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Where Minds Pollinate

Class 12
Biology

Chapter 1

Notes

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The Oral Cavity



What is the Oral Cavity?

- The oral cavity, also known as the mouth, is the entry point of the digestive system where food is ingested.

Parts of the Oral Cavity:

- > **Lips:** - Muscular structures
- Help in speech and food intake.

- > **Teeth:**
- Used for biting, tearing, and chewing food.

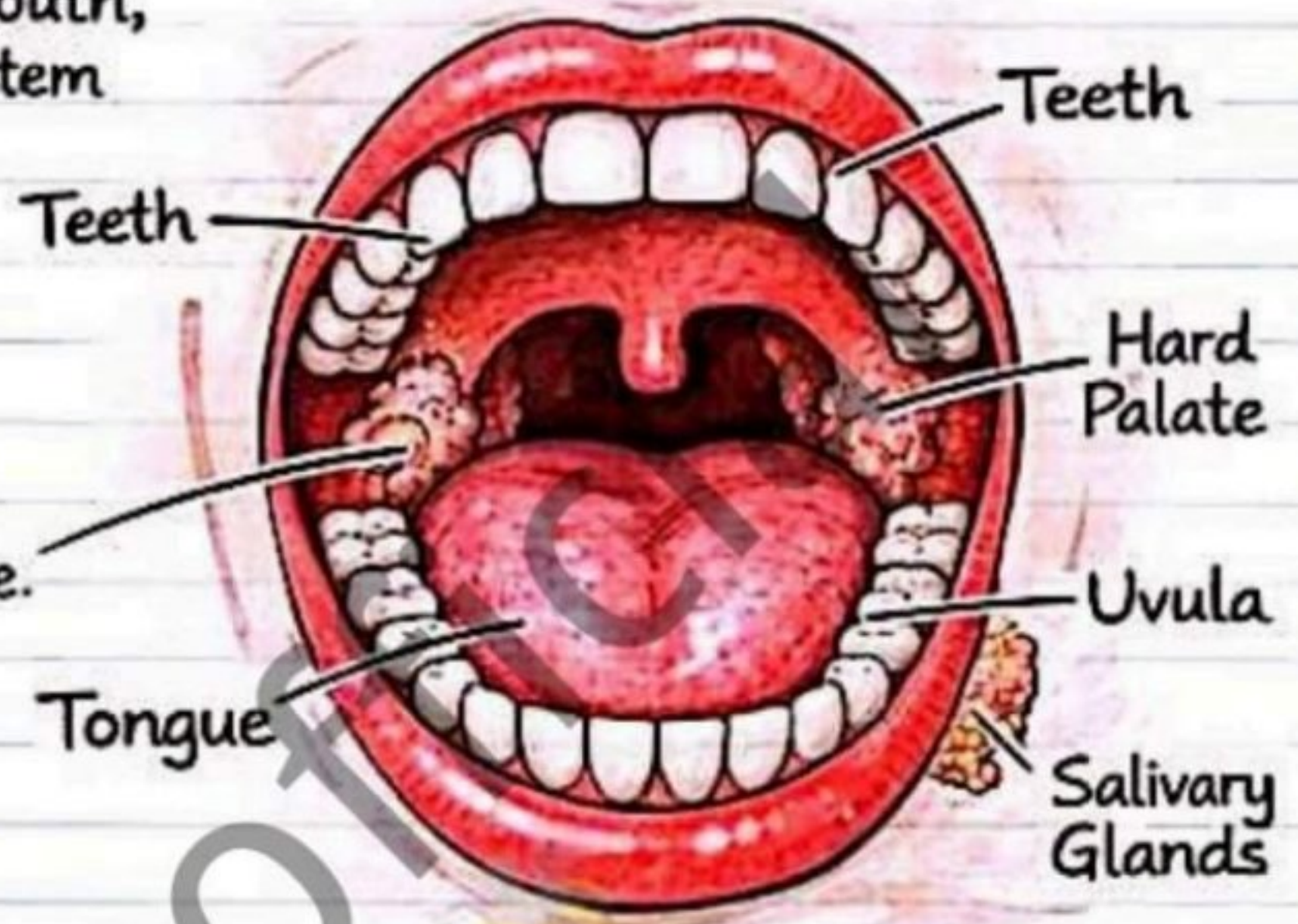
- > **Tongue:**
- Muscle with taste buds
- Assists in mixing food and swallowing

- > **Salivary Glands:**
- Produce saliva that contains enzymes (amylase)
- Moistens food and begins carbohydrate

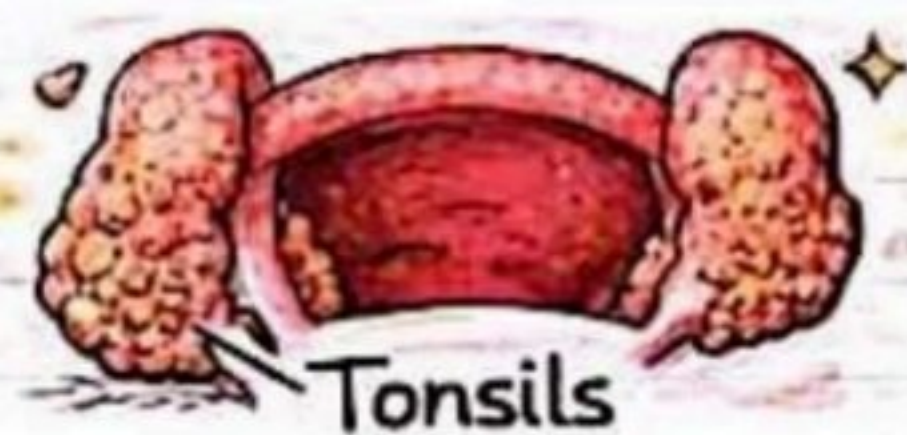
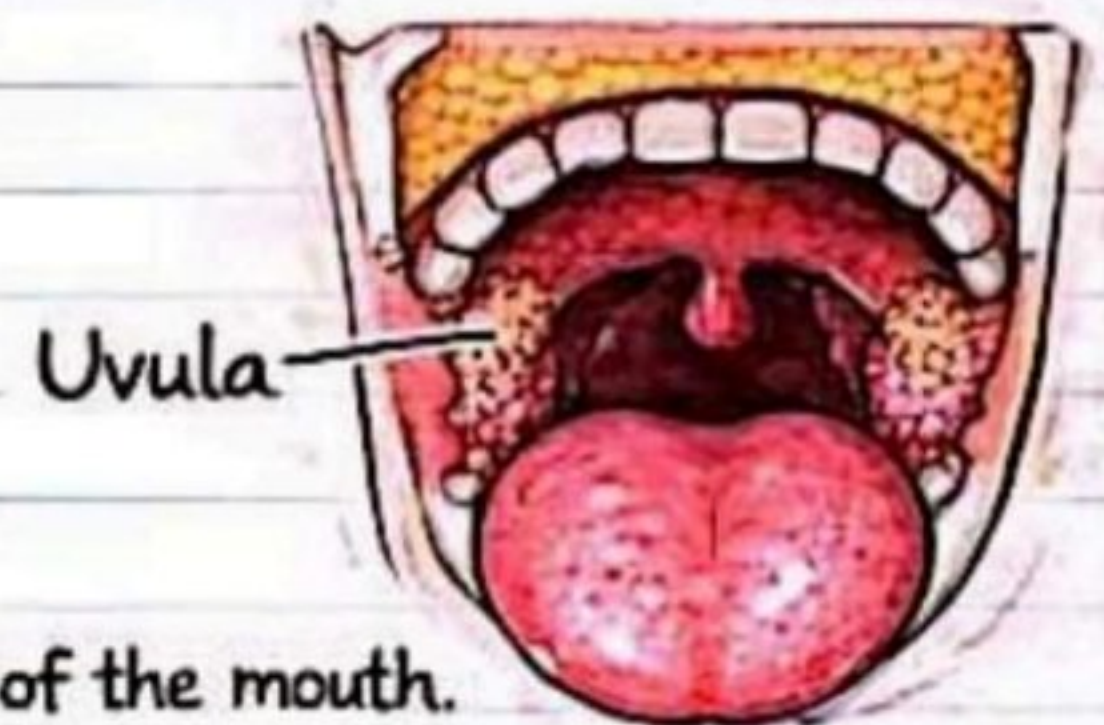
- > **Hard Palate:**
- Bony front portion of the roof of the mouth.

- > **Soft Palate:**
- Soft, muscular back of the roof of the mouth
- Ends with the uvula.

- > **Tonsils:**
- Small, fleshy tissue that hangs down at the back of the mouth.



- > **Teeth:**
- Used for biting, tearing, and chewing food.



Functions of the Oral Cavity:

- Ingestion of food
- Mechanical digestion (chewing, grinding).
- Chemical digestion via saliva.

The Small Intestine



What are the Small Intestine?

- The small intestine is a long, coiled, tubular organ in the digestive system located between the stomach and the large intestine. It plays a crucial role in digestion and absorption of nutrients.

Parts of the Small Intestine:

1. Duodenum (1st Section):

- Approximately 10 inches (25 cm) long
- C-shaped, connects to the stomach
- First part where bile and pancreatic juices enter

2. Jejunum (2nd Section):

- Approximately 8 feet (2.5 meters) long
- Middle part where most digestion and nutrient absorption occurs.

3. Ileum:

- Approximately 8 feet (2.5 meters) long
- Middle part where most digestion and nutrient absorption occurs

4. Ileum (3rd Section):

- Approximately 12 feet (3.6 meters) long
- Final part that absorbs remaining nutrients

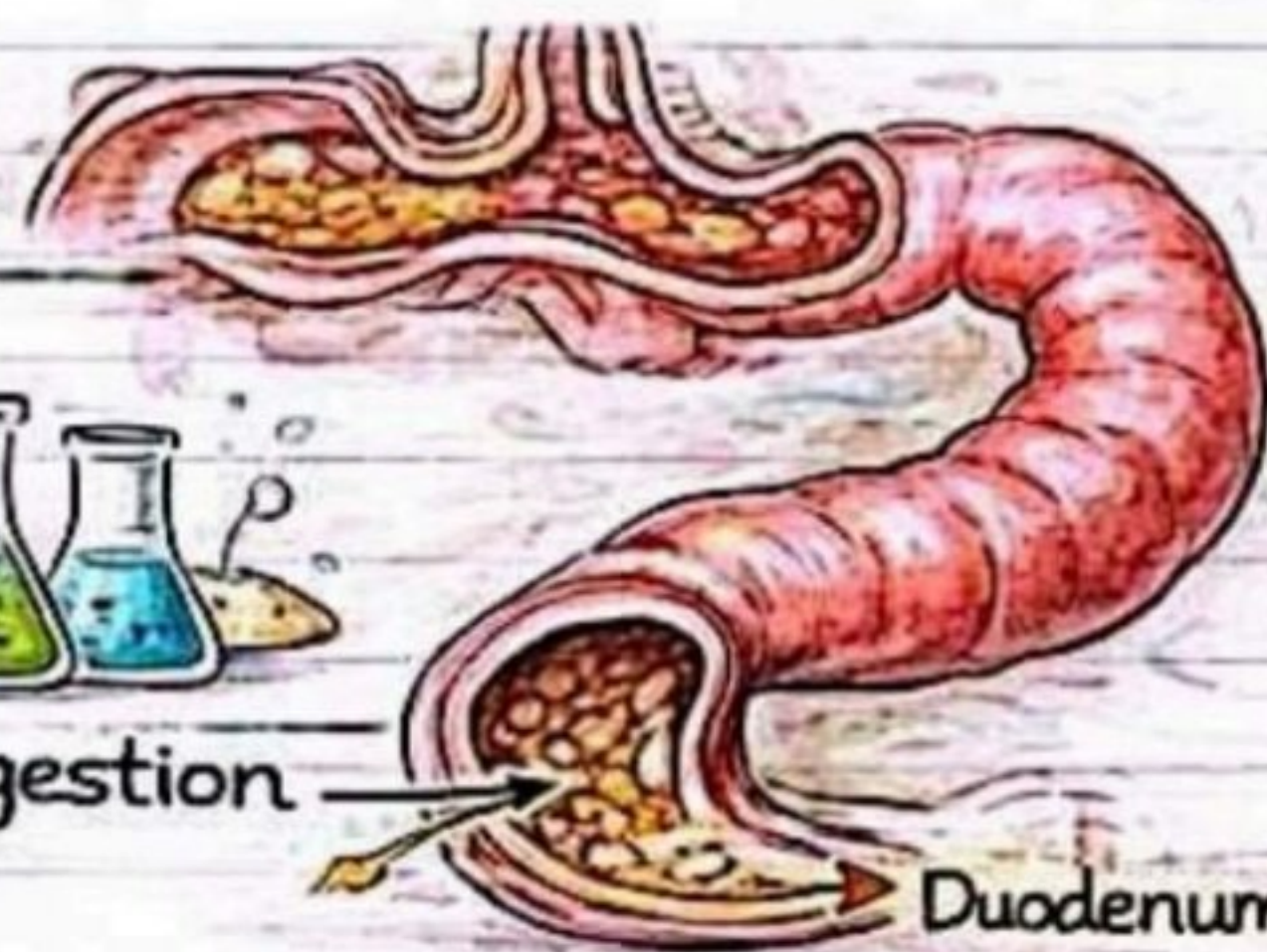
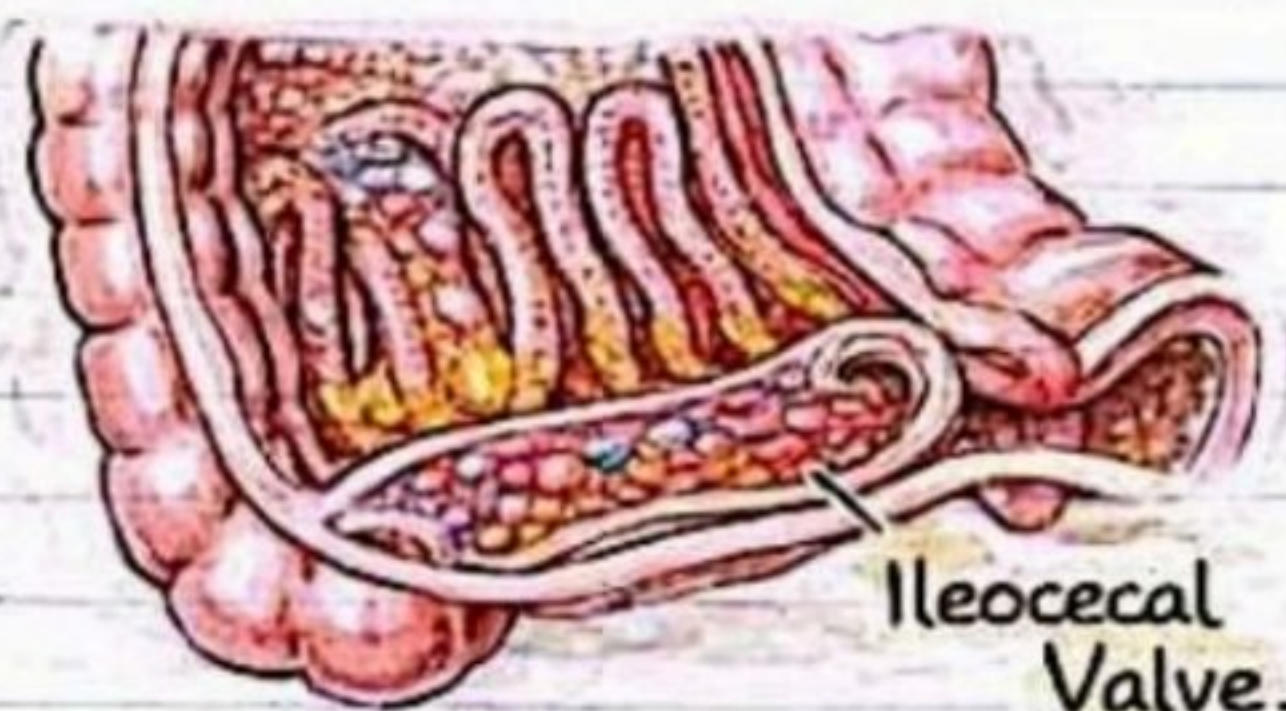
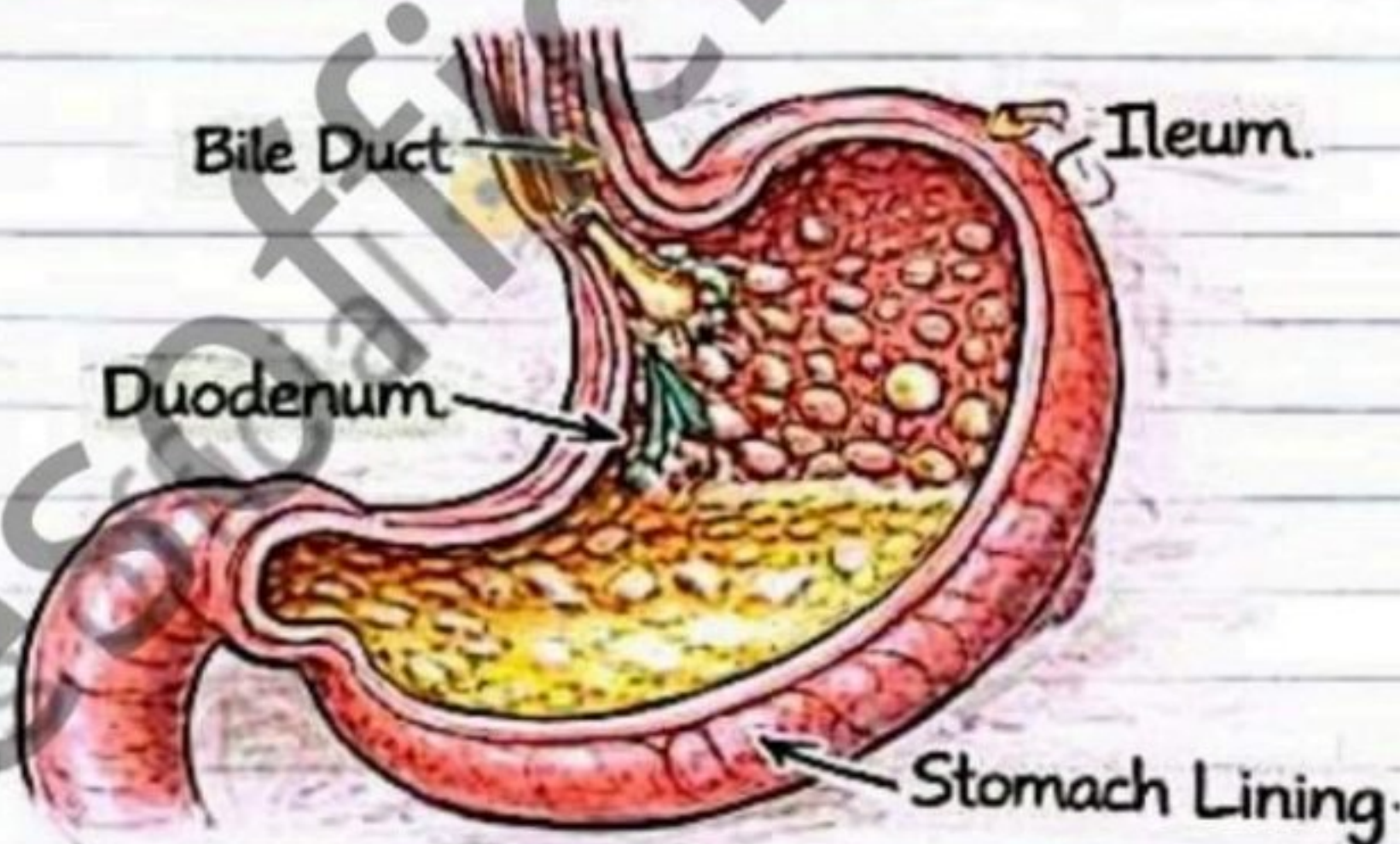
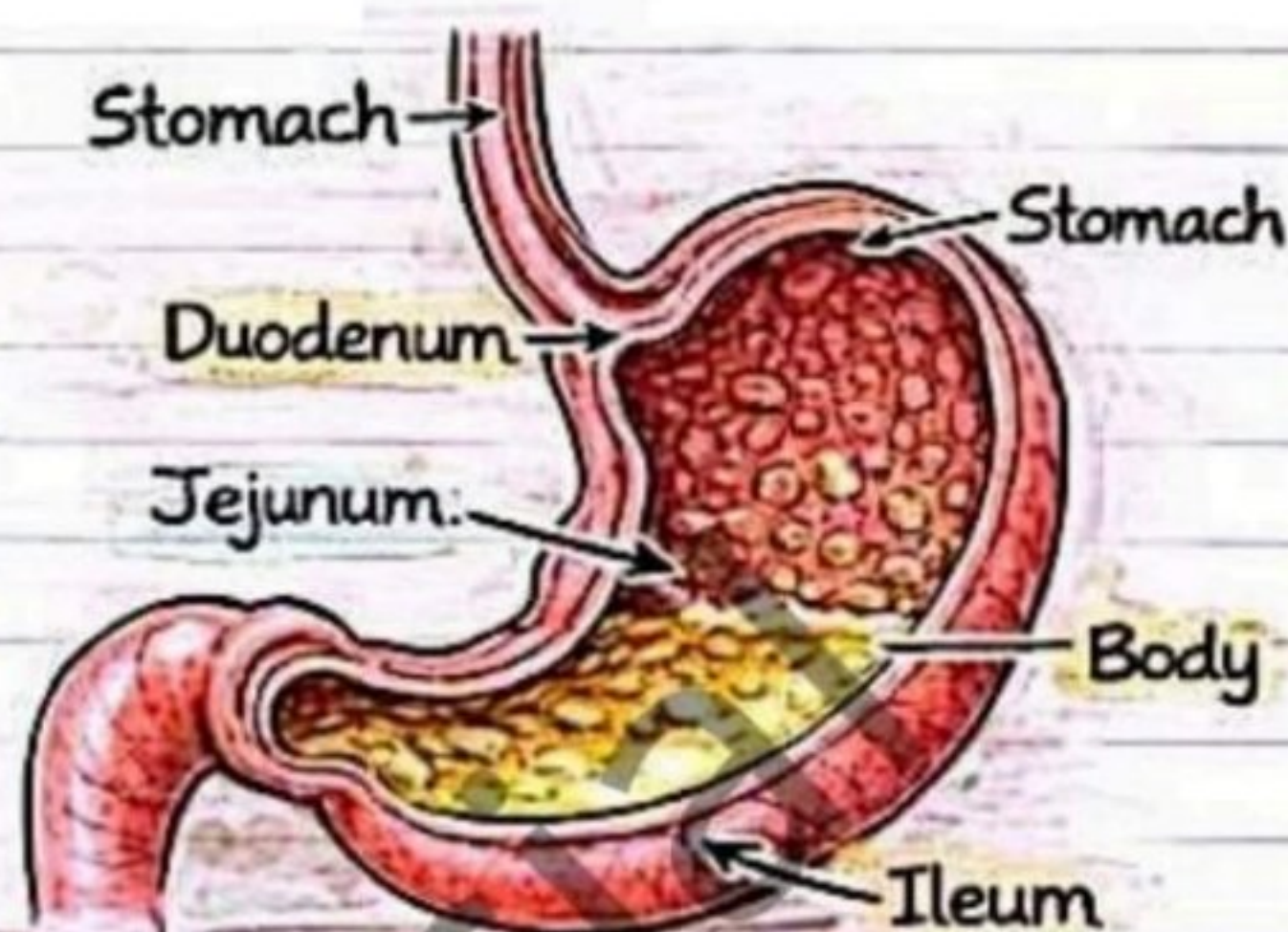
Functions of the Small Intestine:

→ Digestion:

- Completes the breakdown of food into nutrients.

→ Mechanical Digestion:

- Villi and microvilli lining the walls absorb nutrients into the bloodstream.



Digestion

Duodenum:

Key Fact: ~ The stomach lining has gastric glands that secrete gastric juice

The Large Intestine



What is the Large Intestine?

- The large intestine, also known as the colon, is the final section of the digestive system. It's a wide, muscular tube approximately 5 feet (15 meters) long that absorbs water and salts from undigested food and forms solid waste.

Parts of the Large Intestine:

1. Cecum:

- The first part that connects to the ileum of the small intestine
- Contains the appendix, a small, finger-like pouch.

2. Transverse Colon:

- The horizontal section across the abdomen.

3. Descending Colon:

- Downward section on the left side of the abdomen.

