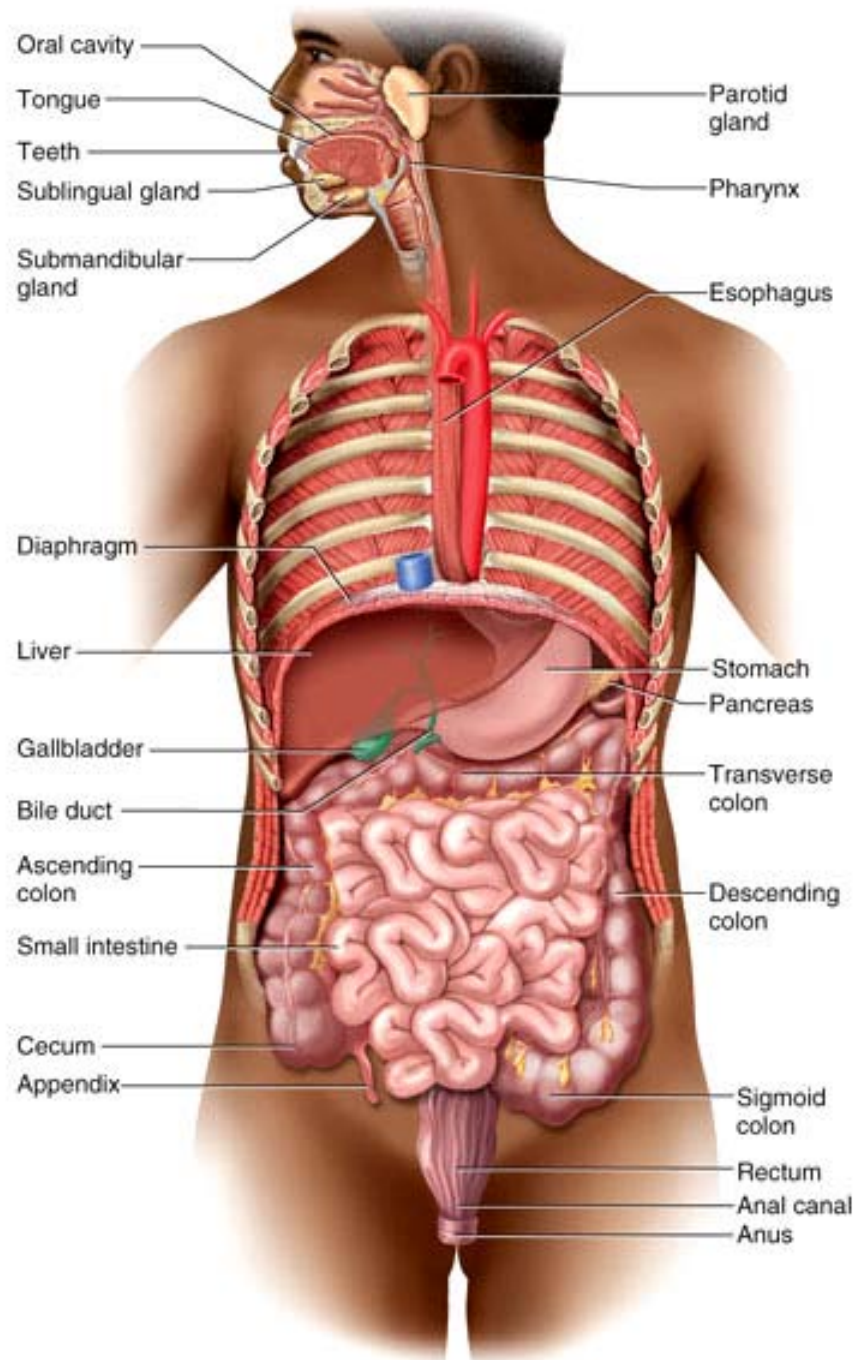


Digestive System

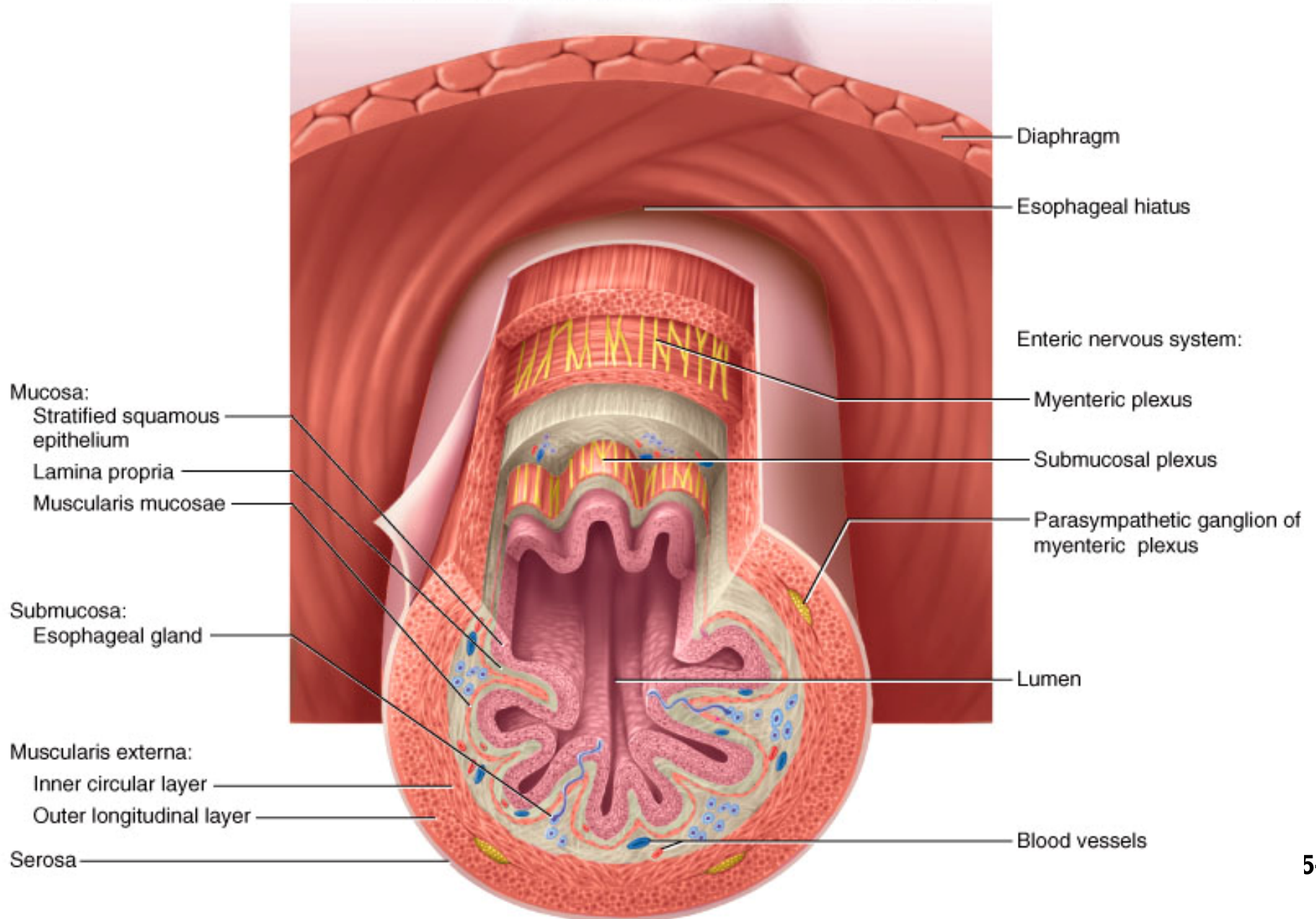
Subdivisions of Digestive System

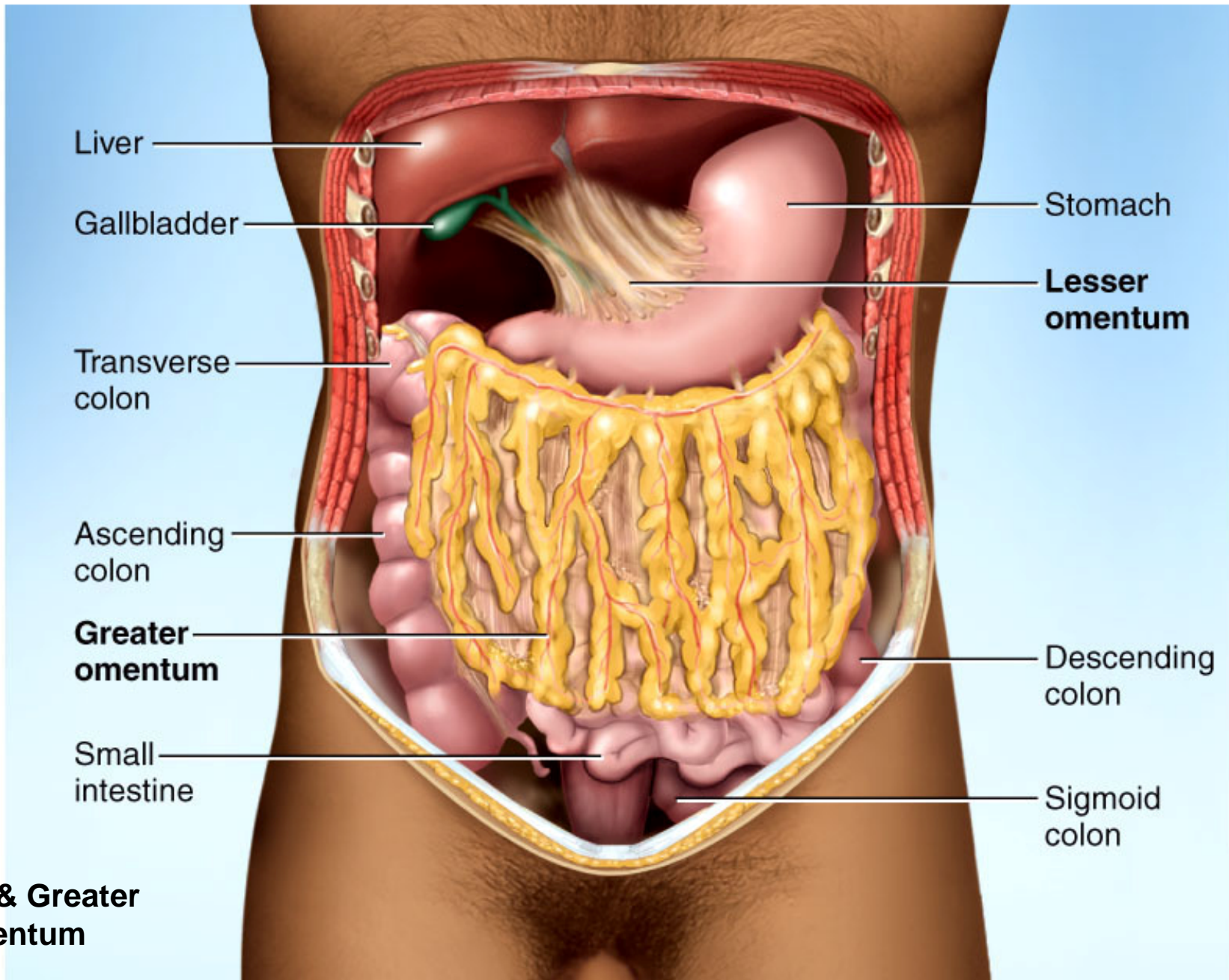
- **Digestive tract (GI tract)**
 - 30 foot long tube extending from mouth to anus
 - must cross mucosa to enter internal environment
- **Accessory organs**
 - teeth, tongue, liver, gallbladder, pancreas, salivary glands



