

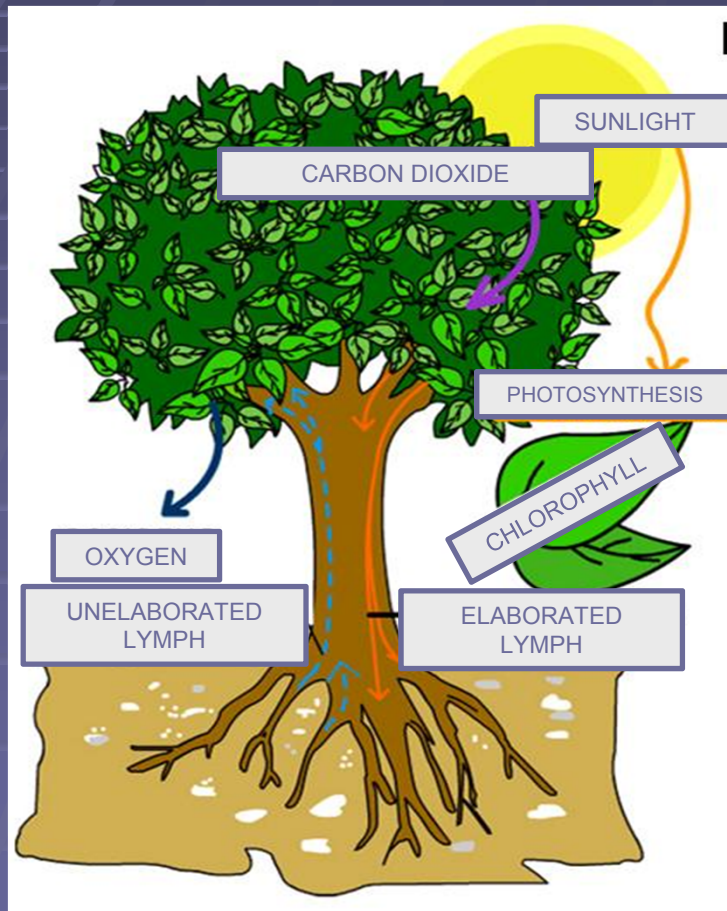
**U.D. CHLOROPHYLLOUS  
PHOTOSYNTHESIS  
ERASMUS PLUS PROJET  
CHEMISTRY & BIOLOGY  
2015/17**

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**ENGLISH TEACHER:**  
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**CLASS: III A**

# CHLOROPHYLLOUS PHOTOSYNTHESIS



## PREREQUISITES:

Difference in the structure and function of animal and vegetable cells.

Inorganic and organic substances.

Structure of the atom, knowledge of the symbols of chemical elements, valences and the formation of inorganic compounds.

## SPECIFIC OBJECTIVES:

Knowing which are the main stages of the photosynthetic process.

## OPERATIVE OBJECTIVES:

Recognizing what conditions consent photosynthesis with simple experiments.

## TIME:

Four hours.

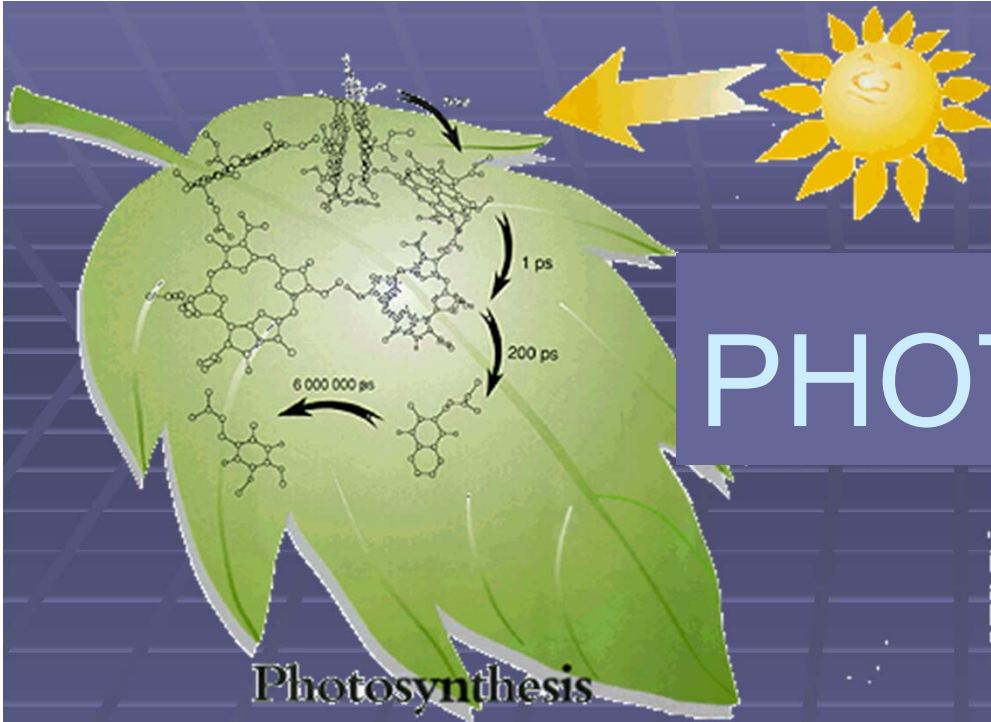
## Methods:

