



Glandular Epithelium (Practical)

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Glands are classified according to the number of cells:

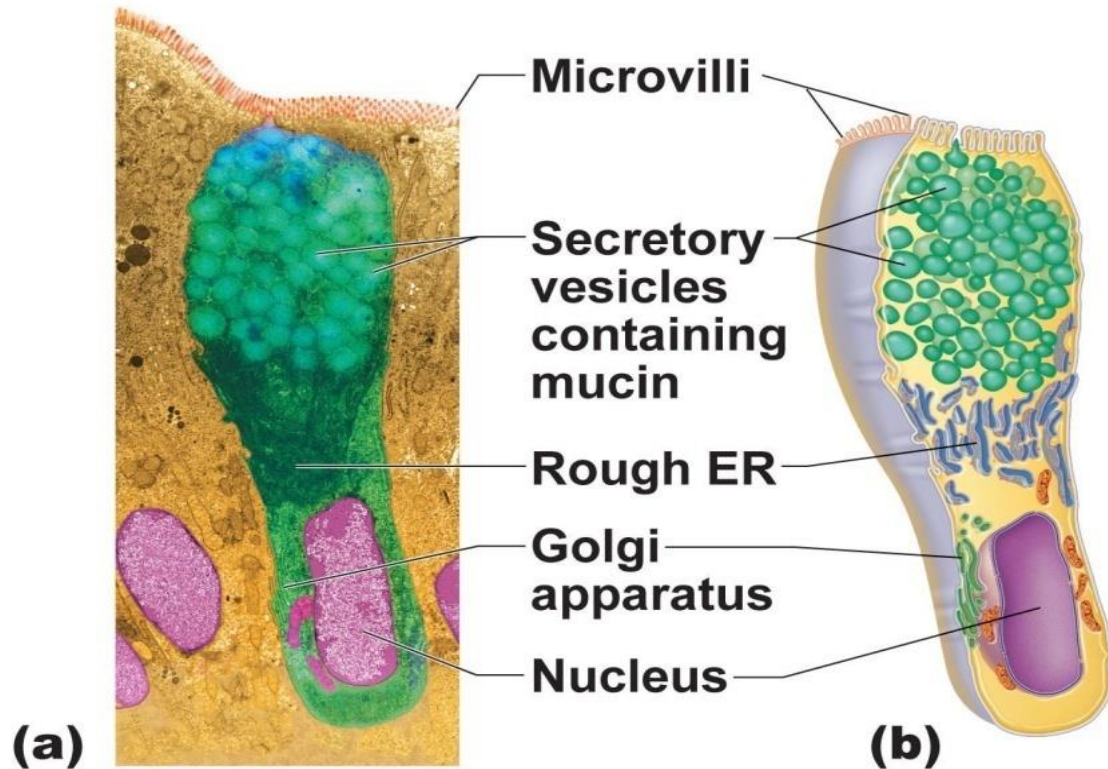
A. Unicellular glands

- **Goblet cells** which are present in the lining epithelia of intestine and the respiratory tract.

B. Multicellular glands

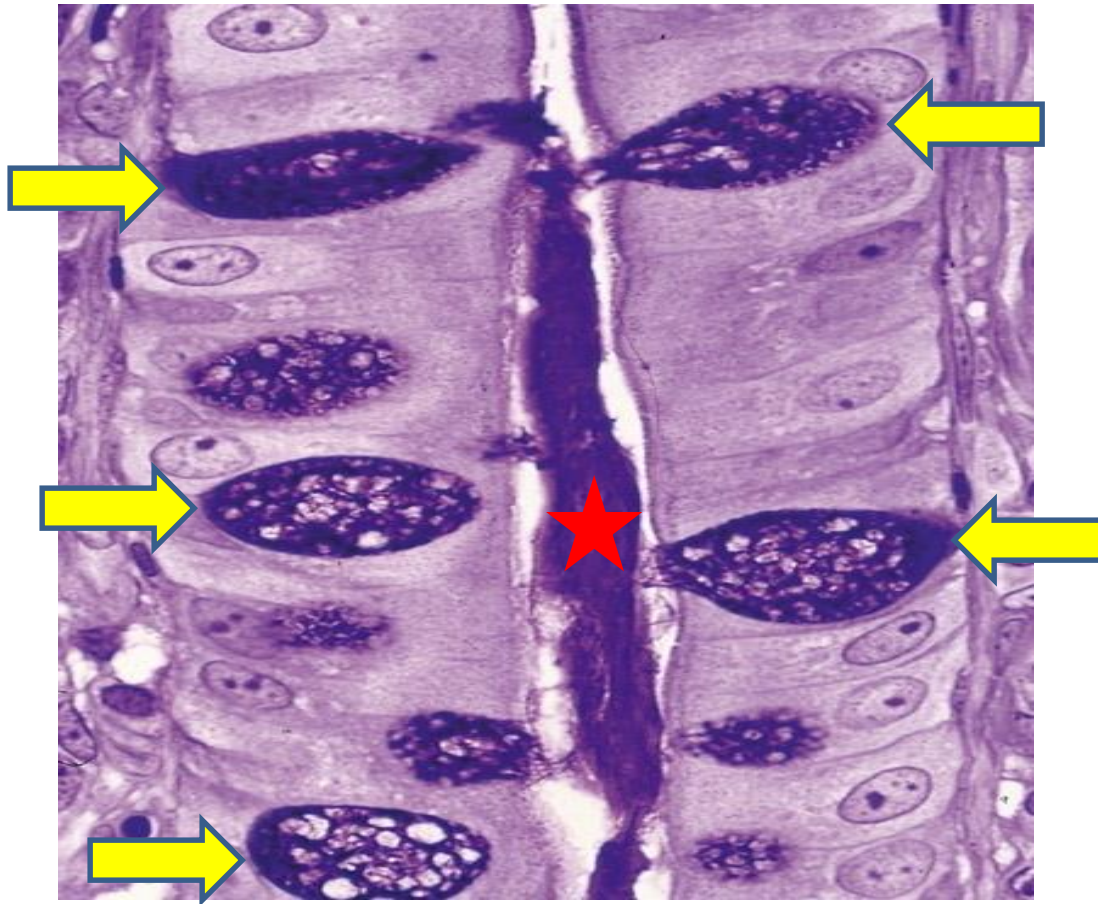
- **Salivary glands, lacrimal glands, sweat glands, ...**

Unicellular gland

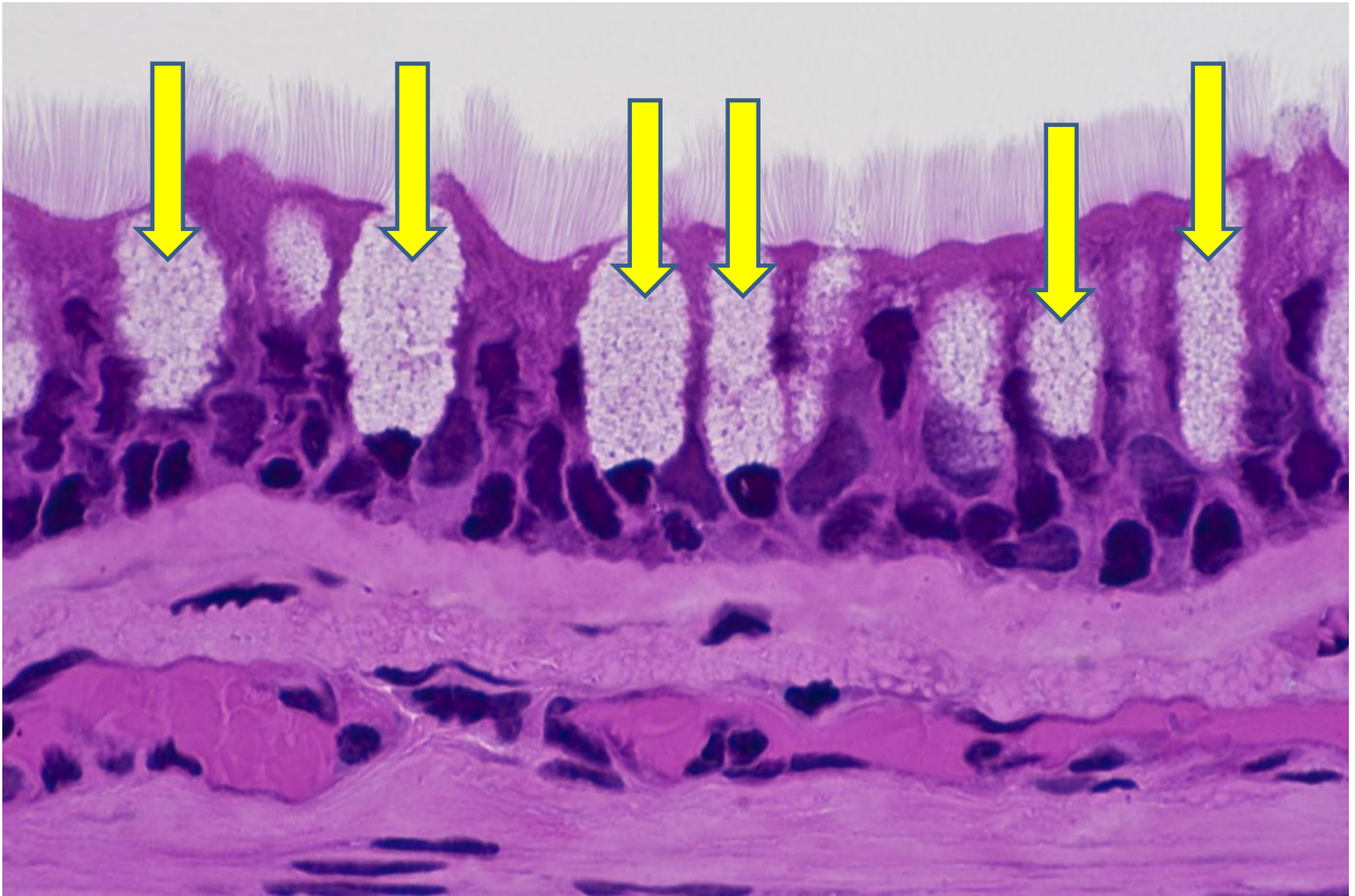


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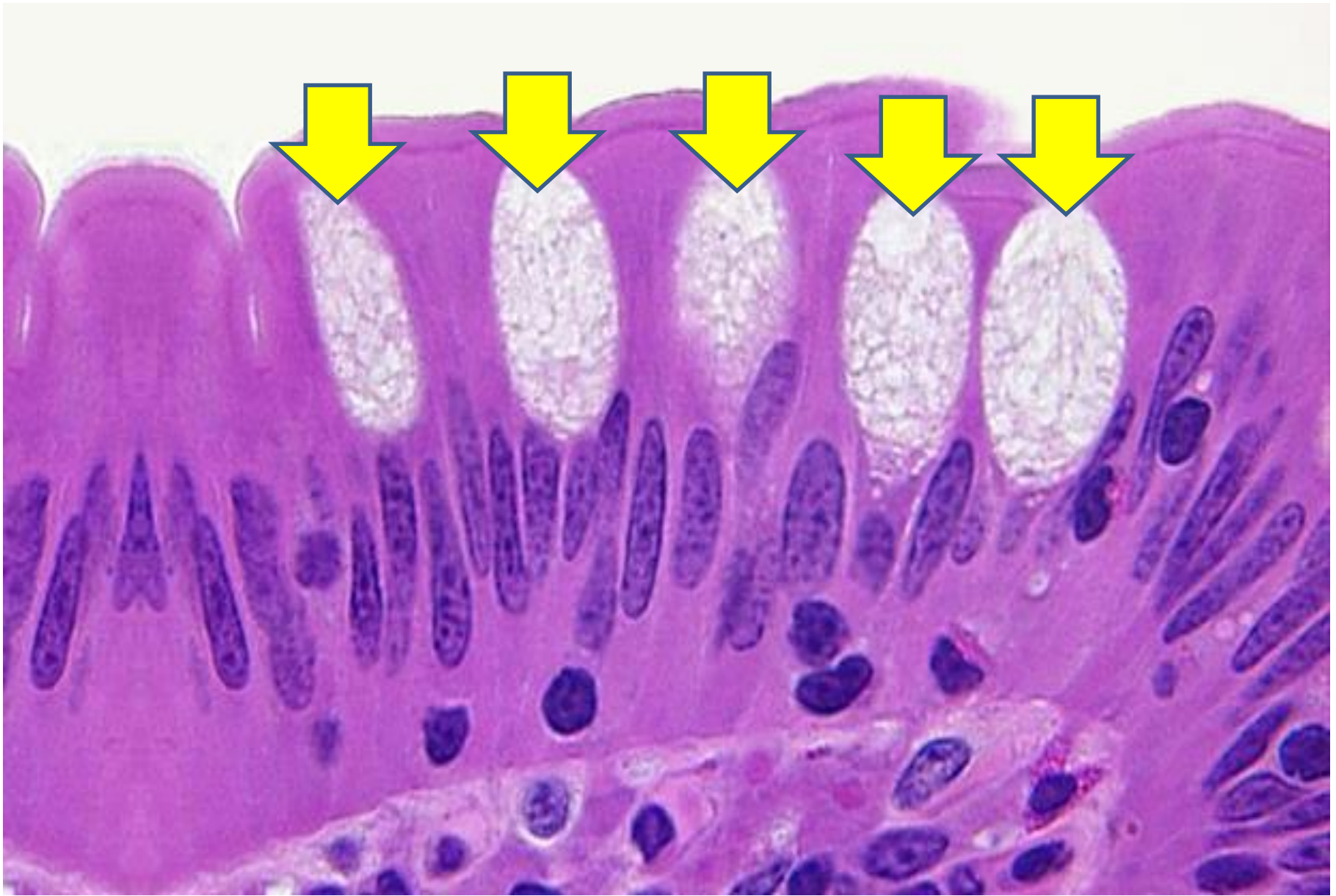
Mucus cells or goblet cells



- **Goblet cells produce Mucin**
- Mucin + water → mucus
- **Protects and lubricates** many internal body surfaces.

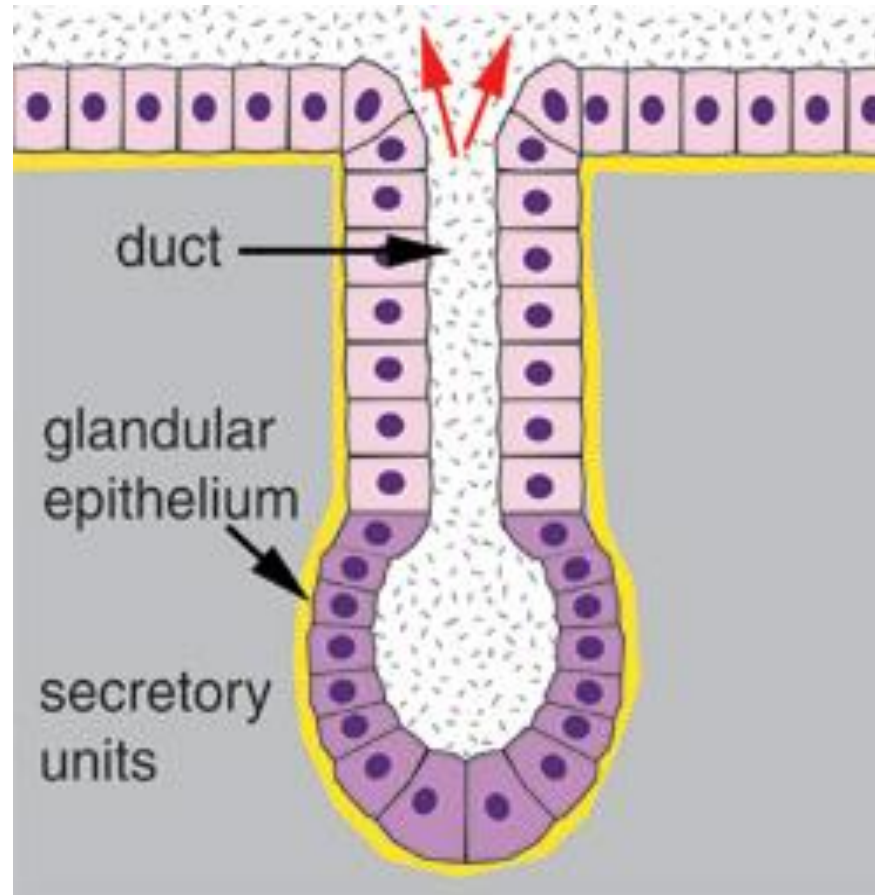


Goblet cells in the respiratory tract



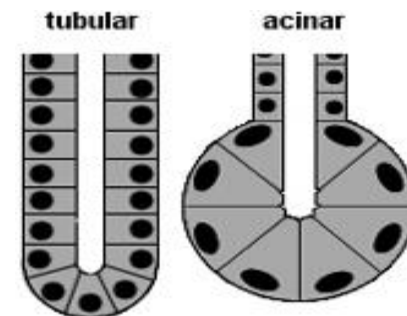
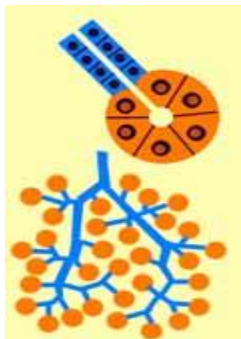
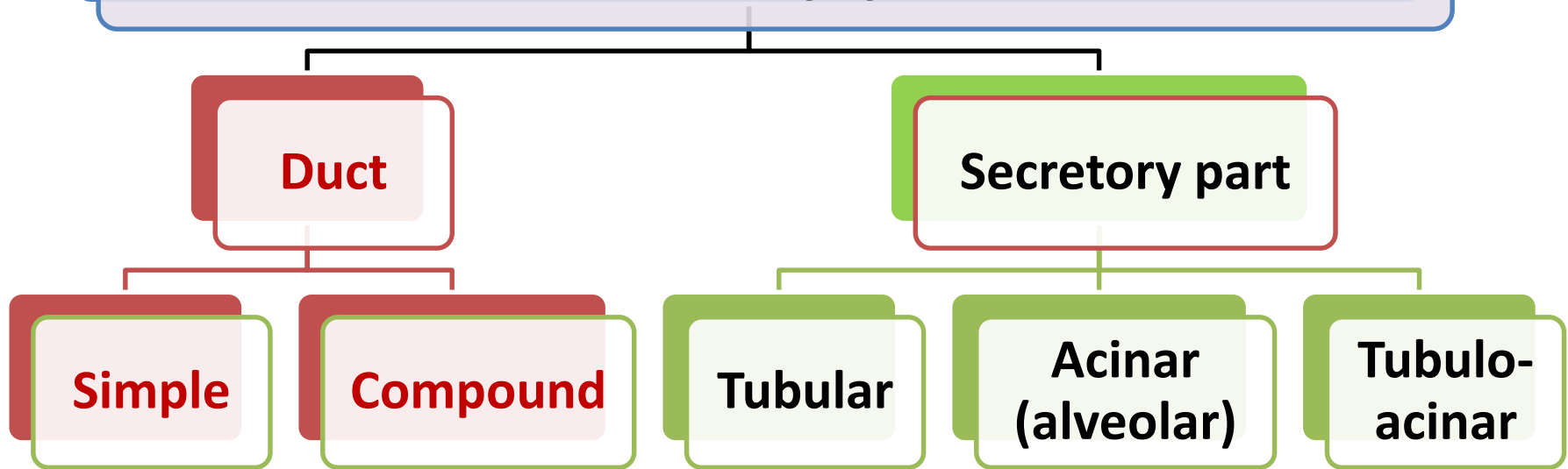
Goblet cells in the intestine

Multicellular Gland



Exocrine glands secrete substances to specific organ/surface via duct systems.

Classified according to the duct system and the secretory part

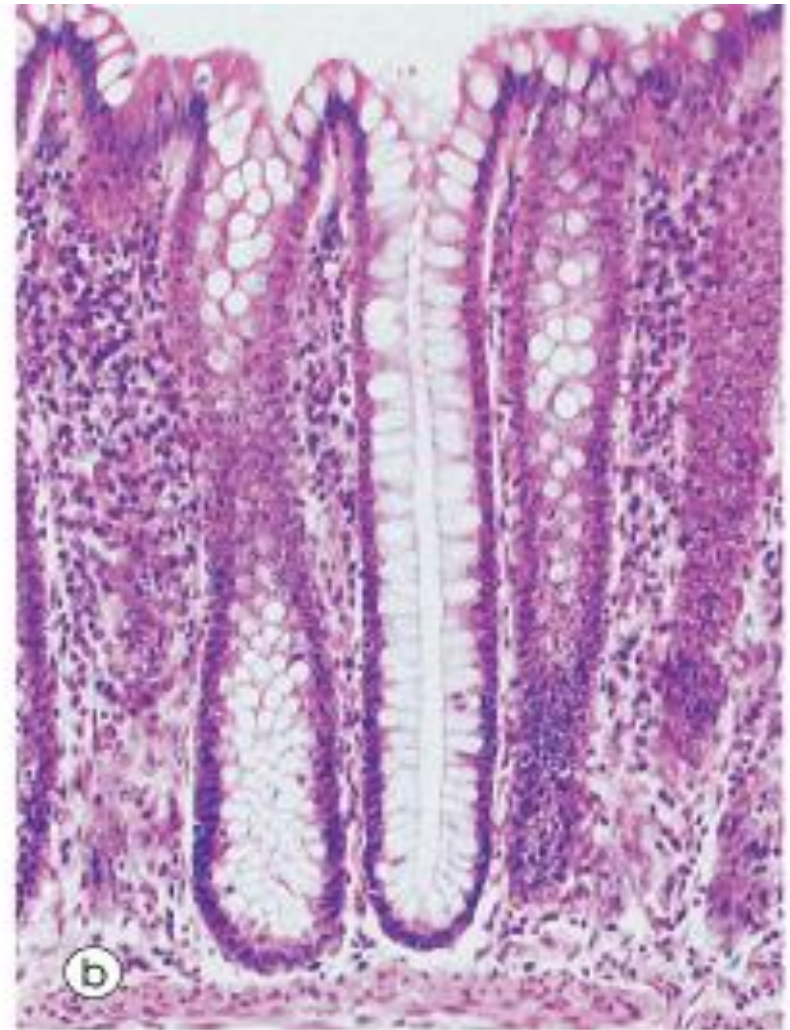
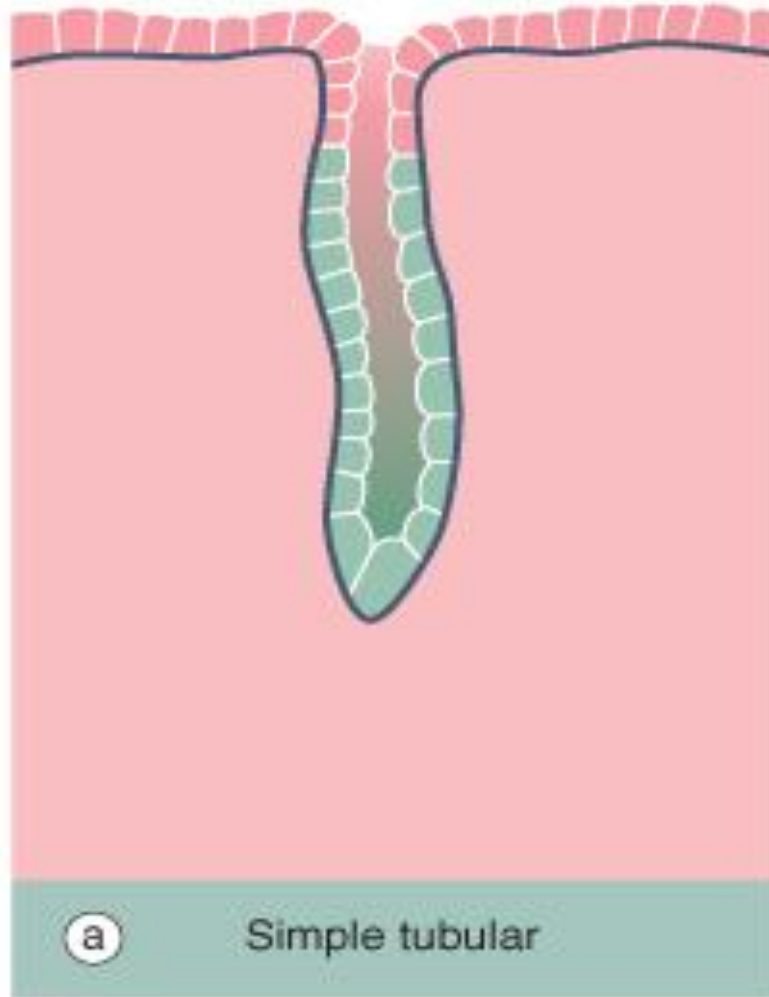


