Third year

GIT..

Anatomy

# Lecture (1)

# Anatomy of Mouth, Teeth& Tongue

Dr. Amany Allam

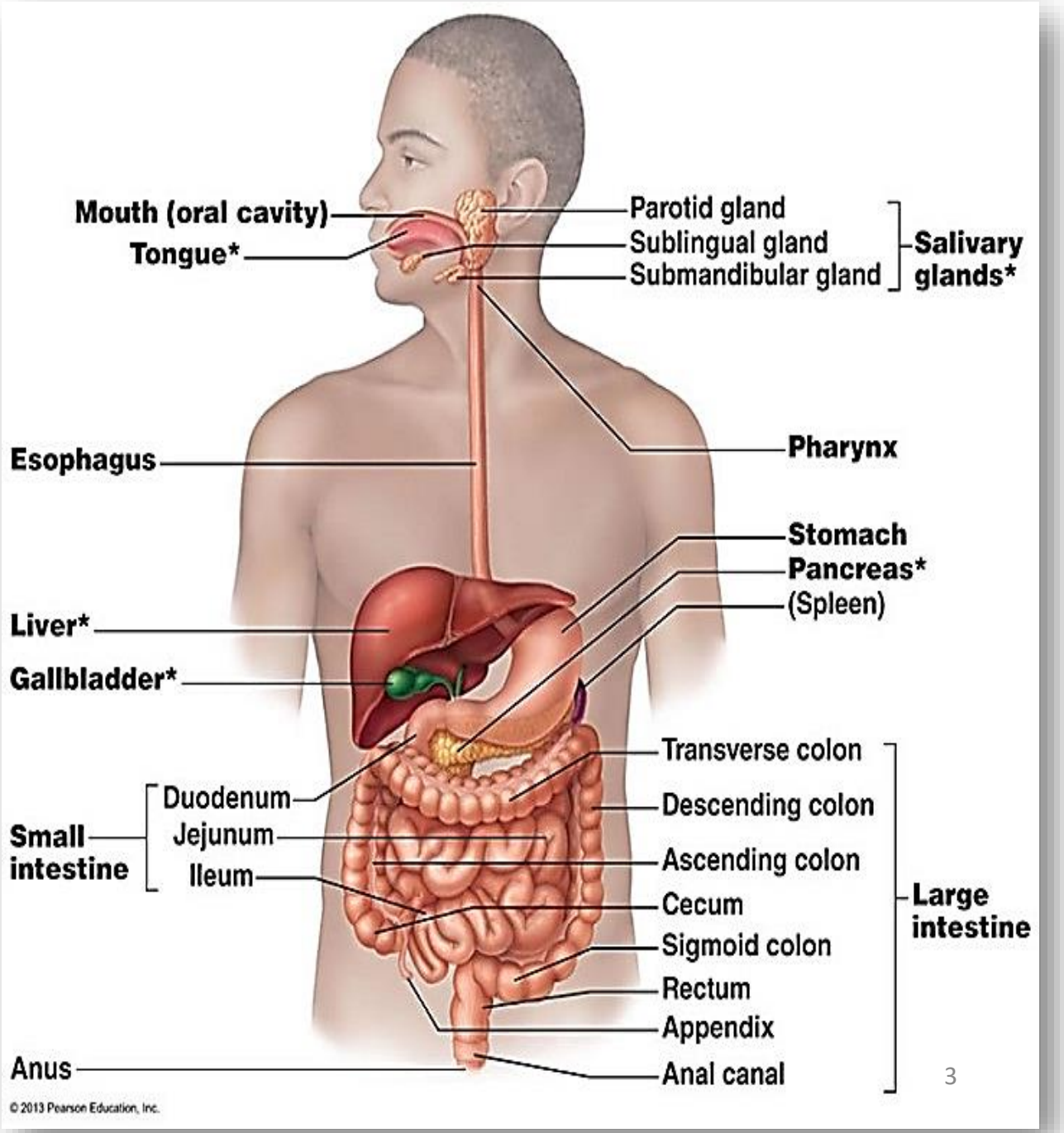
Assistant professor of Anatomy & Embryology

