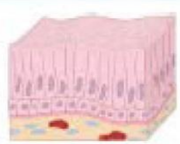
Эпителиальная ткань

Лекция

TABLE 5.1 Types of Epithelium

Classification		Some Typical Locations	Major Function
Simple squamous		Vascular system (endothelium) Body cavities (mesothelium) Bowman's capsule (kidney) Respiratory spaces in lung	Exchange, barrier in central nervous system Exchange and lubrication
Simple cuboidal		Small ducts of exocrine glands Surface of ovary (germinal epithelium) Kidney tubules Thyroid follicles	Absorption and conduit Barrier Absorption and secretion
Simple columnar		Small intestine and colon Stomach lining and gastric glands Gallbladder	Absorption and secretion Secretion Absorption
Pseudostratified		Trachea and bronchial tree Ductus deferens Efferent ductules of epididymis	Secretion and conduit Absorption and conduit
Stratified squamous		Epidermis Oral cavity and esophagus Vagina	Barrier and protection
Stratified cuboidal		Sweat gland ducts Large ducts of exocrine glands Anorectal junction	Barrier and conduit
Stratified columnar		Largest ducts of exocrine glands Anorectal junction	Barrier and conduit
Transitional (urothelium)		Renal calyces Ureters Bladder Urethra	Barrier, distensible property

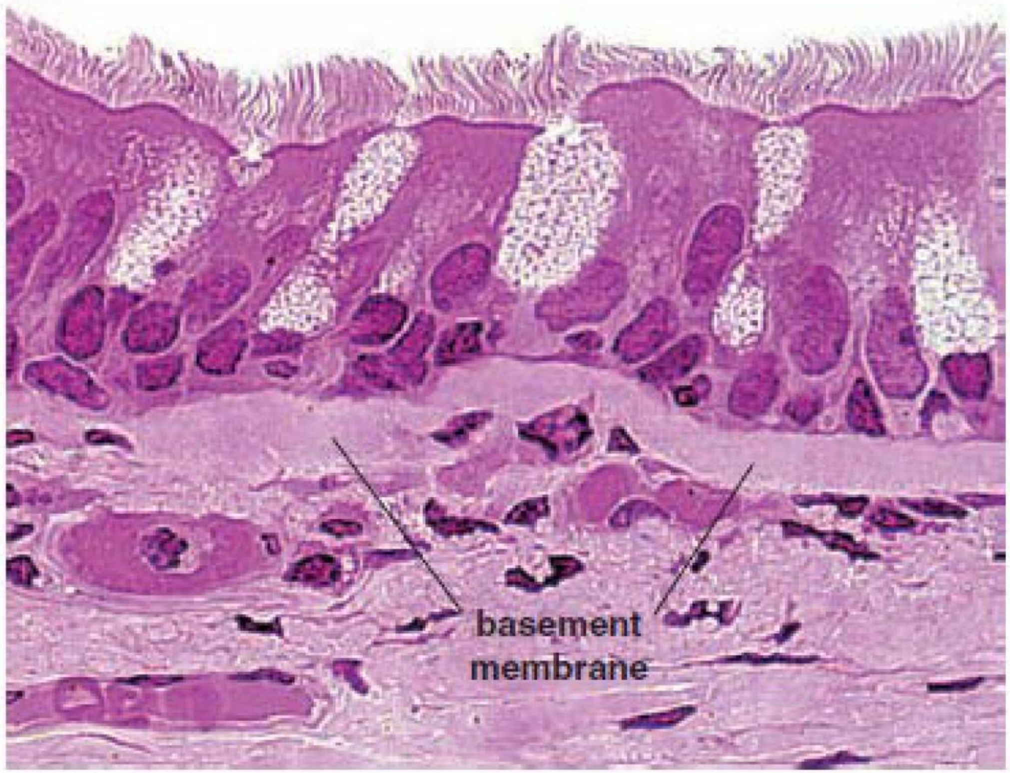


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FIGURE 5.25 ▲ Tracheal basement membrane. Photomicrograph of an H&E–stained section of the pseudostratified ciliated epithelium of the trachea. The basement membrane appears as a thick homogeneous layer immediately below the epithelium. It is actually a part of the connective tissue and is composed largely of densely packed collagen fibrils. ×450.

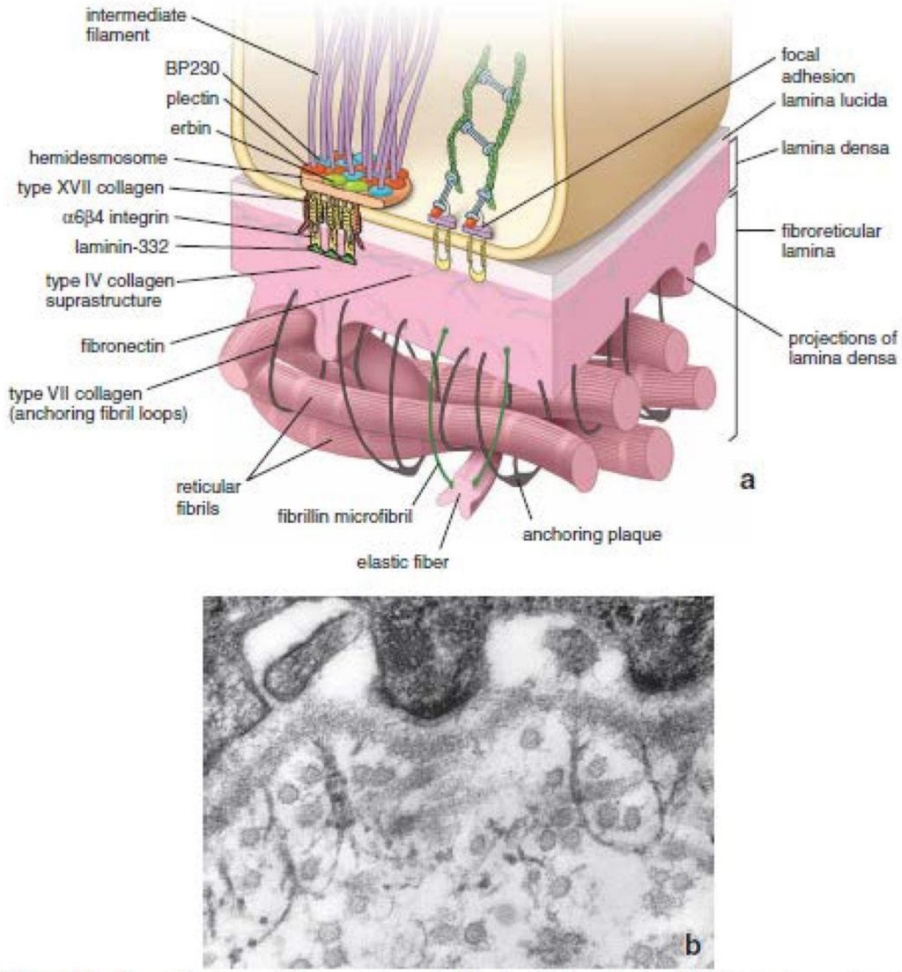


FIGURE 5.34 ▲ Schematic diagram and electron micrograph of the basal portion of epithelial cell. a. This diagram shows the cellular and extracellular components that provide attachment between epithelial cells and the underlying connective tissue. On the connective tissue side of the basal lamina, anchoring fibrils extend from the basal lamina to the collagen (reticular) fibrils of the connective tissue, providing structural attachment at this site. On the epithelial side, laminin (*green*), collagen XVII (*red*), and integrins (*yellow*) are present in the lamina lucida and lamina densa and provide adhesion between the basal lamina and the intracellular attachment plaques of hemidesmosomes. **b.** This high-magnification electron micrograph of human skin shows the basal portion of human epithelial cells with underlying basal lamina. The electron-lucent space, the lamina lucida located just below the basal cell membrane, is occupied by anchoring filaments formed by laminin and type XVII collagen molecules. Anchoring filaments are responsible for attaching the basal cell membrane to the basal lamina. The loop-like fibers originating from the basal lamina represent anchoring fibrils of type VII collagen that link the basal lamina with the reticular fibers (type III collagen) and with anchoring plaques located within the extracellular matrix. ×200,000. (Courtesy of Douglas R. Keene.)

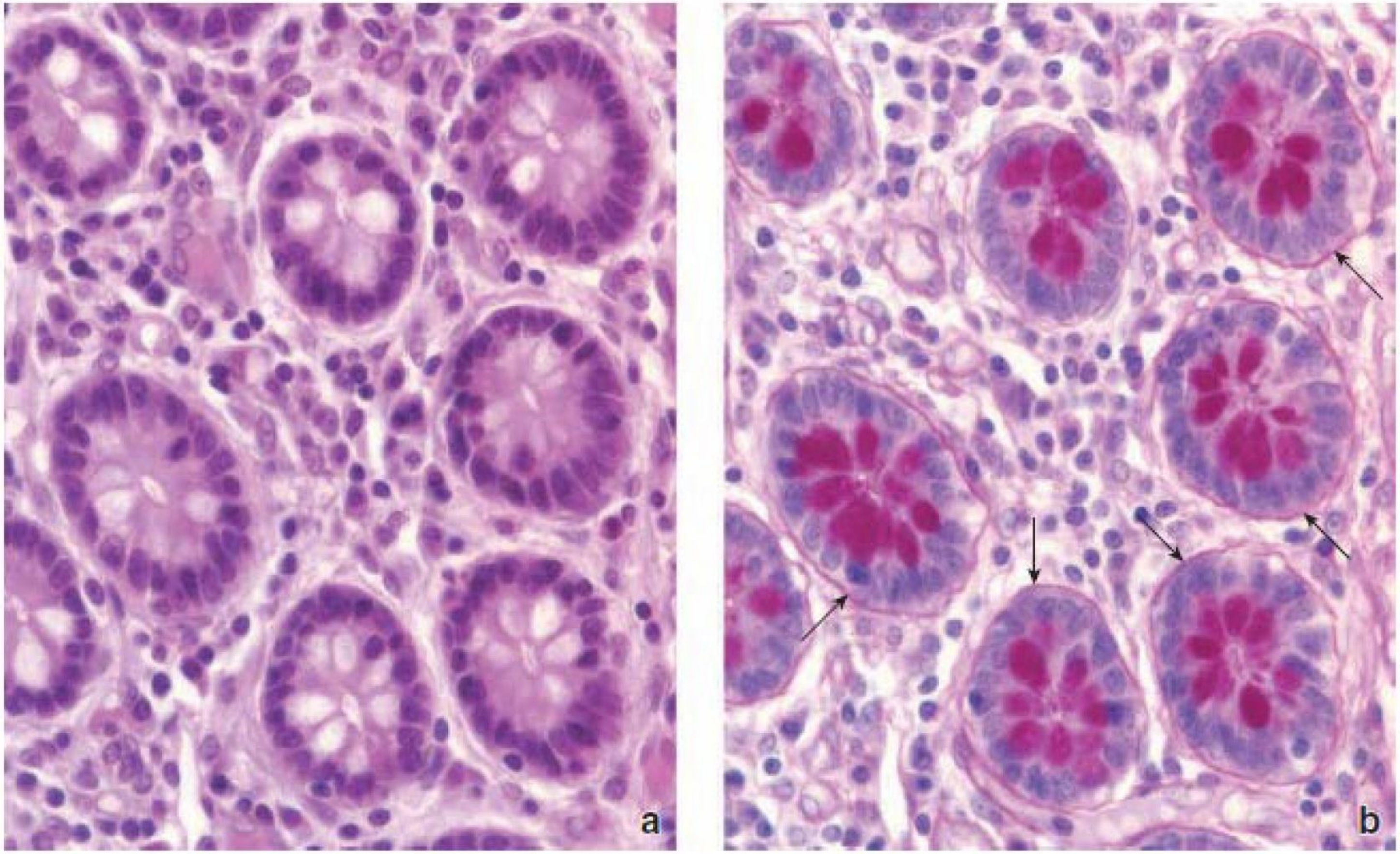


FIGURE 5.26 ▲ Photomicrographs showing serial sections of intestinal glands of the colon. The glands in this specimen have been cross-sectioned and appear as round profiles. **a.** This specimen was stained with H&E. Note that neither the basement membrane nor the mucin that is located within the goblet cells is stained. ×550. **b.** This section was stained by the PAS method. It reveals the basement membrane as a thin, magenta layer (*arrows*) between the base of the epithelial cells of the glands and the adjacent connective tissue. The mucin within the goblet cells is also PAS positive. ×550.

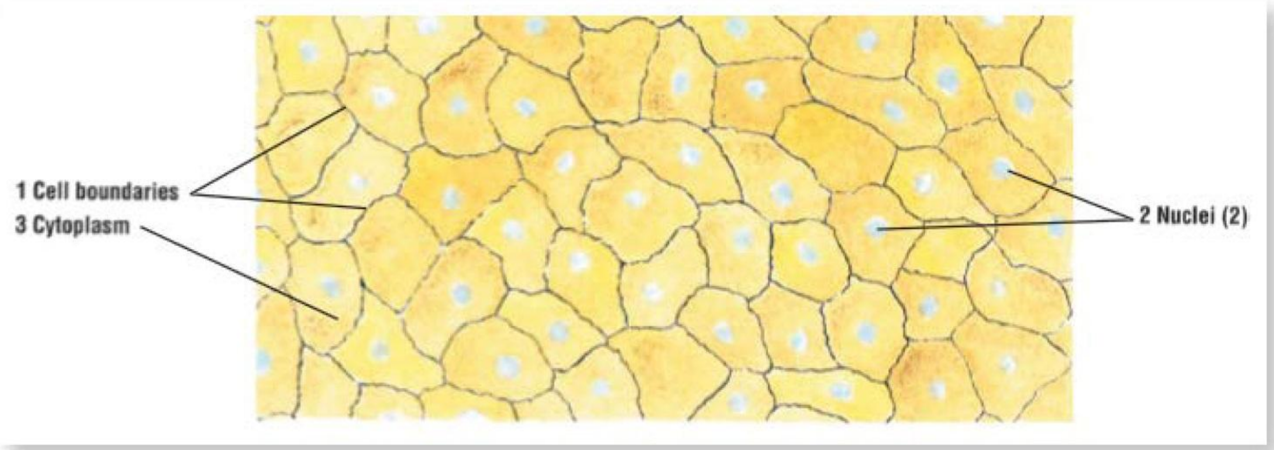


FIGURE 4.1 ■ **Simple squamous epithelium: surface view of peritoneal mesothelium. Stain: silver nitrate with hematoxylin. High magnification.**

Simple squamous epithelium is common in the body. It covers the surfaces that allow passive transport of gases or fluids and lines the pleural (thoracic), pericardial (heart), and peritoneal (abdominal) cavities.

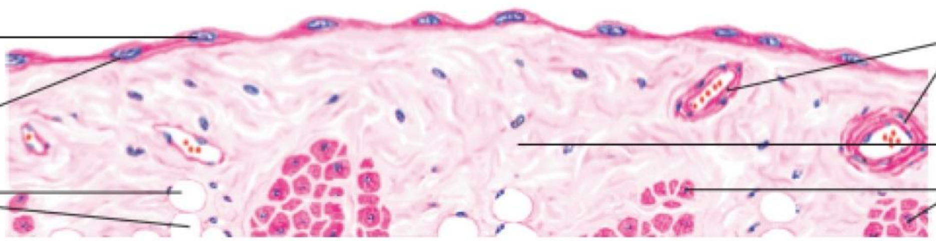


FIGURE 4.2 ■ Simple squamous epithelium: peritoneal mesothelium surrounding small intestine (transverse section). Stain: hematoxylin and eosin. High magnification.

