

Author(s): University of Michigan Medical School, Department of Cell and Developmental Biology

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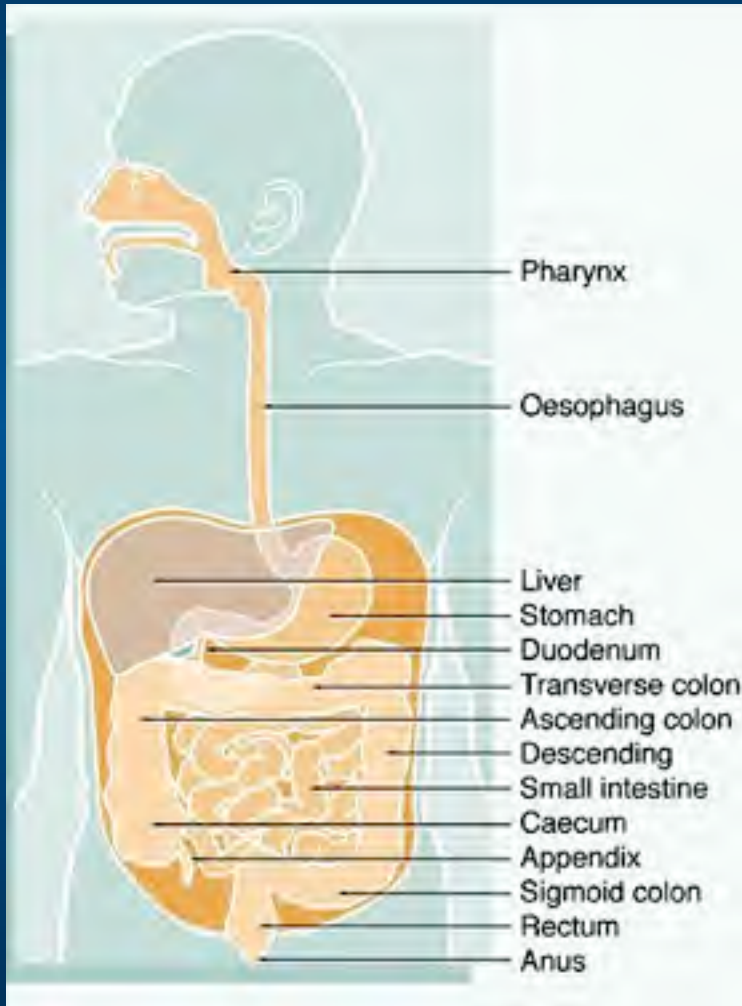
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M1 - GI Sequence

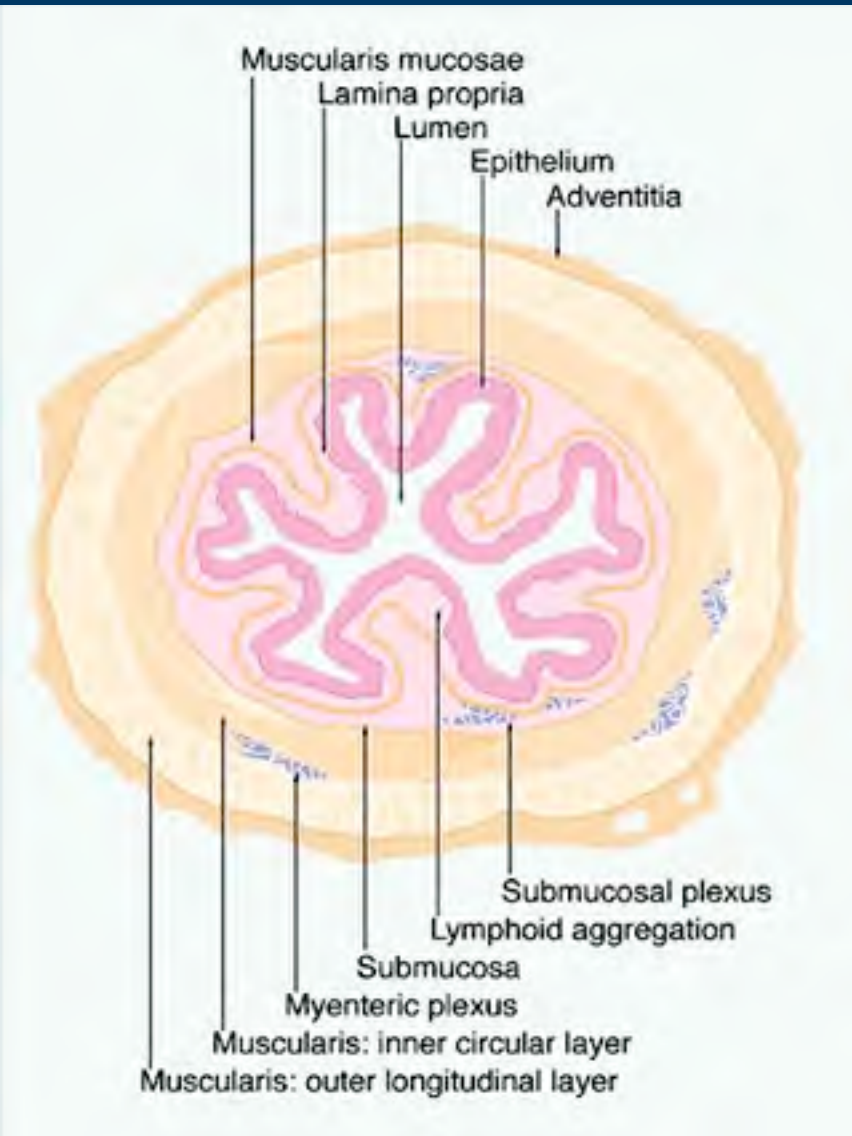
Oral Cavity and Salivary glands

Winter, 2009

Cell and Developmental biology



Layers of the Digestive Tract



Digestive Tube (GI tract)

Mucosa (mucous membrane)

epithelium

lamina propria

muscularis mucosa

Submucosa

Muscularis Externa

inner-circular

outer-longitudinal

(3RD layer in stomach)

Serosa or adventitia

Glands

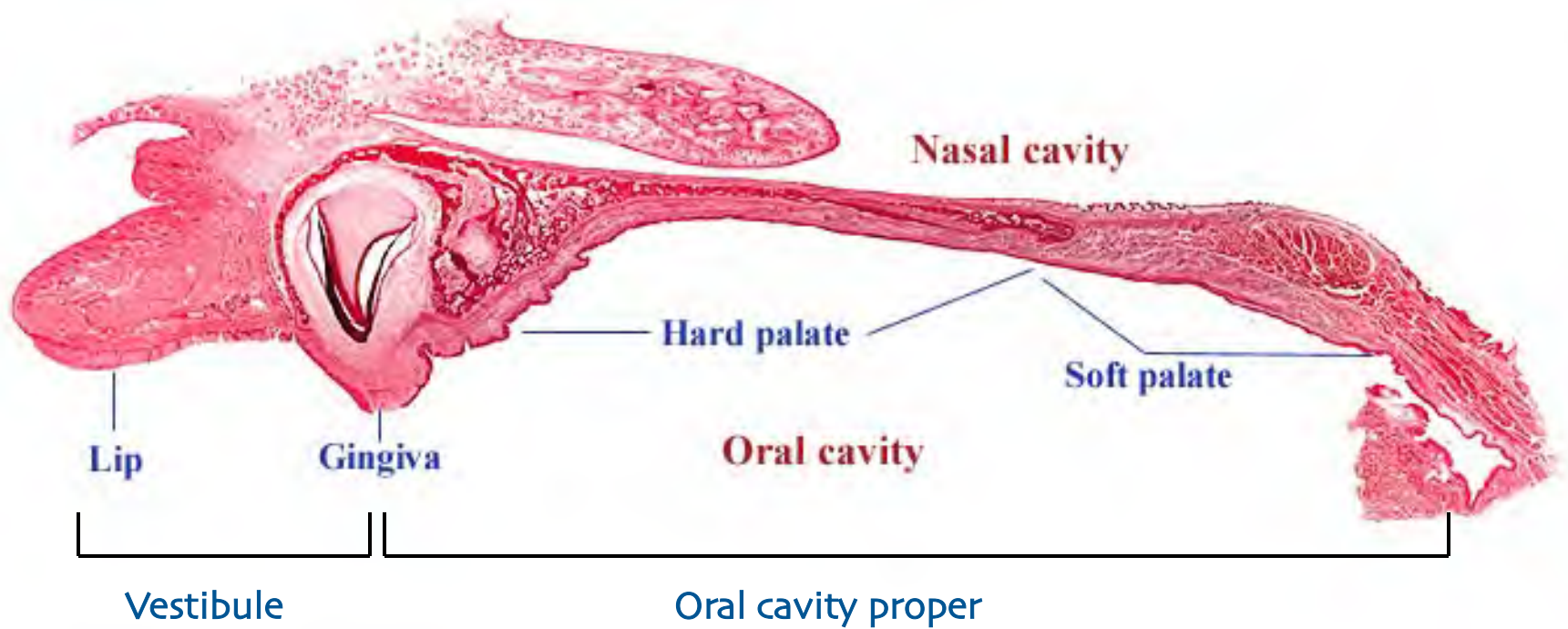
- Glands within the GI Tract

- Glands outside - Salivary glands, Liver, Pancreas

Oral Mucosa

1. Lining Mucosa: lip, cheek, floor of mouth, soft palate, ventral surface of tongue
Epithelium - non-keratinized
Submucosa contains salivary glands
2. Masticatory Mucosa: gingiva, hard palate
Epithelium - keratinized or parakeratinized
Submucosa - absent
3. Specialized Mucosa: dorsal surface of tongue
 1. Filiform Papillae – keratinized epithelium
 2. Fungi form Papillae - non-keratinized epithelium
 3. (Foliate Papillae) - rudimentary in human
 4. Circumvallate Papillae – non-keratinized epithelium with associated taste buds and von Ebner's salivary glands

Slide 115



Slide 114

Lip

Oral mucosa:

St. sq. non-
keratinized
epithelium

Labial salivary
glands in submucosa



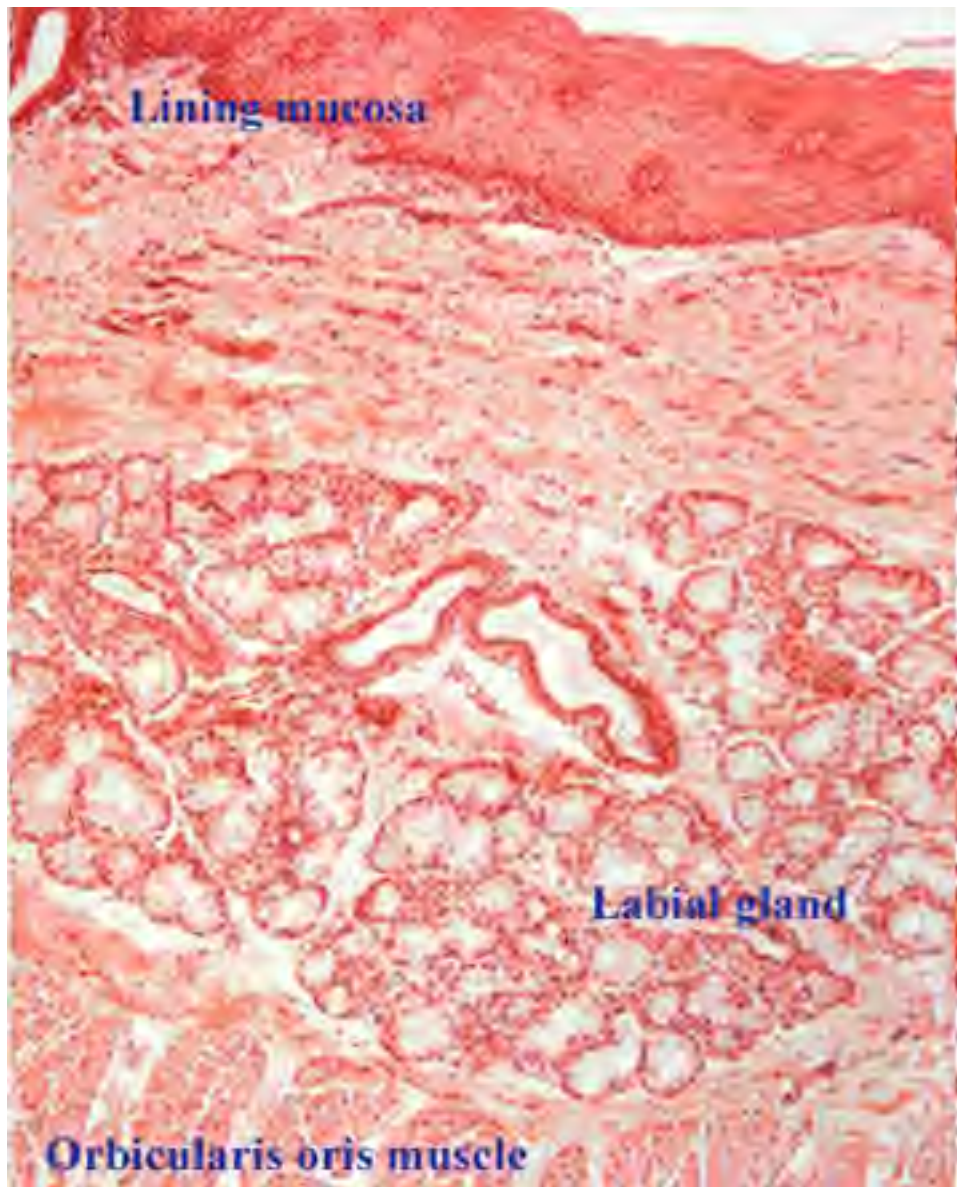
Orbicularis oris muscle

Vermillion border (zone)

Dilated venules and veins
lacks salivary glands

Skin:

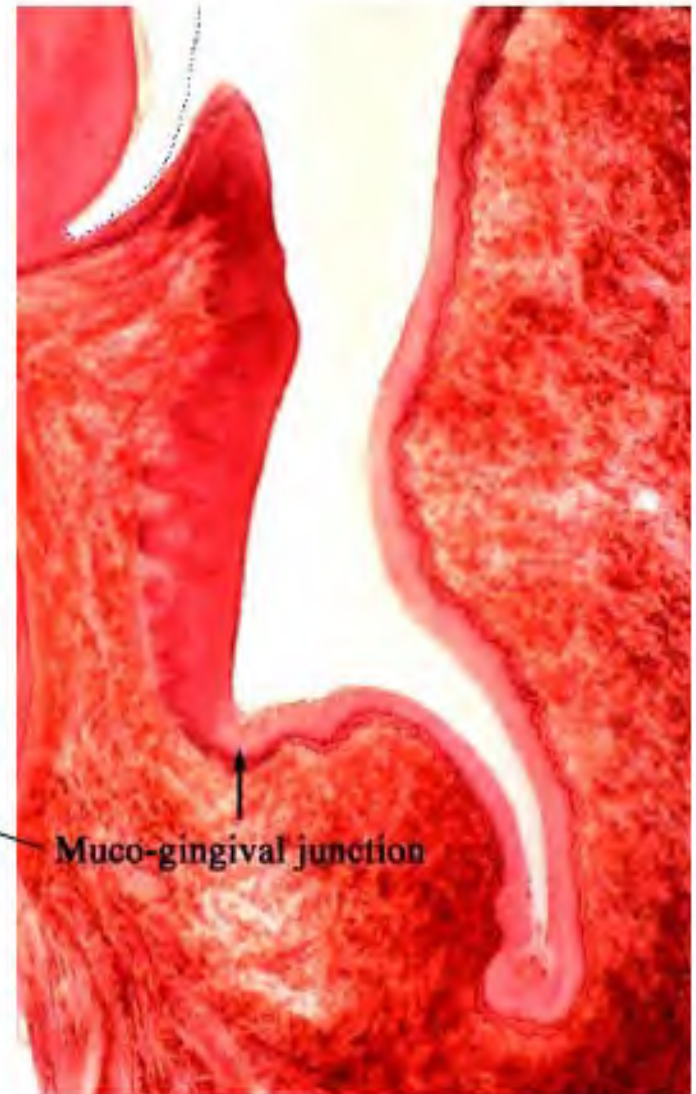
Hair follicles
sebaceous glands
sweat glands



Muco-gingival Junction

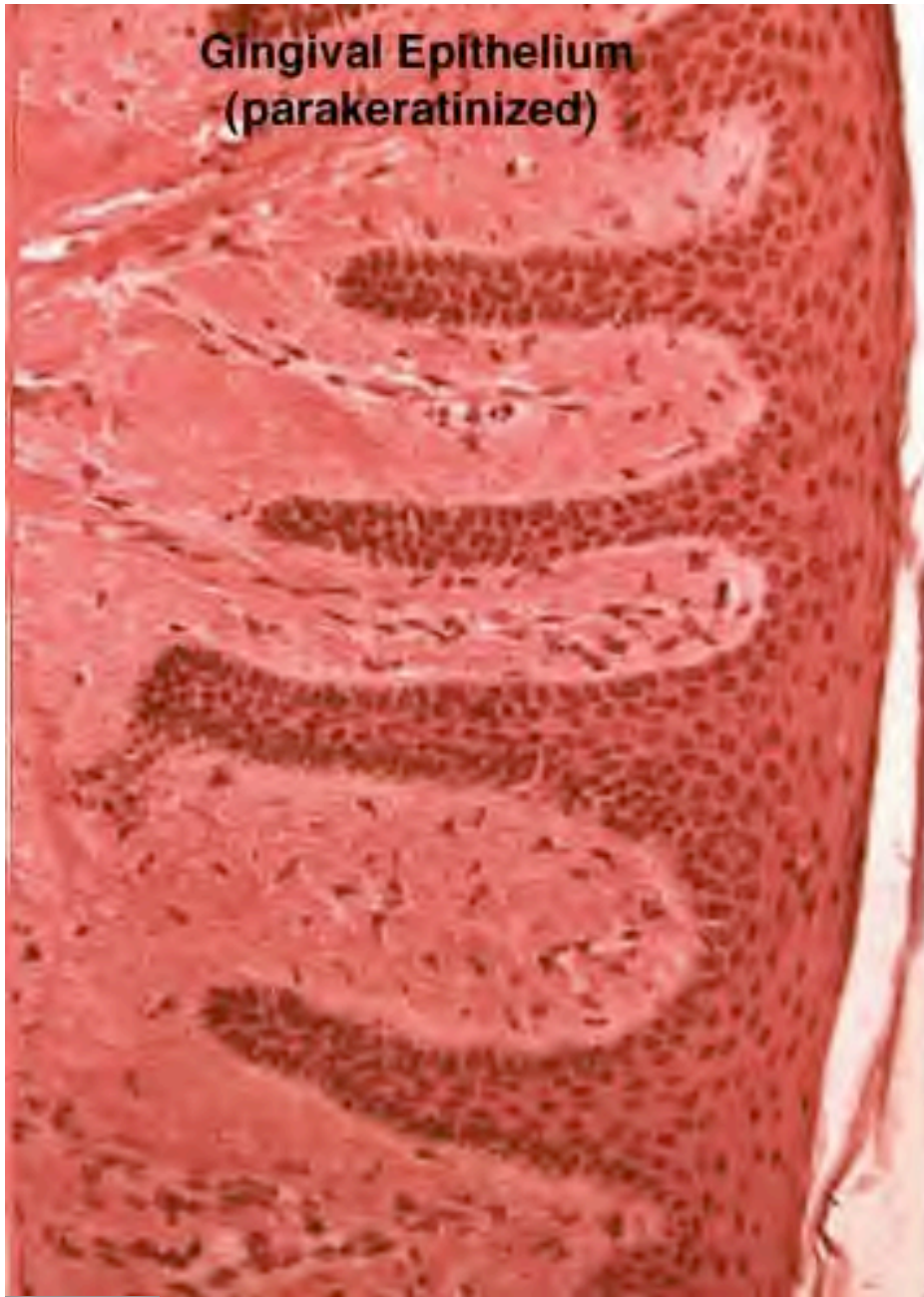


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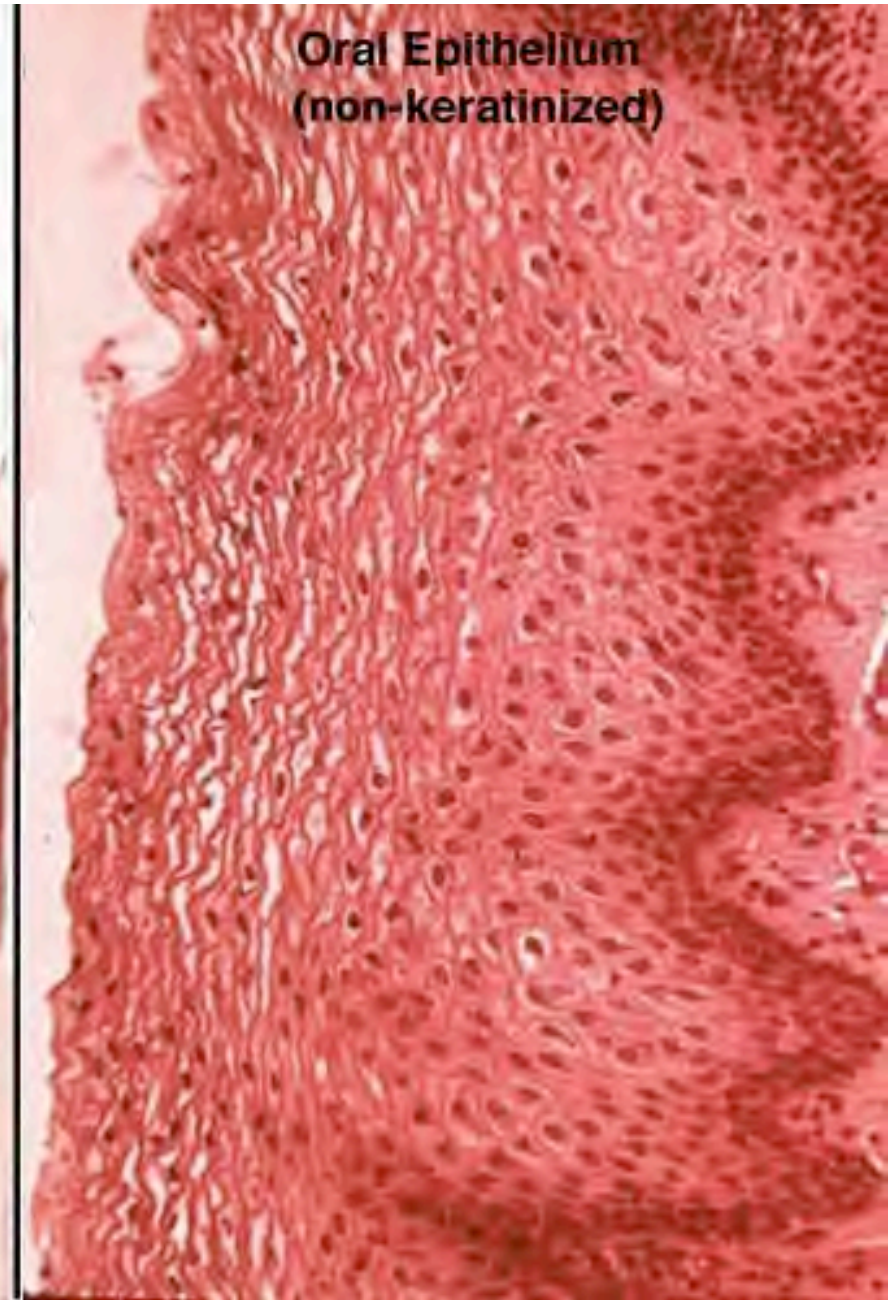


