

## Life processes

Life processes are those vital functions of living organism which are necessary for maintenance of life.

These include -

- (a) Nutrition
- (b) Respiration
- (c) Transportation
- (d) Excretion of waste
- (e) Control and co-ordination
- (f) Growth and Reproduction

Nutrition - Nutrition is a process of intake, as well as utilisation of nutrients by an organism.

Significance of Nutrition:-

- (1) It provides energy, which is used by the body to perform vital life processes.
- (2) Nutrition helps in growth and development of body.
- (3) It helps in repair of worn out or damaged cells.
- (4) It protects the body from diseases.
- (5) It helps in formation of hormones and enzymes.

Types:- Based on the mode of obtaining food organisms can be classified into two groups - autotrophic and heterotrophic.

① Autotrophic Nutrition - "Autotrophic nutrition the organism prepares or synthesises its own food utilising only

(2)  
the inorganic raw material.

eg:- Green plants and autotrophic bacteria obtained food by photosynthesis.

(2) Heterotrophic nutrition:- A type of nutrition in which energy is derived from the intake and digestion of the organic substances, normally of plant or animal source.

Heterotrophic mode of nutrition is of different types:-

(A) Saprophytic Nutrition:- "In saprophytic nutrition organisms obtain nutrients from the dead and decaying organic matter." Such organisms are called Saprophytes.  
ex:- Fungi & bacteria.

Note:- Plant which perform saprophytic nutrition are called Saprophytes.

Animals which perform saprophytic nutrition are called Saprozoites.

(B) Parasitic Nutrition:-

Parasitic nutrition refers to the mode of obtaining food synthesised by others. The organism which obtains the food is called "Parasite", and the organism from which food is absorbed is called "host".

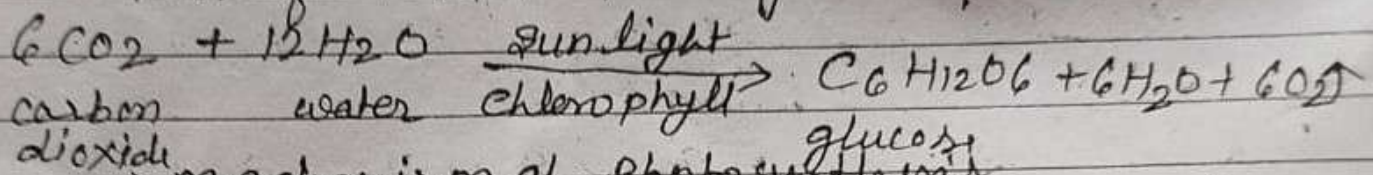
Parasites are of two types

(1) Ectoparasites live on the surface of host body; eg:- leech, bedbug etc.

## Nutrition in plants:-

Green plants are autotrophic and synthesise food with the help of light by the process of photosynthesis.

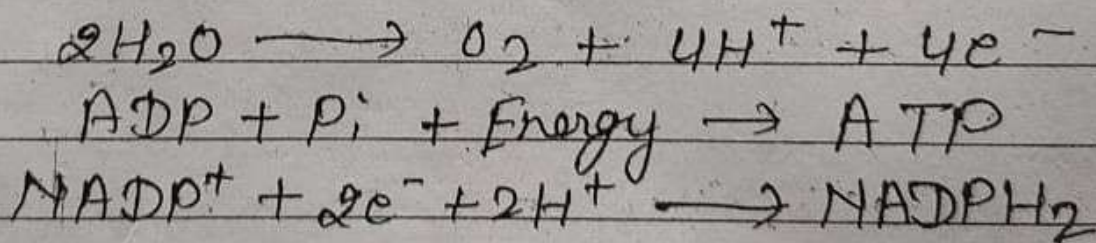
"It is a process in which plants utilize sunlight and chlorophyll to prepare food using carbon dioxide and water". It is a biochemical process in which organic food is manufactured in a green plant.



Mechanism of photosynthesis  
The synthesis of food (glucose) is a complex process and takes place in two phases -  
(a) Light Reaction:-

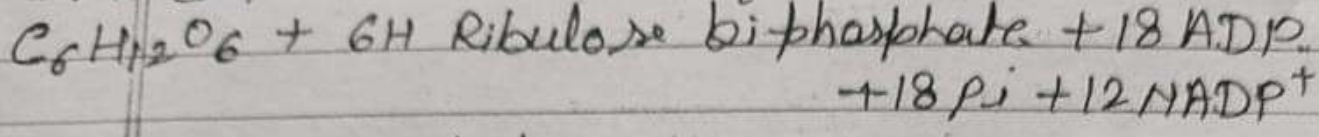
This process takes place in stroma of chloroplast in the presence of sunlight. In this reaction oxygen gas is liberated and energy is formed.

### Photolysis of water:-



(B) Dark reaction:- In this process, carbon dioxide enters into a cycle of reactions starting with ribulose

bisphosphate. At one the end of the cycle, carbonate is synthesised and Ribulose bisphosphate is regenerated. It is complete in stroma of chloroplast.

