
"IF YOU'RE NOT MAKING
MISTAKES, THEN YOU'RE
NOT DOING ANYTHING"

Oral Mucous Membrane

Mucous Membrane:

Moist lining of the gastrointestinal tract, nasal passages and other body cavities that communicate with the exterior

In the oral cavity the lining is called as oral mucous membrane or oral mucosa

Functions of the Oral Mucosa

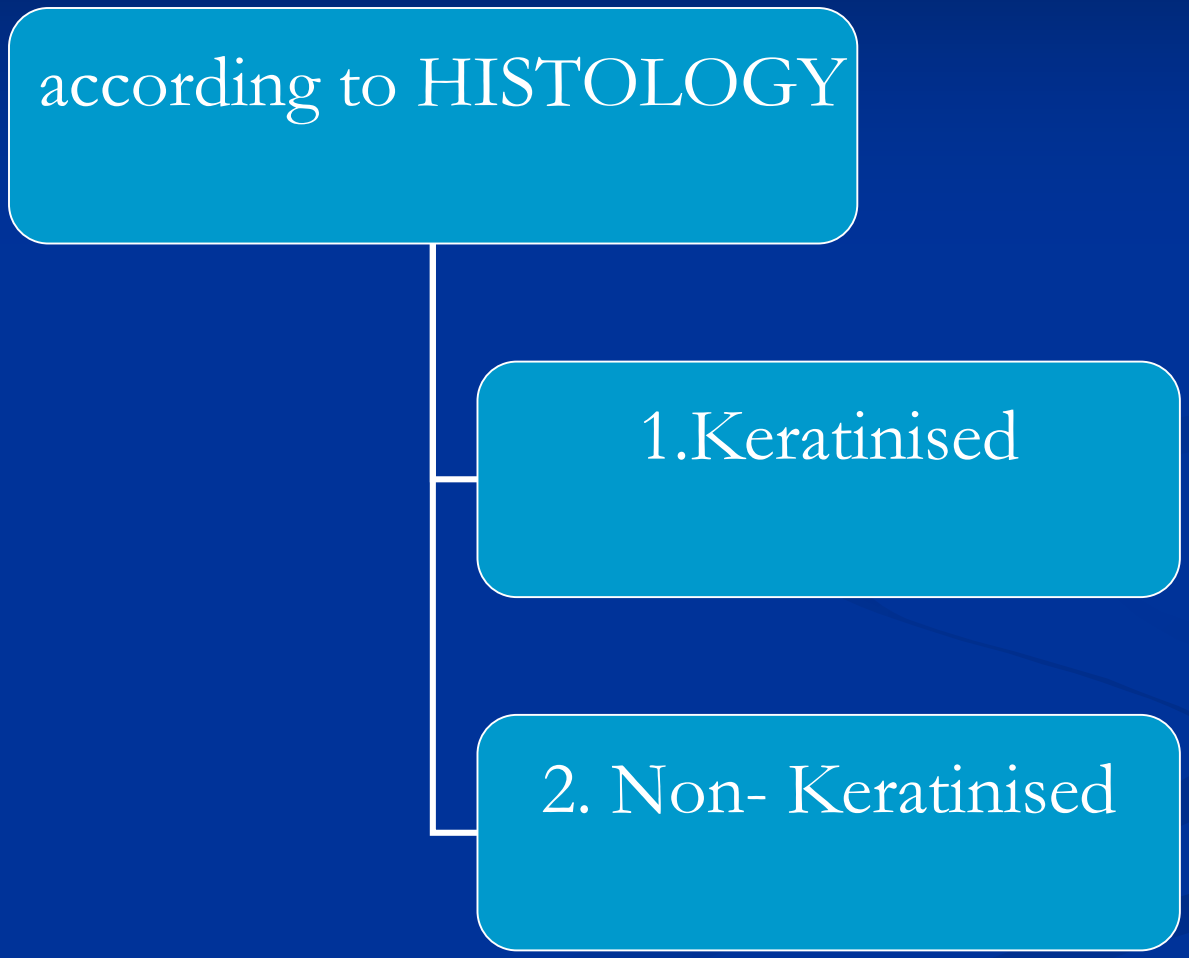
- 1.Defence: Barrier for entry of micro-organisms. Impermeable to bacterial toxins
- 2.Sensory: Temperature (heat and cold), touch, pain, taste buds, thirst;reflexes such as swallowing, etching, gagging and salivating
- 3. Secretion: Salivary secretion
- 4. Thermal regulation: Important in dogs not in humans
- 5. Protection: Protects deeper tissues from mechanical forces

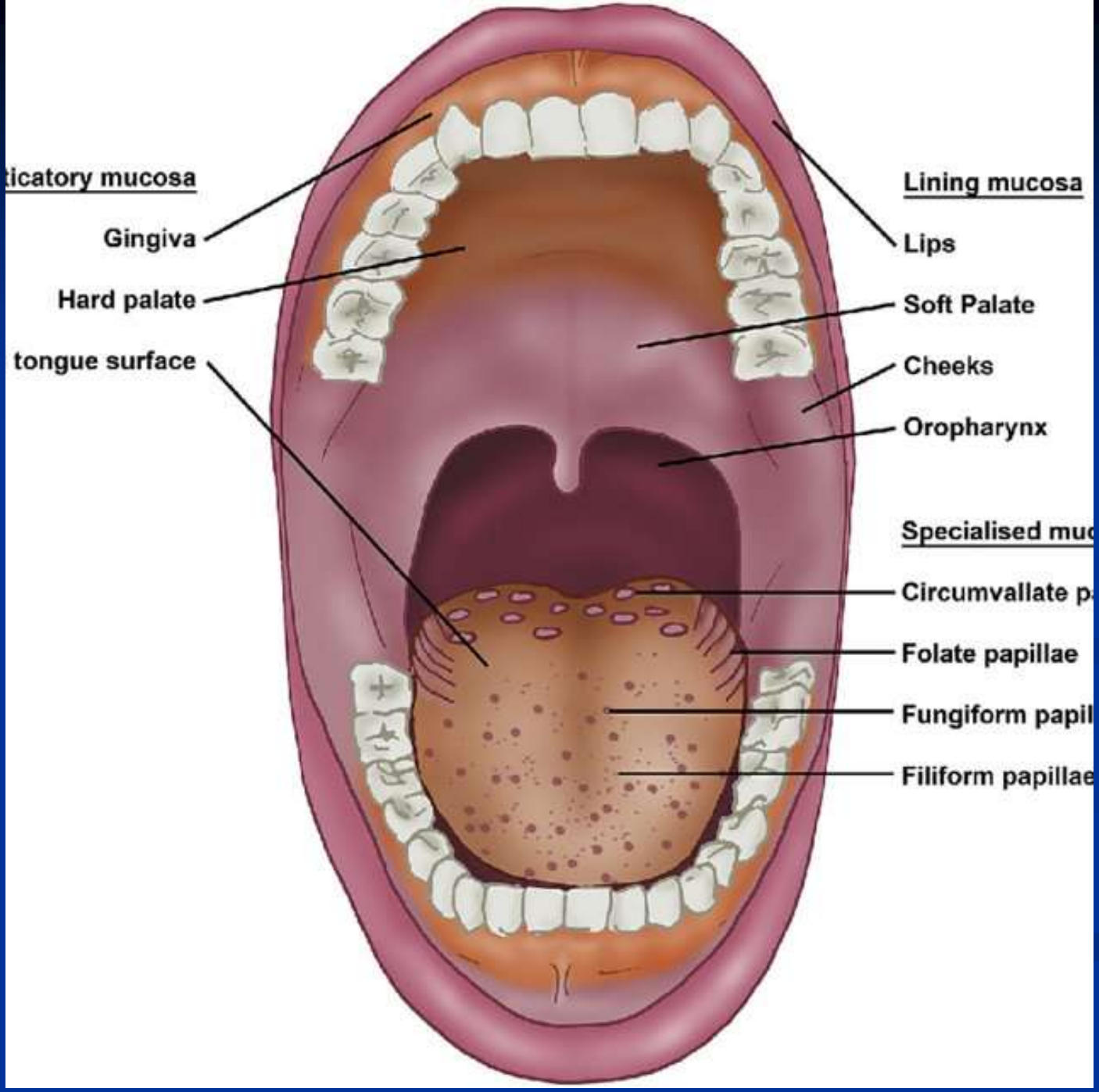
Classification of the Oral Mucosa

According to FUNCTION

1. Masticatory Mucosa:
2. Lining Mucosa:
3. Specialized Mucosa:

Classification of the Oral Mucosa




ticatory mucosa
Gingiva
Hard palate
tongue surface
Lining mucosa
Lips
Soft Palate
Cheeks
Oropharynx
Specialised muc
Circumvallate p
Folate papillae
Fungiform papil
Filiform papillae

1.Masticatory Mucosa

- 25% of total mucosa.
- Gingiva (free, attached and interdental)
- Hard palate.
- Primary mucosa to be in contact with food during mastication.
- MASTOCATORY MUCOSA IS USUALLY KERATINIZED.

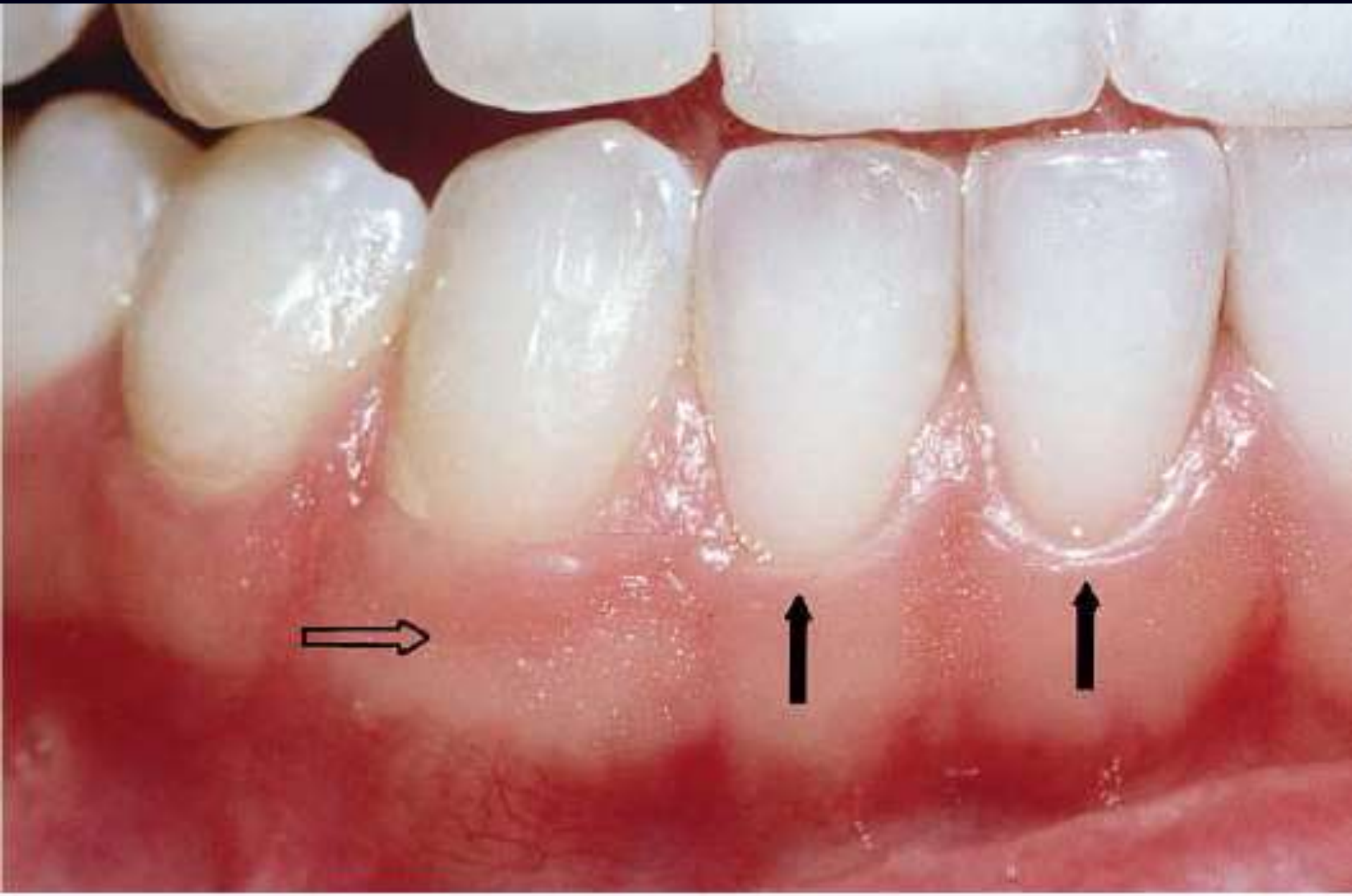
2.Lining Mucosa:

- 60% of total mucosa.
- Covers the floor of mouth, ventral (underside) tongue, alveolar mucosa, cheeks, lips and soft palate.
- Does not function in mastication and therefore has minimal attrition.
- Non-keratinized; soft and pliable.

3.Specialized Mucosa:

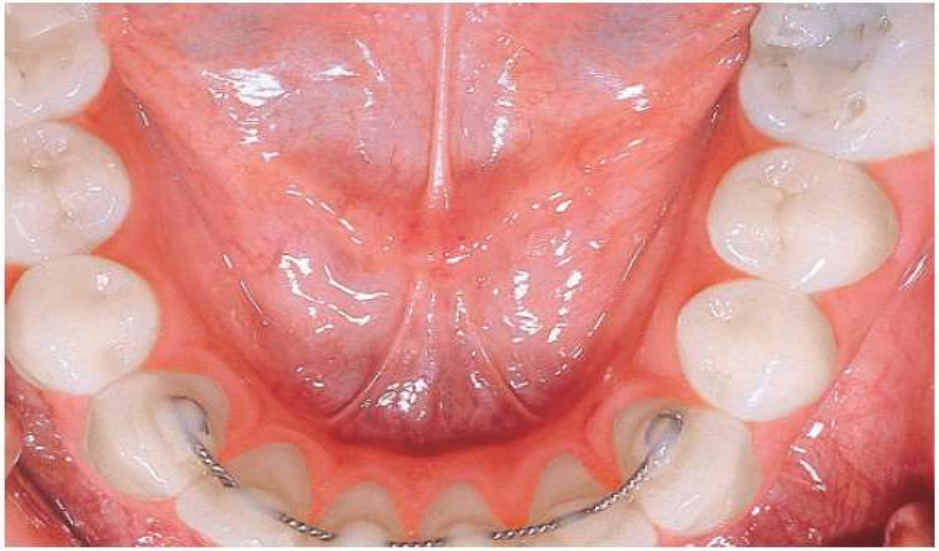
- 15% of total mucosa.
- Covers Dorsal surface of tongue and composed of cornified epithelial papillae and Taste buds.

Masticatory Mucosa

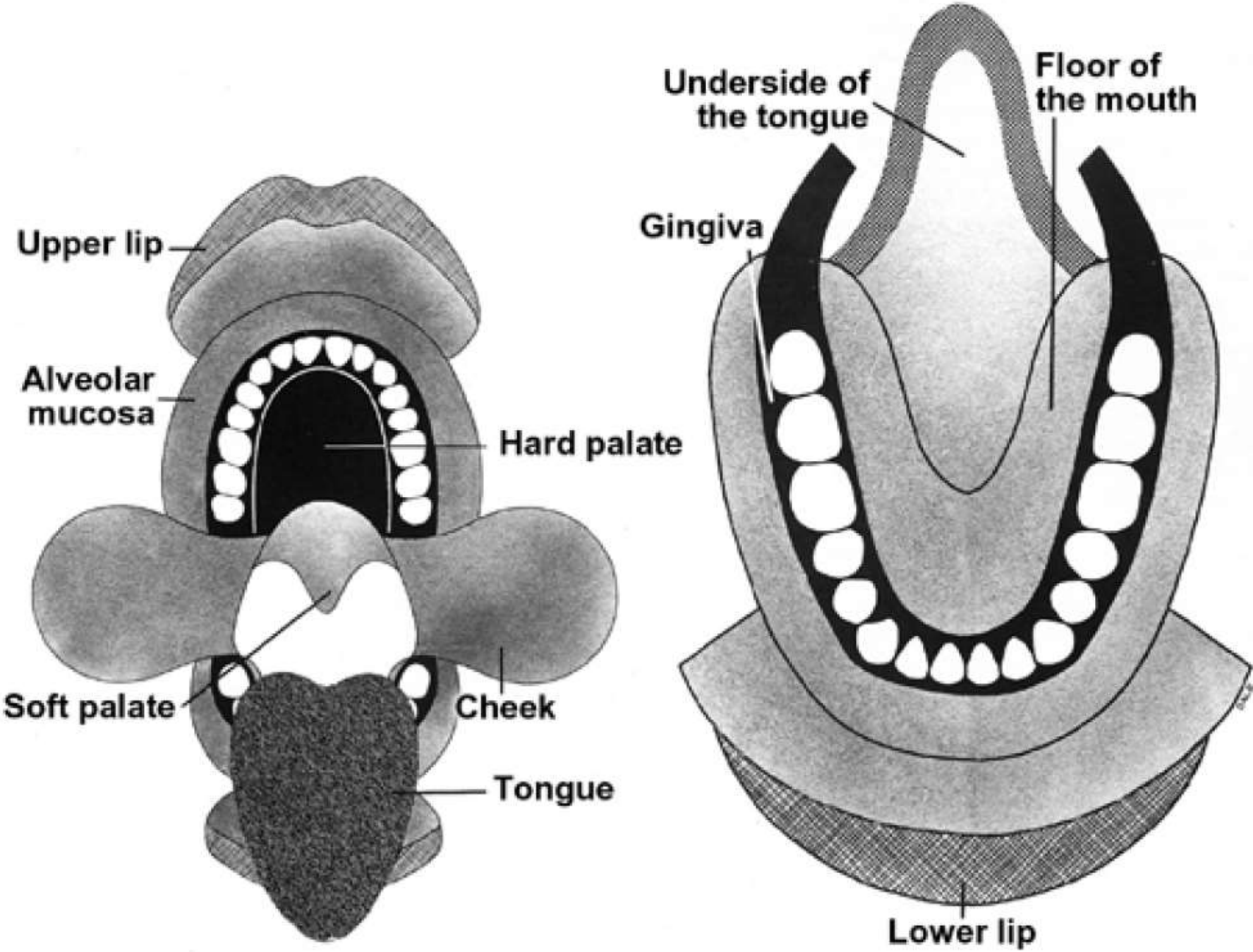


Masticatory Mucosa

Lining Mucosa



Specialized Mucosa


Upper lip
Alveolar mucosa
Hard palate
Soft palate
Cheek
Tongue
Underside of the tongue
Floor of the mouth
Gingiva
Lower lip

General Features of Oral Mucosa

1. Separated from the skin by vermillion zone of the lips which is more deeply colored than rest of the oral mucosa

2. Factors affecting color of the oral mucosa:

a. Concentration and state of dilation of the blood vessels in underlying connective tissue
b. Thickness of the epithelium.
c. Degree of keratinization.
d. Amount of melanin pigmentation

Clinically, color of oral mucosa is very important.
For example, inflamed oral tissues appear red rather than the normal pale pink

How is the oral mucosa different from skin?

1. Color

2. Moist surface

3. Absence of adnexal skin structures such as hair follicles, sweat glands and sebaceous glands (exception in Fordyce's disease)

4. Fordyce's disease: Sebaceous glands in oral cavity predominantly in upper lip, buccal mucosa and alveolar mucosa

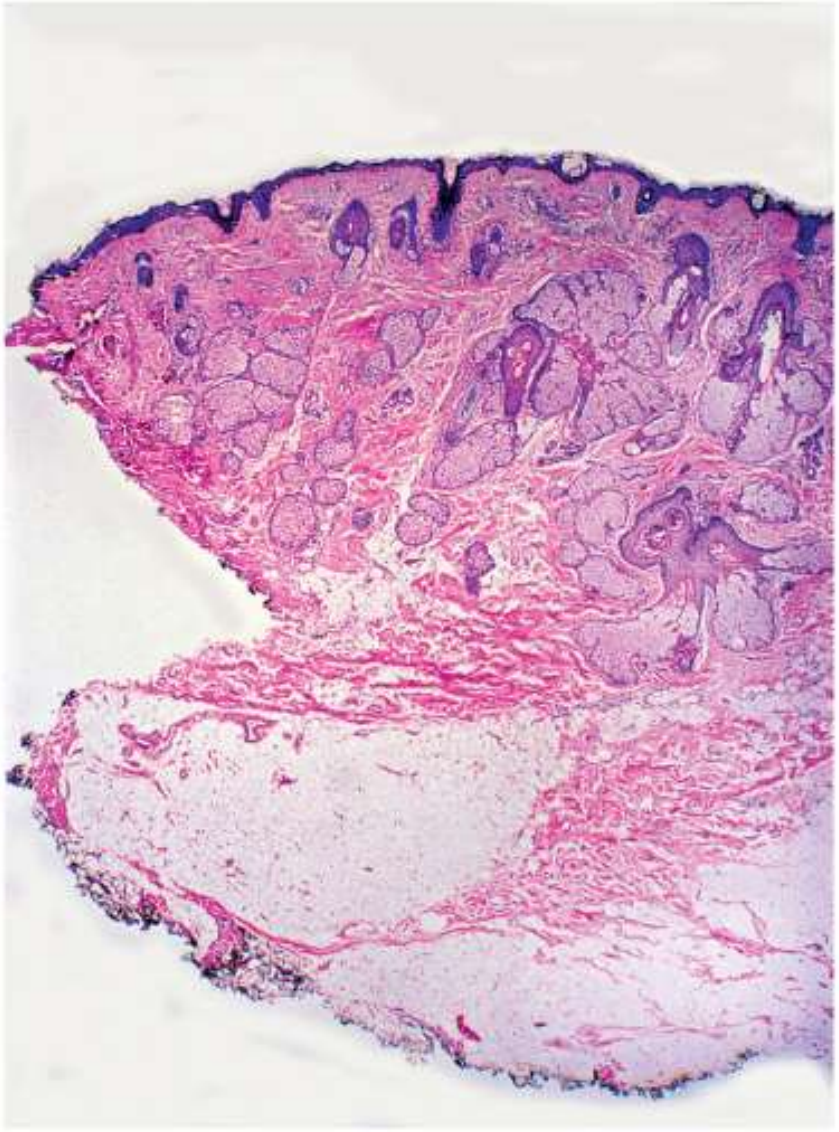
5. Presence of minor salivary glands in oral mucosa

6. Texture of surface: Oral mucosa is smoother than the skin (few exceptions like dorsal tongue –due to papillae; hard palate –rugae; gingiva –stippling)

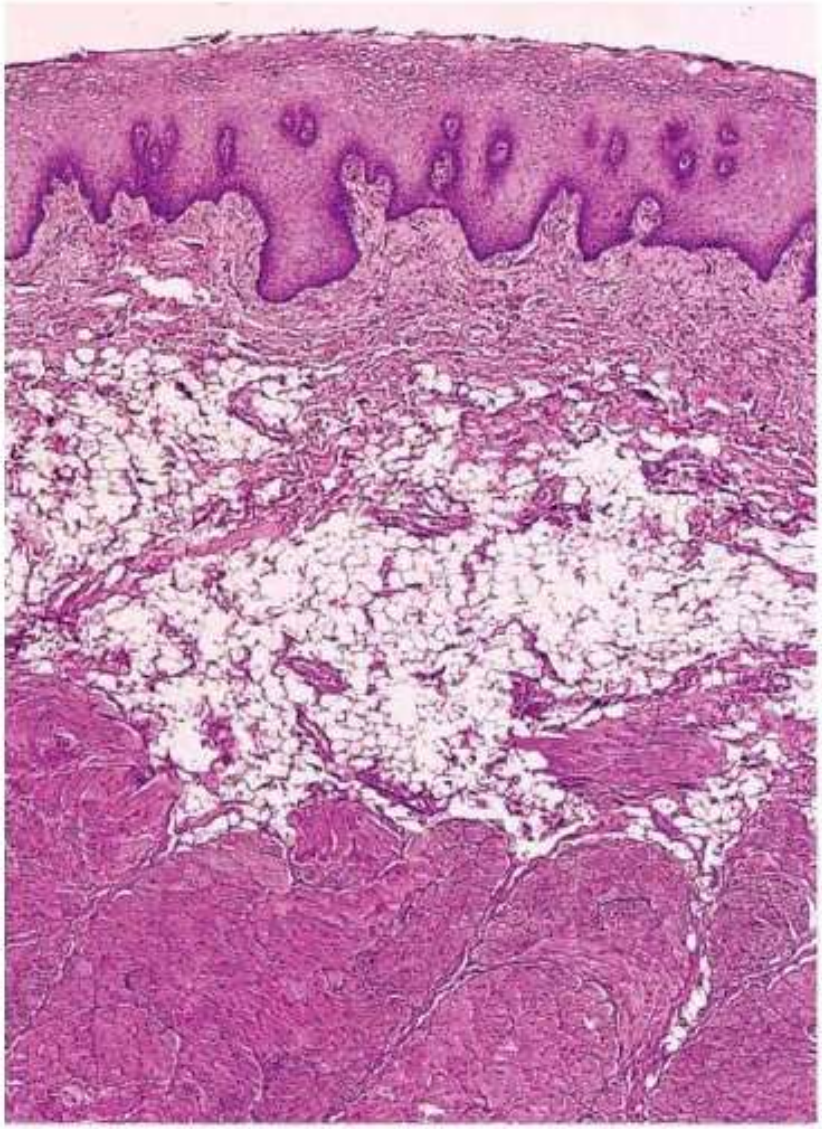
7.Firmness: Oral mucosa varies in its firmness.

For example buccal mucosa and lips are loose and pliable whereas the gingiva and hard palate are firm so critical clinically while giving injections

Skin



Oral Mucosa-Cheek



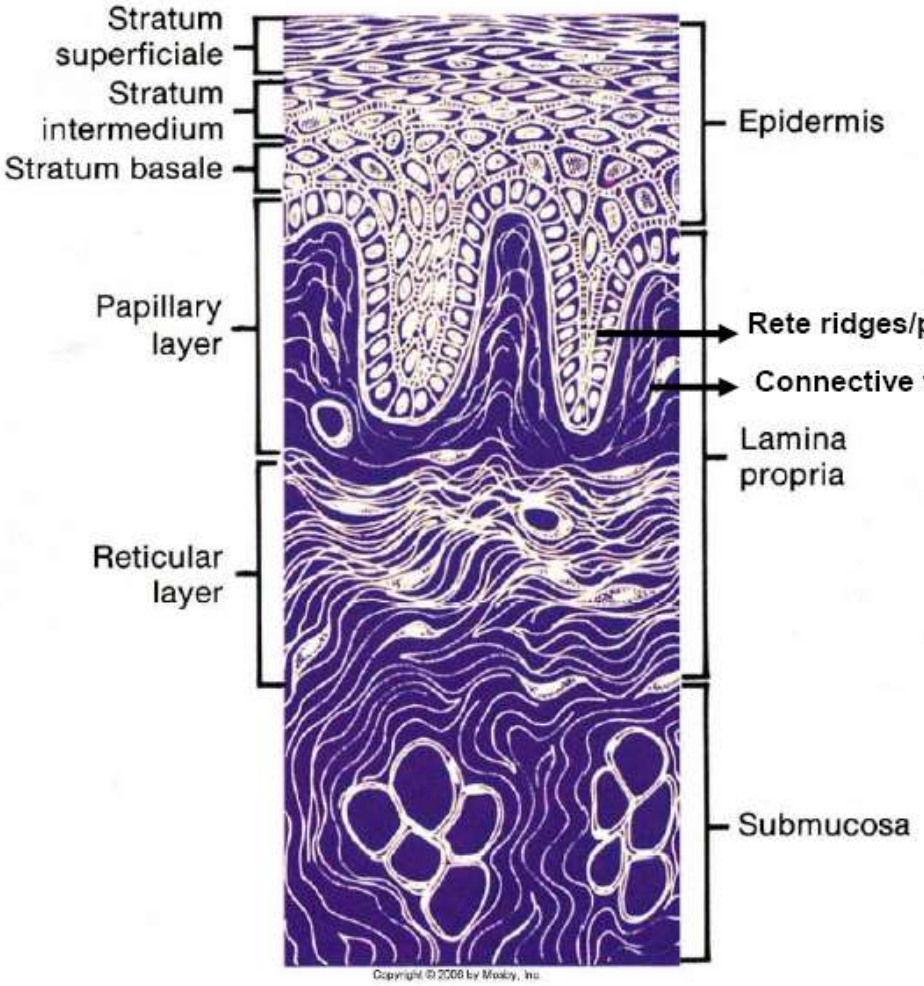
Fordyce's Disease

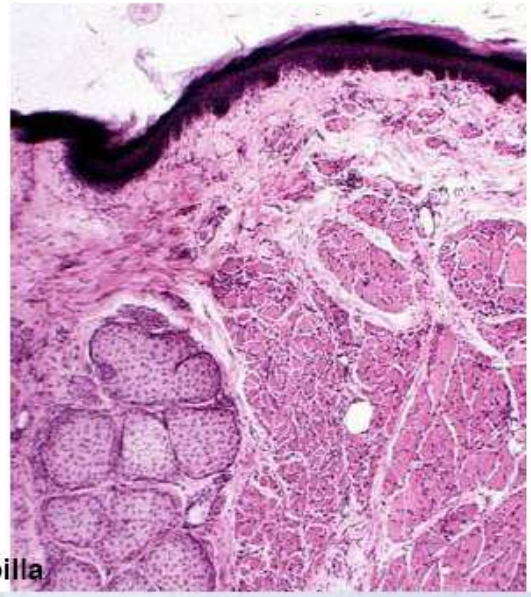
- Pale yellow spots
- Normal variation
- Lips, buccal mucosa, alveolar mucosa and tonsillar pillar