5. Sigmoid Colon:

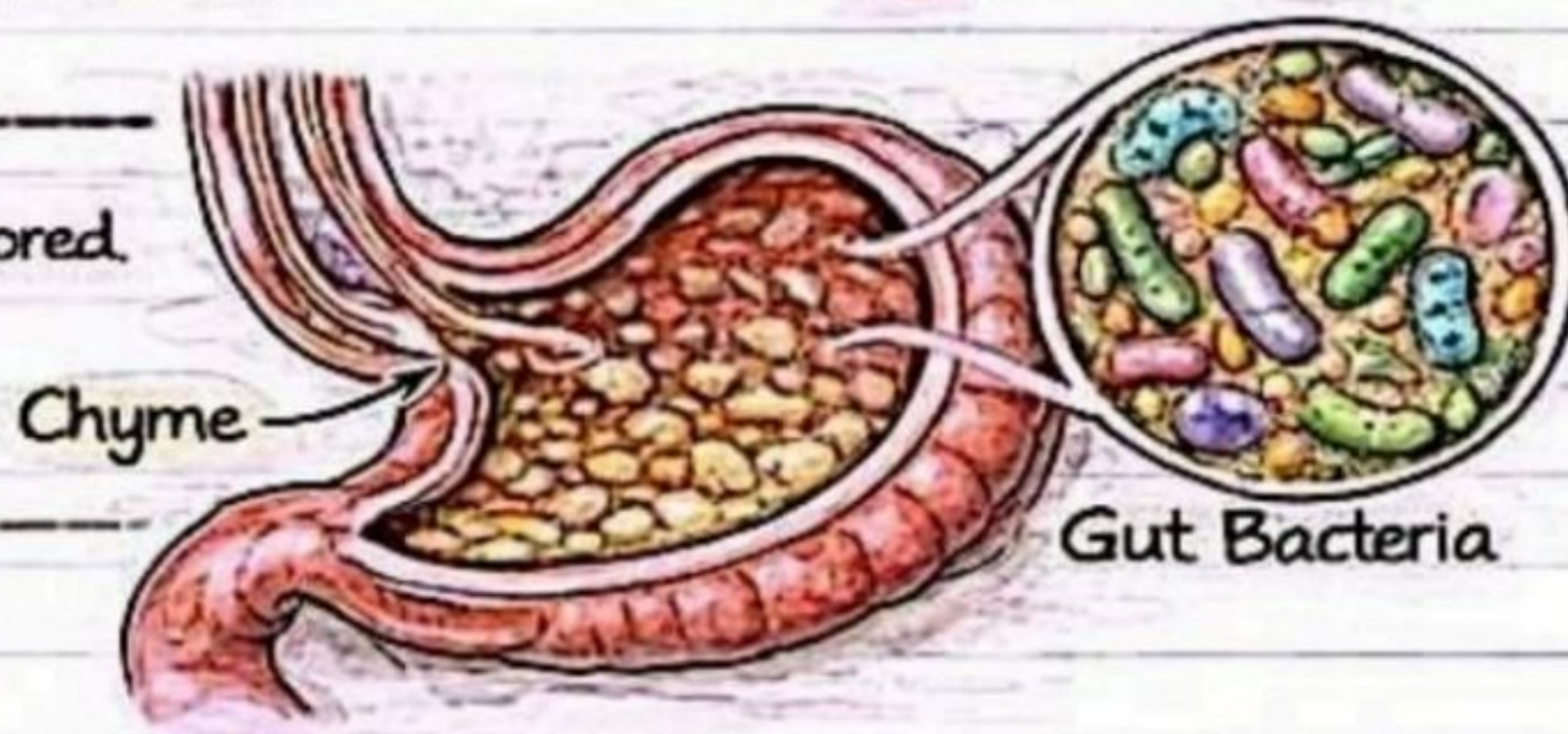
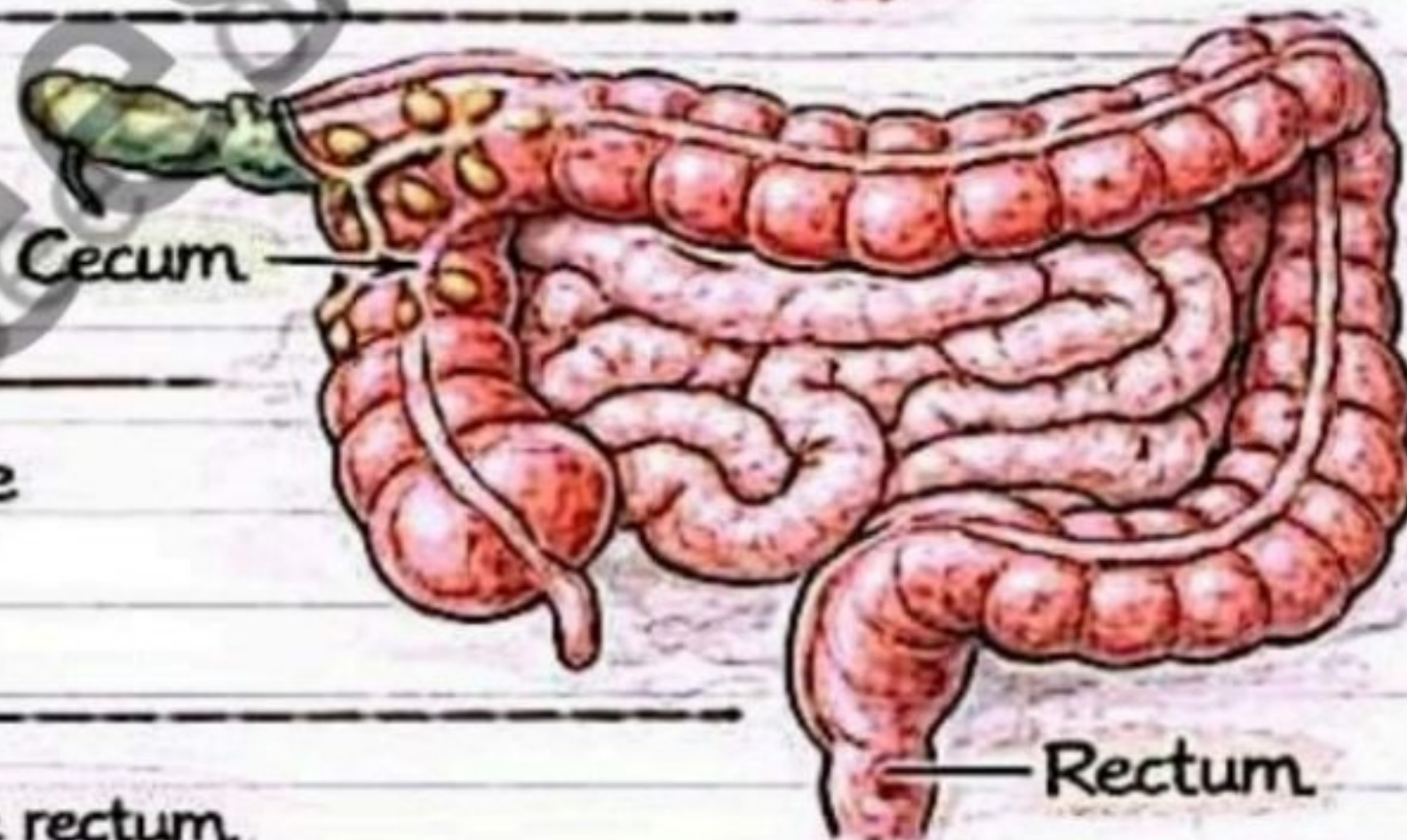
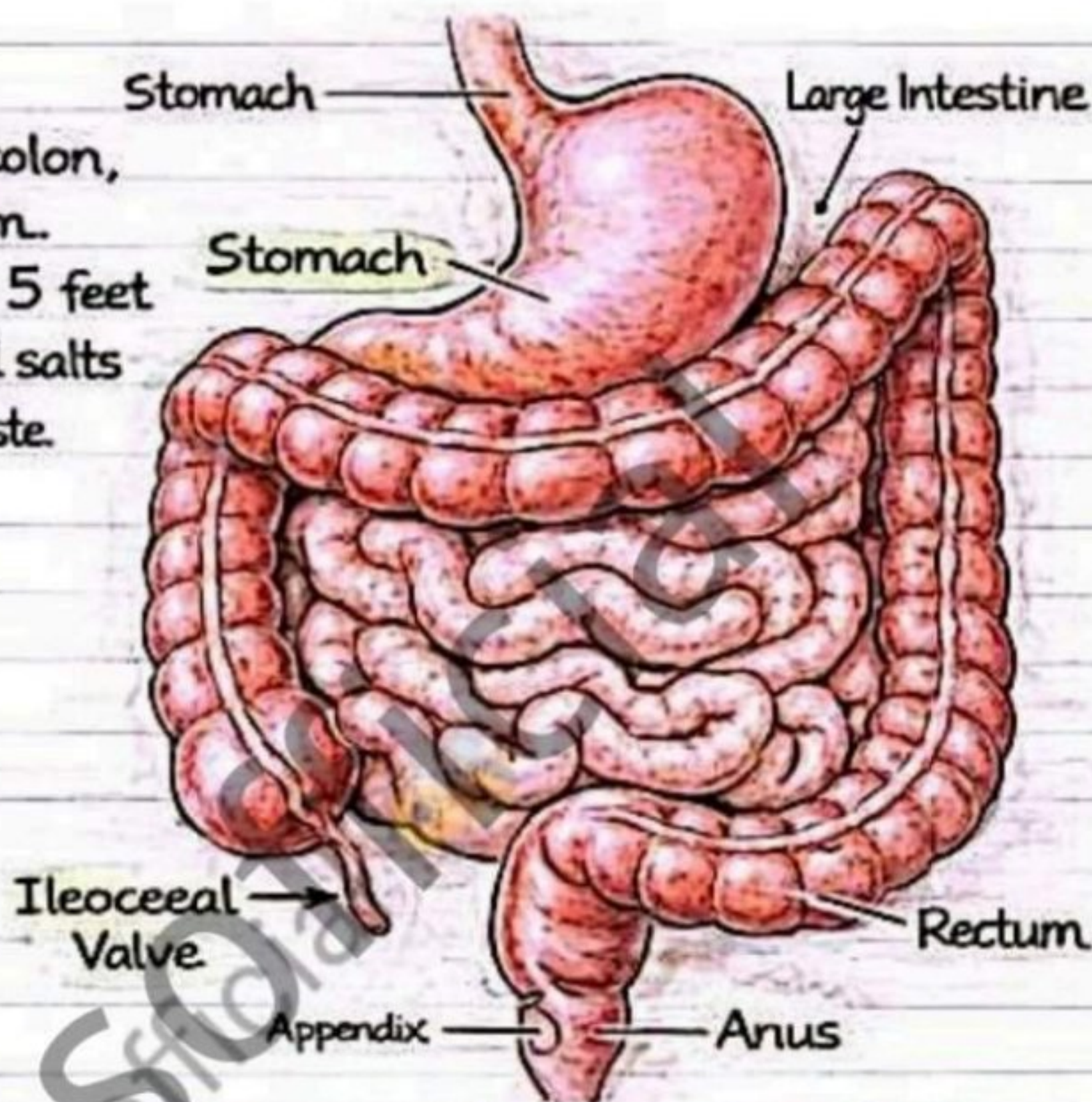
- S-shaped section that leads to the rectum.

6. Rectum and Anus:

- Final section where feces are stored before being expelled through the anus.

5. Formation of Feces:

- Forms and stores solid waste (feces) until it is expelled.



Key Fact: ~ The large intestine is wider but shorter than the small intestine. The small intestine, is about 20 feet (6 meters) long.

What is the Stomach?

- The stomach is a hollow, muscular organ located on the upper left side of abdomen. It acts as a storage tank and a mixing chamber, playing a key role in the digestive process.

Parts of the Stomach:

> Cardia:

- The area where the esophagus connects to the stomach

> Fundus:

- The rounded, upper portion
- Stores undigested food and gas.

> Body:

- The main central region where mixing takes place

> Pylorus:

- The lower section that connects to the small intestine

> Pyloric sphincter:

- Controls and controls the passage of food.

Functions of the Stomach:

> Stores Food:

- Temporarily stores food received from the esophagus.

> Mechanical Digestion:

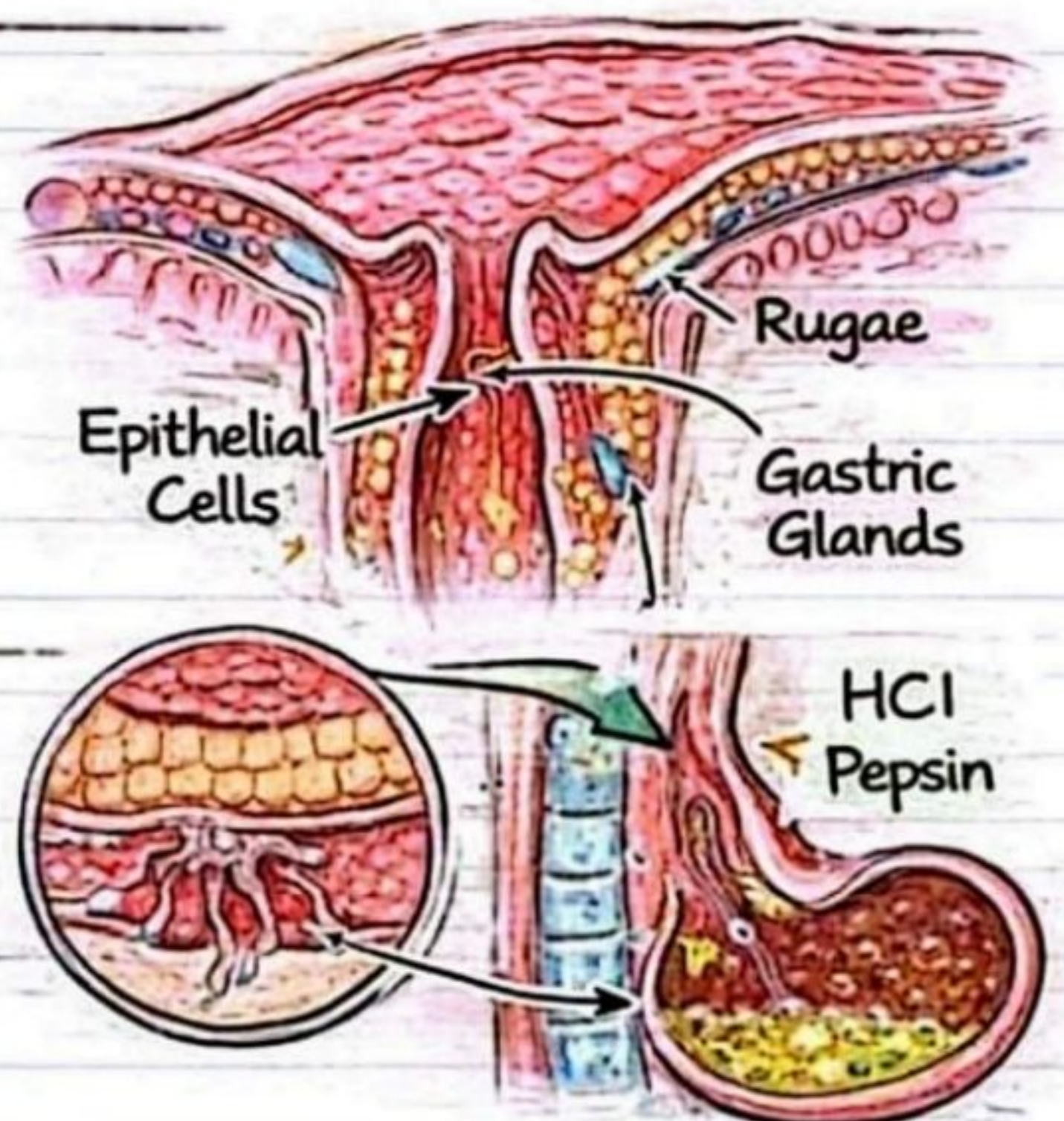
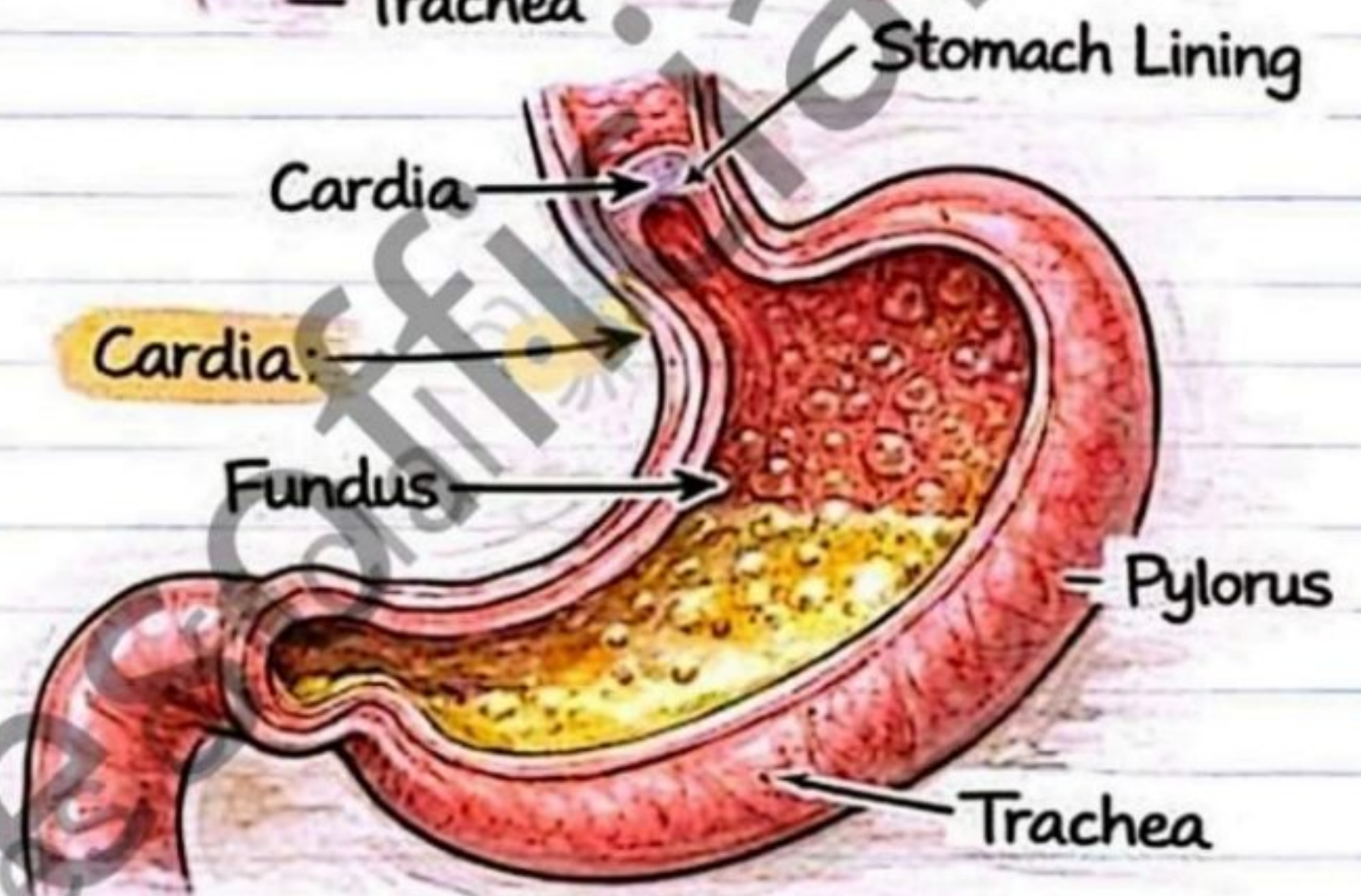
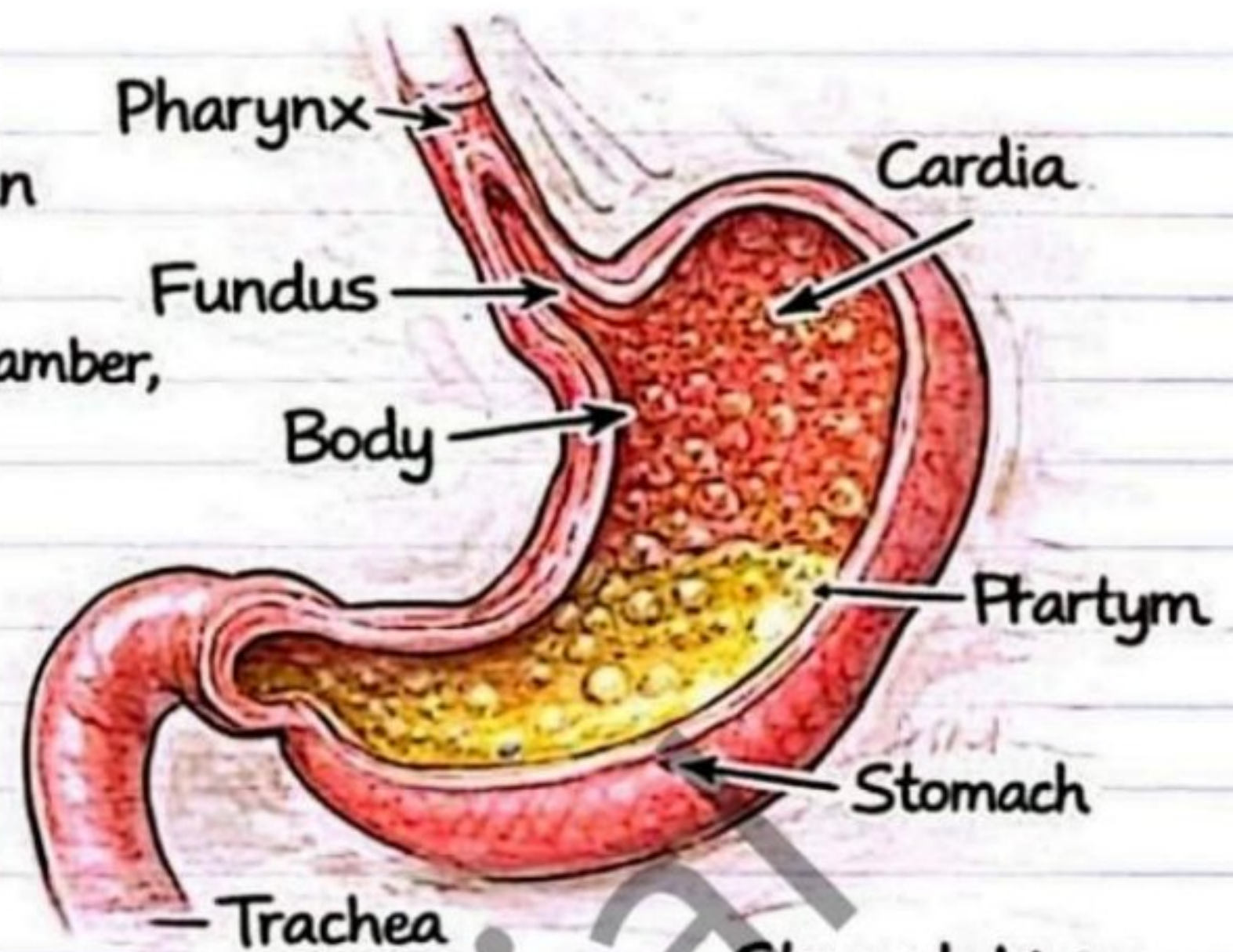
- Muscular churning of food with gastric juices.

> Chemical Digestion:

- Secretes gastric juices that contain HCl (hydrochloric acid) and enzymes (pepsin).

Key Fact:

- The stomach lining has gastric glands that secrete gastric juice to digest food.



Functions of the Large Intestine



What are the Functions of the Large Intestine?

- The large intestine, also known as the colon, has several important functions in the digestive system. It aids in forming and eliminating solid waste, absorbing water and electrolytes, and housing beneficial bacteria.

Parts of the Large Intestine:

1. Water Absorption:

- Absorbs remaining water and electrolytes (e.g., sodium, chloride) from undigested food, turning it into a more solid form.

