



Photosynthesis



Recall that producers are found at the base of every food chain and are the foundation of ecosystems. This is due to their ability to capture light energy to produce their own food in the form of glucose.

1. What raw materials are used by producers for photosynthesis?

Carbon dioxide and water

2. Are these raw materials organic or inorganic? Explain.

Both of these raw materials are inorganic as  $\text{CO}_2$  lacks hydrogen and  $\text{H}_2\text{O}$  lacks carbon.

3. Identify the original source of energy for the process of photosynthesis.

Sunlight is the original energy source for this process.

4. Identify the organic product formed as a result of photosynthesis. Write its chemical formula.

Glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) is the organic produce of photosynthesis as it contains both carbon and hydrogen.

5. Identify two inorganic products of photosynthesis.

Oxygen and water are two inorganic products of photosynthesis

6. Write the formula for photosynthesis.



7. Where in the cells of producers does photosynthesis occur?

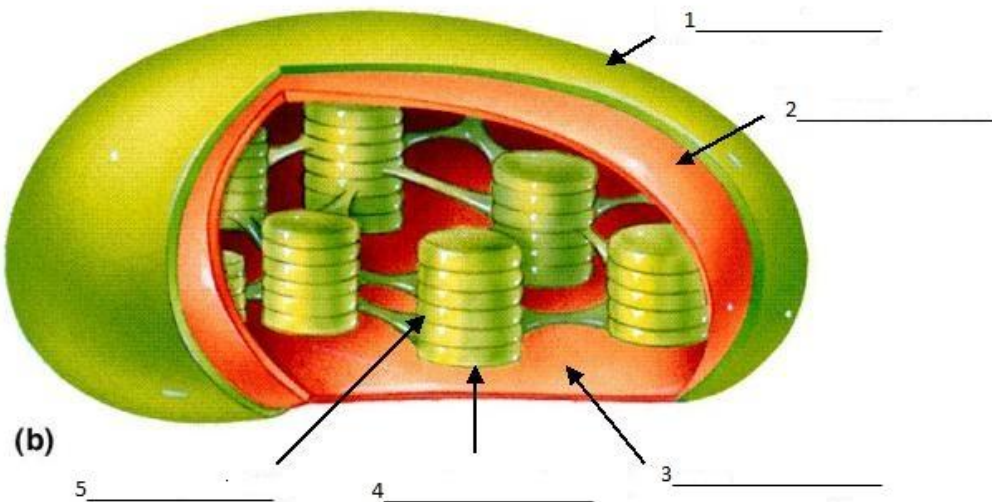
Photosynthesis occurs in the chloroplasts.

The chloroplast is an organelle exclusive to producers, as it is the site of photosynthesis. The green color of this organelle is due to the pigment chlorophyll. In addition to providing this color, chlorophyll traps the light energy from the sun that is needed to produce the sugar glucose.

8. What is the function of chlorophyll?

Chlorophyll traps the light energy from the sun.