Tissue Layers of GI Tract

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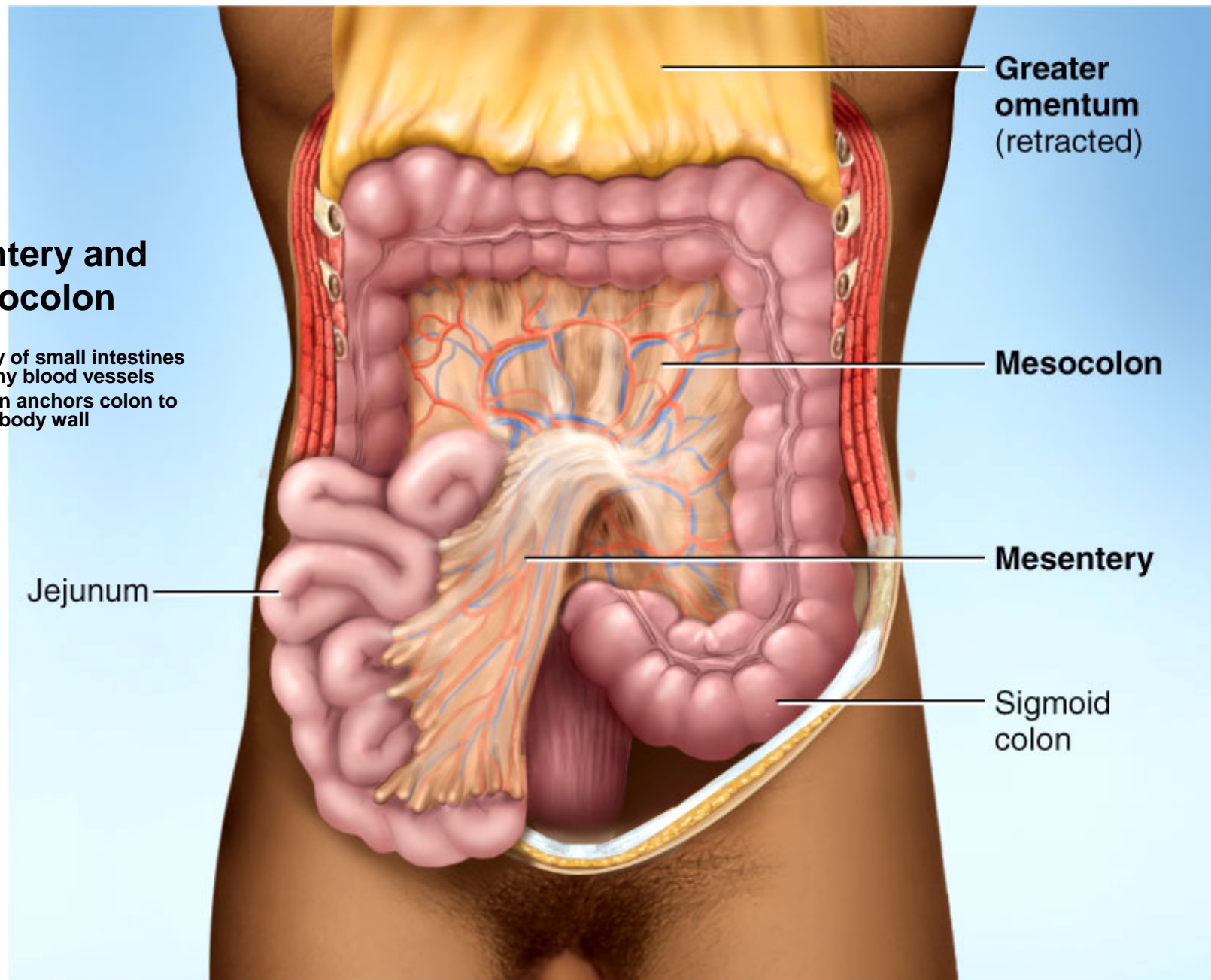




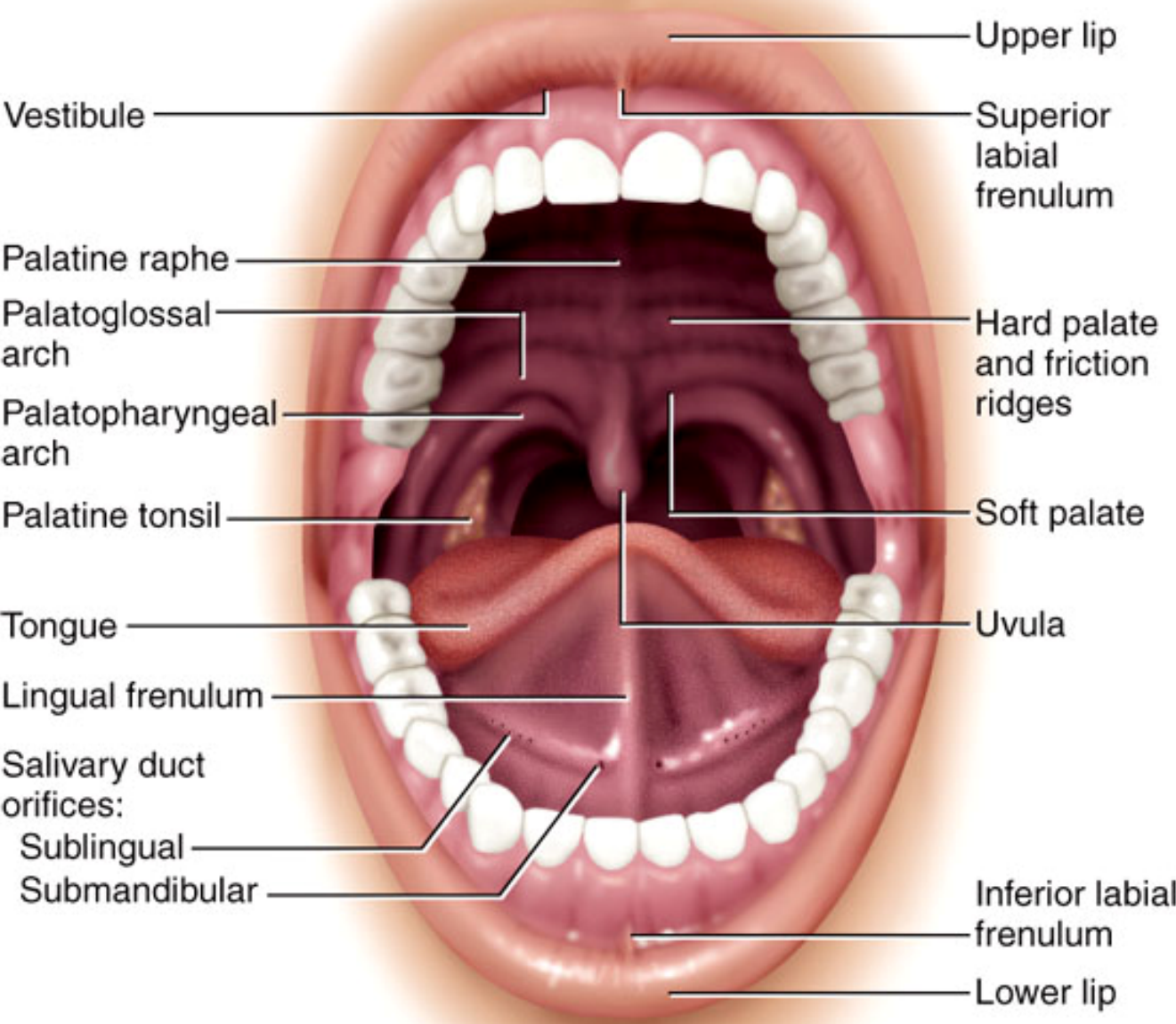
(a)

Mesentery and Mesocolon

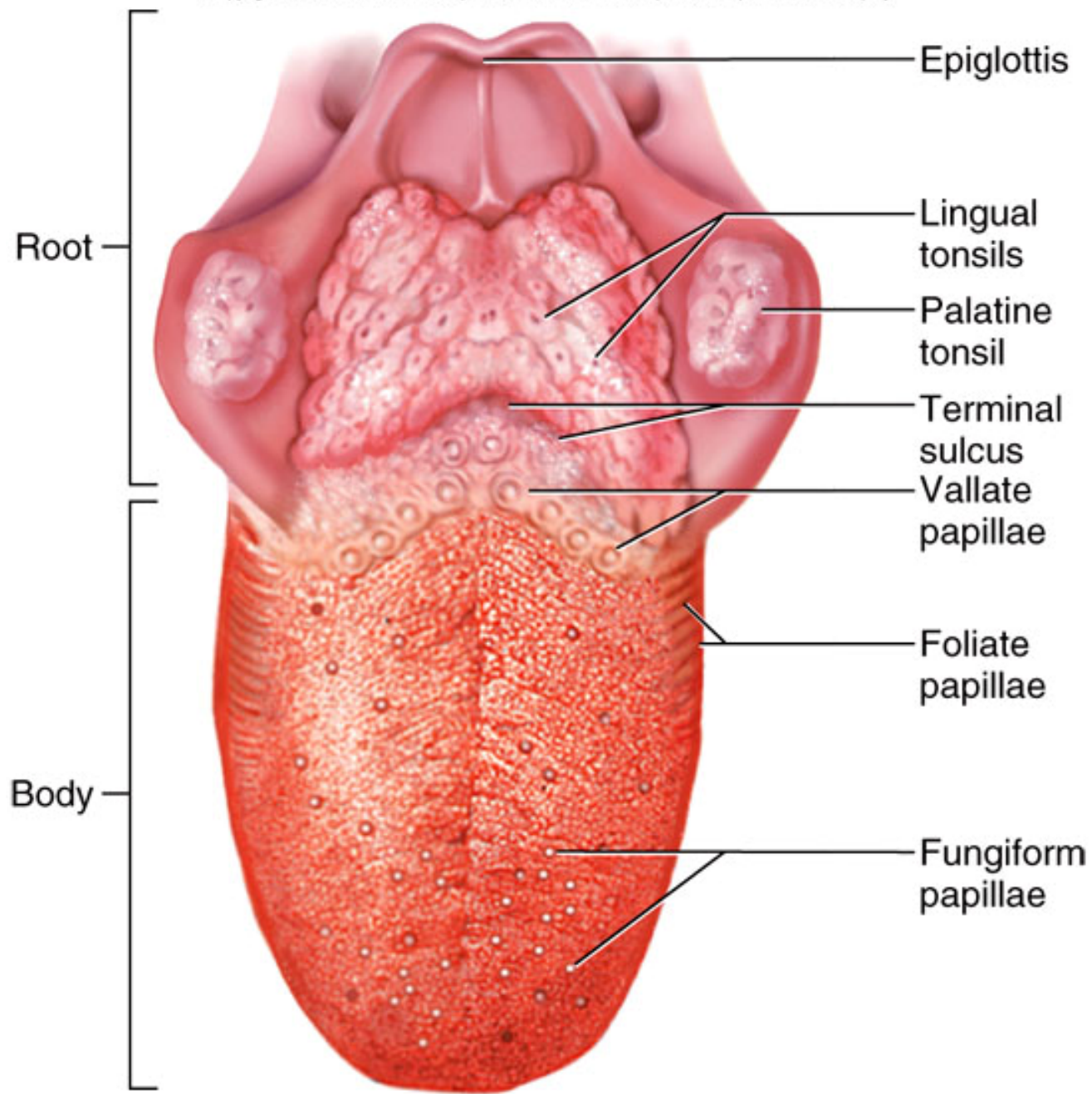
- Mesentery of small intestines holds many blood vessels
- Mesocolon anchors colon to posterior body wall