	Tubular secretory structure		Alveolar secretory structure	
Simple duct structure (duct does not branch)				
	(a) Simple tubular Example: intestinal glands	(b) Simple branched tubular Example: stomach (gastric) glands	(c) Simple alveolar Example: No important example in humans	(d) Simple branched alveolar Example: sebaceous (oil) glands
Compound duct structure (duct branches)				
	(e) Compound tubular Example: duodenal glands of small intestine	(f) Compound alveolar Exocrine pancreas, parotid	(g) Compound tubuloalveolar Example: salivary glands Sublingual and submandibular	

Key:  = Surface epithelium  = Duct  = Secretory epithelium

Simple exocrine glands

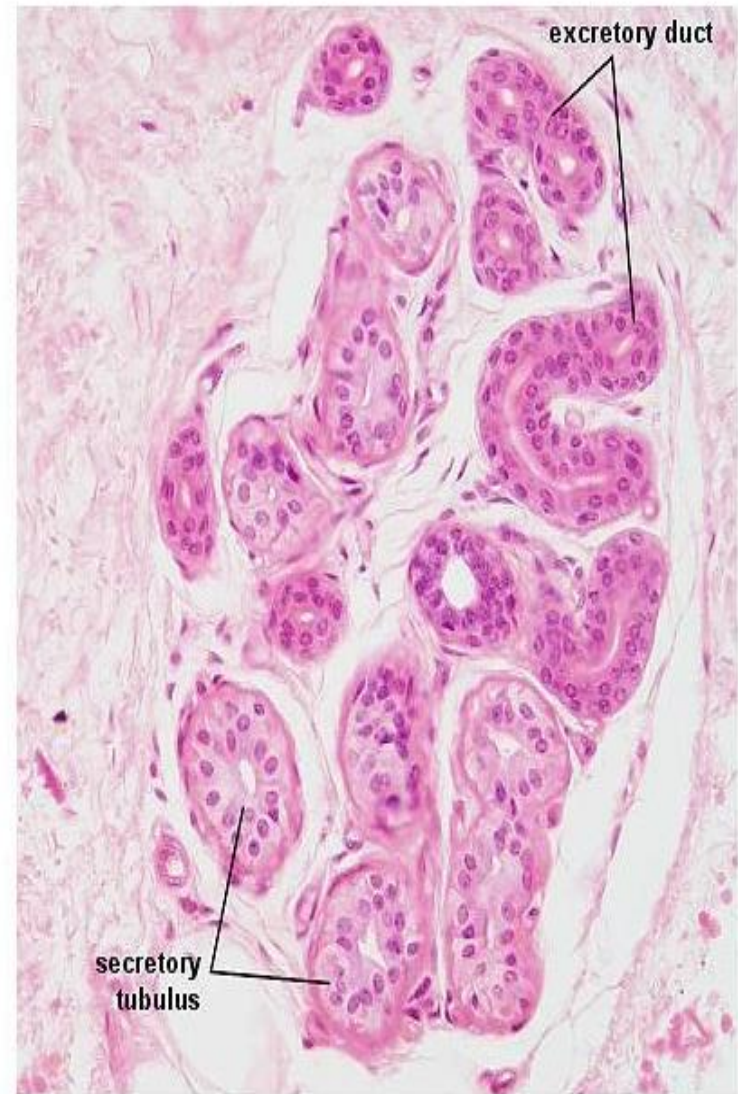
Simple tubular

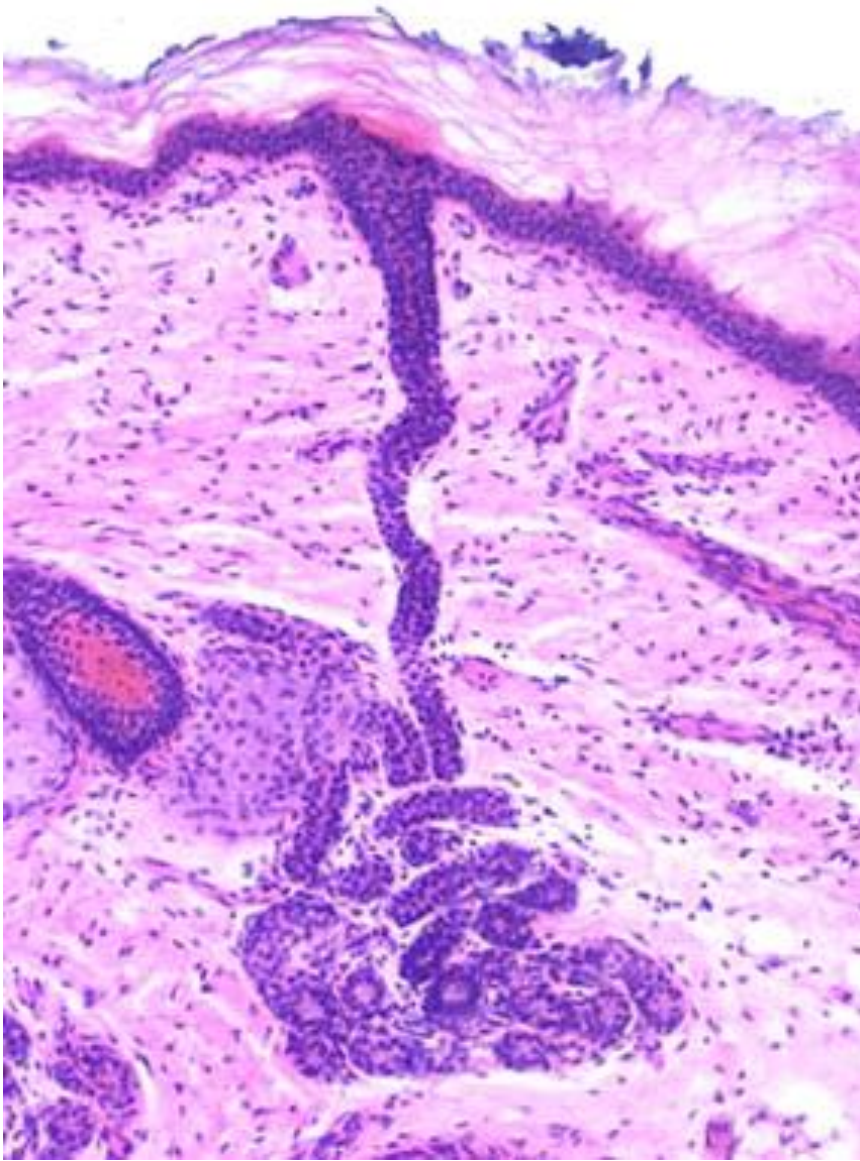


A single, straight tubular lumen into which the secretory products are discharged eg. mucus-secreting gland of the colon; **crypt of Lieberkühn**

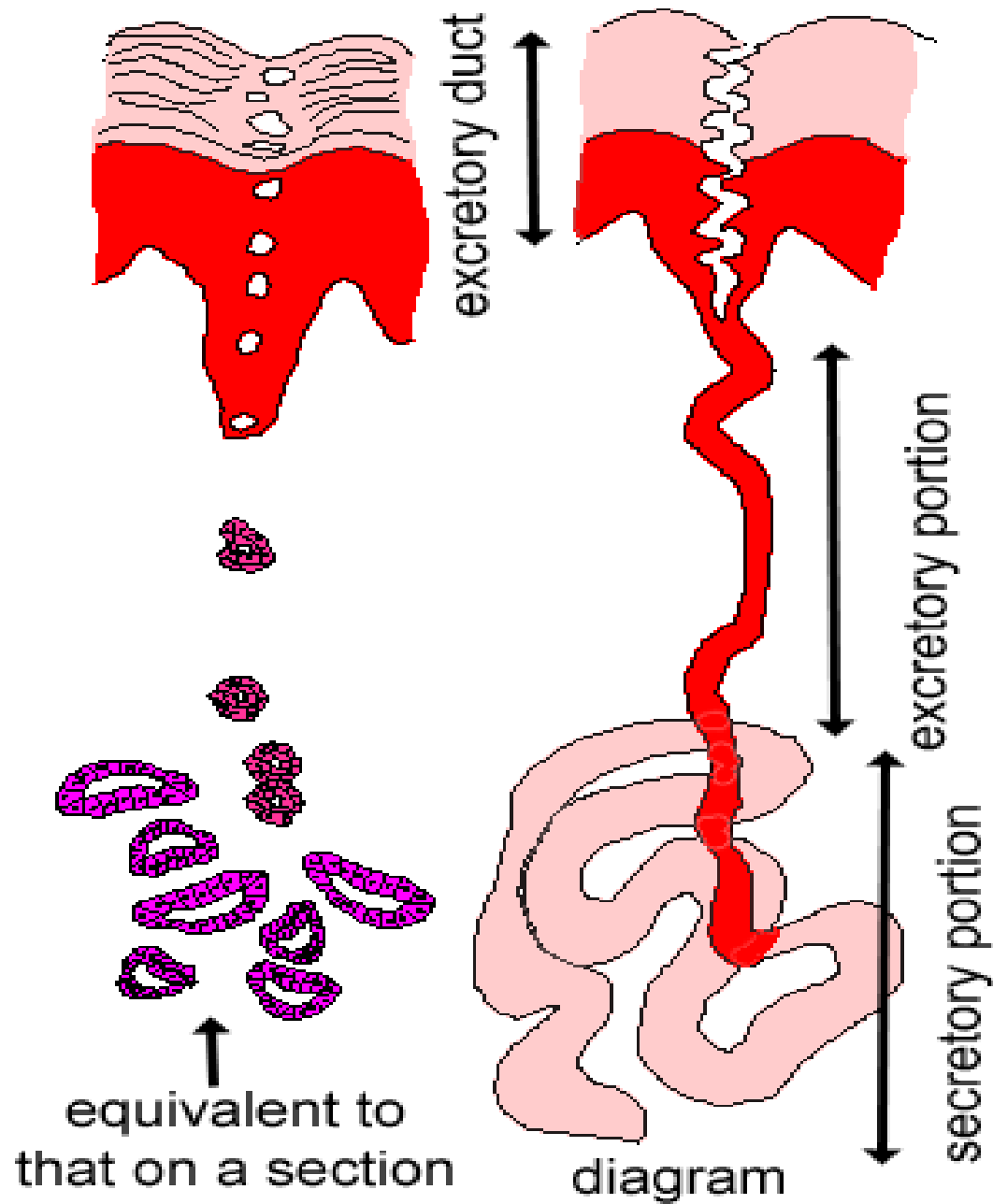


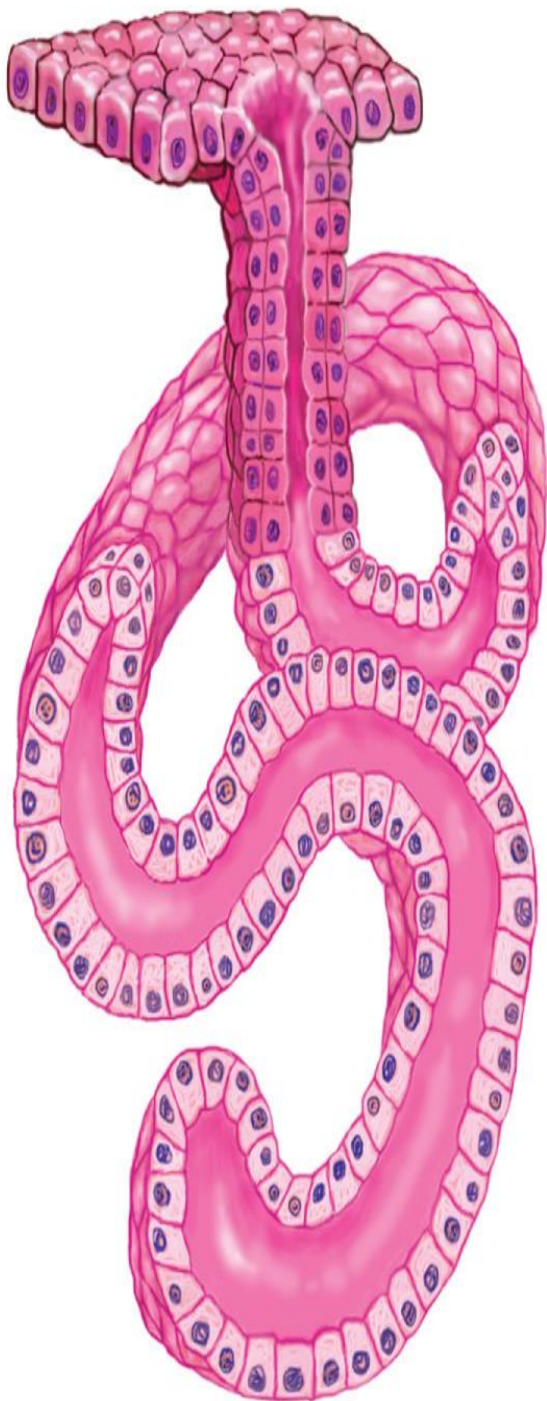
Simple coiled tubular

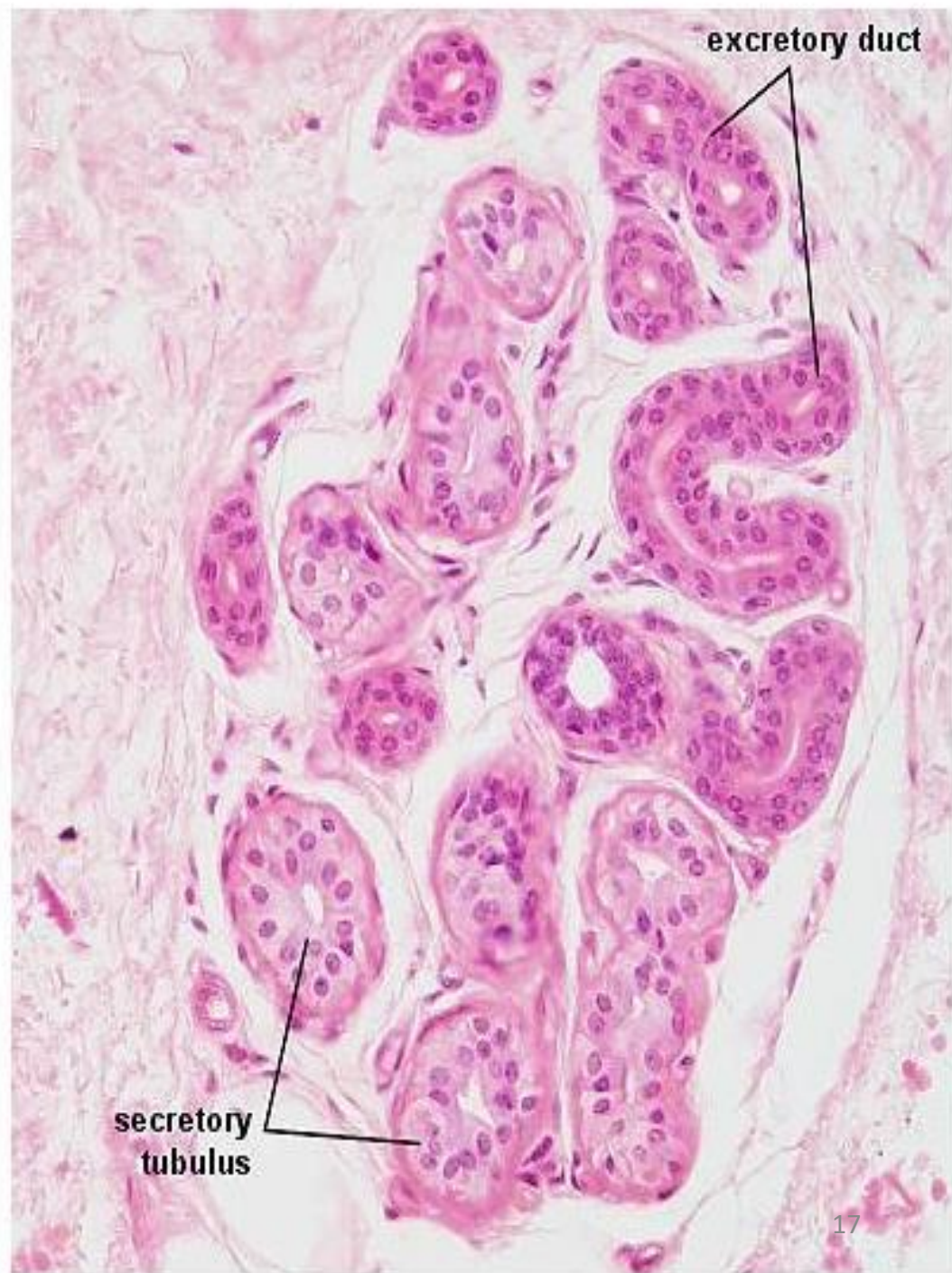
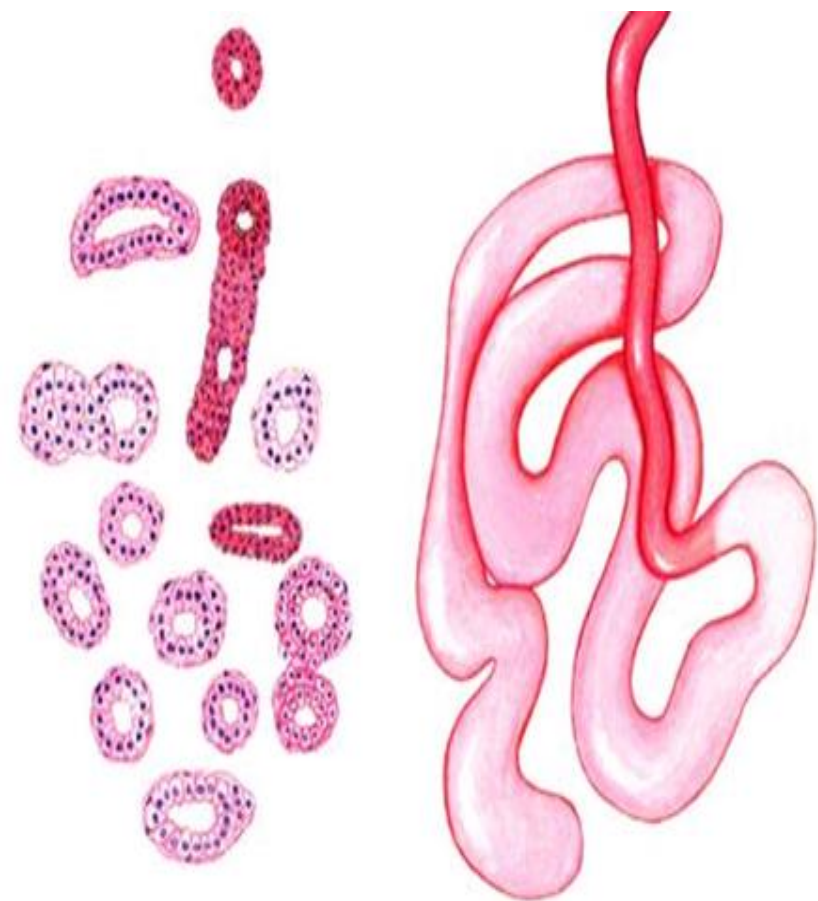




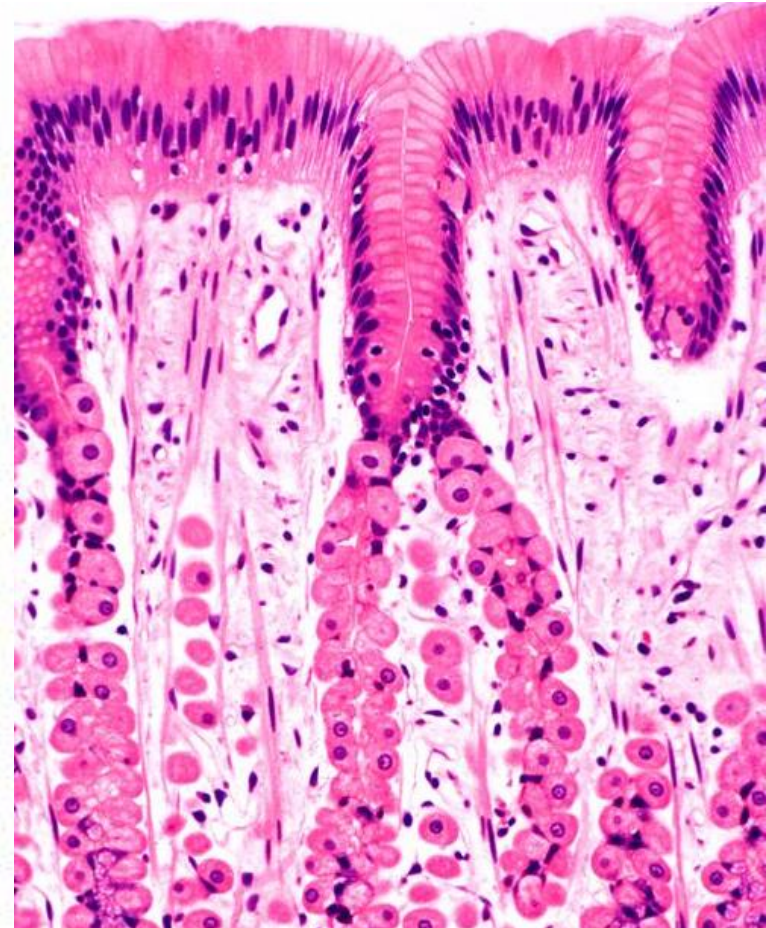
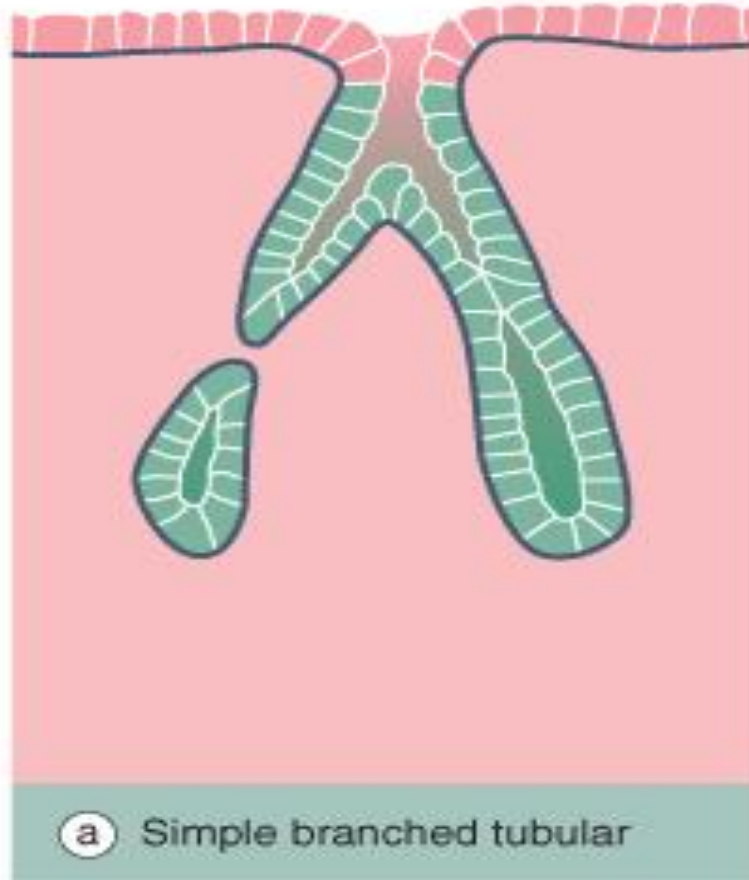
A single tube, tightly coiled in 3 dimensions eg. Sweat glands







