



ACADEMIC WORLD SCHOOL™
BEMETARA

Class- VII

Subject- Science

1

Nutrition in Plants

Let us Learn about

- Modes of nutrition in plants
- Replenishing nutrients in the soil



Previous Connect

Green plants are living things present on the earth that can prepare their own food by the process of photosynthesis. They are called producers. All animals including humans depend on green plants directly or indirectly for food and are called consumers.

All living things require energy to stay alive and to carry out various life processes. Food provides energy. Plants also need food to grow like other living organisms. (The process by which an organism takes in food, uses it for its growth and utilizes it to perform other **vital** activities is called **nutrition**.) Components of food such as carbohydrates, proteins, fats, vitamins and minerals are called nutrients. You know that plants can prepare their own food. Animals and human beings cannot do so; they obtain food from plants or animals. In this chapter, we will learn how nutrition takes place in plants.

MODES OF NUTRITION IN PLANTS

Green plants are the living organisms, which can prepare their own food with the help of sunlight but there are some plants, which get their food by other means. Thus, there are two modes of nutrition in plants as shown in the flow chart given below:



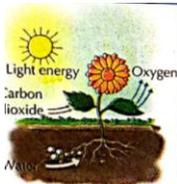
vital: absolutely necessary

FACT FILE

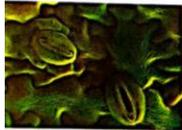
Charles Reid Barnes coined the term 'photosynthesis'.



1



Process of photosynthesis

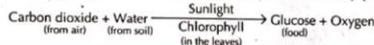


Enlarged view of a closed and an open stoma (plural - stomata)

Autotrophic Nutrition

This is the mode of nutrition in which living organisms prepare their own food. Such organisms are called **autotrophs** ('auto' - self; 'trophe' - feeding).

- Green plants prepare their own food by the process of **photosynthesis** ('photo' - light; 'synthesis', to combine). A pigment, called chlorophyll, is responsible for the green colour of leaves. Chlorophyll traps the sunlight.
- To carry out photosynthesis, plants need carbon dioxide, water and sunlight. This process takes place usually in a leaf or in other green parts like stem as in cactus.
- Carbon dioxide enters the leaves through small openings called **stomata**, that are usually present on the underside of the leaves.
- Water, which is absorbed by the roots, reaches the leaves through xylem tissue where it reacts with carbon dioxide in presence of sunlight to produce glucose. The glucose formed as a result of photosynthesis is transported to various parts of the plant by phloem tissue. Oxygen gas is also released in the process as a by-product.



Activity 1

To show that sunlight is necessary for photosynthesis

- Take a healthy potted plant. Keep it in a dark room for three days, so as to destarch its leaves. Put a few drops of iodine solution on its leaf, the leaf will turn brown showing the absence of starch.
- Now cover one of its leaves partly with a strip of black paper. Then place this potted plant in the sunlight for a few hours. Pluck the leaf covered with the black strip and remove the strip. Bleach the leaf first by boiling it in water and then in alcohol. The leaf will get decolourised.
- Wash the leaf and place it on a flat plate. Put a few drops of iodine solution on it.
- You will observe that the part of the leaf covered with the black strip of paper will not turn blue-black, instead it turns brown. This part could not receive sunlight, so no starch (food) is formed here.
- On the remaining part of the leaf, the iodine solution turns blue-black, because it got sunlight and prepared food in the form of starch.



Destarching leaves by keeping plant in a dark room



Activity 2

To show that only green parts of leaf can photosynthesise

- Take a two-coloured (**variegated**) leaf. For example, leaves of *Coleus* or hibiscus plant.
- Bleach the leaf by first boiling it in water and then in alcohol. The leaf gets decolourised.
- Wash the leaf with water and place it in a dish filled with dilute iodine solution.
- You will notice that the iodine solution on the green portions of the leaf turned blue-black due to the presence of starch, as that part of the leaf could prepare food. The iodine solution on non-green parts will not turn blue-black, rather they turn brown indicating that the non-green parts could not synthesise food.



Chlorophyll is necessary for photosynthesis

Thus, it is clear from the above activity that in plants with variegated leaves, photosynthesis takes place only in the green portions of the leaves.

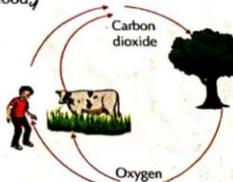
Importance of Photosynthesis

The process of photosynthesis has its own importance. It is the only natural process which utilises sun's energy to prepare food. Its importance can be understood by the following points:

- Photosynthesis enables green plants to prepare their own food, which they use for growth and survival. The extra food gets stored in the form of starch in different parts of the plant.
- All animals depend on plants for their food, directly or indirectly.
- Oxygen, which is essential for the survival of all living organisms, is produced during the process of photosynthesis.
- Animals and humans breathe in oxygen and breathe out carbon dioxide, which is used by green plants to prepare their own food. This maintains the balance of O_2 and CO_2 in nature.

FACT FILE

Chlorophyll gives plants their green colour because it reflects green light and absorbs red and blue light.



Balance of oxygen and carbon dioxide in nature

variegated: showing different colours as patches or streaks

Nutrition in Plants



Hence, in the absence of photosynthesis, life will not be possible on the earth.