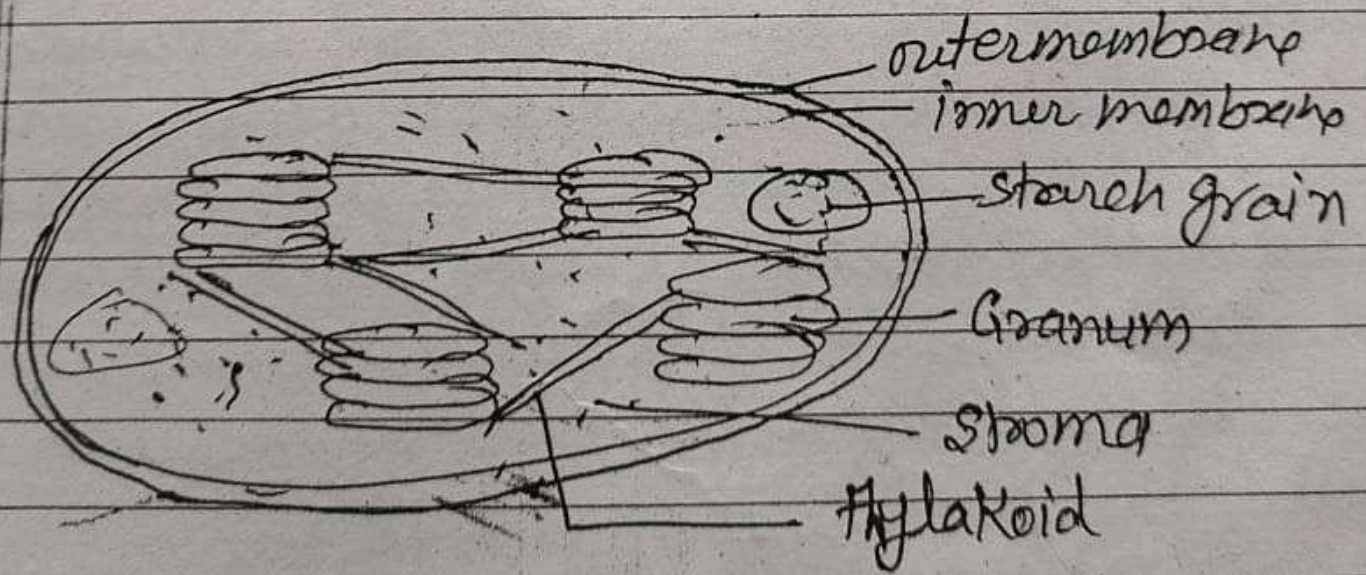


Site of Photosynthesis 1-

The chlorophyll pigments are mainly present in cell organelles, called plastid (chloroplast).

Chloroplast is double membrane structure. In higher plants, stacks of lamellar structure called grana are present. The inner membrane lines the lumen of the chloroplast called the matrix or stroma.

In the grana, lamellae form sac like structure called thylakoids



Structure of chloroplast

Photosynthetic pigments in green plants are —

Chlorophyll — Green

Carotenes — orange

Xanthophylls — Yellow

Chlorophyll is a primary photosynthetic pigment which helps in conversion of light into chemical energy.

Raw materials for photosynthesis :-  $\text{CO}_2$  &  $\text{H}_2\text{O}$

The synthesis of carbohydrate (glucose) requires two substances —  $\text{CO}_2$  and  $\text{H}_2\text{O}$ .

$\text{CO}_2$  is a gas released into the atmosphere during respiration, plants use  $\text{CO}_2$ , which enters the leaf through the stomata present on its surface. Plants utilize  $\text{CO}_2$  during photosynthesis.

Water ( $\text{H}_2\text{O}$ ) is an important requirement for photosynthesis. Roots absorb water through osmosis. Water gets oxidized in the presence of light and releases necessary electrons and protons which pass through the electron transport system.

Stomata :- The  $\text{CO}_2$  gas enters the leaves of the plant through the stomata present on their surface. Each stomatal pore (or stoma) is surrounded by a pair of guard cells.

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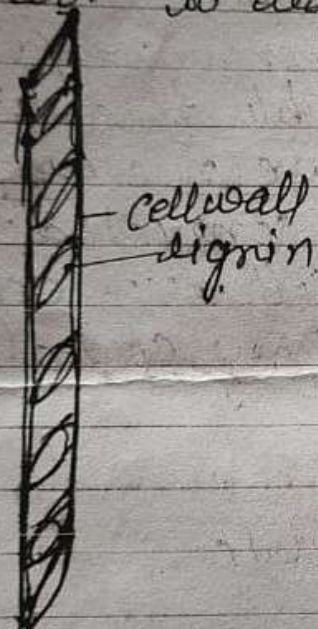
1) Xylem - It is made up of four types of tissues.

(a) Tracheids - These are non-living long tubular cells which are tapering on the two end, cell wall is thick due to lignin.

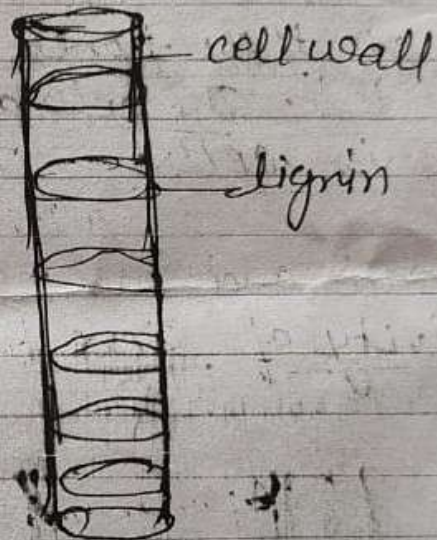
Function - They give strength to soft organs and take water from root to shoot.