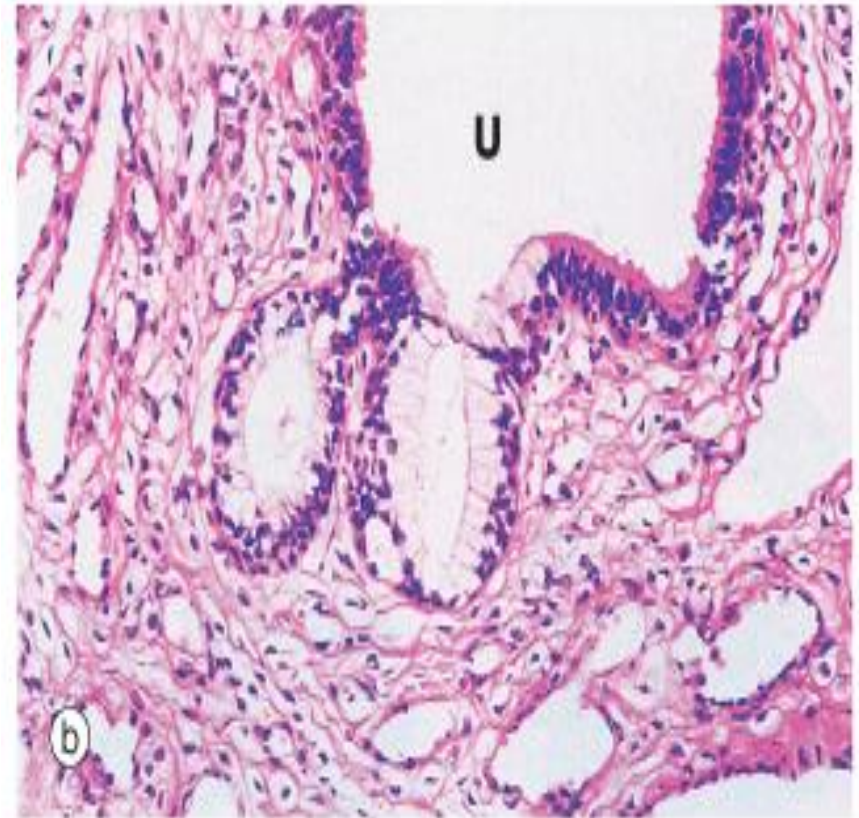
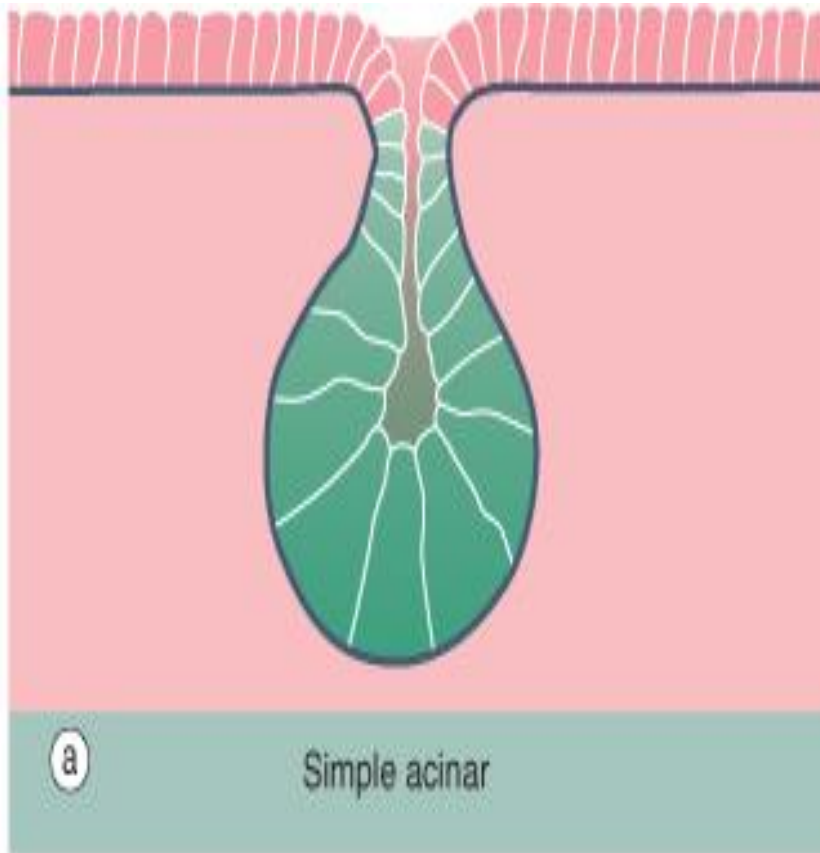
Simple branched tubular



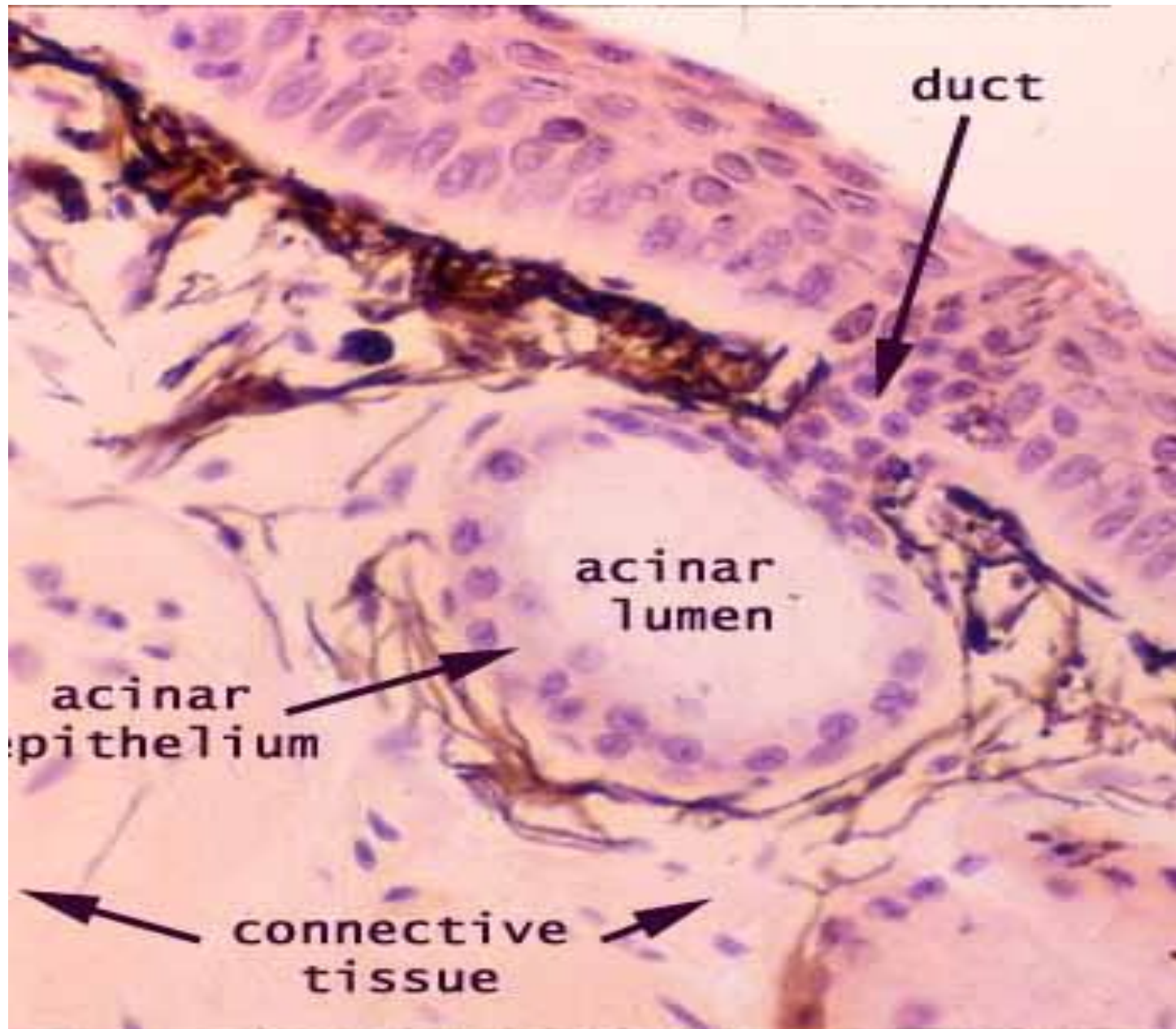
Several tubular secretory portions (T) converge onto a single unbranched duct (D)
eg. Mucus-secreting gland of **the stomach** and **uterus**



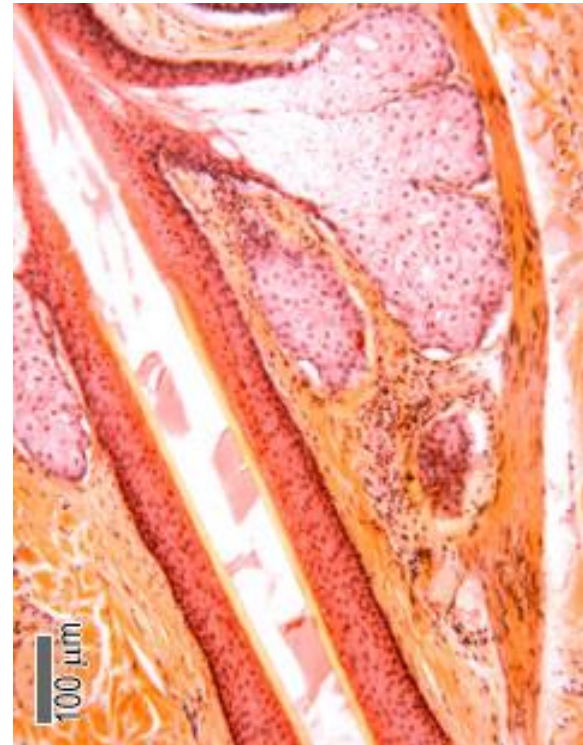
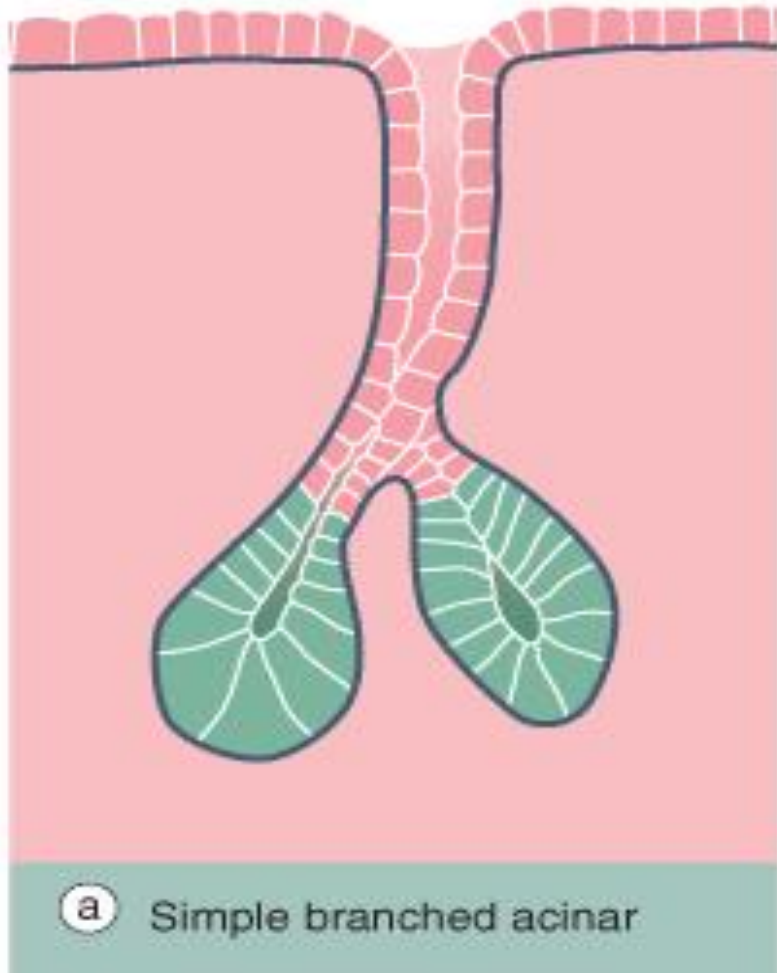
Simple acinar



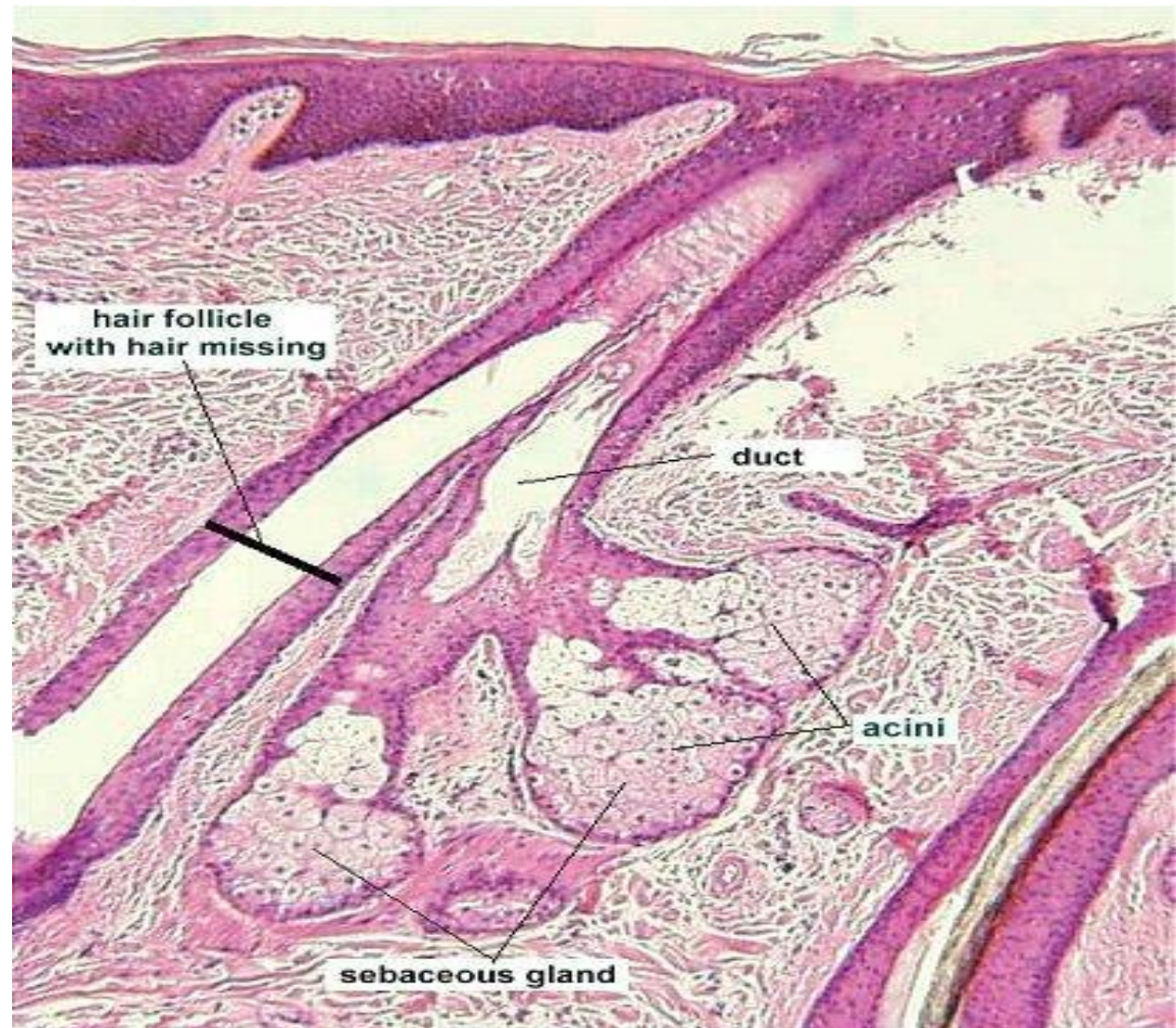
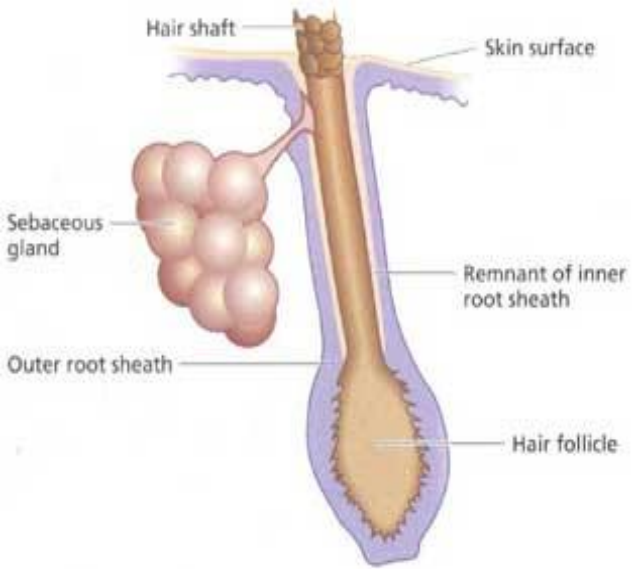
Occur in the form of pockets in epithelial surfaces. Lined by secretory cells eg. Small mucous glands along the **urethra**.

