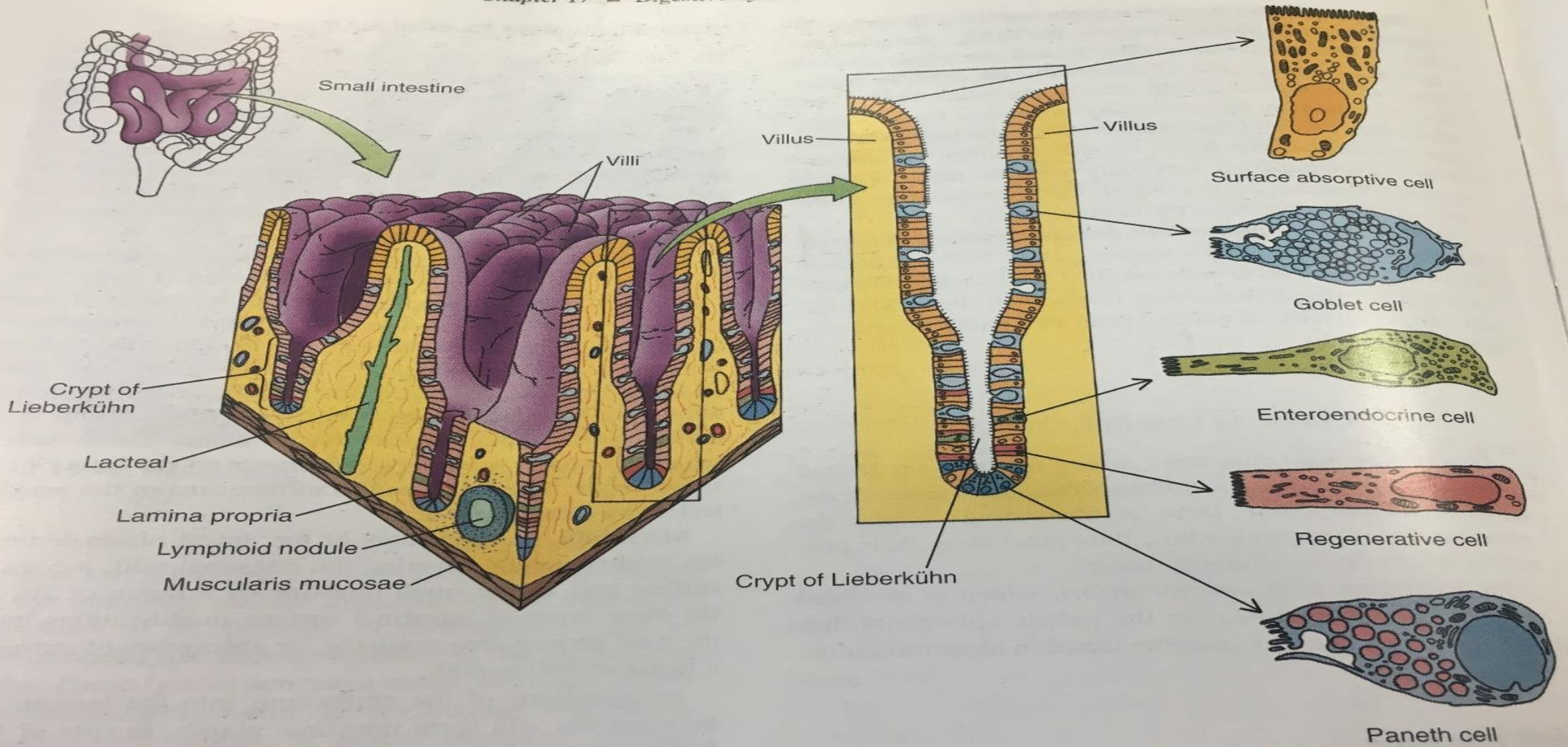


# The Gastrointestinal System

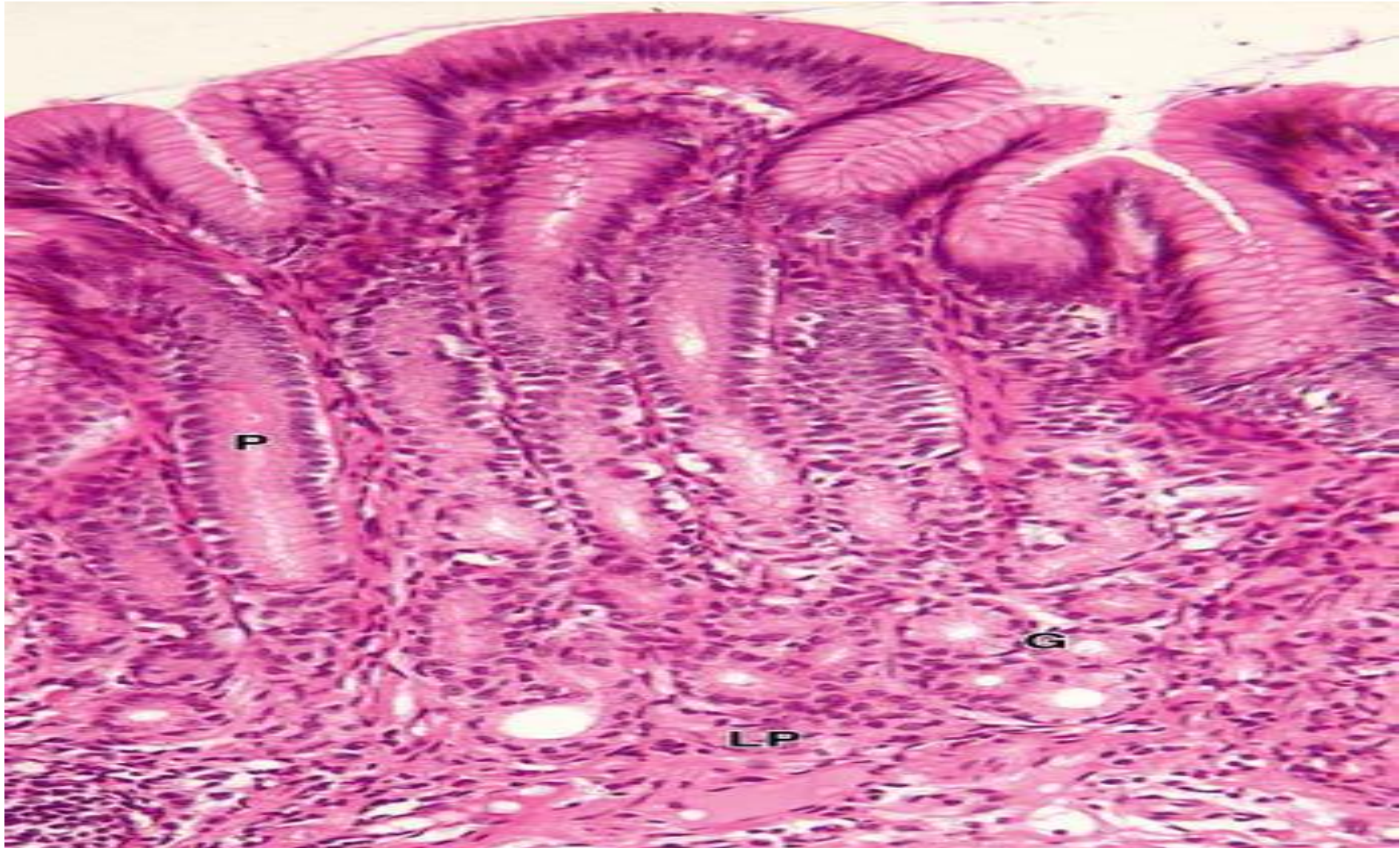
Small - Large Intestines

The small intestine is the part of food digestion, absorption, and endocrine secretion. The processes of digestion are completed in the small intestine( The small intestine is consists of three segments: **duodenum, jejunum, and ileum.**) where the nutrients are absorbed by cells of the epithelial lining.

