PHOTOSYNTHESIS

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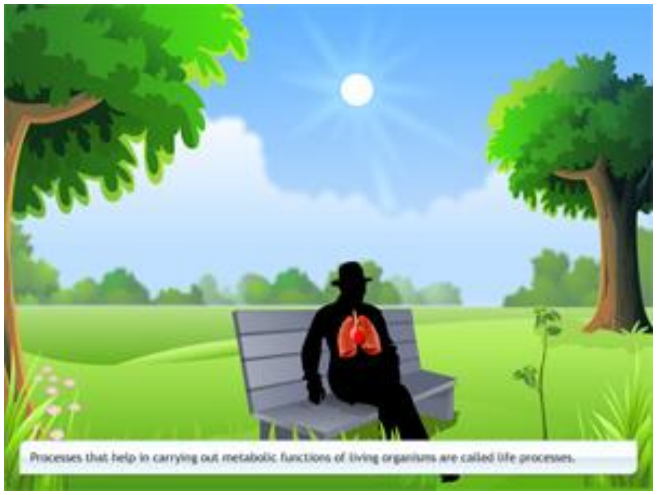
Life Processes are the basic functions performed by living organisms to maintain their life on this earth. Nutrition is the process by which the organisms can assimilate and utilize the food for their basic needs. Autotrophs are the organisms which can synthesize their own food. Autotrophic Nutrition is the process in which the green plants and certain bacteria can synthesize their own food for basic needs. Heterotrophs are the organisms like animals and non-green plants which can depend on other organisms for their food. Heterotrophic Nutrition is the process in which herbivores and consumers depend on others for food and utilize the food for their basic
needs. Photosynthesis is the synthesis of food by plants using light. Stomata are small pores present on the surface of leaves and green parts of plant. Opening and closing of stomata are controlled by guard cells. Plastids with chlorophyll pigments
are chloroplasts. Thylakoids are round sacs in stroma. The stacks of thylakoids are grana. Matrix of chloroplast is stroma. Green pigments in chloroplast are called chlorophyll. ATP: Adenosine Tri Phosphate, an energy form.
NADP: Nicotinamide Adenine Dinucleotide.
NADPH: Nicotinamide Adenine Dinucleotide Phosphate.
Light reaction occurs in grana of chloroplast. Dark reaction occurs in stroma of chloroplast.

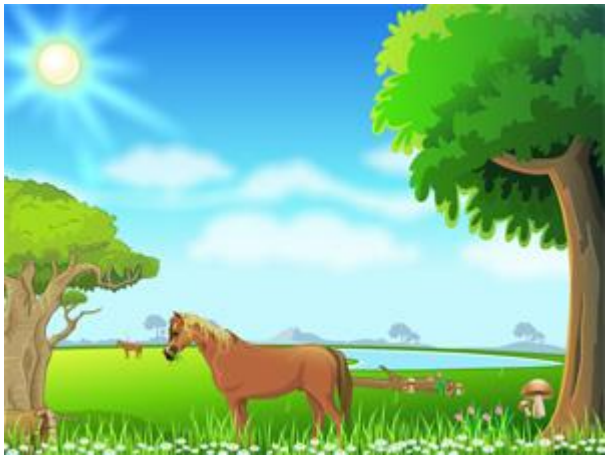
The processes that help carry out metabolic functions, such as respiration, digestion, excretion, circulation or transport, and reproduction, are collectively called life processes.