Time to Answer

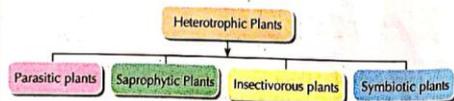
Fill in the blanks.

- _____ are the living things that can prepare their own food.
- The mode of nutrition in which organisms can prepare their own food is called _____ nutrition.
- The end products of photosynthesis are _____ and _____.
- Carbon dioxide enter the leaves through the _____.
- _____ and _____ help to maintain the balance of oxygen and carbon dioxide on the earth.

Heterotrophic Nutrition

- Heterotrophic nutrition is the mode of nutrition in which organisms cannot prepare their own food and depend on green plants directly or indirectly for their nutrition. Such organisms are called **heterotrophs** ('heteros' - different and 'trophe' - feeding).
- Although, most plants are autotrophs but there are some plants that obtain their nutrients from other plants and animals. Such plants are called **heterotrophic plants**.

Heterotrophic plants can be categorised as shown in the flow chart given below:



Cuscuta (dodder) on host plant



Mistletoe
Parasitic plants

- Some plants like ***Cuscuta* (dodder)** and **mistletoe** that depend on other plants for their food are called parasitic plants. They absorb food from green plants which are called **host**.
- The ***Cuscuta*** plant produces yellow tubular structures which attach to the host plant and wrap around its stem to absorb ready-made food from it.
- In a **parasitic relationship**, only the parasitic plant benefits. Also, the parasitic plant harms the host plant to certain extent by affecting its growth (slowing it down) and causing heavy damage. But, it rarely kills the host plant.



Saprophytic Plants

- Organisms like mushrooms, moulds and yeast which feed on dead and decaying organic matter are called **saprophytes**.
- Saprophytes lack chlorophyll and thus they cannot prepare their own food by the process of photosynthesis like green plants. They secrete digestive juices on the dead and decaying matter, converting them into solution and absorb nutrients from them.
- Hot and humid weather favours the growth of fungi. Fungi can be seen during rainy season. Have you ever seen white patches on unused objects like old shoes in warm and humid weather? These white patches are fungi. You must have seen mushrooms in the market and sometimes you may have eaten them. Mushroom is an edible fungi. But remember, all mushrooms are not edible.



Mushroom



Activity 3

To grow fungi (bread mould)

Take a piece of bread and moisten it with water. Keep it in a closed box for a few days. You will observe whitish-green or brown patches on it, which are due to fungal growth.



Growth of fungi (Bread mould) on bread

Insectivorous Plants

The plants which eat small insects, spiders etc., are called **insectivorous plants**. Such plants have special structures to catch their prey. These plants are usually green in colour and can prepare their own food. They eat insects, because they grow in soil that is deficient in certain nutrients (e.g. nitrogen). They fulfil their nitrogen requirement by eating insects. For example,

- In **pitcher plant**, the leaves are modified into a pitcher-like structure, which is lined with downward pointing hair, that do not allow the trapped insects to escape. When an insect is trapped in the pitcher plant, it gets entangled in the hair and is digested by the digestive juices secreted by the cells of pitcher plant.
- In **Venus flytrap**, the leaves are modified into a trap. The inner surface of the leaves have short, stiff hair. When an insect comes in contact with these hair, the two lobes of the leaves get closed and insect gets trapped inside it which is then digested with the help of digestive juices present in it.



Pitcher plant



Venus flytrap
Insectivorous plants

Nutrition in Plants





Lichens

Symbiotic Plants

The plants which live in association with other plants and share shelter and nutrients, thereby mutually benefitting from each other are called **symbiotic plants**. Such relationship between organisms is termed as **symbiosis** or **symbiotic association**. Some examples of symbiotic association are as follows:

- **Lichens** are the organisms in which fungus and green alga live in association with each other. The fungus gets nutrients from the alga and the alga gets water, minerals and shelter from the fungus.
- Some fungi live in the roots of trees. The trees provide nutrients to the fungus and the fungus help it to take up water and nutrients from the soil.

REPLENISHING NUTRIENTS IN THE SOIL

You must have seen farmers and gardeners adding manures and fertilisers to the soil before sowing seeds. We have already learnt that plants absorb nutrients from the soil and thus makes the soil deficient in nutrients. Different plants require different nutrients to grow. Some plants take up nitrogen while some require potassium, phosphorus, etc.

Once these nutrients are used up, it takes a long time to replenish them naturally.

In the present time, we need high yield of crops to fulfil our needs. So, it becomes necessary to **replenish** the soil nutrients artificially by adding manures and fertilisers. These contain plant nutrients like nitrogen, potassium and phosphorus, which plants require to grow well.

A natural way to replenish the soil with nitrogen is through the symbiotic association of *Rhizobium* and leguminous plants. The roots of leguminous plants such as pea contains ***Rhizobium*** bacteria. *Rhizobium* converts atmospheric nitrogen into usable form for the plant and the pea plant provides shelter and food to *Rhizobium* for its growth. It is for this reason that farmers grow leguminous plants alternately with other crops.



Time to Answer

Answer the following questions in Yes or No.

