

# Plant Processes

## Chapter 11

# You should be able to

- Explain the process of photosynthesis and its importance
- Explain the process of respiration and its importance
- Discuss plant hormones, stimulus and responses

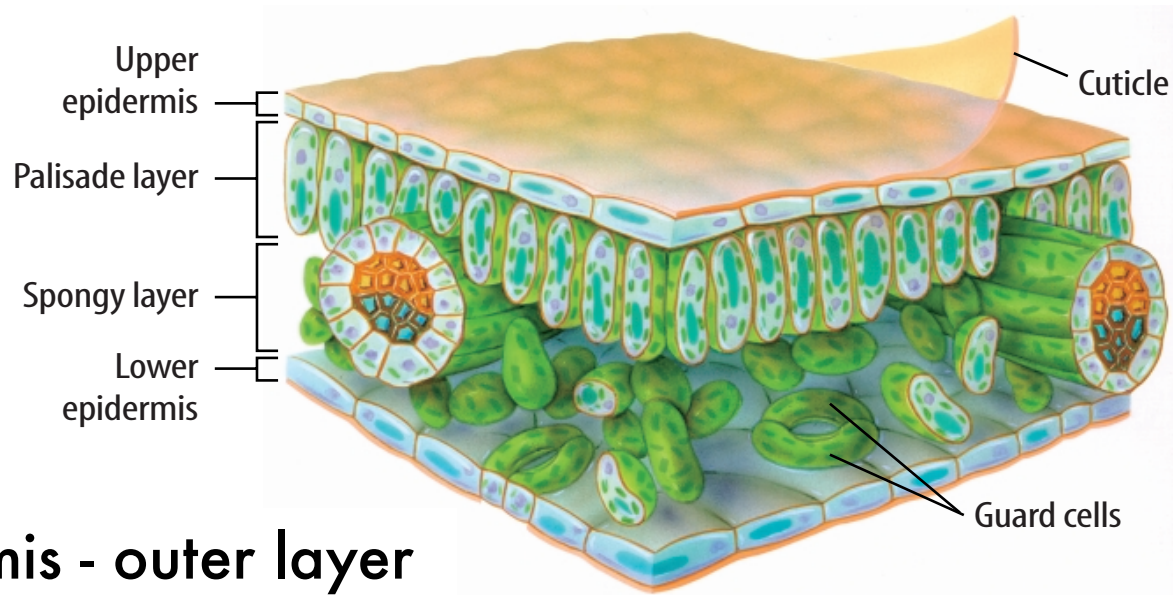
# Photosynthesis and Respiration

- Taking in raw materials how plants eat and breathe

# Movement of materials

- Most water enters through roots and then moves up through the plant
- Water vapor exits through leaves
- Carbon dioxide and oxygen enters and exits the leaves

# Leaf structure and function - layers of cells



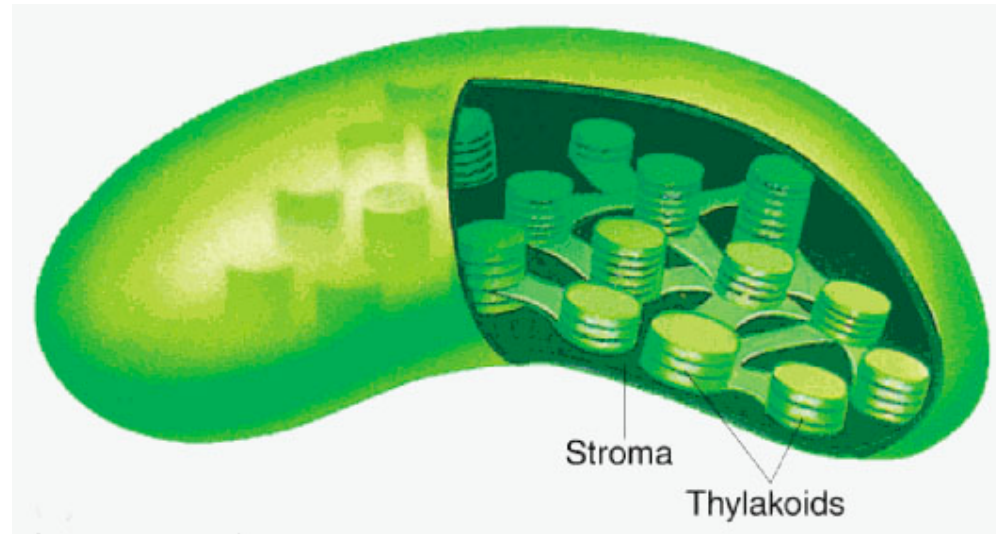
**Epidermis - outer layer containing many stomata to control water loss**

**Spongy layer - contains carbon dioxide and water needed for food production**

**Food is produced in the palisade layer**

# Chloroplasts and Pigments

Chloroplasts -  
cell structures  
in which  
photosynthesis  
occurs



Chlorophyll  
is green  
pigment in  
chloroplasts

Pigments help plants  
absorb light energy  
to make food

# Photosynthesis

# Photosynthesis

- Plant uses carbon dioxide, water, and light energy in the presence of chlorophyll to make glucose and oxygen
- Light-dependent reactions - light energy splits water into oxygen and hydrogen; oxygen is released as a waste product

# Light - independent reactions

- Carbon dioxide and hydrogen from light-dependent reactions combine to make glucose
- Glucose is used in a plant's structure and growth
- Extra glucose is stored as other sugars or starches

# Importance of photosynthesis

- Directly or indirectly produces food for almost all organisms
- Removes carbon dioxide from and adds oxygen to atmosphere

# Breakdown of food - releases energy

- Respiration - chemical reaction that breaks down food molecules and release energy

# Respiration

- Glucose is broken down into smaller molecules in a cell's cytoplasm
- Aerobic respiration uses oxygen to break down smaller molecules and occurs in cell's mitochondria

# Respiration

- Is important because it provides cells with usable energy
- Energy helps plants to transport and produce materials
- Waste products of respiration is carbon dioxide which is returned to atmosphere

# Comparing photosynthesis and respiration

- Reverse processes
- Photosynthesis, occurring only in cells with chlorophyll, combines carbon dioxide and water using light energy and releases glucose and oxygen
- Aerobic respiration occurs in mitochondria of all cells and combines oxygen and food to release energy, carbon dioxide, and water

# **Plant Responses**

**Changes resulting from internal and external stimuli**

**Tropism - a response to a stimulus resulting in growth change; can be positive (toward stimulus) or negative (away from stimulus)**

- Some plants grow around objects they touch
- Plants may grow toward a light source
- Gravity - downward growth of roots is a positive response; upward growth of a stem is a negative response

# Plant Hormones

control growth changes triggered by tropism

## Ethylene

- Gas produced by many plants and released into the air
- Can promote cell growth between leaf and stem resulting in leaf drop
- Stimulates fruit ripening process

# Plant Hormones

control growth changes triggered by tropism

## Auxin

- Controls changes related to a plant's response to light and production of other plant hormones

# Plant Hormones

control growth changes triggered by tropism

## Gibberellins

- Chemicals in fungus that can infect plant stems and make them grow too tall

# Plant Hormones

control growth changes triggered by tropism

## Cytokinins

- Also cause fast growth through rapid cell division

# Photoperiodism

Plant's sensitivity to daily hours of light and darkness for flower production

- Long-day plants - need less than 10 to 12 hours of darkness to produce flowers
- Short-day plants - want 12 or more hours of darkness to produce flowers
- Plants that can flower within a range of darkness hours are called day-neutral plants