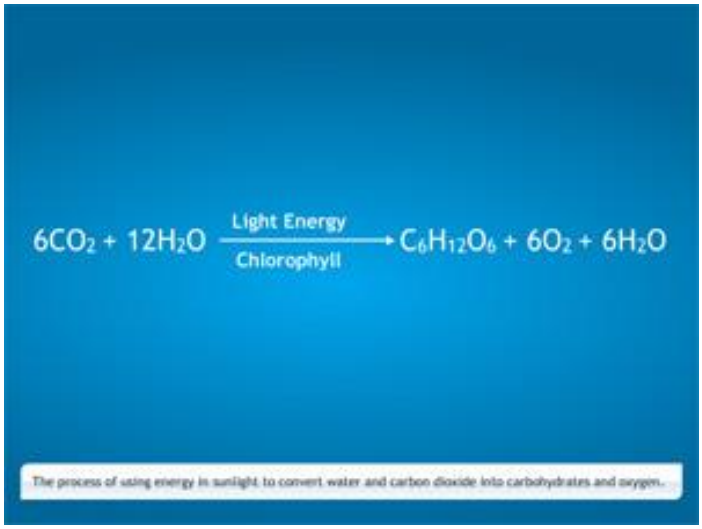
Nutrition is the process by which organisms can assimilate and utilise food for their basic needs.

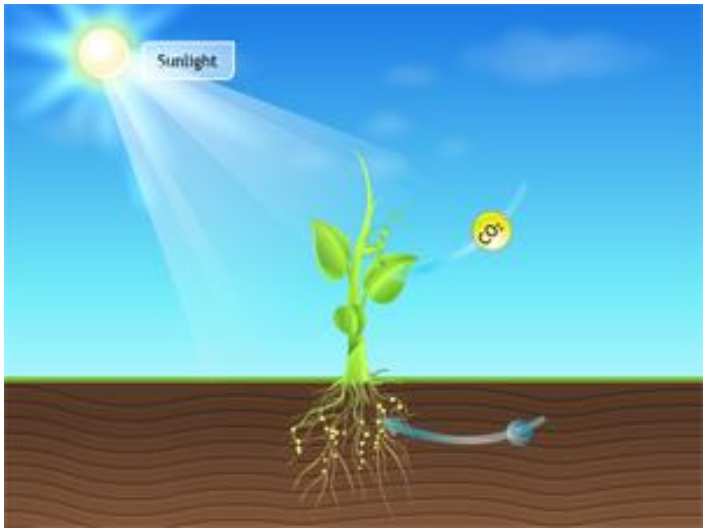
Autotrophs are organisms such as plants and some bacteria that can synthesise their own food. This type of nutrition is known as autotrophic nutrition.

Heterotrophs are organisms like animals and non-green plants that depend on other organisms for food, and utilise this food for their basic needs. This type of nutrition is known as heterotrophic nutrition.

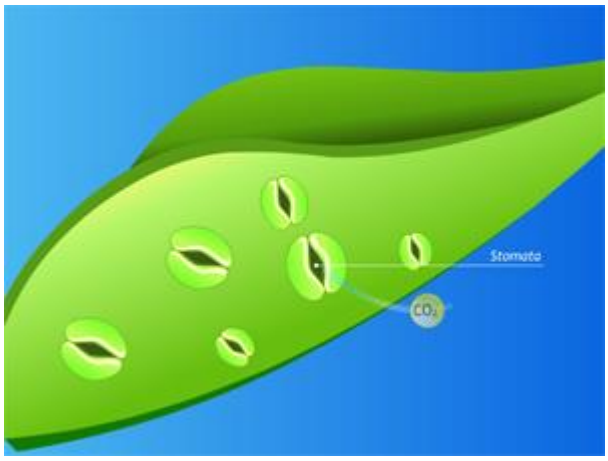


Plants synthesise organic nutrients with the help of chlorophyll, atmospheric carbon dioxide, water and solar energy. This process is known as photosynthesis.

