Small intestine

Divided into three parts:

duodenum

jejunum

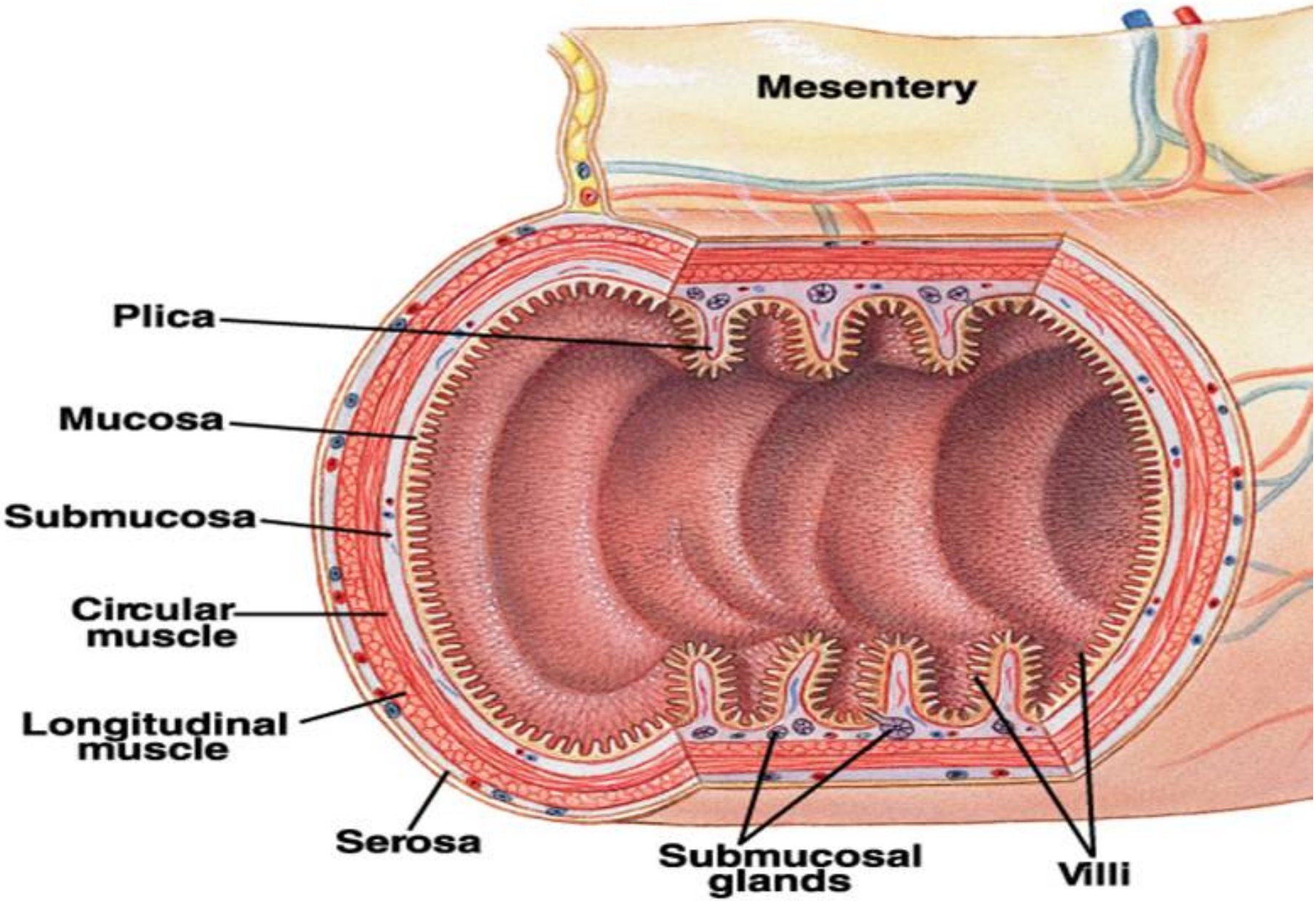
ileum

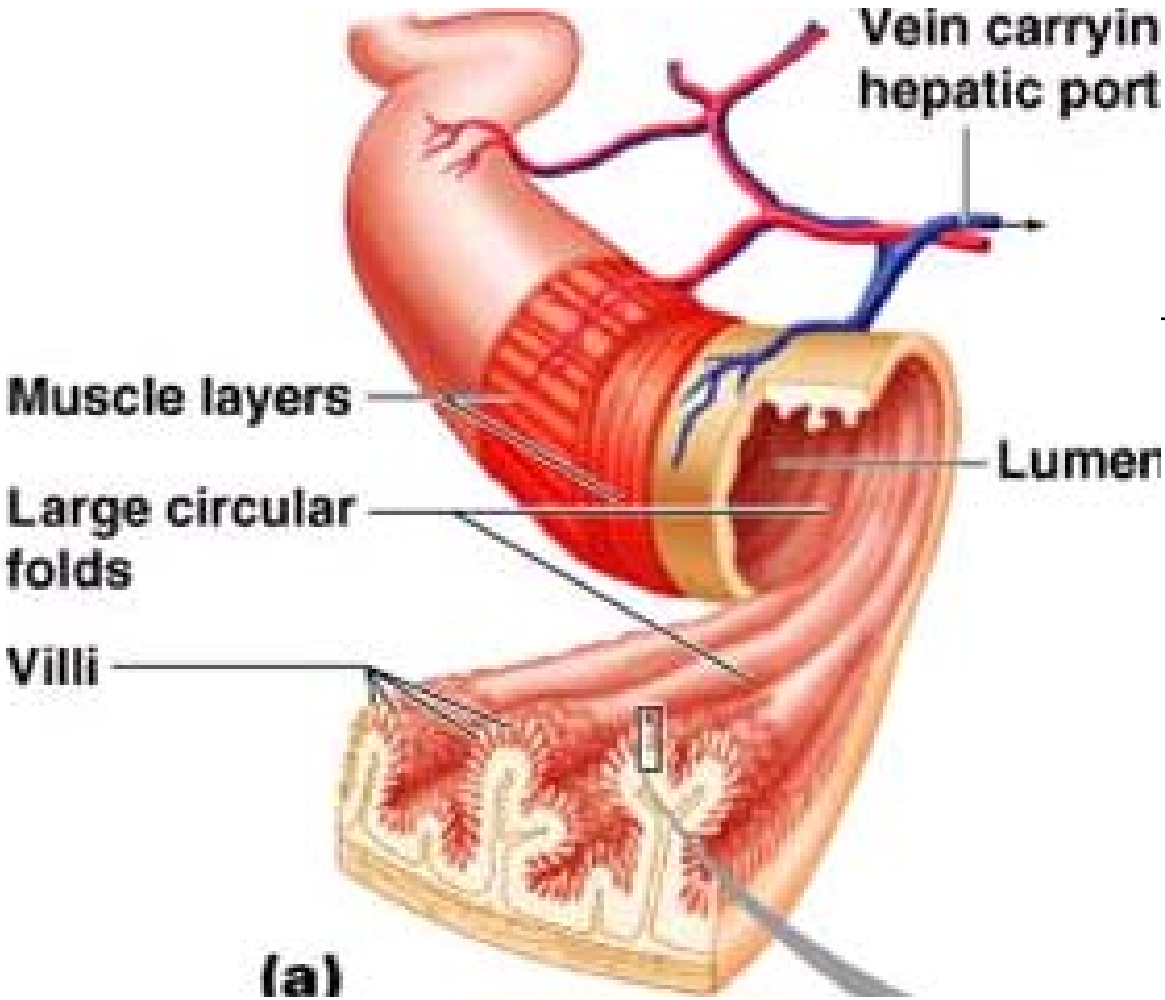
Function:

**digestion*

**absorption*

*secreted certain hormones


Mesentery
Plica
Mucosa
Submucosa
Circular muscle
Longitudinal muscle
Serosa
Submucosal glands
Villi



Plicae circulares :

a fold of mucosa and submucosa in the lumen of digestive tract

Intestinal villi

*small finger- or lea
found only in the s

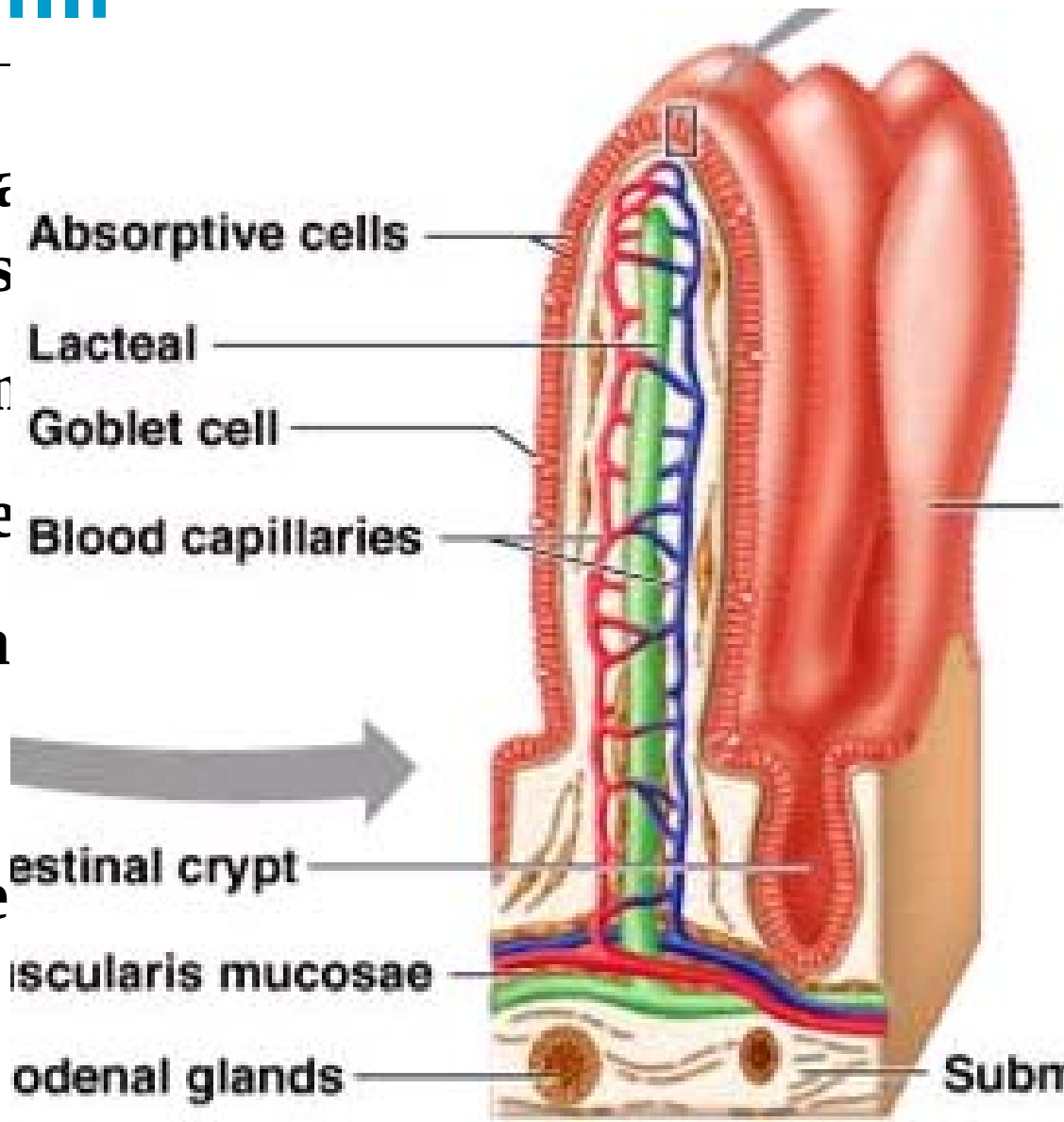
*varying in the forn

*being covered by e

*having a core of la

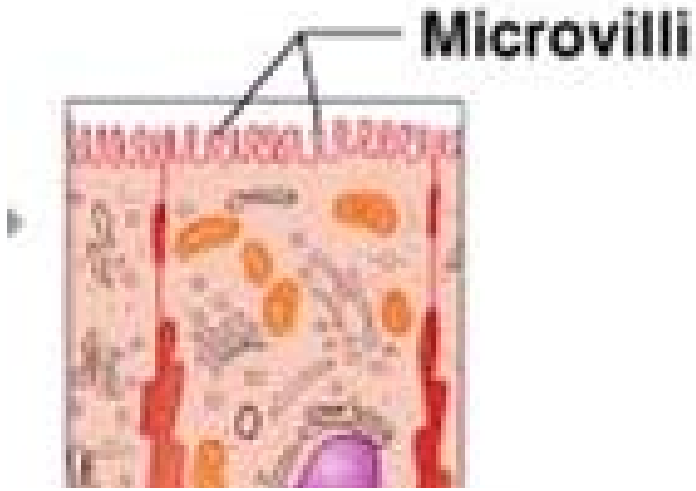
capillary network,

few smooth muscle



microvilli:

the minute projections (1 µm long and about 0.1 µm wide) of cell membranes



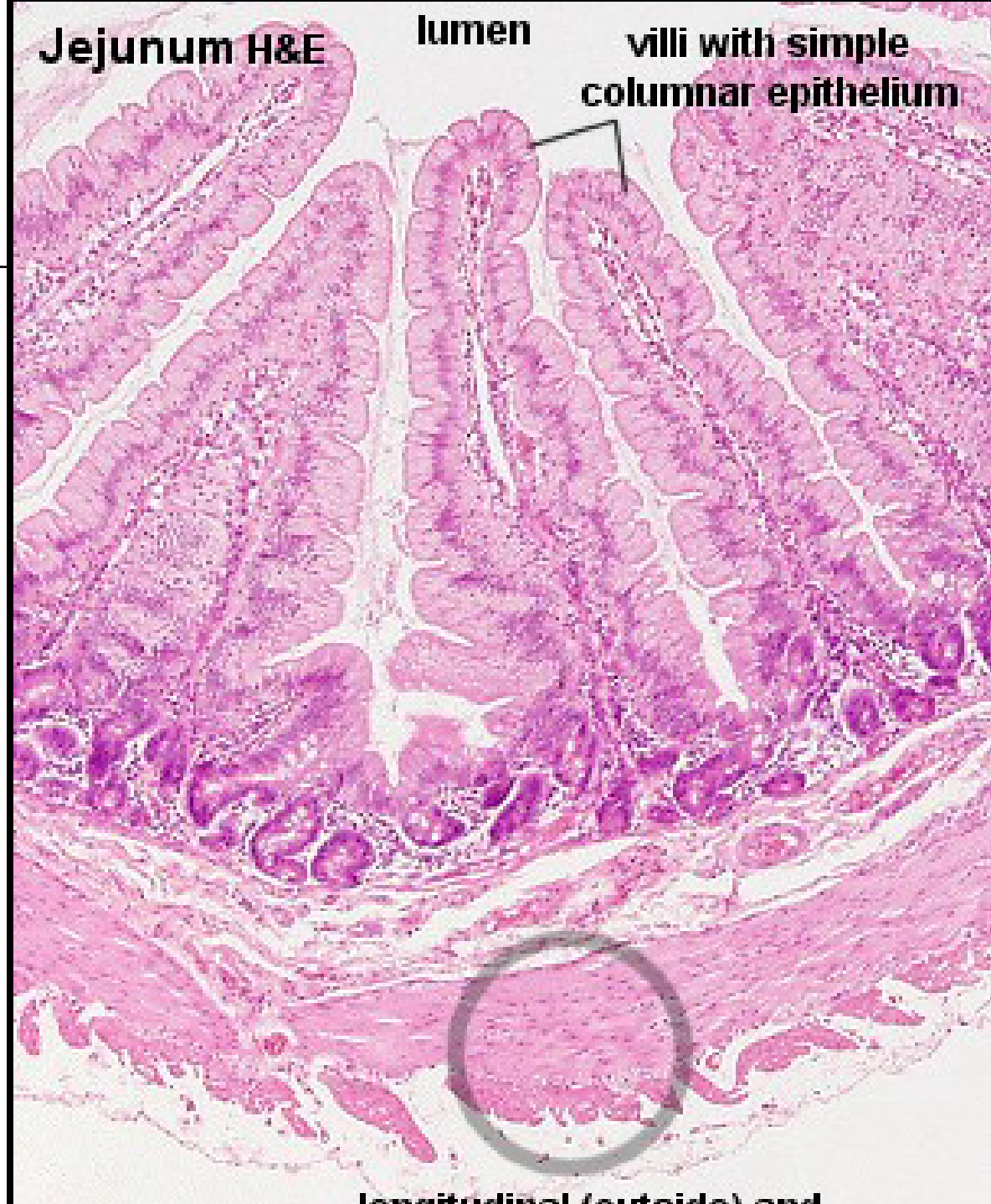
The inner surface of small intestine can be greatly enlarged by:

*** plicae circularesX 3.**

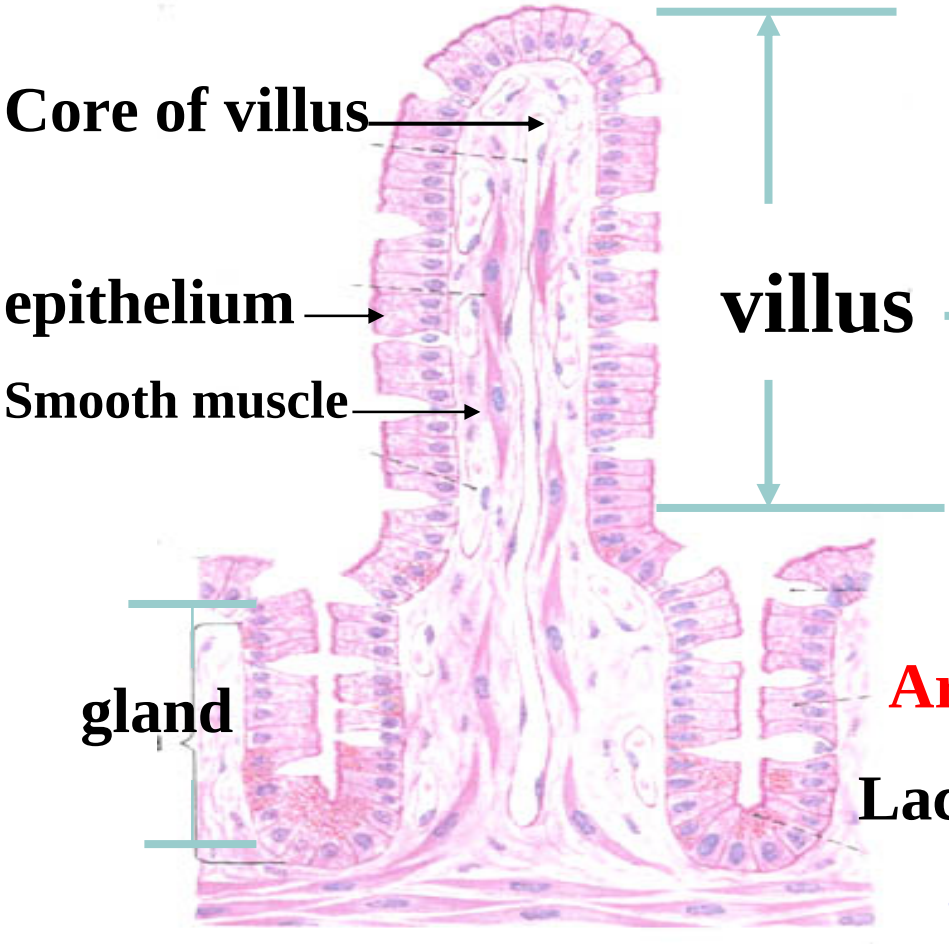
*** villiX 10.**

*** microvilliX 20.**

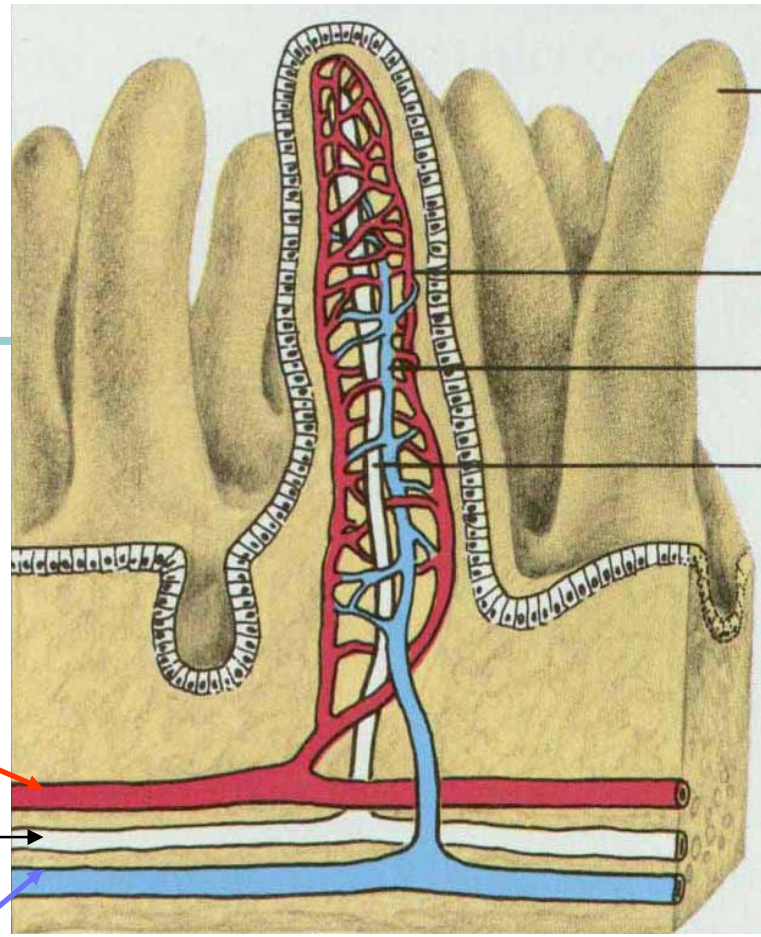
jejunum



H.E. staining



模式图



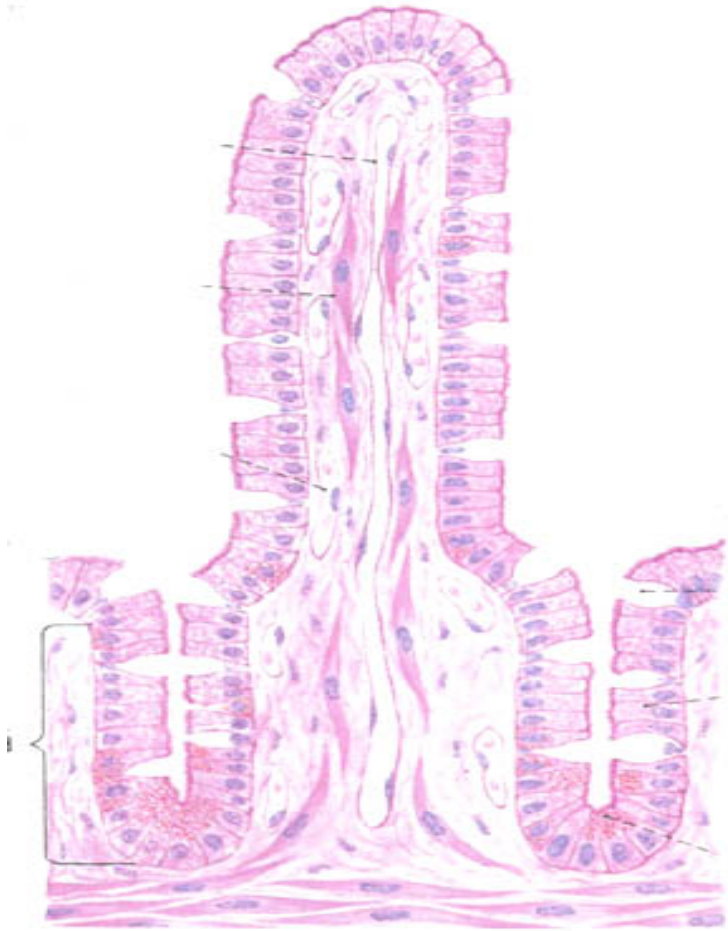
Longitudinal section of small intestine

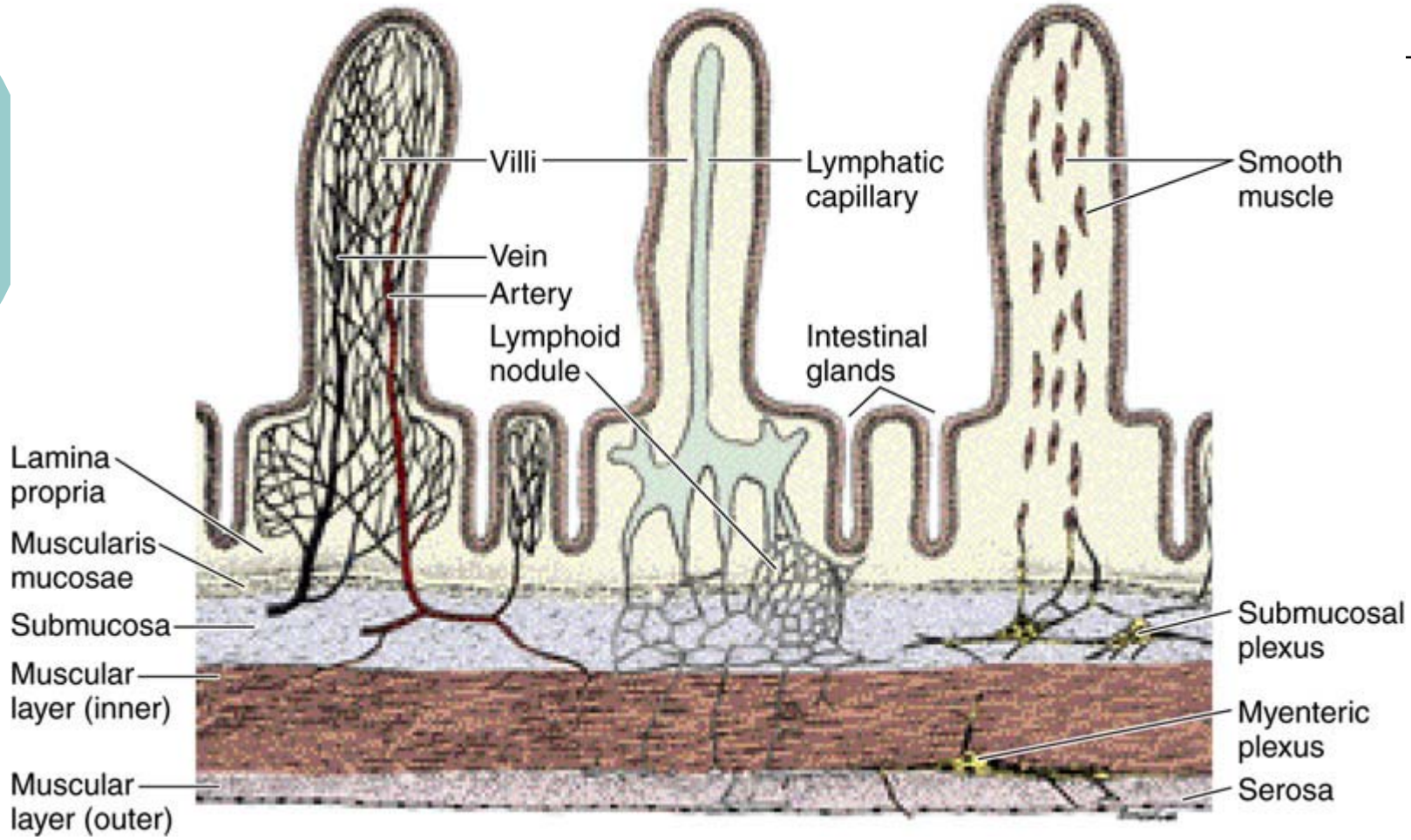
5.1.1 Epithelium

* **Simple columnar epith.**

5.1.2 lamina propria

* **C.T. containing lymphatic tissue, solitary lymphatic nodule, intestinal glands.**
* **protrudes into the lumen together with epithelium to form villi.**




Villi
Lymphatic capillary
Smooth muscle
Vein
Artery
Lymphoid nodule
Intestinal glands
Lamina propria
Muscularis mucosae
Submucosa
Submucosal plexus
Muscular layer (inner)
Myenteric plexus
Muscular layer (outer)
Serosa

Small intestinal gland

*infolding the epithelium to the lamina propria at the base of villus

*types of cells:

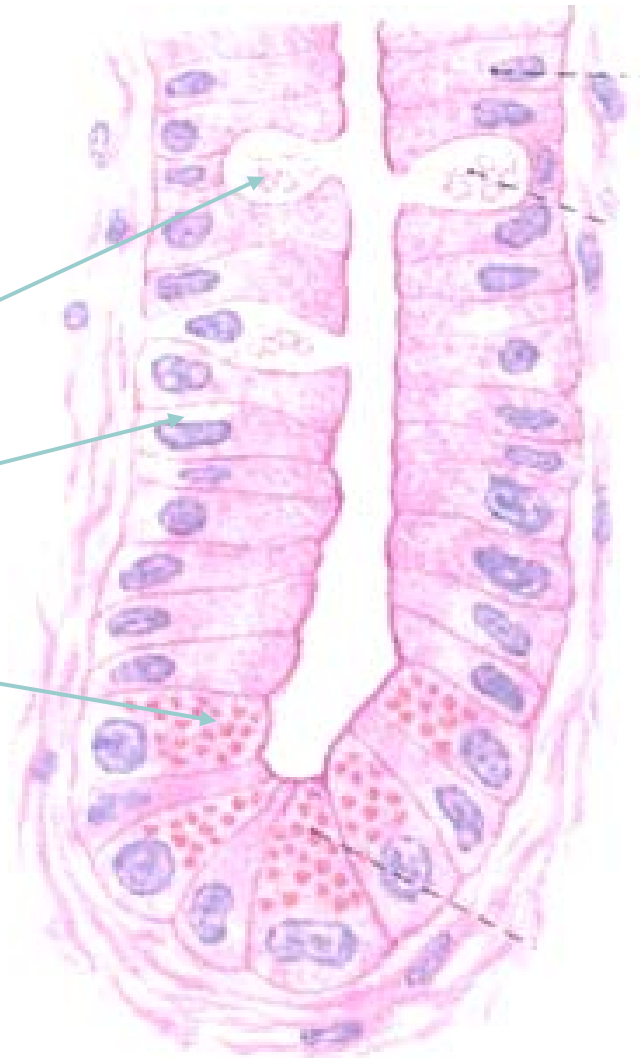
Goblet c.

Absorptive c.

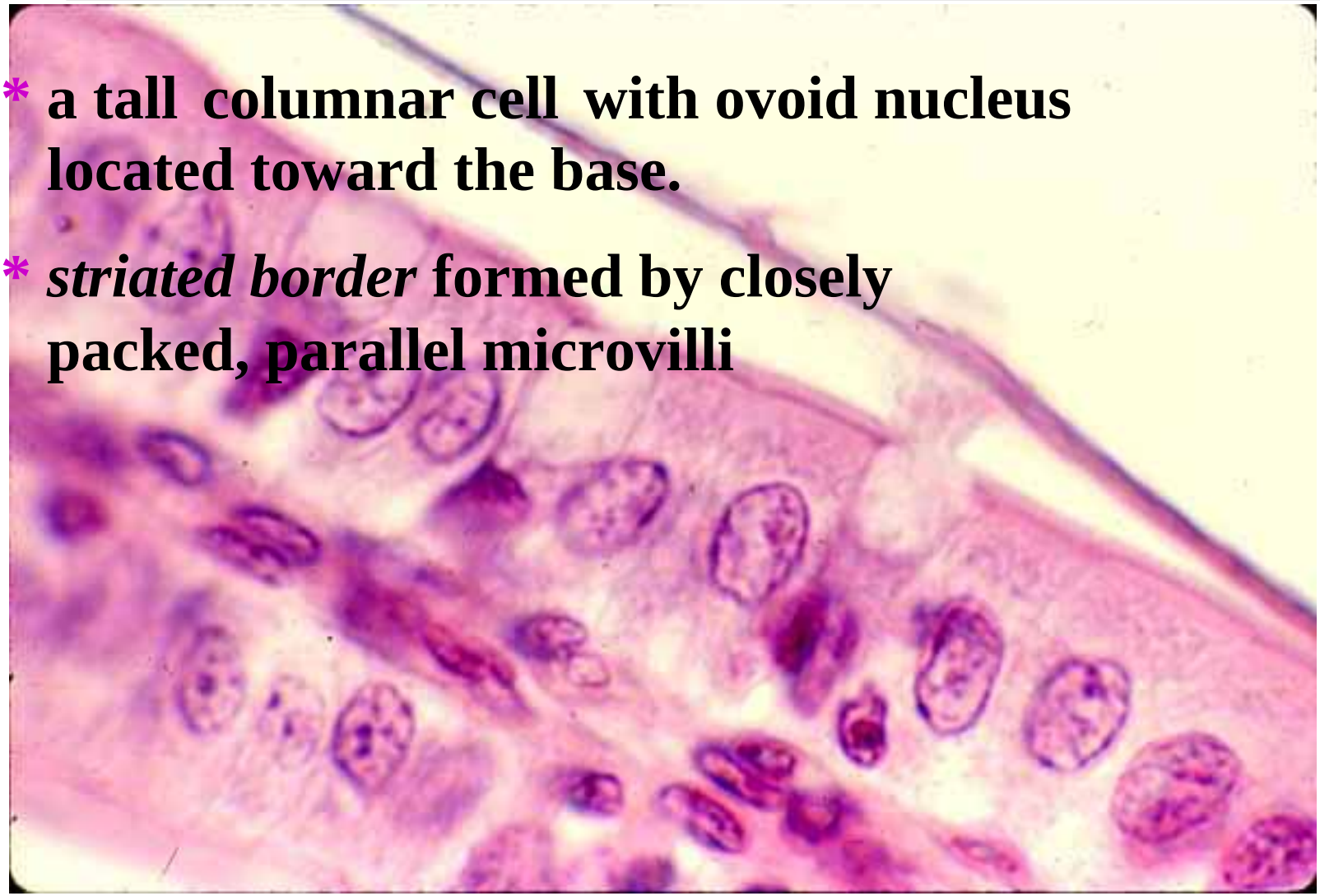
Paneth c

Stem c.

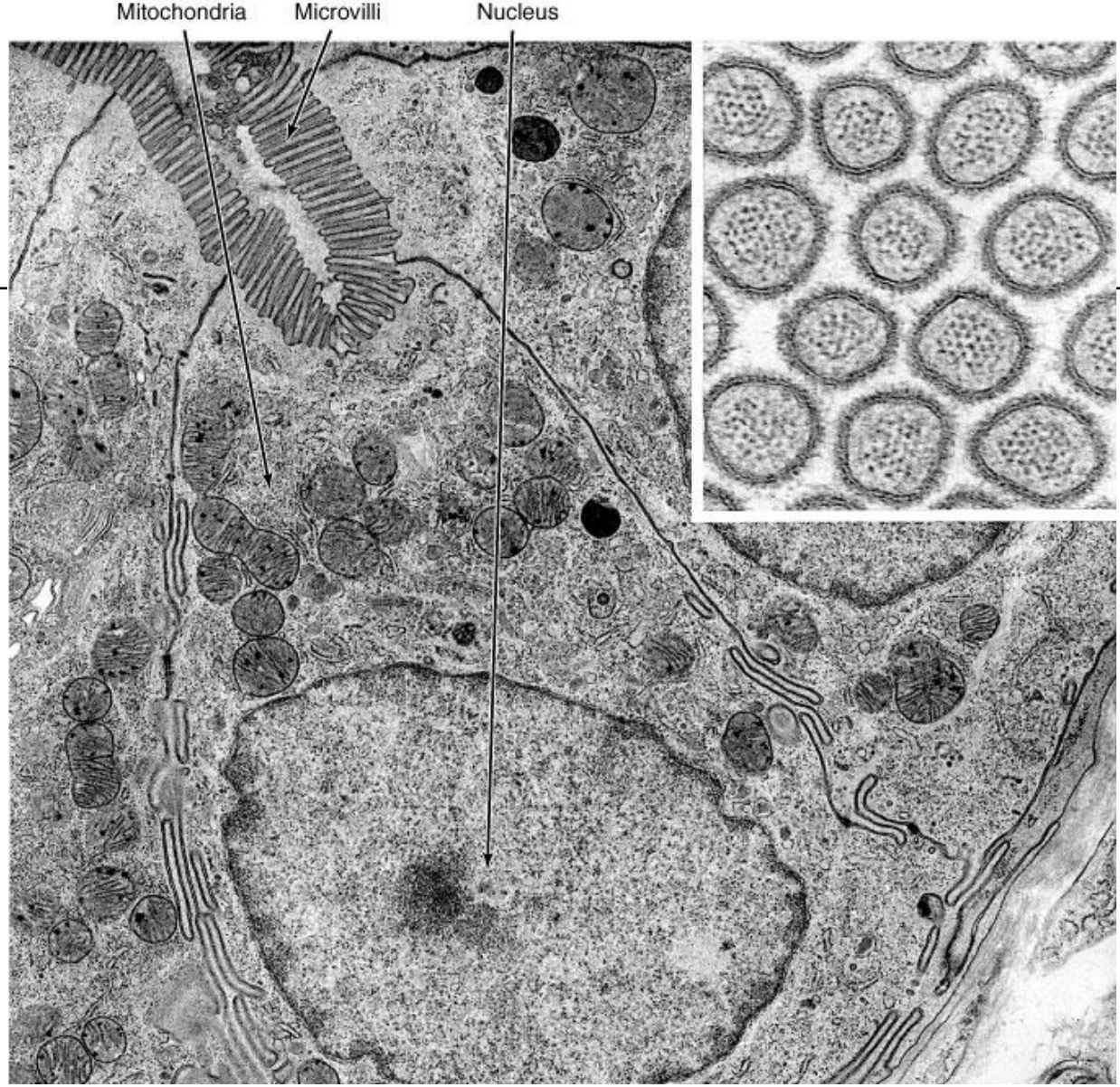
Endocrine c.



