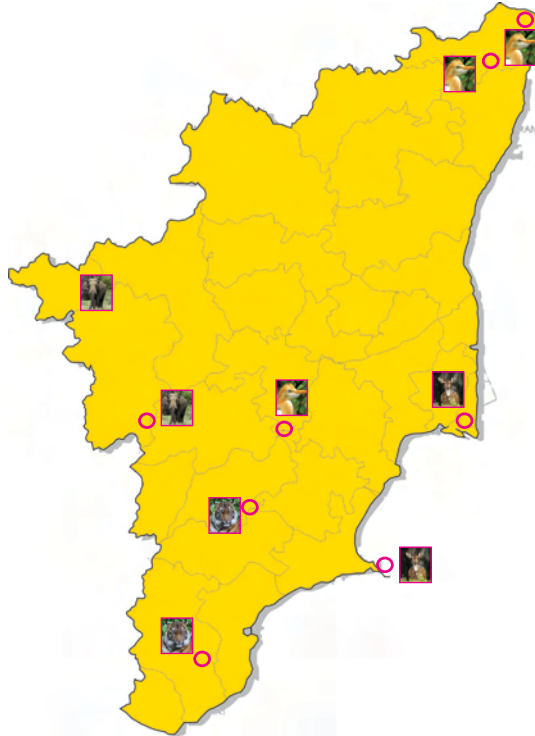


5. In the given map of Tamilnadu some famous wildlife sanctuaries are marked.

- Name the places.
- Find out the animals / birds which are found there.
- Mark your place of residence and find the name of the sanctuary near your home.



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Fig 2.1. Nutritious food

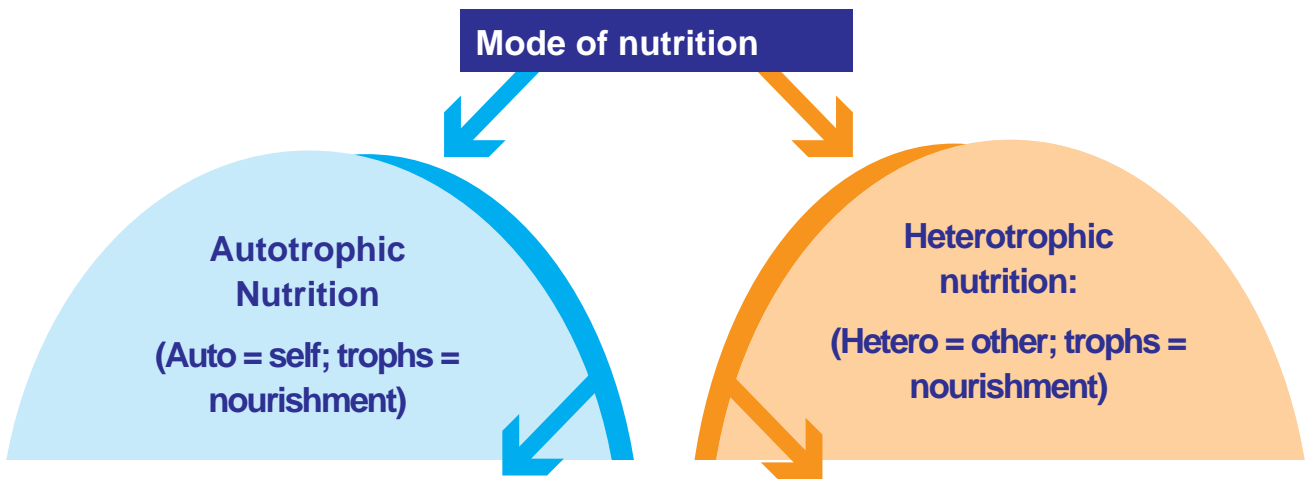
Food is a basic necessity for all living organisms to survive. It is because food provides energy to all living organisms to do their life activities. Food also helps them to grow and build their bodies. How do living organisms obtain their food? Green plants can make their own food by using sunlight, water and carbon dioxide. Animals cannot make their own food. They depend on plants directly or indirectly for their food. The mode of taking food by an organism and utilizing it by the body is called **nutrition**.