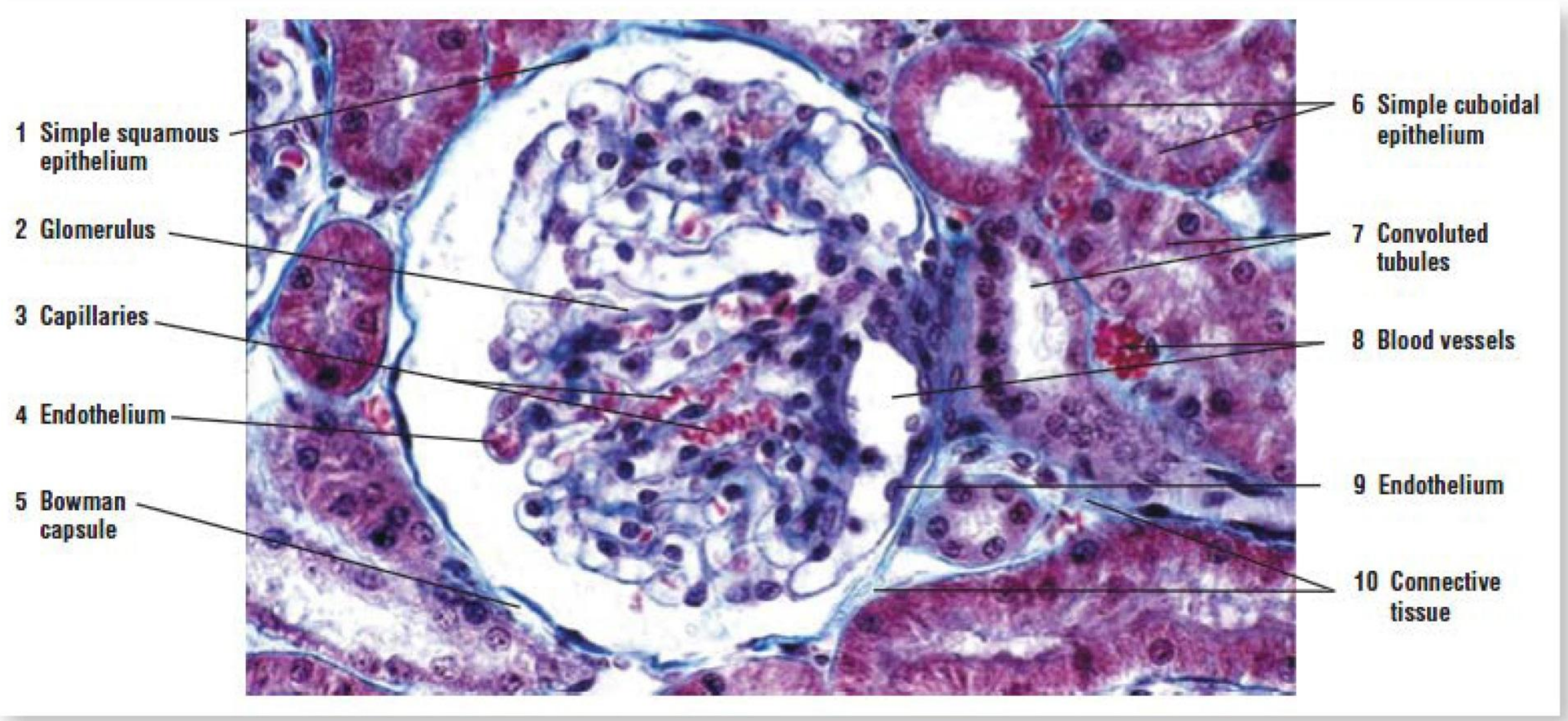


FIGURE 4.3 ■ Different epithelial types in the kidney cortex. Stain: Masson trichrome. ×120.

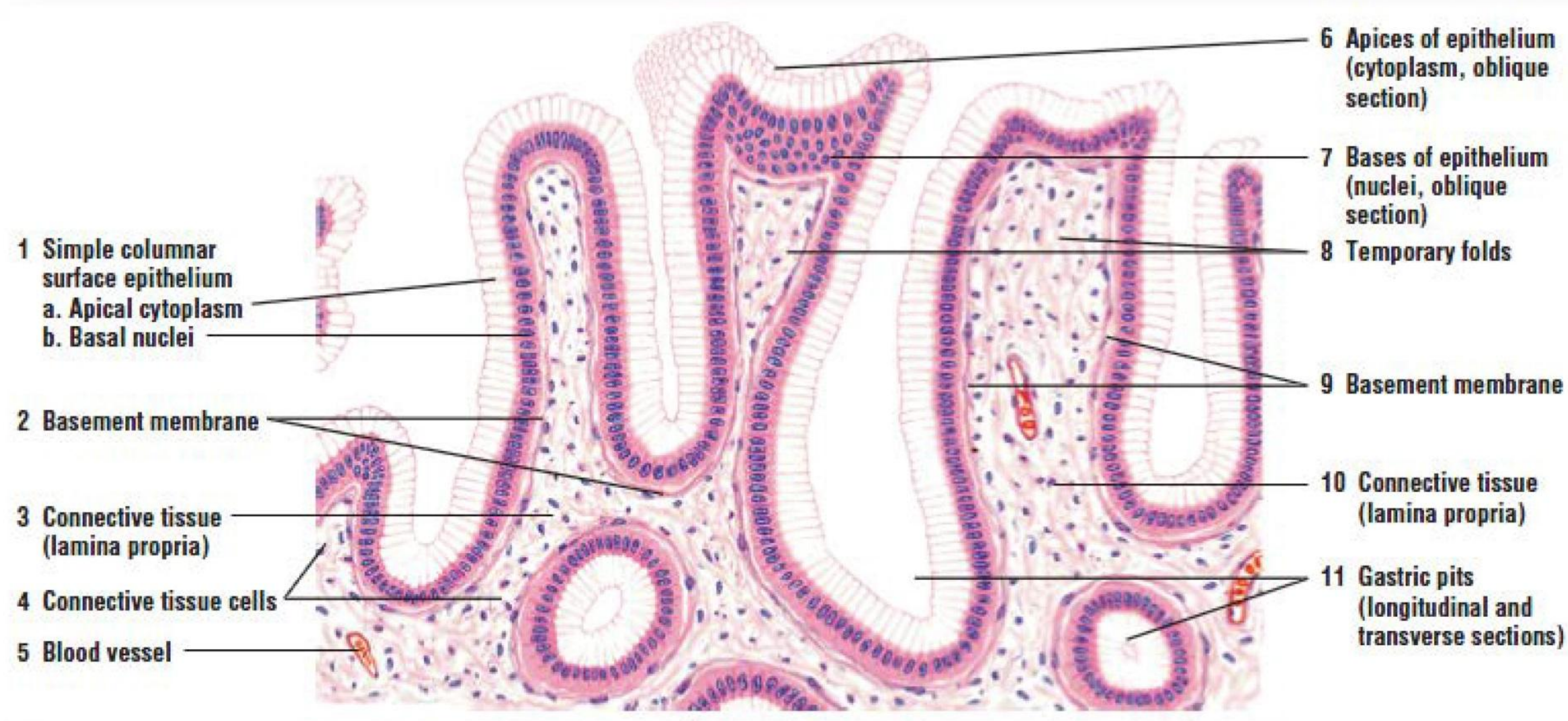


FIGURE 4.4 ■ Simple columnar epithelium: surface of stomach. Stain: hematoxylin and eosin. Medium magnification.

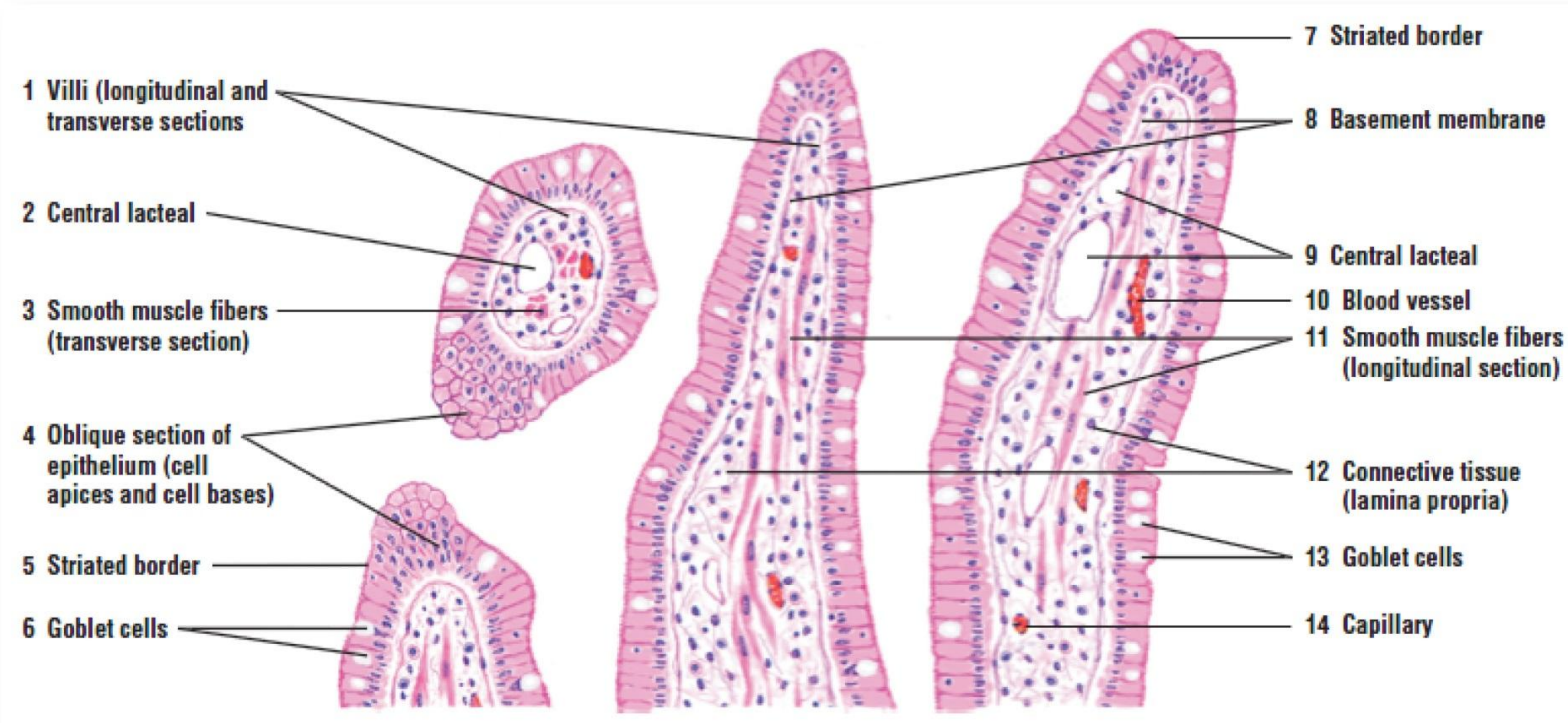


FIGURE 4.5 ■ Simple columnar epithelium on villi in small intestine: cells with striated borders (microvilli) and goblet cells. Stain: hematoxylin and eosin. Medium magnification.

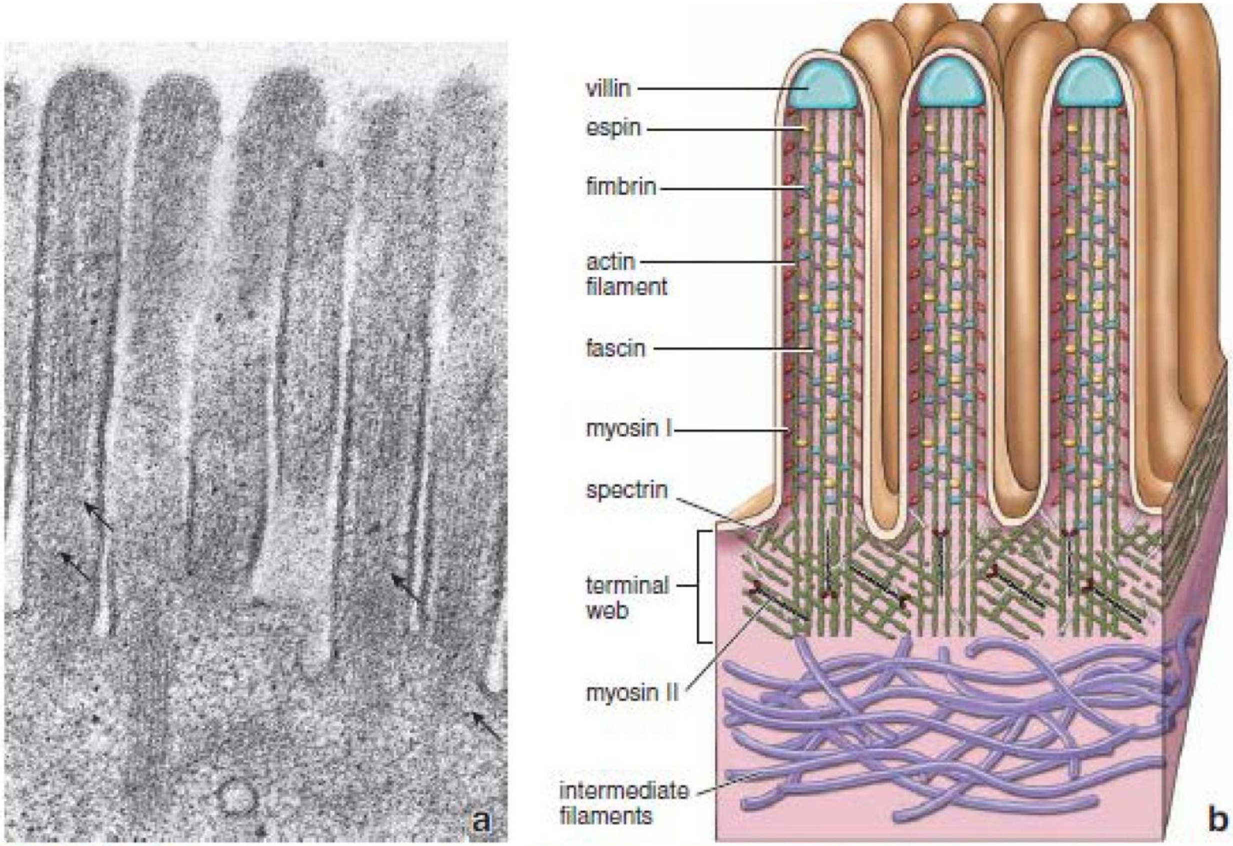


FIGURE 5.3 ▲ Molecular structure of microvilli. a. High magnification of microvilli from Figure 5.2c. Note the presence of the actin filaments in the microvilli (*arrows*), which extend into terminal web in the apical cytoplasm. ×80,000. **b.** Schematic diagram showing molecular structure of microvilli and the location of specific actin filament–bundling proteins (fimbrin, espin, and fascin). Note the distribution of myosin I within the microvilli and myosin II within the terminal web. The spectrin molecules stabilize the actin filaments within the terminal web and anchor them into the apical plasma membrane.

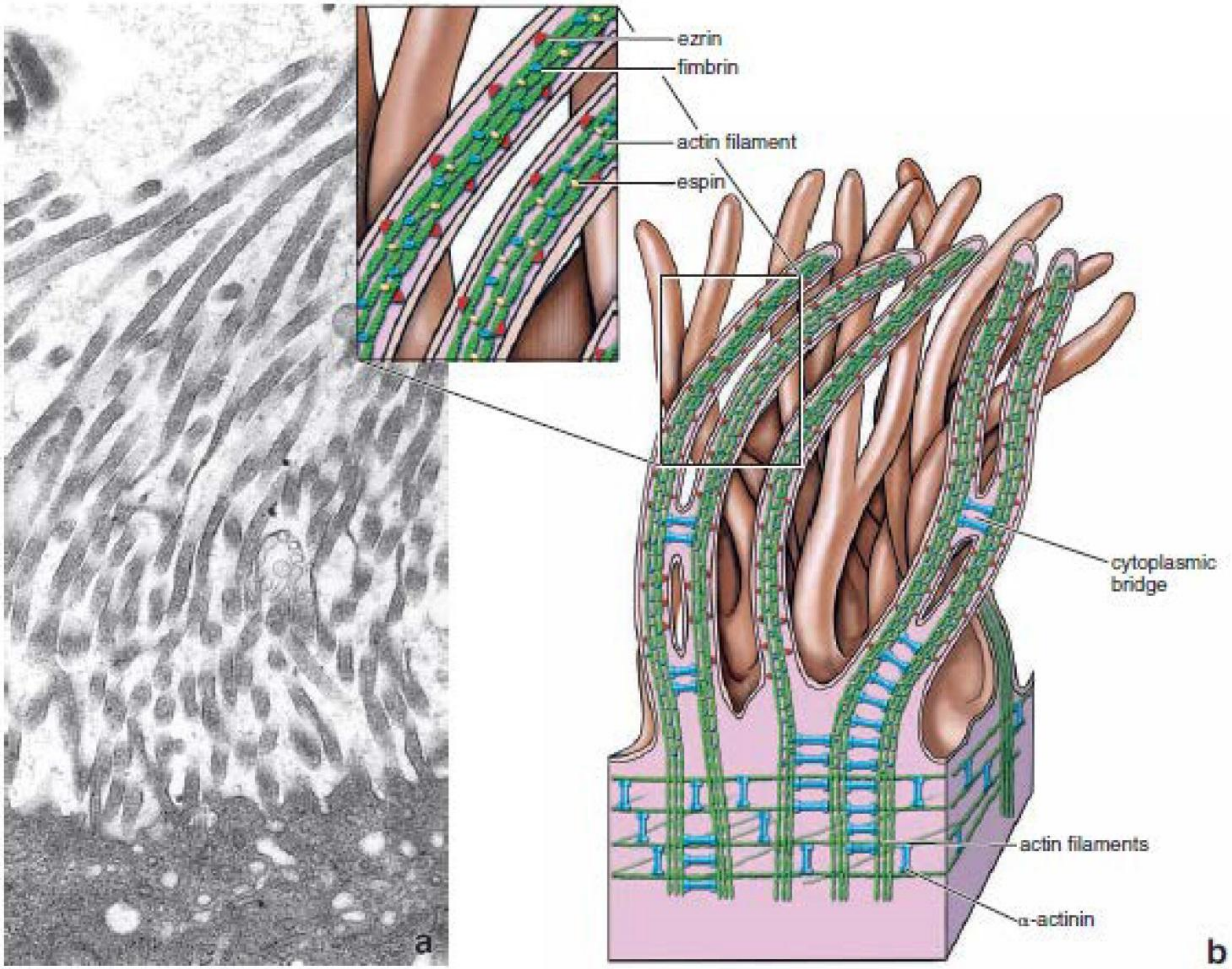


FIGURE 5.4 ▲ Molecular structure of stereocilia. a. Electron micrograph of stereocilia from the epididymis. The cytoplasmic projections are similar to microvilli, but they are extremely long. ×20,000. **b.** Schematic diagram showing the molecular structure of stereocilia. They arise from the apical cell protrusions, having thick stem portions that are interconnected by cytoplasmic bridges. Note the distribution of actin filaments within the core of the stereocilium and the actin-associated proteins, fimbrin and espin, in the elongated portion (*enlarged box*); and α-actinin in the terminal web, apical cell protrusion, and occasional cytoplasmic bridges between neighboring stereocilia.