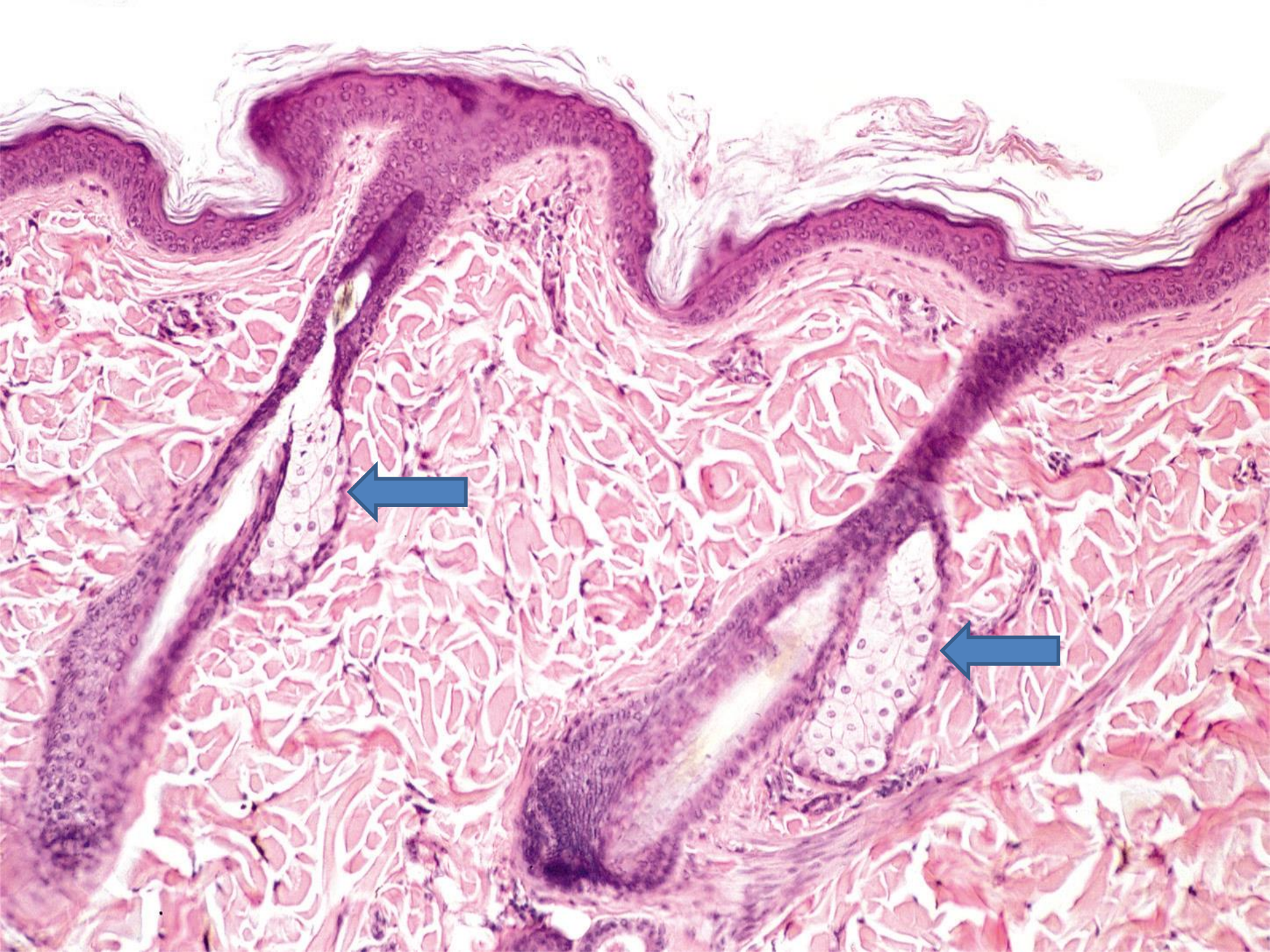


Simple branched acinar



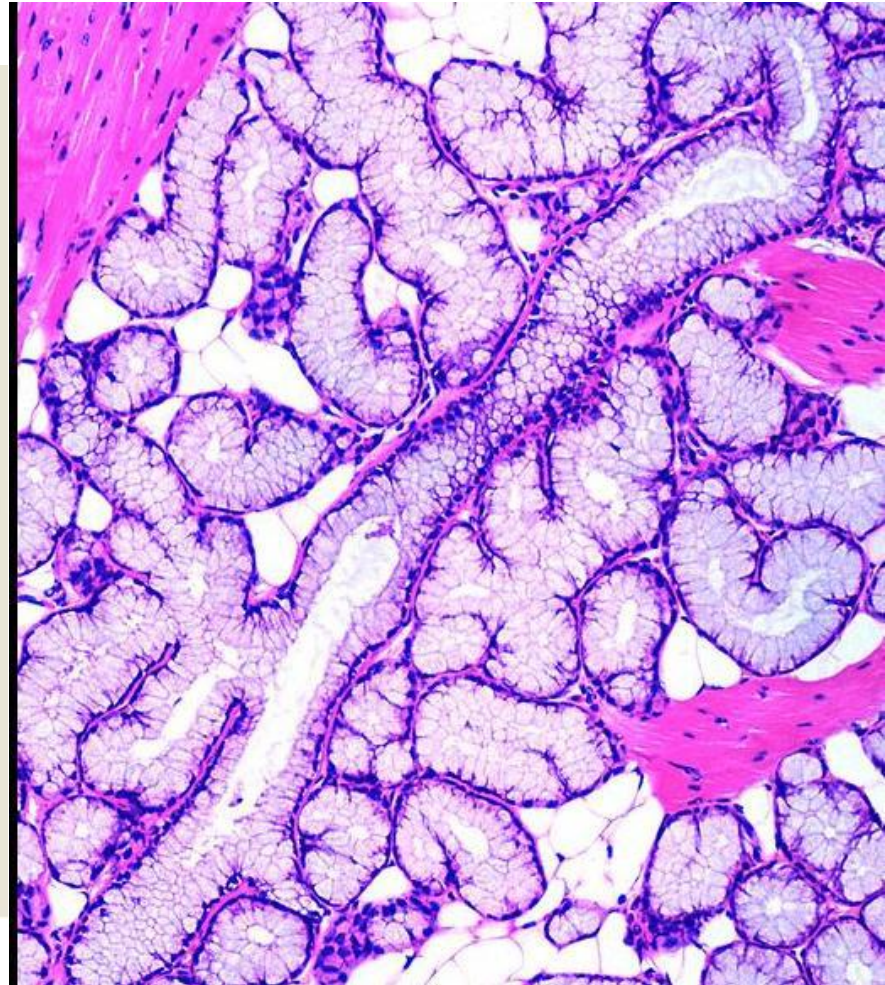
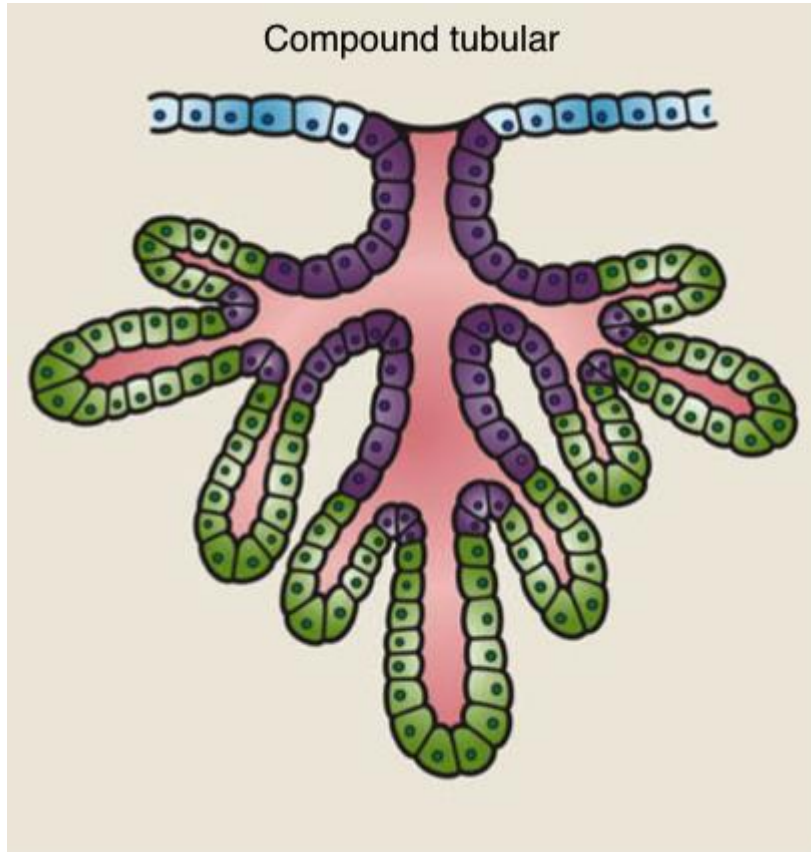
Each gland consists of several secretory acini (A) that empty into a single excretory duct eg. **Sebaceous glands**, sebum secretion



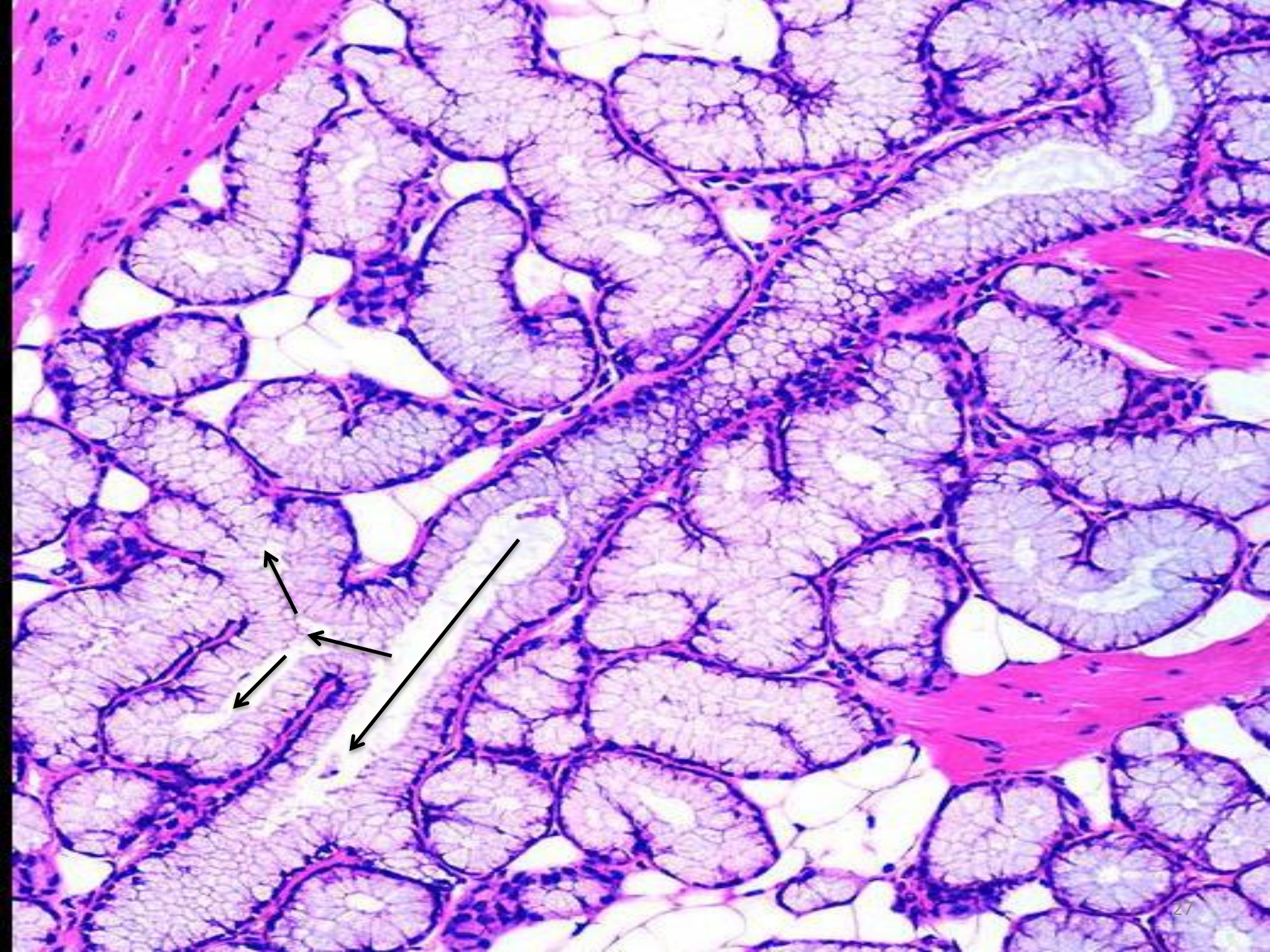


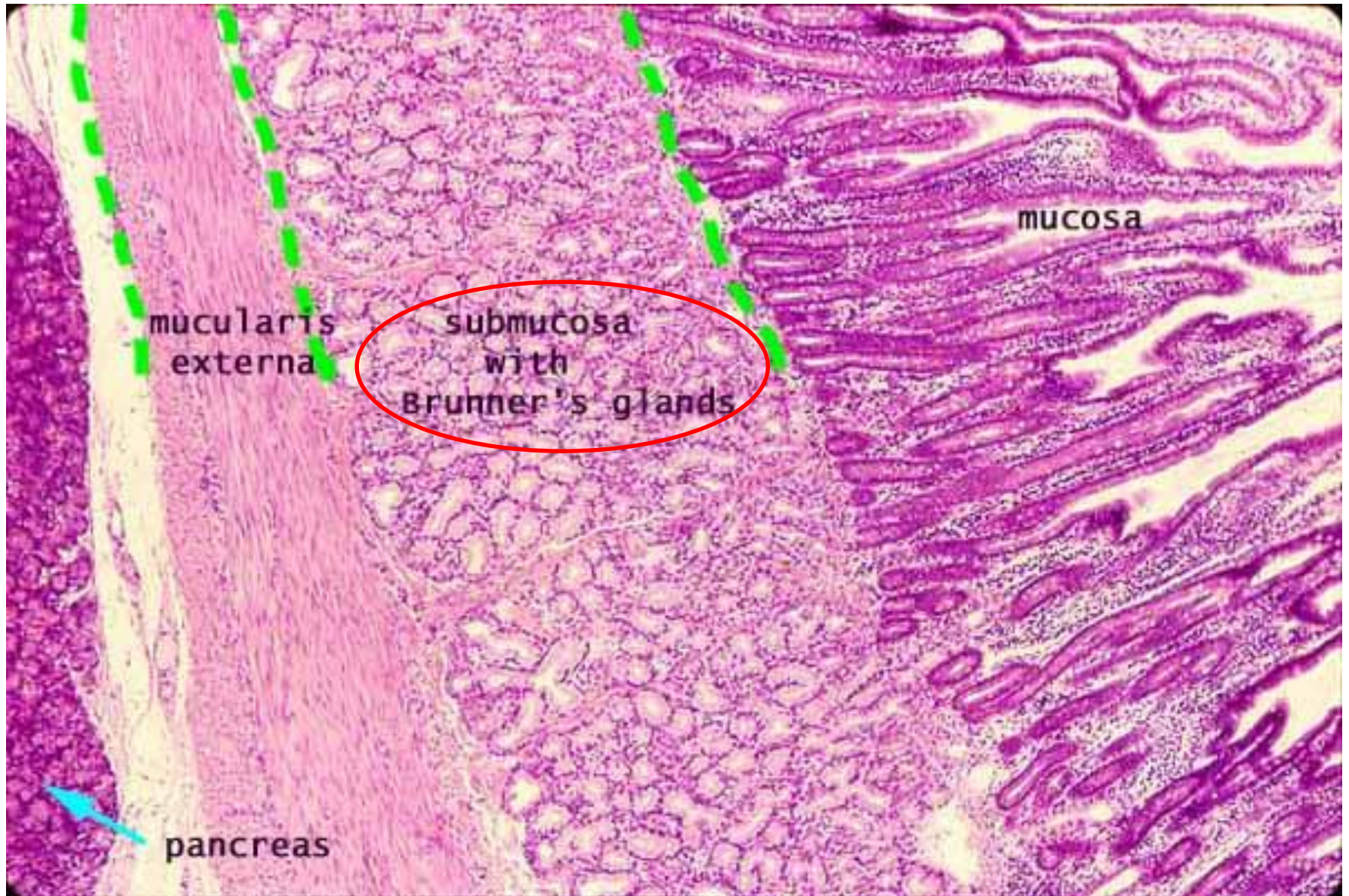
Compound exocrine glands

Compound tubular

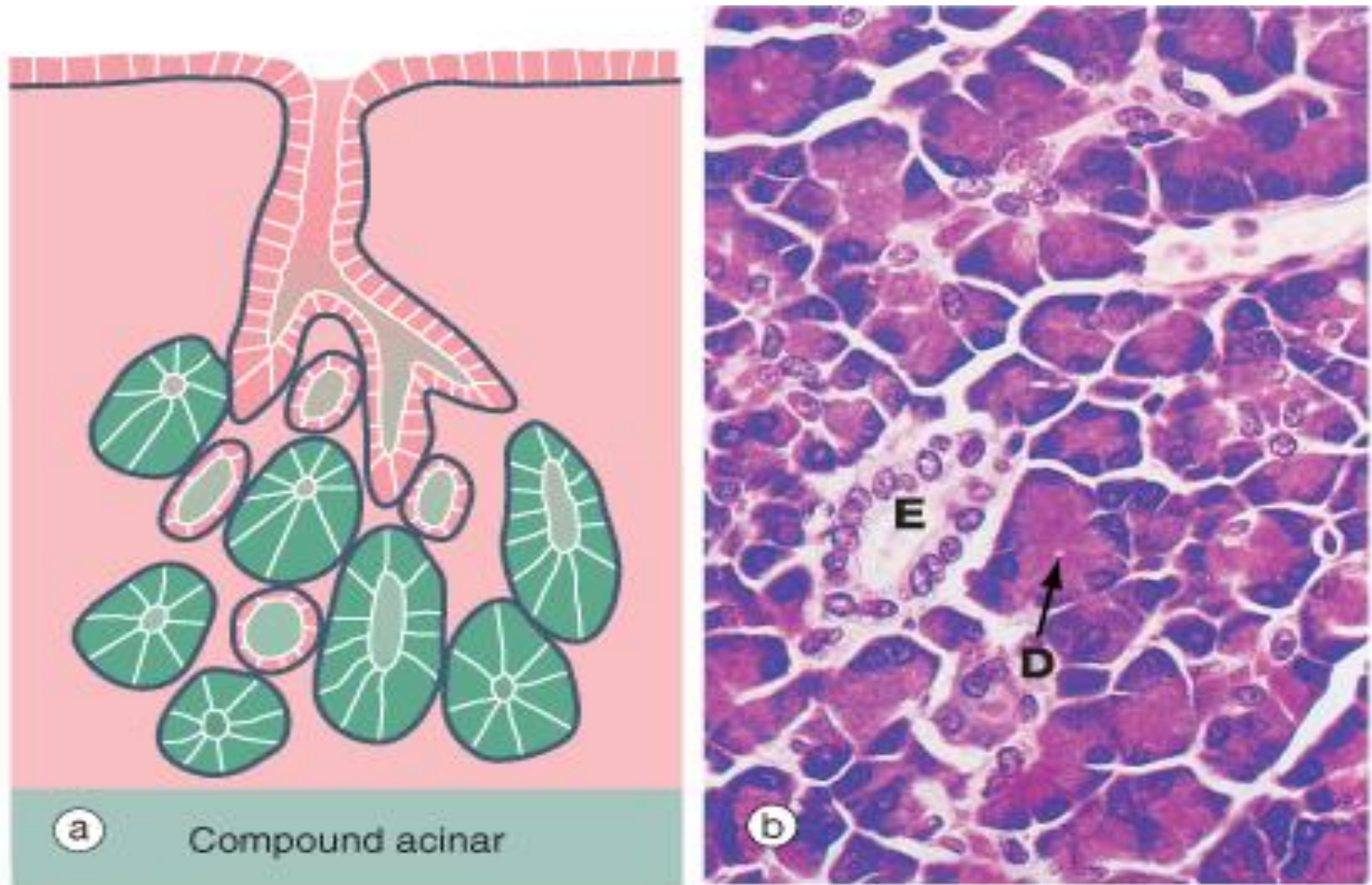


Secretory portion is branched and coiled and the duct system is also Branched (difficult to visualize) eg. **Brunner's gland of the duodenum**



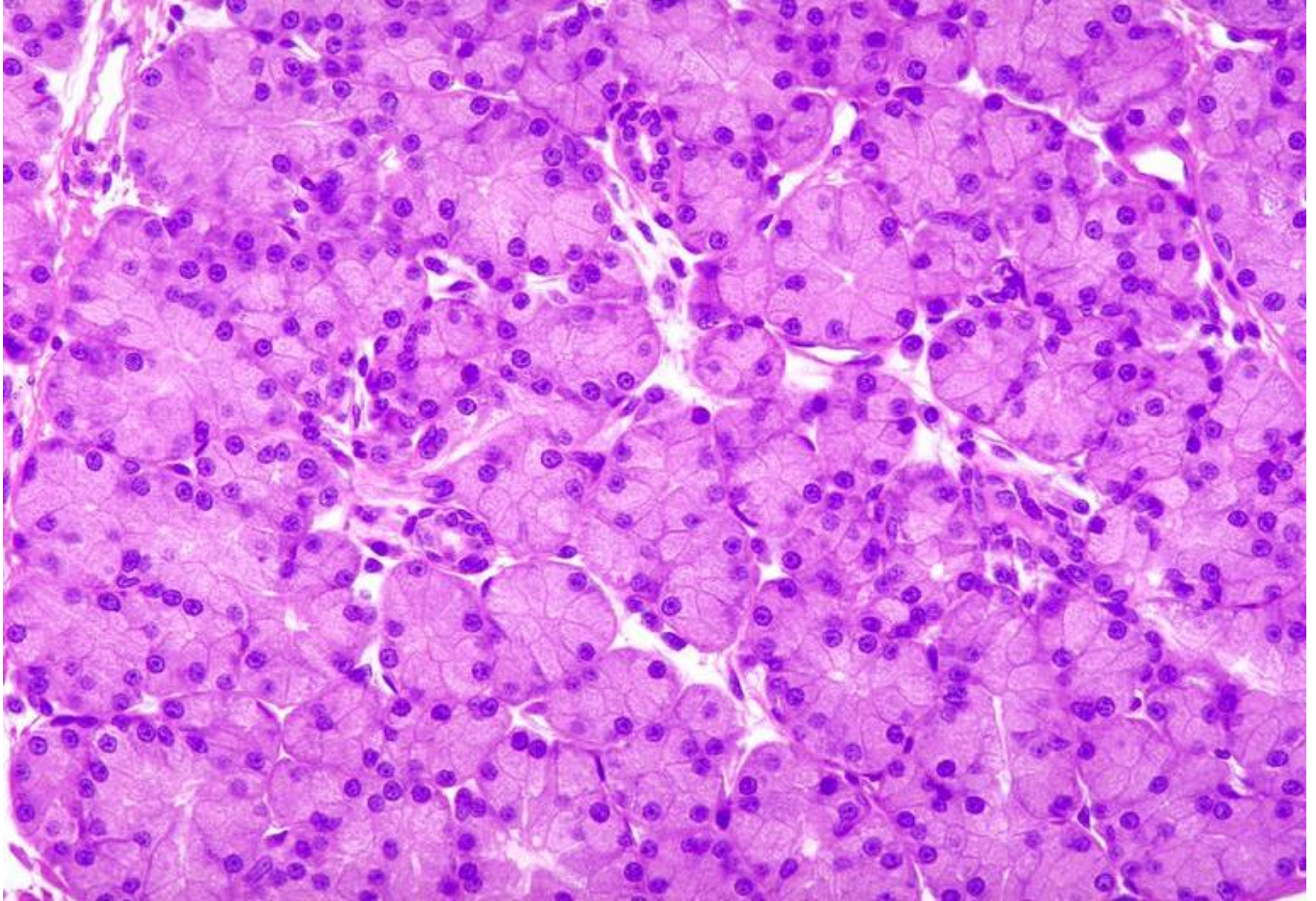


Compound acinar



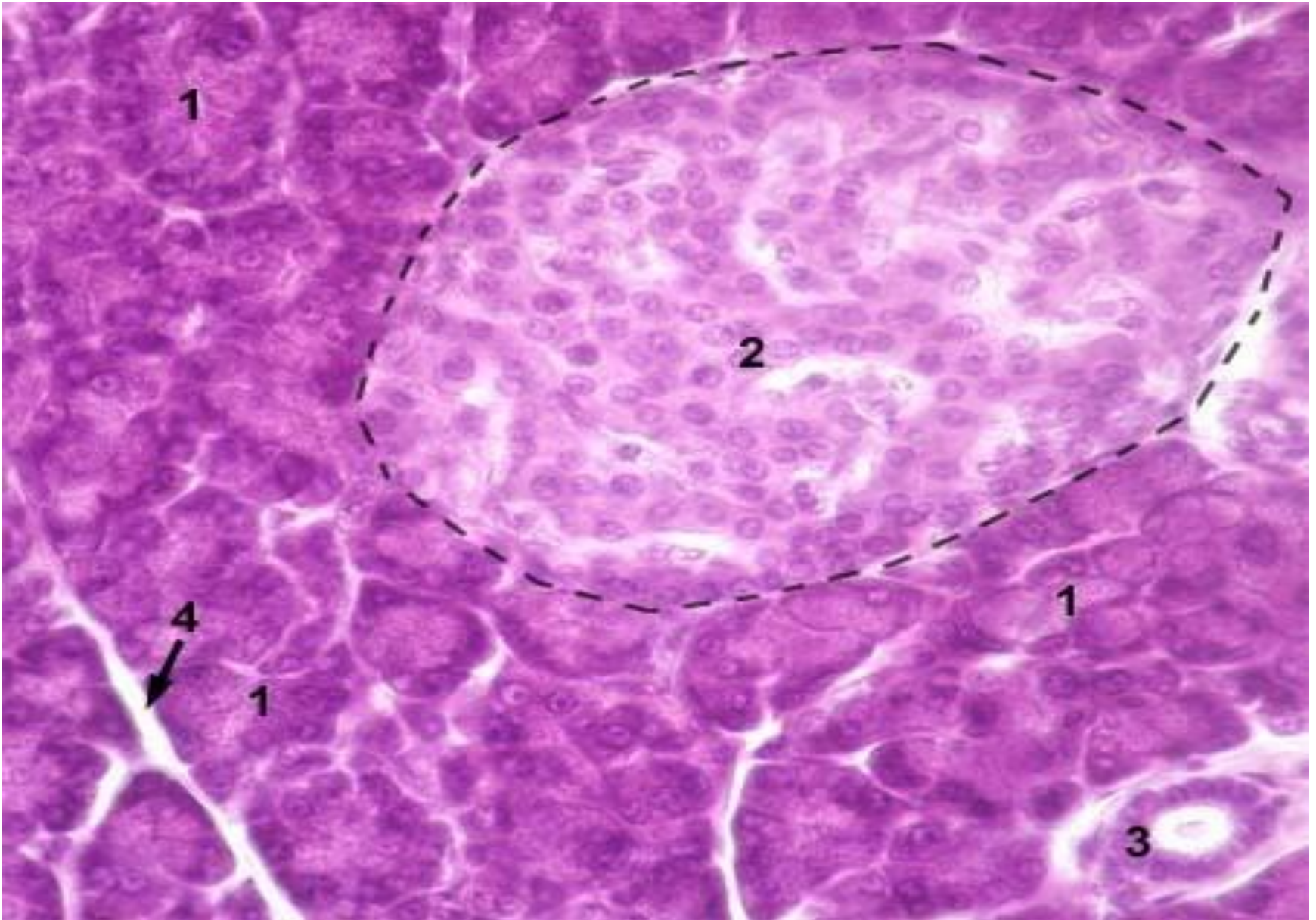
Secretory units are acinar and drain into a branched duct system
eg. **Exocrine pancreas/ parotid**