# ILOs

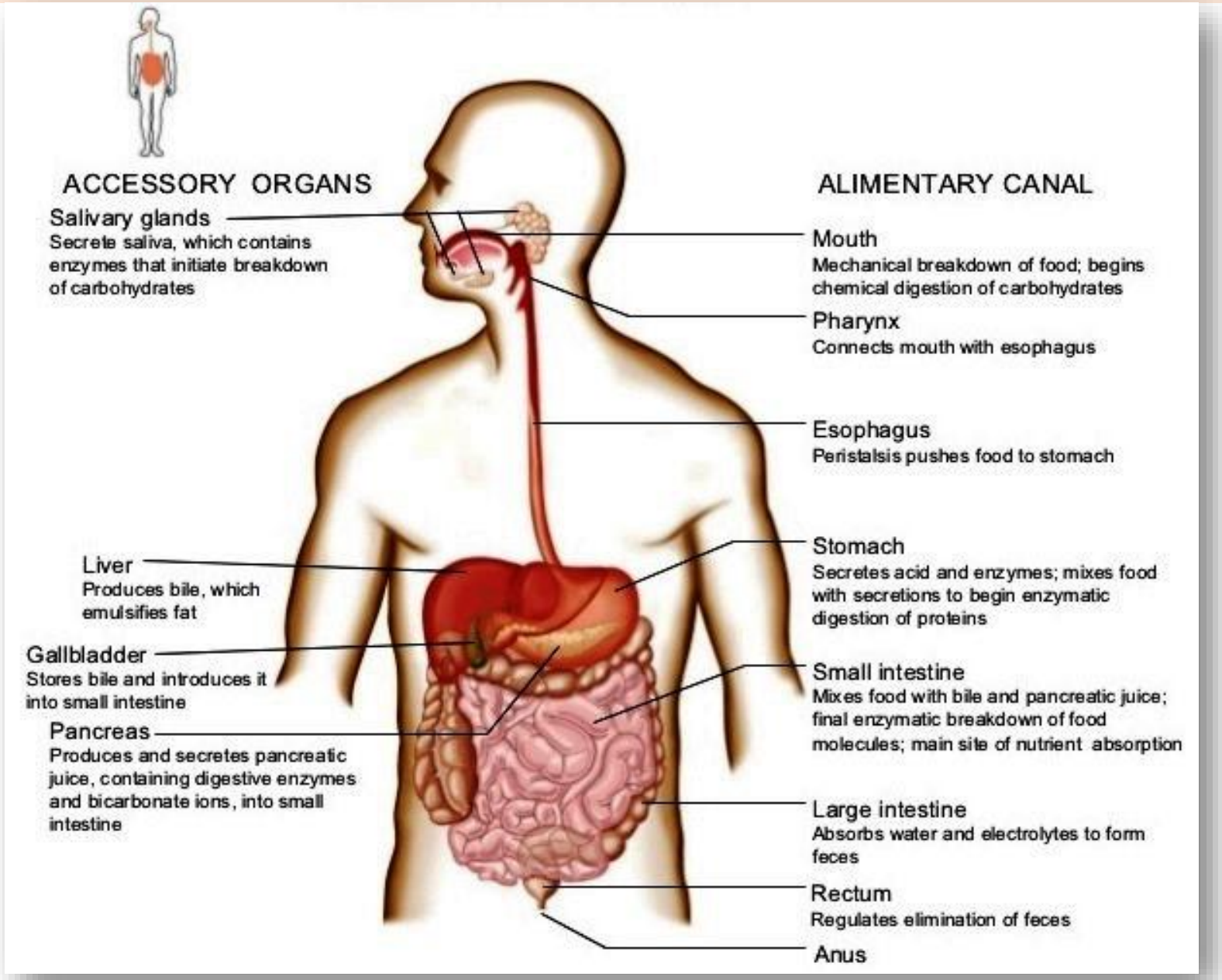
1. Outline the parts & functions of GIT.
2. Describe the anatomy of oral cavity.
3. Briefly describe the teeth (types & structure).
4. Describe the gross features & histology of the tongue.
6. Describe muscles & movements of tongue, blood & nerve supply, lymphatic drainage.

# Parts of GIT

- **The gastrointestinal tract (GIT)** consists of a hollow muscular tube starting from the oral cavity, pharynx, oesophagus, stomach and intestines to the rectum and anus.
- There are various **accessory organs;** the salivary glands, liver, pancreas and gall bladder have important functions in the digestive system.



# Functions of GIT



# Oral cavity

**Def.:** it is the cavity which extends from the lips to the oropharyngeal isthmus, through this isthmus it communicates with the oral part of the pharynx.

## Parts of oral cavity: It is divided into two parts:

## 1-Vestibule:

- It is the space which **bounded externally by** the lips (anteriorly) and the cheek (laterally); and **internally by** the upper and lower alveolar arches (gums and teeth).
- **Parotid ducts:** open into it opposite the upper 2nd molar teeth.

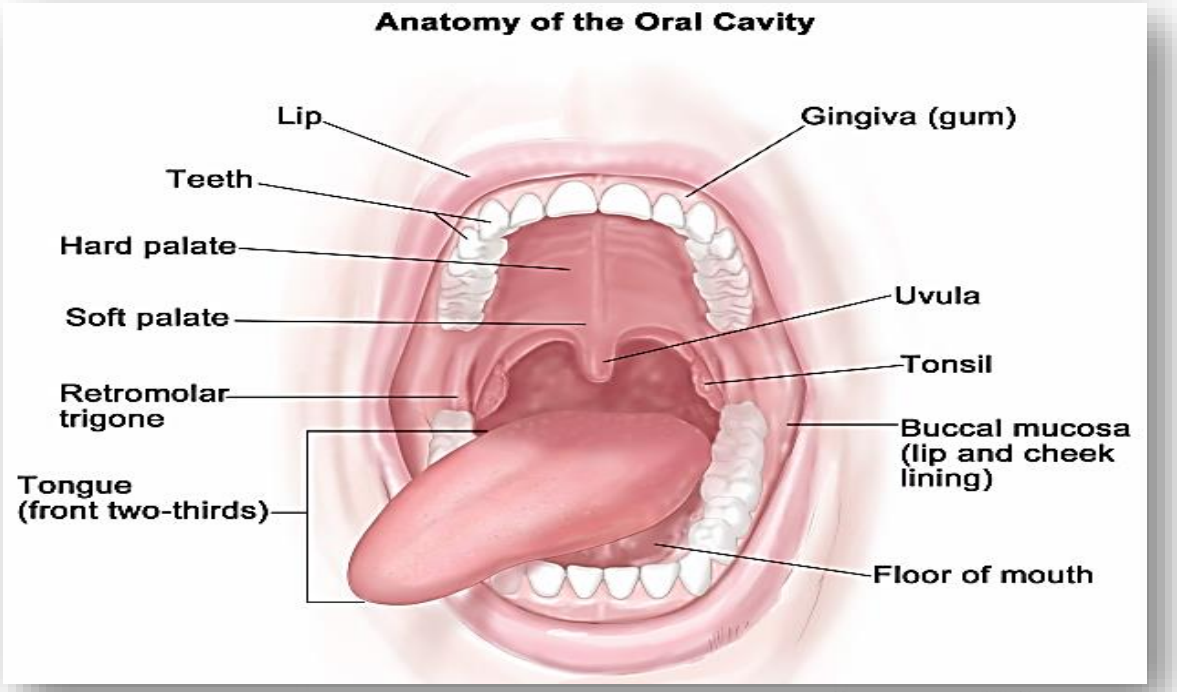
## 2-Oral cavity proper: It has:

**a-Roof:** Hard palate and soft palate.

**b-Floor:** Discussed later.

**c-Anterior &Sides:** Alveolar arches (gums and teeth) of both upper and lower jaws.

**d-Posterior:** Communicates with oropharynx (via oropharyngeal isthmus).



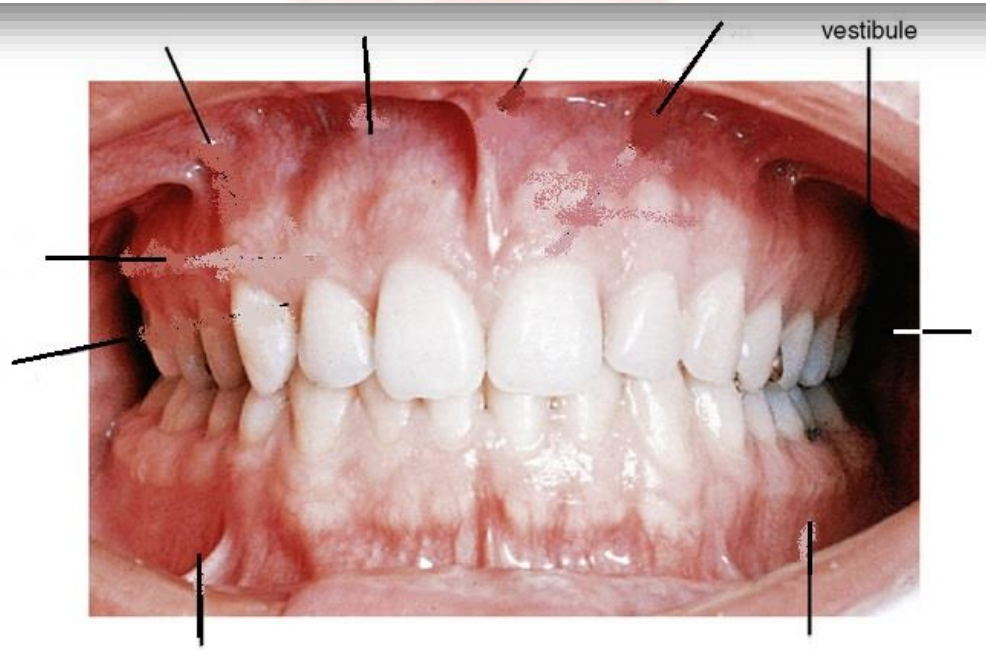
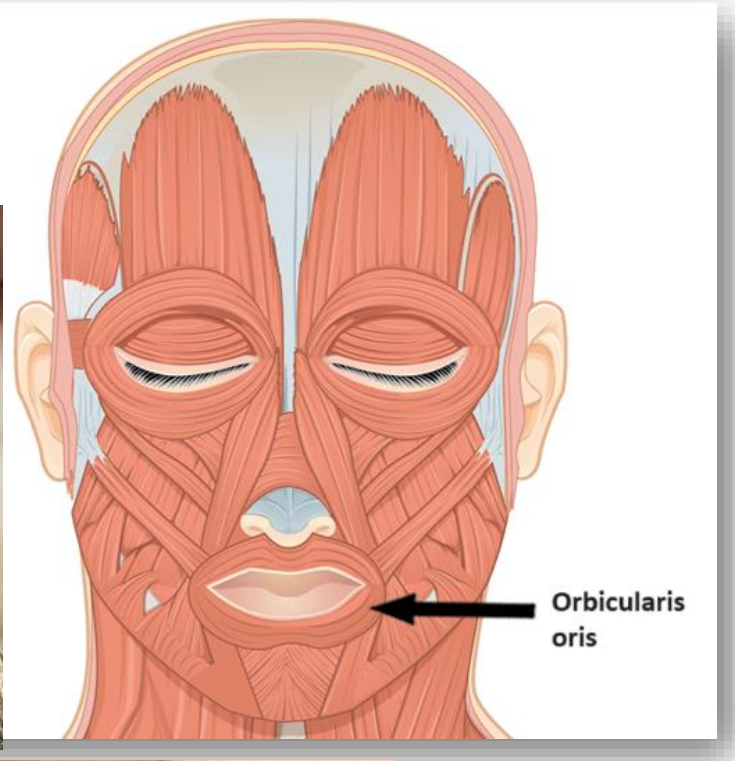




**Fig.: Show the vestibule**

# Lips

- **Philtrum:** Median groove of the skin of upper lip.
- **Oral fissure:** Fissure between the two lips.
- **Angle of the mouth:** Lateral angle of oral fissure at each side.
- **Labial frenulum:** Midline fold of mucous membrane that connect each lip to the corresponding dental arch.




## Nerve supply of lips:

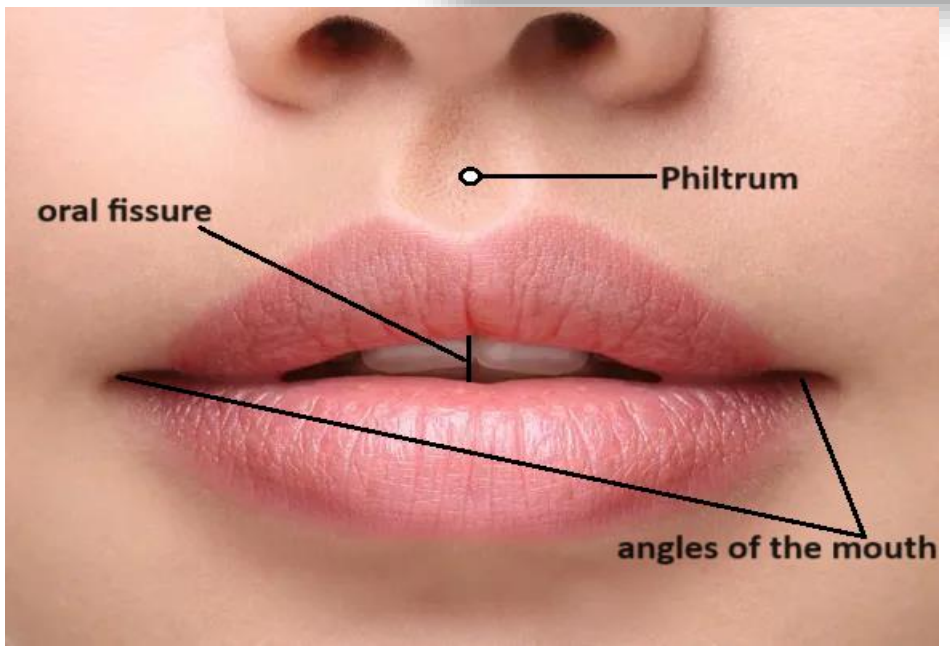
**Motor:** by the facial nerve.