2.1. MODES OF NUTRITION IN PLANTS

There are two modes of nutrition in organisms. They are autotrophic and heterotrophic nutrition.



2.2. AUTOTROPHIC & HETEROTROPHIC NUTRITION



Green plants are the only organisms which can synthesize food for themselves and also for other organisms including us. The mode of nutrition in which organisms make their own food is called **Autotrophic Nutrition** and such organisms are called **autotrophs**.

eg. Green plants.

Non-green plants and most animals (like us) take in readymade food from plants and other animals. The mode of nutrition in which organisms depend on others for their food, is called **Heterotrophic Nutrition** and those organisms are called **heterotrophs**. eg. All animals, including human beings.

SCIENCE

2.2.1. PHOTOSYNTHESIS

Dear children, we shall be surprised if we could peep inside a leaf and find that sunlight comes into a leaf through the leaf's surface. Inside, the leaves also have a wonderful green substance called **chlorophyll**.

At the same time air comes into the leaf through tiny openings named **stomata** and water moves up from roots below.



Fig 2.2 Leaf - (inset) Stomata

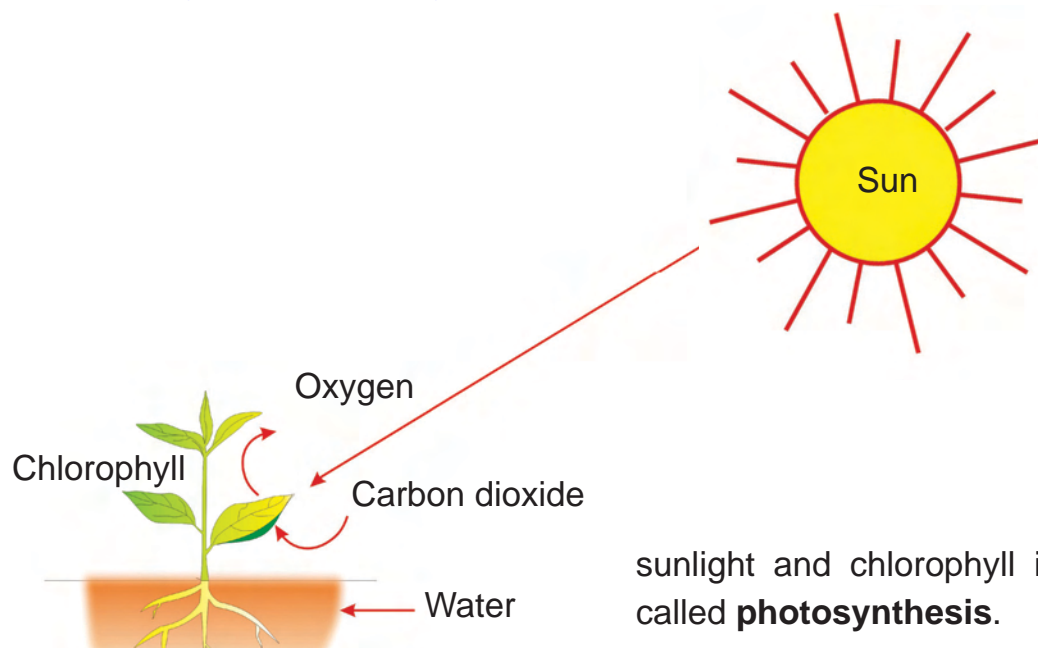


Fig 2.3. Photosynthesis chart

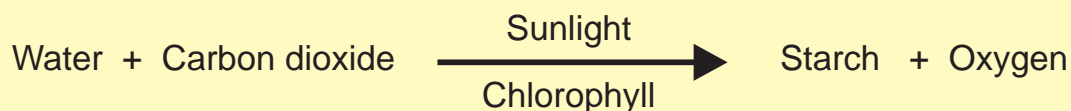
Using sunlight for energy, the chlorophyll changes water and carbon dioxide into food for the plant.

The process of preparing food with the help of water, carbon dioxide,

sunlight and chlorophyll in plants is called **photosynthesis**.