- (a) All plants can prepare their own food. _____
- (b) Venus flytrap is a parasitic plant. _____
- (c) Mushroom and yeast are saprophytes. _____
- (d) A symbiotic relation exists between fungus and green alga in lichens. _____
- (e) *Rhizobium* is a symbiotic bacteria. _____



replenish: restore to a former condition or level

Exercise

FIND THE ANSWERS OF EVERY QUESTIONS GIVEN BELOW FROM THE TEXT ABOVE:-

(A) Answer in one word :

1. Where does the synthesis of food in plants take place?
2. What is formed as the result of photosynthesis?
3. What is the ultimate source of energy for all living organisms?
4. Which reagent is used to test the presence of starch in the laboratory?
5. Which organism obtain their food from dead decaying organism?
6. Which pigment helps the plant to capture the solar energy?
7. What are fluffy umbrella-like patch growing on rotting wood during the rainy season called?
8. Name the device under which cells can be seen.
9. Where is nucleus located in a cell?
10. What are carbohydrates made up of?

(B) Answer the following in short within 25-30 words :

1. Why cannot non-green plants prepare their own food?
2. Why does a farmer add manure or fertiliser to the soil?
3. Why do organism need to take food?
4. If the insectivorous plant is green and perform photosynthesis, then why do we categorise them under heterotrophic plant?
5. What are algae?
6. How does cuscuta obtain its nutrient?
7. What is the role of rhizobium bacteria in leguminous plant?
8. What is the special about leaves that they can synthesise their own food but other parts of the plant cannot?
9. What are insectivorous plants?
10. Why photosynthesis is named so?
11. Why plants such as pitcher plant do not get all the required nutrient from the soil where they grow?

(C) Answer the following in detail within 45-50 words :

1. Distinguish between autotrophic and heterotrophic nutrition.
2. List the benefits of photosynthesis.
3. Explain symbiotic relationship with the help of an example.
4. How would you test the presence of starch in leaves?
5. How do plants obtain the raw material from the surroundings?
6. Explain how does a pitcher plant trap insects?
7. Show with the help of a sketch that the plants are the ultimate source of food.

(D) HOTS (High Order Thinking Skills)

1. Can we imagine life on earth in the absence of photosynthesis? Support your answer with proper explanation.
2. Except green plants, why cannot other living organisms prepare their own food using carbon-dioxide, water and minerals?

-----::00000::-----

2

Nutrition in Animals

Let us Learn about

- Steps involved in animal nutrition
- Nutrition in Amoeba
- Nutrition in humans
- Nutrition in ruminants

Previous Connect

All living things require food to stay alive and grow well. The food contains useful substances called **nutrients**. It needs to be digested in the body so that it can be utilised by every cell of the body.

All living things require food. It gives them energy to perform various life processes. Animals cannot prepare their own food and depend on plants or other animals for their food. Some animals including human beings consume both plants and animals.

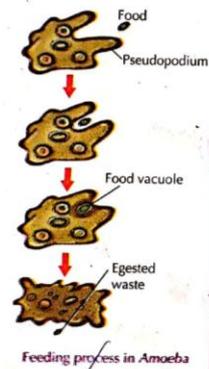
The food eaten by animals and humans has to be broken down inside the body into simple, soluble form, so that it can be used by the body to obtain energy. Let us study how the process of nutrition takes place in animals.

STEPS INVOLVED IN ANIMAL NUTRITION

Almost all animals take food in solid or liquid form. This form of nutrition in which food is taken in, digested and absorbed for its utilisation is called **holozoic nutrition**. There are five steps involved in holozoic nutrition in animals.

Ingestion

The process which involves taking in food inside the body of an organism is called **ingestion**. Different organisms have special structures for taking food.



particle taken inside the body forms a **food vacuole**. Digestion of food particles is made possible by digestive juices, secreted into the food vacuole. They act on food to break it down into simpler substances. Then, the digested food is absorbed and assimilated. The undigested food is thrown out from any point of the body.

Activity 2

To observe Amoeba in pond water

Collect some water from the pond. Put a drop of this water under the microscope. Can you find anything moving? Observe it for some time and note down your observations.



Time to Answer

Circle the correct word among the two words given in bold to make correct sentences.

- Assimilation/**Absorption** is the process of using absorbed food.
- Egestion**/Digestion is the process of removing undigested food from the body.
- Amoeba**/*Hydra* uses tentacles to catch food.
- Snakes**/*Birds* swallow their food as a whole.
- Ingestion**/Digestion is the process of taking in food inside the body of an organism.

NUTRITION IN HUMANS

- Human beings like other animals take in food through their mouth.
- The continuous canal by which food enters the body and wastes are **expelled** out is called alimentary canal. The organs of the alimentary canal are **mouth, oesophagus (food pipe), stomach, small intestine, large intestine, rectum and anus**.
- The alimentary canal (digestive tract) and the associated glands like pancreas and liver together form the **digestive system**.

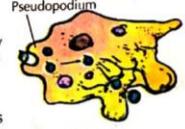
Amoeba uses **pseudopodia** to engulf food particles. *Hydra* uses **tentacles** to catch food, *Paramecium* uses **cilia**, mosquitoes use **feeding tubes** for sucking blood, birds use their **beaks**, snakes such as Python swallow their food as a whole and humans use their **hands**.



(a) Mosquito



(b) Paramecium



(c) Amoeba

Different feeding structures

Digestion

The process of breaking down of complex components of food into simple, soluble form is called **digestion**.

