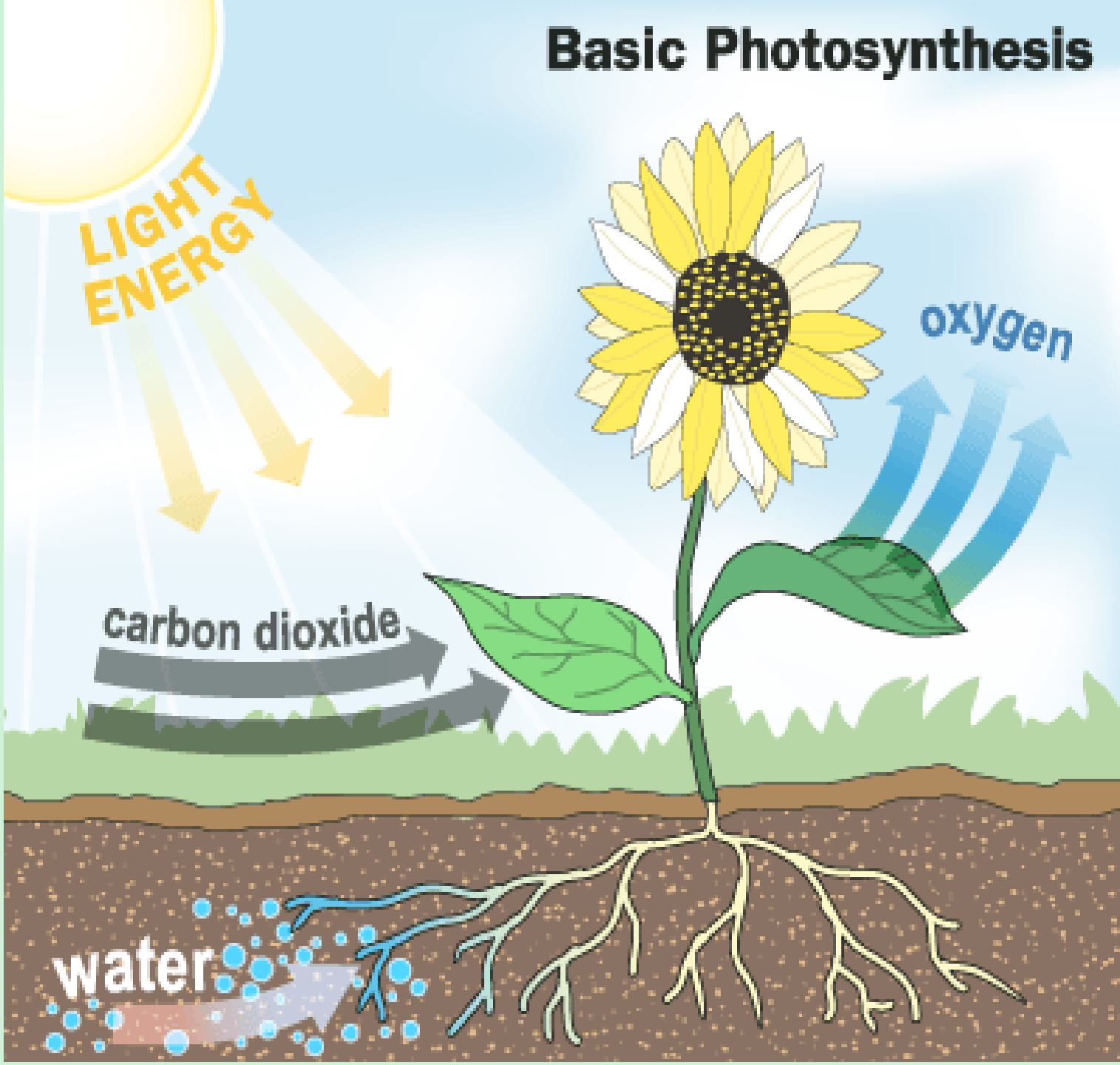


# Basic Photosynthesis



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S

# Heterotrophs and Autotrophs

All living organisms require nutrients in order to maintain normal bodily functions. Organisms can be classified based on the main way they obtain the nutrients they require for living. They can be classified into one of two groups:

- **Autotroph**: organisms produce their own organic compounds by photosynthesis
- **Heterotroph**: an organism that cannot synthesise organic compounds, but rather has to obtain them by eating other organisms.

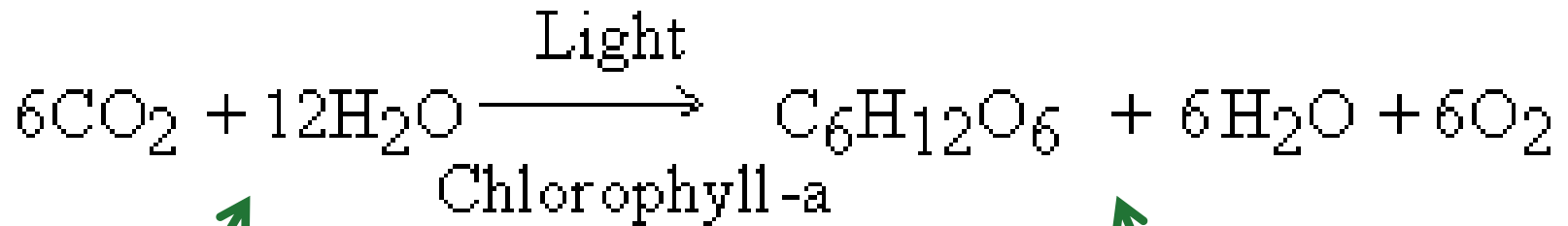


# Photosynthesis

Process whereby green plants convert (energy poor) inorganic compounds into (energy rich) organic compounds.

Stored as carbohydrate in their bodies.