(b) Vessels - These are cylindrical tubes connected end to end. The cell wall gets thickened due to lignin.

Function - Vessels also provide mechanical strength and ascend water and minerals from root to leaves.



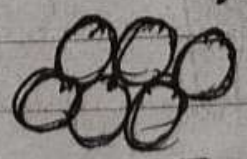
Tracheid



vessel

(3) xylem parenchyma - These are living cells, but the walls are thick.

Function - They store food and provide strength.



(4) xylem Fibres - These are non-living sclerenchymatous cells.

Function - They provide mechanical strength.

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## ① Functions of xylem

- ① Tracheid and vessels conduct water from down to up.
- ② xylem parenchyma store food and lateral conduction of water.
- ③ The fibrous peel of coconut is made up of Sclerenchyma.

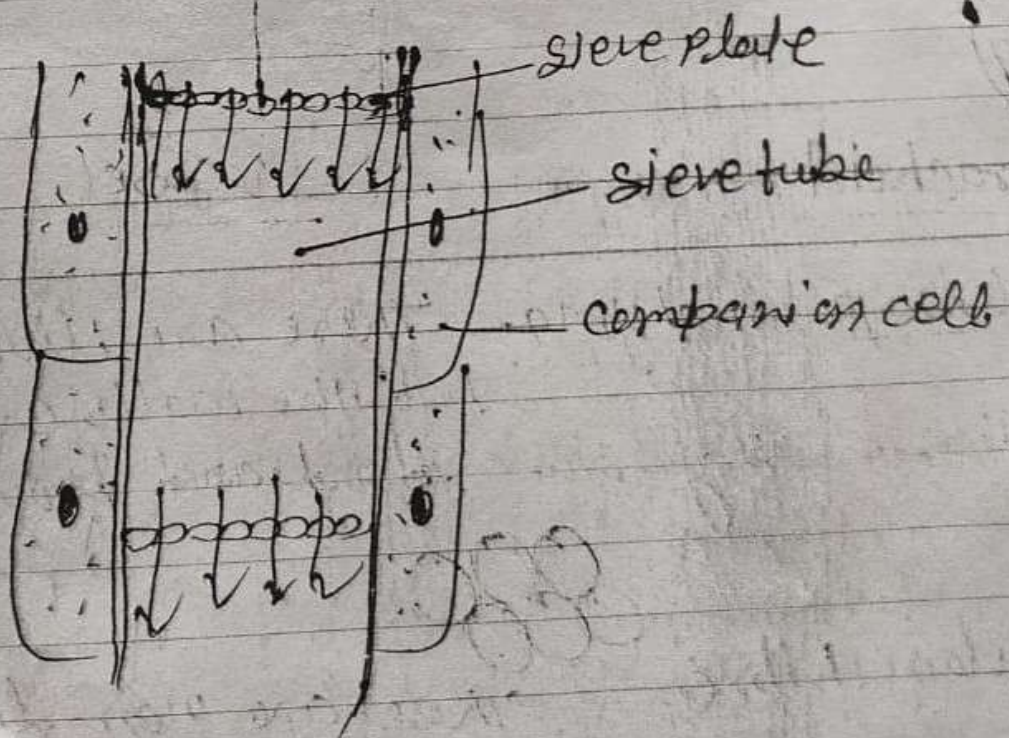
## ② phloem It is made up of four types of tissues.

① Sieve tubes - These are living tubular cells. The place where one connects with the other end to end many pores are present.

Through these pores only soluble food is transported. The cells do not have nucleus.

② Companion cells - These are connected with sieve cell. The cells

has thin wall and one nucleus. They control the activity of sieve tubes.

