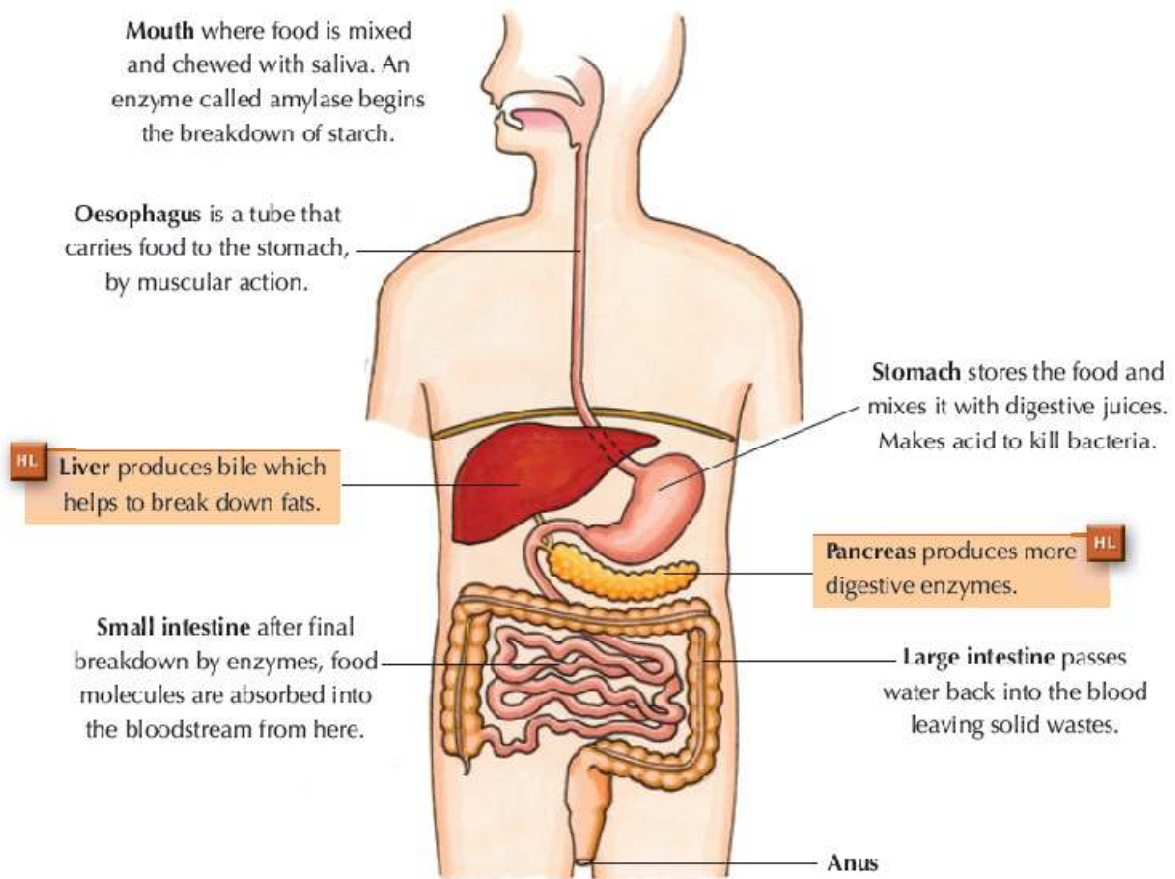


Chapter 4 – The Digestive System



The digestive system is seven and a half metres long and runs from the mouth to the anus. The length gives time for food to be digested and nutrients to be absorbed. The pancreas and liver are part of the digestive system but food does not pass through these. They secrete chemicals to help break down the food. Food moves through the digestive system by muscular action called **peristalsis**.