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**Gingival Epithelium
(parakeratinized)**



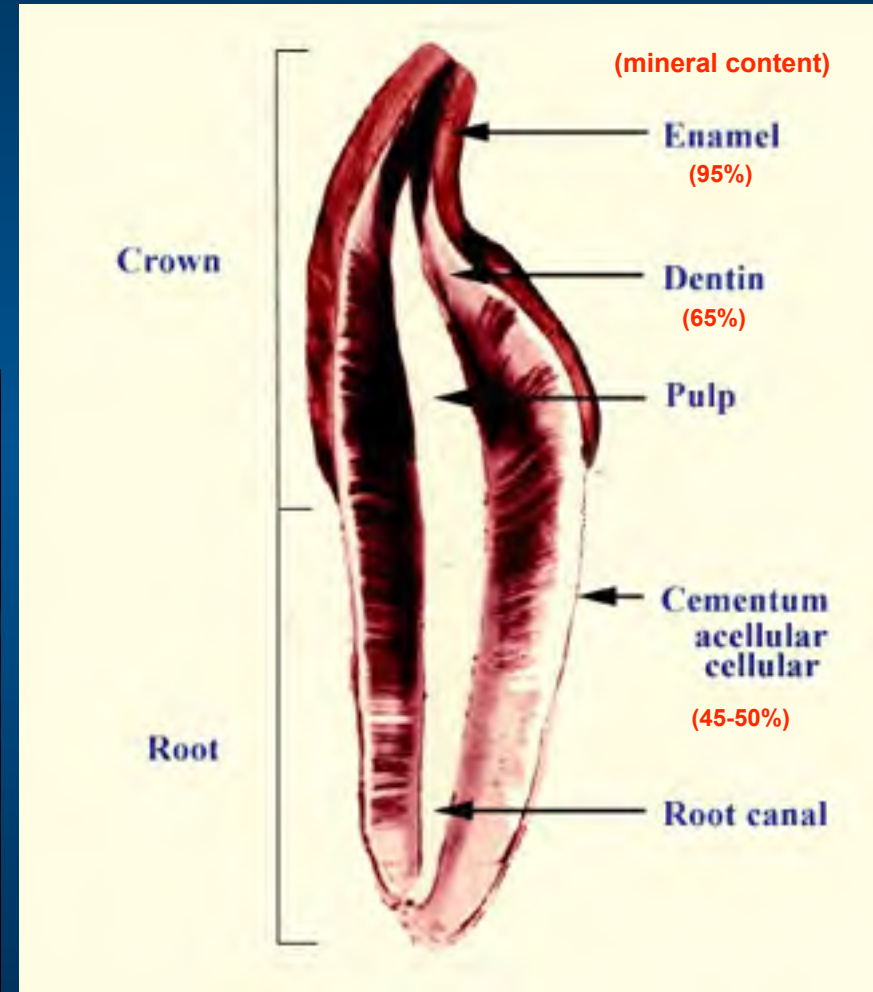
**Oral Epithelium
(non-keratinized)**



Tooth Structure

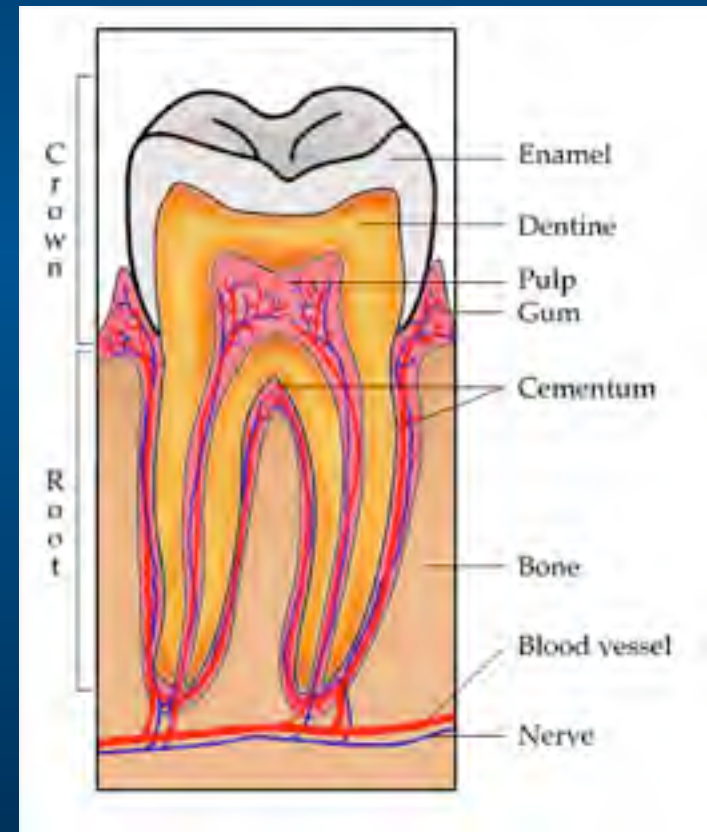
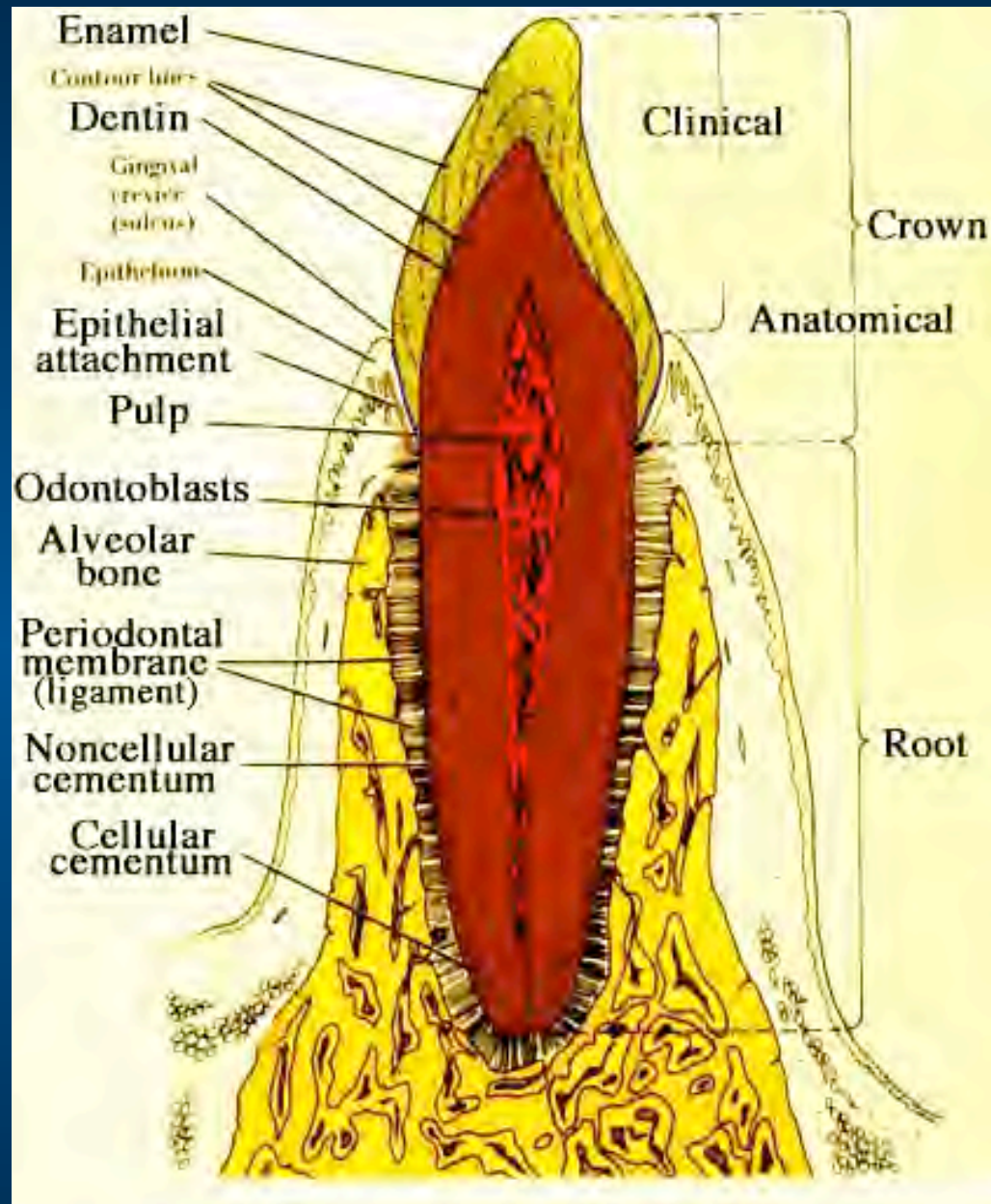


© PD-INEL Cell and Tissue Biology, L. Weiss 6th Ed. Pp. 597

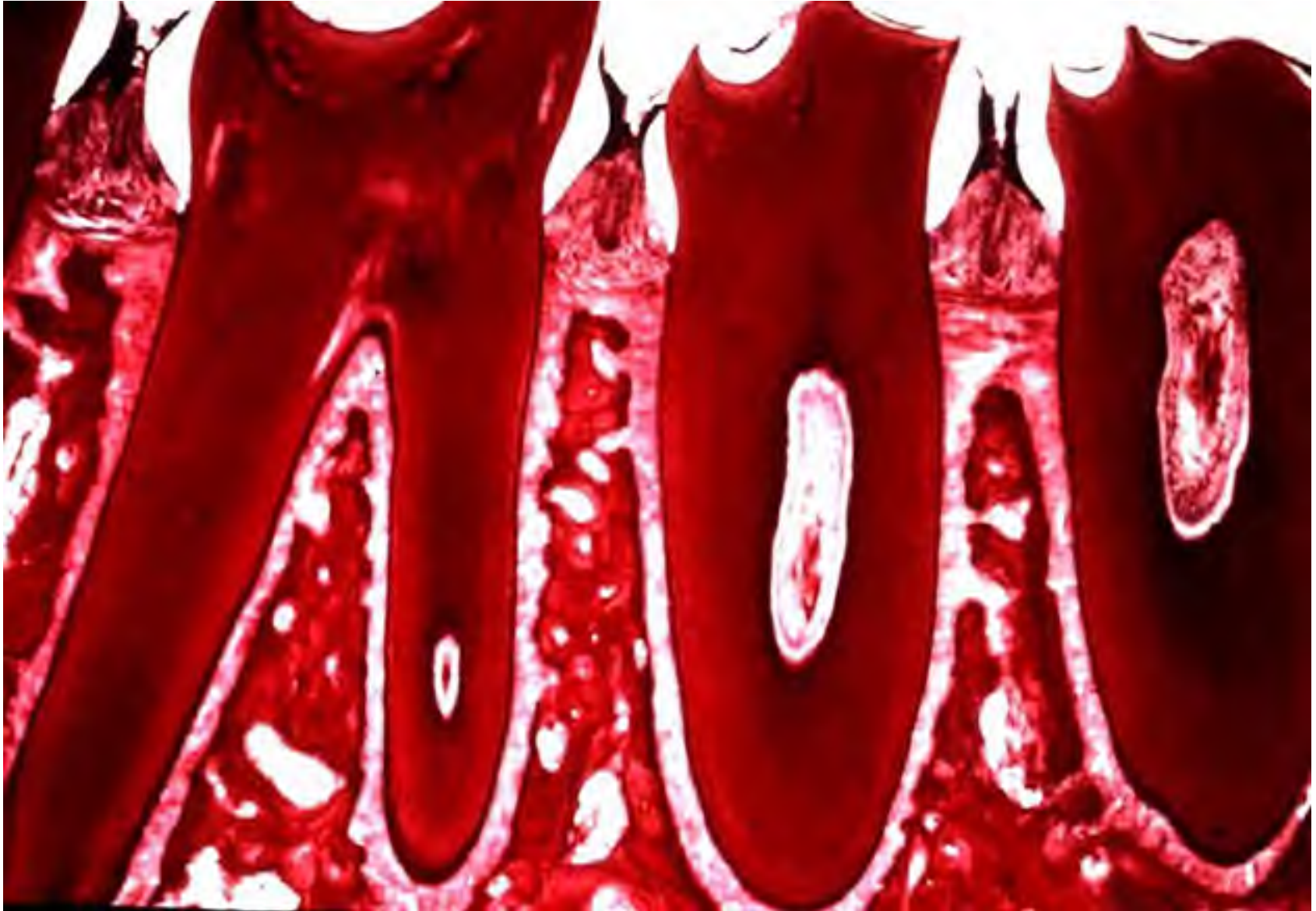


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Diagram of a tooth (incisor) in its alveolar socket



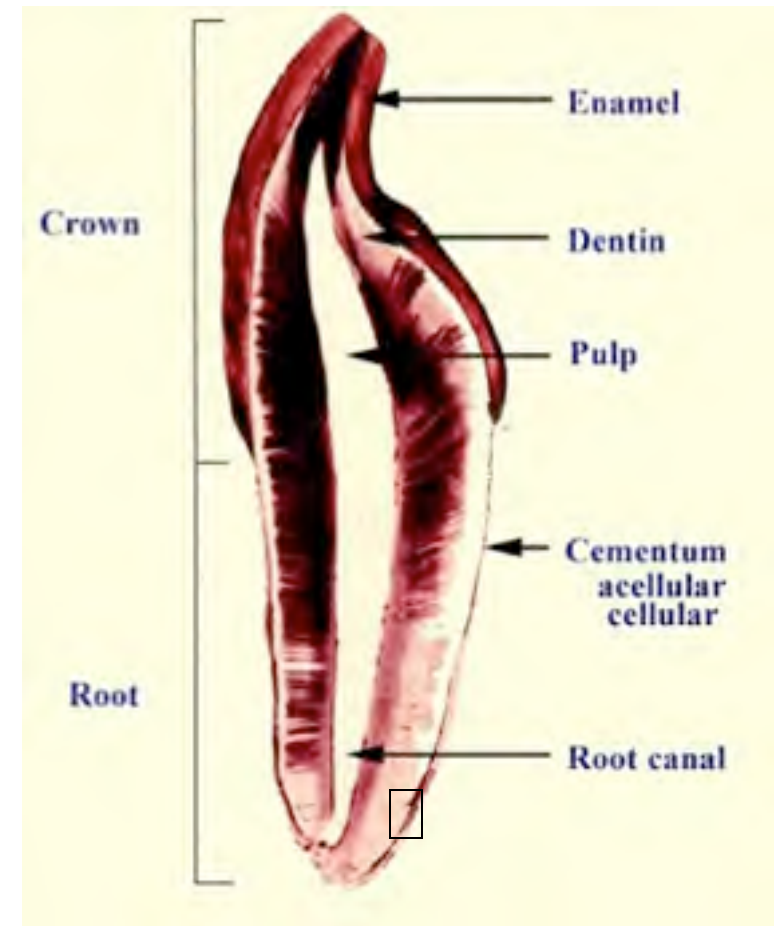
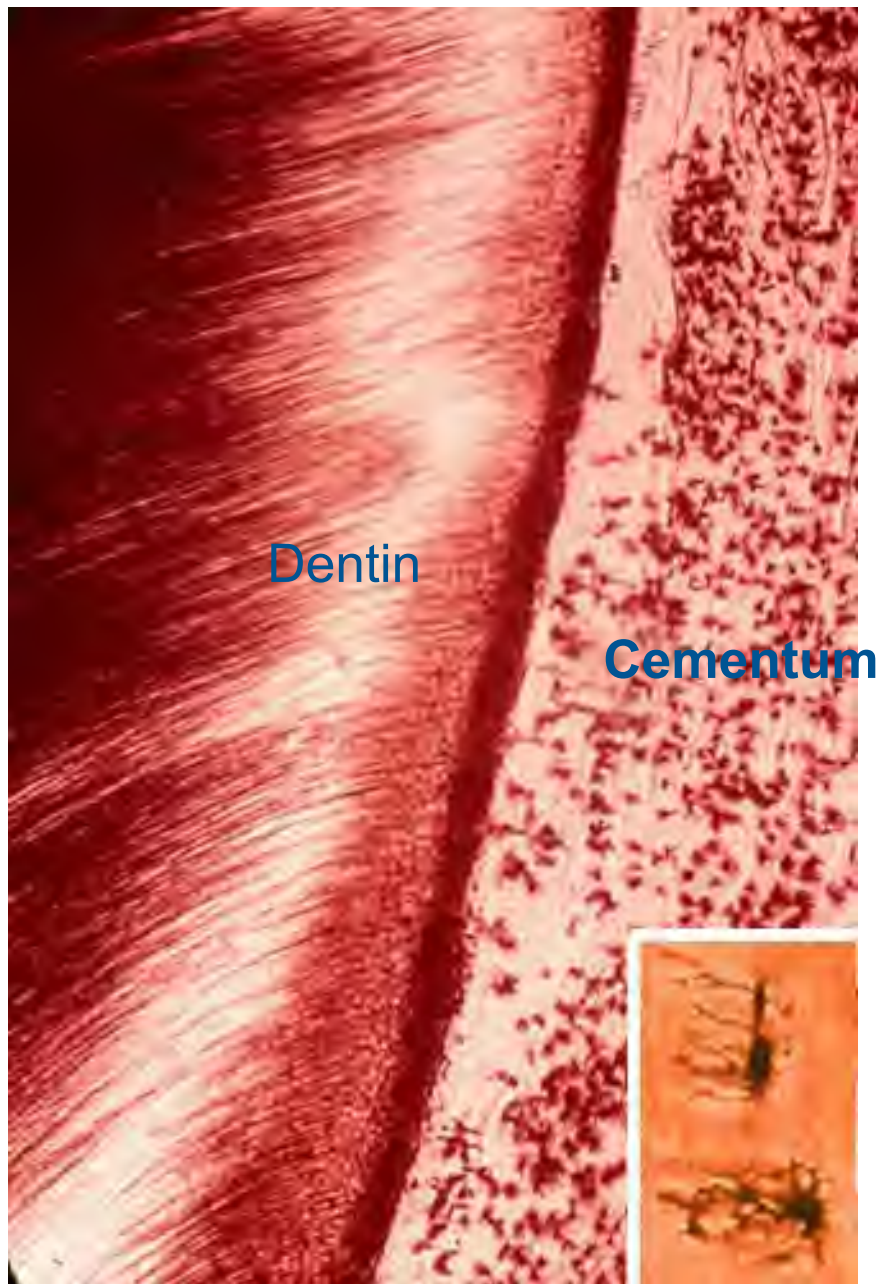
Teeth in Alveolar Bone (Sockets)



Periodontal Ligaments (fibers)