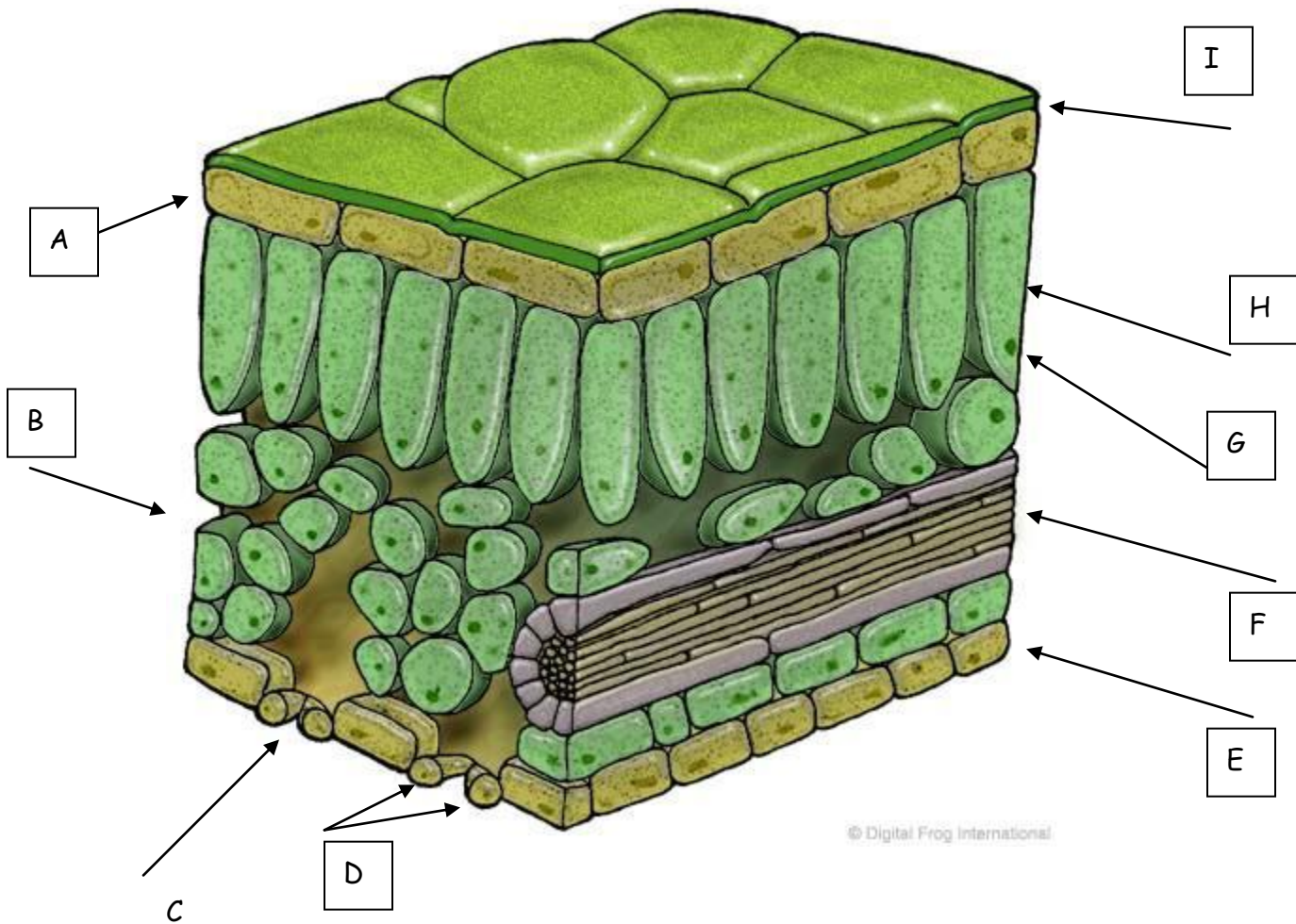
The chloroplast consists of membrane-bound sacs called thylakoids that tend to be stacked on top of one another, creating structures known as grana. The thylakoids contain the chlorophyll. Label the grana in the diagram of the chloroplast below. The stroma is the liquid portion of the chloroplast. Label the stroma in the diagram.



1 = outer membrane, 2 = inner membrane, 3 = stroma, 4 = grana, 5 = thylakoid

## Leaf Adaptations for Photosynthesis:

Directions: Label each part of the leaf in the diagram below and use the spaces provided to describe the function of each part.