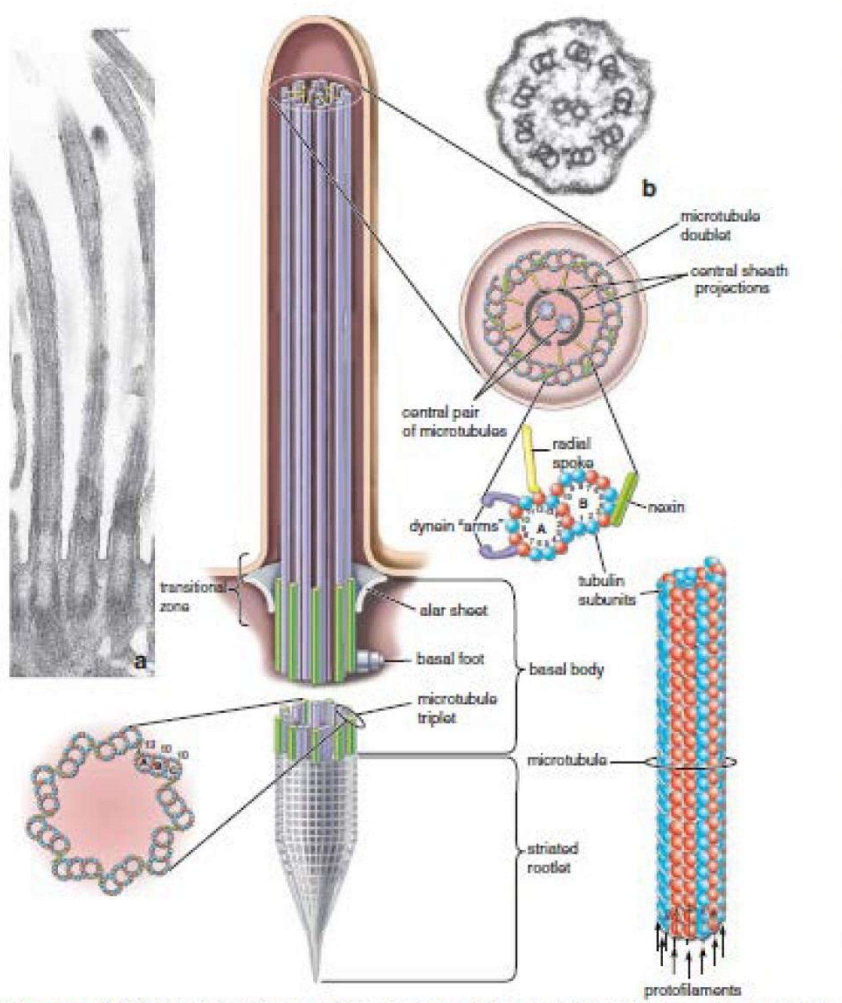


FIGURE 5.7 ▲ Molecular structure of cilia. This figure shows a three-dimensional arrangement of microtubules within the cilium and the basal body. Cross-section of the cilium (*right*) illustrates the pair of central microtubules and the nine surrounding microtubule doublets (9 + 2 configuration). The molecular structure of the microtubule doublet is shown below the cross-section. Note that the A microtubule of the doublet is composed of 13 tubulin dimers arranged in a side-by-side configuration (*lower right*), whereas the B microtubule is composed of 10 tubulin dimers and shares the remaining dimers with those of the A microtubule. The dynein arms extend from the A microtubule and make temporary cross-bridges with the B microtubule of the adjacent doublet. The basal body is anchored by the striated rootlet within the cell cytoplasm. Note the presence of the basal foot in the midsection of the basal body. The cross-section of the basal body (*lower left*) shows the arrangement of nine microtubule triplets. These structures form a ring connected by nexin molecules. Each microtubule doublet of the cilium is an extension of two inner A and B microtubules of the corresponding triplet. The C microtubule is shorter and extends only to the transitional zone. **Inset a.** Electron micrograph of longitudinally sectioned cilia from the oviduct. The internal structures within the cilia are microtubules. The basal bodies appear empty because of the absence of the central pair of microtubules in this portion of the cilium. ×20,000. **Inset b.** Electron micrograph of cross-section of the cilium showing corresponding structures with drawing below. ×180,000.

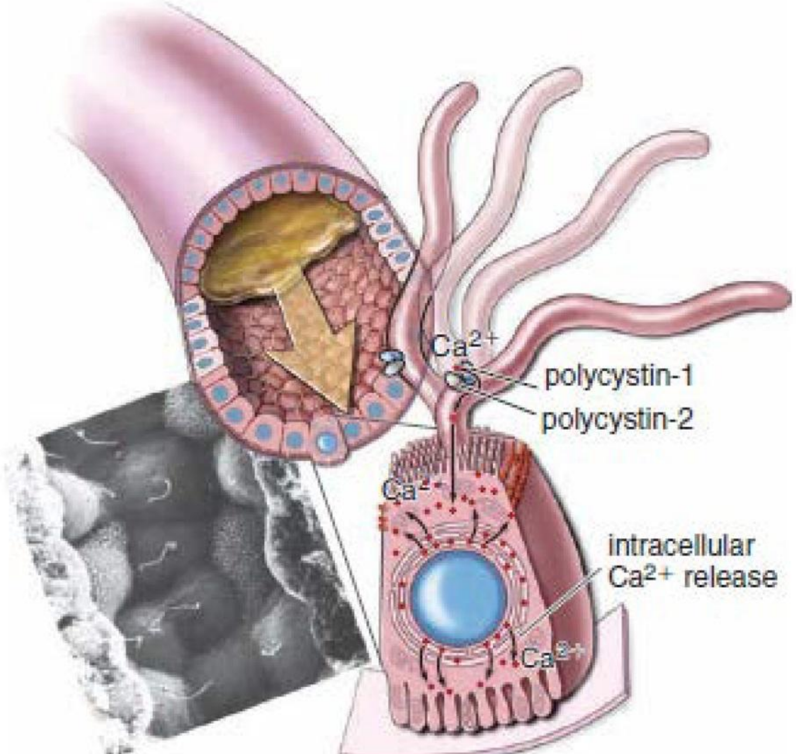


FIGURE 5.11 ▲ Primary cilium in the kidney tubule is a primary sensor for the fluid flow. Primary cilia in kidney function as sensors for the flow of fluid through the tubules. Deflection of the primary cilium opens the mechanoreceptor calcium channels, which are formed by polycystic kidney disease–associated proteins (polycystin-1 and policystin-2). This subsequently initiates the influx of calcium into the cell, releasing additional intracellular calcium from the endoplasmic reticulum. Scanning electron micrograph *inset* shows primary cilia projecting into the lumen of the collecting tubule. ×27,000. (Courtesy of Dr. C. Craig Tisher.)

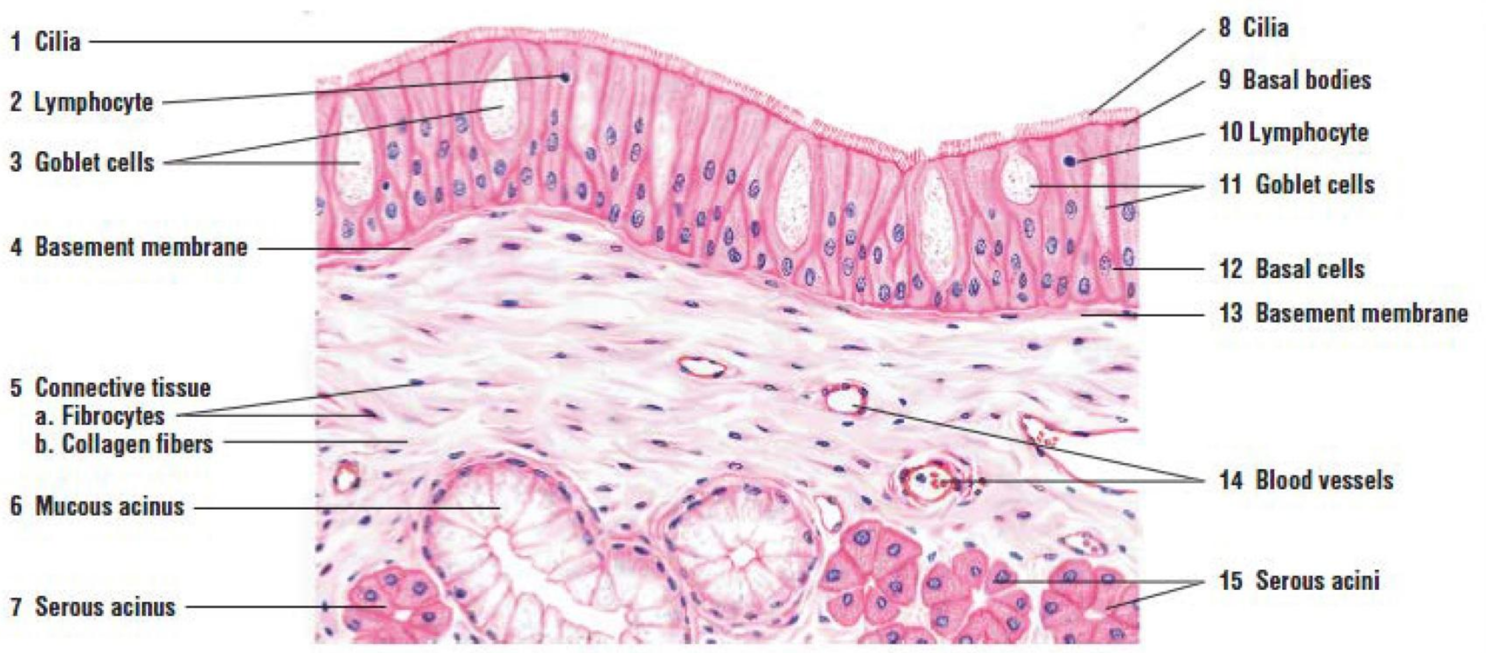


FIGURE 4.6 ■ Pseudostratified columnar ciliated epithelium: respiratory passages—trachea. Stain: hematoxylin and eosin. High magnification.

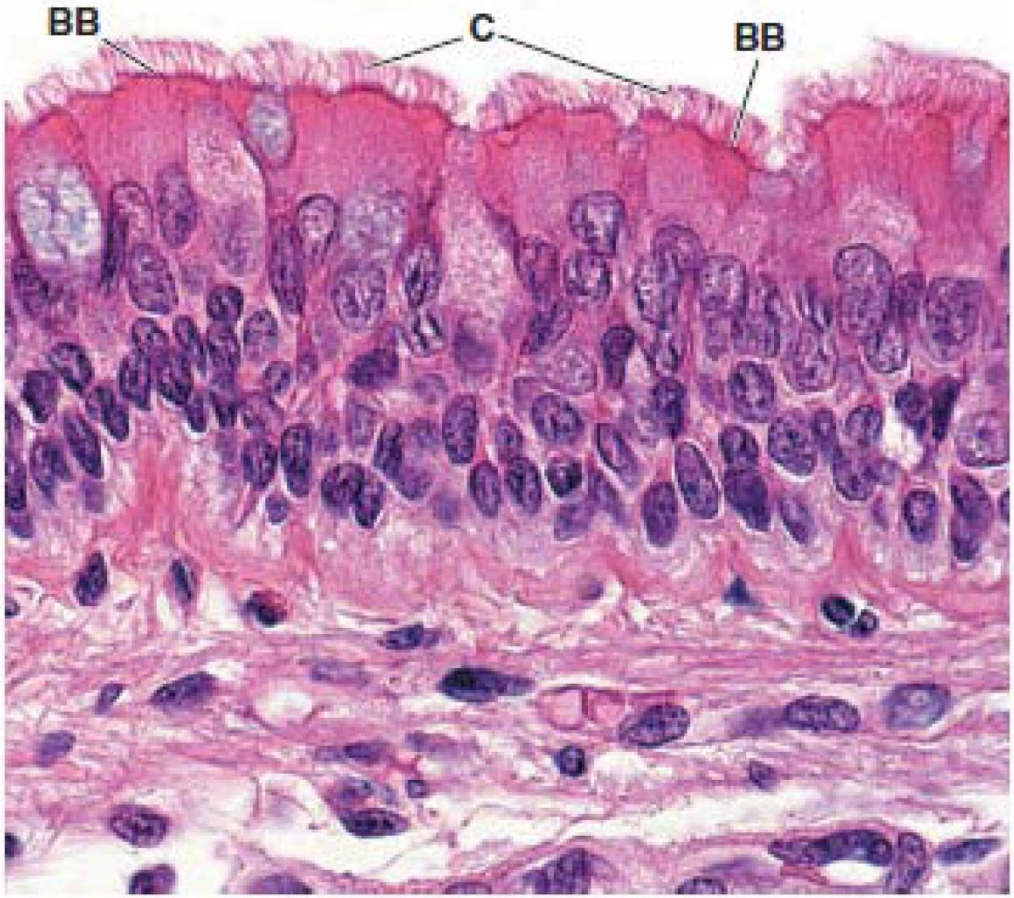


FIGURE 5.6 ▲ Ciliated epithelium. Photomicrograph of an H&E–stained specimen of tracheal pseudostratified ciliated epithelium. The cilia (*C*) appear as hair-like processes extending from the apical surface of the cells. The dark line immediately below the ciliary processes is produced by the basal bodies (*BB*) associated with the cilia. ×750.

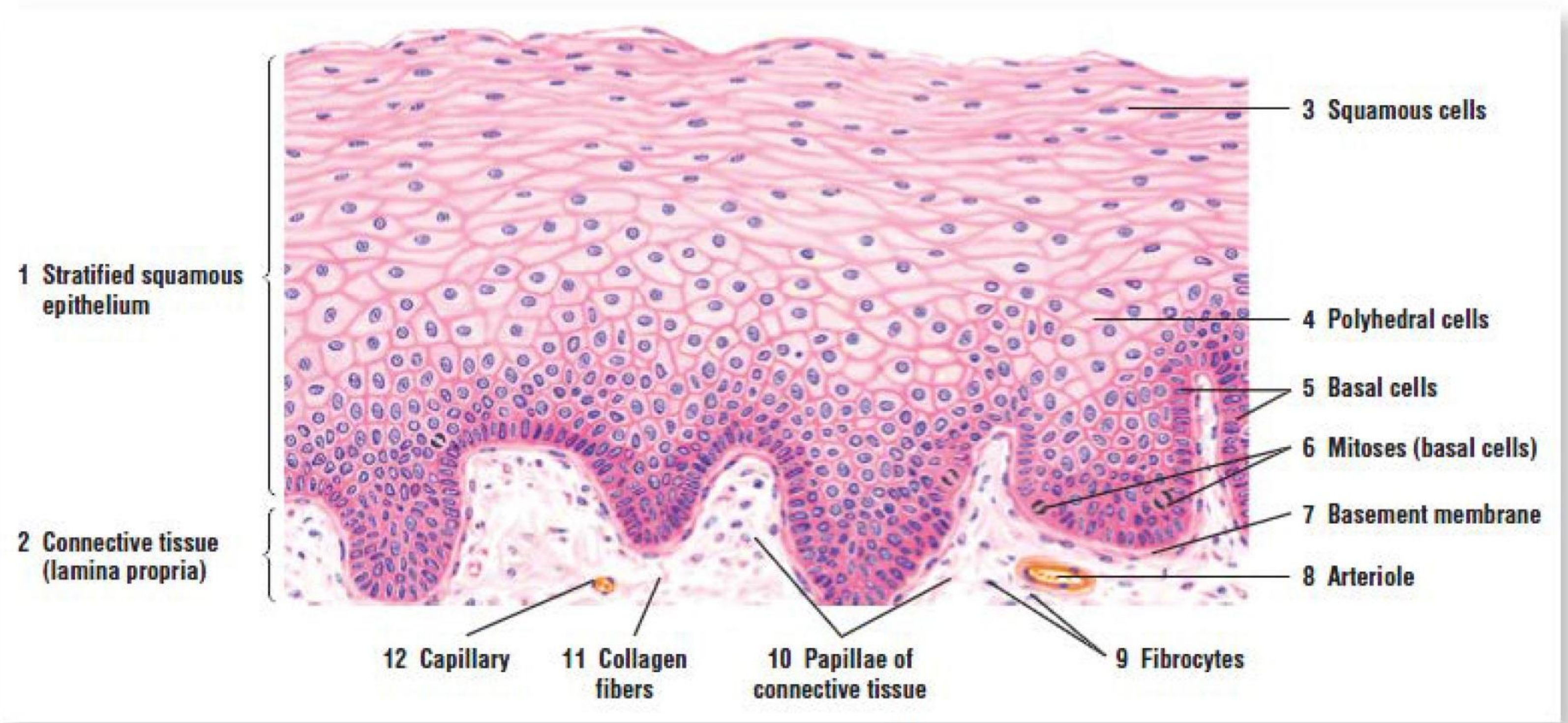


FIGURE 4.9 ■ Stratified squamous nonkeratinized epithelium: esophagus. Stain: hematoxylin and eosin. Medium magnification.