**Sensory:** skin and mucosa of upper lip is supplied by the **maxillary nerve**. while the lower lip by the **mandibular nerve.**

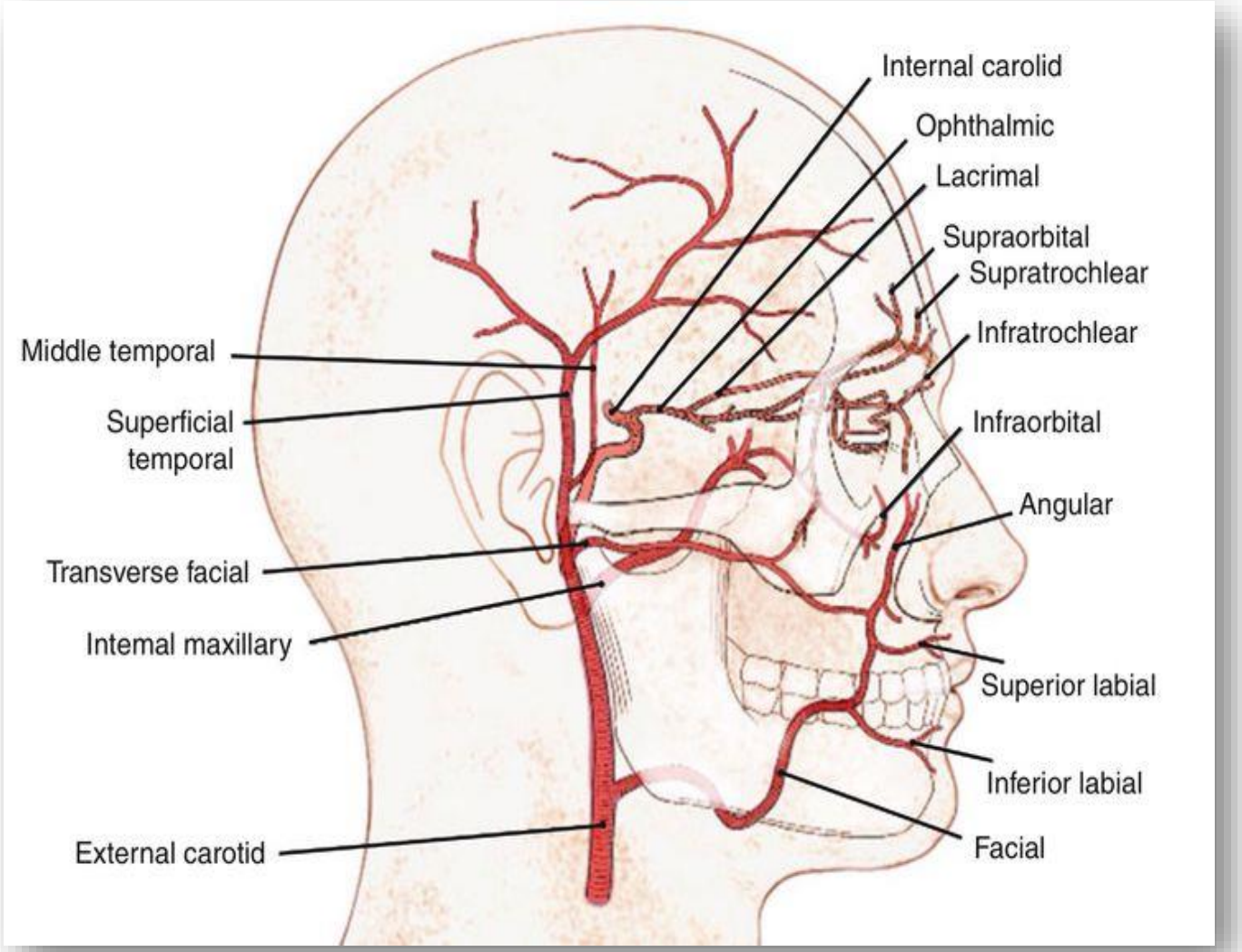
## Arterial supply of lips:

**Upper lip:** by the superior labial of facial artery.

**Lower lip:** by the inferior labial of facial artery.



# Lips




**Arterial supply of lips**

# Structure of lips

**It consists of three surfaces:**

1- **Skin surface:** thin skin.