(b)



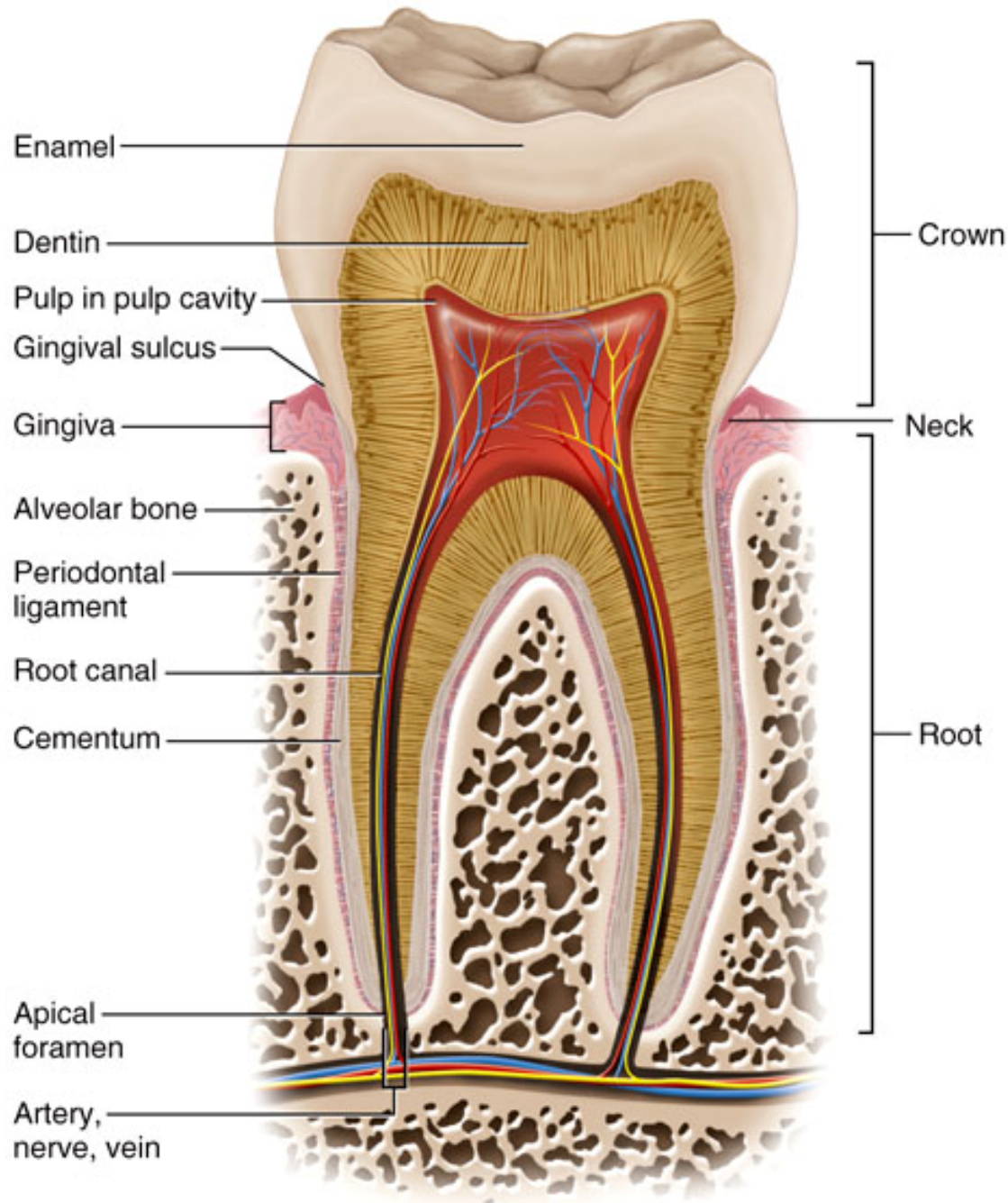
Mouth & Oral Cavity



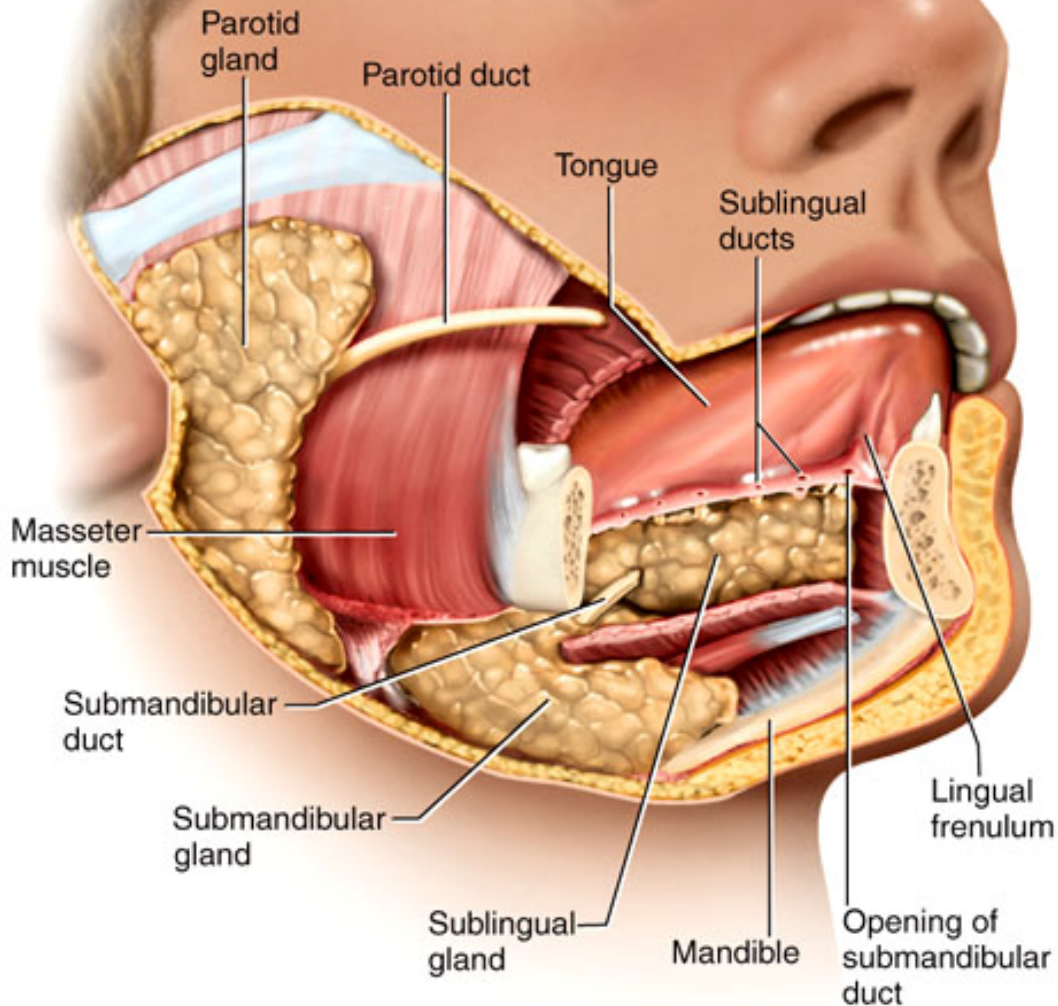
(a) Dorsal view

Tooth Structure

- Periodontal ligament is modified periosteum
 - anchors into alveolus
- **Cementum and dentin are living tissue**
- Enamel is noncellular secretion formed during development
- Root canal leads into pulp cavity
 - nerves and blood vessels
- Gingiva or gums