2. Formation of Feces:

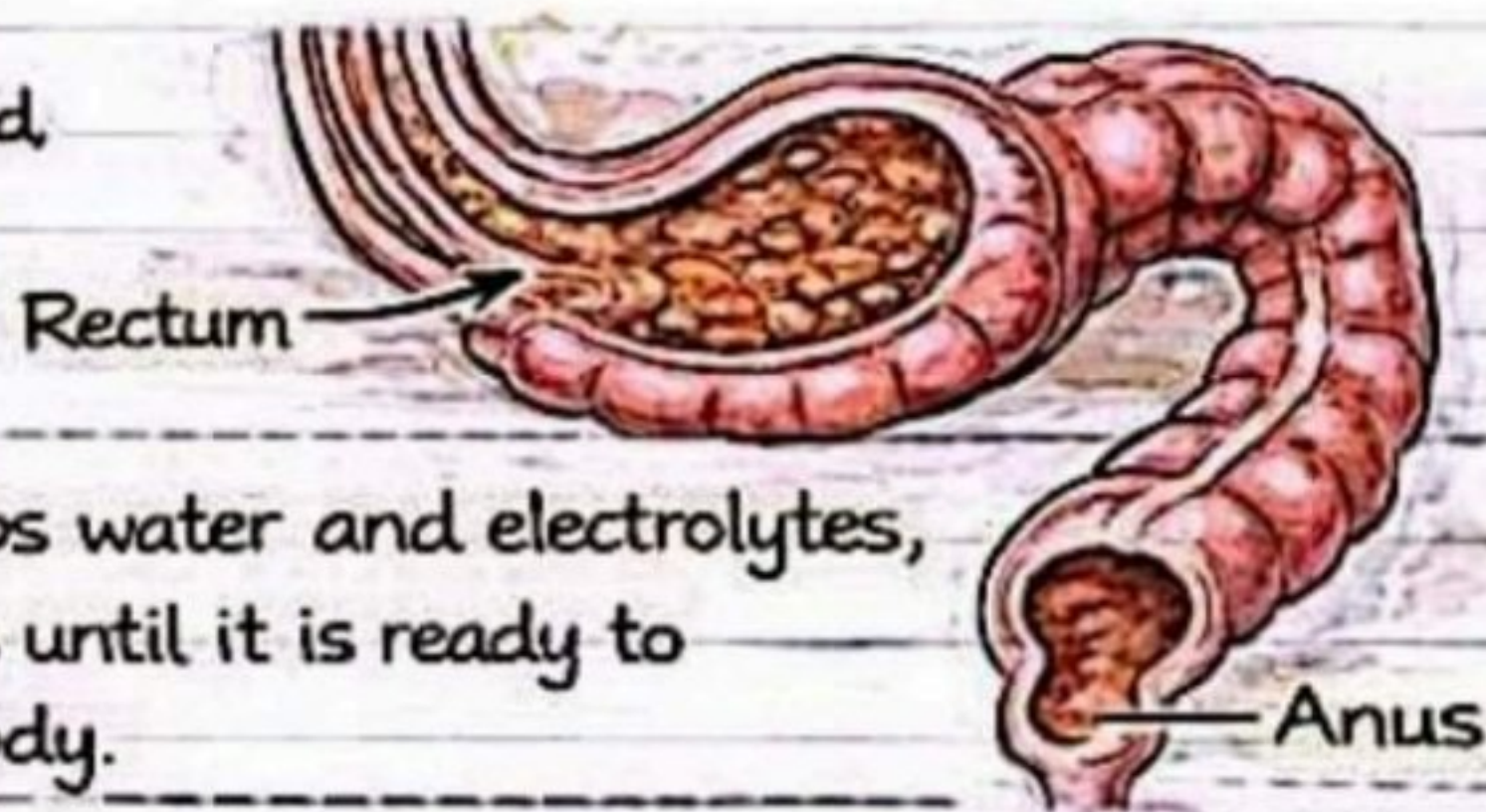
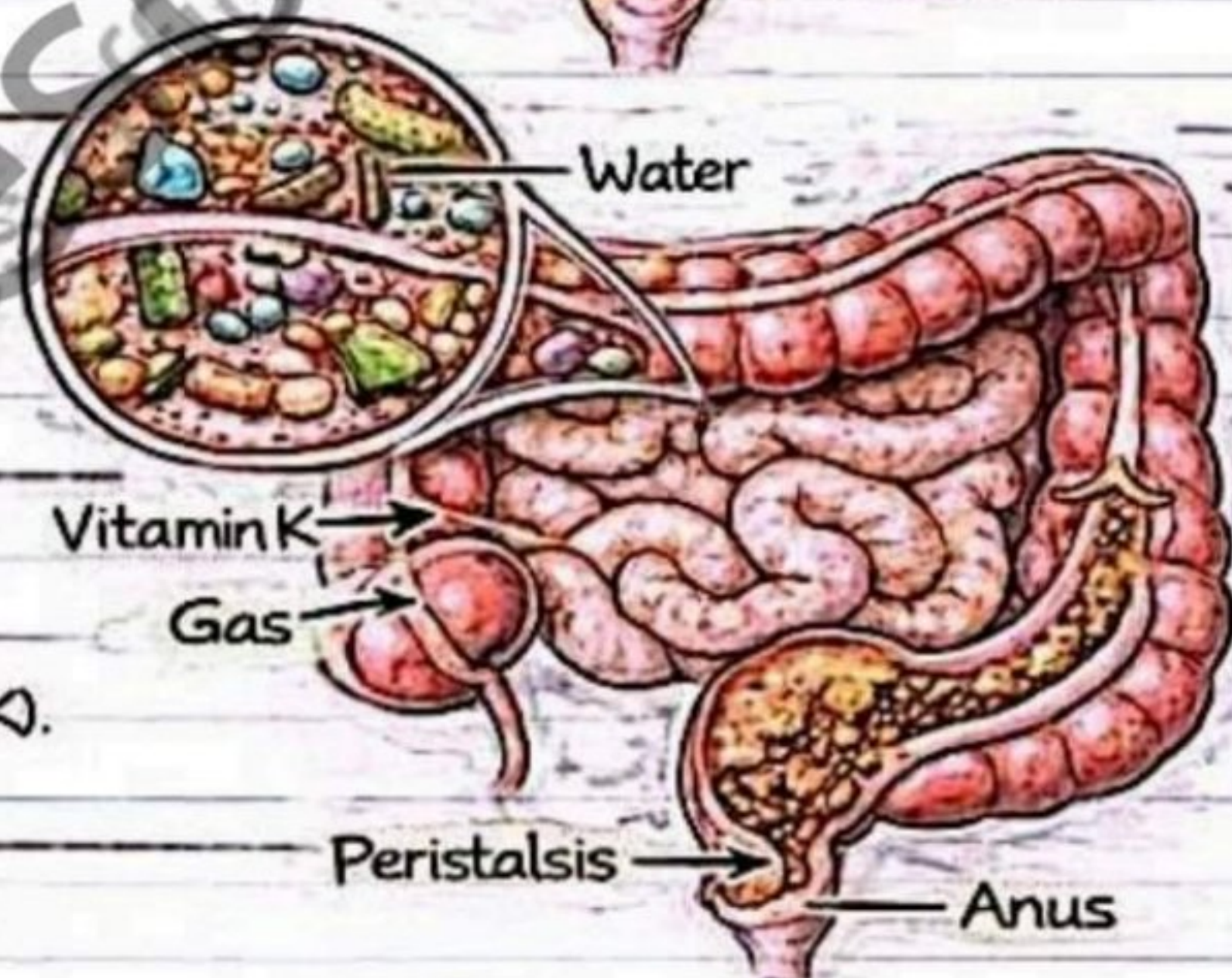
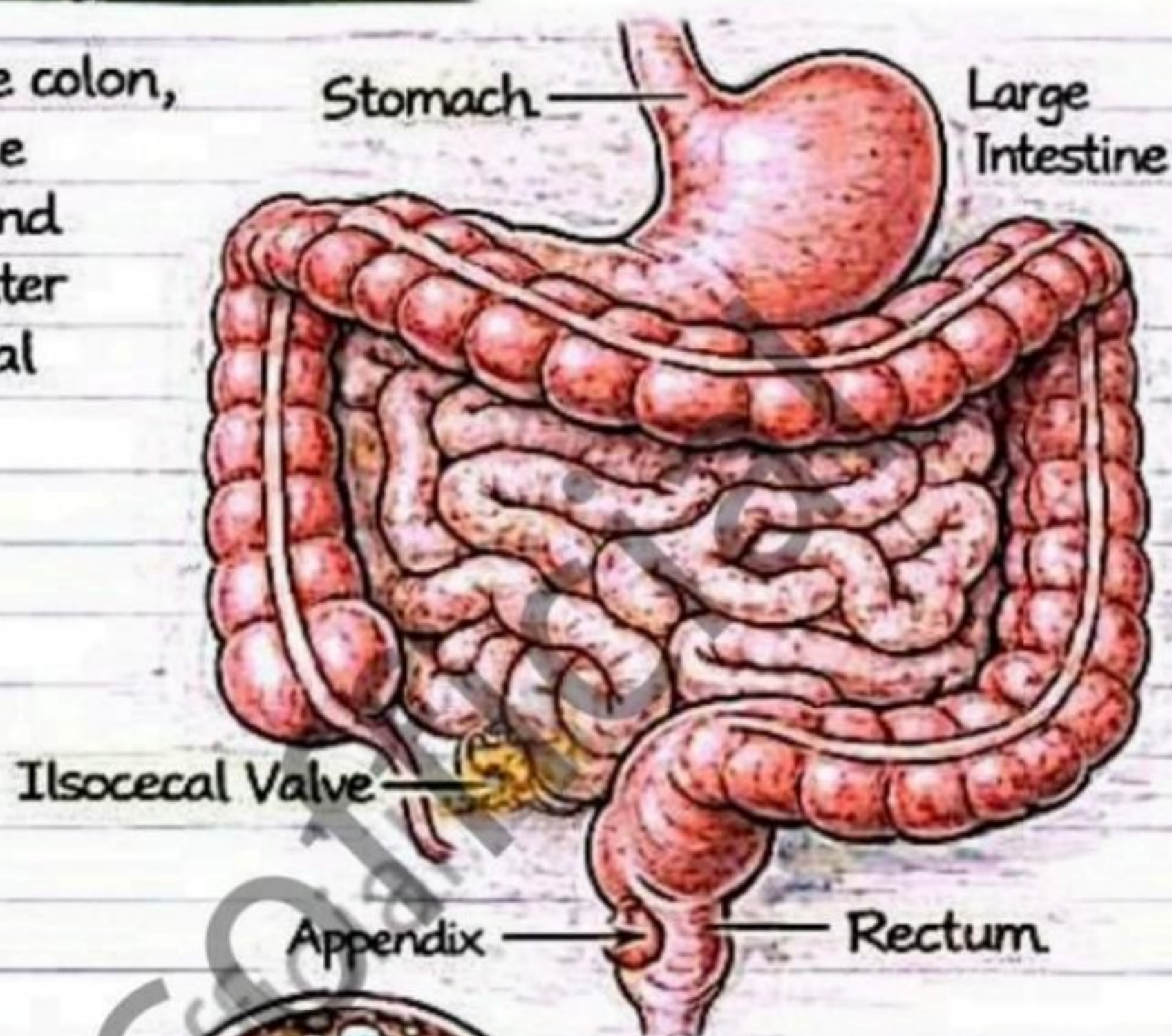
- Undigested food, bacteria, and waste products combine to form feces.

3. Bacteria:

- Houses beneficial bacteria (gut flora) that break down remaining nutrients and produce vitamins (such as vitamin K).

4. Elimination of Waste:

- Peristalsis moves solid waste (feces) toward the rectum.
- The rectum stores feces until it is expelled through the anus.



Key Fact: ~ The large intestine absorbs water and electrolytes, forming and storing feces until it is ready to be eliminated from the body.

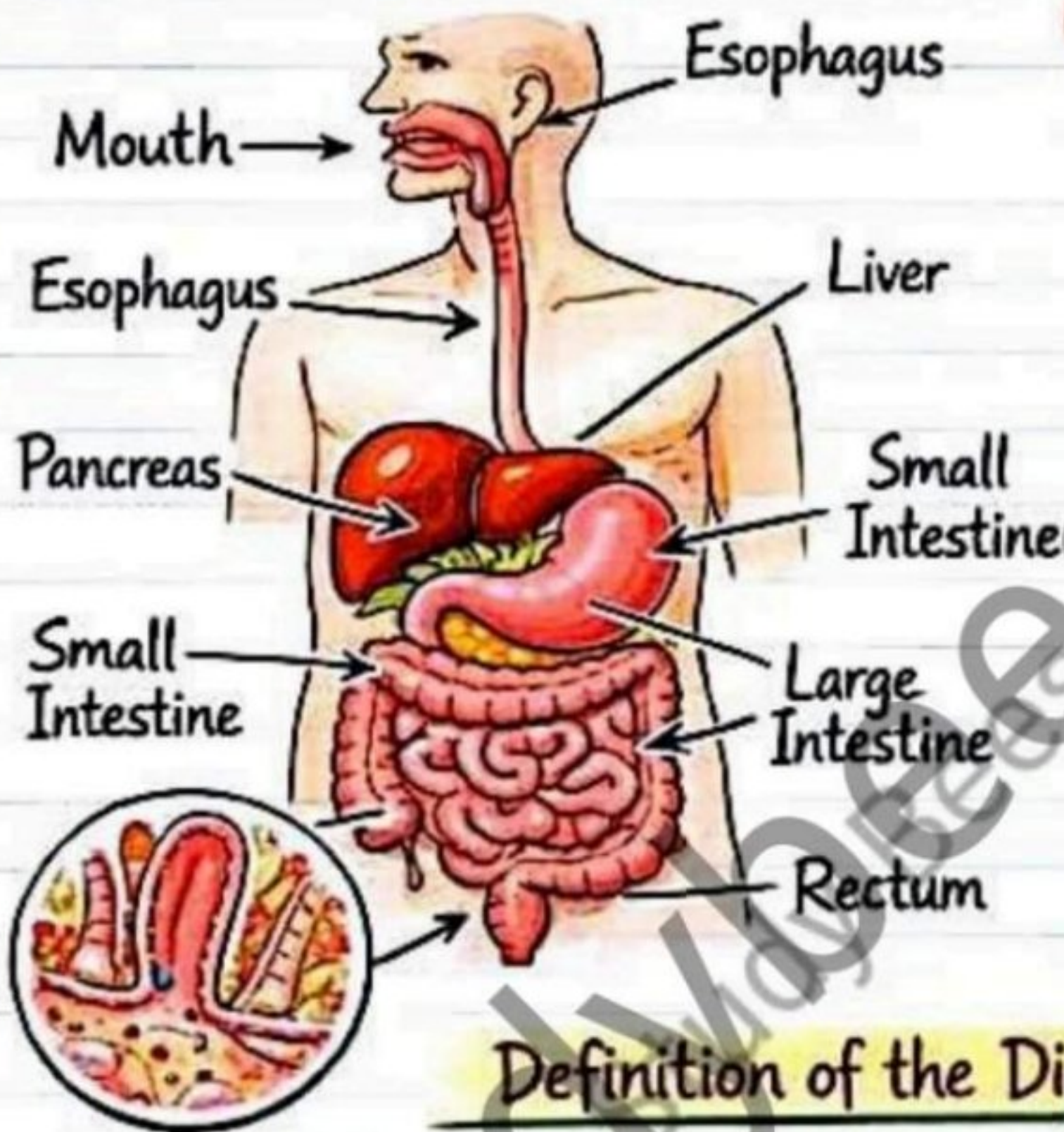
Key Fact: ~ The large intestine absorbs water and electrolytes, forming and storing feces until it is ready to be eliminated from the body.

Introduction & Definition of the Digestive System



What is the Digestive System?

- The digestive system is a complex group of organs that work together to break down food, absorb nutrients, and eliminate waste.



Functions of the Digestive System:

1. Ingestion: Taking in of food



2. Digestion: Breaking down food into smaller components

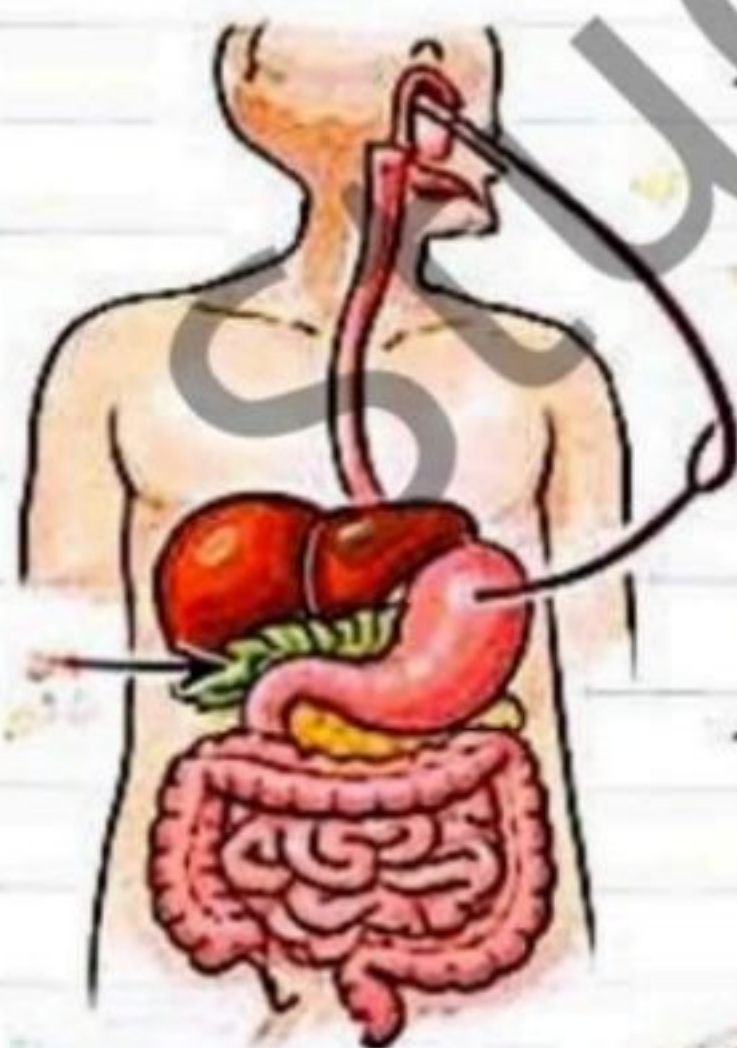
3. Absorption: Nutrients move into the bloodstream



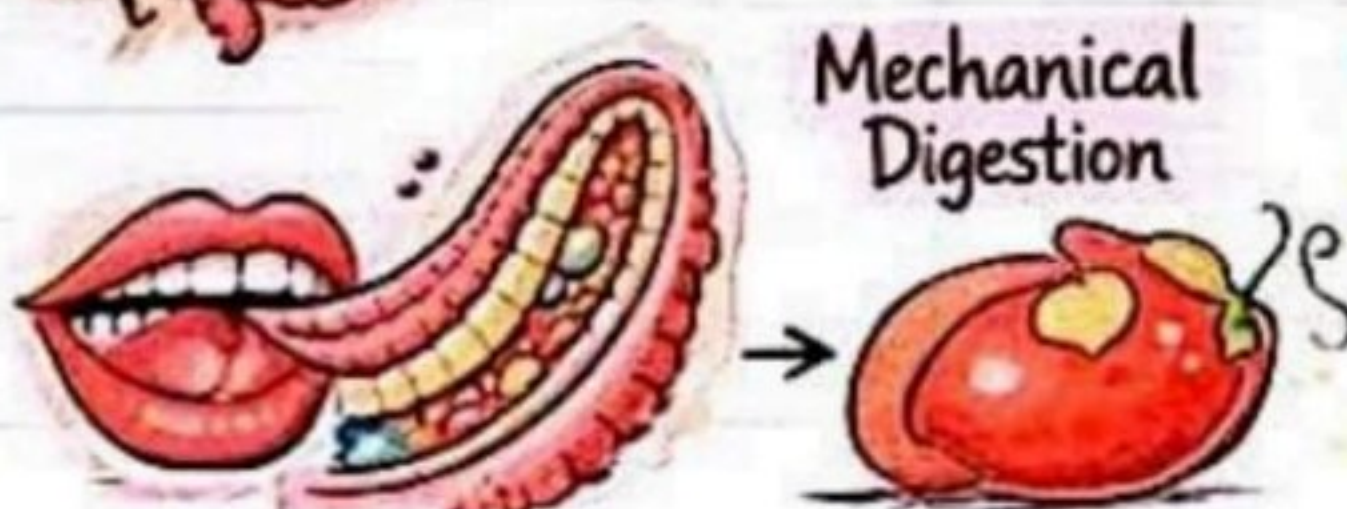
4. Elimination: Removal of undigested waste from body



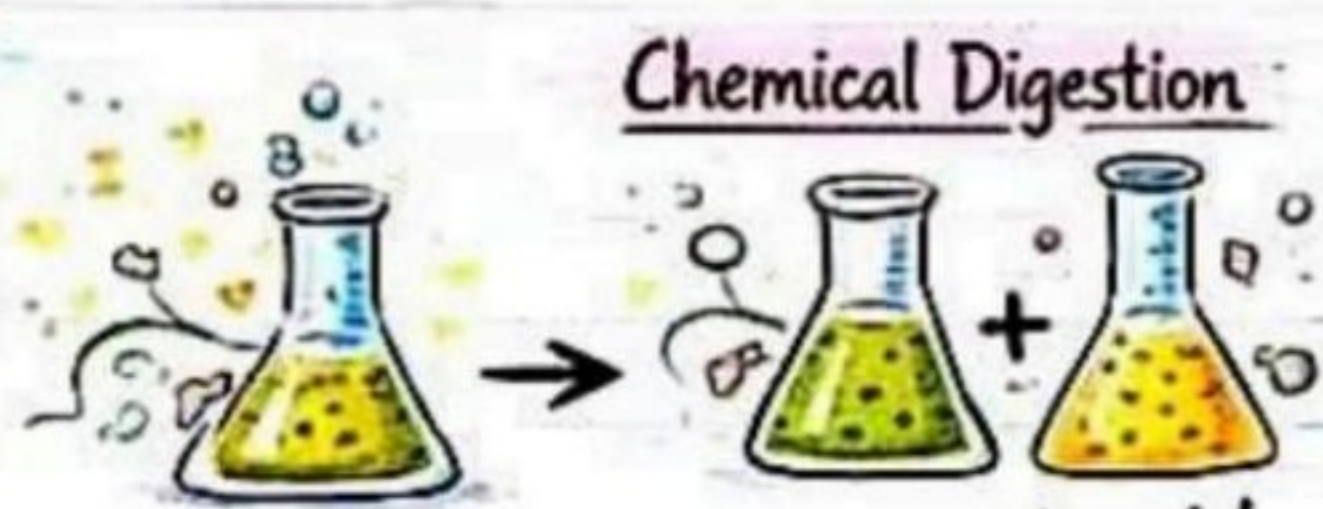
Definition of the Digestive System:



- The digestive system consists of a series of hollow organs joined in a long, twisting tube, from the mouth to the anus, along with accessory organs like the liver and pancreas.
- Its primary function is to break down food into smaller components to allow the absorption of nutrients and the elimination of waste.
- The digestive system works through a combination of mechanical digestion (chewing, churning) and chemical digestion (enzymes and acids).



Mechanical Digestion



Chemical Digestion

Functions of the Digestive System



Four Main Functions:

1. Ingestion

- The intake of food into the mouth
- Chewing (mastication) breaks food into smaller, digestible pieces
- Saliva contains enzymes (amylase) that start the breakdown of carbohydrates



2. Digestion

- The process of breaking down food into smaller components
- Mechanical digestion: Chewing & churning in the stomach
- Chemical digestion: Enzymes and acids further break down the food



3. Absorption

- The transfer of nutrients from the digestive tract into the bloodstream
- Occurs primarily in the small intestine - nutrients pass through the walls of the villi then enter the blood vessels



4. Elimination

- The removal of indigestible substances and waste products from the body
- Water is absorbed in the large intestine, and the remaining waste is formed into feces, which is then expelled from the body.



Key Fact: ~ Each function is crucial for maintaining the body's health and providing it with necessary nutrients for energy, growth, and repair.



Functions of the Stomach



What are the Functions of the Stomach?

- The stomach is a muscular organ that plays several critical roles in the digestive process, helping to prepare food for absorption in the small intestine.

Parts of the Small Intestine:

1. Storage of Food:

- Temporarily holds food after it is ingested.
- Releases food at a controlled rate into the small intestine.

2. Mechanical Digestion:

- Approximately 8 feet (2.5 meters) long
- Middle part where most digestion and nutrient absorption occurs.

3. Jejunum (3rd Section):

- Approximately 12 feet (3.5 meters) long
- Final part that absorbs remaining nutrients.

3. Chemical Digestion:

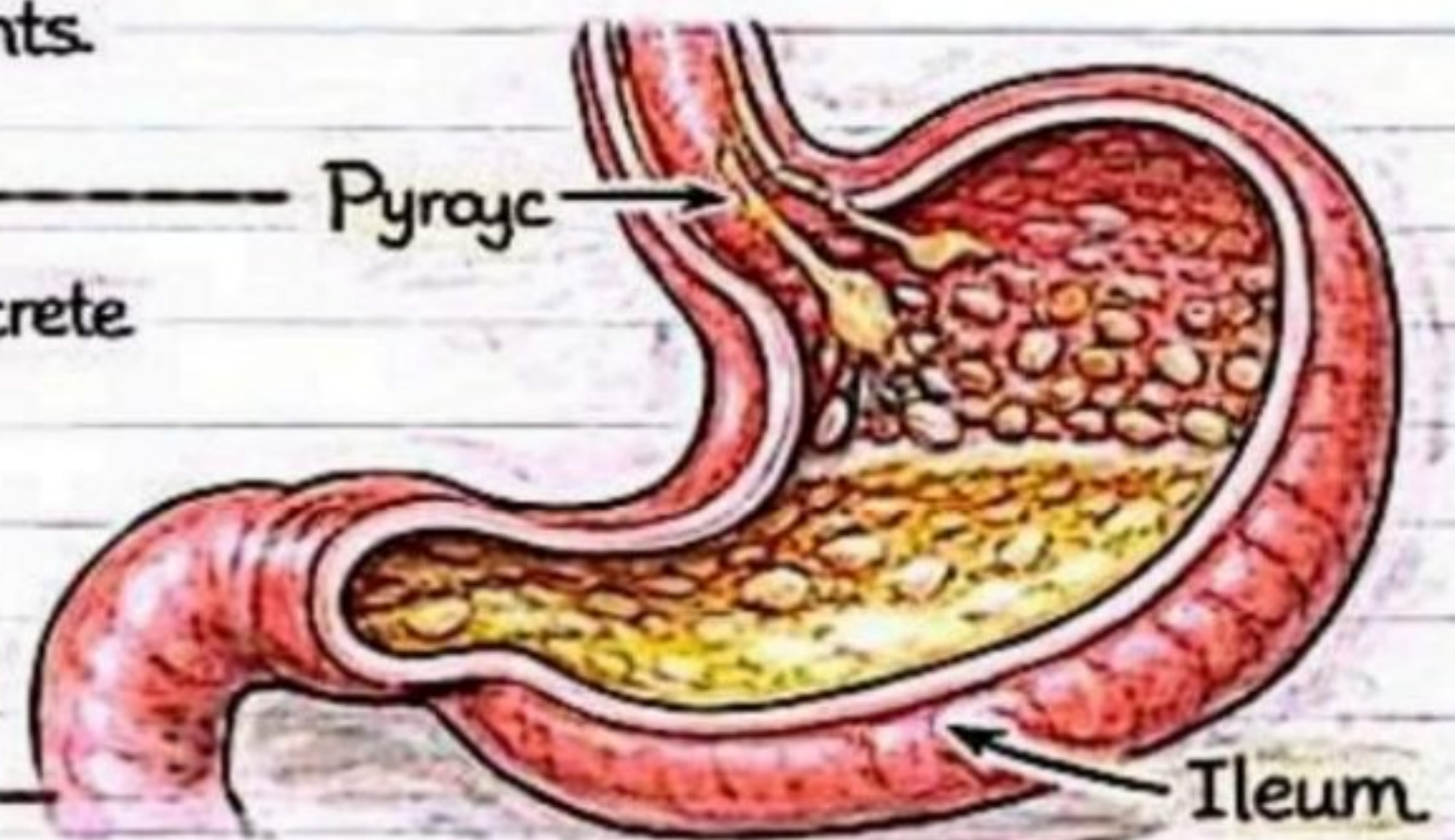
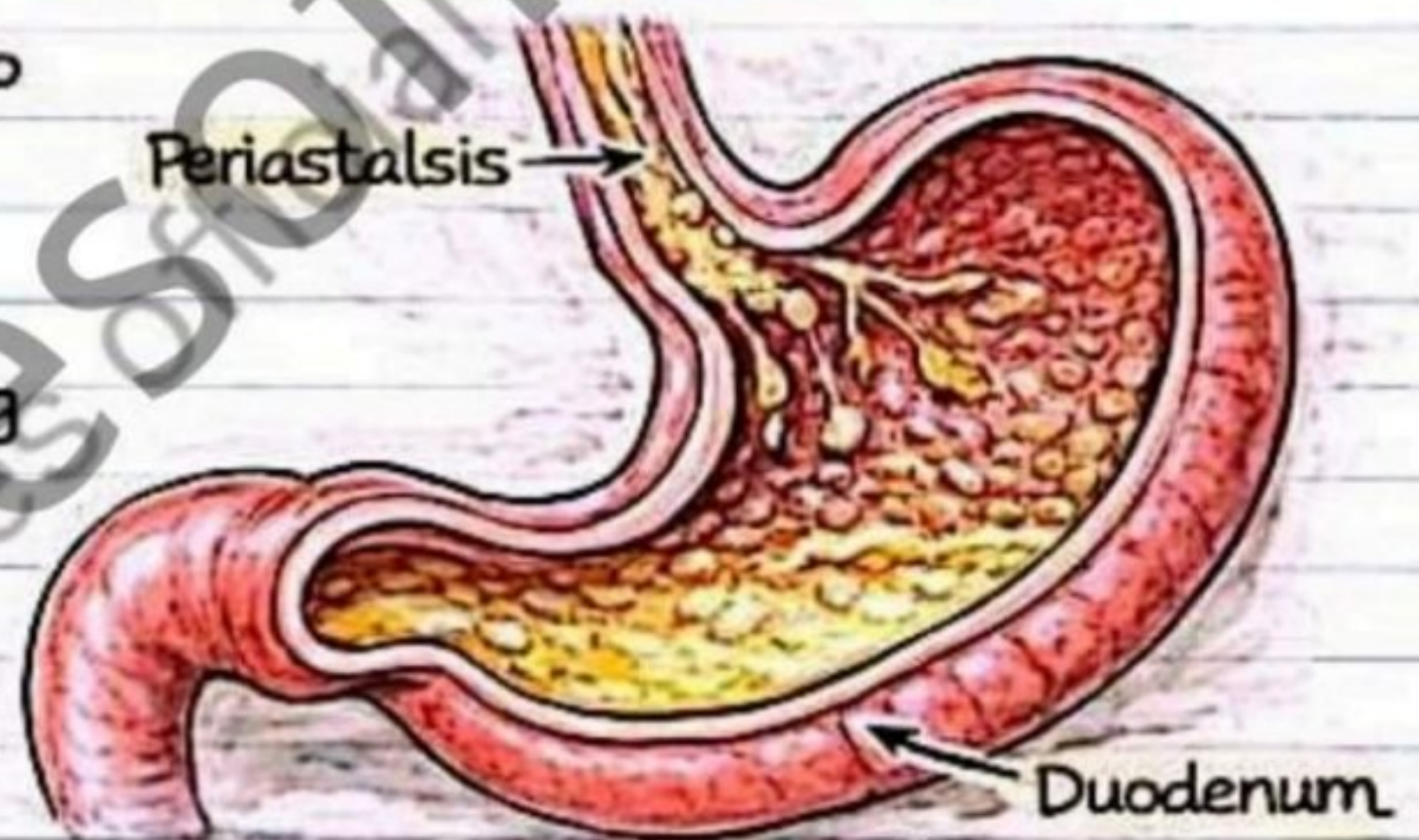
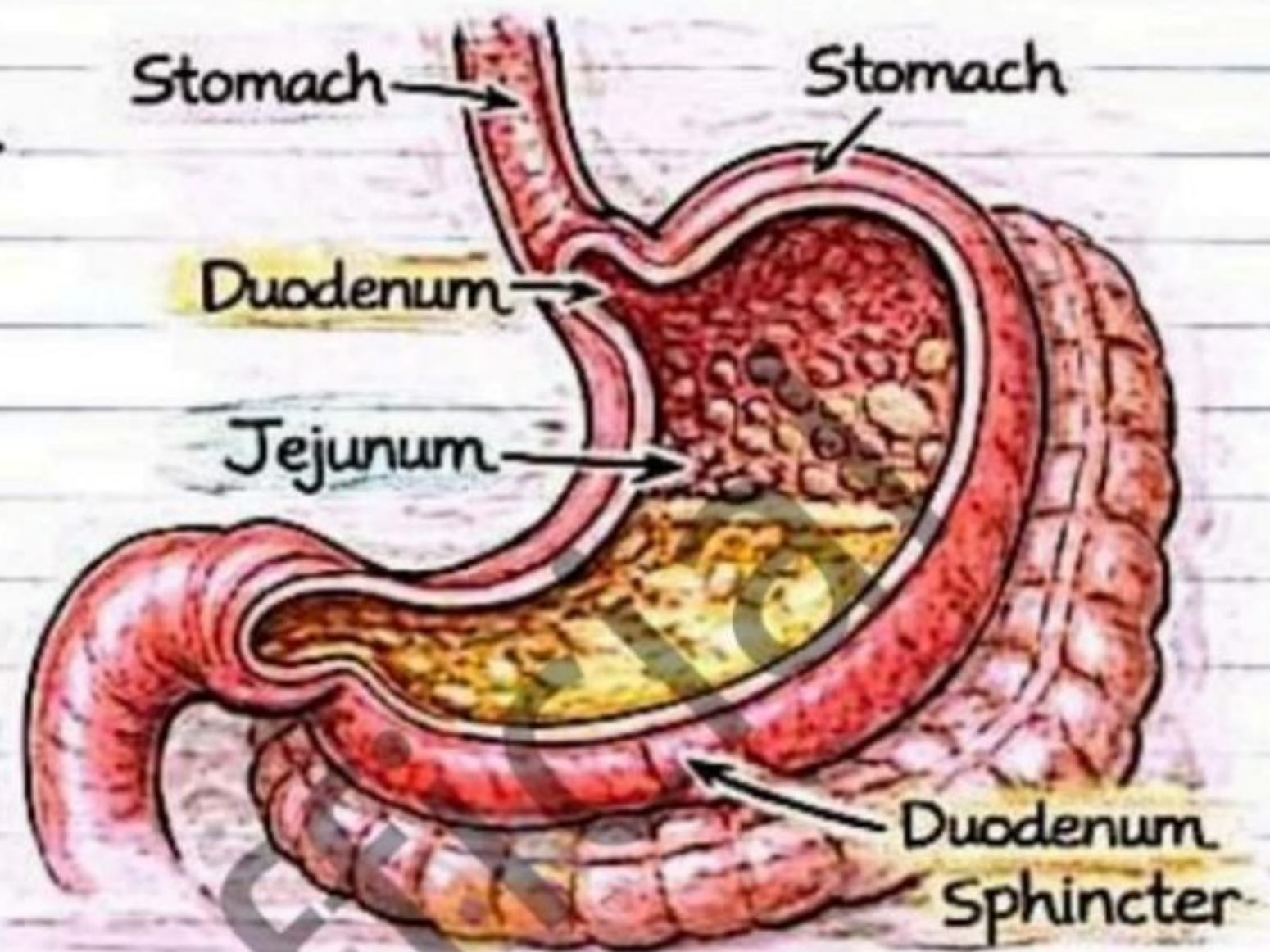
- Gastric glands in the stomach lining secrete gastric juice containing hydrochloric acid (HCl) and enzymes (like pepsin).