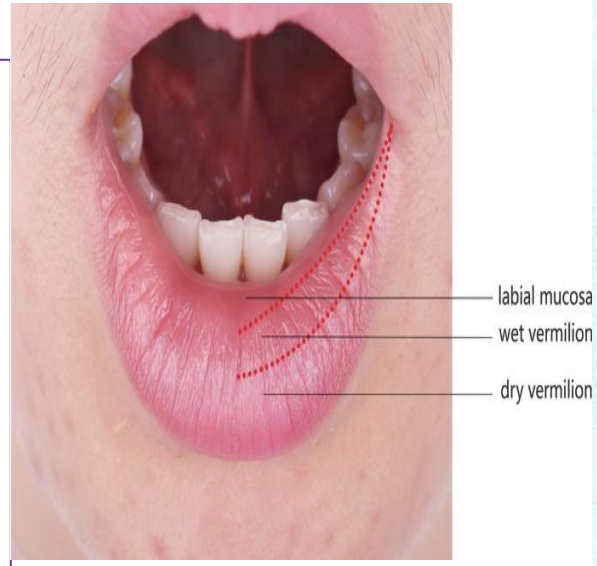
**2- Red margin (vermillion border):**

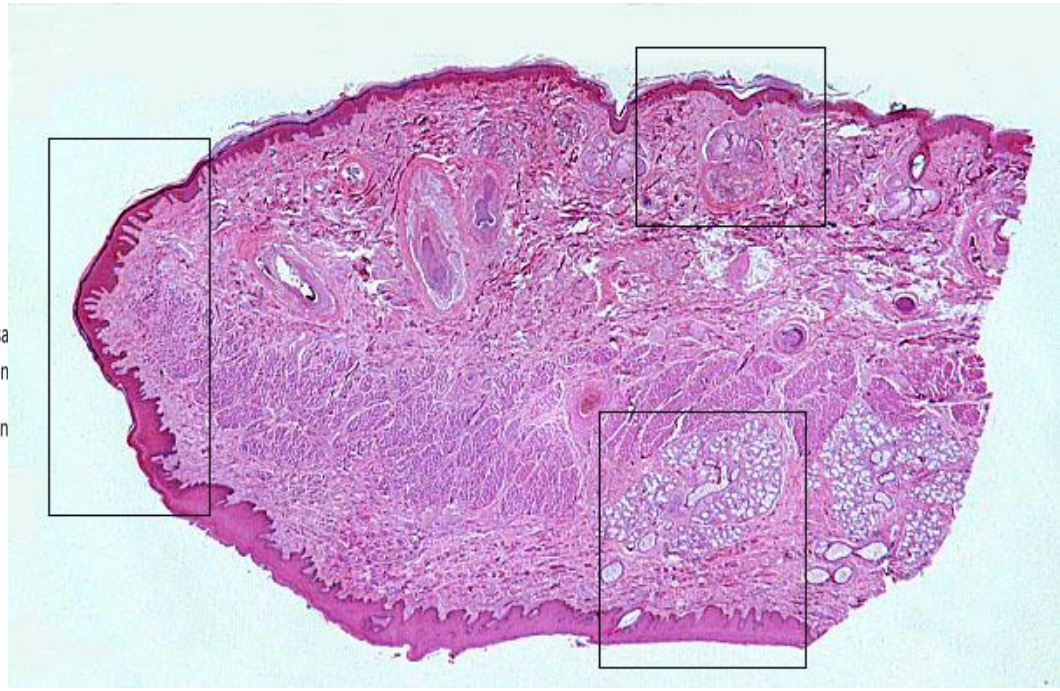
- Transitional zone between the skin & mucous surface.
- Rich in sensory nerve endings.
- Lined by thin keratinized stratified squamous epithelium which is invaded by long c.t. papillae, rich in blood capillaries.

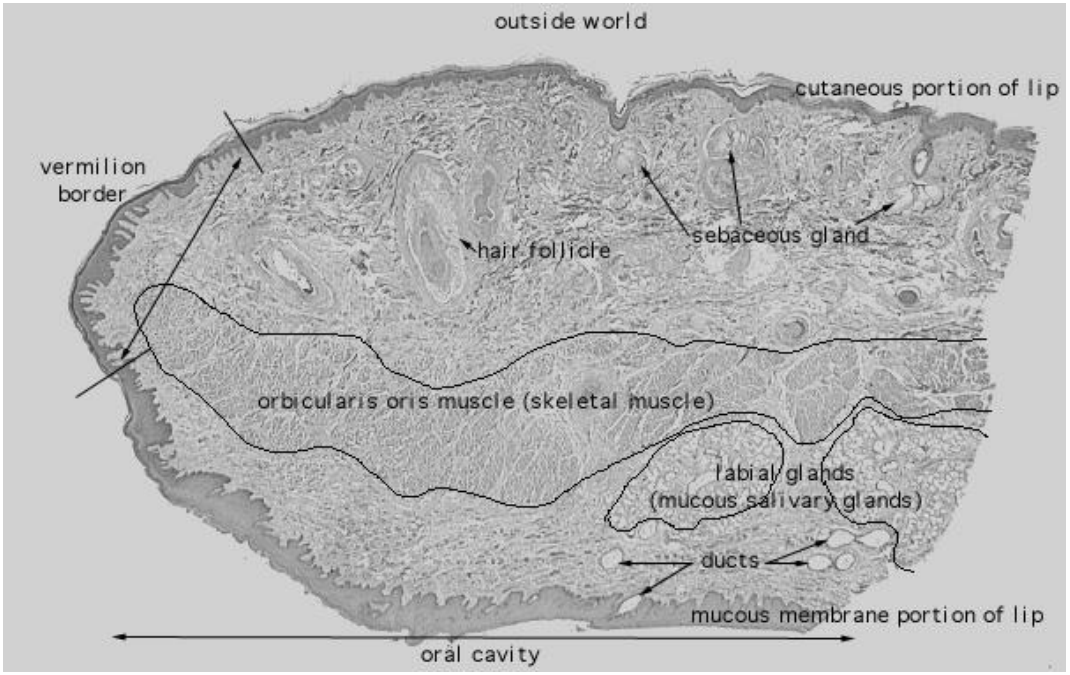
**3- Mucous surface:**

- **Epithelium:** non-keratinized stratified squamous epithelium.
- **Lamina propria:** contains labial salivary gland.

The main bulk of lip is formed by **orbicularis oris muscle** embedded in fibro elastic c.t.





# Cheeks (right & left)

- It forms the side of the vestibule of the oral cavity and is limited anteriorly by the **nasolabial fold,** which extends from the side of the nose to the angle of the mouth.

