Anatomy of Digestive System

OBJECTIVES:

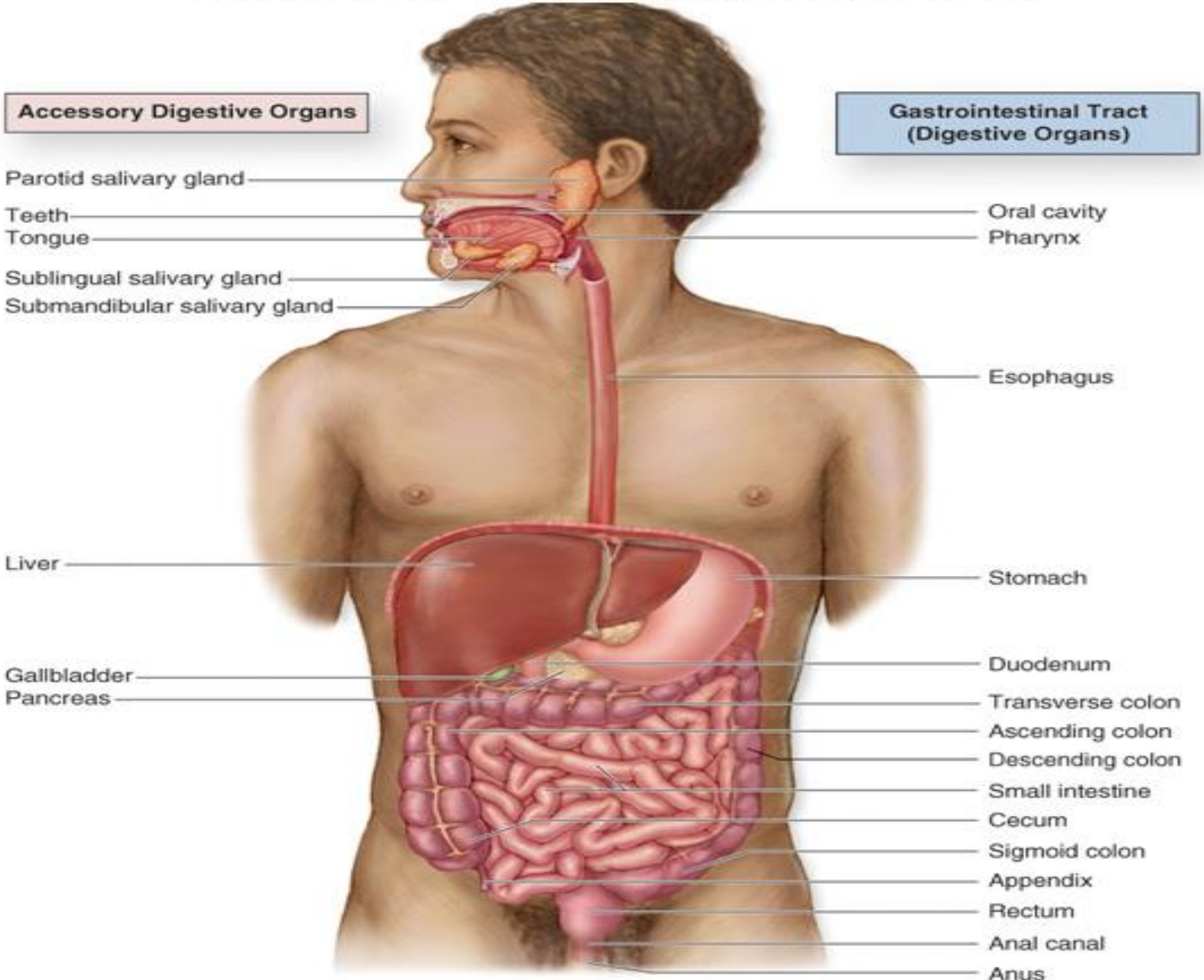
- By the end of this lecture, student should understand the functions and general Structure of the digestive system

Functions of the Digestive System

- Ingest the food.
- Transport the food.
- Digest the food into smaller usable components.
- Absorb the necessary nutrients into the bloodstream.
- Expel the waste products from the body.

General Structure of the Digestive System

- Composed of two separate categories of organs:
  - digestive organs
  - accessory digestive organs.
- Digestive organs collectively make up the gastrointestinal (GI) tract, also called the digestive tract or alimentary canal.



❖**The GI tract organs is** continuous tube about 30 feet (9–10 meters) from mouth to anus, include:

- oral cavity
- pharynx
- esophagus
- stomach
- small intestine
- large intestine

❖Accessory digestive organs:

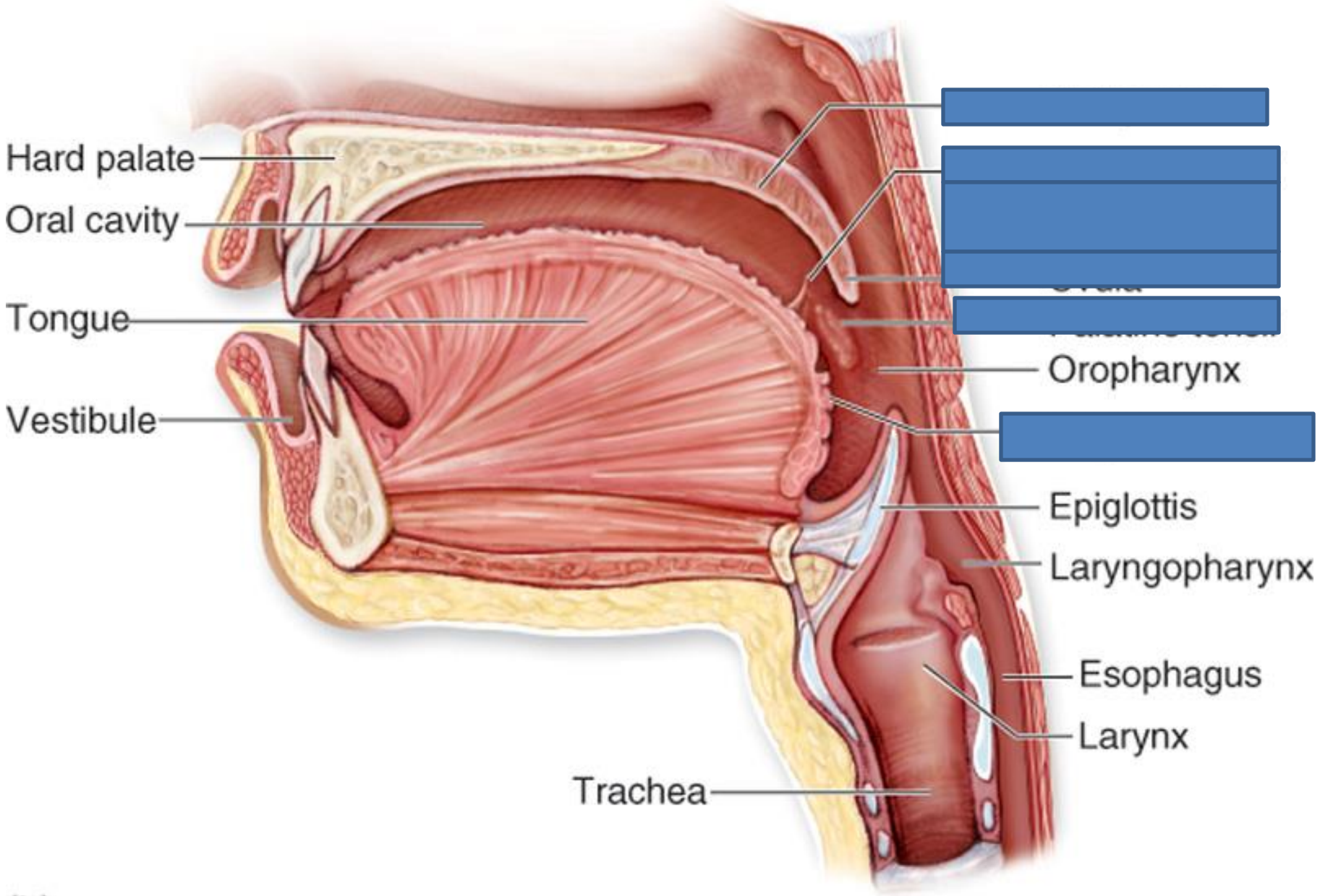
Assist the GI tract in the digestion of food, Include:

- Teeth
- Tongue
- Salivary glands
- Liver
- Gallbladder
- Pancreas

The digestive organs

Oral Cavity (mouth)

- Entrance to the GI tract
- **Initial site of digestion:**
  - mechanical digestion (via mastication)
  - chemical digestion (via enzymes in saliva).
- Bounded anteriorly by the teeth and lips
- Bounded posteriorly by the oropharynx
- Superior boundary is formed by the hard and soft palates.



(b)

Pharynx

- Review

Esophagus

- Tubular passageway
  - Pharynx to stomach
  - About 25 cm in adult

❖Superior esophageal sphincter:

- Skeletal muscle
- Where pharynx and esophagus meet

❖Inferior esophageal sphincter

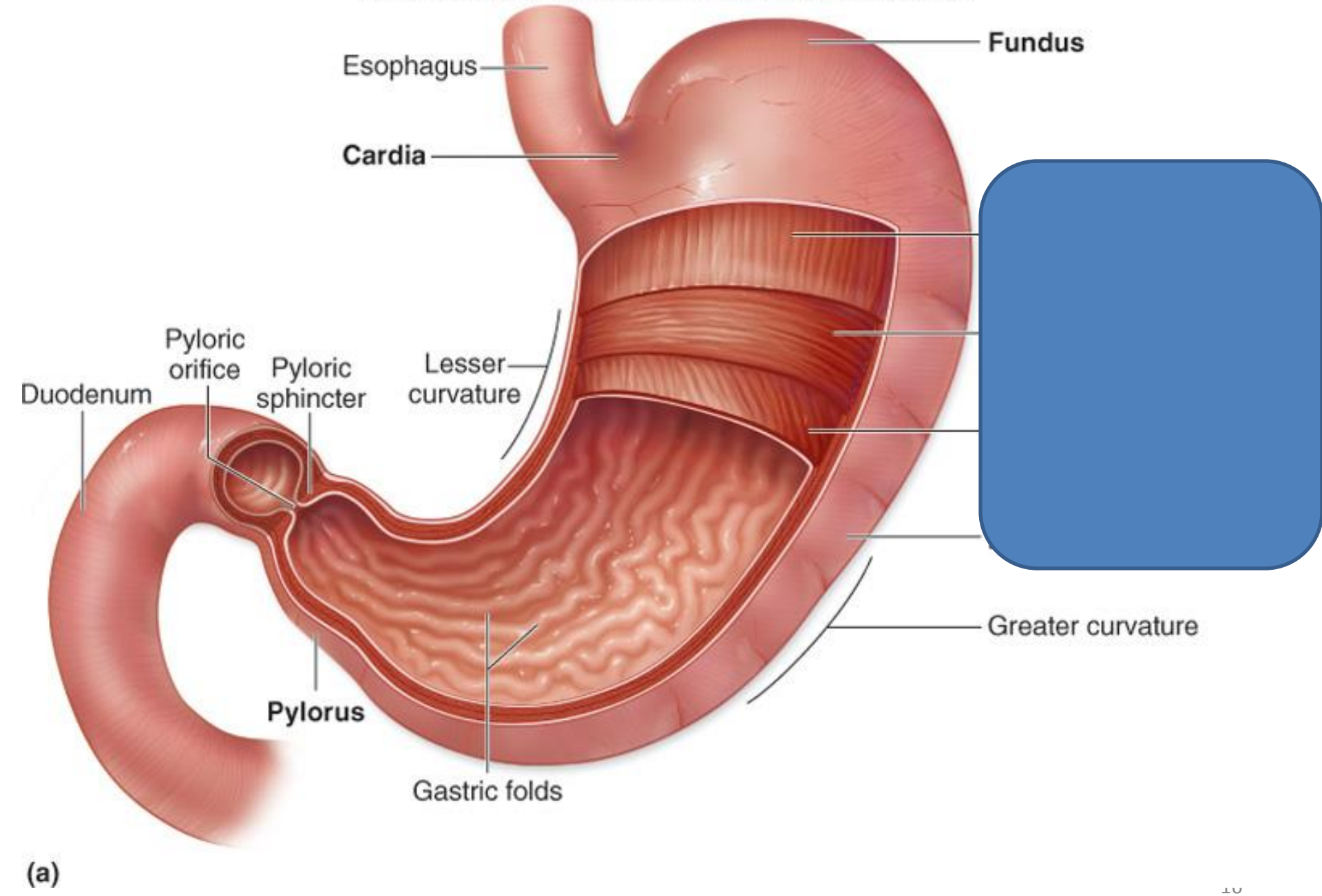
- Also cardiac sphincter
- Circular smooth muscle
- Orifice between esophagus and stomach

Stomach

- J-shaped
- Functions
  - Digestion (Chemical , Mechanical)

Gross anatomy of the Stomach

- Cardia
- Cardiac orifice
- Fundus
- Body
- Pylorus
- Pyloric sphincter
  - Pyloric orifice
- Greater curvature
- Lesser curvature
- Gastric folds



Small Intestine

- Finishes chemical digestion
- Responsible for absorbing most of the nutrients.
  - Ingested nutrients spend at least 12 hours in the small intestine.
- thin-walled tube
  - about 6 meters (20 feet) in length.
  - coiled
- Extends from the pylorus of the stomach to the cecum of the large intestine

Region (segments) of small intestine

The duodenum

- first segment of the small intestine.
- approximately 25 centimeters (10 inches) long