# General Equation for Photosynthesis



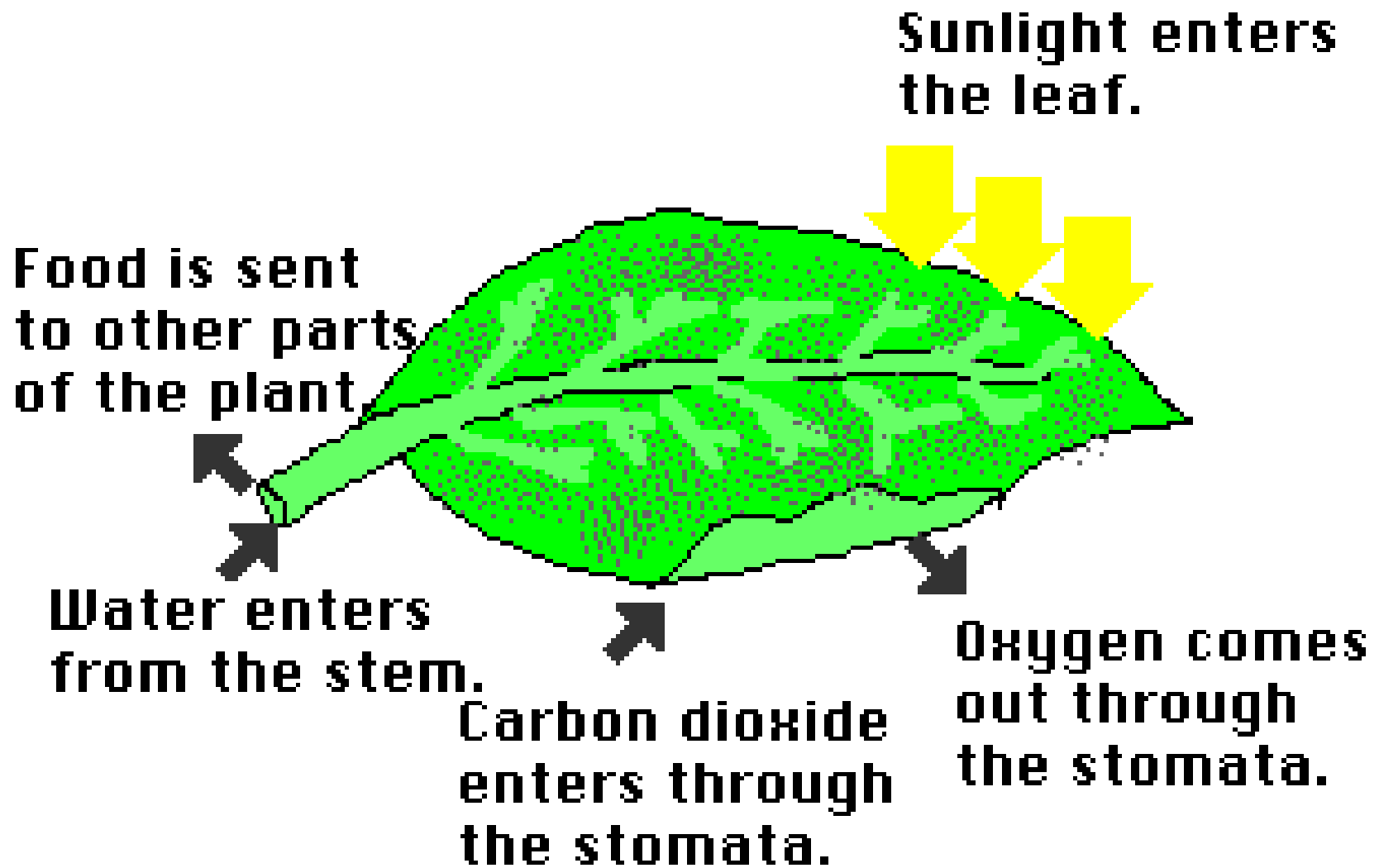
INPUTS

OUTPUTS

# What is the main plant organ that carries out photosynthesis??

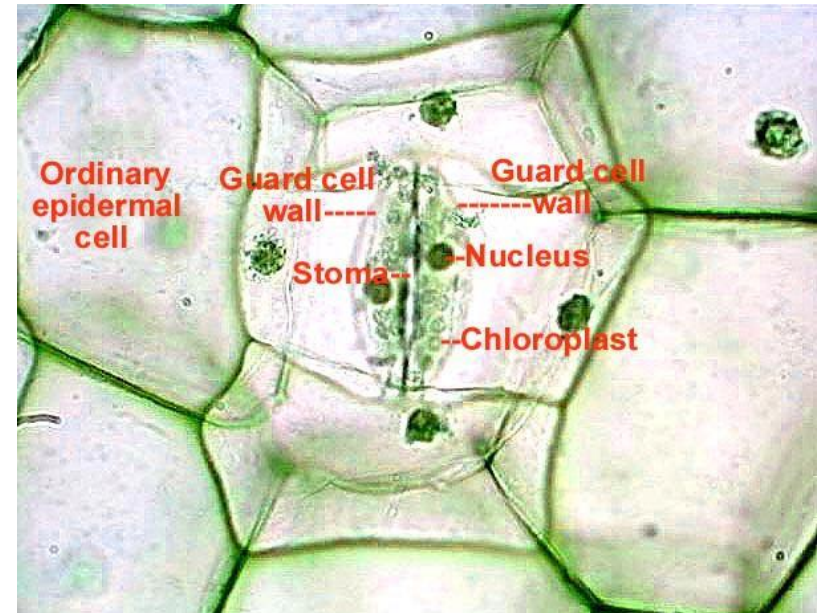
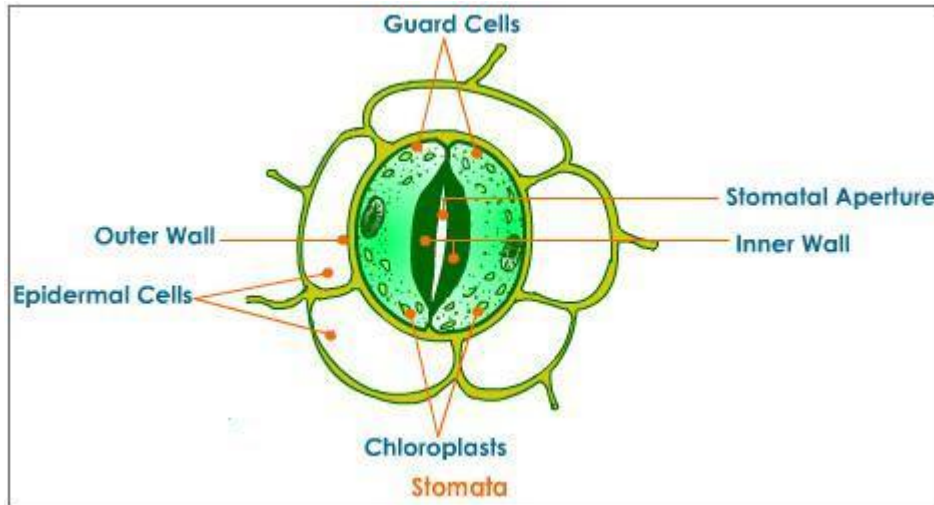