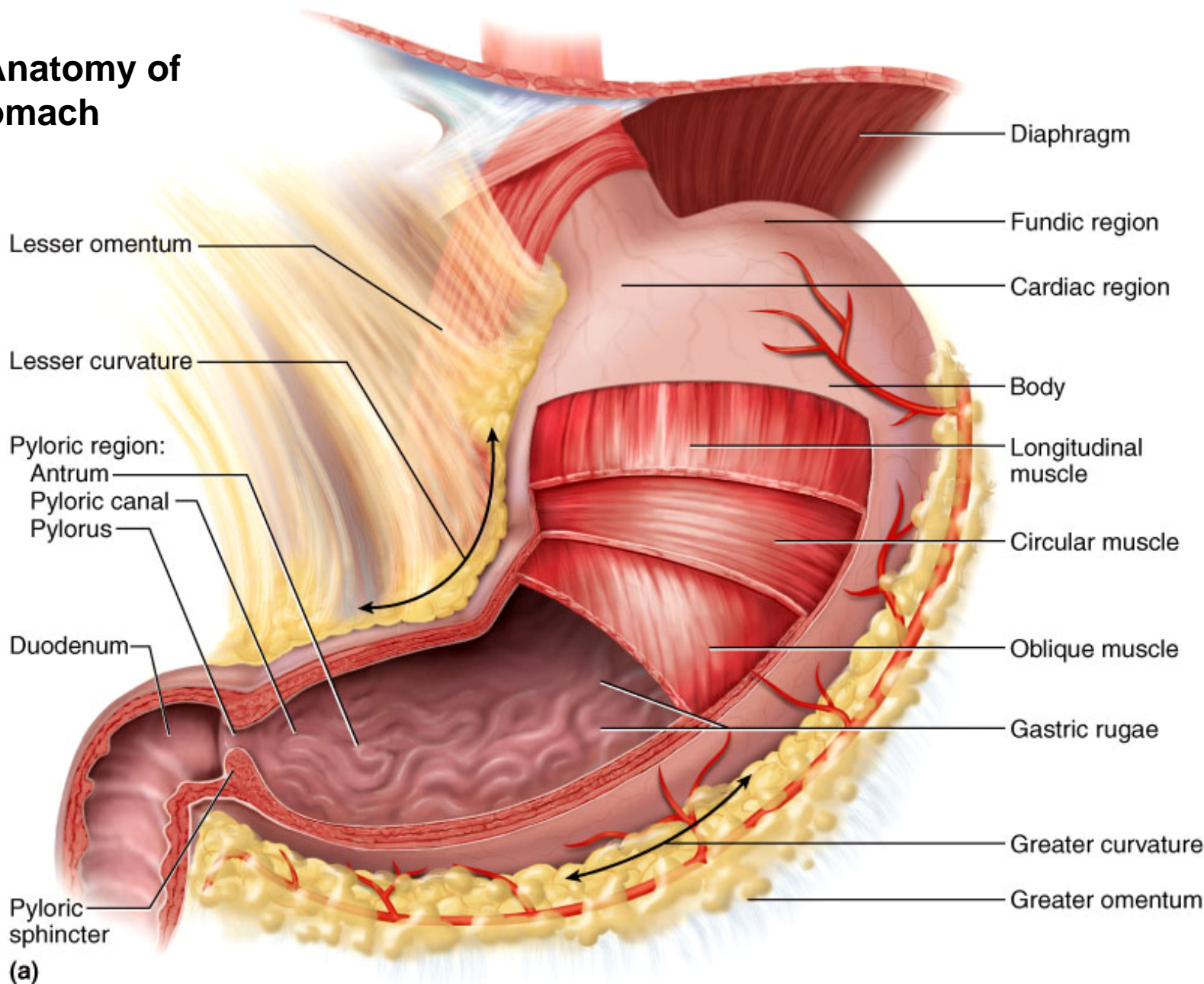


Salivary Glands



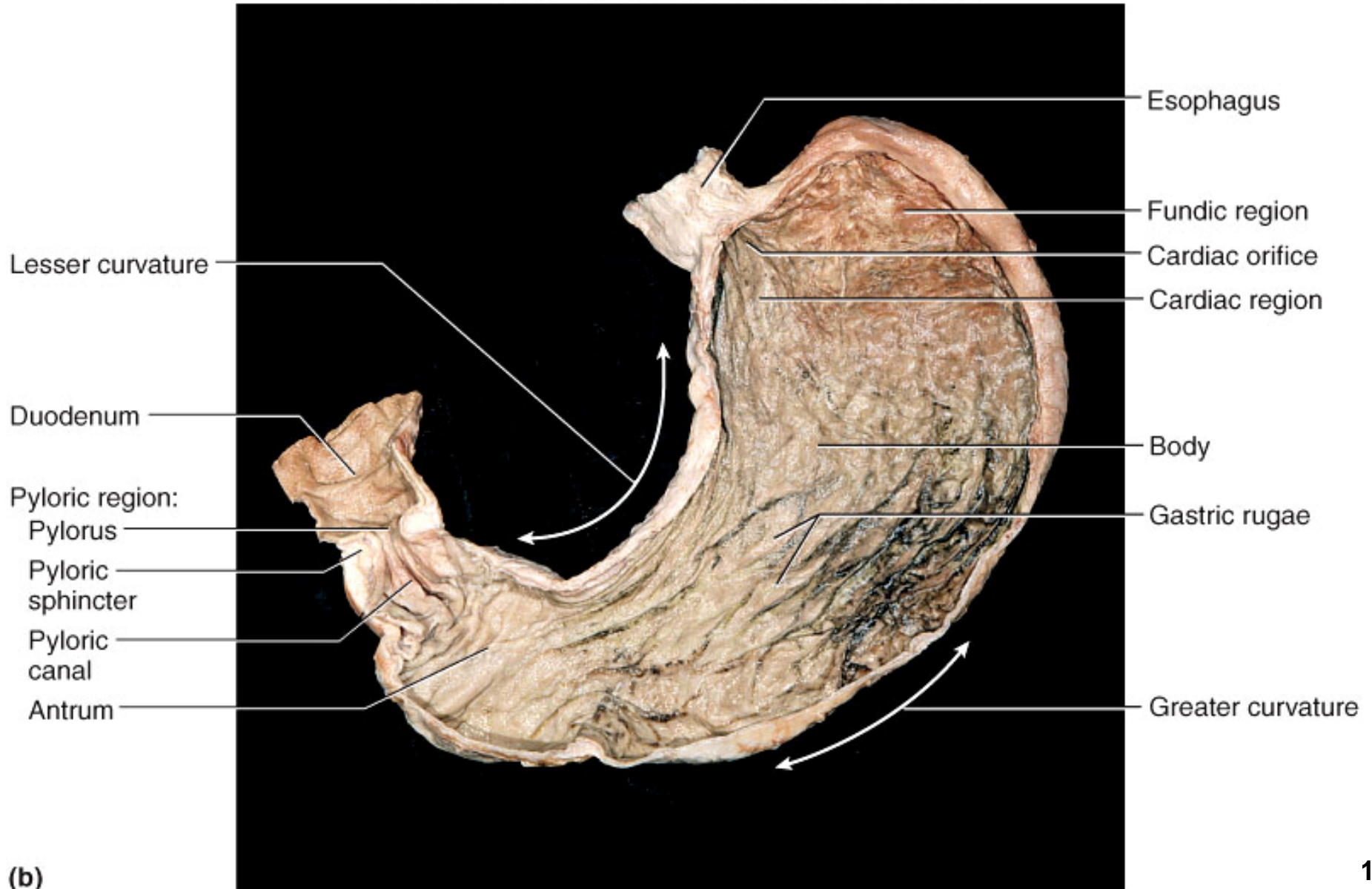
- **Small intrinsic glands**
 - found under mucous membrane of mouth, lips, cheeks and tongue
 - secrete at constant rate, low volume, keep mouth moist and inhibit bacteria
- **3 pairs extrinsic glands**
 - connected to oral cavity by ducts
 - parotid (mumps)
 - submandibular
 - sublingual

Gross Anatomy of Stomach



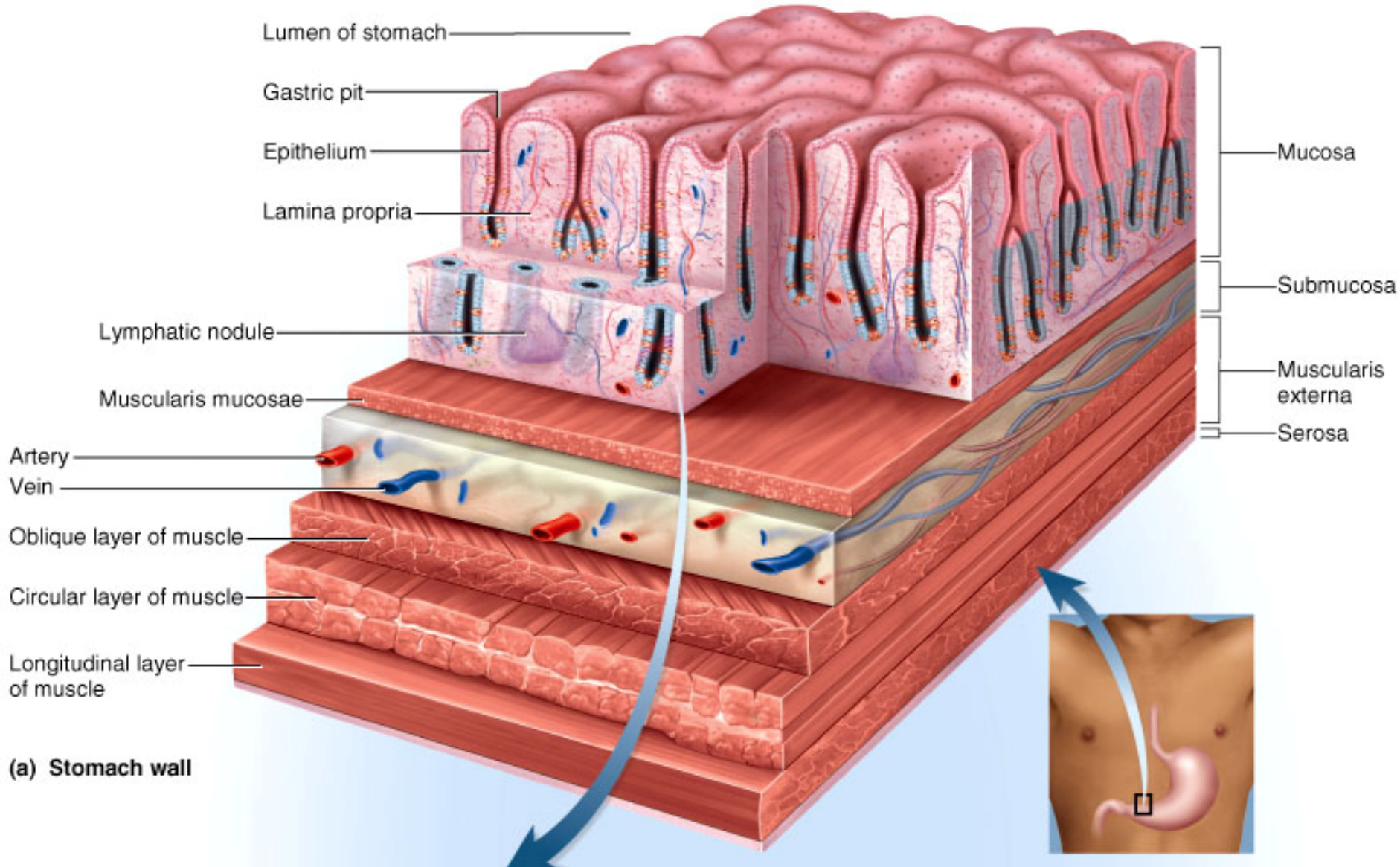
Gross Anatomy of Stomach

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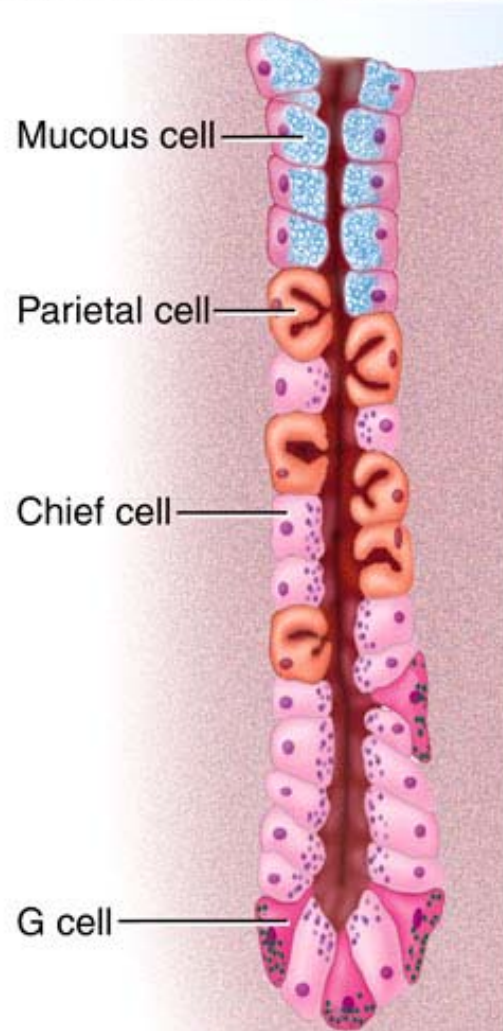
Unique Features of Stomach Wall