Cellular Cementum, Cementocytes

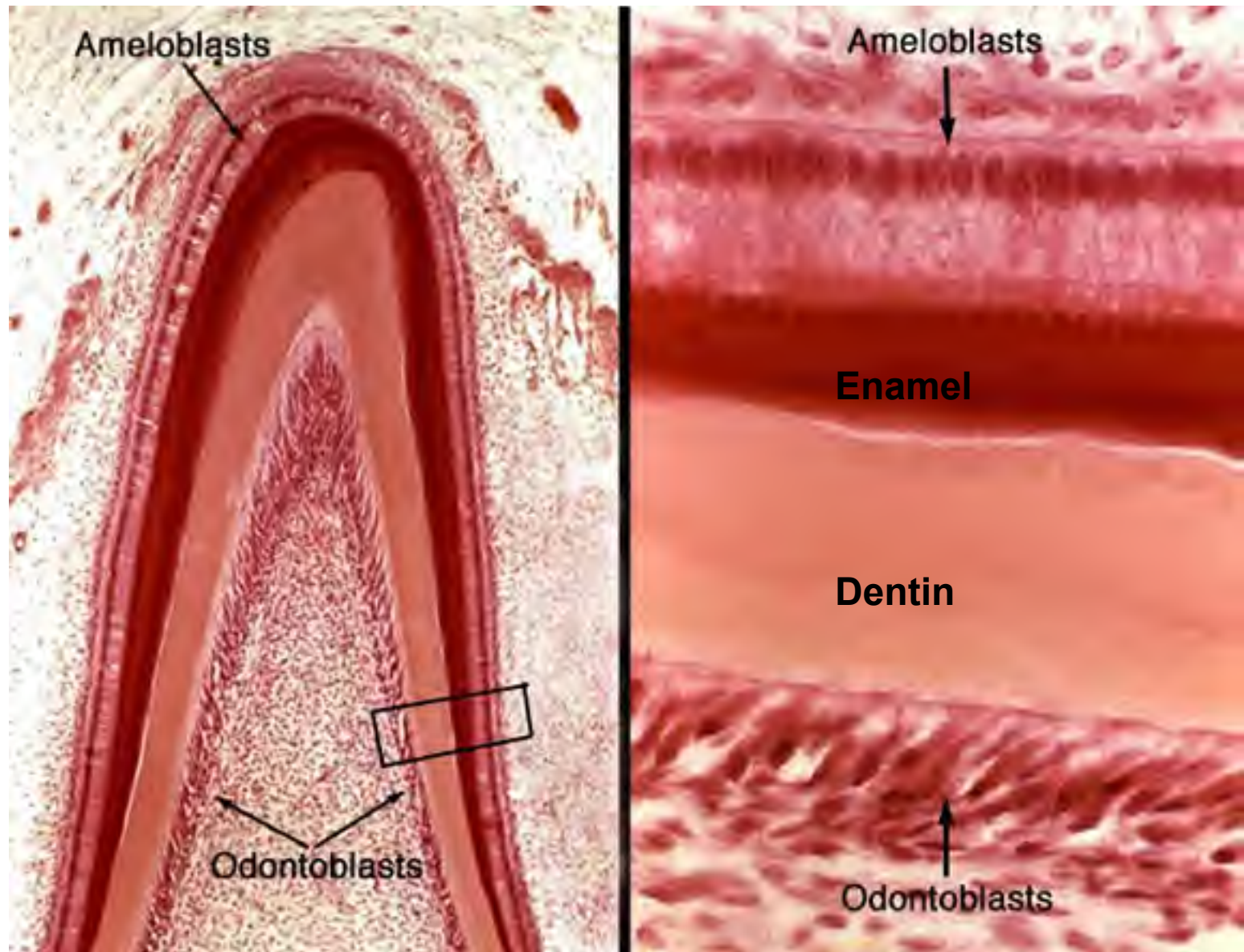


Deciduous and Permanent Teeth



Deciduous and permanent teeth

Forming Tooth

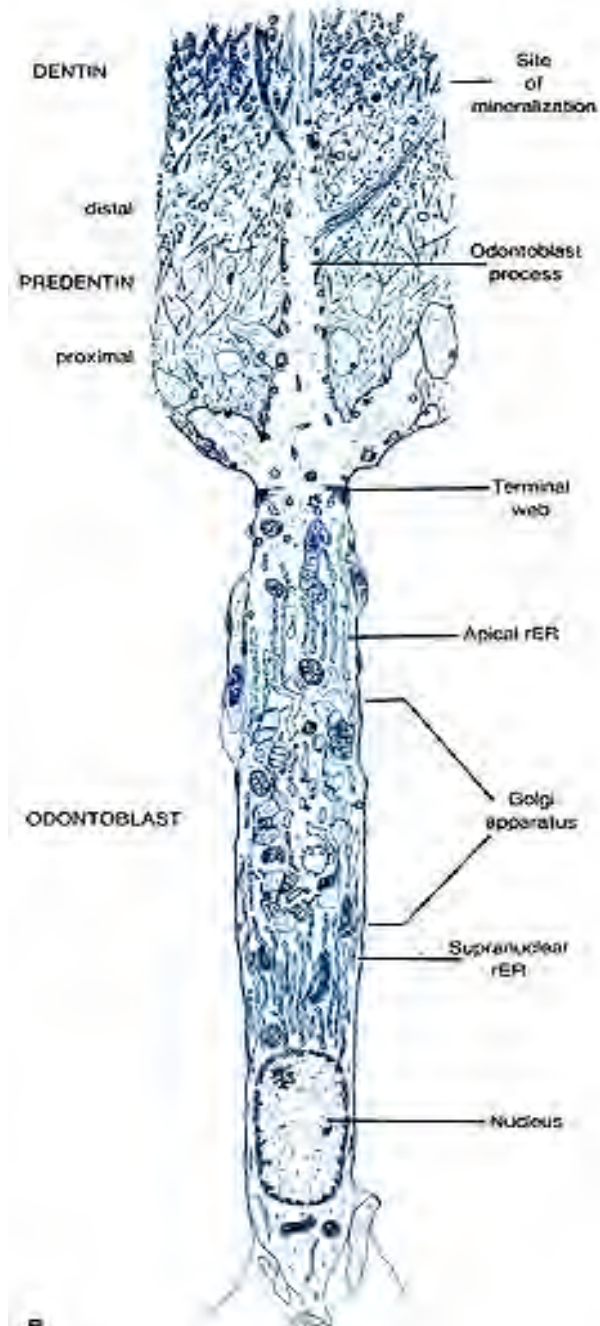
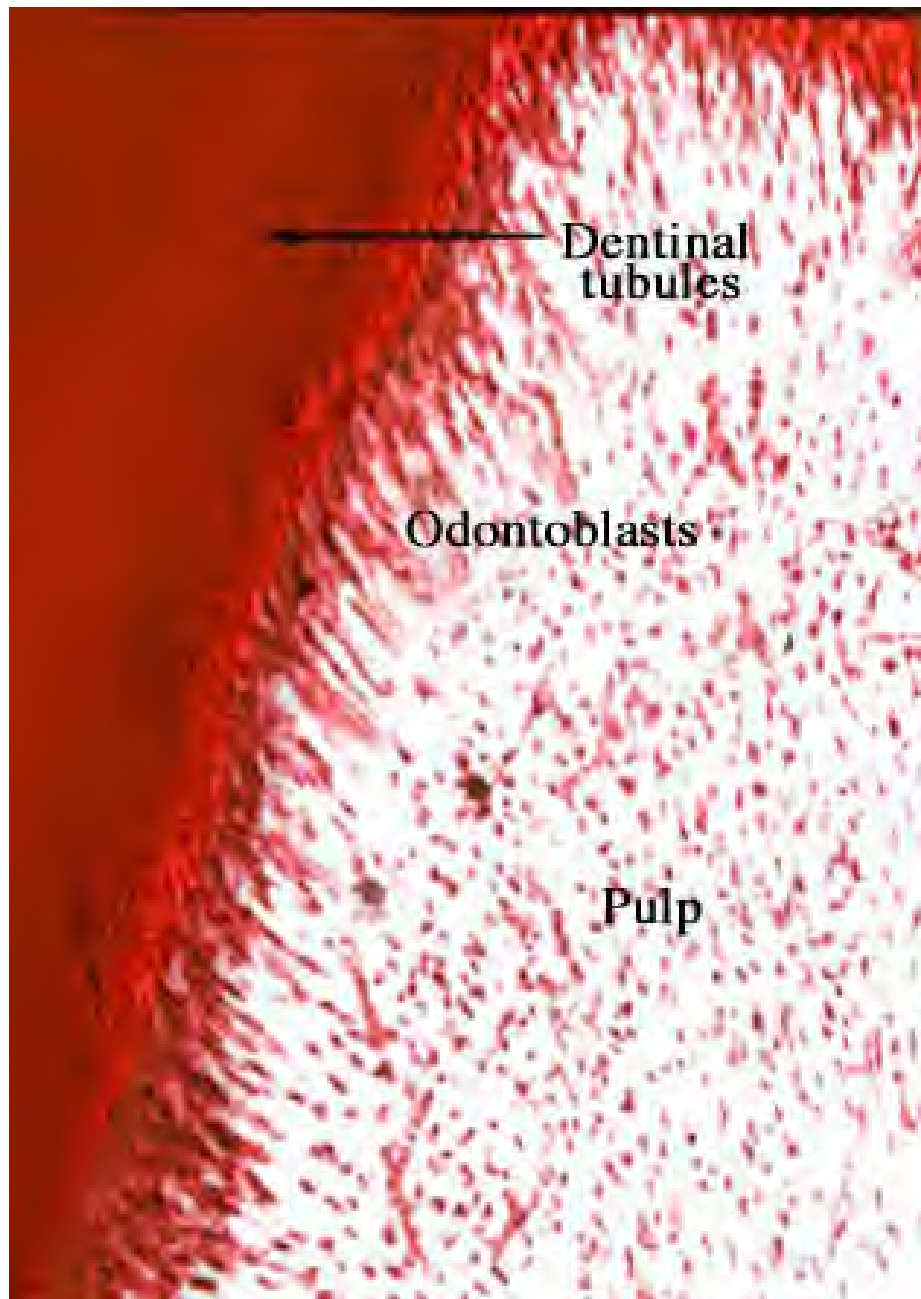




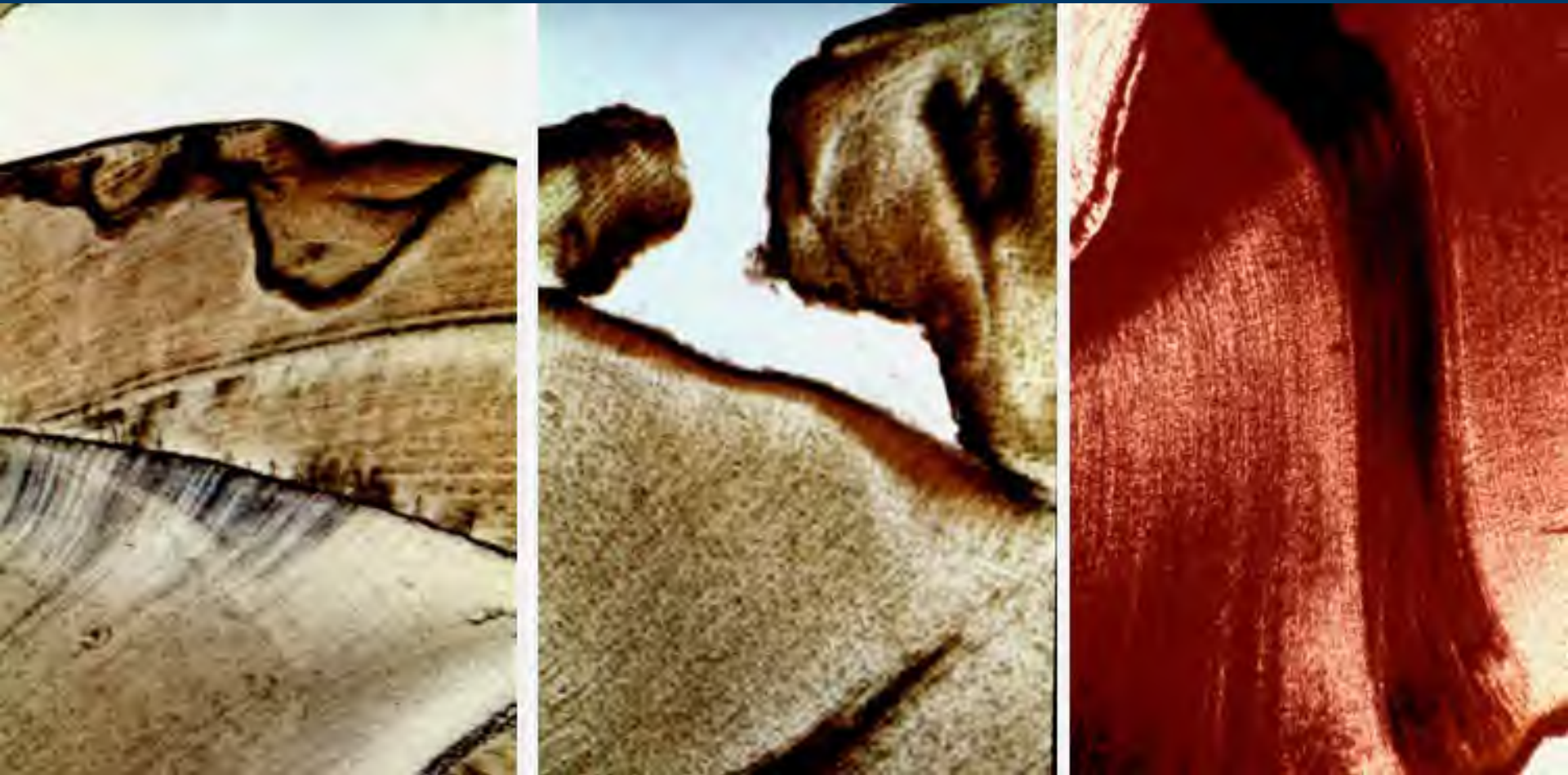
This is a high-magnification micrograph of dental tissue. The image is characterized by two distinct structural patterns. On the left side, there are several thick, dark, wavy vertical bands. On the right side, there is a dense, interlocking network of thin, light-colored lines. Two text labels are overlaid on the image: 'Enamel rods' in the upper right and 'Dentinal tubules' in the lower left.

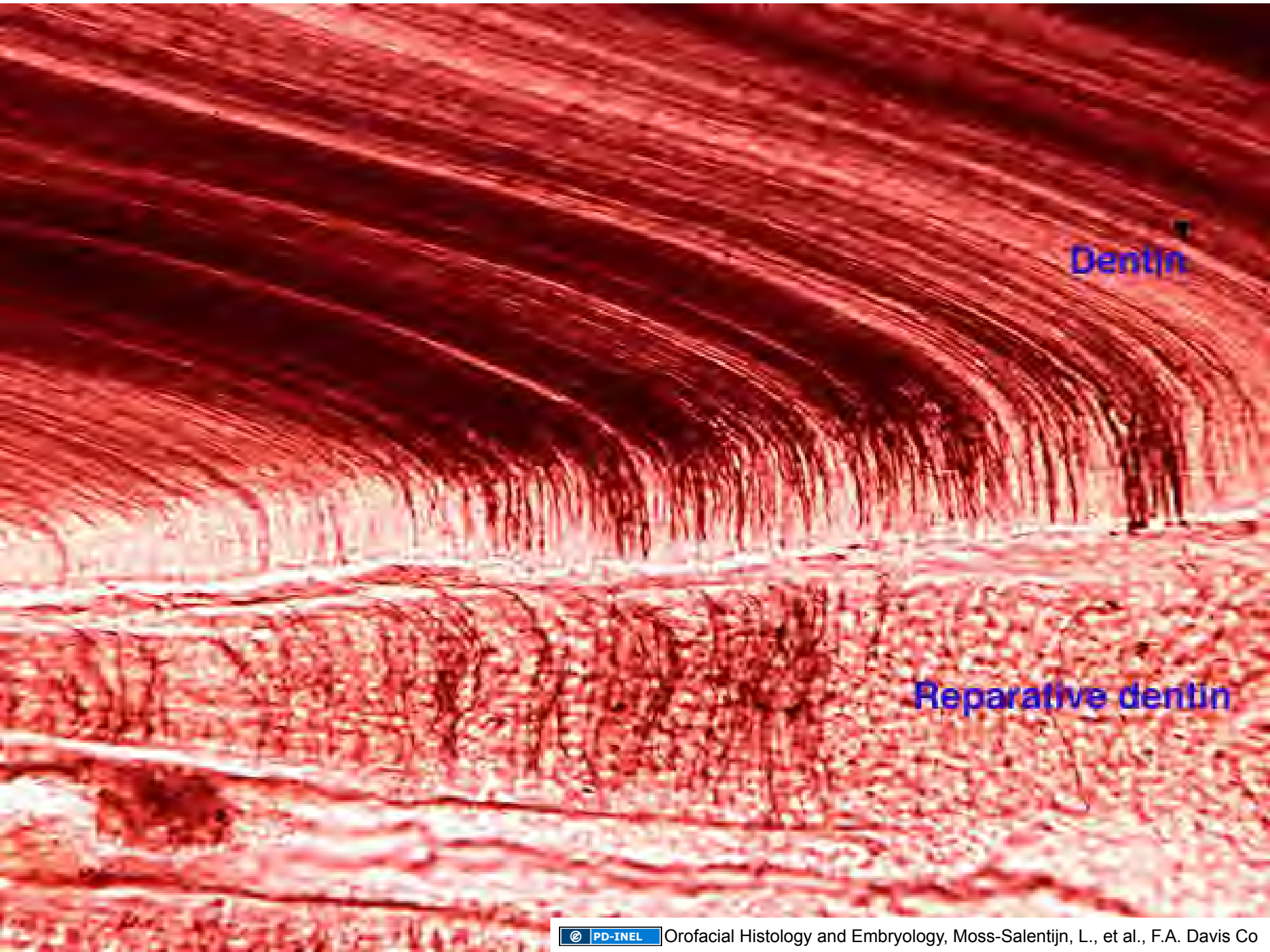
Enamel rods

Dentinal tubules



Erosion of Enamel and Cavity Formation

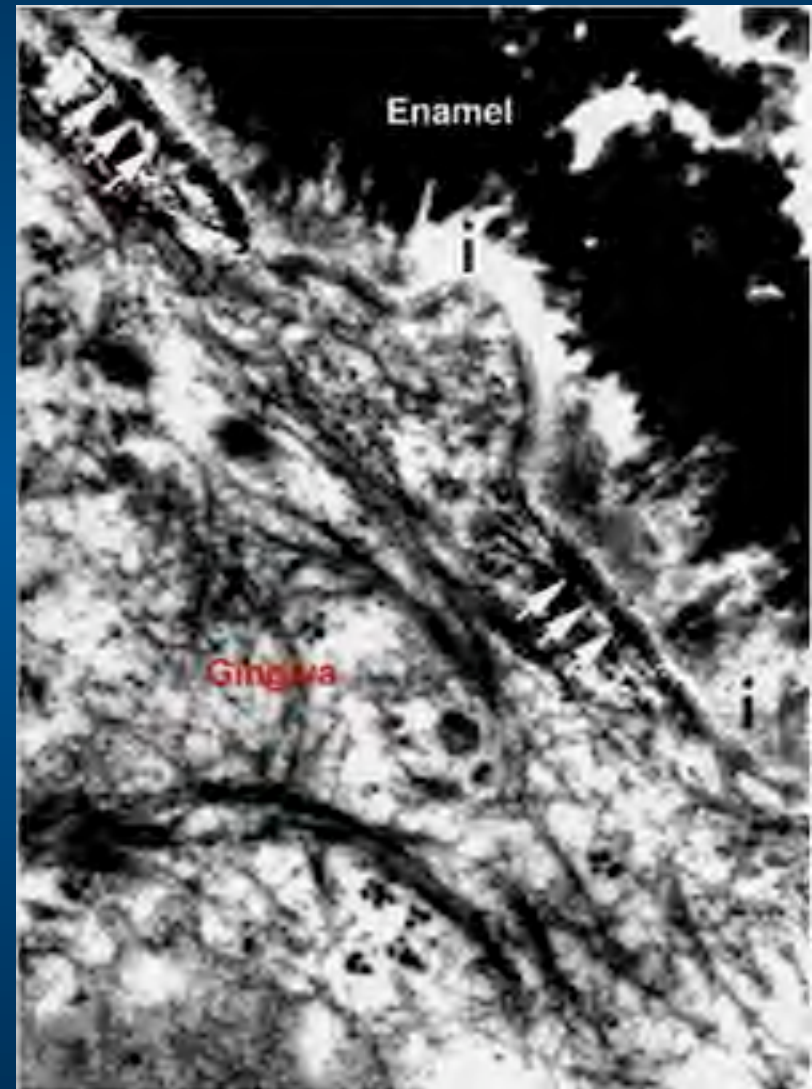
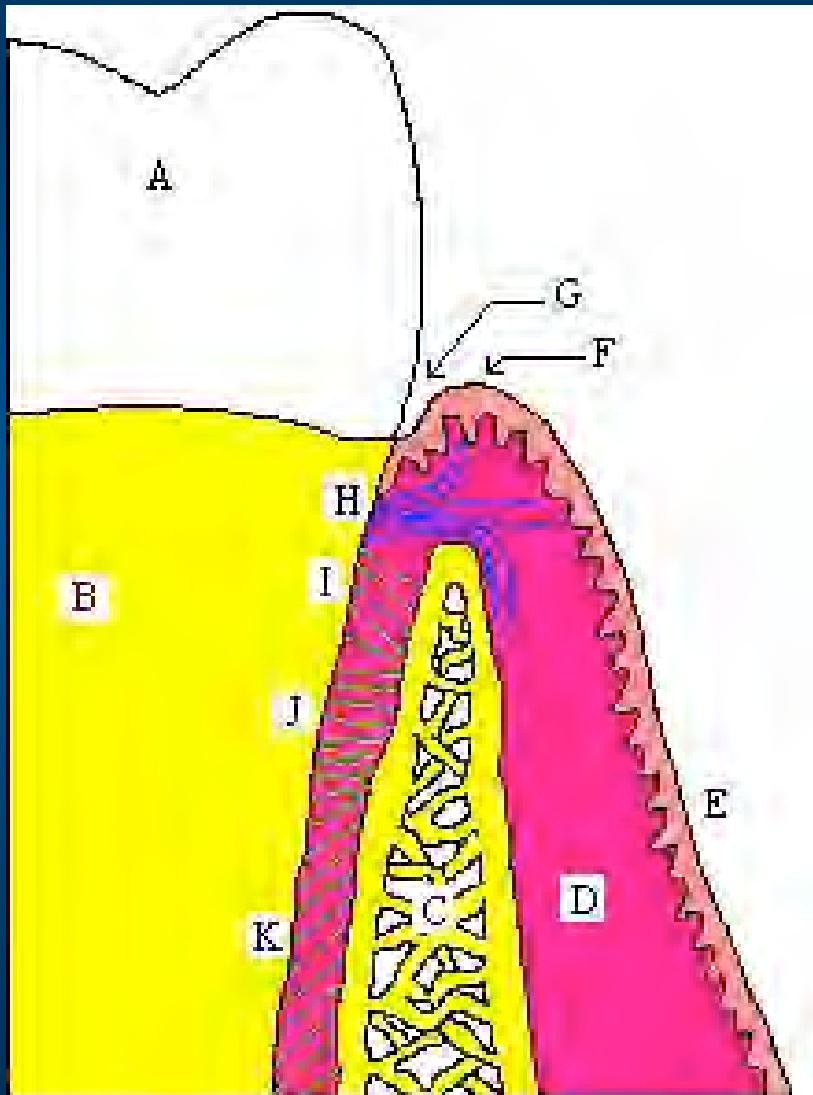


