組織學實驗：消化系統 II
Histology laboratory : Digestive system II

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Please study these slides before coming to the class!

Sources of the Pictures & Text

Wheater's Functional Histology (4th ed)

B. Young & J. W. Heath

Histology: A Text and Atlas (4th ed)

M.H. Ross & W. Pawlina

Photomicrograph Taken by

Department of anatomy,
Kaohsiung Medical University

Learning Objective

Microscopic structure of digestive system by observing following specimens

93W2254 Colon, human (cs) H&E

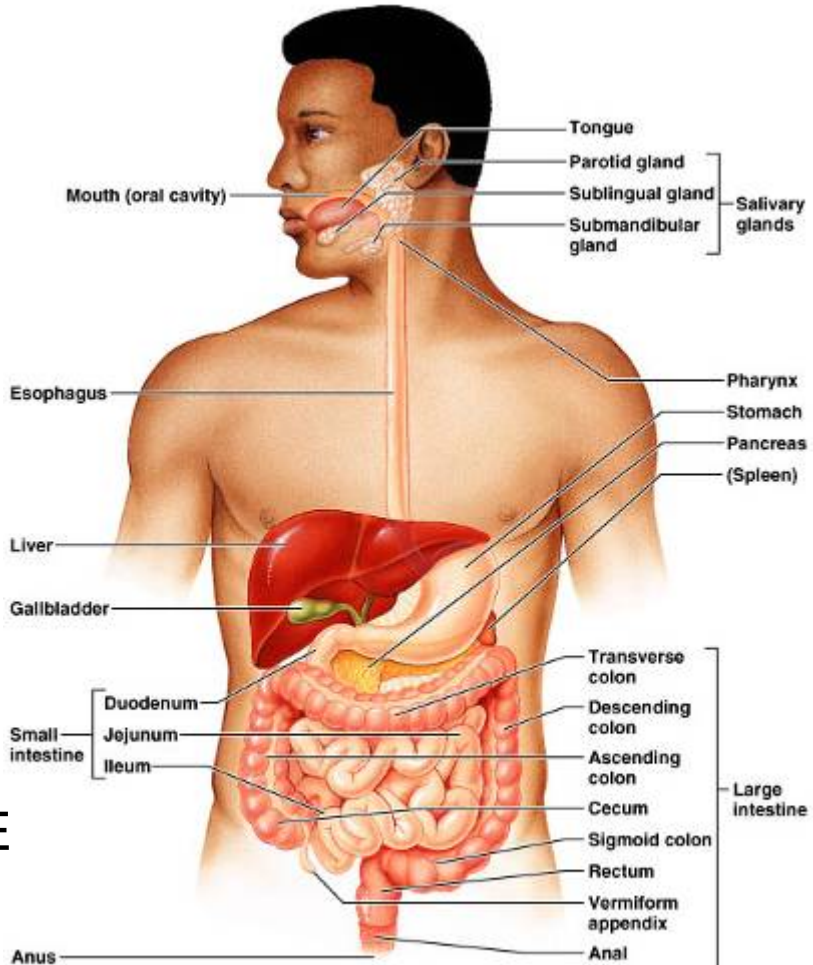
93W4523 Digestive system, Composite (sec.) H&E

93W4558 Recto-anal junction (ls) H&E

93W4570 Liver, human (sec.) H&E

93W4600 Pancreas (sec.) H&E

93W6814 Gallbladder, human (sec.) H&E



Wheater's Functional Histology

Learning Objective

- Understand the microscopic structure of large intestine (colon) and digestive glands
  - Liver
  - Pancreas
  - Gallbladder

Fig 1. **W2254**
Large intestine
(cs) H&E

M: Mucosa
ME: Muscularis externa
TC: Tenia coli

S: Submucosa
Se: Serosa
V: Vessels

Fig 1. W2254, Large intestine (cs) H&E.

A cross section through the colon is shown at low magnification. It shows the four layers that make up the wall of the colon: the mucosa (M), the submucosa (S), the muscularis externa (ME), and the serosa (Se). Although these layers are the same as those in the small intestine, several differences should be noted. The large intestine has neither villi nor the plicae circulares. On the other hand, the longitudinal layer of the muscularis externa is substantially thinner than the circular layer except in three locations where the longitudinal layer of smooth muscle is present as a thick band, called teniae coli (TC).