absorptive cells

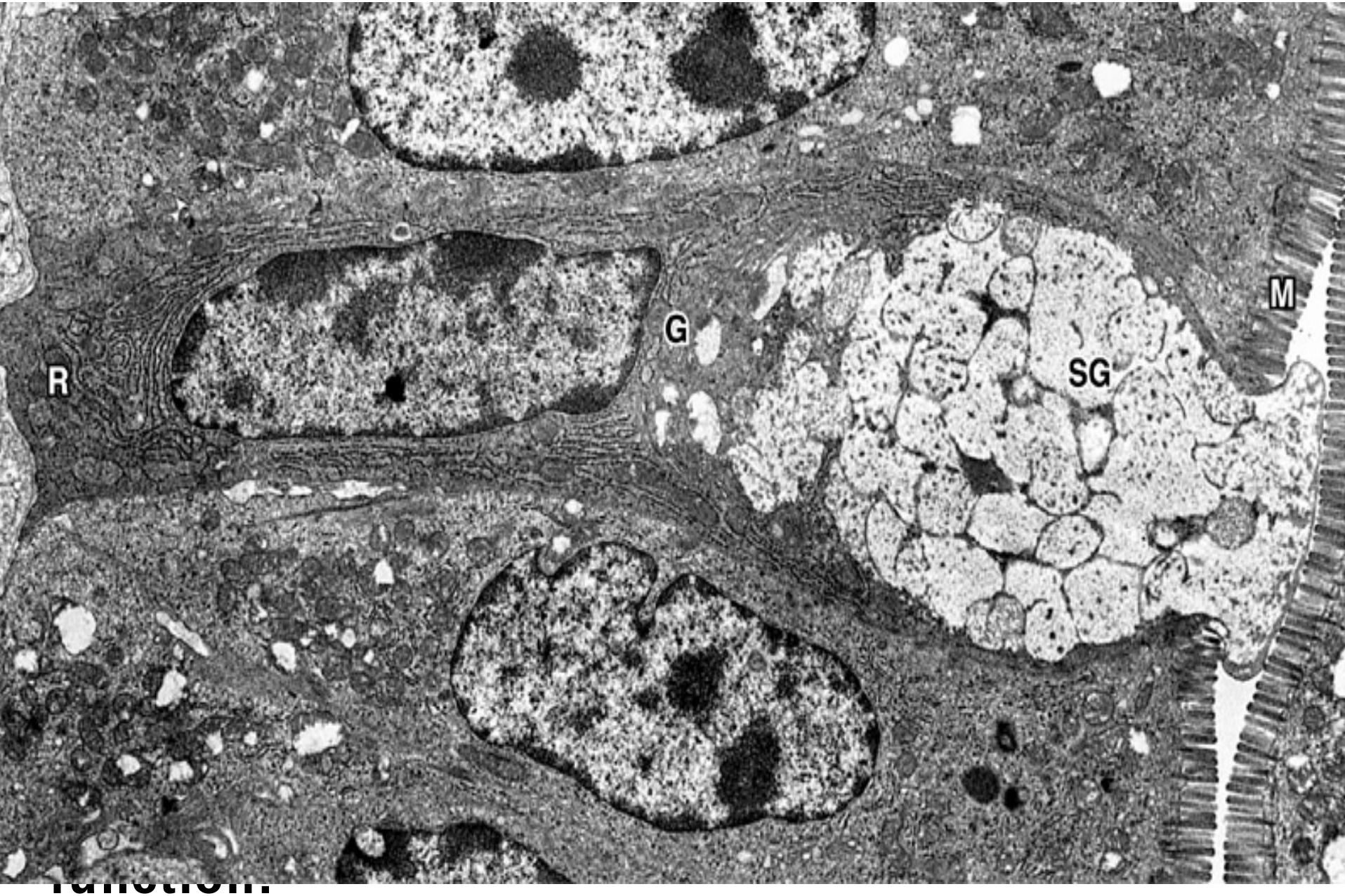


* **a tall columnar cell with ovoid nucleus located toward the base.**
* ***striated border* formed by closely packed, parallel microvilli**

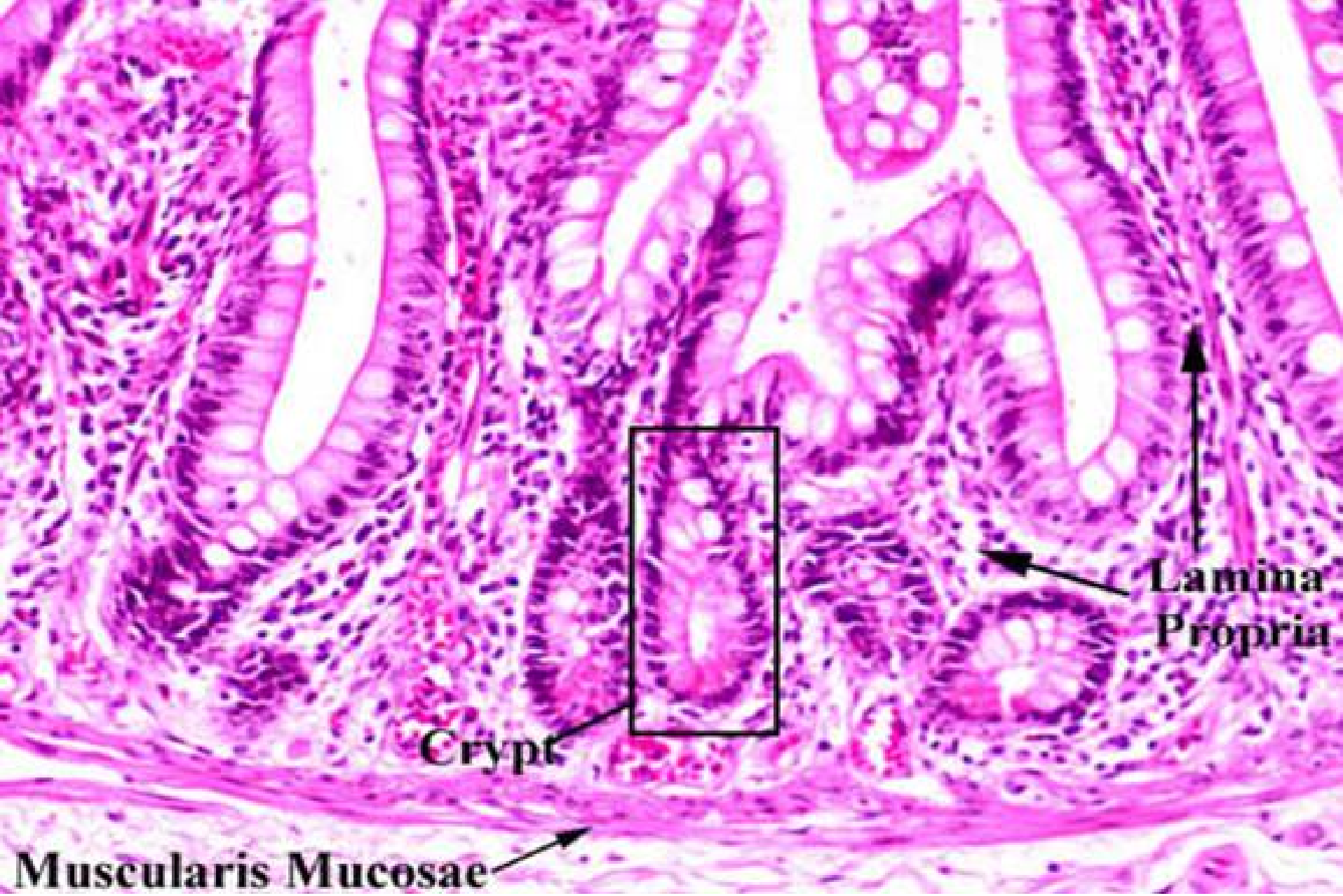


* tight junction complex at the periphery and near the apex
* function as absorption of sugar, amino acid and lipid.
* involving in secretion of IgA and producing enterokinase

goblet cells

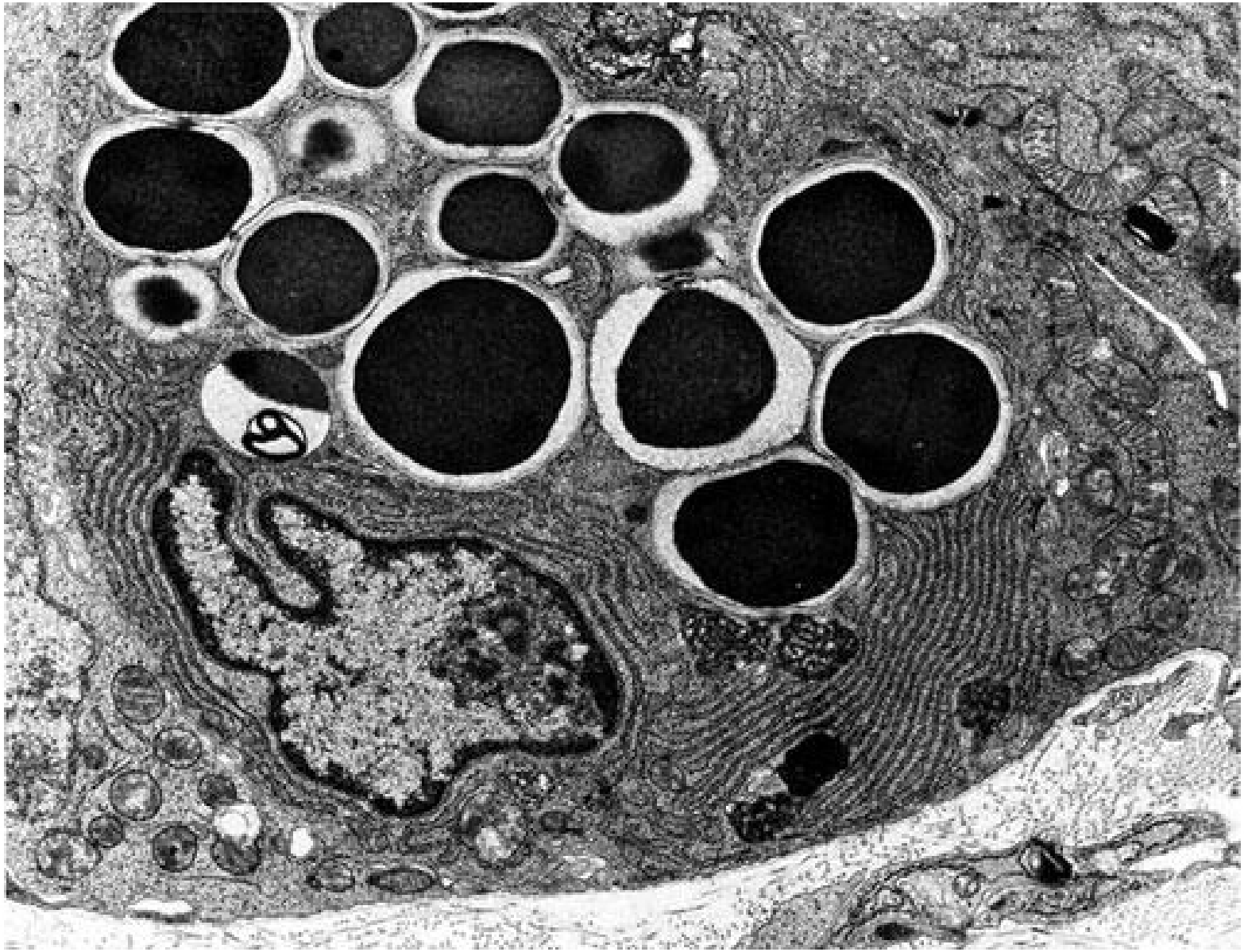


function:
secrete mucus.



