

# Oral Histology and Embryology

## PRACTICE

**Mgr. Jan Křivánek, Ph.D.**

# Oral Histology and Embryology

## PRACTICE

### **1. practice**

Introduction

Cards, sitting order

Organisation of practice

Attendance and substitution of missed lessons

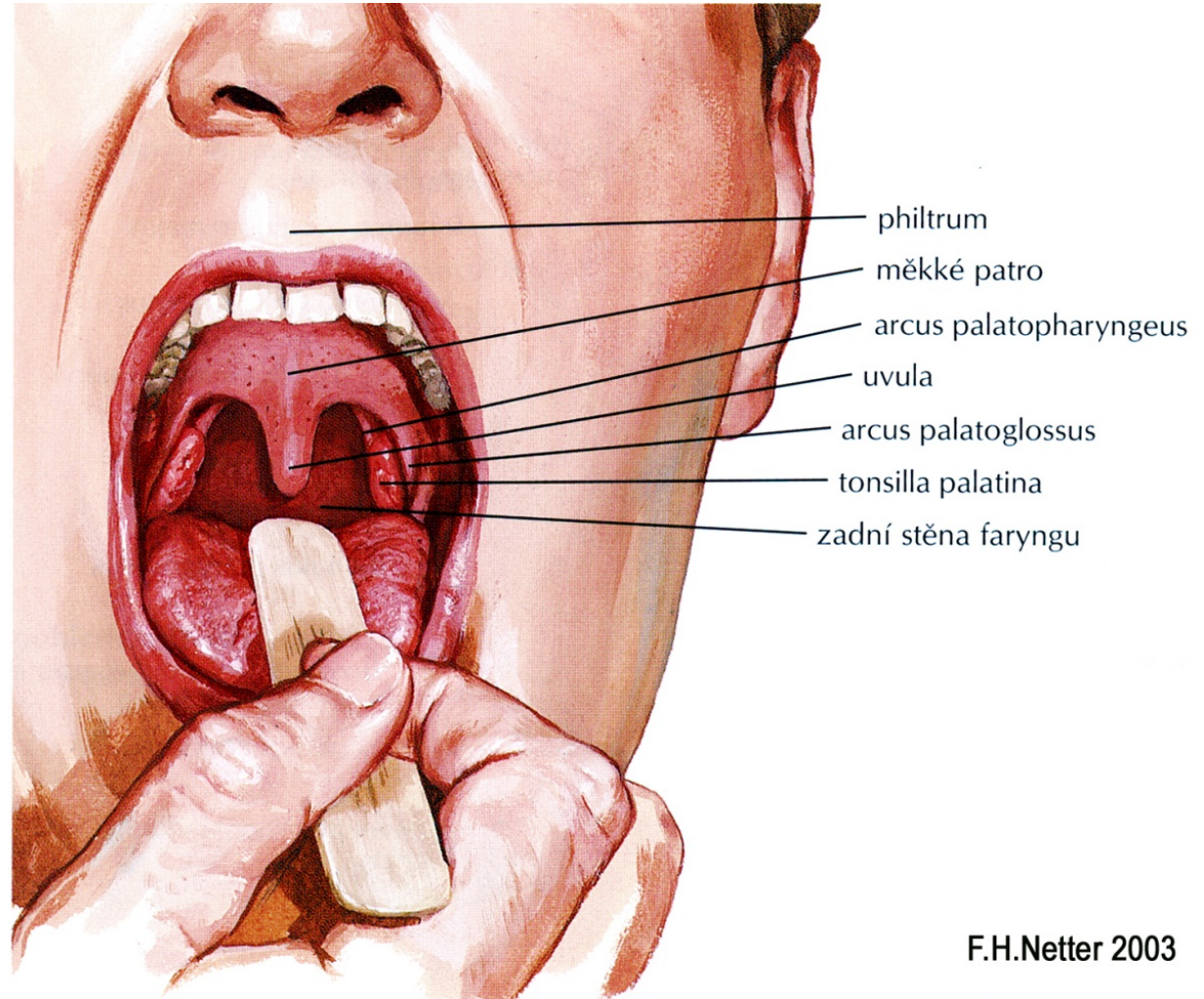
Protocols

Tests (3. and 6. pract.)

Safety rules

# Microscopic anatomy

**Lips**  
**Tongue**  
**Palate**  
**Cheeks**



# Oral cavity (*cavitas oris*)

vestibulum oris / *cavitas oris propria*

## Borders

Lips, cheeks, hard and soft palates, caudally floor of cavity, faucial isthmus (connection to oropharynx)

## Inside

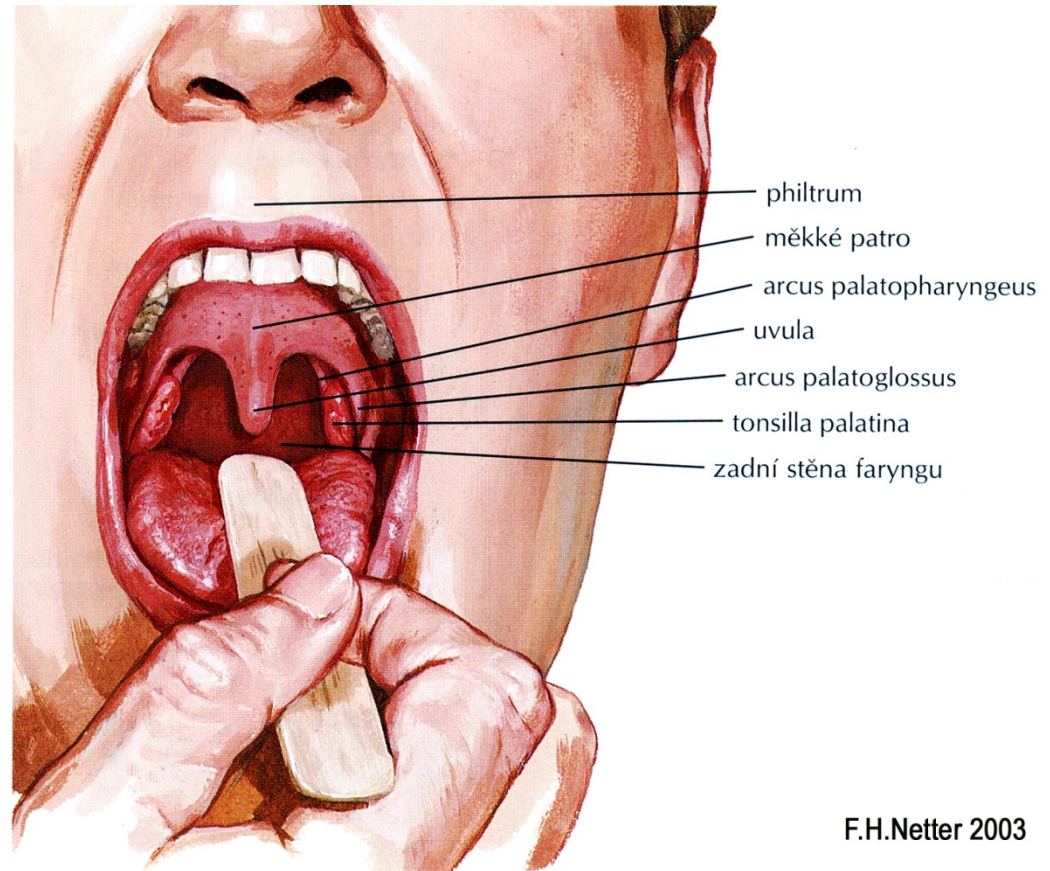
Tongue, teeth, gums, tonsilla palatina

## Major salivary glands:

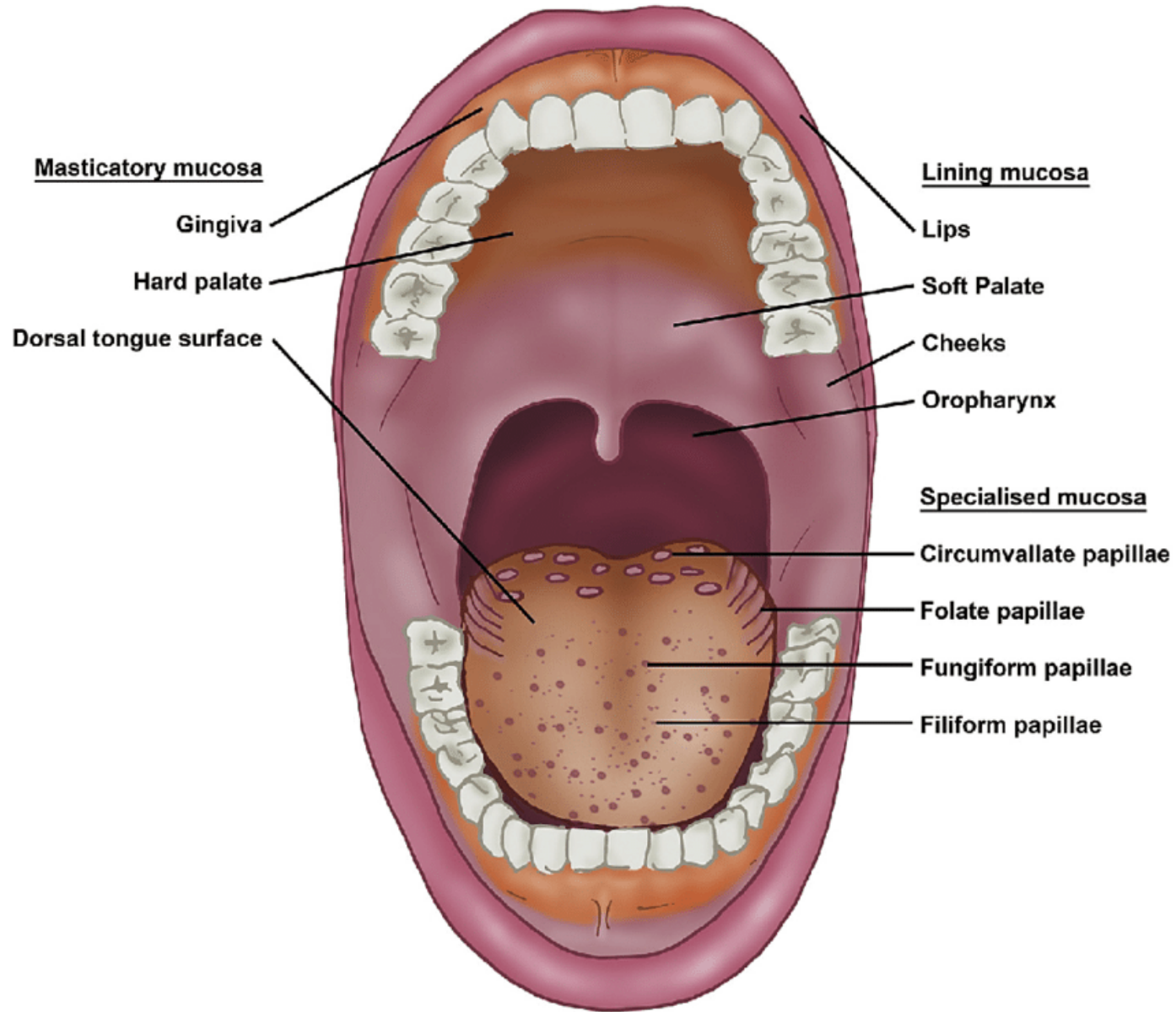
*gl. submandibularis*

*gl. sublingualis*

*gl. parotis*



# Oral mucosa



# Oral mucosa

epithelium  
**thick stratified squamous**

**nonkeratinized**

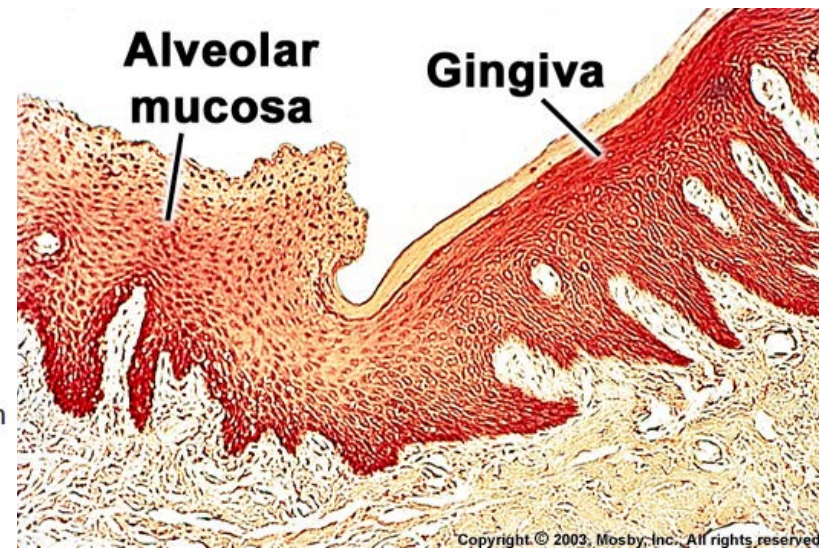
- Lining mucosa

**keratinized**

- Masticatory mucosa
- (Specialized mucosa)



Gingiva  
Mucogingival junction  
Alveolar mucosa  
Labial mucosa



## ***Lamina propria mucosae***

Contains numerous of melanocytes or melanophages

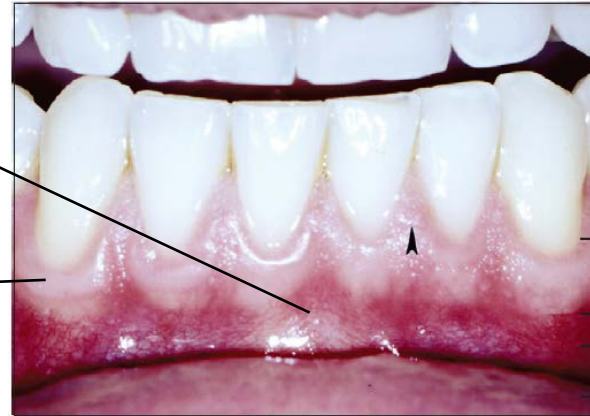
Multiple papillae projected against the epithelium. Their shape and density are spatially different (depends on different mechanical needs of oral mucosa)

# Oral mucosa classification

## Lining (65 %)

Inner part of lips, cheeks soft palate, inferior aspect of the tongue, floor of the mouth and alveolar process (except of the gingiva)

- tela submucosa located under mucosa
- soft and slightly movable (submucous coat)
- lamina propria from loose connective tissue



## Masticatory (25 %)

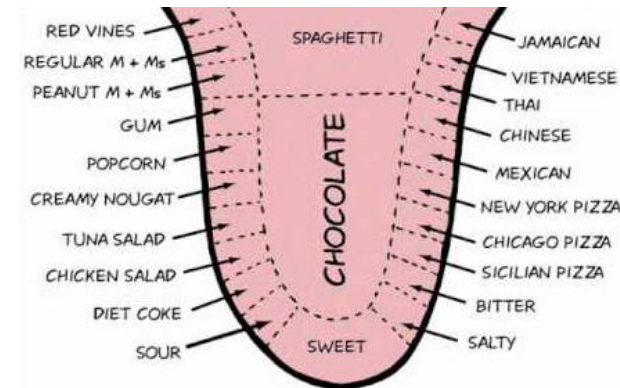
Hard palate and gingiva

- epithelium keratinized
- tela submucosa is missing
- lamina propria composed from dense collagenous of irregular type and firmly connected with periosteum (mucoperiosteum)

## Specialized (10 %)

dorsal surface of the tongue

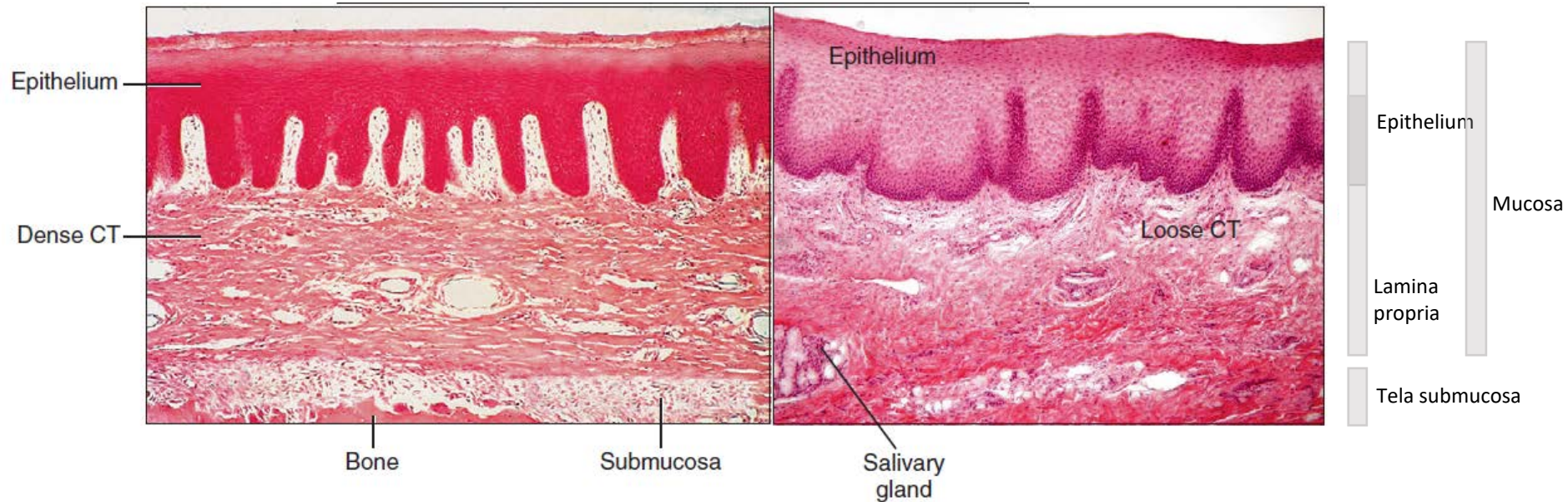
- mucosa protrudes into papillae
- tela submucosa is missing
- lamina propria connected with aponeurosis linguae



AREAS OF THE HUMAN TONGUE

## Gingiva

## Lip



### Masticatory mucosa

- Lamina propria from dense collagenous connective tissue of irregular type
- Firmly connected to periosteum (mucoperiosteum)

### Lining mucosa

- Lamina propria from loose collagenous tissue
- Tela submucosa under mucosa
- Mucosa is slightly movable

**B**, In histologic sections, the **gingival** epithelium is seen to be tightly bound to bone by a dense fibrous connective tissue (CT), whereas the epithelium of the **lip (C)** is supported by a much looser connective tissue.



