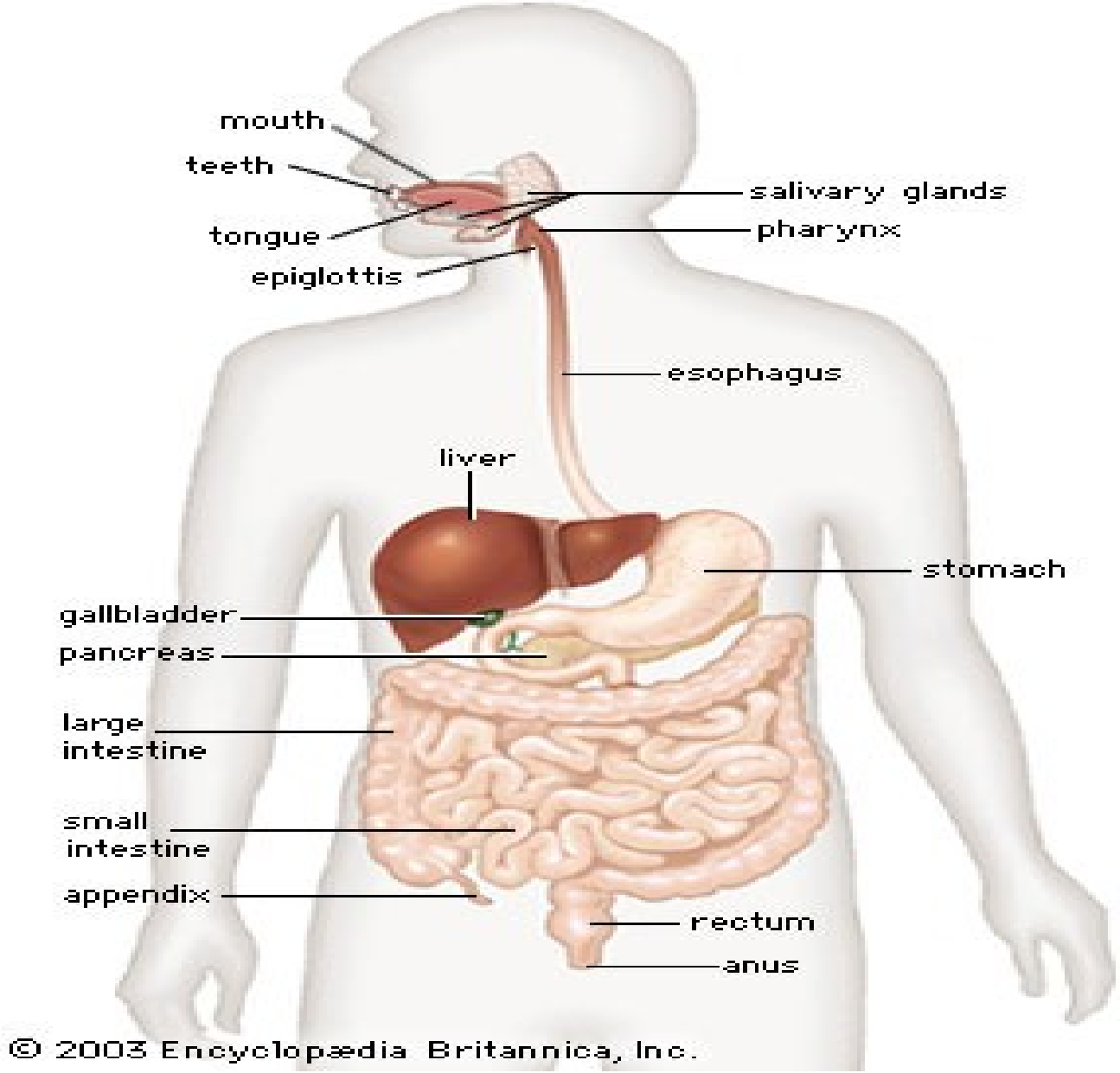
The Digestive System



Autotrophs-make their own food. Also called producers Ex-Plants

Heterotrophs cannot make their own food and must obtain food from other organisms.

