Small Intestine

It is divided into duodenum, jejunum and ileum.

- **Mucosa:** characteristic features-

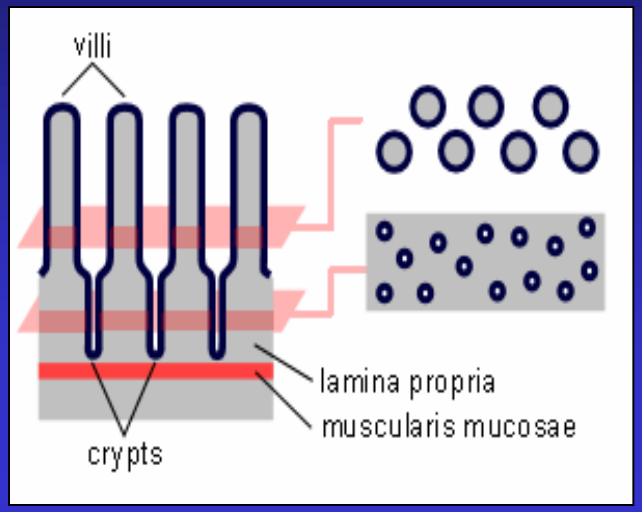
✓ Plicae circularis (valves of Kerkring)

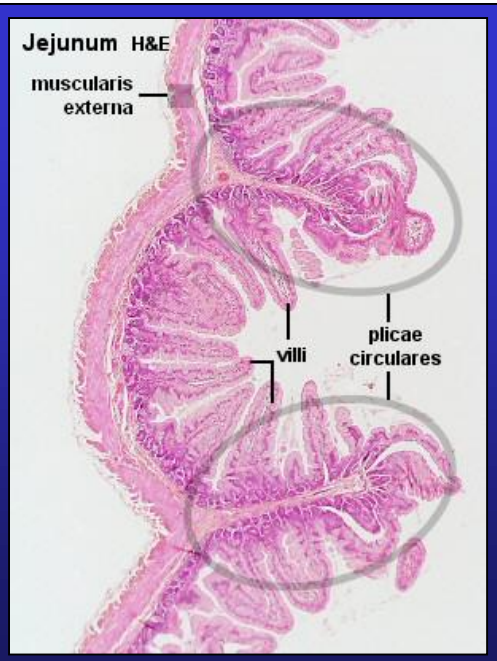
✓ Villi & Microvilli

✓ Goblet cells (few)

✓ Crypts of Lieberkuhn (intestinal glands)

✓ Glands are lined by columnar cells, goblet cells, Paneth cells & enteroendocrine cells





The Small Intestine

- Plays key role in digestion and absorption of nutrients
- 90% of nutrient absorption occurs in the small intestine

Segments of the Intestine

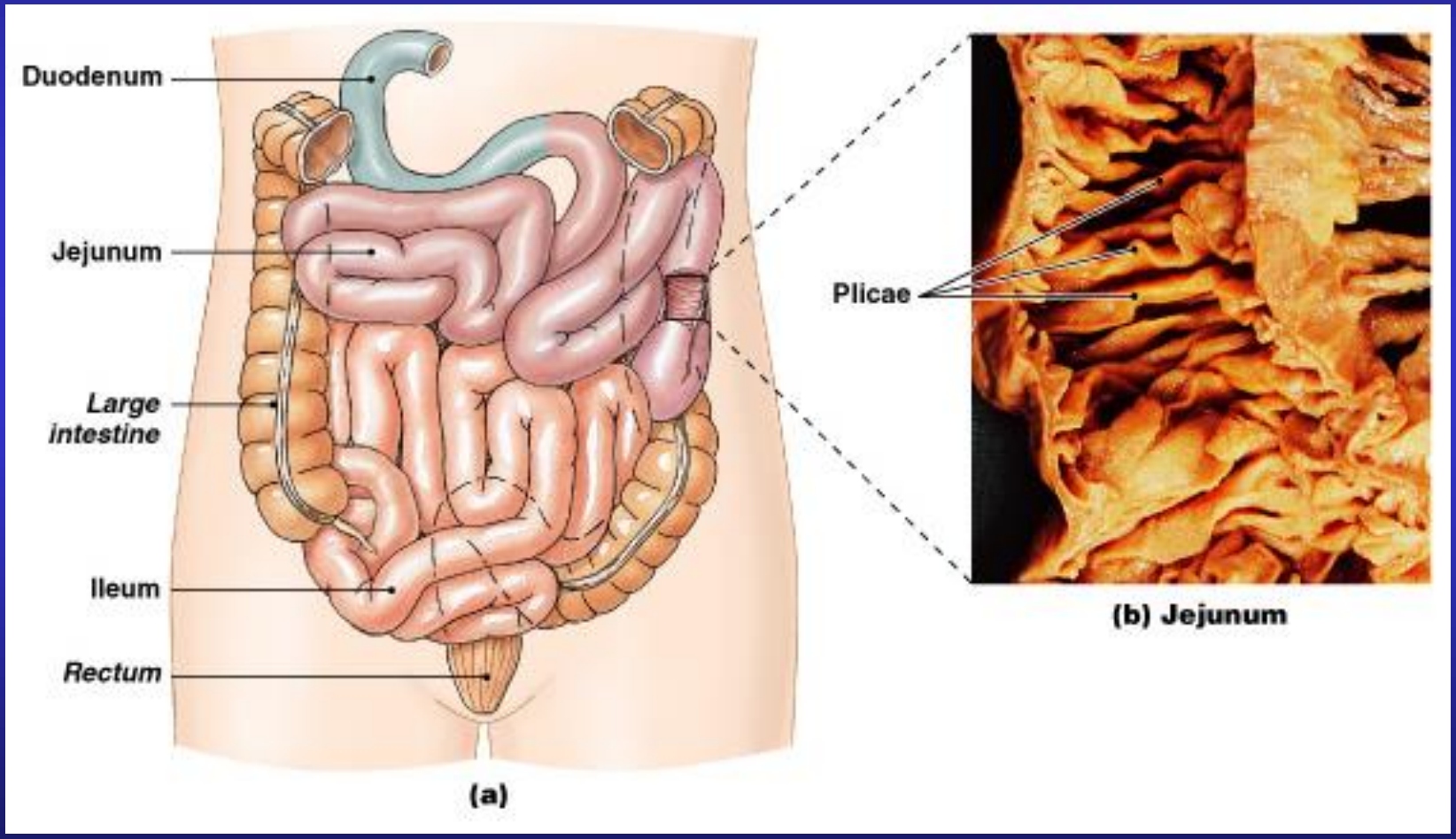


Figure 24-16

Segments of the S.I.