# Oral mucosa regeneration

Oral epithelium turnover time: 4 - 24 days

Significant local differences

Gingivo-dental junctional epithelium

Gingiva affixa epith. (masticatory mucosa)

Taste buds

Lining epith. of lips and cheeks mucosa

Lining epith. of the floor of mouth

Masticatory epithl. of hard palate

4-6 days

10 days

10 - 14 days

14 days

20 days

24 days

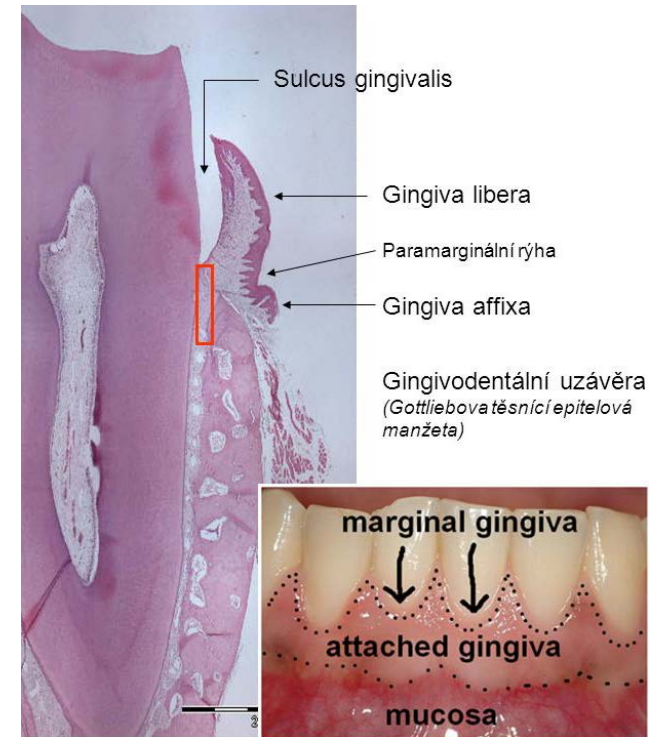
*Epidermis of the face and neck frontal side*

7 days

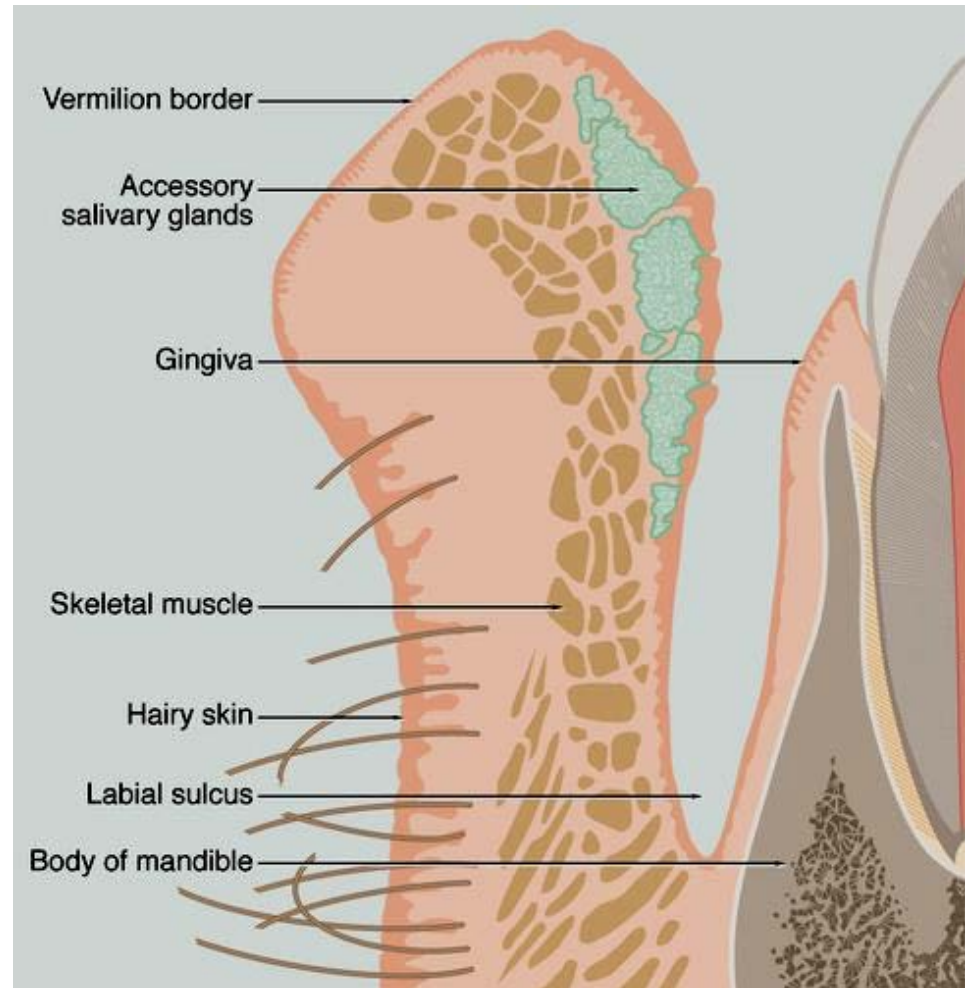
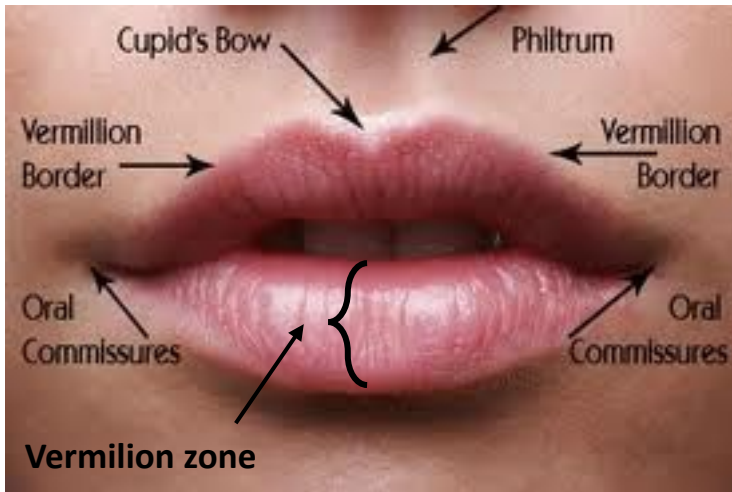
*Epidermis (rest)*

30 days

*(faster turnover time in case of the face is probably caused by inductive effect of the ectomezenchyme)*



# Lip



Sagittally:

- ventral aspect of the lip
- dorsal aspect of the lip
  - a) lamina epithelialis mucosae - stratified squamous epithelium
  - b) lamina propria mucosae - loose areolar connective tissue
- m. orbicularis oris
- vermilion zone

Why do the lips have a red color?

Red portion of lip

Orbicularis oris muscle

Labial artery

Mucosa with epithelium and lamina propria

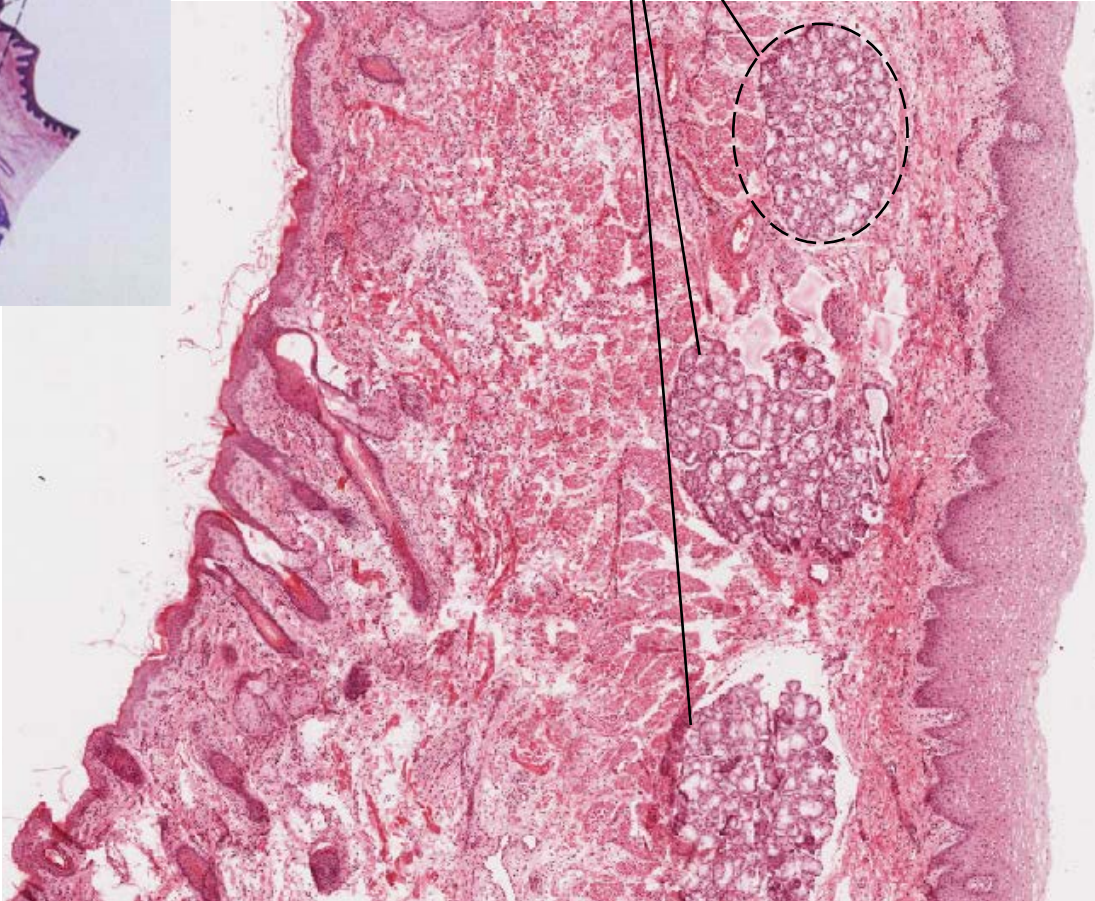
Hair follicles

Labial glands

Labial skin with cornified epithelium and corium

Orbicularis oris muscle

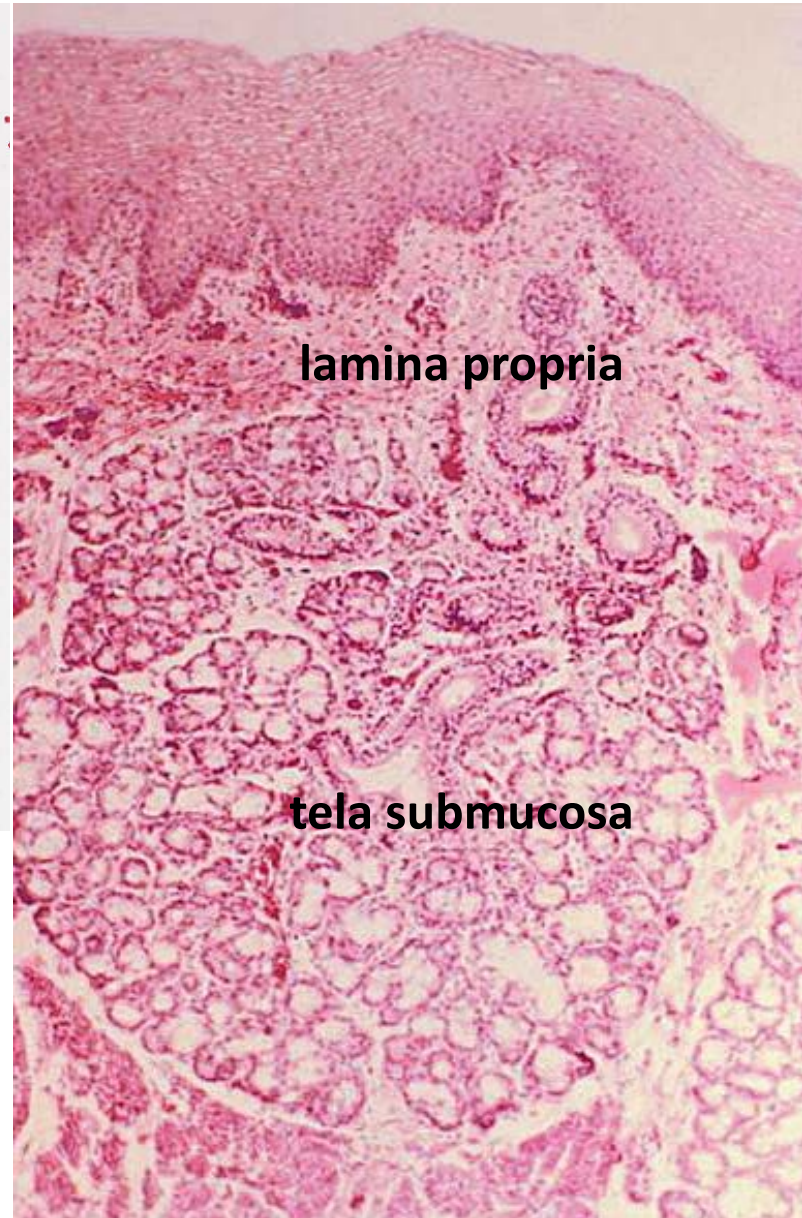
**glandulae labiales**  
(mixed)