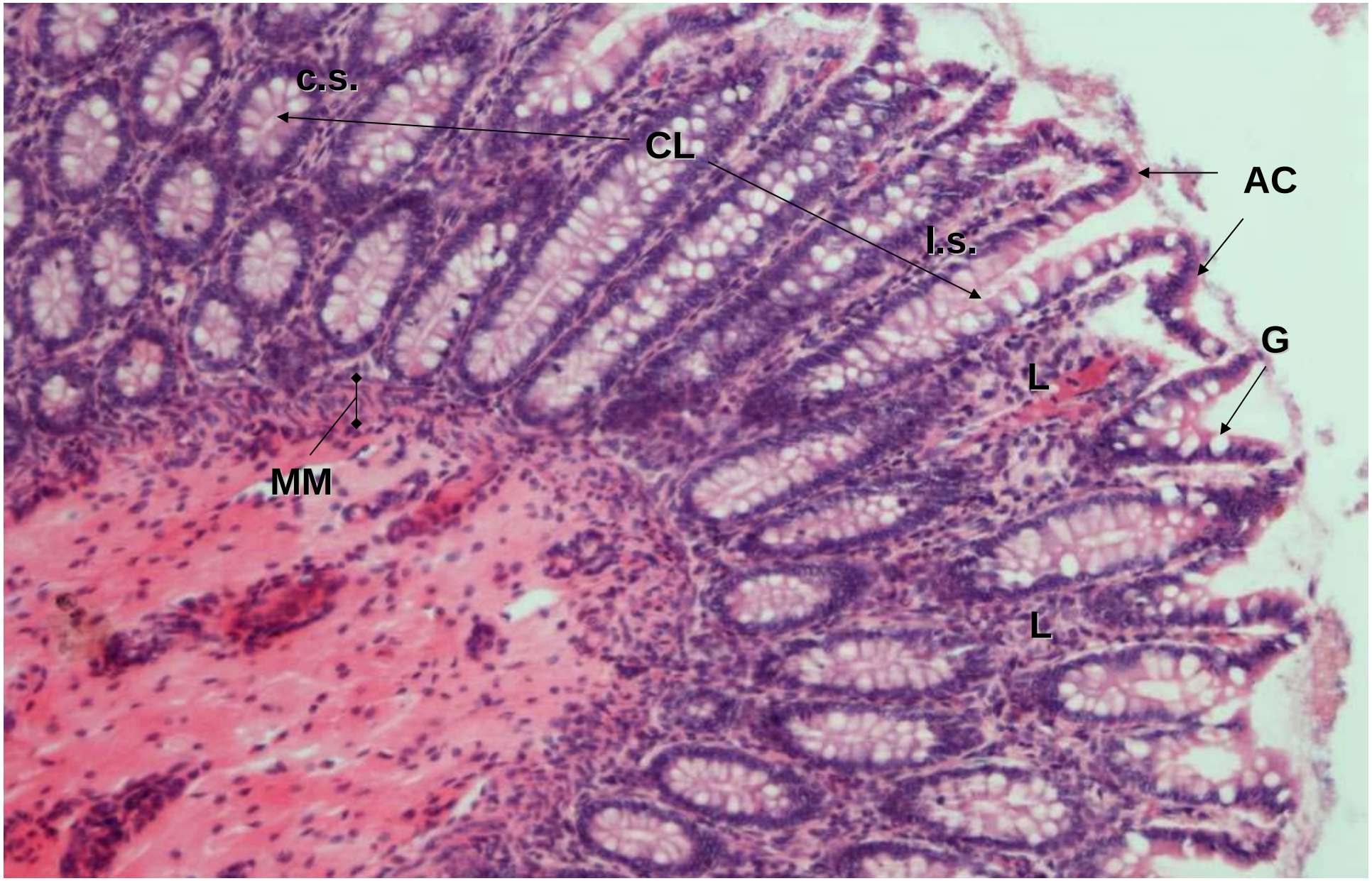


Fig 2. **W2254**
Large intestine, c.s.

CL: Crypts of Lieberkühn MM: Muscularis mucosa
L: Lamina propria AC: Absorptive cell G: Goblet cell

Fig 2. W2254, Large intestine (cs) H&E.

The mucosa contains straight, simple tubular glands -- Crypts of Lieberkühn (CL) -- that extend to the muscularis mucosa (MM). Between the glands is a lamina propria (L) that contains considerable numbers of lymphocytes and other cells of the immune system. The cells that line the surface of the colon and the glands are principally absorptive cells (AC) and goblet cells (GC).