- S.I. Runs from pyloric sphincter to the ileocecal valve; 3 segments:
- The Duodenum is the 25 cm (10 in.) long segment of small intestine closest to stomach
  - "Mixing bowl" that receives chyme from stomach, digestive secretions from pancreas and liver
- The Jejunum is the 2.5 meter (8.2 ft) long middle segment and is the location of most chemical digestion and nutrient absorption
- The Ileum is he final 3.5 meter (11.48 ft) long segment, joins large intestine at ileocecal valve

Intestinal Folds and Projections

- Structural modifications of the small intestine wall increase surface area
- Plicae = Largest; deep transverse (circular) folds in intestinal lining; permanent features (they do not disappear when small intestine fills)
- Intestinal Villi: a series of fingerlike projections of mucosa
- Villi are covered with simple columnar epithelium which themselves are have many plasma membrane projections called microvilli
- All serve to increase surface area for absorption (altogether by 600x)

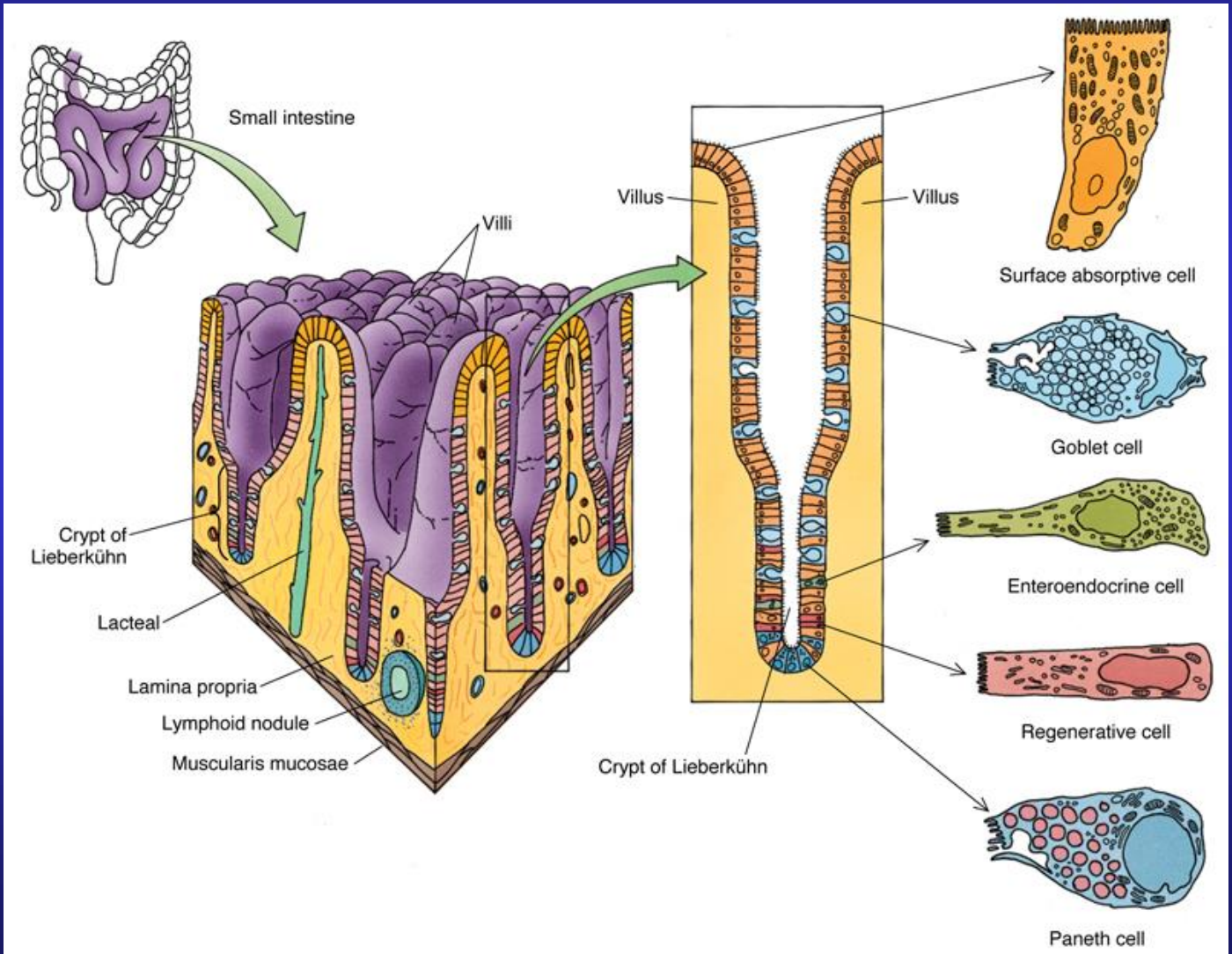
Intestinal Histology

- Absorptive columnar cells
- Goblet cells between columnar epithelial cells eject mucins onto intestinal surfaces
- Enteroendocrine cells in intestinal glands produce intestinal hormones:
  - gastrin
  - cholecystokinin
  - Secretin
- Peyer's patches are found in the submucosa

Lacteals

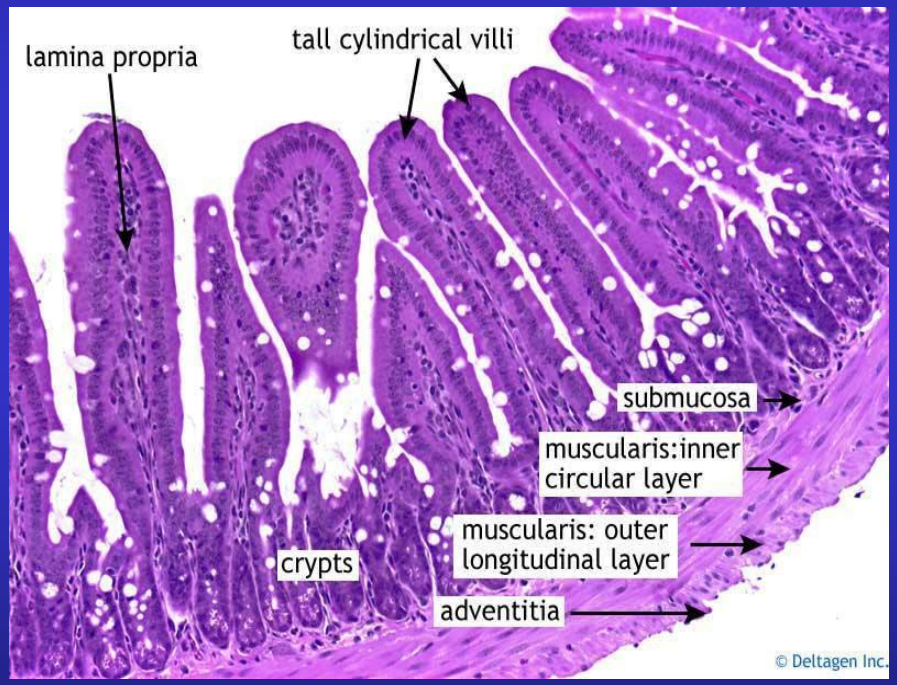
- Each villus lamina propria has ample capillary supply (to absorb nutrients) and nerves
- In addition, each villus has a central lymph capillary called a lacteal. These are larger than the blood capillaries and thus can absorb larger particles into the body, such as lipid droplets.
- Muscle contractions move villi back and forth to facilitate absorption and to squeeze the lacteals to assist lymph movement