Answer: The Leaf



# How do gases enter and exit the cell?

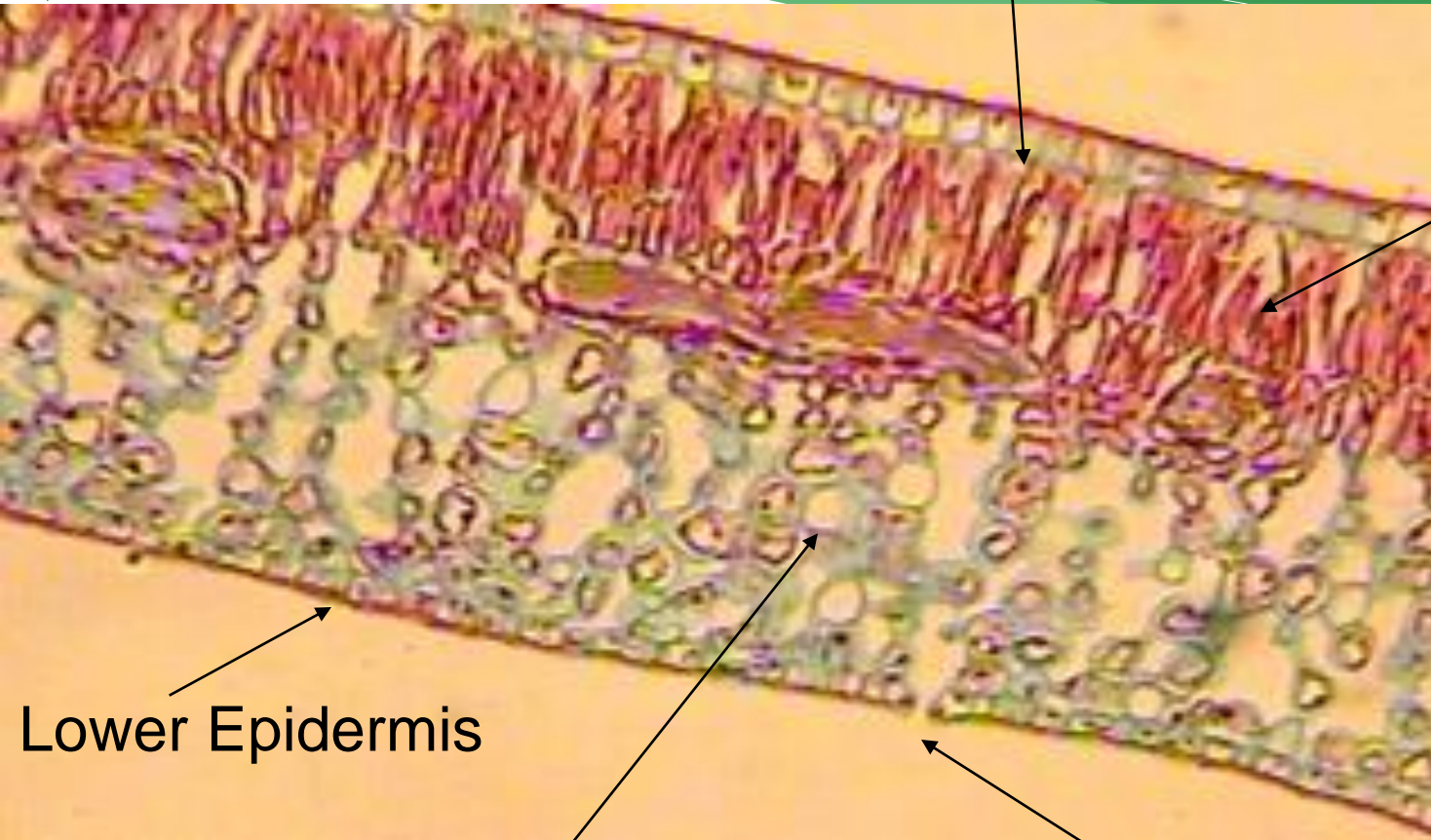
## Stomata



Activity- Stomata Prac



# Upper Epidermis



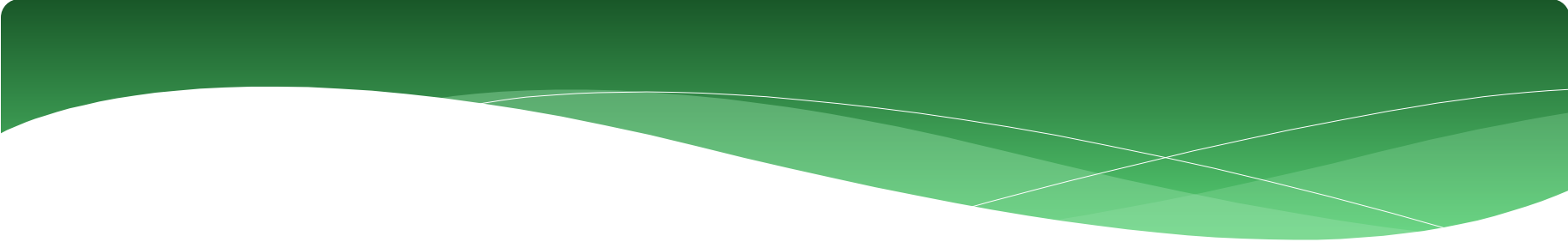
Palisade  
mesophyll

Lower Epidermis

Spongy  
mesophyll

Stoma with two  
guard cells





When the plant is well watered, the guard cells swell (become turgid) and the stoma opens to let in carbon dioxide.