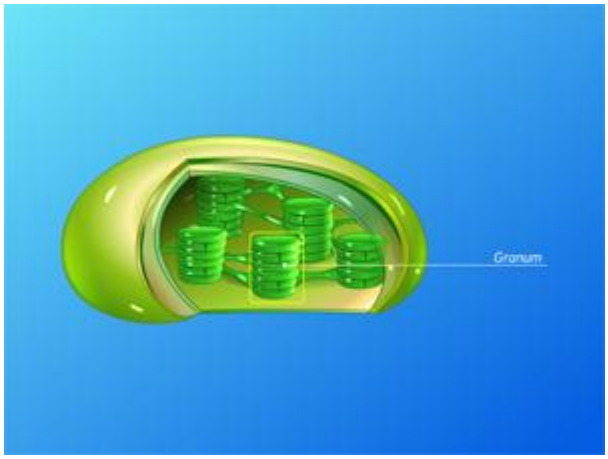


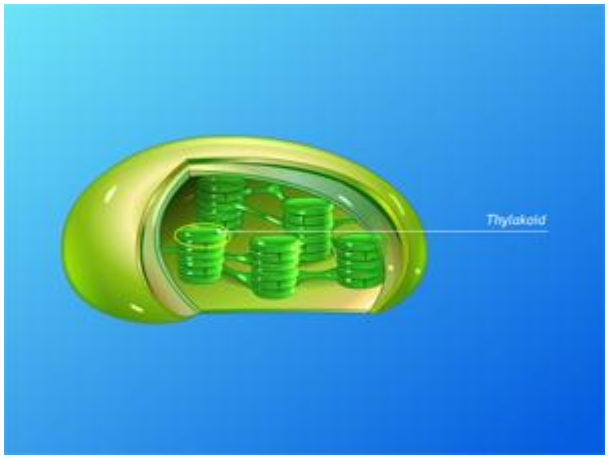


Leaves have tiny pores on their surface, called stomata. The stomata contain guard cells that regulate the opening and closing of the stomata. They are opened only when the plant needs carbon dioxide for photosynthesis.

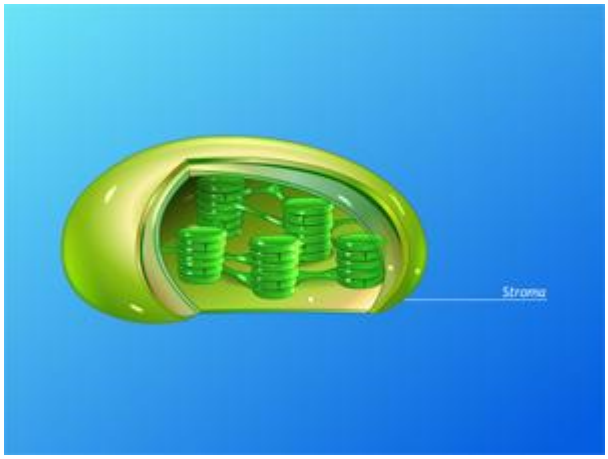


The chloroplasts in leaves contain closely packed flattened sacs, called thylakoids, arranged in piles, called granum.

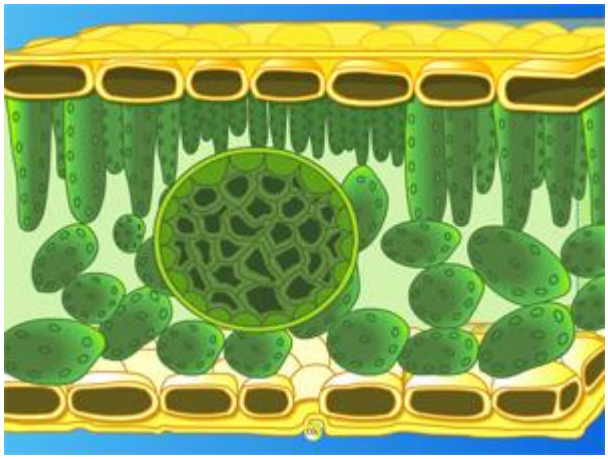




Granum lies in a colourless ground substance, called stroma.