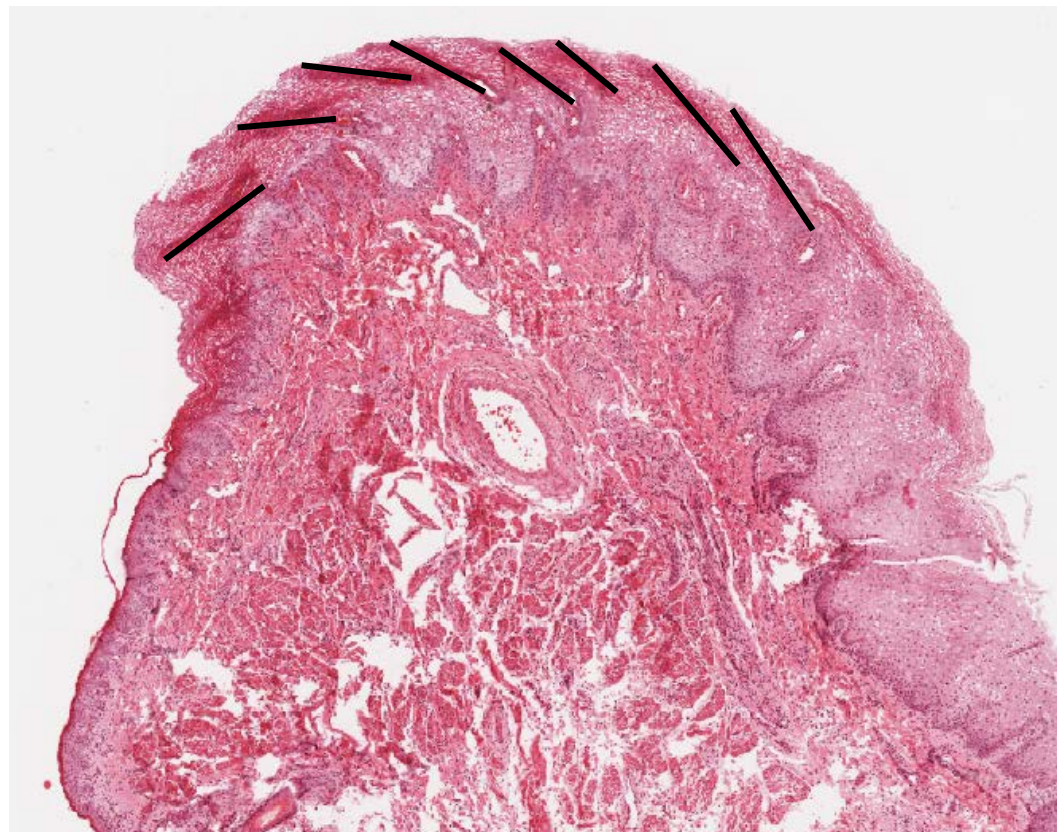
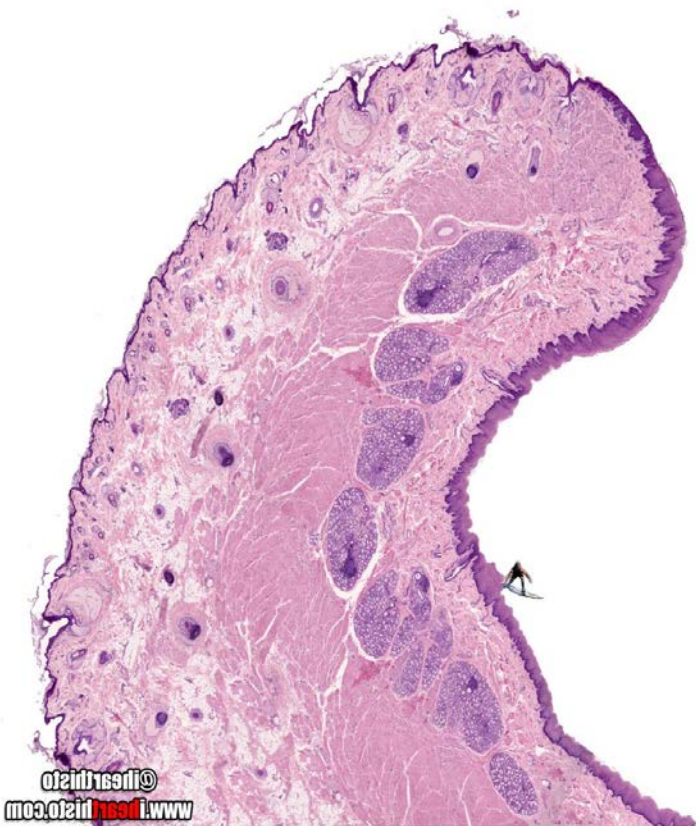
**Lip**  
(skin side)



**Ret**  
(mucous side)



?



Adult

Suckling

# Newborns vermilion zone can be divided into:

- PG** - pars glabra (Glabra = flat)
- PV** - pars villosa (Villosa = vilous)
- (PM** - pars mucosa)

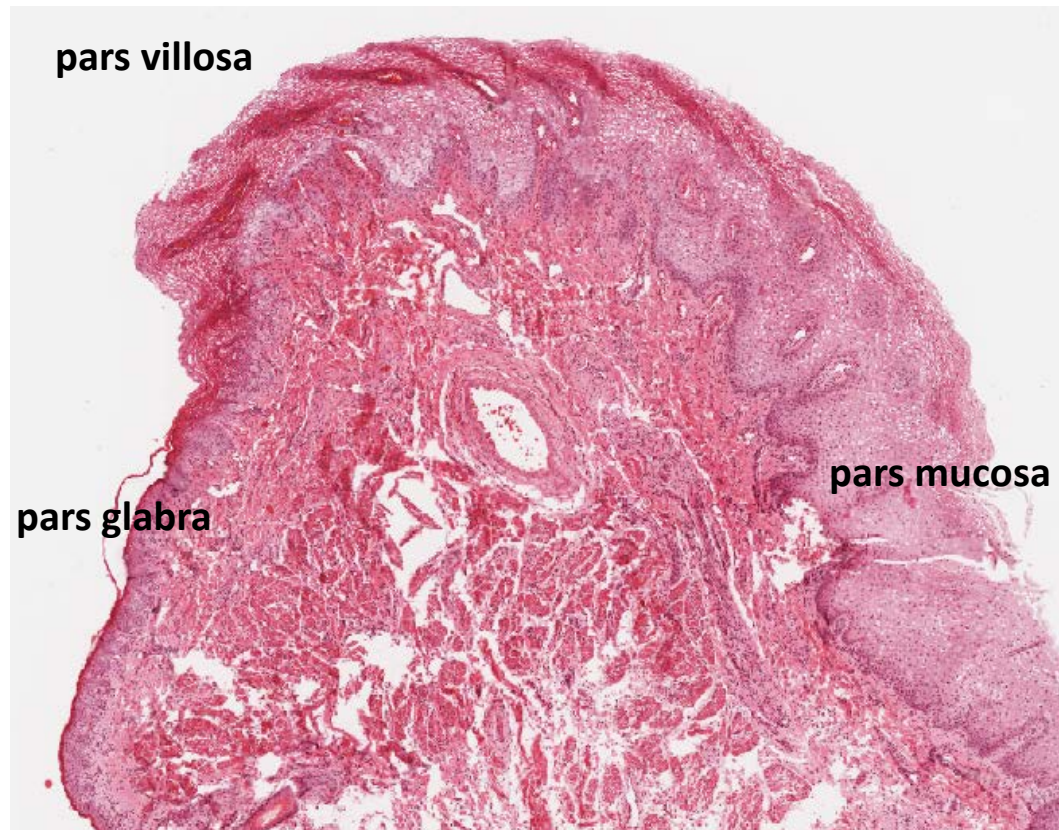
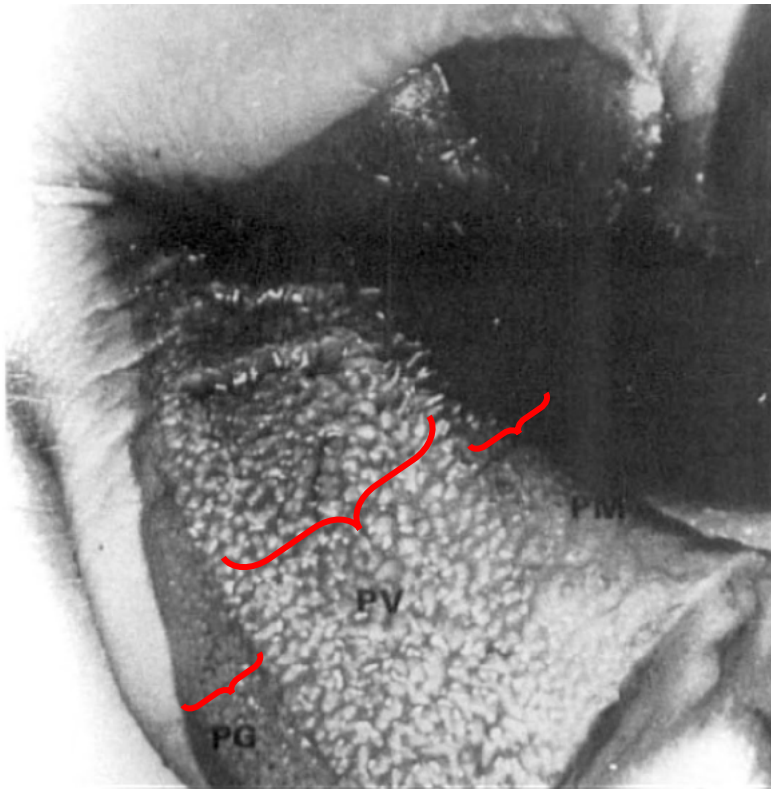


FIG. 1.10. Lips and commissure of mouth of a 39-week-old fetus.

# Newborns vermilion zone

ventral (skin) and dorsal (mucous) side are connected by vermilion zone

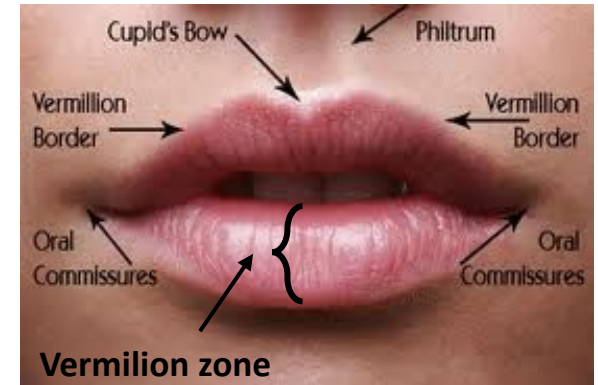
## NEWBORNS vermilion zone can be divided into:

**pars glabra (2 mm)**

more narrow, ventral

**pars villosa (asi 4 mm)**

wider, dorsal



### Pars glabra

- Stratified squamous epithelium with keratinization signs
- Lamina propria protrudes by higher papillae than dermal papillae
- In 50 % small sebaceous glands are in lamina propria

### Pars villosa

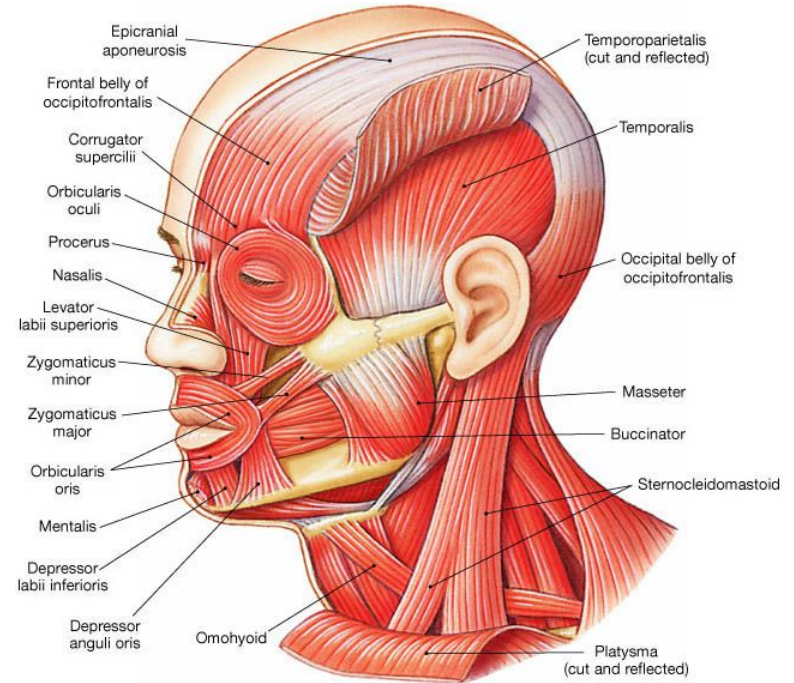
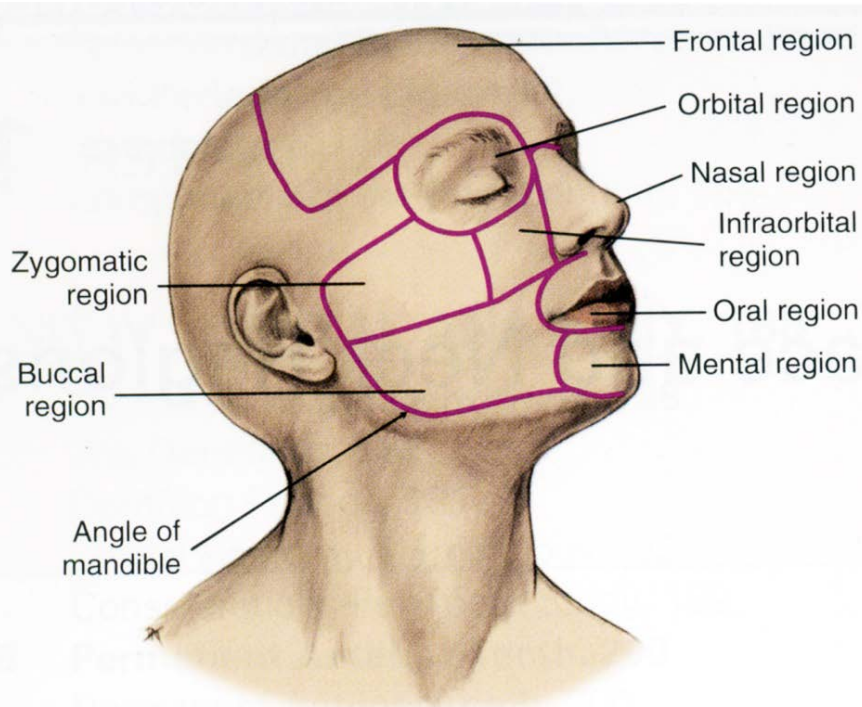
- Thick stratified squamous epithelium
- Numerous and slender papillae, which form the labial torus (torus labialis)
- Papillae are HIGHLY VASCULARIZED and contains numerous of sensitive NERVE ENDINGS
- Facilitates firm connection with the nipple during breastfeeding



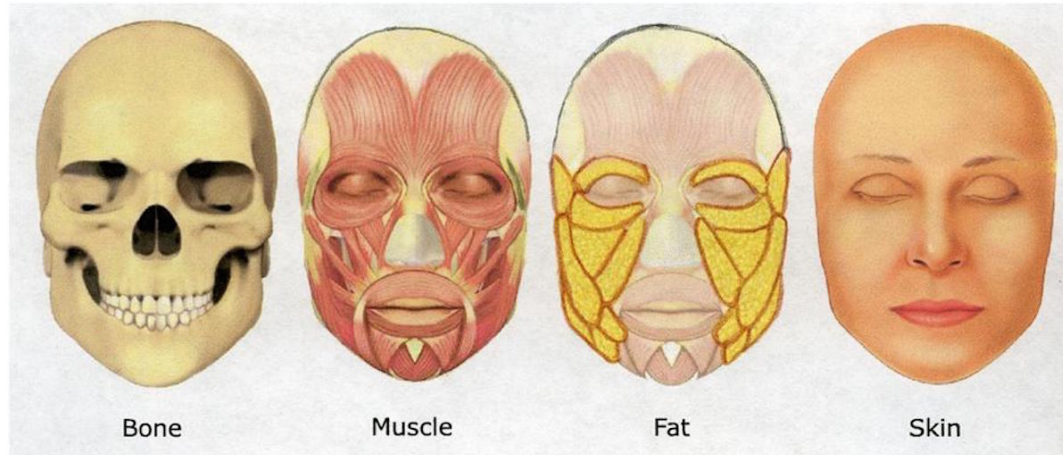
zonation of the vermilion zone disappears with advanced age of a child

