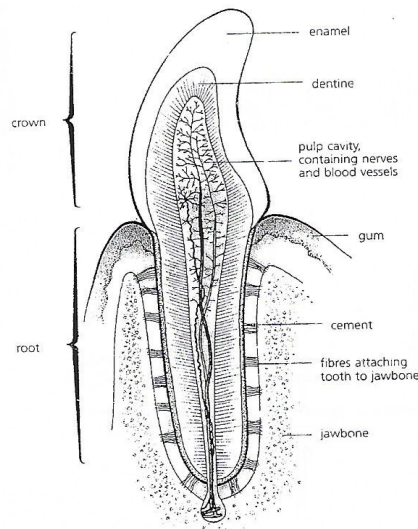


4.6 Types of human teeth



4.5 Longitudinal section through an incisor tooth

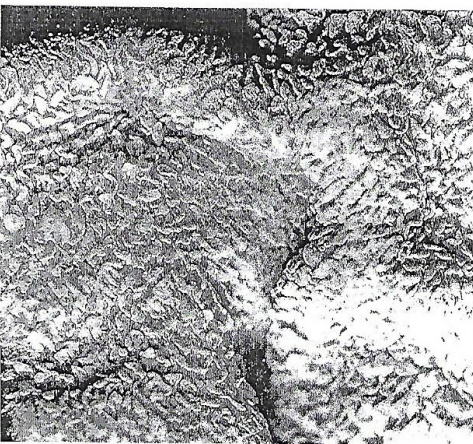
Table 4.5 Summary of chemical digestion in the human alimentary canal

Part of the canal	Juices secreted	Where made	Enzymes in juice	Substrate	Product	Other substances in juice	Function of other substances in juice
Mouth	Saliva	Salivary glands	Amylase	Starch	Maltose		
Oesophagus	None						
Stomach	Gastric juice	In pits in wall of stomach	Protease (pepsin)	Proteins	Polypeptides	Hydrochloric acid	Acid environment for pepsin; kills bacteria
						Rennin (in young mammals)	Clots milk
Duodenum	Pancreatic juice	Pancreas	Amylase	Starch	Maltose	Sodium hydrogen-carbonate (NaHCO ₃)	Neutralises acidity of chyme, to make an alkaline environment for enzymes
			Protease (trypsin)	Proteins and polypeptides	Amino acids		
			Lipase	Emulsified fats	Fatty acids and glycerol		
	Bile	Liver, stored in gall bladder	None			Bile salts	Emulsify fats
						Bile pigments	Excretory products
Ileum	No juice secreted; enzymes remain in or on the cells covering the villi	By cells covering the villi	Maltase	Maltose	Glucose		
			Sucrase	Sucrose	Glucose and fructose		
			Lactase	Lactose	Glucose and galactose		
			Peptidase	Polypeptides	Amino acids		
			Lipase	Emulsified fats	Fatty acids and glycerol		

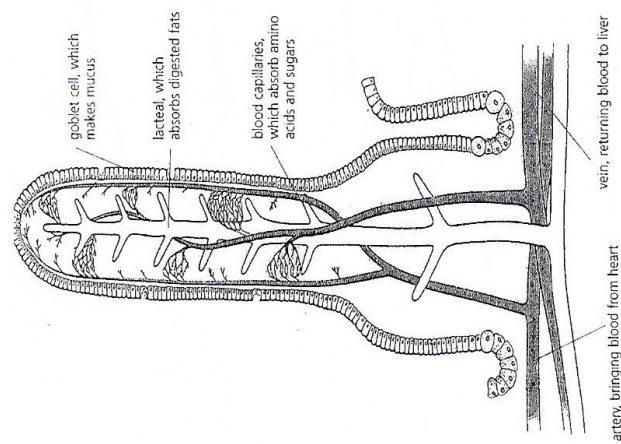
All of the digestive juices also contain water. Water is used in splitting the large food molecules (see section 2.11). It also acts as a solvent for the enzymes, substrates and products. The juices also contain mucus, which is a lubricant, and helps to protect the walls of the alimentary canal from being digested by the enzymes. The colon and rectum play no part in digestion. They are concerned with the absorption and egestion. They are not included in this table.