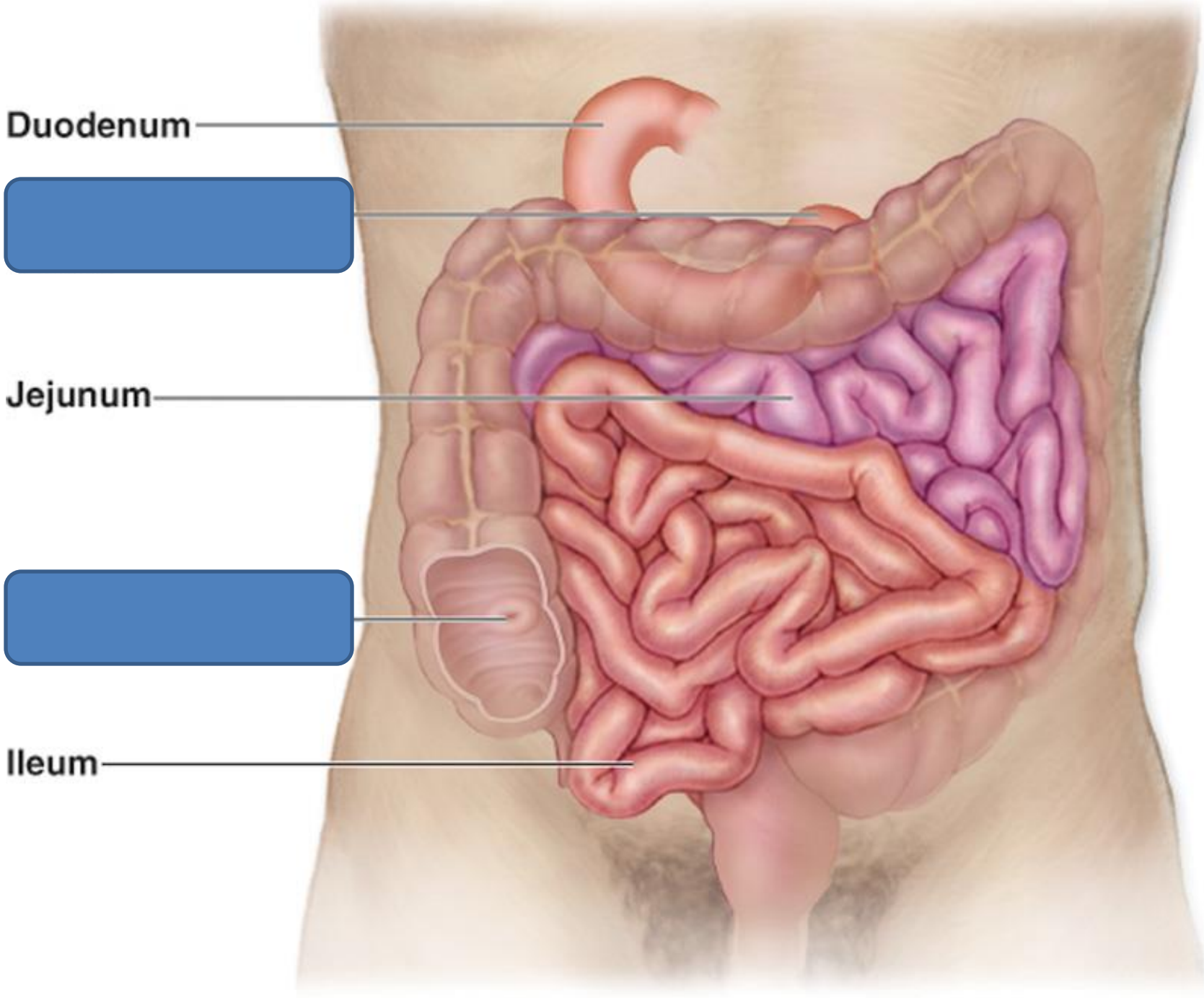
The jejunum

middle region of the small intestine.

- ❖approximately 2.5 meters (7.5 feet)
- ❖makes up approximately two-fifths of the small intestine’s total length.
- ❖primary region for chemical digestion and nutrient absorption