Between the villi are small openings of short tubular glands called **intestinal crypts or crypts of Lieberkühn** . The epithelium of each villus is continuous with that of the intervening glands, which contain differentiating absorptive and goblet cells, Paneth cells, enteroendocrine cells, and stem cells that give rise to all these cell types

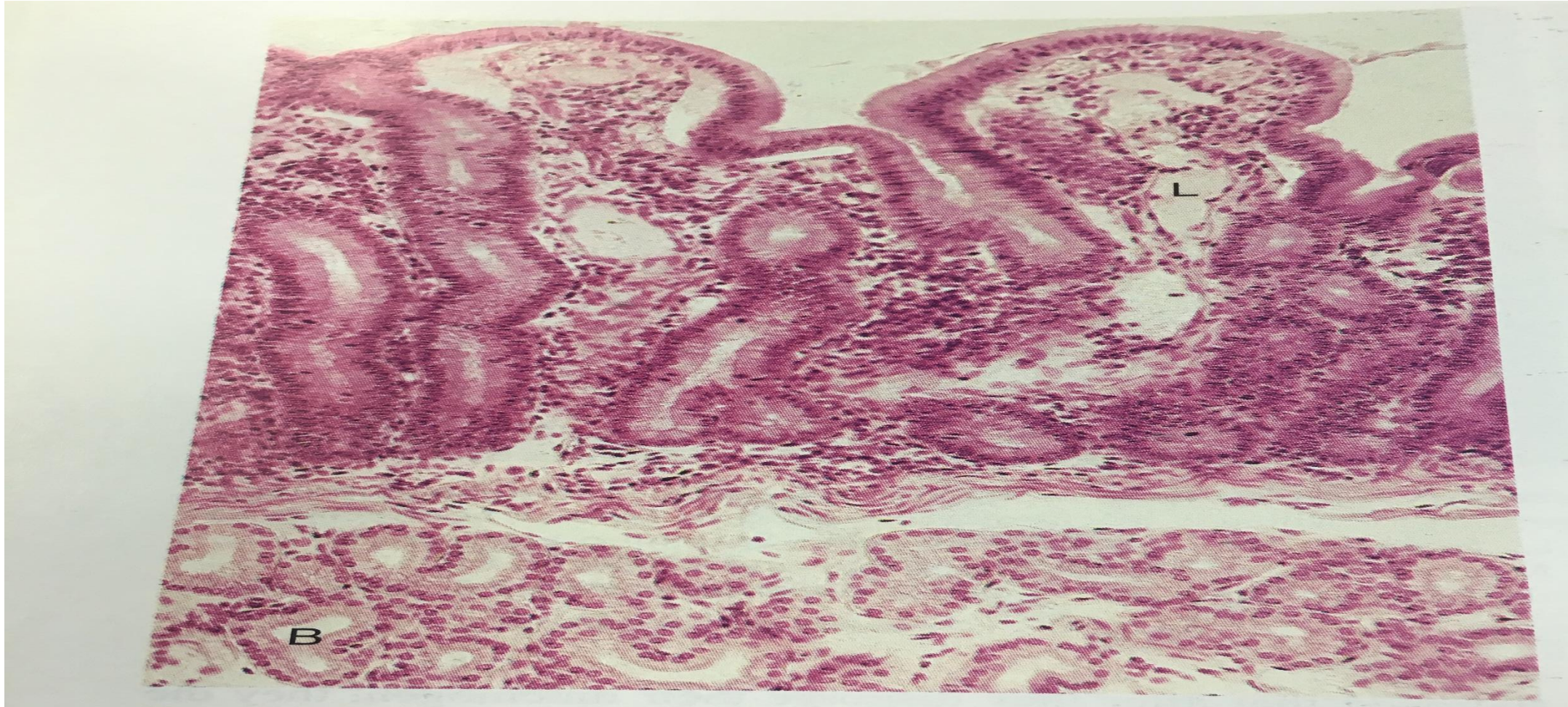


**M (microfold) cells** are specialized epithelial cells in the ileum overlying the lymphoid follicles of Peyer patches. These cells are characterized by the presence of basal membrane invaginations or pockets containing many intraepithelial lymphocytes and antigen-presenting cells. **Enteroendocrine cells** are present in varying numbers throughout the length of the small intestine, secreting various peptides and representing part of the widely distributed diffuse neuroendocrine system. Upon stimulation these cells release their secretory granules by exocytosis and the hormones may then exert paracrine (local) or endocrine (blood-borne) effects. **Goblet cells** are interspersed between the absorptive cells. They are less abundant in the duodenum and more numerous in the ileum. These cells produce glycoprotein mucins that are hydrated and cross-linked to form mucus, whose main function is to protect and lubricate the lining of the intestine. **Paneth cells**, located in the basal portion of the intestinal crypts below the stem cells, are exocrine cells with large, eosinophilic secretory granules in their apical cytoplasm. Paneth cell granules undergo exocytosis to release lysozyme, phospholipase A2, and hydrophobic peptides called defensins, all of which bind and breakdown membranes of microorganisms and bacterial walls. Paneth cells have an important role in immunity and in regulating the microenvironment of the intestinal crypts.