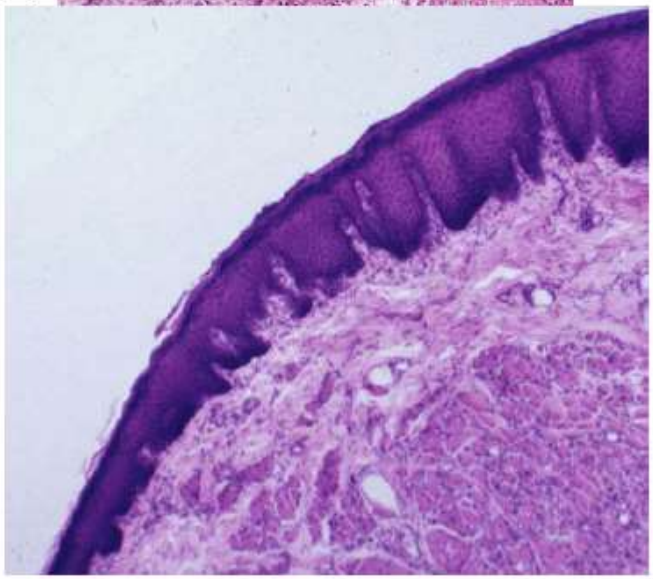
Structure of Oral Mucosa

1. Overlying oral epithelium
2. Underlying connective tissue (lamina propria and submucosa)

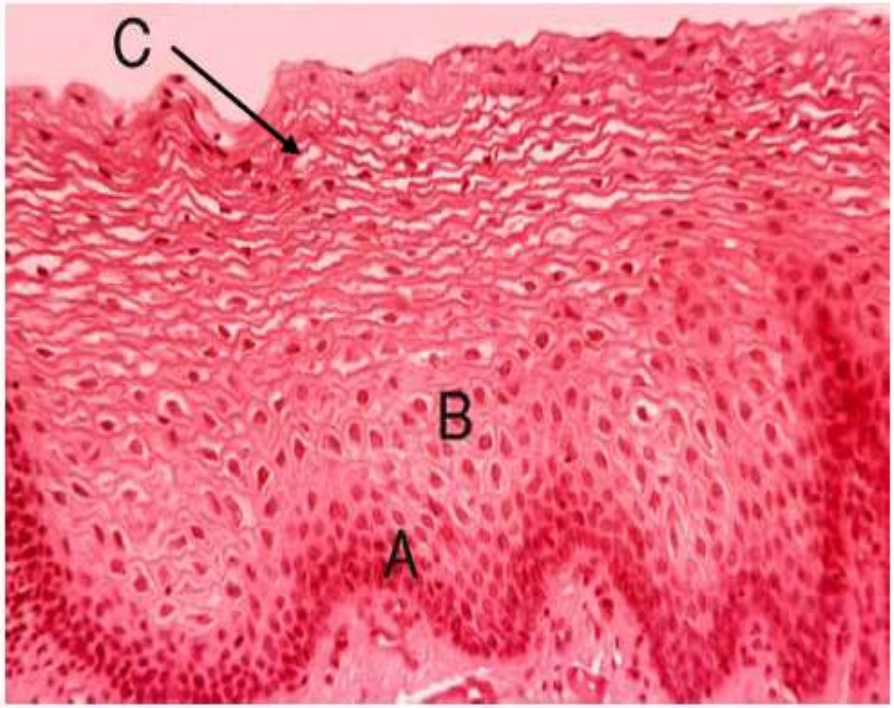
In skin called epidermis and dermis







A: Epithelium
B: Connective tissue
C: Salivary gland



A: Startum basale
B: Startum spinosum
C: Startum superficiale

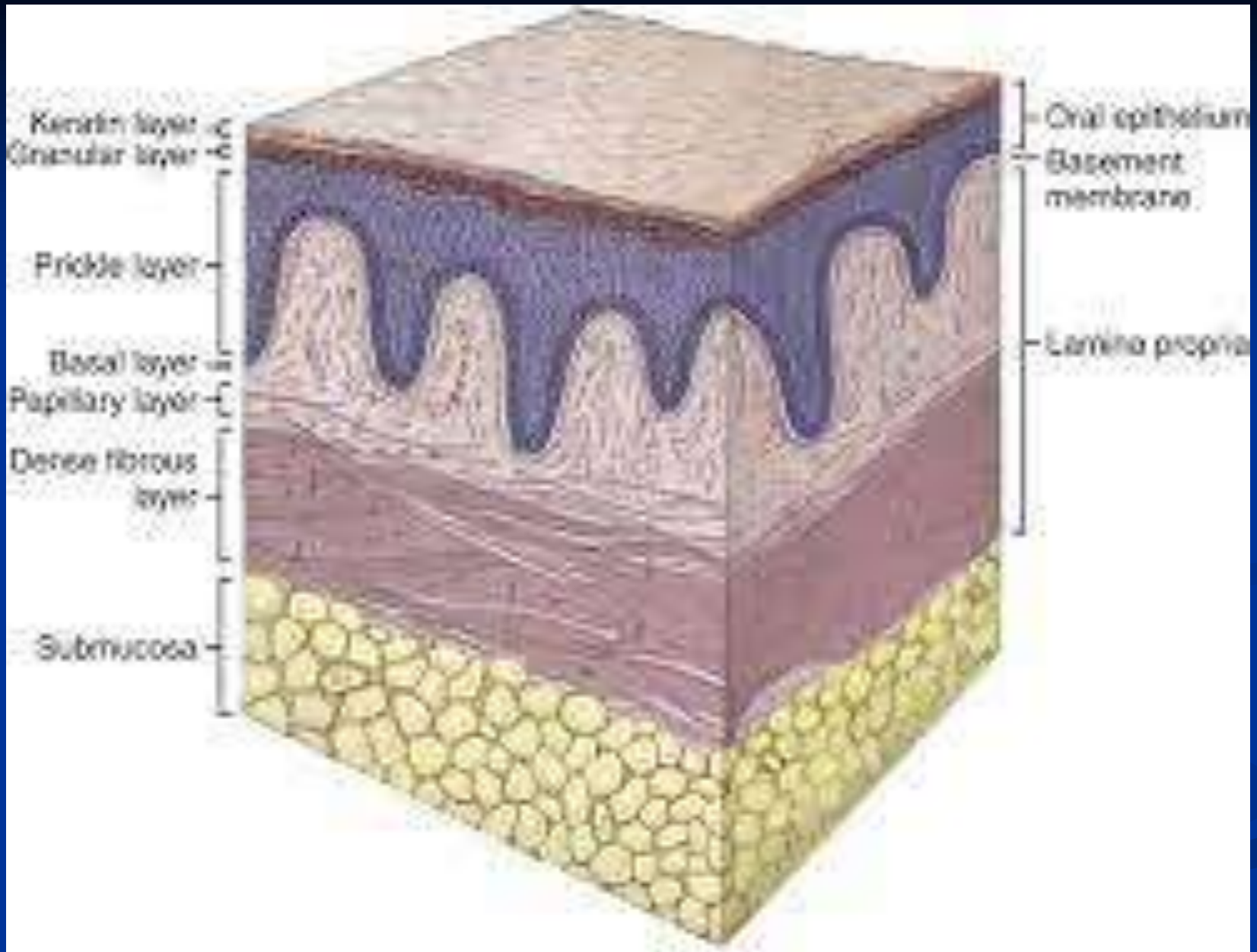
- The oral epithelium is Keratinized Or Non-keratinized Stratified Squamous Epithelium

- The interface between epithelium and connective tissue is comprised of a structureless layer called **basement membrane**

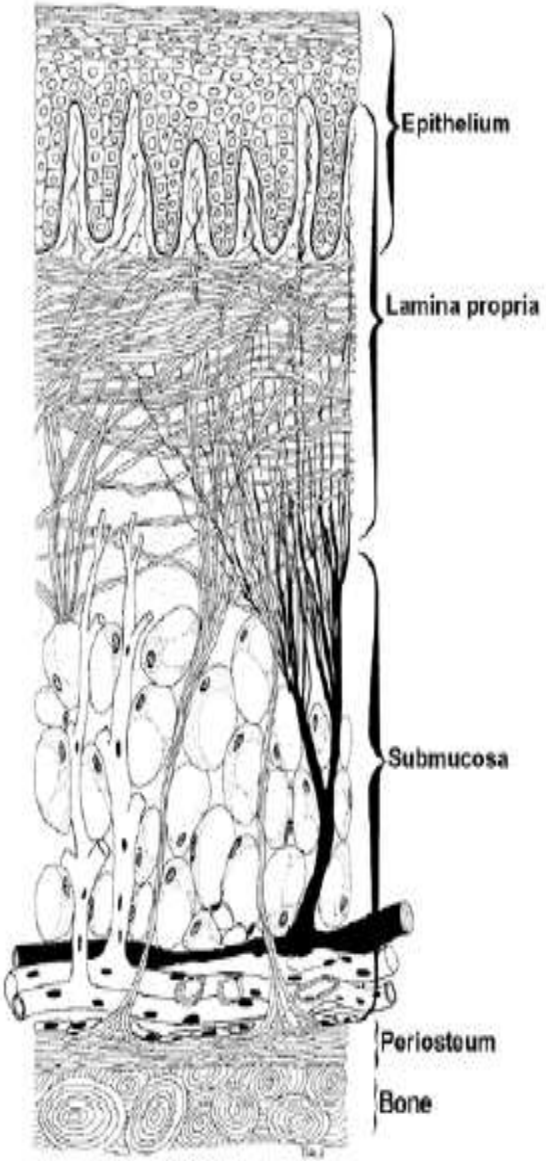
- This interface is irregular and is composed of downward projections of epithelium called **reteridges or retepegs**, and upward projection of connective tissue termed as connective tissue papillae

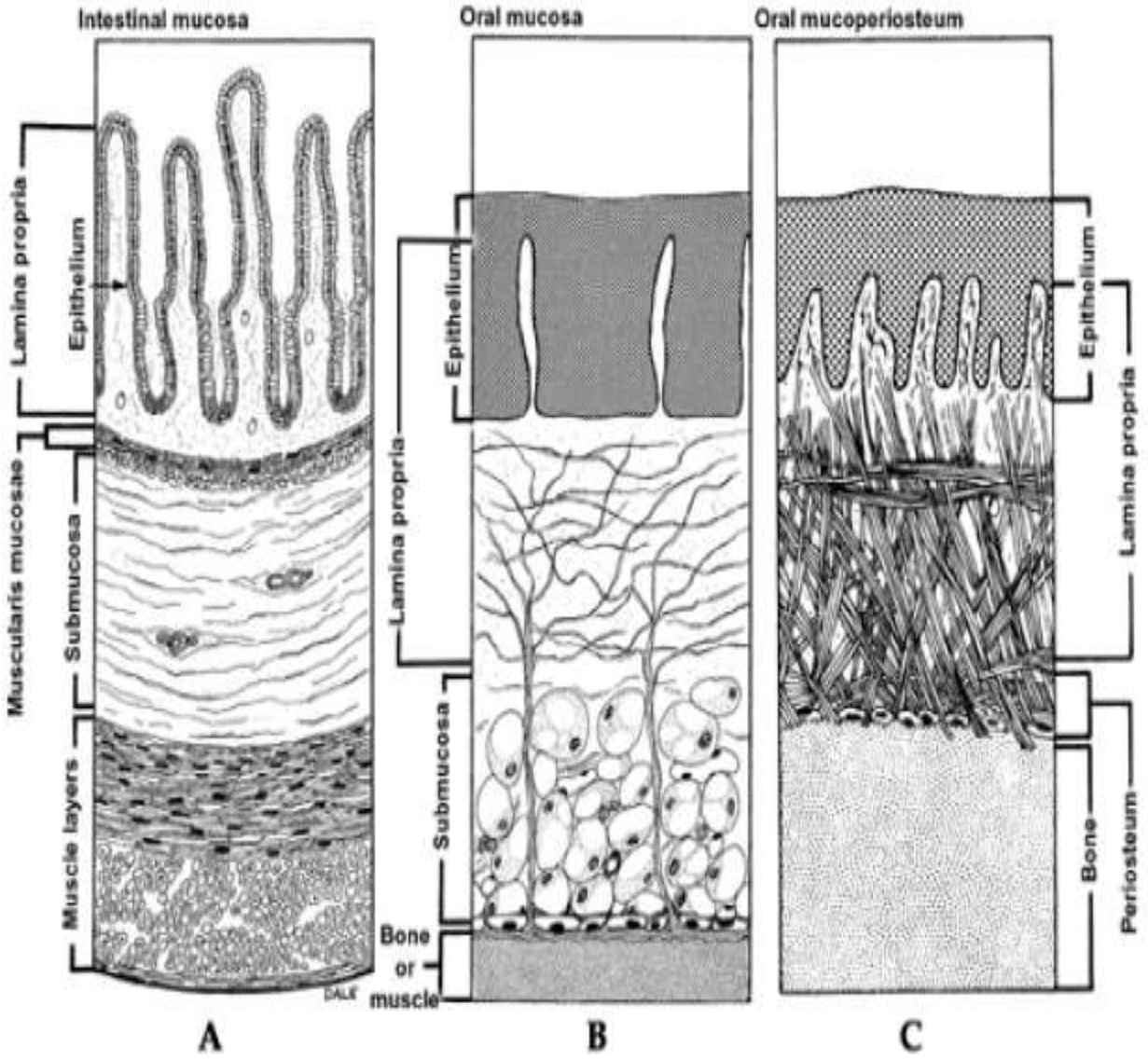
- Junction between oral epithelium and lamina propria is more obvious than that between lamina propria and submucosa
- No muscularis mucosae layer seen in oral mucosa
- Loose fat and glandular tissue with blood vessels and nerves seen underneath oral mucosa from underneath bone or muscle layer -this layer is termed SUBMUCOSA –provides flexibility

- In gingiva and hard palate, no submucosa is seen and the lamina propria is directly attached to the periosteum of the underlying bone which provides firm, inelastic attachment –this is called ORAL MUCOPERIOSTEUM



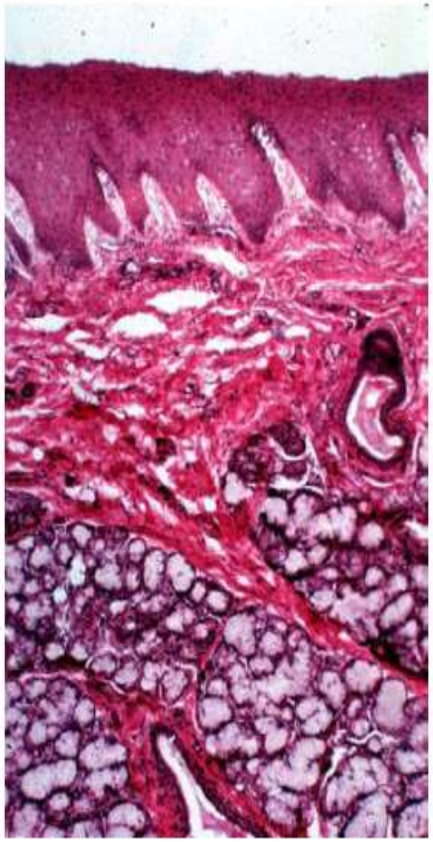
Oral Mucosa
(and underlying tissues)



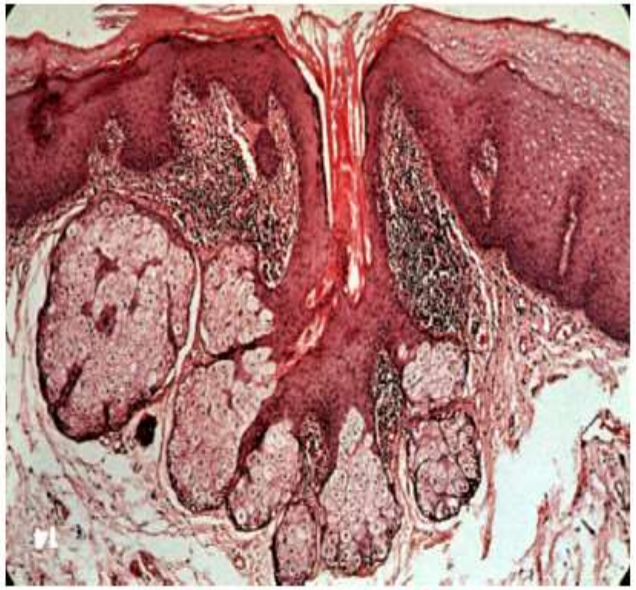


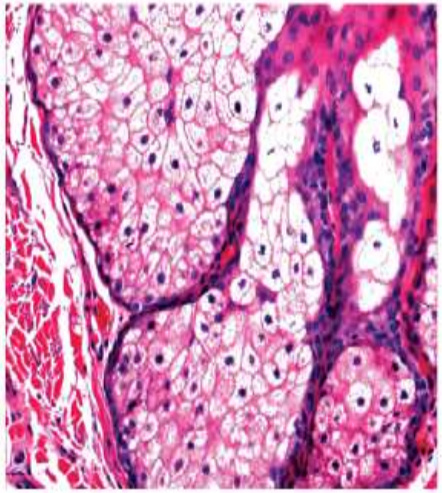
- Connective tissue in oral cavity is comprised of salivary glands, sebaceous glands(Fordyce's disease) and lymphoid tissue (tonsillar tissue)

Salivary glands



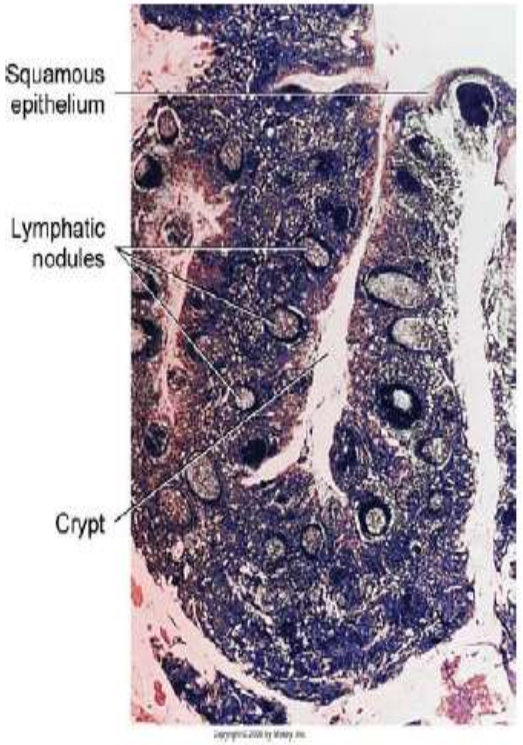
Sebaceous glands





High Power view of sebaceous glands

Lymphoid tissue (tonsil)



Histology for Pathologists, Third Edition by Stacey E. Mills.

www.usc.edu/hsc/dental/opfs/QL/09tn.html

Classification of oral mucosa

- Based upon primary function served
  1. Masticatory Mucosa (25%)
  2. Lining Mucosa (Covers 60% of total area)
  3. Specialised Mucosa (15%)

- Based upon keratinisation
  1. Keratinised
     - Orthokeratinized
     - Parakeratinized
  2. Non-keratinised.

Masticatory Mucosa/ Keratinized Epithelium

Mucosa is thicker than nonkeratinized because of the keratin layer

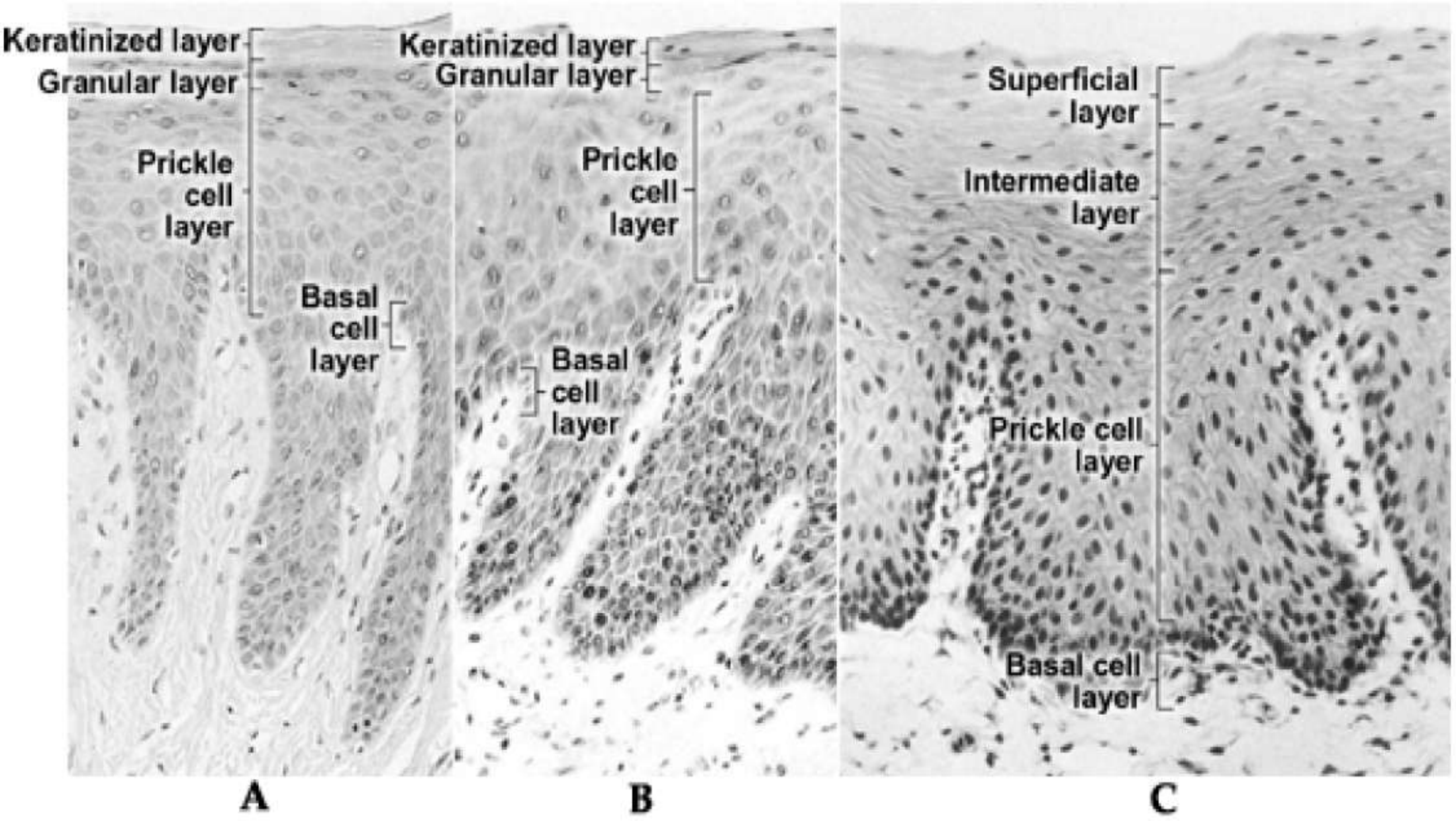
- **Stratum basale-**Same as nonkeratinized epithelium
- **Startumspinosum-**Same as nonkeratinized epithelium
- **Stratum granulosum:** Cells contain keratohyaline granules
- **Stratum corneum :**Contains thin, flat and non nucleated cells which are filled with keratin. In contrast to the hard keratin seen in nails and hair, keratin overlying normal masticatory oral mucosa is soft. Keratin is tough, nonliving material that is resistant to friction and impervious to bacterial invasion. Same as nonkeratinized epithelium

Types of Oral Epithelium

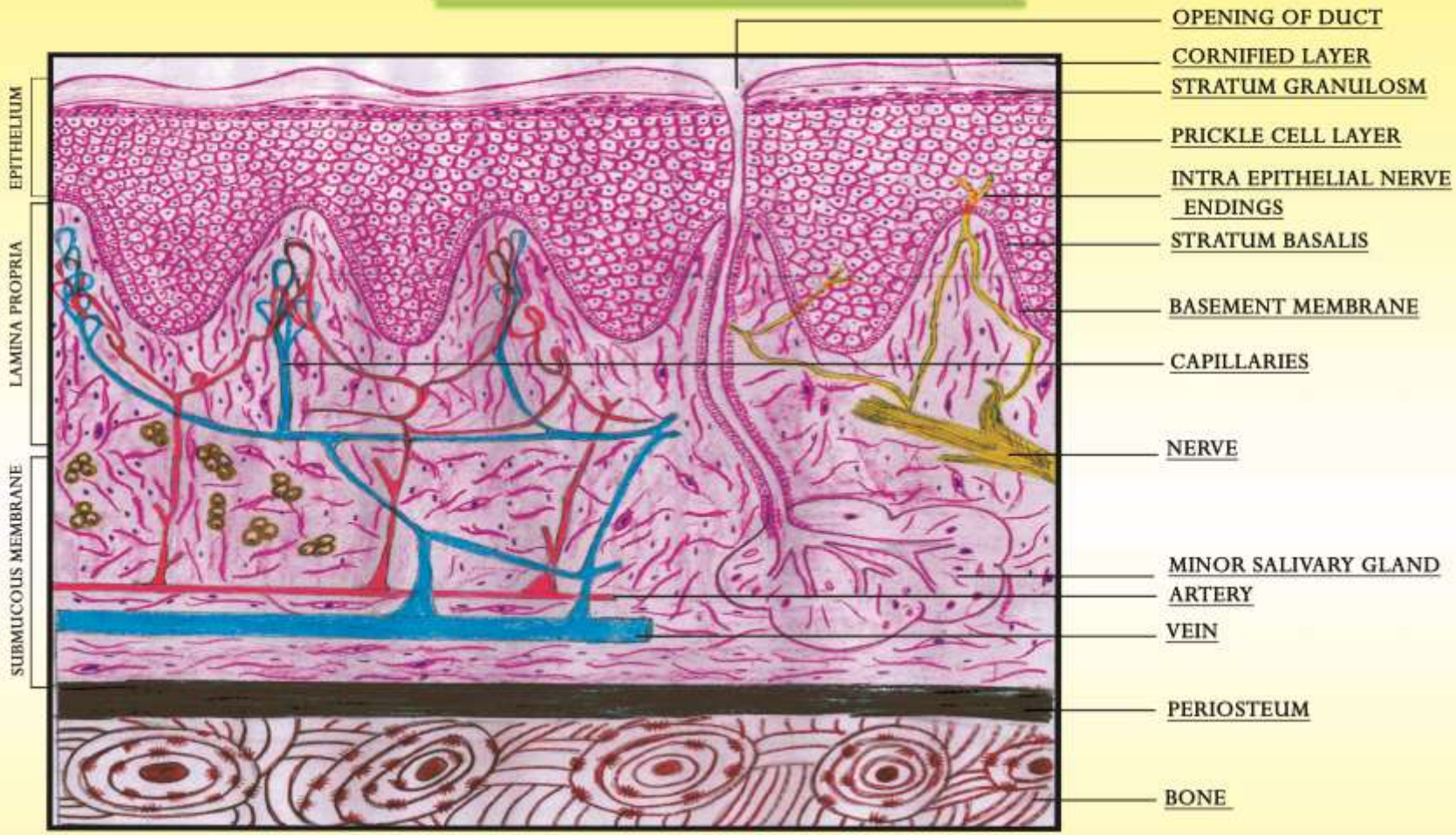
Orthokeratinized stratified squamous epithelium

Parakeratinized stratified squamous epithelium

Nonkeratinized stratified squamous epithelium



Oral Mucosa



Epithelium :Stratified squamous keratinised epithelium

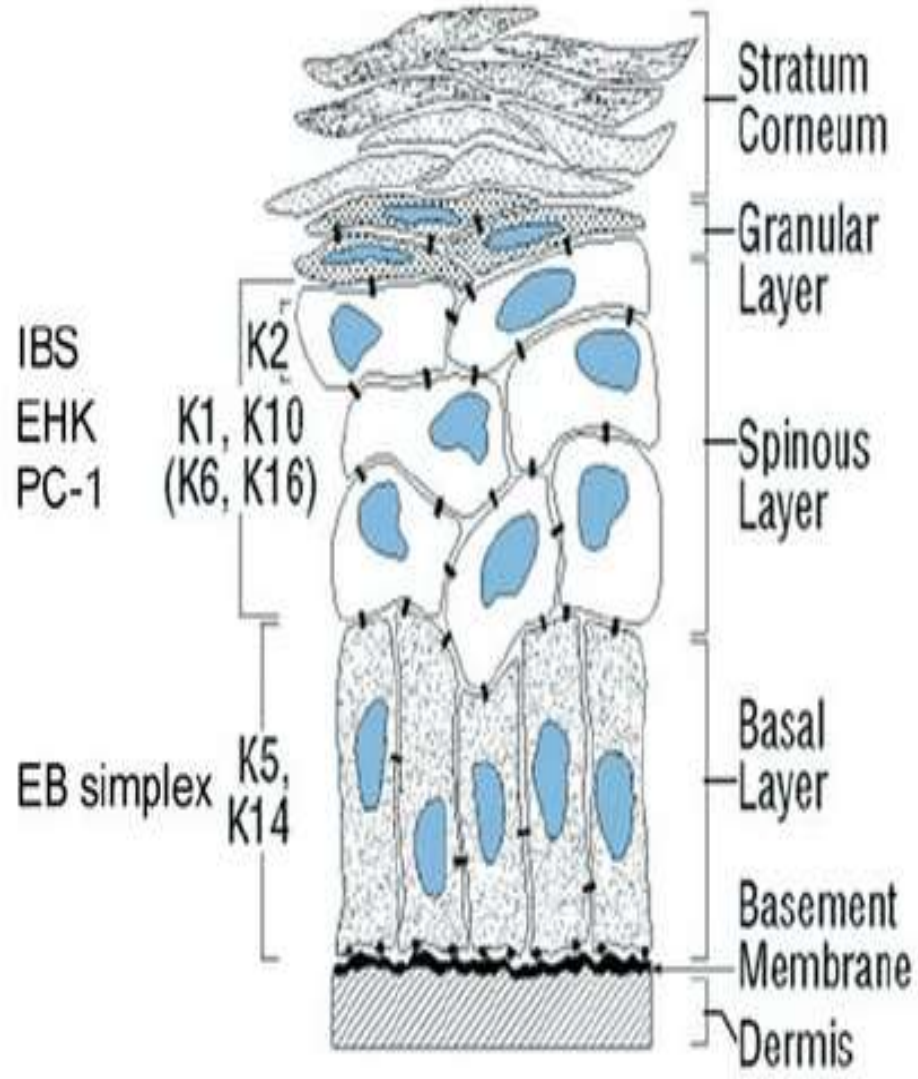
Basement Membrane :Is the interface between the connective tissue and the epithelium

Lamina Propria :Is a connective tissue of variable thickness that support the epithelium
It is divided into two parts- Papillary and Reticular

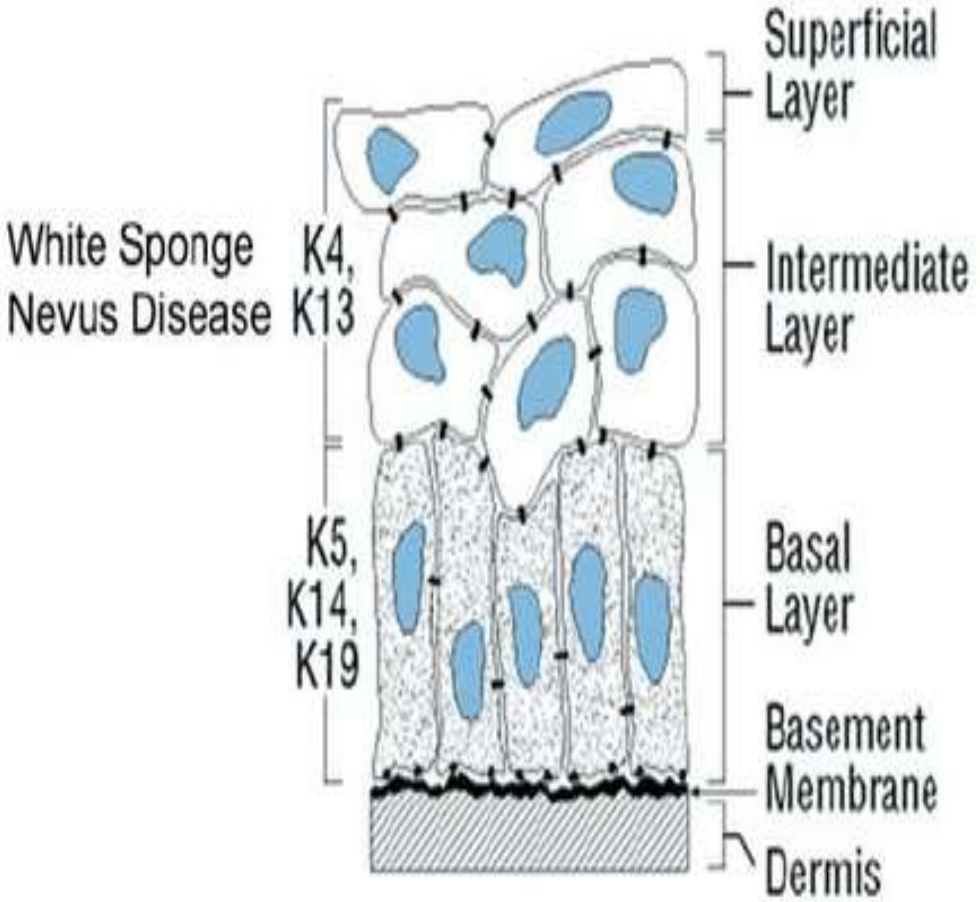
Submucosa :It attaches the mucous membrane to the underlying structure

Submitted By : Aardra Ann joe, Absal Abdul Azeez, Antony Juju Vincent, Aswathy C.S, Aswathy V.Mohan.
(II[nd]BDS 2007-08Batch)

Epidermis, Oral Keratinized



Oral Non-Keratinized (Buccal)