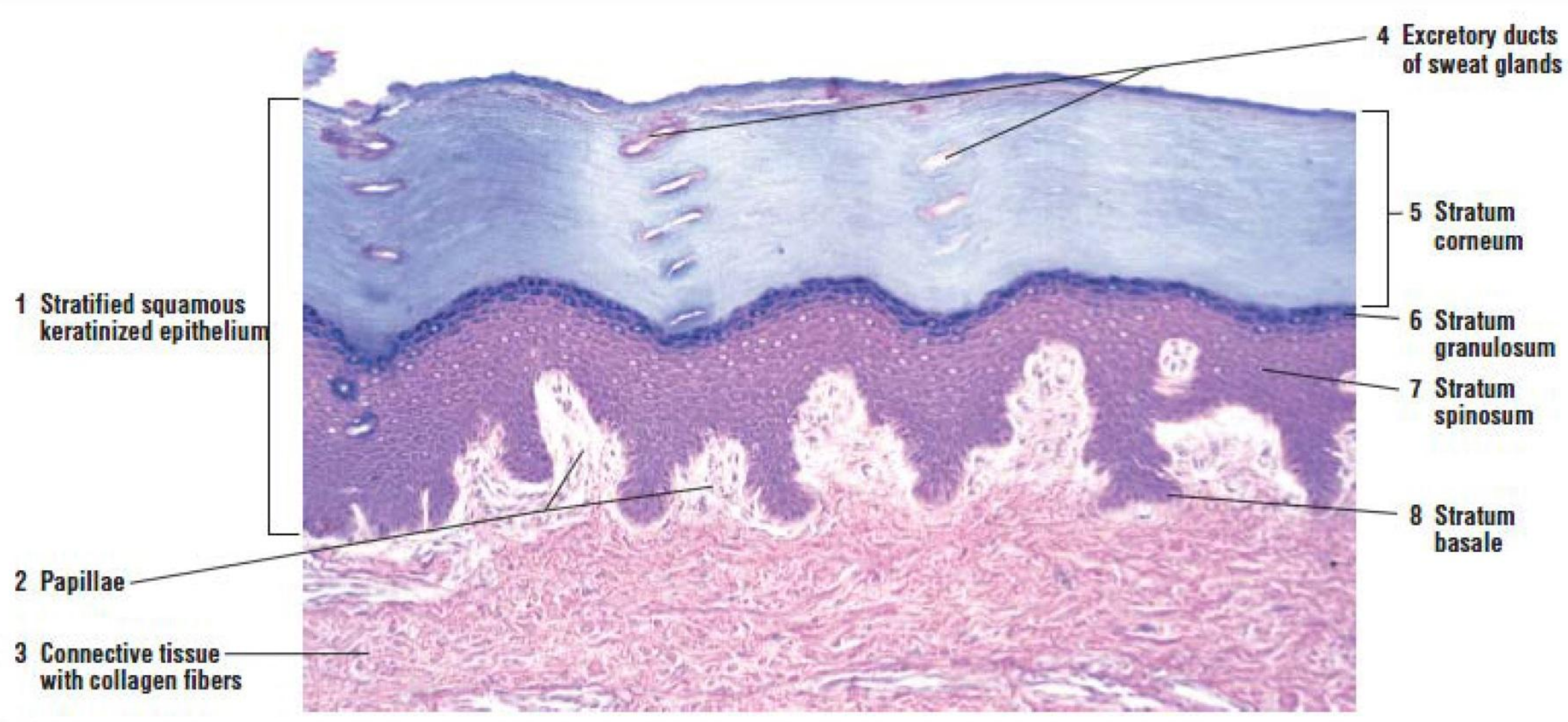


FIGURE 4.10 ■ Stratified squamous keratinized epithelium: palm of the hand. Stain: hematoxylin and eosin. ×40.

FIGURE 4.7 ■ Transitional epithelium: bladder (unstretched, or relaxed). Stain: hematoxylin and eosin. High magnification.

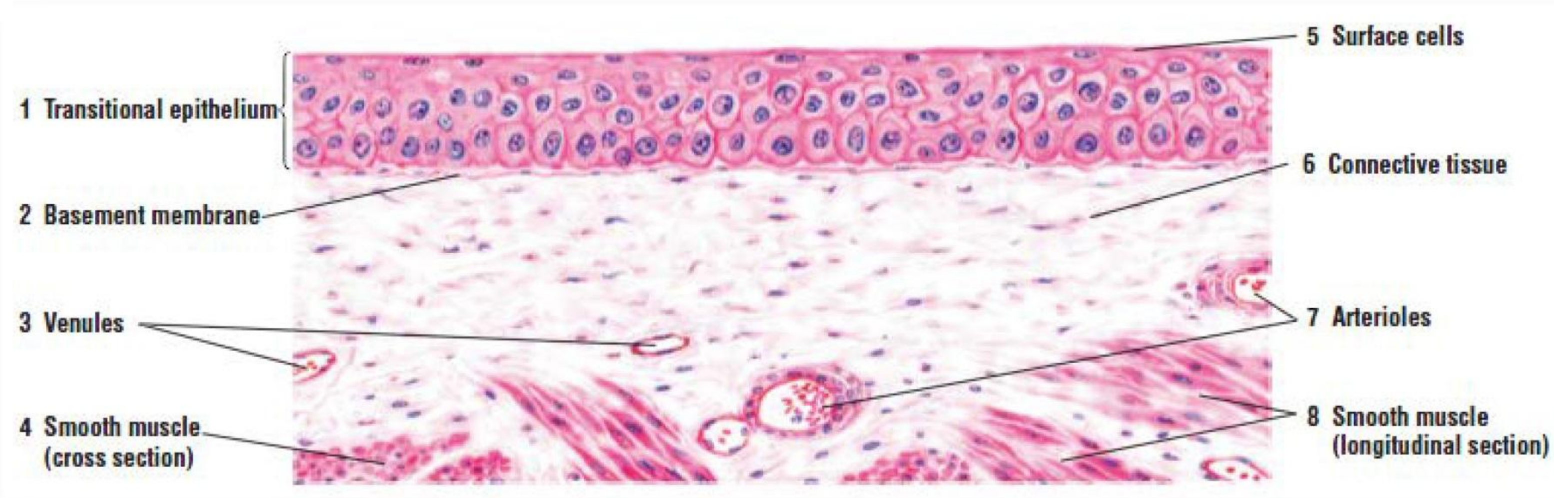


FIGURE 4.8 ■ Transitional epithelium: bladder (stretched). Stain: hematoxylin and eosin. High magnification.

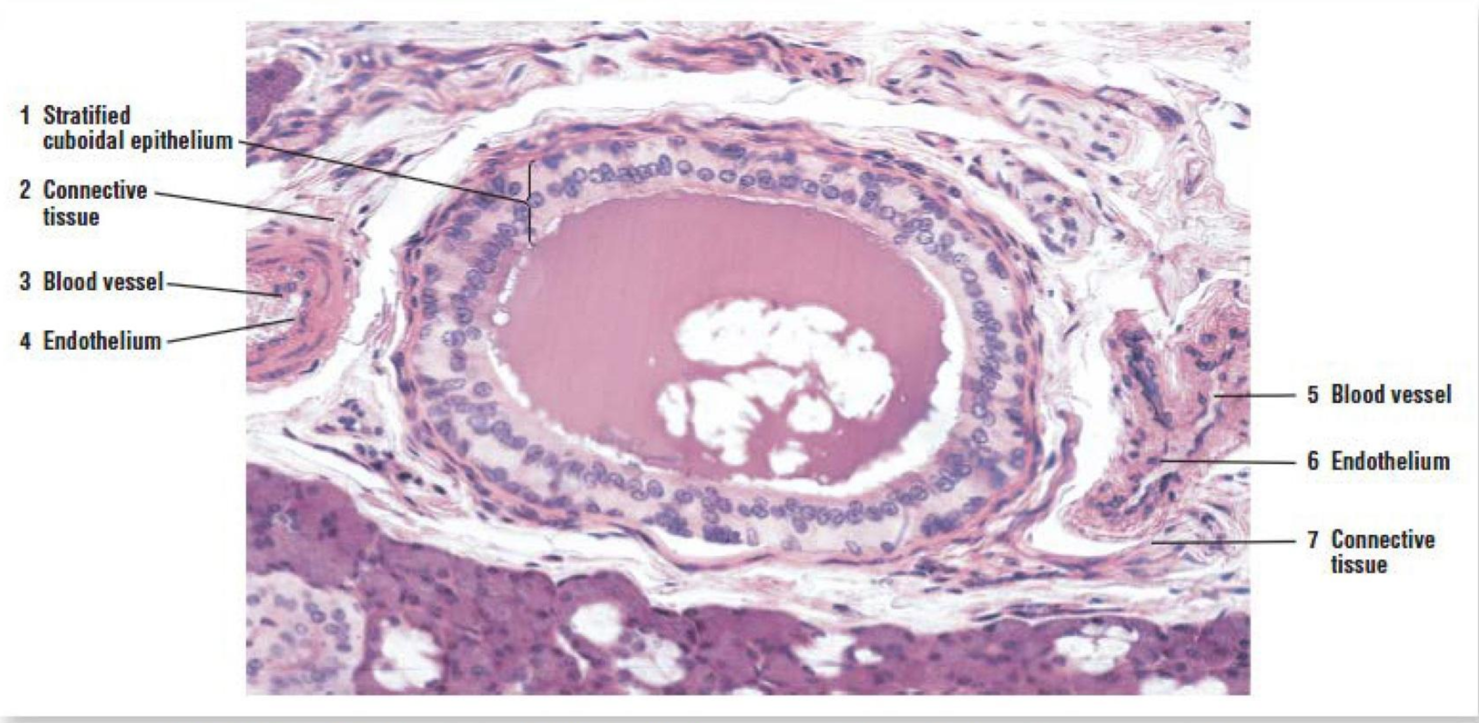


FIGURE 4.11 ■ Stratified cuboidal epithelium: an excretory duct in the salivary gland. Stain: hematoxylin and eosin. ×100.

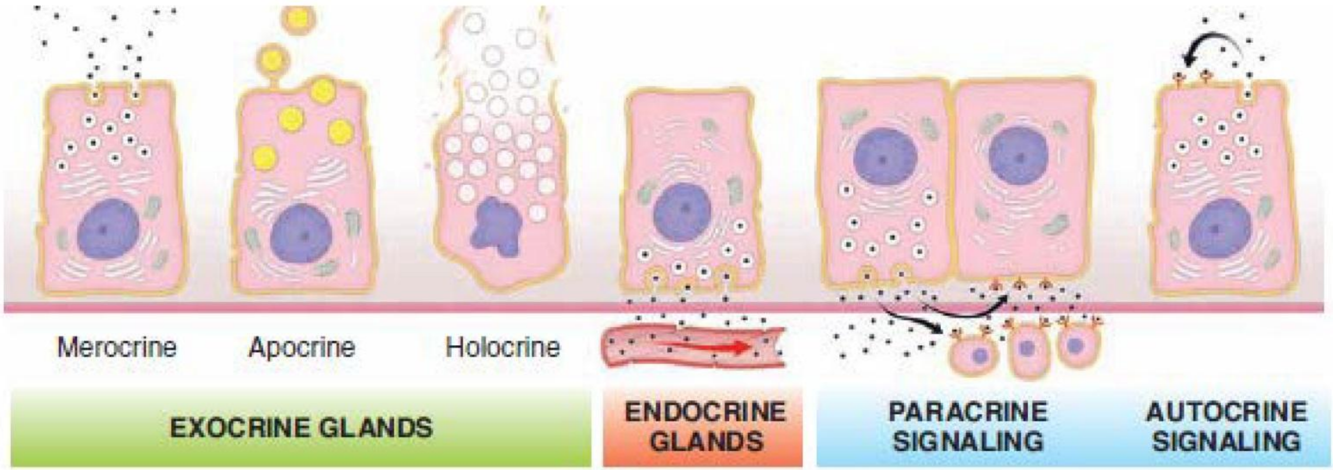
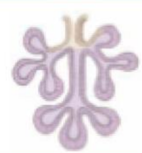
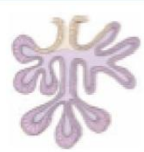


FIGURE 5.38 ▲ Types of glands and their mechanism of secretion. This diagram shows two types of glands (exocrine and endocrine) and two types of signaling mechanisms (paracrine and autocrine) that are used to influence behavior of nearby cells. Note that the three basic types of secretions are shown in cells of the exocrine glands. Merocrine secretion is the most common and involves exocytosis of the vesicle content at the apical cell membrane. The best example of holocrine secretion causing disintegration of secretory cells is seen in sebaceous glands of hair follicles, whereas apocrine secretion is best observed in mammary gland cells that secrete lipid droplets into milk.

TABLE 5.5 Classification of Multicellular Glands

	Classification		Typical Location	Features
Simple Glands	**Simple tubular**		Large intestine: intestinal glands of the colon	Secretory portion of the gland is a straight tube formed by the secretory cells (goblet cells)
	Simple coiled tubular		Skin: eccrine sweat gland	Coiled tubular structure is composed of the secretory portion located deep in the dermis
	Simple branched tubular		Stomach: mucus-secreting glands of the pylorus Uterus: endometrial glands	Branched tubular glands with wide secretory portion are formed by the secretory cells and produce a viscous mucous secretion
	Simple acinar		Urethra: paraurethral and periurethral glands	Simple acinar glands develop as an outpouching of the transitional epithelium and are formed by a single layer of secretory cells
	Branched acinar		Stomach: mucus-secreting glands of cardia Skin: sebaceous glands	Branched acinar glands with secretory portions are formed by mucus-secreting cells; the short, single-duct portion opens directly into the lumen
Compound Glands	**Compound tubular**		Duodenum: submucosal glands of Brunner	Compound tubular glands with coiled secretory portions are located deep in the submucosa of the duodenum
	Compound acinar		Pancreas: exocrine portion	Compound acinar glands with alveolar-shaped secretory units are formed by pyramid-shaped serous-secreting cells
	Compound tubuloacinar		Submandibular salivary gland	Compound tubuloacinar glands can have both mucous branched tubular and serous branched acinar secretory units; they have serous end-caps (demilunes)

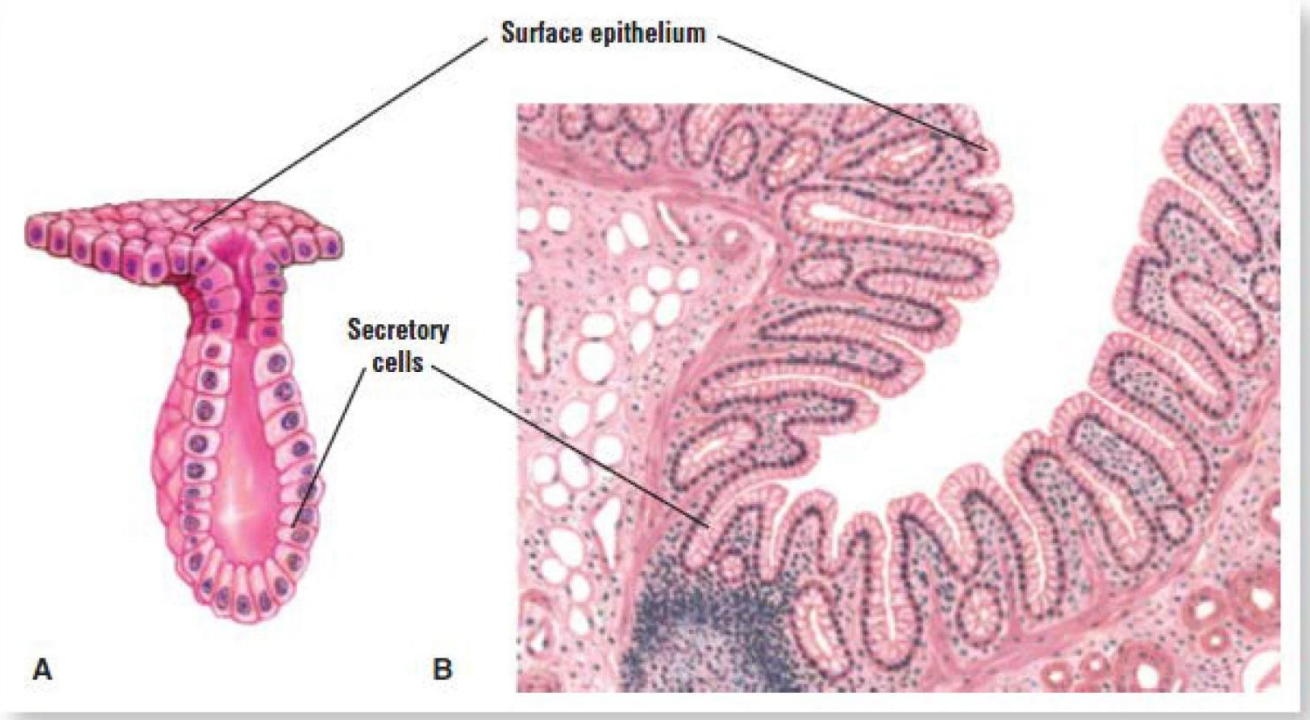


FIGURE 4.12 ■ Unbranched simple tubular exocrine glands: intestinal glands. (A) Diagram of gland. (B) Transverse section of large intestine. Stain: hematoxylin and eosin. Medium magnification.