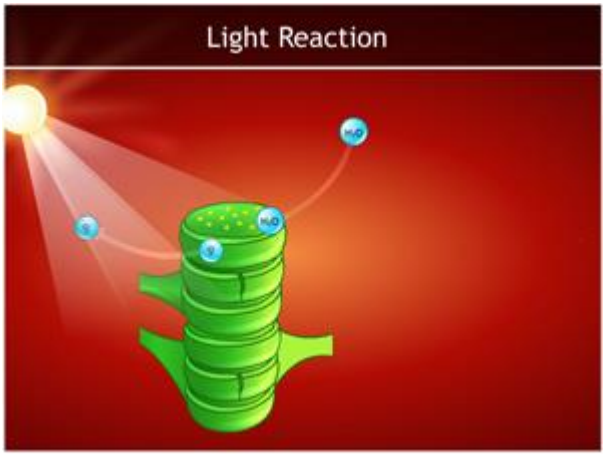


Thylakoids contain green pigments, called chlorophyll, which trap solar energy.

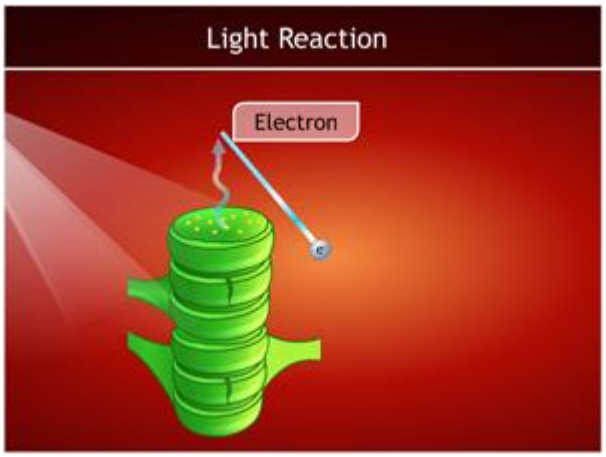


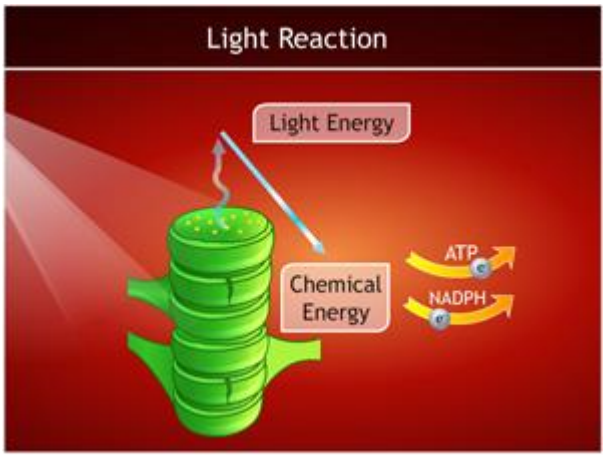
Photosynthesis involves a series of photochemical reactions in two phases: Light reactions and dark reactions.

Light reaction occurs in the grana of the chloroplasts. Using light energy, water molecules split to release oxygen.

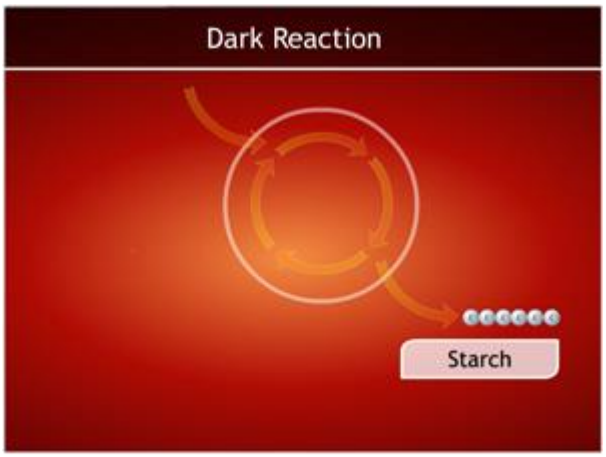


The chlorophyll pigments trap light energy and excite an electron. This excited electron converts light energy into chemical energy. This chemical energy is stored as ATP (Adenosine Tri Phosphate) and NADPH (Nicotinamide Adenine Dinucleotide Phosphate).