-Before beginning laboratory activities, we deem it necessary, in order to obtain the prefixed goals, to conduct a traditional classroom lesson and then to proceed Cooperative Learning to stimulate the curiosity, interest and attention of students.

## -Instruments:

Blackboard, illuminating blackboard, computer, illustrated text, laboratory equipment.

- Verification:
- Written tests (Multiple choice, true or false, etc.)
- Quizzes, classwork, conceptual maps.
- Grading:
- Grading will take into account students' initial levels, learning rhythm and student potential.

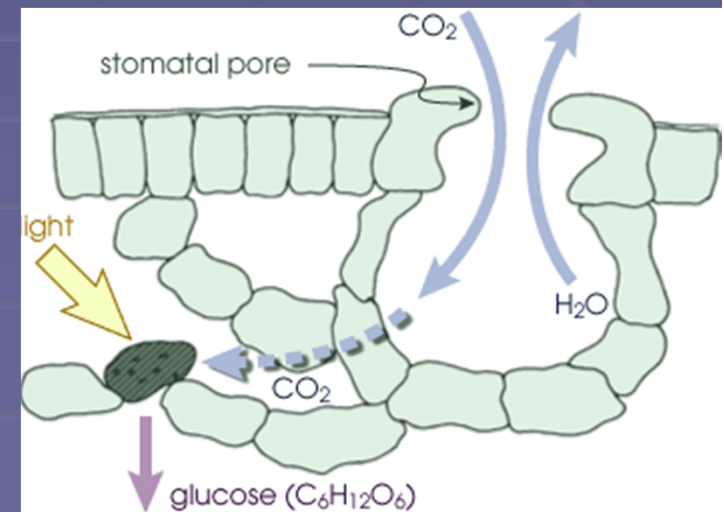
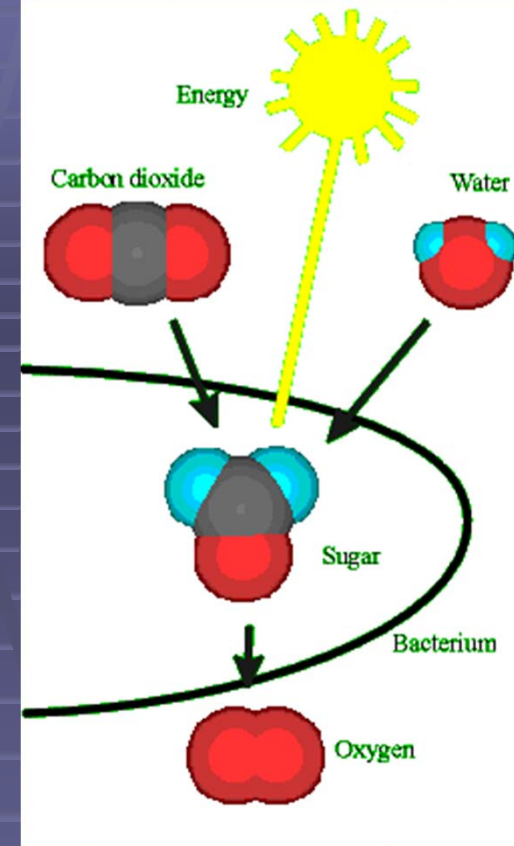


# PHOTOSYNTHESIS

The synthesis of organic compounds of carbon via photoautotrophic organisms.