Nutrition

Nutrition is the obtaining and using of food. There are five stages:

- **Ingestion** the taking in of food into the mouth
- **Digestion** the breaking down of food into smaller molecules
- **Absorption** the passing of digested food into the digestive system
- **Assimilation** the use for the food for energy, growth and repair
- **Egestion** the passing of undigested food from the body

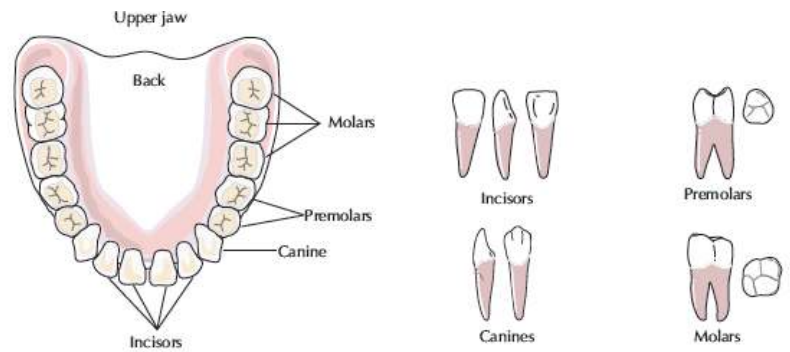
Types of digestion

There are two types of digestion: physical and chemical. **Physical digestion** is the mechanical breakdown of food into smaller parts by chewing in the mouth and churning in the stomach. Chemical digestion is the breakdown of food by chemicals called enzymes in the body.

Physical Digestion

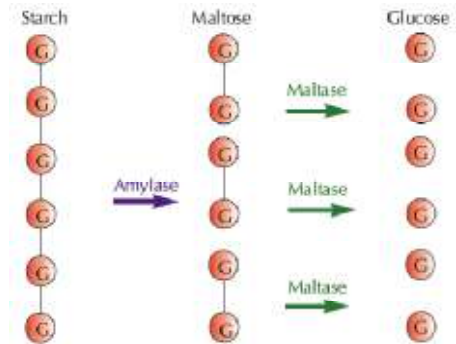
The functions of the 4 types of teeth are:

- **Incisors** cutting food
- **Canines** tearing food
- **Premolars** grinding food
- **Molars** grinding food



Chemical Digestion

Chemical digestion is carried out by special chemicals called **enzymes**. An enzyme acts as a catalyst. A catalyst is something that speeds up or slows down a chemical reaction. **A digestive enzyme is a protein that acts as a catalyst in breaking down food.**



Experiments

To investigate the action of a digestive enzyme (amylase) on starch

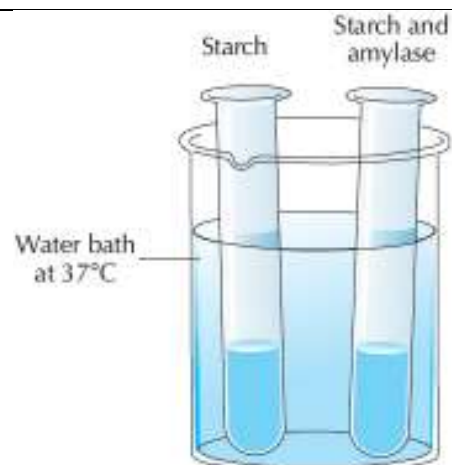
Set up two test tubes as shown. One contains starch solution and amylase, the other just contains starch solution.

Leave in a water bath at 37°C for 30 minutes. Add iodine solution to each test tube and observe the results.

Result: The test tube with just starch turns blue/black showing starch is still present. The test tube with starch and amylase does not turn blue/black.

This is because the enzyme amylase removed the starch and turned it into maltose as seen in the diagram above.

Note: we can further test this sample for a sugar and it should give a brick red colour in the Benedict's solution test.



To investigate the effect of boiling on an enzyme

Set up the equipment as shown in the diagram with 2cm³ of amylase in the test tube. Boil the amylase solution in the water bath. After removing from the bath pour 2cm³ of starch solution into the test tube and shake. Leave this for 15 minutes and test for starch with iodine solution.

Result: the solution turns blue/black showing that the amylase did not break down the starch. We caused the enzyme not to work (denatured) by boiling it. The enzyme amylase works best at 37°C which is body temperature.