This, however, lets water vapour escape from the leaf.

If the plant loses too much water vapour, the guard cells lose their turgidity and become flaccid.

This causes the stoma to close, preventing further water loss from the plant.

# Stoma (pore) open and closed

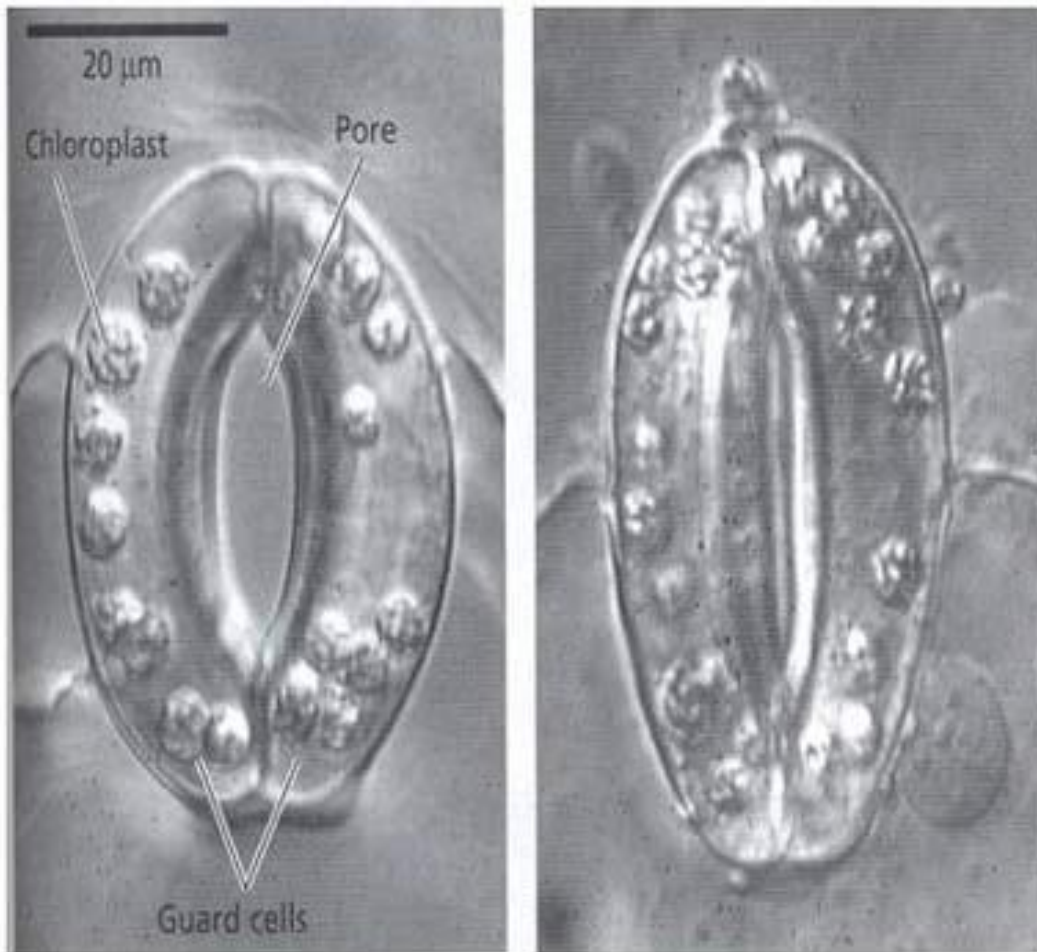
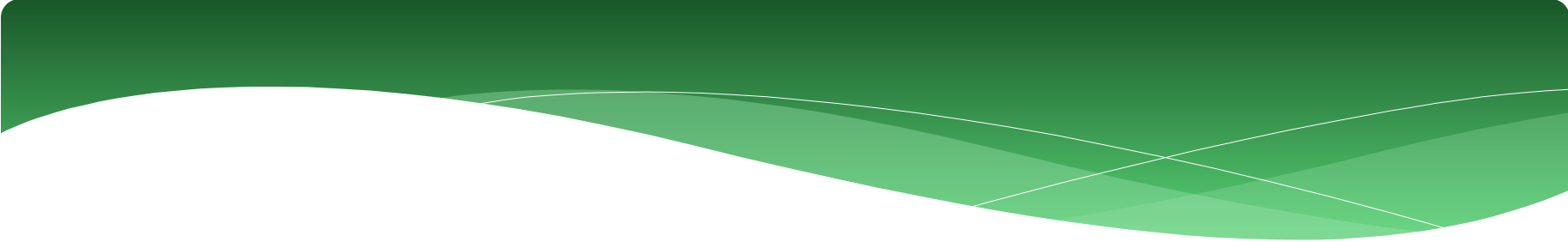


Image reproduced from Plant Physiology, Eds: L. Taiz and E. Zeiger, 2nd edition, Sinauer Associates, Inc. Publisher, Sunderland MA, USA. p. 523