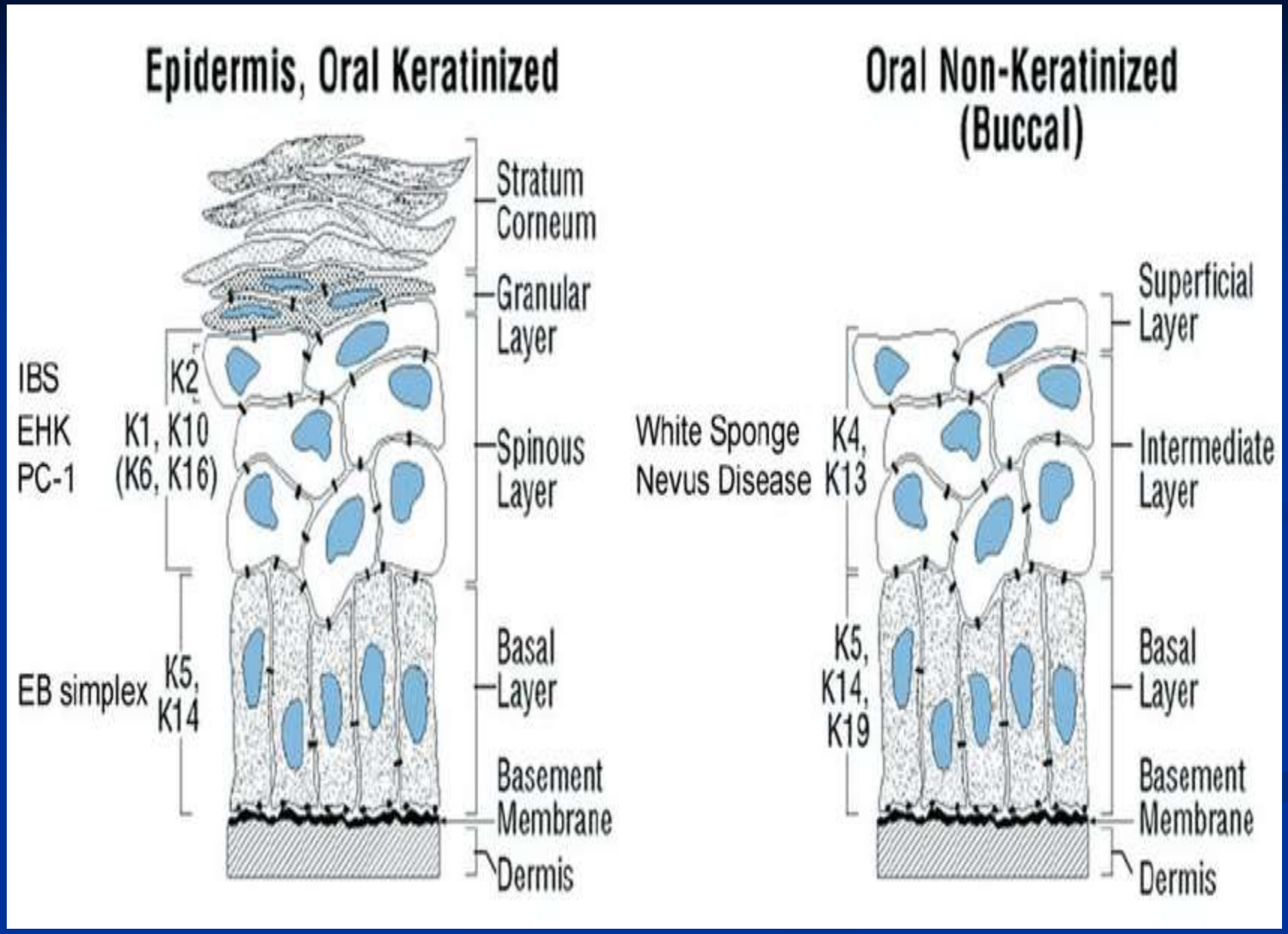


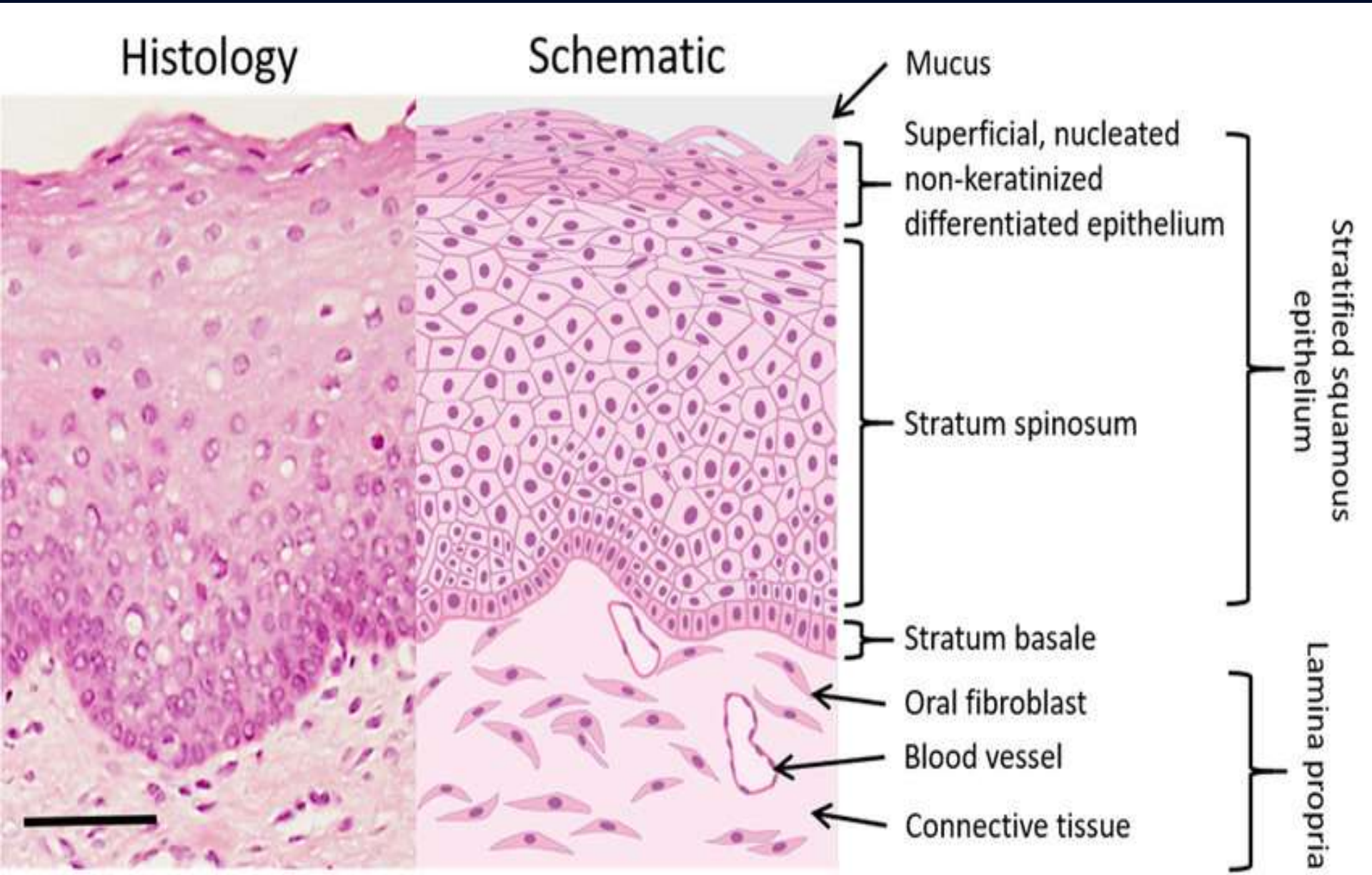
Components of Oral Epithelium

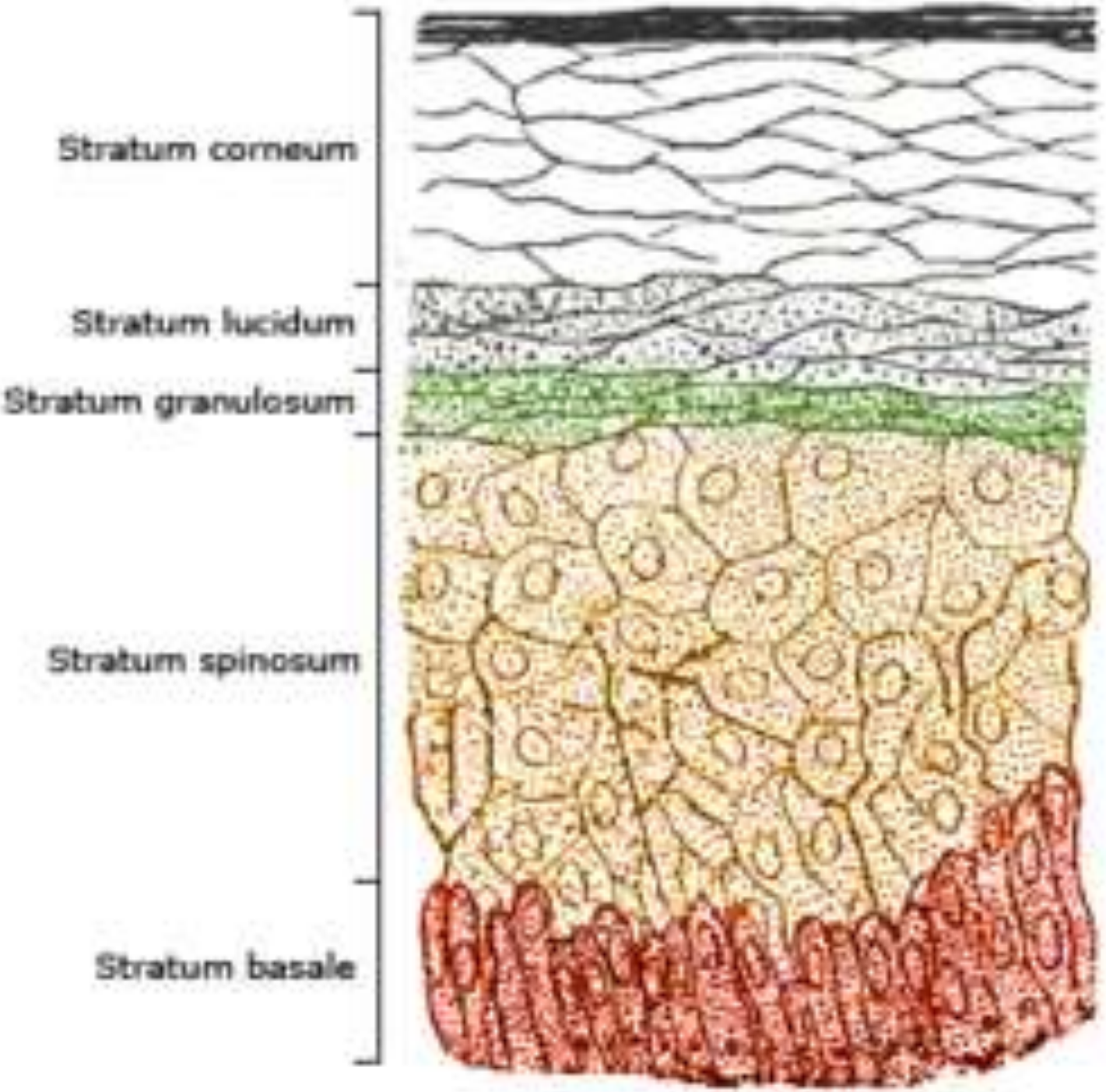
- **Lining Mucosa:**
- **Stratum Basale:** Basal cell layer comprised of cuboidal cells. Progenitor cells that divide and provide new cells by mitotic division that migrate to thesurface to replace cells that are shed.

- **Starum Spinosum (or intermedium):**Cells are oval and represent bulk of the epithelium.

- **Startum Superficiale:** Cells are flat and contain small oval nuclei that are continuously shed.


Epidermis, Oral Keratinized
Stratum Corneum
Granular Layer
Spinous Layer
Basal Layer
Basement Membrane
Dermis
IBS
EHK
PC-1
K2
K1, K10
(K6, K16)
EB simplex
K5, K14
Oral Non-Keratinized (Buccal)
Superficial Layer
Intermediate Layer
Basal Layer
Basement Membrane
Dermis
White Sponge Nevus Disease
K4, K13
K5, K14, K19


Histology
Schematic
Mucus
Superficial, nucleated
non-keratinized
differentiated epithelium
Stratum spinosum
Stratum basale
Oral fibroblast
Blood vessel
Connective tissue
Stratified squamous
epithelium
Lamina propria

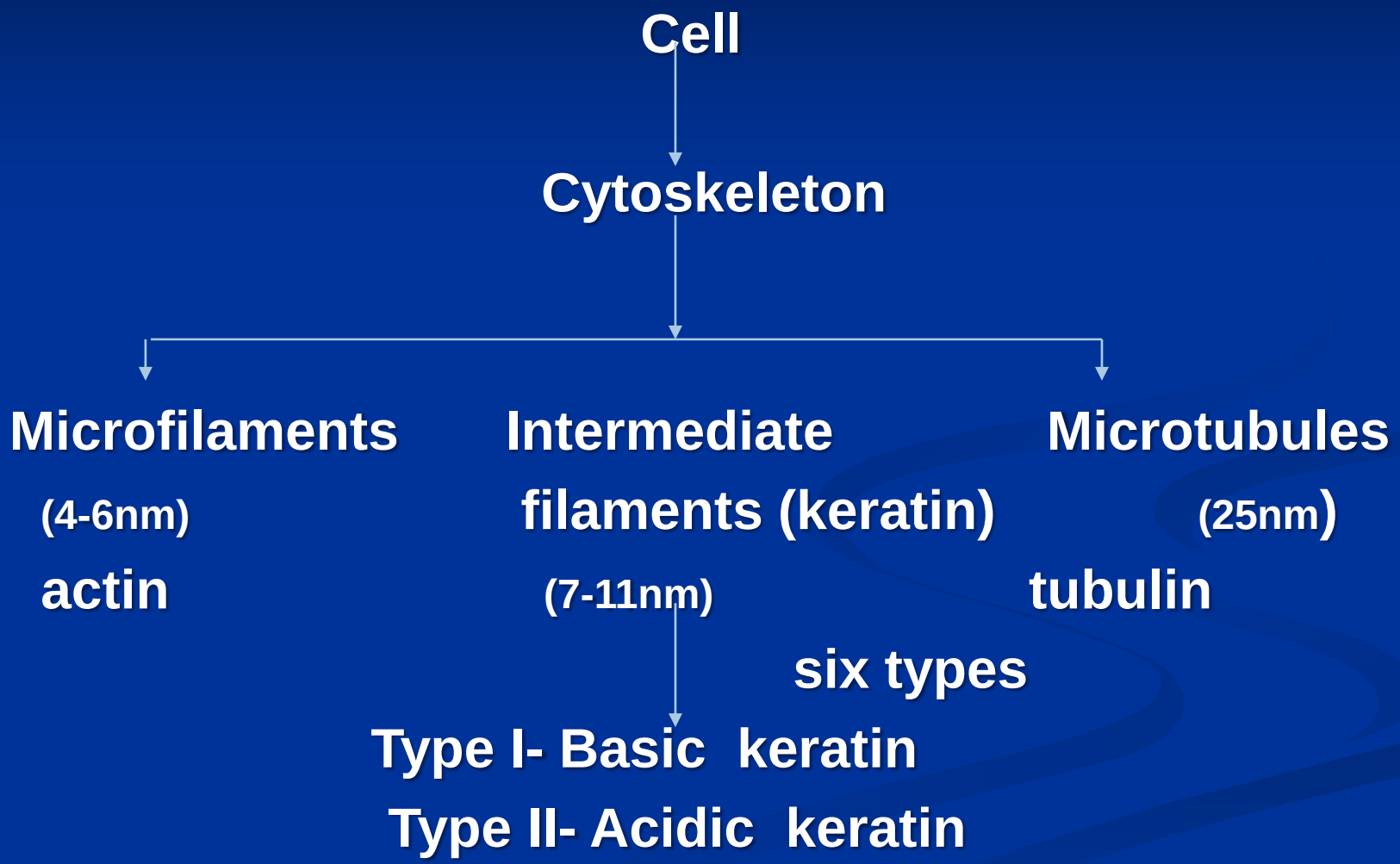

Stratum corneum
Stratum lucidum
Stratum granulosum
Stratum spinosum
Stratum basale

Cytokratins

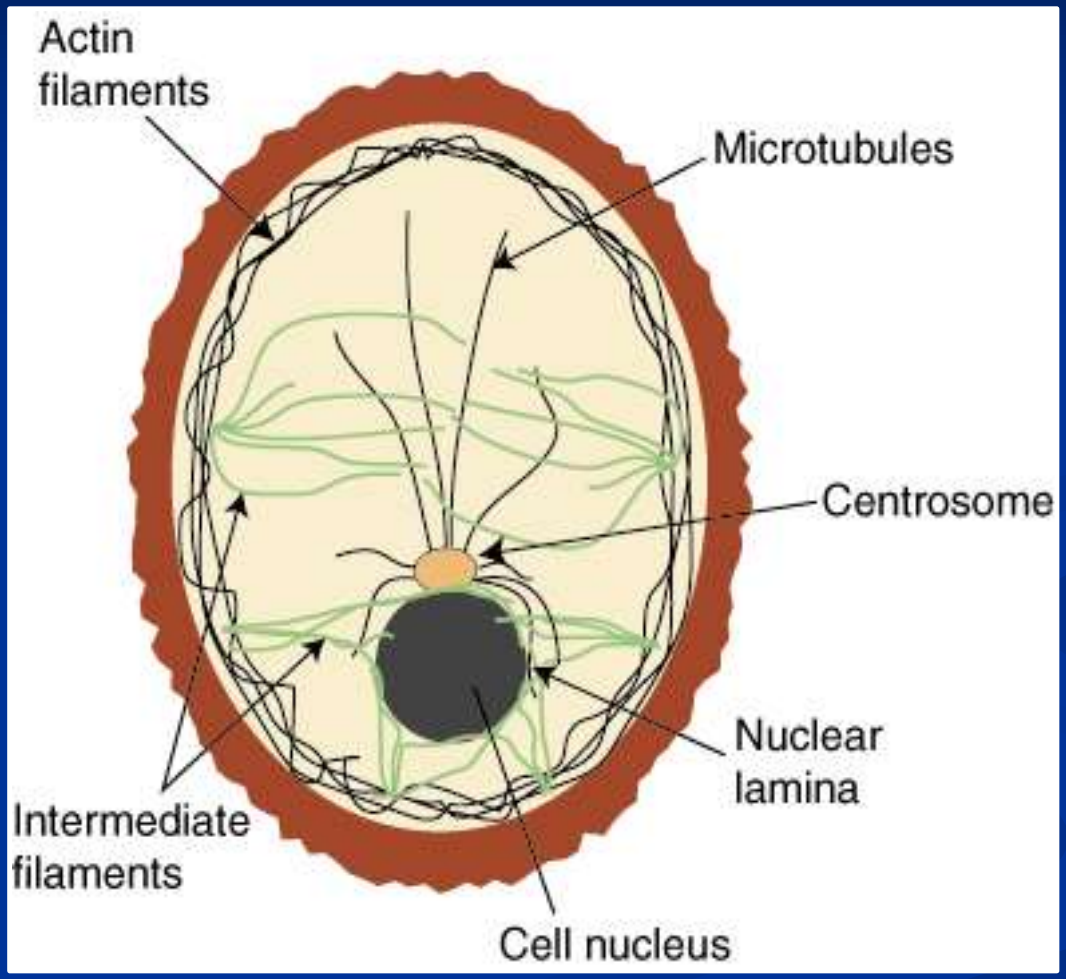
- Cytokeratins form the Cytoskeleton of all epithelial cells, along with microfilaments and microfibrils.
- Serve to provide mechanical linkages and distribute the forces over wide area.

- Function as stress bearing structures within epithelium and are important in maintaining cell shape.

Structural elements of cell



Cytoskeleton

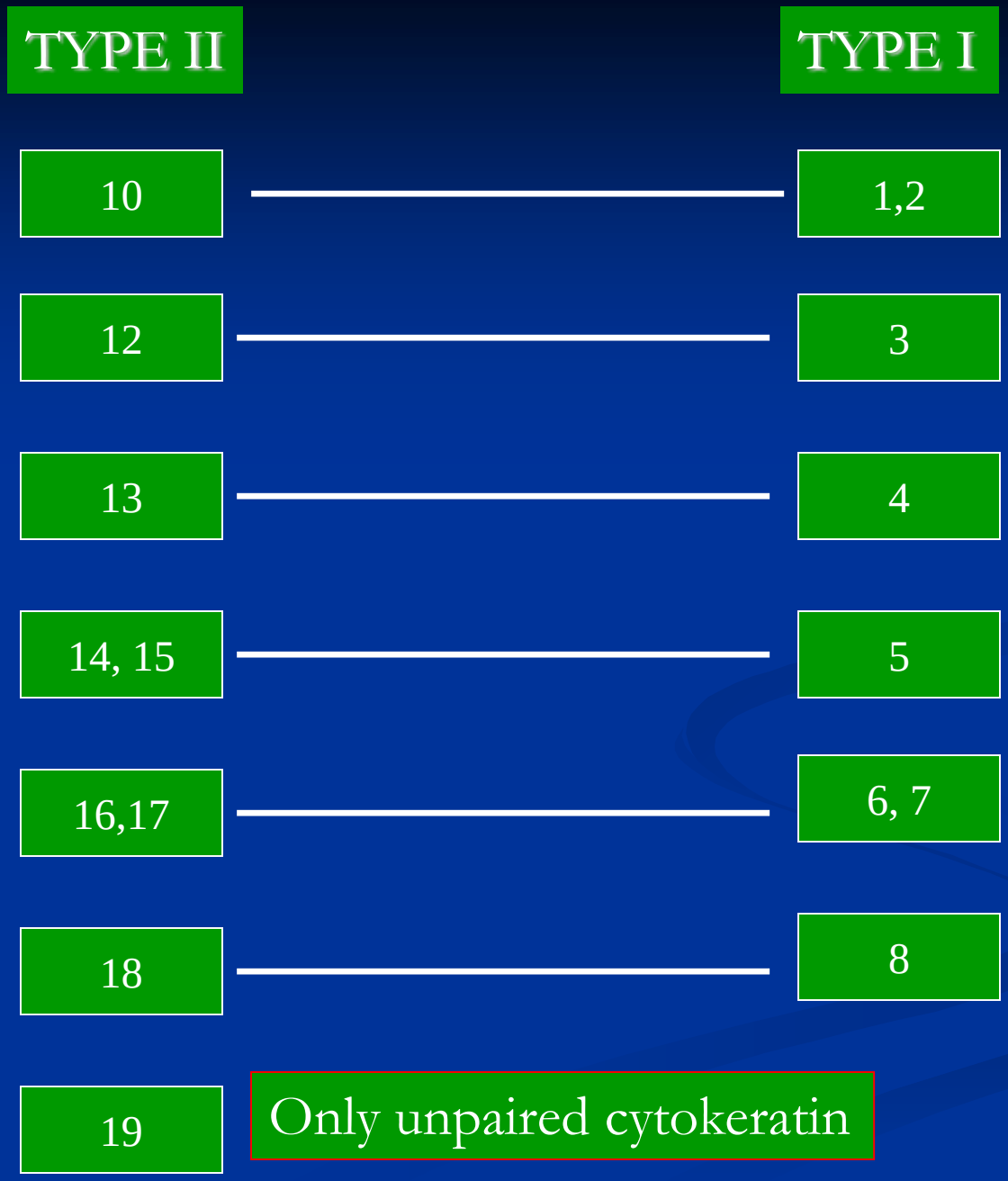


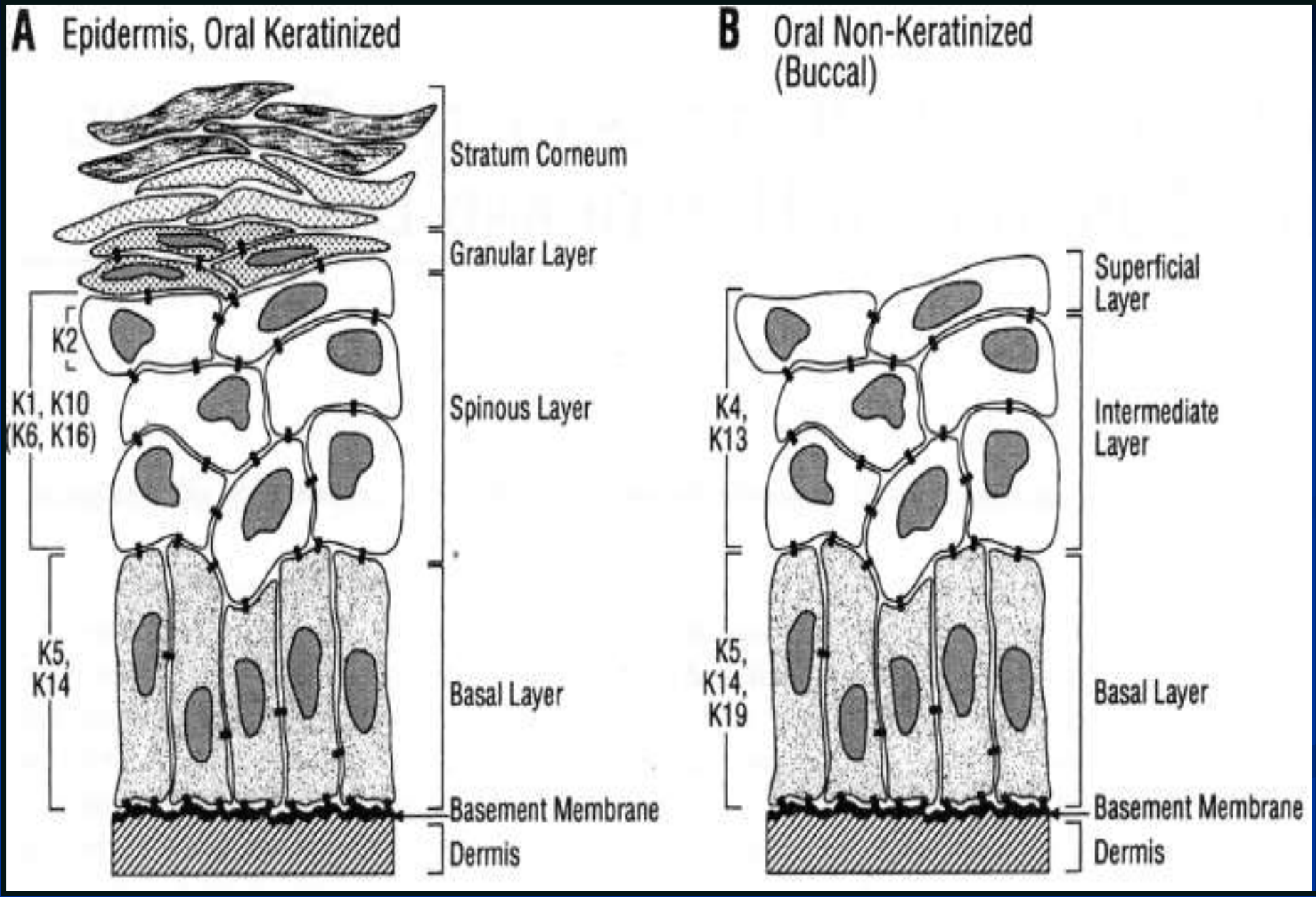
Type I Cytokeratins

- Basic group
- Cytokeratins: 1-8
- Mol wt: 52-67 KDa
- LARGER cytokeratins

Type II Cytokeratins

- Acidic group
- Cytokeratins: 9-20
- Mol wt: 40-56.5 KDa
- SMALLER cytokeratins


TYPE II
TYPE I
10
1,2
12
3
13
4
14, 15
5
16,17
6, 7
18
8
19
Only unpaired cytokeratin


A Epidermis, Oral Keratinized
Stratum Corneum
Granular Layer
K2
K1, K10
(K6, K16)
Spinous Layer
K5,
K14
Basal Layer
Basement Membrane
Dermis
B Oral Non-Keratinized
(Buccal)
Superficial
Layer
K4,
K13
Intermediate
Layer
K5,
K14,
K19
Basal Layer
Basement Membrane
Dermis

- Masticatory Mucosa--- CK1, CK10
- Lining Mucosa--- CK4, CK13

- Ventral surface of Tongue- CK5,6,14
- Soft Palate- CK7,8,18

Keratinosome or odland bodies or membrane containing granules

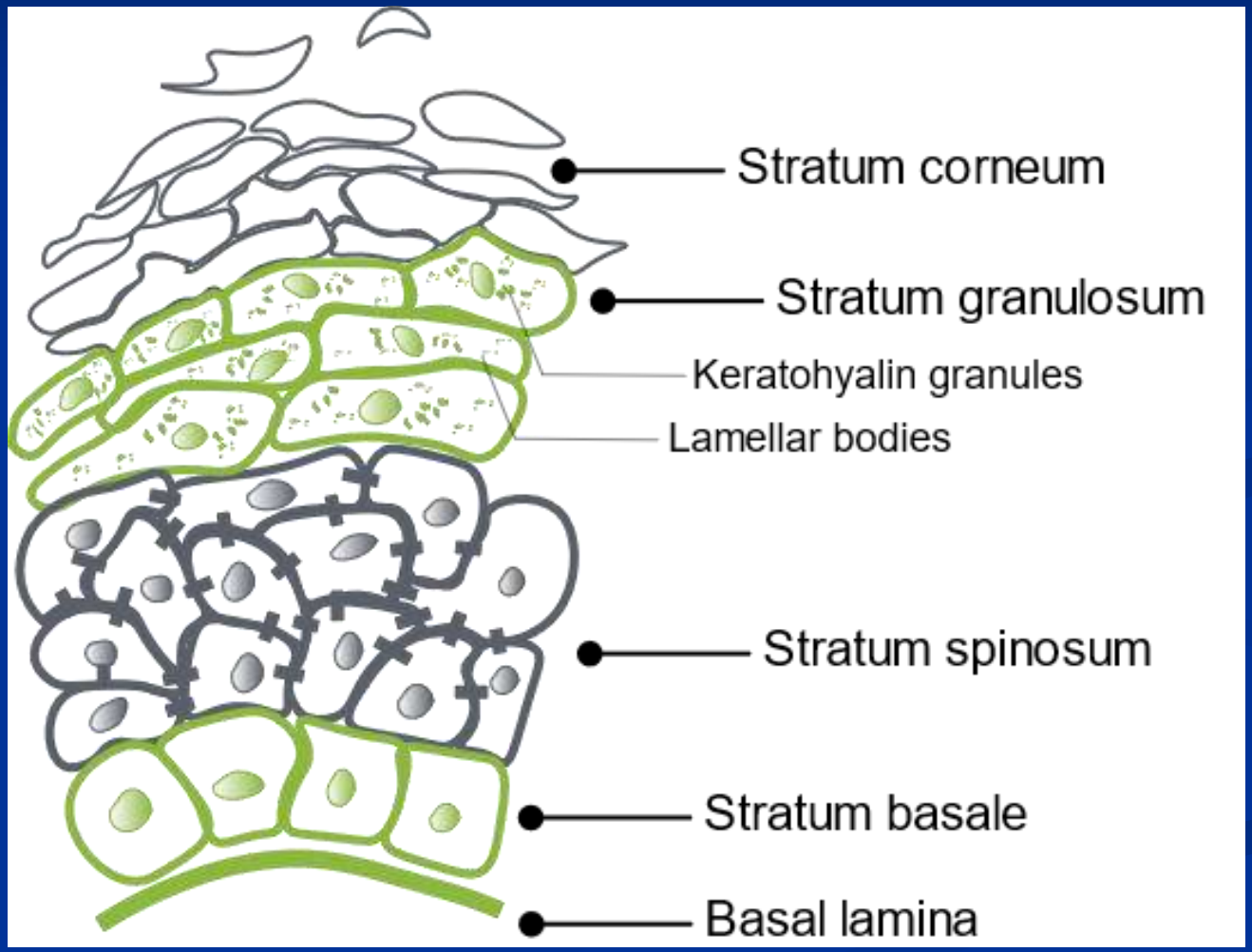
- Modified lysosomes
- 0.25µm in length.
- Rich in phospholipids.

- Structure - layers of parallel lamellae, probably originating from golgi apparatus.
- Lamellar granules discharge their contents - permeability barrier.

ODLAND BODIES/ KERATINOSOMES

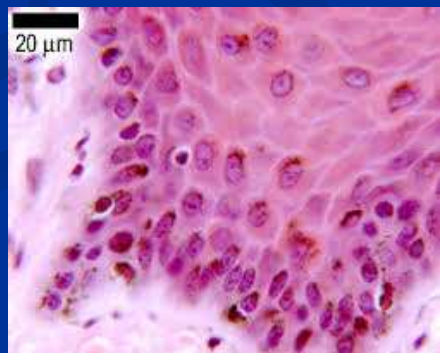
- Lamellar granules secrete their contents in to the intercellular spaces forming a intercellular lamellar structure.
- This contributes to the permiability barrier.
- This barrier forms at the junction of granular and cornium layer.

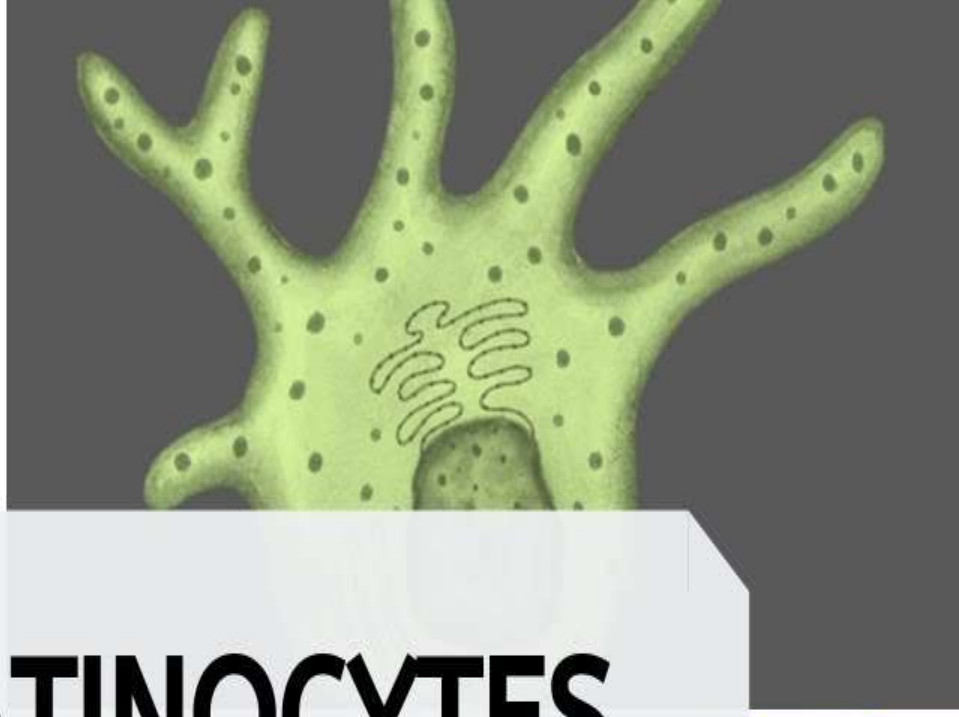
Odland bodies



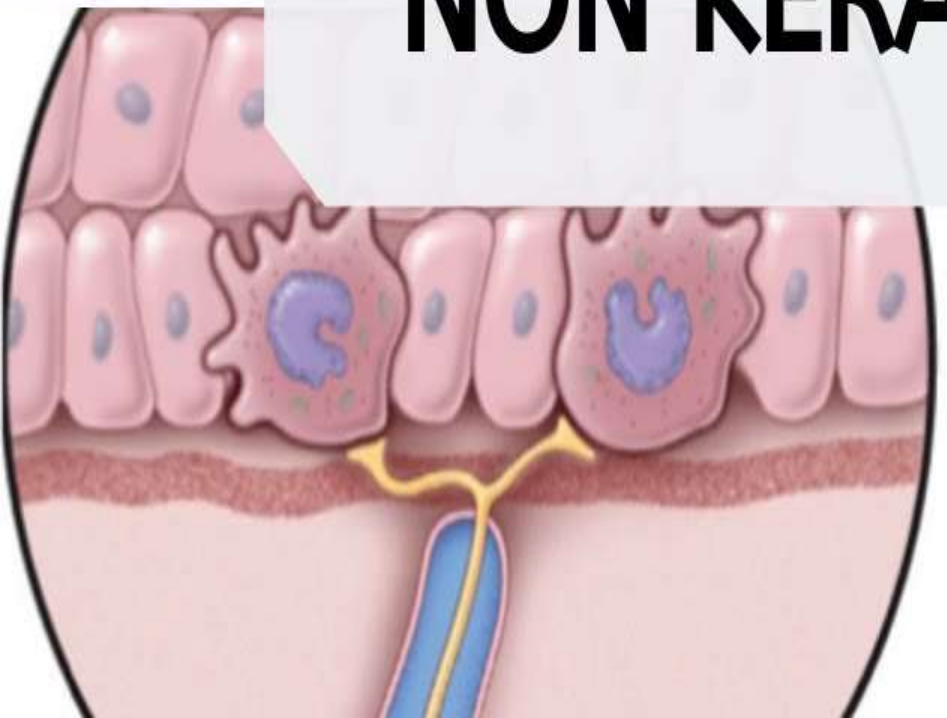
Non- keratinocytes.