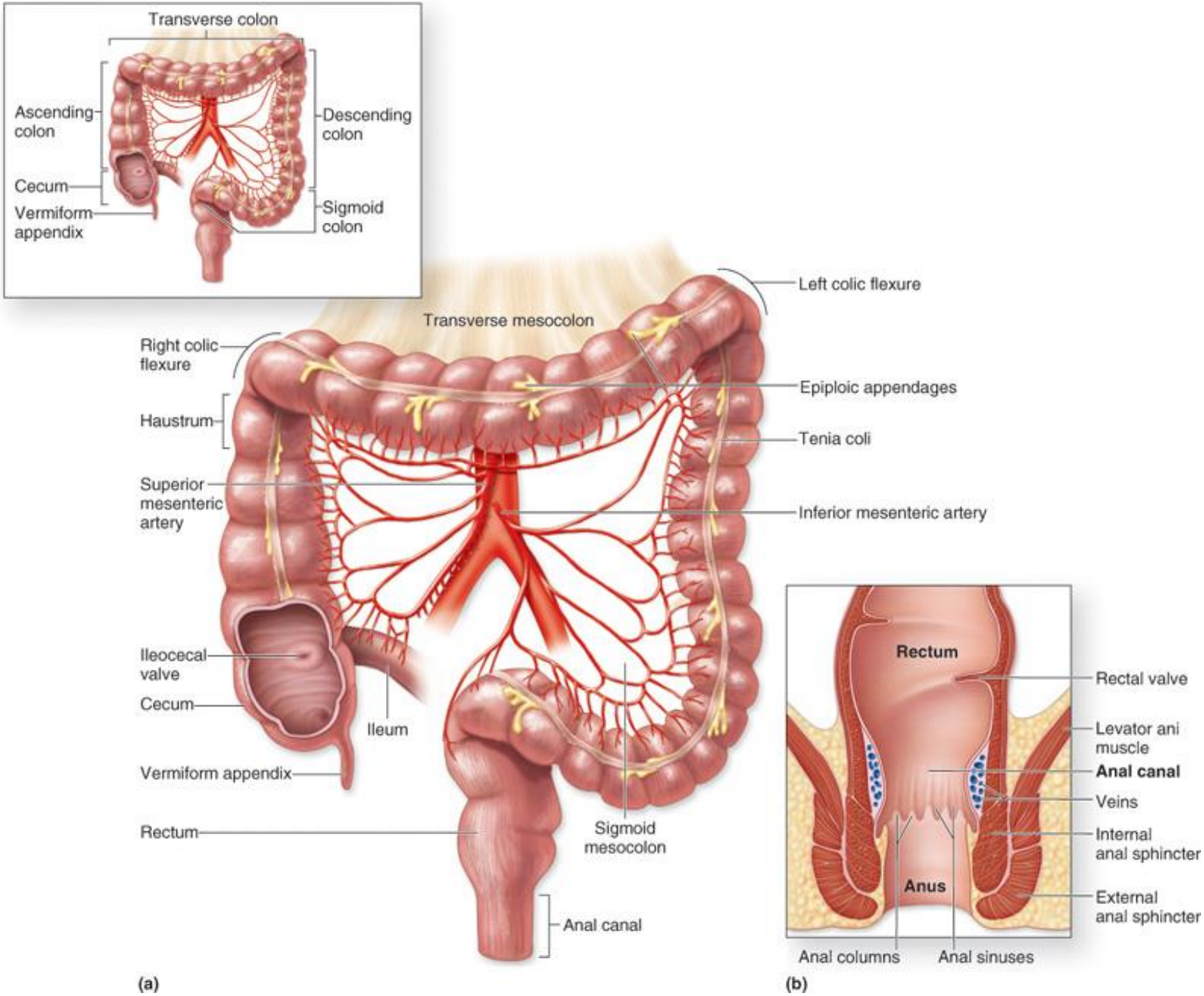
The ileum

- is the last region of the small intestine.
- about 3.6 meters (10.8 feet) in length
- forms approximately three-fifths of the small intestine.



Large Intestine

- approximate length of 1.5 meters (5 feet)
- diameter of 6.5 centimeters (2.5 inches).
- Absorbs most of the water and electrolytes from the remaining digested material.
- Watery material that first enters the large intestine soon solidifies and becomes feces.
- Stores fecal material until the body is ready to defecate.
- Absorbs a very small percentage of nutrients still remaining in the digested material.
- Composed of four segments: the cecum, colon, rectum, anal canal



Accessory digestive organs

❖Accessory digestive organs:

Assist the GI tract in the digestion of food, Include:

- Teeth
- Tongue
- Salivary glands
- Liver
- Gallbladder
- Pancreas

Teeth

- Collectively known as the dentition.
- Responsible for mastication (first part of the mechanical digestion).

Two sets of teeth :

- 20 deciduous teeth, also called "milk teeth," erupt between 6 months and 30 months after birth.
- These teeth are eventually lost and replaced by 32 permanent teeth.

- The more anteriorly placed permanent teeth tend to appear first, followed by the posteriorly placed teeth.
- The last teeth to erupt are the third molars, often called “wisdom teeth.

Tongue

Formed from:

- Skeletal muscle(muscles move the tongue).
  - Covered with lightly keratinized stratified squamous epithelium.
- Manipulates and mixes ingested materials during chewing
- Performs important functions in swallowing.

- Numerous small projections (papillae) cover the superior (dorsal) surface.
- Inferior surface of the tongue attaches to the floor of the oral cavity
- Posterior surface contains lingual tonsils.