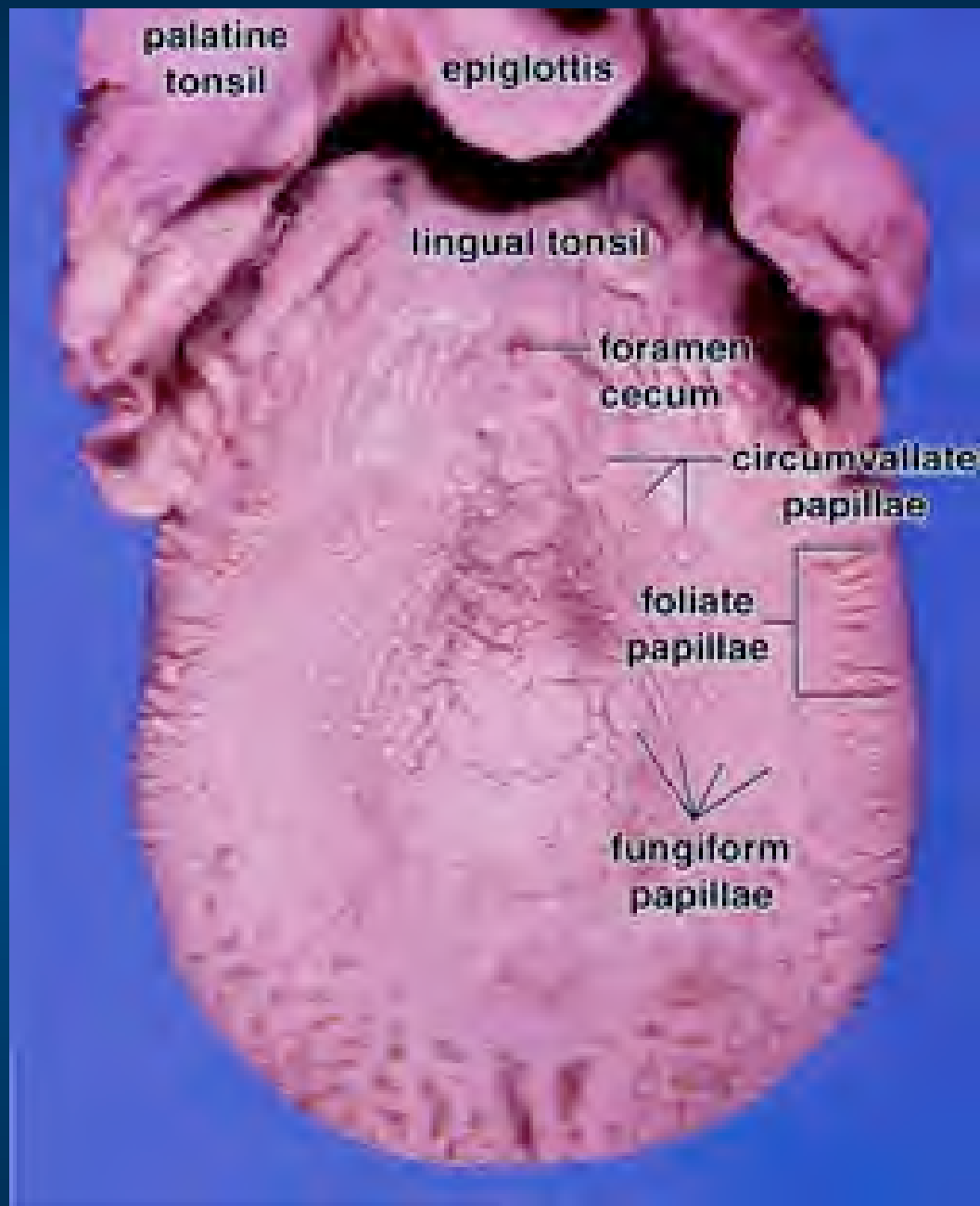


Dentin

Reparative dentin

The Epithelial Attachment





X-section of the Tongue

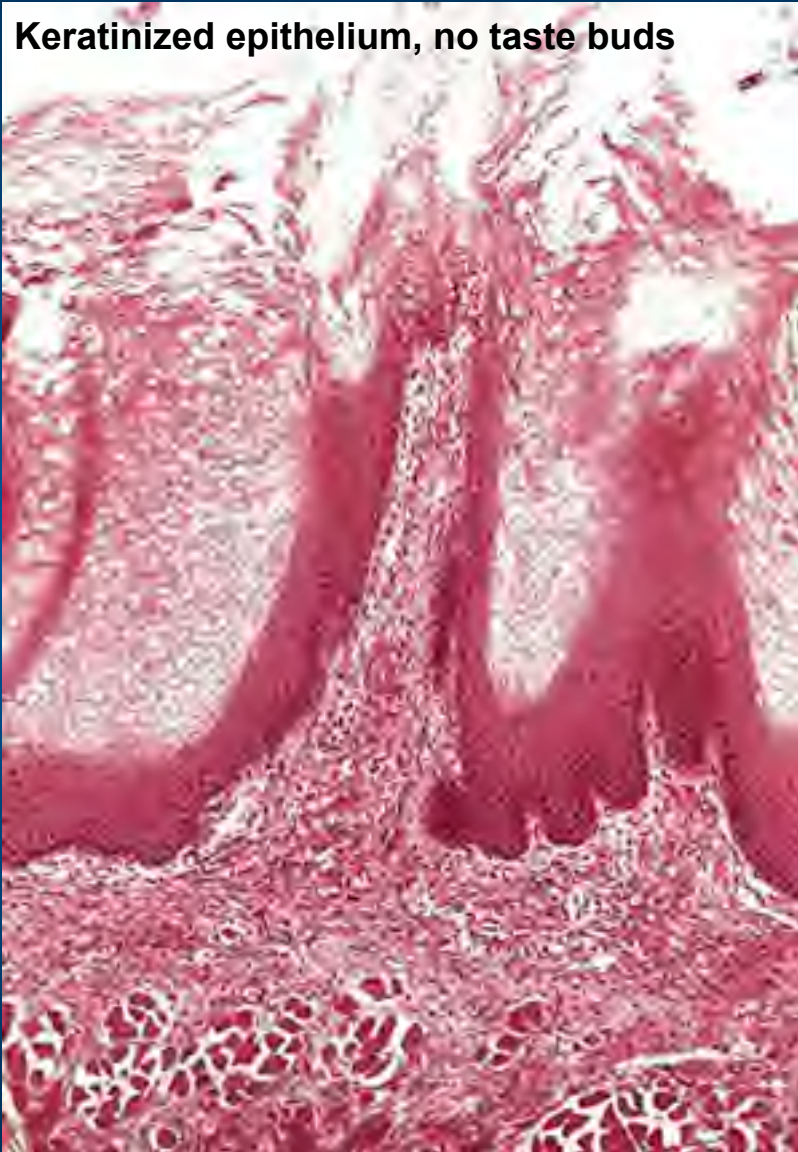


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Intrinsic and Extrinsic Muscles

Filiform and Fungiform Papillae

Keratinized epithelium, no taste buds



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Non-keratinized epithelium with secondary papillae and scattered taste buds.

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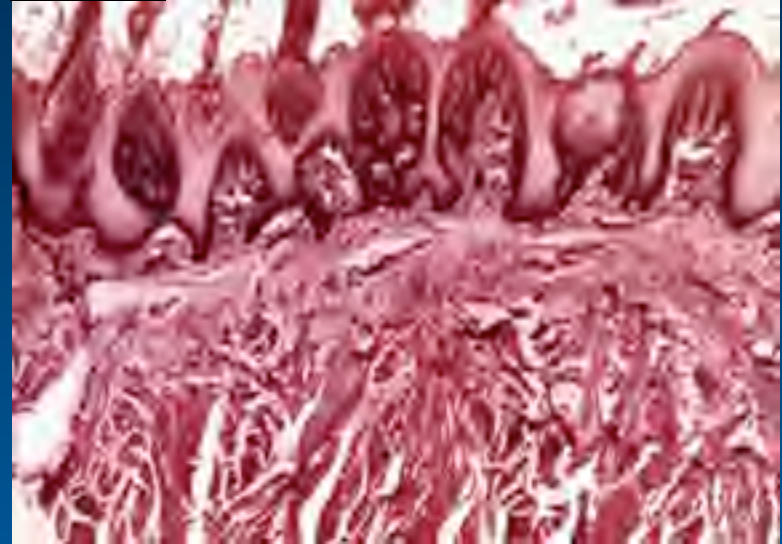
Abnormal Keratinization of Filiform Papillae

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Hairy tongue

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Over keratinized

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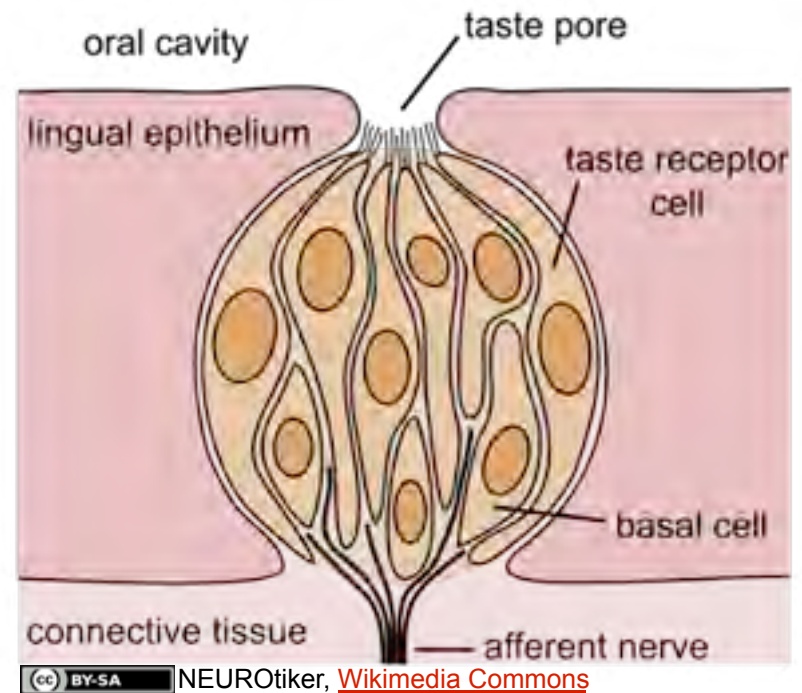
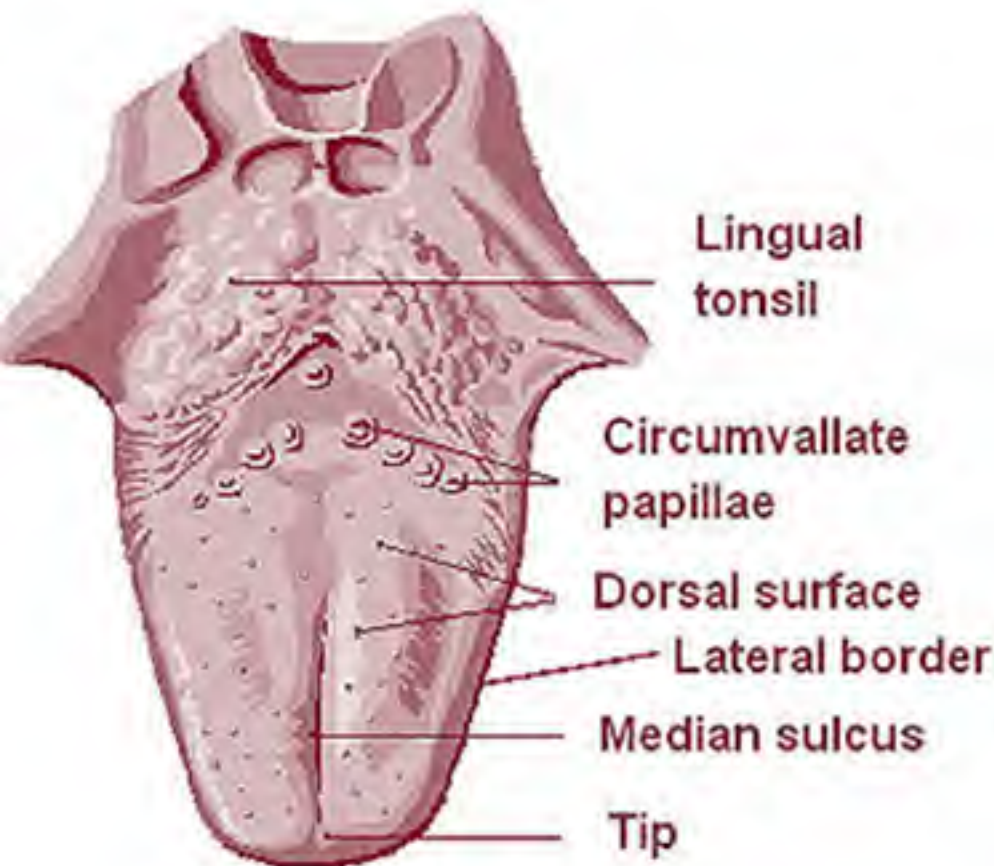
Geographic tongue

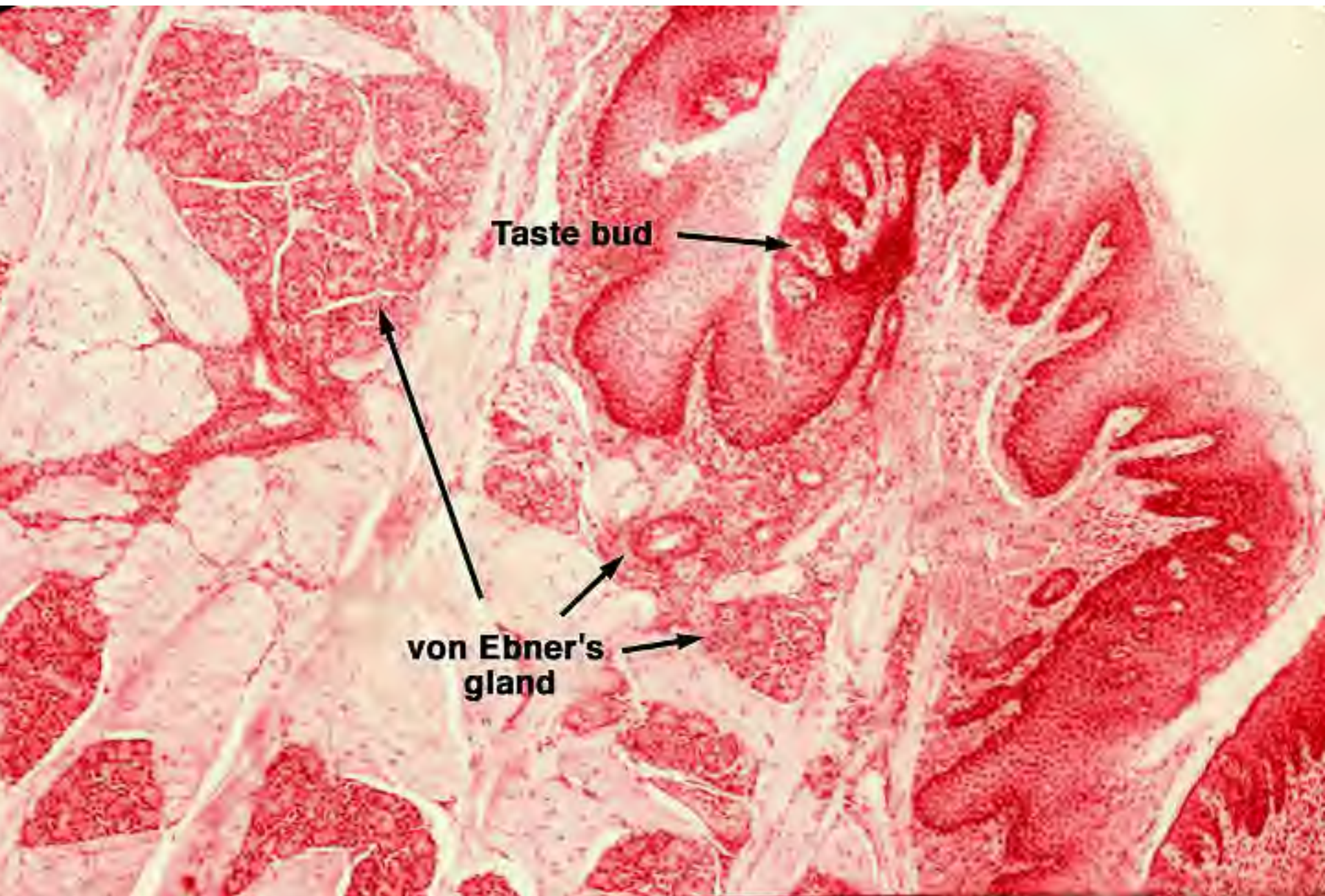
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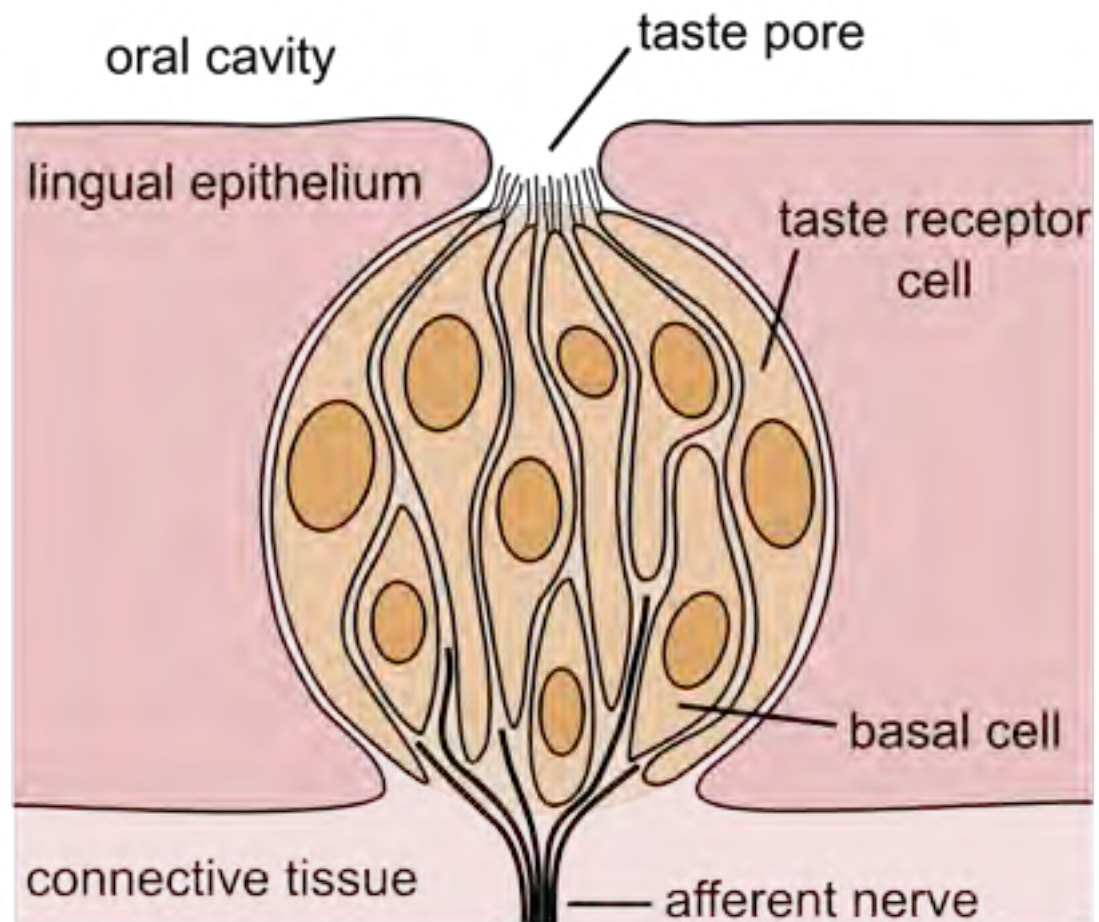
Under keratinized