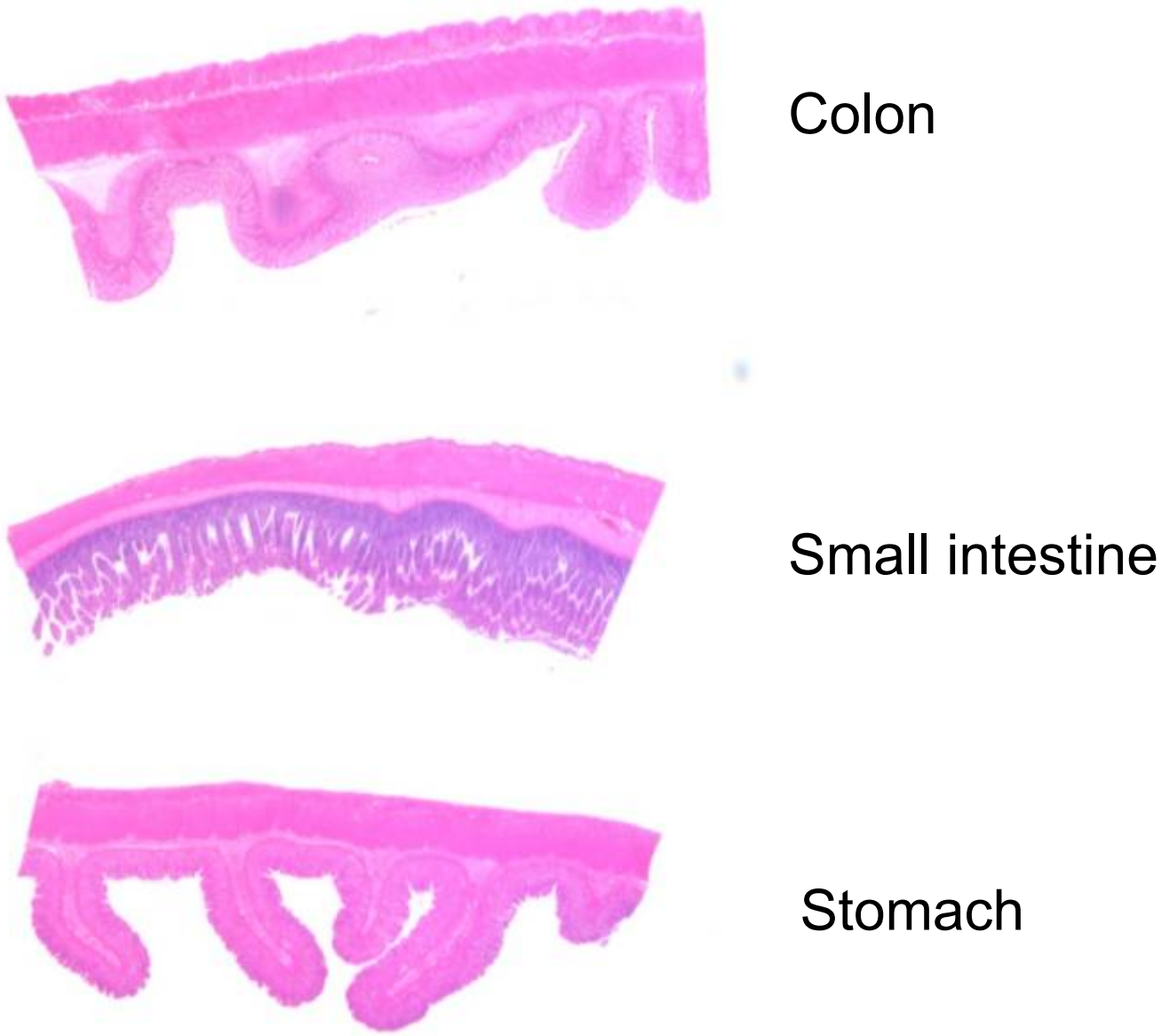
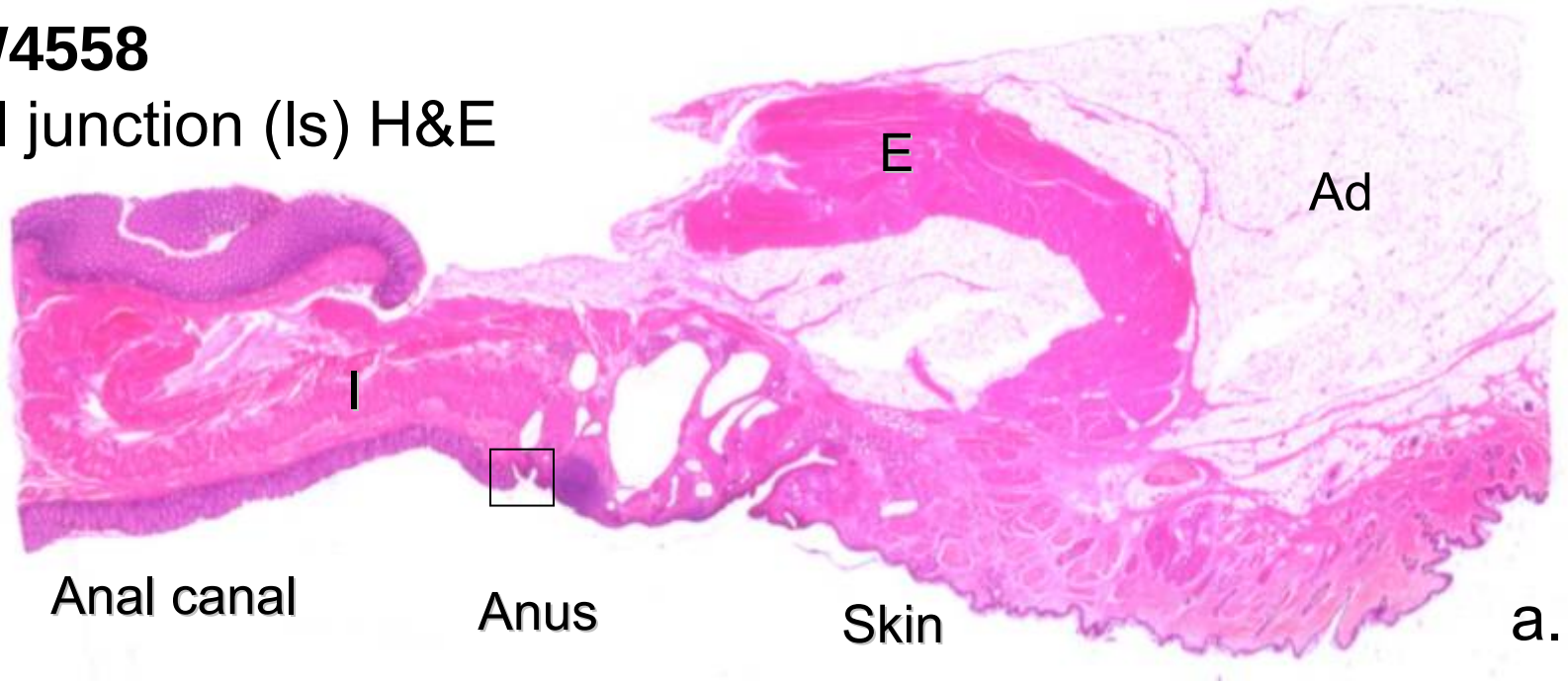
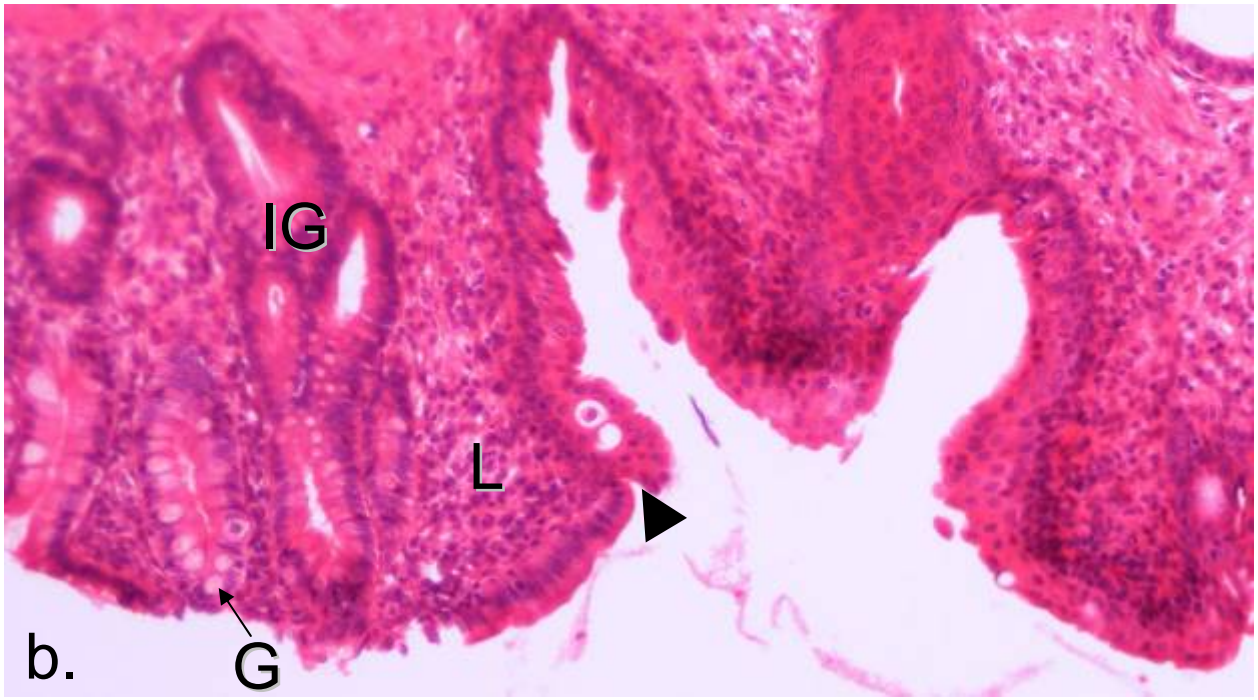


Fig 3. **93W4523** Digestive system, Composite (sec.) H&E

Fig 3. 93W4523, Digestive system, Composite (sec.) H&E.
There are three tissues in this slide: upper, colon; middle, small intestine; lower, stomach. The histological features have been mentioned already. Please compare the histological characteristic among three organs.

Fig 4. **93W4558**
Recto-anal junction (ls) H&E





I: Internal anal sphincter
E: External anal sphincter
Ad: Adipose tissue
G: Goblet cell
IG: Intestinal gland
L: Lamina propria

Fig 4. 93W4558, Recto-anal junction (ls) H&E.

A view of the recto-anal junction is shown at Fig 4a. Mucosa characteristic of the anal canal is seen on the lower left of the micrograph. This region has the intestinal glands same as those present in the colon. At the level of the anal canal, the muscularis mucosa disappears, and the circular layer of the muscularis externa (smooth muscle) thickens to become the internal anal sphincter (I). The external anal sphincter (E) is formed by the striated muscles of the pelvic floor. The rectangle of Fig 4a is examined at higher magnification in Fig 4b.