Imagine what would happen if there is no sun? In the absence of the sun, there would be no photosynthesis. Hence, there would not be any food. In the absence of food, life would be impossible on earth. So, the **sun** is the **ultimate source** of energy for all forms of life.

Photosynthesis can be represented by the equation given below



There are some leaves of plants which show different colours other than green. Can they do photosynthesis? Yes, they can. The huge amount of red, brown and other pigments eclipse the green colour.

ACTIVITY 2.1

When the weather is sunny, let us put a steel bowl on a patch of grass. Leave the bowl for 5 days. No peeking! Lift the bowl and look at the grass. How is it different from the grass exposed to sunlight?



Fig 2.4 Leaves of various colours



2.2.2. OTHER MODES OF NUTRITION IN PLANTS

There are some non-green plants which cannot prepare the food. They take readymade food prepared by other plants. They follow heterotrophic nutrition. They may be **saprophytes**, **parasites**, **insectivorous** plants etc.

ACTIVITY 2.2

Let us take a piece of bread. Moisten it and leave it for a few days. We can see the cotton like mass growing on it. What is it?



Fig 2.5 Bread mould

Saprophytes

Sometimes we see umbrella-like structures growing on decaying matter on the road side during the rainy season. What are they? How do they get their nutrients?

These organisms are called **fungi**. They grow on dead organic matter. They produce digestive enzymes on the dead matter and change it into simple nutrients. They absorb the nutrients in dissolved form (solution) and utilize it. Such a mode of nutrition is called **saprotrophic** nutrition and those plants are called **saprotrophs**.

eg: mushroom, bread mould.



Fig 2.6 Mushroom

Parasites

Shall we look at the picture carefully. we can see yellow coloured tubular structures coiling around the stem of a tree. This is a plant called **cuscuta**. It cannot synthesize food. As it lacks chlorophyll, it depends on the tree on which it is climbing for food. The plant which provides food is called **host** and the plants which consumes it is called **parasite**.



Fig 2.7. Parasite cuscuta (Sadathari)



venus fly trap
(Insect entering)



Fig 2.8. Nepenthes (pitcher plant)



venus fly trap
(Insect trapped)

Insectivorous Plants

We know that many insects eat plants, but we shall be surprised to know that some plants eat insects.

Let us observe the pictures of venus fly trap, pitcher plant. They need to eat insects because their soil does not have certain nutrients like nitrogen for them to grow.

Symbiotic Plants

There is yet another mode of nutrition in which two different types of organisms live together and mutually help each other for nutrition. Lichens are organisms that consist of a fungus and alga. The algae gives food to the fungus and the fungus absorbs water and minerals and gives to algae. Here, both the organisms help mutually. The phenomenon by which two different organisms live together for mutual help is called **symbiosis**. The organisms are called **symbionts**.



Fig 2.9. Lichens

2.3. NUTRITION IN ANIMALS:

Let us observe machines like a car, bus or a train etc. How do they work? They get energy to do work from fuels. Our body is also a machine. We get energy from the food that we eat. Food contains not only energy but also the raw materials needed for body's growth, maintenance and repair. Mostly animals take in solid food. This mode of nutrition is called **holozoic nutrition**.



Fig 2.10 Ingestion

Nutrition includes five steps

1. Ingestion

The process of taking food into the body is called **ingestion**. The mode of intake of food differs in different organisms. eg: Butterflies and bees suck the nectar of the flowers. Snakes (Python) and frogs swallow their food. Aquatic animals (Blue Whale) filter feed.

2. Digestion

The process of breaking down of complex food into simple food with the help of enzymes is called **digestion**.

3. Absorption

The process by which the digested food passes into the villi of the wall of the intestine is called **absorption**.

4. Assimilation

The ways in which the absorbed food is utilized in cells is called **assimilation**.

5. Egestion

The removal of undigested food through anus is called **egestion**.