# Cheek (bucca)

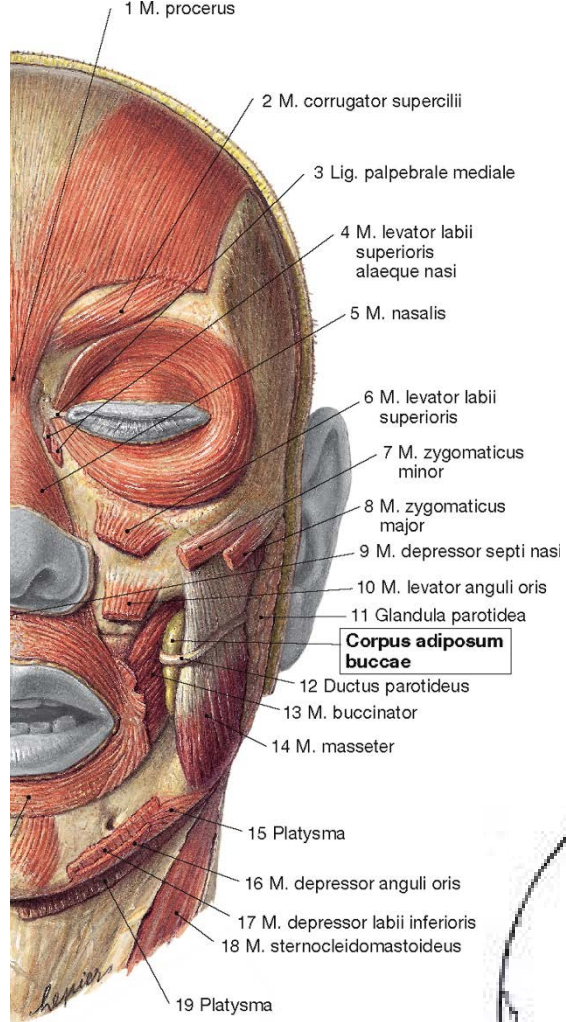
Histologically similar to the lip



(a) Lateral view

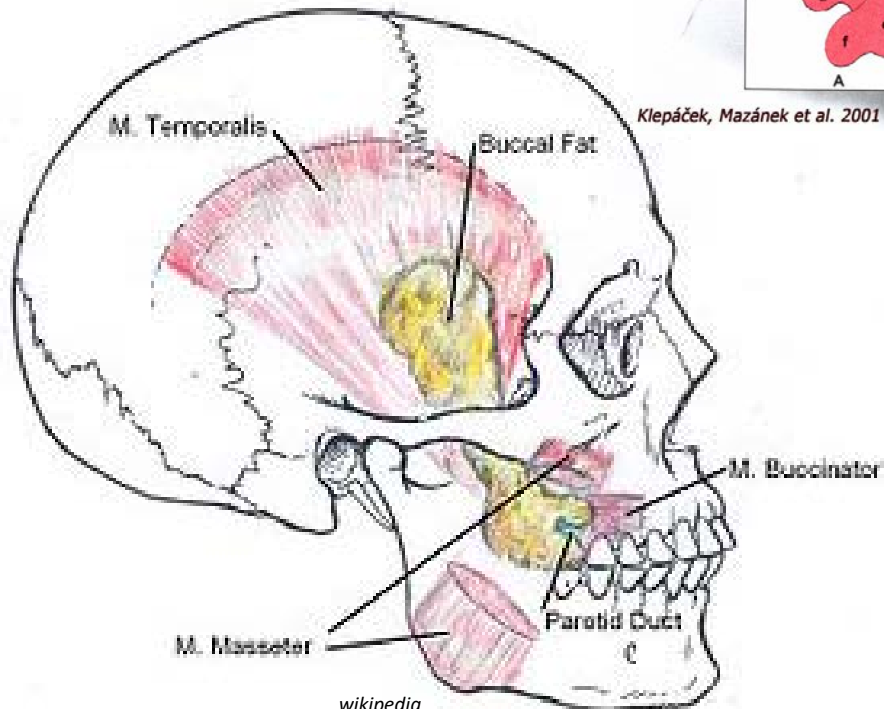
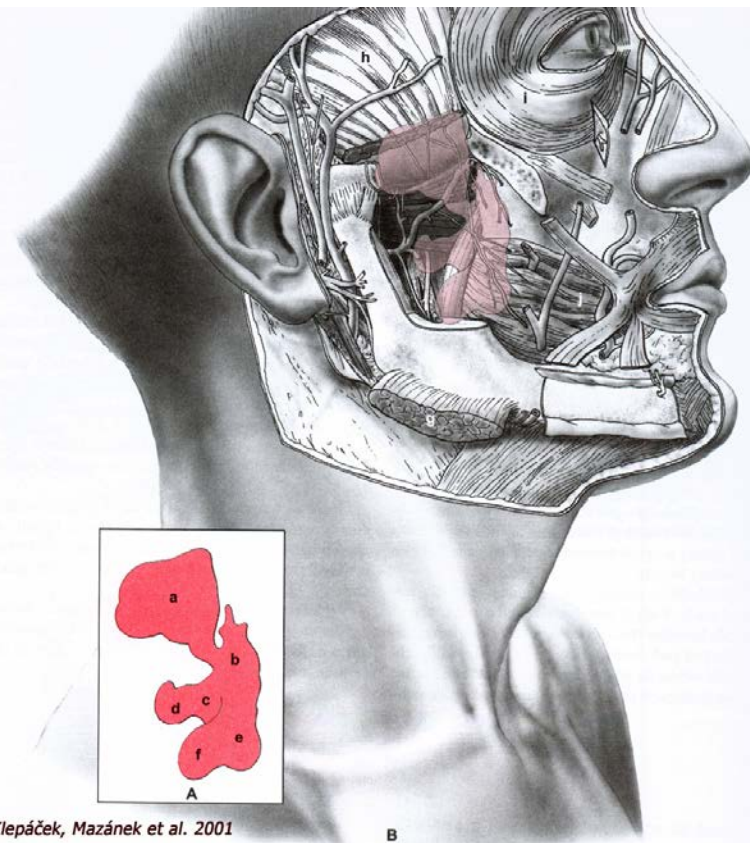






Between *m.buccinator* and  
*m. masseter*:

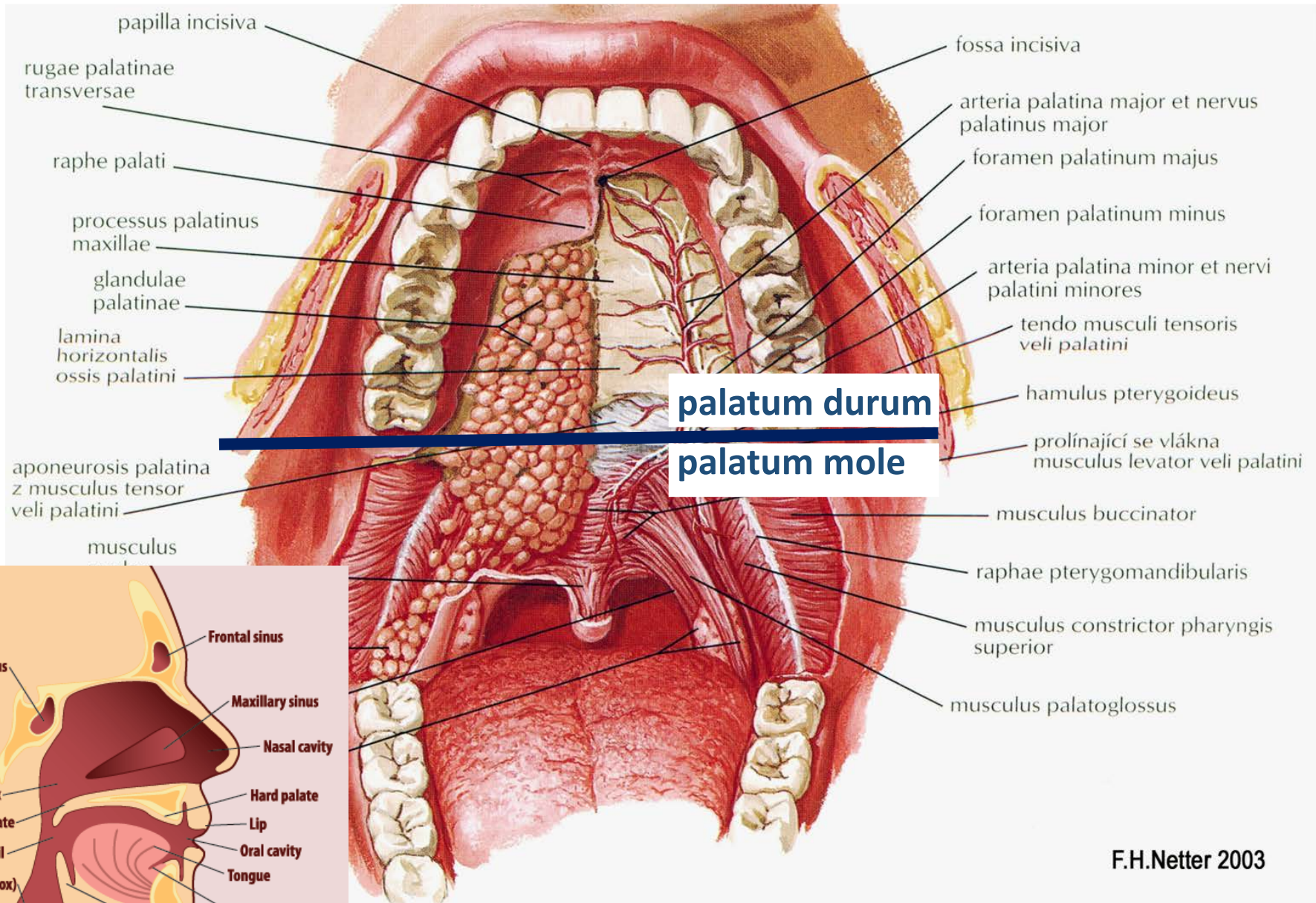
## Corpus adiposum buccae



wikipedia

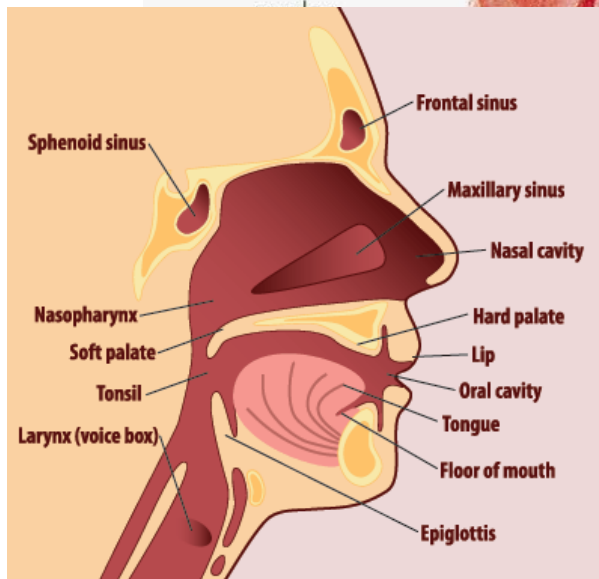
<https://www.brainyoo.de/Brainyoo2Web/>

# Palate



**palatum durum**

**palatum mole**

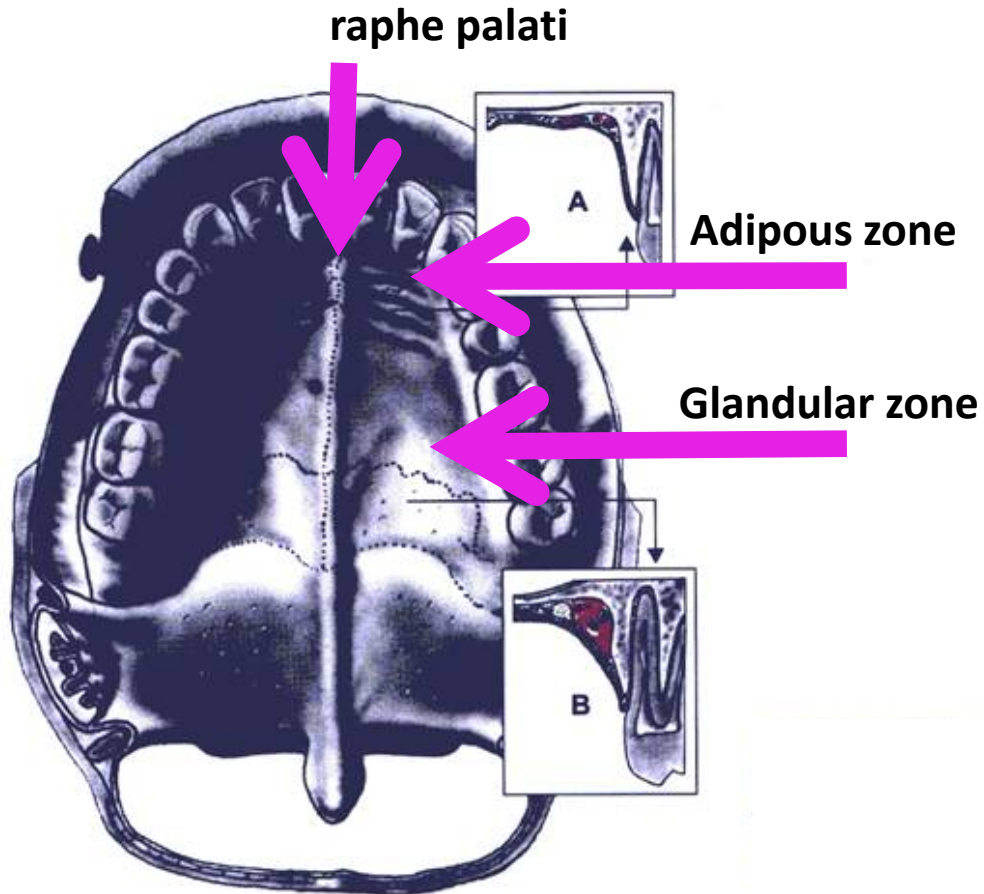


# Hard palate (*palatum durum*)

Masticatory mucosa:

- Epithelium stratified squamous keratinizing
- Tela submucosa missing

Huge regional variability:



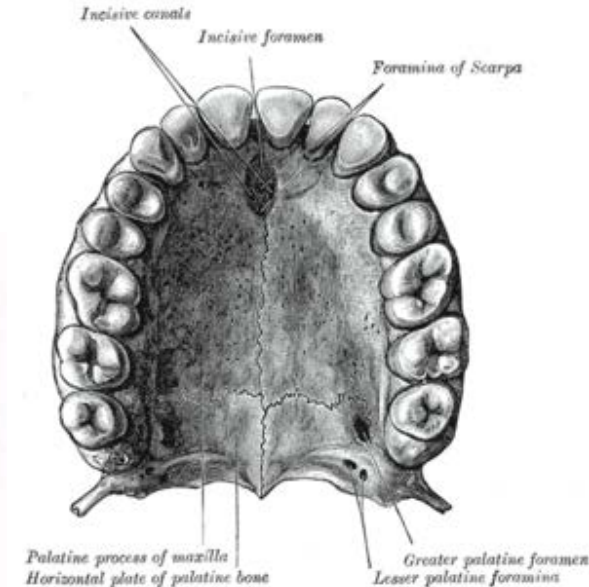
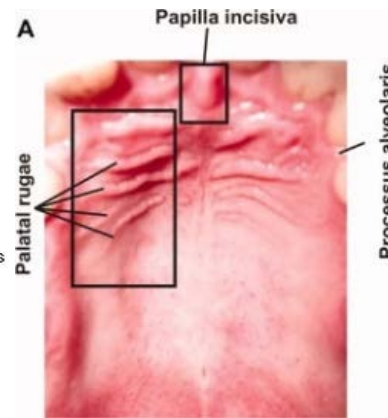
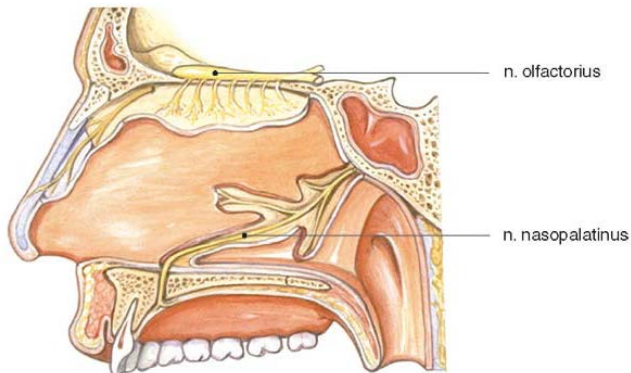
# Local differences in hard palate structure