Small Intestine



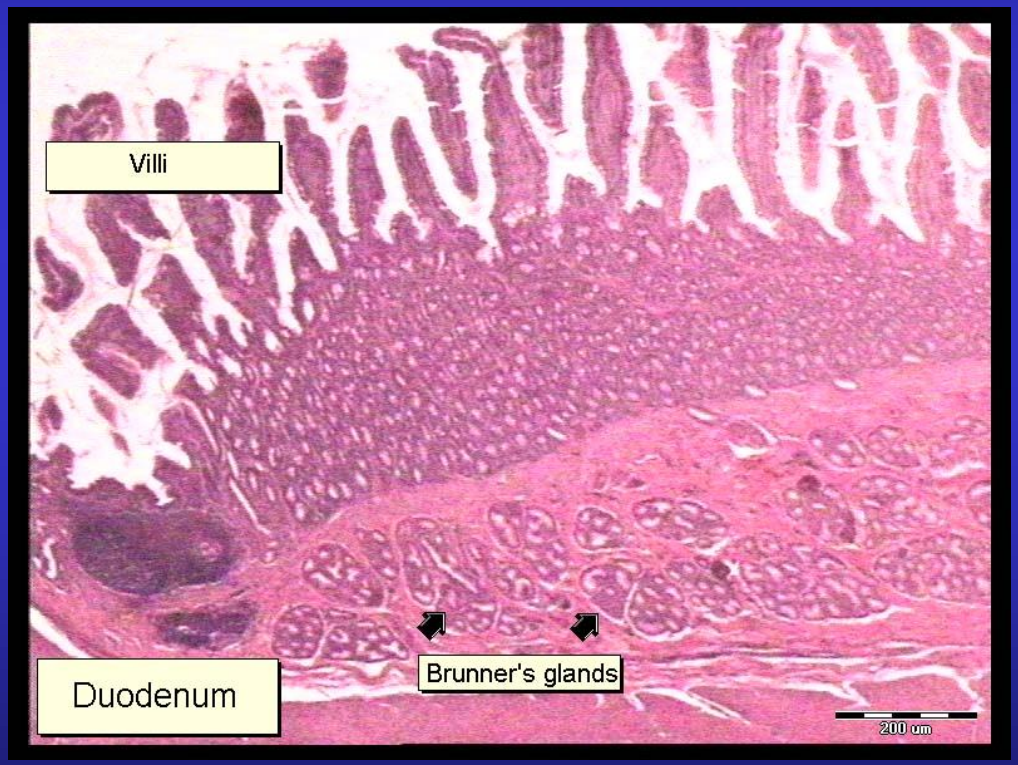
Small Intestine

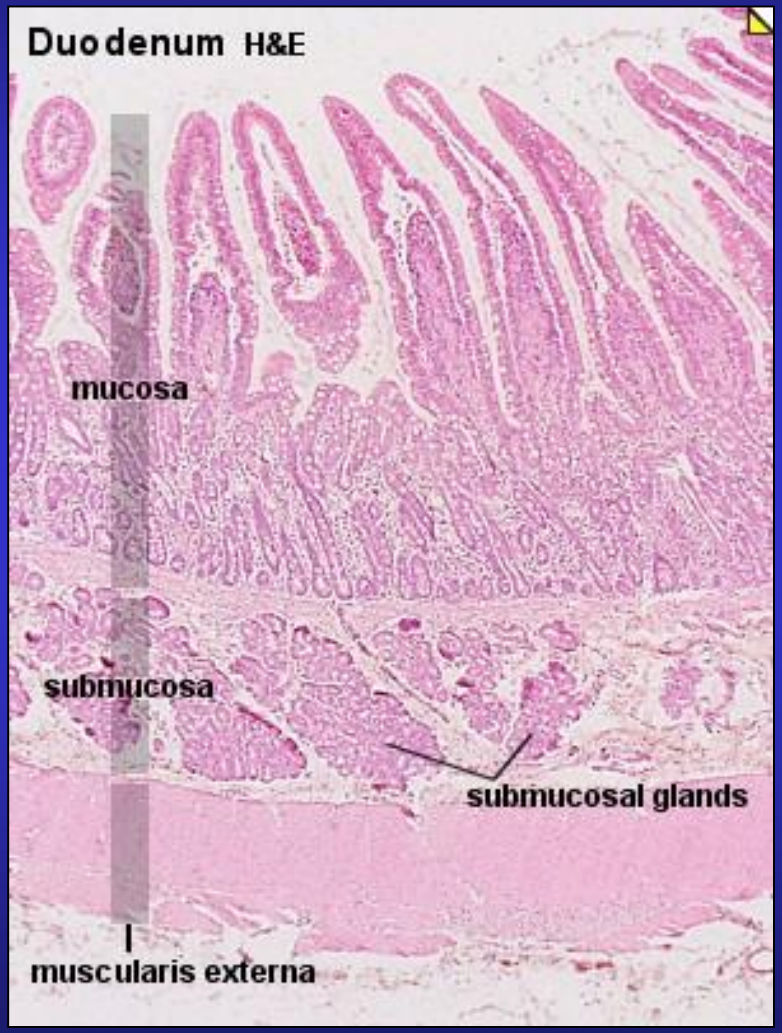
- **Submucosa:** contains blood vessels, lymphatics and Meissner's plexus.
- **Muscularis externa:** Outer longitudinal and inner circular layers of smooth muscle.
- **Serosa/Adventitia**