Fig 4b shows the junction between the simple columnar and the stratified epithelium (marked with the arrowhead). The simple columnar epithelium of the anal canal contains numerous goblet cells (G). As in the mucosa of colon, the epithelium is continuous with the epithelium of the intestinal gland (IG). These glands continue to about the same point as the muscularis mucosa. Characteristically, the lamina propria (L) contains large numbers of lymphocytes.

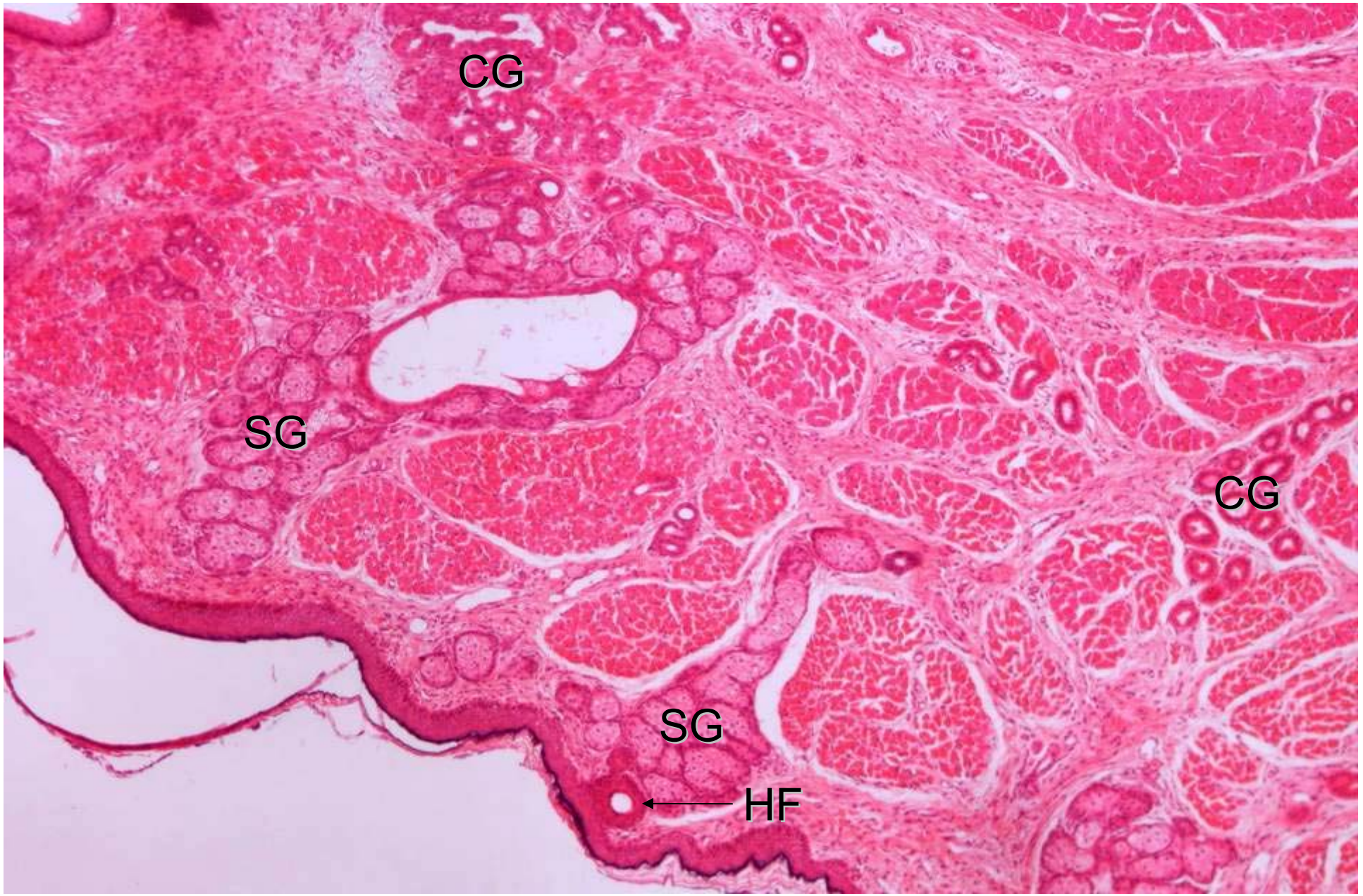


Fig 5. **93W4558**
Recto-anal junction (ls) H&E

HF: Hair follicle SG: Sebaceous gland
CG: Circumanal gland

Fig 5. 93W4558, Recto-anal junction (ls) H&E.

The right side of this slide is the keratinized stratified squamous epithelium of skin. The dermis of the skin contains hair follicles (HF), sebaceous gland (SG) and circumanal glands (CG). The microscopic characteristics of the skin will be described in the next semester.