# Stomata on the undersurface of a leaf

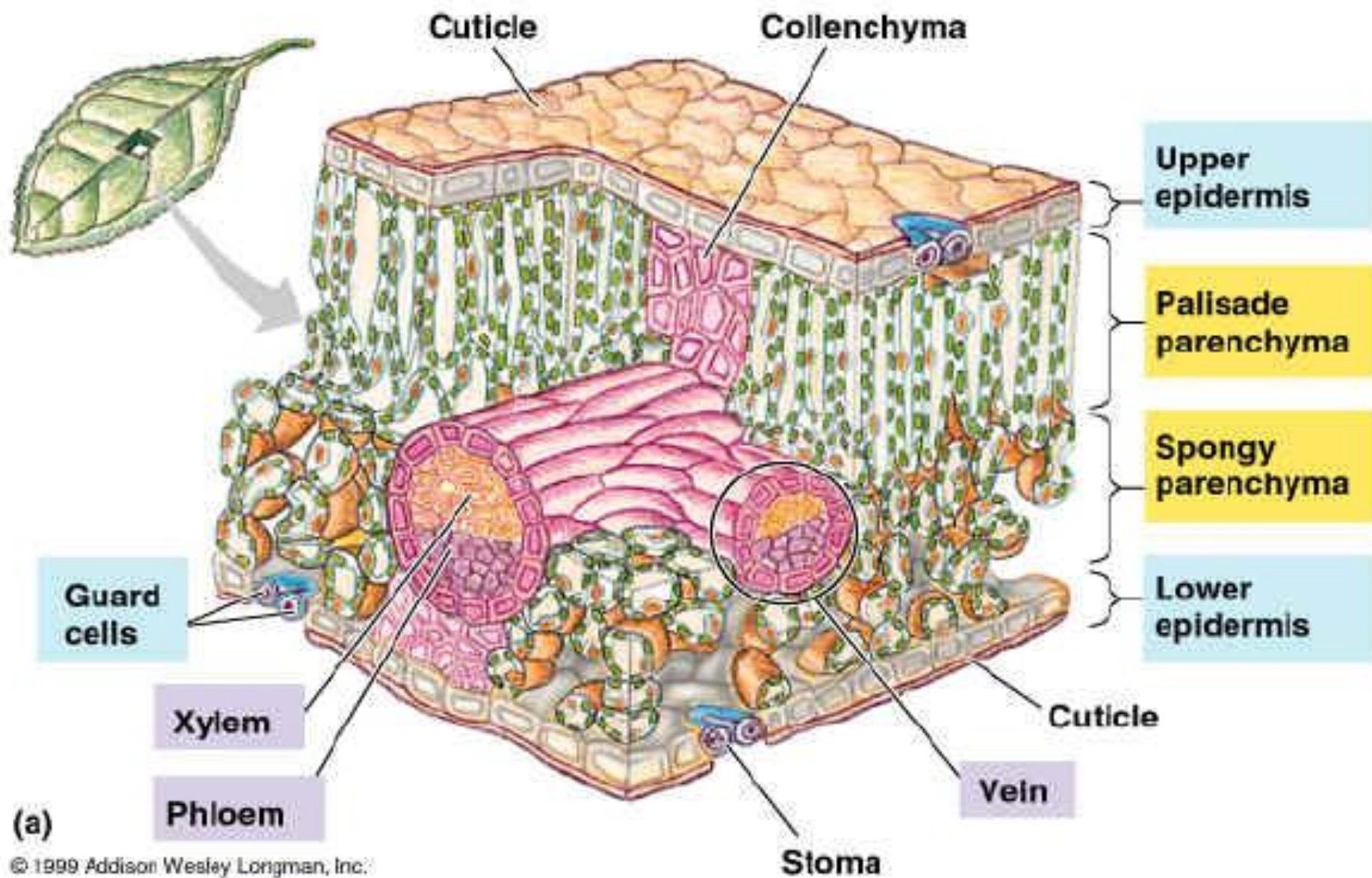




How does water travel to the leaf from the roots?

How does glucose travel from the leaf to other parts of the cell?







# Plant Transport Research Activity

Leaves are green  
because they contain  
the pigment:

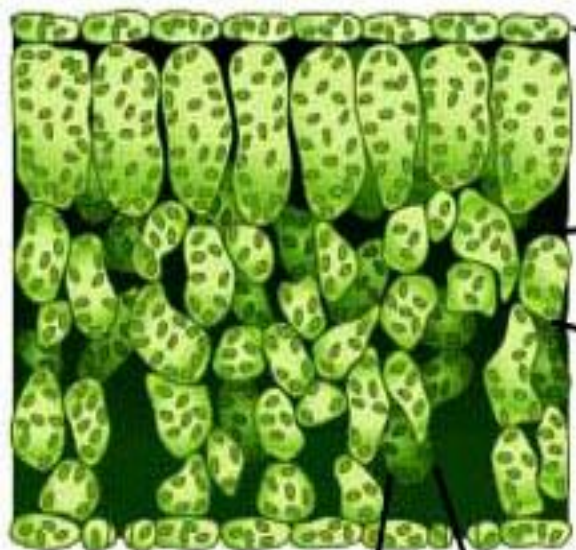
Leaves have a  
large surface  
area to absorb as  
much light as  
possible







How would this plant  
photosynthesise?