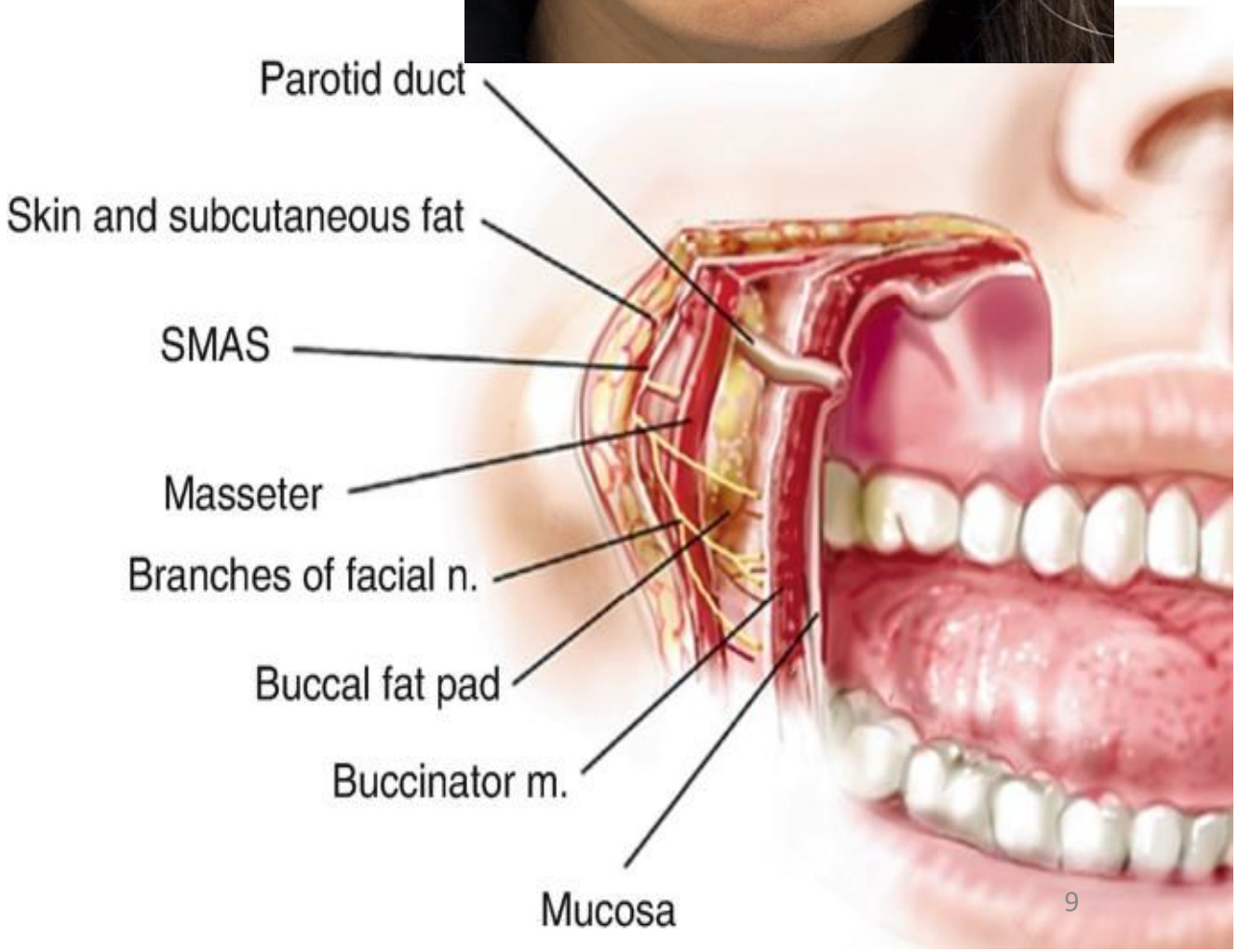
**Structure:** **From superficial to deep;**

- **Skin.**
- **Buccal pad of fat.**
- **Buccopharyngeal fascia.**
- **Buccinator muscle.**
- **Buccal mucosa.**