Key Fact:

- The stomach converts food into chyme, a semi-liquid substance

Key Fact:

- The stomach converts food into chyme, a semi-liquid substance that is ready for absorption in the small intestine.



Functions of the Small Intestine

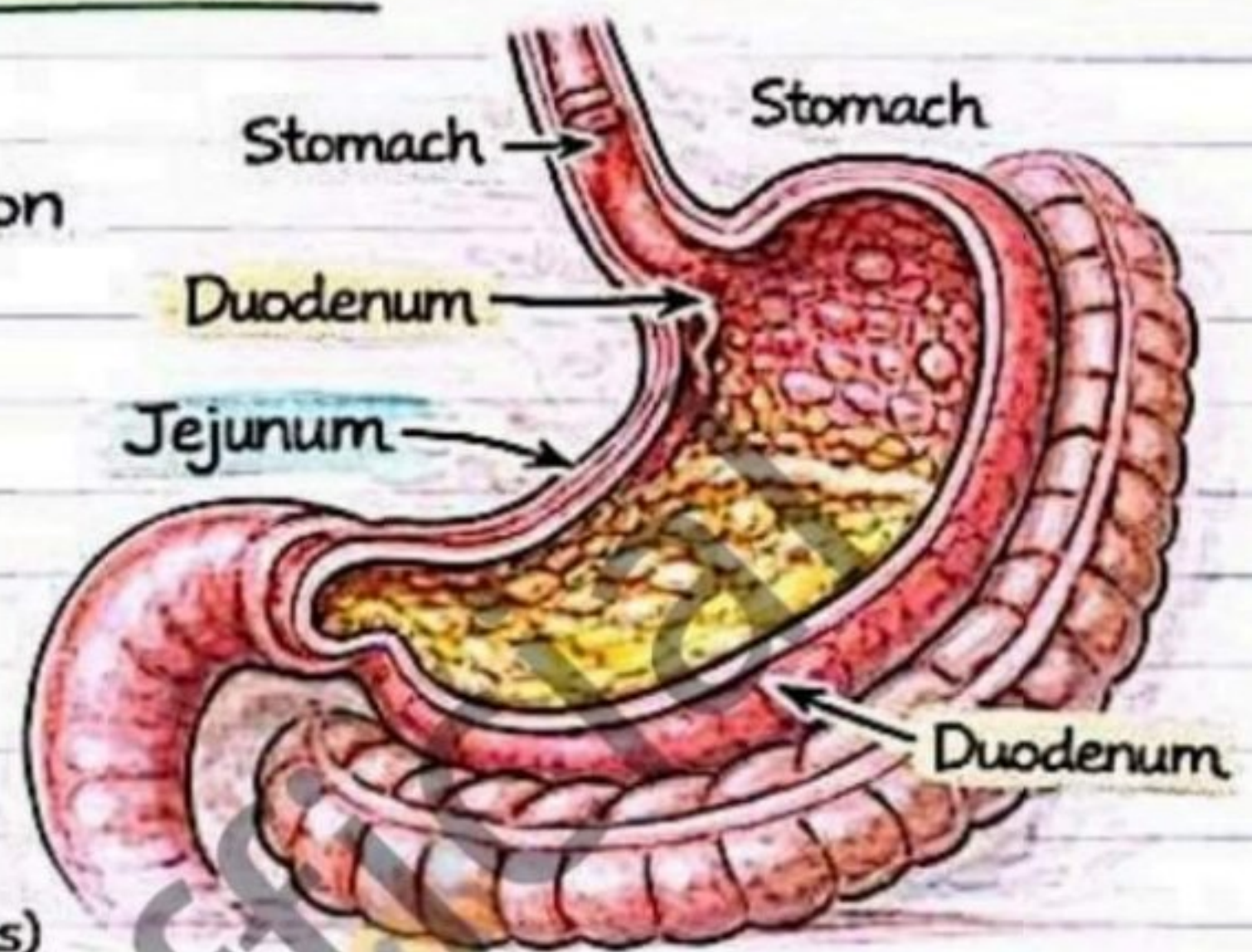


What are the Functions of the Small Intestine?

- The small intestine is a long, coiled tube where most digestion and nutrient absorption occur. It has several important functions that are essential for health.

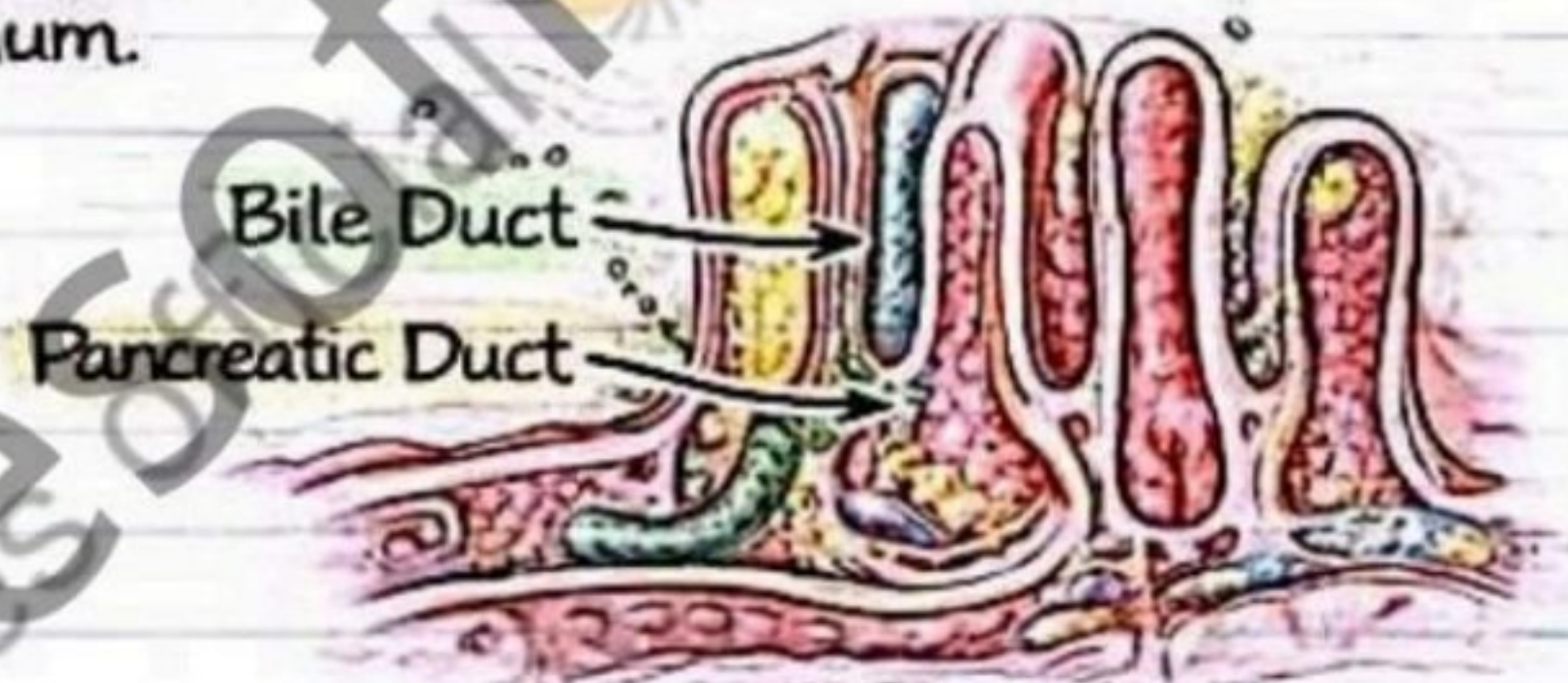
1. Digestion:

- Temporarily holds food after it is ingested
- Releases digestive enzymes (from pancreas) and bile (from liver) into the duodenum.



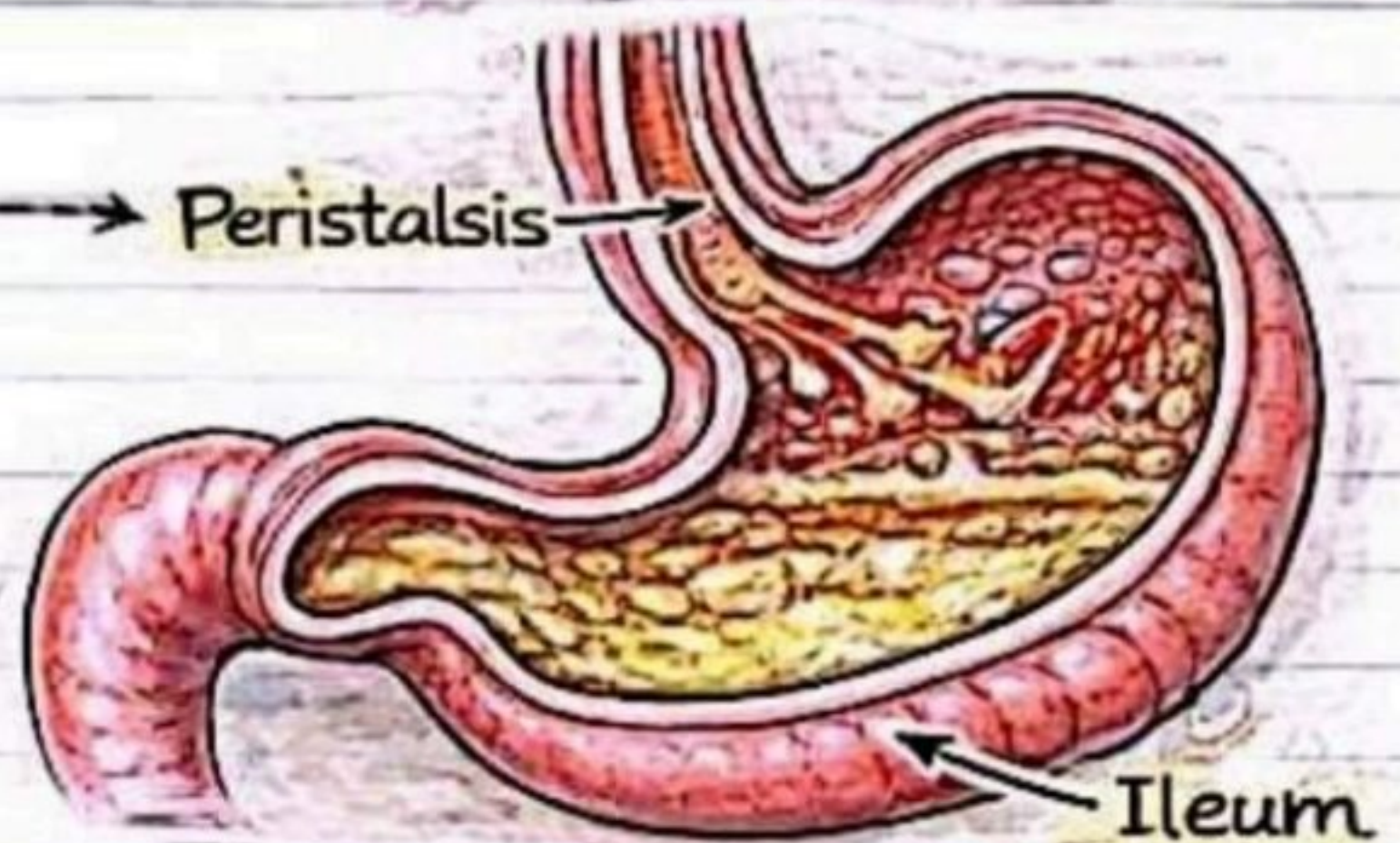
2. Absorption:

- Villi and microvilli lining the walls increase the surface area.
- Nutrients (sugars, amino acids, fatty acids, vitamins, minerals) are absorbed into the bloodstream.



3. Peristalsis:

- Wave-like muscle contractions that move chyme through.

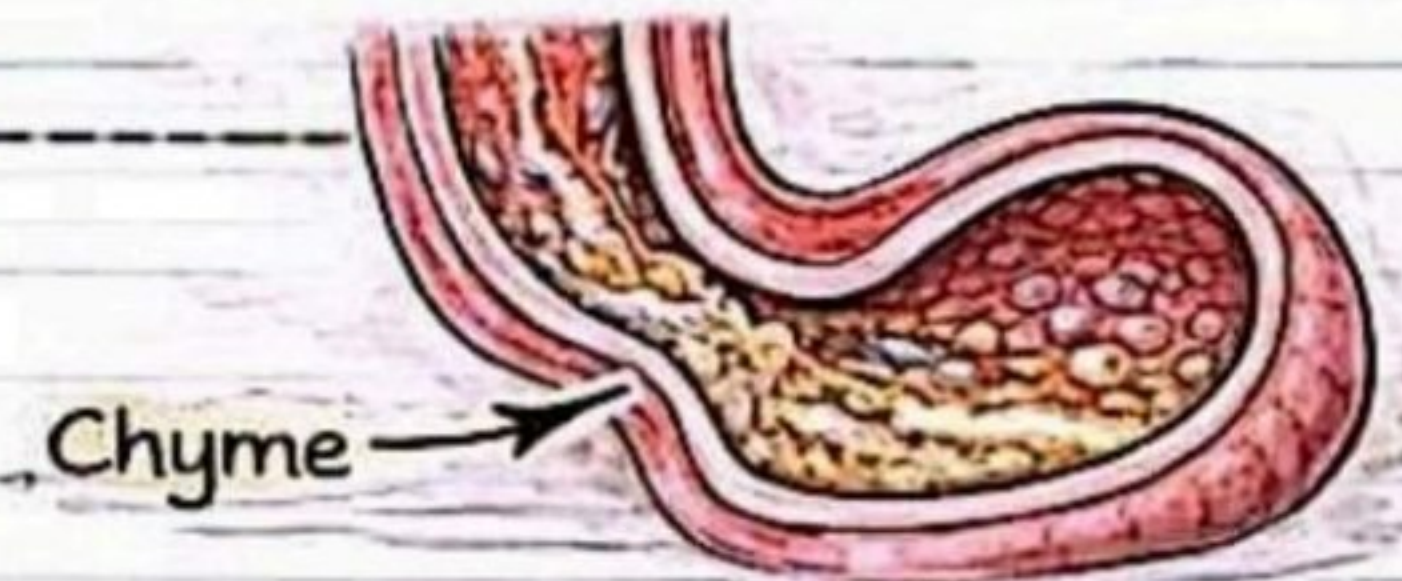


4. Immune Function:

- Contains lymphoid tissue (Peyer's patches) that combat

Key Fact:

- About 90% of nutrient absorption occurs in the small intestine.



Key Fact: - About 90% of nutrient absorption occurs in the small

Accessory Organ: The Salivary Glands



What are the Salivary Glands?

- The salivary glands are accessory organs of the digestive system found in and around the mouth. They produce and secrete saliva, a fluid that plays a key role in the digestion of food.

Types of Salivary Glands:

1. Parotid Glands:

- Located in front of and below the ears.
- Produce about 20-25% of the saliva.

Parotid Duct (duct of Stensen):
opens near the upper second molar

2. Submandibular Glands:

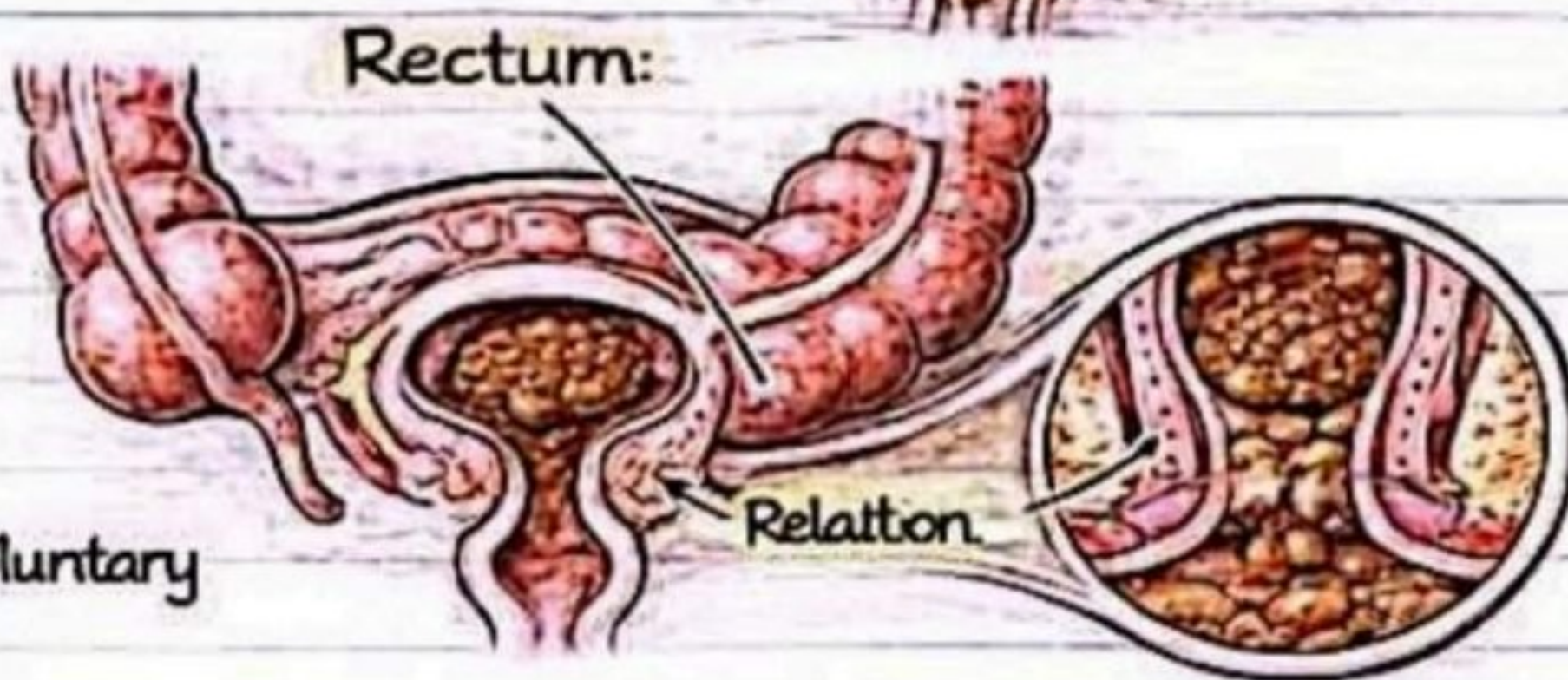
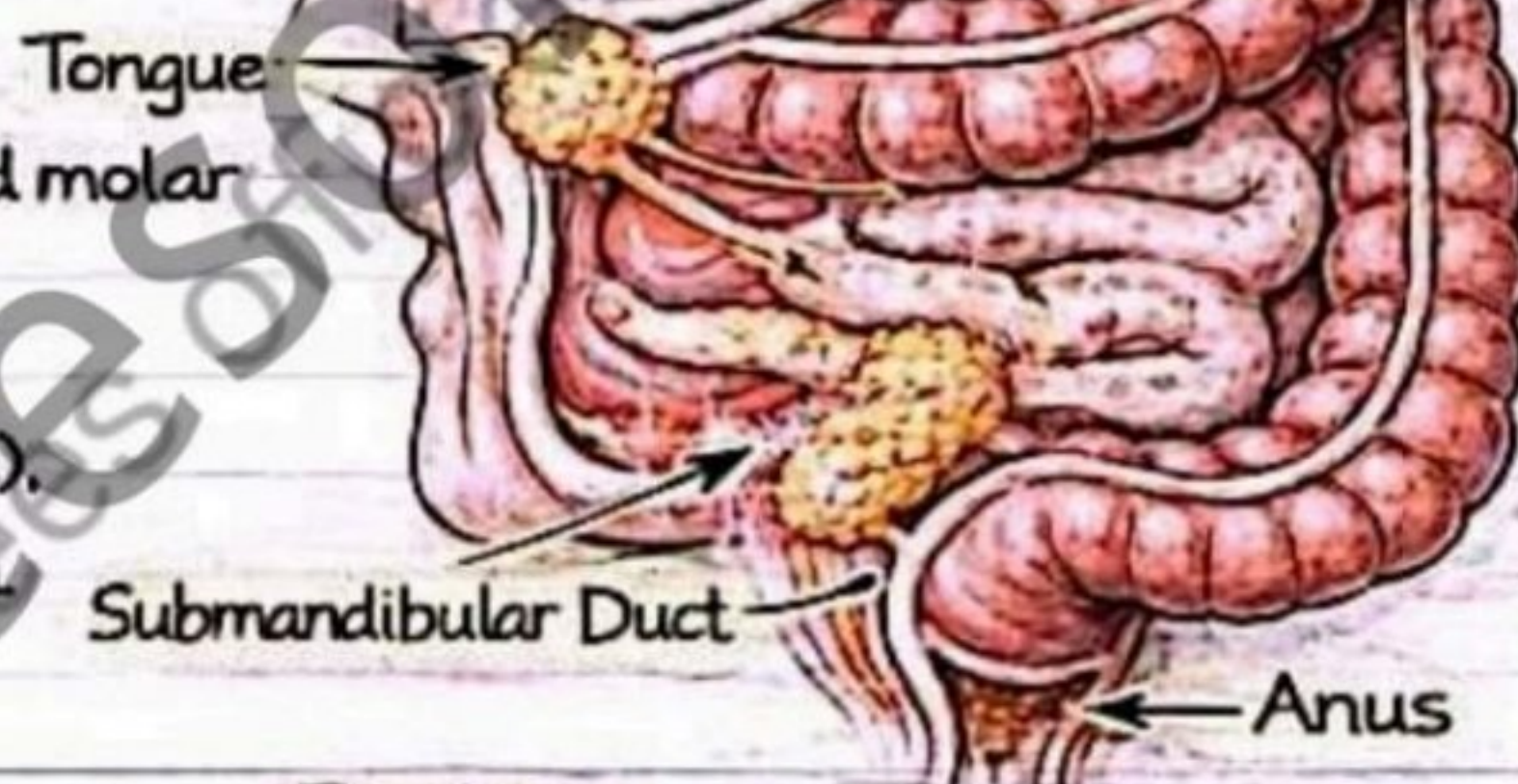
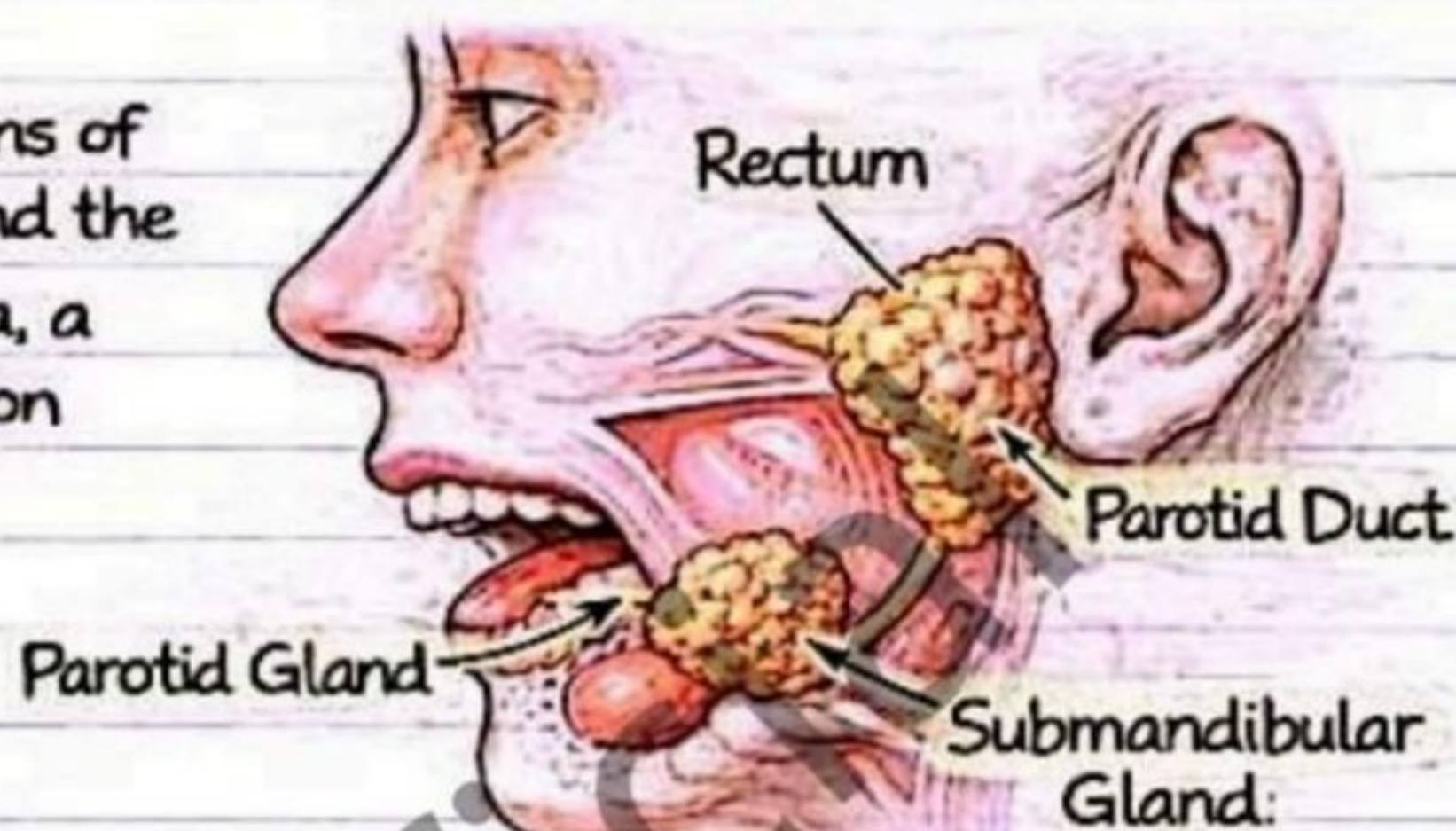
- Located beneath the jaw (mandible).
- Produce about 65-70% of the saliva.