Types of Heterotrophs

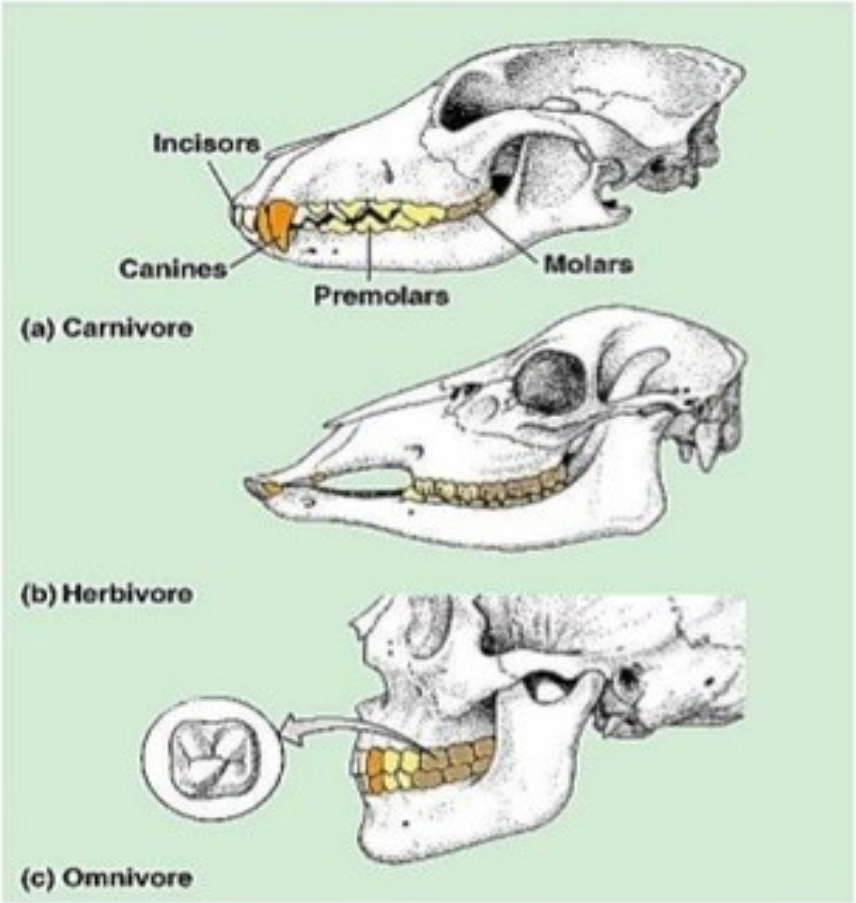
Carnivores are animals that eat only other animals. Ex-Fox

Herbivores eat only plant material. Ex-Rabbit

Omnivores eat both plant and animal material. Humans are omnivores as we have teeth suitable for both plant and animal based foods.

Teeth

- Carnivore
  - sharp ripping teeth
  - "canines"
- Herbivore
  - wide grinding teeth
  - molars
- Omnivore
  - both kinds of teeth