Duodenum

Presence of Brunner's glands in submucosa

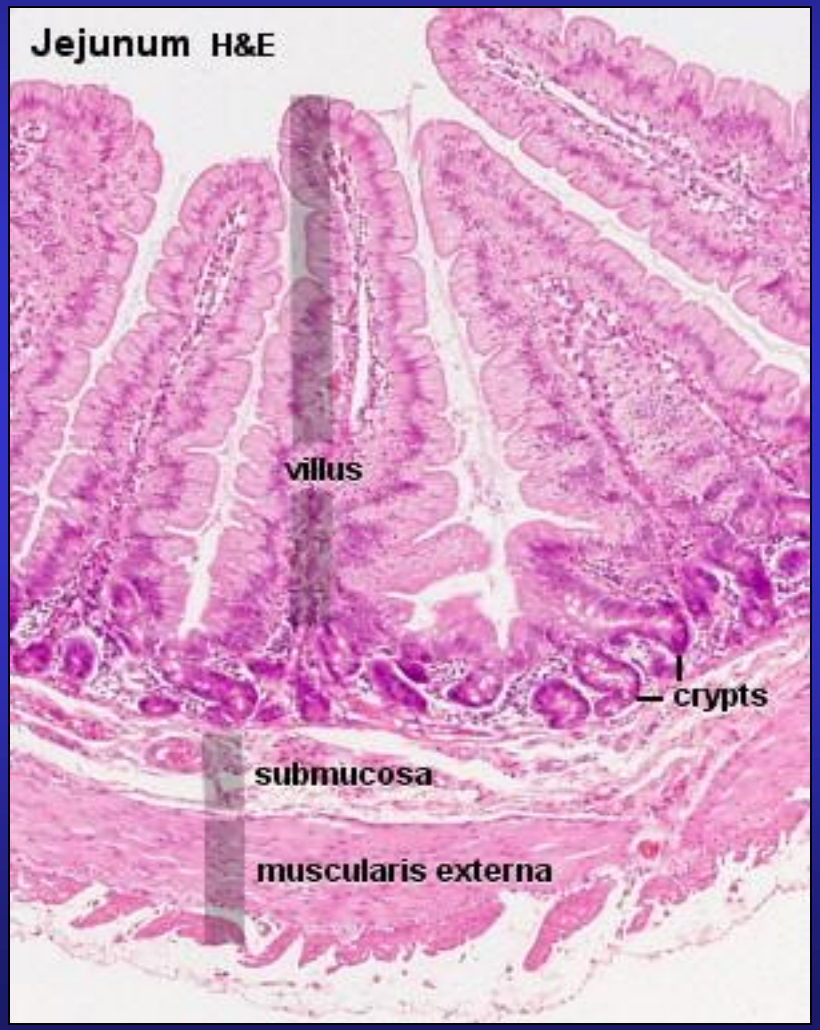




High power view of the Duodenal Mucosa

Jejunum

- Villi are tongue shaped.
- Absence of Brunner's glands.



Ileum

- Presence of lymphoid aggregations in lamina propria known as **Peyer's patches.**
- Villi are short & finger like.

The Large Intestine

- Also called large bowel
- Horseshoe-shaped, about 1.5 meters long and 7.5 cm wide
- Extends from end of ileum to anus
- Lies inferior to stomach and liver
- Frames the small intestine
- Functions
  - Reabsorption of water [the last 15-20%]
  - Compaction of intestinal contents into feces
  - Absorption of important vitamins produced by bacteria
  - Storage of fecal material prior to defecation

Parts of the Large Intestine

- Cecum:
  - the pouchlike first portion
  - Has wormlike appendix projecting from it
- Colon:
  - the largest portion
- Rectum:
  - the last 15 cm of digestive tract
- Anal canal

The Colon

- Has a larger diameter (this is why it is called large) and thinner wall than small intestine
- The wall of the colon forms a series of pocketlike pouches (haustra) giving it a sgmented appearance
- Haustra permit expansion and elongation of colon

Colon Muscles

- 3 longitudinal bands of smooth muscle (taeniae coli) run along outer surfaces of colon deep to the serosa (similar to outer layer of muscularis externa)
- Muscle tone in taeniae coli creates the haustra

Large Intestine

- It consists of: appendix, colon, rectum and anal canal.
- Mucosa: Absence of Plicae circulares and villi

  Presence of **Microvilli**

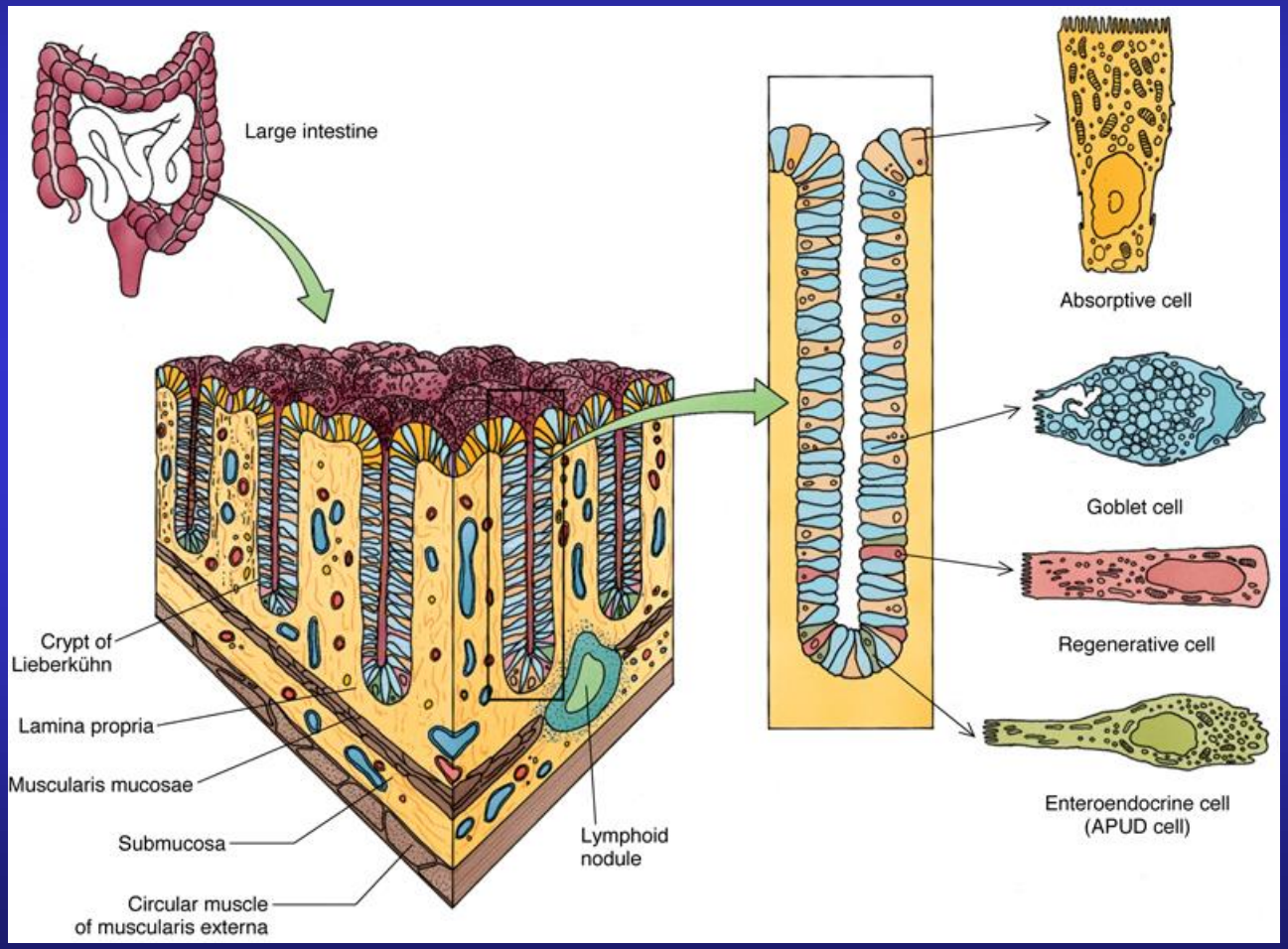
  Presence of **Crypts of Lieberkuhn**

  Presence of **Goblet cells** in large number
- Submucosa
- Muscularis externa:

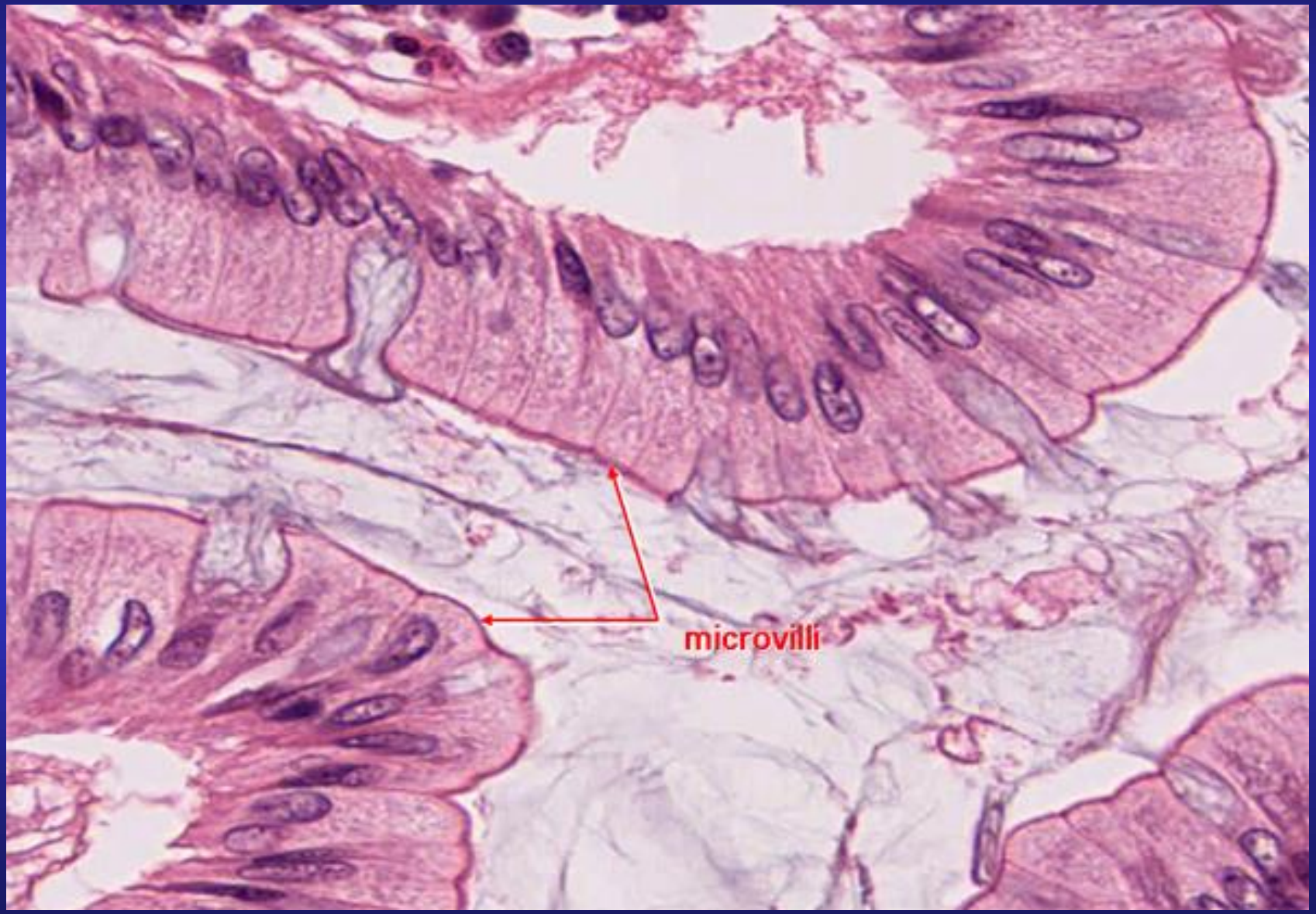
  Inner circular layer - thin compared to small intestine.

  Outer longitudinal layer- forms **Taenia coli**.
- Adventitia: **Appendices epiploicae** (peritoneum forms pouch like processes filled with fat)