2.4. NUTRITION IN AMOEBIA

Amoeba is a unicellular organism. It lives in the stagnant water bodies. It feeds on microscopic organisms. Though amoeba is a one celled animal, it takes in solid food through its body surface. So the mode of nutrition is holozoic. Whenever the food touches the body surface of amoeba, it engulfs the food with the help of pseudopodia (false feet) and forms the food vacuole. The food is digested with the help of enzymes inside the food vacuole. The digested food reaches the entire cell by diffusion. Amoeba uses the food for getting energy, making proteins for growth, etc. The undigested food is thrown out of the body through its body surfaces.

2.5. HUMAN DIGESTIVE SYSTEM

Think of any food that you like, a sweet, a fruit etc. Let us find out what happens to it when eaten. It passes through the digestive system. This system is made of mouth, oesophagus, stomach, small intestine, large intestine and anus.

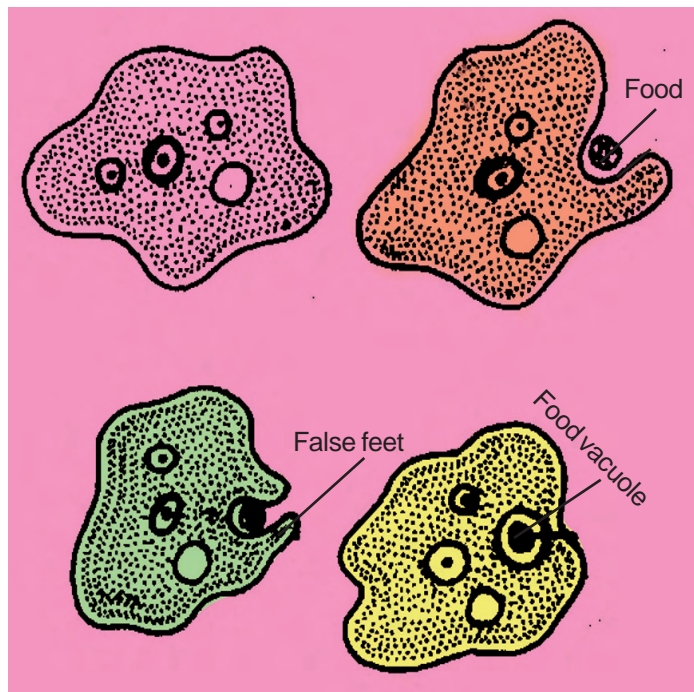


Fig 2.11 Ingestion of food in Amoeba

Mouth

We ingest the food into mouth cavity through mouth. Mouth cavity contains teeth, tongue and salivary glands.

Teeth

Teeth help us to cut the food into small pieces, chew and grind it.

Salivary Glands

There are three pairs of salivary glands in our mouth. These glands secrete a watery fluid called saliva. It makes the food wet so that we can easily swallow it. It contains an enzyme called amylase which helps in the digestion of starch

Tongue

The tongue is an organ of taste. It helps to mix the food with saliva and make it wet. It also helps in rolling and pushing the food while swallowing.



Oesophagus

It is a tube which connects mouth and stomach. It is also known as food pipe. It helps to pass the food from the mouth to the stomach.

Stomach

Stomach is a bag-like structure where the food is further digested. The food is churned. Stomach secretes digestive juice called gastric juice which helps to digest food.

Small Intestine

It is a very long tube and is about 7 metre in length. Here the food is mixed with bile juice, pancreatic juice and intestinal juice. These juices help in completing the digestion.

At the end of digestion, carbohydrates are broken down into glucose; proteins into amino acids and fats into fatty acids. This digested food is absorbed by the villi in the small intestine.

Large Intestine

It is about 1.5 metre in length and helps in absorbing water. It is the place for temporary storage of undigested food. Digestion does not take place here.

Anus

The undigested food (faecal matter) is eliminated through anus and the process is called egestion.

Let us find out how the food moves in our digestive system.

Food in the digestive system moves from oesophagus to anus by rhythmic contraction and expansion of the wall of digestive system. This movement is called **peristalsis**.