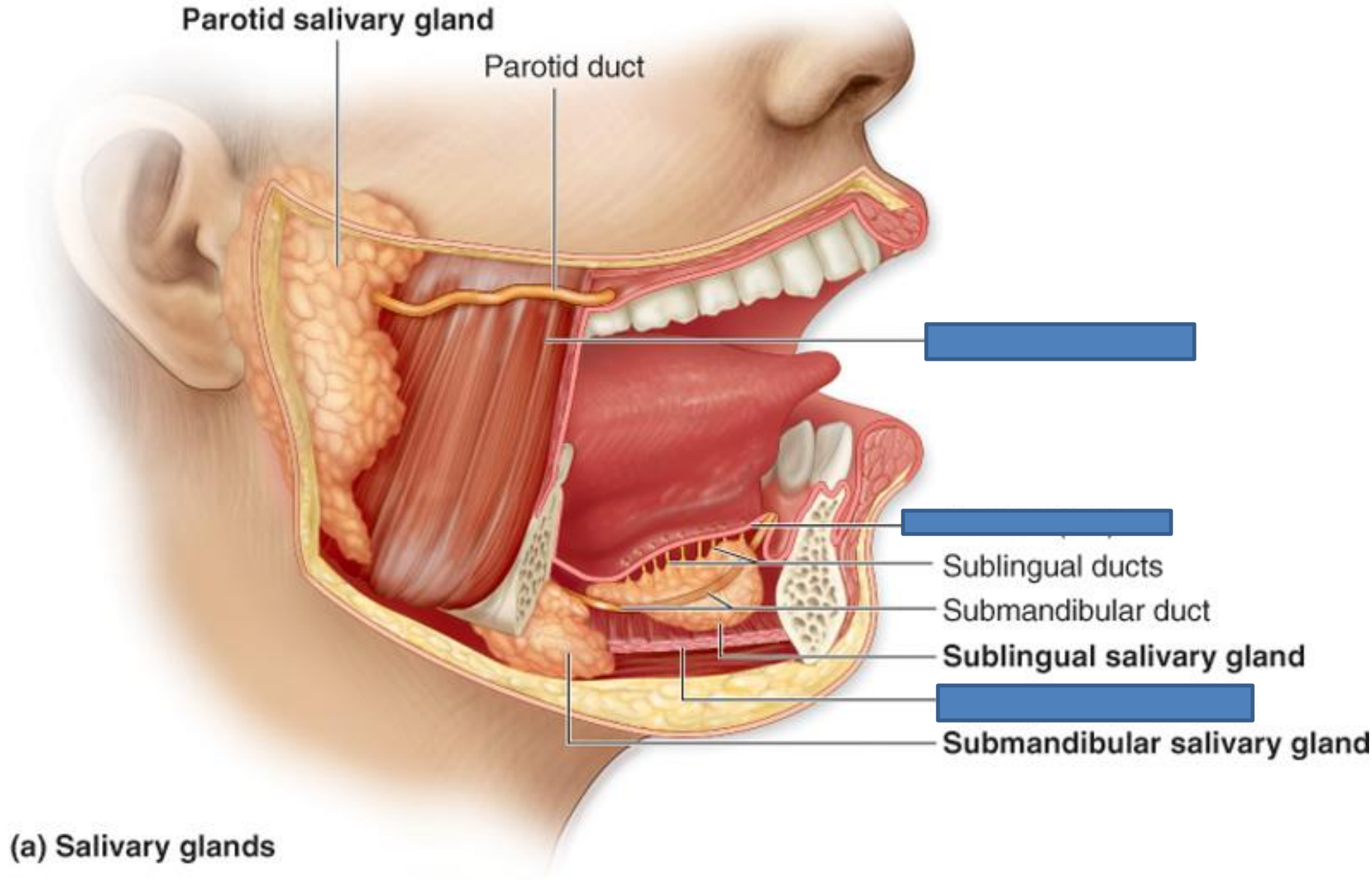
Salivary Glands

- Collectively produce and secrete saliva.

  (a fluid that assists in the initial activities of digestion)

- Volume of saliva secreted daily ranges between 1.0 and 1.5 L.
  - Most is produced during mealtime
  - Smaller amounts are produced continuously to ensure that the oral cavity remains moist.

- Three pairs of **large**, **multicellular** salivary glands:
  - parotid glands
  - submandibular glands
  - sublingual glands



(a) Salivary glands

The liver

Composed of four incompletely separated lobes

- Right lobe
- Left lobe
- Caudate lobe
- Quadrate lobe

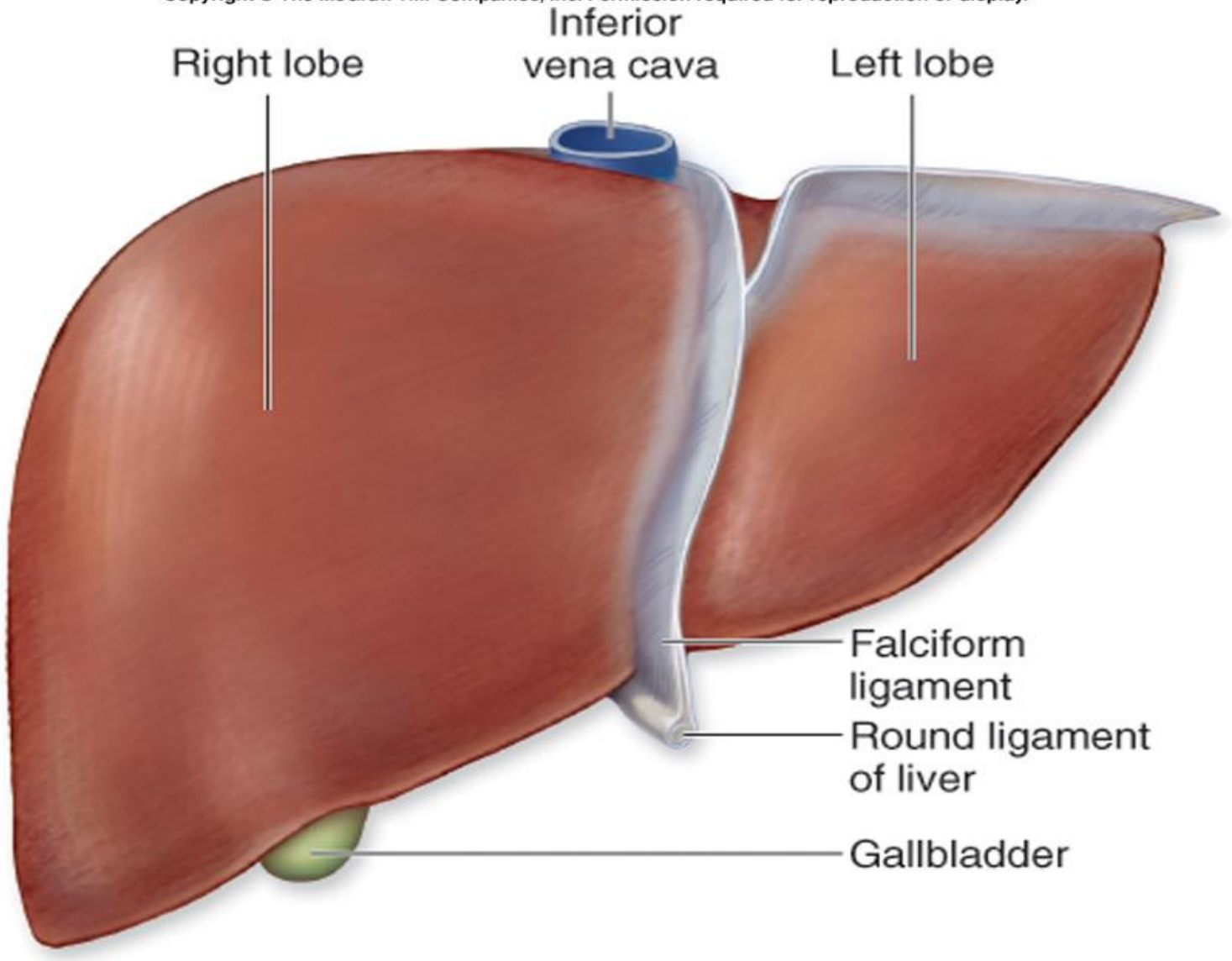
- supported by two ligaments
- Falciform ligament
- Round ligament

Functions of The Liver

- Produce bile.