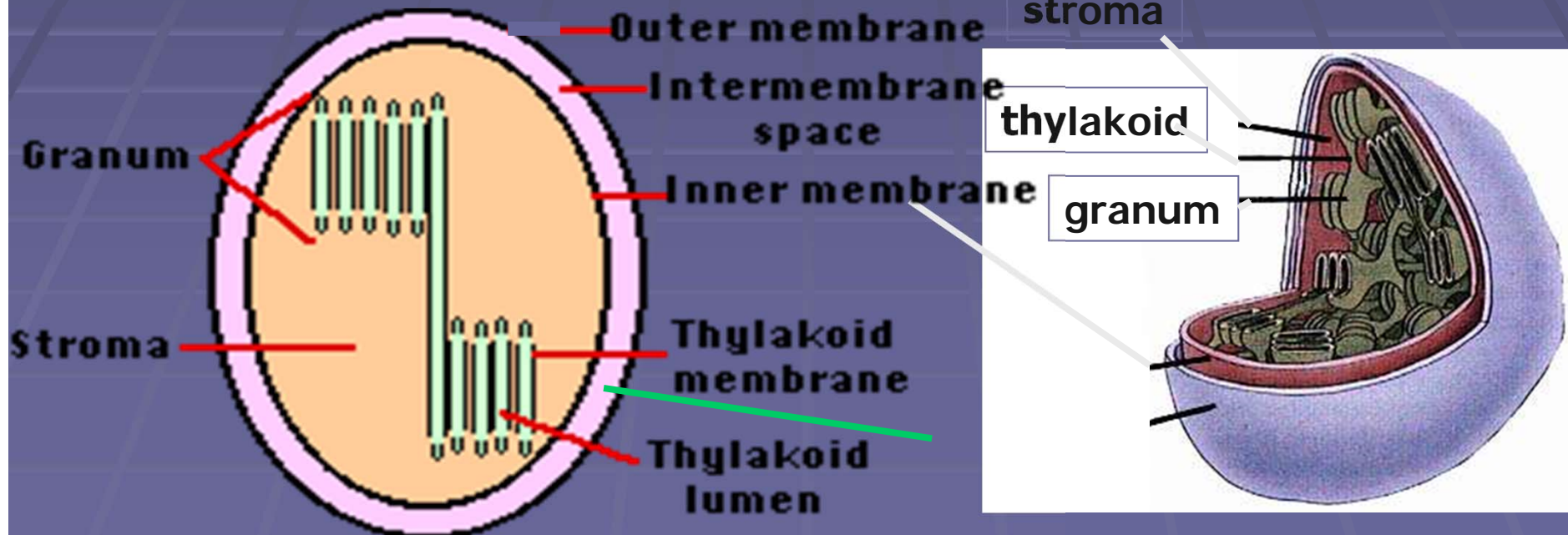
# THE ROLE OF LIGHT

- Solar energy is utilized to decompose molecules of water.
- Hydrogen atoms (divided into  $H^+$  ions and  $e^-$  electrons) are used to reduce the carbon in  $CO_2$ .
- Loaded onto temporary transporters, (NADP), they participate in the Calvin Cycle and glucose becomes synthesized.

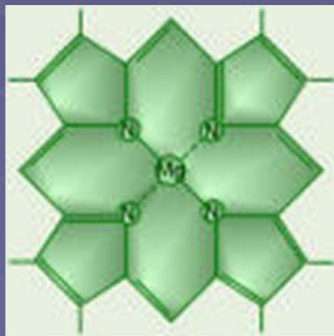
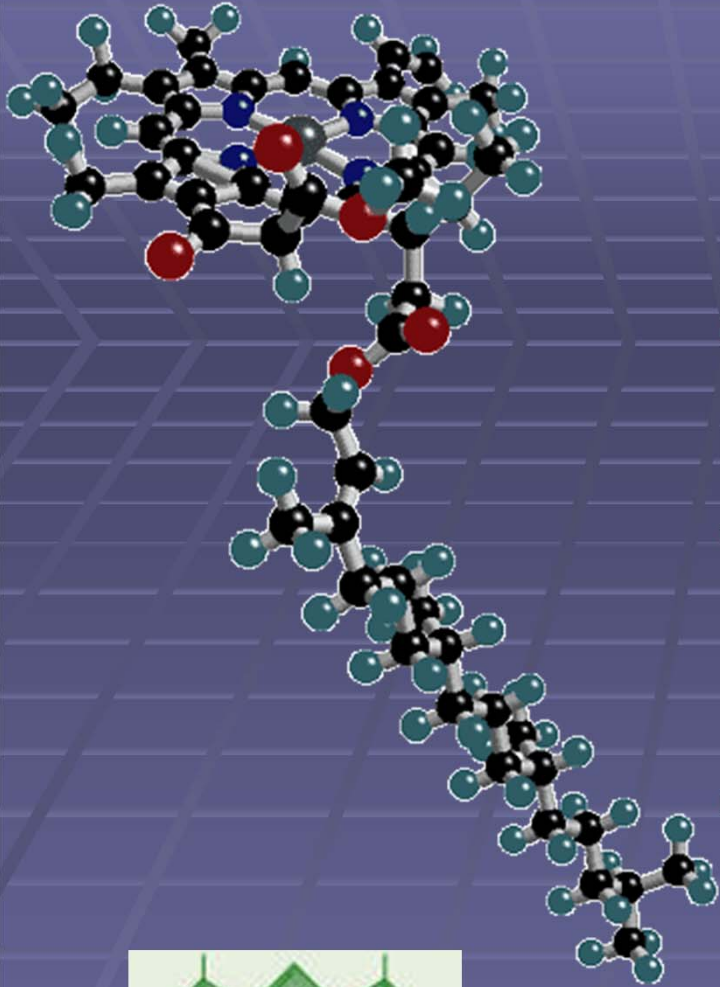