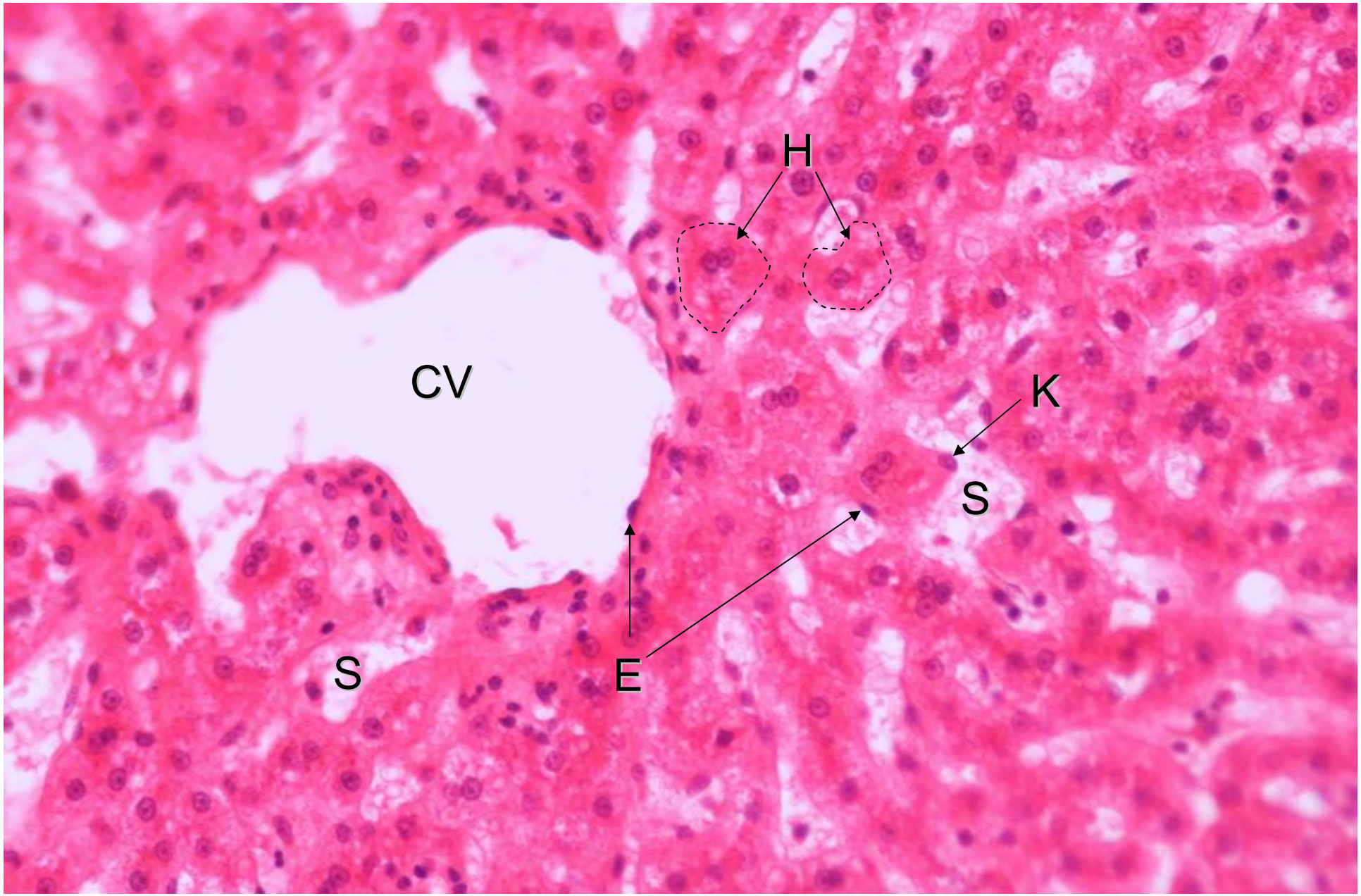


Fig 6. **93W4570** Liver, human (sec.) H&E

CV: Central vein H: Hepatocyte S: Sinusoid
E: Endothelial cells K: Kupffer cell

Fig 6. 93W4570, Liver, human (sec.) H&E.

The central vein (CV) and surrounding hepatocytes (H) are shown in this figure at high magnification. Hepatocytes are large polyhedral cells with round nuclei and are arranged in one-cell-thick plates. The plates of the hepatocytes exhibit a radial arrangement toward the central vein. The sinusoid (S) appears as light areas between the cords of the hepatic cells. The cells that line the sinusoids are endothelial cells (E) [squamous cell, elongated nuclei] and Kupffer cells (K) [ovoid nuclei].

If you examine the outer surface of this slide, you would find the tissue is covered by a capsule composed of collagenous tissue called Glisson’s capsule. Over the Glisson’s capsule is a layer of mesothelial cells from the peritoneum.

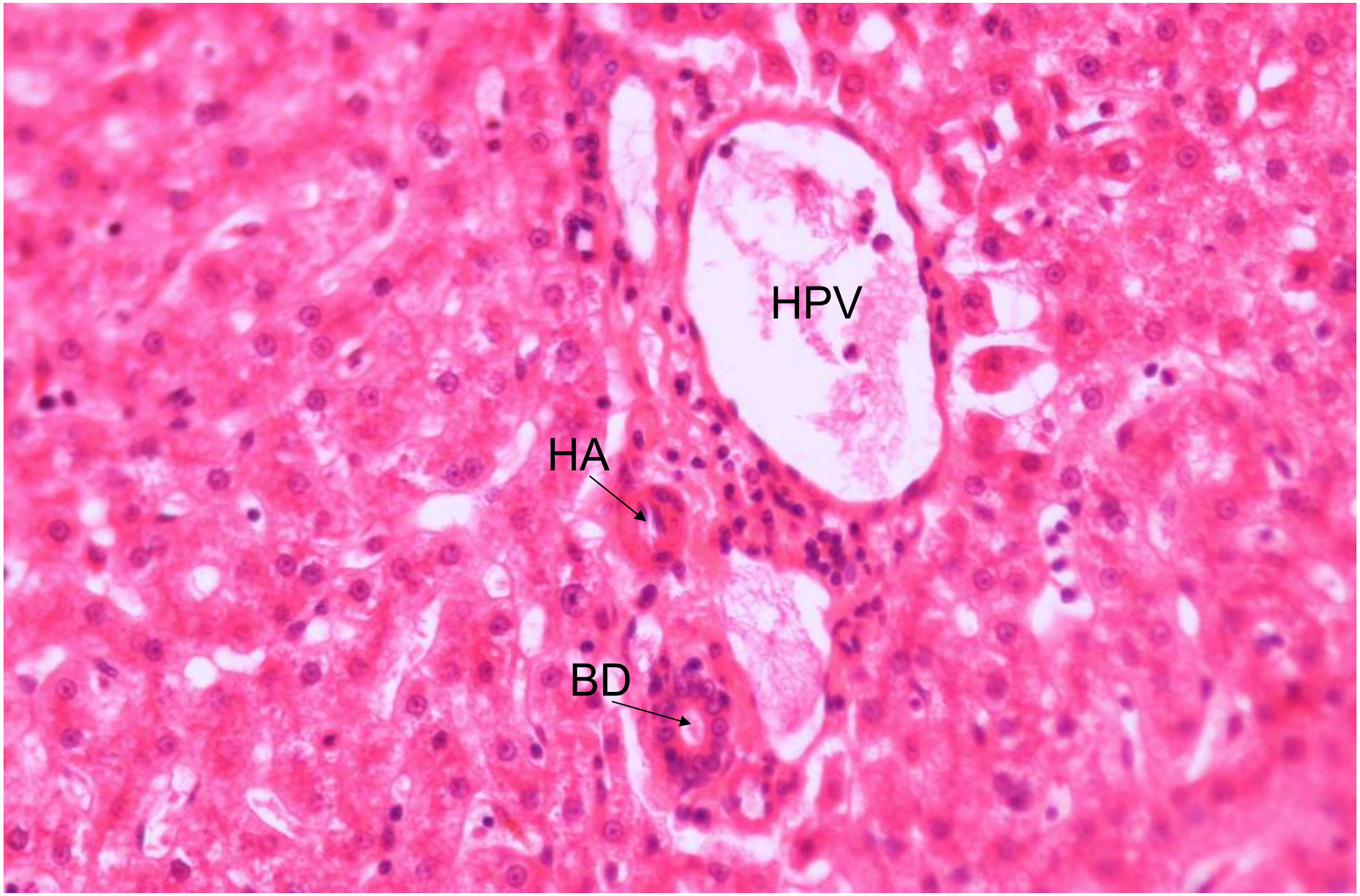


Fig 7. **93W4570** Liver, human (sec.) H&E

HPV: Hepatic portal vein
HA: Hepatic artery
BD: Bile duct

Fig 7. 93W4570, Liver, human (sec.) H&E.