Circumvallate papillae and Taste Buds



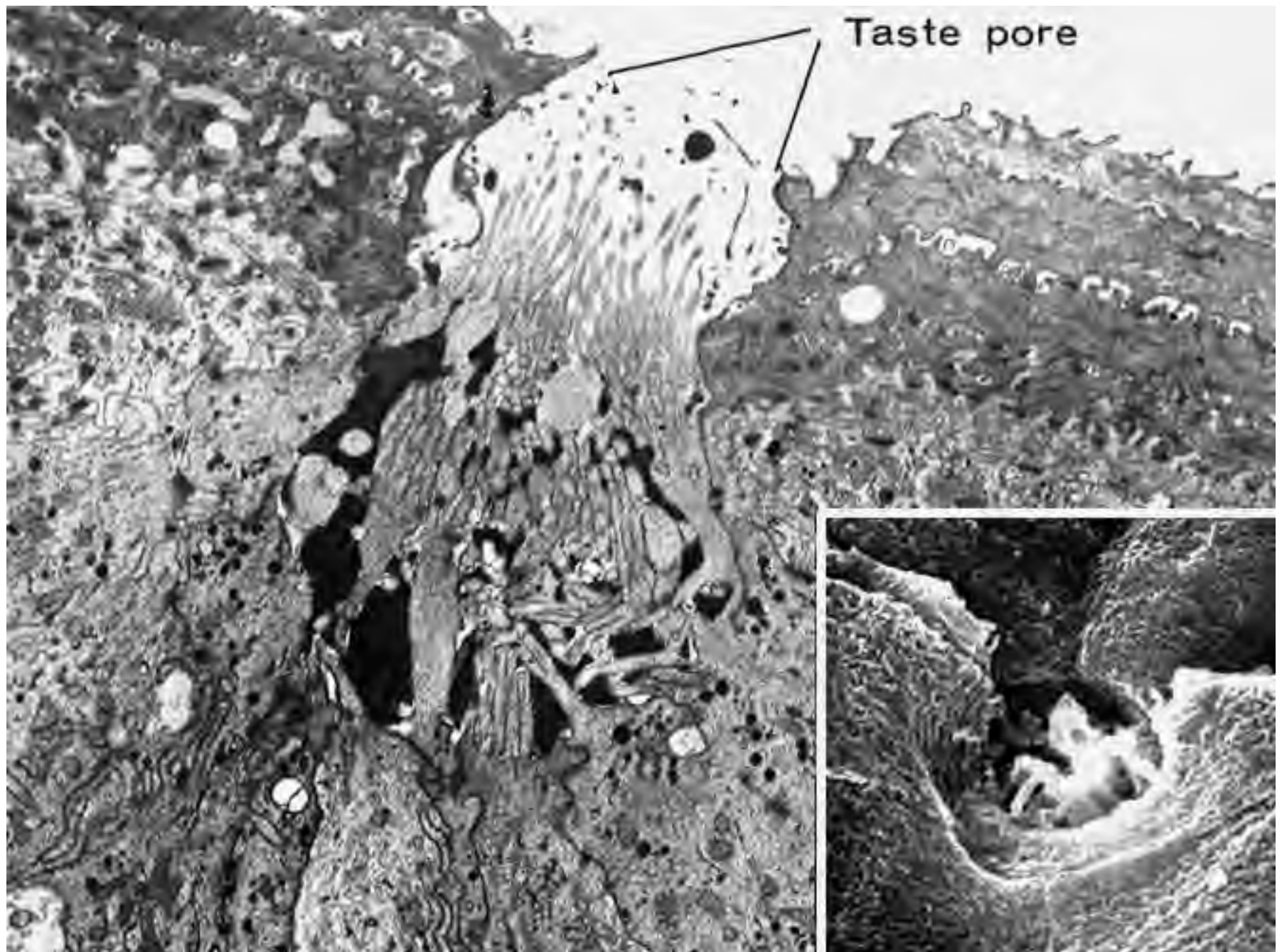


Taste Buds



 NEUROtiker, [Wikimedia Commons](#)





Areas of Taste Perception

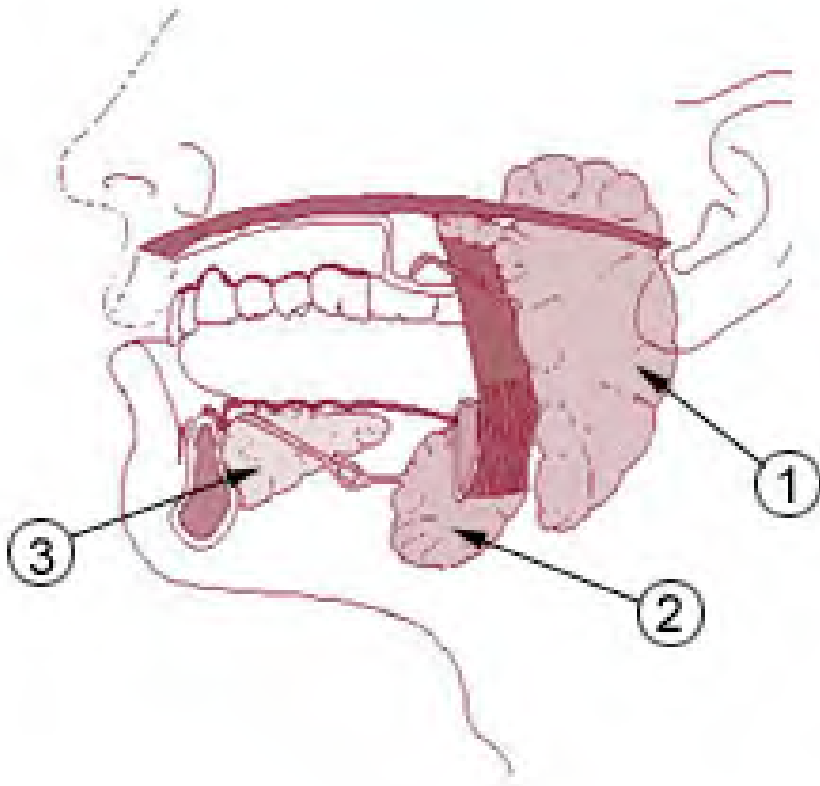


 Wela49, [Wikimedia Commons](https://commons.wikimedia.org/wiki/File:Tongue_taste_areas.jpg)

 Salt
 Sweet

 Sour
 Bitter

Major Salivary Glands



1. Parotid

2. Submandibular

3. Sublingual

Saliva

Secretion

About 1,000 ml/day

Submandibular Glands 65%

Parotid Glands 23%

Sublingual Glands 4%

Minor Salivary Glands 8%

Flow Rate

0.3 ml/min (Unstimulated)

Stimulation

Autonomic Nervous System

Composition

Varies with flow rate

Composition of Saliva

Water

Ions: Bicarbonate, potassium, sodium, chloride, etc

Glycoproteins: Mucus

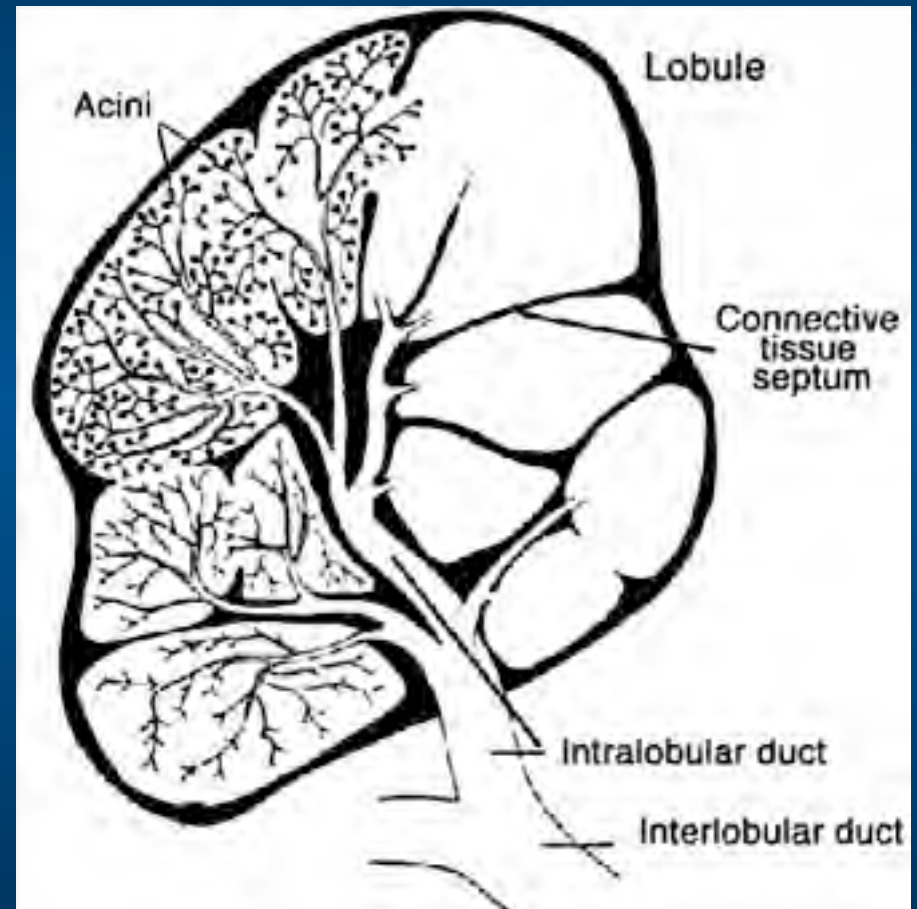
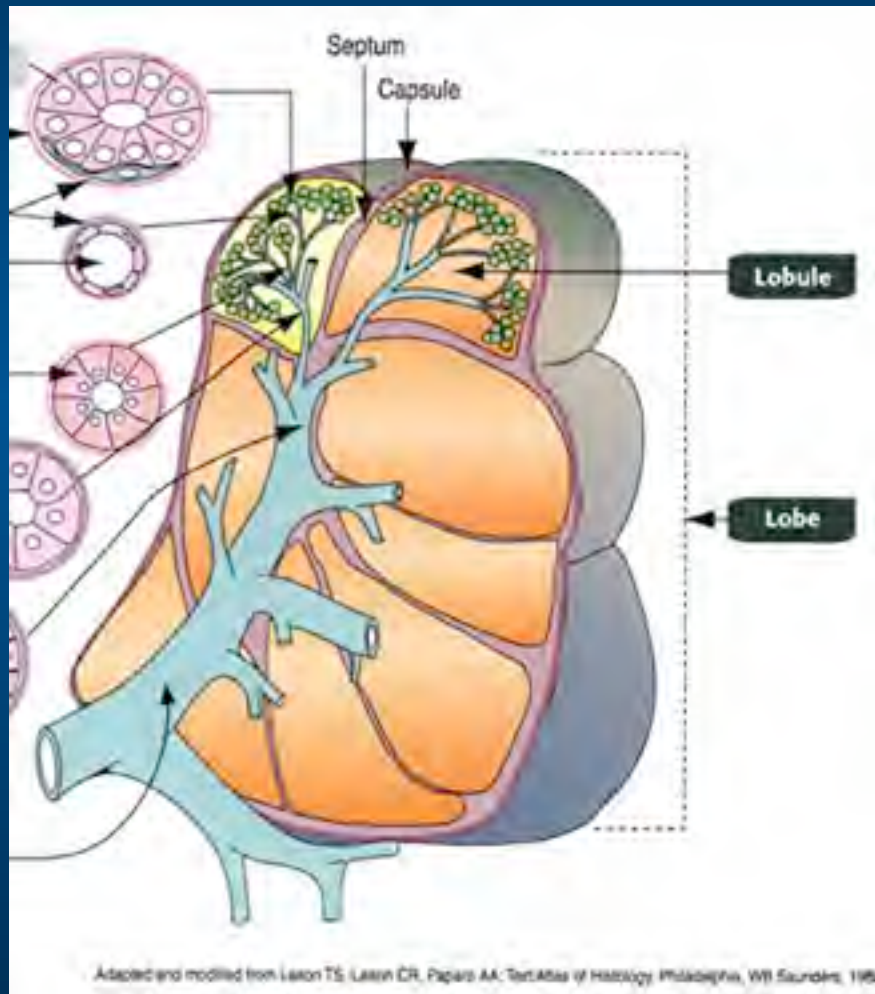
Proteins: Enzymes – Amylase (parotid gland), nucleases, etc.