## Palatal raphe

- Midline from the incisive papilla to soft palate, mucosa without glandulae and adipocytes

## Foramen incisivum

- Location on the *papilla incisiva*
- Maintains connection with nasal cavity before birth is closed

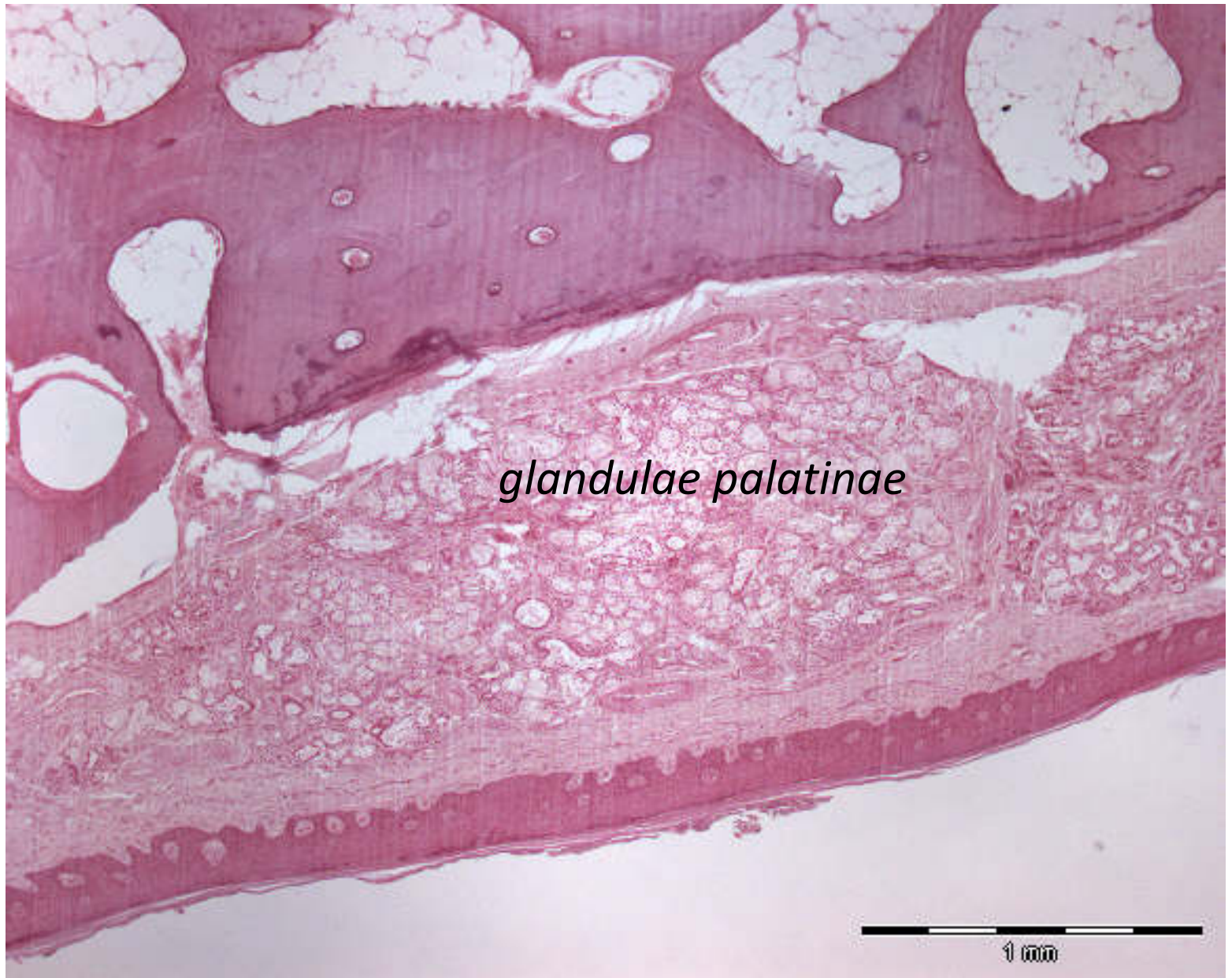


## Adipose zone

- Paired structure
- Medially divided by papilla incisiva and raphe palati, Laterally bordered by gingiva and premolars
- Mucosa is thickened into 3-5 transversal plicae - *plicae palatinae transversae*, core of plicae is formed by stripes of dense collagenous connective tissue interlaced with adipocytes

## Glandular zone

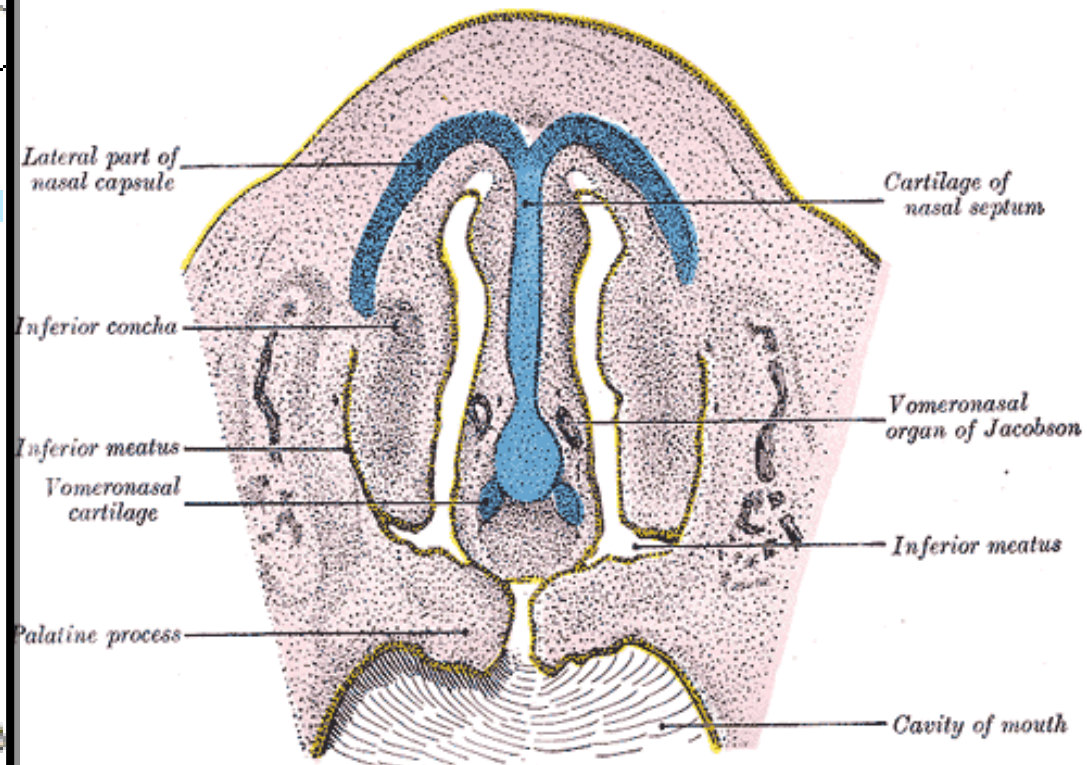
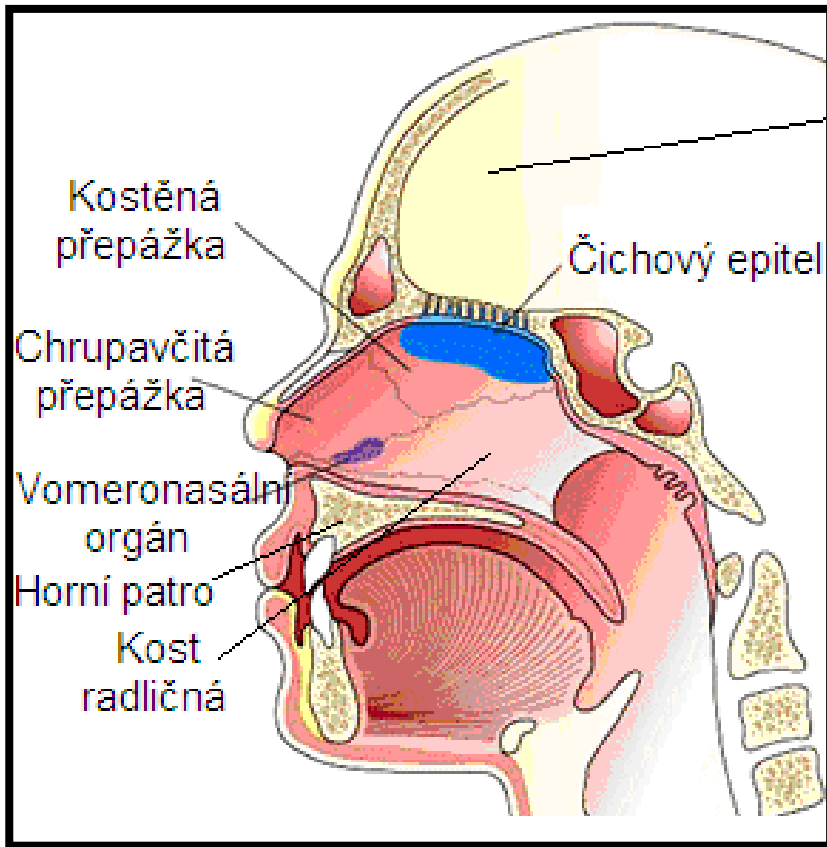
- Paired structure
- Mucosa is smooth and contains true mucous glands – *gll. palatinae*



**Hard palate – glandular zone (frontal view)**

## Vomeronasal organ (organon Jacobsoni)

- **RUDIMENTARY** in human
- Under nasal septum musosa anteriorly to and above the incisive duct
- 2- 6 mm long, dead-end thin canal
- Well developed in reptiles - the olfactory organ
- Chemoreceptors