Absorption

The process of passing up of soluble products of digestion into the cells of the body through body fluids such as blood is called **absorption**.

Assimilation

The process of using the absorbed food molecules for producing energy and growth is called **assimilation**.

Egestion

The process of removing undigested food materials from the body is called **egestion**.

Activity 1

Given below are the names of some animals. Find out the food they eat and their mode of ingestion.

S. No.	Animal	Type of food eaten	Mode of ingestion
1.	Frog		
2.	Lizard		
3.	Lice		
4.	Parrot		
5.	Cockroach		

NUTRITION IN AMOEBIA

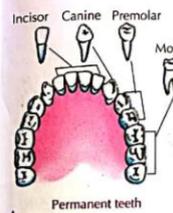
- Amoeba* is a unicellular organism that can be seen only under a microscope. It is found in ponds and ditches. It eats microscopic plants and animals that float in water.
- An *Amoeba* has an irregular shape and consists of a cell membrane, nucleus and many small vacuoles.
- An *Amoeba* can change its shape and position constantly. (It gives out one or more finger-like projections called **pseudopodia** or false feet on sensing food to engulf the food particles, and push it inside the body. *Amoeba* has no mouth or digestive system. The food



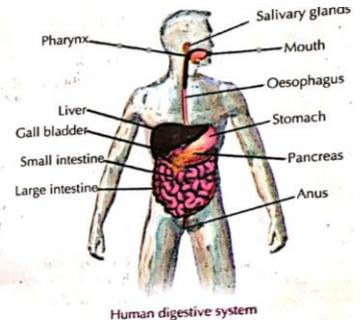
Let us study the different steps involved in the nutrition in human beings.

Ingestion - Taking Food into the Body

The food is taken into the body through the mouth. It is broken down into smaller pieces with the help of teeth. The process of breaking down food into smaller pieces by the teeth is called **mastication**.



- There are four different kinds of teeth in the mouth:
- Incisors
 - Canines
 - Premolars
 - Molars



S. No.	Types of teeth	Number of teeth		Total number of teeth	Function
		Lower jaw	Upper jaw		
1.	Incisors (flat teeth located in front)	4	4	8	Cutting and biting food
2.	Canines (sharp pointed teeth next to the incisors on either sides)	2	2	4	Piercing and tearing food
3.	Premolars (next to canines on either sides)	4	4	8	Chewing and grinding food
4.	Molars (next to premolars on either sides)	6	6	12	Chewing and grinding food

- Humans have two sets of teeth in their lifetime. The first set of teeth are called **temporary teeth** or milk teeth and are 20 in number. Around the age of six, milk teeth start falling and get replaced by permanent teeth.
- There are thirty-two permanent teeth in the mouth of an adult with different shapes and functions. Each jaw has 16 teeth. In children, there are only eight molar teeth in the mouth, the other four molars develop at the age of 18 or later and are called **wisdom teeth**.
- It is very important to take care of our teeth to prevent them from decaying. If we do not clean our teeth and mouth after eating, harmful bacteria begins their growth and start living in it. These bacteria start acting on the food (break down sugar) stuck on between our teeth and produce an acid.

FACT FILE

We eat about 500 kg of food in a year.





Cavity in teeth

- This acid gradually damages the teeth and results in **cavities**. This is called **tooth decay**. Bacteria grow faster on sweet and sugary products. Sometimes, bacteria, food particles and saliva form a thick layer on the surface of the teeth, which is called **plaque**.



Taste areas on the tongue

Tongue

The **tongue** is a fleshy, muscular organ present in our mouth, that is free at the front but attached at the back to the floor of buccal cavity. (The tongue helps to mix saliva with the food, detect different kinds of tastes through the taste buds and to swallow food.)



Activity 3

Sit in groups of two. Prepare solutions of sugar, common salt, lemon juice and crushed bitter gourd. One member of the team should stick his/her tongue out. Put one drop of a solution on different areas of the tongue one by one and ask him/her on which part of the tongue could he/she detect the taste. Ask him/her to rinse his/her mouth and repeat the same with all the solutions.

Digestion – To Convert Food Into Usable Form

The **mouth, stomach and small intestine** are involved in the process of digestion.

Mouth

Digestion begins in the **mouth**. The **salivary glands** present in the mouth continuously secrete **saliva**. The primary function of saliva is to make the food moist. The saliva also contains digestive enzyme that break down starch present in the food to sugar.



Activity 4

To study the effect of saliva on food

You need two bread pieces, a watch glass, Petri dish and iodine solution to perform this activity.

Take a bread piece and put some drops of iodine solution on it. It will turn blue-black due to the presence of starch.

Now take another bread piece and put it in a watch glass after chewing it for 3-5 minutes. Put some drops of iodine solution on the piece.

The chewed pieces do not turn blue-black showing the absence of starch. Thus, it can be concluded that starch is converted into sugar in presence of saliva.

Oesophagus

From the mouth, the food passes into the **oesophagus** or **food pipe** and finally reach the stomach. (The walls of the oesophagus relax and contract repeatedly to push the food down. This type of movement takes place throughout the alimentary canal and is called **peristalsis** or peristaltic movement. No digestion takes place in the oesophagus.)