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Gastric Gland

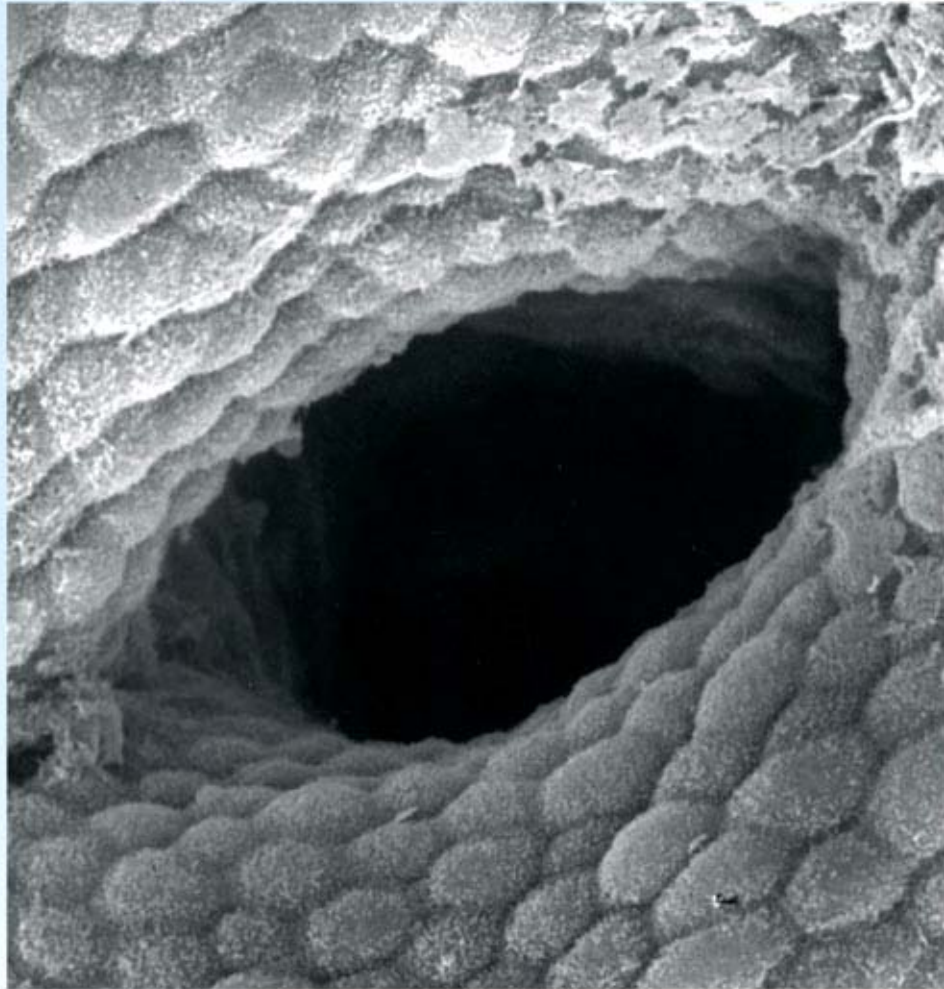
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(b) Gastric gland

Opening of Gastric Pit

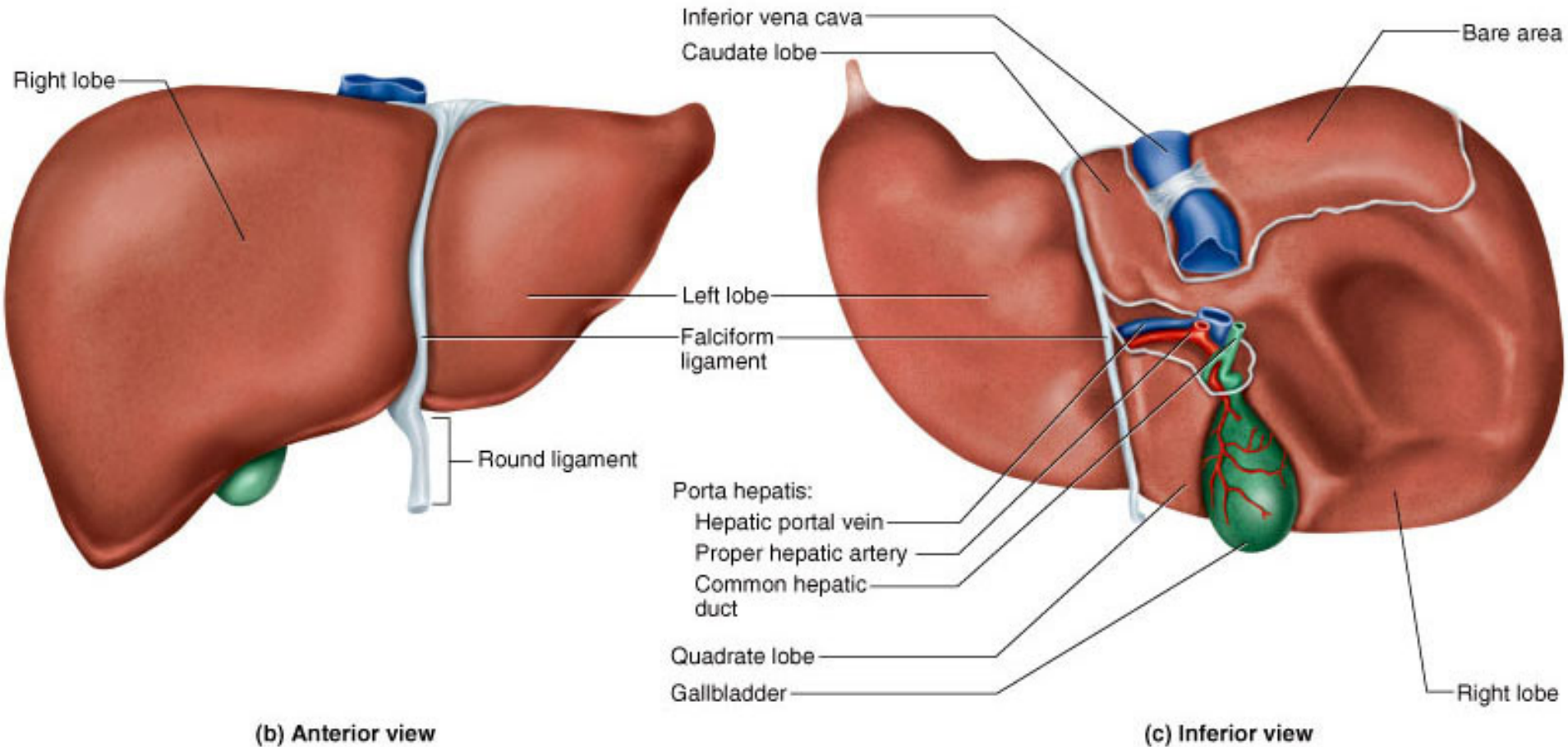
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(d) Gastric pit

Gross Anatomy of Liver

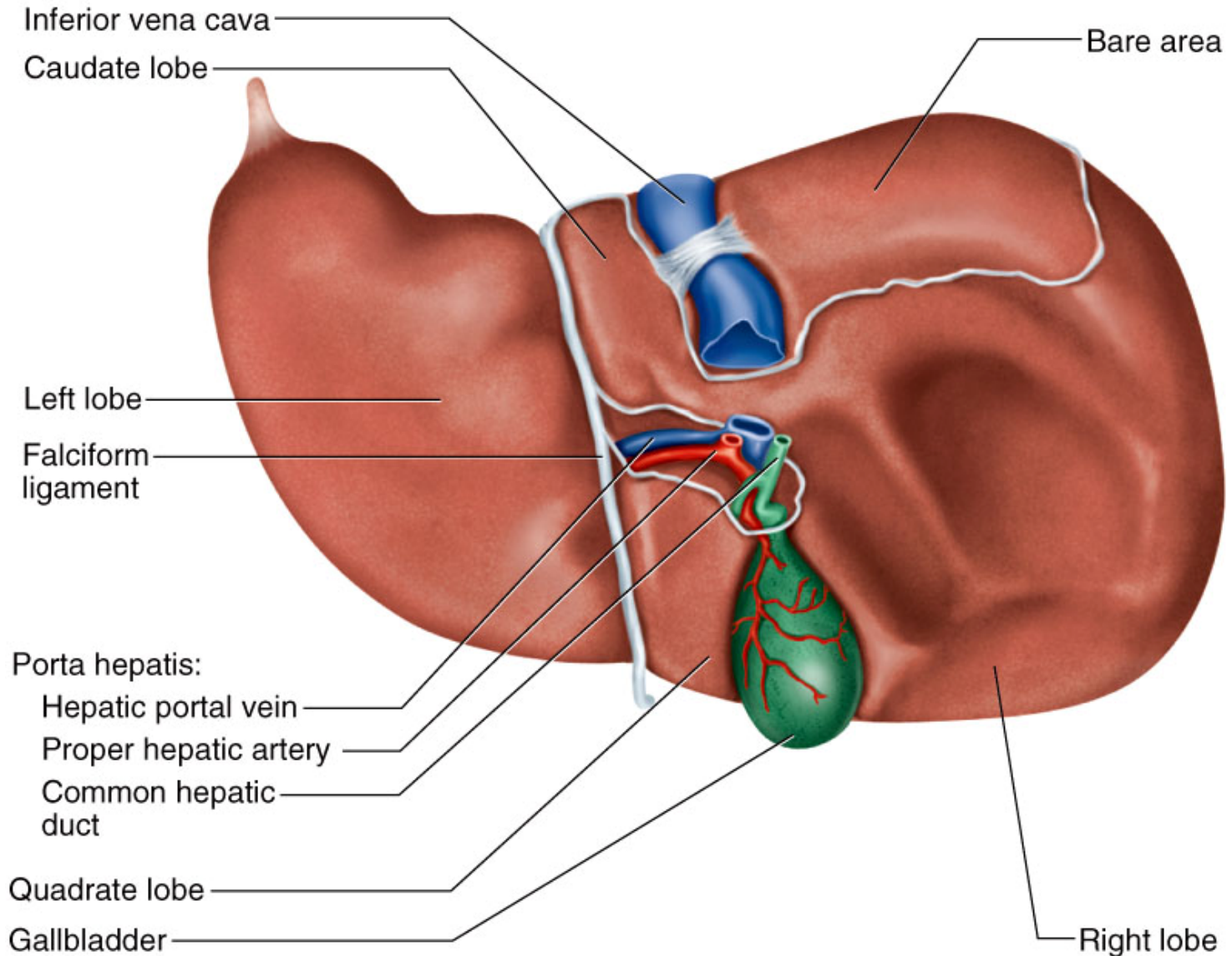
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- **3 lb. organ located inferior to the diaphragm**
- **4 lobes - right, left, quadrate and caudate**
 - falciform ligament separates left and right
 - round ligament, remnant of umbilical vein
- **Gallbladder adheres to ventral surface between right and quadrate lobes**