Stages

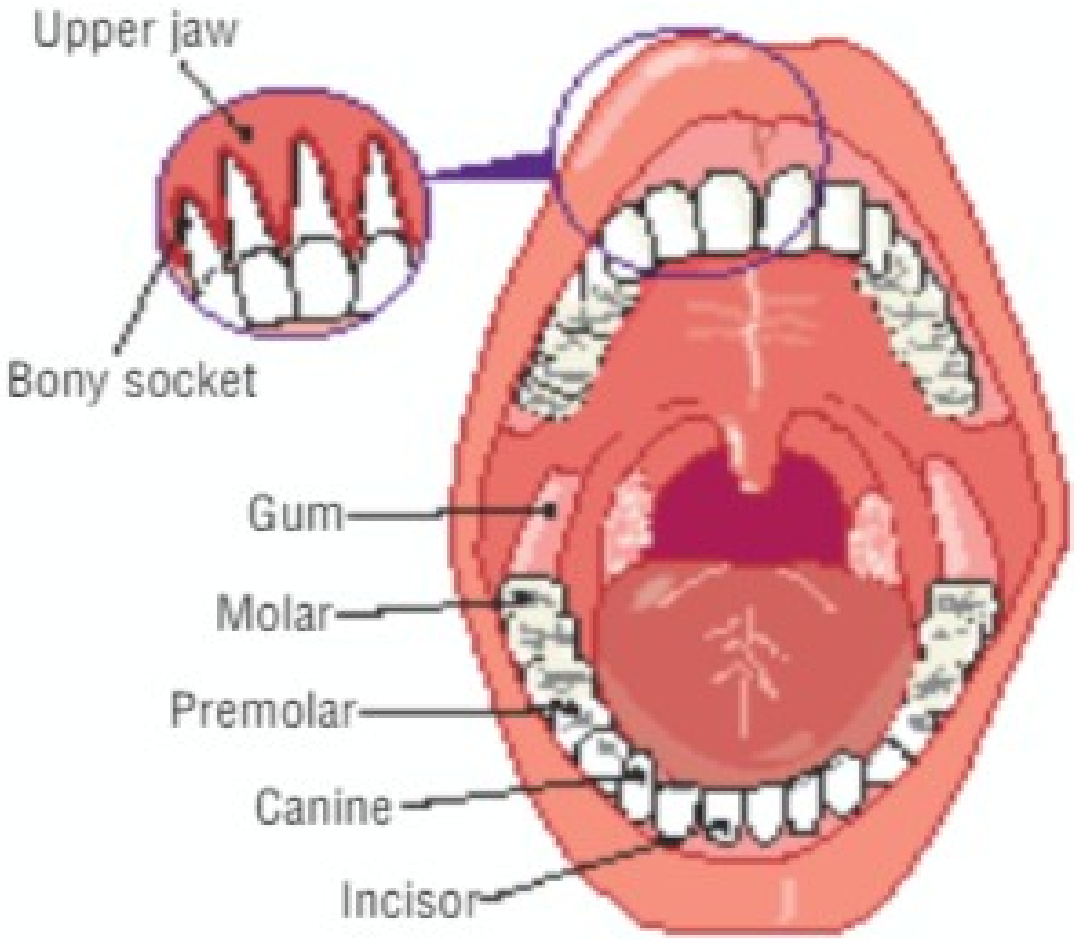
1-Ingestion-Taking in of food into the body

2-Digestion-breaking food down small enough to fit through walls of intestine

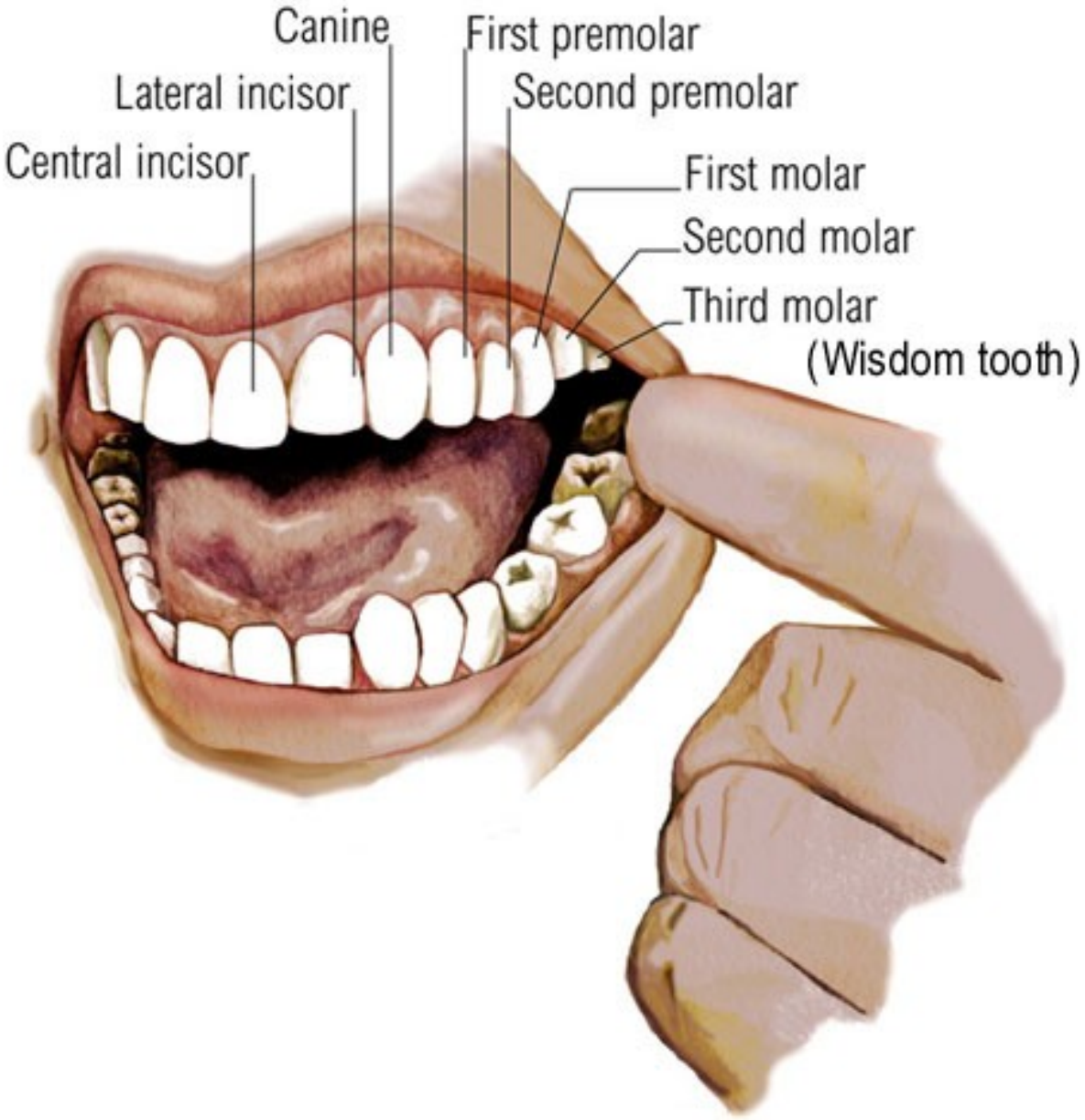
3-Absorption-taking broken down food into the blood