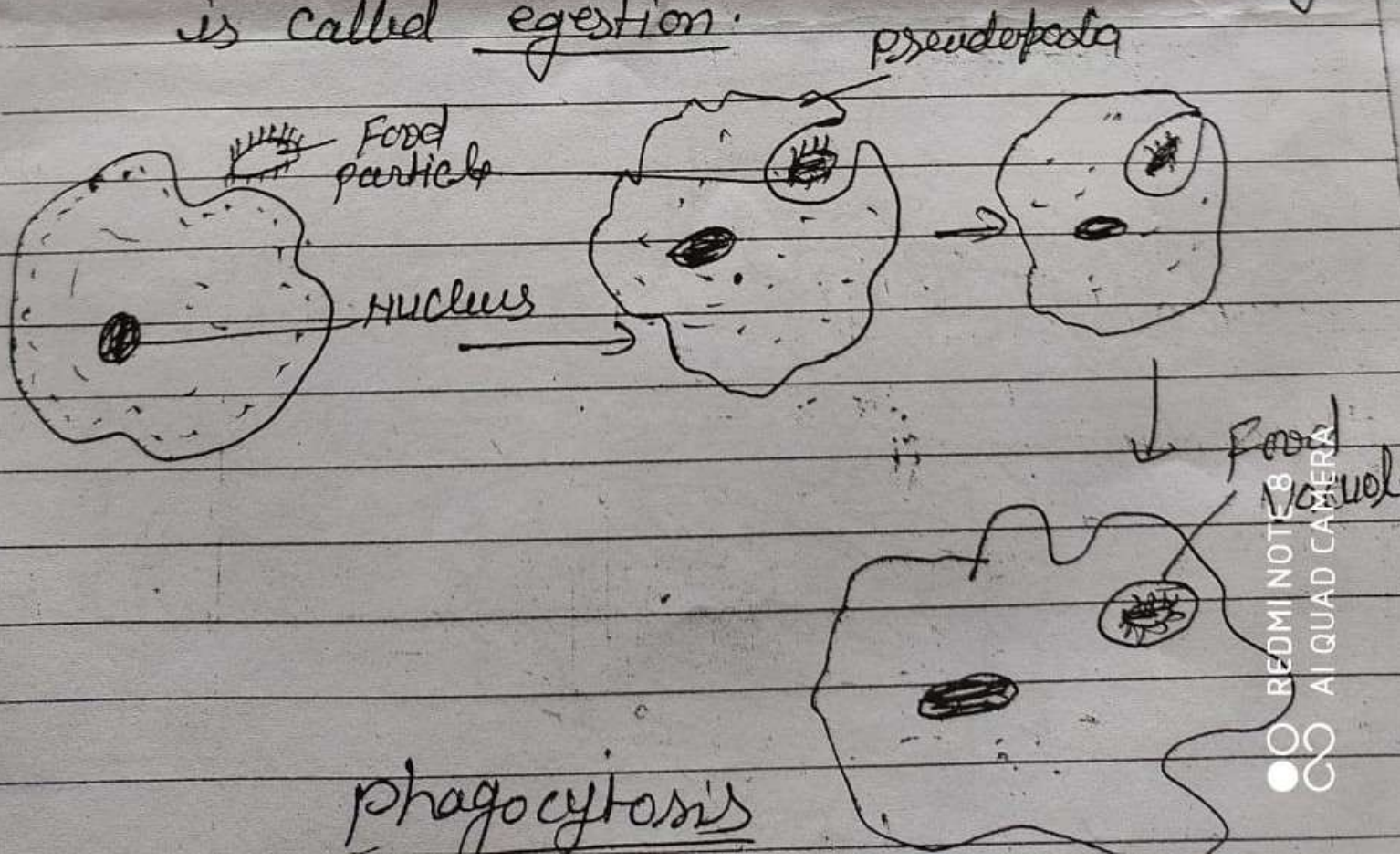


③ Digestion :- the lysosomes release digestive enzymes in the food vacuole and convert the food particle into soluble form. This process is called digestion.

The food vacuole in Amoeba is also called gastric or temporary stomach.

④ Absorption and Assimilation :- The digested food is in soluble form. It gets diffused into the cytoplasm by passing through the membrane of the food vacuole. Then it is utilized by the cell. This process is called assimilation.

⑤ Egestion :- Removal of undigested food or waste products from the body is called egestion.