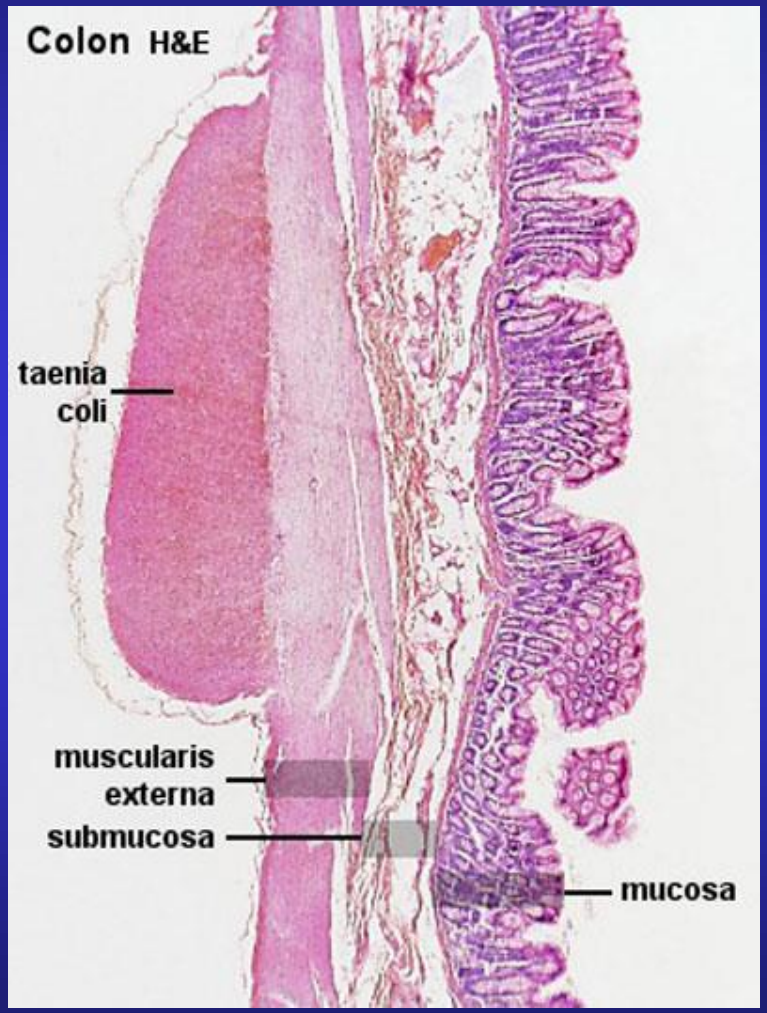
Large Intestine



Magnified view of a villus



Large Intestine



Mucosa and Glands of the Colon

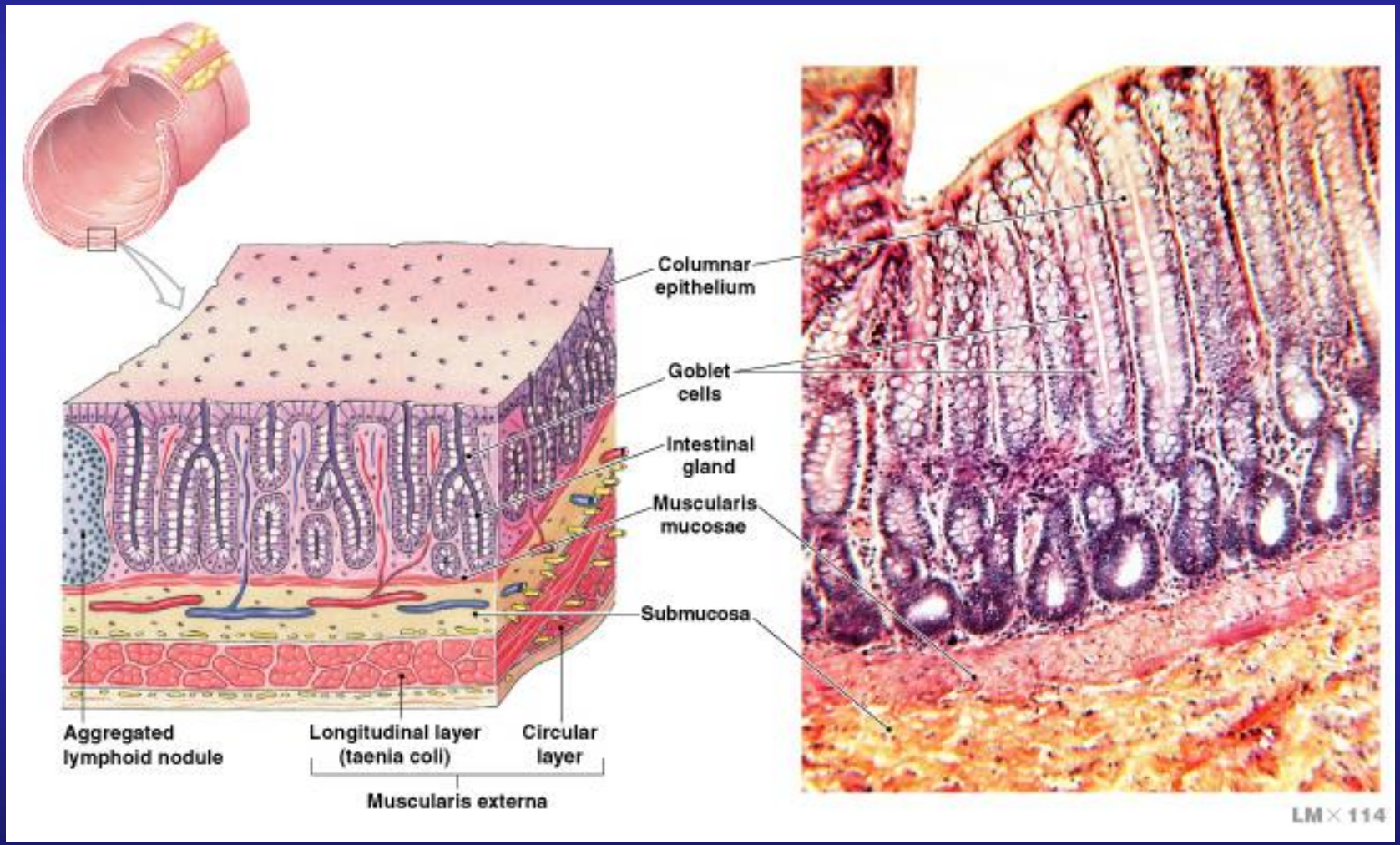


Figure 24-24

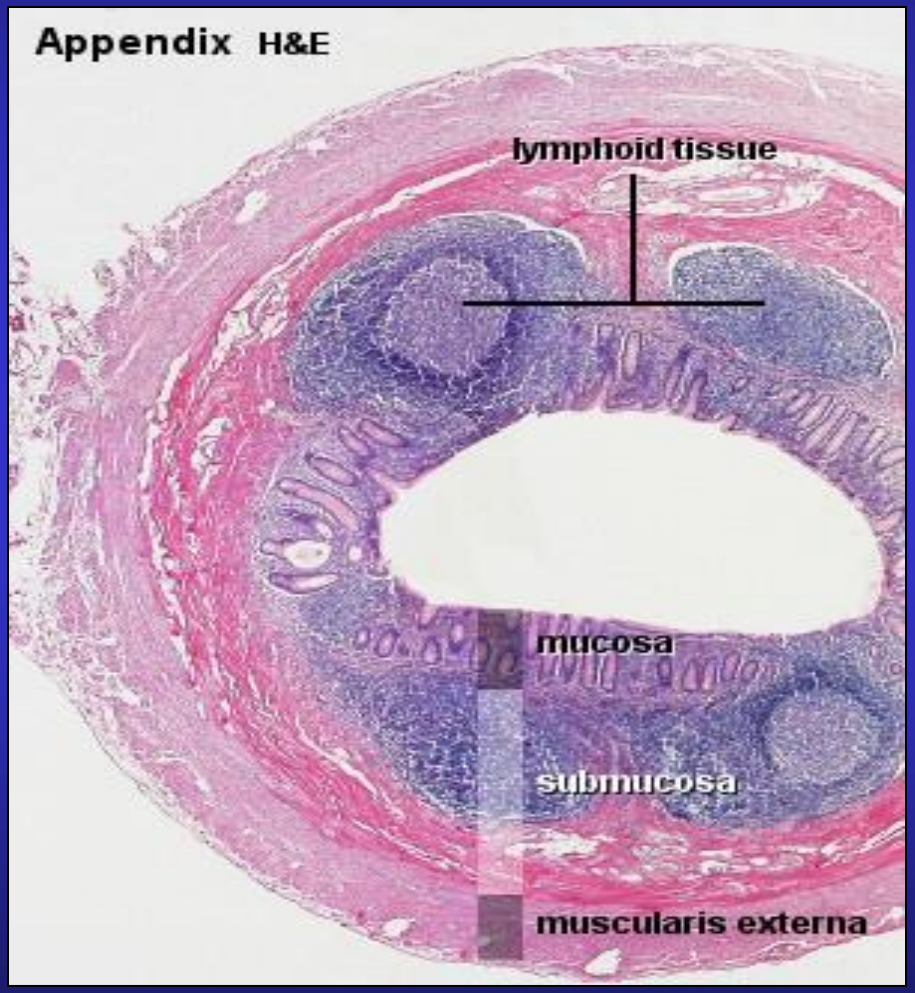
Vermiform Appendix

- A small blind-ending diverticulum.
- **Large accumulations of lymphoid tissue** in lamina propria which may extend into submucosa.
- Intestinal villi are usually absent.
- Crypts are poorly formed.
- Muscularis externa is thin.
- Absence of taenia coli.