# Soft palate (palatum molle)

Nasal side

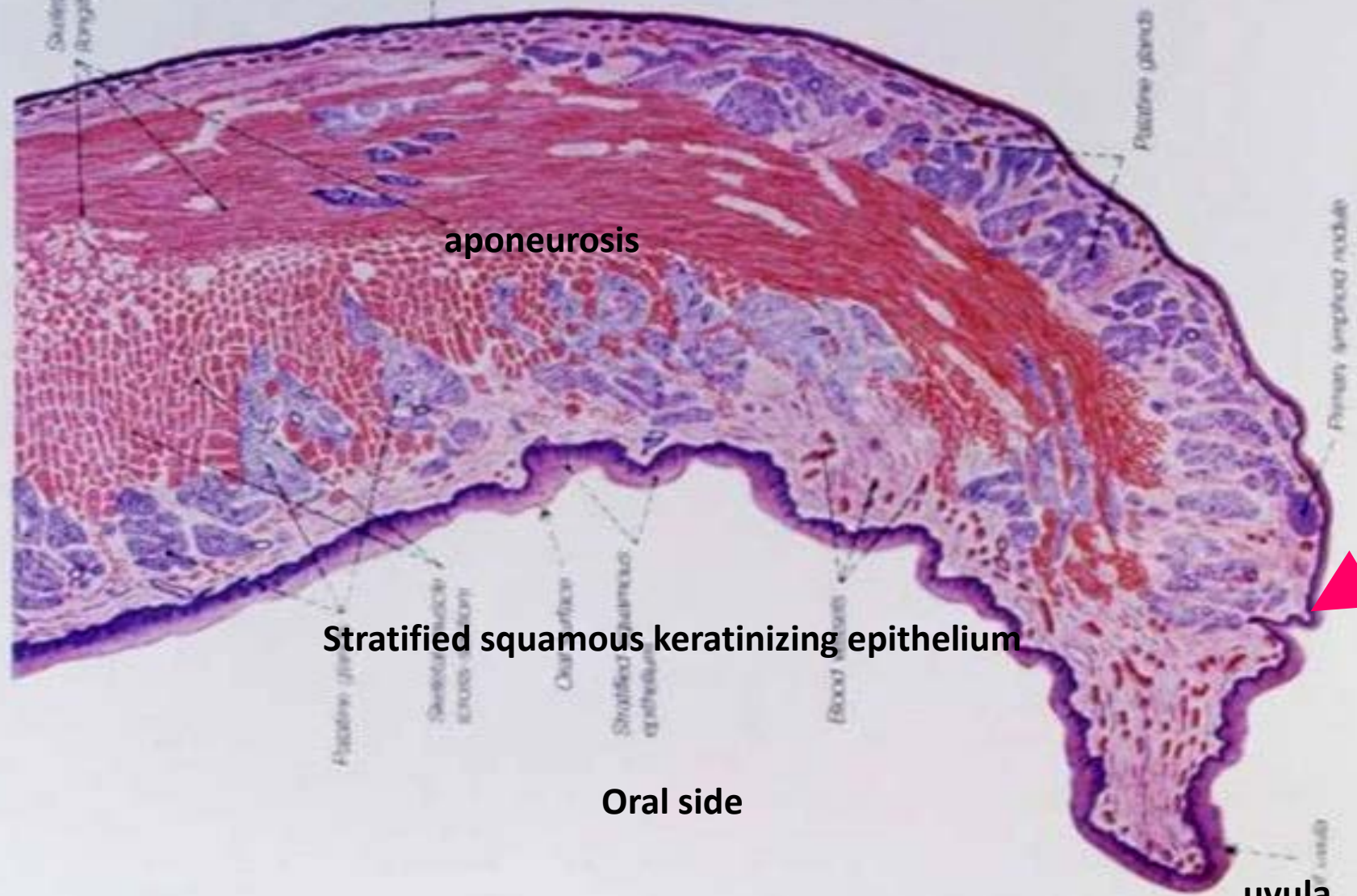
Pseudostratified epithelium

aponeurosis

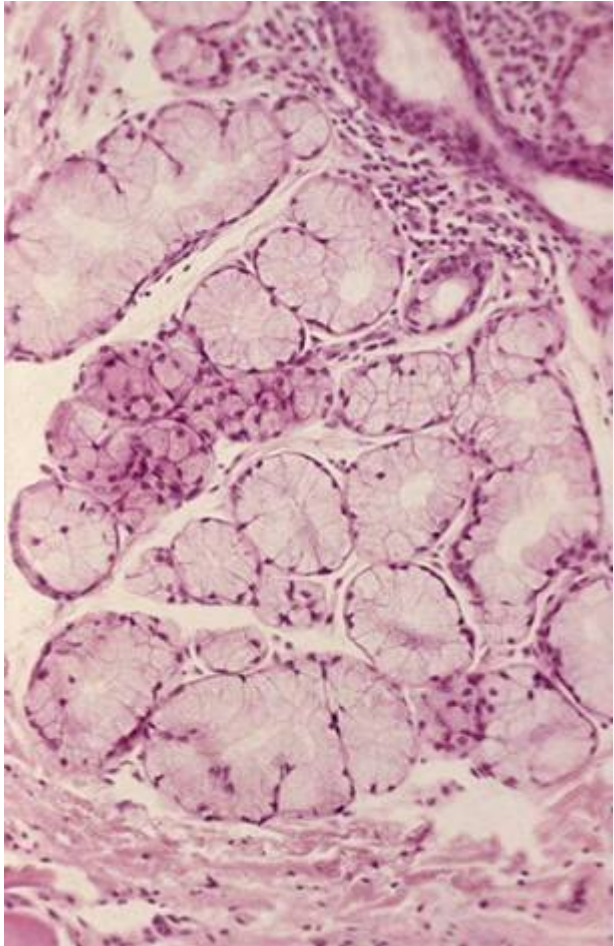
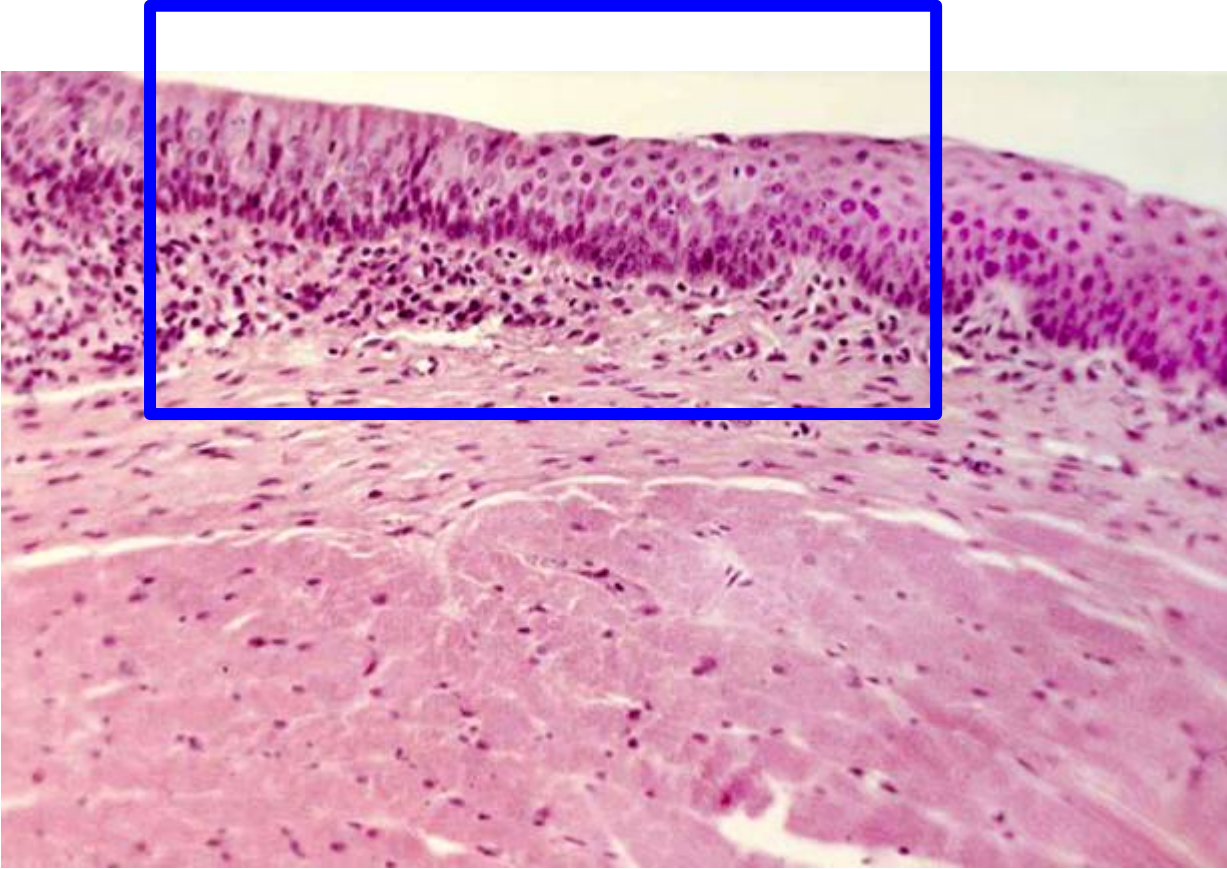
Stratified squamous keratinizing epithelium

Oral side

uvula

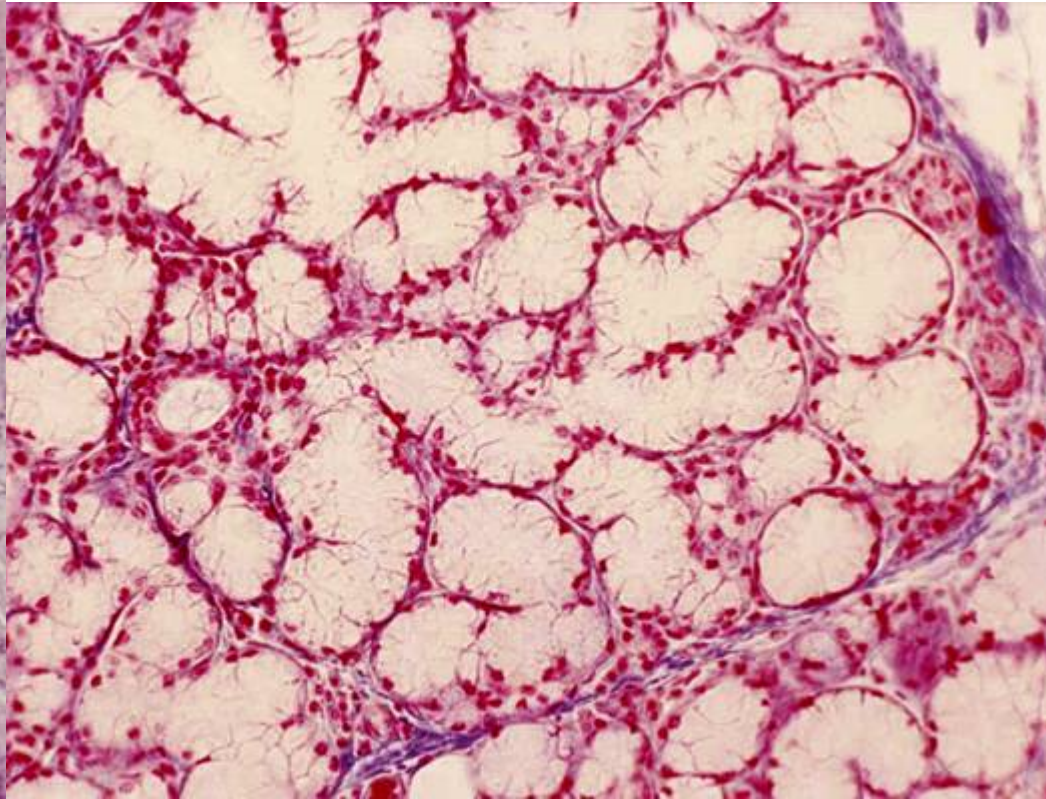
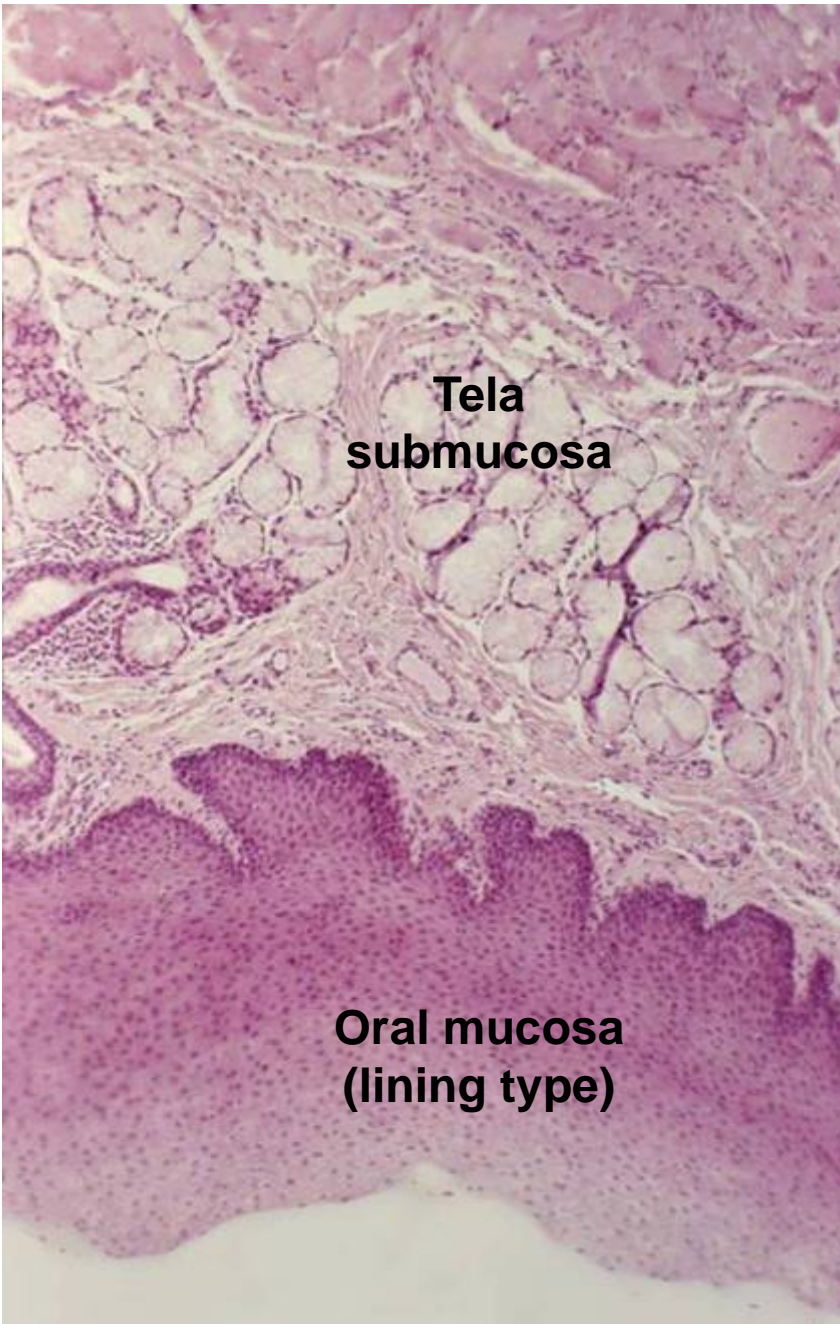


Transitional zone on nasopharyngeal side



Mixed gll. nasales  
(nasal side)





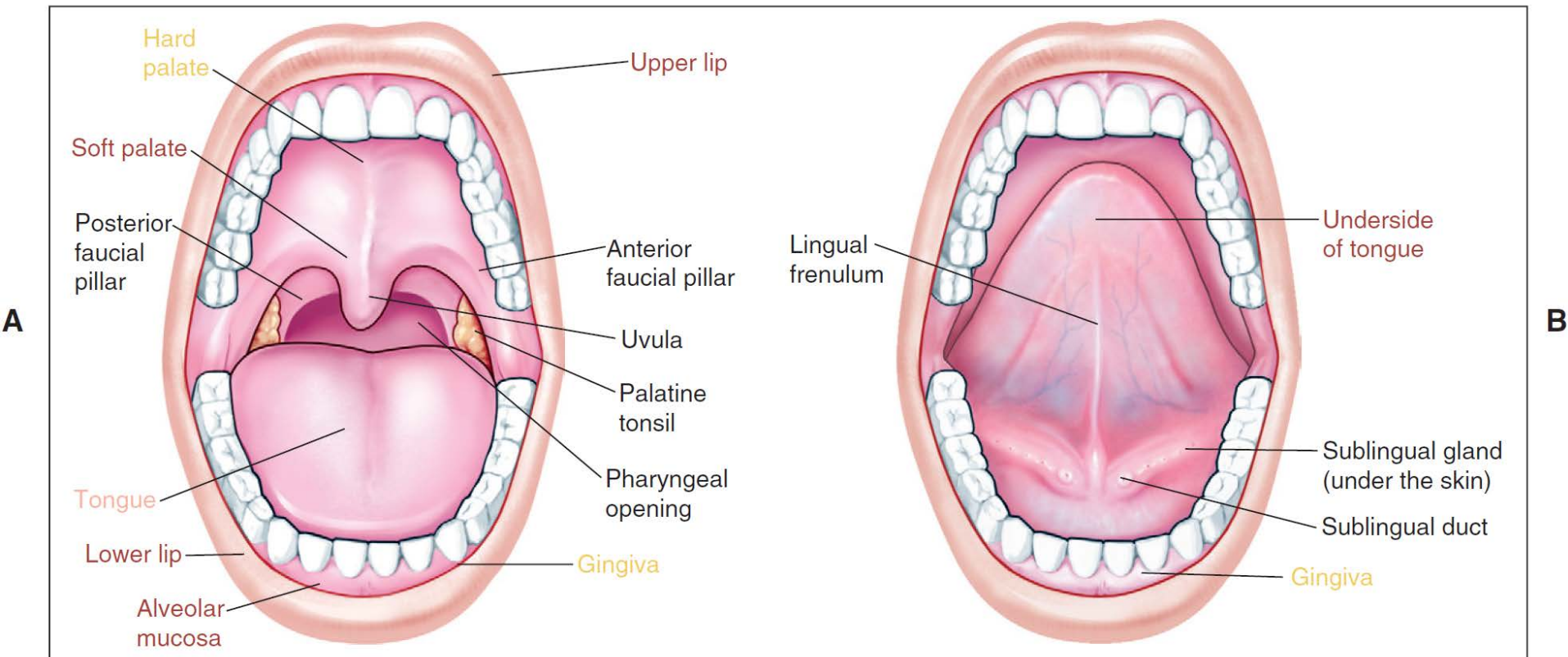
# Soft palate(*palatum molle*)

- Movable mucosal fold terminated by a uvula – *uvula* (gr. *staphylos*)
- Interposed between the oral cavity and nasal fossae

Core tissue - ***aponeurosis palatina***, composed of tendons and muscles of striated muscles (mostly *m. tensor veli palatini*)

- **Nasal aspect** - mucosa of respiratory passages and tela submucosa with mixed glandulea (*glandulae nasales*)

- **Oral aspect** - lining mucosa, dorsally passes to the nasal aspect (over uvula) between mucosa nad aponeurosis is submucous coat with mucinous glandulae (*glandulae palatinae*)



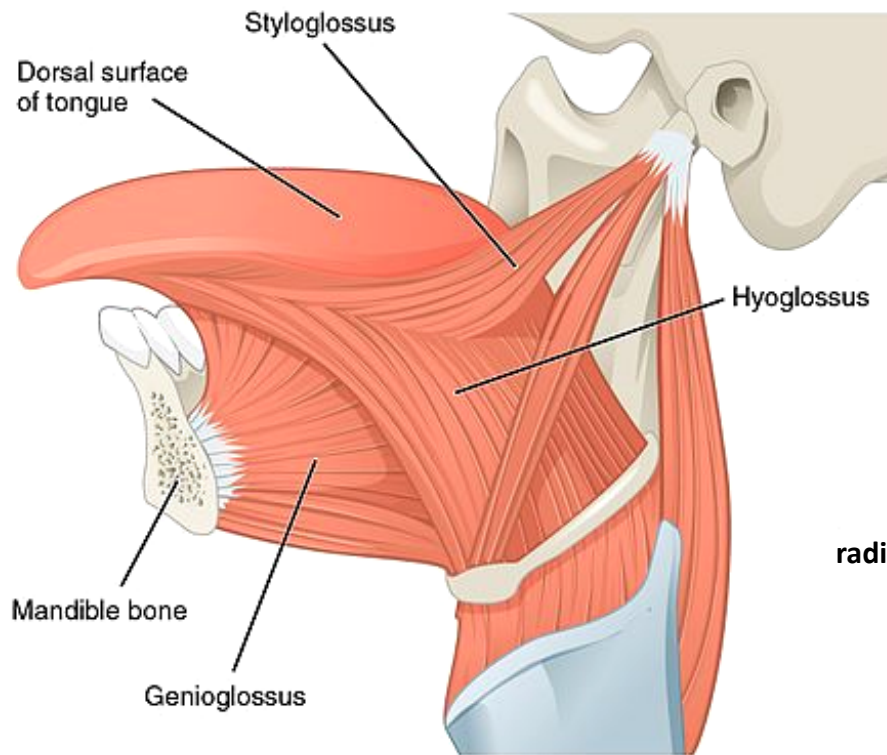
**FIGURE 12-1 A and B,** Anatomic locations occupied by the three main types of mucosa in the oral cavity. (From Thibodeau G, Patton K: *Anatomy and physiology*, ed 6, St Louis, 2007, Mosby.)