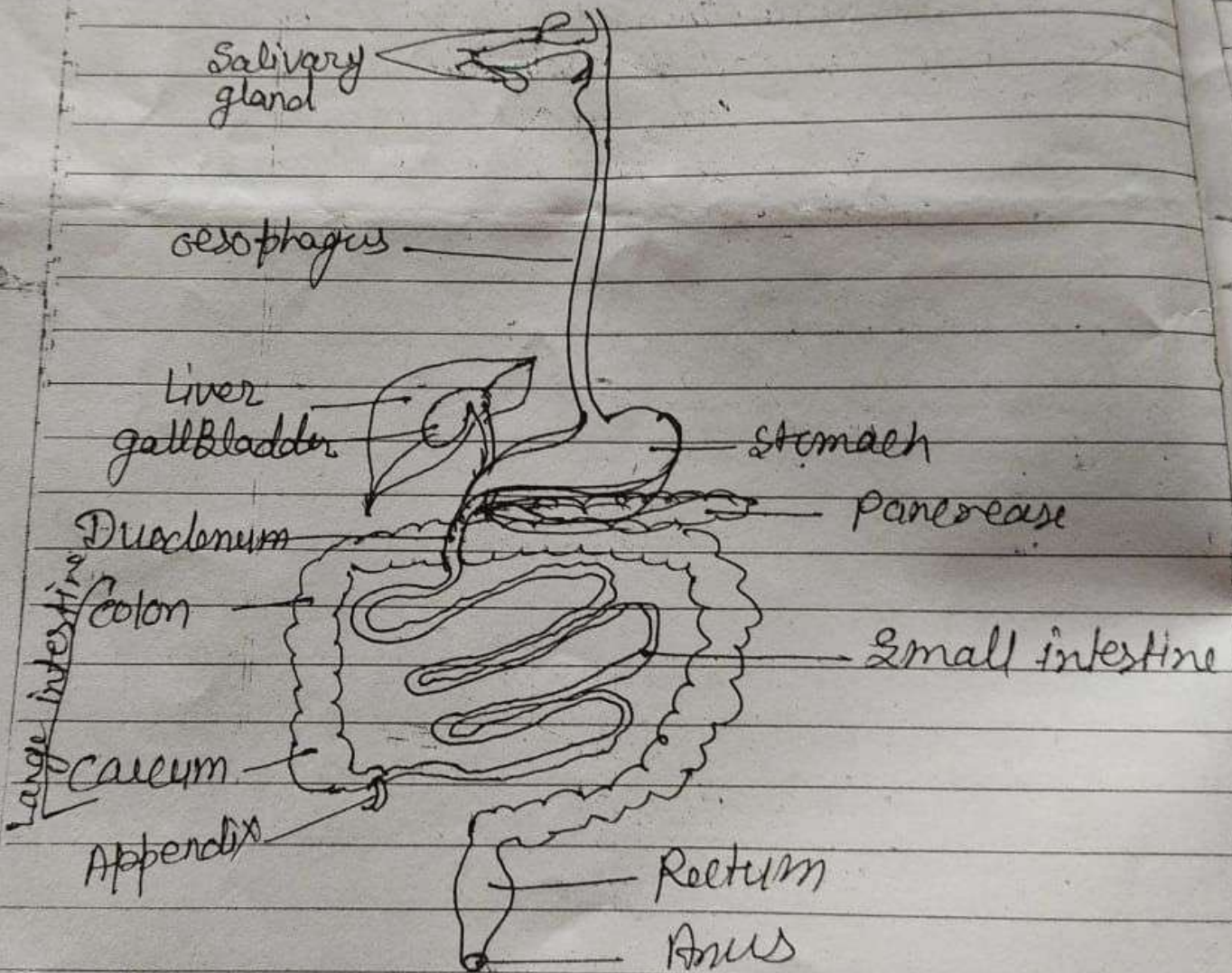


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## Nutrition in Human Beings :-

Human beings are heterotrophic omnivores which have a well defined system for digestion of food. The human digestive system consists of alimentary canal and its associated glands.

Alimentary Canal :- The alimentary canal in human is 9m long tube which extends from mouth to the anus.



Human Alimentary Canal

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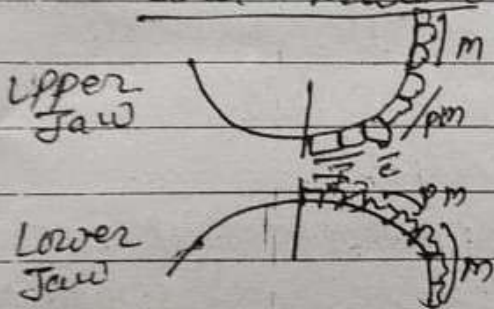
Mouth :- The uppermost opening of the digestive system through which intake of food occurs, is called mouth.

Buccal cavity or oral cavity - It is a large space which has palate above it. The floor of this cavity is formed by the muscular tongue which helps in ingestion of food. It bears taste buds which help to identify taste -

Sweet, Sour, Salty and bitter. It moves food in buccal cavity, mixes with saliva.

Teeth bearing jaws are on the sides of buccal cavity. Both upper and lower jaws are provided with four different types of teeth - Incisors, canines, premolar

and molar.

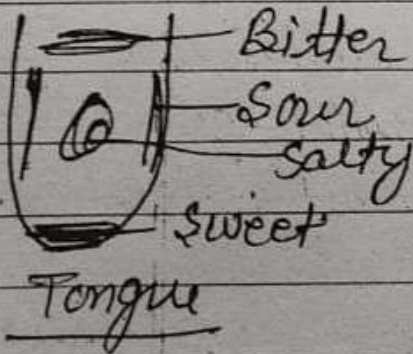


Dental formula of milk teeth

$$\begin{array}{c} I \ C \ P \ M \\ 2 \ 1 \ 0 \ 2 \\ \hline 2 \ 1 \ 0 \ 2 \end{array} \times 2 = \frac{10}{10} = 20$$

Dental formula of permanent teeth

$$\begin{array}{c} I \ C \ P \ M \\ 2 \ 1 \ 2 \ 3 \\ \hline 2 \ 1 \ 2 \ 3 \end{array} \times 2 = \frac{16}{16} = 32$$



Incisors are sharp cutting teeth.

Canines are pointed teeth for tearing.

Premolars and molars are grinding / Chewing teeth.

Oesophagus - It is long tubular ~~walls~~ <sup>walls</sup> which carry the food from buccal cavity to the stomach. The walls of oesophagus perform peristalsis which involves expansion and contraction of walls of oesophagus. This help to push the food down to the stomach. It is open into stomach.

Stomach - It is muscular sac which receive the partially digested food. Stomach contains muscus, HCl, and gastric juices.

Small Intestine :- It is a coiled and narrow tube and differentiated into three regions

① Duodenum - This is first part and is curved C-shaped. In this part Bile duct and pancreatic duct open.

② Jejunum :- long and more coiled.

③ Ileum - Last part of small intestine whose inner surface is folded to form villi which absorb the products of digestion.

Large Intestine :- It is much shorter and wider than small intestine and divided into three part :-

Caecum - which is small rounded blind sac from which vermiform appendix arise

Colon - is the inverted U shaped tube

Rectum - it is open to exterior through anus

Digestive Gland :-

① Salivary Gland - These are three pair and secrete the saliva - parotids gland, submaxillary and sublingual glands.

② Gastric Glands - These are present in stomach and gastric juice, which containing HCl, enzymes and mucus.

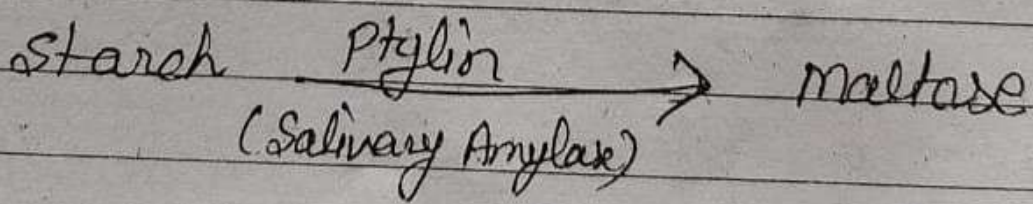
③ Liver - This is largest gland at right side gall bladder is present, which is containing secrete bile juice.