Paneth cells


Paneth cells



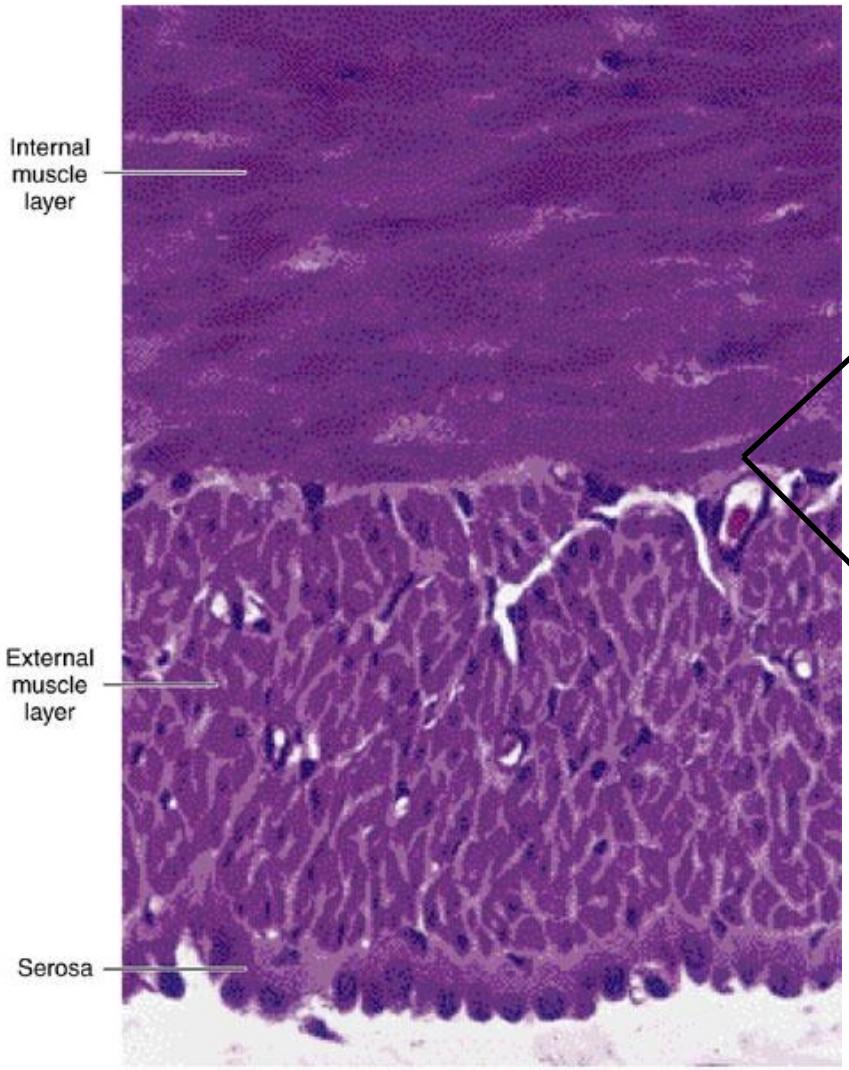
EM of paneth cell

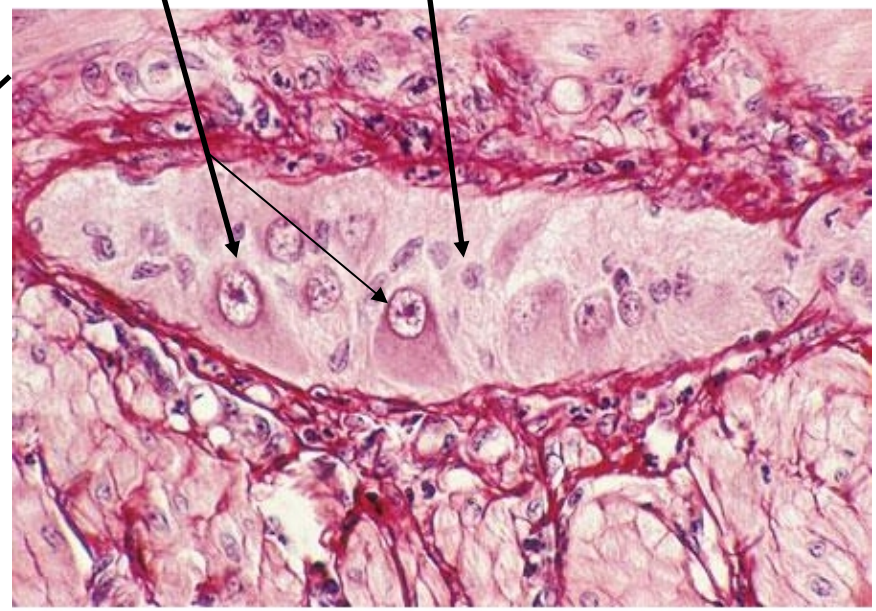
Paneth cell

* found only in the base of the gland
* pyramidal shape with a broad base and a narrow apex
* having all features of protein-secreting cells (RER)
* acidophilic granules in the apical cytoplasm
* secreting defensin

  which involved in the control of infection

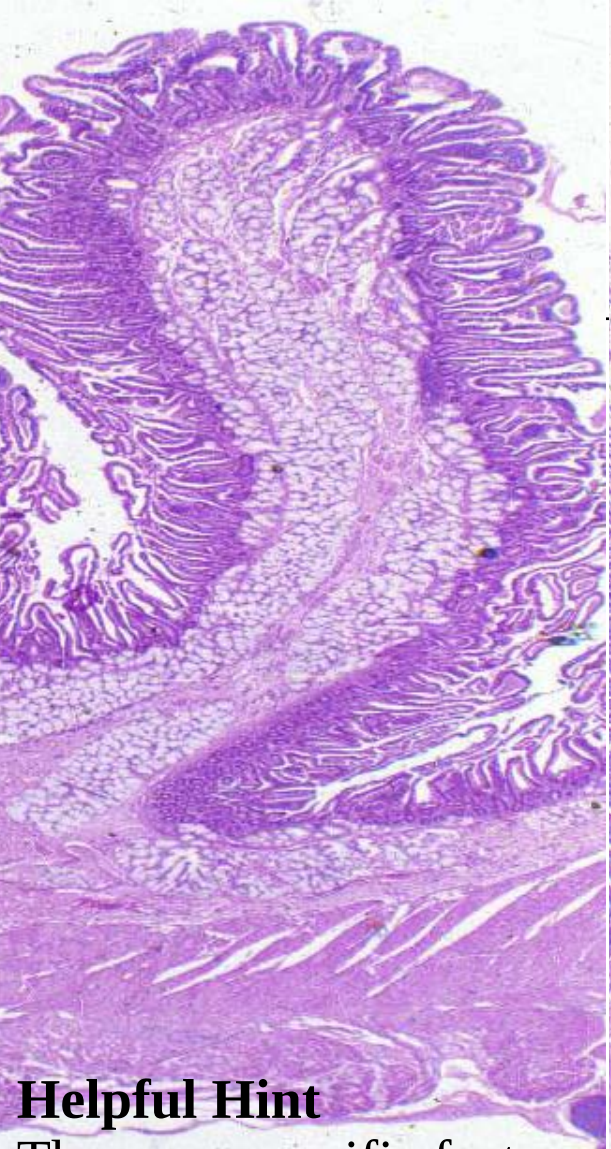
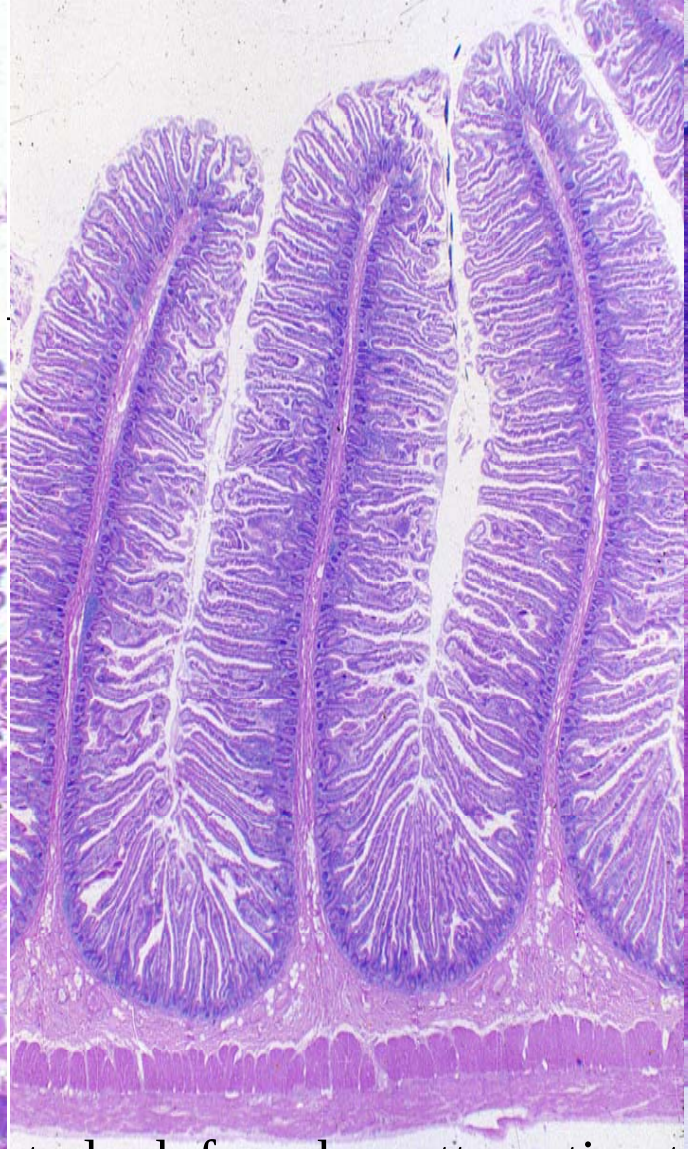
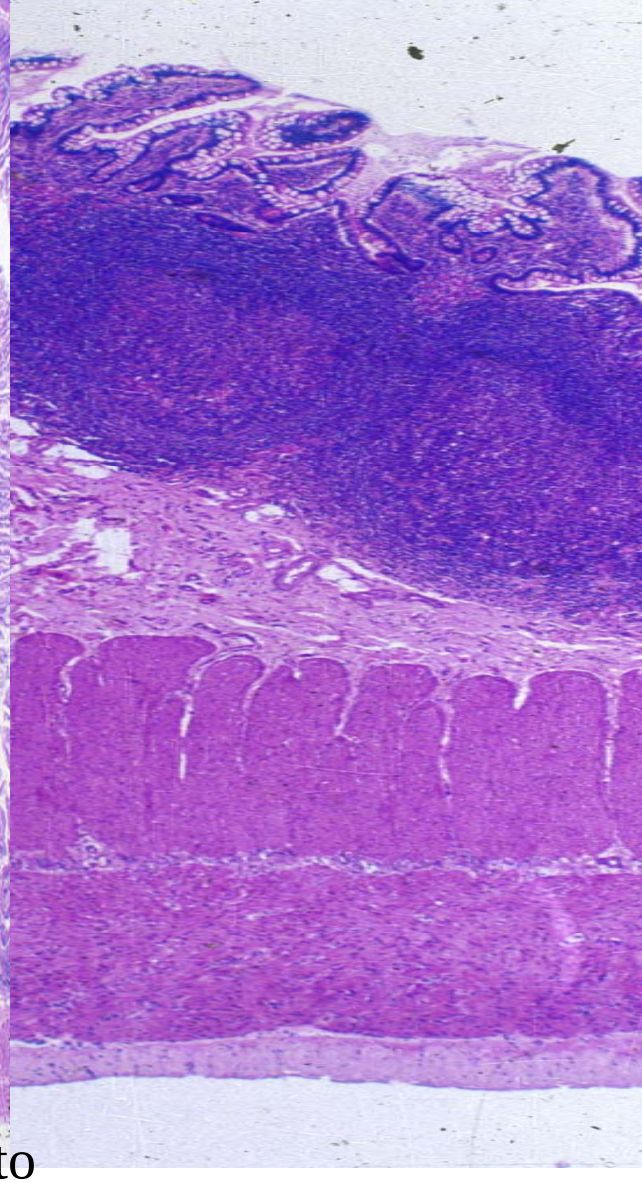
5.3 muscularis
5.4 serosa/adventitia





Regional differences in the small intestine

	duodenum	jejunum	ileum
Villi shape	leaf-like	finger-like	becoming smaller
Goblet C.	+	++	+++
Lymphatic tissue	scattered lymphacytes, solitary lymphatic nodule	Same as in duodenum	aggregated lymphatic nodule
Glands in submucosa	Present	none	none