This figure focuses on the structure of the portal area. Portal area is a connective tissue septa that carries the branches of the hepatic artery, the portal vein, and the bile duct. The largest tube is a terminal branch of the hepatic portal vein (HPV) which has very thin wall lined by flattened endothelial cells. Smaller diameter thick-walled vessels with the typical structure of arterioles are terminal branches of the hepatic artery (HA). The bile ducts (BD) are lined by simple cuboidal epithelium. They are usually located at the periphery of the portal area and are approximately the same size as the arterioles.

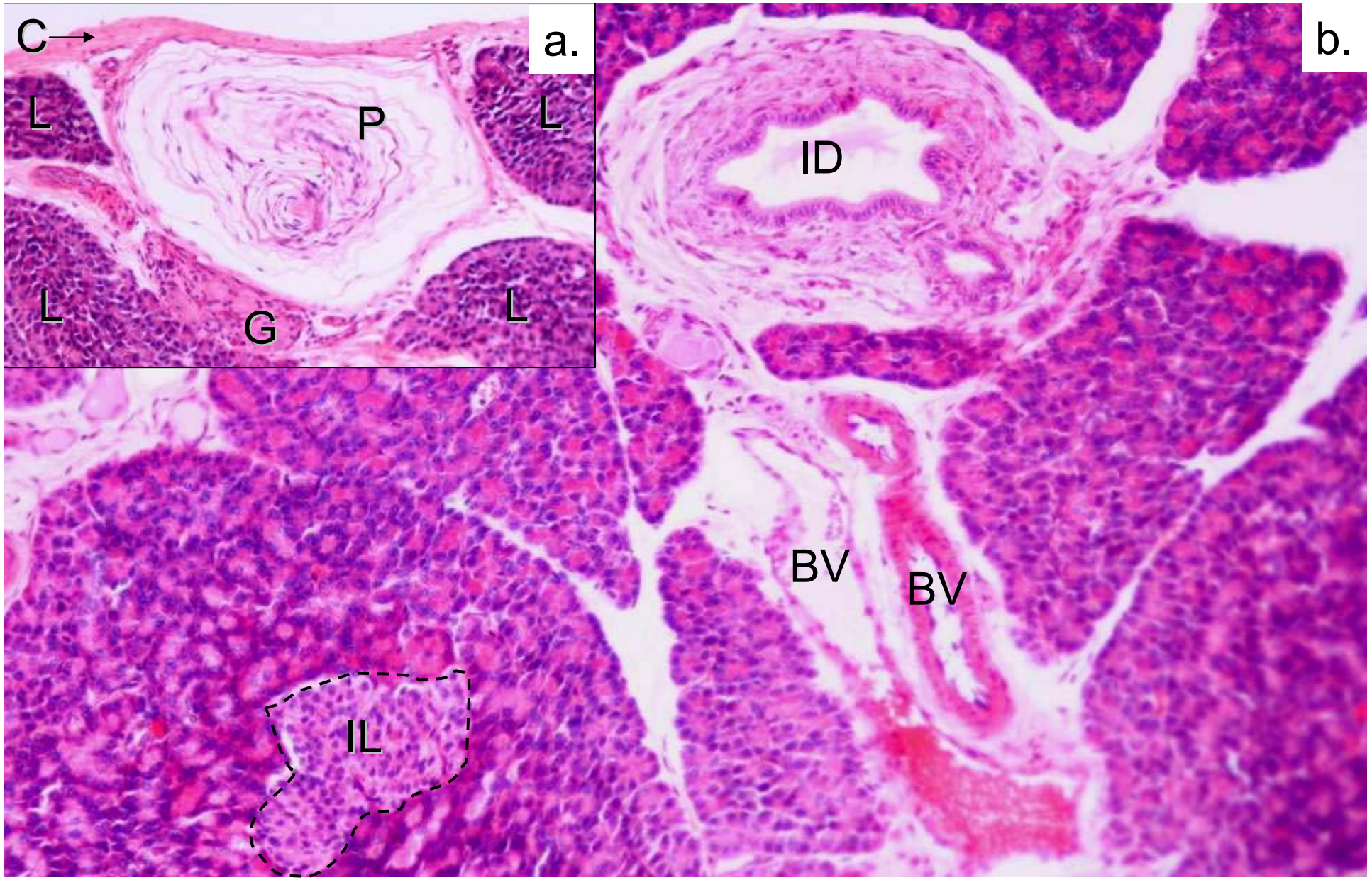


Fig 8. **93W4600**
Pancreas (sec.) H&E

C: Capsule L: Lobule BV: Blood vessel
ID: Interlobular ducts G: Ganglion
P: Pacinian corpuscle IL: Islets of Langerhans

Fig 8. 93W4600, Pancreas (sec.) H&E.

The pancreas is surrounded by a delicate capsule (C) of moderately dense connective tissue. Septa from the capsule divide the pancreas into lobules (L). Larger blood vessels (BV) and interlobular ducts (ID) travel in the connective tissue septa. Ganglion (G) and Pacinian corpuscle (P) can also be found in this slide.

Pancreas is a mixed gland containing both an exocrine component (pancreatic acini) and an endocrine component (islet of Langerhans, IL), that have distinctive characteristics. Within the lobule are the numerous pancreatic acini, an intralobular duct, intercalated ducts [not readily evident at this low magnification], and islet of Langerhans.