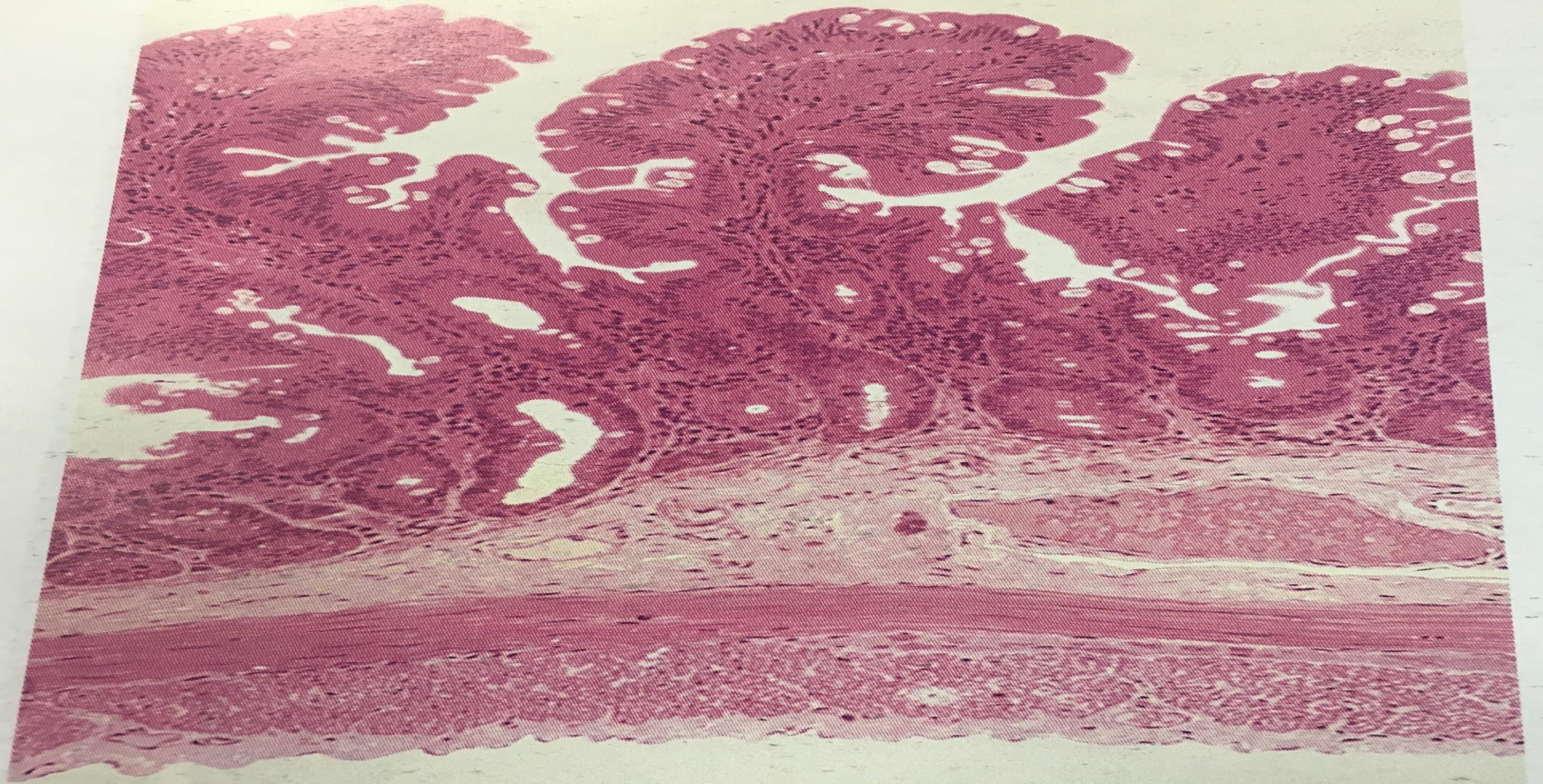


Junqueira, L. C., & Mescher, A. L. (2009). *Junqueira's basic histology: text & atlas 12th Edition*/Anthony L. Mescher. New York [etc.]: McGraw-Hill Medical,.