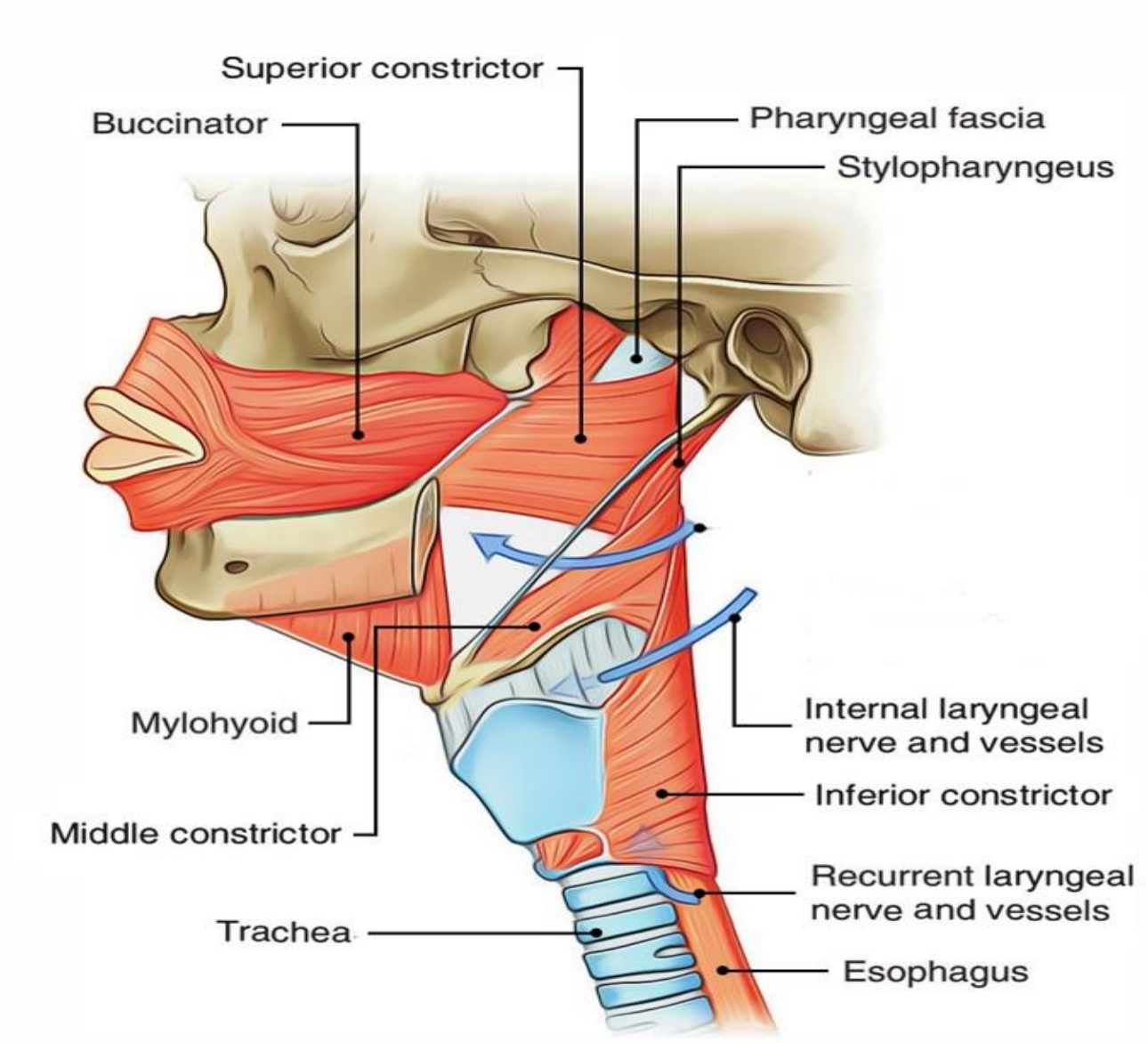
**Nerve supply:**

**Sensory;** the skin and mucosa of the cheek is supplied by **buccal branch of mandibular nerve.**

**Motor;** The buccinator muscle is supplied by **buccal branch of facial nerve.**

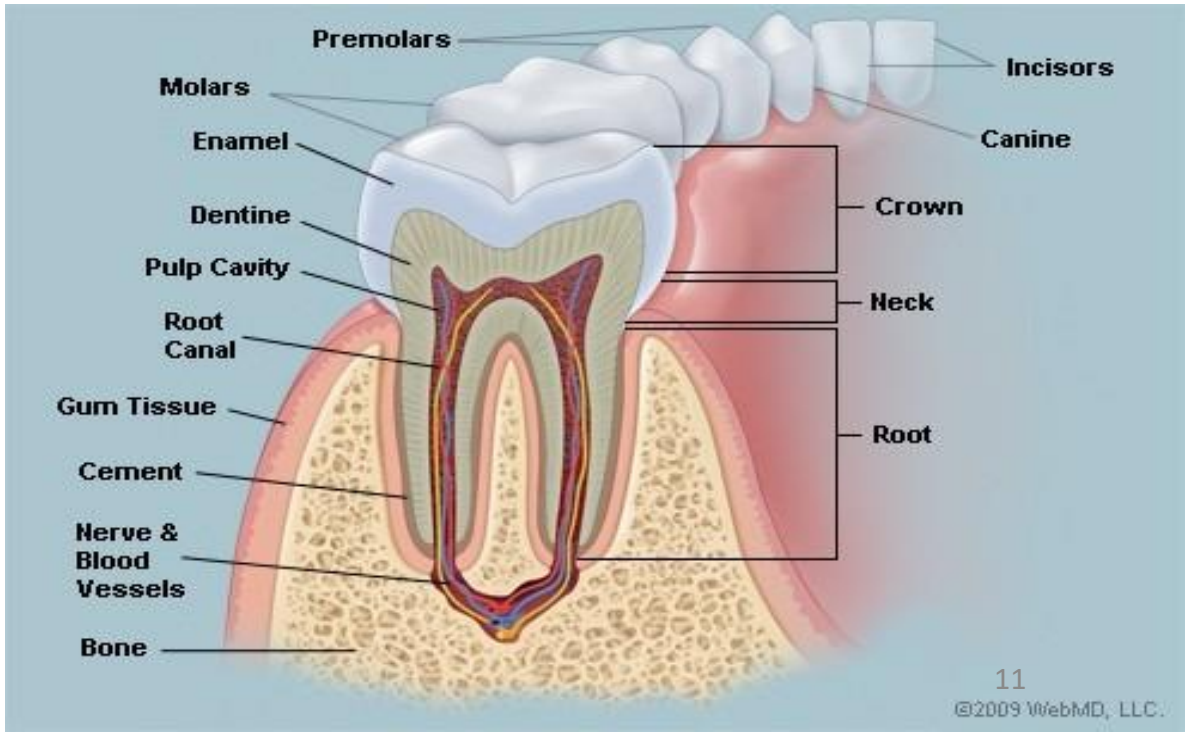
# Cheek


Superior constrictor
Buccinator
Pharyngeal fascia
Stylopharyngeus
Mylohyoid
Internal laryngeal nerve and vessels
Inferior constrictor
Middle constrictor
Recurrent laryngeal nerve and vessels
Trachea
Esophagus

# Gums

- The gums are composed of dense connective tissue covered with **mucous membrane** (thick, firmly attached to underlying tissues, keratinized stratified squamous epithelium)

- They **cover** alveolar process of the maxillae and mandible and is firmly adherents to their periosteum and to neck of the teeth. Also it surround and support teeth's roots.