Characteristics of the Colon

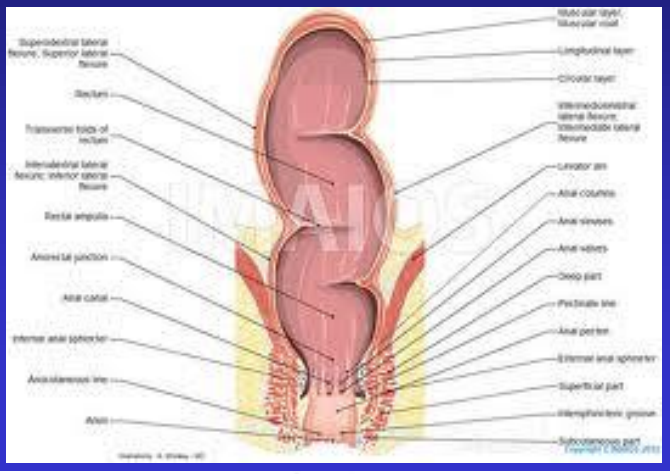
- Lack villi
- Abundance of goblet cells
- Presence of distinctive intestinal glands in crypts
  - deeper than glands of small intestine
  - dominated by goblet cells
- Mucosa of the large intestine does not produce enzymes
  - Provides lubrication for fecal material
- Large lymphoid nodules are scattered throughout the lamina propria and submucosa
- The longitudinal layer of the muscularis externa is reduced to the muscular bands of taeniae coli

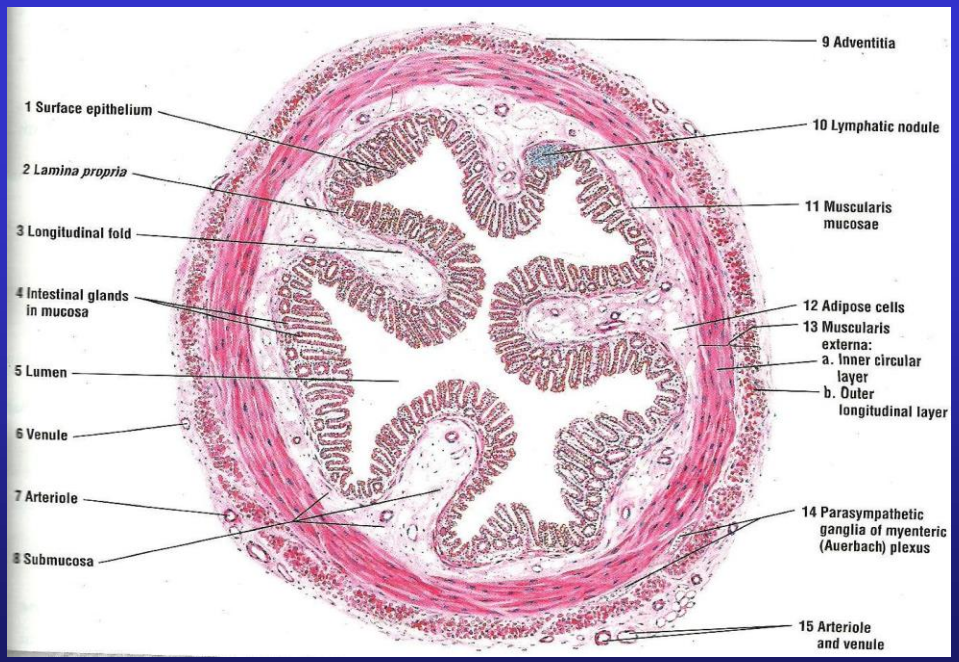
Vermiform Appendix



Rectum

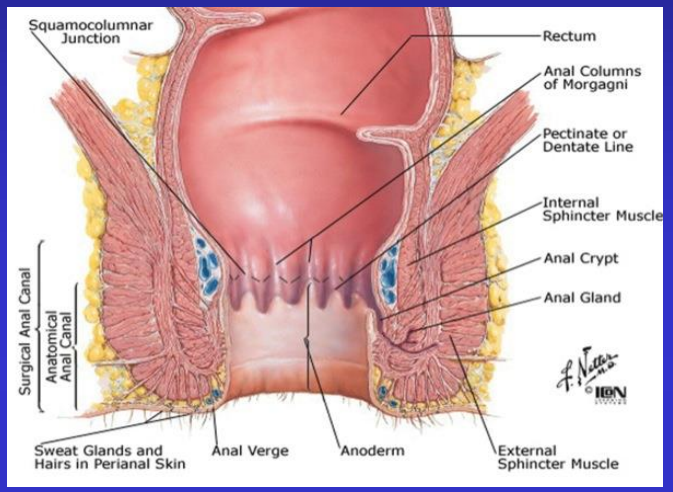
- Intestinal glands are straight, like test tubes.
- A continuous coat of longitudinal muscle is present.
- Absence of taenia.
- Absence of appendices epiploicae.