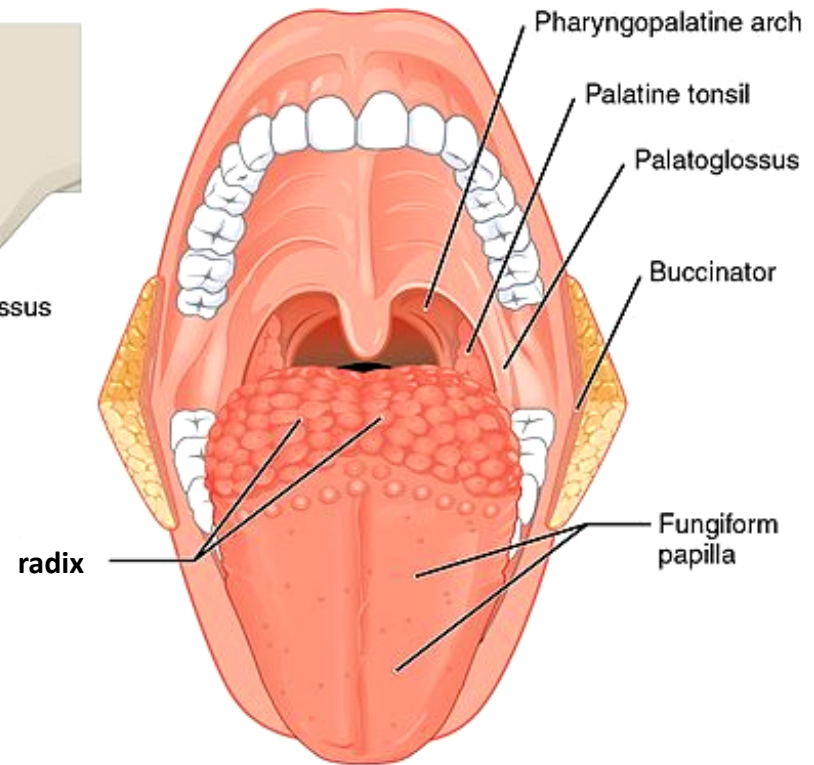
# Tongue

Lingua (lat.)

Glossa (gr.)



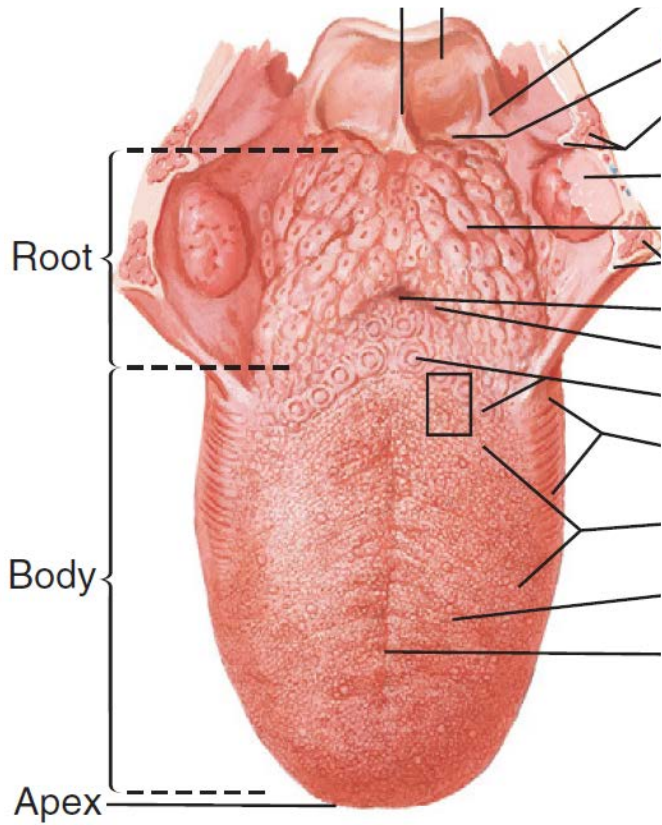
(a) Extrinsic tongue muscles



(b) Palatoglossus and surface of tongue

**Base:** intra- and extraglossal striated muscles

**Evolutionary:** developed in terrestrial vertebrates and amphibians (tetrapods) from muscles of oral floor



## Surface

### Dorsum linguae

Specialized oral mucosa

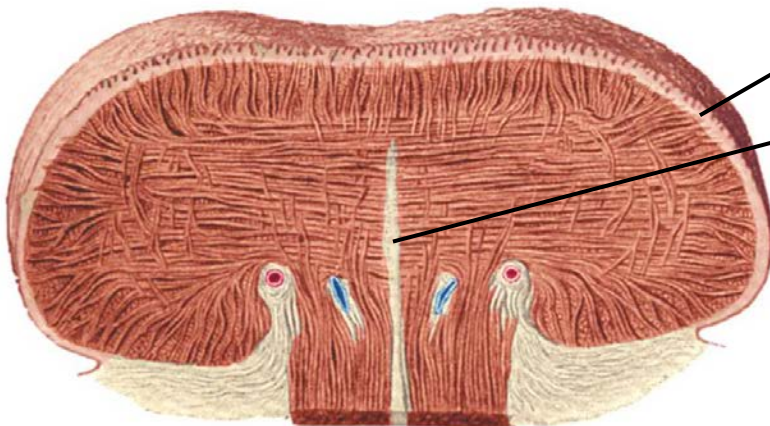
### Inferior aspect

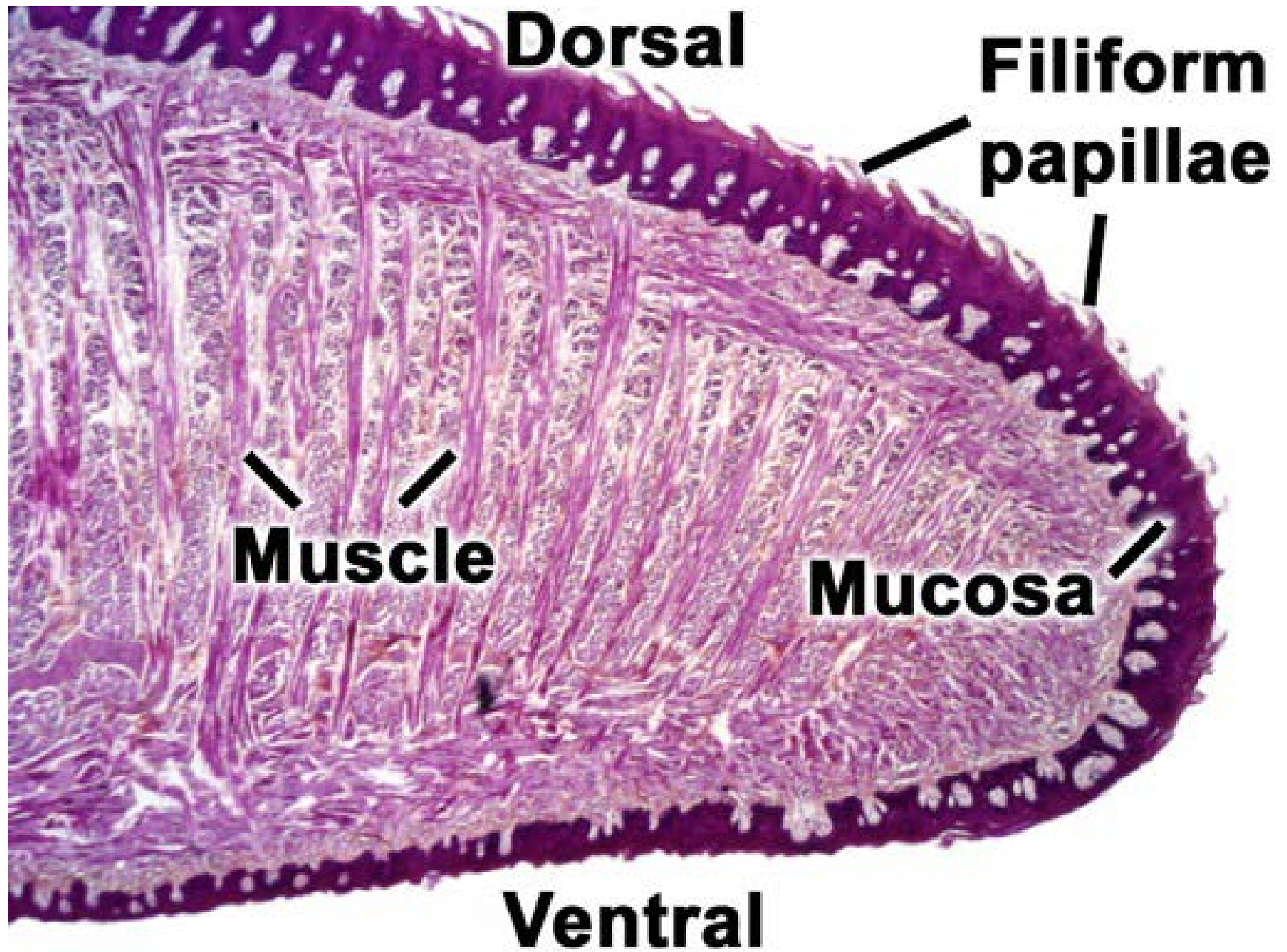
Lining mucosa

## Fibrous parts

*aponeurosis linguae*  
very stiff fibrous membrane

*septum linguae*  
Composed from dense collagenous tissue







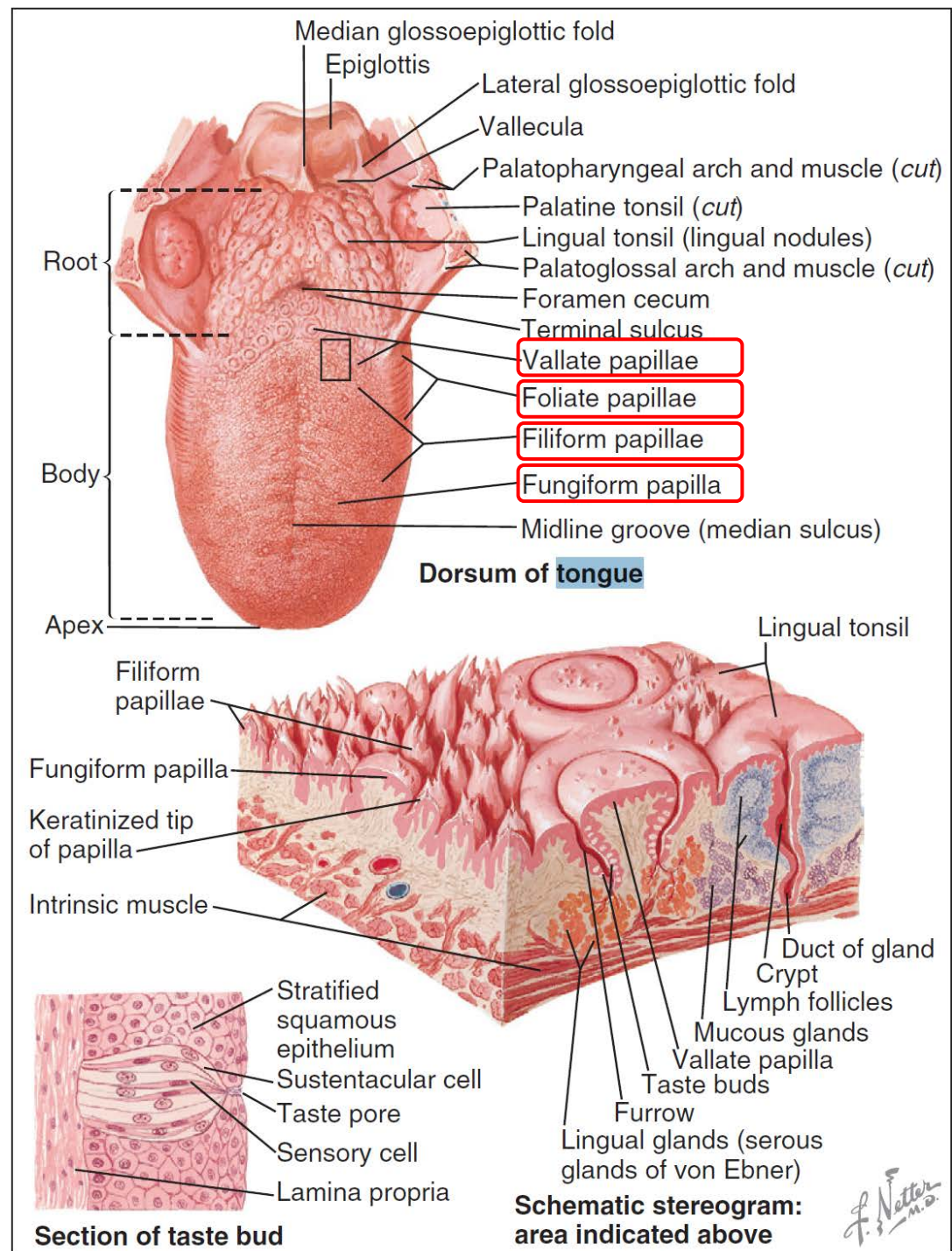




# Dorsum linguae

## Specialized oral mucosa

- Firmly connected with *aponeurosis linguae*
- Rough surface
- Mucosal outgrowths - **lingual papillae**
- Covered by nonkeratinized squamous stratified epithelium (except of papillae filiformes)

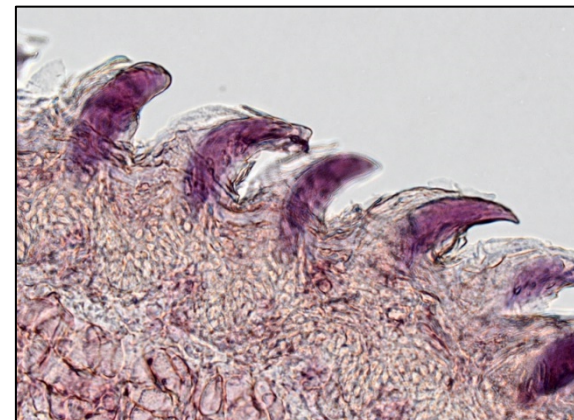
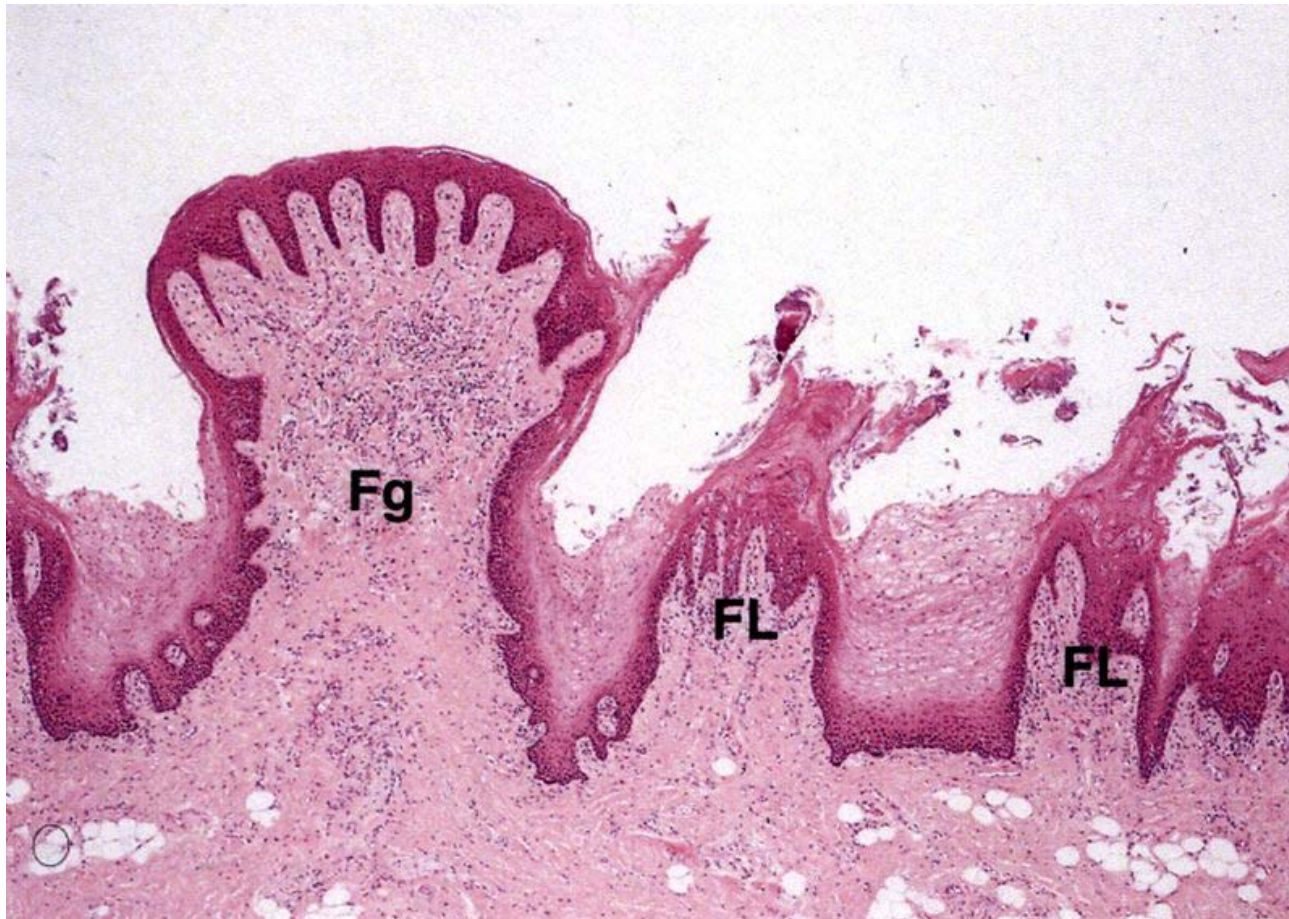