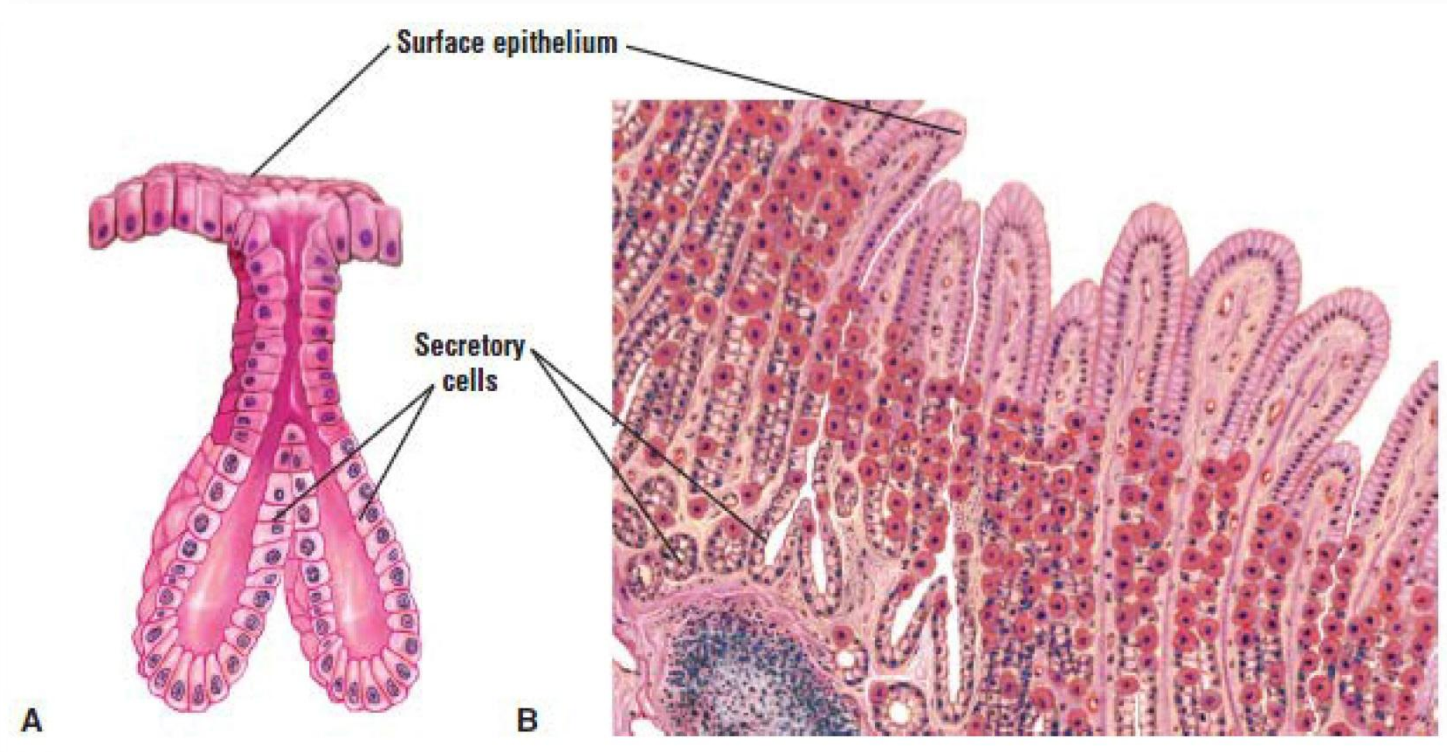


FIGURE 4.13 ■ Simple branched tubular exocrine gland: gastric glands. (A) Diagram of gland. (B) Transverse section of stomach. Stain: hematoxylin and eosin. Low magnification.

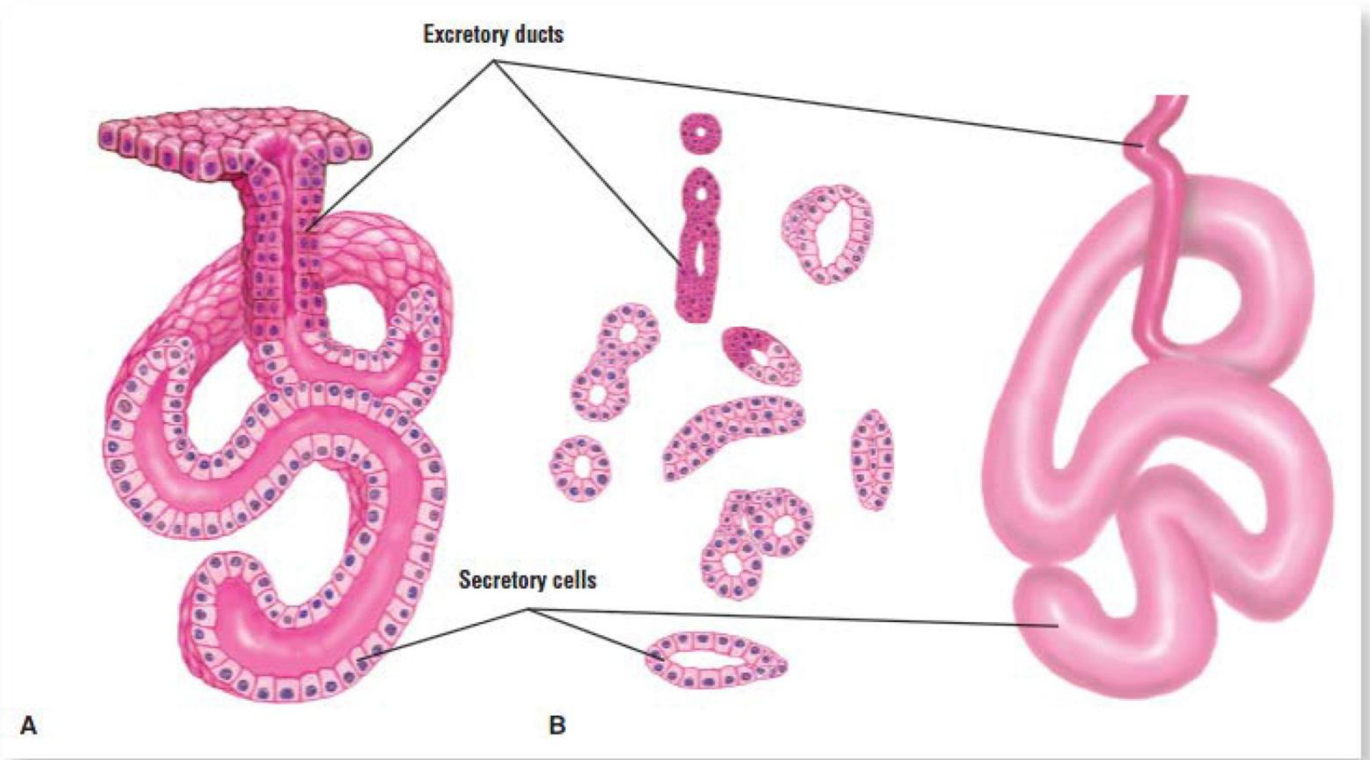


FIGURE 4.14 ■ Coiled tubular exocrine glands: sweat glands. (A) Diagram of gland. (B) Transverse and three-dimensional view of coiled sweat gland. Stain: hematoxylin and eosin. Medium magnification.

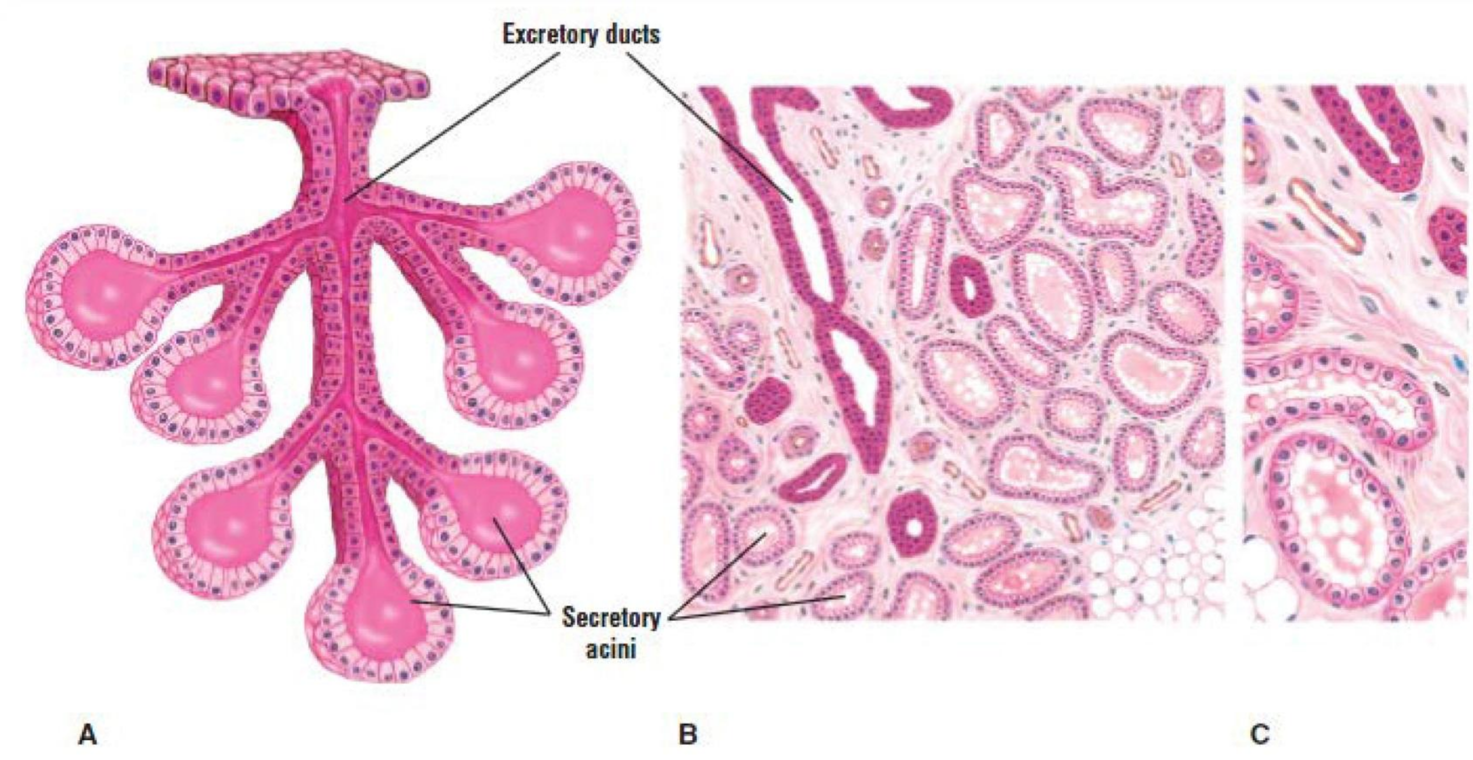


FIGURE 4.15 ■ Compound acinar exocrine gland: mammary gland. (A) Diagram of gland. (B and C) Mammary gland during lactation. Stain: hematoxylin and eosin. (B) Low magnification. (C) Medium magnification.

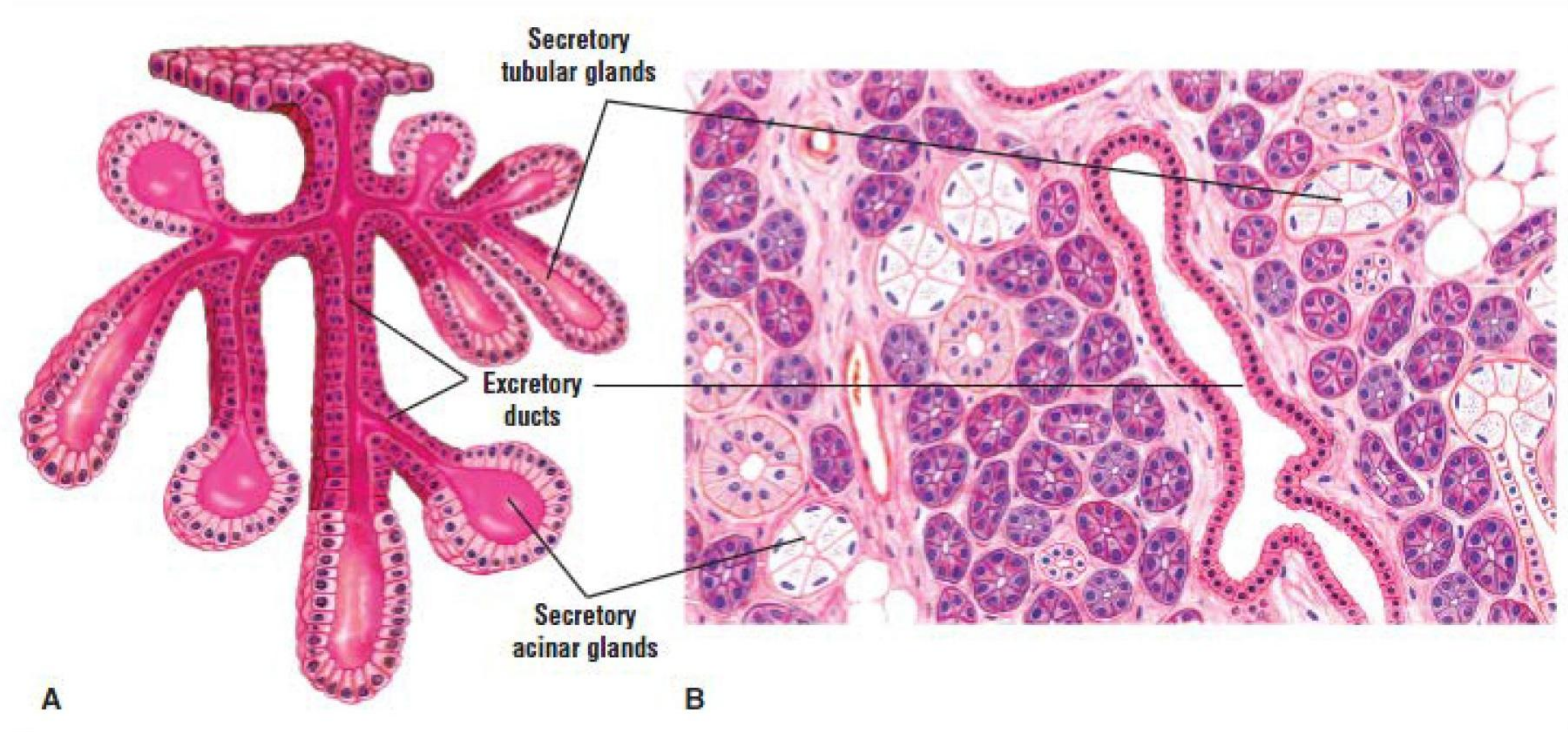


FIGURE 4.16 ■ Compound tubuloacinar (exocrine) gland: salivary gland. (A) Diagram of gland. (B) Submandibular salivary gland. Stain: hematoxylin and eosin. Low magnification.

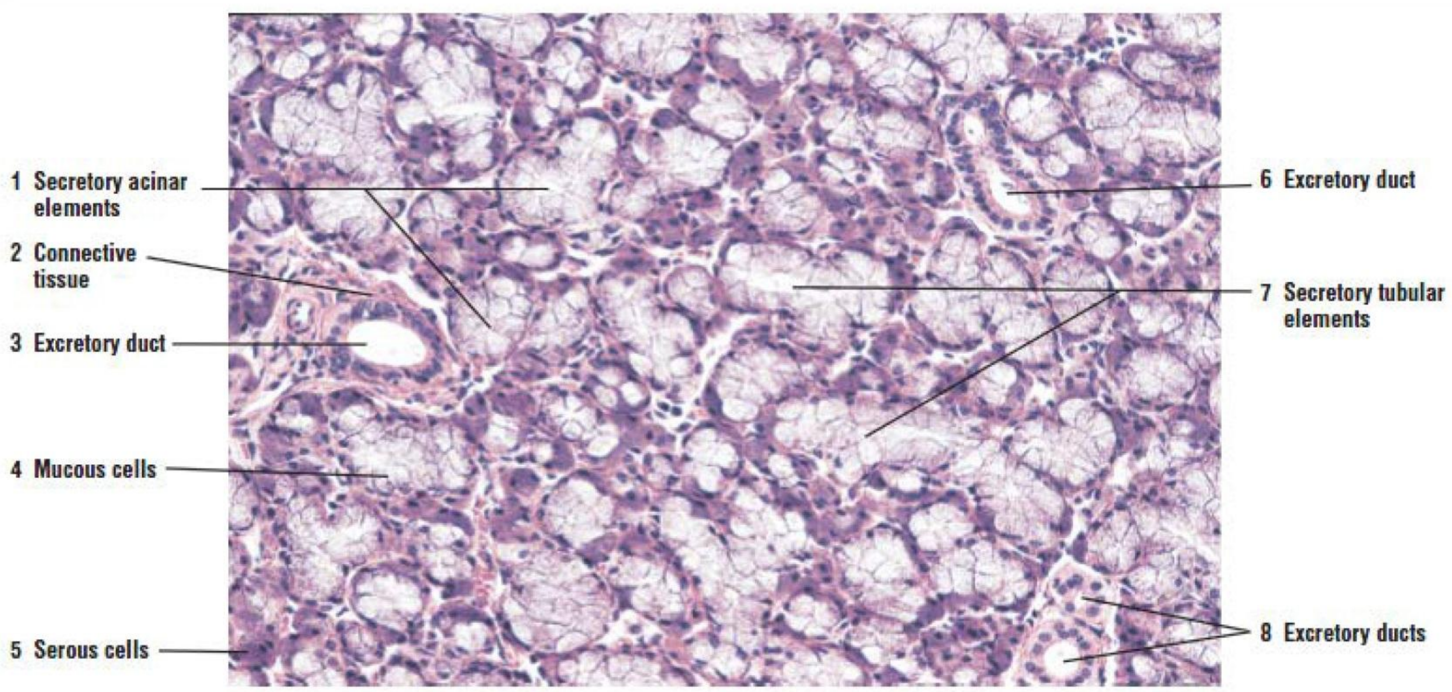


FIGURE 4.17 ■ Compound tubuloacinar (exocrine) gland: submaxillary salivary gland. Stain: hematoxylin and eosin. ×64.