Helpful Hint

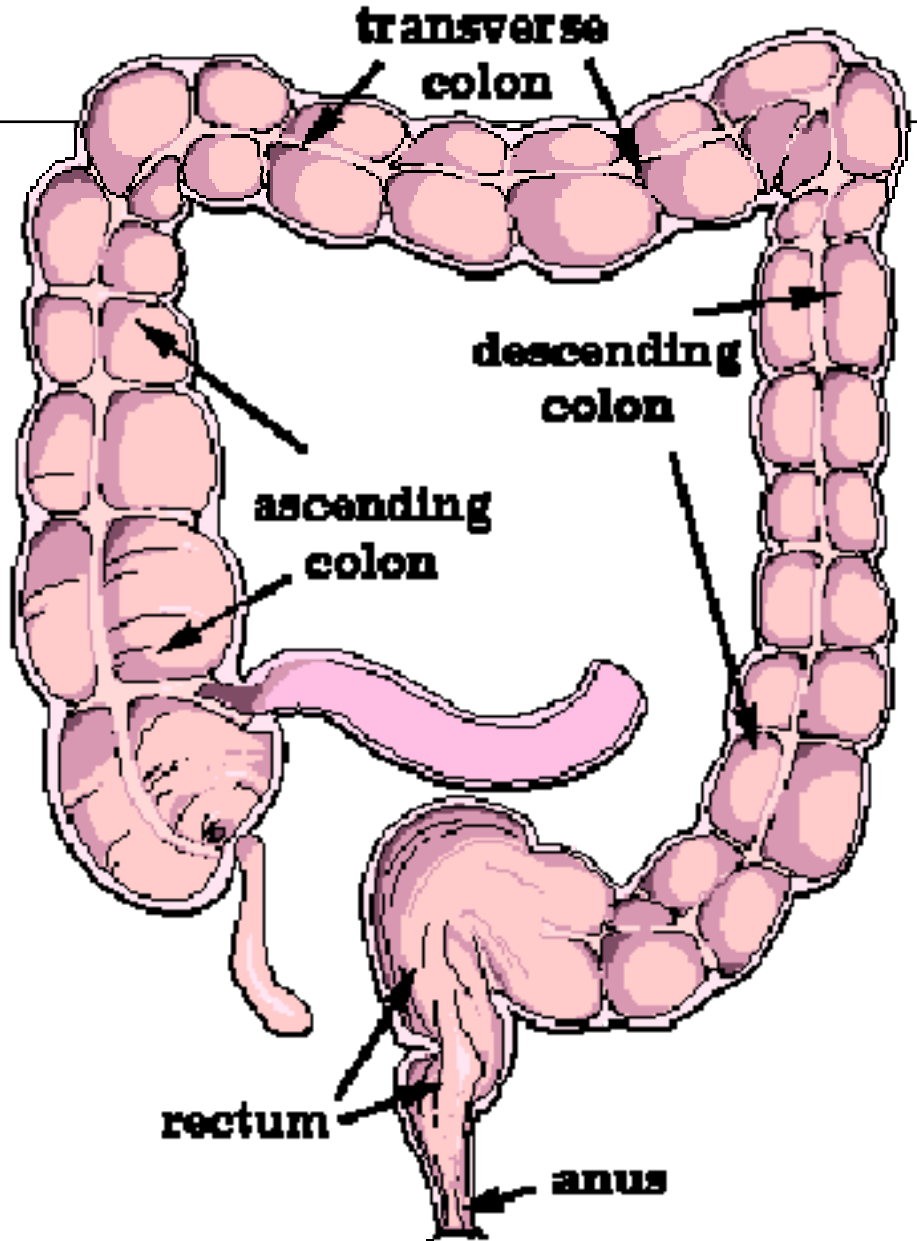
There are specific features to look for when attempting to identify a particular portion of the small intestine:

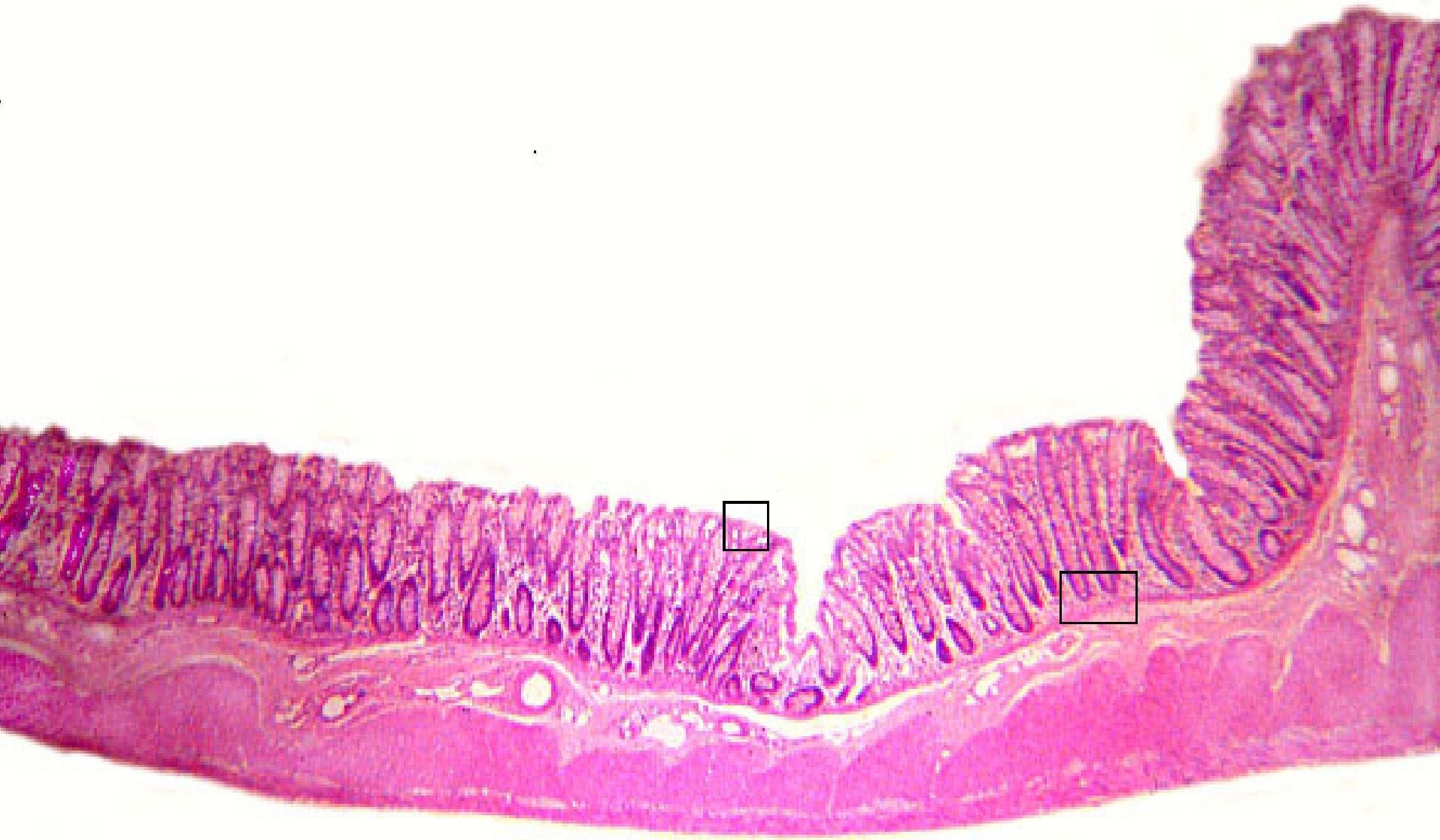
Duodenum - Brunner's glands in submucosa, some Goblet Cells

Jejunum - large plicae with many villi, more Goblet Cells

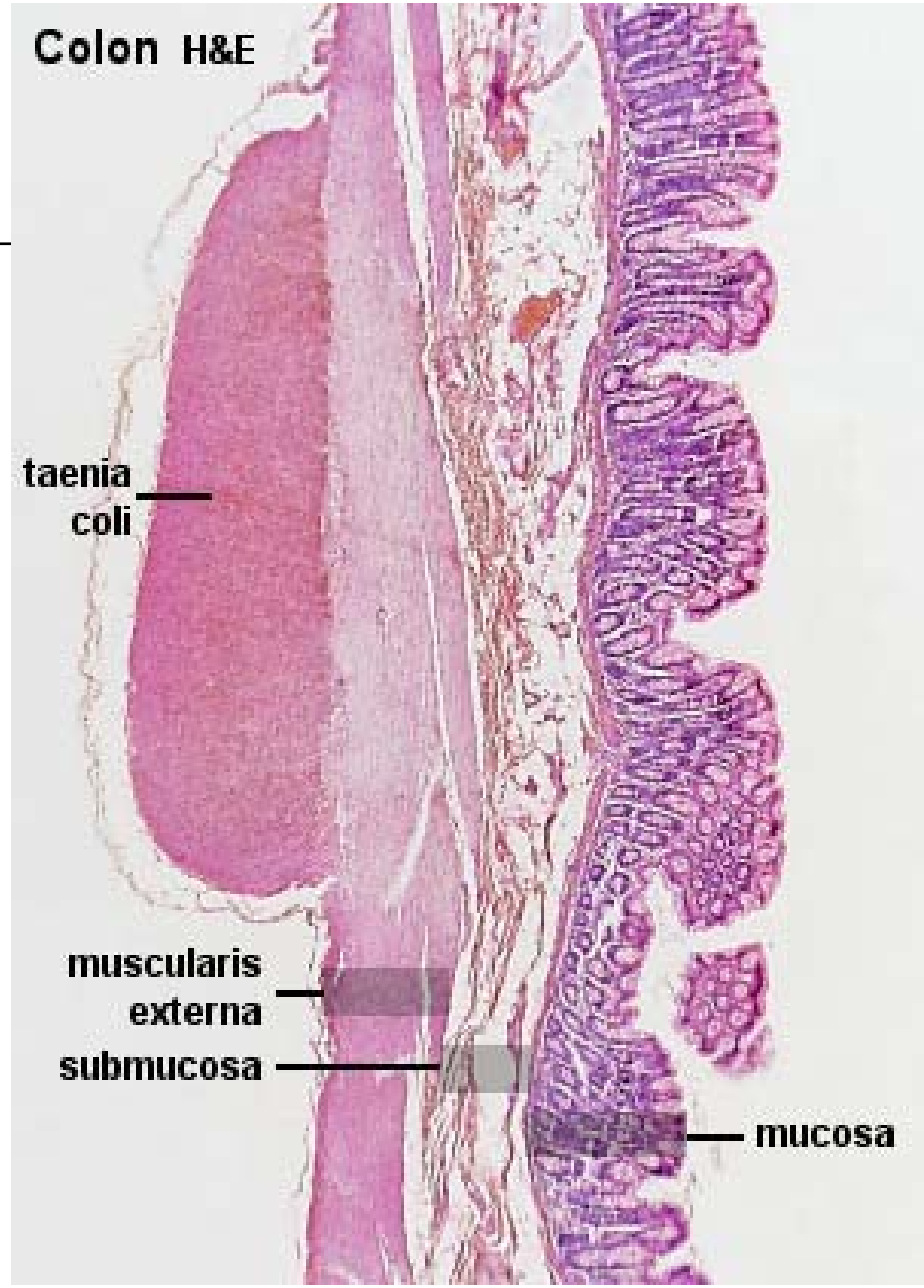
Ileum - aggregates of Peyer's patches, even more Goblet Cells