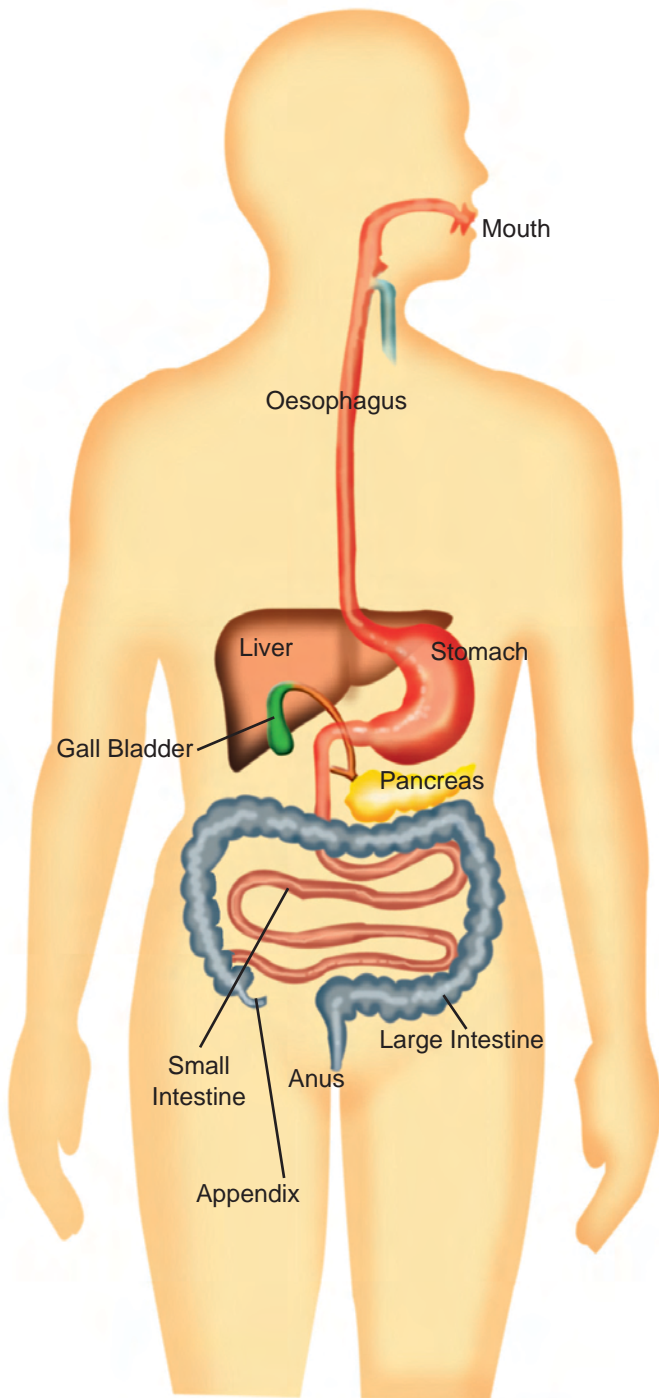
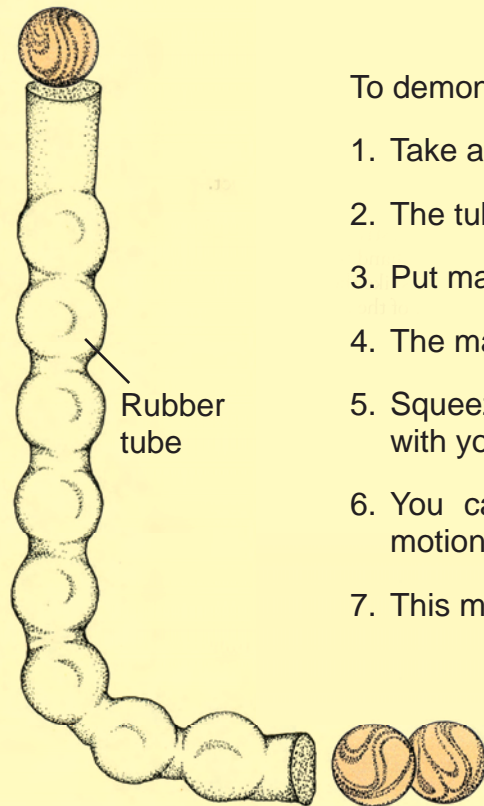


Fig 2.12. Digestive System of man

MORE TO KNOW

Food takes an average of 24 hours to pass all the way through the digestive system.