Cells: Desquamated Epithelial cells
Leukocytes

pH: ~ 7.0

Glandular Lobules and Lobes

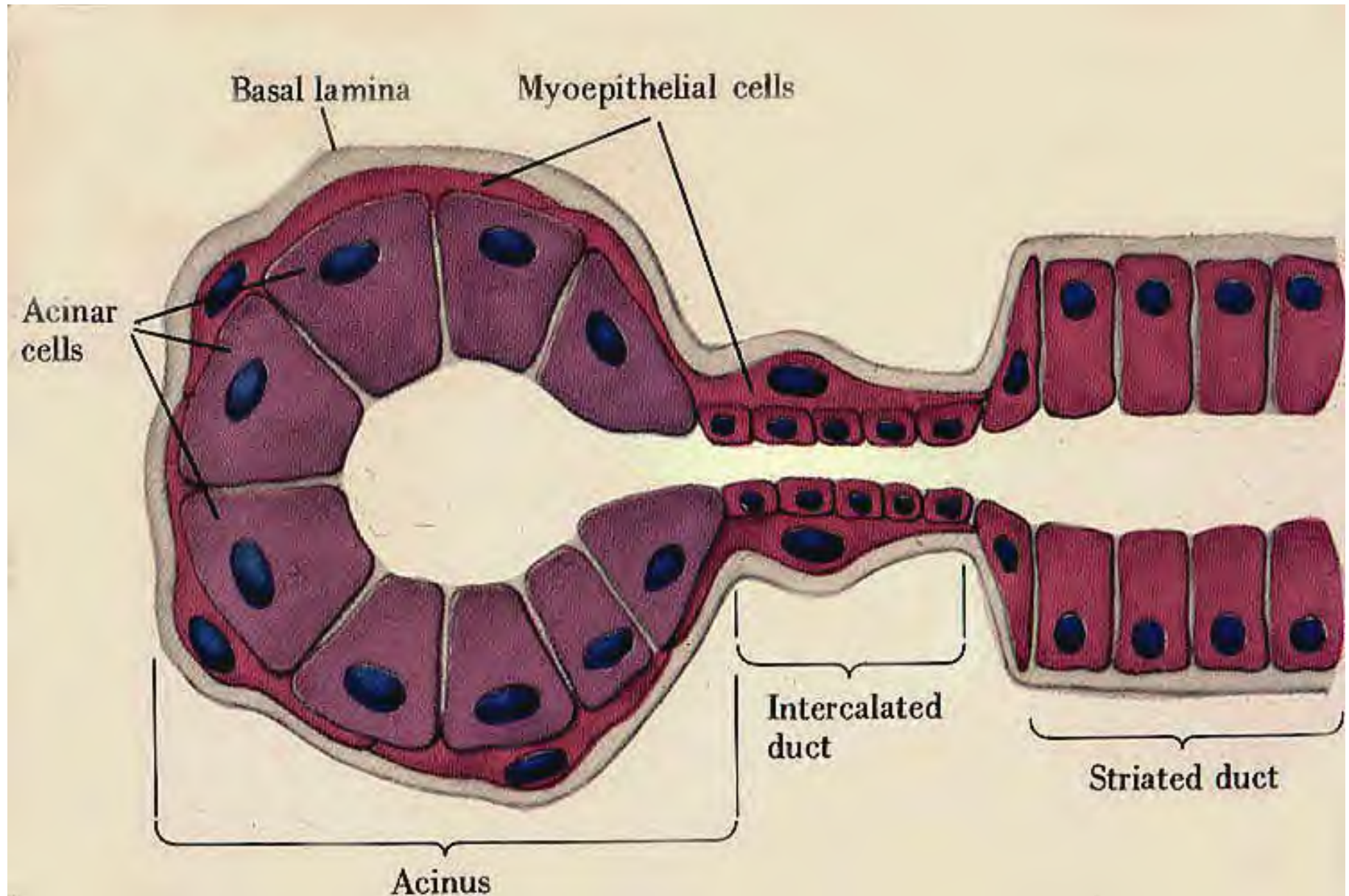
Many *Lobules* form a *Lobe*



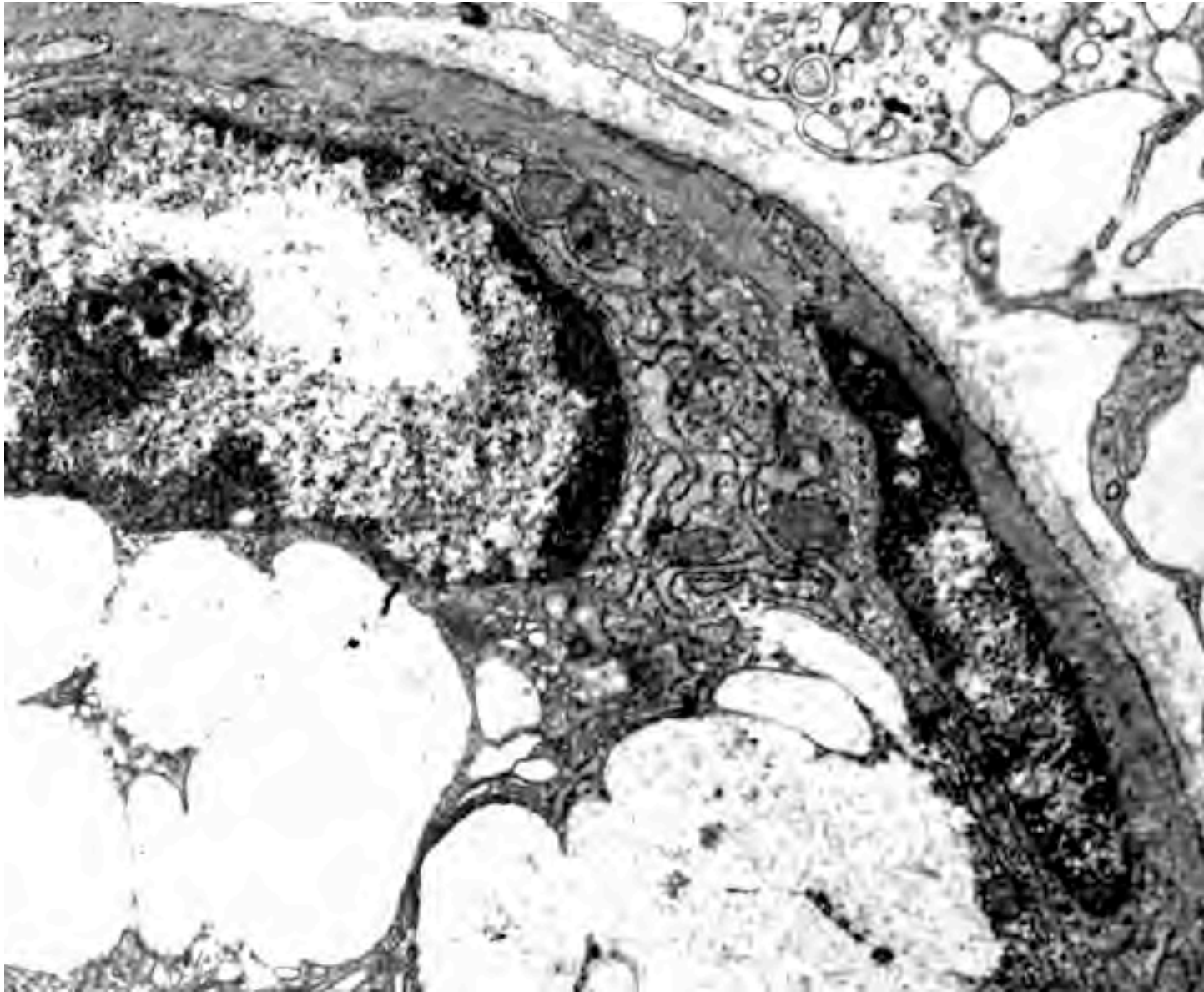
© PD-INEL Kierszenbaum p. 53

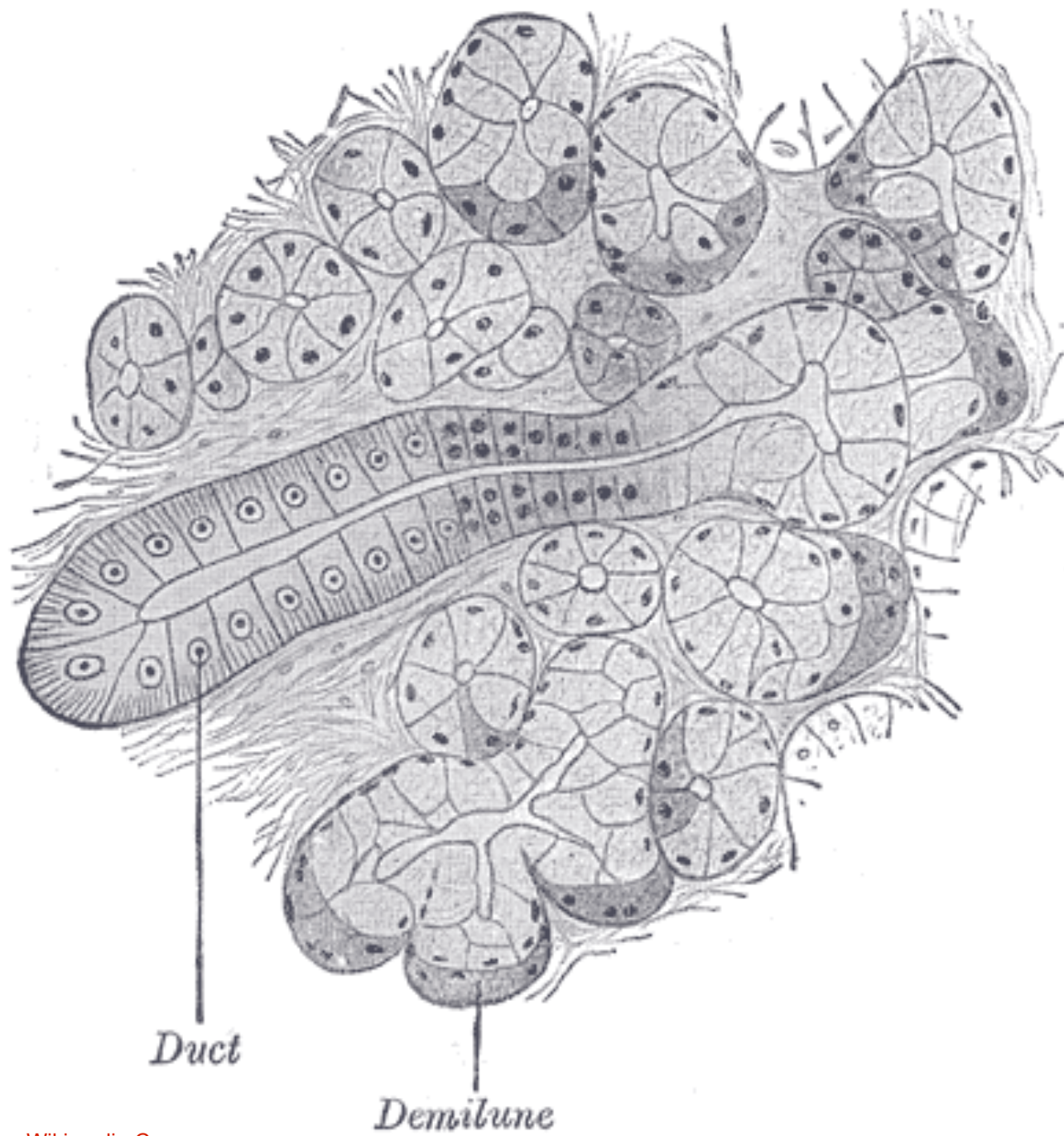
Acini, **Intra**lobular duct, **Inter**lobular duct

Structural and functional Unit of Salivary Gland

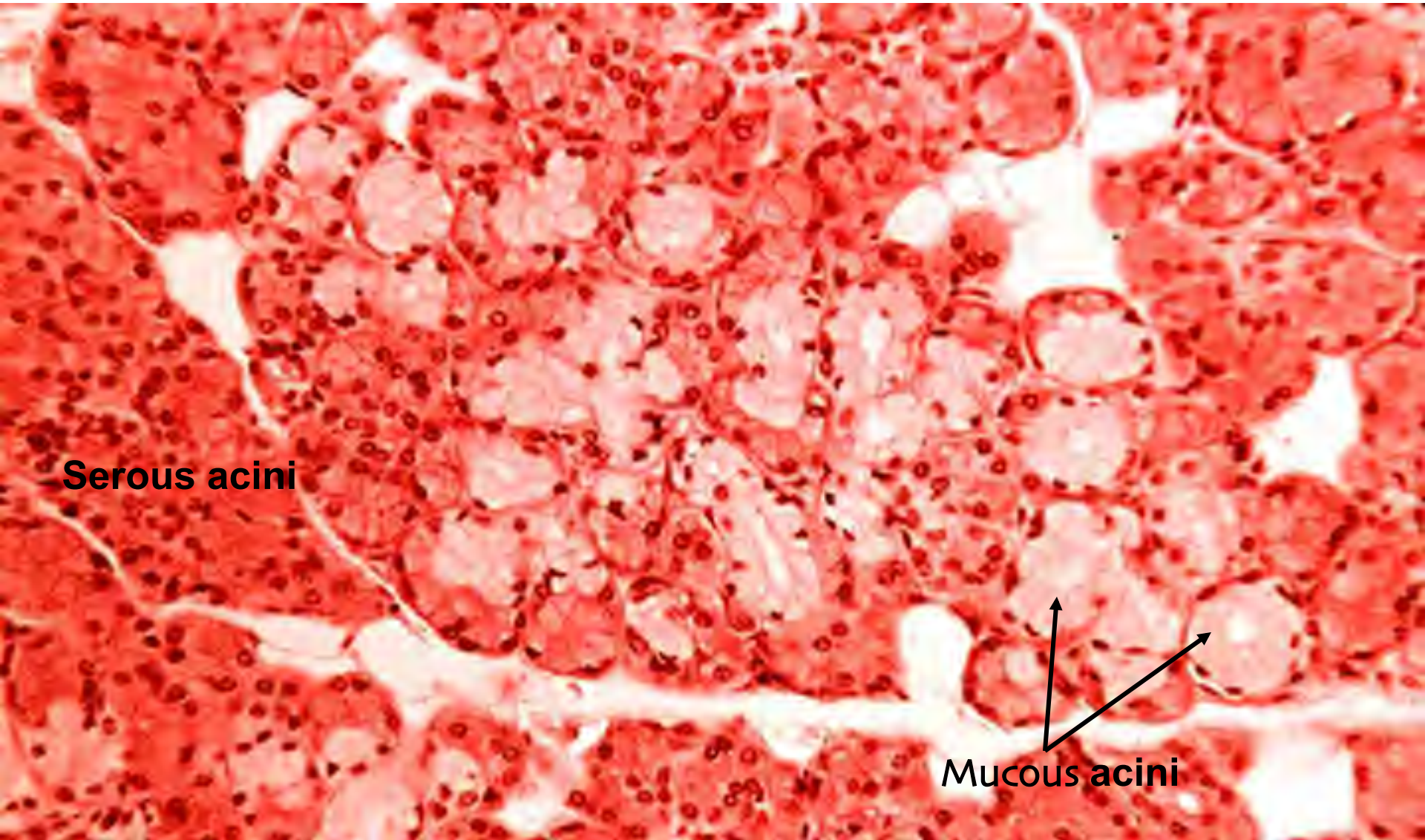


Myoepithelial Cell





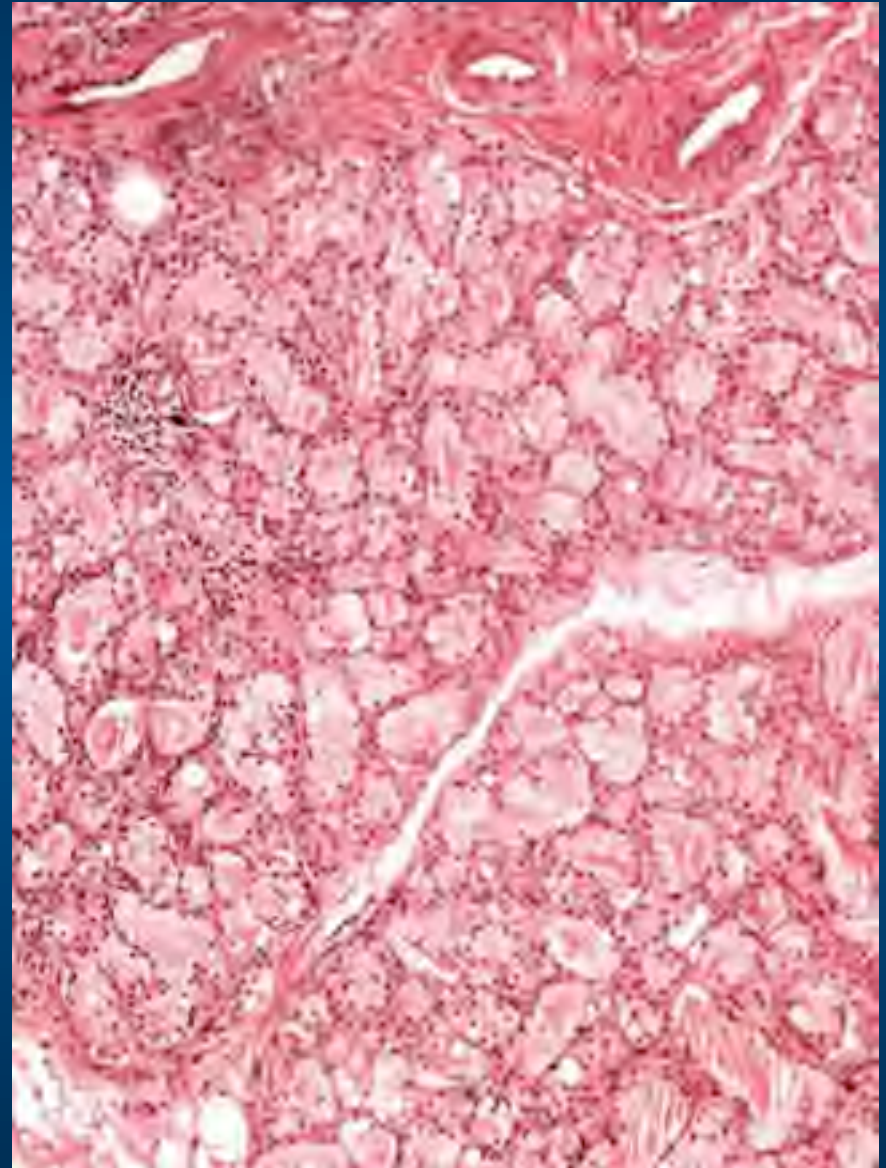
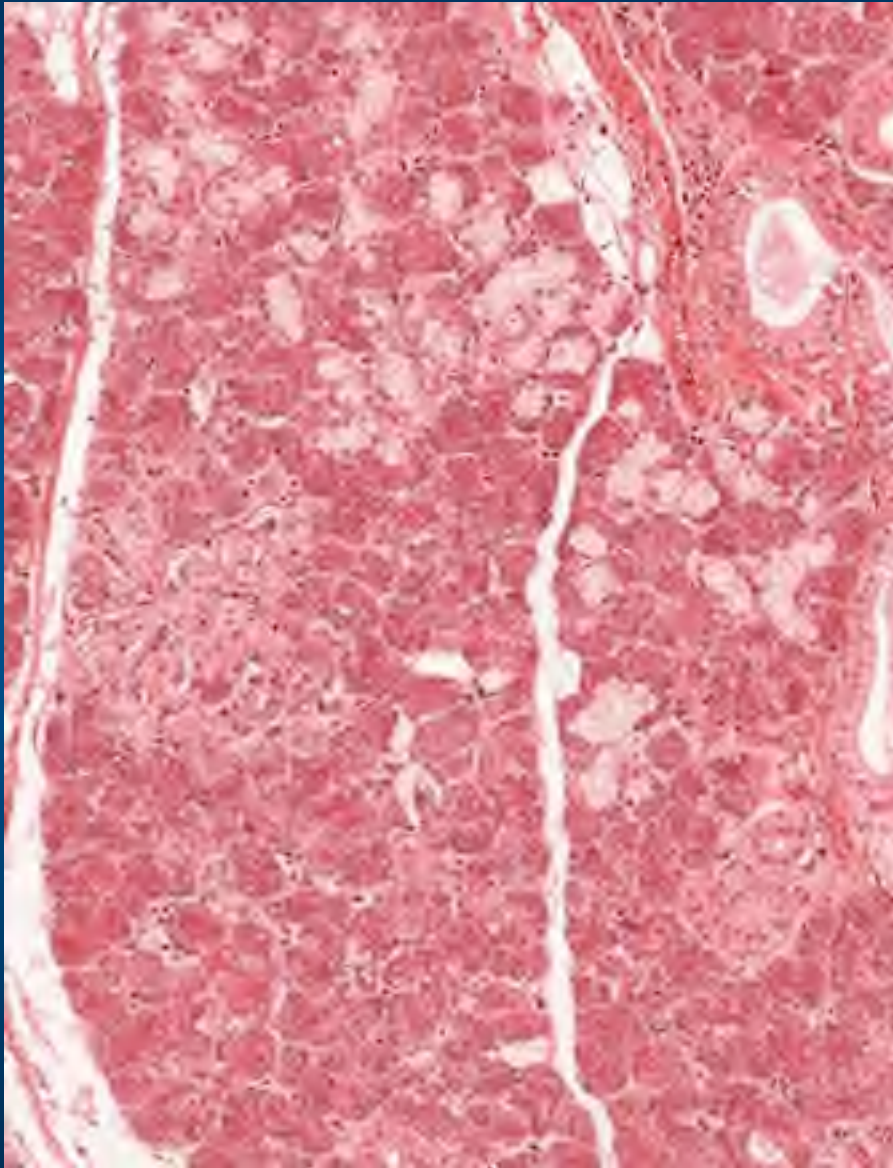
Mixed, Sero-mucous Gland