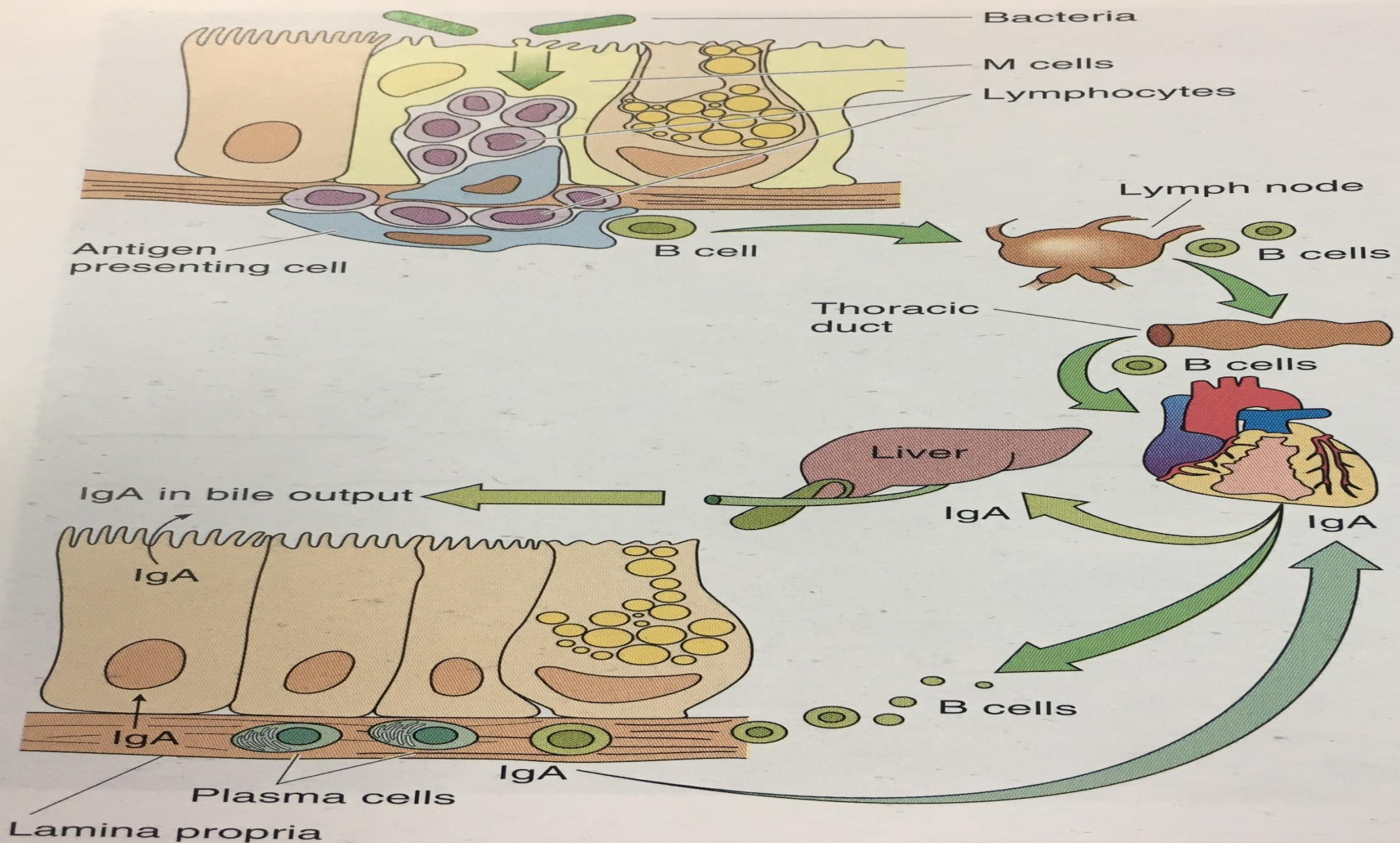
# Duodenal mucosa ,Brunner's glands



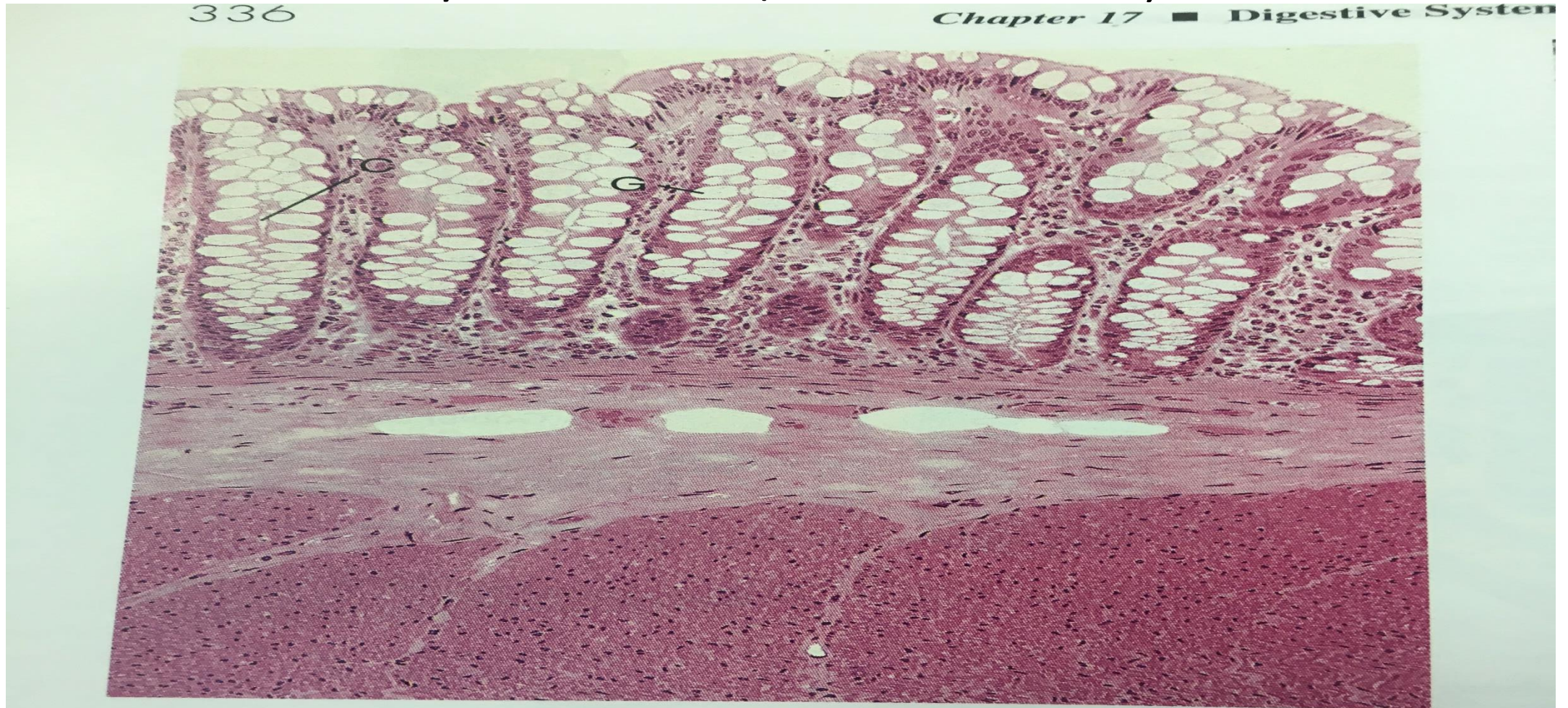
Gartner, L.P. & Hiatt, J.L. (1997). *Color textbook of Histology*: W.B. Saunders Company, Philadelphia, Pennsylvania, USA