④ Pancreas :- It is gland present between the loops of duodenum. It secretes pancreatic juice containing enzymes.

Digestion - It is the process of conversion of large, complex and insoluble organic molecules into simpler, smaller and soluble molecules.

The process of digestion starts in the mouth cavity and continues up to intestine.

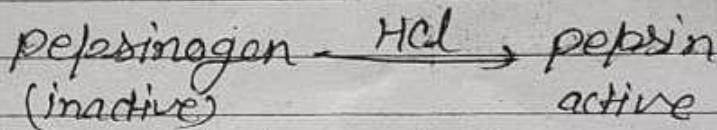
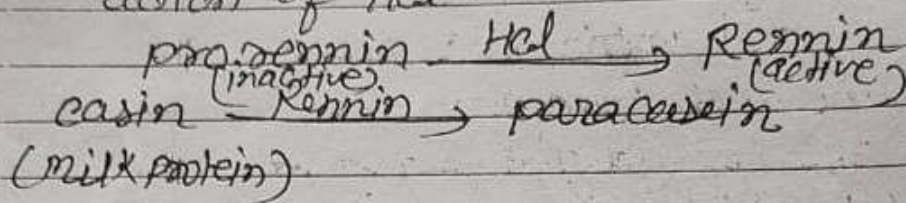
① In the mouth food mixed with saliva, which contains ptylin or salivary amylase and help in digestion of starch.



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② The food passes from mouth cavity to stomach. Stomach contains gastric juice which contains HCl, two protein digesting enzymes — pepsinogen and prorennin.

Pepsin and rennin are activated by the action of HCl.

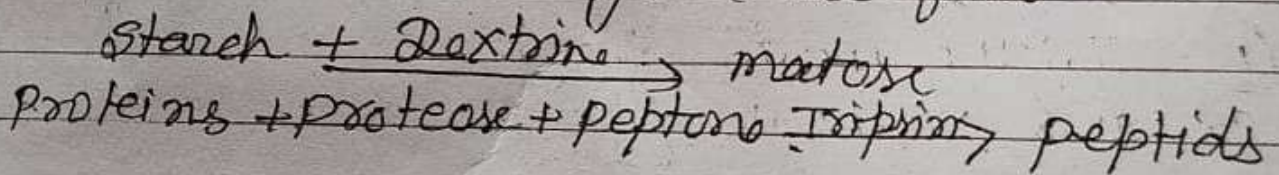


Protein  $\xrightarrow{\text{Pepsin}}$  peptones & proteoses

Function of HCl: -

- ① Activated the gastric enzyme.
- ② Stop the action of Saliva.
- ③ Kill microorganism present in food.
- ④ make the food soft for digestion.

③ In small intestine pancreatic juice, Bile juice and intestinal juices are present which digest all food.



Fat  $\xrightarrow{\text{Bile juice}}$  Emulsify Fat

Emulsify fat  $\xrightarrow{\text{Lipase}}$  Fatty acid + glycerol

Emulsification: - The large globules of fat are broken down in smaller globules in the presence of Bile juice and provide large surface area for action of enzyme.

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Absorption - All the digested food is absorbed in the ileum. The food is absorbed by the diffusion, osmosis or by active participation of the cells of the intestine.

Assimilation :- It is the process of utilisation of absorbed food for various body function. The absorbed nutrients are utilised to synthesise complex molecules like carbohydrates, protein and fats inside the cells.

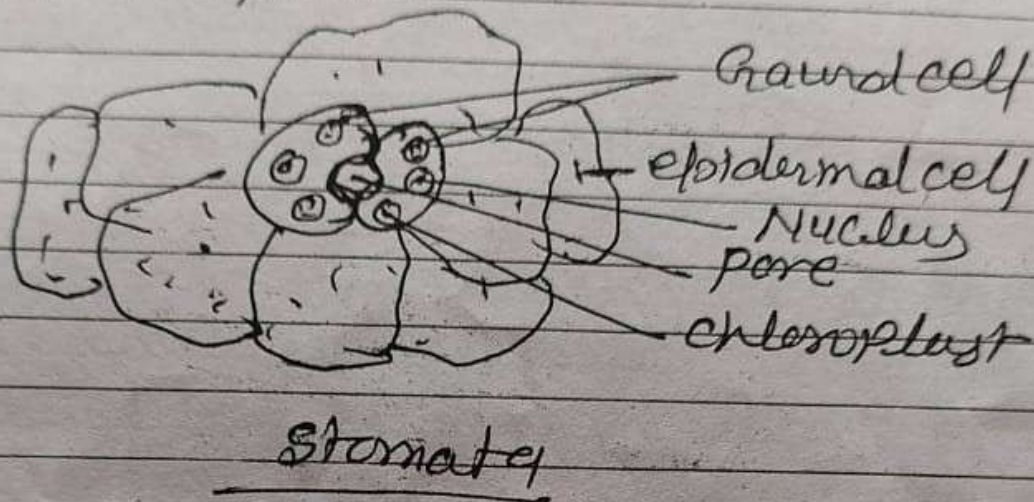
Egestion :- It is the process of elimination of undigested food formed in the cells, or in the lumen of large intestine through the anus.