- Oral epithelium in many areas contain cells that differ in appearance from other epithelial cells.
- Lack desmosomal attachment to adjacent cells Hence During histologic processing, Cytoplasm shrinks around the nucleus To produce--------- Clear cell
- None of these cells contain the large numbers of tonofilaments and Desmosomes seen in epithelial keratinocytes and none participates in the process of maturation seen in epithelial.
- They are called as --- Non keratinocytes



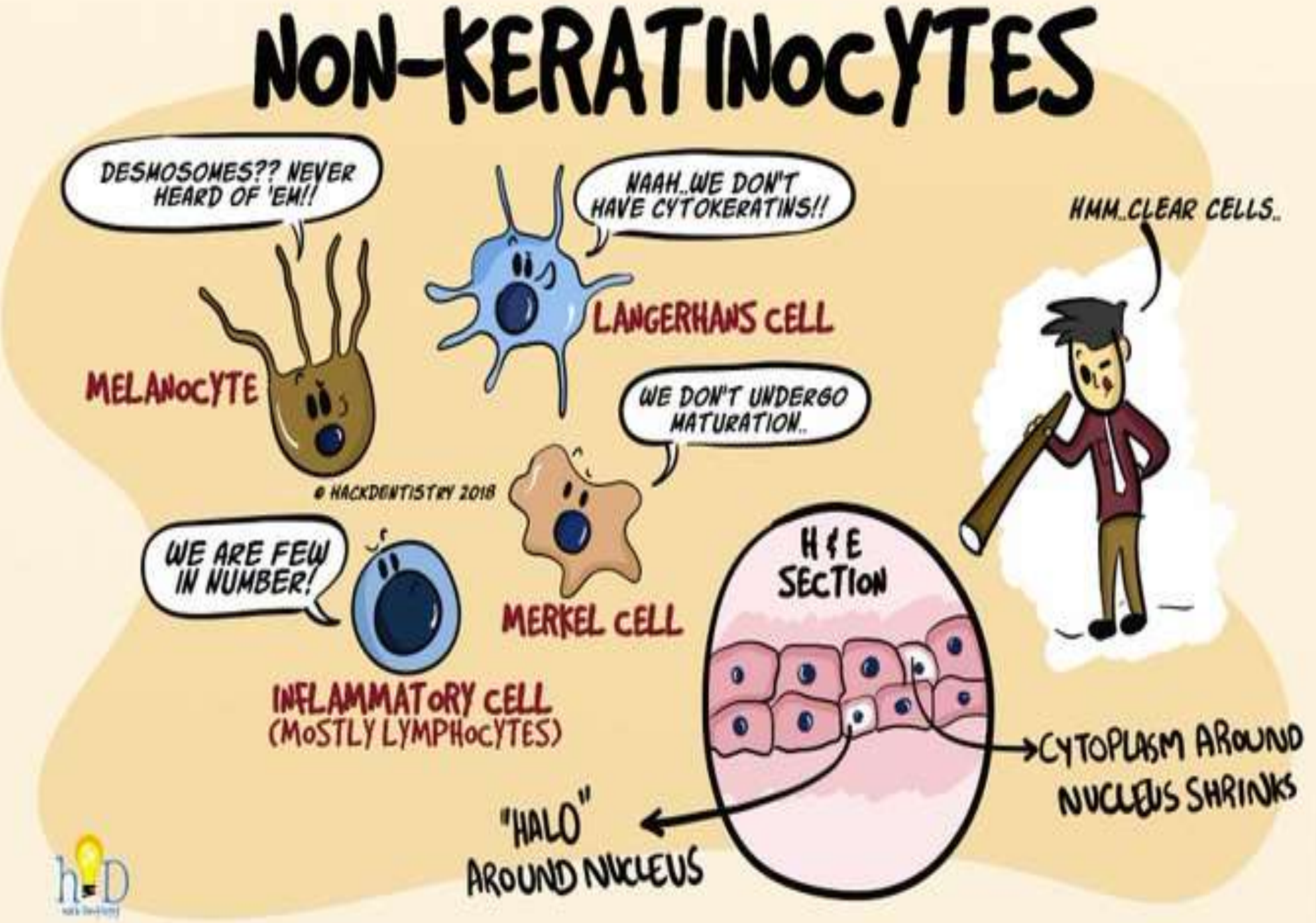


NON KERATINOCYTES

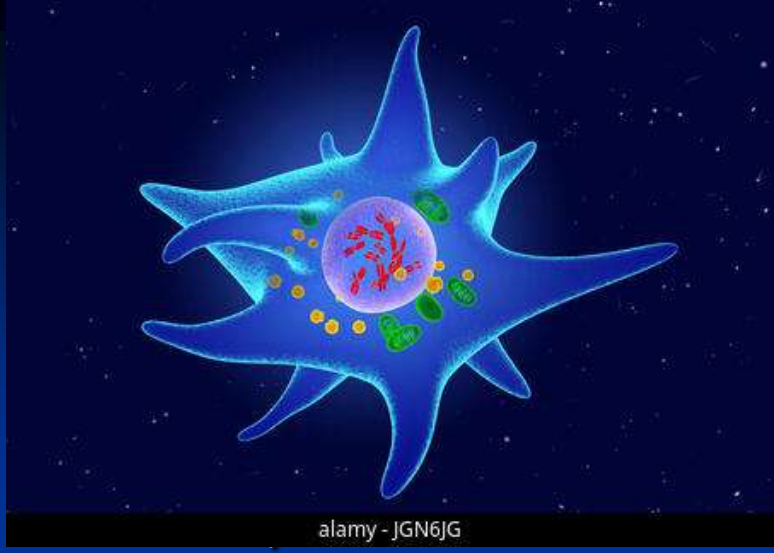



20 µm

NON-KERATINOCYTES

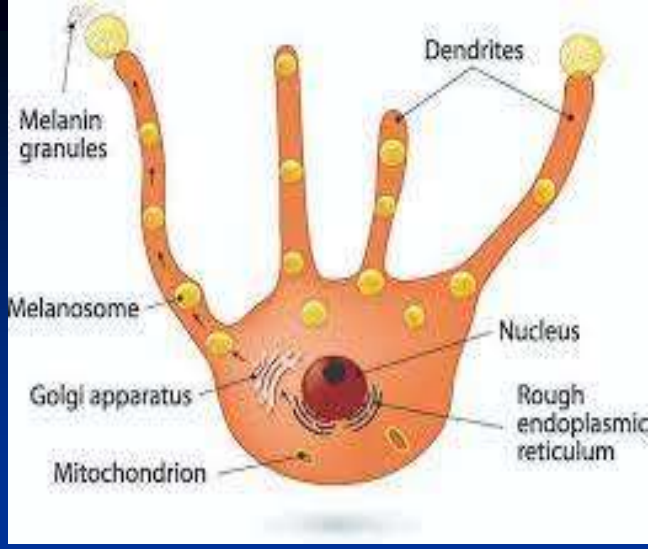


Langerhan's cells:

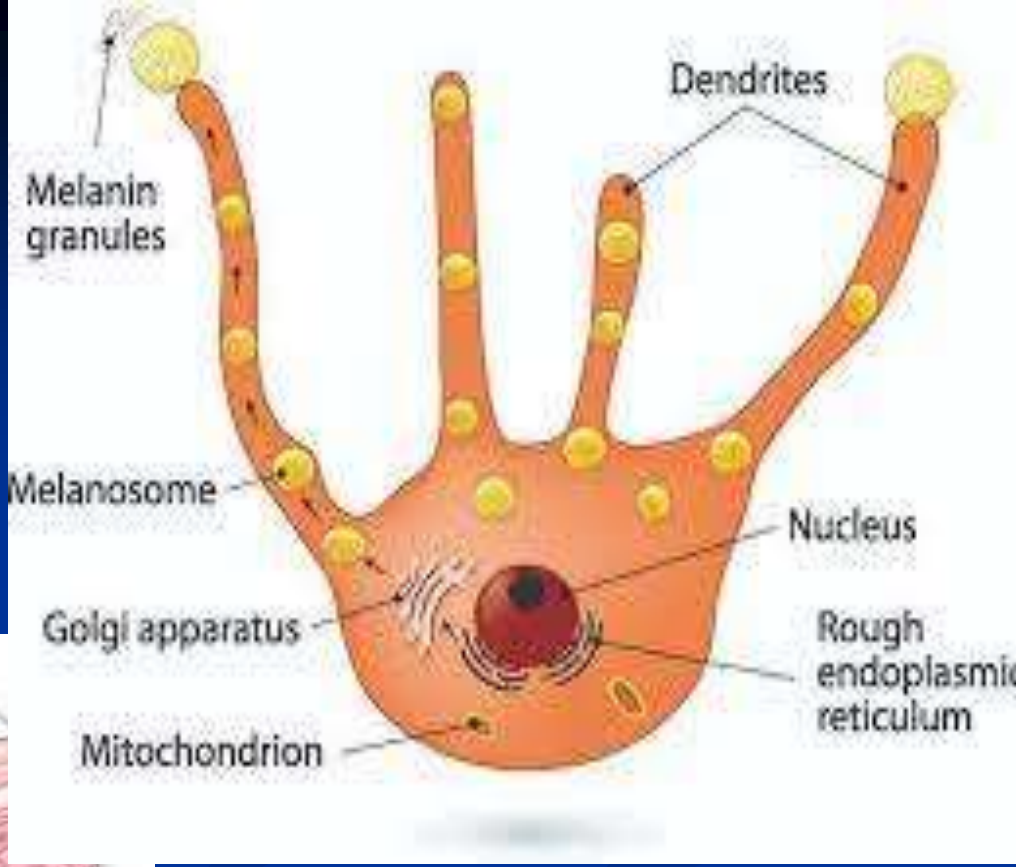


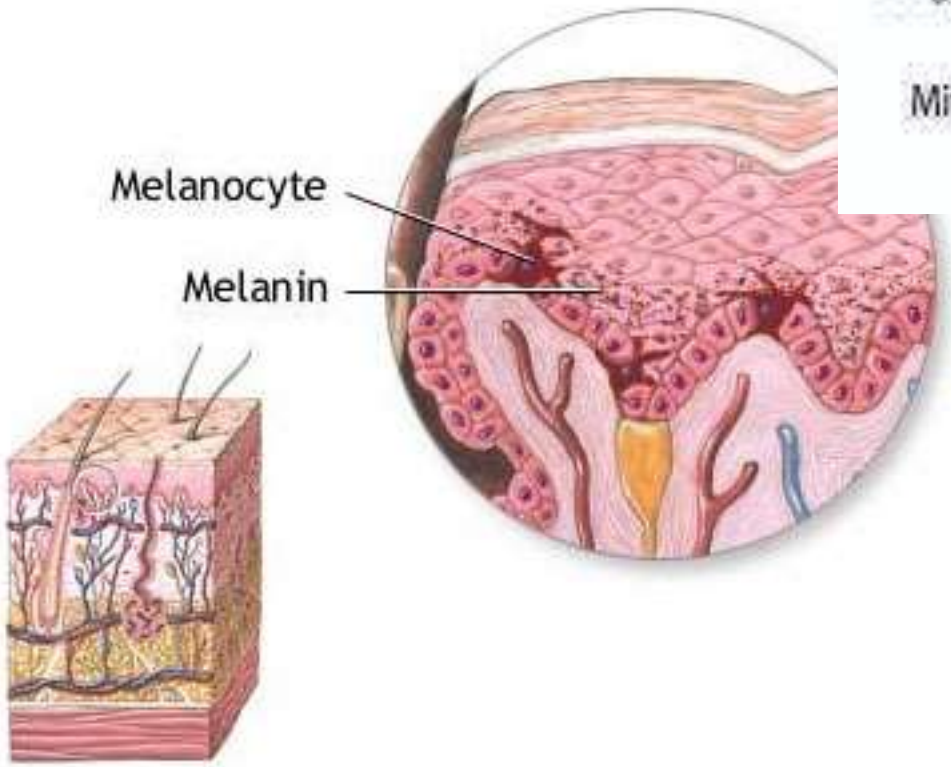
- Location: Supra basal.
- Function: Antigen trapping and processing
- Description: Dendritic cell
- ~ Lack desmosomal attachments
- ~ Characterized ultra structurally by a small rod or flask shaped granules sometimes called — **Birbeck granules.**
- They may be capable of limited division with in the epithelium.

Melanocytes:

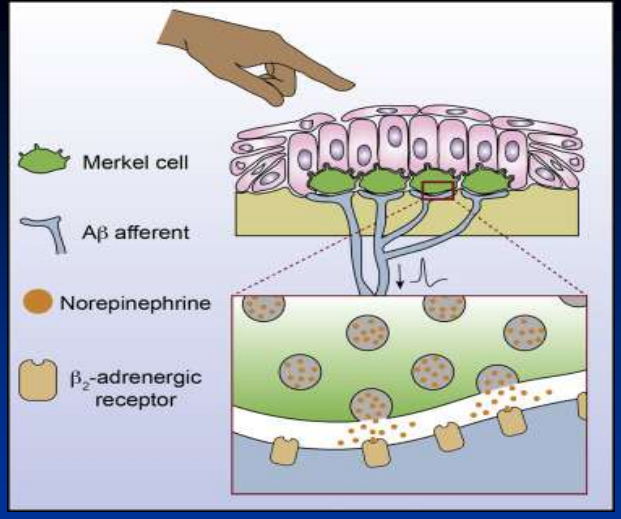


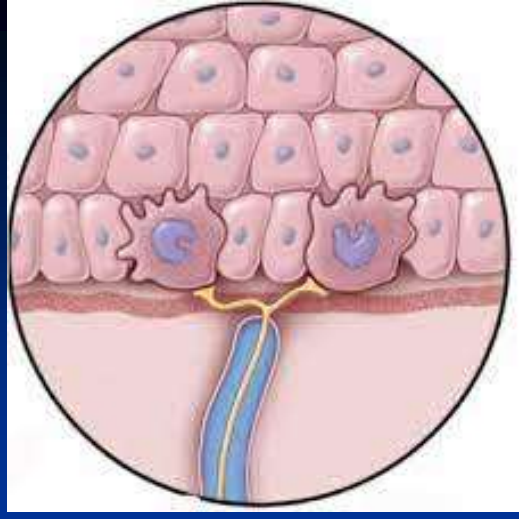
- Origin: Neural crest cytoderm.
- Function: Produce Melanin — Pigment.
- Description: They are present predominantly at Basal layer of epithelium.
- ~ They lack desmosomes and tonofilaments but have Long dendritic processes that extend between keratinocytes.
- ~ **Melanin** — synthesized with in the Melanocytes as small structures called — Melanosomes. Injected Into cytoplasm of adjacent keratinocytes by the dendritic processes of Melanocytes.


Dendrites
Melanin granules
Melanosome
Nucleus
Golgi apparatus
Rough endoplasmic reticulum
Mitochondrion


Melanocyte
Melanin

Merkel Cell:





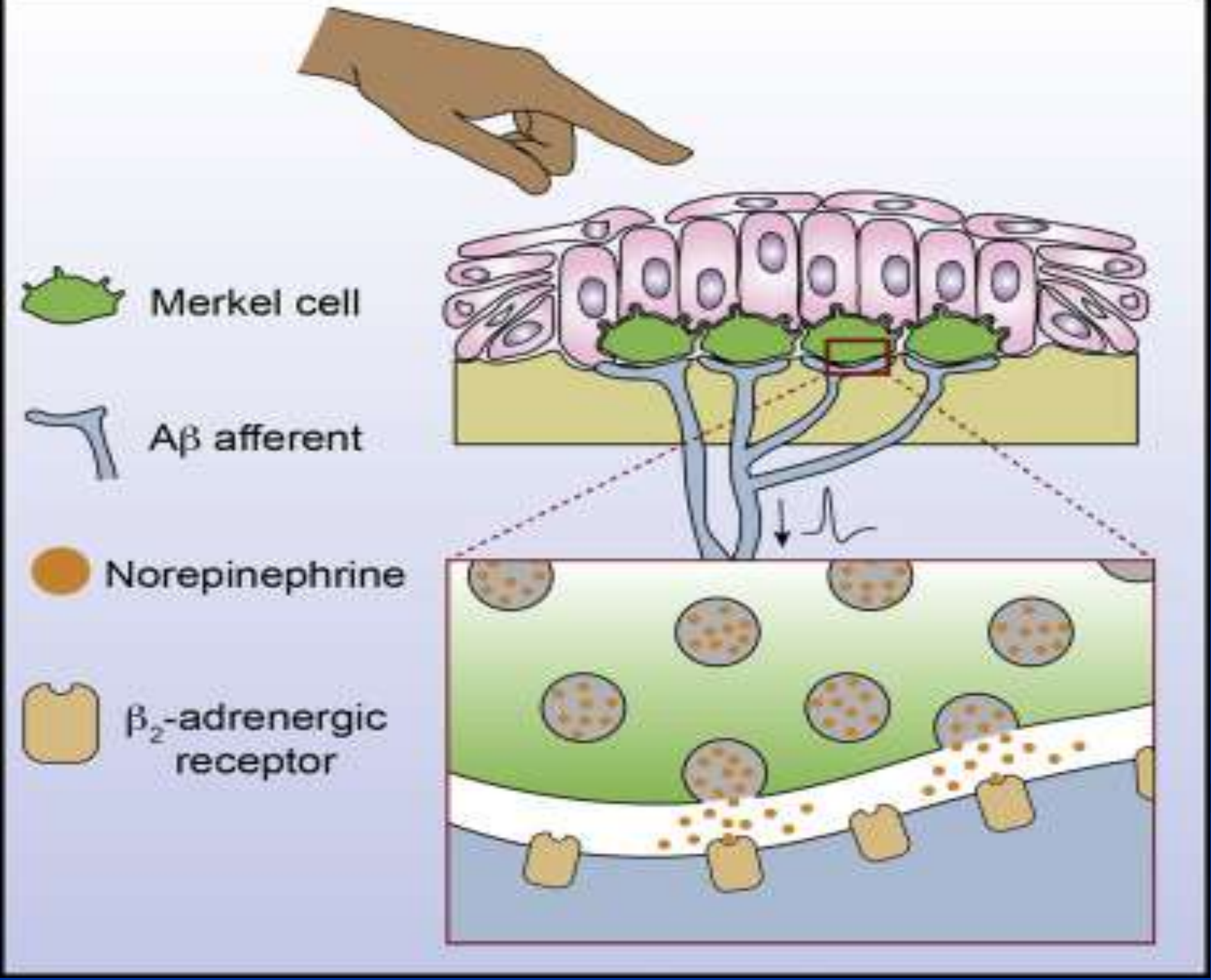
- Location: Basal layer.
- Function: Tactile sensory cell.
- Description: Unlike Melanocytes and Langerhan's cells it is not dendric.
- It does not contain tonofilaments and presence of occasional desmosomes linking to adjacent cells—hence not always clear cell.

- It has nerve tissue immediately adjacent.
- It is presumed to be "Specialised neural pressure-sensitive receptor cell"
- Responds to touch sensation.

- ***Characteristic features:***
- Small membrane bound vesicles in the cytoplasm

Sometimes situated adjacent to nerve fiber associated with the cell

- These granules many liberate Transmitter substance
- Across synapse like function between Merkel cell and Nerve fiber--- trigger an impulse
- These cells may arise from division of an epithelial cell (Keratinocyte).


Merkel cell
Aβ afferent
Norepinephrine
β2-adrenergic receptor

Inflammatory cells:

- Function: Associated with inflammatory process in Oral Mucosa.
- Description: Sections of normal Oral inflammatory cells often in the nucleated cell layers.
- ~ These cell — transient & do not reproduce themselves in the Epithelium
- ~ The cell most frequently seen is
- ~ Lymphocyte occasionally PNM and mast cells can also be seen
- ~ Lymphocytes — often associated with Langerlan's cells

Histology of Lip

- **Skin:** keratinized stratified squamous epithelium with adnexal skin structures

- **Oral Mucosa:** Moist-surface, covered by nonkeratinized stratified squamous epithelium associated with small round seromucous glands of the lamina propria. In thesubmucosa fibers of orbicularis oris muscle is noted.

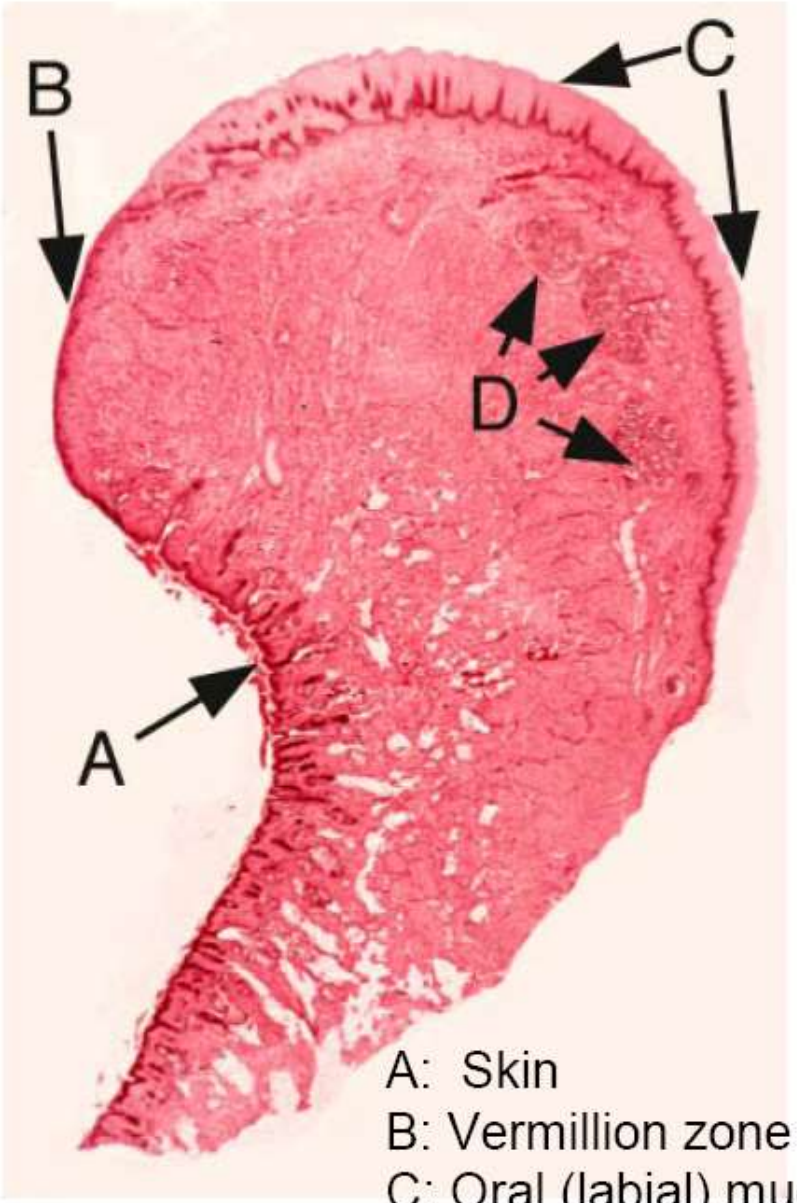
- **Vermillion zone:** Very thin keratinized epithelium that contains no adnexal skinstructures (can contain sebaceous glands)

- The Transitional zone between the Skin of the Lip and the Mucous Membrane of Lip is the **RED ZONE/ VERMILLION ZONE.**

- The line that separates the skin from the Vermillion zone- **VERMILLION BORDER**

- The skin on outer surface of Lip- moderately Thick keratinized epithelium with thick str. Corneum.
- CT Papillae few and short.

- Transitional Zone- midly keratinized epi with long CT papillae.
- Deep in to epi---- large capillary loops



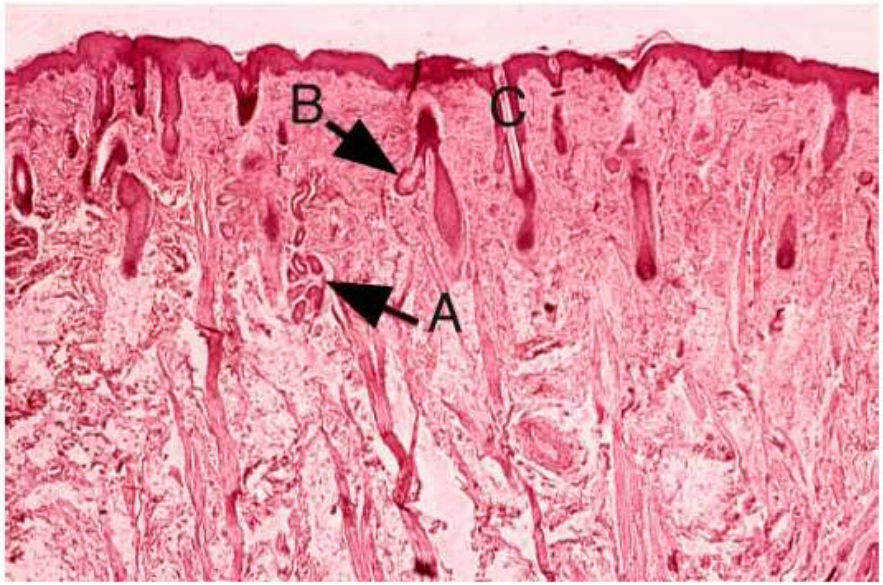
A: Skin
B: Vermillion zone
C: Oral (labial) mucosa
D: Minor salivary glands

http://dentistry.ouhsc.edu/intranet-WEB/Courses/CELL8002/Home.html

What gives the vermillion zone the red color?

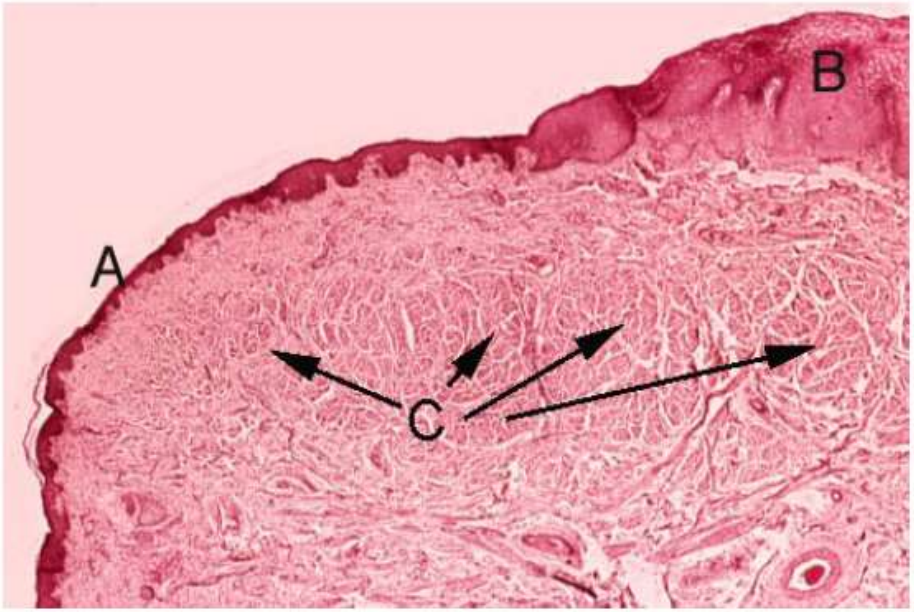
- 1.Epithelium is thin
- 2.Epithelium contains eleidin, which is transparent
- 3.Blood vessels are present near the surface

Skin of the Lip



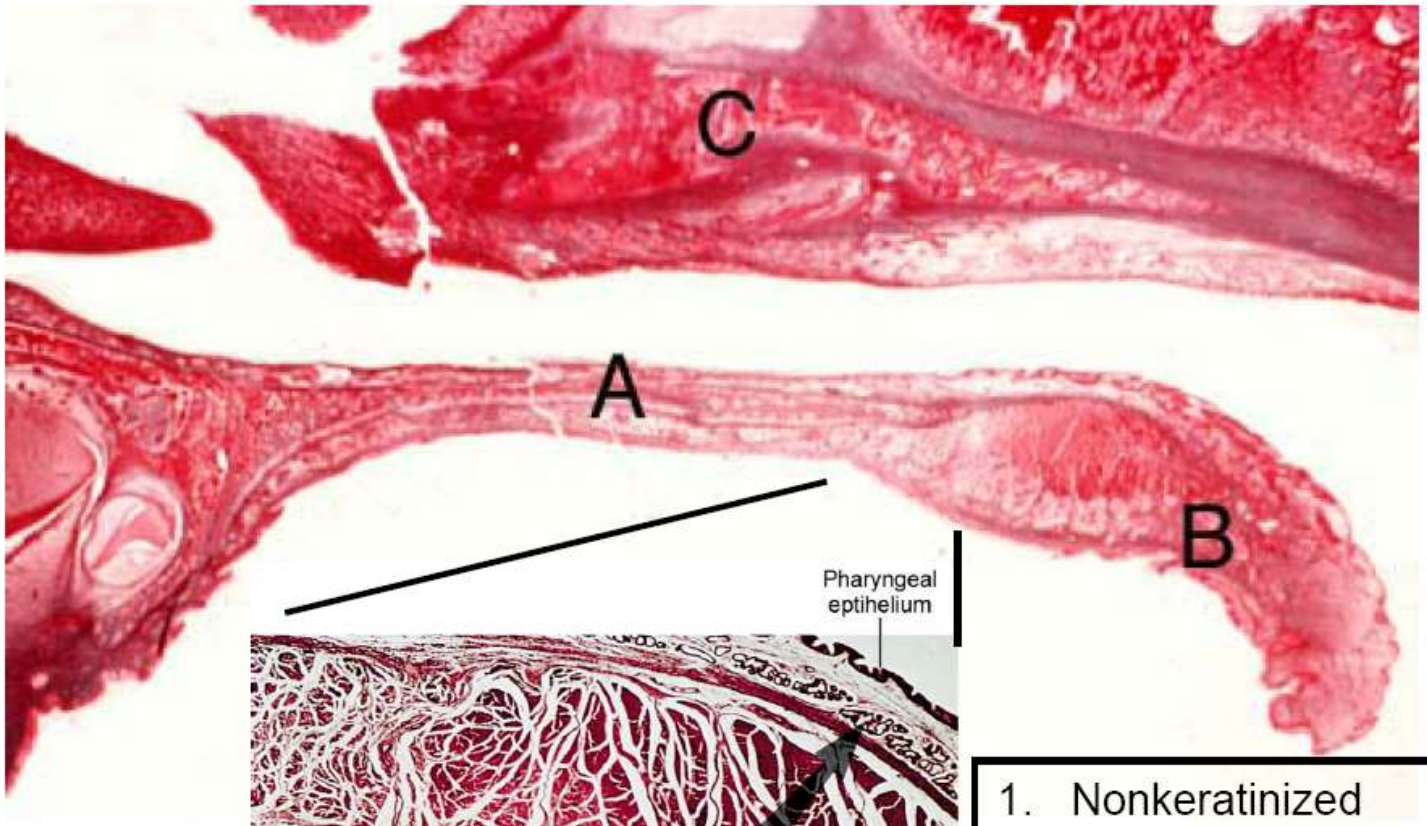
A: Sweat glands
B: Sebaceous glands
C: Hair follicles