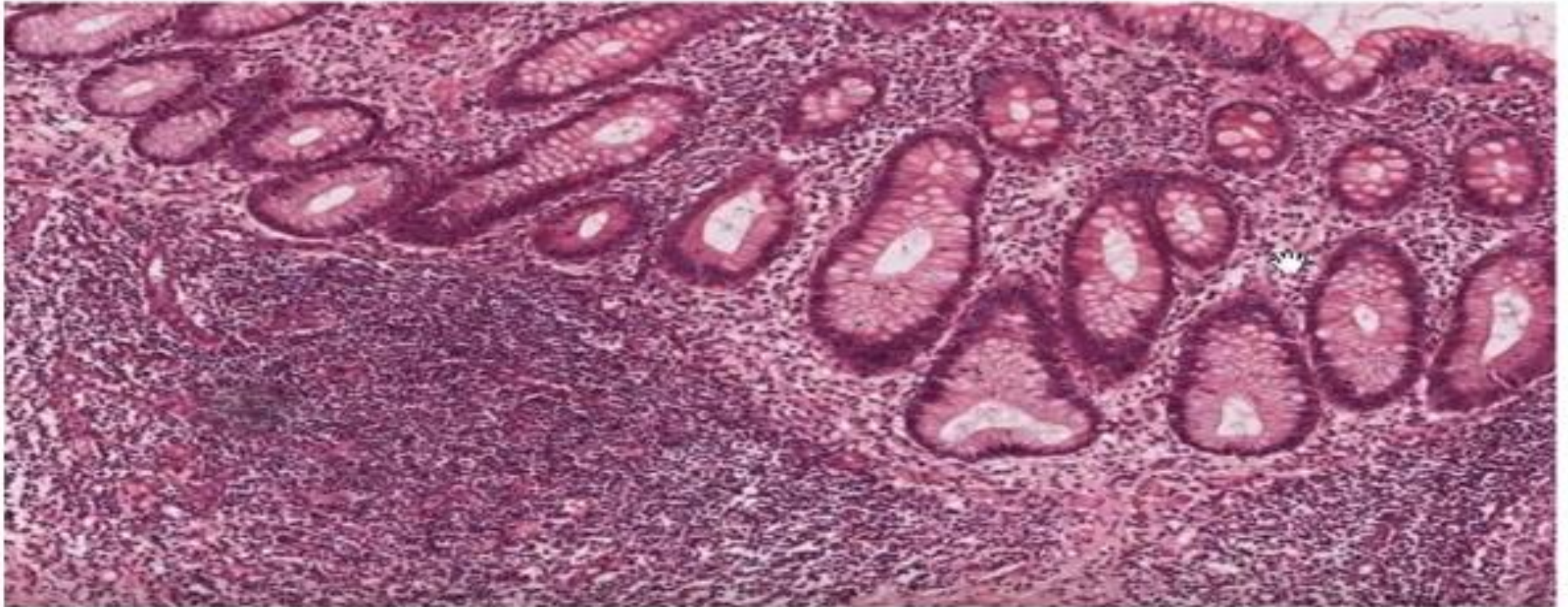


# Monkey Colon, G(Goblet Cells)



Gartner, L.P. & Hiatt, J.L. (1997). *Color textbook of Histology*: W.B. Saunders Company, Philadelphia, Pennsylvania, USA

# Apendix



Gartner, L.P. & Hiatt, J.L. (1997). *Color textbook of Histology*: W.B. Saunders Company, Philadelphia, Pennsylvania, USA

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- Junqueira, L. C., & Mescher, A. L. (2009). *Junqueira's basic histology: text & atlas (12th ed.)/Anthony L. Mescher*. New York [etc.]: McGraw-Hill Medical, Chapter 15, pp. 314-354.