Inferior Surface of Liver

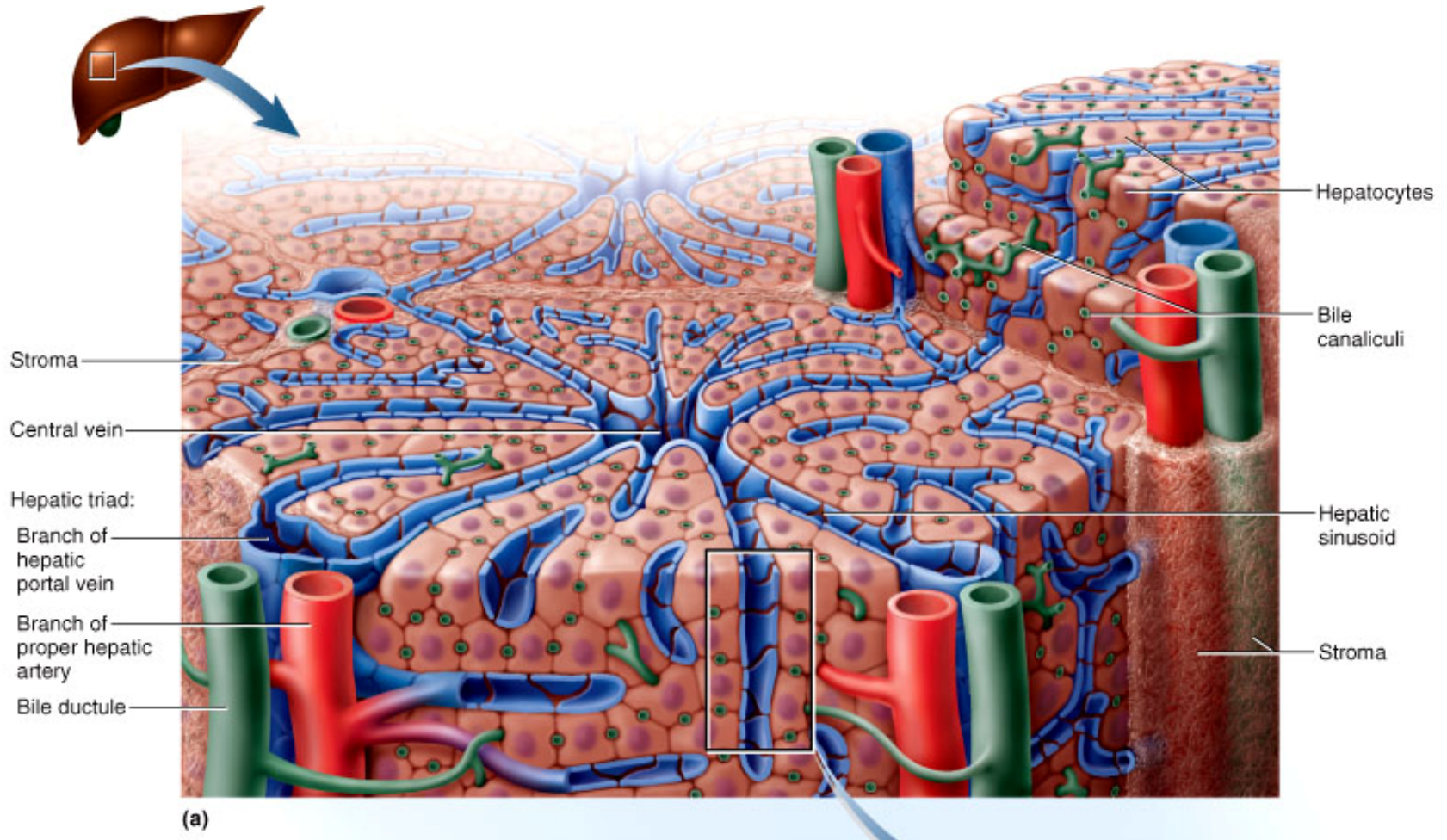
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(c) Inferior view

Microscopic Anatomy of Liver

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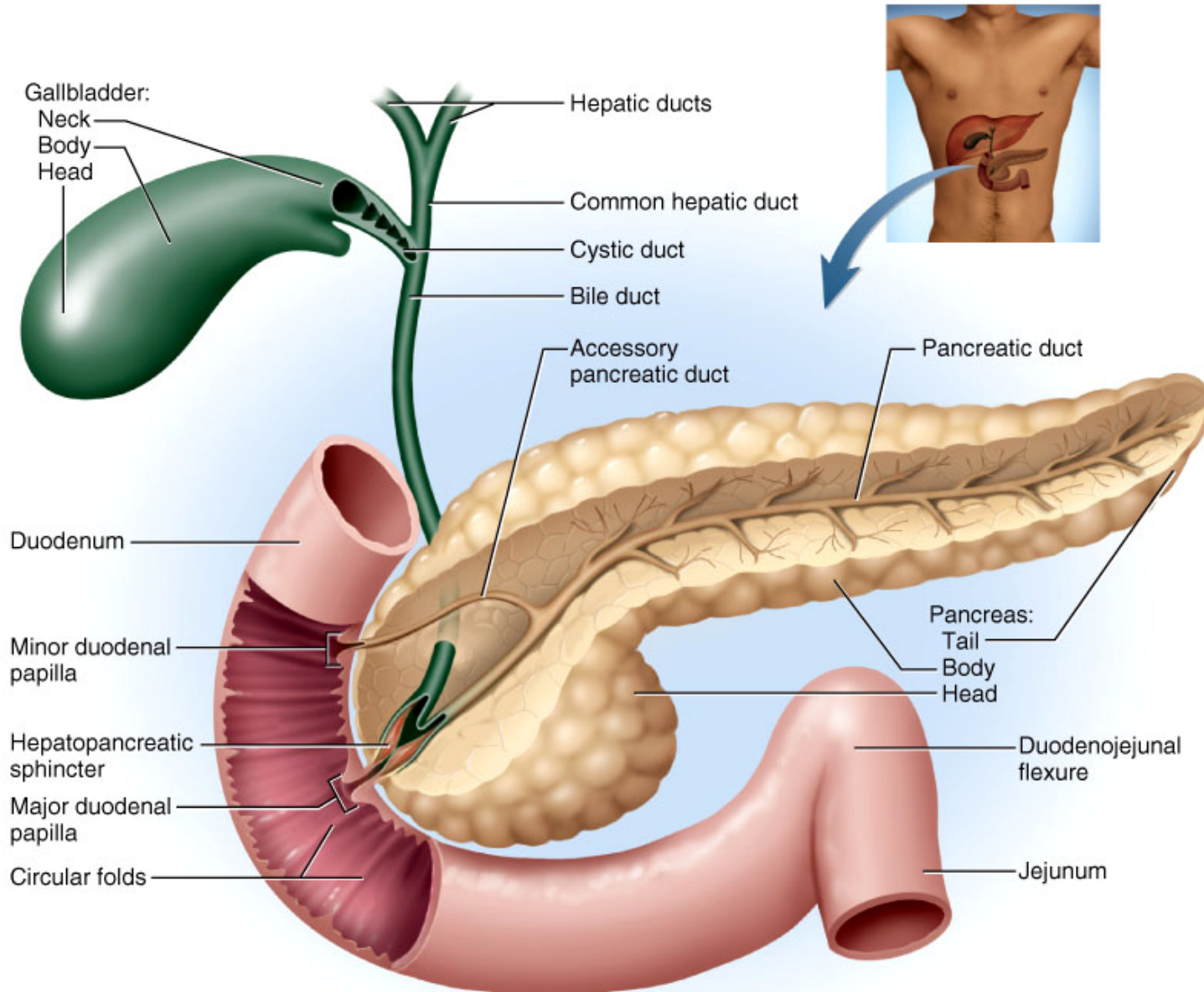


(a)

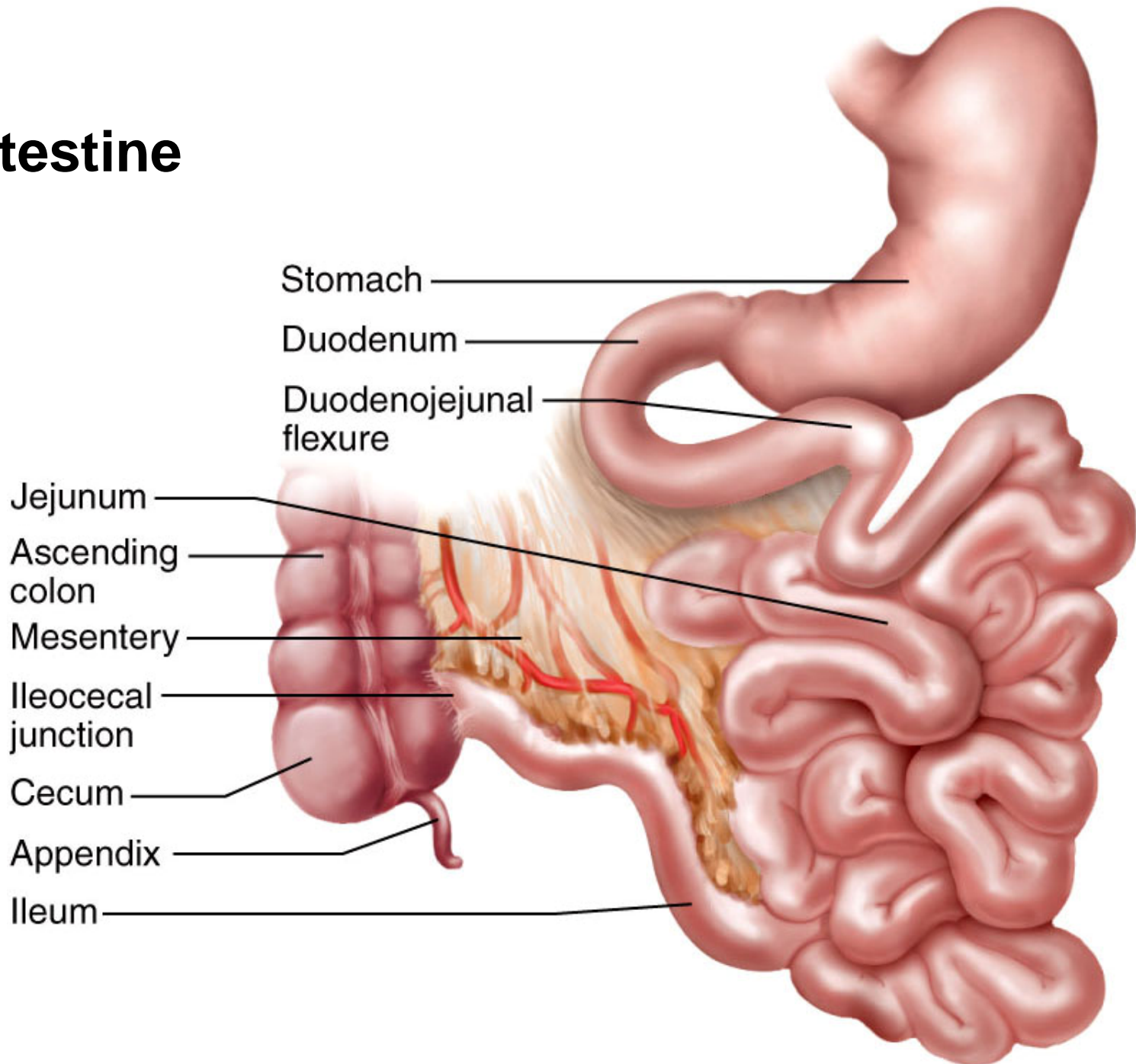
- **Tiny cylinders called hepatic lobules (2mm by 1mm)**
- **Central vein surrounded by sheets of hepatocyte cells separated by sinusoids lined with fenestrated epithelium**
- **Blood filtered by hepatocytes on way to central vein**