3. Sublingual Glands:

- Located under the tongue.
- Produce about 5-10% of the saliva.

2. External Anal Sphincter:

- Voluntary (skeletal) muscle
- Under conscious control. allows voluntary control over defecation.



Functions of the Anus:

✓ Moistens Food:

- Lubricates and moistens food to aid in chewing and swallowing.

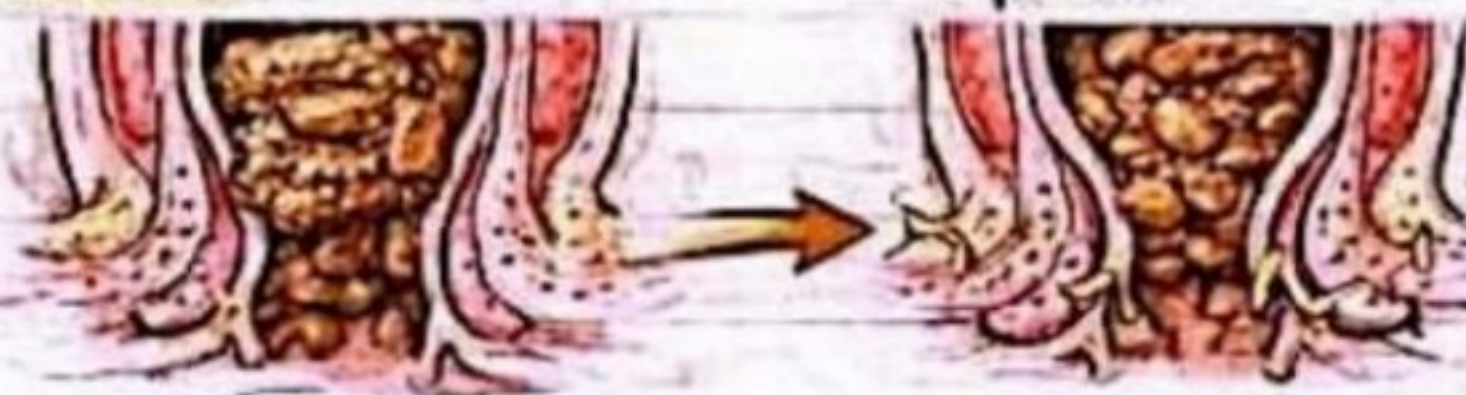
✓ Begins Digestion:

- Contains the enzyme amylase that starts the breakdown of carbohydrates.

- ✓ Protects the Mouth: Helps cleanse the mouth and contains antibacterial compounds that protect against infection.

Closed:

Open:



What is the Pharynx?

- The pharynx, also known as the throat, is a muscular tube that serves as a passageway for both air and food.

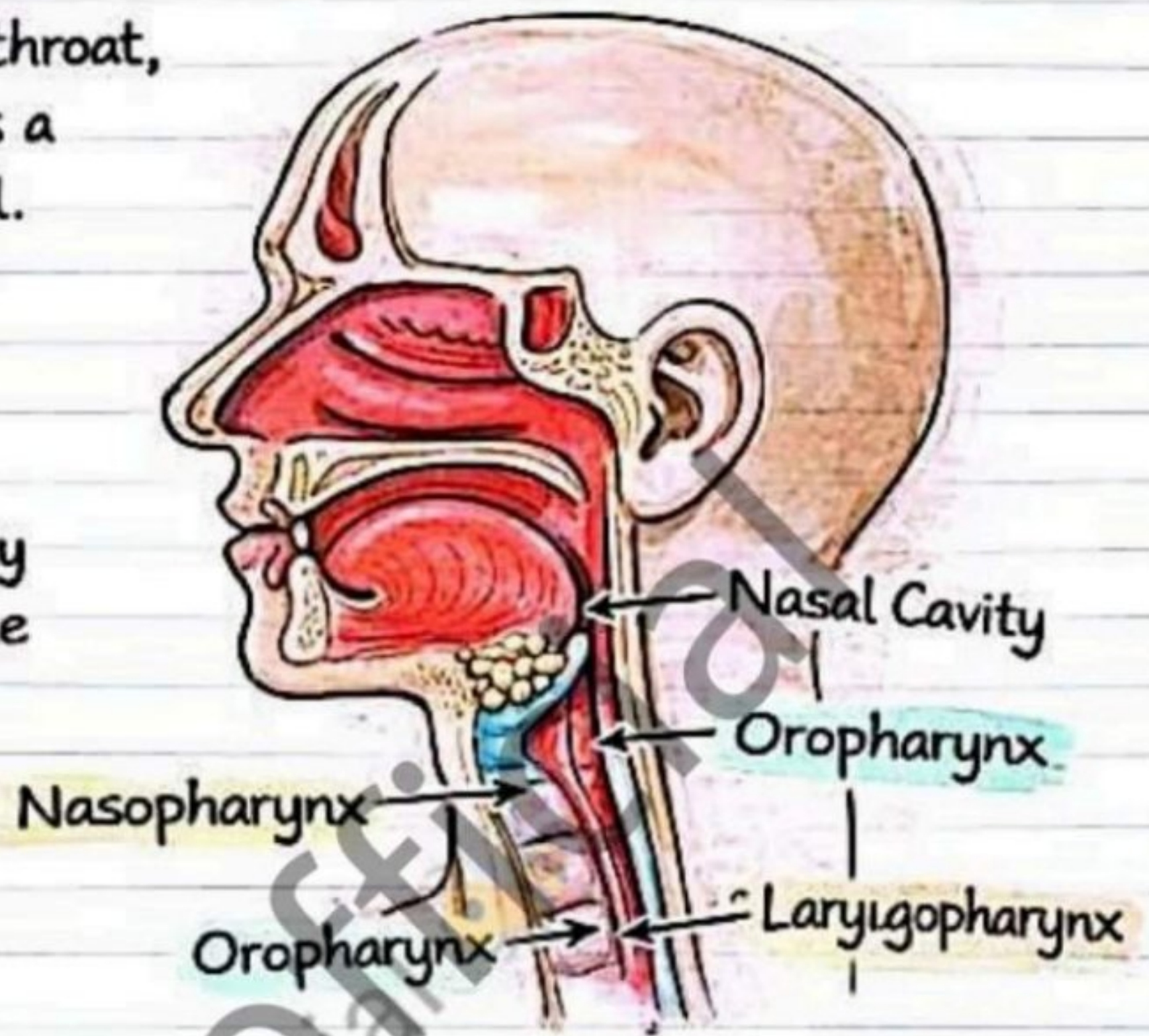
Parts of the Pharynx:

> Nasopharynx:

- Located behind the nasal cavity
- Connects the nasal cavity to the oropharynx.

> Oropharynx:

- Located behind the oral cavity
- Passage for both air and food.



Parts of the Pharynx:

> Nasopharynx:

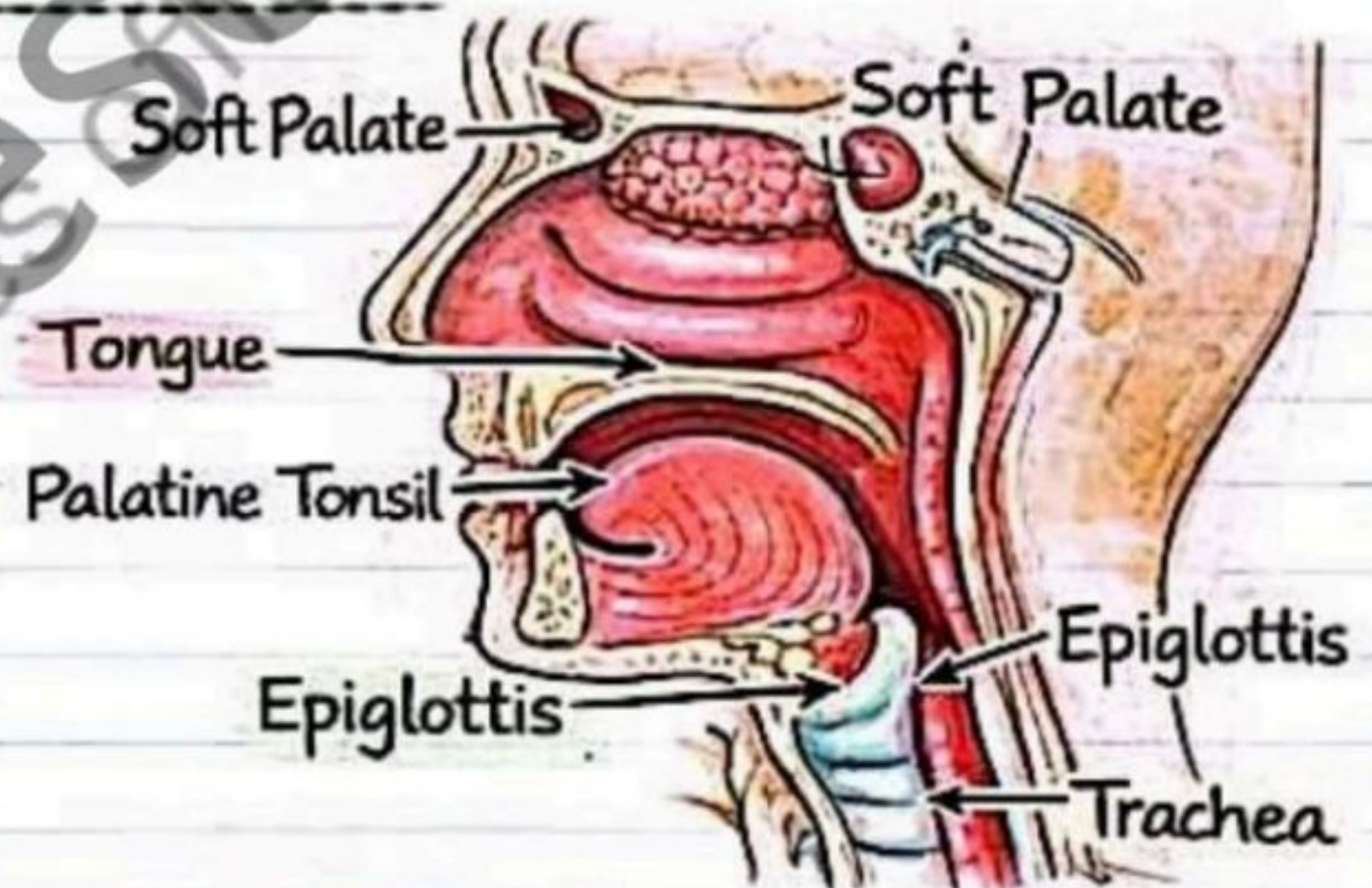
- Located behind the nasal cavity
- Passage for both air and food.

> Oropharynx:

- Located behind the oral cavity
- Passage for both air and food.

> Laryngopharynx:

- Located behind the larynx
- Leads to the esophagus.



Functions of the Pharynx:

> Passage for Air:

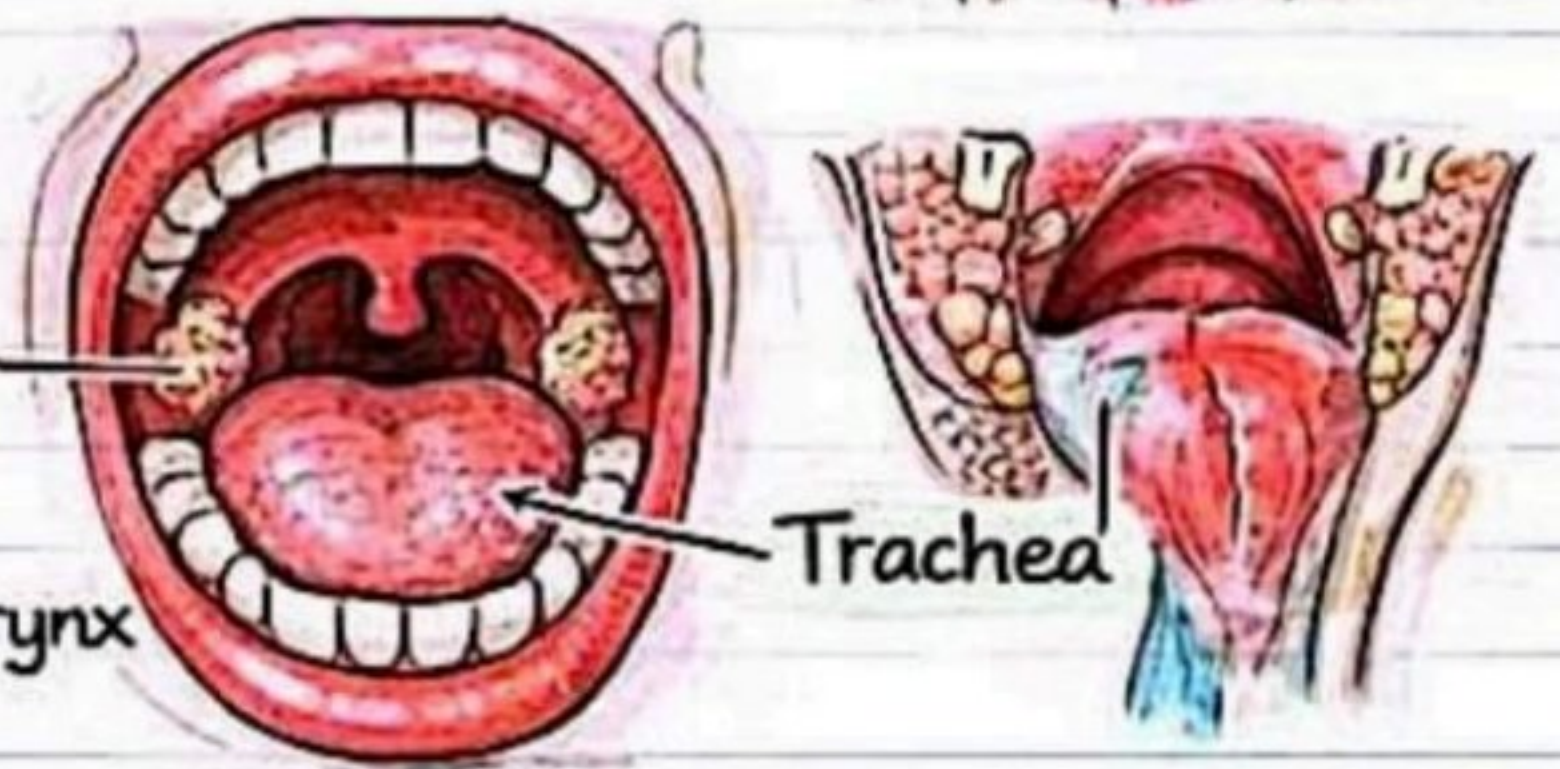
- Transports air from nasal cavity to larynx (voice box)

> Passage for Food:

- Moves food from mouth to esophagus.

> Role in Swallowing:

- Coordinated actions in the pharynx help to propel food into the esophagus.



The Anus



What is the Anus?

- The anus is the final part of the digestive tract and the opening at the end of the gastrointestinal (GI) system.
- It's a short, muscular canal through which solid waste (feces) is expelled from the body.

Structure of the Anus:

1. Water Absorption:

- Absorbs remaining water and electrolytes (e.g, sodium, chloride) from undigested food.

2. External Anal Sphincter:

- Involuntary (smooth) muscle
- Automatically contracts to hold feces in the rectum.
- Relaxes to allow passage of feces

3. Bacteria:

- Houses beneficial bacteria (gut flora) that break down remaining nutrients and produce vitamins (such as vitamin K).

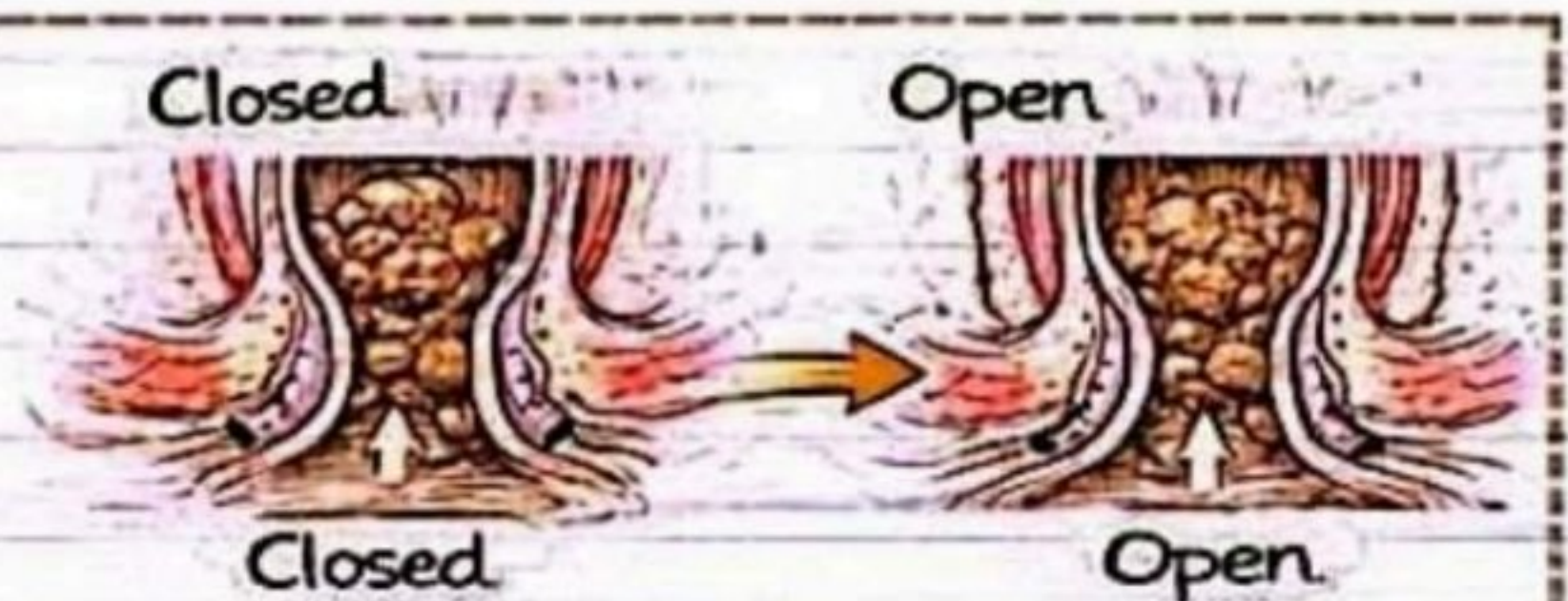
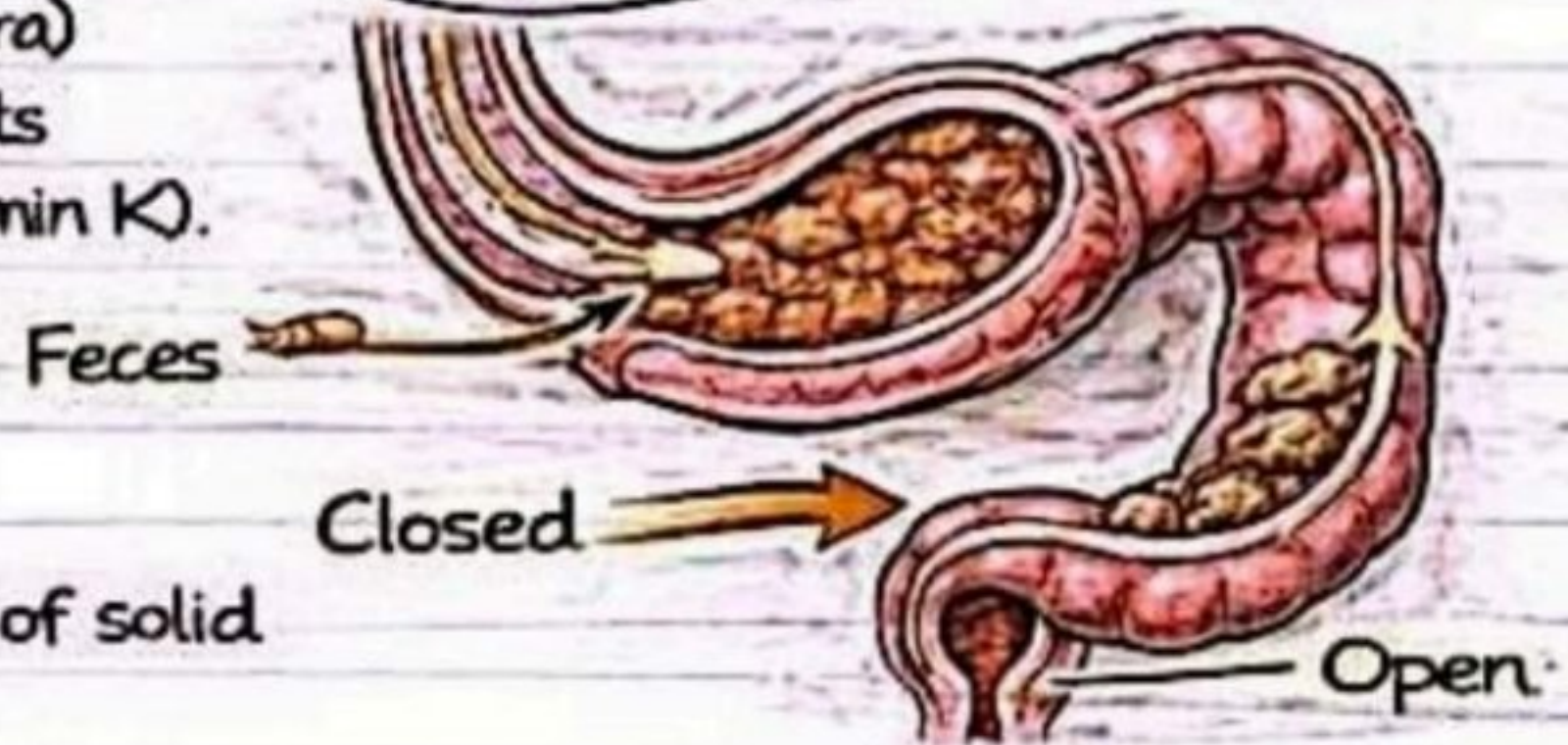
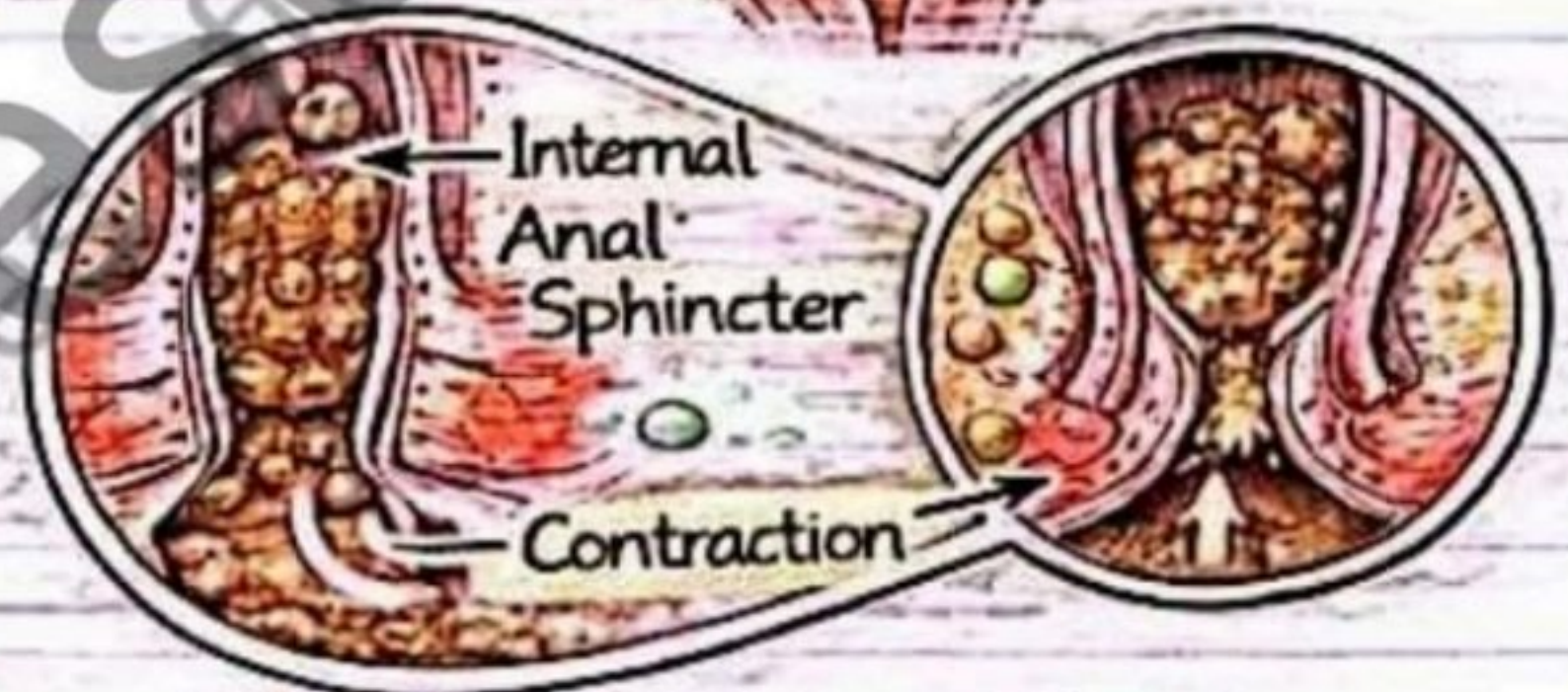
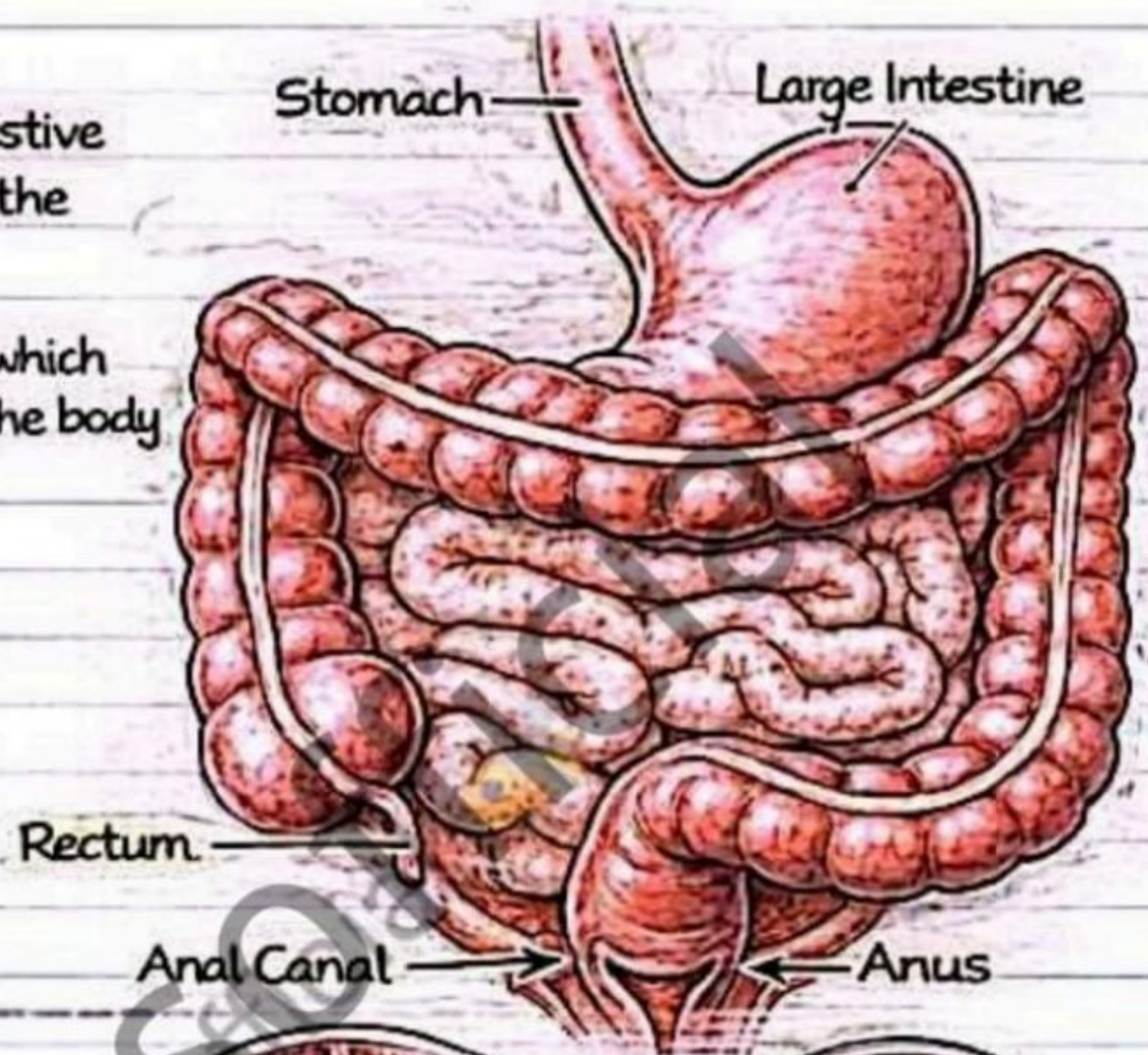
4. Functions of the Anus:

1. Passage of Feces:

- The sphincters control the release of solid waste (feces) from the body.

2. Control of Defecation:

- The external anal sphincter gives conscious control over the timing of defecation.



Key Fact: ~ The internal anal sphincter is involuntary and the external anal sphincter is voluntary allowing control of bowel movements

The Gallbladder



What is the Gallbladder?

- The gallbladder is a small, pear-shaped, greenish organ located beneath the liver on the right side of the abdomen.
- It stores and concentrates bile, a digestive fluid produced by the liver.

Blood Supply to the Gallbladder:

1. Cystic Artery: (25%)

- Carries oxygen-rich blood to the gallbladder.
- Branches off the right hepatic artery, which is a branch of the hepatic artery.

Blood Supply to the Gallbladder:

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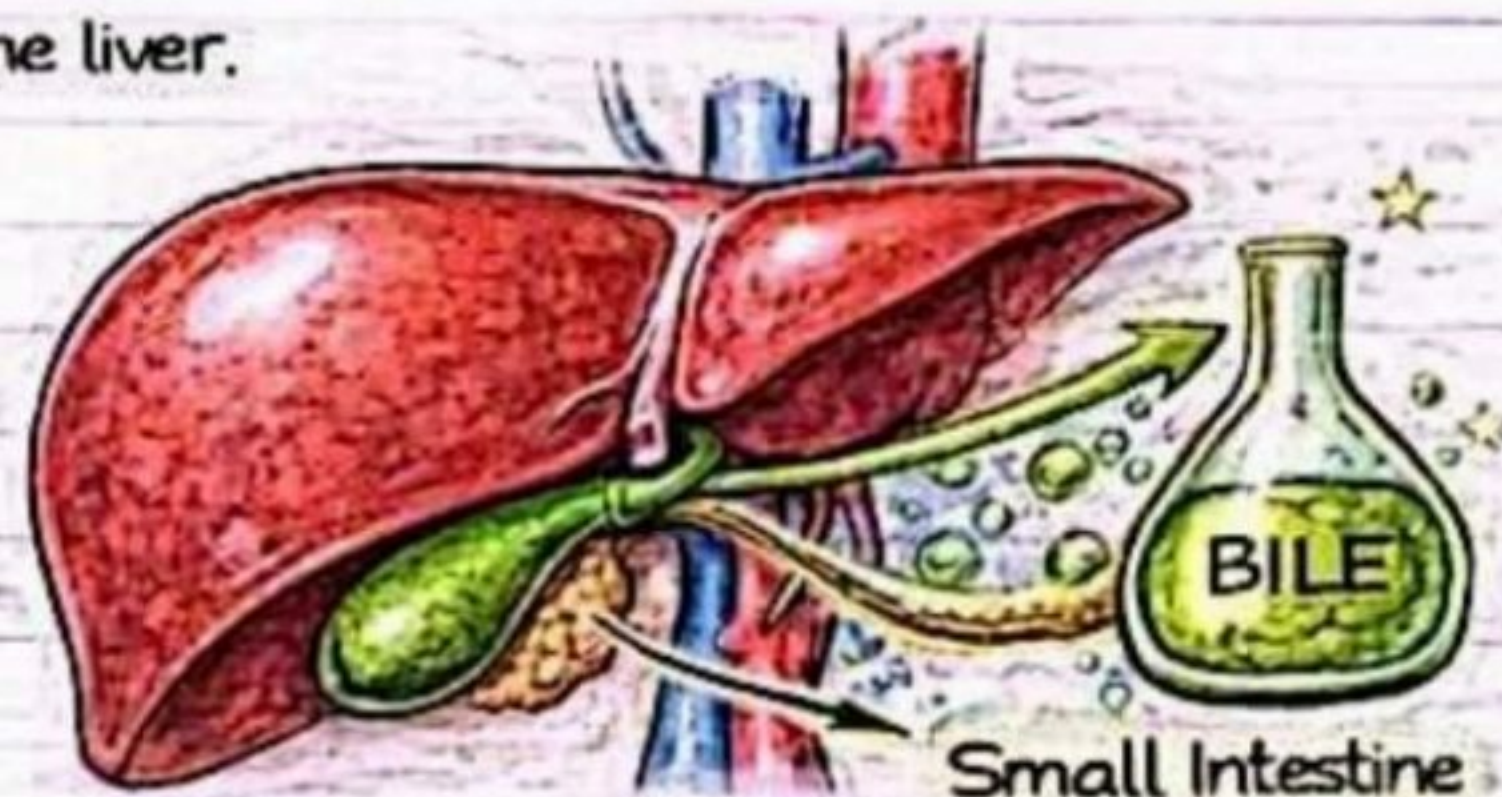
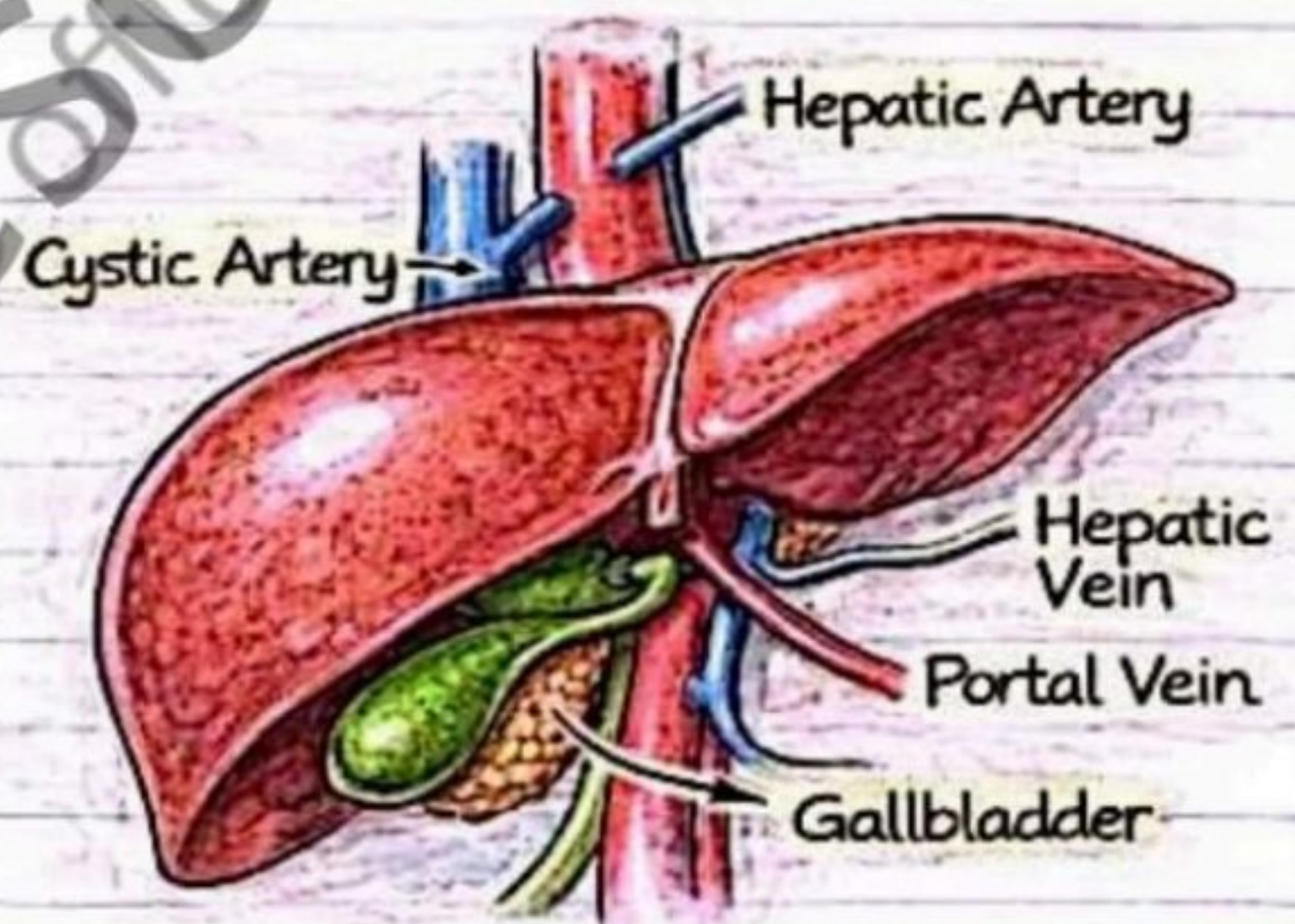
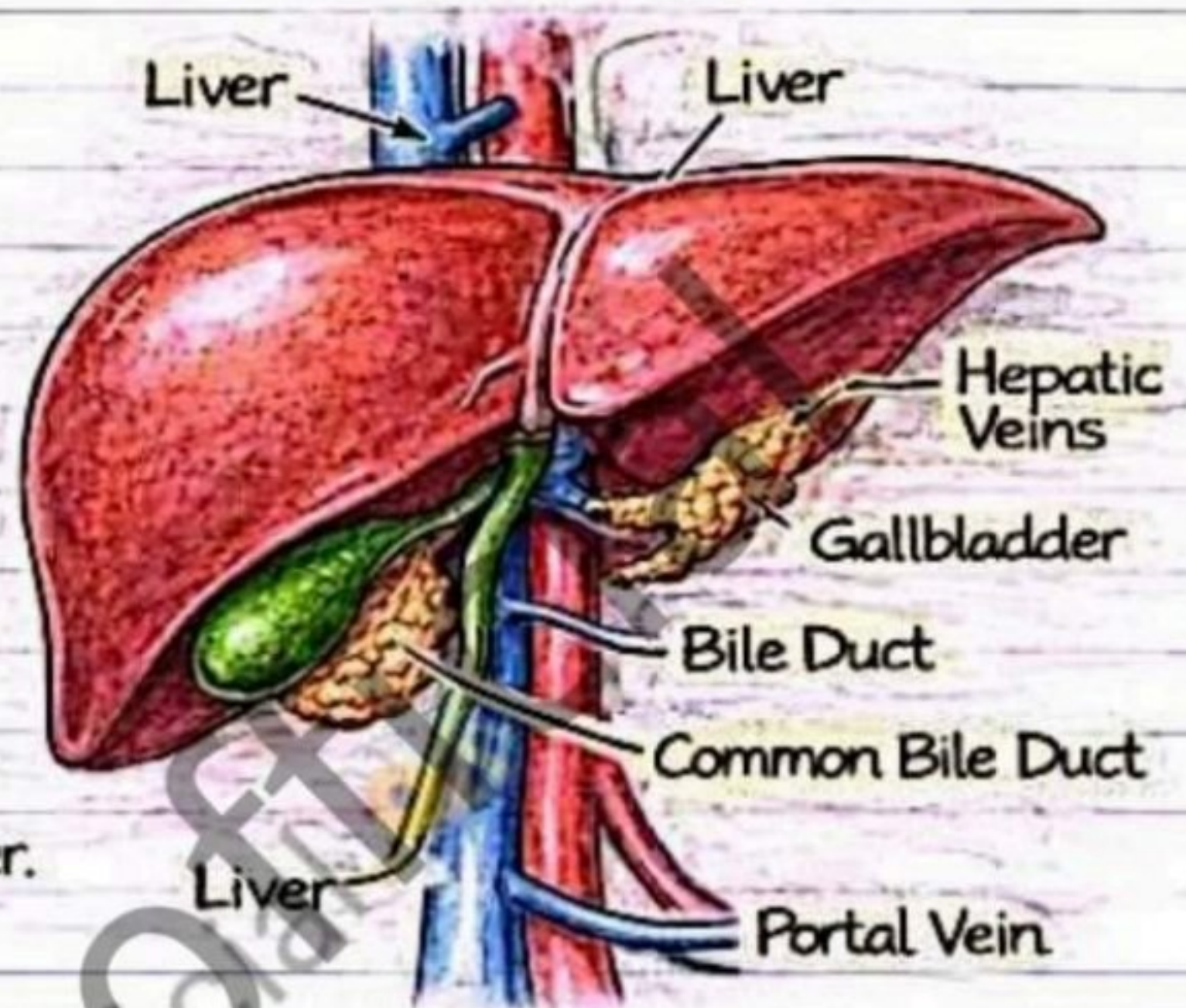
5. Functions of the Gallbladder:

1. Stores and Concentrates Bile:

- The gallbladder stores bile produced by the liver.
- It concentrates bile by absorbing water and electrolytes.

2. Releases Bile:

- In response to eating the gallbladder contracts and releases bile into the small intestine.



Key Fact: ~ The gallbladder is not essential for survival. If removed bile flows directly from the liver to the small intestine to assist with digestion.



The Pancreas



What is the Pancreas?

- The gallbladder is a light yellow, elongated, spongy organ located behind the stomach, extending across the back of the abdomen.
- It has both endocrine and exocrine functions, making it essential for digestion and blood sugar regulation.

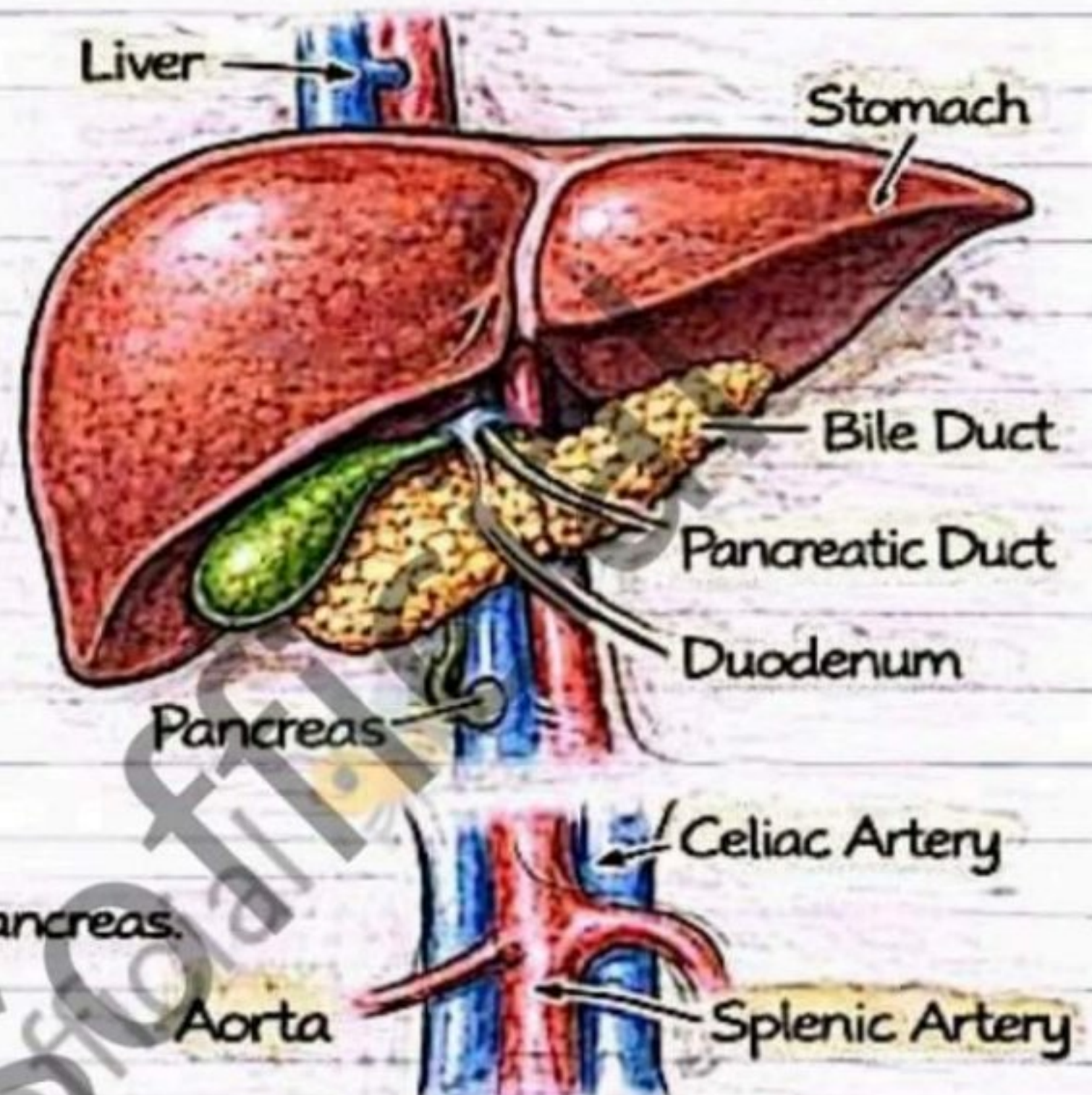
Blood Supply to the Pancreas:

1. Splenic Artery: (25%)

- Branches off the celiac artery:
- Supplies blood to the body and tail of the pancreas.

2. Superior Mesenteric Artery:

- Branches off the aorta.
- Supplies blood to the head of the pancreas.



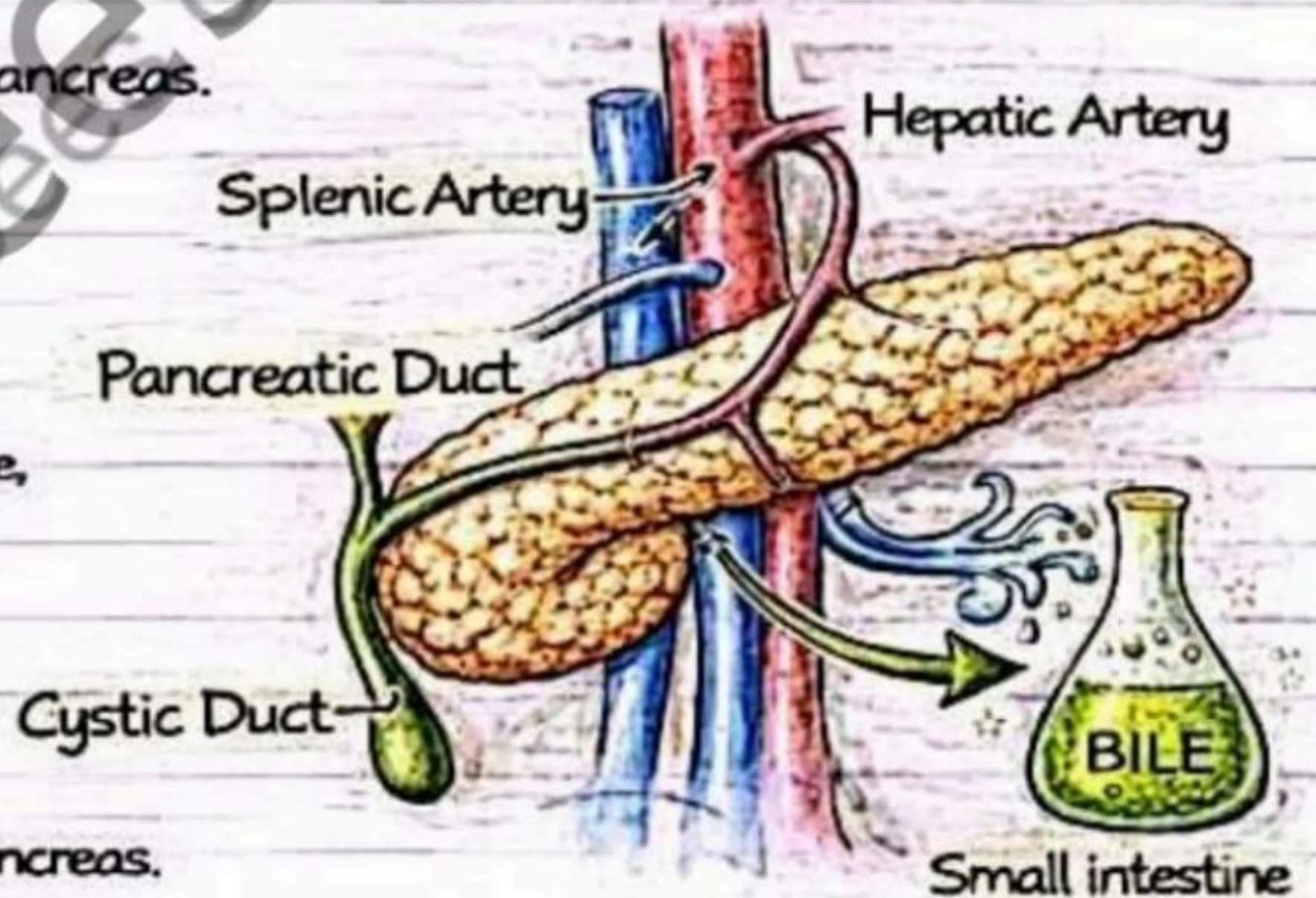
Functions of the Pancreas:

1. Digestive (Exocrine) Function:

- Produces digestive enzymes (amylase, lipase, proteases) that help break down carbohydrates, fats, and proteins.

2. Superior Mesenteric Artery:

- Branches off the aorta.
- Supplies blood to the head of the pancreas.



3. Functions of the Pancreas:

1. Digestive (Exocrine) Function:

- Produces digestive enzymes (amylase, lipase, proteases) that help break down carbohydrates, fats, and proteins.

2. Hormonal (Endocrine) Function:

- Contains clusters of cells called islets of Langerhans. ☆ ☆
- Releases insulin (lowers blood sugar (glucose levels)). ☆ ☆



Helps regulate blood sugar levels -

Functions of the Small Intestine



What are the Functions of the Small Intestine?

- The small intestine is a long, coiled, tubular organ that plays a crucial role in the absorption of nutrients. It plays a crucial role in digestion and absorption of food and absorbing the nutrients.

1. Storage of Food:

- Completes the chemical breakdown of food.
- Enzymes (from pancreas) and bile (from liver) aid in digestion.