Serous gland



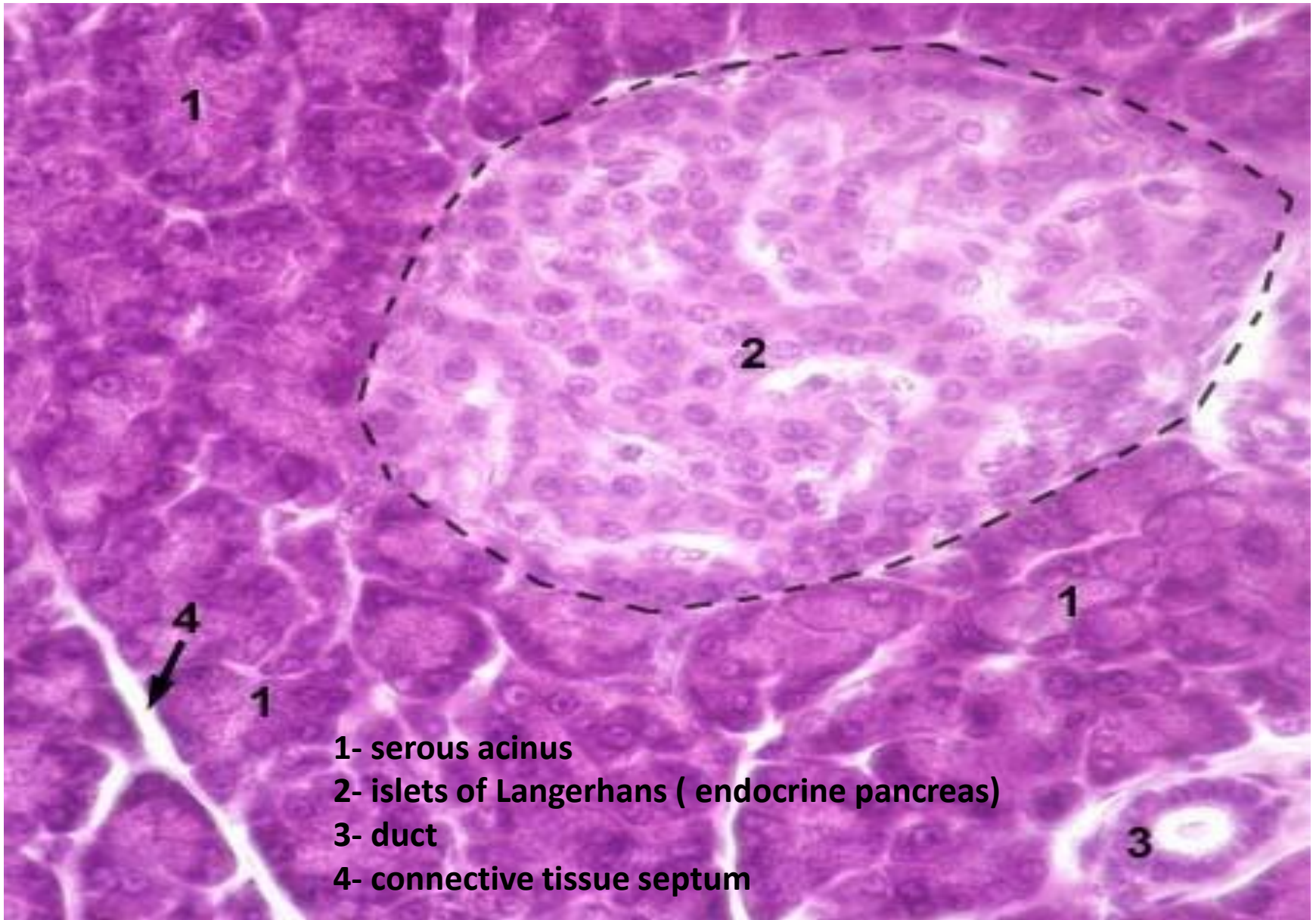
Parotid gland

Serous gland



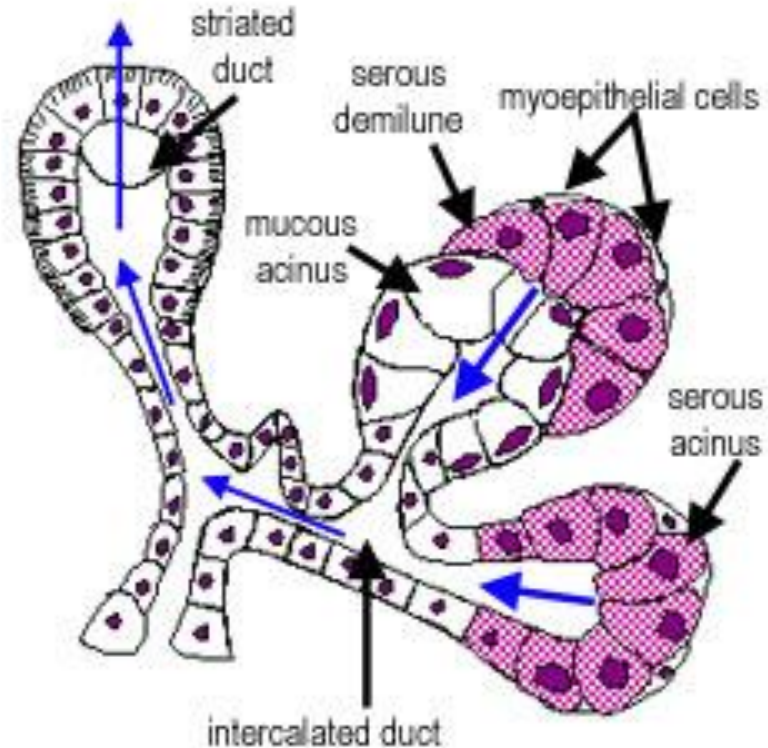
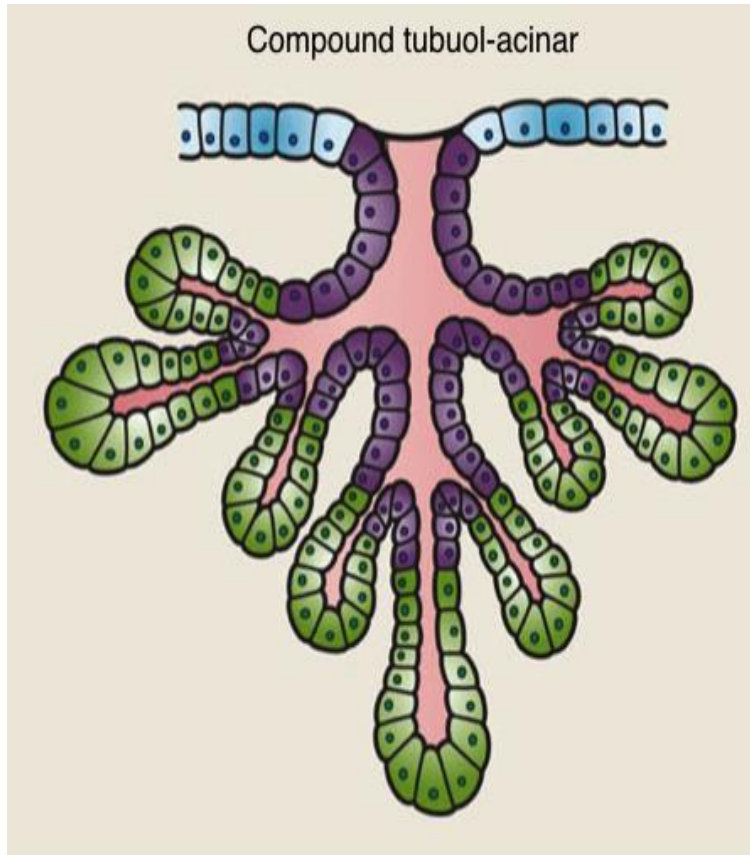
Pancreas

Serous gland



Pancreas

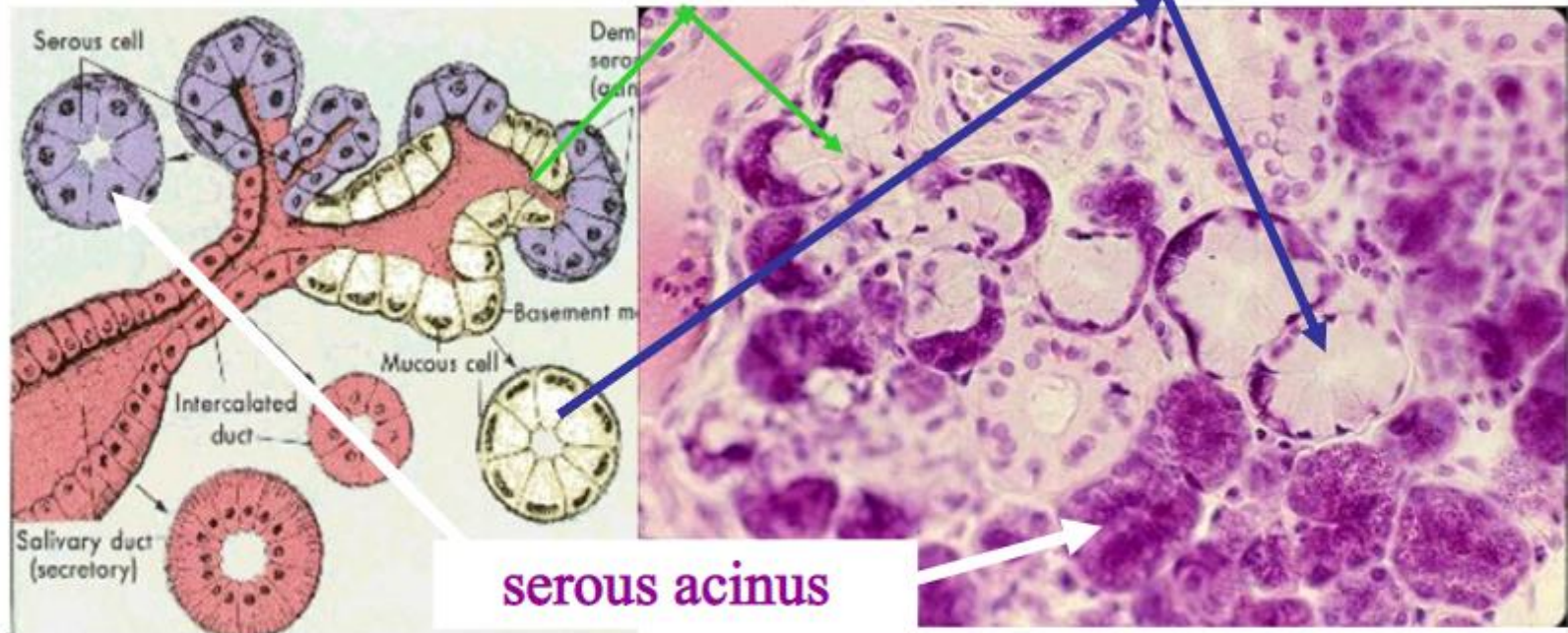
Compound tubulo-acinar



3 types of secretory units:
branched tubular, branched acinar and branched tubular with acinar end-pieces called demilunes eg. **salivary gland**

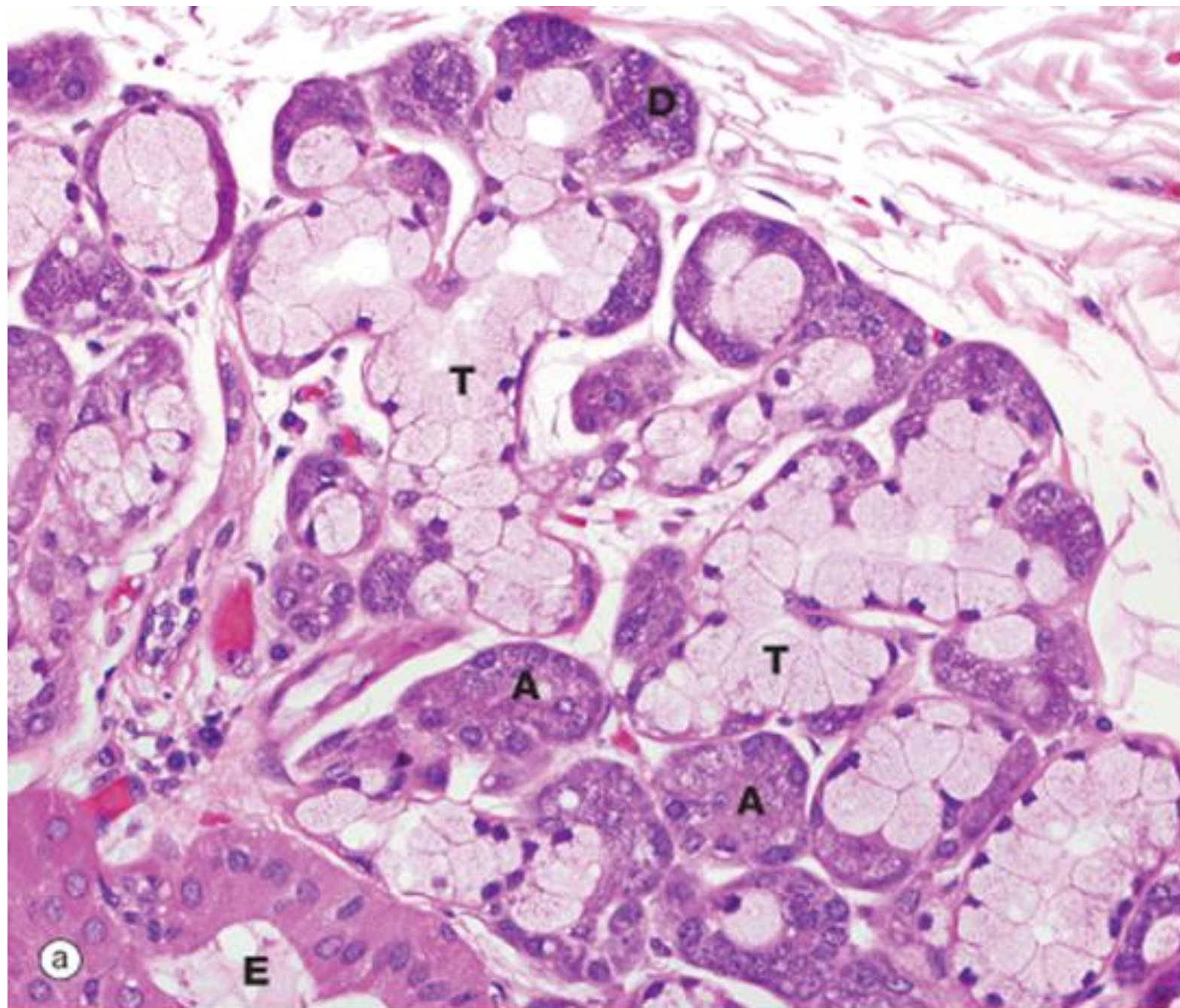
seromucous /mixed acinus

mucous acinus



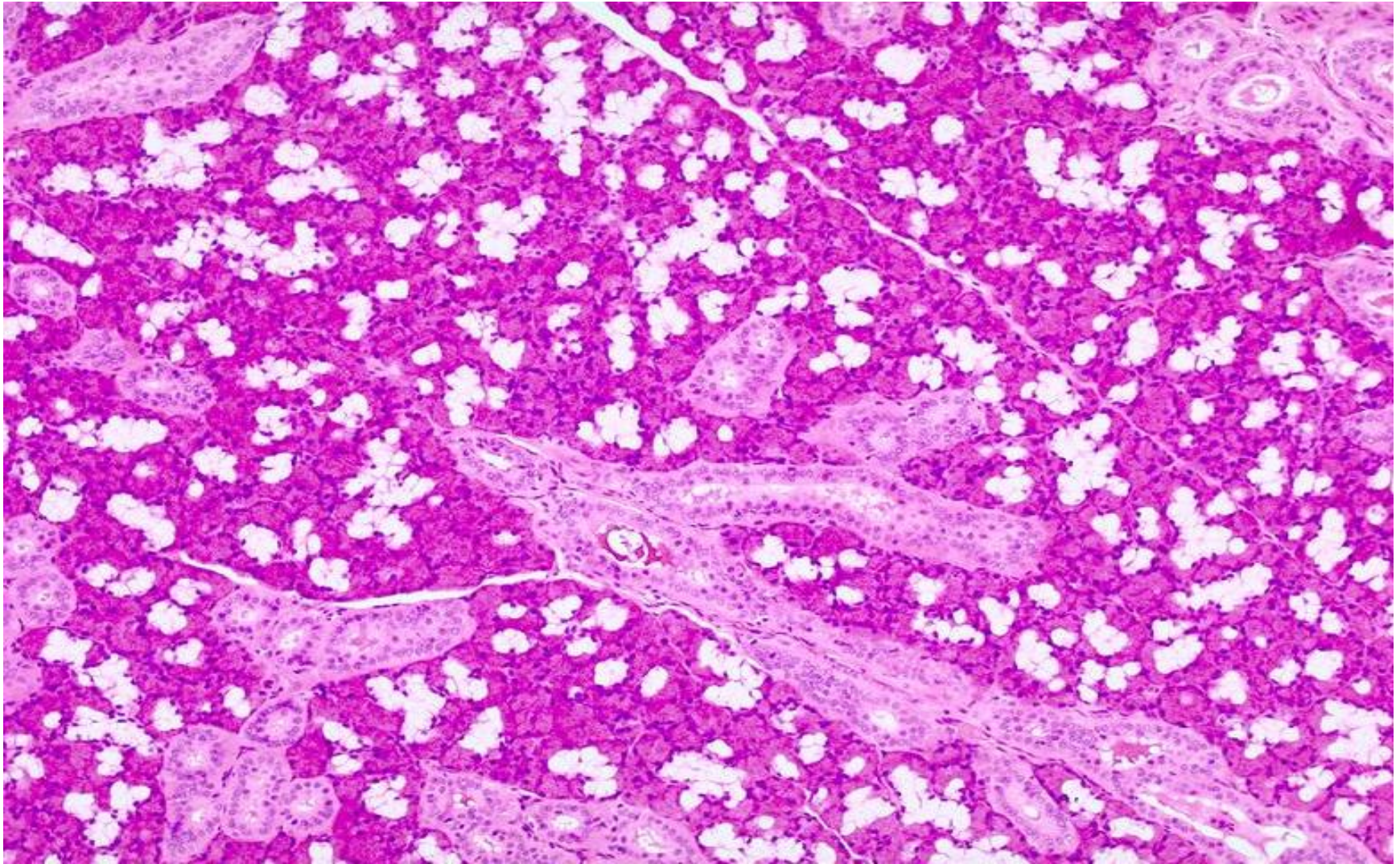
Model

Section (H&E)