Ducts of Gallbladder, Liver and Pancreas

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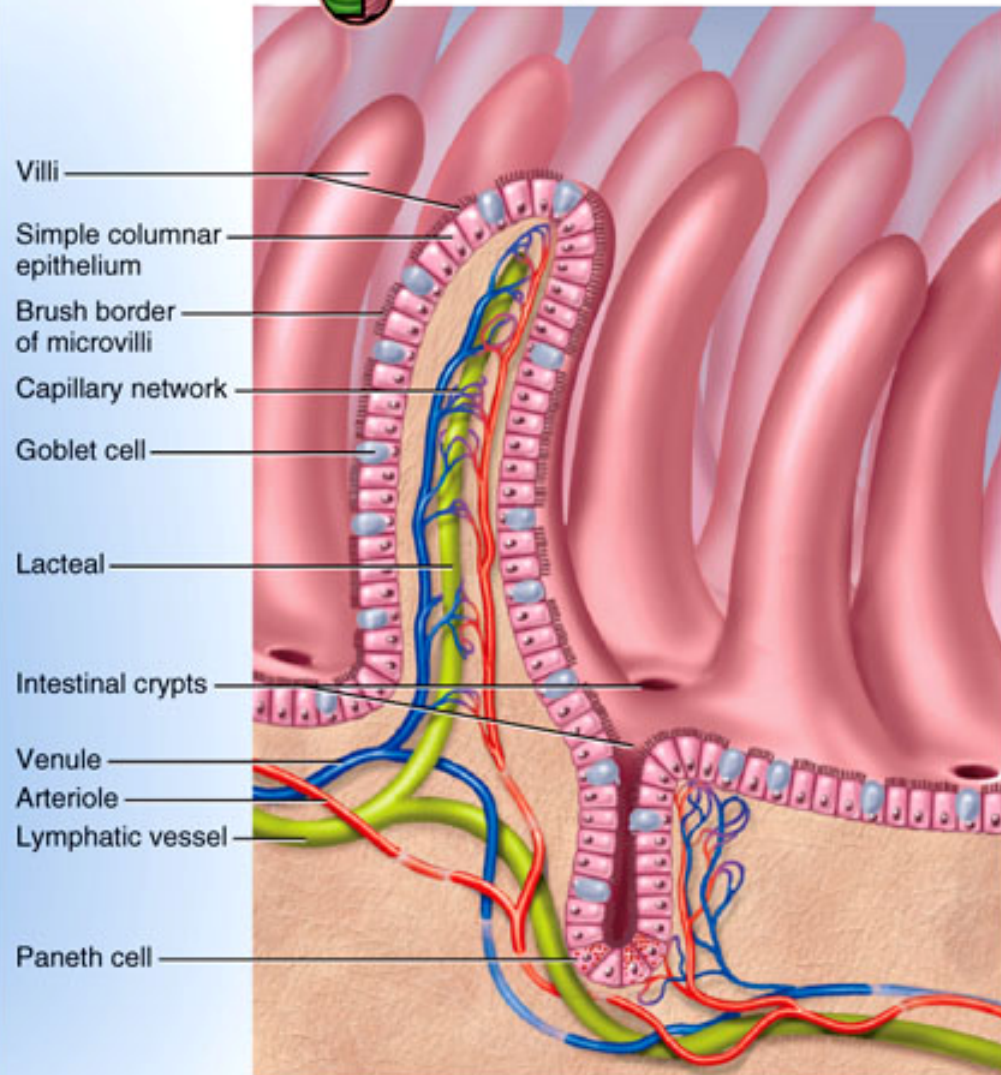


Small Intestine



Small Intestine Surface Area

- **Circular folds (plicae circularis) up to 10 mm tall**
 - involve only mucosa and submucosa
 - chyme flows in spiral path causing more contact
- **Villi are fingerlike projections 1 mm tall**
 - contain blood vessels and lymphatics (lacteal)
 - nutrient absorption
- **Microvilli 1 micron tall; cover surface**
 - brush border on cells
 - brush border enzymes for final stages of digestion

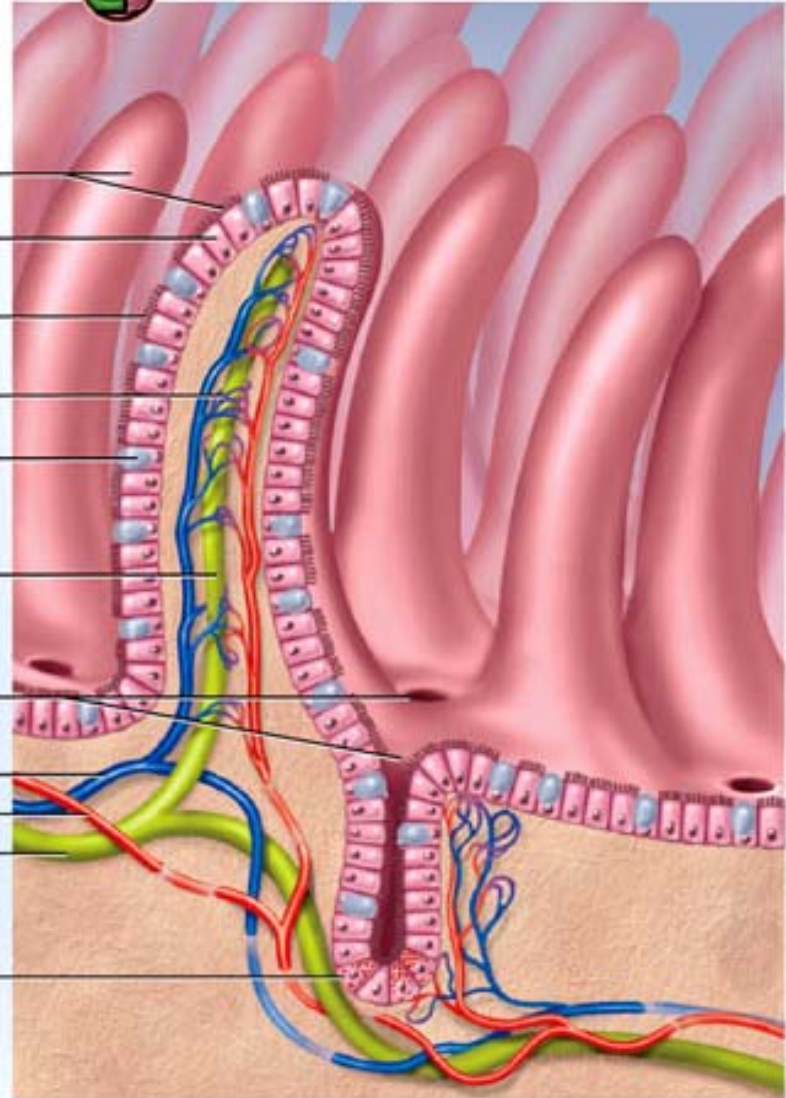


(c)

Intestinal Crypts



- Villi
- Simple columnar epithelium
- Brush border of microvilli
- Capillary network
- Goblet cell
- Lacteal
- Intestinal crypts
- Venule
- Arteriole
- Lymphatic vessel
- Paneth cell

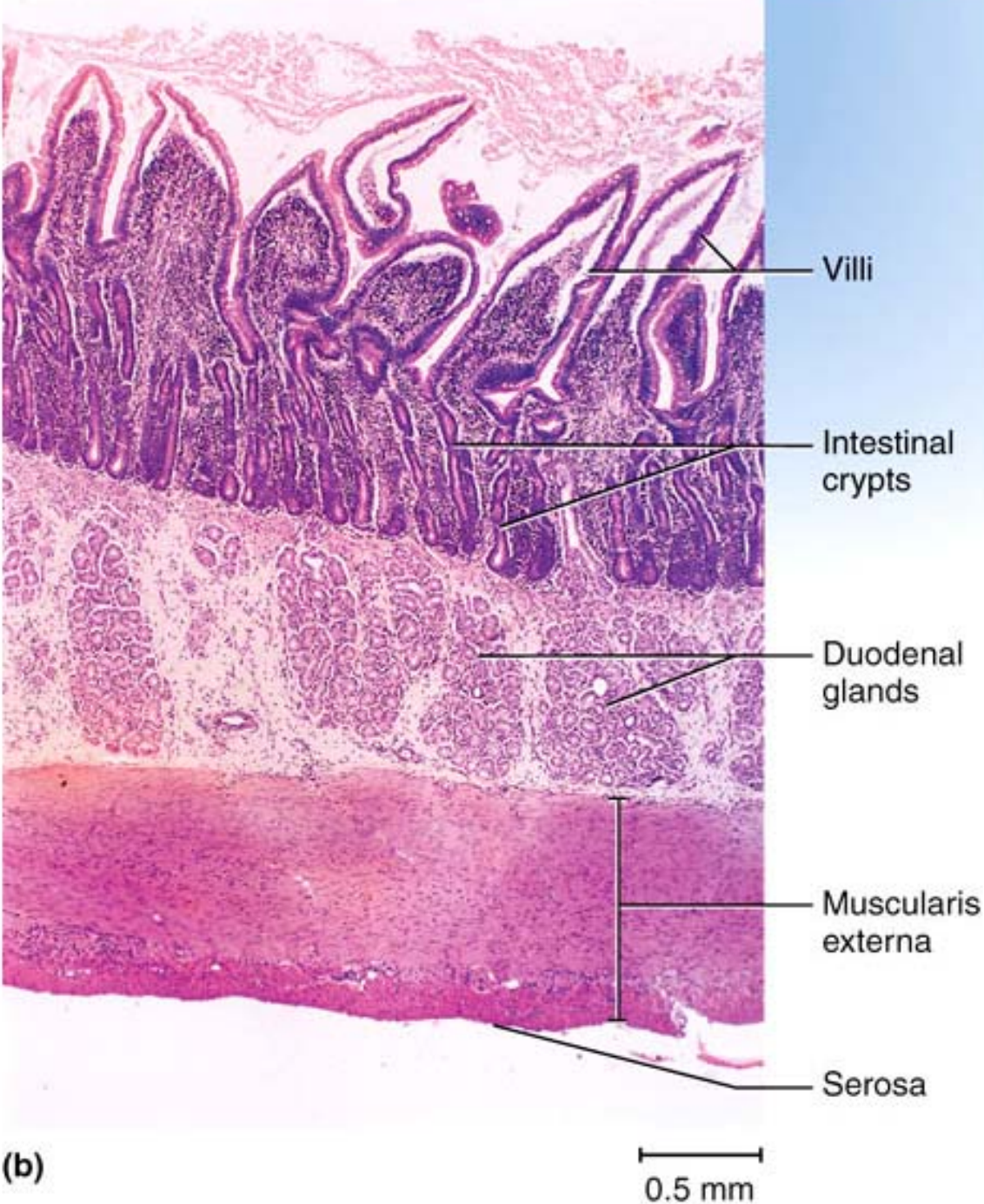


(c)