  (a greenish fluid that breaks down fats into small droplets to assist in their chemical digestion)

- Detoxify drugs, metabolites, and poisons.
- Store excess nutrients and vitamins and release them when they are needed.
- Synthesize blood plasma proteins such as albumins, globulins, and proteins required for blood clotting.
- Phagocytize debris in the blood.
- Help break down and recycle components of aged and damaged erythrocytes .

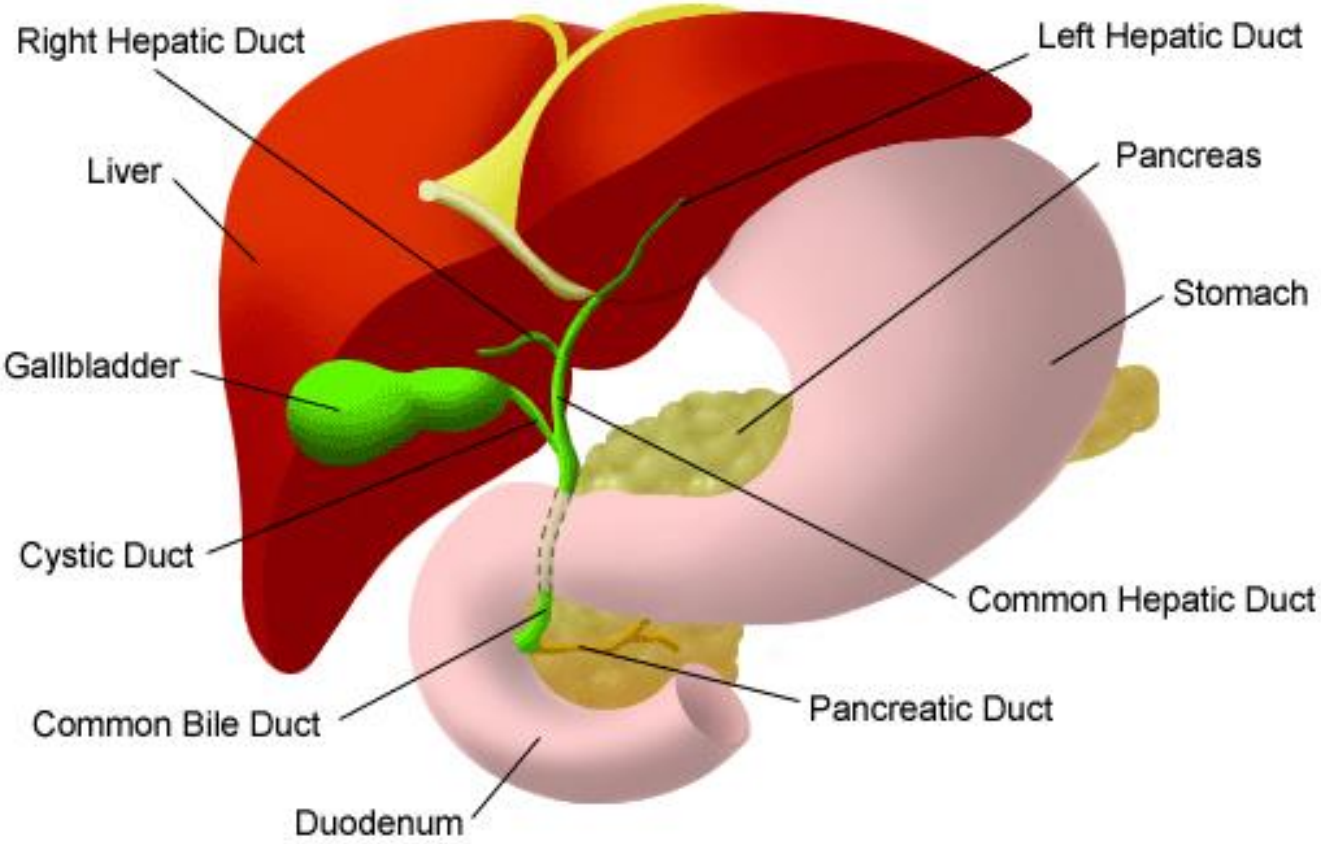


(a) Anterior view

Gallbladder

- Stores concentrate until it is needed for digestion
- Can hold approximately 40 to 60 milliliters of concentrated bile
- Cystic duct connects the gallbladder to the common bile duct

Biliary System



Anatomy of Gallbladder

Pear-shaped, hollow, sac like organ.

