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B.Sc HONS Part III Paper V

Topic :- Give an account of Physiology of digestion in Mammals.

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**Q. • Give an account of physiology of digestion in mammal.**

**Ans. Chemical process of digestion :** Chemical process of digestion refers to the treatment of food materials with enzyme. The chemical process of digestion can be conveniently studied by the digestion occurring in the different region of the alimentary canal. Based on this it is grouped into 3 types namely :

- (1) Buccal digestion or salivary digestion.
- (2) Gastric digestion and
- (3) Intestinal digestion.

**(1) Buccal digestion or salivary digestion :** Digestion of the food occurring inside the cavity is called buccal digestion. As salivary enzymes play the major role here it is also called salivary digestion.

In the mouth food is masticated. During mastication the food is crushed into smaller particles. As it is crushed it mixes with secretion of salivary gland.

**(a) Parotid glands :** These glands are located just below and in front of the ears.

**(b) Sub-maxillary glands :** These glands are present in the angles of the lower jaw.

**(c) Sub-lingual glands :** These glands are located below the tongue.

**Saliva :** The secretion of salivary gland is called saliva. The human saliva has following salient features. Gases like  $O_2$ ,  $N_2$  and  $CO_2$  are also present in the saliva.

**(1) Function of Saliva :** It keeps the mouth moist and helps speech.

(2) It moistens the food and helps mastication and deglutition.

(3) It lubricates the mouth cavity and avoids thirsty.

(4) It cools down the hot substances.

(5) It dilutes the irritant substances and prevents injury to the mucous membrane.

(6) It is essential for the appreciation of taste.

(7) Saliva is an important digestive agent. It contains two digestive enzymes. They are ptyalin (amylase) and maltase.

**Role of Ptyalin :** Ptyalin acts on starch. First of all it is converted into soluble starch. Then soluble starch is converted into achrodextrin is converted into maltose.

Starch - Soluble starch Erythrodestrin -

Maltose ← Archrodextrin ←

**(1) Action of maltose :** Maltose acts on maltose and it is split into two glucose molecules.

Maltose  $\xrightarrow{\text{Maltase}}$  Glucose

**(2) Gastric digestion :** After swallowing the food reaches the stomach. Here the food is treated mechanically as well as chemically. The chemical changes are due to gastric juices. Gastric juices are the secretion of gastric glands.

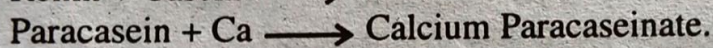
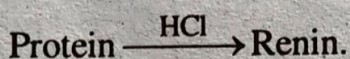


**Gastric glands :** The gland present inside the stomach are called gastric glands. They secrete gastric juices. There are about 35,000,000 gastric glands in man. The glands are located below the surface of epithelium. These are simple, tubular glands arranged as parallel tubes opening on the surface. The main tubular portion of the gland is called body. The inner end extends into the muscular mucosa where it terminates in a blind bulbous end called fundus of the gland. The neck of the gland connects the body of the isthmus which communicate with the gastric crypt.

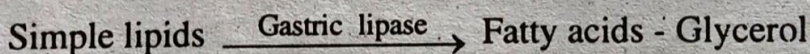
**These glands are formed of four types of cells. They are :**

- (1) Mucous neck cells secreting mucous.
- (2) Chief cells or zymogenic cells or peptic cells secreting pepsin, renin and gillatinase.
- (3) Oxyntic or parietal cells secreting hydrochloric acid (HCl) and
- (4) Argentaffin cells are concerned with the secretion of vasoconstrictor serofenin.

**(a) Renin :** It is secreted in an inactive form called prorenin. It is converted into active renin by HCl. It acts on the protein of milk and converts into paracasein. Paracasein combines with calcium to form calcium paracaseinate. It separates out as curd and is acted upon by pepsin. This process is called curdling of milk.



**(b) Gastric lipase :** It splits neutral fats (simple lipids) into one molecule of glycerol and three molecules of fatty acids.



**(c) Hydrochloric acid :** It provides an acid medium for the action of enzymes in the stomach. It activates pepsinogen and prorenin it has some effect bactericidal effect on harmful bacteria.

**(3) Intestinal digestion :** As far as digestion is concerned small intestine especially duodenum is significant because it receives pancreatic juice from pancreas. Bile from liver and intestinal juice from intestinal glands. Because of these major events of digestion occur in the small intestine.

**Pancreatic juice :** It is secreted by the acini cells of pancreas. It is colourless and odourless alkaline fluid. It has low viscosity. It is isotonic with blood.

**(1) Trypsin :** It is secreted in an inactive form called trypsinogen. It is activated by enteropeptidase (enterokinase—old name) it is endopeptidase. It acts on all proteins. It readily digests the denatured or partially digested protein into some amino acids.

**(2) Chymotrypsin :** It is secreted in an inactive form called trypsinogen. It is activated by trypsin. It is endopeptidase. It has a milk curdling effect.



**(3) Carboxy peptidase :** It is secreted in an inactive procarboxy peptidase. It is activated by trypsin.

**(4) Pancreo peptidase or Elastase :** It hydrolyses elastin.

**(5) Sucrose :** It splits sucrose into glucose and fructose.



**(6) Maltose :** It splits maltose into molecules of glucose.



**(7) Lactose :** It splits lactose into glucose and galactose.



**Absorption of carbohydrate :** Carbohydrates are absorbed mainly in the form of a monosaccharide glucose. In addition monosaccharides like galactose, laevulose, mannose, xylose, arabinose, etc. are also absorbed.

**Absorption of Proteins :** Proteins are absorbed mainly in the form of amino acids. Rarely proteins are absorbed in the form of peptides. Absorption is an active or passive process. They are absorbed by the blood capillary and transported by portal system.

**Absorption of fats :** Fats are absorbed in the form of fatty acids and glycerol. Most of the fats are absorbed in the small intestine.

Fats are absorbed after emulsification by bile salts. Fatty acids and monoglycerides are absorbed in the duodenum and jejunum, conjugated bile salts are absorbed in the terminal ileum.

Fatty acids are absorbed by the lacteal and are transported by lymphatic system. They enter the blood stream from thoracic duct.

The products of fat digestion enter the mucosa cells in two forms. They are :

(1) Some of the fatty acids and monoglycerides aggregate to form water soluble particles called micells. The micelles diffuse into the epithelial cells.

(2) They are absorbed in the form of bile salts.