Stomach

The **stomach** is a U-shaped muscular organ present in the upper abdomen. The inner walls of the stomach secrete digestive juices, mucus and hydrochloric acid. (The digestive juices break down proteins into simpler forms while the hydrochloric acid kills the bacteria present in food) and provides an acidic medium for the action of digestive juices. (The mucus helps in protecting the stomach lining from the action of acids.) The food is now partially digested and is in the form of a thick soup.

Small Intestine

The partially digested food goes into a highly coiled, about 7.5 m long tube called the **small intestine**. The inner walls of the small intestine secrete intestinal juices that complete the digestion of various components of food. It also receives secretions from the liver and pancreas. The largest gland in the body, the **liver**, secretes **bile juice** that is stored in the gall bladder until needed. Bile helps to break down fats. The **pancreas** secretes **pancreatic juices** that break down carbohydrates, fats and proteins into simpler forms. Digestion is completed in the small intestine.

Absorption

Absorption of nutrients takes place in the small intestine. There are finger-like projections in the lining of the small intestine called **villi** (singular - villus). Villi increase the surface area making absorption more efficient. Villi have a network of blood vessels. The soluble food is absorbed by the villi and transported through the blood vessels to different parts of the body.)

Assimilation

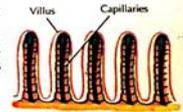
The soluble food absorbed by the blood is transported to different organs where it is utilised for building substances such as protein. This is called **assimilation**. In each cell of the body, this soluble food is broken down with the help of oxygen for producing energy, carbon dioxide and water.

Large Intestine

The undigested food (after absorption) passes into the **large intestine**. Here, water and some salts are absorbed from the undigested food and the undigested food becomes semi-solid. This is called **faeces**.

FACT FILE

Sometimes we hiccup. During hiccup, a muscular spasm occurs in the diaphragm. This forces air rapidly through the vocal cords and produces hiccup sound.



Villi present in the small intestine

FACT FILE

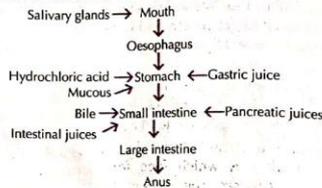
Appendix is a vestigial organ present at the junction of the small and large intestine.

A bullet opened the mystery of digestion

In 1822, a man named Alexis St. Martin, was accidentally hit by a shot gun which damaged his chest wall and made a hole in his stomach. Dr. William Beaumont saved his life but could not close that hole properly. He took this opportunity to learn about digestion. He observed that the stomach was churning food. The wall of the stomach secreted juices which could digest the food. He also observed that food goes into intestine after digestion is completed in stomach.

Egestion

The faeces are stored in the **rectum** and passed out of the body through the **anus** from time to time. This is called **egestion**.



The path of food in the alimentary canal

What is diarrhoea?

When we consume infected food or unclean water, we may suffer from watery stool. This condition is called **diarrhoea**. It results in the loss of water and some essential salts from the body. This condition can be dealt with by giving the patient **Oral Rehydration Solution (ORS)**. ORS can be made at home by mixing some salt and sugar in water.

NUTRITION IN RUMINANTS

Cows and some grass-eating animals can swallow large amount of food at a time and later bring back the swallowed food into the mouth to chew it again. This process of **chewing the cud** is called **rumination** and such animals are called **ruminants**.

Grass is rich in **cellulose**, a carbohydrate, which many other animals and humans cannot digest, but can be digested by ruminants. Let us study the process of nutrition in ruminants.

Ingestion

The animals take in food such as grass into the mouth, chew it and mix it with saliva. They have big chewing teeth with powerful jaw muscles to chew the grass again and again. The chewed food passes through the oesophagus into the stomach.

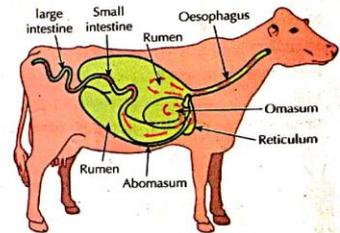
Digestion

(Digestion of chewed food takes place in the stomach. The stomach of ruminants is four chambered.)

- Rumen:** It is the first and largest chamber, which stores large quantity of food that is quickly consumed. (The food is partially digested here. It is called cud. Cellulose is digested in the rumen by billions of bacteria present there.)

cud: food of a ruminant regurgitated to be chewed again

- Reticulum:** It is the second chamber into which food enters from the rumen. (Here, the contents of both rumen and reticulum mix freely. The cud is brought back to the mouth and is re-chewed and re-swallowed.)
- Omasum:** It is the third and the smallest chamber of the stomach into which food passes after chewing. (Excess of water is absorbed from the food here.)
- Abomasum:** It is the last chamber of the stomach into which food from the omasum passes. The walls of the abomasum secrete digestive juices that help in digestion.)



Digestive system of a cow (a ruminant)

Absorption

Although the process of absorption begins in the stomach itself, the main absorptive organ is intestine. The digested food passes into the small intestine. The small intestine receives secretions from the pancreas and liver and digestion of food ends here. Villi present in the small intestine increase the surface area for absorption.

Water from the undigested food is absorbed in the **large intestine**. The undigested food is excreted out as faeces (egestion).



Time to Answer

Fill in the blanks.