### ***Papillae filiformes***

The most abundant and distributed over the entire dorsal surface of the tongue;  
Brush-like appearance (0.5-1 mm in height, 0.2-0.3 mm in width);  
The stratified squamous epithelium is often cornified

### ***Papillae fungiformes***

Mushroom-shape (0.5-1.5 in height, 0.5–1.0 mm in width)  
Taste buds in epithelium



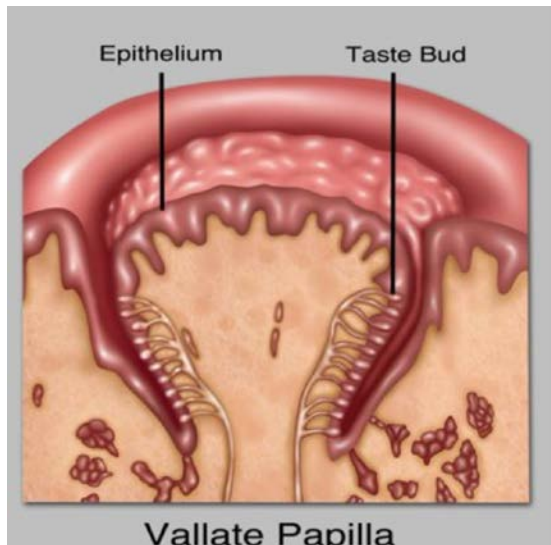
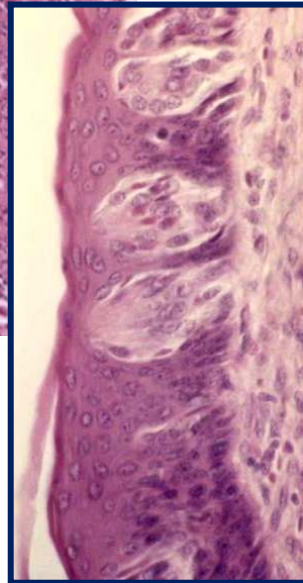
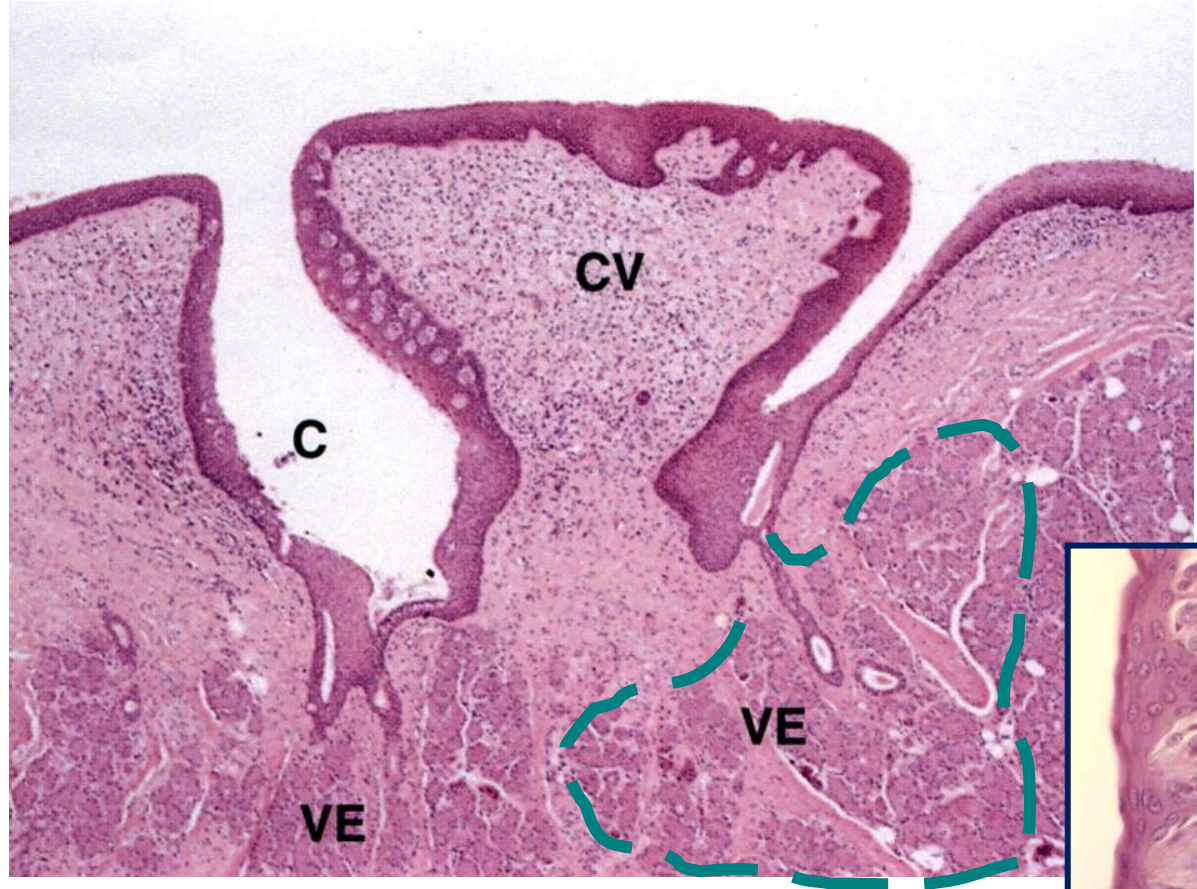
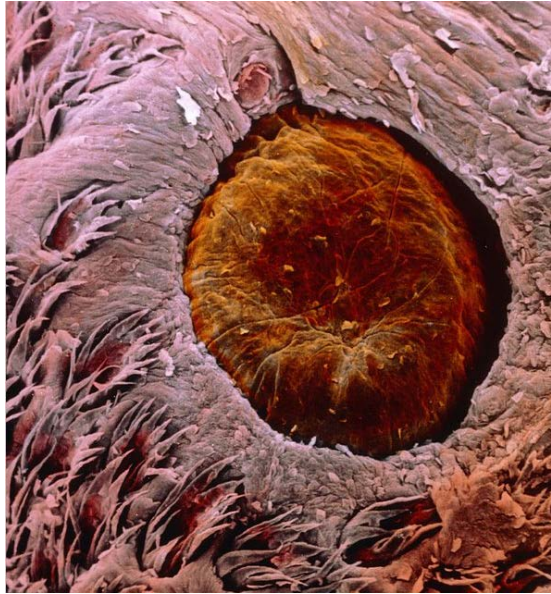
## Keratinisation differences



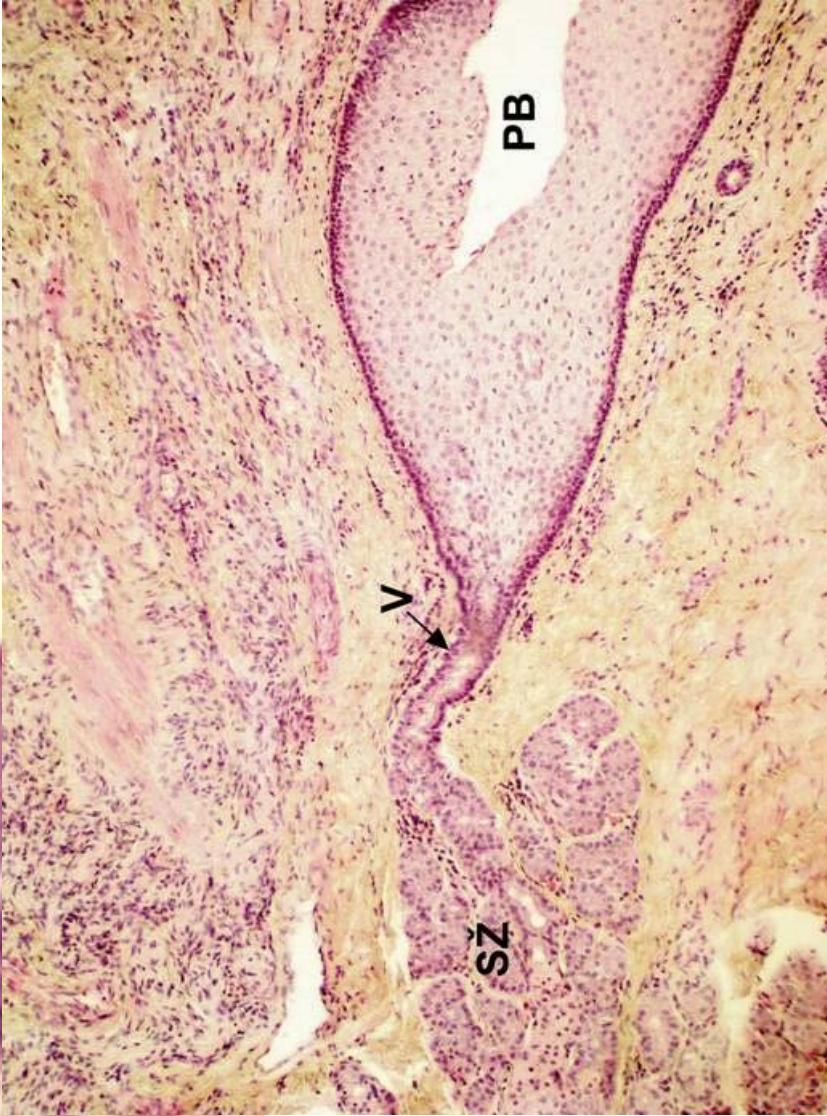
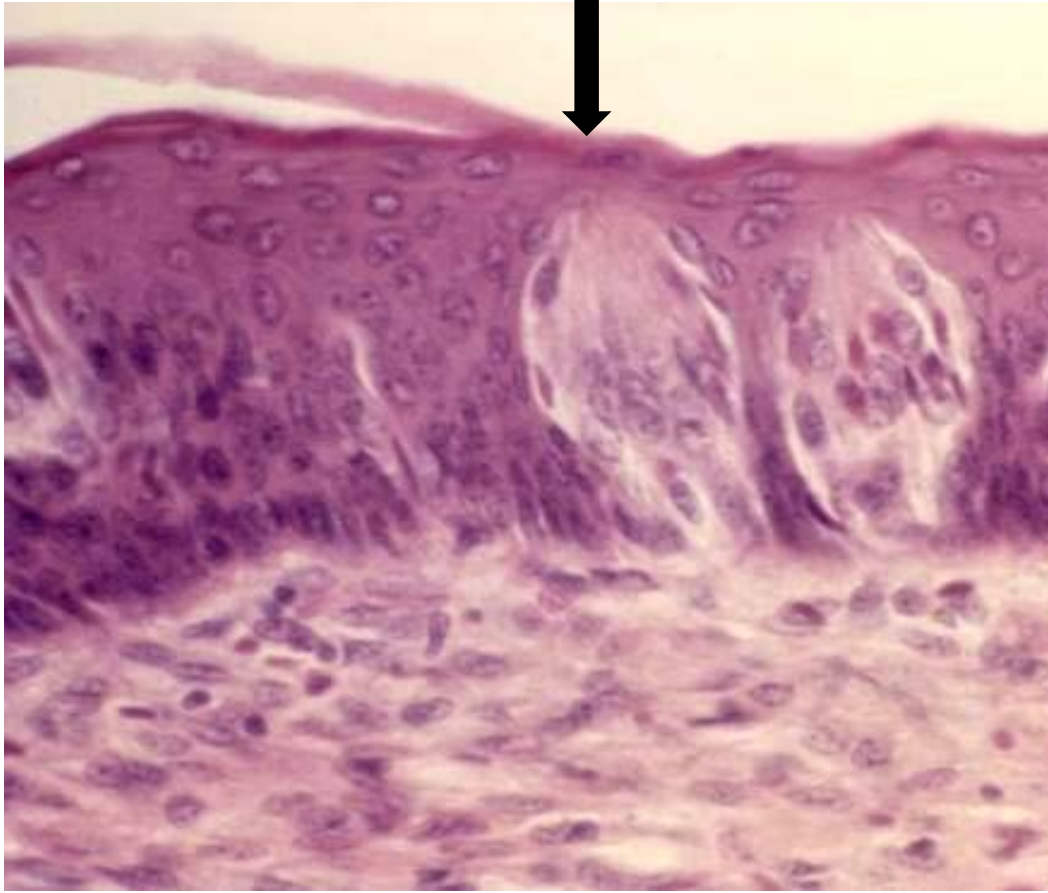
## ***Papillae vallatae (Papila circumvallata)***

Largest (1-4 mm in height, 1-3 mm in width), 7–12 just in front of sulcus terminalis, submerged into mucosa. Deep circumpapillary furrow.

Taste buds



Taste bud



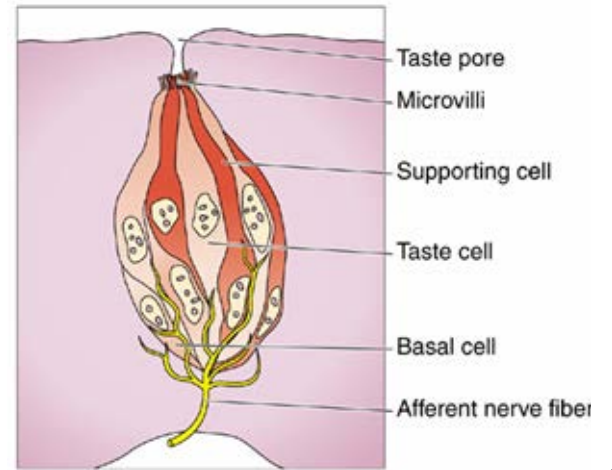
Duct (V) of Ebner's gland opening on bottom of an circumpapillary furrow.



**TASTE ?**

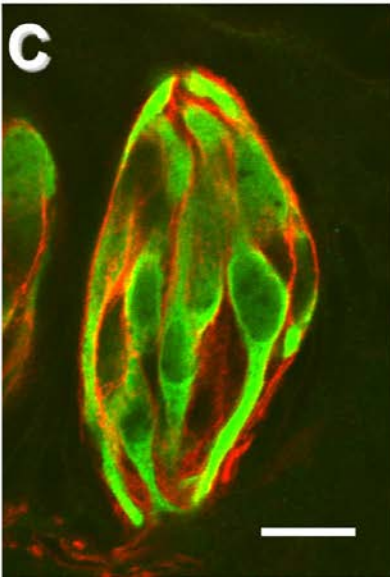
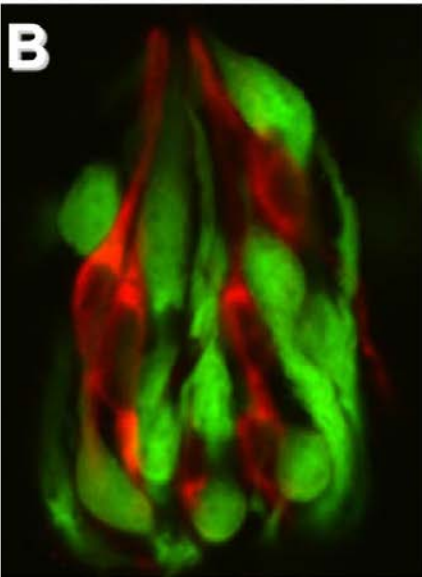
**Basic tastes:**

- Sweet
- Salty
- Sour
- Bitter
- Umami



**Suggested:**

- Fatty
- Metalic



## Samples:

- labium oris (1)
- palatum molle (5)
- apex linguae (2)
- papilla vallata (3)