Dental Caries :- It is the tooth decay which involves destruction of the enamel layer of the tooth by acid produced by the action of bacteria on sugar. If dental caries is not treated, it can spread to the dentine and pulp of the tooth causing inflammation and infection of the tooth.

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The opening and closing of stomatal pores is controlled by the guard cell. When water flows in to the guard cell, they swell, become curved and the pore to open. When the guard cells lose water, they shrink and close the stomatal pores.



## Factors Affecting Photosynthesis :-

- ① Light :- Plants use a very small portion of the incoming solar radiation through their pigment. The chlorophyll absorbs mostly the blue and red region of the spectrum.
- ② Temperature :- Low temp. has an inhibitory effect on the rate of photosynthesis because the activity of the enzymes is lowered. Increase in temp. initially accelerates the rate, but higher temp. inhibits photosynthesis.
- ③ Water :- water is a very important factor. Photosynthesis rate slow in water deficient

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(2) Carbon dioxide:- The rate of photosynthesis increase with an increase in  $\text{CO}_2$  concentration up to a certain level.

Beyond that,  $\text{CO}_2$  concentration has no effect on the rate of photosynthesis.

On the contrary, it is toxic to plants and inhibits the rate of photosynthesis.

## Nutrition In Animals

Animals are dependent upon external source for food. Hence they are called heterotrophs.

Depending upon the food habit, animals are classified into herbivores, Carnivores and omnivores.

### Nutrition in Amoeba:-

The mode of nutrition of amoeba is holozoic. The process of obtaining food by a cell or unicellular organism is termed as phagocytosis.

The various steps of nutrition are:-

Ingestion - means intake of food, food particle is engulfed by amoeba formation of Pseudopodia around it. The food particle gets trapped when tips of pseudopodia on both sides get attached. Lysosome present in cytoplasm surround the food particle and form a food vacuole.



Definition:- A group of cell similar in structure that work together to perform a particular function forms a tissue. The term tissue was coined by Bichat in 1792.

Histology - The study of tissues is called histology.

Bichat is known as the father of histology. marcello Malpighi is considered as founder of histology. The term histology was given by Mayer in 1819.

Division of Labour:- Each specific function is carried out by specific tissue.

In man the muscle cell has the capacity of contraction and stretch. It has movement. Oxygen, food, hormone and materials are transported by blood.

In plant cell vascular tissue transport food and water from one place to other. In multicellular organism division of labour is present.

Difference between plant and Animal Tissue -

Plant tissue

Animals Tissue

- |   |   |
|---|---|
| (1) Dead supportive tissue are more abundant as compared to living tissues. | (1) In animals, Living tissue are more common as compared to dead tissue. |
| (2) Growth in plants is limited to specific region.                         | (2) In animals it is dispersed.   |
| (3) They require less maintenance energy.                                   | (3) They required more maintenance energy.                                |

(2) Collenchyma :- The tissue of epidermis of plant.

- (1) They are also living cells.
- (2) The corners of cells are thick due to deposition of extra cellulose.
- (3) Intercellular space is nearly absent.



Functions - It provides elasticity and mechanical support to the plant.

(3) Sclerenchyma - They are found in hard covering of seeds and nuts.

- (1) The cells of tissues are dead.
- (2) The cells are long and thick walled due to deposition of lignin.
- (3) Intercellular space are absent.

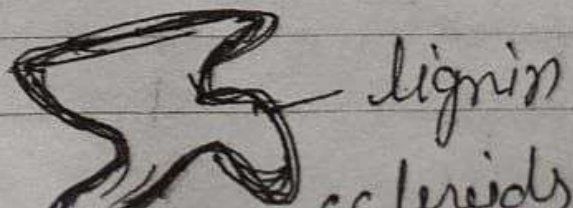
Function - Sclerenchyma provides strength and hardness to plant.

Such tissues are present in vascular tissue veins of leaf, seed and fruit rinds or peels.

Sclerenchyma are of two types -

① Sclereids, ② Fibres.

① Sclereids - It is also called grit cells or stone cells. They are irregular shaped, dead cells.

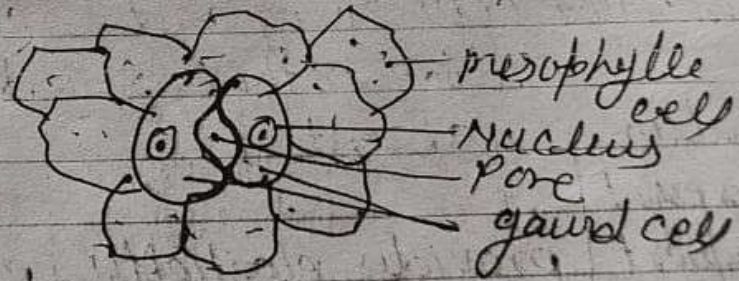


Epidermis - The outermost layer of plants is called Epidermis. The cells have no intercellular space, most of cells are flat. The external and internal walls are thicker than the inner walls.

- functions -
- (1) It protects all parts of plants
  - (2) It help in decreasing the evaporation of water.
  - (3) It prevents mechanical pressure and entry of parasites in plants.
  - (4) cuticle is present in some plant which prevents water losses.

Stomata - There are small pores present in the epidermis of leaf. The pores are called Stoma. Each Stomata is covered with two kidney shaped cells, known as guard cell.

- Function
- (1) Help in gaseous exchange from environment
  - (2) Stomata also help in Transpiration.