- Digestion in animals begins in the _____.
- _____ is the largest gland in the body.
- Grass is rich in the carbohydrate _____.
- Faeces passes out of the body through the _____.
- Digestion ends in the _____.



Key-Terms

- Holozoic nutrition:** the process of taking in of food and its digestion and absorption
- Ingestion:** the process of taking food into body
- Assimilation:** the process of using the absorbed food by body

Exercise

(A) Answer in one word :

1. What helps amoeba to engulf food particles?
2. What is the organ that store bile?
3. Which part of the digestive canal is involved in killing bacteria?
4. Which is the largest chamber of the stomach of a ruminant?
5. Where is the water from undigested food absorbed in the body?
6. In which part of the digestive canal food is completely digested?
7. Where are faeces formed in the human body?
8. Which gland secretes saliva?
9. Name the enzyme which breaks carbohydrate in the mouth.
10. Which is the largest gland in the human body?

(B) Answer the following in short within 25-30 words :

1. What is the role of tongue in digestion?
2. What happen to the food in the stomach?
3. What are villi?
4. What is digestion?
5. What is the role of pancreas in digestion?
6. What do you mean by rumination?
7. What are the main parts of the alimentary canal?
8. How is the food prevented from entering the windpipe?
9. Write a short note on small intestine.
10. What are the functions of the tongue in human body?

(C) Answer the following in detail within 45-50 words :

1. Distinguish between ingestion and egestion.
2. Write a short note on 'tooth decay'.
3. Name the substances secreted in stomach and give the functions for each
4. Draw a labeled diagram of human digestive system, name the five stages in the process of digestion and write one line for each .
5. How does digestion takes place in ruminants?
6. Name the four kinds of teeth in humans. State their functions.
7. Explain how an Amoeba gets its nutrition. Support your answer with a diagram.

(D) HOTS (High Order Thinking Skills)

1. Why does bread taste sweet after it is chewed for a while?
2. Can we survive only on raw leafy vegetables/grass? Support your answer with proper explanation.
3. Gagandeep saw his friend Yash eating food very quickly without chewing it properly. Gagandeep told Yash that he should eat food by chewing it properly. Why do you think Gagandeep said so?

-----:00000:-----

3

Fibre to Fabric

Let us Learn about

- Wool
- Silk
- Health hazards in wool and silk industries



Previous Connect

We wear clothes to protect ourselves from harsh weather conditions, dust, insects, etc. Clothes are made from fabric. Fabric is made from yarn. Yarn is made from fibres. Fibres can be natural or man-made (synthetic).

You have already learnt about different types of fibres and their sources.

- Fibres are broadly classified into two categories – **natural fibres** and **synthetic fibres**.
- Natural fibres are further of two types: Plant fibres and animal fibres. The fibres obtained from plants are called **plant fibres**, while those obtained from animals are called **animal fibres**.
- Fibres that are manufactured in factories by chemicals are called **synthetic** or **man-made fibres**.



Activity I

To observe different types of fibres and differentiate between them

Collect threads of different fibres as listed in the table. Touch, observe and stretch them. Fill your observations in the table.

S. No.	Fibre	Texture (Soft/Coarse)	Lustre (Shiny/Dull)	Strength (Weak/Strong)
1.	Cotton			
2.	Wool			
3.	Silk			
4.	Jute			
5.	Nylon			



Flax



Hemp



Polyester



Rayon



Silk



Wool

Different kinds of fibres



Sheep - a source of wool

In this chapter, we will learn about two of the animal fibres—wool and silk.

WOOL

Wool is an animal fibre obtained from the **fleece** of animals like sheep, goat, yak, etc. The fleece traps air in the spaces between them, preventing the body heat from escaping, thus keeping the animal warm. Wool is a better insulator than synthetic fibres like nylon, polyester and other natural fibres like cotton, silk, etc. We wear woollen clothes in winter to protect ourselves from cold.

Wool is mostly obtained from the fleece of sheep. A sheep's hairy skin has two types of fibres—the **coarse beard hair** and the **soft under-hair** found close to the skin. There are different varieties of sheep that provide us wool. The quality of wool differs from breed to breed. The **merino** breed of sheep provides the finest wool which is soft and light.

Selective breeding is the process of selecting parents for obtaining special characters in the offspring, such as soft under hair in sheep.

fleece: thick covering of wool on an animal's body

New Learnwell Science-VII

Sheep are mainly reared for wool in regions like Australia, the Middle East, Asia, Iceland, Europe, and South America. In India, rearing of sheep is chiefly done by people in the states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh or the places of Punjab, Rajasthan, Gujarat and Haryana.

The table given below tells us about some breeds of sheep and the quality of wool obtained from them.

Name of the breed	Quality of wool
Lohi (Rajasthan, Punjab)	Good quality, used to make sweaters and shawls
Nali (Rajasthan, Haryana, Punjab)	Carpet wool
Bakharwal (Jammu & Kashmir)	Good quality for shawls
Mjarwari (Gujarat)	Coarse wool
Patanwadi (Gujarat)	For hosiery

Sheep are herbivorous animals that prefer grass and leaves. Rearers also feed sheep on a mixture of pulses, corn, jawar, oil cakes and minerals. They are kept indoors in winter and feed on leaves and dry fodder.