ACTIVITY 2.3



To demonstrate peristalsis.

1. Take a rubber tube and wet it inside.
2. The tube represents the food pipe.
3. Put many marbles into the tube.
4. The marbles represent food.
5. Squeeze the rubber tube from the top with your hand in a forward direction.
6. You can observe a kind of wave-like motion in the rubber tube.
7. This movement represents peristalsis.

2.5.1. TYPES OF TEETH

We all have two sets of teeth in our life time. The first set of teeth grows when a baby is about one year old. This set of teeth is called **milk teeth**. They are twenty in number. Milk teeth stay in a child up to the age of seven to eight years. When the milk teeth fall off, a new set of teeth grow. They are called **permanent teeth**. They are thirty-two in number. Of these, sixteen are in the upper jaw and sixteen are in the lower jaw. All the teeth in our mouth are not the same. There are four types of teeth. They are **incisors**, **canines**, **premolars** and **molars**.

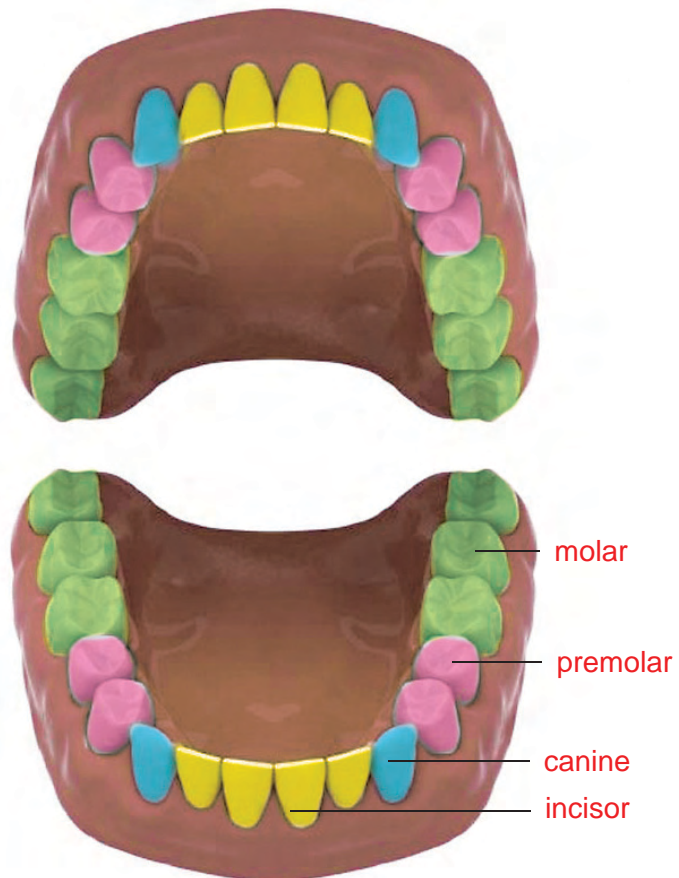


Fig 2.13. Types of Teeth



Incisors: These are chisel shaped teeth at the front of the mouth. They are eight in number. Four are present in each jaw. These are used for biting the food.

Canines: These are sharp and pointed teeth. They are four in number and two are present in each jaw. Canines are used for cutting and tearing of food.

Premolars: These are large teeth behind canines on each side. They have large surface. They are eight in number and four are present in each jaw. They help in chewing and grinding the food.

Molars: These are very large teeth present just behind the premolars. They have more surface area than premolars. They are used for chewing and grinding of food like premolars. They are twelve in number, and six are present in each jaw.