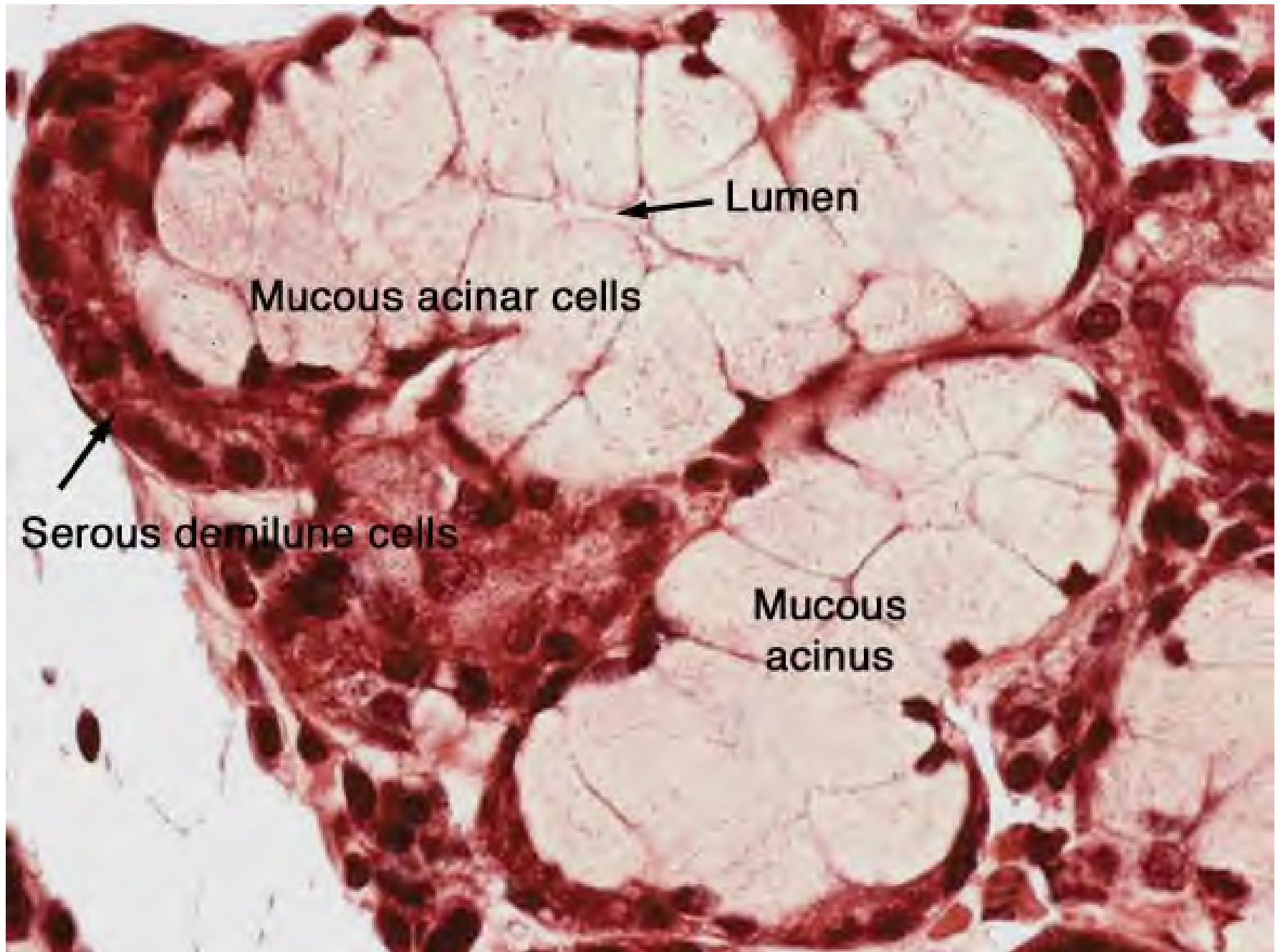


Serous acini

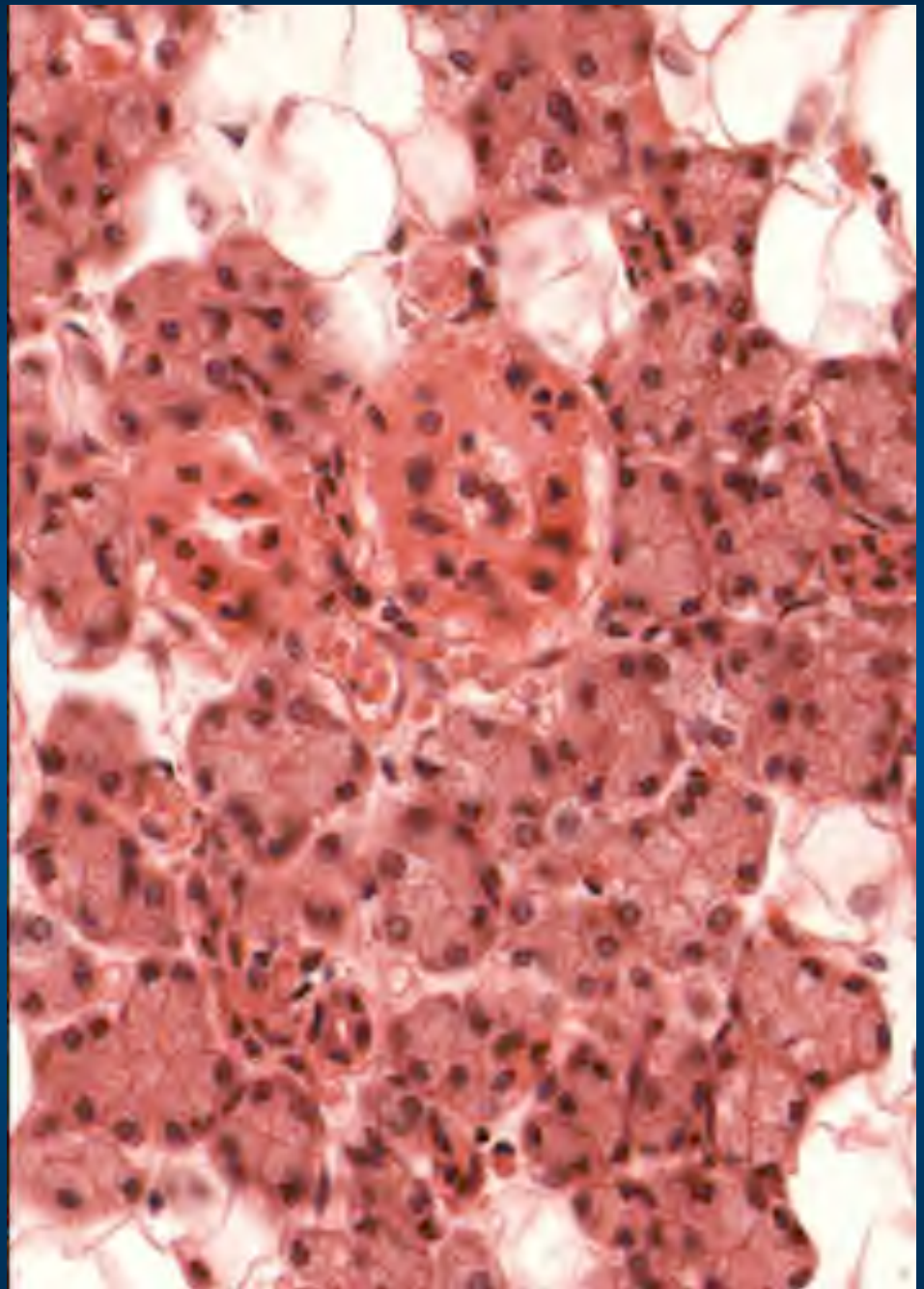
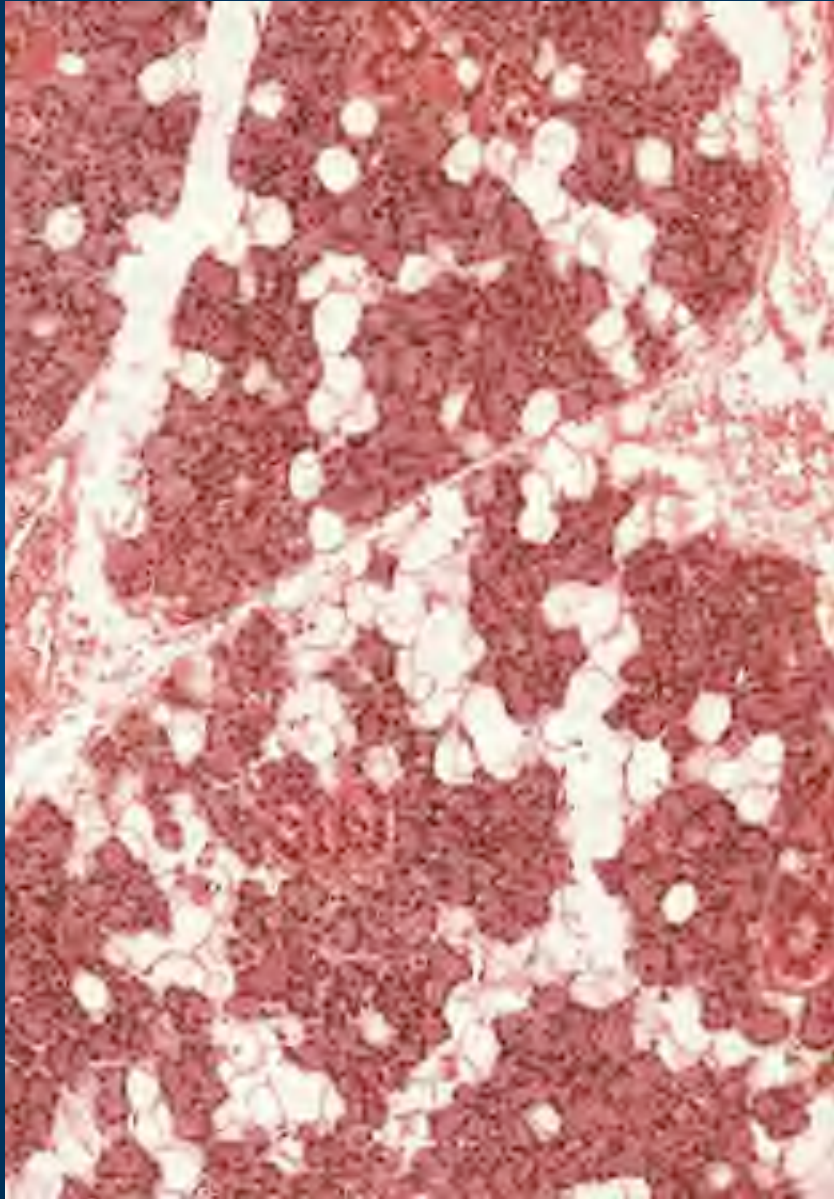
Mucous acini

Submandibular and Sublingual Gland

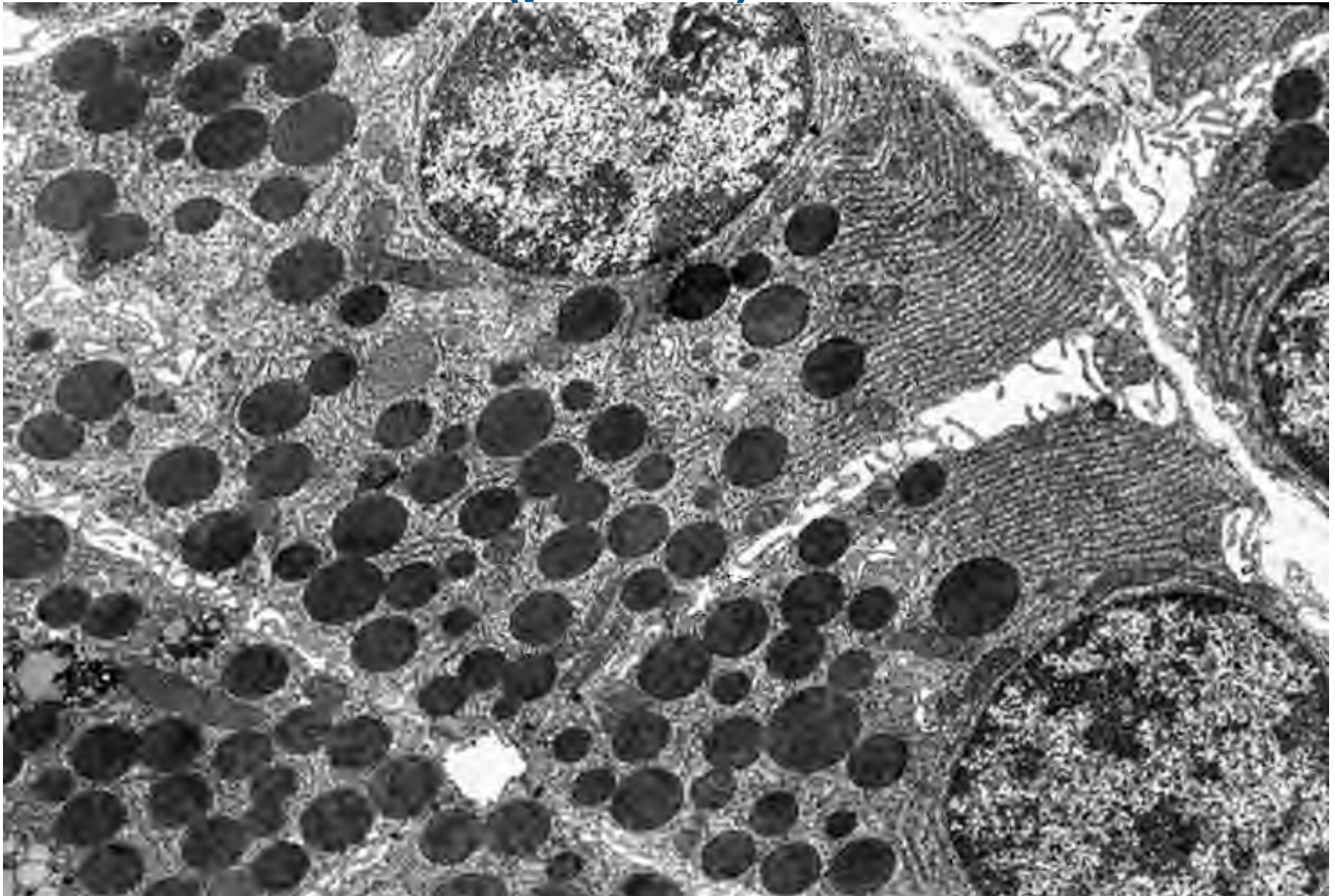




Parotid gland



Serous (parotid) Acinar Cells



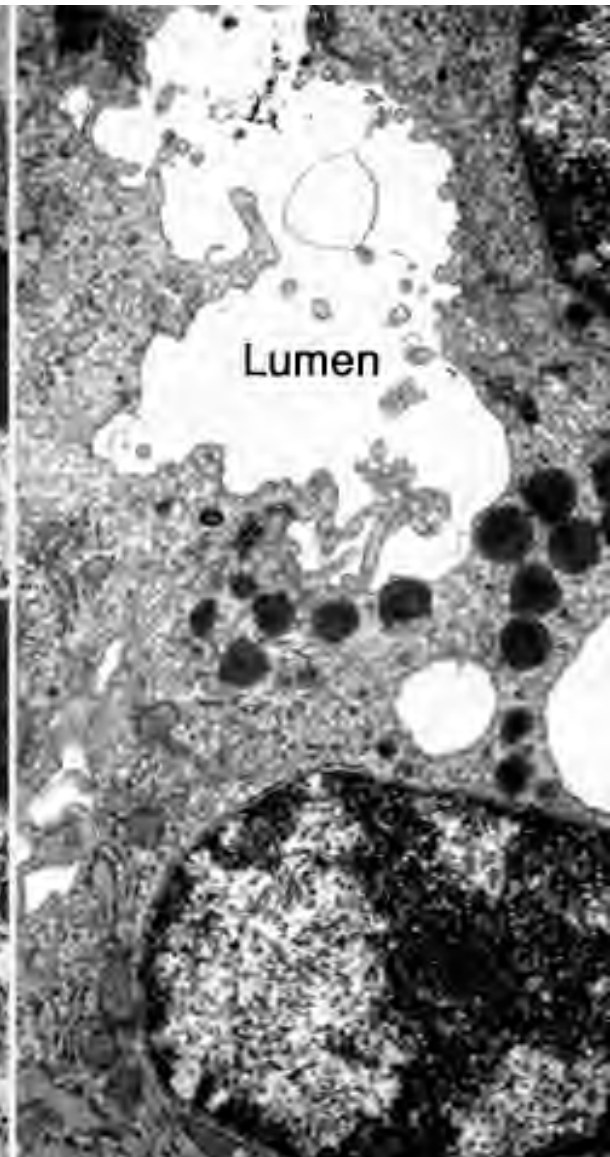
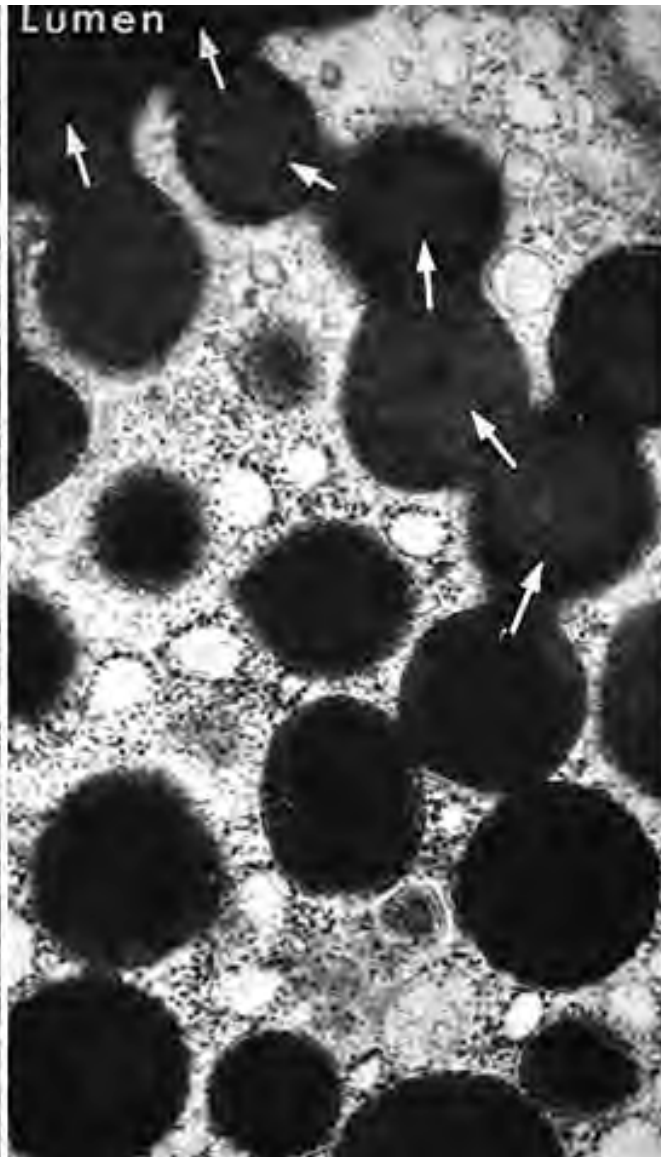
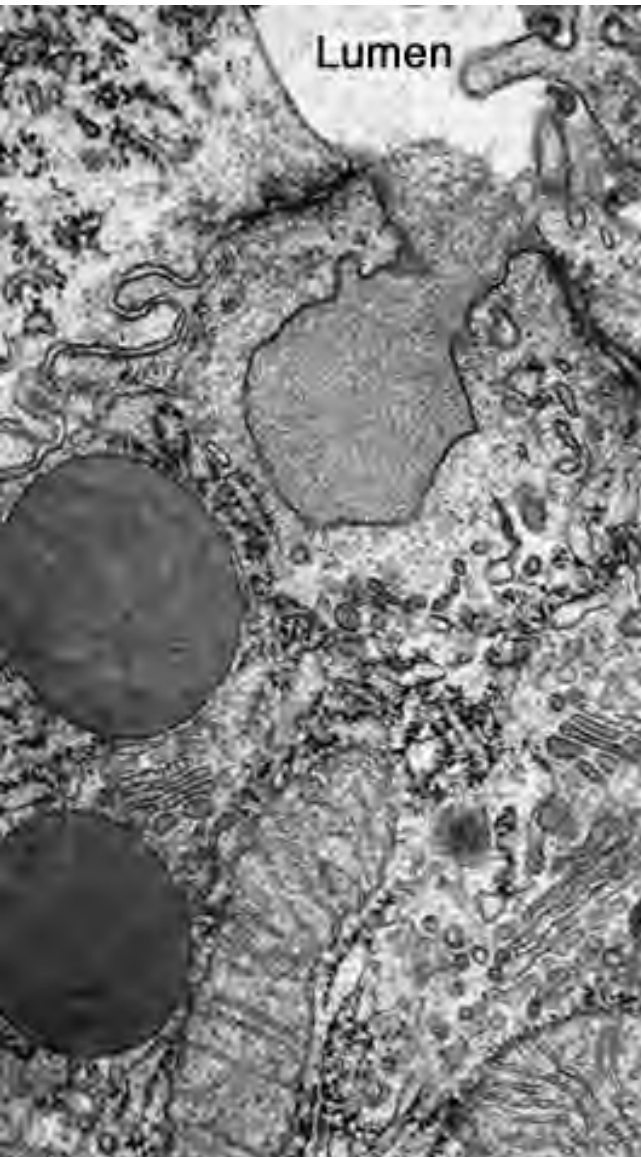
Innervations of the Acinar Cells



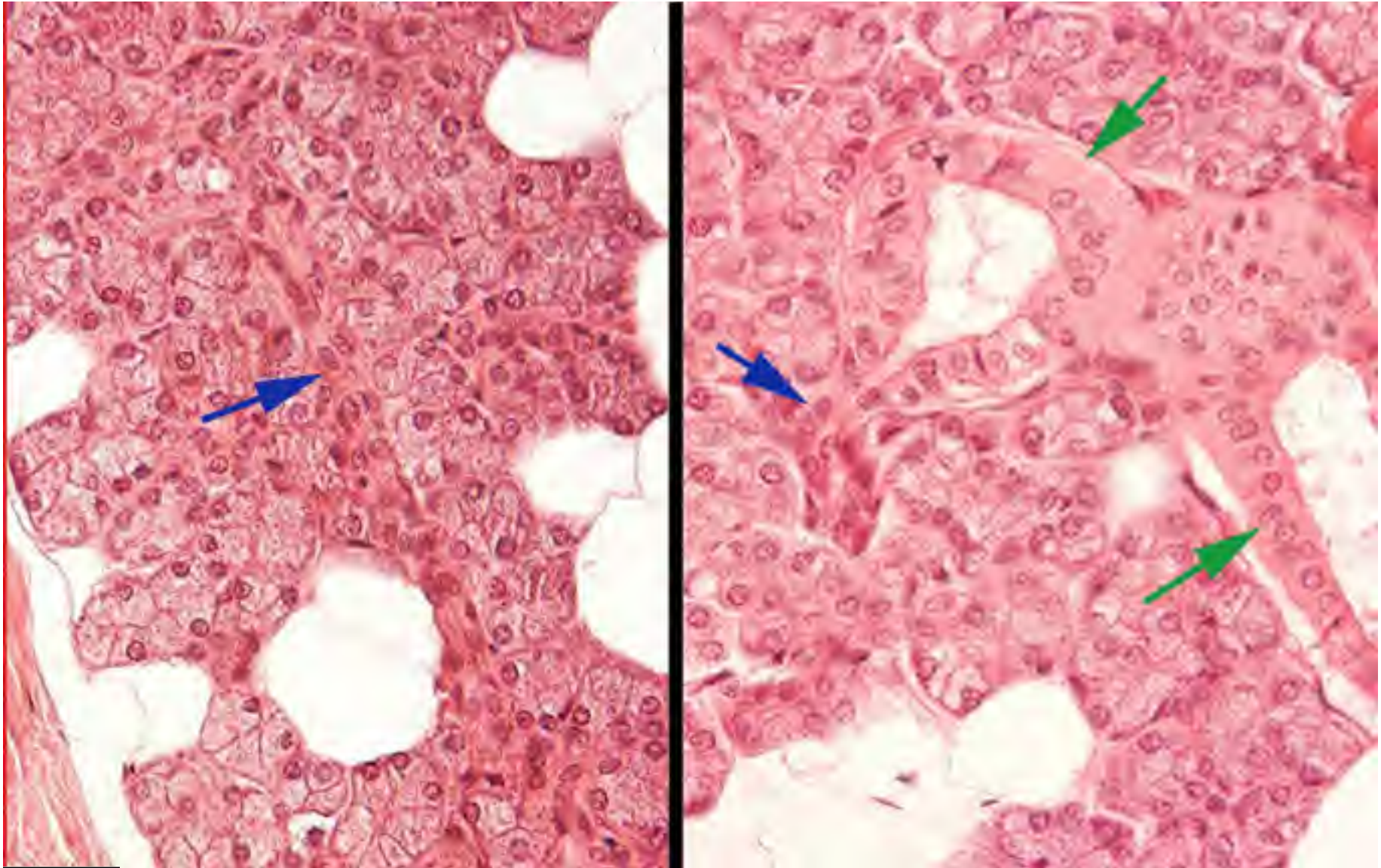
Salivary Gland
secretion
is regulated by the
autonomic nervous
System