Wool from Other Animals

- Wool is also obtained from the fur of camels, like the **Bactrian camels**, **Alpaca** and **Llama**, found in South America also yield wool.
- Yak wool is common in Tibet and Ladakh.
- Cashmere wool fibres are obtained from cashmere goat. The under hair of **Kashmiri goat** is used to make fine shawls called **pashmina shawls**. The **Angora goat** provides fine fibre called **mohair**.
- The **Angora rabbit** also provides fine wool and is very expensive because each rabbit can only provide a small amount of angora wool.
- Shaktoosh**, which is also called king of fine wools, is obtained from the under hairs of Tibetan antelope known as Chiru. They are hunted and killed to obtain their delicate hair. As a result, the population of chiru has decreased considerably. To stop their hunting, the government has banned the use and selling of shawls made of **shaktoosh**.

Production of wool

The steps involved in the production of wool are as follows:

Shearing

The process of removing the fur or fleece of the sheep along with a thick layer of skin is called **shearing**. It is done without harming the sheep using a manual razor or clipper. It is usually done every year in spring or in summer as the fleece is not required as an insulator during these months.

Fibre to Fabric

FACT FILE

Australia is the leading producer of wool in the world.



Yak



Cashmere goat



Angora rabbit



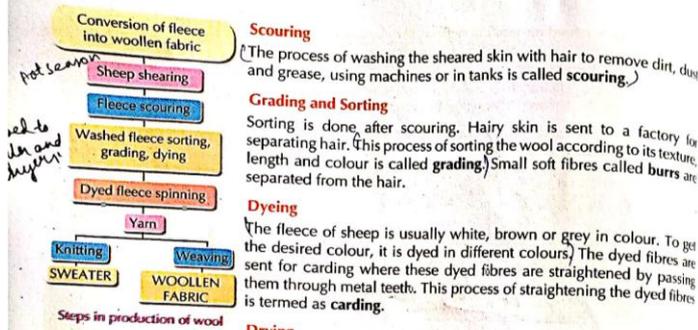
Chiru

Other animals as sources of wool

FACT FILE

Woolmark is a symbol of quality to assure that the woollen cloth is made from pure wool.

27



Scouring

The process of washing the sheared skin with hair to remove dirt, dust and grease, using machines or in tanks is called **scouring**.

Grading and Sorting

Sorting is done, after scouring. Hairy skin is sent to a factory for separating hair. This process of sorting the wool according to its texture, length and colour is called **grading**. Small soft fibres called **burrs** are separated from the hair.

Dyeing

The fleece of sheep is usually white, brown or grey in colour. To get the desired colour, it is dyed in different colours. The dyed fibres are sent for carding where these dyed fibres are straightened by passing them through metal teeth. This process of straightening the dyed fibres is termed as **carding**.

Drying

The wool is dried and sent for spinning into yarn. It is then weighed and packed into **bales**. Longer fibres are made into wool for sweaters and the shorter fibres are spun and woven into woollen cloth.



Shearing



Scouring



Carding



Spinning wool fibres into yarn

Steps of wool production

Time to Answer

Write True or False.

- The merino breed of sheep provides the finest wool.
- The quality of wool differs from breed to breed.
- The Cashmere goat provides fine fibre called mohair.
- Grading is the process of straightening the dyed fibres by passing them through metal teeth.
- Shearing is the process of removing the fur from a sheep.

bale: a large amount of a light material pressed tightly together and tied up.

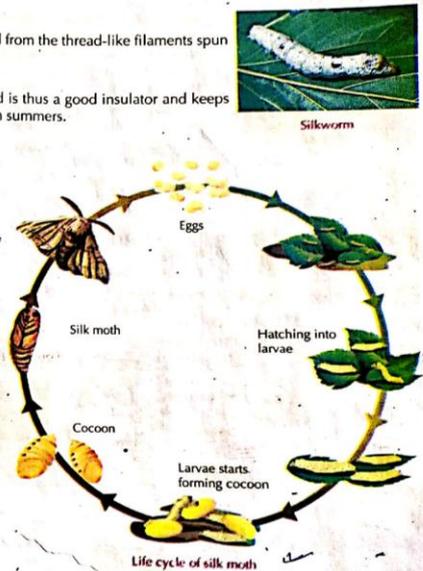
New Learnwell Science-VII

SILK

- Silk is an animal fibre obtained from the thread-like filaments spun by silkworms.
- Silk is soft and lustrous.
- Silk does not conduct heat and is thus a good insulator and keeps us warm in winters and cool in summers.

Life cycle of silk moth

- Silkworm is the larva or caterpillar of the domesticated silk moth. Mulberry silk moth is the most common silk moth.
- The female silk moth which is shorter and stouter than the male lays 300 to 400 eggs at a time on leaves. After some days, the eggs hatch and the black larvae or silkworms emerge.
- The larval stage lasts for about 27-28 days. During this stage, the larvae shed their skin four times. This process is called **moulting**.
- The silkworms feed on mulberry leaves and develop glands that produce silk.
- The silkworms secrete fine filaments from their glands, which are made of protein and harden on exposure to air. The filaments are deposited in layers forming **cocoon**. Inside the cocoon, the silkworm transforms itself into a **chrysalis** and this stage is called **pupa**.
- The silkworm continues to develop inside the cocoon and changes into an adult. Silk fibres are obtained from the cocoon of silkworms.