Vermillion Zone and Labial Mucosa

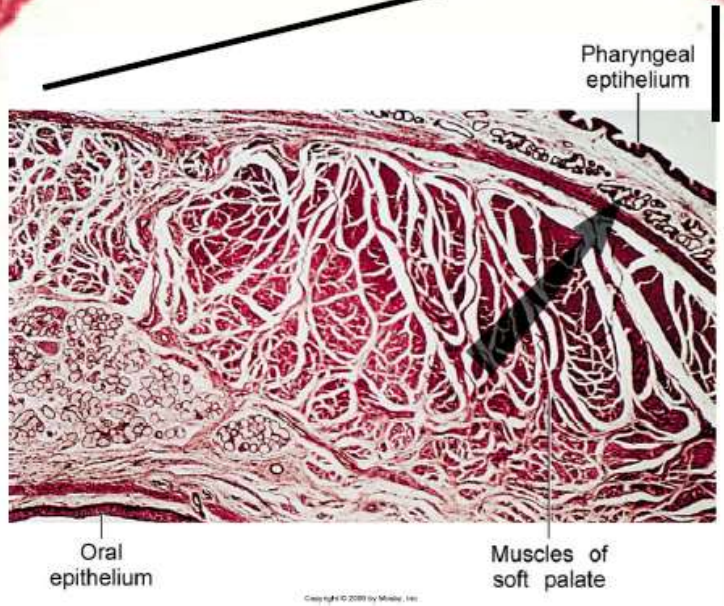


A: Vermillion zone
B: Labial mucosa
C: Orbicularis oris muscle

Soft palate



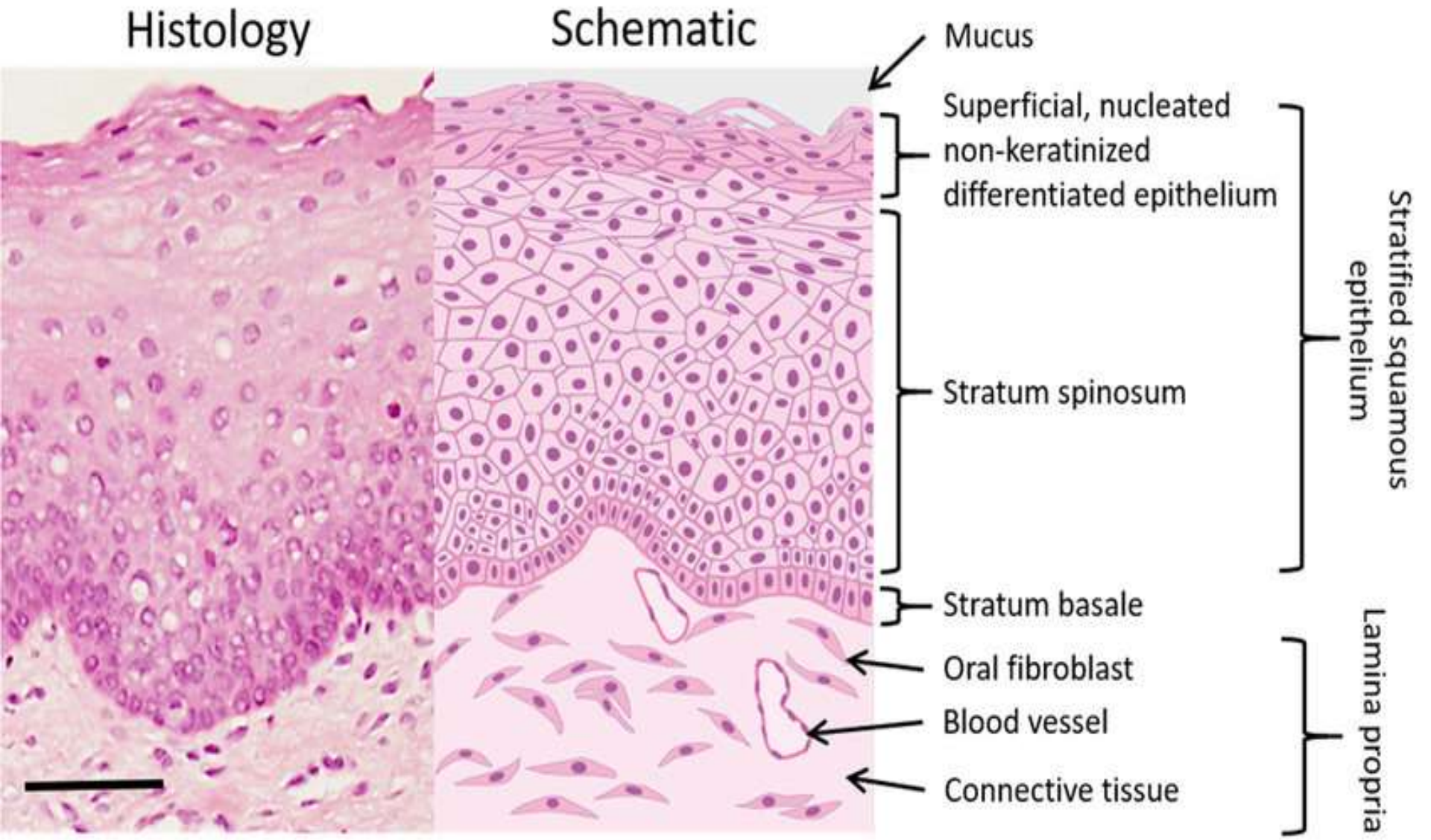
A: Hard Palate
B; Soft palate
C: Nasal cavity

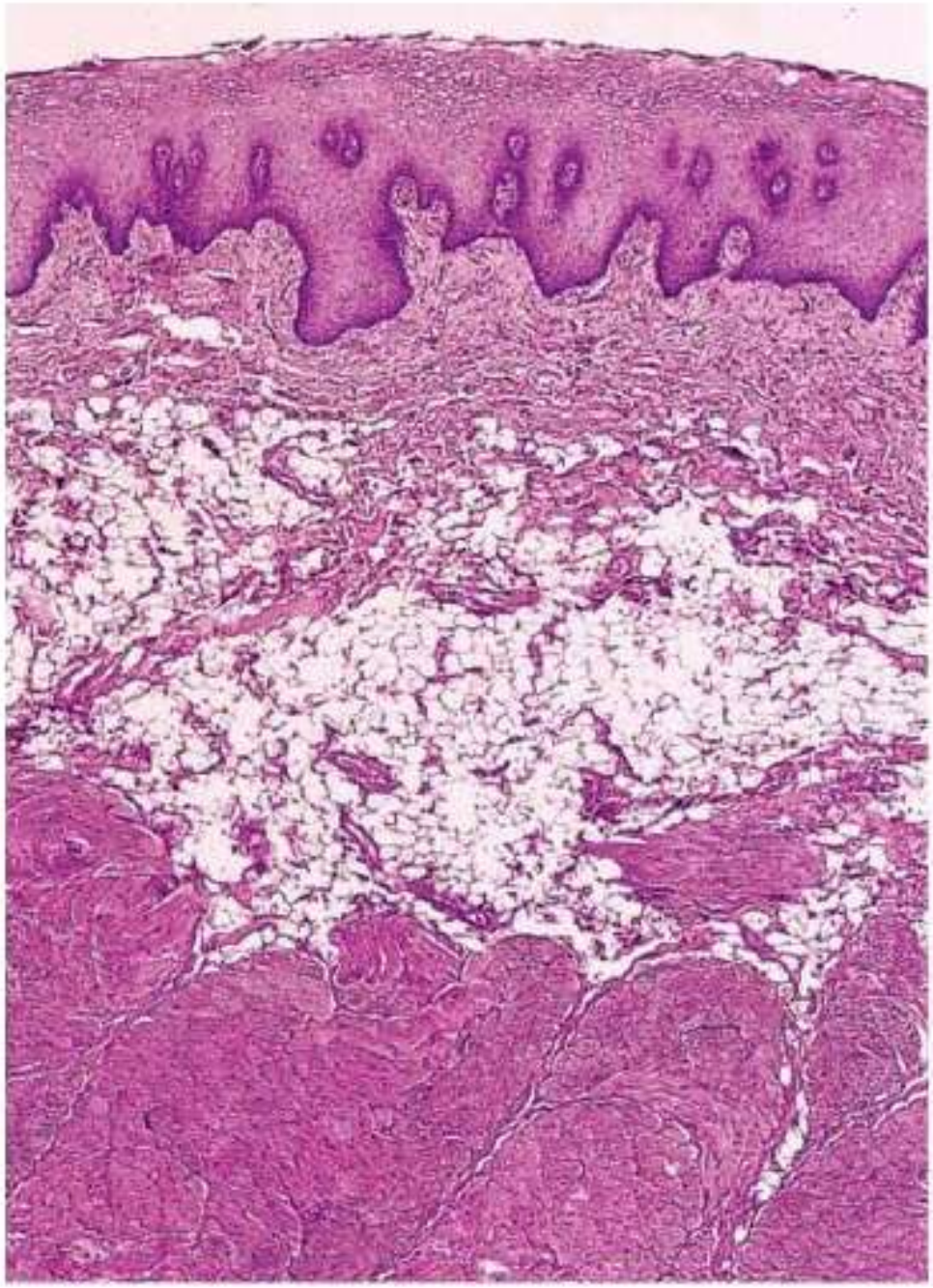


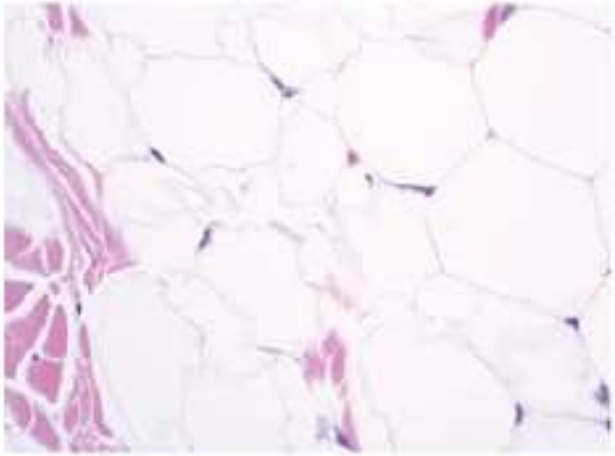
1. Nonkeratinized
2. Highly vascularized so more pink than hard palate
2. Lamina propria and submucosa present (unlike hard palate when only lamina propria is noted – mucoperiosteum)
3. Submucosa contains salivary glands and muscle soft palate

http://dentistry.ouhsc.edu/intranet-WEB/Courses/CELL8002/Home.html

Cheeks (Buccal Mucosa)







Cheeks (Buccal Mucosa)

- Similar to lips and soft palate
- Non-keratinized stratified squamous epithelium, lamina propria and submucosa
- Submucosa of cheeks contain fat cells along with lobules of minor salivary glands and muscle fibers

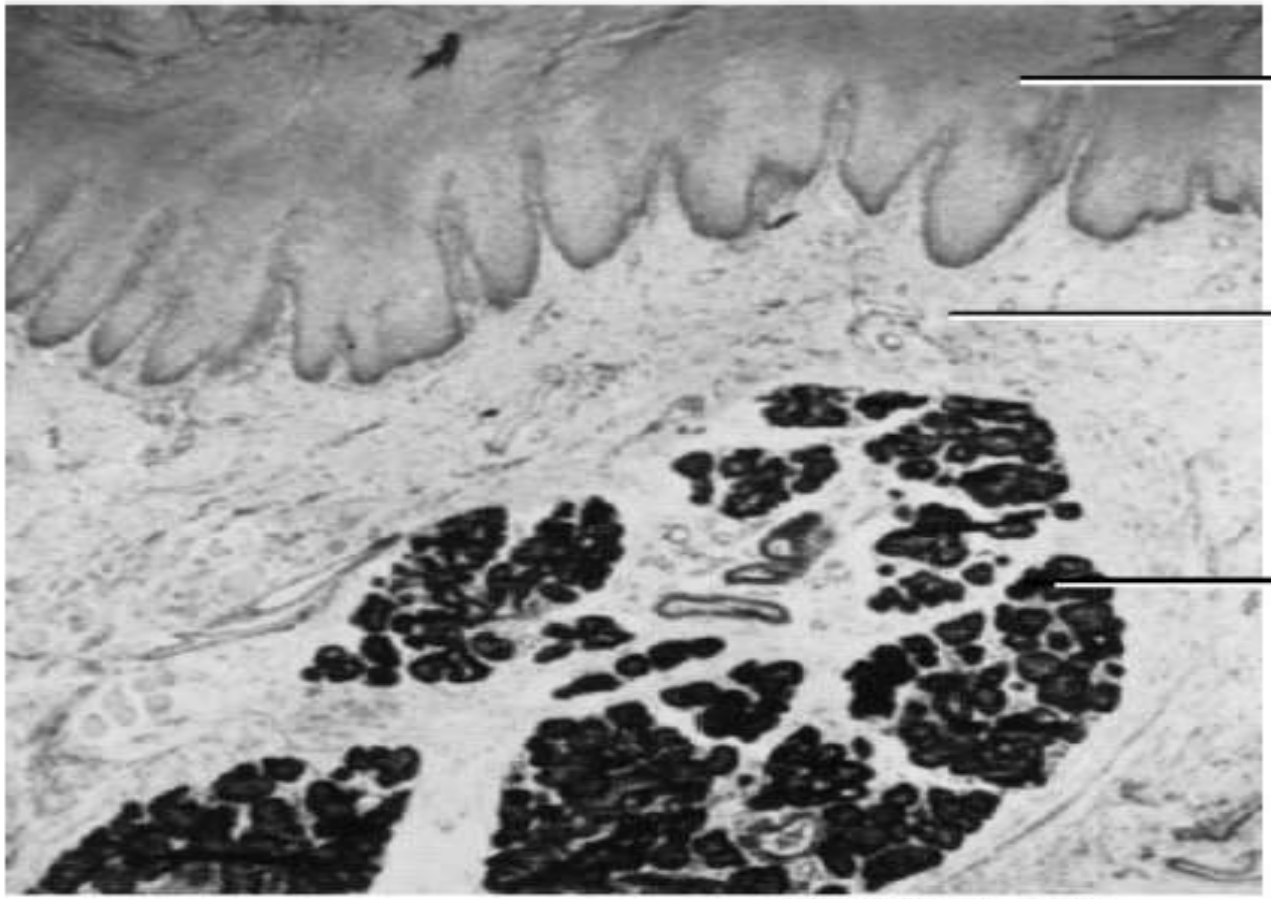
- The strands of dense connective tissue limit the mobility mucous membrane, holding it to the musculature and preventing the elevation between folds.

- This prevents mucous membrane of lips and cheeks from lodging between biting surfaces of teeth.

Ventral surface of tongue

- Nonkeratinized stratified squamous epithelium, lamina propria and submucosa
- Thin epi loosely attached to underlying structures– free mobility of tongue
- Extremely dense muscle fibers
- interlacing connective tissue fibers in submucosa

Floor of mouth



Nonkeratinized stratified squamous epithelium, lamina propria and submucosa

Epithelium is loosely attached to lamina propria

No muscle

Masticatory Mucosa

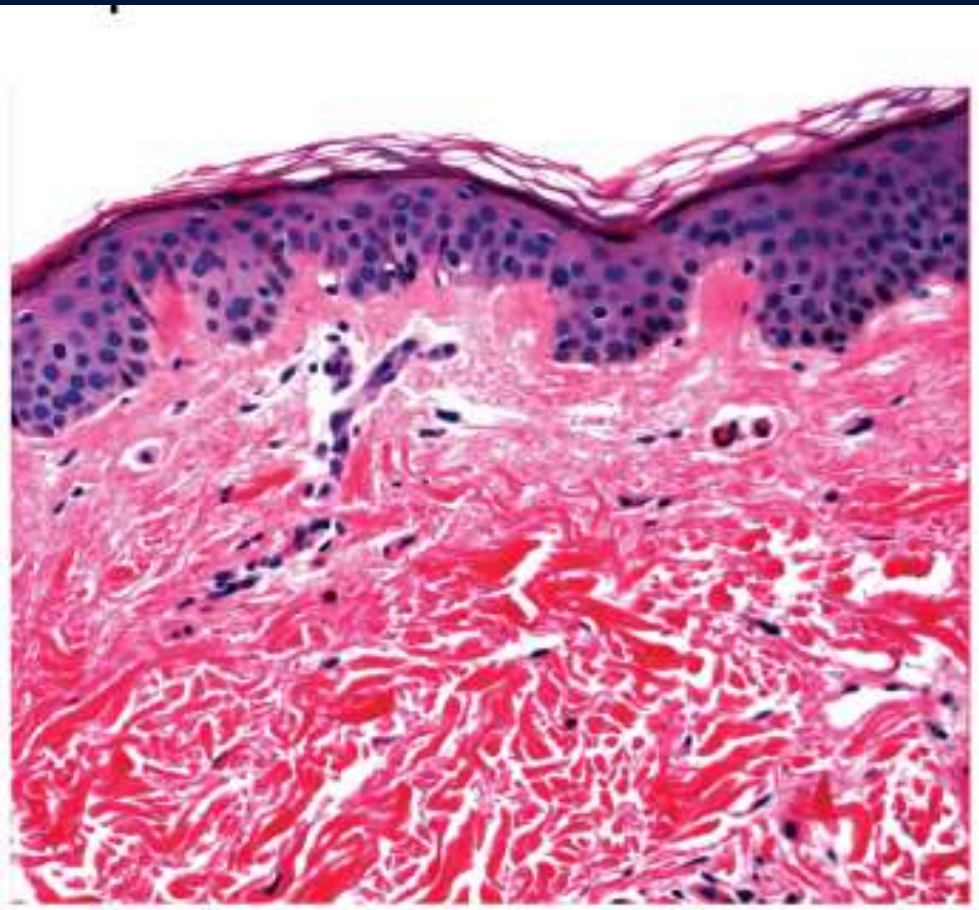
- Epithelium that covers gingiva and hard palate
- Mucosa is thicker than nonkeratinized because of the keratin layer

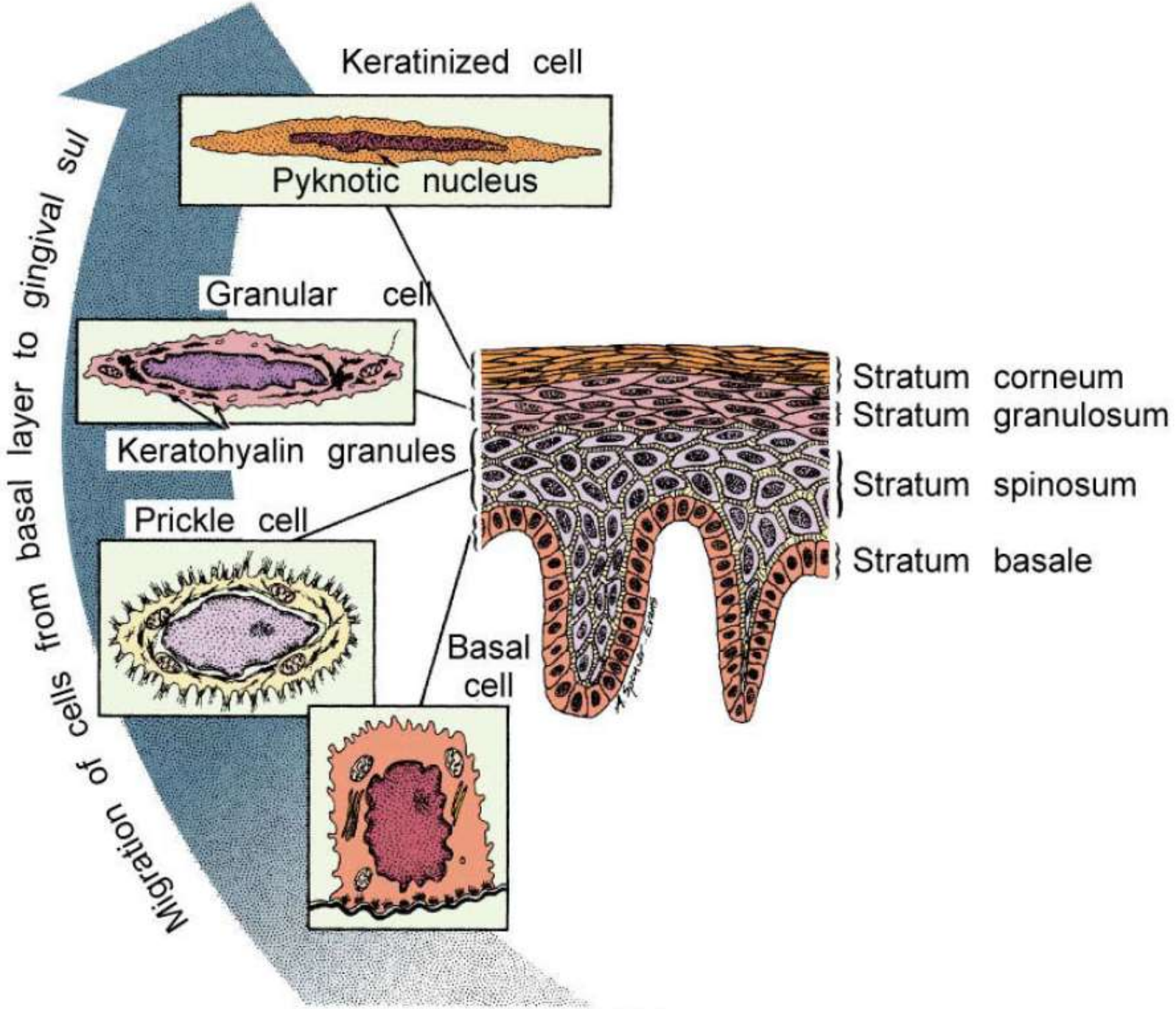
- **Stratum basale-**Same as nonkeratinized epithelium

- **Startumspinosum-**Same as nonkeratinized epithelium

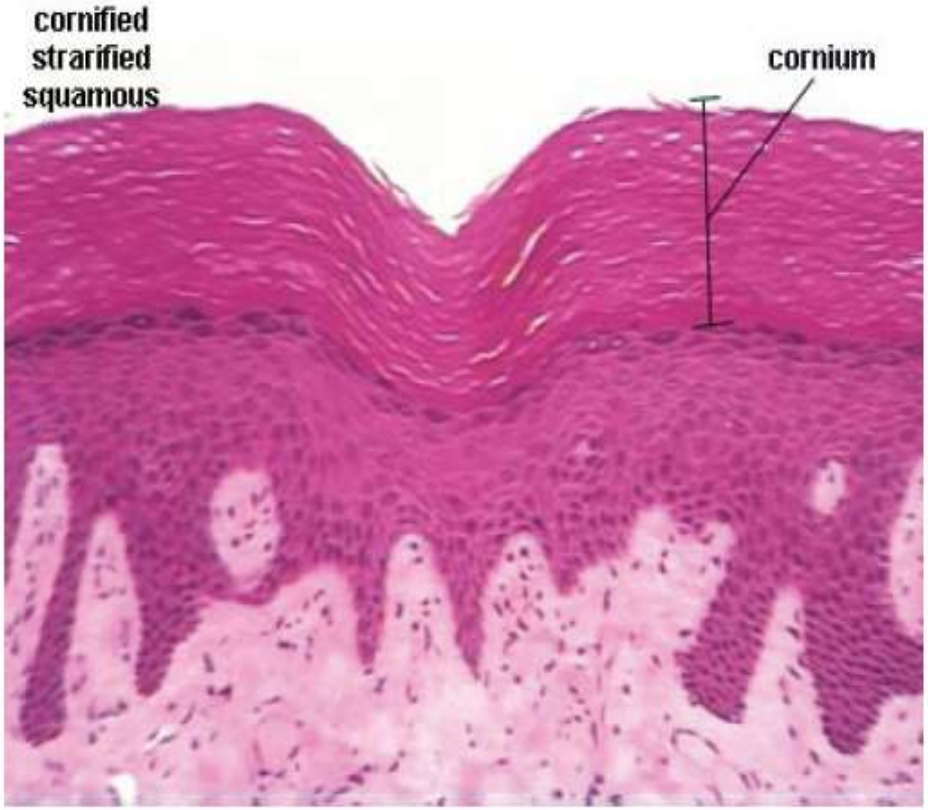
- **Stratum granulosum:** Cells contain keratohyaline granules

- **Stratum corneum :**Contains thin, flat and non nucleated cells which are filled with keratin. In contrast to the hard keratin seen in nails and hair, keratin overlying normal masticatory oral mucosa is soft. Keratin is tough, nonliving material tha tis resistant to friction and impervious to bacterial invasion. Same as nonkeratinized epithelium

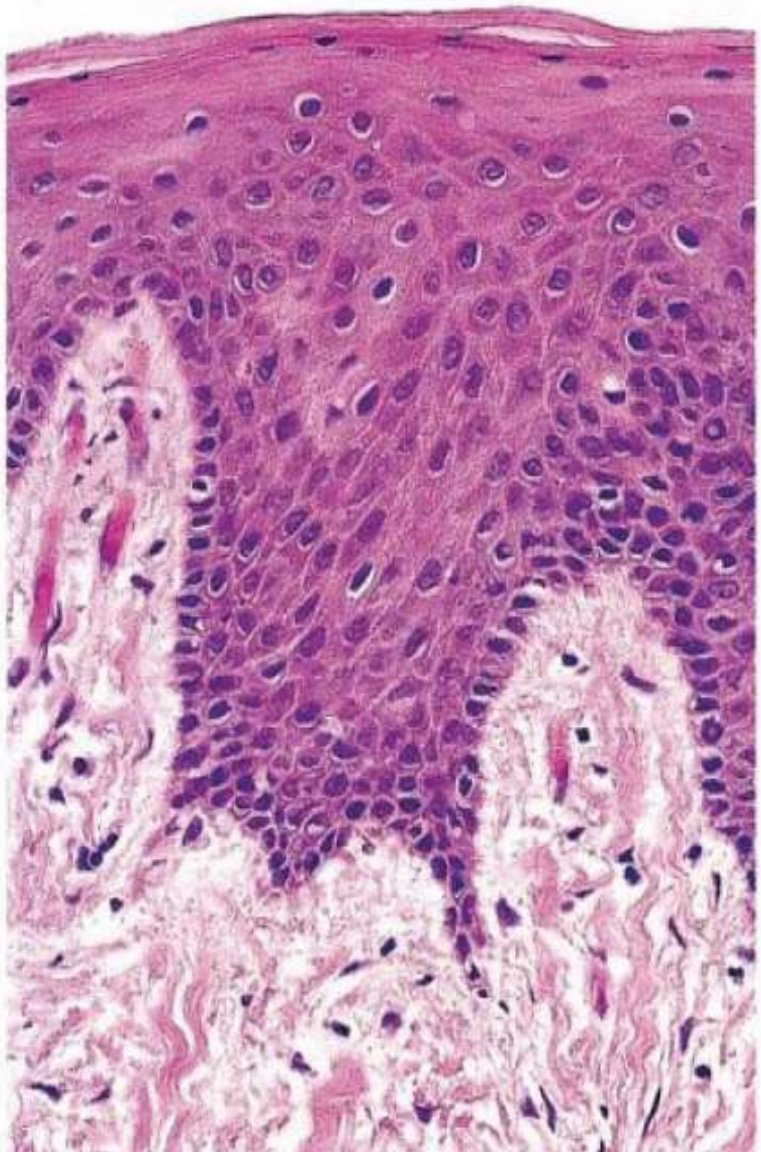




Types of Keratinized Epithelium



Miller SE. Histology for Pathologists. 3rd edition. LWW. 2007

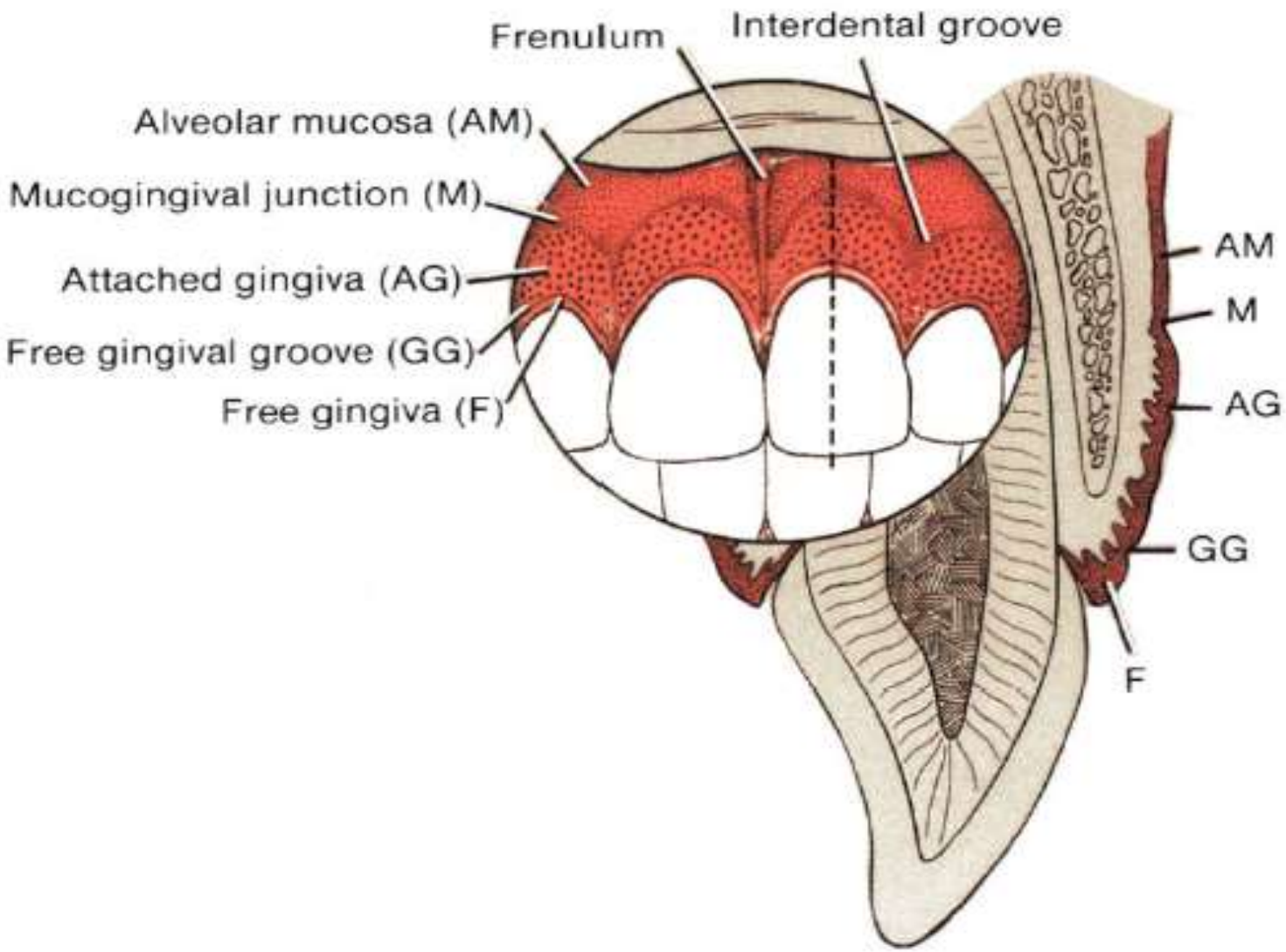


- **Epithelium--** The superficial cells are dead but retain the nucleus in parakeratinized epithelium but the nuclei are lost in orthokeratinized epithelium