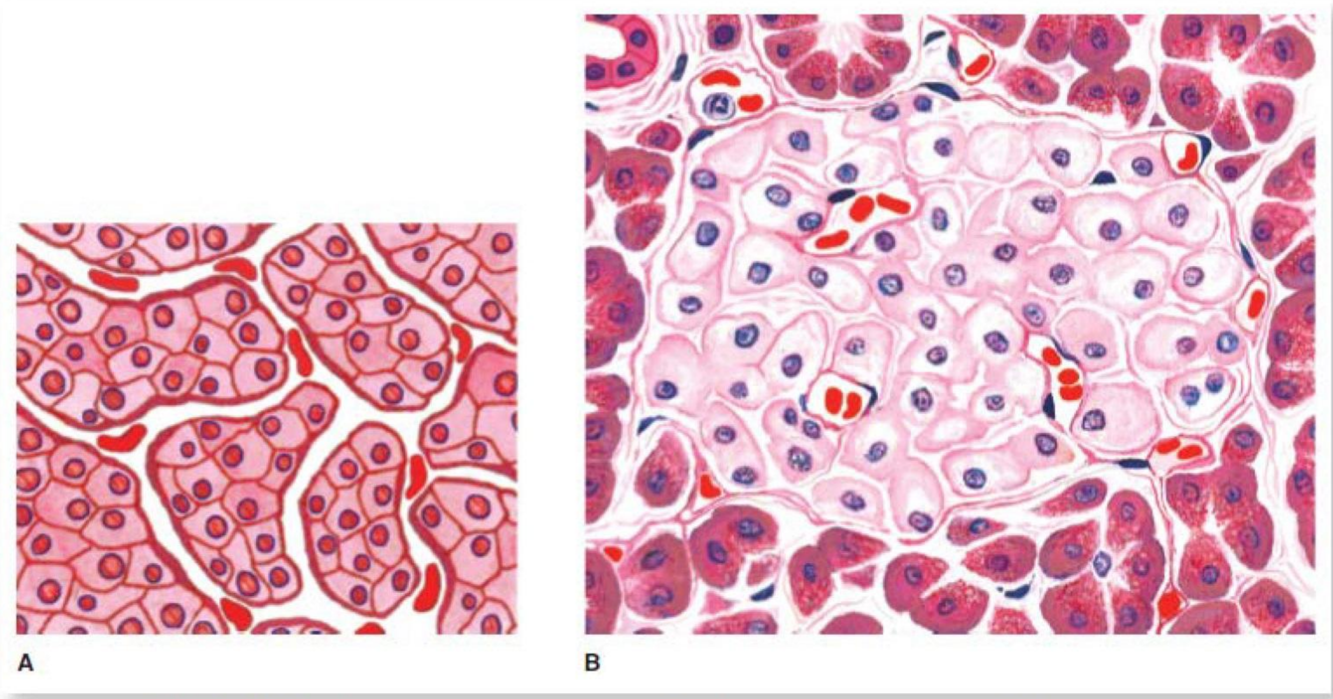


FIGURE 4.18 ■ Endocrine gland: pancreatic islet. (A) Diagram of pancreatic islet. (B) High magnification of endocrine and exocrine pancreas. Stain: hematoxylin and eosin. High magnification.

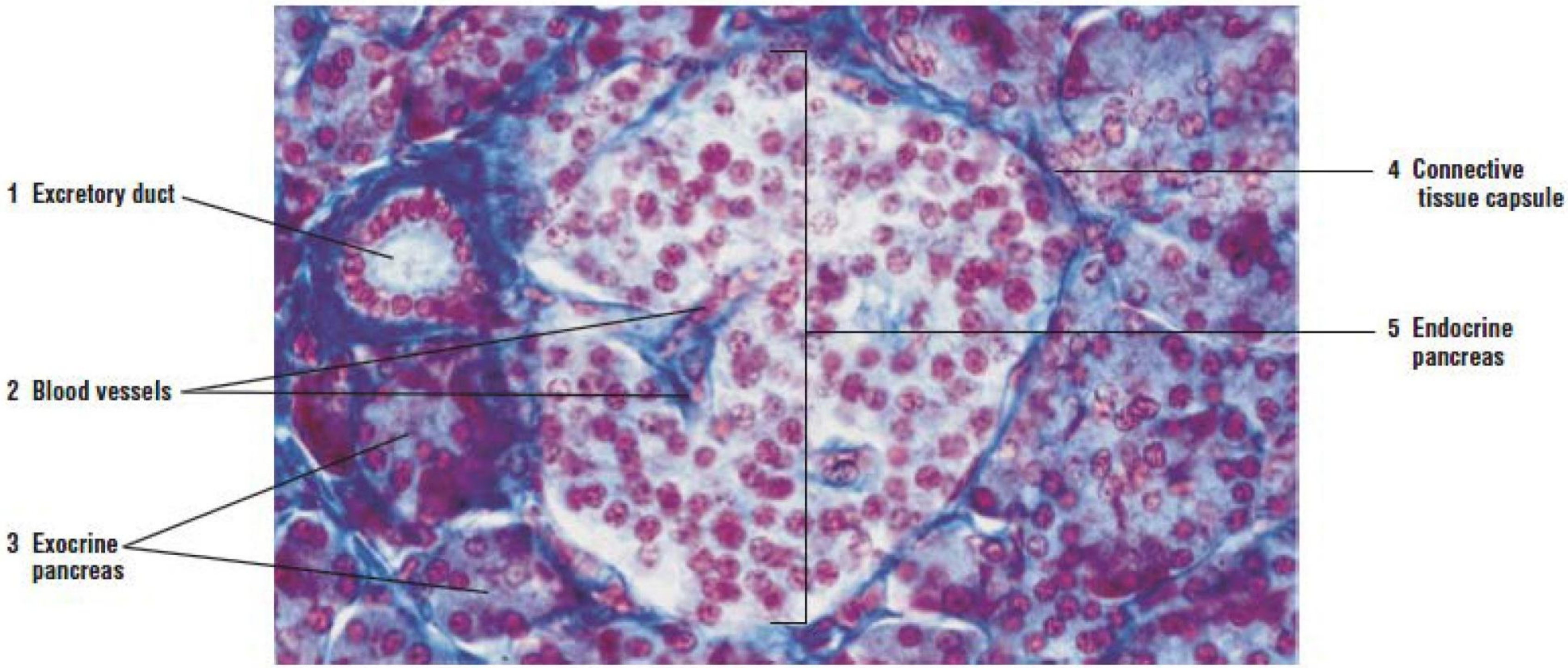
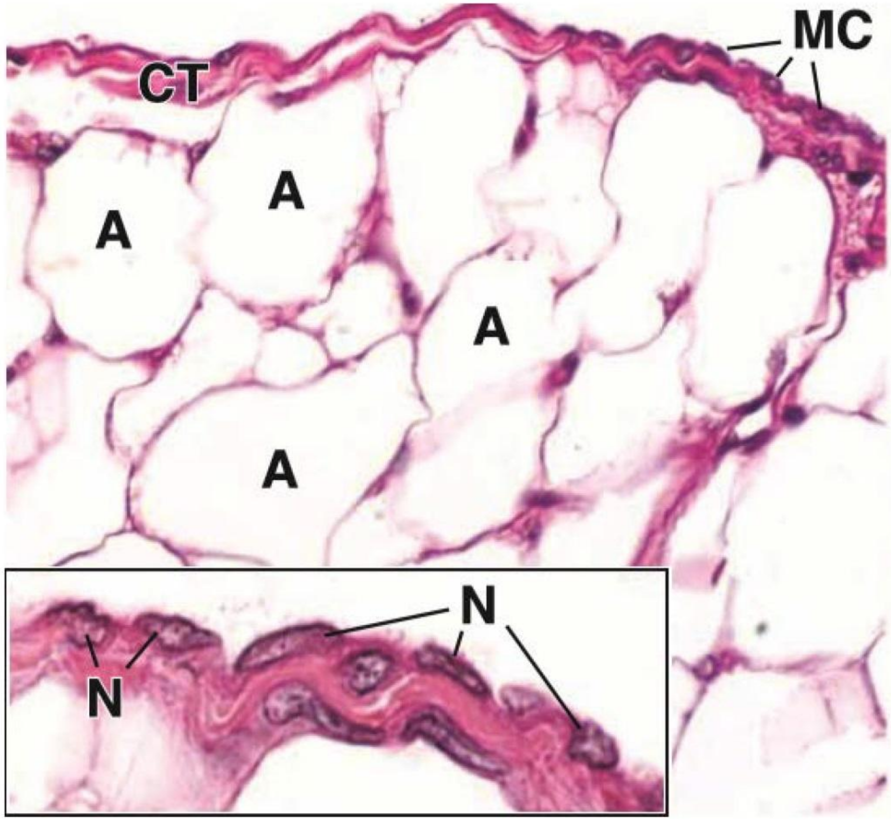
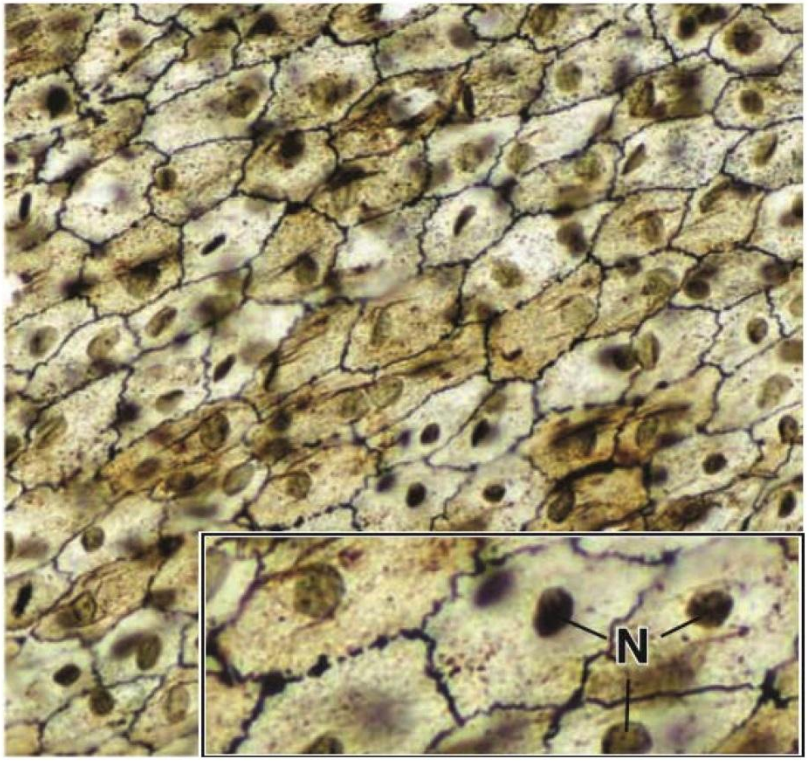


FIGURE 4.19 ■ Endocrine and exocrine pancreas. Stain: Mallory-Azan. ×100.



Однослойный плоский эпителий.



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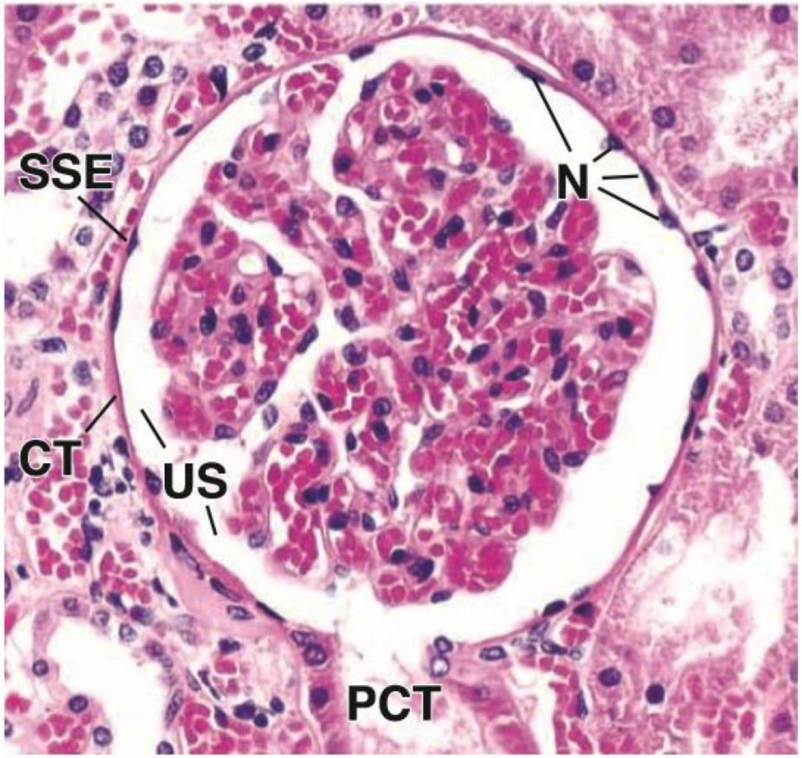
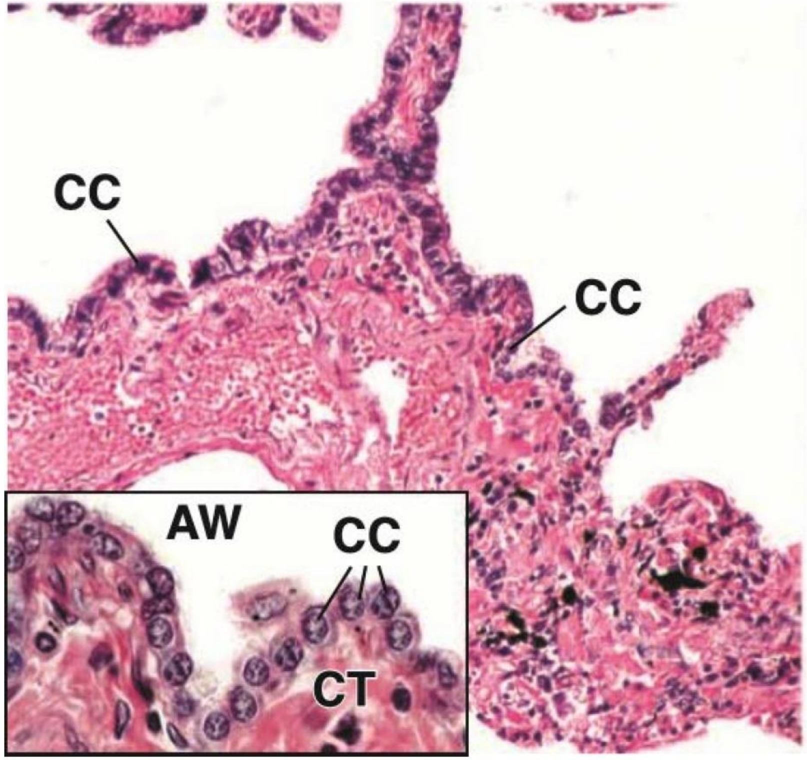


Однослойный плоский эпителий (почка).