# PHOTOSYNTHESIS IN SHORT

- The process that occurs in chloroplasts, divided into two phases:
- **LUMINOUS PHASE** - Solar energy is necessary in order to promote it and chlorophyll molecules are needed to transform the solar energy into “electrical” energy.
- **DARK PHASE** - It occurs in the inside of a chloroplast (in structures called **GRAINS**). It does not need solar energy and it transforms “electrical” energy into chemical energy, that is, the energy contained in the bonds deriving from the carbon in CO<sub>2</sub> and the hydrogen taken from water molecules.



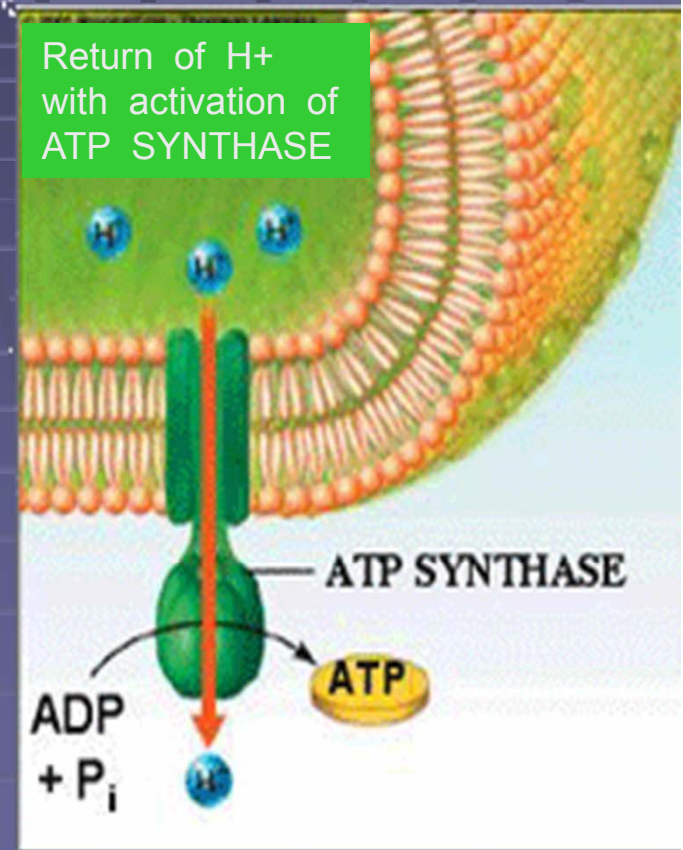
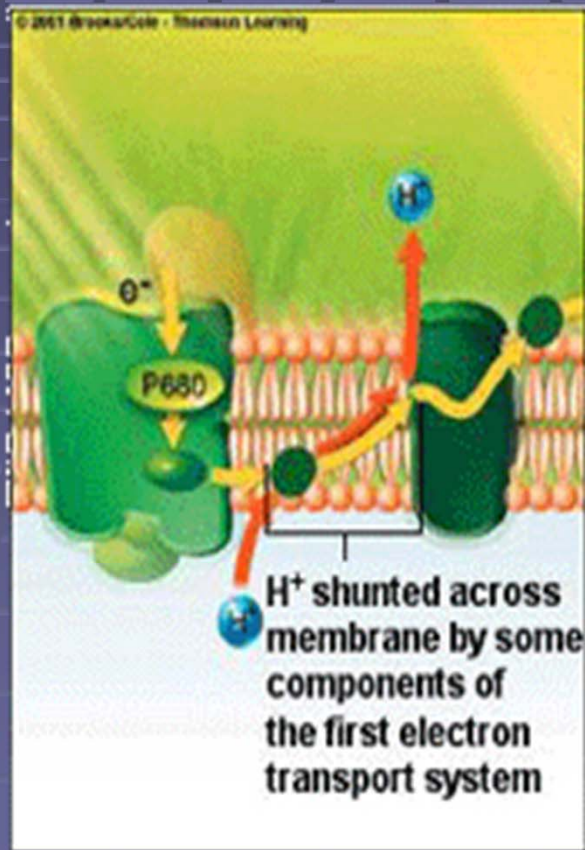
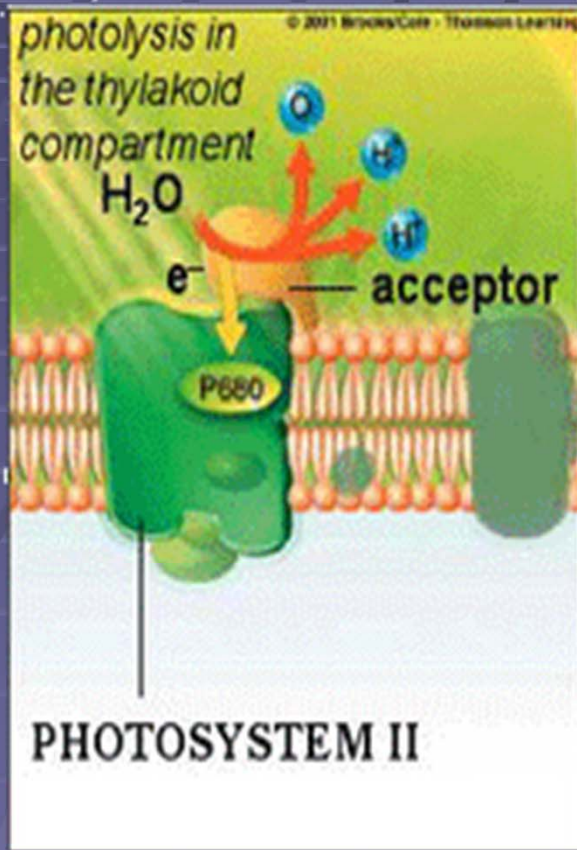
# CHLOROPHYLL