Production of Silk

The rearing of silkworms for the production of silk is called **sericulture**. It involves the following steps:

- First the silkworm eggs are warmed and put in conditions which enable them to hatch.

Fibre to Fabric

28



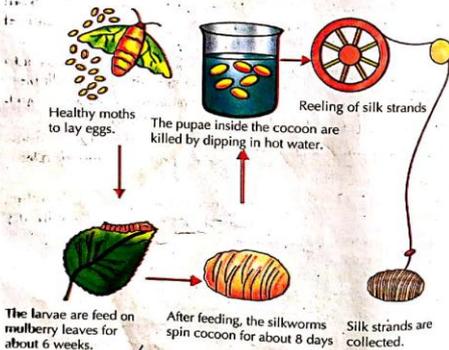
Tassar silk



Muga silk

Different kinds of silk

- After hatching, the larvae are spread on bamboo trays to grow and are fed on chopped mulberry leaves for about a month. The larvae eat and increase in size. Twigs or small racks are then placed on the trays after the caterpillars stop eating and start spinning cocoons. The cocoons get attached to these twigs.
- The cocoons are then sorted according to the colour, size and shape. Cocoons obtained may be white, yellow or grey in colour.
- The selected cocoons are then boiled in hot water, kept under the sun treated in ovens or fumigated to kill the larvae inside. The cocoons are placed in hot and cold water alternatively to loosen the filament. If the larvae are not killed and are allowed to grow, they will break the cocoon, thereby reducing the length of the fibre.
- The filaments are taken out from the cocoon by a process called reeling.
- The filaments of several cocoons are twisted together to make a strong thread. This thread is wound on a reel.
- The silk threads are then dyed and woven into silk fabric.



Summary of the process of silk production

Different varieties of silk moths produce different varieties of silk like *tassar silk*, *muga silk* and *kosa silk* etc. Mulberry silk is white in colour and is the finest quality of silk.

fumigated: disinfected or purified with fumes of certain chemicals

New Learnwell Science-VII



Activity 2

To identify different fabrics by burning them

(This activity should be demonstrated by the teacher to enable students to identify fabrics by the smell which they produce on burning.)

Take a small piece of cotton, nylon, silk and wool. Bring each piece near a burner flame by holding it with a pair of forceps. Carefully observe what happens.

Fabric	Burning characteristics	Smell
Cotton	Burns steadily producing light and smoke	Burning paper
Nylon	Melts and shrinks	Burning plastic
Silk	Burns slowly	Burning hair
Wool	Burns slowly	Burning hair

HEALTH HAZARDS IN WOOL AND SILK INDUSTRY

Health hazards are associated with almost every industry. Some health hazards of wool and silk industry are discussed below:

- In the wool industry, the workers who sort wool often suffer from a fatal disease called **anthrax or sorter's disease**, which is caused by an infection of **Anthrax bacteria**.
- Workers in the silk industry have to dip their bare hands into hot water to judge by touch whether the fine threads of silk have loosened enough to be wound. (This often causes blisters and open wounds or injuries on their hands that can cause infection.)
- The reeling of silk thread requires workers to stand for 12-16 hours in a day, resulting in backaches, spine problems and problems related to vision.
- Workers who are exposed to continuous vapour from the boiling cocoons and diesel fumes from machines suffer from respiratory diseases like asthma and bronchitis.



Time to Answer

Fill in the blanks.

- Workers who sort wool in the wool industry suffer from _____ disease.
- _____ silk is white in colour and is the finest quality of silk.
- Inside the cocoon, the silkworm transforms itself into a _____.
- Rearing of silkworms for silk production is called _____.
- The larvae of silk moths feed on _____ leaves.

forceps: an instrument used to hold things

Fibre to Fabric

Exercise

A.

B. Answer in one word :

1. What does a silk moth eat?
2. What type of smell do silk produce on burning?
3. What is the process of straightening of dyed cotton fibres called?
4. What type of wool is called the king of fine wools?
5. Name the causative agent of sorter's disease.
6. Which part of the black sheep have wool?
7. What term is coined for rearing of silkworms for obtaining silk?
8. Which country leads the world in silk production?
9. Which is the most common silk moth?
10. Which breed of sheep provides the finest wool?

C. Answer the following in short within 25-30 words :

1. Describe shearing of sheep.
2. Write the sequence of steps involved in the processing of wool.
3. Why do sheep have a thick coat of hair?
4. What is fibre? Classify the fibres.
5. Why shearing does not hurt the sheep?
6. Why do we wear woollen clothes in winter?
7. What is scouring?
8. Why sorter's job in wool industry is risky job?
9. What do sheep feed on?
10. Where are rearing and breeding of sheep popular in India?

D. Answer the following in detail within 45-50 words :

1. Distinguish between Natural and Synthetic fibres.
2. Explain the lifecycle of a silkworm and support your answer with a diagram.
3. List three health hazards associated with the wool and silk industries.
4. Explain the process of obtaining silk from cocoon.
5. Write a note on rearing silkworm.
6. Explain the various steps involved in the process of making wool.

E. HOTS (High Order Thinking Skills):

1. Is sericulture an eco-friendly practice? Support your answer with proper explanation.
2. Why does burning of wool give the smell similar to burning of hair?

-----:O O O O O:-----