NE: Nerve endings of
postganglionic fibers

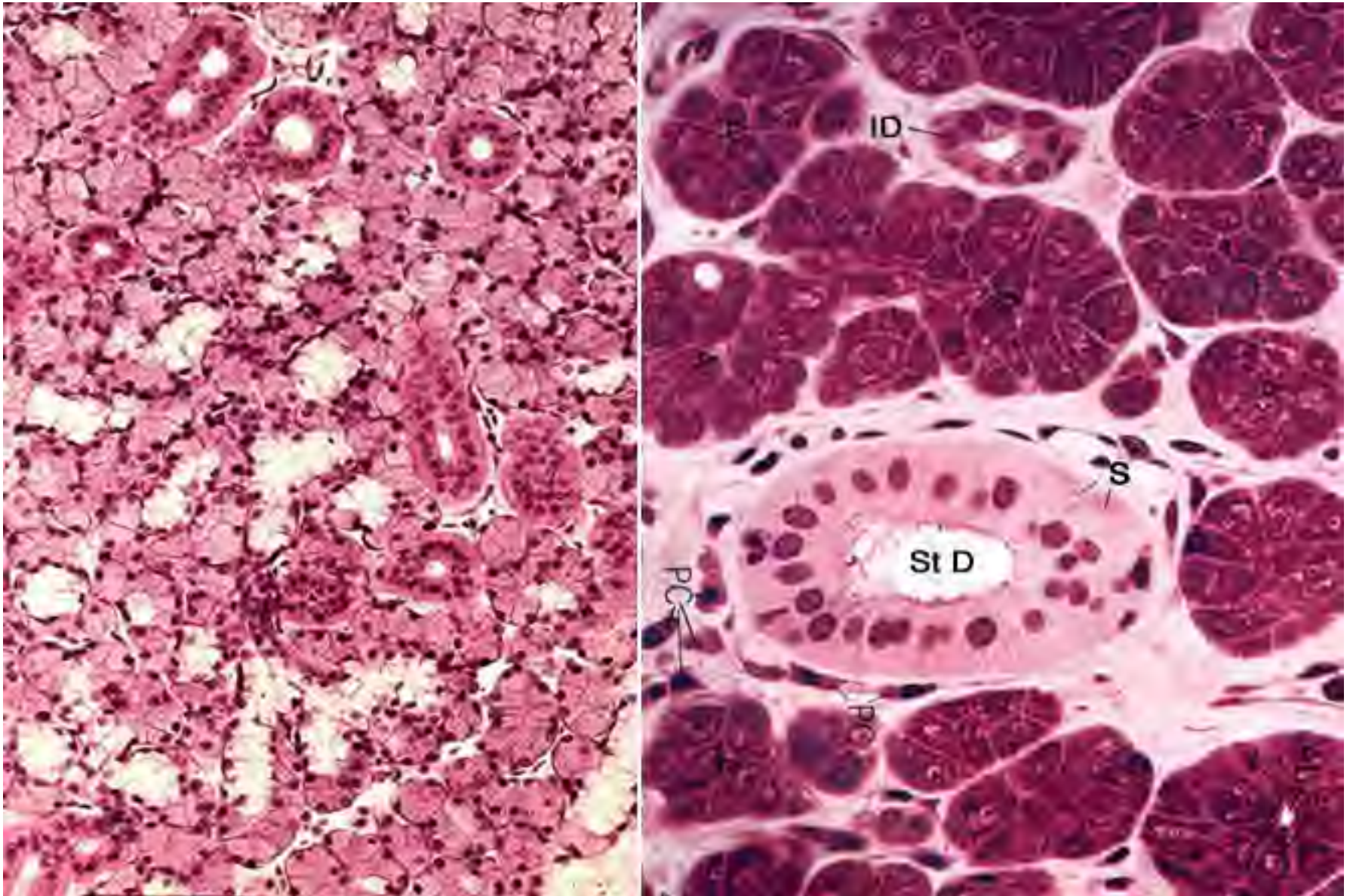
Exocytosis



Intercalated (blue) and Striated (green) Ducts



Salivary Gland Ducts



EM of Striated Duct Cells



Role of Striated Ducts in Saliva Production

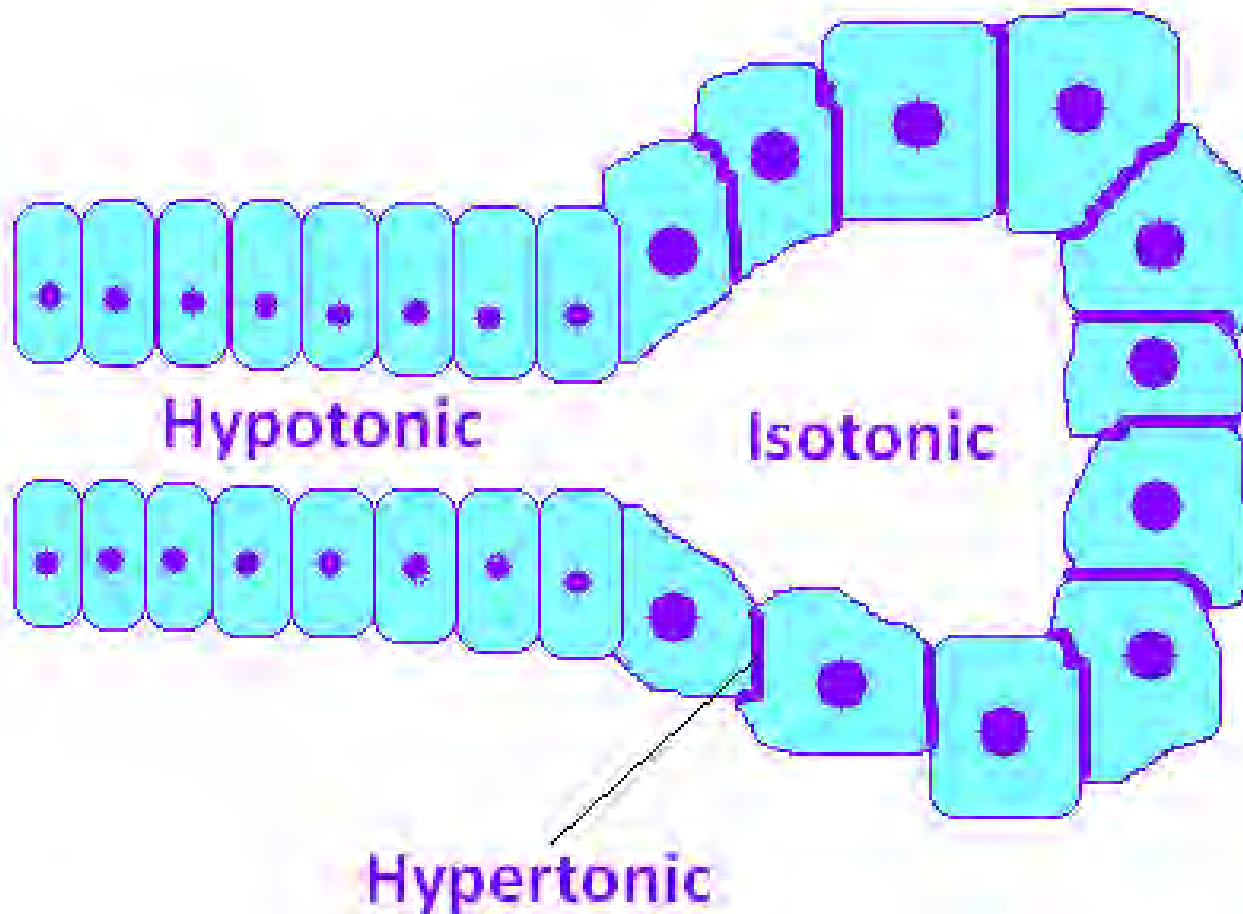
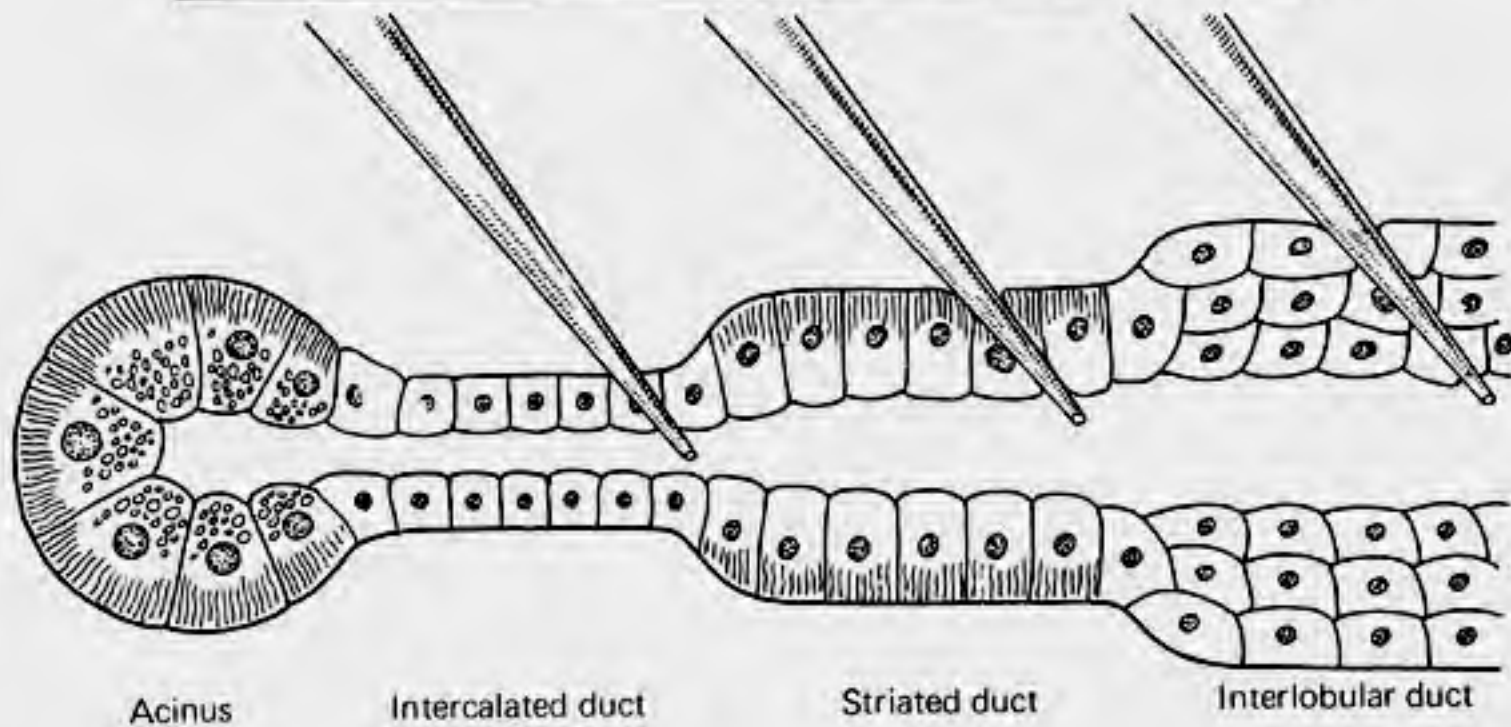
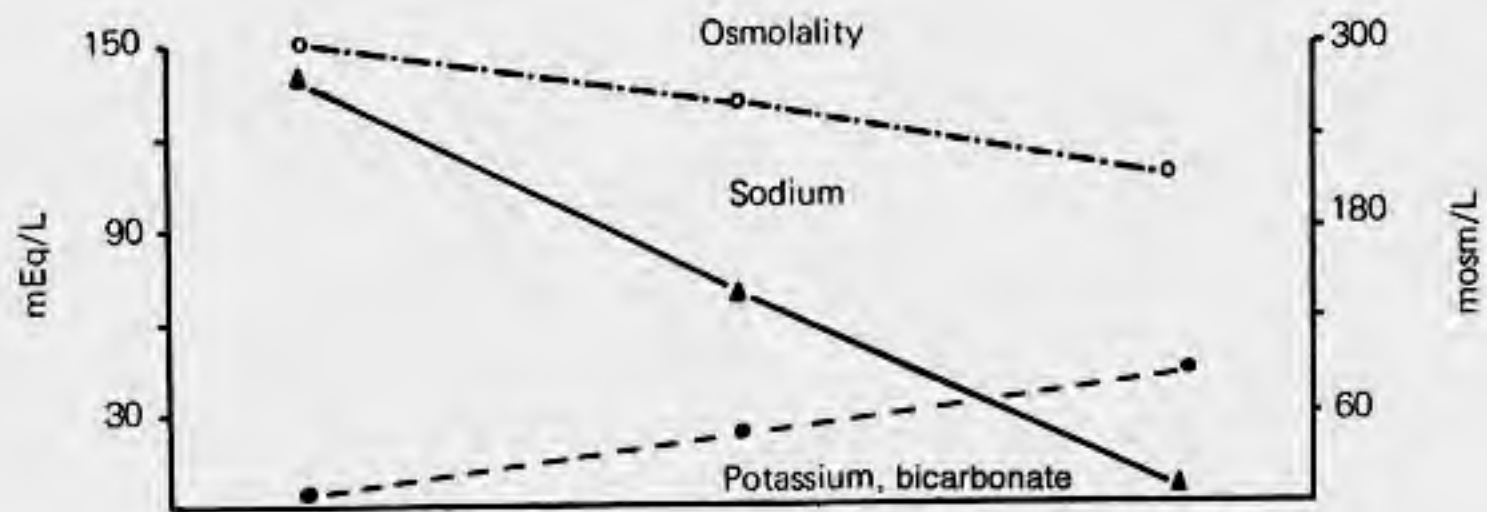
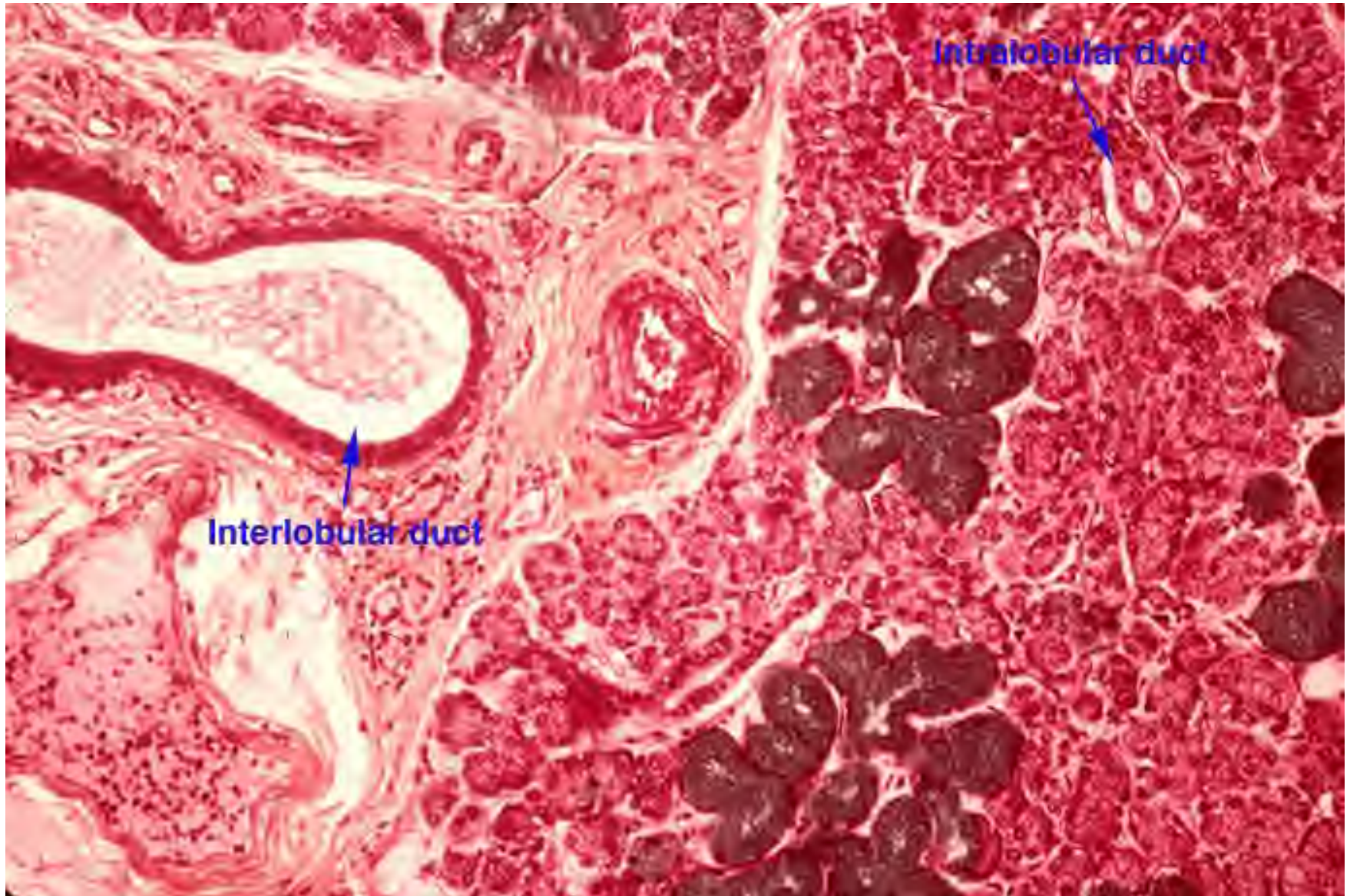


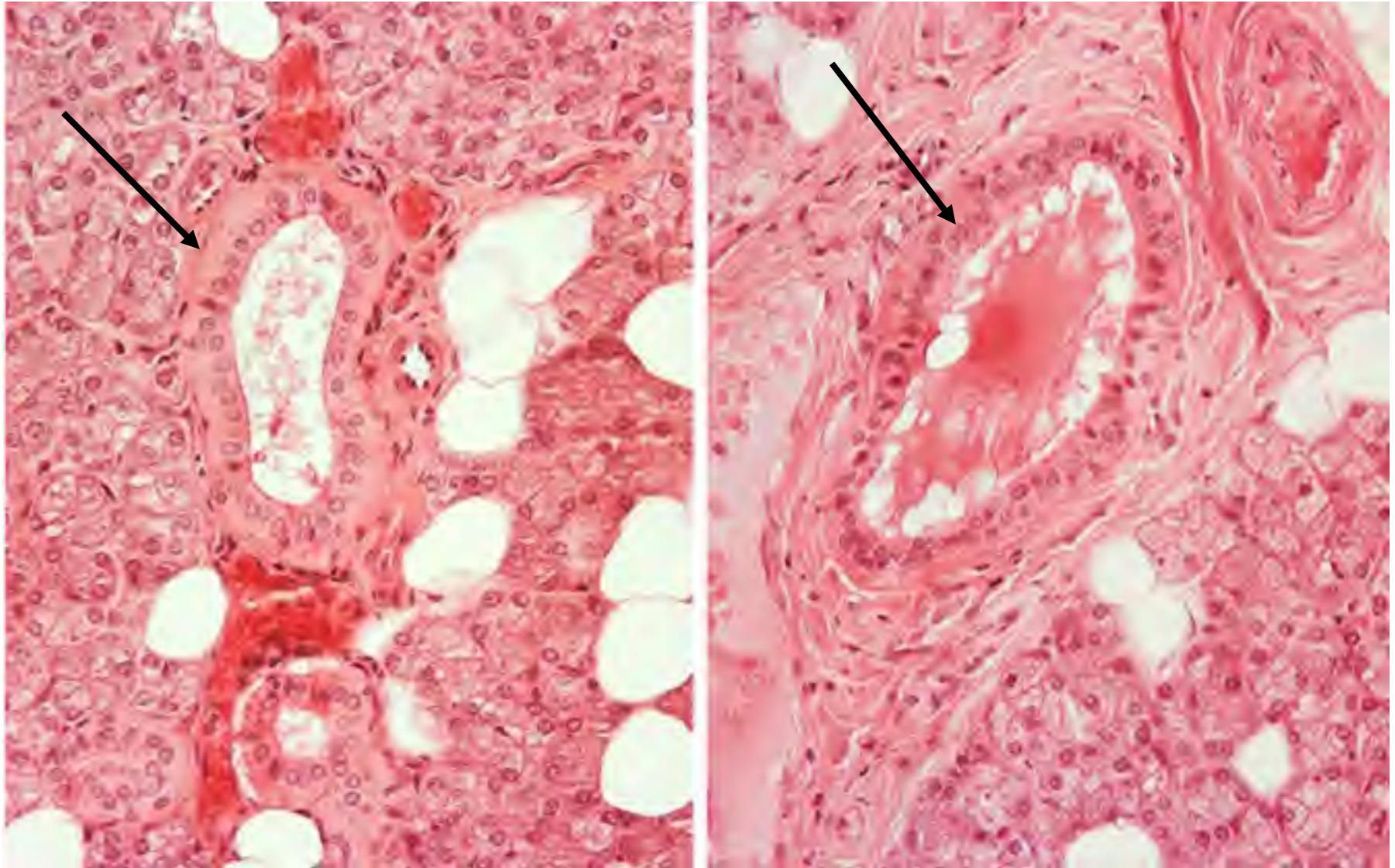
Image of ion flow
through striated
ducts removed



Intra and Inter Lobular Ducts



Intra (left) and Inter (right) Lobular Ducts



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Slide 9: Sources Undetermined

Slide 10: Orofacial Histology and Embryology, Moss-Salentijn, L., et al., F.A. Davis Co.

Slide 11: Cell and Tissue Biology, L. Weiss 6th Ed. Pp. 597; Orofacial Histology and Embryology, Moss-Salentijn, L., et al., F.A. Davis Co.

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Slide 19: Orofacial Histology and Embryology, Moss-Salentijn, L., et al., F.A. Davis Co; Cormack D., p.485

Slide 20: Source Undetermined

Slide 21: Orofacial Histology and Embryology; Moss-Salentijn, L., et al., F.A. Davis Co

Slide 22: Drosenbach, Wikipedia, http://en.wikipedia.org/wiki/File:The_Periodontium.jpg; Weiss/Greep, Histology, 4th ed. P.637

Slide 23: Indiana University, http://anatomy.iupui.edu/courses/histo_D502/D502f04/lecture.f04/upperdigf04/uppergif04.html

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Slide 28: A Visual Approach to Histology, Wismar and Ackerman

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Slide 30: Bloom and Fawcett, Histology, p. 568

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Slide 35: Text/Atlas of Histology, Philadelphia, WB Saunders, 1968; Kierszenbaum p. 53

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Slide 37: Sun-Kee Kim

Slide 38: Gray' s Anatomy Plate 1025, Wikimedia Commons, <http://commons.wikimedia.org/wiki/File:Gray1025.png>
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Slide 41: Michigan Medical School Histology Slide Collection
Slide 42: Michigan Medical School Histology Slide Collection
Slide 43: Sun-Kee Kim
Slide 44: Hand, A.R., J. Cell Biol. 47:541, 1970
Slide 45: Sun-Kee Kim; Bloom and Fawcett p. 695
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Slide 49: Regents of the University of Michigan
Slide 50: Junqueira/Carneiro 3rd ed. P. 340
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