No chloroplasts  
in epidermis

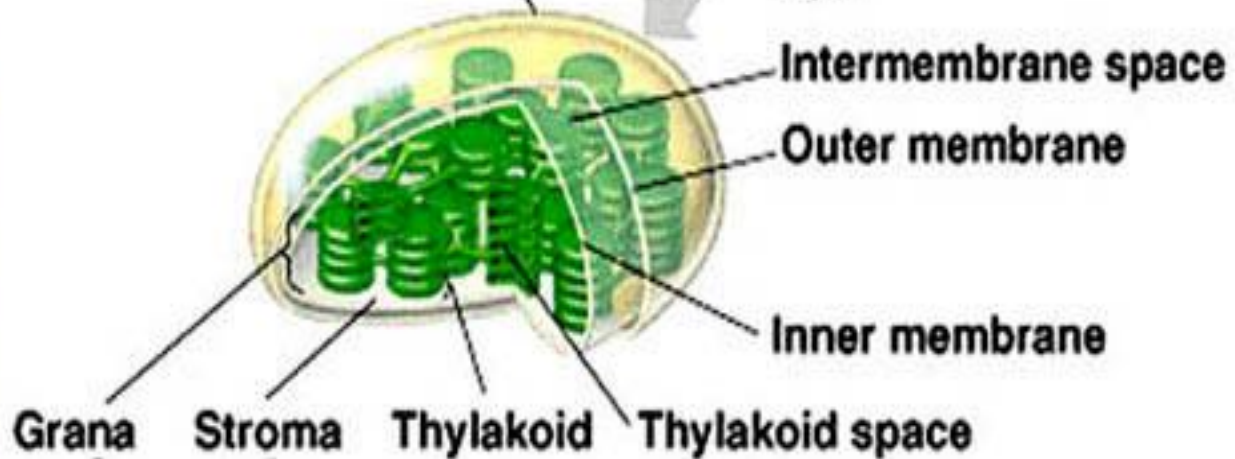
**Mesophyll cell**



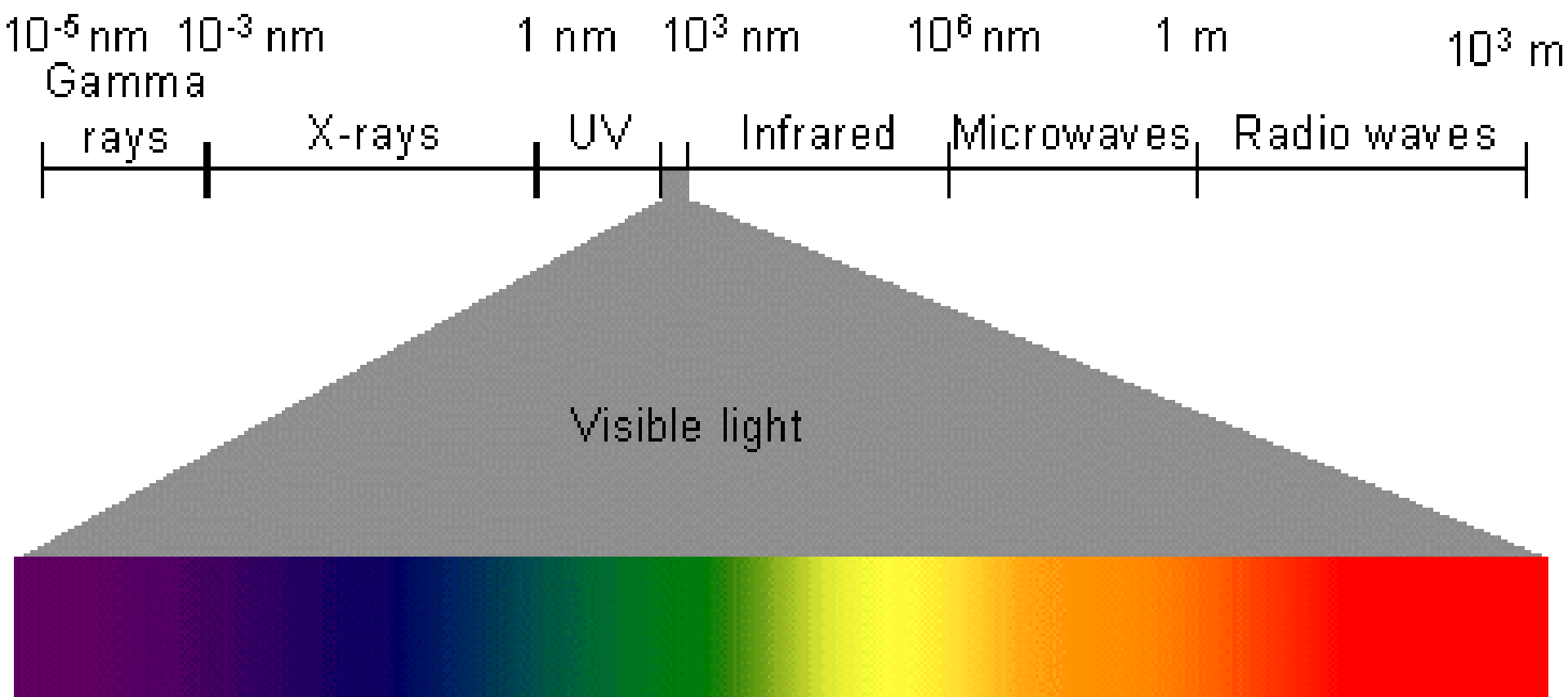
5 μm

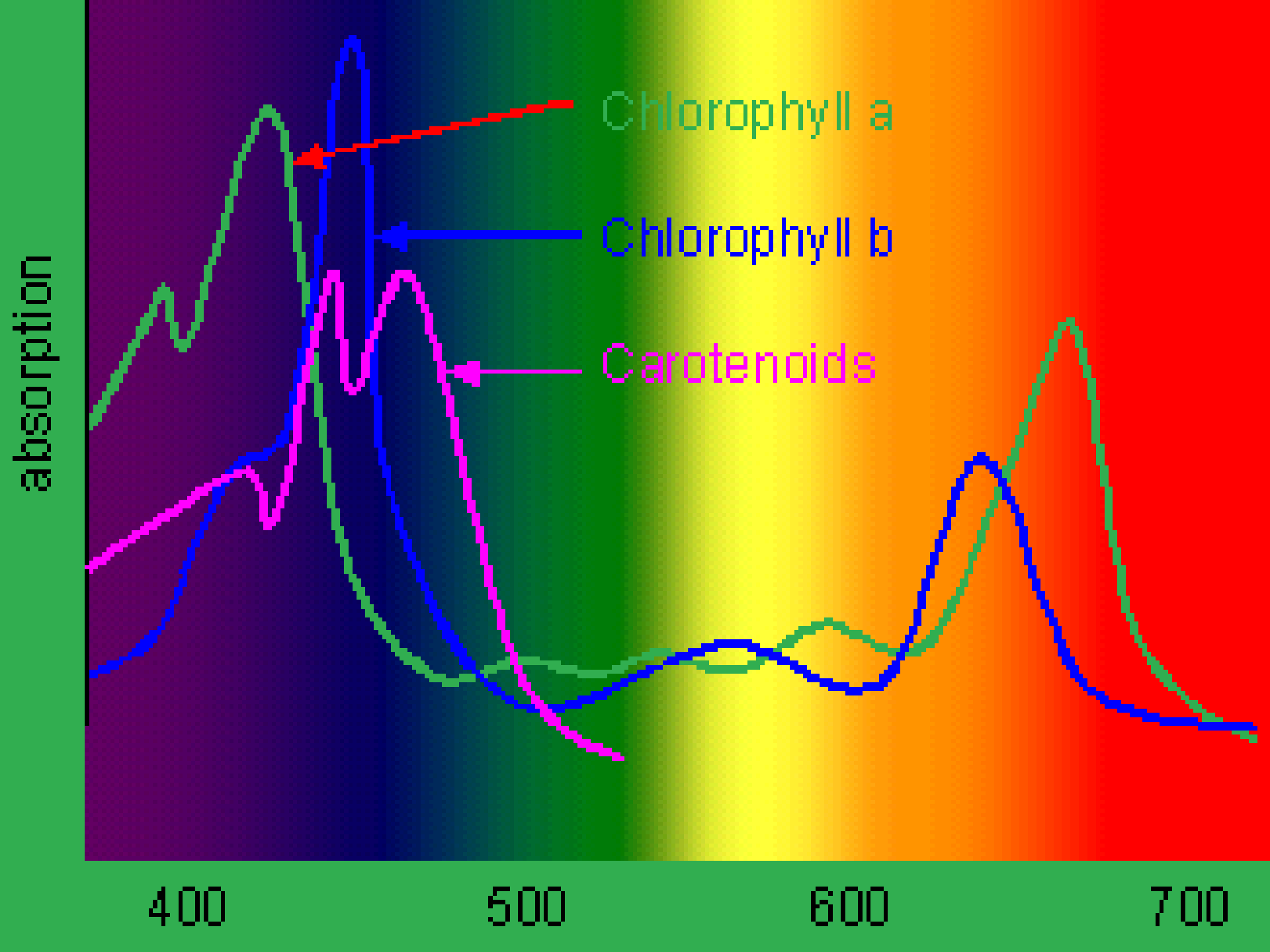
**Chloroplast**

Leaf cross-section



Cells containing chloroplasts





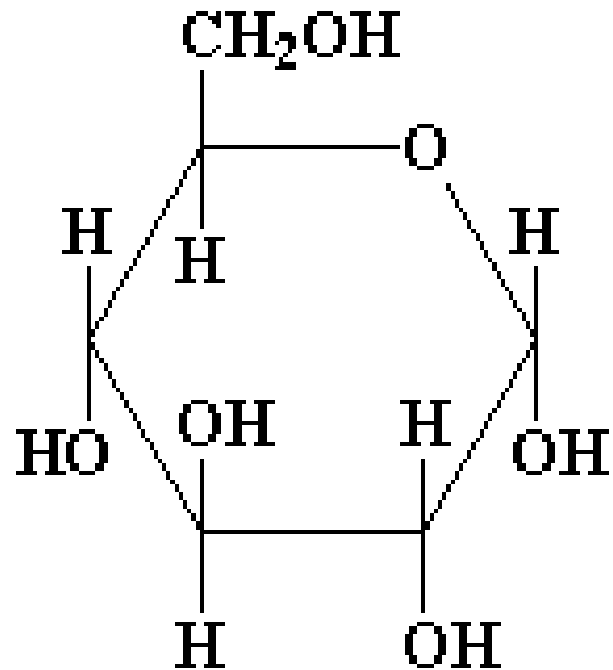


Where is the energy contained in  
organic compounds?

Answer????????????????