- A chlorophyll molecule has a ring, in the center of which there is a magnesium atom (Mg).
- Chlorophyll absorbs electromagnetic waves 660 nm. long (yellow-red) and 430 nm. long (blue-violet) and reflects the color green.
- A certain amount of chlorophyll molecules are involved in PHOTOSYSTEMS.
- Besides chlorophyll, there are other pigments such as CAROTENOIDS, which absorb blue and green and PHILOCYANINES, which absorb green and yellow.

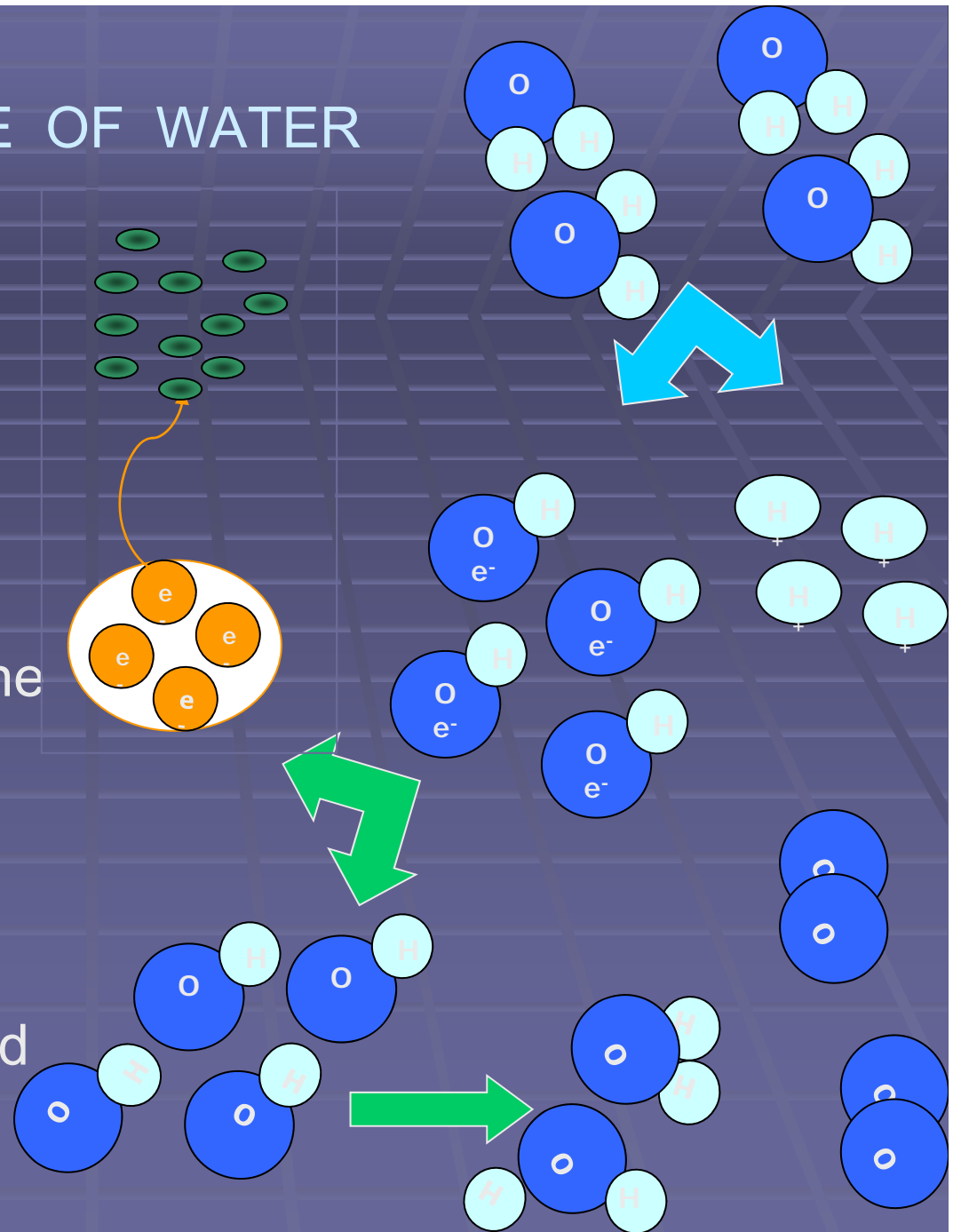