7.5 – 10 cm long.

Lies in the inferior surface of the liver ⇨ attached by loose connective tissue.

Capacity ⇨ 40 – 60ml of bile.

Gallbladder wall ⇨ smooth muscle.

Connected to CBD by cystic duct.

Pancreas

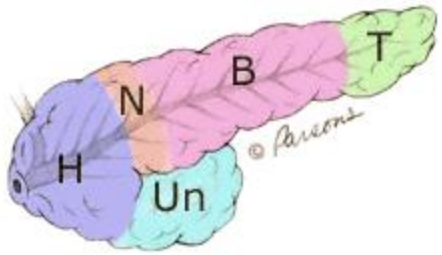
❖Mixed gland because it exhibits both endocrine and exocrine functions

- Endocrine functions are performed by the pancreatic islets.
- Exocrine activity results in the secretion of digestive enzymes, collectively called pancreatic juice, into the duodenum.

Pancreatic Anatomy

- **15-25** cm long
- **60-100 g**
- **Location**: retro-peritoneum, 2nd lumbar vertebral level
- Extends in an oblique, transverse position
- Parts of pancreas: head, neck, body and tail

Pancreas



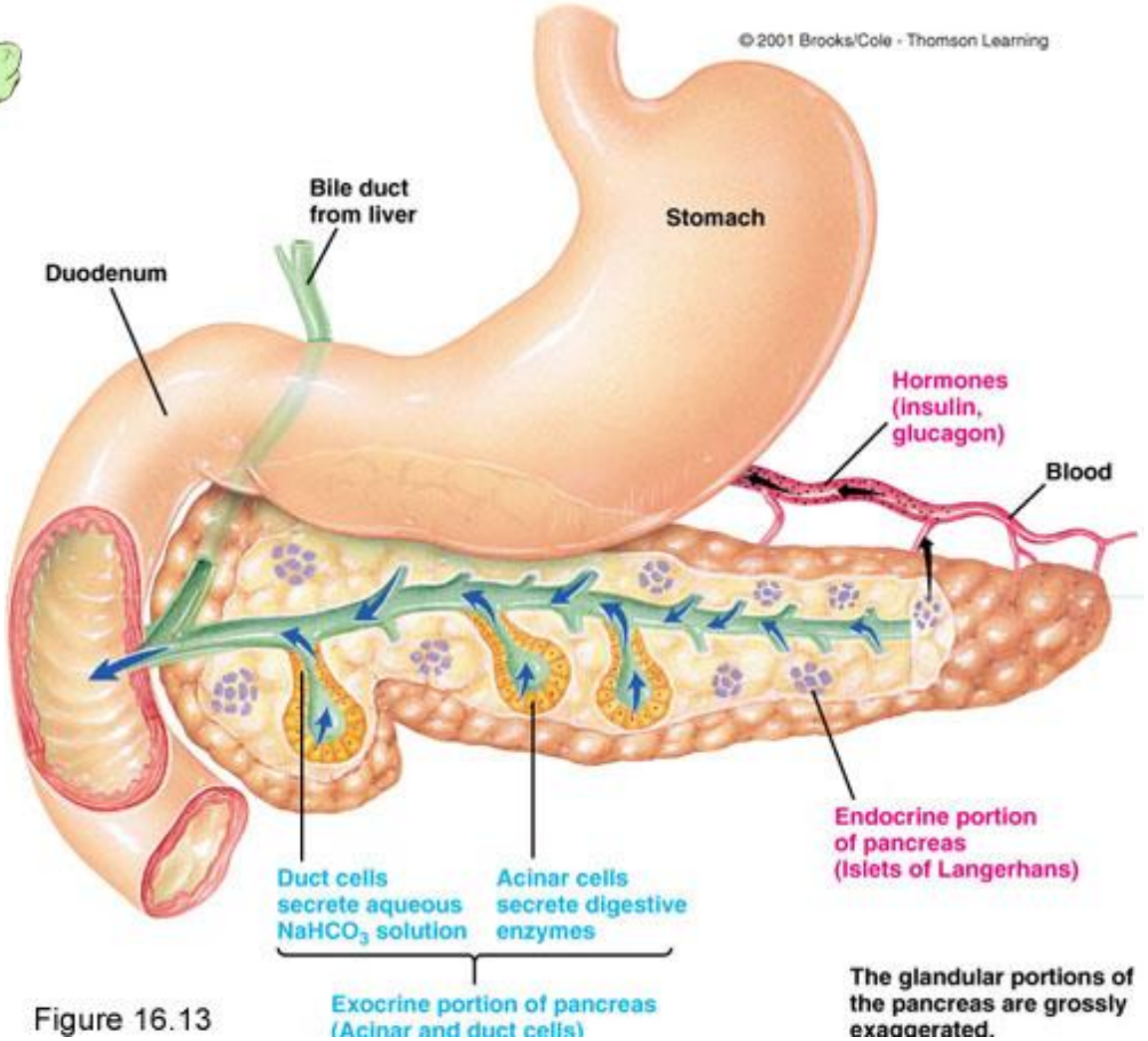


Figure 16.13

THANK YOU

Define the following:

1) Gross anatomy
2) True ribs
3) False ribs
4) Organ
5) Tissue