

Where does Photosynthesis takes place in the leaf?



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NUTRITION

- Food Supplying System

CHAPTER AT A GLANCE

- ◆ Nutrition in autotrophs
- ◆ Photosynthesis- Definition importance
- ◆ Materials needed for photosynthesis
Water
Air-(Joseph priestly Experiment)
CO₂-Essential-Mohl half leaf experiment
Light – Essential –Ingenhousz experiment
- ◆ **Lab activities:**
 1. O₂ is released in the photosynthesis
 2. Importance of light in producing carbohydrate
 3. Essentiality of chlorophyll – Pelletier, & caventou
 4. Starch test in leaf – Experiment
- ◆ **Where does Photosynthesis takes place in the leaf.**
 1. Anatomy of leaves, (T.S. of leaf)
 2. Structure of chloroplast
- ◆ **Mechanism of photosynthesis**
 1. Light reaction, I, II, III steps..
Photolysis, splitting of water molecule, O₂ released
 2. Dark reaction
 3. CO₂-NADP+ATP – Glucose
- ◆ **Nutrition in Heterotrophs**
- ◆ **How do organism obtain their food**
Ex: Paramecium, Amoeba.
- ◆ **Parasitic nutrition in Cuscuta.**
- ◆ **Digestive system in Human**
 1. Digestive system-organs and glands.
 2. Test with litmus paper (Saliva)
 3. Digestive tract – Health concepts
- ◆ **Malnutrition – diseases**
 1. Kwashiorkor;
 2. Marasmus; 3. Obesity;
 4. Vitamin deficiency diseases
- ◆ Type of vitamins ◆ deficiency diseases

KEY WORDS

1. **Alimentary canal:** In the human digestive system, it is a long tube like structure which extends from mouth to anus
2. **Amylase:** A digestive enzyme secreted in alimentary canal. It is called salivary amylase or ptyalin present in saliva. It is also present in pancreatic juice. It converts complex carbohydrate to simple ones.
3. **Bile juice:** Secreted by liver. Though there are no enzymes in it helps in emulsification of fats.
4. **Cellulose:** A complex carbonic compound stored in the plants. It is made of thousands of glucose molecules.
5. **Chloroplast:** A unique three membranous structure only present in plant cells. Photosynthesis is done in chloroplasts in the name of light reaction and dark reactions which lead to the synthesis of glucose (starch).
6. **Chyme:** A soft slimy substance formed during digestion process in stomach. The proteins and carbohydrates are broken



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down into small molecules and form it.

7. **Dark reaction:** This is the second and Bio-Synthetic phase of photosynthesis. Glucose will be synthesized by consuming CO₂ and by utilizing the energy of ATP+NADPH in this reaction. This occurs in the absence of light.
8. **Digestion:** The breaking down of complex food material, into simple food material with the help of enzymes, to get absorbed in the body is called digestion.
9. **Emulsification:** The process in which fat materials are broken down into small globule like forms by the action of bile juice secreted from liver.
10. **Enzymes:** These are catalytic chemical substances. These are secreted by digestive glands and help in the process of digestion.
11. **Glucose:** Glucose is a simple carbohydrate. We obtain glucose (C₆H₁₂O₆) through our diet. Glucose gives us energy.
12. **Grana:** Membrane of chloroplast showing stacked sac like structures. These are thylakoid stacks. Here light reaction takes place.
13. **Haustoria:** The root like structures of cuscuta plant that penetrate the tissue of a host water and nutrients are drawn through these.
14. **Heterotrophic nutrition:** The method in which some organisms acquire food by depending on others.
15. **Light reaction:** This is Photochemical phase of photo synthesis. In this reaction events like splitting of water molecule and formation of ATP and NADPH occur by absorbing Photons. For this light is essential.
16. **Lipase:** The enzyme secreted by stomach and pancreas. It converts fats into fatty acids and glycerol
17. **Liver:** The biggest digestive gland. It performs so many functions. It secretes bile which helps in emulsification of fats. Its special function is to store Glucose in the form of Glycogen.
18. **Pancreas:** The most important digestive gland, located near the curve of duodenum. It secretes Trypsin, Lipase, Amylase etc.
19. **Parasitic nutrition:** Obtaining food (nutrients) from animals or plants without doing any harm to them **Eg:** Dodder plant.
20. **Pepsin:** The enzyme present in gastric juice. It breaks down proteins into peptones.
21. **Peristaltic Movement:** The wave like movements that occur in different parts of alimentary canal. These are involuntary movements.
22. **Salivary glands:** These are the three pairs of digestive glands present in the oral cavity. These secrete Salivary Amylase (ptyalin)

which converts complex carbohydrates to simple carbohydrates.

23. **Sphincter:** Ring like muscular structures present at different parts of the alimentary canal **Ex:** Sphincter at the end of stomach, anus etc..
24. **Starch:** It is a form of carbohydrate. It is synthesised by the process of Photo synthesis.
25. **Stroma:** Colourless part of chloroplast is called stroma. Dark phase of Photosynthesis takes place in stroma.

All the Organisms perform some basic functions to keep themselves alive. These basic functions are called Life Process. Nutrition is defined as the process by which an organism gets food which is utilized for the provision of energy and things for its life sustaining activities.