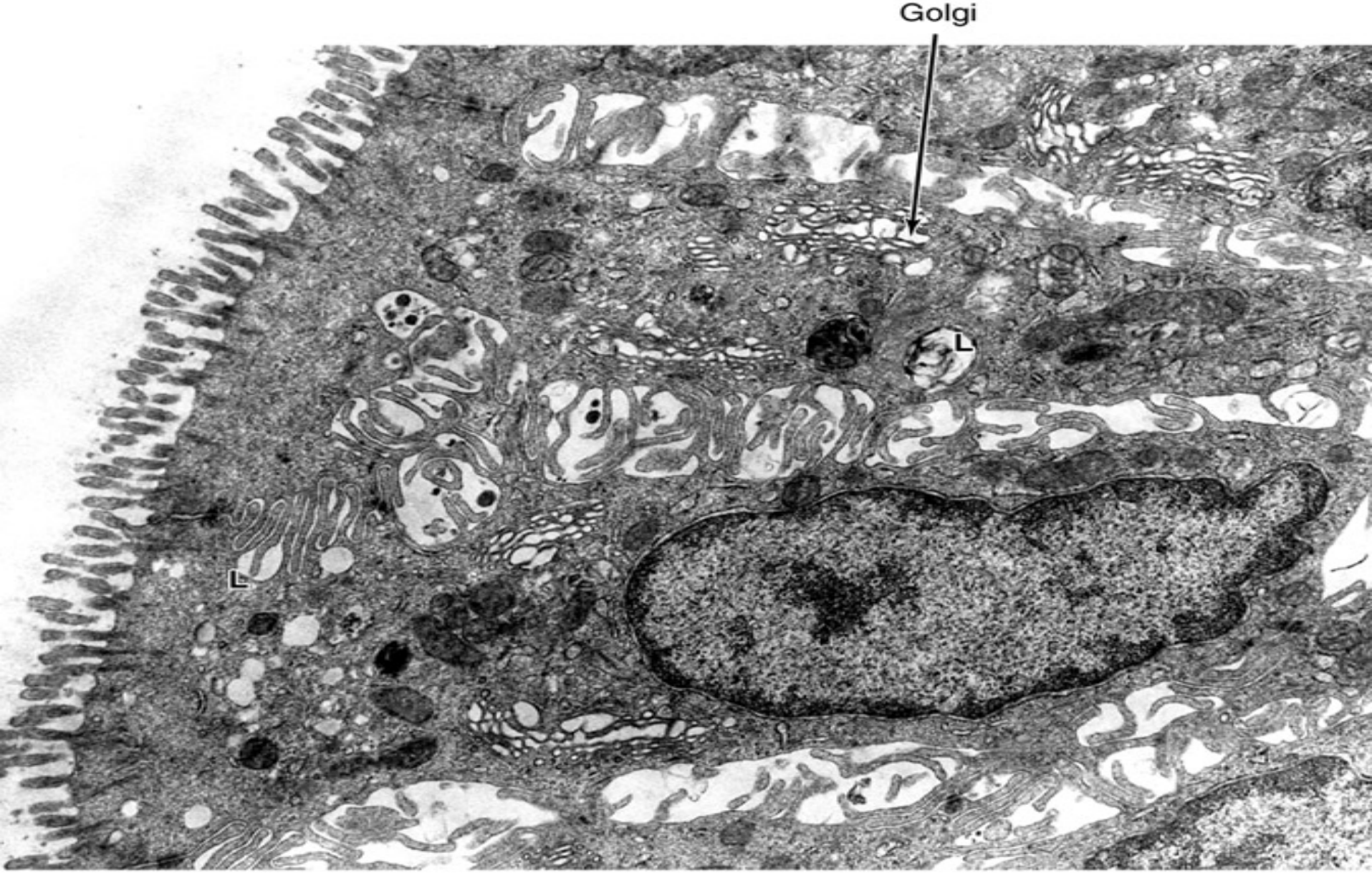
Large intestine






Colon H&E
lamina propria
crypt of
Lieberkühn
muscularis mucosae
vein
submucosa

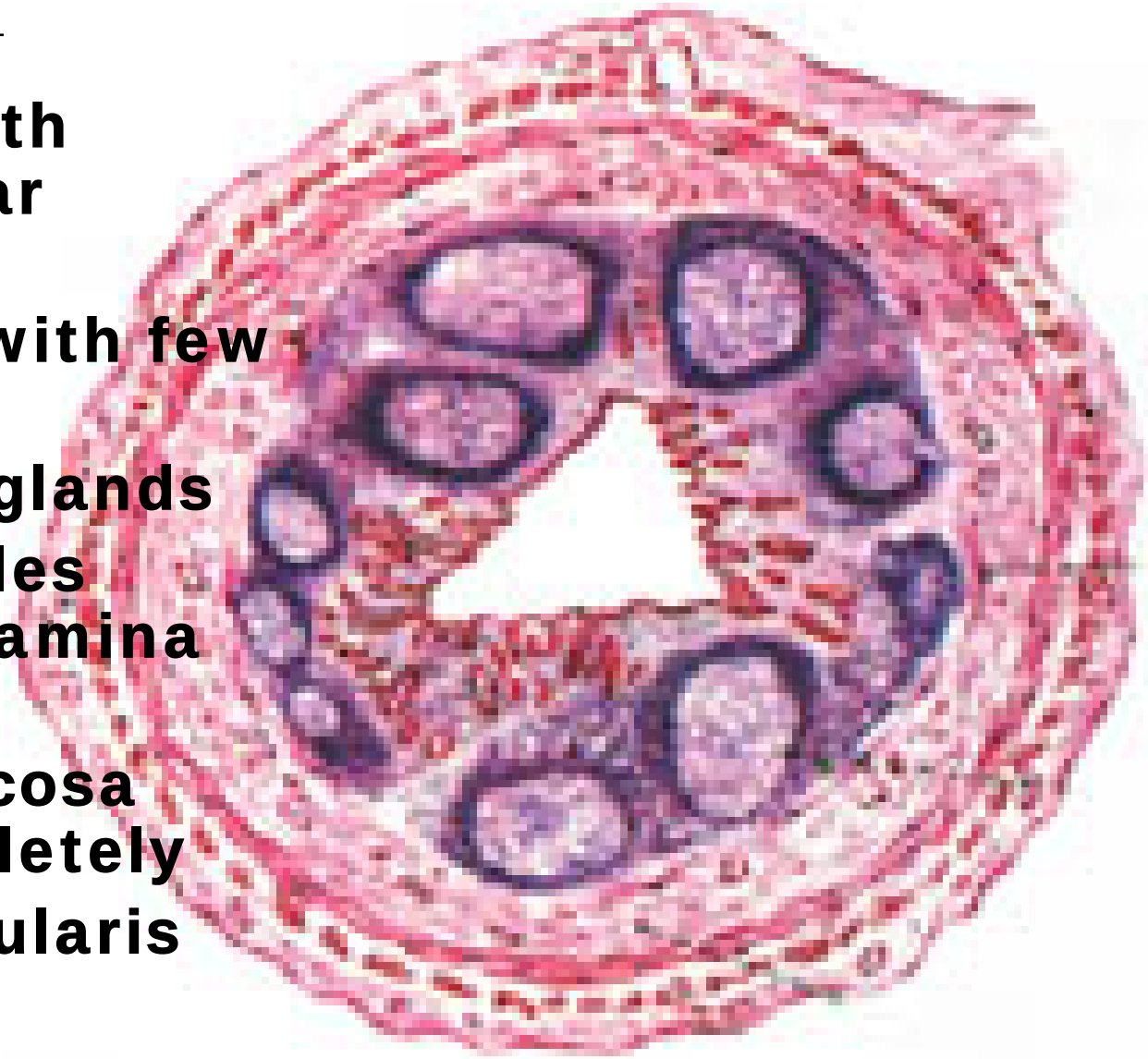

Colon H&E
taenia
coli
muscularis
externa
submucosa
mucosa

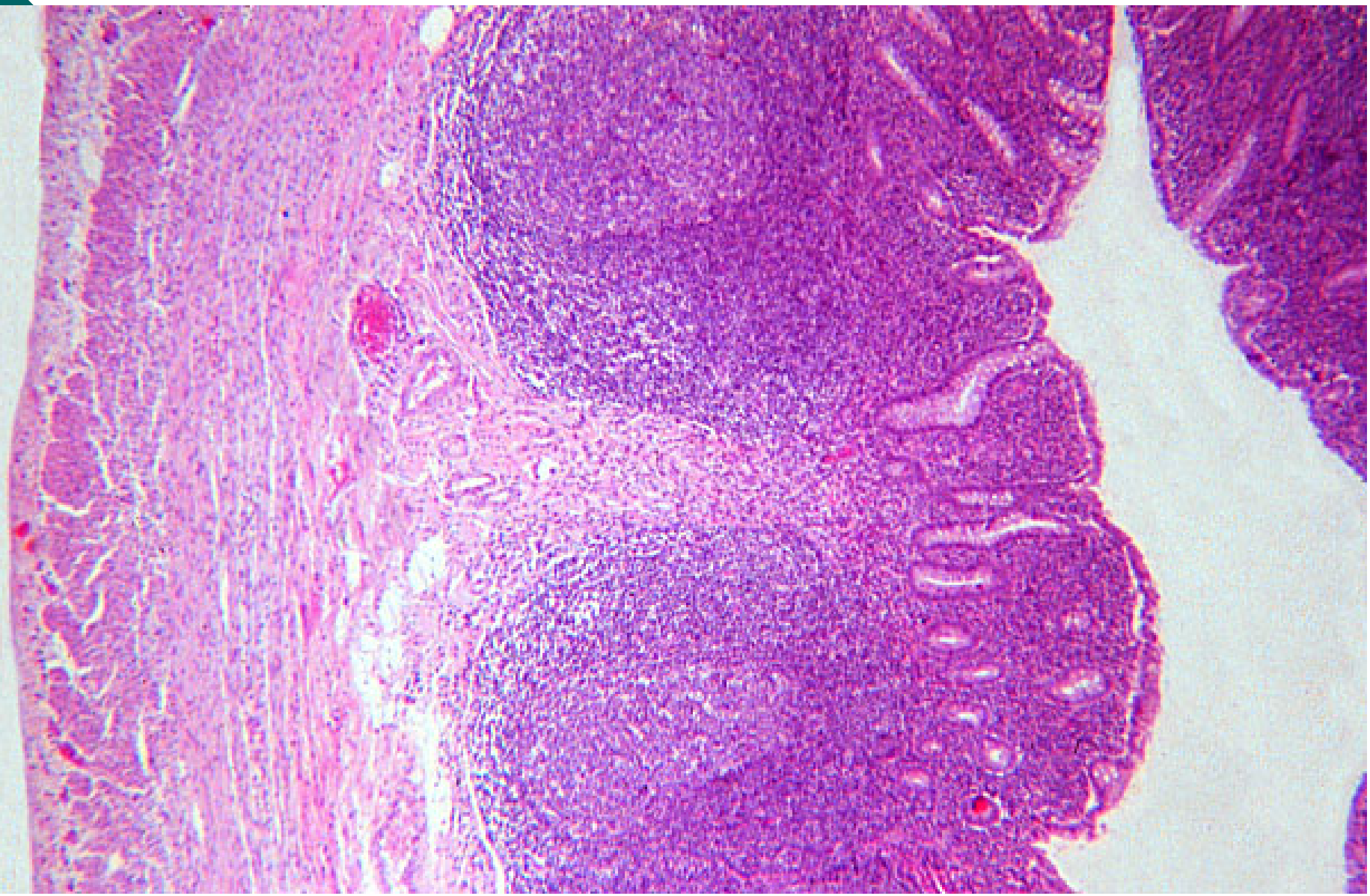


EM of epithelial cells of the large intestine. Note the microvilli at the luminal surface, the well-developed Golgi complex, and dilated intercellular spaces filled by interdigitating membrane leaflets, a sign of active water transport. x3900

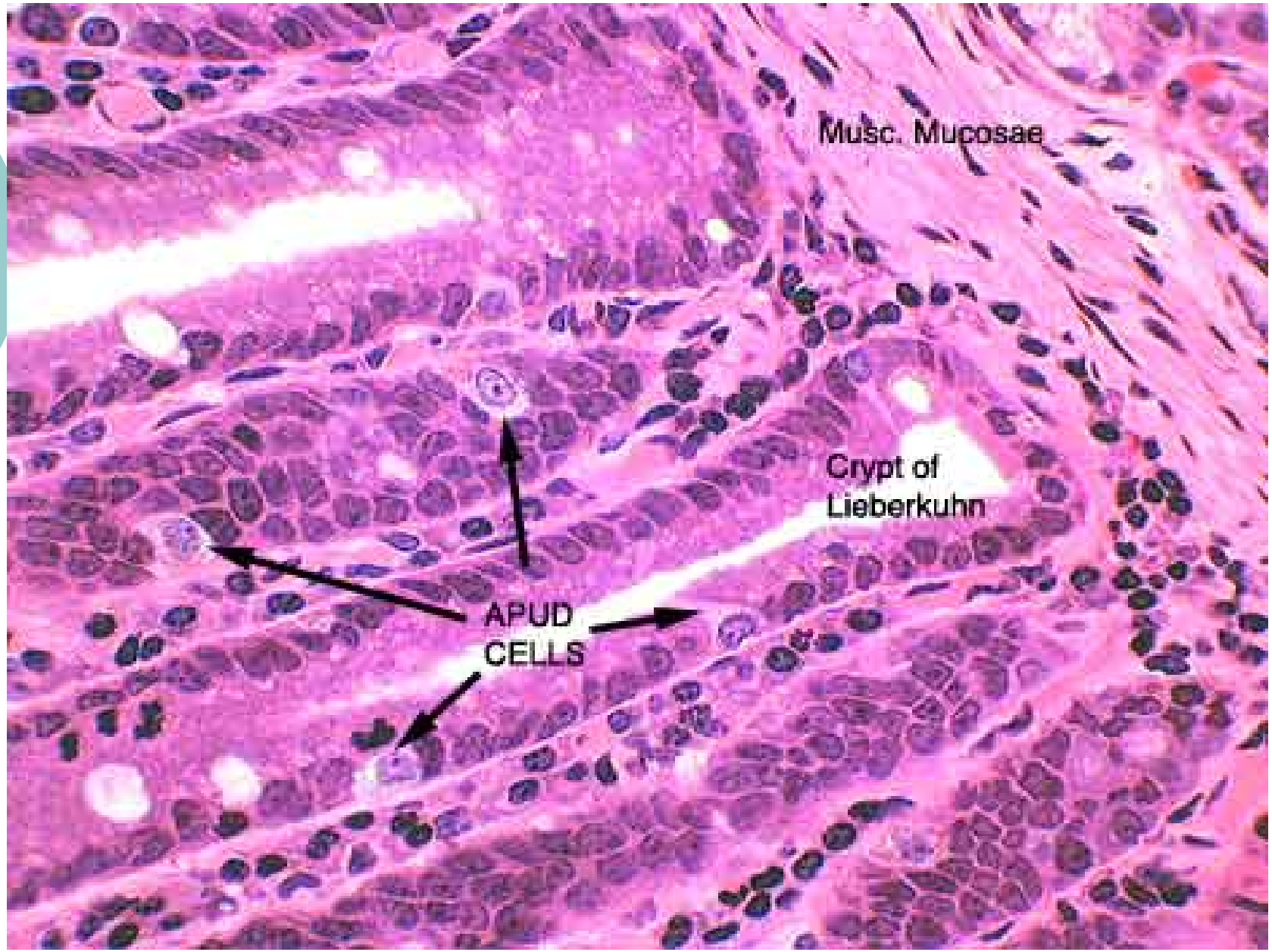
Appendix

- **small lumen with usually irregular outline**
- **surface epith. with few goblet cells.**
- **rare intestinal glands**
- **lymphoid nodules located in the lamina propria**
- **muscularis mucosa usually incompletely**
- **very thin muscularis**
- **serosa**