4-Assimilation-using the materials absorbed

5-Egestion-Removal of undigested waste from the body(faeces)



25.4 Teeth in the mouth


Canine
First premolar
Lateral incisor
Second premolar
Central incisor
First molar
Second molar
Third molar
(Wisdom tooth)

INGESTION

- Food enters the digestive system through the mouth which contains **salivary glands**
- Digestion starts in the mouth.
- Physical/mechanical digestion by teeth.
- Chemical digestion by enzymes.

TEETH

Tooth type	Function

Dental Formula (number of types of teeth on top and bottom of mouth of <u>one side of the mouth</u>

Dental Formula

$$\mathrm{I}\frac{2}{2} : C\frac{1}{1} : P\frac{2}{2} : \mathrm{M}\frac{3}{3}$$

Chemical digestion in mouth:

- Three salivary glands surround the mouth.
- Saliva is secreted into the mouth and moistens the food.
- Saliva contains the enzyme-salivary amylase which breaks down carbohydrate into the sugar maltose
- Amylase works best at pH 7-8

Oesophagus

- A bolus of food forms in the back of the mouth.
- While the bolus is swallowed a flap (epiglottis) covers the windpipe (trachea).
- Peristalsis – muscular contractions – push the food down the oesophagus to the stomach.

Stomach

- A muscular sac which churns the food and mixes it with the gastric juices (Hydrochloric Acid). Has pH between 1-2
- The hydrochloric acid:

- kills bacteria entering stomach
- Converts the inactive enzyme pepsinogen into the active enzyme pepsin
- Pepsin breaks down protein into polypeptides

- Stomach produces **mucous** which protects the lining of stomach being attacked by acid and enzymes
- After churning a soup like liquid called **chyme** is formed which enters the small intestine