Table 4.4 How the small intestine is adapted for absorbing digested food

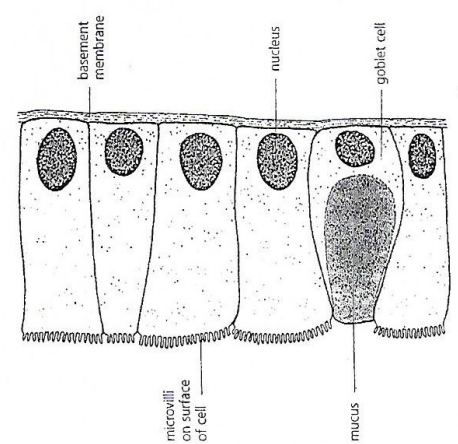
Feature	How this helps absorption to take place
1 It is very long, about 5 m in an adult.	This gives plenty of time for digestion to be completed, and for digested food to be absorbed as it passes through.
2 It has villi. Each villus is covered with cells which have even smaller projections on them, called microvilli.	This gives the inner surface of the small intestine a very large surface area. The larger the surface area, the faster food can be absorbed.
3 Villi contain blood capillaries.	Digested food passes into the blood, to be taken to the liver and then round the body.
4 Villi contain lacteals, which are part of the lymphatic system.	Fats are absorbed into the lacteals.
5 Villi have walls only one cell thick.	The digested food can easily cross the wall to reach the blood capillaries and lacteals.



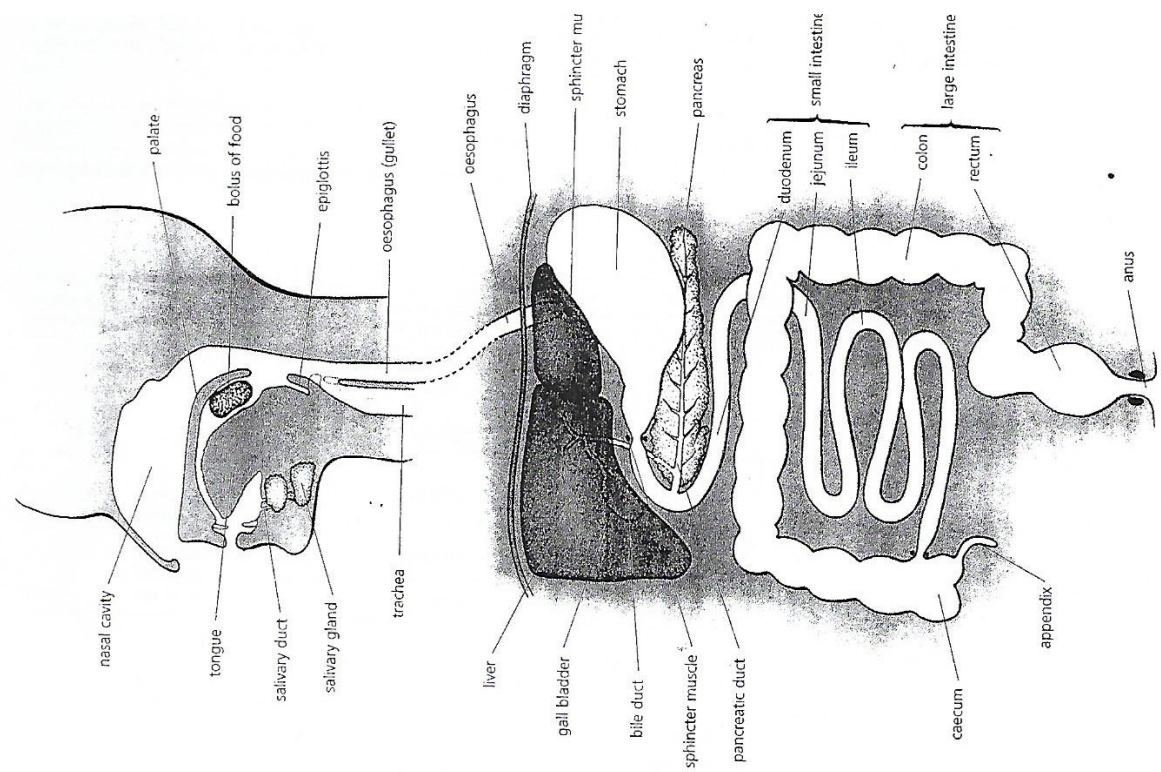
4.12 A surface view of the inside of the ileum. You can see that the surface is folded. The tiny "fingers" are villi. Both the folds and the villi help to increase the surface area to speed up absorption.



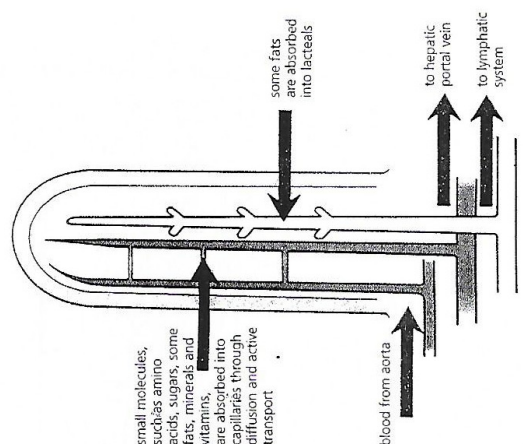
4.10 Longitudinal section through a villus



4.11 Detail of villus surface



4.7 The human alimentary canal



4.13 Diagrammatic section through a villus to show how food is absorbed