Plants and animals do not obtain food by the same process, organisms differ in autotrophic and heterotrophic nutrition. Autotrophic Nutrition involves the intake of simple, inorganic materials, water as well as some gases from the air and an external energy source like the sun to synthesize complex high energy organic material. Photosynthesis is a process by which green plants having chlorophyll, synthesis the carbohydrates from the simple materials water and Carbon dioxide using the energy of sunlight.

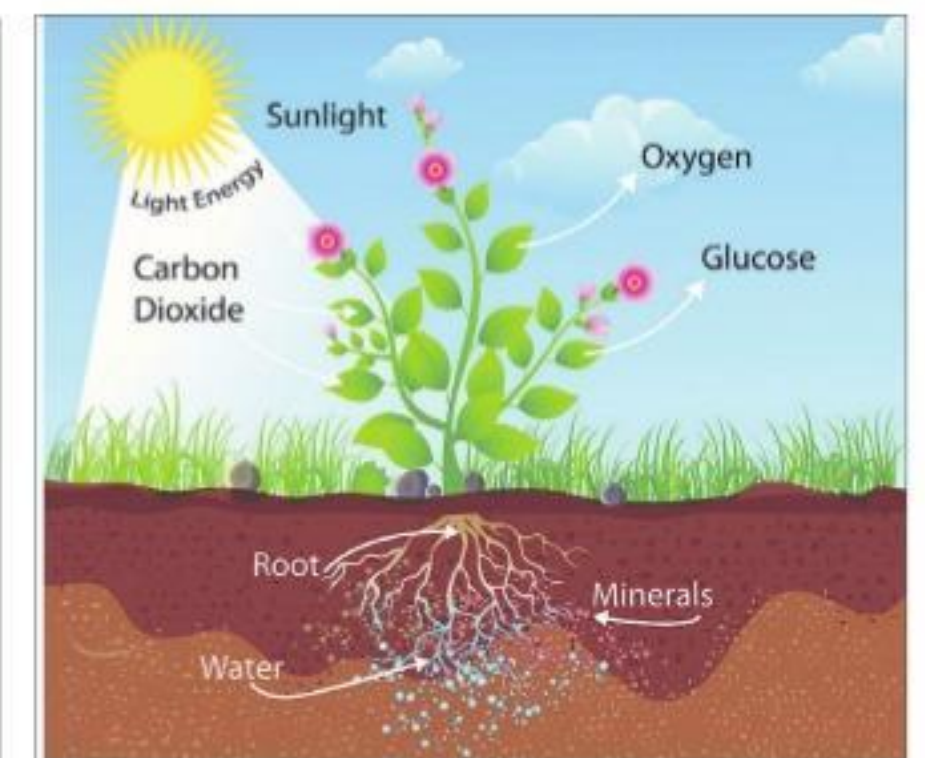
- ◆ Chloroplasts are the main sites of Photosynthesis.
- ◆ Photosynthesis requires two types of factors CO₂, water, sunlight, Chlorophyll.

Mechanism of Photosynthesis

There are two main stages in the entire process of Photosynthesis. The first stage is dependent on light. The other stage does not require light.

During these two stages the following events occur..

1. Light energy is first absorbed by chlorophyll molecule found inside the chloroplasts.
 2. The absorbed energy causes splitting water molecules into Hydrogen and Oxygen.
 3. Finally, CO₂ is utilised and formulated carbohydrate as the end product of Photosynthesis.
- ◆ In light reaction, the chlorophyll molecules absorb light energy, its electrons get excited and are displaced a span of time of this state. The energy transfers of the electrons are responsible for the formation of oxygen.
 - ◆ The energy is used in splitting the water molecule into two component ions named H⁺, OH⁻.
H₂O → H⁺ + OH⁻ + O₂
This process is called Photolysis.
OH⁻ ions through a series of steps produce water and oxygen.
ATP, NADPH are formed at the end of the light reaction.
 - ◆ In Dark reaction, the presence of light as well as in the absence of light in the stroma region of the chloroplast CO₂ is used to synthesis sugars. The ATP and NADPH are utilized to form glucose, this was invented by Melvin Calvin.



How organisms obtain Nutrition?

Different organisms obtain food in different ways. Amoeba takes in complex organic matter as food. It identifies and enclose the food by projection of cytoplasm are called pseudopodia. In paramecium also food is ingested through a special opening the cytostome.

Parasitism in Plants

- ◆ Cuscuta is a parasitic plant. It has no chlorophyll and cannot make its own food by photosynthesis. It grows on other plants, using their nutrients for its growth and weakening the host plant. The dodder produces haustoria that insert themselves into the vascular system of the host.

Human Digestive System

- ◆ Human digestive system is very complex in nature. Different parts are involved and perform different functions by using various digestive juices and enzymes. The Alimentary canal is basically a tube extending from the mouth to the anus.

Digestive process

- ◆ Ingestion, Digestion, Absorption-Assimilation, Elimination are the basic stages in digestive process. Digestion begins with the chewing of food by the teeth and is continued through muscular mixing of food by the stomach and intestine. The chemical digestion begins in the mouth with salivary amylase is saliva splitting complex carbohydrates into simple maltose. The gastric juice, pancreatic juice, bile, intestinal juices are participated in digestion.

Malnutrition:

- ◆ Malnutrition actually means badly nourished. The condition that results from eating a diet in which nutrients are either not enough or are too much. Kwashiorkor, Marasmus are caused by under nutrition, obesity is caused by over nutrition.

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