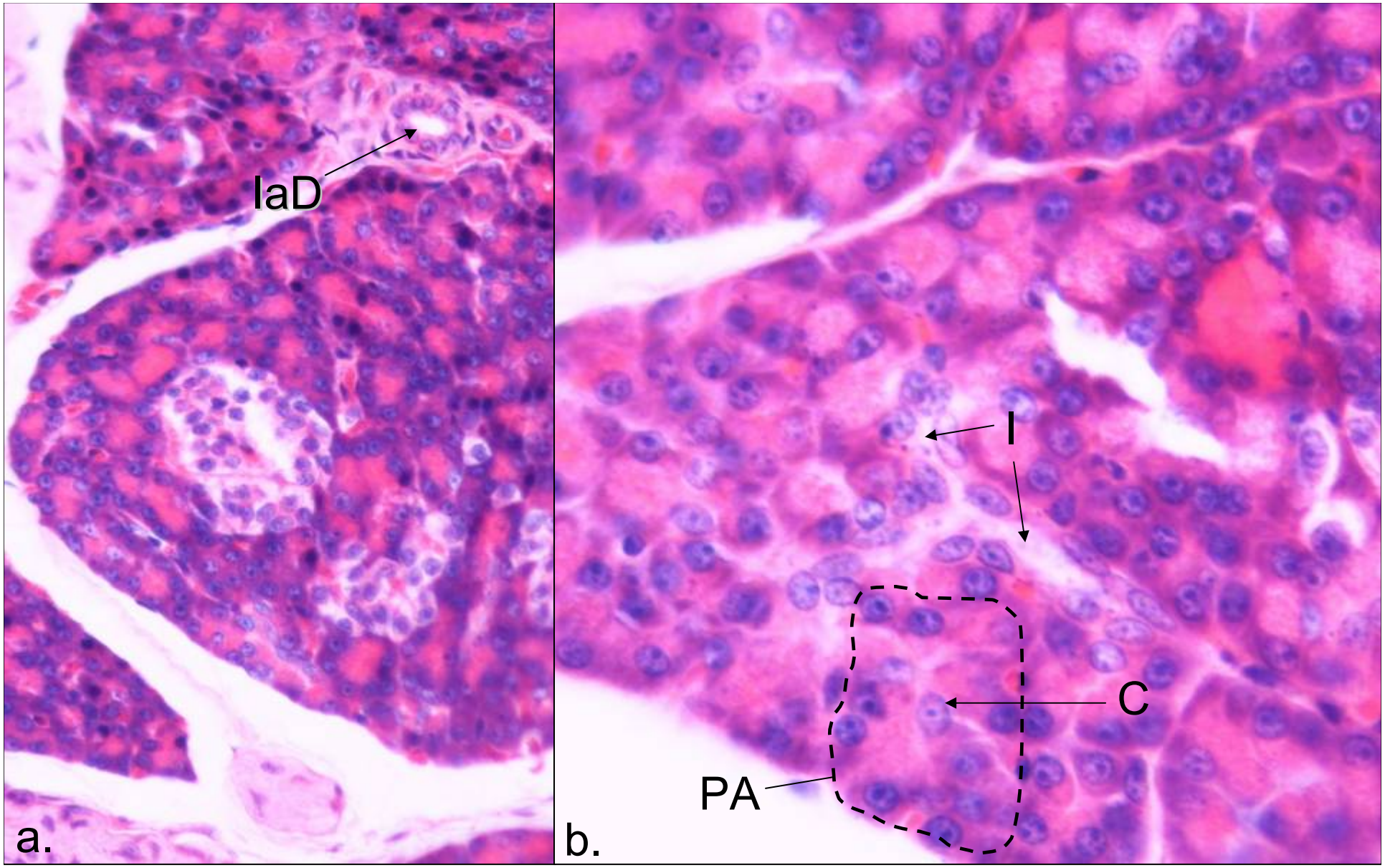


Fig 9. **93W4600**
Pancreas (sec.) H&E

PA: pancreatic acini
IaD: Intralobular ducts

I: Intercalated duct
C: Centroacinar cells

Fig 9. 93W4600, Pancreas (sec.) H&E.
Pancreatic acini (PA) are made up of irregular clusters of pyramid-shaped secretory cells. The apices of secretory cells surround a minute central lumen (the intercalated duct, I) which represents the terminal end of the duct system. The intercalated ducts are lined by simple low cuboidal epithelium and drain into small intralobular ducts (IaD). The centres of the acini frequently contain one or more nuclei of centroacinar cells (C) with pale nuclei and sparse pale-stained cytoplasm; these represent the terminal lining cells of intercalated ducts actually. The acinar cells are typical protein-secreting cells. The nuclei are basally located and surrounded by basophilic cytoplasm crammed with rough endoplasmic reticulum; the apices of the cells are packed with eosinophilic zymogen secretory granules.

Fig 10. **93W6814** Gallbladder, human

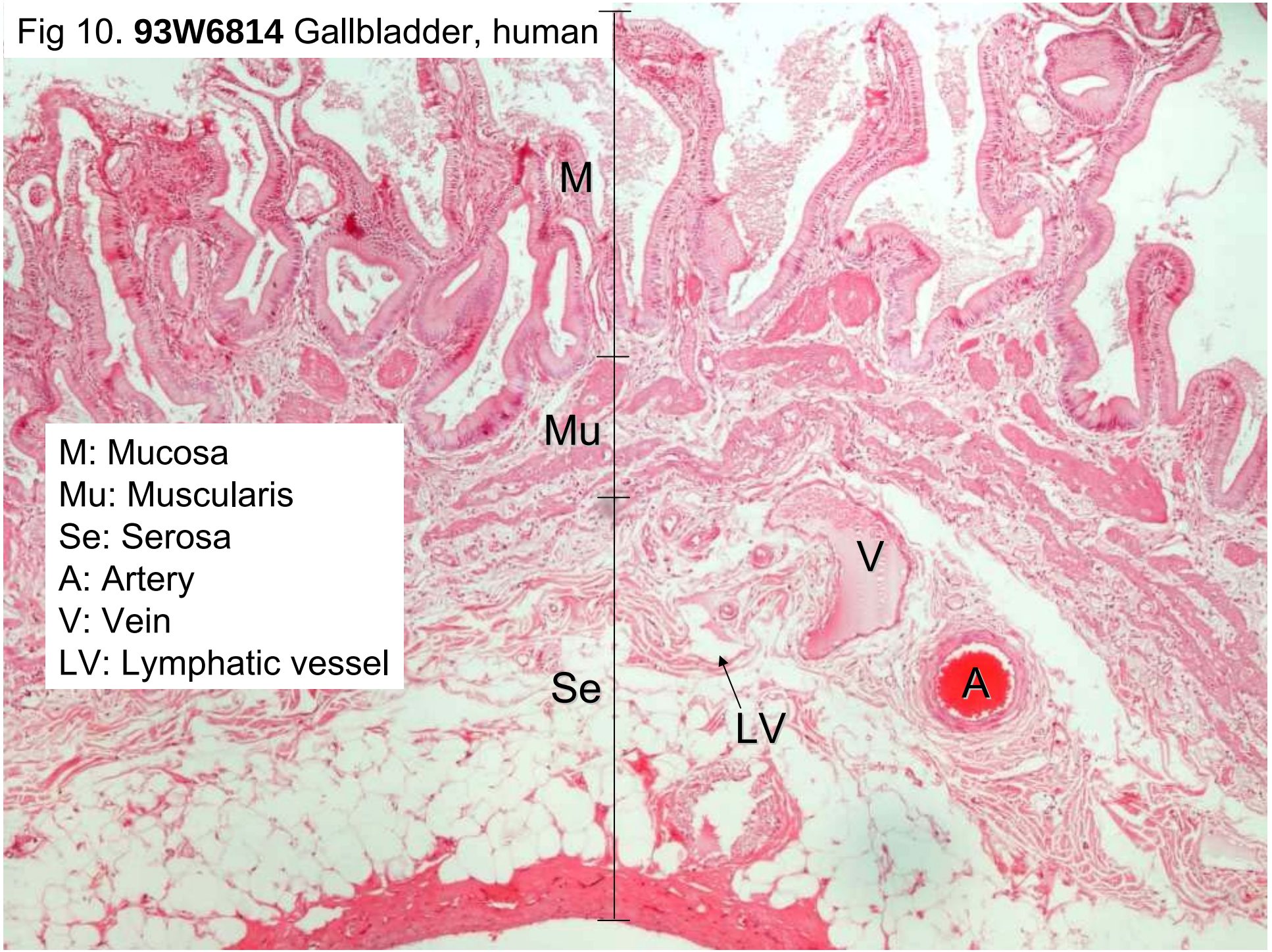


Fig 10. 93W6814, Gallbladder, human, H&E.