Tooth Care

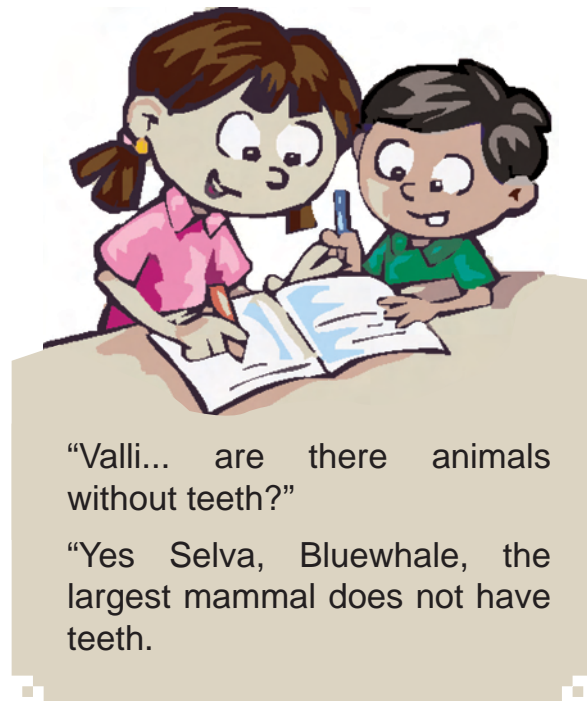
Permanent teeth serve for life time. They are not replaced like the milk teeth. Hence, great care should be taken for keeping the teeth clean.

The enamel in the teeth of children is much thinner than on the teeth of adults. So, teeth of children are more liable to decay than those of adults. Children should avoid very cold or very hot food. They should brush twice a day. Teeth should not be rubbed with hard things like brick powder.

ACTIVITY 2.4

Let us take any fruit. Enjoy eating it. Now find out.

Function	Teeth
Biting	
Tearing and cutting	
Chewing and grinding	



SCIENCE

MORE TO KNOW

Interesting facts about teeth in other animals.

1. Birds have no teeth.
2. Rats have continuously growing teeth.
3. The tusks of elephants are actually incisors that have become very long.
4. Very few adult humans have all the 32 teeth.

2.6. RUMINANTS

Shall we observe some grass eating animals such as goat, cow and buffalo. They keep on chewing even when they are not eating or at rest. They have an interesting digestive system. In fact they eat grass hurriedly and swallow quickly and store it in the first chamber of the stomach called **rumen**.