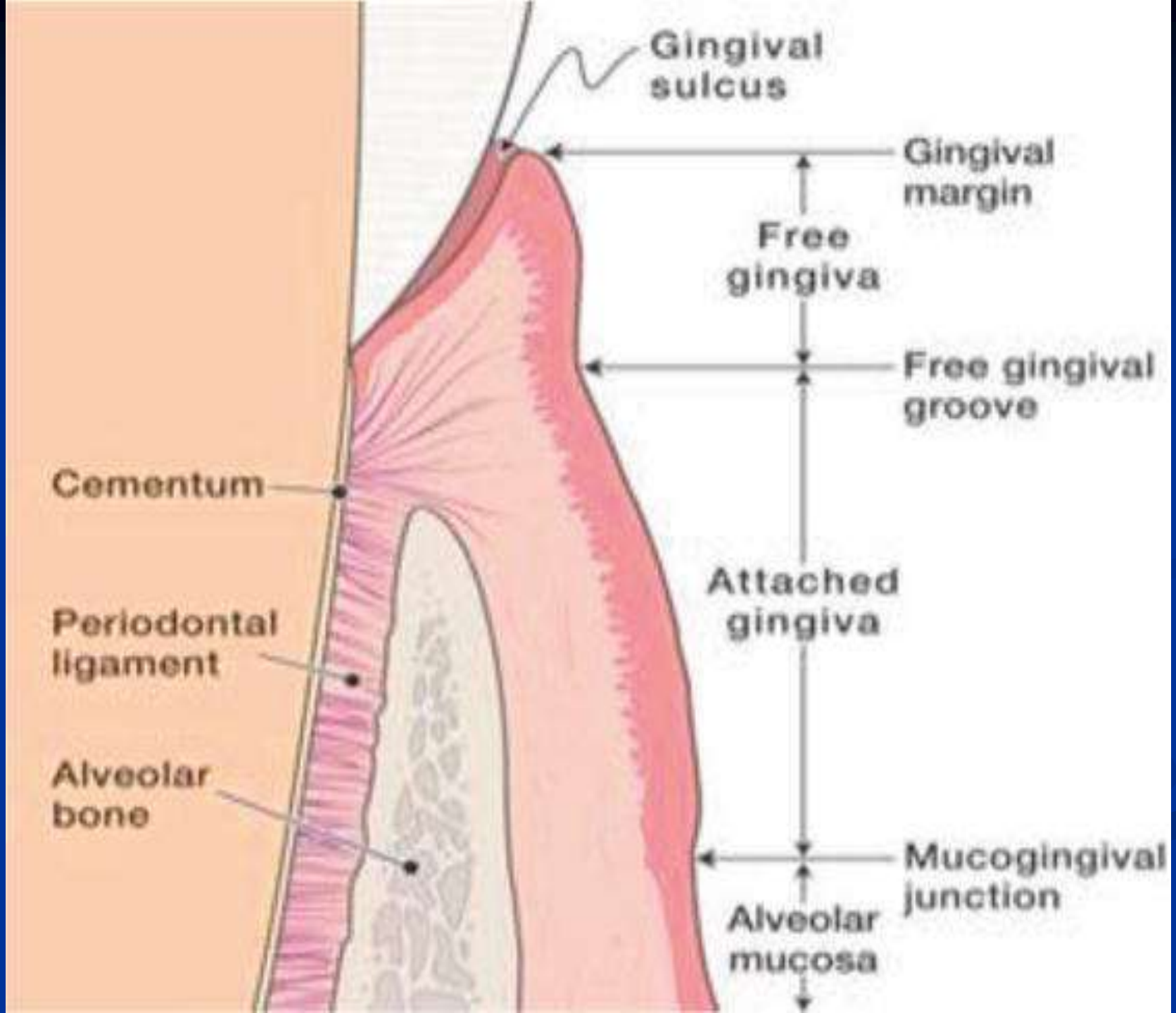
- The rete pegs are long and slender in keratinized epithelium

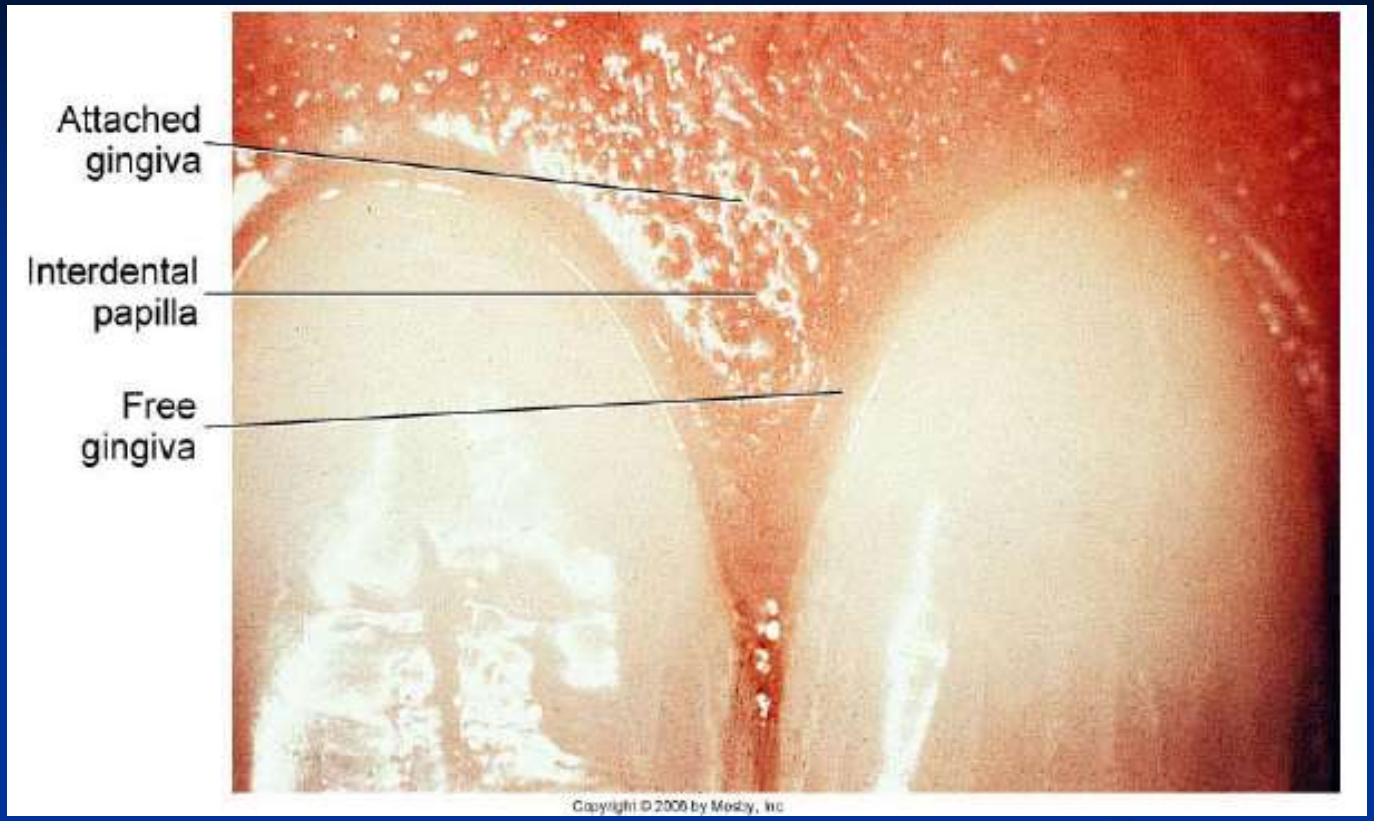
- Mucoperiosteum

Gingiva and Epithelial Attachment




ALVEOLAR MUCOSA
ATTACHED GINGIVA
MUCO GINGIVAL LINE
MARGINAL GINGIVA
MARGINAL GINGIVA
Interdental gingiva
Science Mank


Gingival sulcus
Gingival margin
Free gingiva
Free gingival groove
Cementum
Attached gingiva
Periodontal ligament
Alveolar bone
Mucogingival junction
Alveolar mucosa



Free or marginal gingiva

Attached gingiva attaches with the neck of the tooth by means of junctional epithelium

STIPPLING

- Functional adaptation to mechanical forces
- Healthy gingiva

Histology of Gingiva

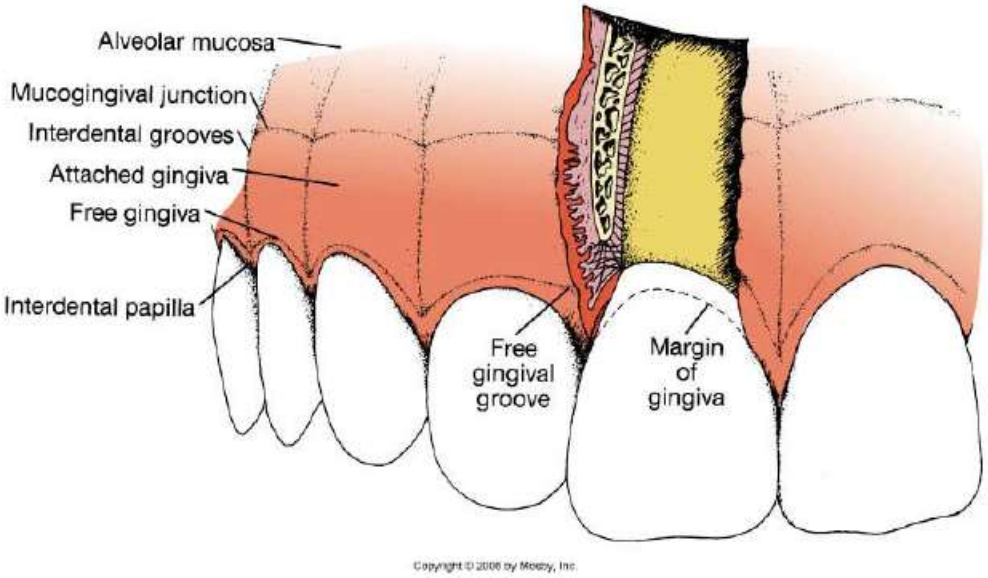
- Thick (250 μm), either orthokeratinized or parakeratinized stratified squamous epithelium with a stippled surface
- In healthy attached gingiva "stippling"is seen which appears as small pits in the epithelium and are due to deep retepegs.
- The lamina propria is composed of long narrow papillae which are not highly vascular.
- No distinct submucosa is noted as the overlying mucosa is directly attached to the underlying periosteum and cementum by collagen fibers

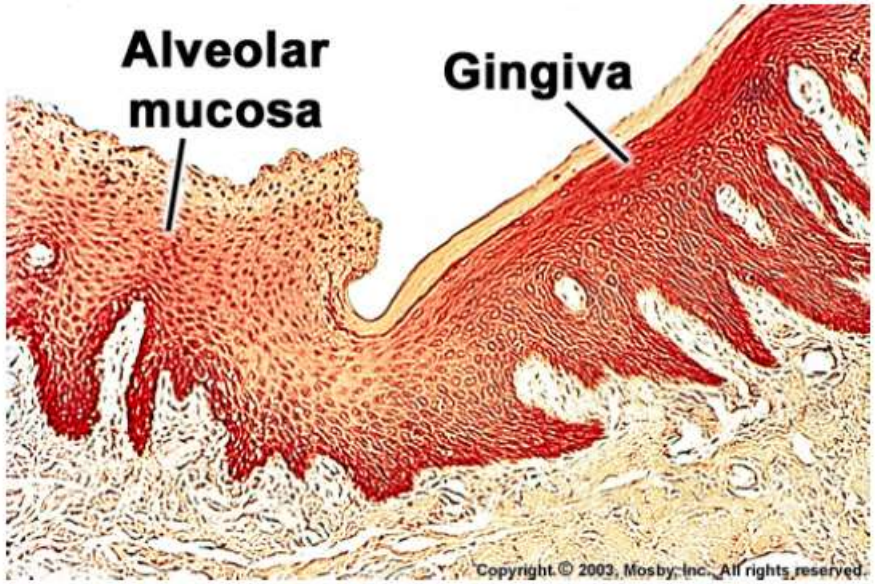
- **Free Gingiva:**

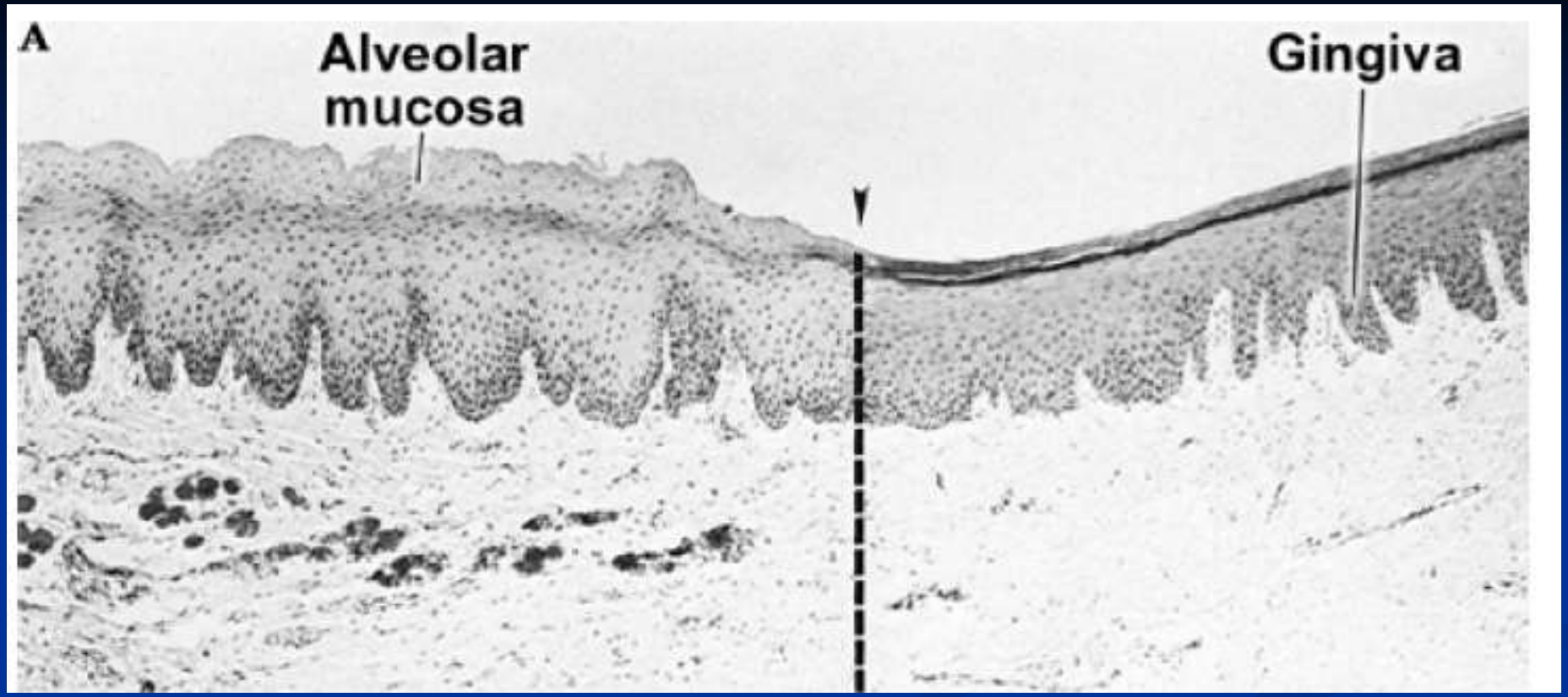
  Keratinized; NOT STIPPLED; bound on inner margin by the gingival sulcus, which separates it from the tooth; bound on its outer margin by the oral cavity; and apically by the free gingival groove.

- **Attached Gingiva:**

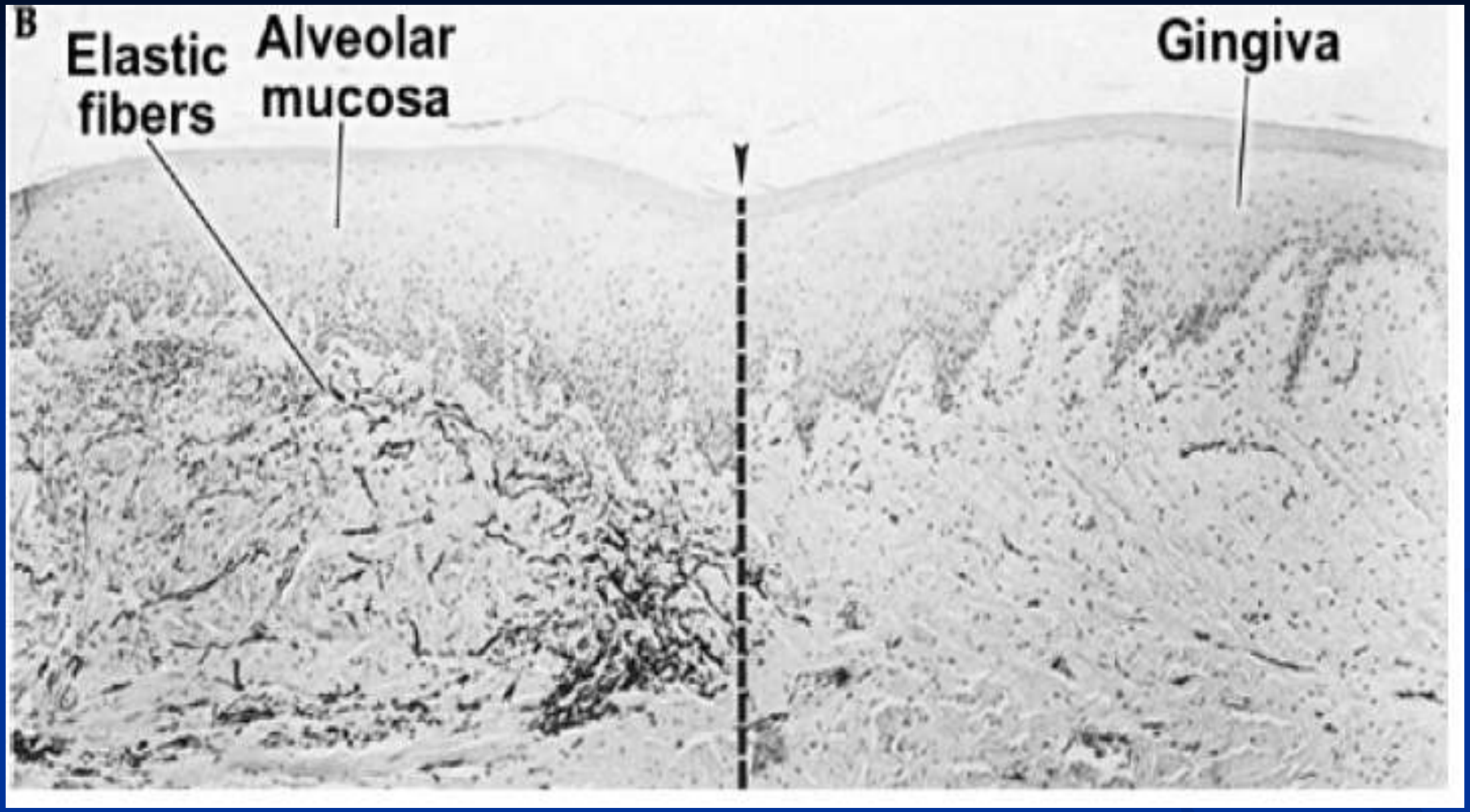
  Keratinized; STIPPLED; separated from the alveolar mucosa by the mucogingival junction (groove). Attached to the tooth by junctional epithelium.



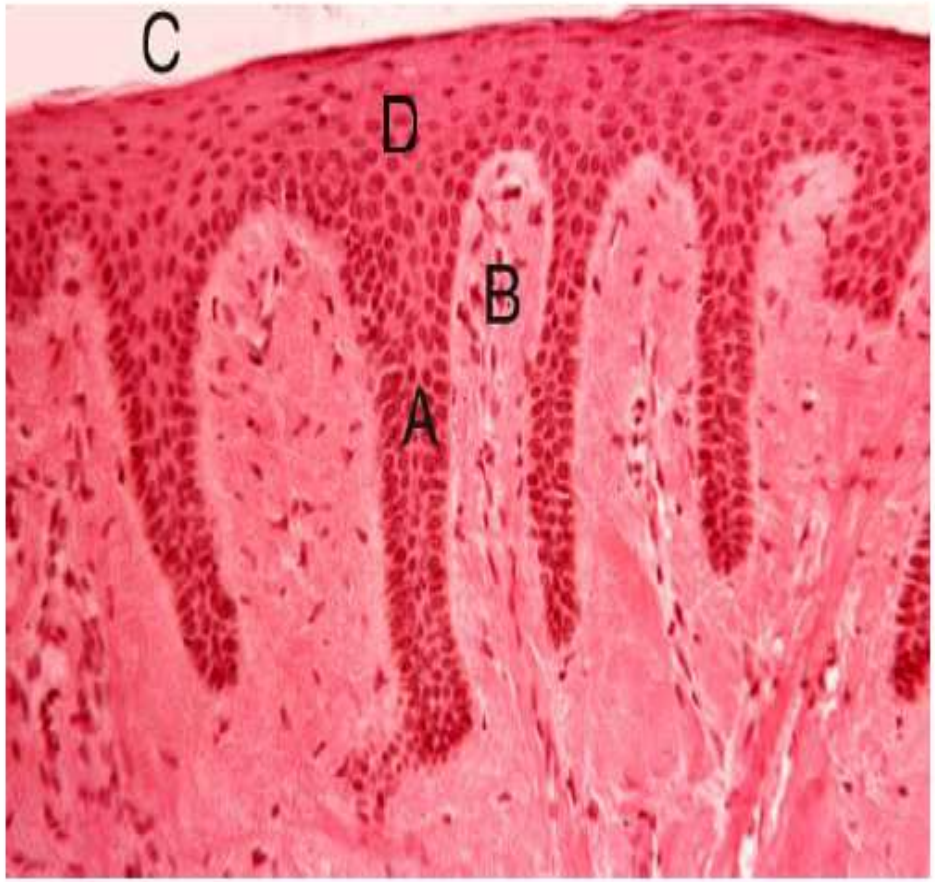


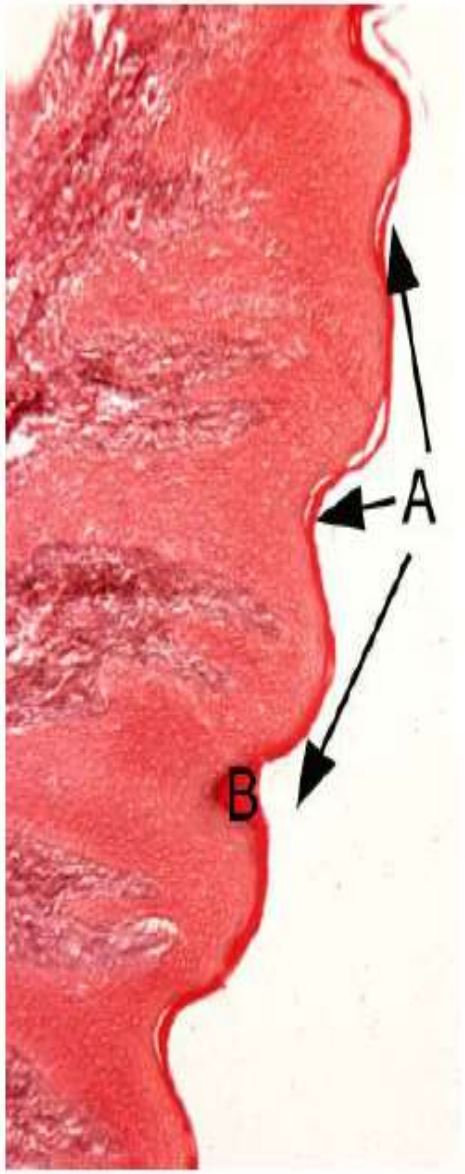


note the difference in keratinization, thickness of epithelium and ridge pattern.



stained with an elastic stain, note the presence o f elastic fibers in lamina propria in alveolar mucosa. Not much difference in the epithelium is seen between the two types of mucosa.





A: Rete pegs
B: Conective tissue papilla
C: Parakeratin
D: Spinous layer

- In healthy attached gingiva "stippling"is seen which appears as small pits in the epithelium and are due to deep retepegs.

- The lamina propria is composed of long narrow papillae which are not highly vascular.

- No distinct submucosa is noted as the overlying mucosa is directly attached to the underlying periosteum and cementum by collagen fibers

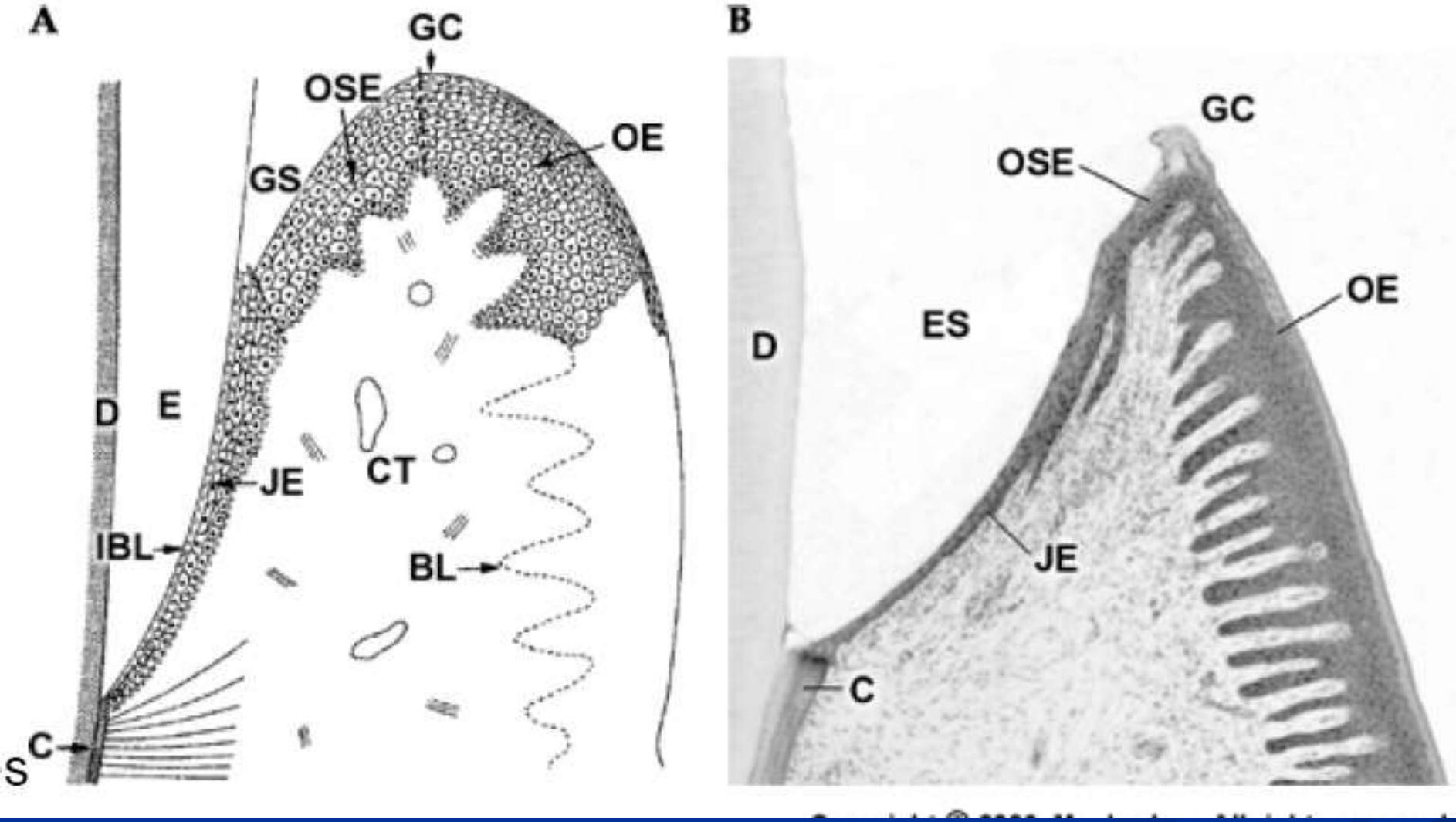
Dentogingival Junction and Junctional Epithelium

- Dentogingival junction is the region where the oral mucosa meets the surface of the tooth
- Very important because it is a weak area in the oral mucosa which is otherwise continuous
- Bacteria on the surface of the tooth produce toxins that can incite inflammation and damage if it enters into the mucosal tissues
- Gingival sulcus in healthy individuals is ~ 0.5 to 3 mm (mild inflammation is present-1.8 mm average)

- Depth greater that 3mm is considered pathologic; and the sulcus represents periodontal pocket

- Floor of the sulcus and the epithelium cervical to it is called junctional epithelium which is in contact with the tooth surface (enamel and some times cementum)

- Wall of the gingival sulcus is lined by **NON-KERATINIZED** stratified squamous epithelium that is derived from and continuous with the rest of the oral mucosa –oral sulcular epithelium


A
GC
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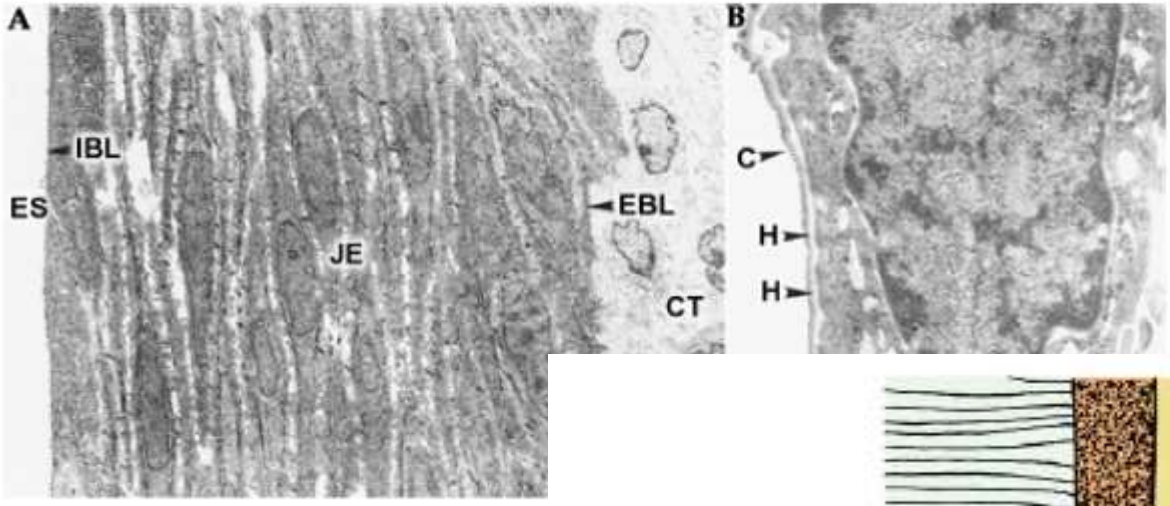
C

Junctional Epithelium

- The epithelium that is attached to the tooth (enamel or sometimes cementum) surface continuous with sulcular epithelium
- Derived from reduced enamel epithelium of the tooth germ
- Junctional epithelium consists of flat cells aligned parallel to the tooth surface increasing in thickness from the apex to the crown
- Attached to enamel by internal basal lamina and to the connective tissue by external basal lamina.
- Hemidesmosomesare present in both basal laminas.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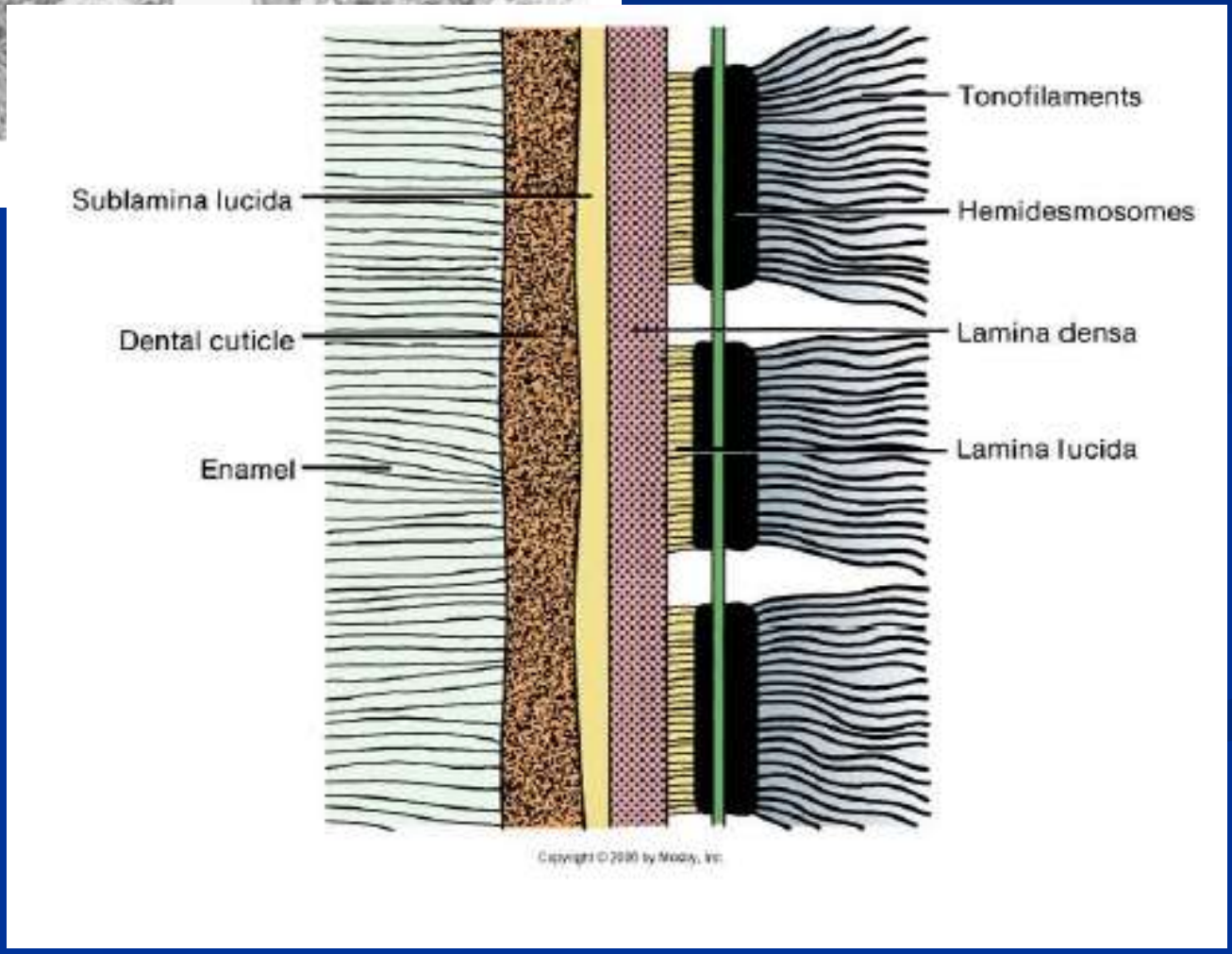