Compound tubulo-acinar

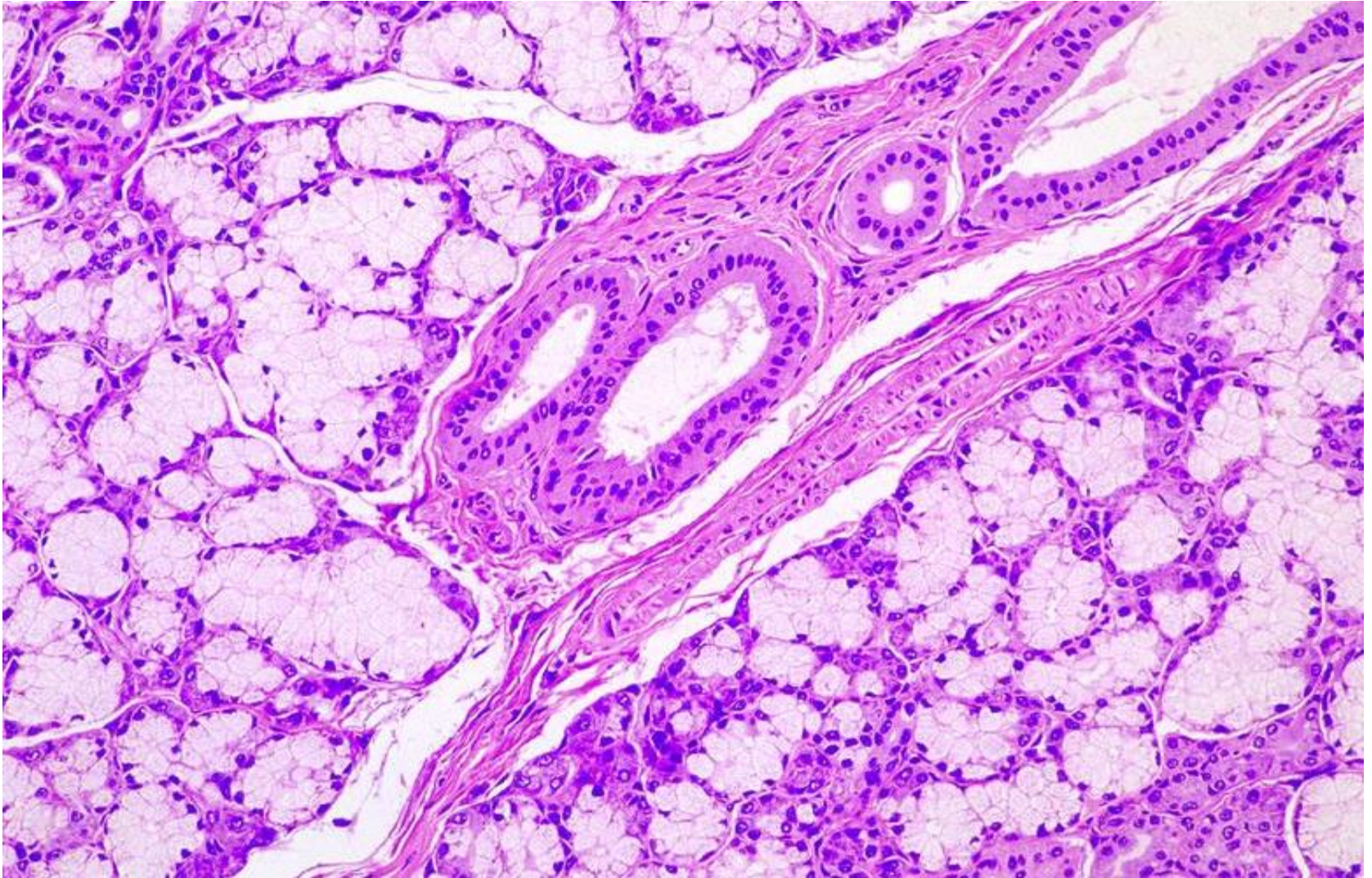
Mixed gland: Seromucous gland



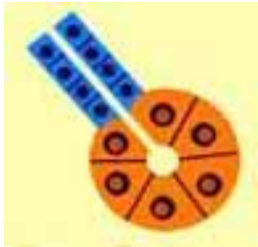
Submandibular gland

Compound tubulo-acinar

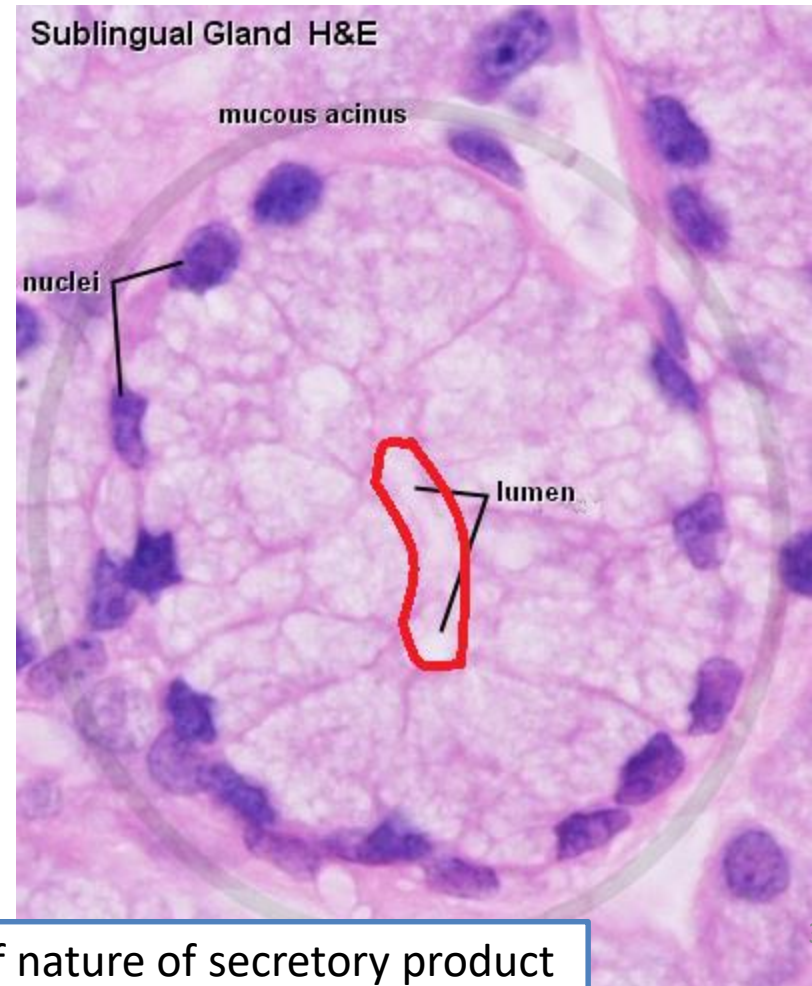
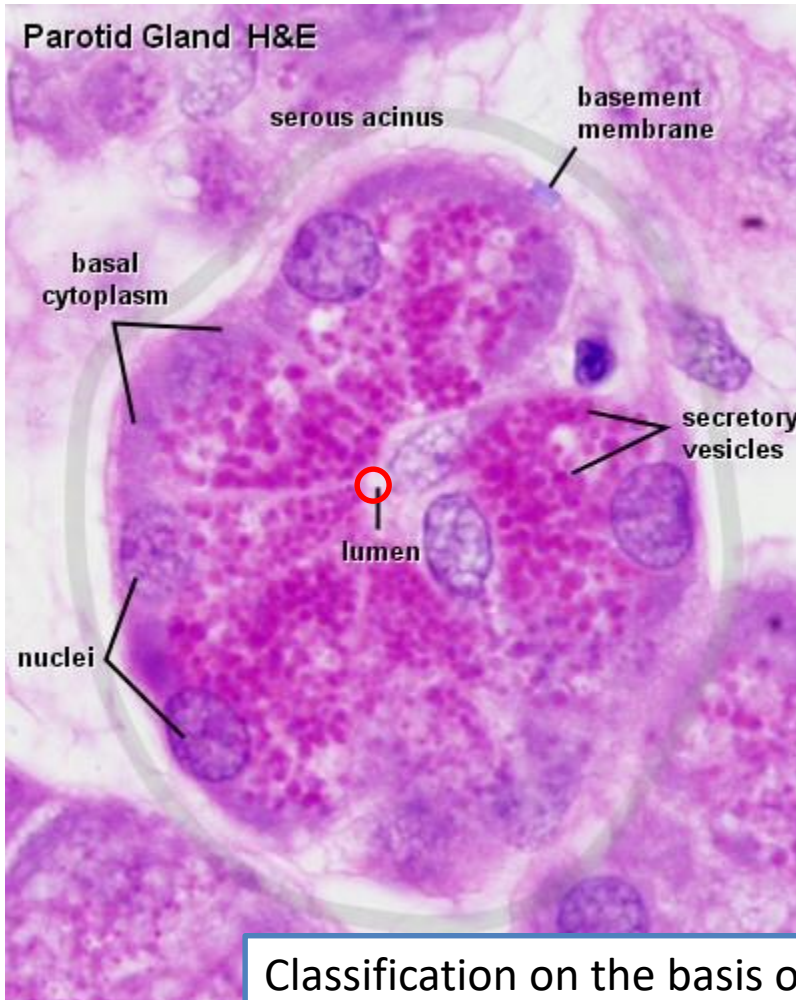
Mixed gland: Mucoserous gland



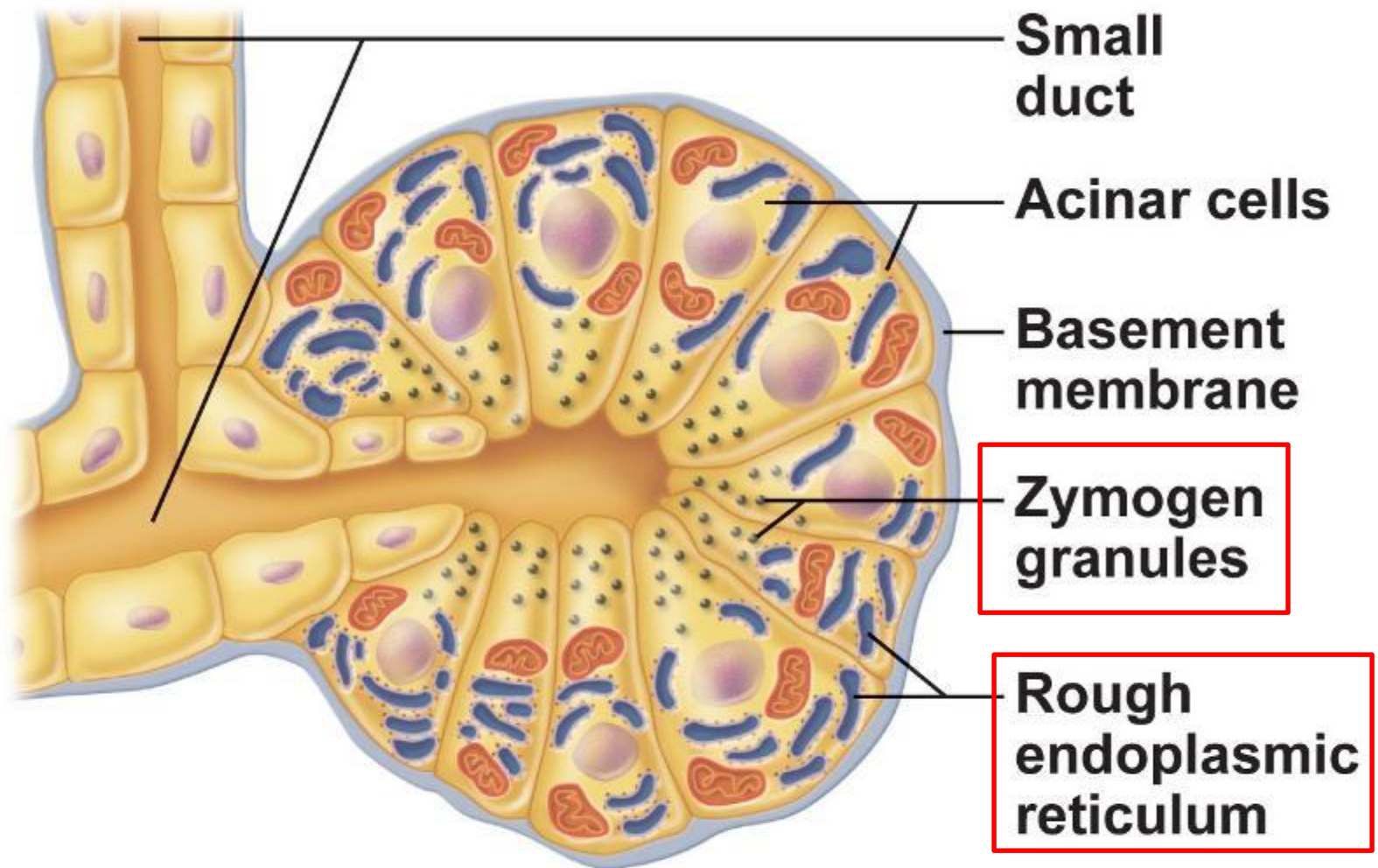
Sublingual gland



Serous cell Vs Mucous cell

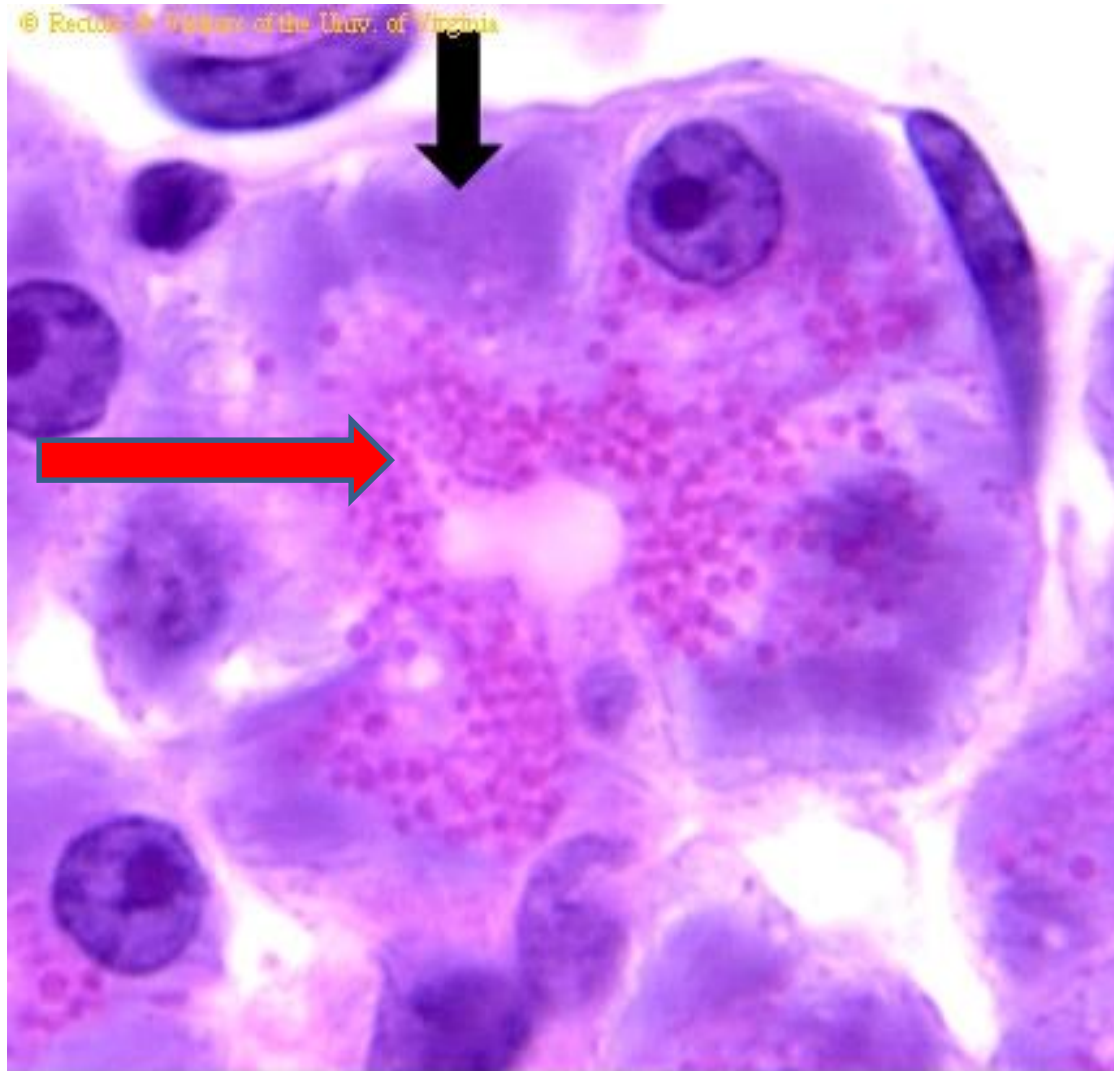


Classification on the basis of nature of secretory product

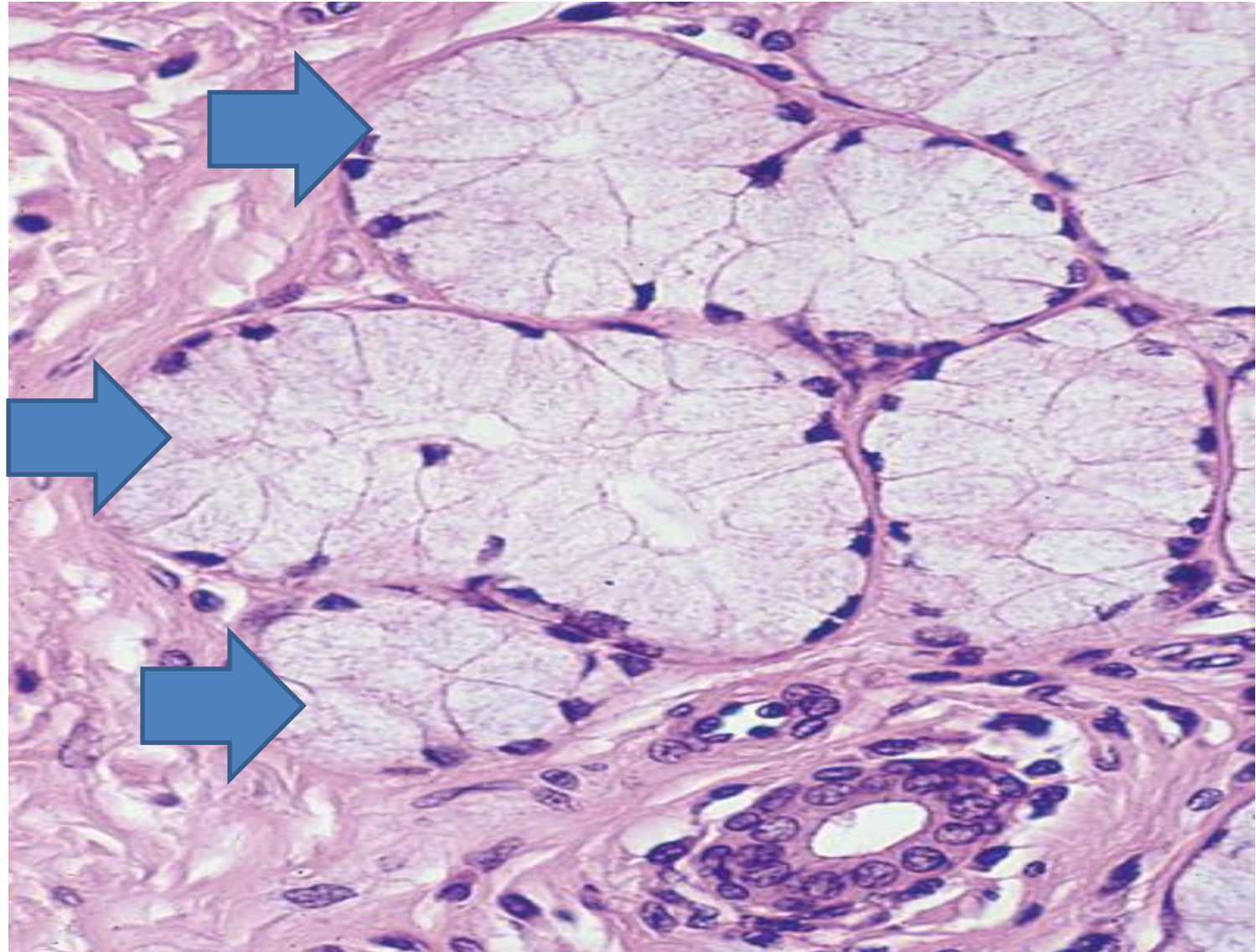


(a)

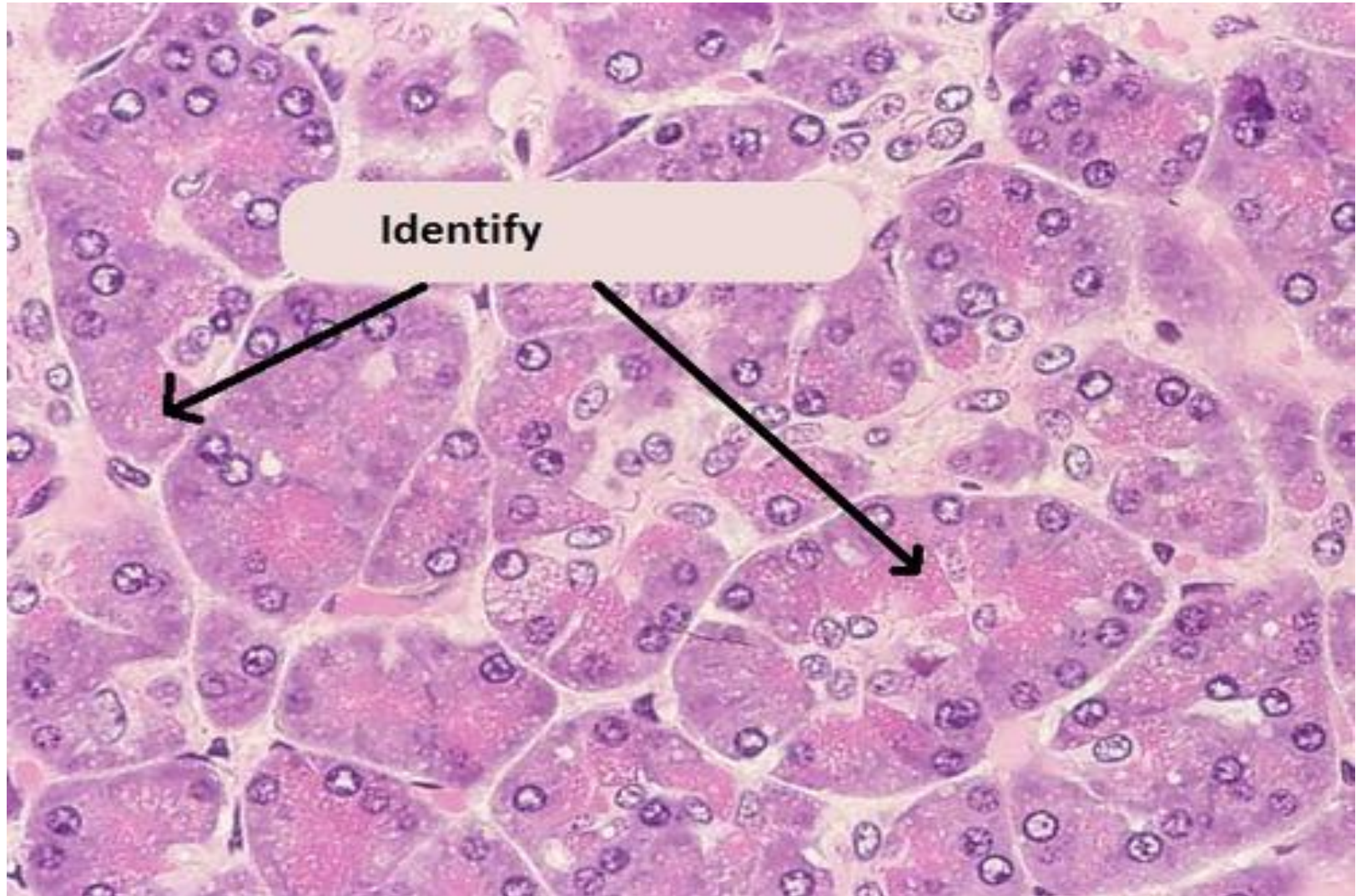
© Rectal - University of the Univ. of Virginia