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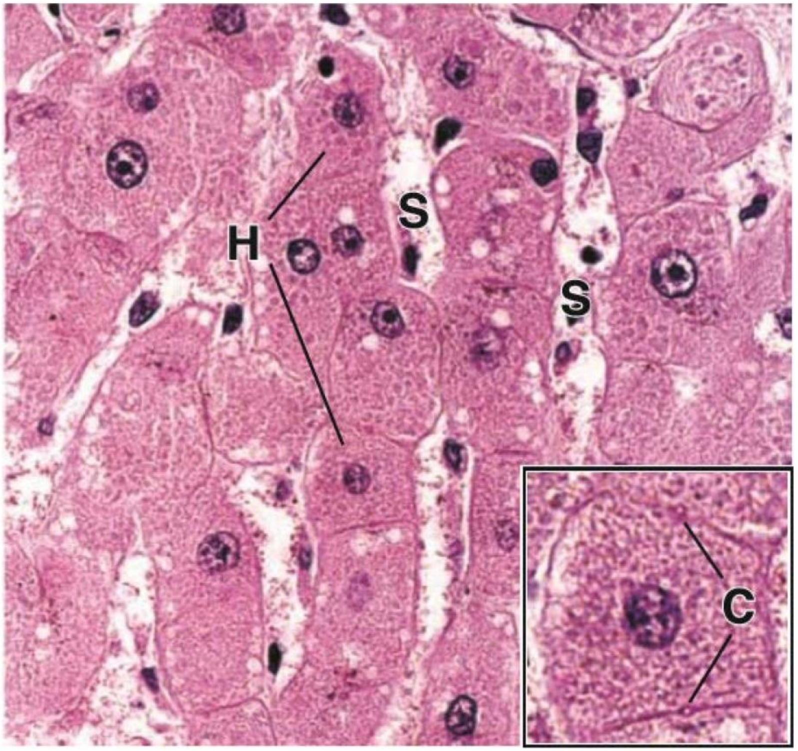
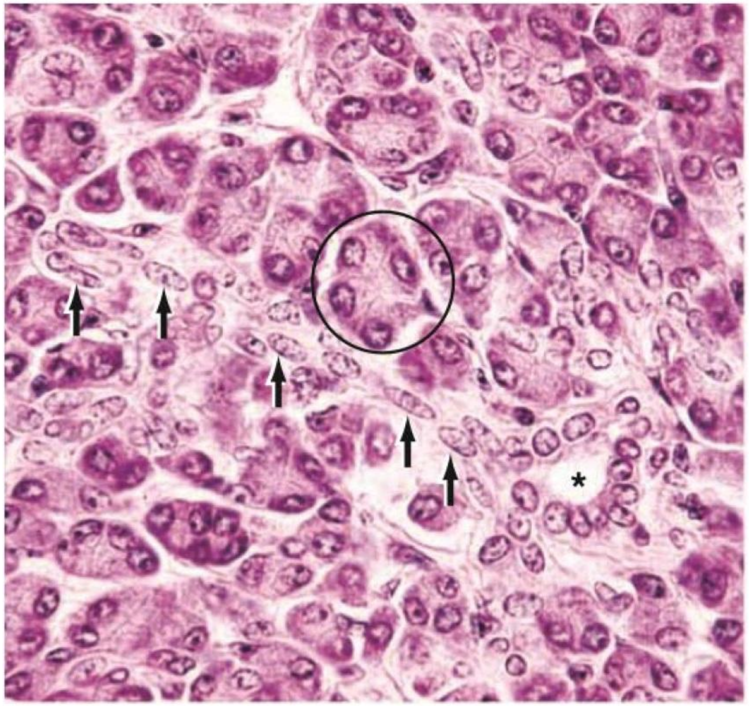
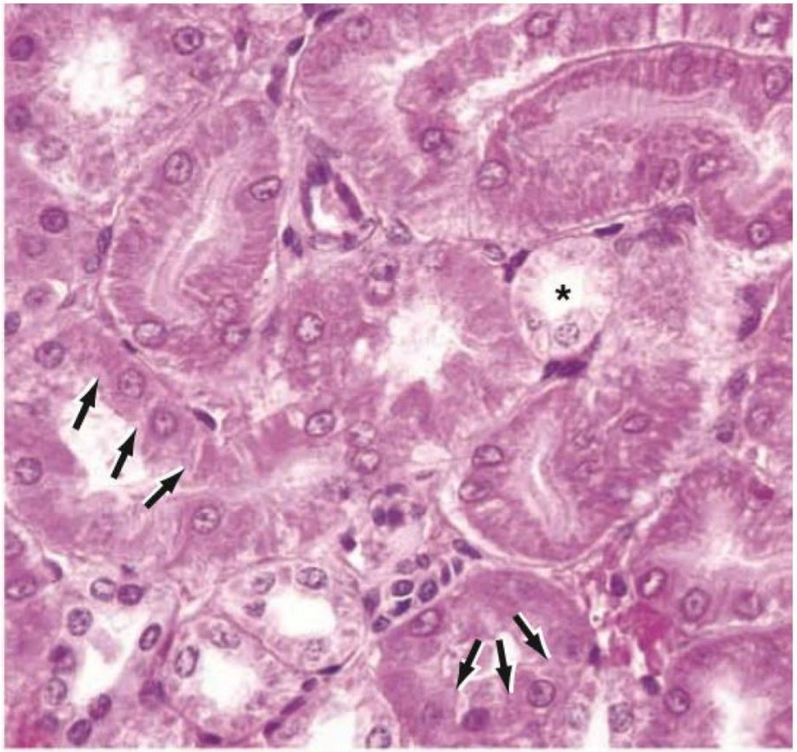


Однослойный кубический эпителий (печень).



Однослойный эпителий (экзокринная часть поджелудочной железы).



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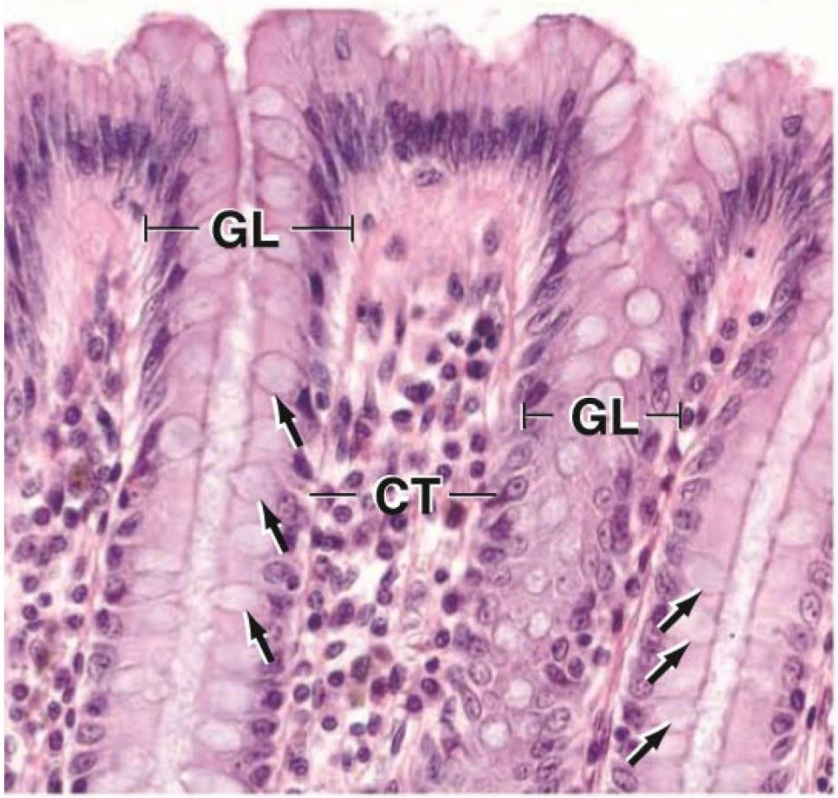
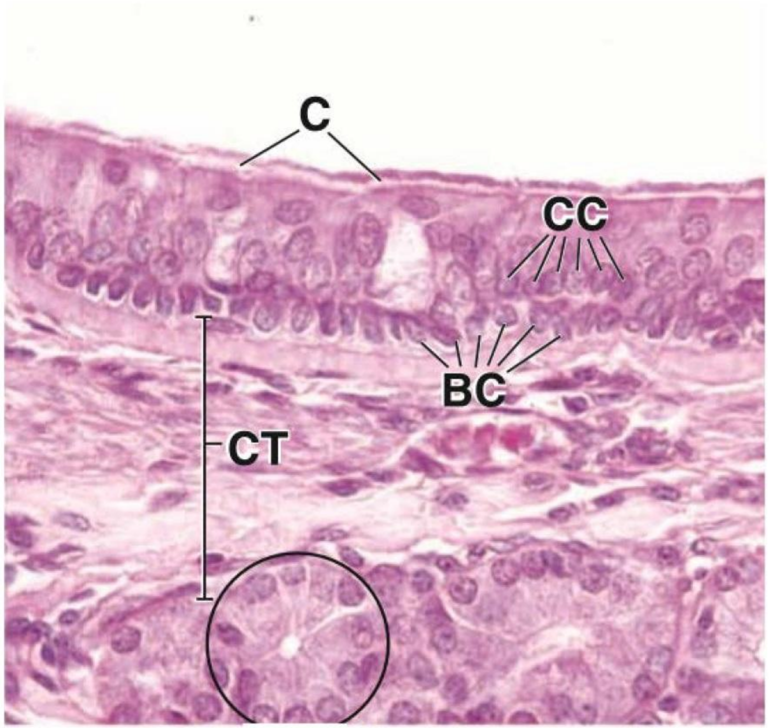
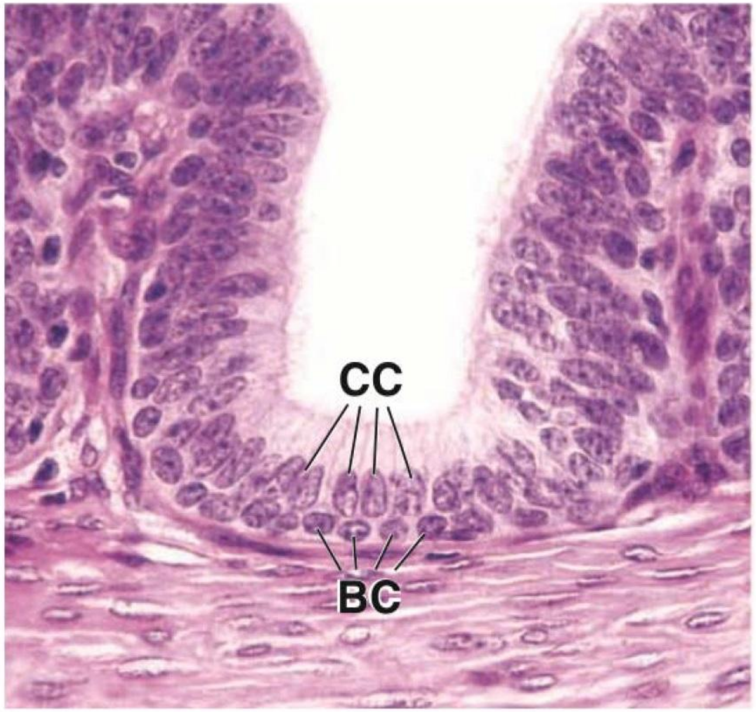


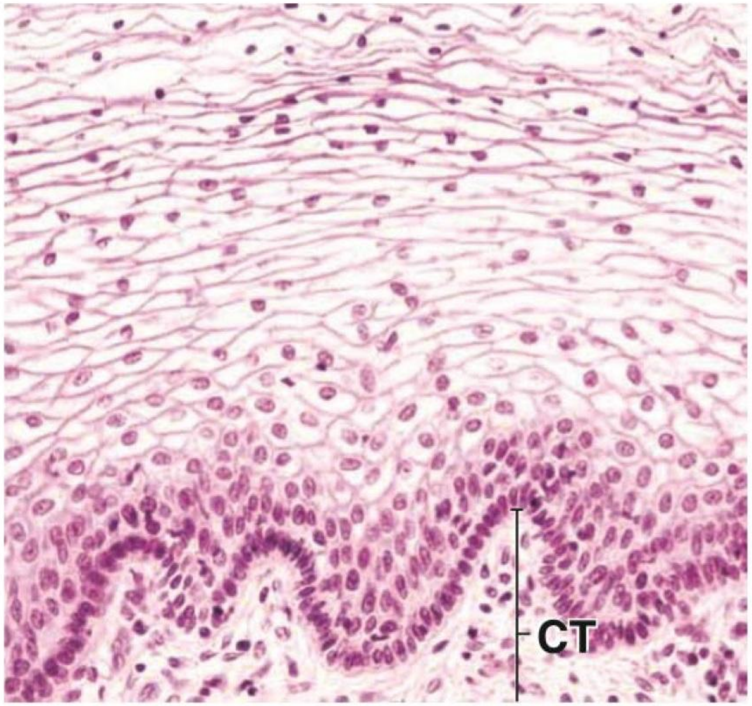
Однослойный призматический эпителий.



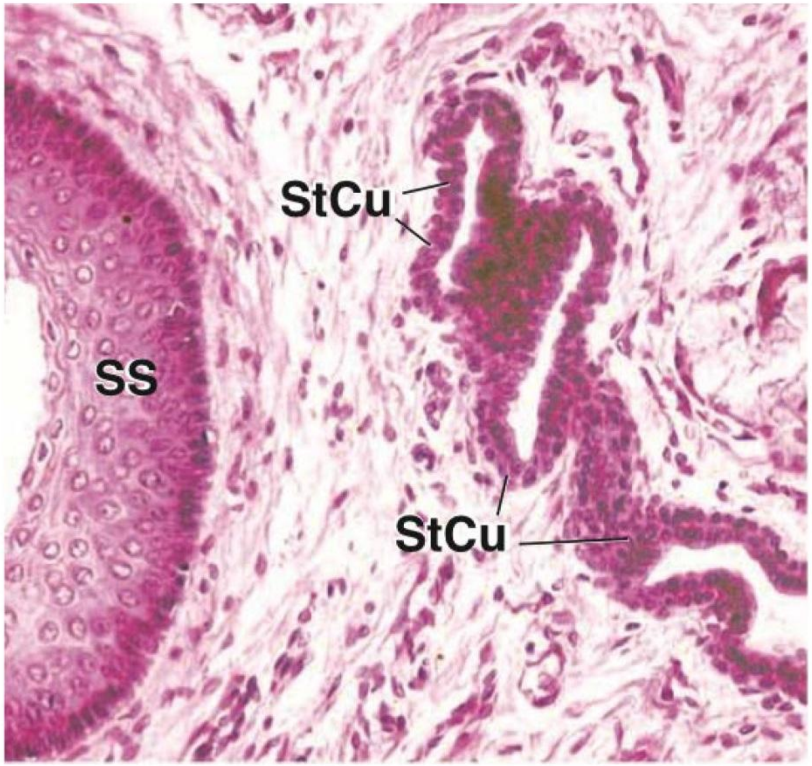
Многорядный эпителий (трахея).



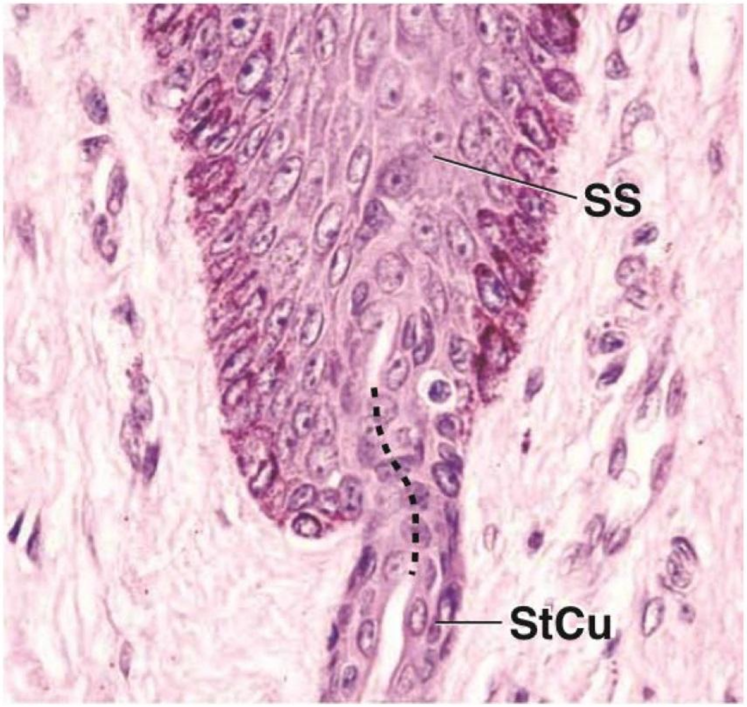
Многорядный эпителий (придаток яичка).



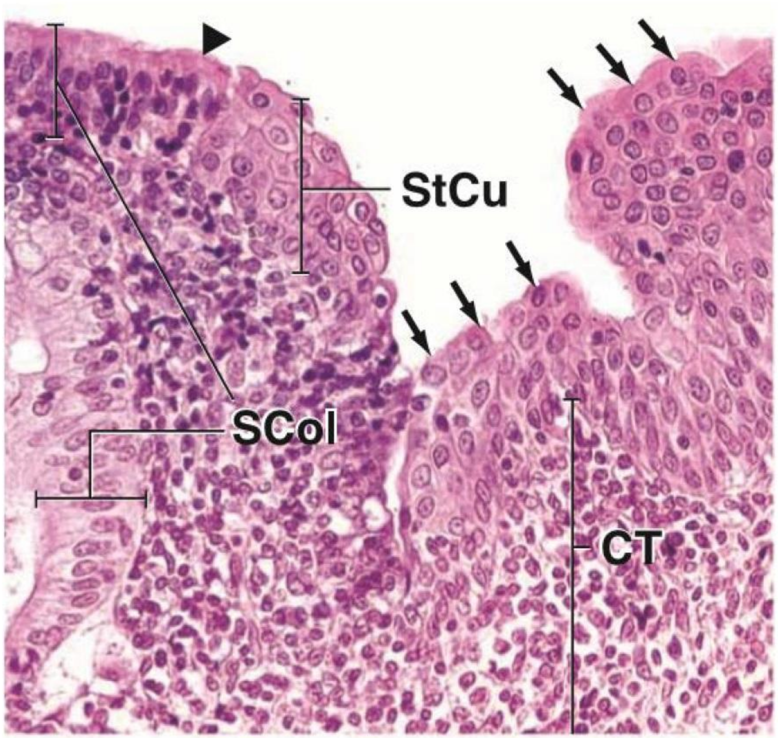
Многослойный плоский неороговевающий эпителий (влагалище).