The wall of the gallbladder is composed of a mucosa (M), muscularis (Mu) and serosa (Se). The mucosa is thrown into numerous folds. The muscularis consists of interlacing bundles of smooth muscle. The serosa consists of irregular dense connective tissue through which the artery (A), vein (V), and lymphatic vessel (LV) travel; and containing abundant adipose tissue.

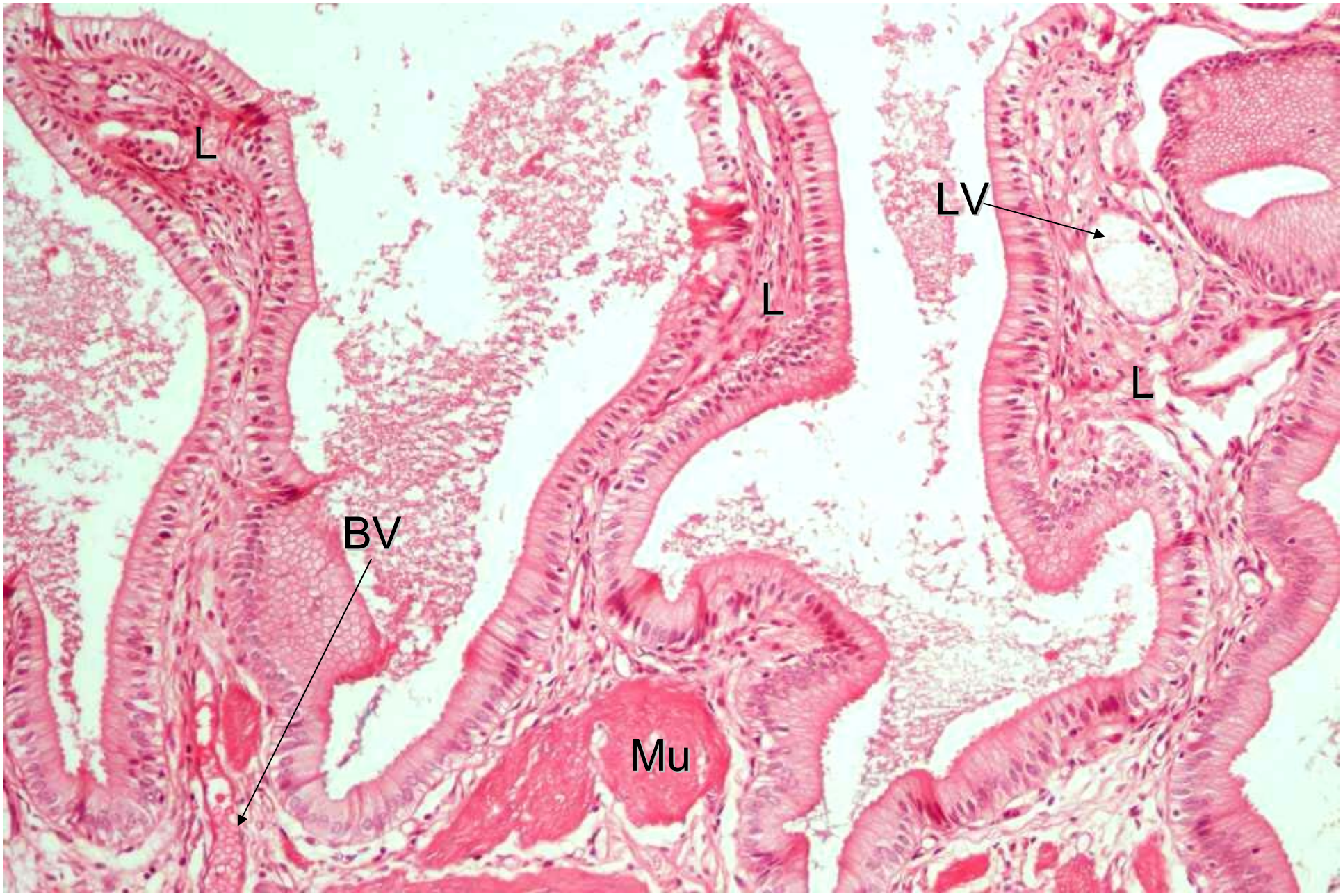


Fig 11. **93W6814**
Gallbladder, human, H&E

L: Lamina propria Mu: Muscularis
BV: Blood vessels LV: Lymphatic vessel

Fig 11. 93W6814, Gallbladder, human, H&E.

The mucosa consists of a tall simple columnar absorptive epithelium resting on a lamina propria (L) of loose connective tissue. Only one cell type, tall columnar cells, is present in the epithelial layer. The nuclei are in the basal portion of the cell. The cells possess a thin apical striated border. The lamina propria underlying the epithelium is usually very cellular containing lymphocytes, the blood vessel (BV) and lymphatic vessels (LV).

Summary

W2254, Large intestine	Mucosa, Submucosa, Muscularis externa, Serosa Lamina propria, Muscularis mucosa Tenia coli, Crypts of Lieberkühn Absorptive cell, Goblet cell
W4558 Recto-anal junction	Internal anal sphincter External anal sphincter Lamina propria, muscularis mucosa Goblet cell, Intestinal gland Hair follicle, Sebaceous gland, Circumanal gland

Summary

W4570 Liver	Portal triad, Central vein, Glisson's capsule Hepatic portal vein, Hepatic artery, Bile duct Hepatocyte, Sinusoid, Endothelial cells, Kupffer cell
W4600 Pancreas	Interlobular ducts, Intralobular ducts Islets of Langerhans, Pancreatic acini, Lobule Intercalated duct, Centroacinar cells
93W6814 Gall-bladder	Mucosa, Muscularis, Serosa Lymphatic vessel Lamina propria