2. Absorption of Nutrients:

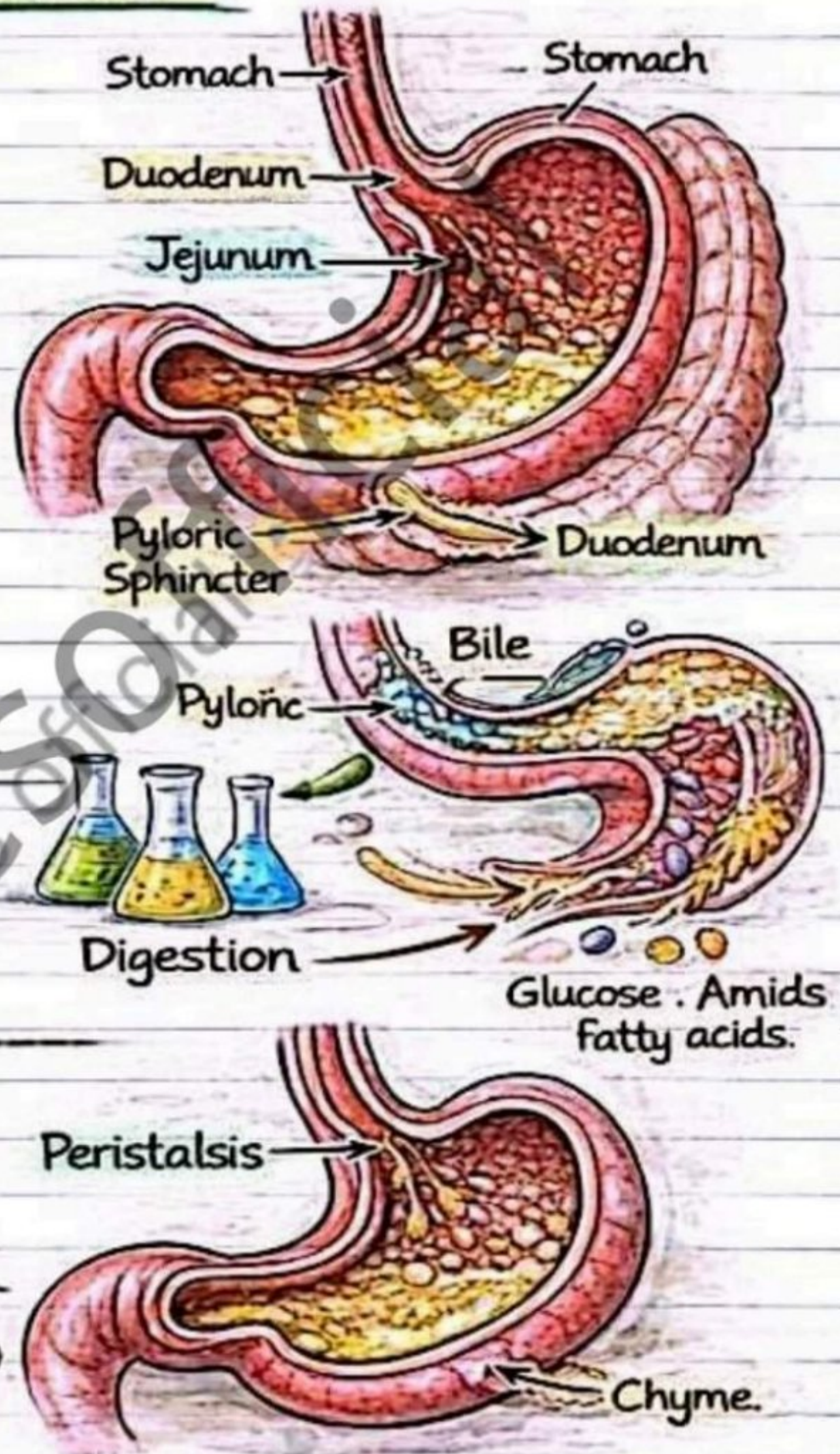
- Villi and microvilli line the walls of the small intestine, increasing the surface area for absorption.

3. Chemical Digestion:

- Gastric glands in the stomach lining secrete gastric juice containing hydrochloric acid (HCl) and enzymes.

4. Immune Function:

- Contains lymphoid tissues (Peyer's patches) that help protect the body from harmful bacteria.



Key Fact:

- The stomach converts food into chyme, a semi-liquid substance.



Key Fact: ~ The stomach converts food into chyme, a semi-liquid substance that is ready for absorption in the small intestine.

Types of Digestive Juice & Enzymes



Types of Digestive Juice:

1. Saliva:

- Produced by the salivary glands in the mouth.
- Contains the enzyme amylase that begins the digestion of carbohydrates.

2. Gastric Juice:

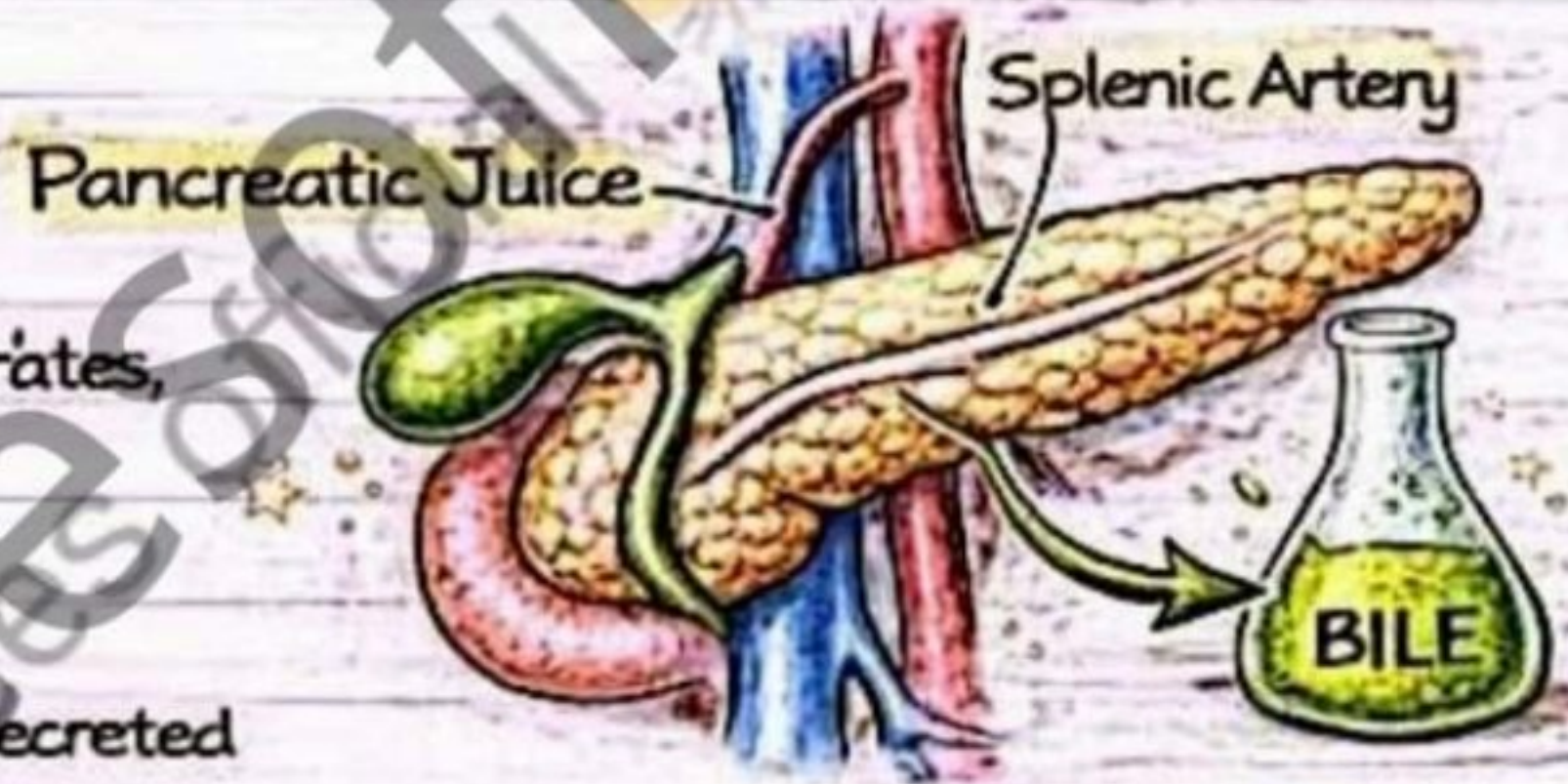
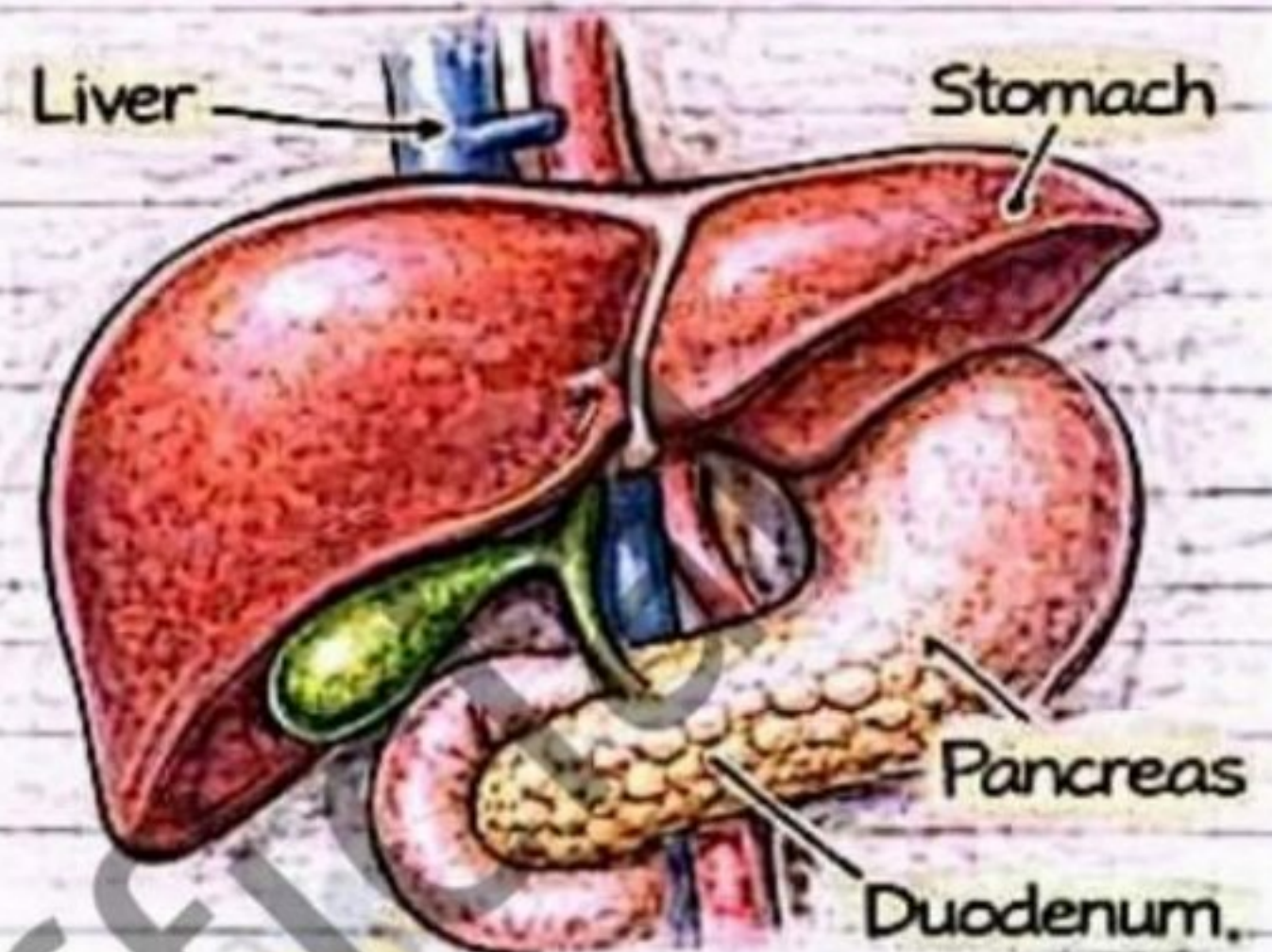
- Produced by the stomach lining.
- Contains hydrochloric acid (HCl) and pepsin, which start digestion of proteins.

3. Pancreatic Juice:

- Produced by the pancreas.
- Contains enzymes (amylase, lipase, proteases) that break down carbohydrates, fats, and proteins.

4. Bile:

- Produced by the liver and stored and secreted by the gallbladder.
- Contains bile salts that help digest fats by emulsifying (breaking down) large fat globules into smaller droplets.



Types of Enzymes:

1. Amylase:

- Breaks down carbohydrates (starches) into sugars like maltose.
- Found in saliva and pancreatic juice.



Proteases:

- Breaks down proteins into smaller peptides or amino acids.
- Includes pepsin (in gastric juice), trypsin, and chymotrypsin (in pancreatic juice).



3. Lipase:

- Breaks down fats (lipids) into fatty acids and glycerol.
- Found in pancreatic juice.



★ Tip: ~ Digestive enzymes help break down food into smaller molecules that can be absorbed by the body: ★★

The Liver



What is the Liver?

- The liver is a large, reddish-brown organ located in the upper right side of the abdomen, just below the diaphragm.
- It is essential for various metabolic, detoxification, and synthetic processes in the body.

Blood Supply to the Liver:

1. Hepatic Artery: (25%)

- Carries oxygen-rich blood from the aorta.
- Produce about 20-25% of the saliva.

2. Portal Vein: (75%)

- Carries nutrient-rich blood from the gastrointestinal tract.

3. Sublingual Glands:

- Located beneath the jaw (mandible).
- Produce about 65-70% of the saliva.

Functions of the Liver:

1. Metabolism:

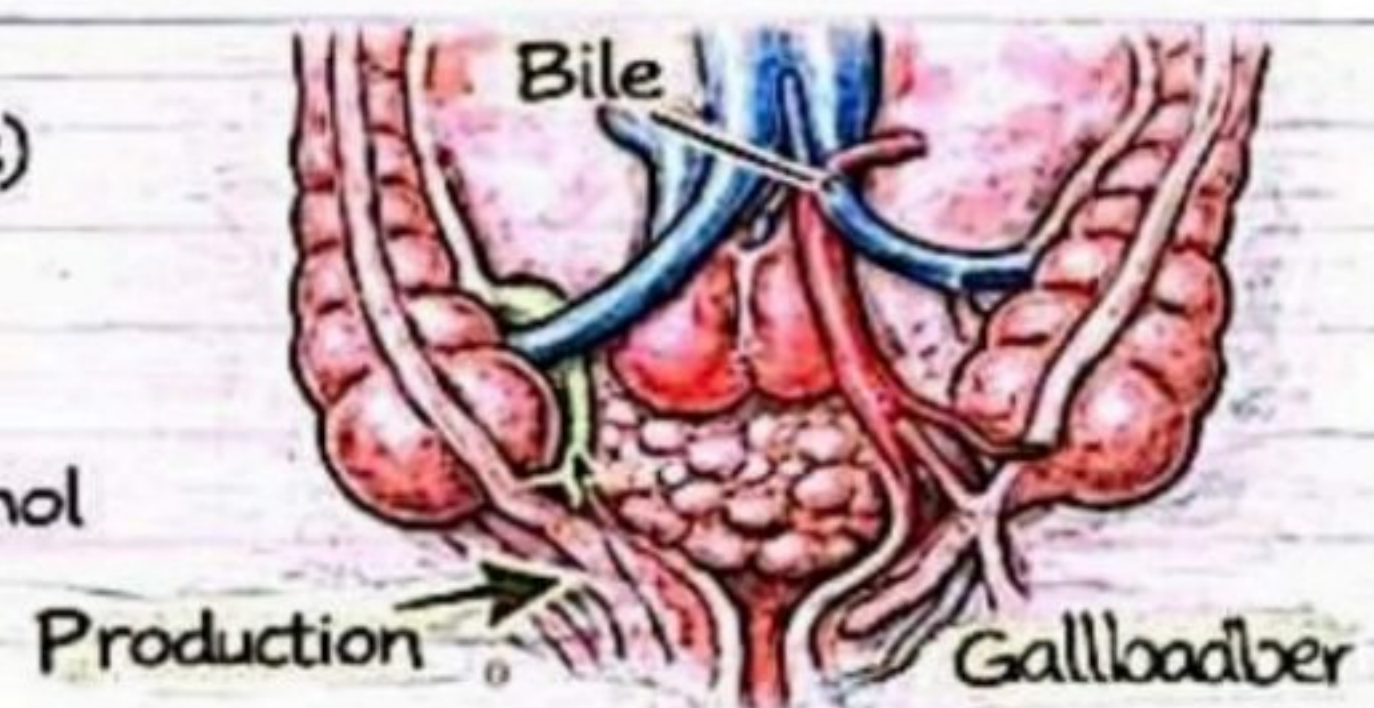
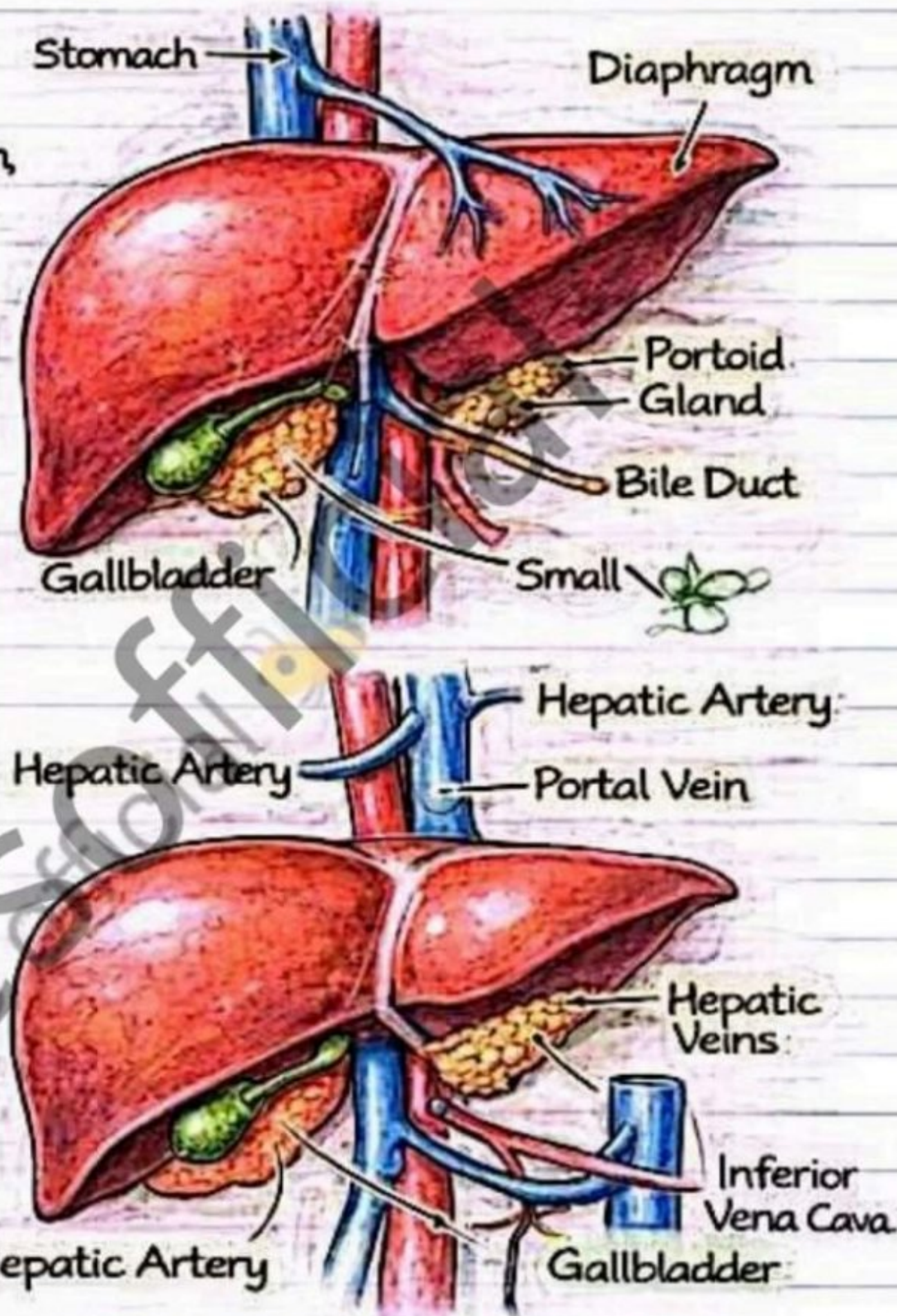
- Converts nutrients (carbohs, food, proteins, fats) into energy and important substances.

2. Detoxification:

- Processes and removes toxins, drugs, and alcohol from the blood.

3. Bile Production:

- Produces bile a liquid that helps digest fats in the small intestine.



Key Fact: ~ The liver is the only organ that can regenerate, It can repair damaged tissue and receiver its function.



The Esophagus

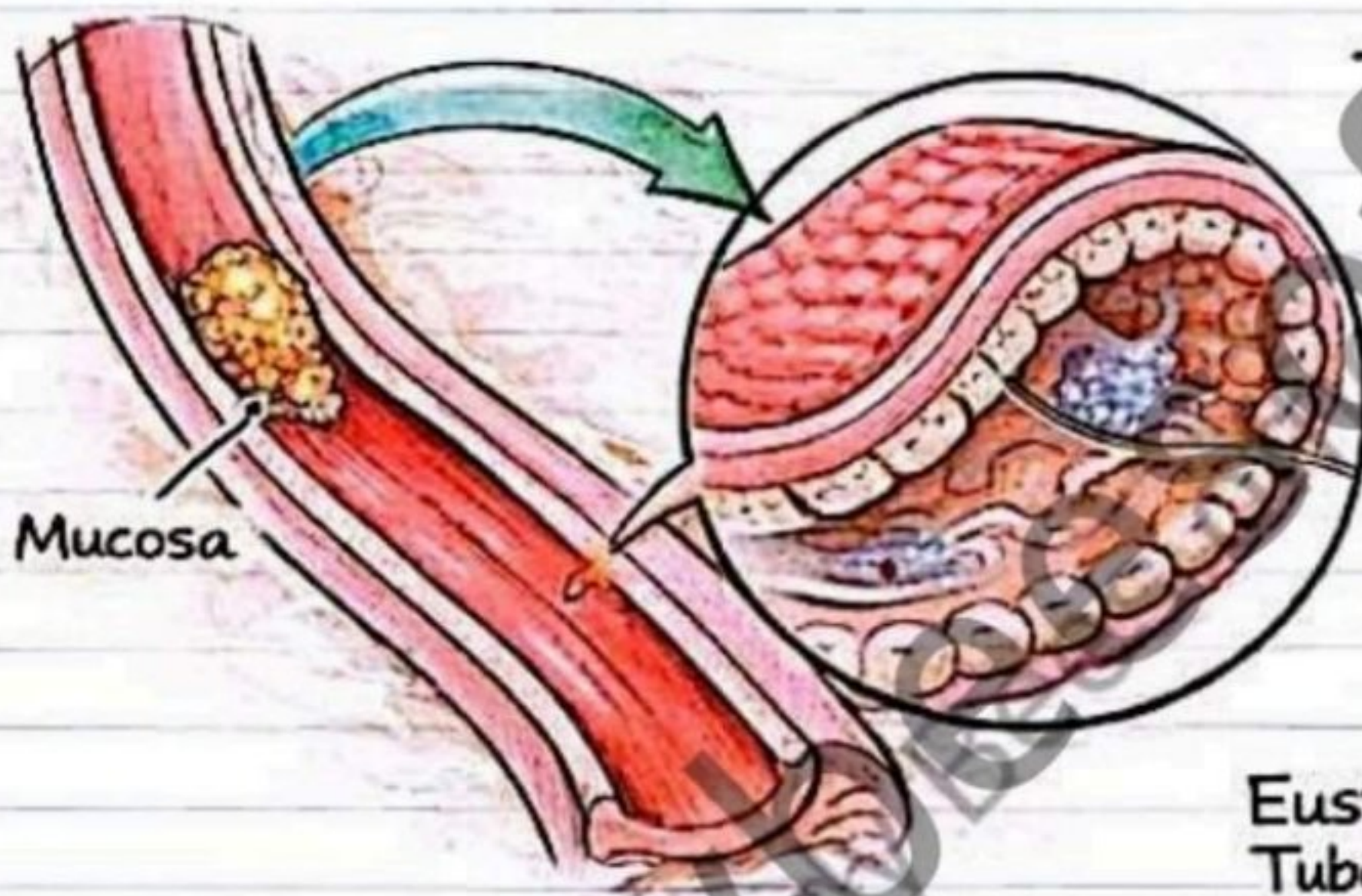
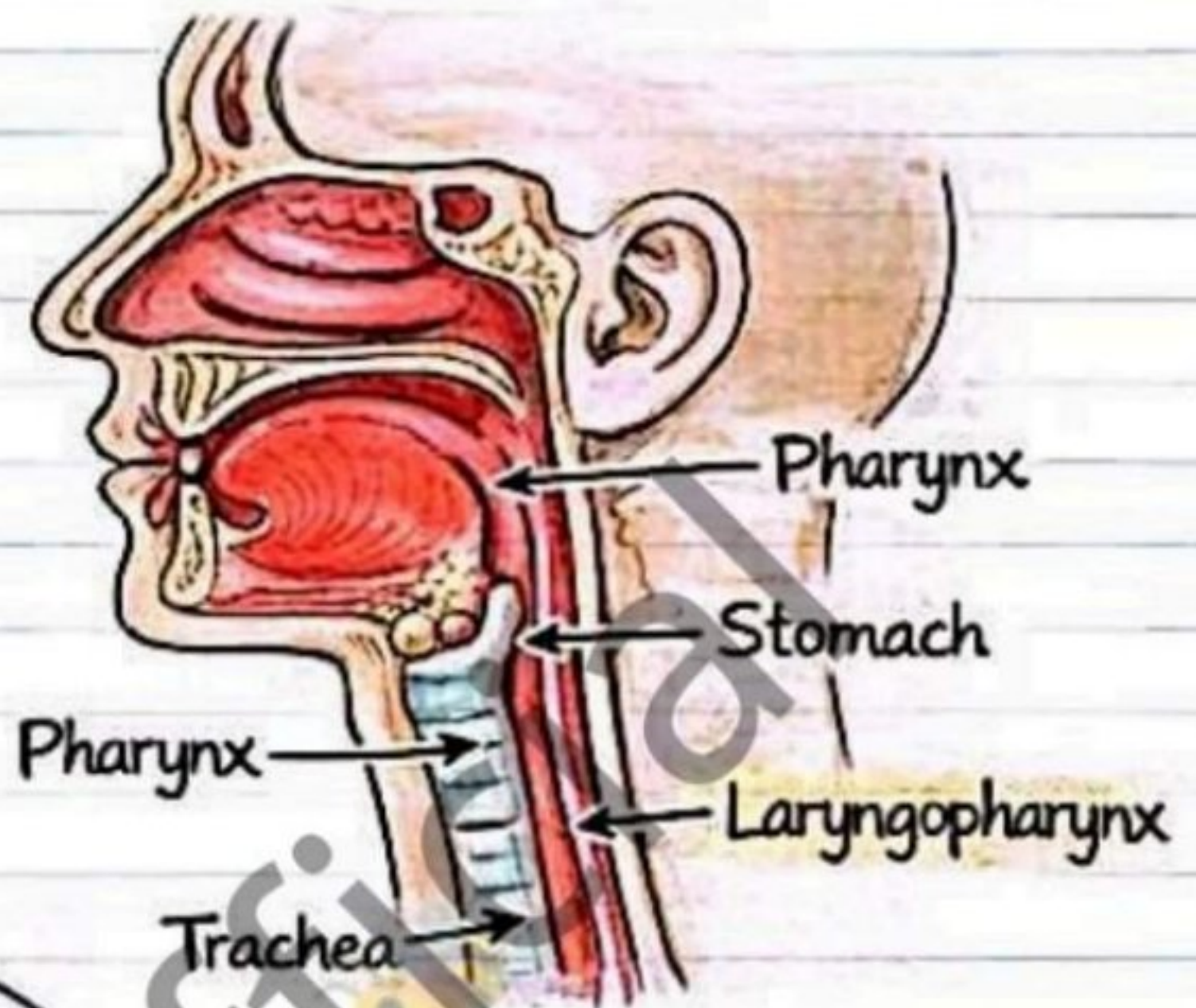


What is the Esophagus?