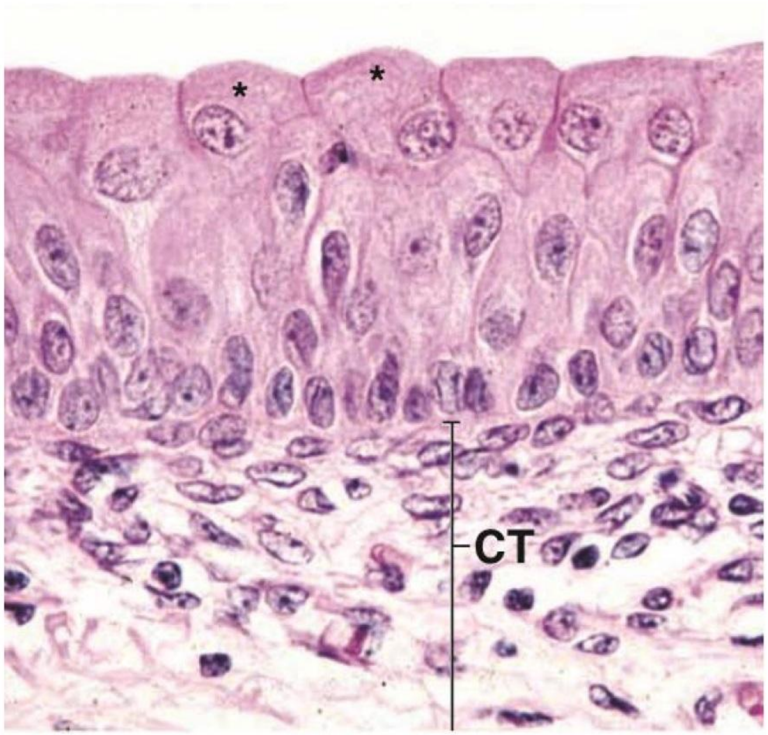
Многослойный плоский неороговевающий эпителий (пищевод).



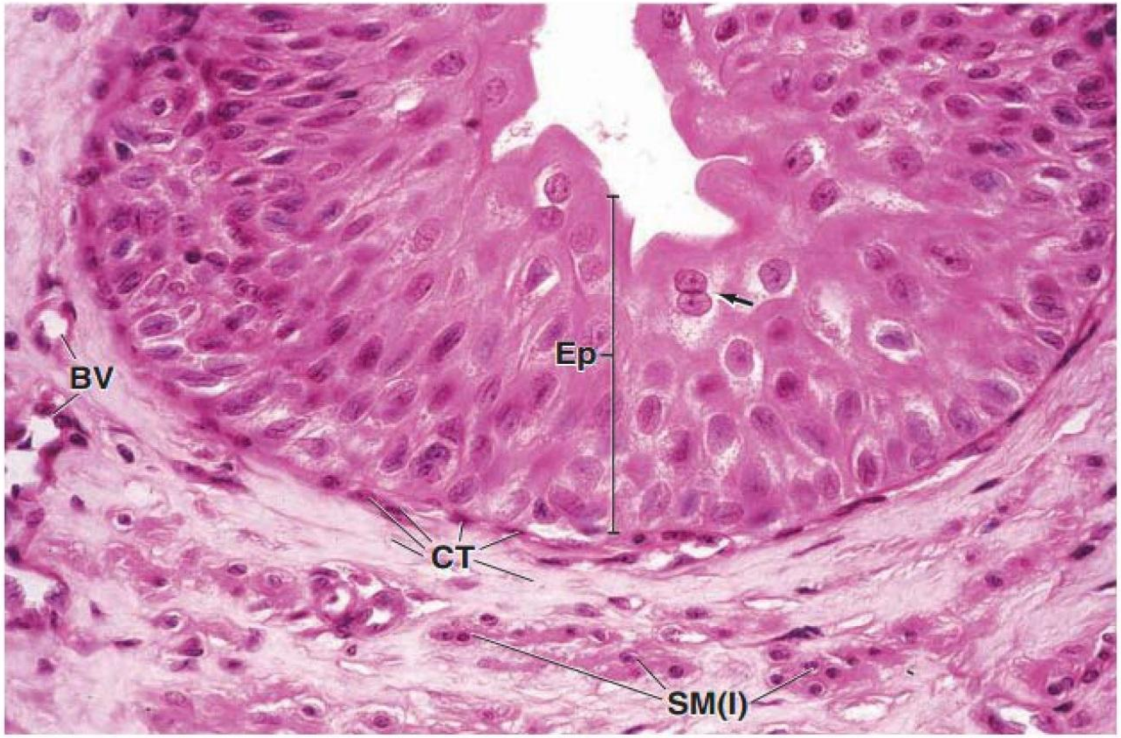
Многослойный плоский ороговевающий эпителий (кожа) с участком кубического эпителия.



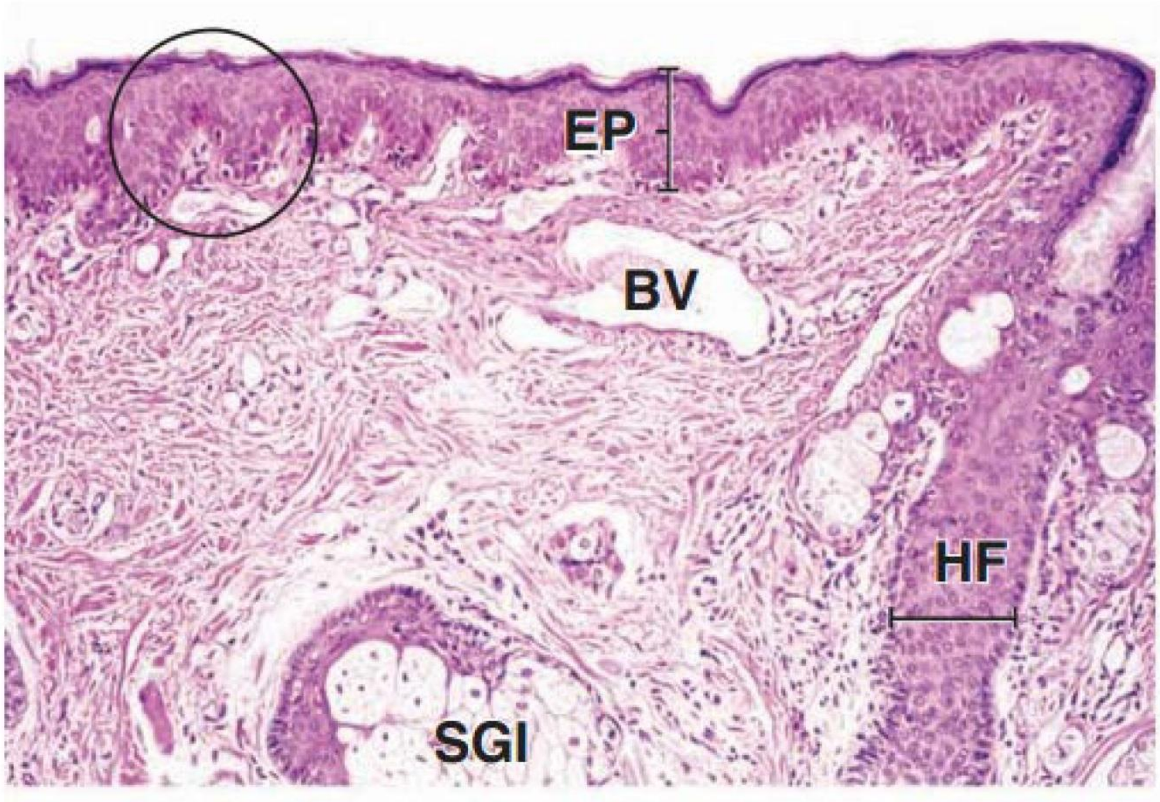
Участок перехода неороговевающего эпителия в ороговевающий в области аноректального соединения.



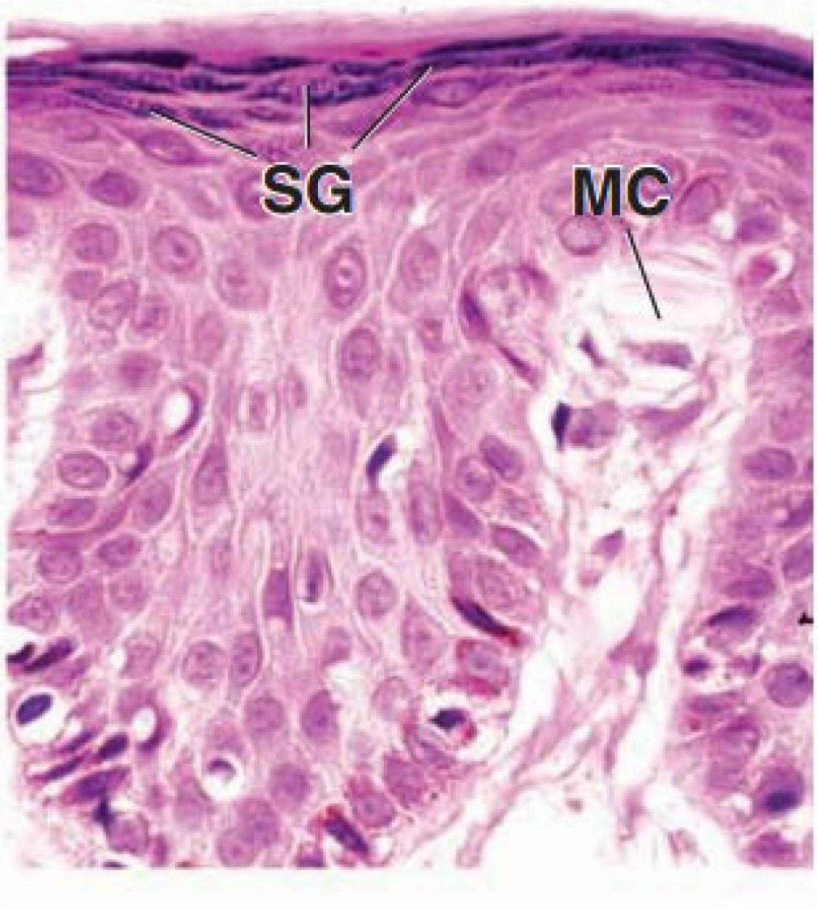
Переходный эпителий.



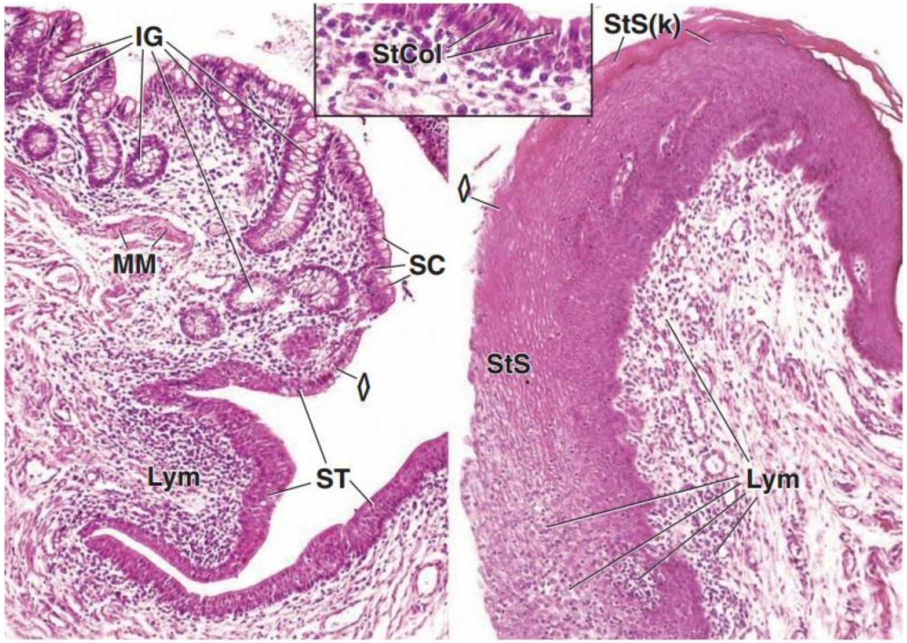
Переходный эпителий мочеточника.



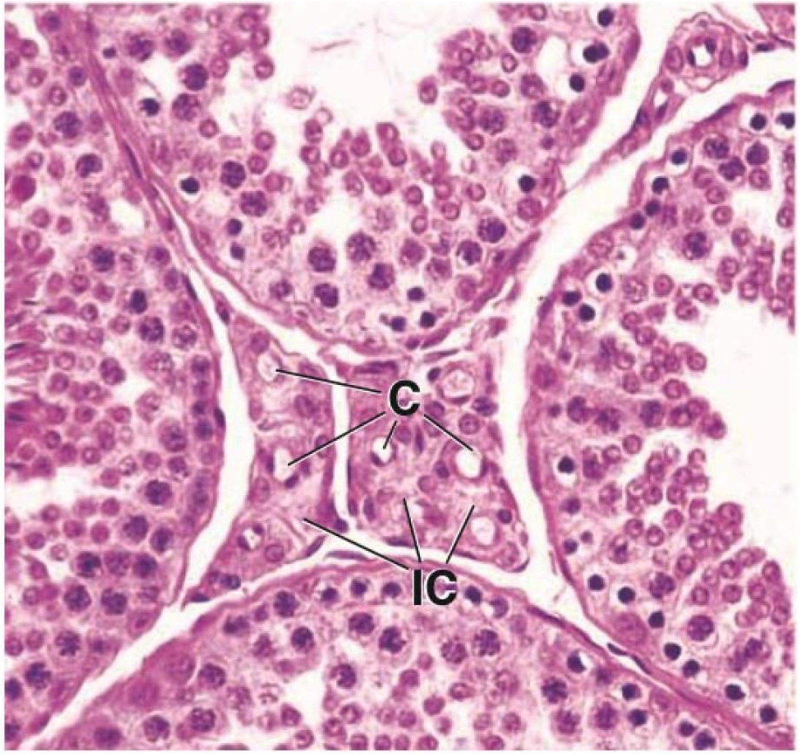
Ороговевающий эпителий кожи.



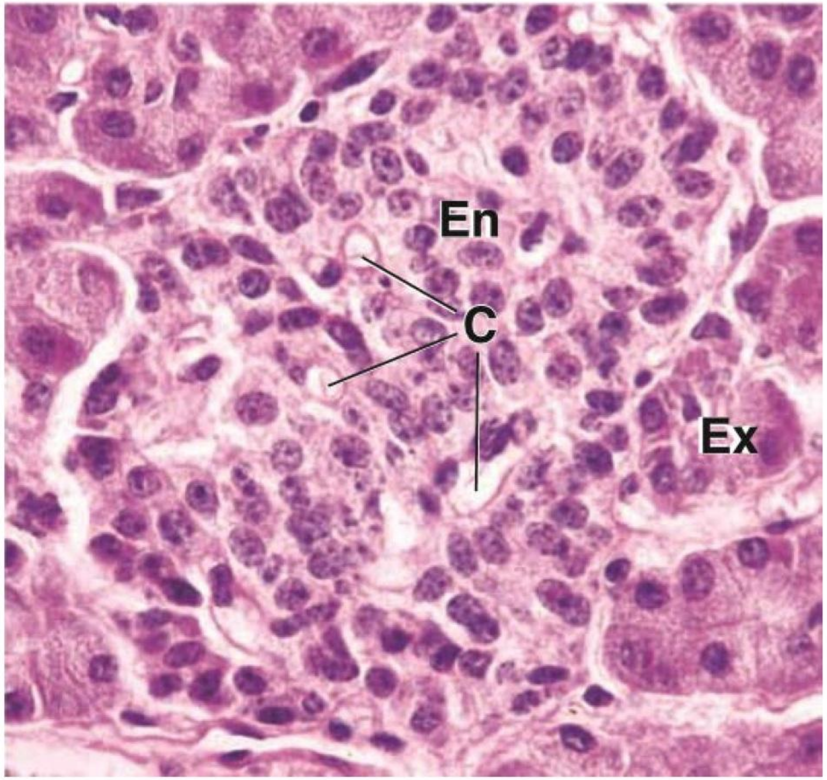
Ороговевающий эпителий губ.



Переходная зона эпителия в прямой кишке.



Эпителиальная ткань (яичко).



Эпителиальная ткань (эндокринная часть поджелудочной железы).