**Int hec hemicalb ondsh  
oldingt hea tomst ogether**

# What does this mean?



glucose

Where is the energy????



Where does photosynthesis occur?

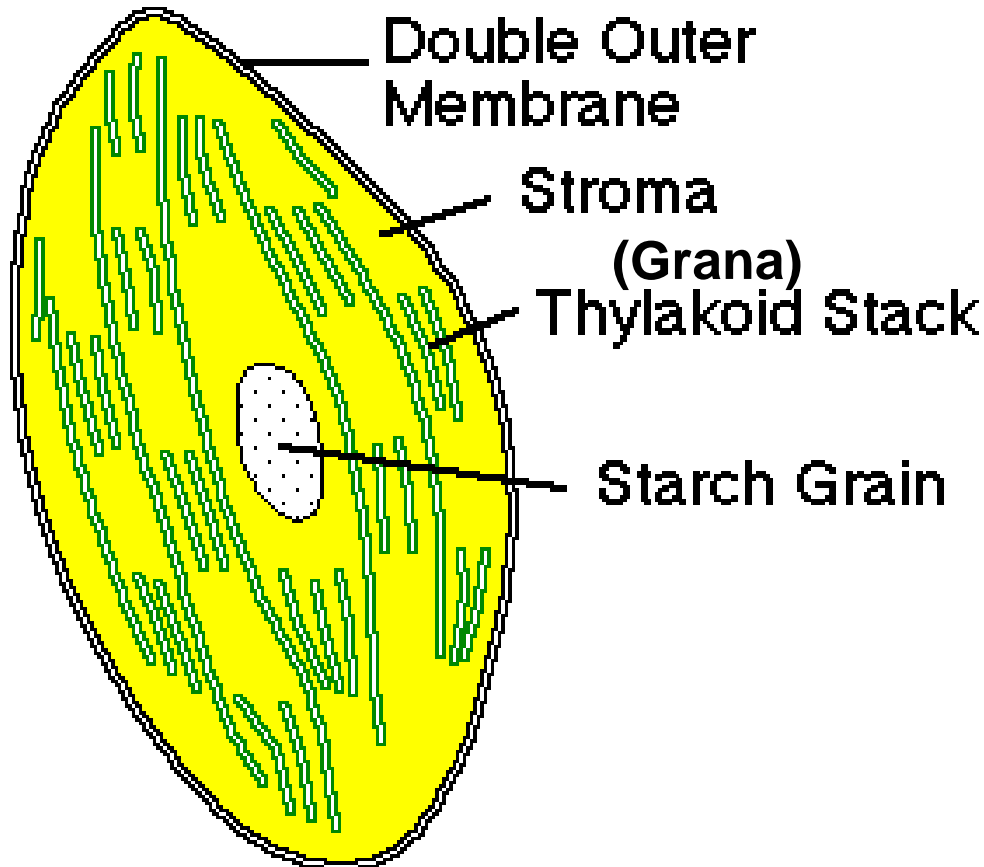


# Structure of a chloroplast

**Thylakoids: Disk shaped membranes containing photosynthetic pigments.**

**Grana:**

**Stroma:**



# What happens in the chloroplast?

Two main stages.