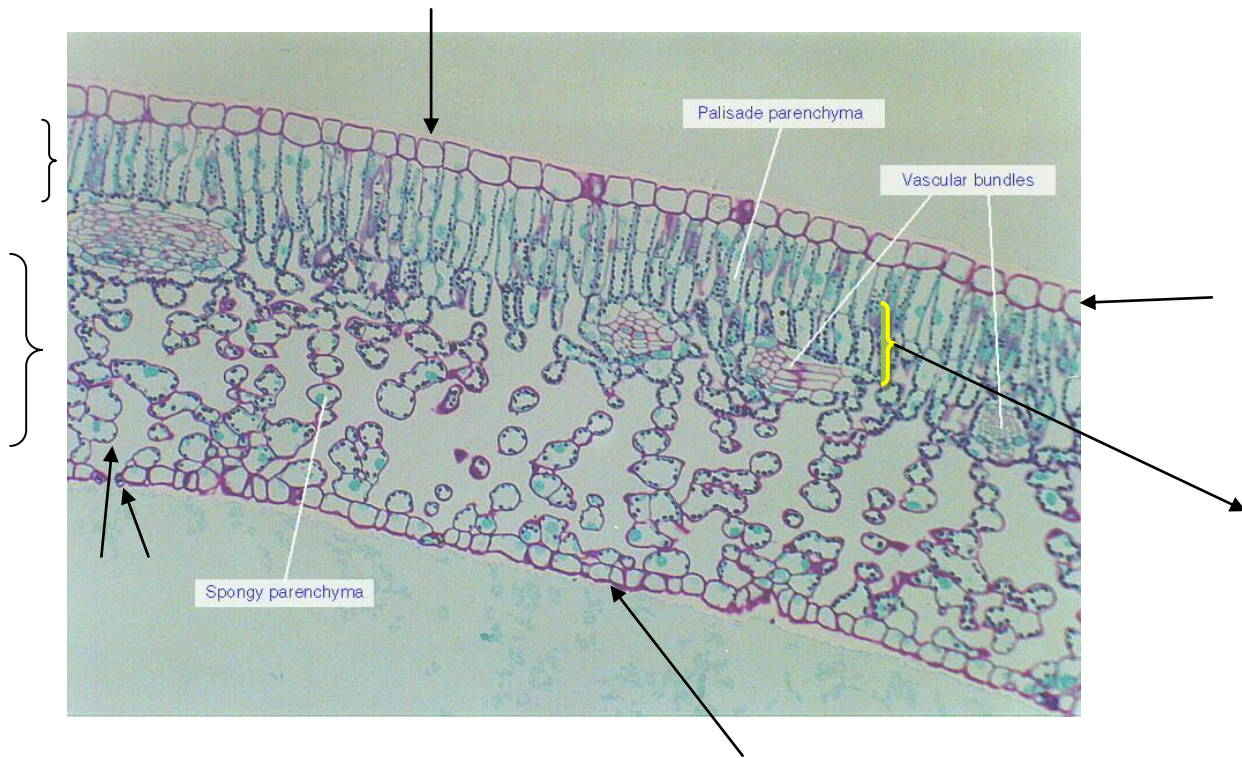


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Letter	Structure	Function
A	Upper epidermis	Transparent layer of cells that allows light through
B	Spongy layer	Consists of cells with air spaces through which gases pass

C	stomata	Opening typically in lower epidermis through which gas exchange occurs
D	Guard cells	Pair of cells found on each side of stomate and control if it is open or closed
E	Lower epidermis	Bottom layer of transparent cells on a leaf
F	Vascular bundle (xylem & phloem)	Xylem- transports water Phloem- transports food
G	chloroplast	Site of photosynthesis in plant cells
H	Palisade layer	Column-like cells found below the upper epidermis, contain the most chloroplasts and are therefore the location where the majority of photosynthesis takes place
I	Waxy cuticle	Waxy layer on top of upper epidermis, which keeps water in the leaf

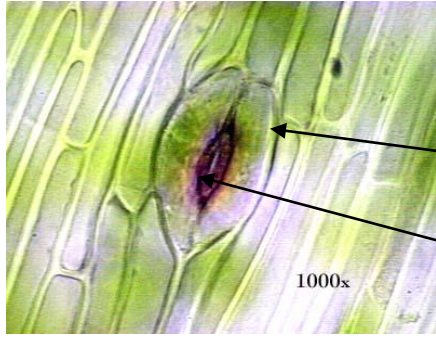
Directions: See if you can label parts A-I in the prepared slide of a leaf cross section shown below.



1= waxy cuticle, 2= upper epidermis, 3= Palisade layer, 4= chloroplasts, 5= spongy layer, 6= lower epidermis, 7= guard cell, 8= stomata, 9 = vascular bundle

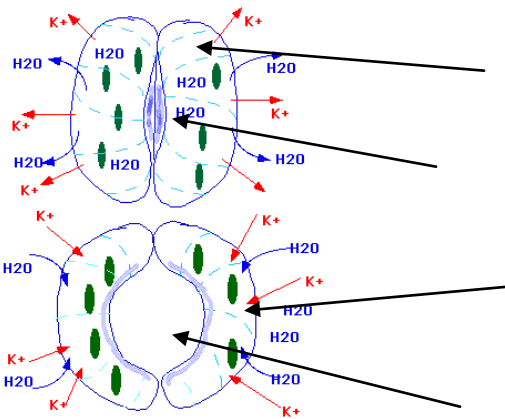
### Leaf Adaptations for Gas Exchange

Leaves contain structures known as guard cells, mainly in the lower epidermis. These paired structures work together to regulate the opening known as the stomate (stomata plural). Through this stomate, gases such as water vapor, carbon dioxide and oxygen can pass in and out. The guard cells only allow the stomate to be open when gases need to be exchanged. Below are different pictures illustrating guard cells and stomata.



top arrow = guard cell

Center = stoma



top picture is a closed stoma, while the bottom is an open stoma

Questions:

1. How do guard cells help maintain homeostasis in a leaf?  
Guard cells regulate gas exchange (control what gases enter and exit leaf)
2. Which gases would need to enter the leaf for photosynthesis to occur?  
Water and carbon dioxide enter through the stomata to be used in photosynthesis
3. Which gases would exit the stomata after photosynthesis has occurred?  
Oxygen would exit the stomata as a product of photosynthesis