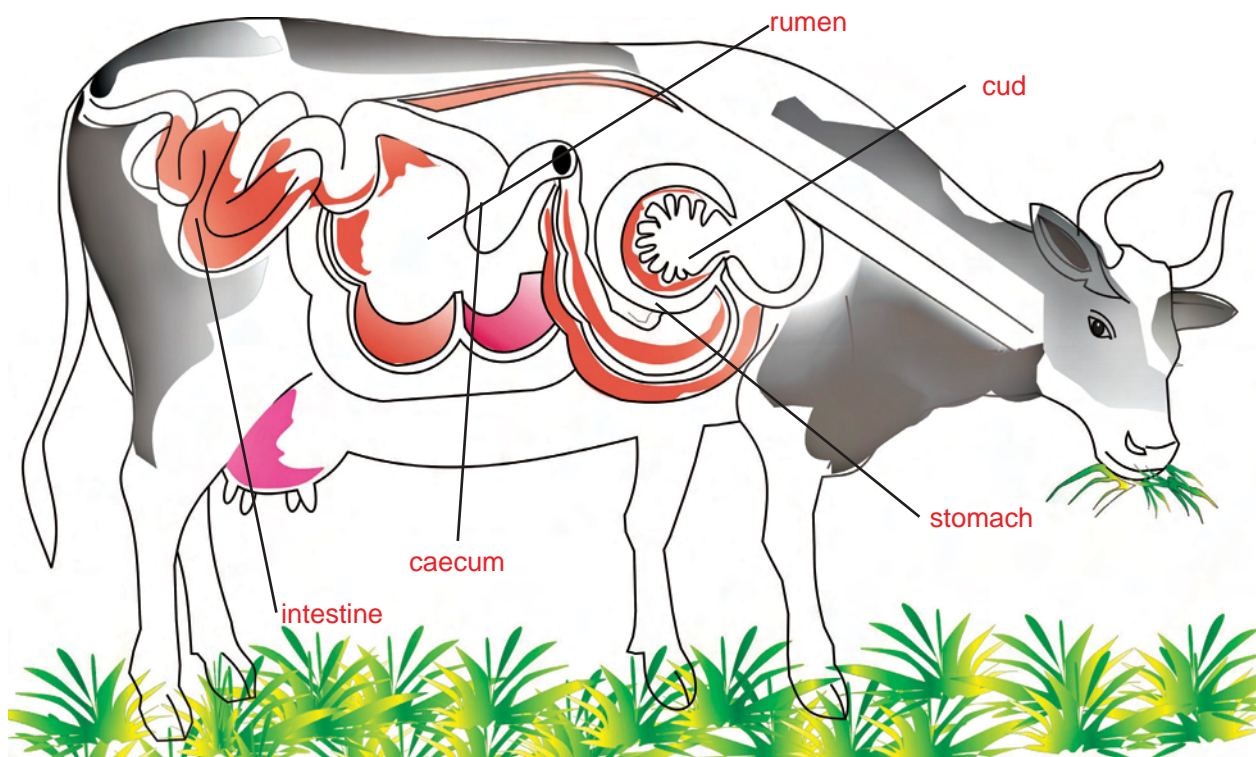


Fig 2.14 Ruminant - Cow

In the rumen, the grass is fermented with the help of certain bacteria and the partially digested grass is called cud. Later, the cud is brought back to the mouth in small quantities and the animal chews it. The process of chewing the cud is called **rumination**. Animals which chew the cud are called **ruminants**.

Grass is rich in cellulose which is a kind of carbohydrate. Herbivorous animals can digest it. The other animals and humans cannot digest cellulose. There is a sac-like structure called caecum between the small and large intestine in ruminants. This sac

contains some bacteria which produce an enzyme called cellulase which digest the cellulose.

ACTIVITY 2.5

From the given list of animals, shall we find out the ruminants and the non ruminants:

Bison, deer, horse, camel, rabbit, and donkey.

MORE TO KNOW

A Cow makes 40,000 to 60,000 jaw movements per day while it keeps on chewing and rechewing.



EVALUATION

1. From the given list of living things list out the autotrophs and heterotrophs.

grass, snake, neemtree, man, mushroom, amoeba, mangotree, cabbage, cow, sunflower.

S.No.	AUTOTROPHS	HETEROTROPHS
1.		
2.		
3.		
4.		
5.		

2. Fill in the boxes with the given words to complete the equation for photosynthesis.

water, starch, oxygen, sunlight, carbondioxide, chlorophyll.



3. Given below is a list of food items with their constituents. In the table given below write the names of the food that you took yesterday and tick the constituents in it.

- Idli - Carbohydrates, proteins
- Dosai - Carbohydrates, proteins
- Sambar - Protein, vitamin, minerals, fat
- Rice - Carbohydrates
- Egg - Protein, fat
- Channa sundal - Protein
- Vegetable poriyal - Vitamins, minerals
- Vadai, milk - Fat, protein
- Fish - Protein
- Millet (Kambu/Cholam) - Carbohydrates
- Greens - Vitamins, minerals

	Food you took	Carbo hydrate	Protein	Fat	Vitamin	Mineral
Breakfast						
Lunch						
Snacks						
Dinner						

Could you find out the nutrient missing in your diet.



4. Observe the teeth of your family members. Count the teeth and record below.

S.No	Family member	Jaws	Incisors	Canines	Premolars	Molars
1.	Father	U				
		L				
2.	Mother	U				
		L				
3.	Self	U				
		L				
4.	Brother	U				
		L				
5.	Sister	U				
		L				
6.		U				
		L				

Dental formula of human being = $I \frac{2}{2}; C \frac{1}{1}; PM \frac{2}{2}; M \frac{3}{3} \times 2 = 32$

5. Find out the teeth, (Look at the diagram) and list its use in human being.

S.No	Picture of teeth	Name of the teeth	Uses
1.			
2.			
3.			
4.			

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