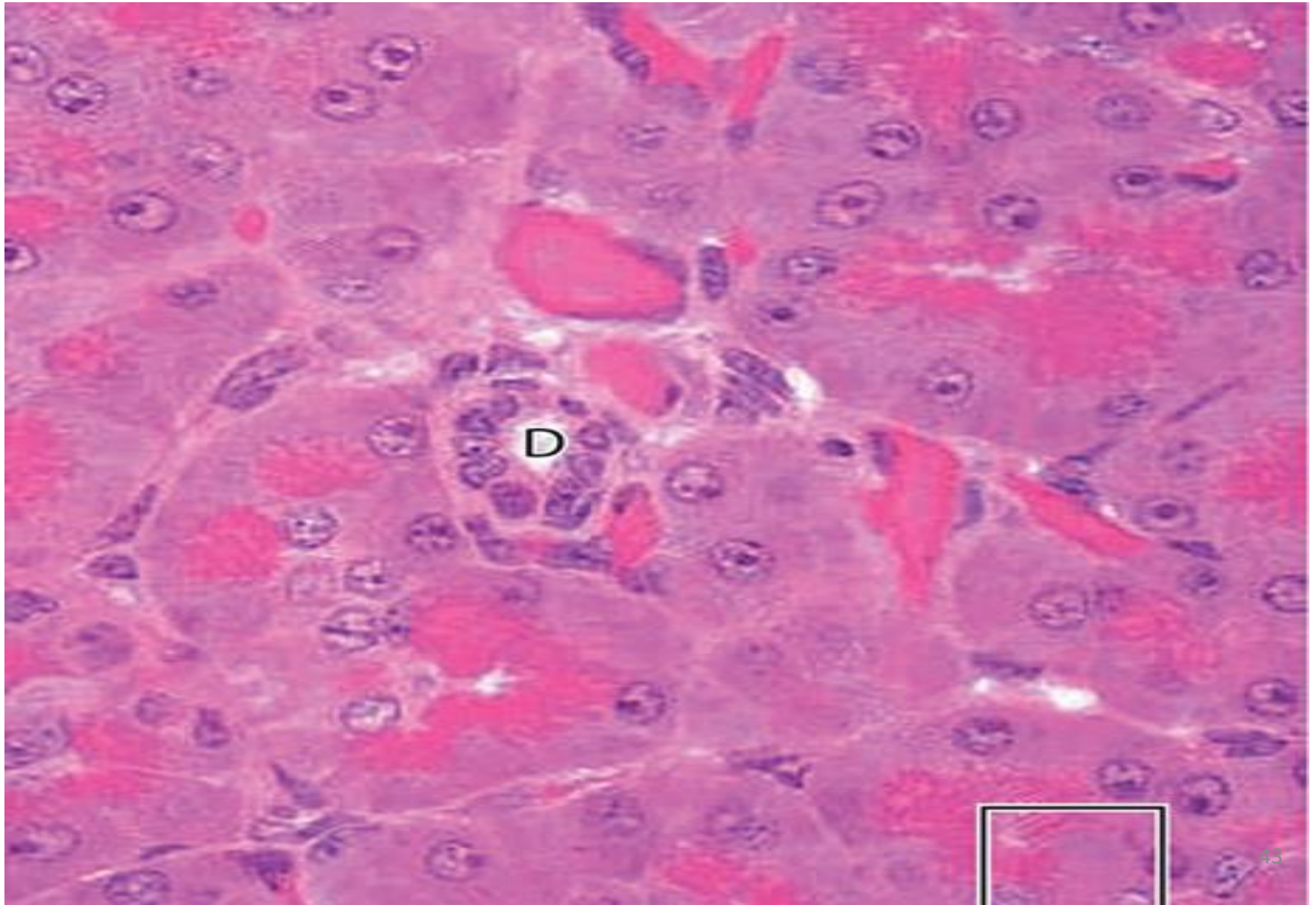
Mucous cells

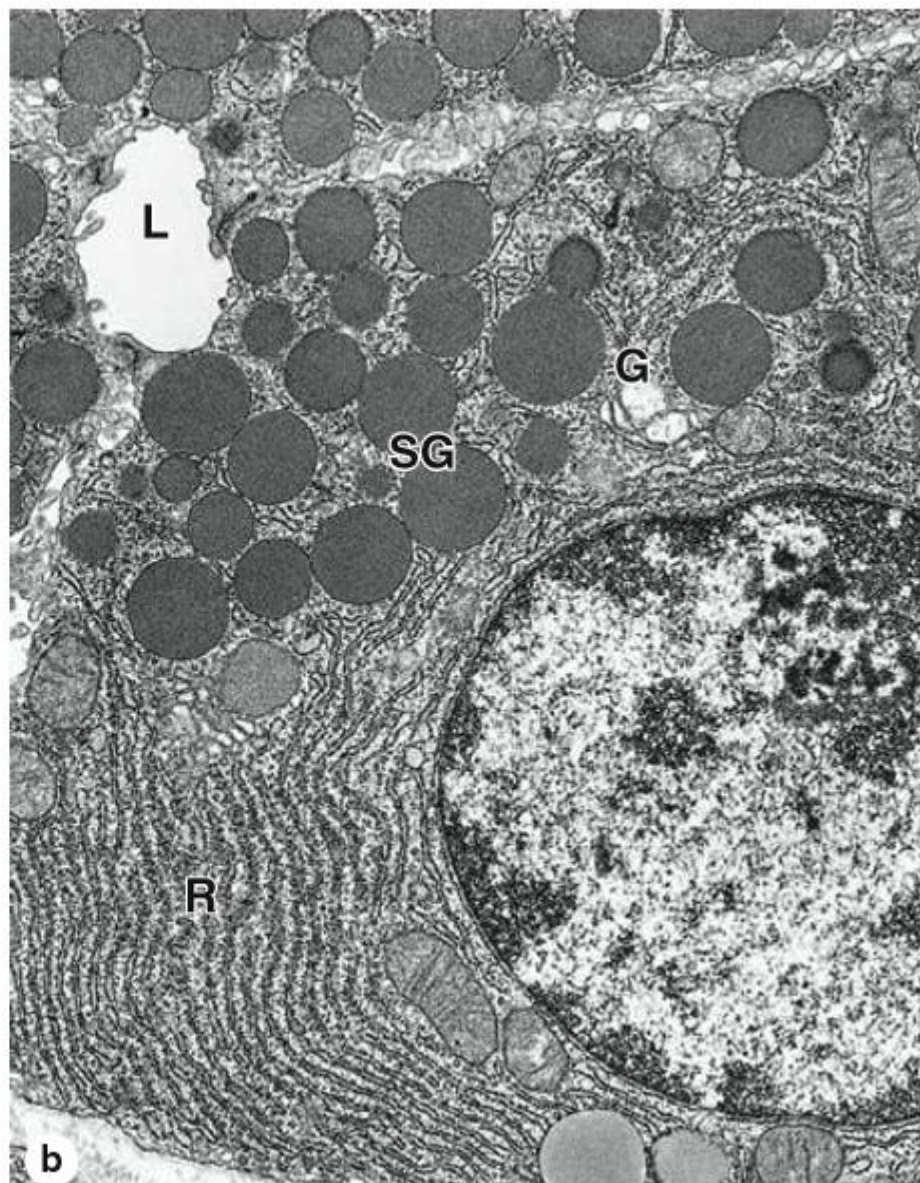
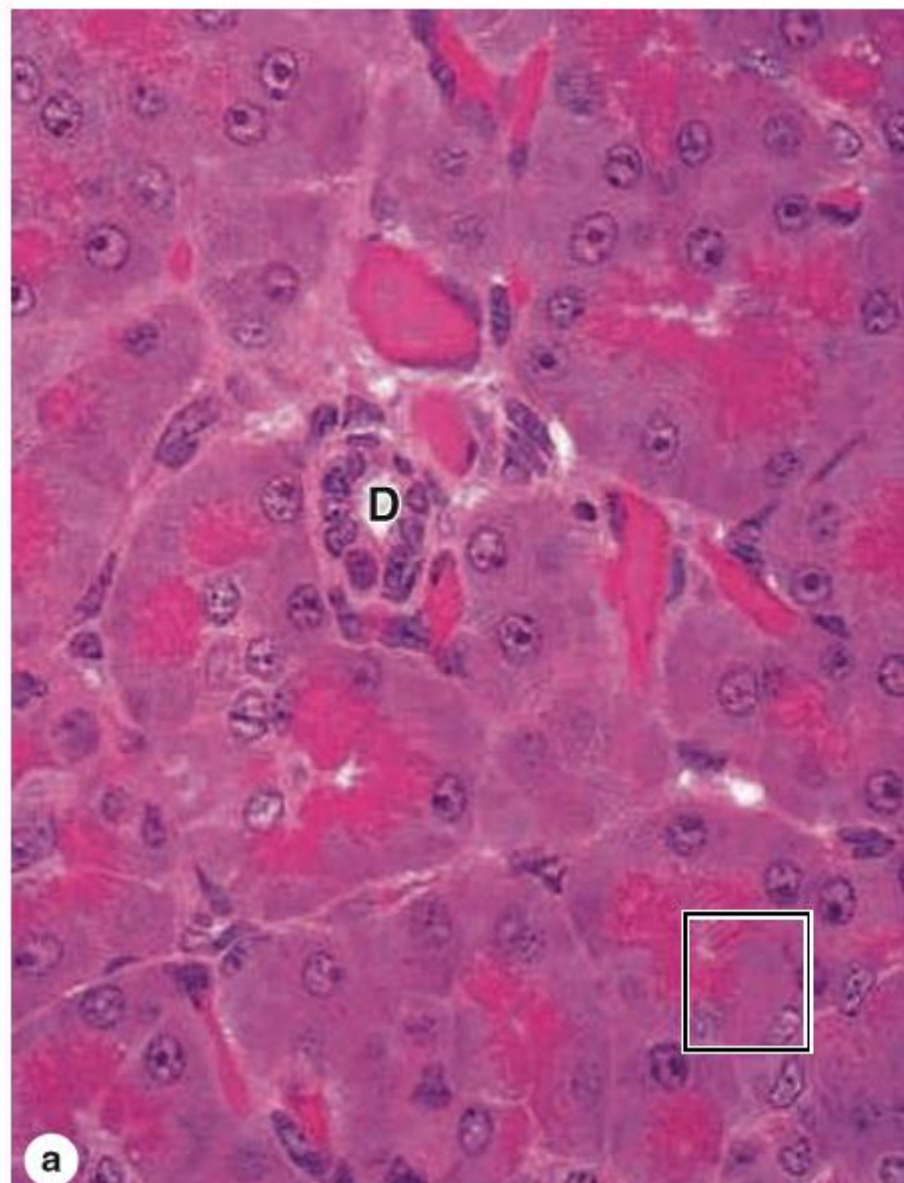


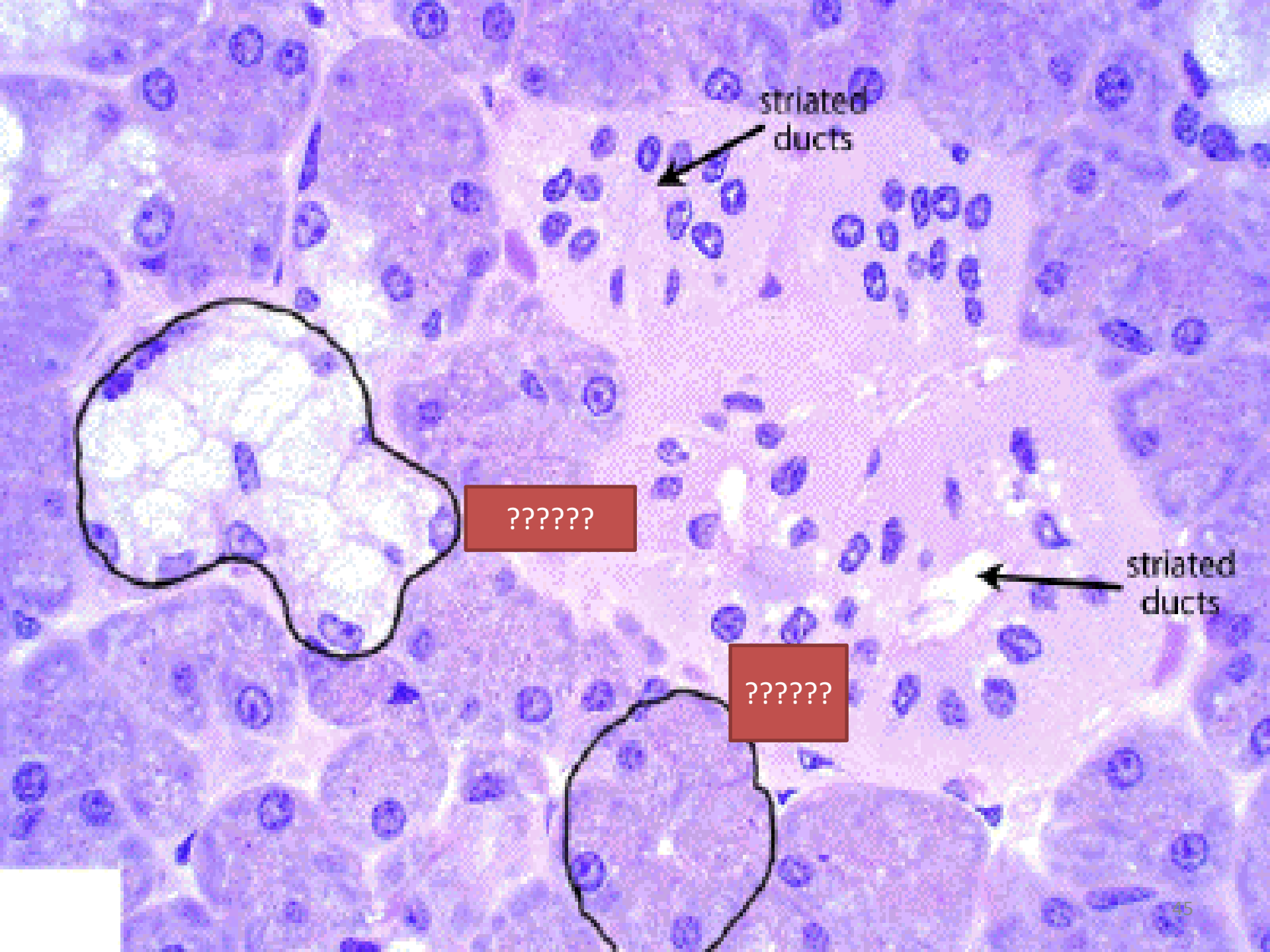
Serous cells



Serous or mucous cells????





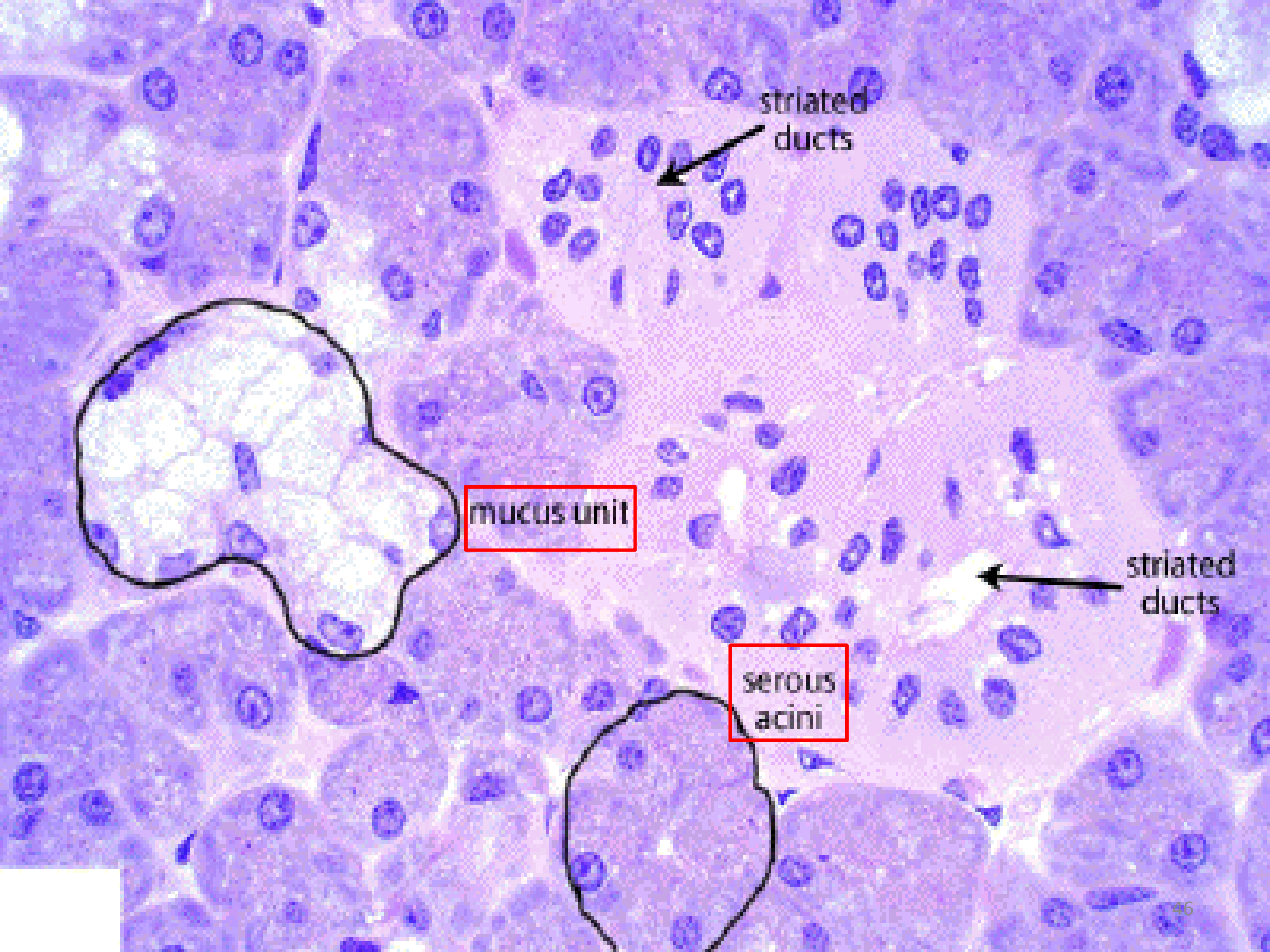


striated
ducts

??????

striated
ducts

??????

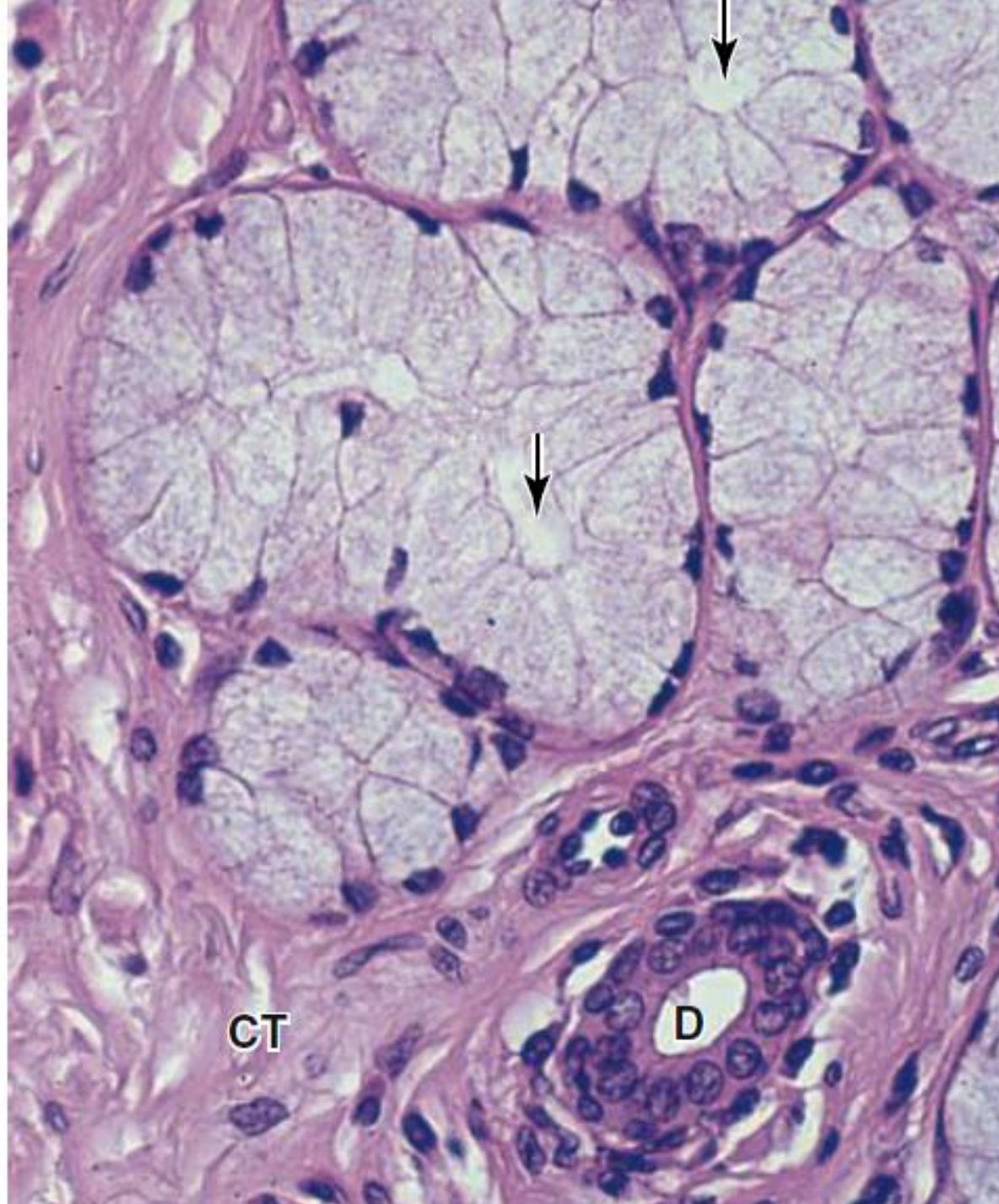


striated
ducts

mucus unit

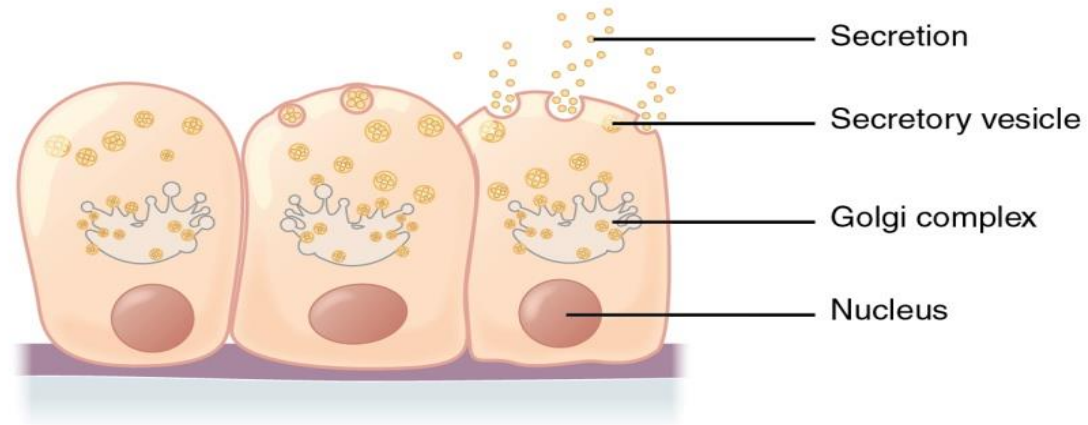
striated
ducts

serous
acini

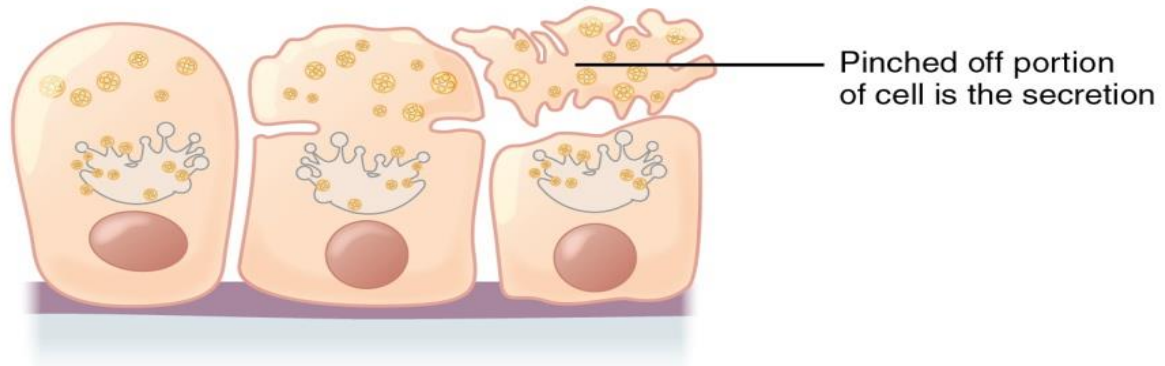


Classification on the basis of the mode of secretion:

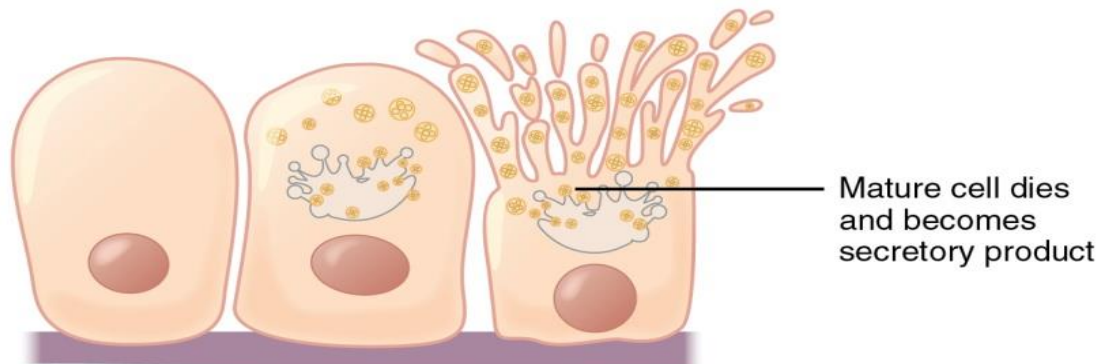
(a) Merocrine secretion

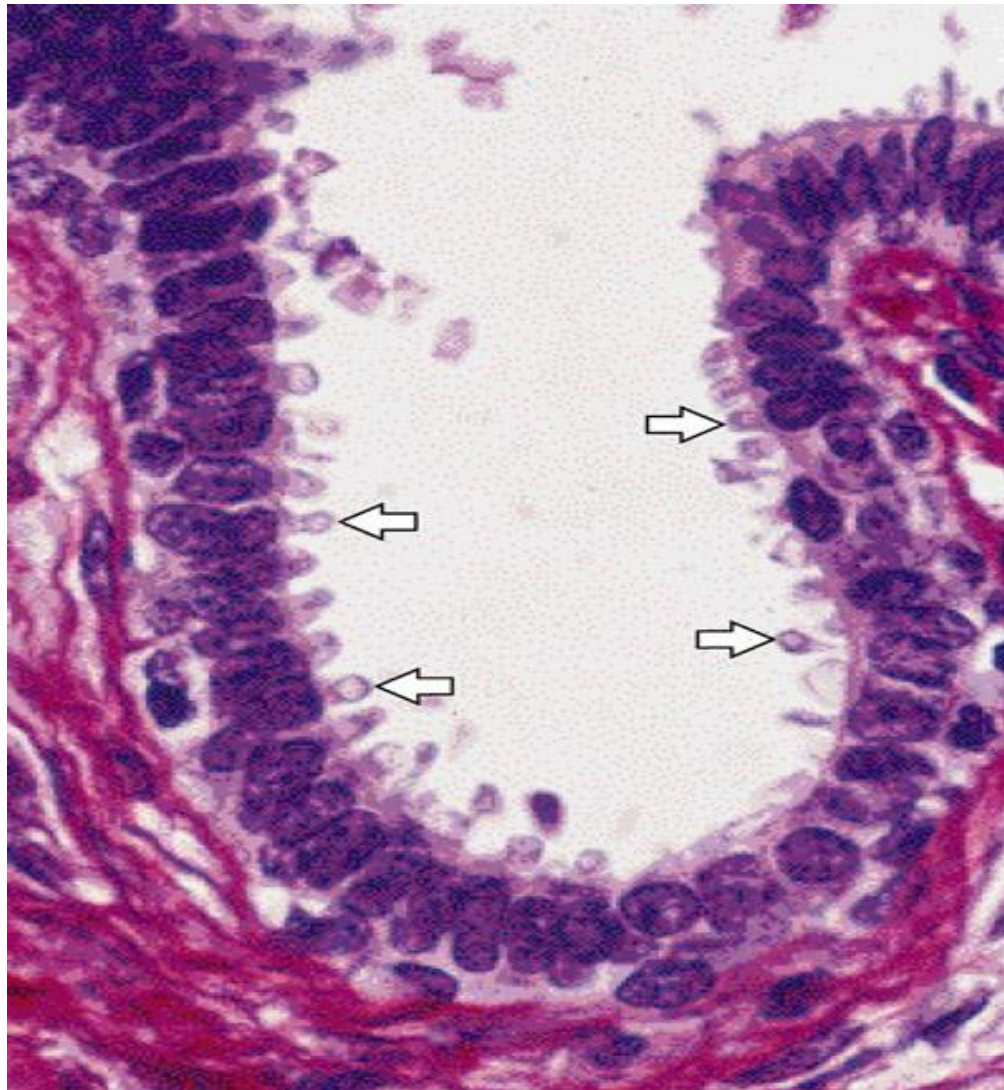


(b) Apocrine secretion



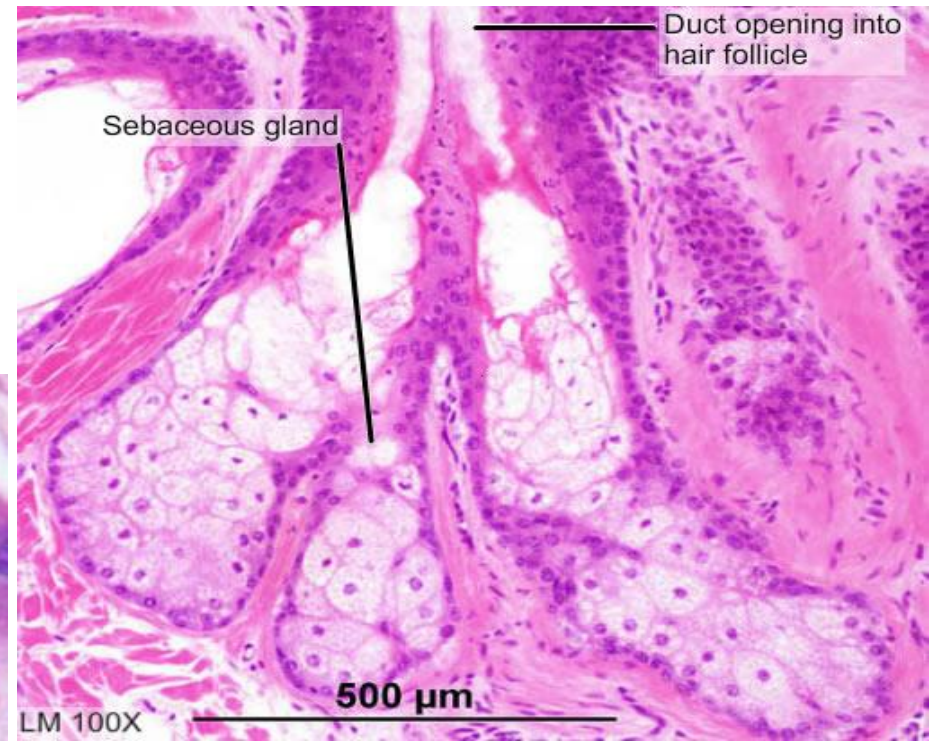
(c) Holocrine secretion



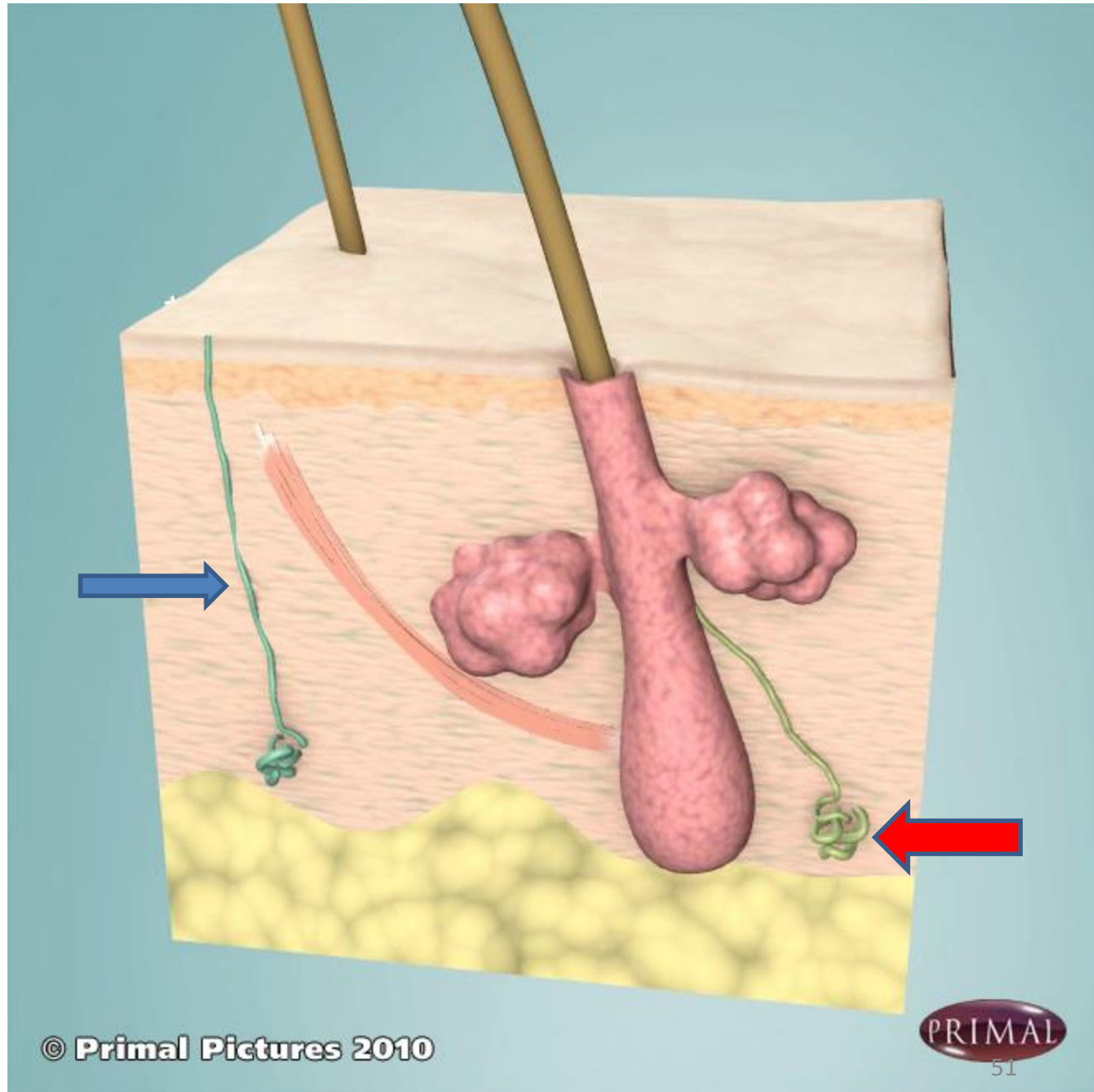


Apocrine Mammary gland

**Holocrine secretion
(Sebaceous gland)**



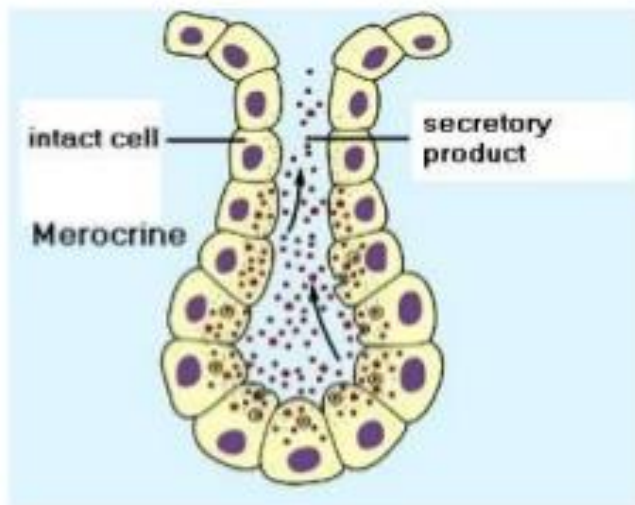
Sweat glands



Types of sweat glands

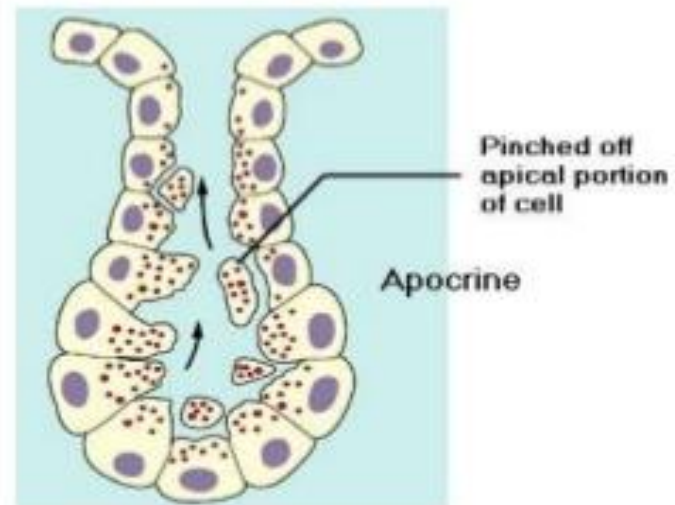
Eccrine sweat gland

- Merocrine secretion
- Empty directly onto skin surface
- Location: most all over body (esp. abundant on palms & soles: ~ 500/cm²)
- Clear, watery secretion (99% H₂O; rest NaCl + some waste products)

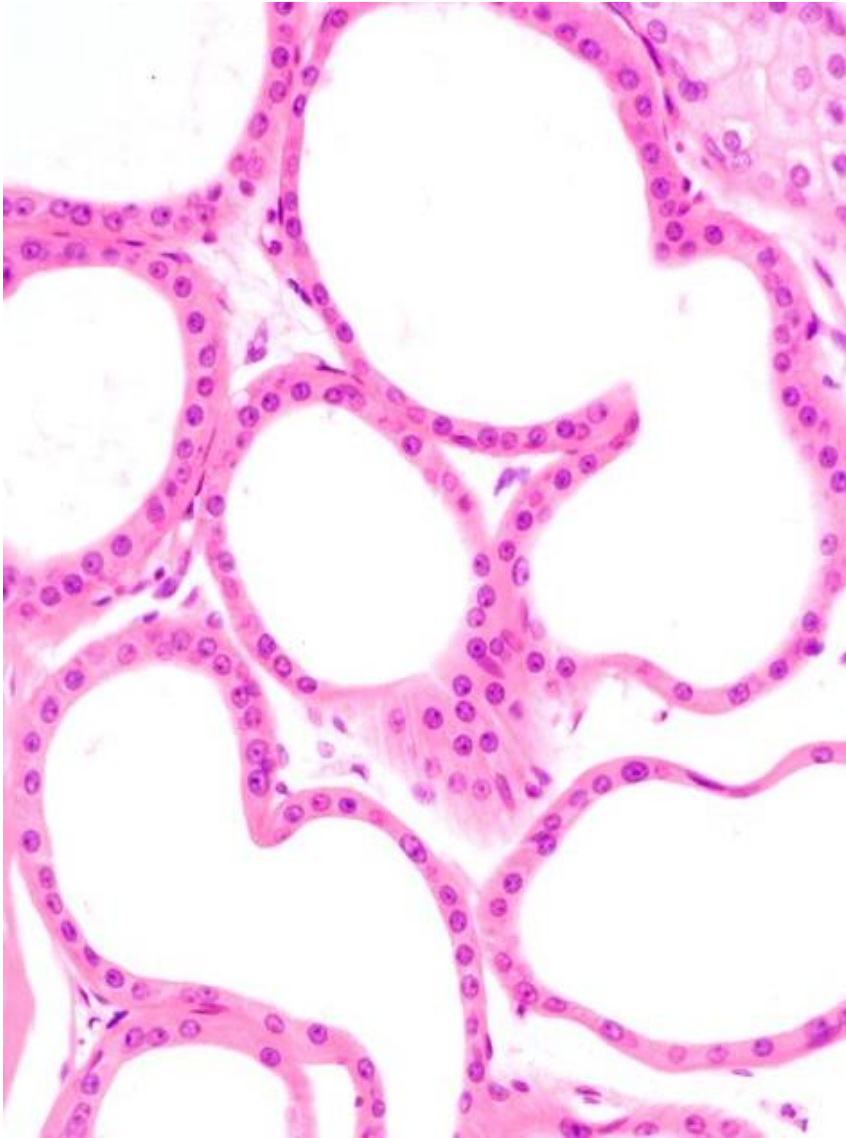


Apocrine sweat gland

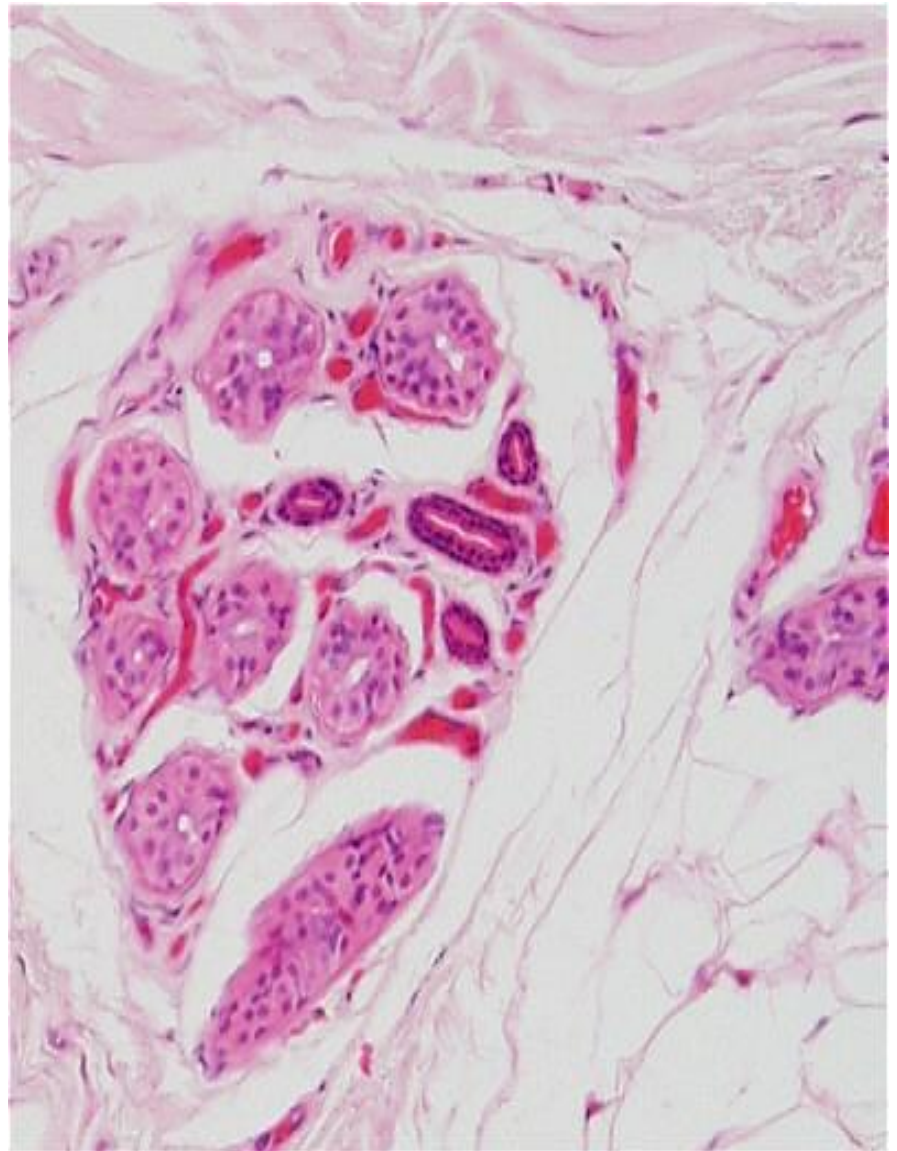
- Empty into hair follicle
- Location: armpits, groin, nipples
- Viscous, cloudy secretion → good nutrient source for bacteria (odor !!)
- Secretion may contain Pheromones
- Secretion begins at puberty and is stimulated during emotional distress

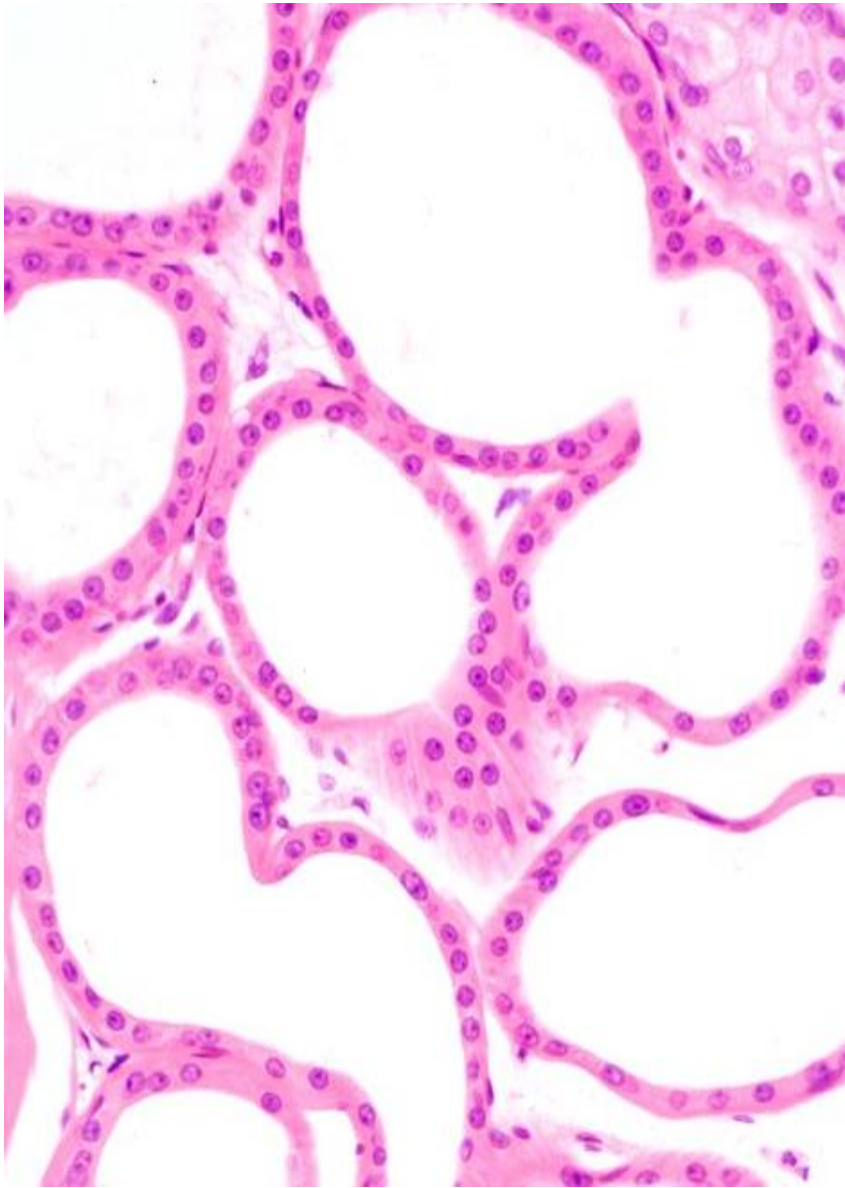


Apocrine sweat glands



Eccrine sweat glands





Apocrine sweat glands