- The esophagus, also known as the food pipe or gullet, is a long, muscular tube that connects the pharynx (throat) to the stomach.

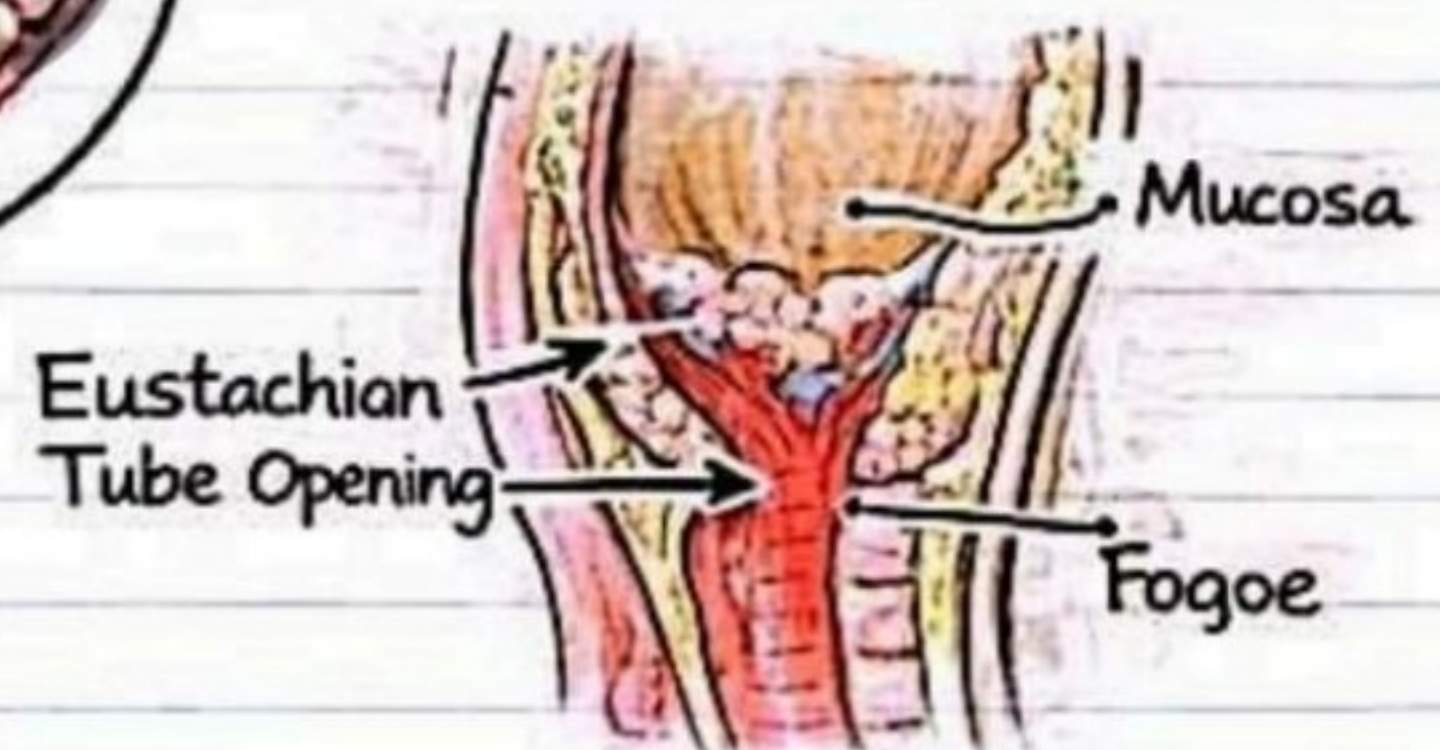
Structure of the Esophagus:

- Approx. 8-10 inches (20-25 cm) long



Structure of the Esophagus:

- Approx. 8-10 inches (20-25 cm) long



> Wall of the Esophagus:

- Approx. 8-10 inches (20-25 cm)

> Nasopharynx:

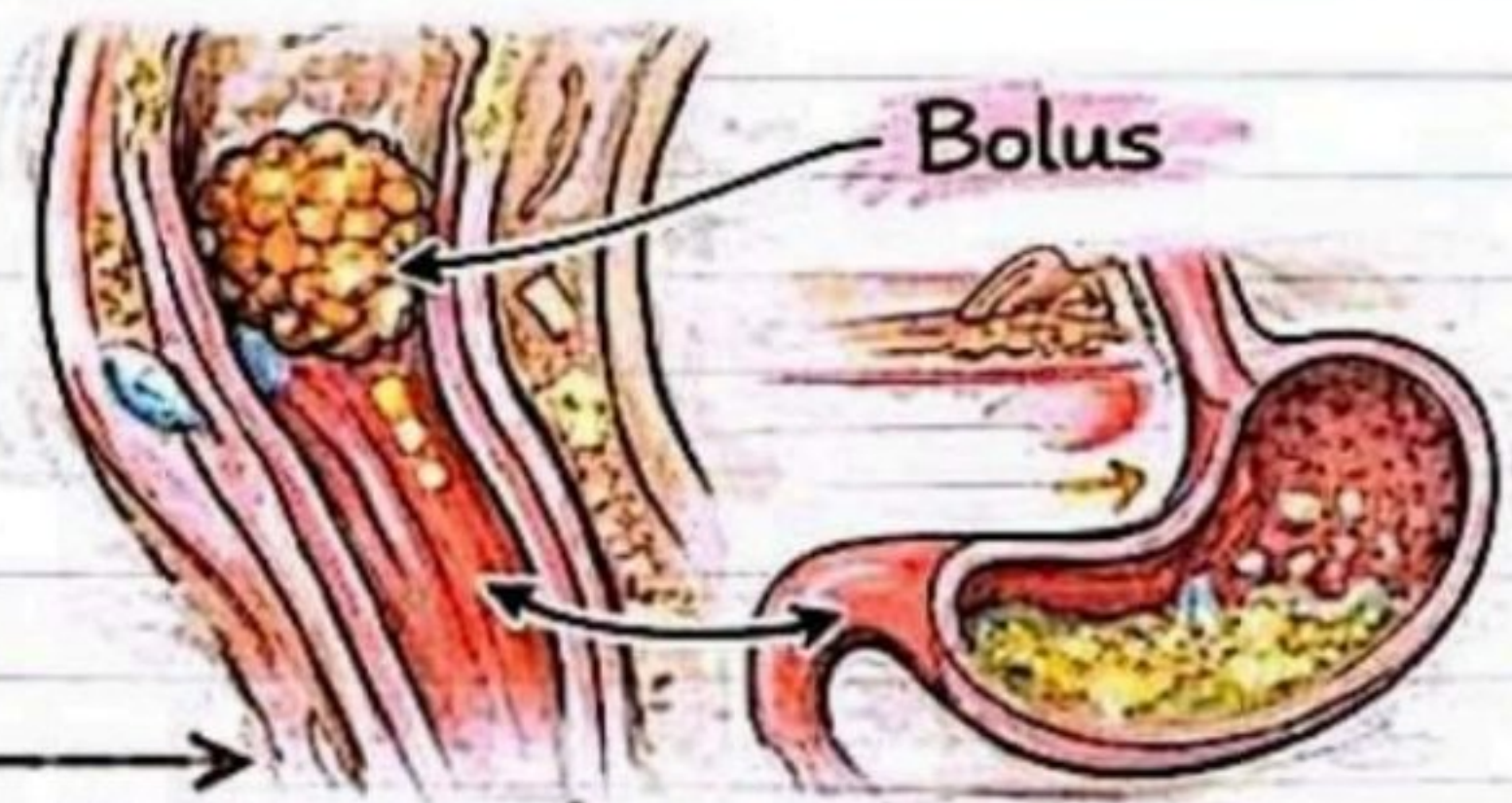
- Lining with epithelial cells

> Submucosa:

- Contains blood vessels, nerves, and esophageal glands that secrete mucus

> Muscularis:

- Two layers of muscles: circular and longitudinal



Functions of the Esophagus:

→ Transportation of Food.

- Carries food from the pharynx to the stomach.

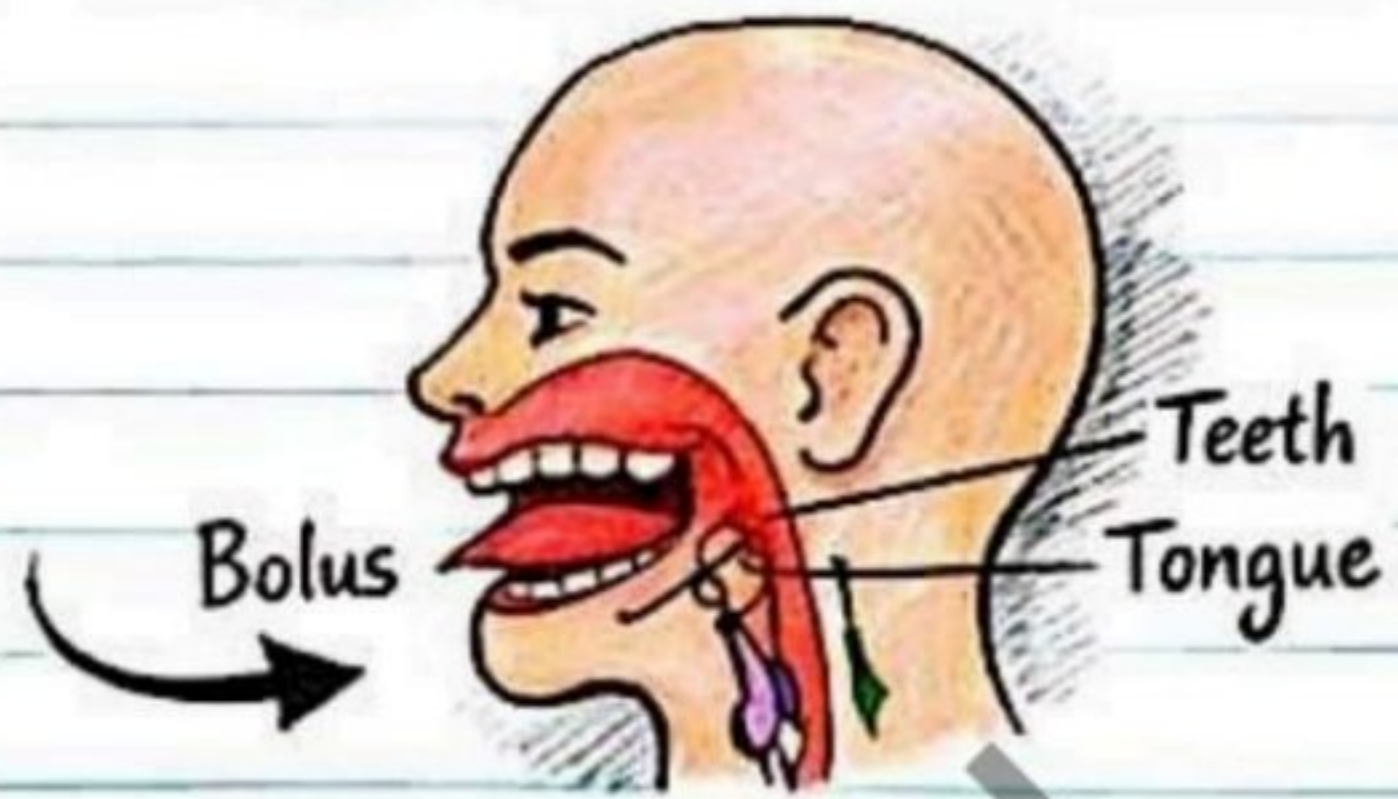
→ Peristalsis:

- Wave-like muscle contractions that push food downward.

Process of Digestion

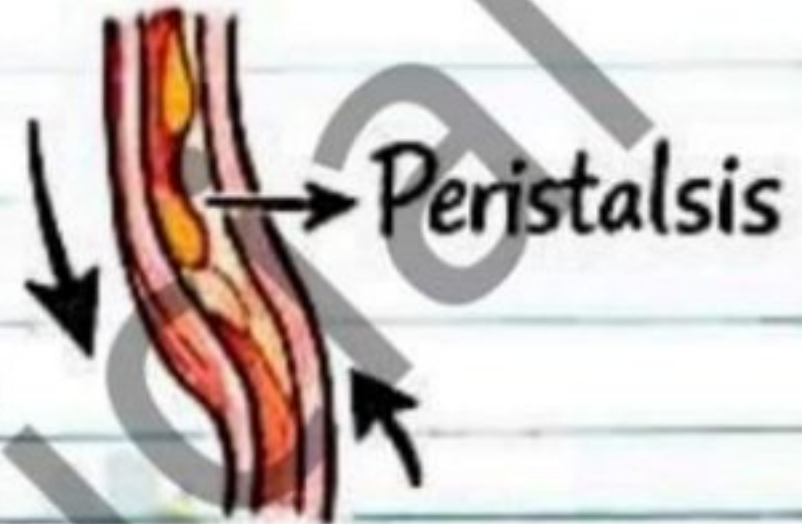
1. Mouth

- Ingestion of Food
- Chewing + Saliva (Amylase)
- Food forms into Bolus.



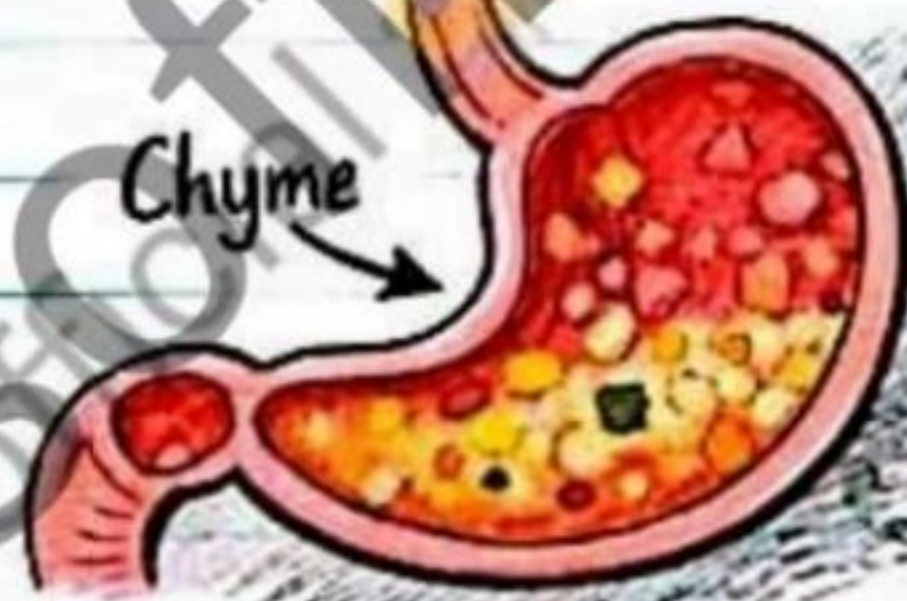
2. Esophagus

- Bolus moves down
- Peristalsis (Muscle Contraction)



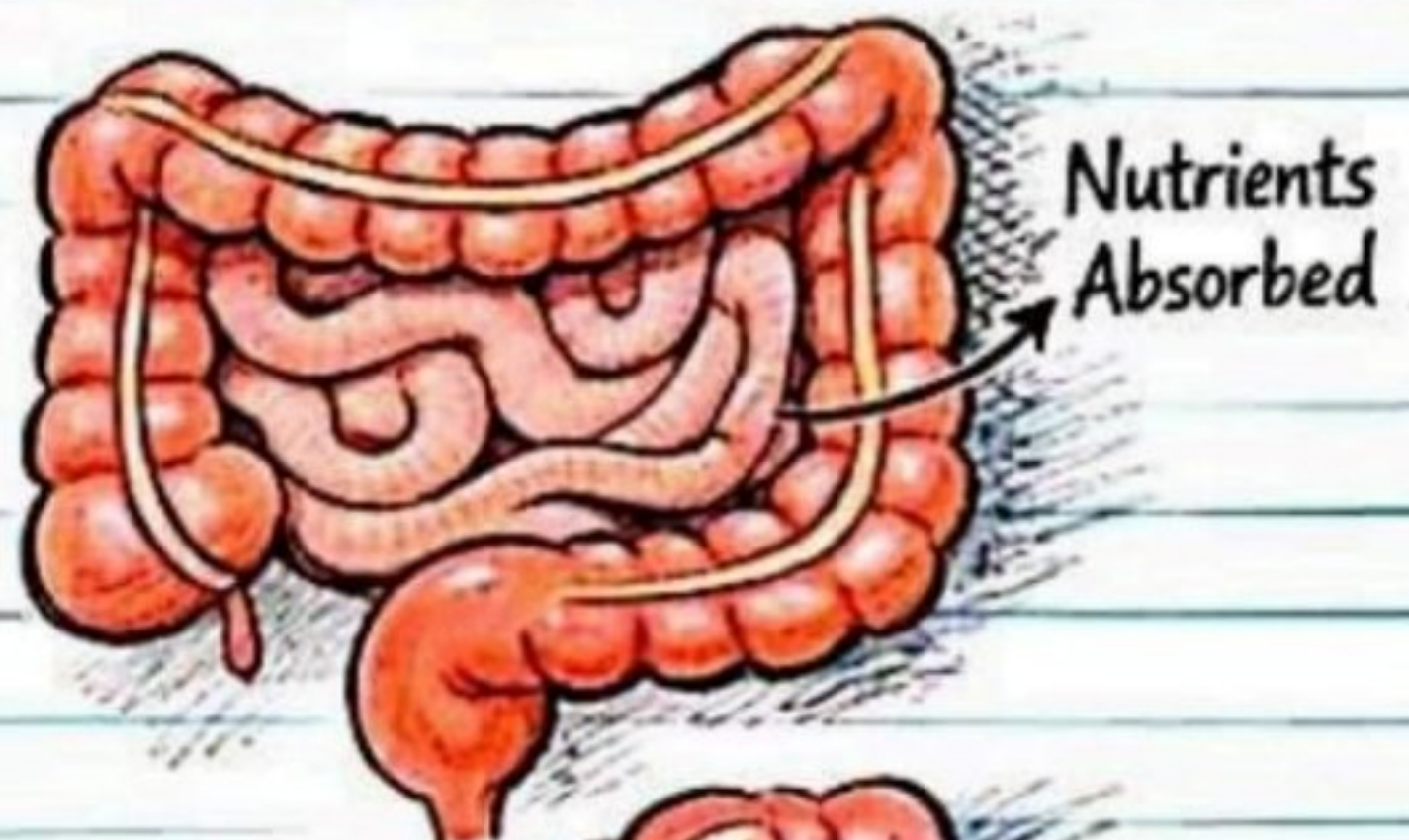
3. Stomach

- Gastric Juices (HCl, Pepsin)
- Churning of Food
- Food becomes Chyme.



4. Small Intestine

- Digestion & Absorption
- Enzymes (from Pancreas)
- Bile (from Liver)



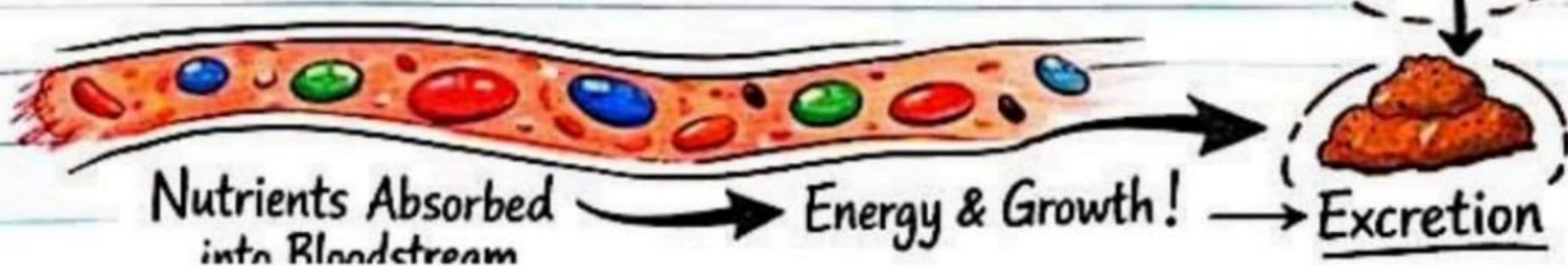
5. Large Intestine

- Water Absorption
- Formation of Feces

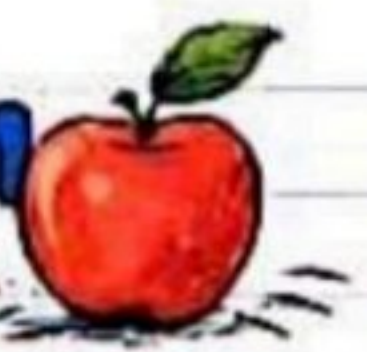


6. Rectum & Anus

- Storage & Elimination of Feces



Parts of the Digestive System



The digestive system consists of two main groups:

1. Alimentary Canal (Digestive Tract)

It is a long muscular tube from mouth to anus.

Main Parts:

> Mouth (Oral Cavity)

- Entry of food
- Chewing (mastication)
- Saliva starts digestion

Mouth →

> Pharynx

- Passage for food from mouth to esophagus

Esophagus →

> Esophagus (Food Pipe)

- Carries food to stomach by peristalsis

> Stomach

- Stores food
- Mixes food with gastric juice
- Begins protein digestion

> Large Intestine

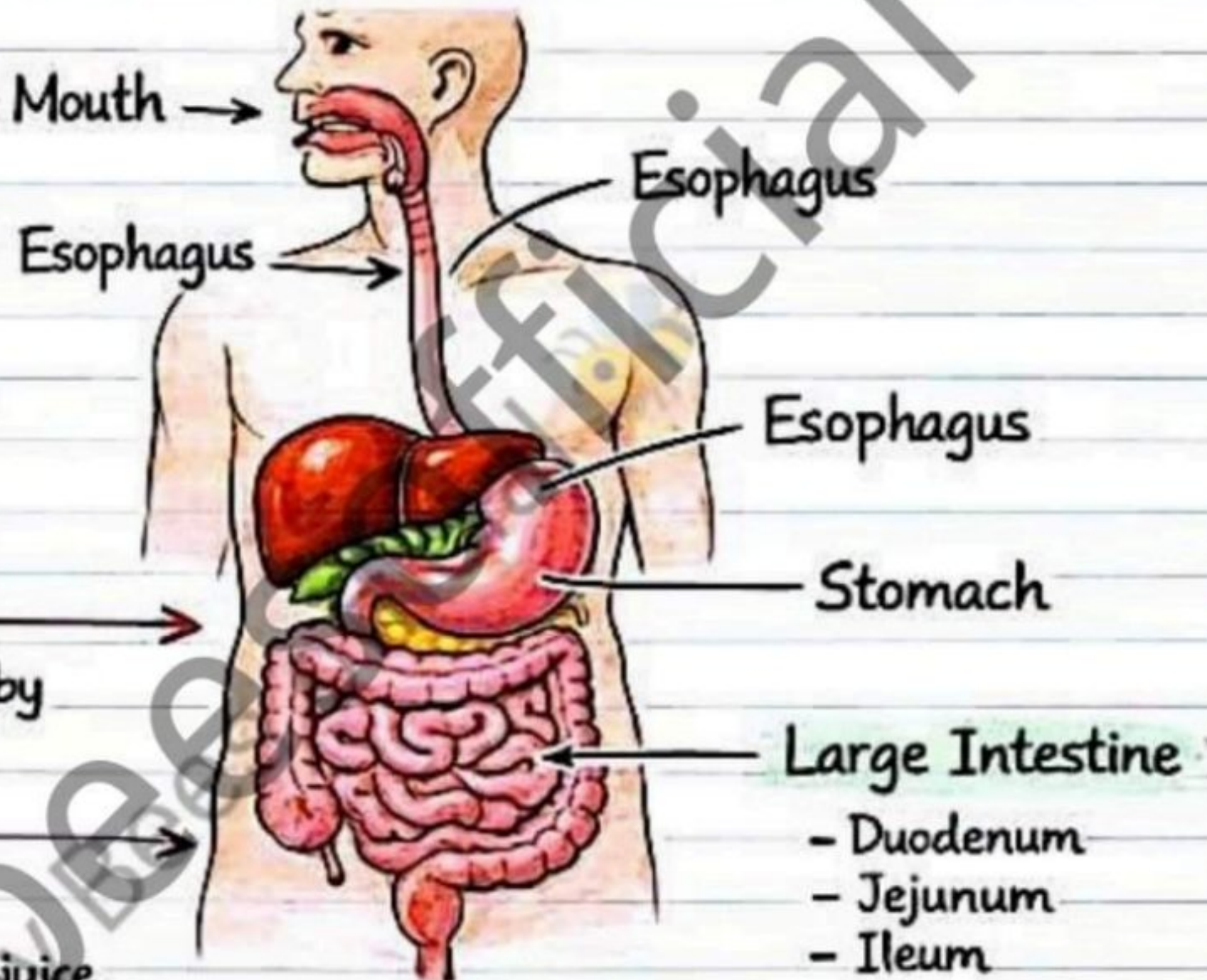
- Duodenum
- Jejunum
- Ileum

> Large Intestine

- Cecum - Colon - Rectum

> Anus

- Elimination of waste



2. Accessory Digestive Organs

These organs help in digestion by producing digestive juices.

> Salivary Glands

- Parotid
- Submandibular
- Sublingual

> Liver

→ Produces saliva



Parotid



Liver



Gall Bladder



Gall Bladder



Pancreas

Summary:

- Digestive System = Alimentary Canal + Accessory Organs

- Alimentary Canal

- Accessory Organs