Tonofilaments
Sublamina lucida
Hemidesmosomes
Dental cuticle
Lamina densa
Enamel
Lamina lucida

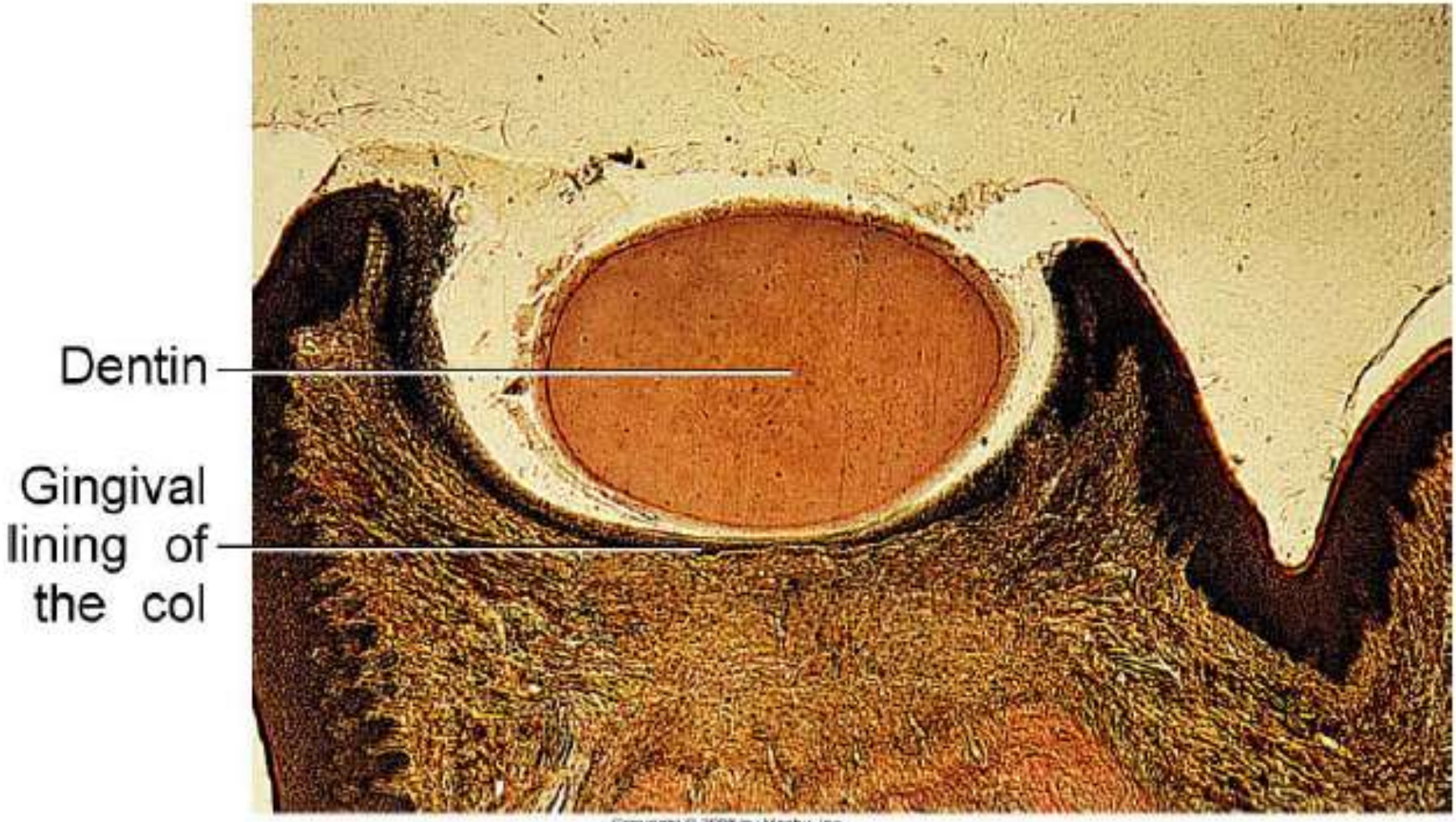
Epithelial cell turnover in gingiva

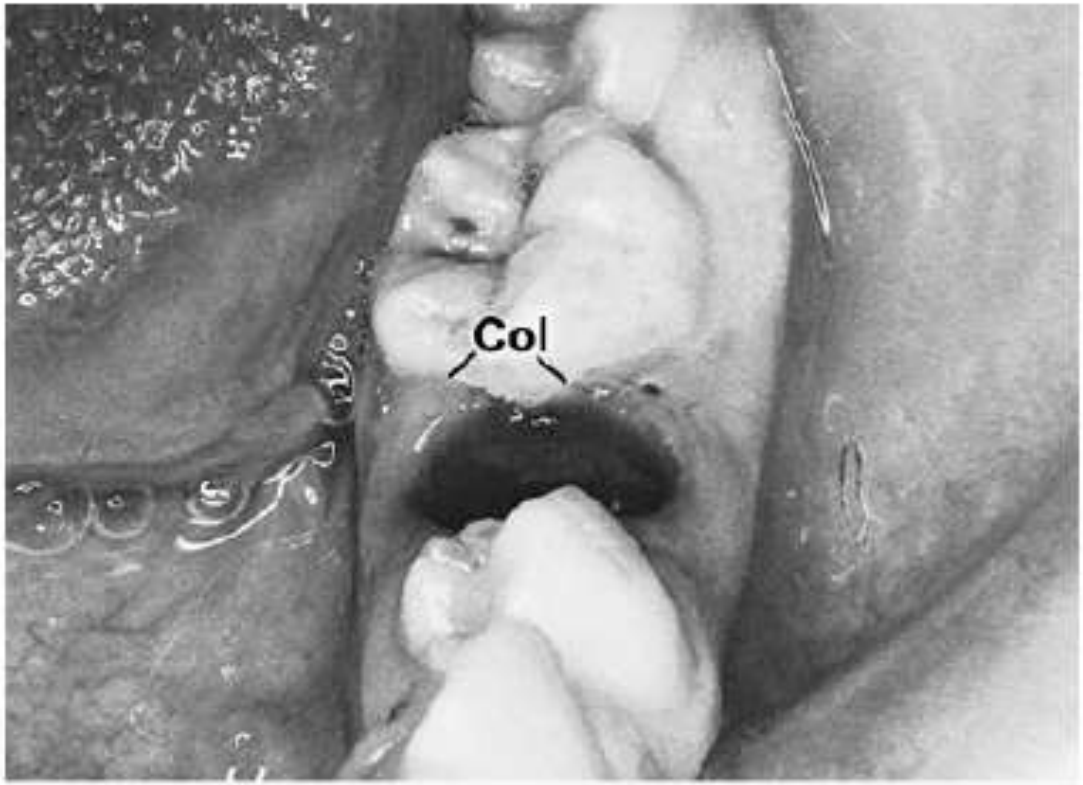
- Similar to all other epithelia, the deeper cells adjacent to the connective tissue undergo cell division to replenish those lost at the surface
- High rate of cell division
- Migrate about 2 to 3 cell layers from the tooth surface and then join a main migratory route in a coronal direction, parallel to tooth surface, to be desquamated into the gingival sulcus.
- Key point: Junctional epithelium readily regenerates from the sulcular epithelium or oral epithelium if it is damaged or surgically excised
- Connective tissue normally contains plenty of neutrophils which is different than the normal oral mucosa

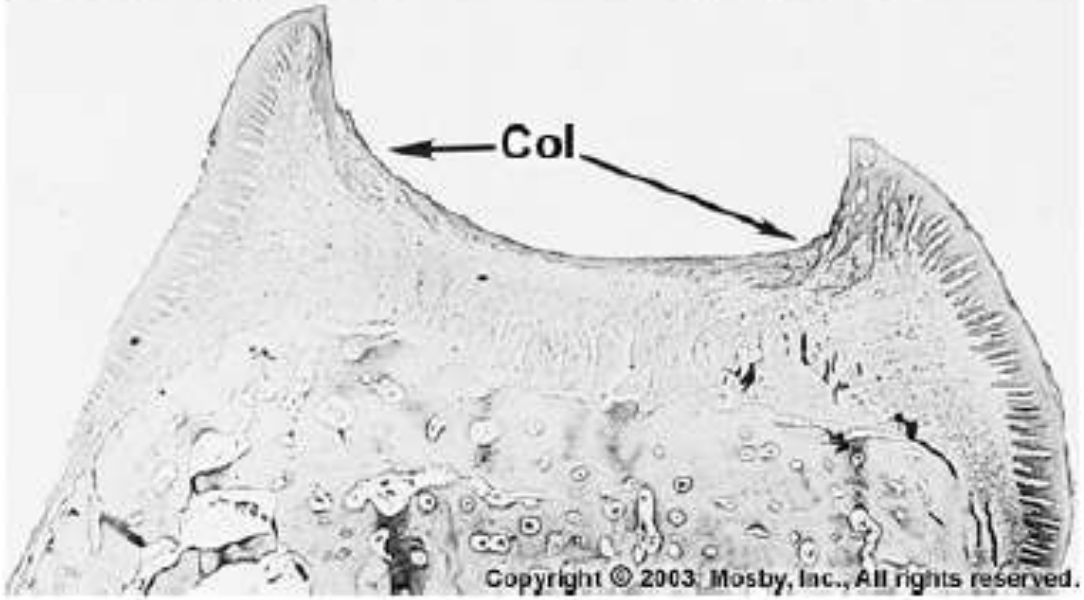
Col

- Col (or depression): This is how the gingiva looks in the interdental area. Similar to an outline of a depression or col with buccal and lingual peaks. Col epithelium is identical to junctional epithelium and has the same origin (from dental epithelium)and is also replaced continually by cell division.

- Not sure if there is any significance that the col is more vulnerable to inflammation, but the incidence of gingivitis is greater interdentally.




Col


Col
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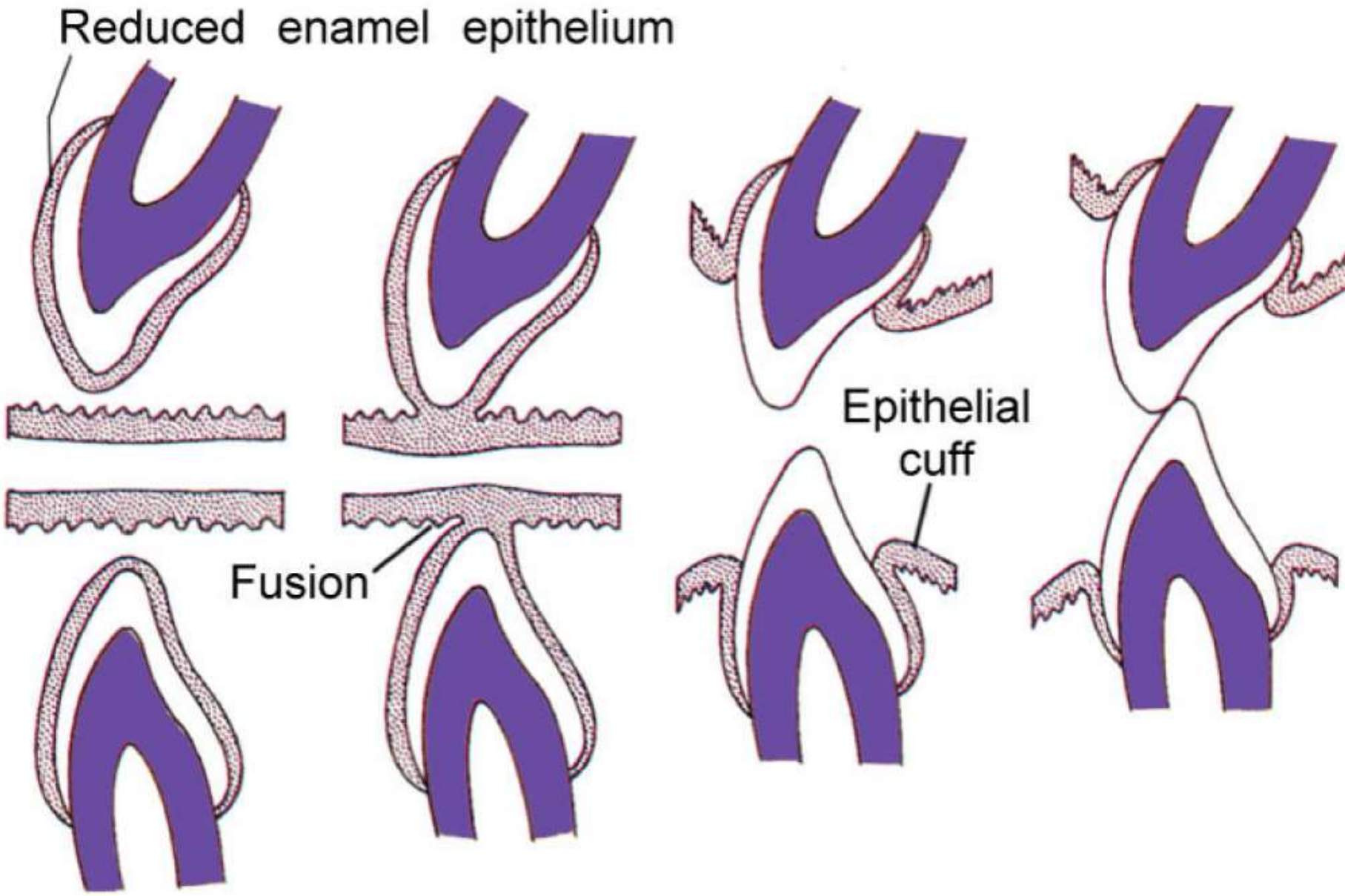
How does Gingiva develop?

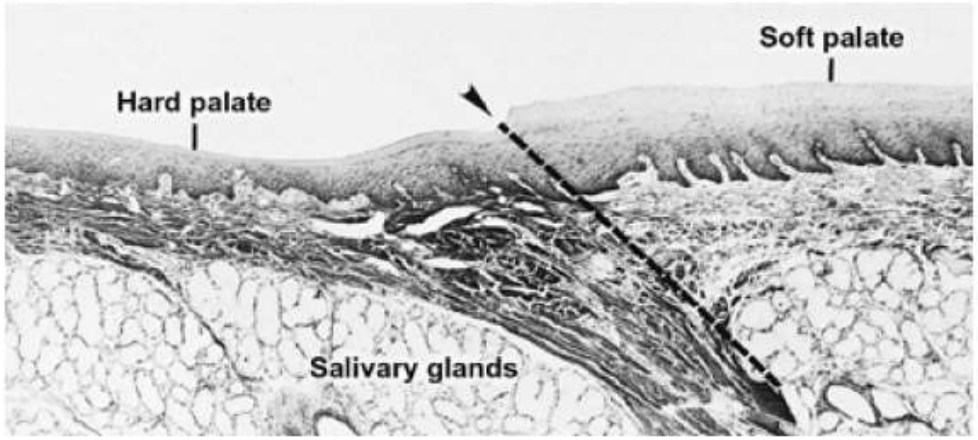


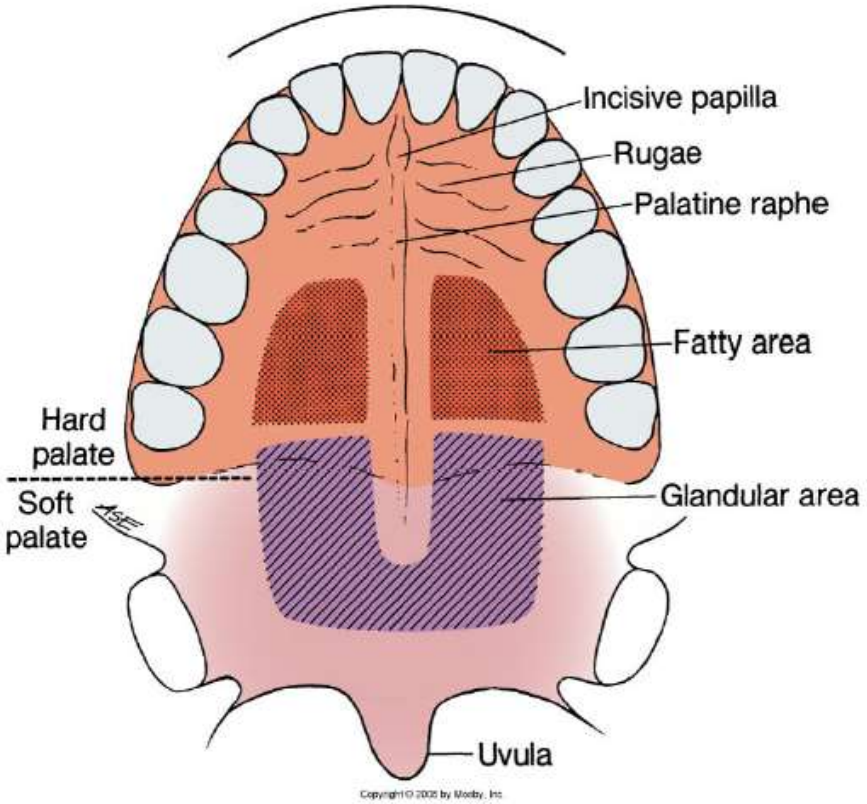
A quick note on…..

- Blood supply to the gingiva: Derived from periosteal vessels in the periosteum of the alveolar process
- Blood supply to the dentogingival junction: Continuation of inter alveolar arteries
- Nerve supply to the gingiva: terminal branches of periodontal nerve fibers and by branches of the infraorbital and palatine, or lingual, mental, and buccal nerves

Histology of Hard Palate

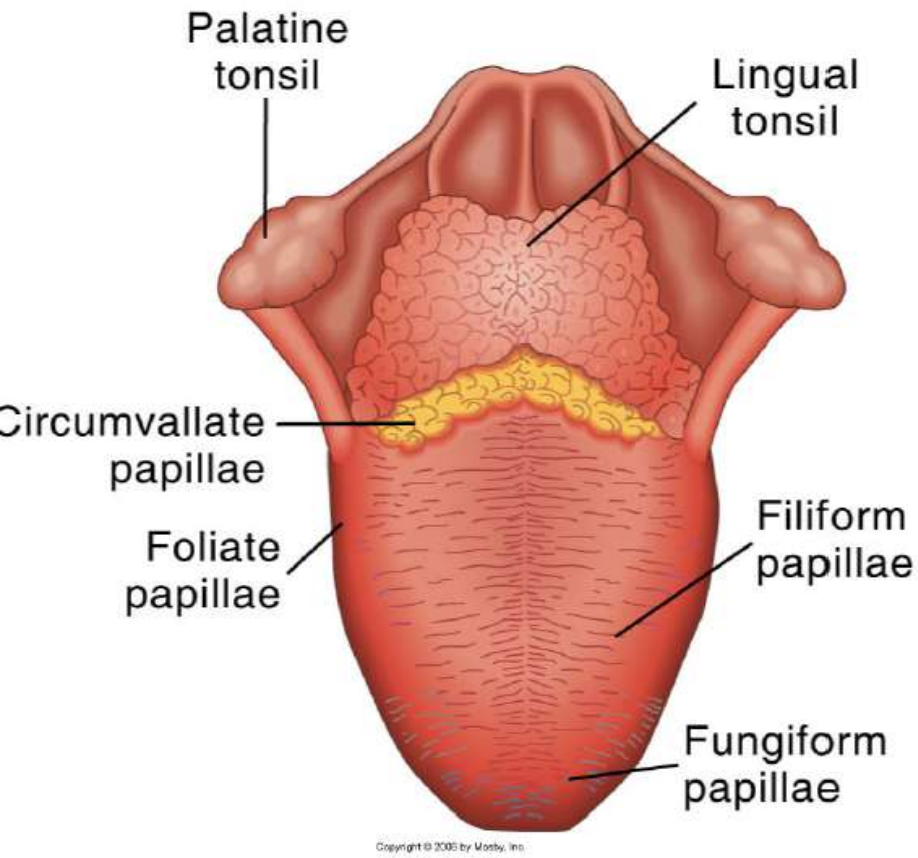
- Thick orthokeratinized (or parakeratinized in areas) epithelium showing ridges (rugae)
- Lamina propria shows long papillae with thick dense connective tissue
- Submucosa is mucoperiosteum with dense collagenous connective tissue attaching directly to periosteum. Contains fat and salivary glands

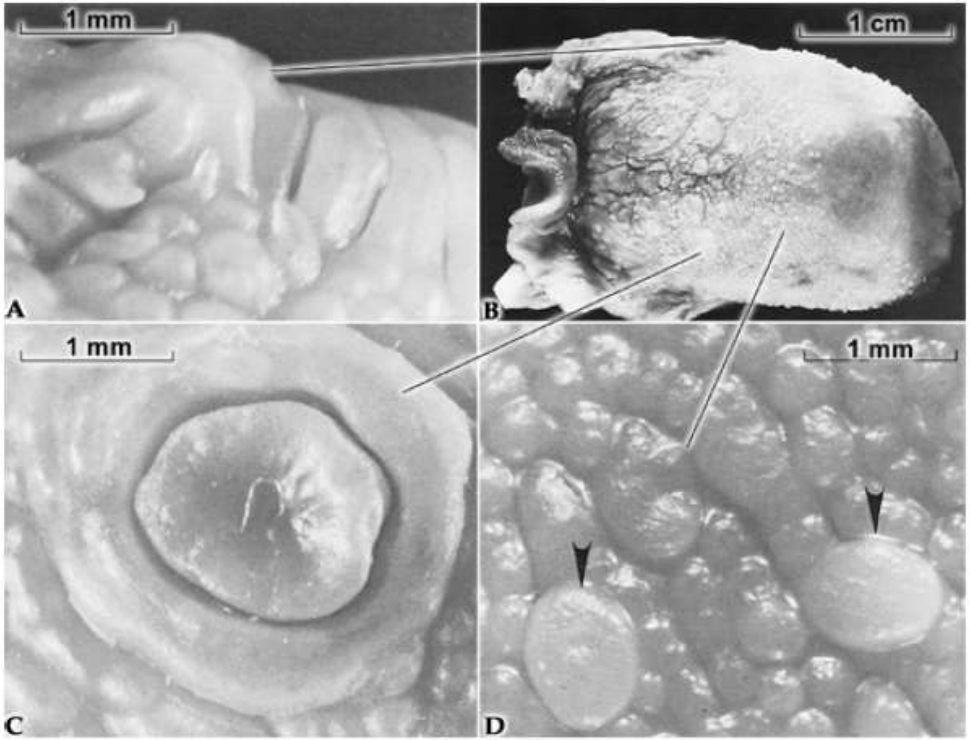




Specialized Mucosa -Dorsal Tongue

Types of papilla: 4 types





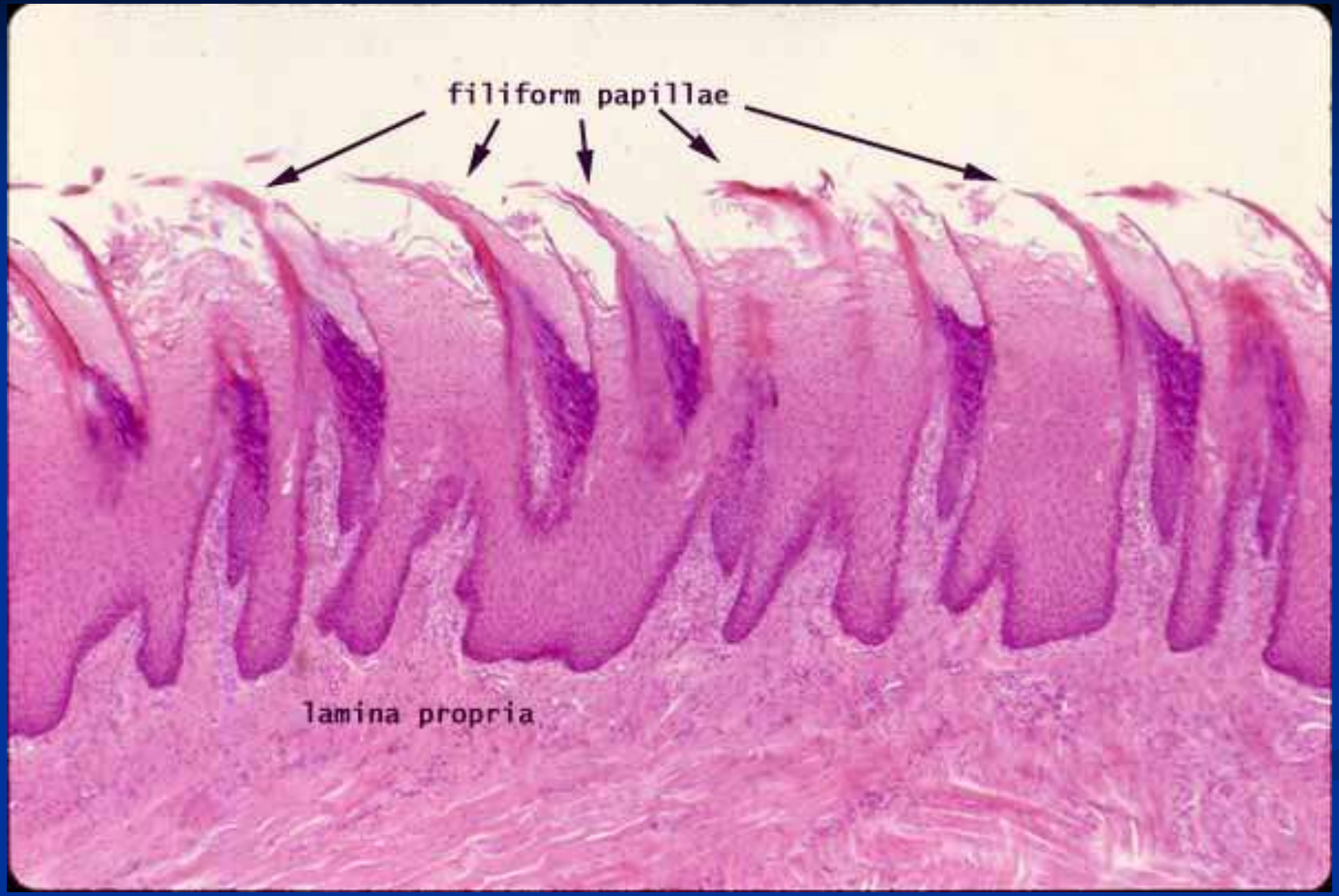
A: Foliate
C: Circumvallate
D: Filiform

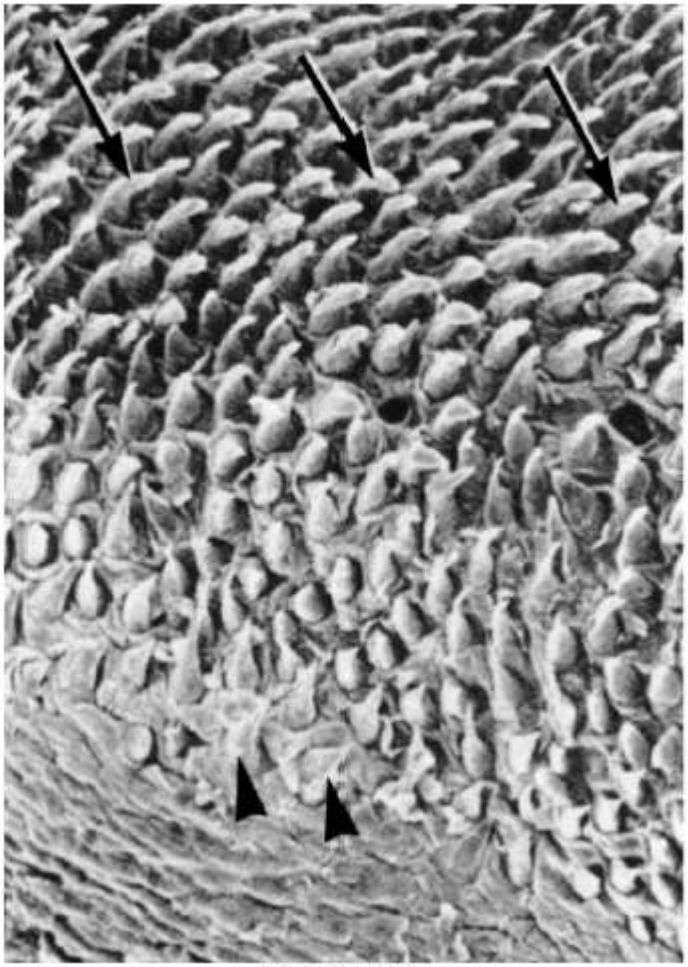
NERVE SUPPLY OF TONGUE

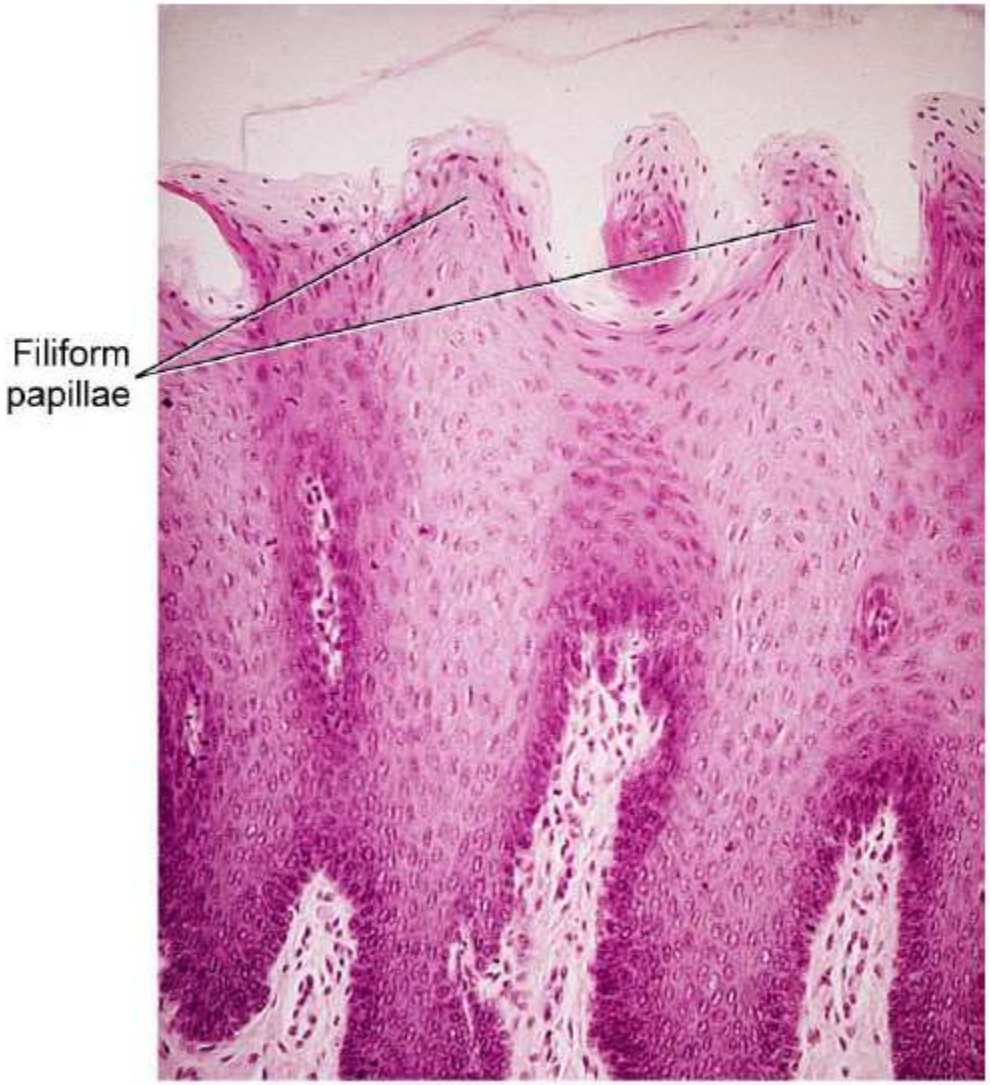
- ANTERIOR 2/3RD--- TREGEMINAL NERVE
- POST 1/3RD--- GLOSSOPHARYANGEAL NERVE
- MUSCLES OF NERVE--- HYPOGLOSSAL NERVE EXCEPT,
- PALATOGLOSSUS MUSCLE--- VAGUS NERVE

Filiform papilla:

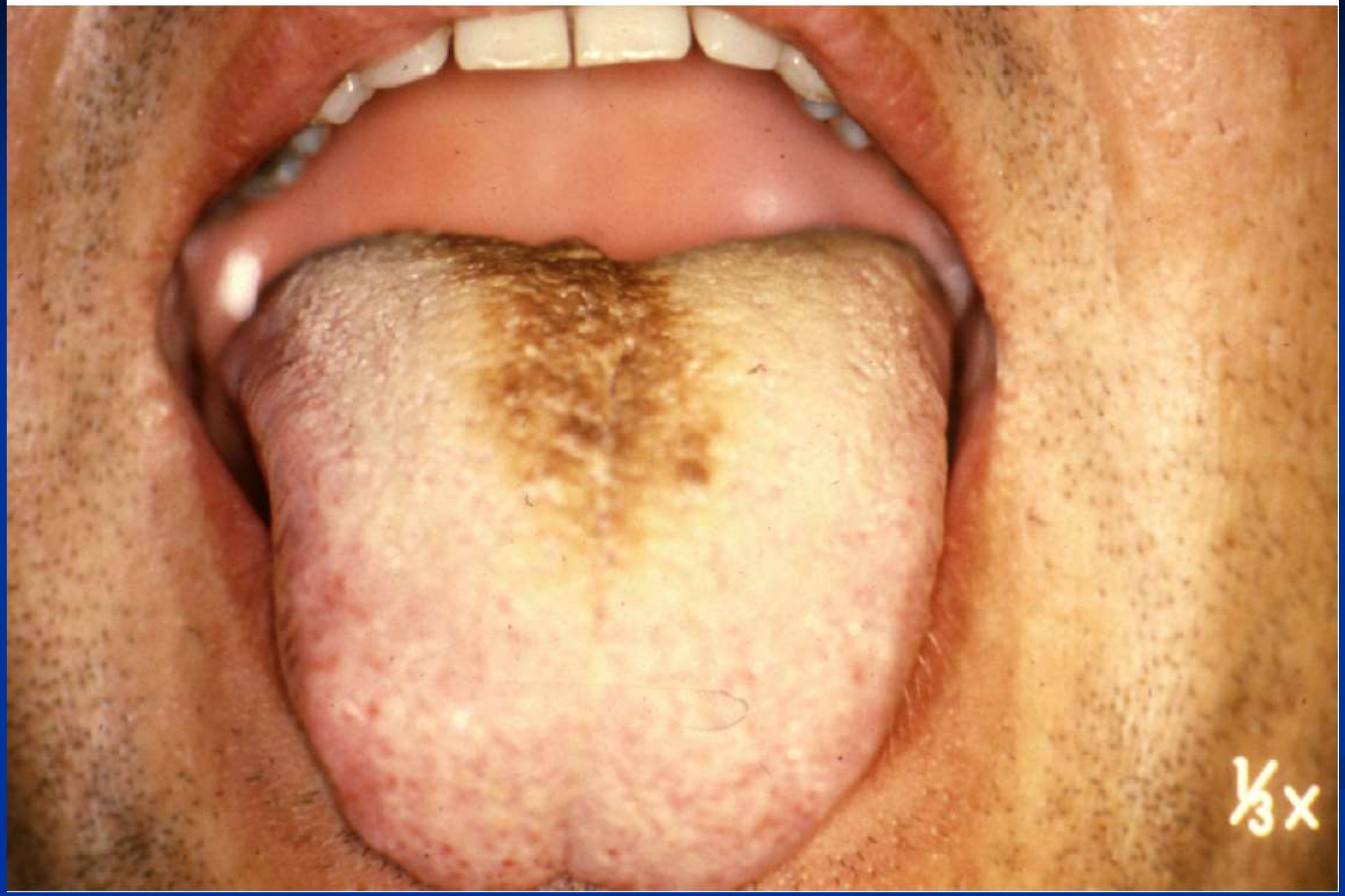
- Makes up majority of the papillae and covers the anterior part of the tongue.
- VELVET Appearane to tongue
- They appear as slender, threadlike keratinized projections(~ 2 to 3 mm) of the surface epithelial cells.
- These papillae facilitate mastication(by compressing and breaking food when tongue is apposed to the hard palate) and movement of the food on the surface of the tongue.
- The papillae is directed towards the throat and assist in movement of food towards that direction.
- NO TASTE BUDS.


filiform papillae
lamina propria





Hairy Tongue

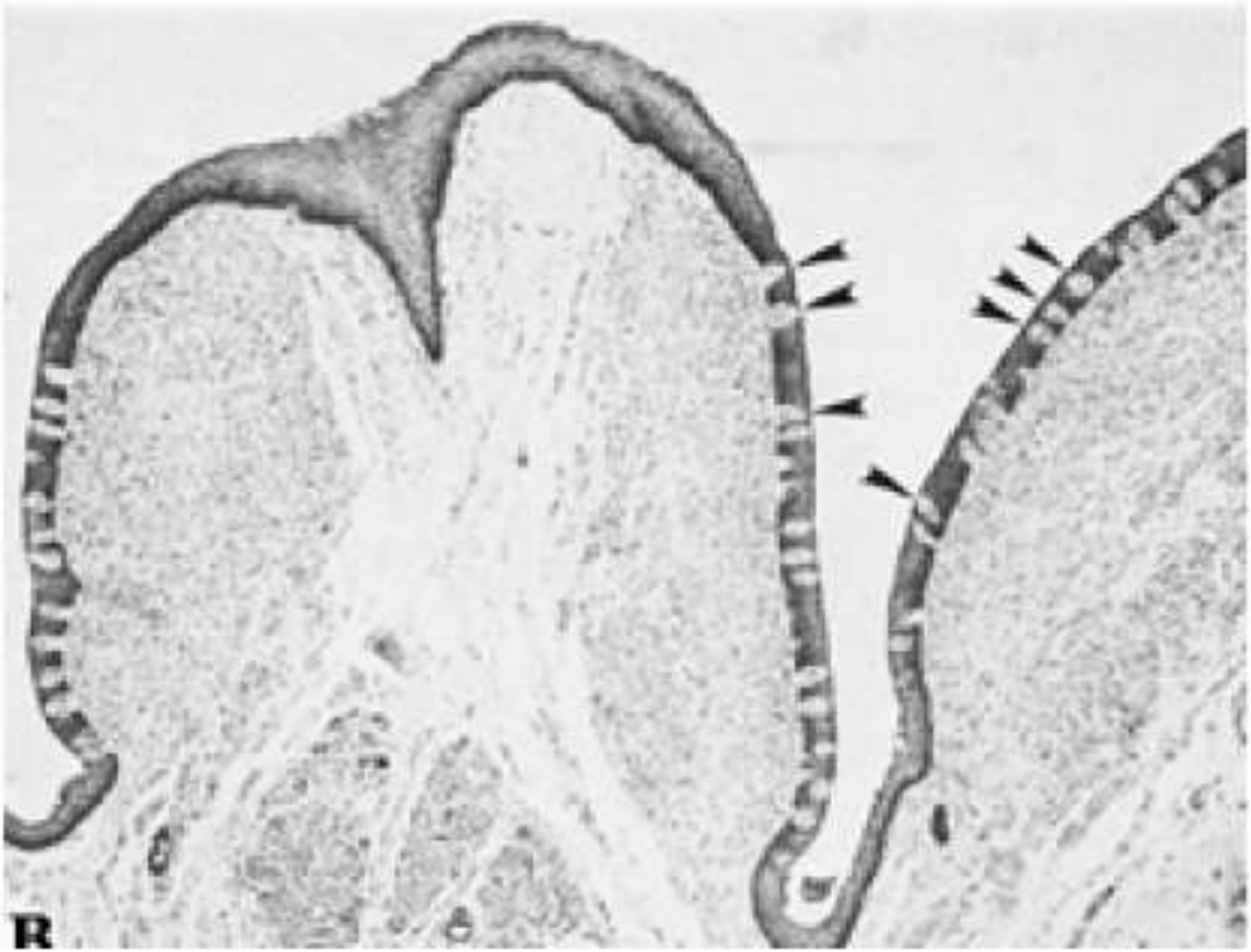


Fungiform papilla

- These are interspersed between the filiform papilla.
- More numerous near the tip of the tongue.
- Smooth, round structures that appearred because of their highly vascular connective tissue core
- seen through a thin,nonkeratinized stratified squamous epithelium.
- Taste buds are usually seen within the epithelium.

Foliate Papilla

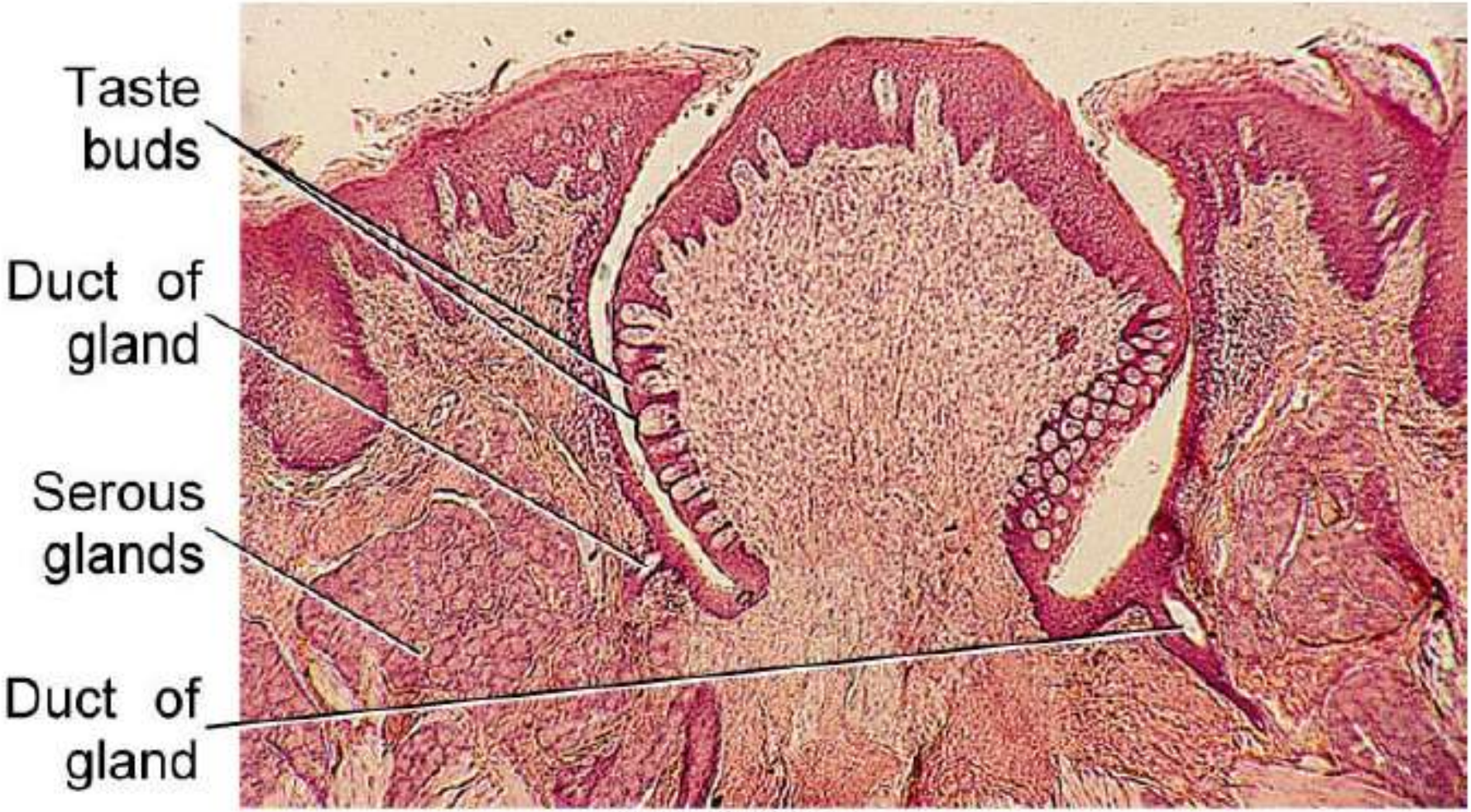
- (Leaf-like). Present on the lateral margins of the posterior tongue.
- Consist of 4 to 11 parallel ridges that alternate with deep grooves in the mucosa,
- A few taste buds are present in the epithelium.
- They contain serous glands underlying the taste buds which cleanse the grooves.

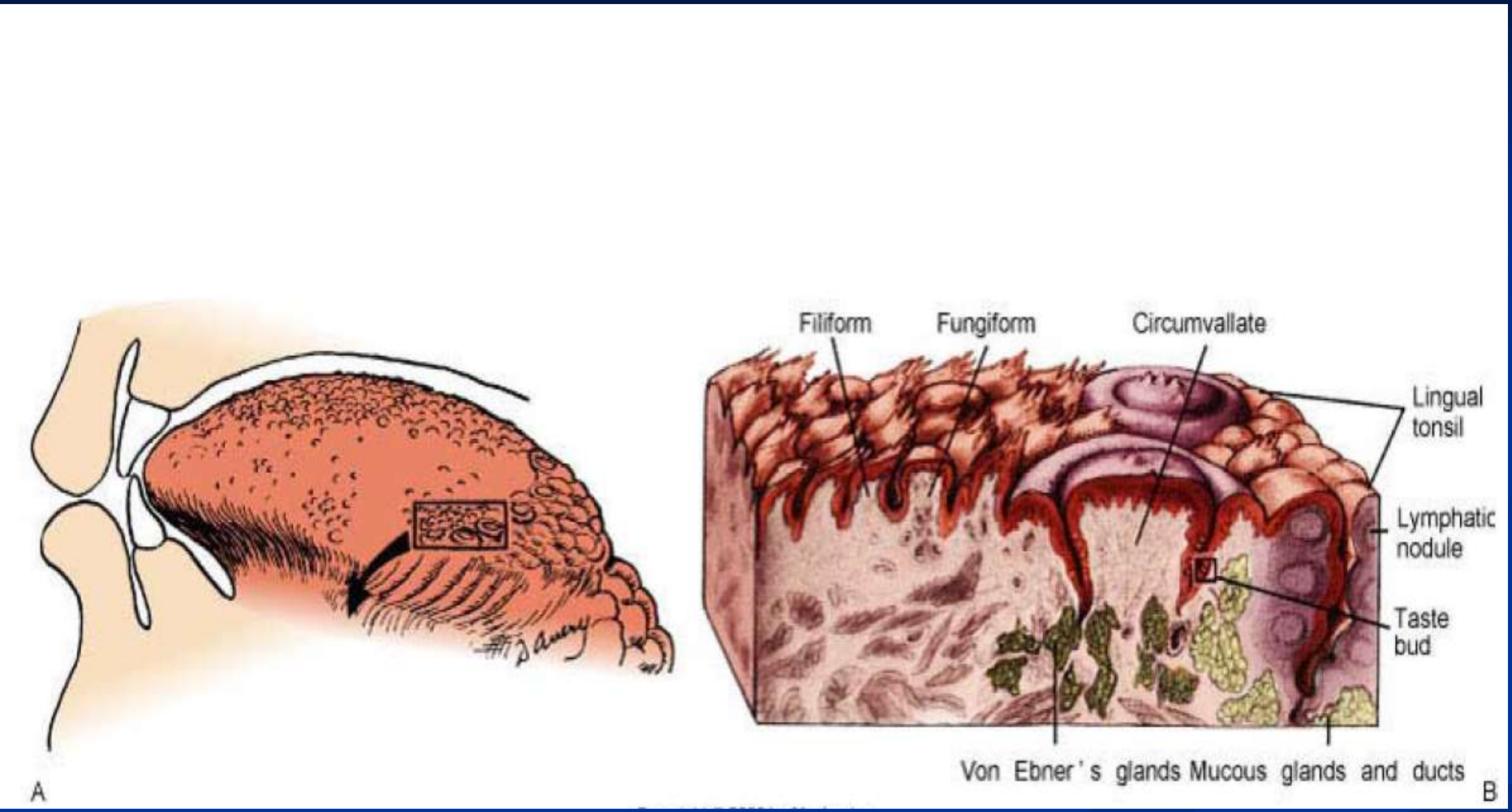

R

Circumvallate papilla

- (Walled papilla). 10 to 14 in number these are seen along the V-shaped sulcus between the base and the body of the tongue.
- Large, ~ 3 mmin diameter with a deep surrounding groove.
- Ducts of Von Ebner glands (serous salivary glands) open into the grooves.
- Taste buds are seen lining the walls of the papillae.


1
2
3
4




Filiform
Fungiform
Circumvallate
Lingual tonsil
Lymphatic nodule
Taste bud
Von Ebner's glands
Mucous glands and ducts
A
B

TASTE BUDS

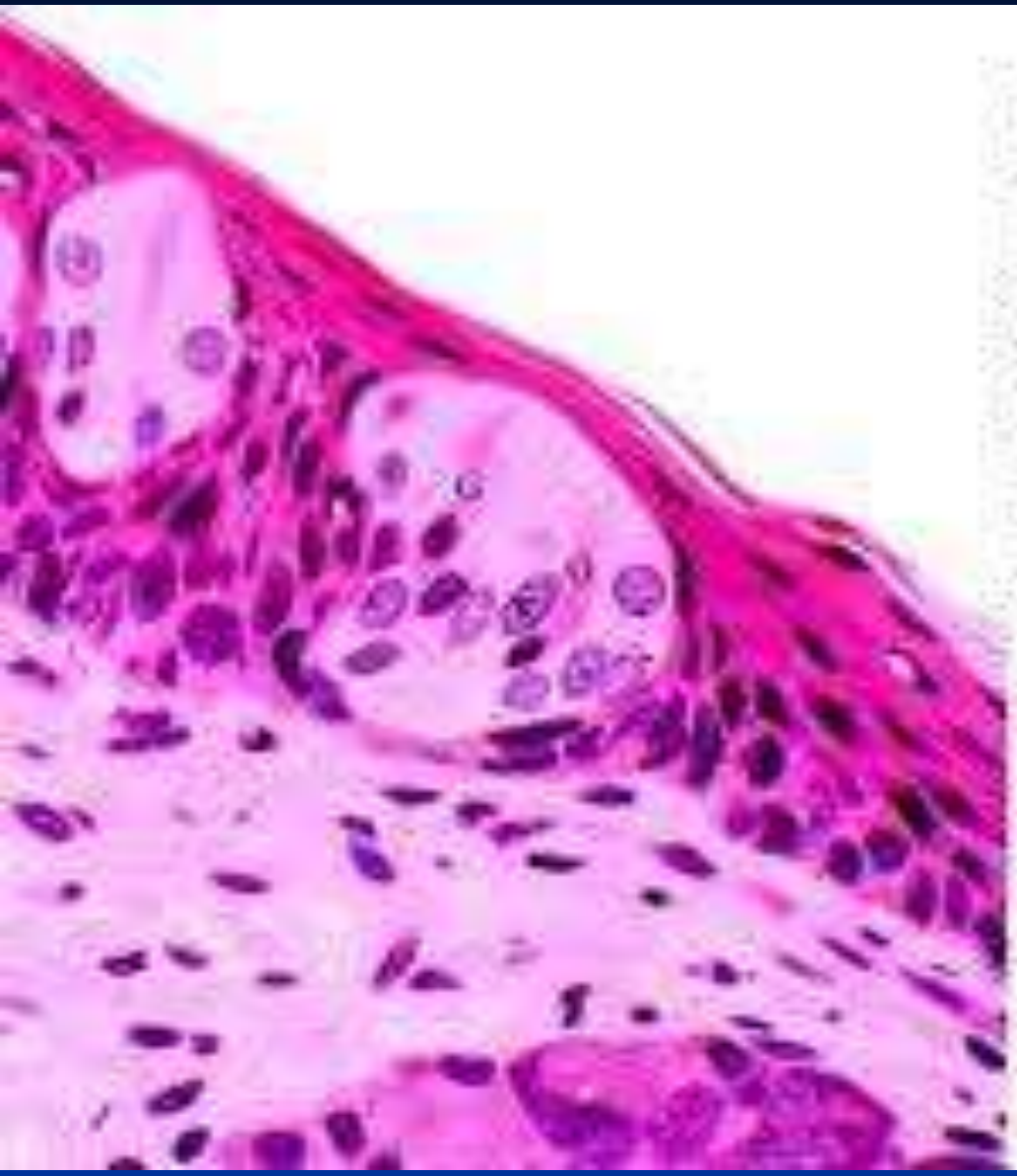
- Small ovoid or Barrel shaped intra- epithelial organ
- 80um high and 40um thick
- Extend from basal lamina till surface
- Seen in:

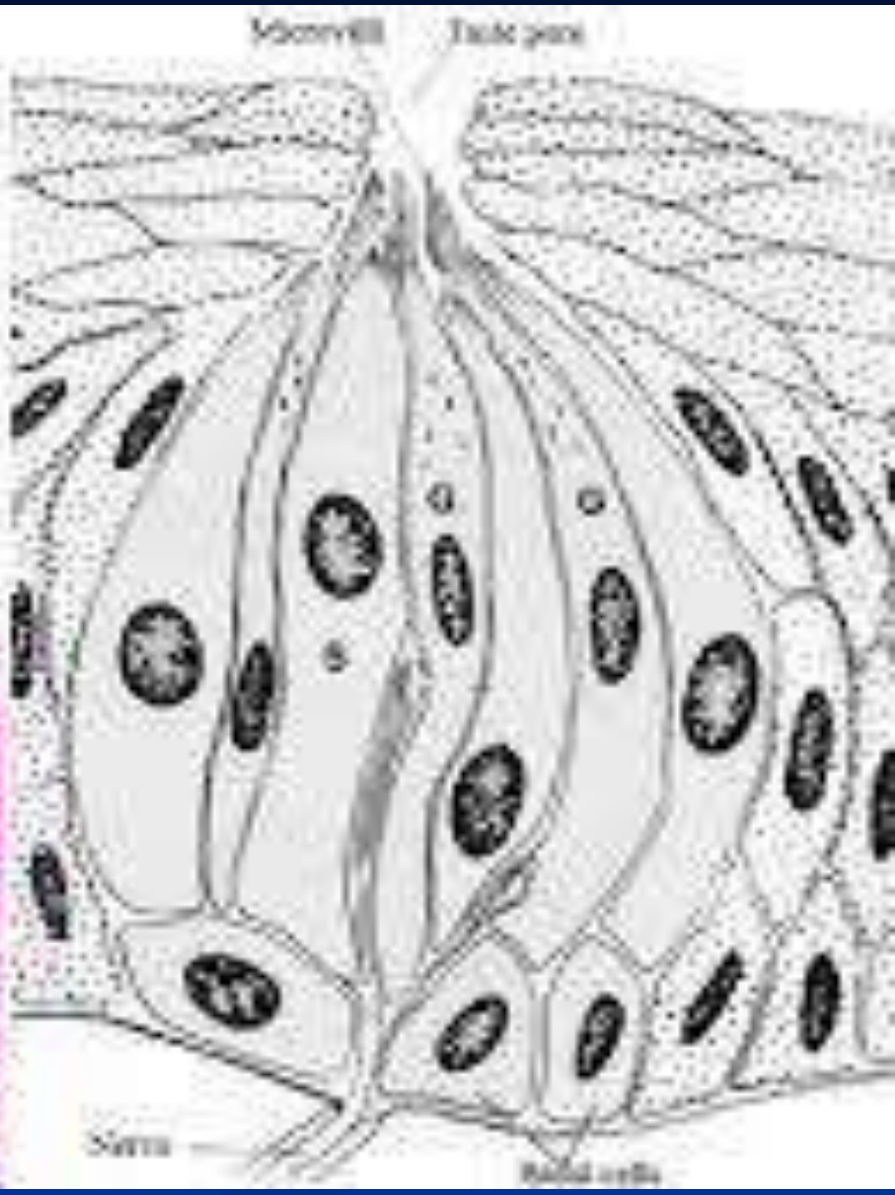
A. Circumvallate papillae

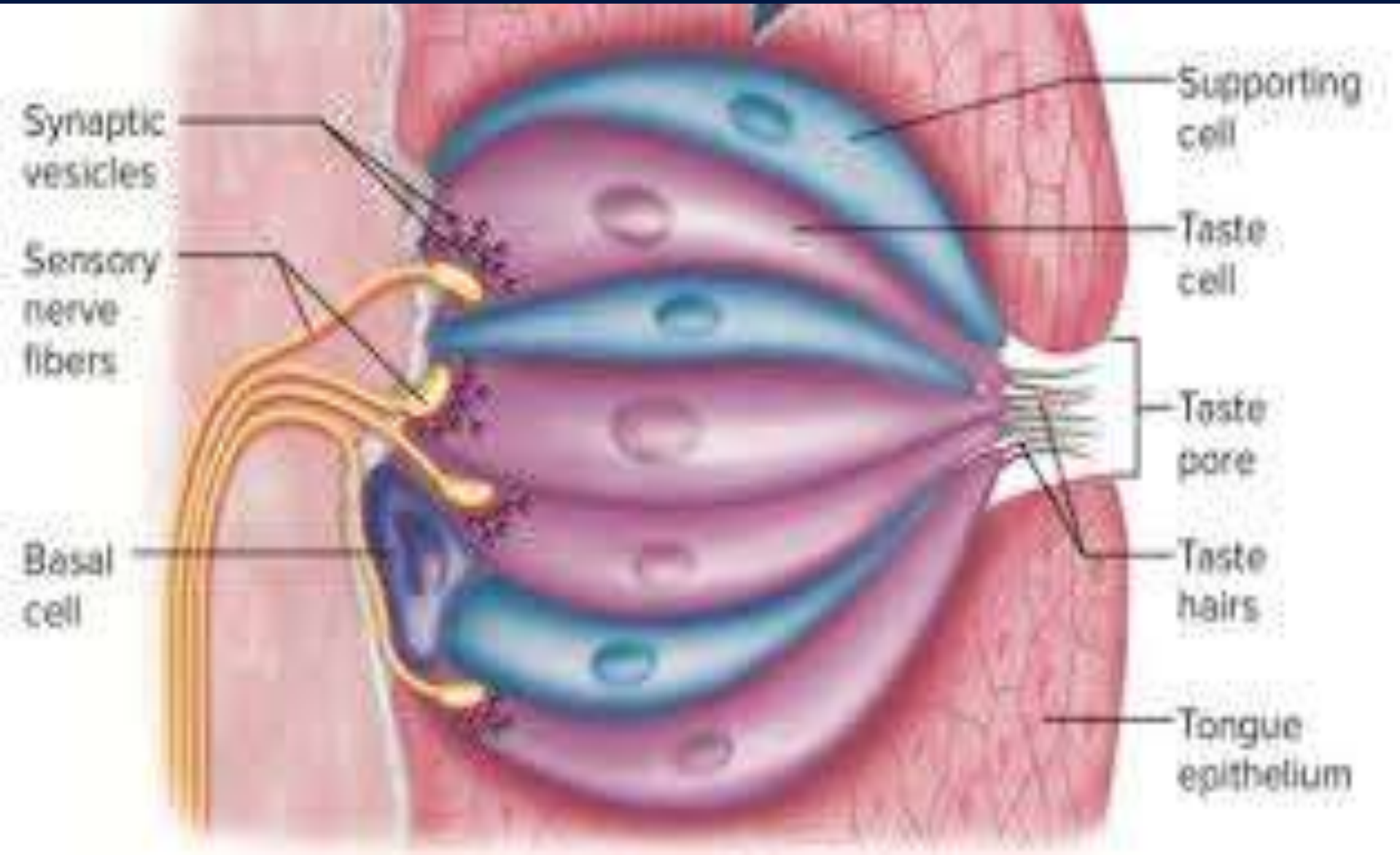
B. Folds of foliate papillae

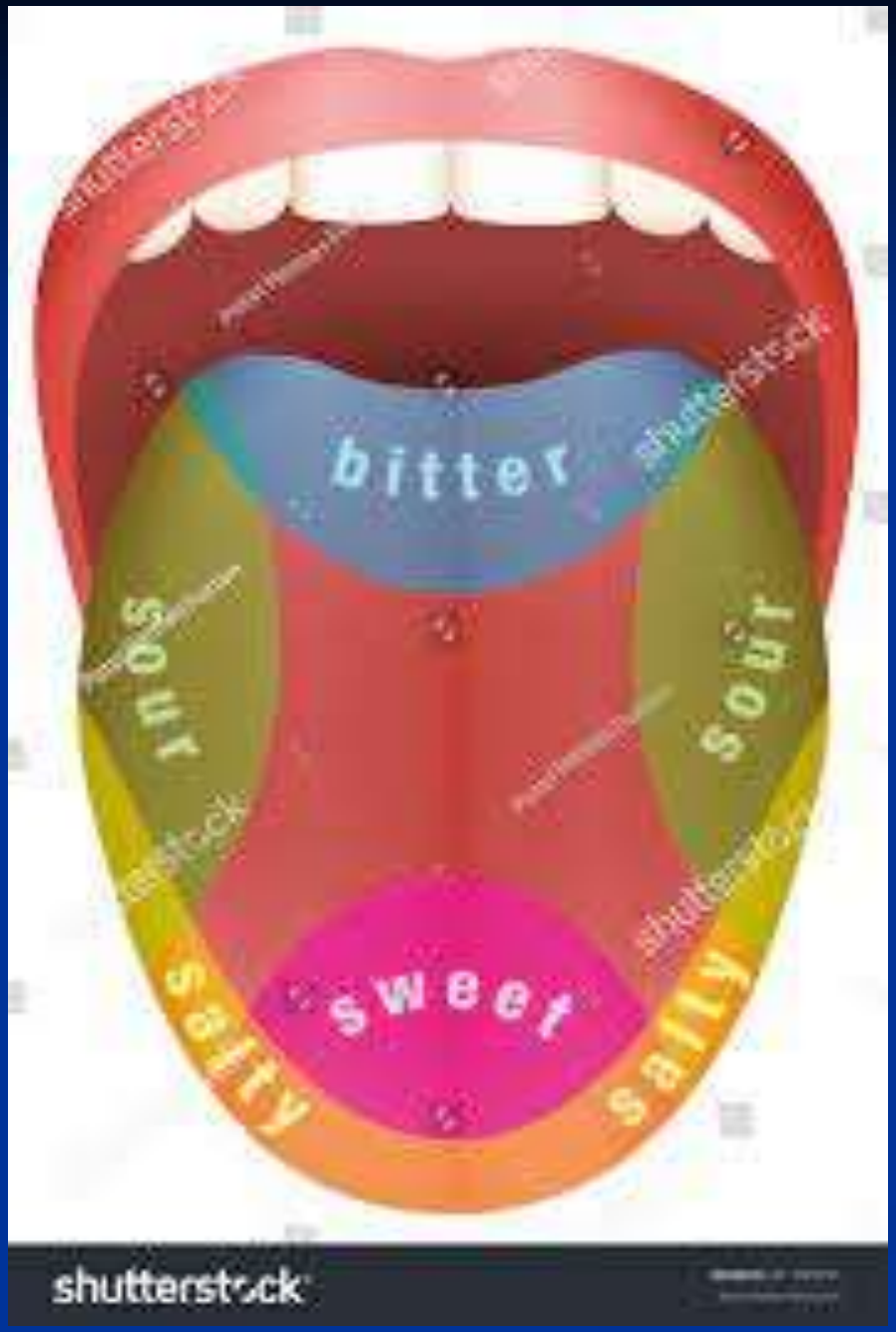
C. Post part of epiglottis

D. Fungiform papillae




Villi
Taste pore
Nerve
Basal cells


Synaptic vesicles
Sensory nerve fibers
Basal cell
Supporting cell
Taste cell
Taste pore
Taste hairs
Tongue epithelium



- SWEET- TIP
- SALTY- LATERAL BORDER
- BITTER- POSTERIOR MIDLINE
- SOUR- POSTERIOR LATERAL

Structure of Mucosa in different regions

Region	Covering epithelium	Lamina propria	submucosa
Lining mucosa			
Labial & buccal mucosa	Very thick-nonkeratinized	Long slender papillae; dense fibrous CT, rich vascular supply	Muscle forming firm attachment .Fat, minor salivary glands, sometimes sebaceous glands
Floor of mouth	Very thin-nonkeratinized	Short papillae, extensive vascularity	Loose CT, containg fat and minor salivary glands
Soft palate	Thin-nonkeratinized Taste buds	Thick with numerous short papillae, elastin fibers, highly vascular	Diffuse tissue containing numerous minor salivary glands

Structure of Mucosa in different regions

Region	Covering epithelium	Lamina propria	submucosa
Lining mucosa			
Lips vermilion zone	Thin orthokeratinized	Numreous narrow papillae	Mucosa firmly attached to muscle, some sabecous glands, minor salivary glands and fat
Ventral surface of the tongue	Thin nonkeratinized	Thin with numerous short papillae, few minor salivary glands	Thin and irregular, may contain fat and small vessels ;tongue musculature

Structure of Mucosa in different regions

Region	Covering epithelium	Lamina propria	submucosa
Masticatory mucosa			
Gngiva	Thick parakeratinized/ orthokeratinized	Long nrarrow papillae(fork like) not highly vascular	No distinct layer- mucoperiosteum
Hard palate	Othokeratinized	Longe thick papaillae, dense collagenous tissue	Mucoperiosteum, antlatelaral –fat, Posterolateral-minor salivary glands