration gradient through _____ complex; ADP binds to _____; _____ are produced.

3 Second, Carbohydrate Is Synthesized

6.12 The Calvin cycle uses ATP and NADPH from the light reactions to produce a carbohydrate

- CO₂ fixation: The _____ RuBP _____ fixes _____ to _____, producing a C₆ molecule that immediately splits into two _____ molecules (_____).
- CO₂ reduction: Each 3PG is reduced to a _____ molecule.

Illustrate CO₂ reduction (p. 110)

- RuBP reduction: During three turns of the _____, _____ molecules of _____ are used to reform three molecules of _____. This step requires _____ energy.

6.13 In plants, carbohydrate is the starting point for other molecules

- G3P can be converted to all _____ needed by a plant.
- It takes two _____ to make one _____ molecule.

4 C₃, C₄, and CAM Photosynthesis Thrive Under Different Conditions

6.14 C₃ photosynthesis evolved when oxygen was in limited supply

- C₃ photosynthesis occurs _____.
- RuBP _____ combines with O₂ when _____ supply is limited, and this _____.

6.15 C₄ photosynthesis boosts CO₂ concentration for RuBP carboxylase

- C₄ _____ grow where the climate is _____.
- Partitioning in Space: CO₂ occurs in _____; Calvin cycle occurs in _____ cells, where RuBP is not exposed to _____.

6.16 CAM photosynthesis is another alternative to C₃ photosynthesis

- CAM plants grow where _____; _____ are closed during the day to _____.
- Partitioning in Space: CO₂ is fixed _____; does not enter _____ cycle until _____.