# LUMINOUS PHASE: MECHANISM



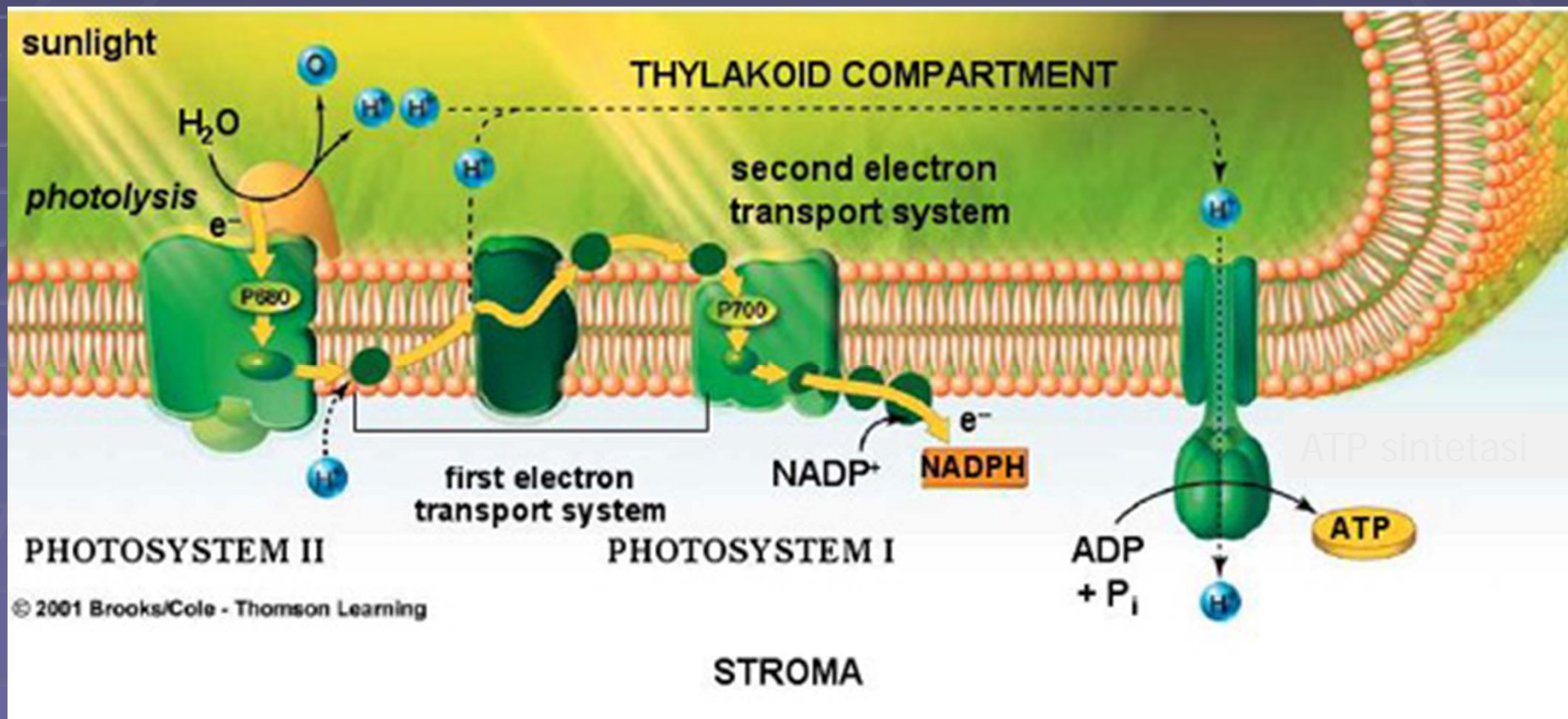
# PHOTOLYSIS: THE ROLE OF WATER

- Some water molecules become dissociated in hydroxyl ions  $\text{OH}^-$  and in  $\text{H}^+$  ions, or protons.
- A protein separates electrons from  $\text{OH}^-$  ions.
- The electrons recharge the II photosystem .
- The  $\text{OH}$  radicals, being unstable, react among each other and
- Yield water molecules and
- OXYGEN  $\text{O}_2$