1. Light Dependent Reactions
2. Light Independent (Dark) Reactions



# Light Dependent Reactions

Occurs in the grana of the chloroplasts

Chlorophyll captures **sunlight energy** and transfers it to electrons. The electrons are “excited”.

# Light Dependent Reactions involves two key parts

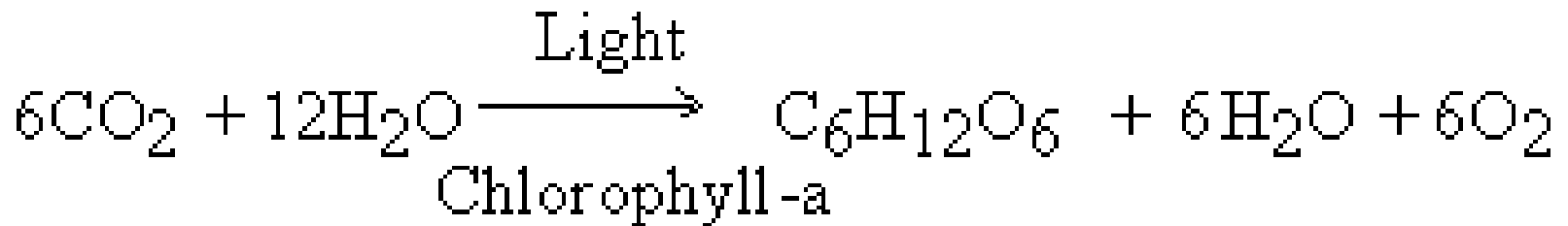
1. Splitting of water molecules into hydrogen and oxygen. This is called photolysis.
2. Electron Transport Chains. This is where energy captured from light is used to form ATP.

# Light Independent Reactions (Dark Reactions)

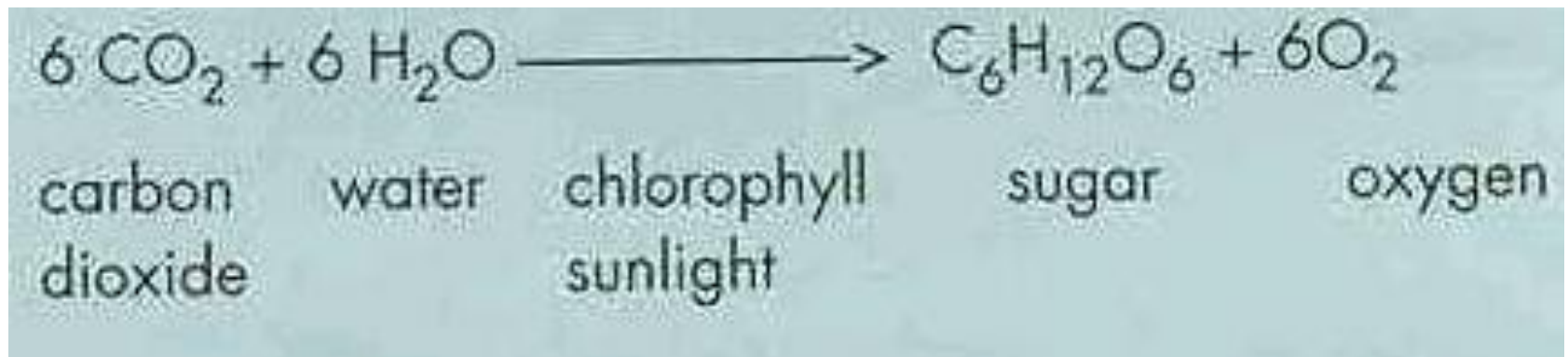
Enzymes in the stroma use the chemical energy of ATP to produce glucose.

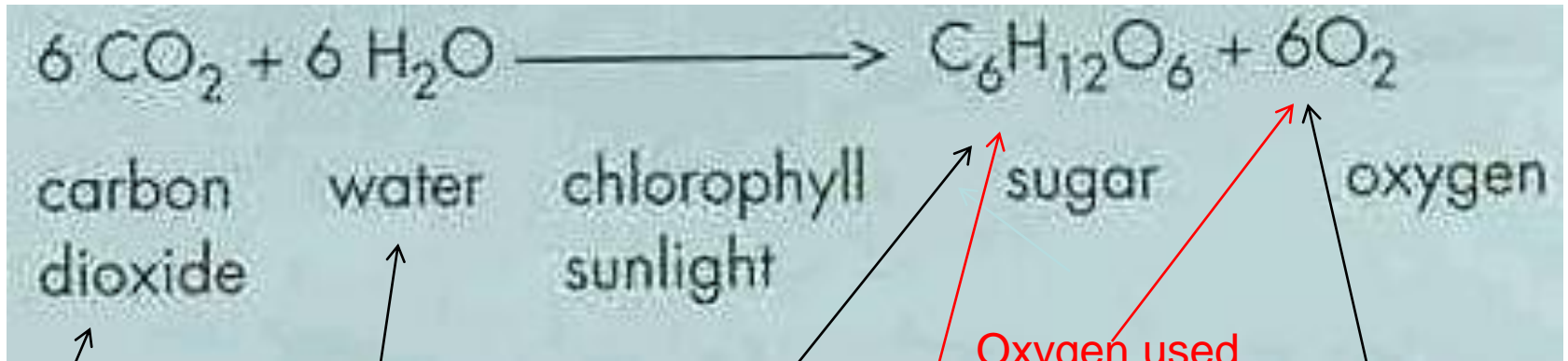
To do this, carbon dioxide is combined with hydrogen to produce glucose.

# Do you remember this?



## Let's simplify it!





Carbon dioxide comes from the air and provides raw materials for production of glucose

Provides Hydrogen required in glucose

Oxygen in glucose comes from carbon dioxide

Glucose is used as a fuel for cellular respiration or to construct larger molecules such as cellulose, starch or disaccharide molecules such as fructose.

Oxygen used for aerobic respiration

Oxygen comes from the water



# How well did you understand?

\* <http://www.youtube.com/watch?v=pdgkuT12e14>

<http://www.youtube.com/watch?v=xRMKiLlpATk>

Watch and analyse these video's

Answer Questions 12-14 page 46