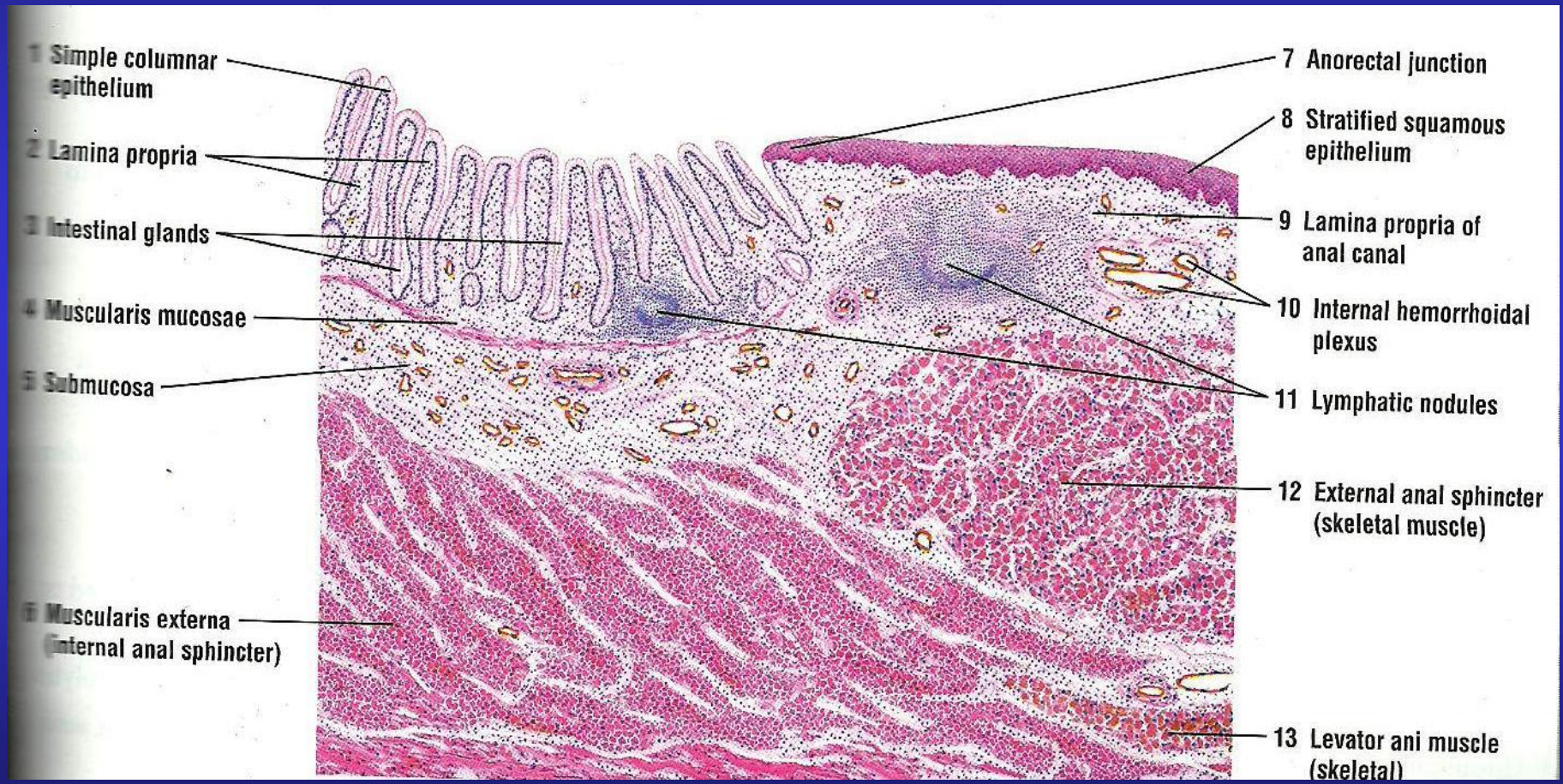


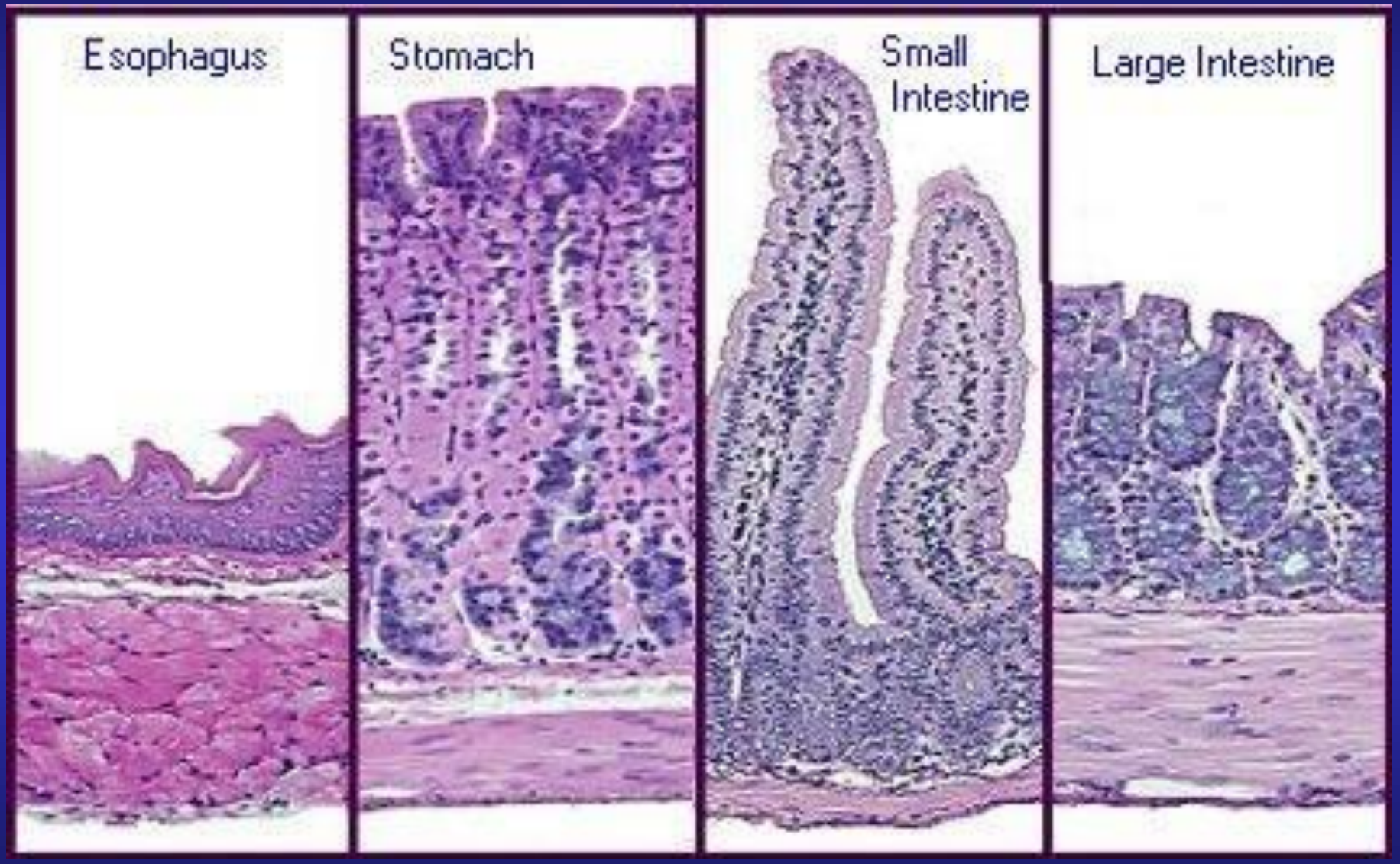
Anal Canal

- Epithelium: upper part-simple columnar, middle part-stratified squamous non-keratinized, lower part-covered by true skin.
- Mucosa has characteristic longitudinal folds-**Anal columns**.
- Small mucosal folds between the anal columns **-Pectinate line**.
- Crypts disappear below this line.
- Muscularis externa-circular muscle forms involuntary **internal anal sphincter.**



Ano-rectal Junction




Esophagus
Stomach
Small Intestine
Large Intestine

MCQ

Q3. Plica circularis is a feature of:

a. Oesophagus
b. Stomach
c. Small intestine
d. Large intestine

MCQ

Q4. Taenia coli is present in:

a. Oesophagus
b. Stomach
c. Small intestine
d. Large intestine

MCQ

Q5. Abundant lymphoid tissue in lamina propria is a feature of:

a. Oesophagus
b. Stomach
c. Duodenum
d. Appendix