7.Enteroendocrine cells



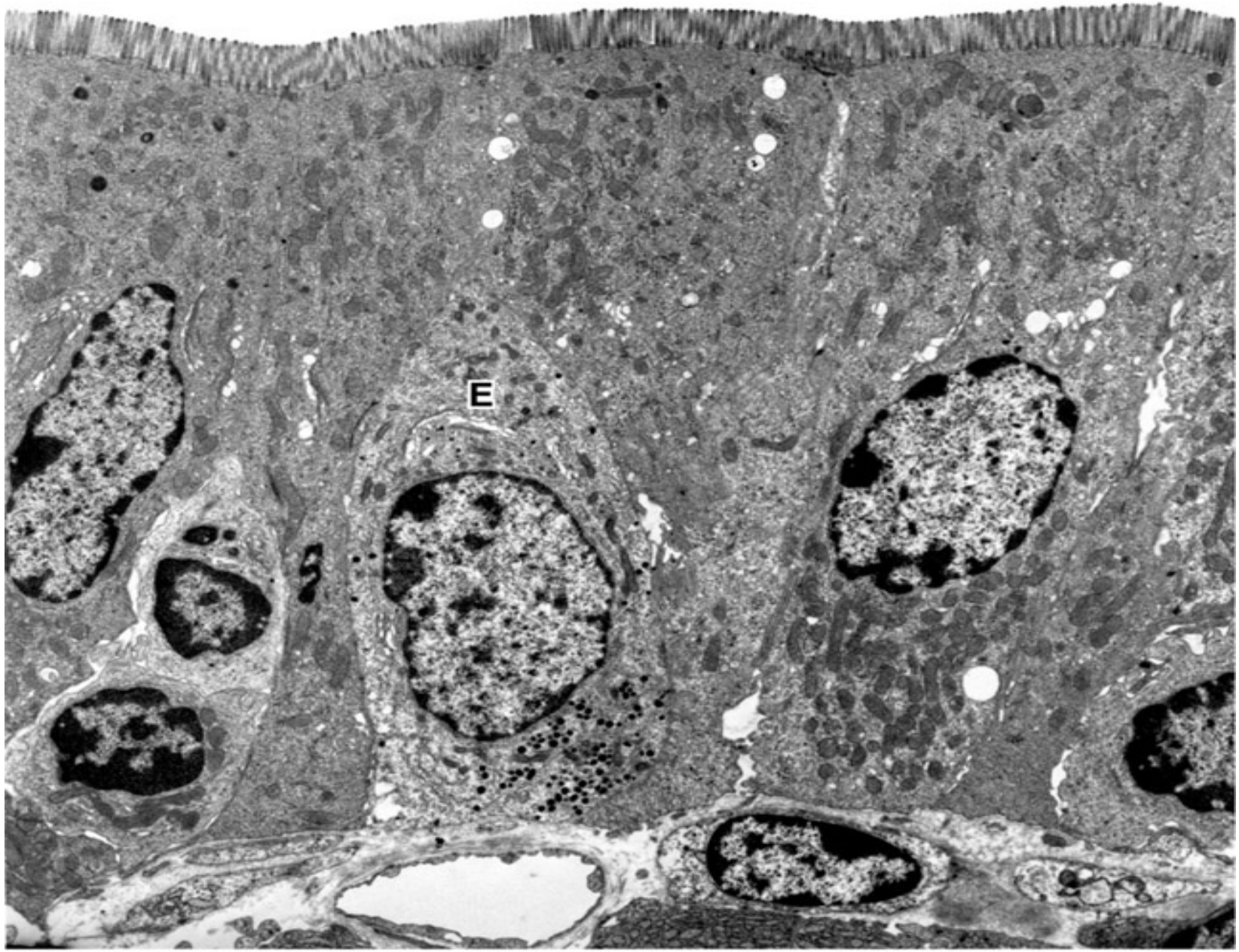
7.Enteroendocrine cells

- **The endocrine cells belong to the APUD (amine precursor uptake and decarboxylation) system and form part of the diffuse neuroendocrine system.**
- **The endocrine cells contain basal secretory granules and can be divided into 2 types:**

*** open type: cells are adjacent to the lumen of the glands.**

*** close type: cells are separated with the lumen of the glands.**

close type

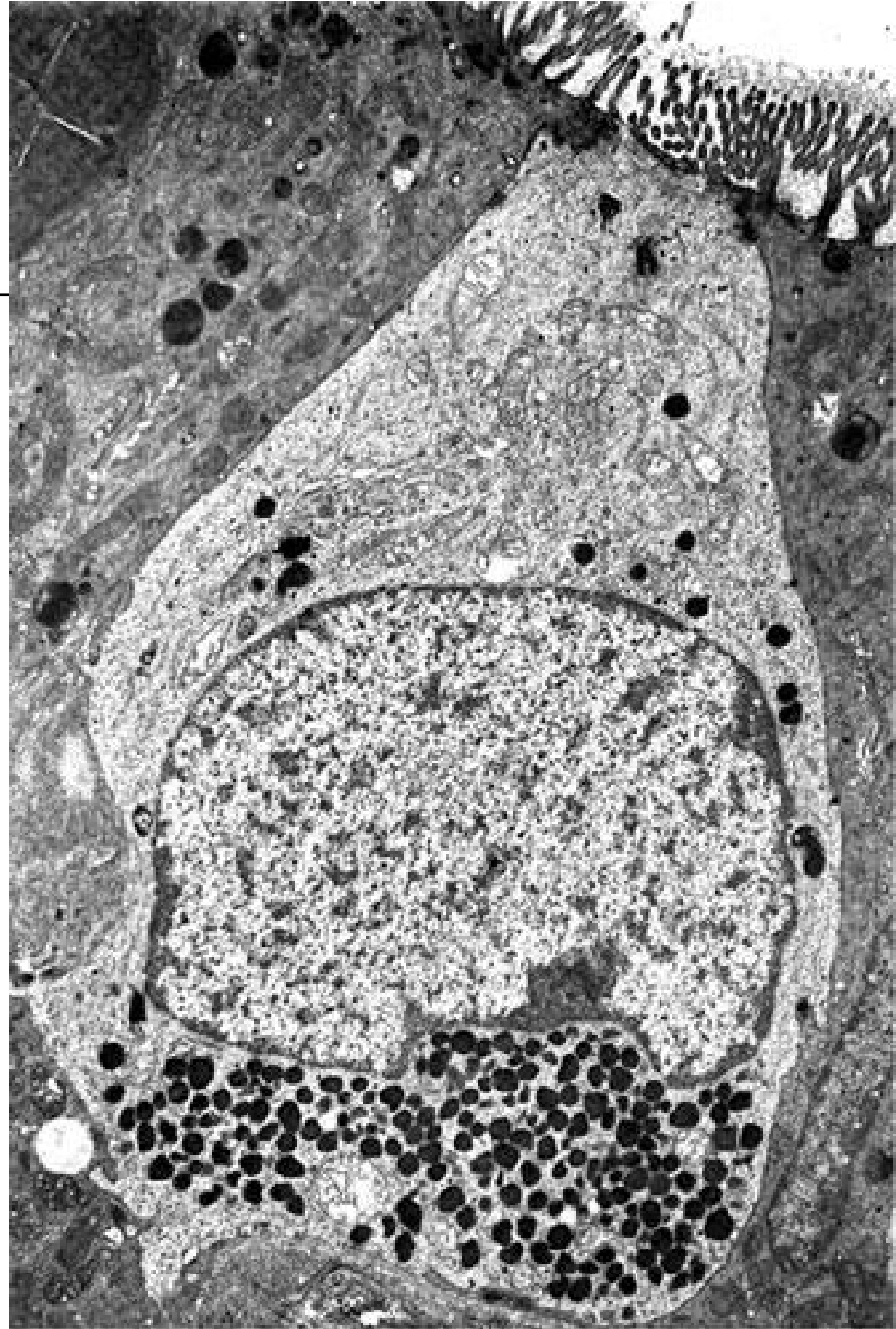


Basal granules in endocrine cells

U1 Electron micrograph of epithelium of the small intestine. Abundant microvilli at the cell apex can be seen. At the left are 2 lymphocytes migrating in the epithelium.
User, 2007-5-14

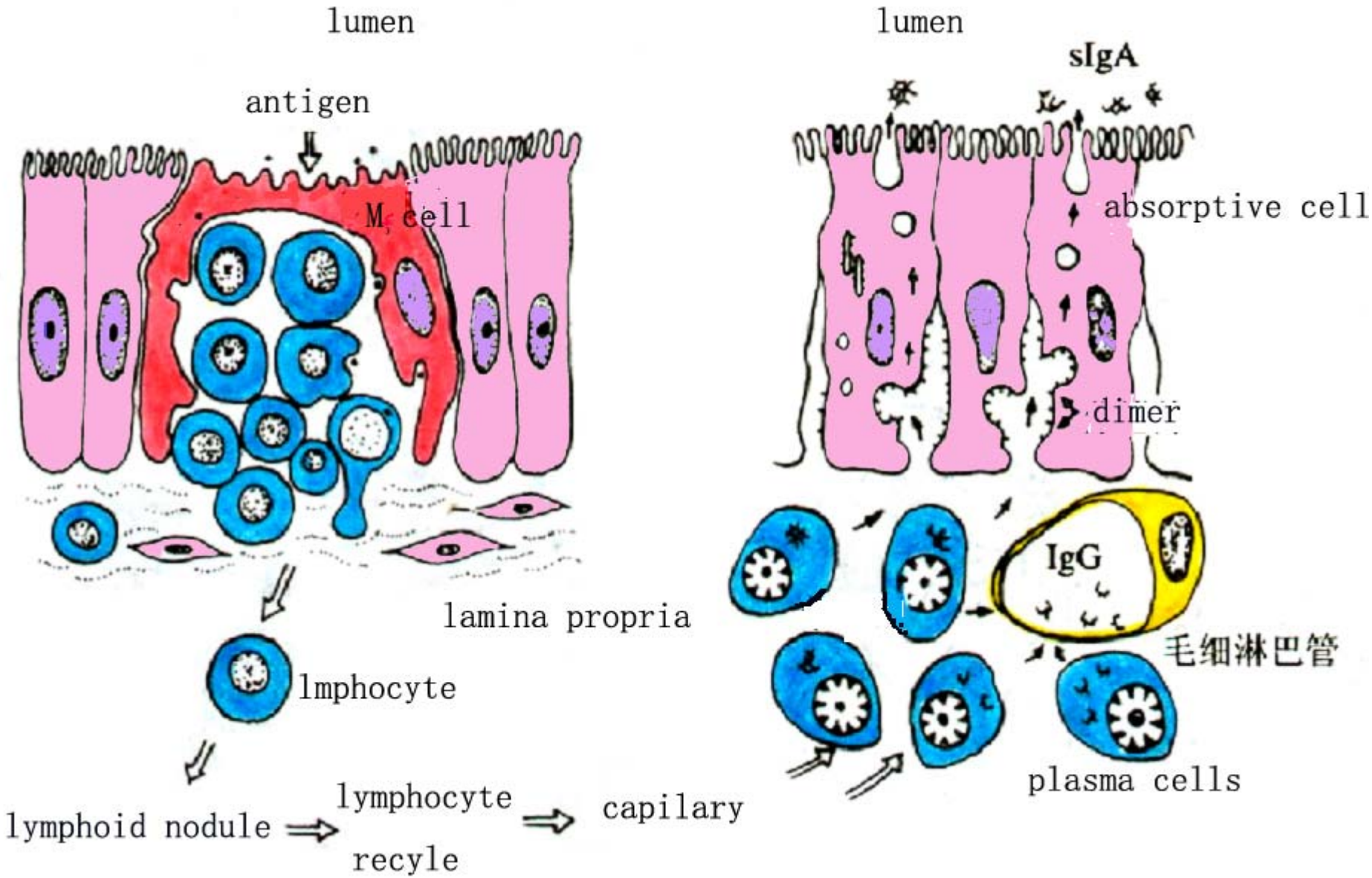
open type

- Numerous granules of variable size accumulate
- The granules have an affinity for silver and chromium salts



8.Immunological properties of digestive tract

- Aggregated lymphatic nodules
- M cells
- lymphocytes
- Plasma cells


lumen
antigen
M cell
lamina propria
lmphocyte
lymphoid nodule
lymphocyte
recyle
capilary
lumen
sIgA
absorptive cell
dimer
IgG
毛细淋巴管
plasma cells

Microfold (M) cells

- are specialized epithelial cells overlying the lymphoid follicles
- These cells are characterized by the presence of numerous basal membrane invaginations that form pits containing many lymphocytes and macrophages.
- **Function: endocytose antigens and transport them to the underlying macrophages and lymphoid cells**

Summary

- **Master the structure of small and large intestine, especially the structure and functions of absorptive cell, small intestinal gland and large intestinal gland.**
- **Know the composition and functions of lymphatic tissue of digestive tract.**
- **Know gastrointestinal five kinds of endocrine cells (EC cells, ECL cells, G cells, I cells and S cells).**