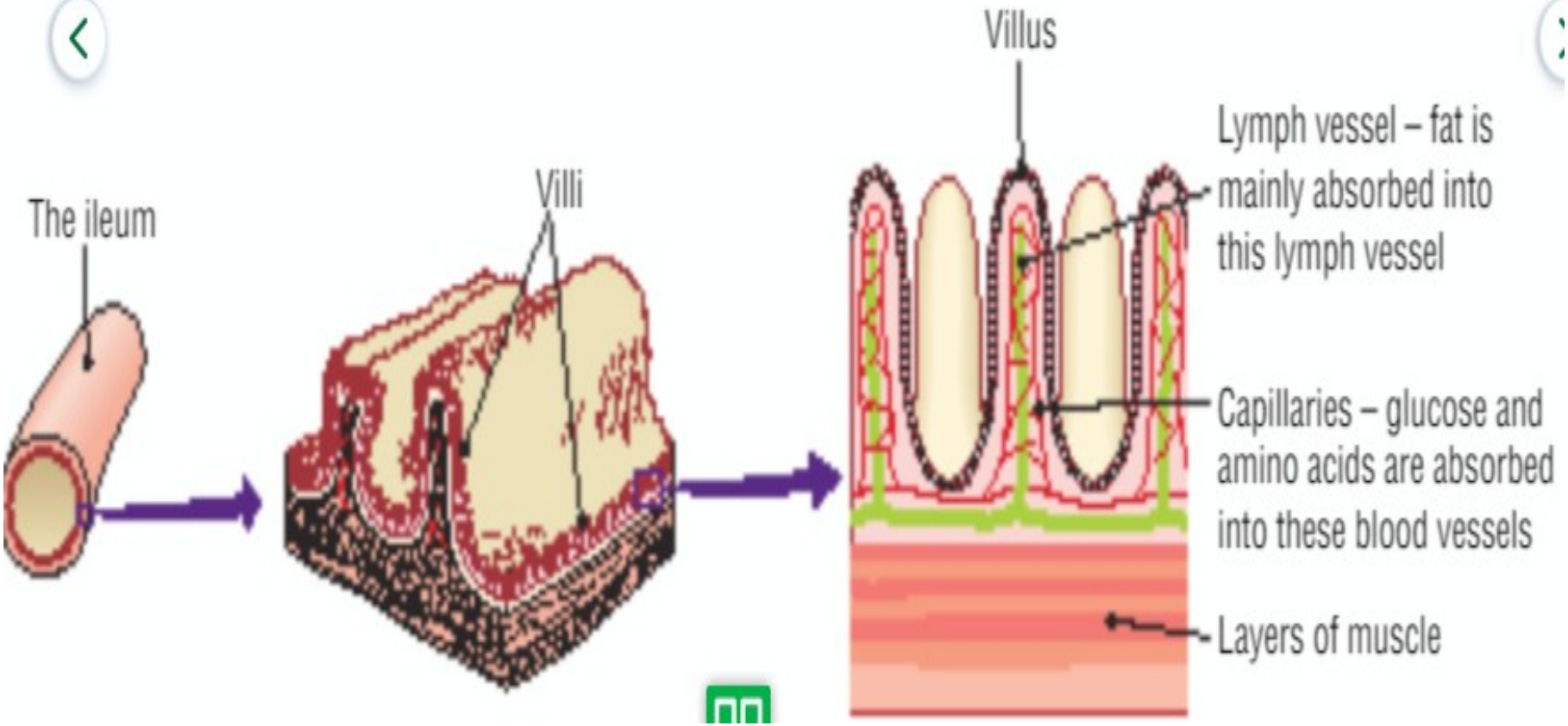
Small Intestine

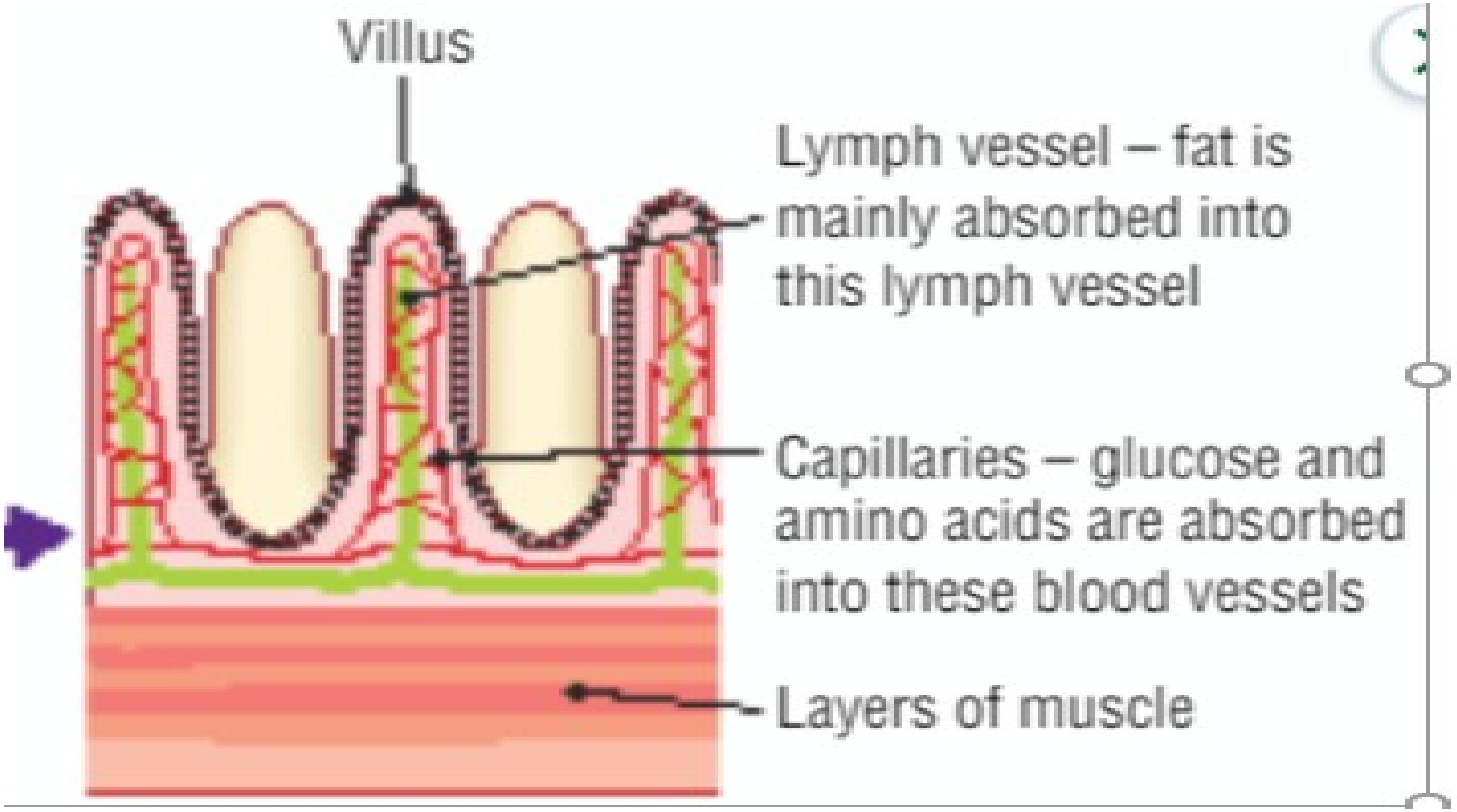
- Duodenum and ileum
- Long, narrow tube.
- Digestion continues in first part of small intestine.
- Absorption occurs in rest of small intestine.
- Inner lining is folded and covered in small projections called villi.
- Surrounded by a network of blood capillaries.

Glucose and amino acids are absorbed directly from villi into the blood capillaries and are transported to the liver by the HEPATIC PORTAL VEIN.