### Complex permanent tissues

They are made up of more than one type of cells but act as a unit. ex - xylem and phloem. These are also known as conducting tissues.

Conducting tissues - xylem and phloem together known as vascular bundle.

(2) Endoparasites live inside the body of host eg - Ascaris, Taenia, Plasmodium etc. bacteria, fungi, a few higher plants like cuscuta (amarbel).

### (3) Holozoic Nutrition:-

Holozoic nutrition can be defined as "the feeding of complex organic matter by ingestion, which is subsequently digested and absorbed" eg:- Amoeba, frog, human being.

Note:- Detritivores or Scavengers are holozoic animals which feed on dead bodies of other animals eg:- Vultures, hyena, kites etc.

### Difference between Autotrophs and Heterotrophs

#### Autotrophs

(1) They manufacture their own food from inorganic substances.

(2) They have capability to perform photosynthesis.

eg:- green plants, cyanobacteria

#### Heterotrophs

(1) They obtain their food from their surroundings.

(2) They do not perform photosynthesis.

eg:- Animals, Parasites, Fungi

## (2) Permanent Tissues:-

Permanent tissues are specific in function. They have no ability of division. The cells form a permanent tissue. The process of modification of cells to do specific function is called differentiation.

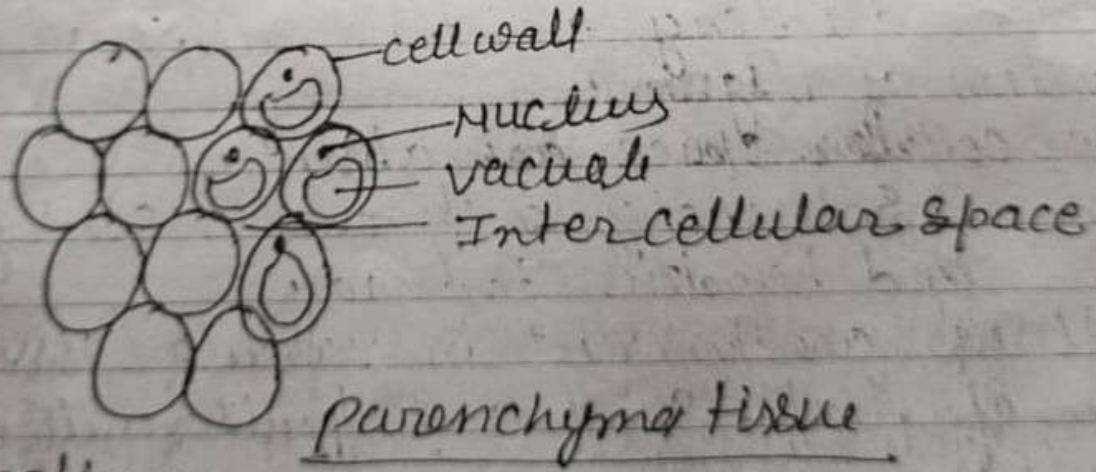
The cells of meristematic tissue divide and form various types of simple permanent tissue.

1- Simple Permanent tissue - These are of following 3 types:-

(a) parenchyma - The tissue is made up of thin walled simple cells.

The characters are -

- (a) cells are living.
- (b) cytoplasm is dense.
- (c) Intercellular space present.
- (d) The cells possess the power of division.
- (e) cells contains a small nucleus and a large central vacuole.



### Functions

- (1) It provides support and store food for plant.
- (2) Some layers of this tissue form the basic packing.
- (3) These tissue store waste products of plant. Such as tannin, gum, crystals, resins. etc.

Sclereids form the gritty part of the ripe fruits and hardness to the seed coat and nut shells.

(2) Fibres - It is long, narrower thick and lignified cells. It is pointed at both ends and are clustered into strands.



- lignin

Fibre used for mats, Cordage (ropes and cables) brushes etc.

### Difference

	<u>parenchyma</u>	<u>collenchyma</u>	<u>Sclerenchyma</u>
1	cells are thin walled and living.	cells living and thick in the corners	cells dead and thick walled
2	Intercellular spaces present	absent	absent
3	provides support to the plant and store food.	provides elasticity and mechanical support to the plant	provides strength to the plants

### Difference

#### Simple tissue

1- Simple tissue is made up of similar type of cells. These tissue may take a specific permanent shape for specific function, i.e. parenchyma, collenchyma

#### Complex tissue

Complex tissue is made of more than one type of cells. i.e. xylem and phloem

## Plant Tissues

1. On the ability of division plant tissues are of two types:

- ① Growth or meristematic tissue
- ② Permanent tissue.

① Meristematic Tissues :- Meristematic tissues have ability of division and help in increasing the length and girth of the plant.

Characters of Meristematic Tissues :-

- 1) Cells are small and thin walled.
- 2) Cytoplasm is dense.
- 3) Vacuoles are very small or absent. Nucleus is large.
- 4) No intercellular spaces present.
- 5) It always divides and form new permanent tissues.

Types of Meristematic Tissues

① Apical meristem :- The tissues are present on the shoot and root apex. It results in the growth in height.

② Lateral meristem :- Due to division of this cell stem and root grow in thickness.

③ Intercalary meristem :- It is present in the base of leaves, branches and the sides of internodes.

Functions :-

- ① This is act as a parent tissue from which other tissues develop.
- ② These tissue take part in growth by formation of new cells.
- ③ The place of injury in plants is healed up by the formation of new cell.