Dark reaction takes place in the stroma of the chloroplasts by reducing carbon dioxide to carbohydrates, utilising energy from ATP.



BIOGEOCHEMICAL CYCLES

Cycling of chemicals between biological and geological world is called biogeochemical cycle. Four biogeochemical cycles include water cycle, nitrogen cycle, carbon cycle and oxygen cycle. Water enters the atmosphere as water vapour by evaporation. Water from plants evaporates as vapour into the atmosphere through transpiration. Water vapour in the atmosphere form clouds, called condensation. Clouds break into rain, snow or fog, called precipitation. Photosynthesis with respect to carbon cycle: Plant use sunlight, carbon dioxide in the atmosphere to form carbohydrates. Respiration with respect to carbon cycle: Plants and animals breakdown carbohydrates for energy and release of carbon dioxide. Decomposition with respect to carbon cycle: Bacteria and fungi decay dead plants and animals releasing carbon dioxide. Combustion with respect to carbon cycle: Burning of fossil fuels release carbon dioxide into the atmosphere. Types of nitrogen fixation include both biological nitrogen fixation and physical nitrogen fixation. Bacteria in the soil decompose the organic matter into ammonia, called ammonification. Bacteria in the soil convert ammonia to nitrate, called nitrification. Denitrifying bacteria convert nitrite and nitrate to nitrogen, called denitrification.

Respiration and Combustion with Respect to Oxygen Cycle:

Plants and animals use atmospheric oxygen during respiration and oxygen is used for burning of fossil fuels. Temperature inside a glass house is much higher than the surroundings, such enclosures are called greenhouse. Carbon dioxide trap the heat and thereby increase the temperature on earth, called the greenhouse effect. Ozone absorbs harmful ultraviolet radiations from the Sun. ozone layer is depleting due to an increase in chlorofluorocarbons.

The biotic and abiotic components of the biosphere constantly interact through biogeochemical cycles.

During these interactions, there is a transfer of
nutrients between living organisms, or bio, and the non-living environment, or geo.
Water evaporates from the water bodies, and returns
as rain and snow, which, in turn, flows back into the seas via rivers. This cyclic movement of water from the land to the ocean to the atmosphere and back to the land is called the water cycle.

Water from plants evaporates as vapour into the atmosphere through the stoma in the leaves and stems.

Water is maintained in the biosphere by rainwater flowing back into the water bodies. Some of it penetrates the earth's surface and is logged as groundwater.
Carbon Cycle Decomposition: Dead plant and animal remains in the soil are converted into coal, petroleum and natural gas, better known as fossil fuels. These fuels are used for cooking, transportation and industrial processes.
Nitrogen makes up 78 per cent of the earth’s atmosphere. Nitrogen is an essential constituent of proteins, nucleic acids like DNA and RNA, vitamins, and chlorophyll.

Legumes have nitrogen-fixing bacteria in their root nodules. These bacteria convert atmospheric nitrogen into ammonia, which is utilised readily by plants.

Nitrogen-fixing bacteria along with free living bacteria in the soil achieve 90 per cent of nitrogen fixation.

When lightning occurs, the high temperature and pressure makes nitrogen and water combine to form nitrates and nitrites. These compounds dissolve in water and are readily used by plants.

The sequence in which nitrogen passes from the atmosphere to the soil and organisms, and then is eventually released back into the atmosphere, is called the nitrogen cycle.

Oxygen makes up 21 per cent of the air, and is an essential constituent of carbohydrates, proteins, fats and nucleic acids.

Oxygen is found in air, in combined form as carbon dioxide, and in the earth's crust as carbonates, sulphates and nitrates.

The sequence in which oxygen from the atmosphere is used by organisms and eventually released back into the atmosphere through photosynthesis is called the oxygen cycle.

The ozone layer prevents harmful radiations from reaching the earth's surface, where they might damage life forms.