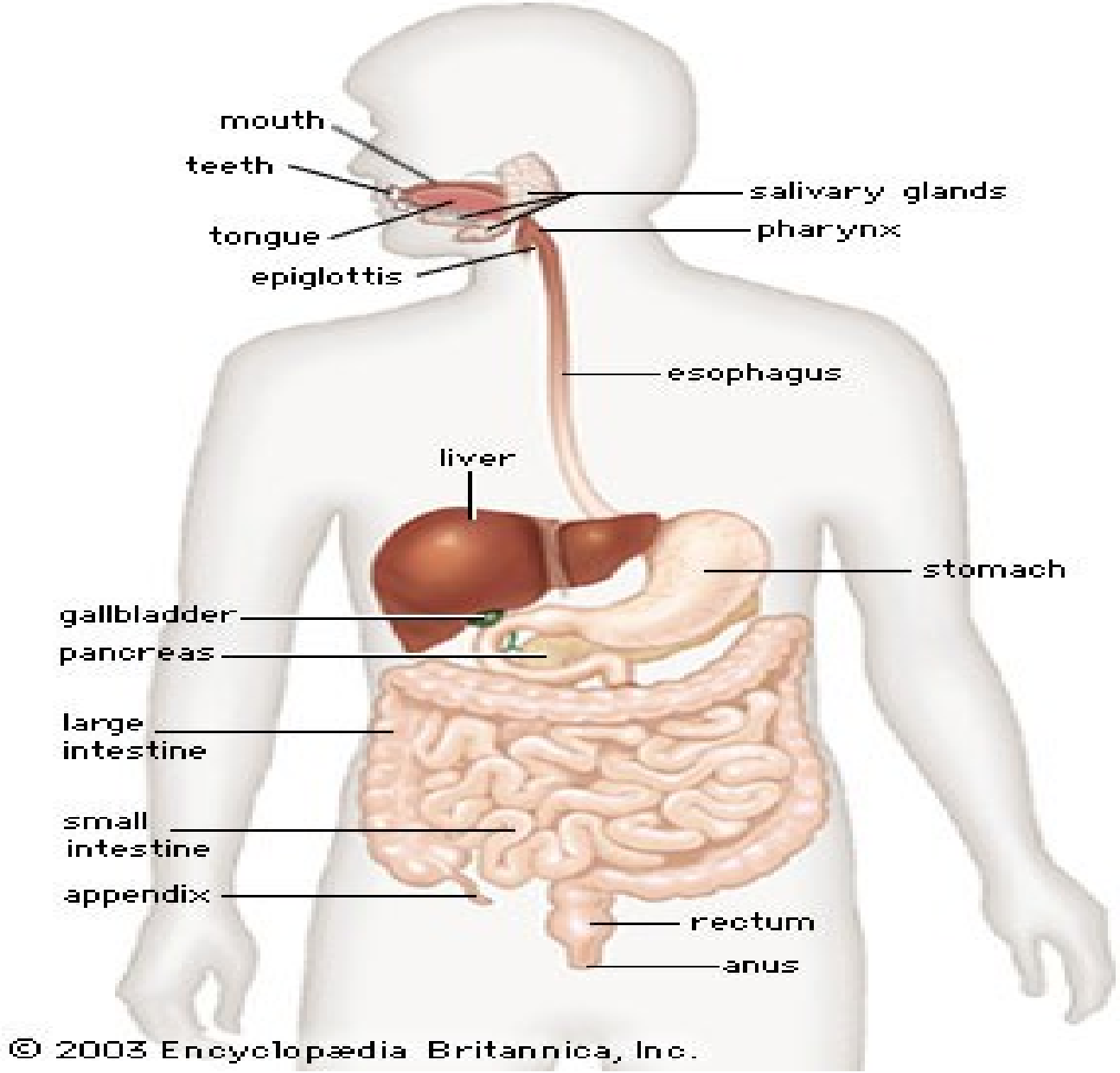
Fatty acids and glycerol don't pass through villi but instead are absorbed into the lymphatic system and then enter the blood and then travel to the liver.

Diagram of a villus:




Villus
Lymph vessel – fat is mainly absorbed into this lymph vessel
Capillaries – glucose and amino acids are absorbed into these blood vessels
Layers of muscle

The Digestive System



Pancreas

- Pancreas lies below the stomach.
- The pancreas is a digestive gland.(**Glands are organs that produce one or more substances)**
- It secretes 3 digestive enzymes:

1-Amylase-continues digestion of carbohydrate into glucose

2-Protease-continues breakdown of proteins and polypeptides down into amino acids

3-Lipase-breaks fats down into fatty acids & glycerol

Large Intestine

- The large intestine comprises the caecum and colon.
- It is a wide tube.
- **Functions:**

1)Absorbs water and prepares faeces for elimination

2) Contains **symbiotic bacteria** produce Vit B & K

- **Symbiotic bacteria** have a **mutualistic relationship** with humans (a close association between two species where both species benefit)

Liver

- The liver is the largest gland in the body.