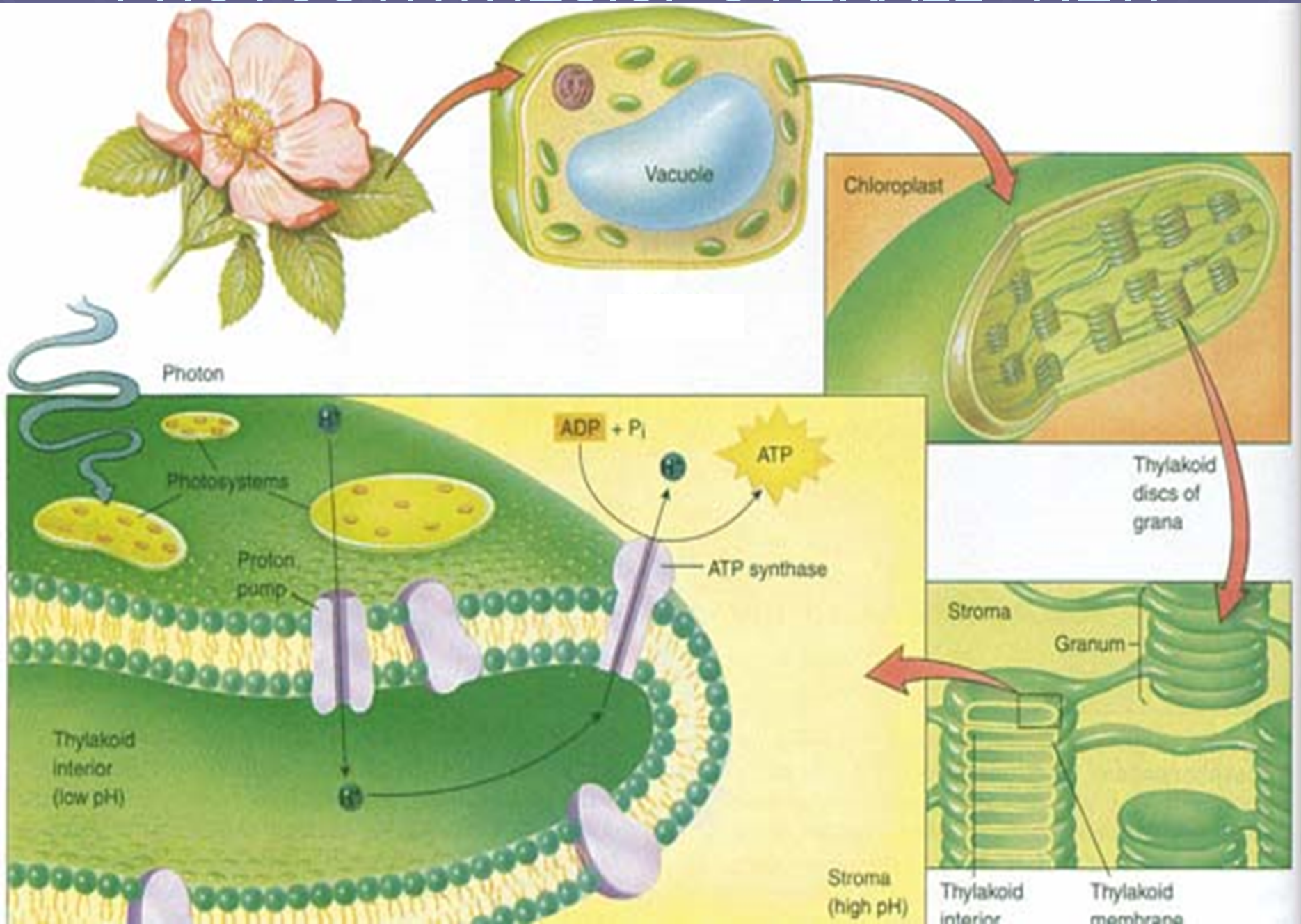


# SUMMARY OF LUMINOUS PHASE

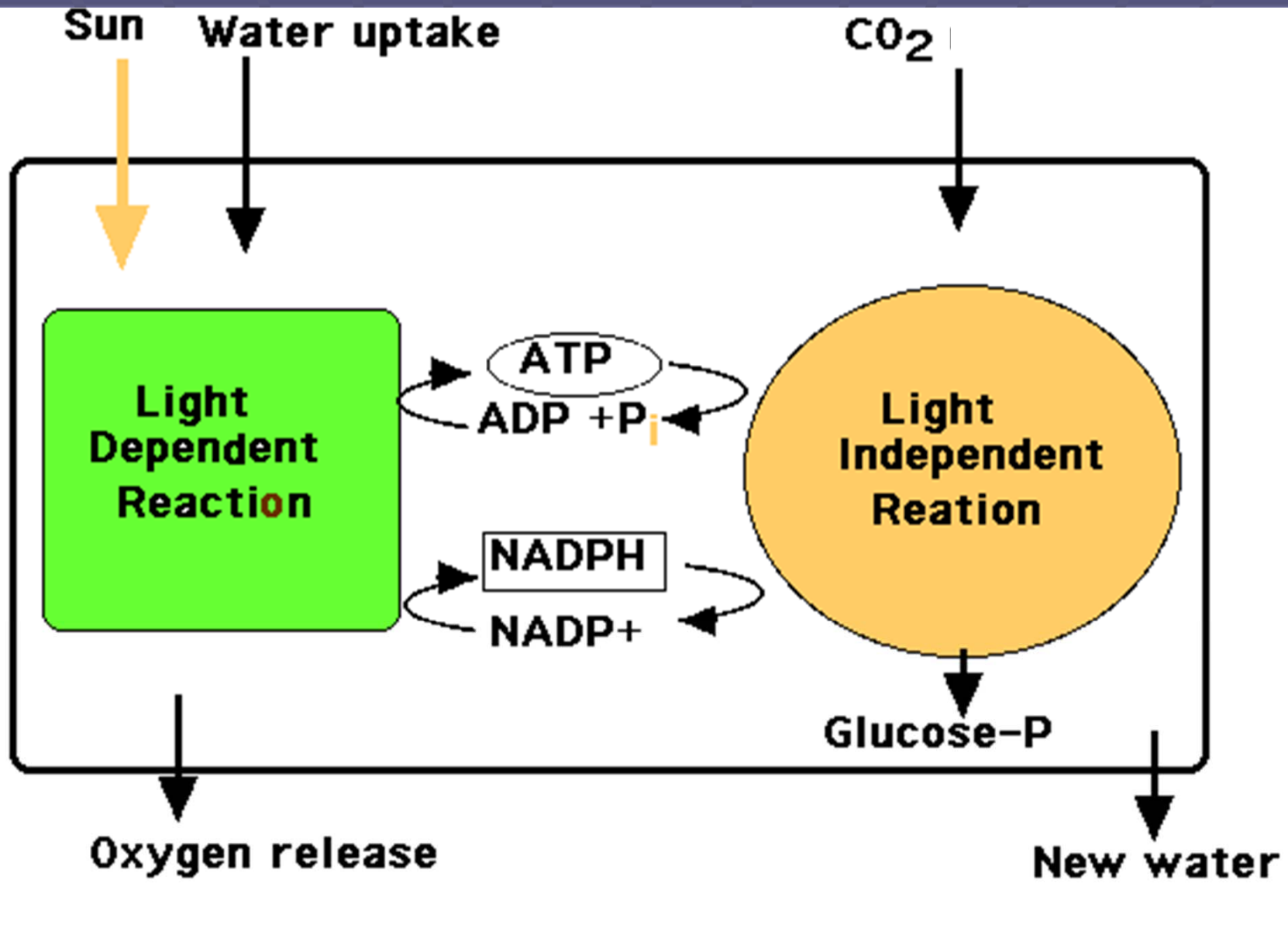
LUMINOUS ENERGY is transformed firstly in “electrical” energy (displacement of charged particles, electrons and  $H^+$  extracted from water) and then into CHEMICAL ENERGY ( A phosphate group is bonded to the ADP to give ATP).



# PHOTOSYNTHESIS: OVERALL VIEW



# LUMINOUS PHASE AND DARK PHASE



### EXPERIMENT 1: CAN PLANTS LIVE WITHOUT WATER, AIR AND LIGHT?

Let us take four bean plants and create a different situation for each:

1. One is watered and kept in light.
2. One is put into a glass jar (absence of air).
3. One is not watered (absence of water).
4. One is kept in the dark (absence of light).

After a week, let us compare the plants.

It is evident that the first plant has grown much better than the other three.

Conclusion: PLANTS GROW WELL IF THEY ARE SUPPLIED WITH WATER, AIR AND LIGHT, WHICH ARE THE INGREDIENTS OF CHLOROPHYLLOUS PHOTOSYNTHESIS.