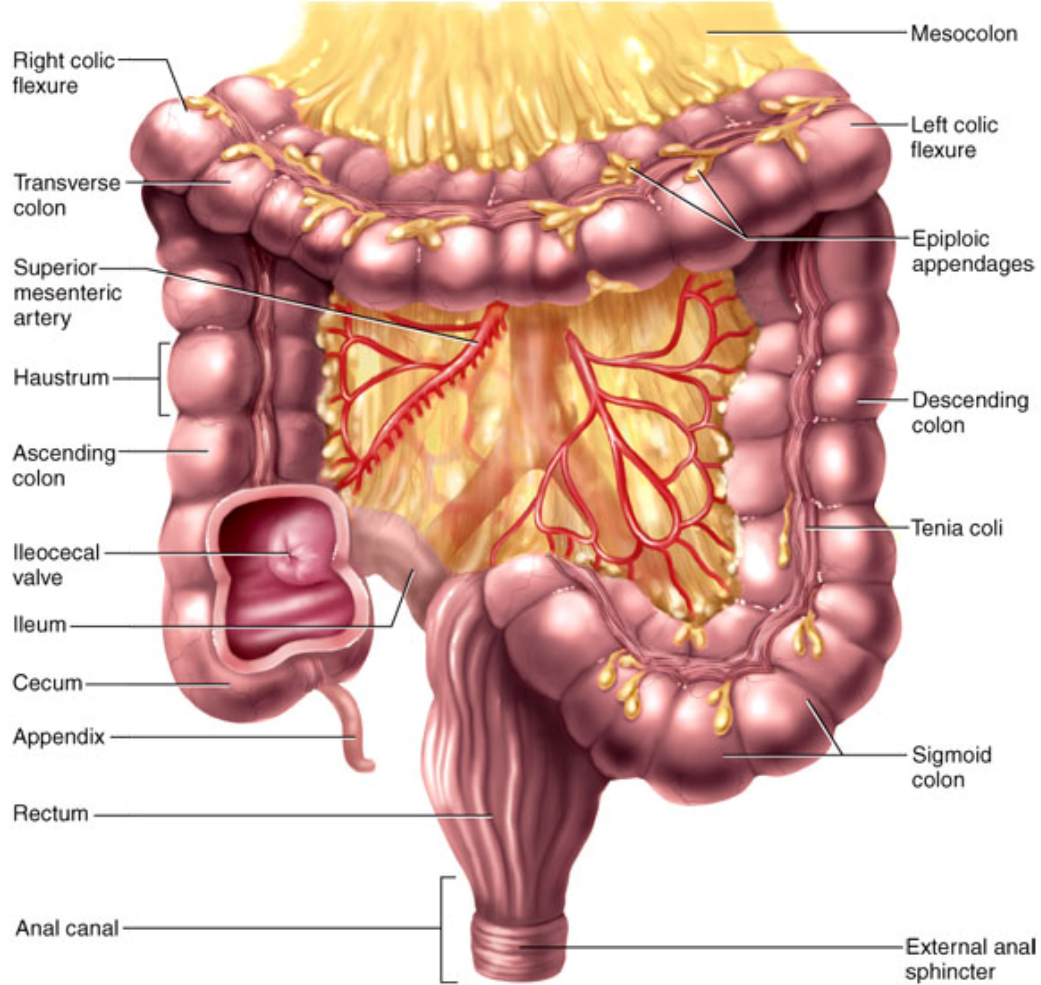
Intestinal Villi of
the Jejunum

Histology of the Duodenum



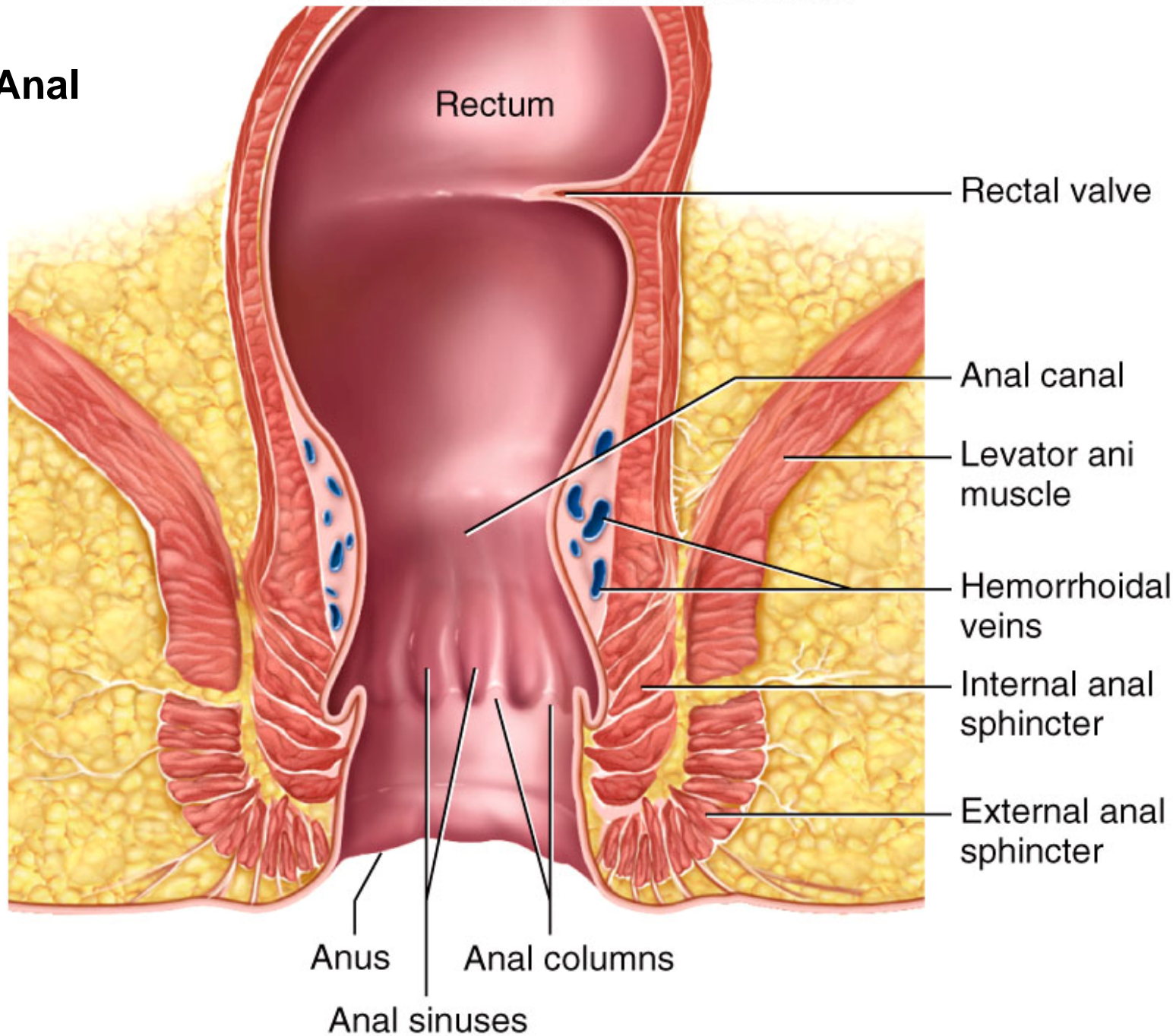
Anatomy of Large Intestine

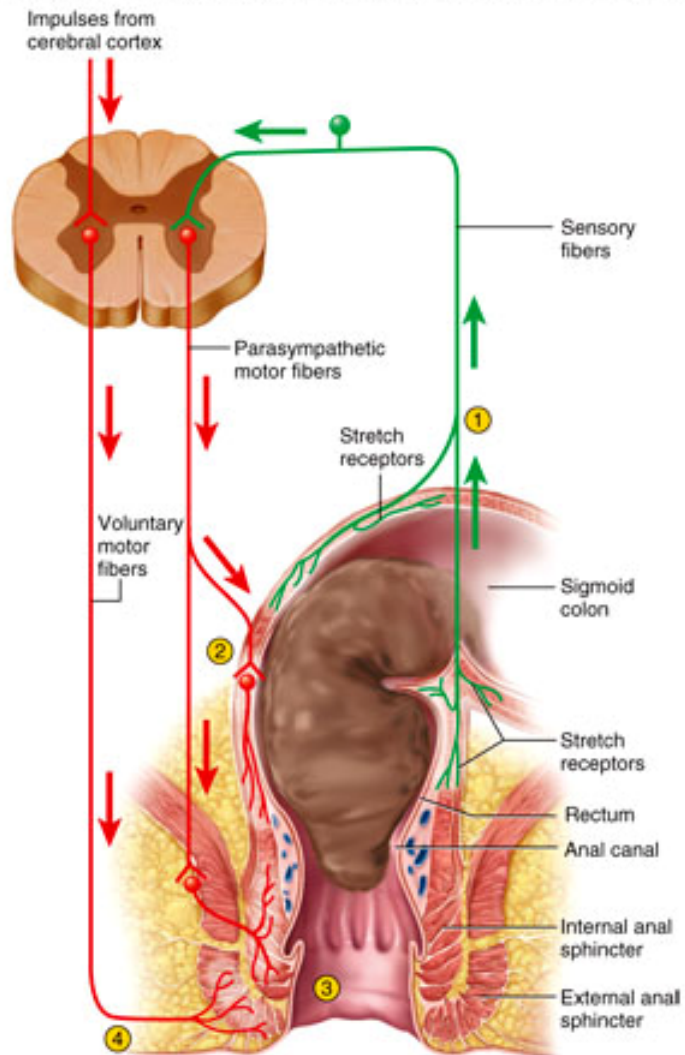
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(a)

Anatomy of Anal Canal

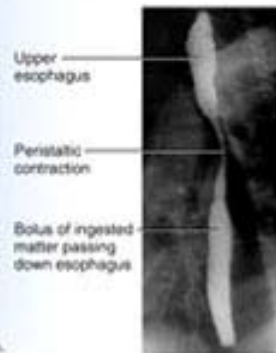
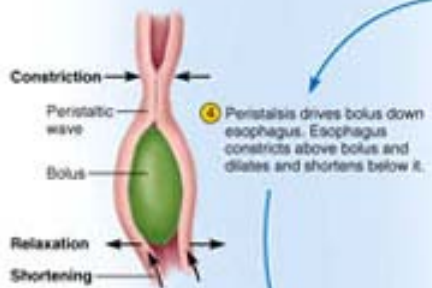
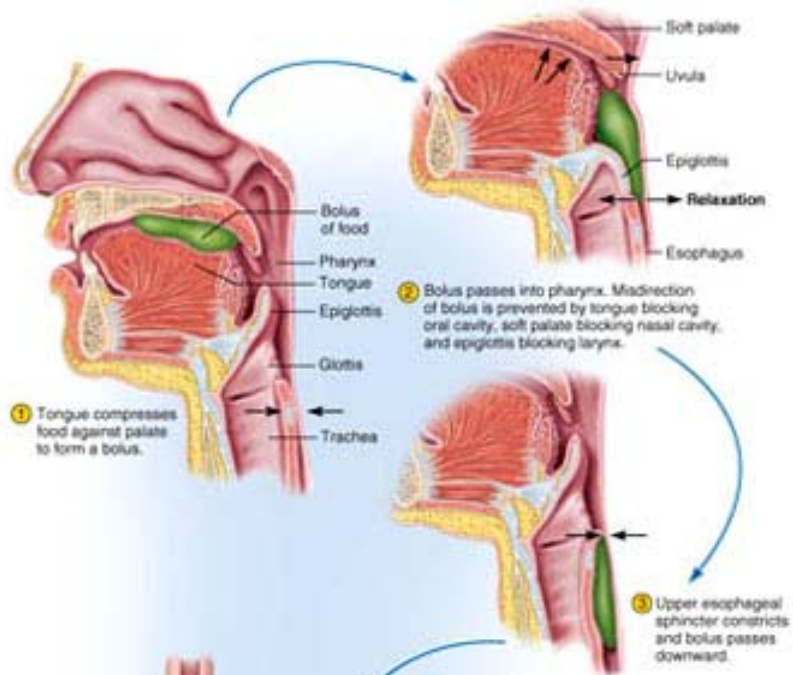




Neural Control of Defecation

1. Filling of the rectum
2. Reflex contraction of rectum and relaxation of internal anal sphincter
3. Voluntary relaxation of external sphincter

- ① Feces stretch the rectum and stimulate stretch receptors, which transmit signals to the spinal cord.
- ② A spinal reflex stimulates contraction of the rectum.
- ③ The spinal reflex also relaxes the internal anal sphincter.
- ④ Impulses from the brain prevent untimely defecation by keeping the external anal sphincter contracted. Defecation occurs only if this sphincter also relaxes.



(b)



(a)

Swallowing