Functions:

1)Stores glucose as glycogen

2)Breaks down excess amino acids into urea

3)Produces bile

4)Breakdown toxins like alcohol

Bile

- Bile is produced: Liver
- Bile is stored: Gall bladder
- Bile is brought to the intestine by: bile duct
- The function of bile is to emulsify (separate) fats

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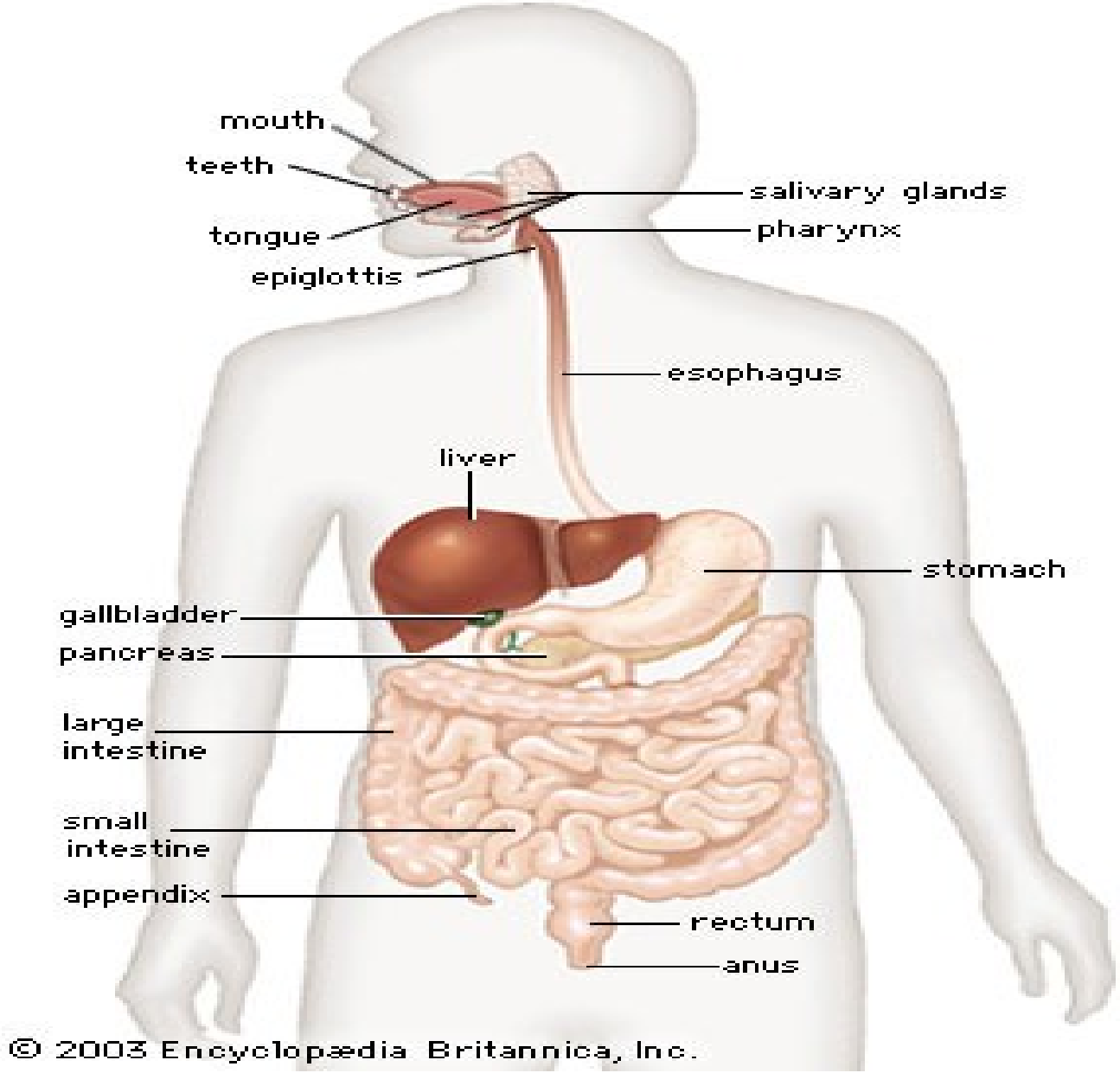

Enzyme digestion

Substrate	Enzyme	Product	Site of Production	Site of Action	pH
	Amylase				
	Lipase				
	Protease				

Fibre

- Indigestible material
- Prevent Constipation by retaking moisture to keep faeces soft
- Prevents bowel cancer by carrying toxins through large intestine more rapidly