# Teeth

**There are two types of teeth:** deciduous (milky) teeth and permanent teeth.

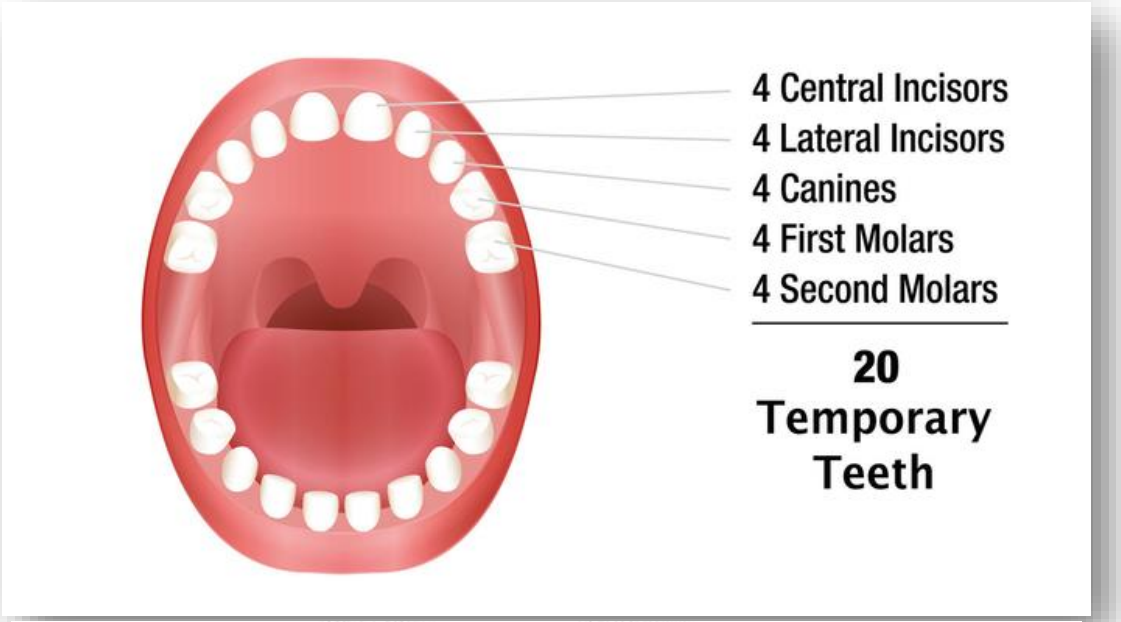
## Milky teeth:

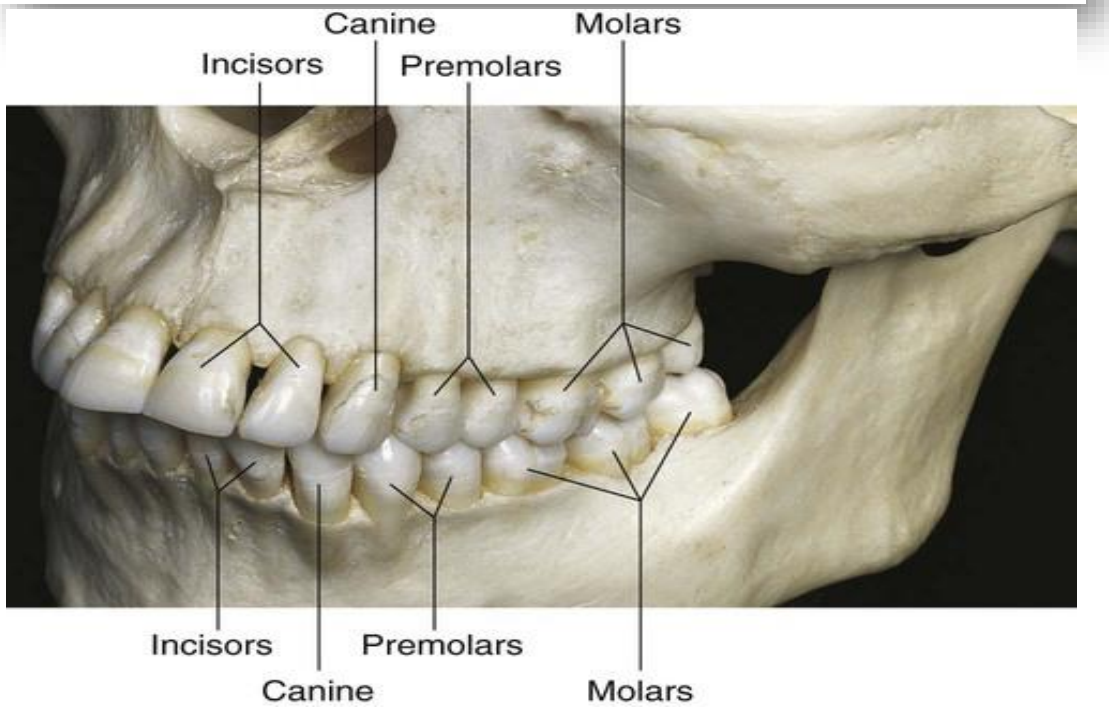
- They are **temporary** and **starts their appearance by the 6th month after birth** and **complete their eruption by the 2nd year.**
- **They are 20 in number,** arranged as follows in each jaw (10 teeth): 4 incisors, 2 canines and 4 molars.

## Permanent teeth:

They **start their appearance by the 6th year** and **complete their eruption by 17-21 years**.

**They are 32 in number**, arranged as follows in each jaw (16 teeth): 4 incisors, 2 canines, 4 premolars and 6 molars.




**Permanent teeth**

# Teeth

**Each tooth is composed of three principal regions**, crown, neck, and root.

**The crown:** is the **only visible part.**

**The root:** is **embedded** in the corresponding socket of the alveolar process. Each tooth has from 1 – 3 roots.

**The neck:** is the constricted portion between the crown and roots.

**The enamel:** it **cover the dentine part of the crown.**

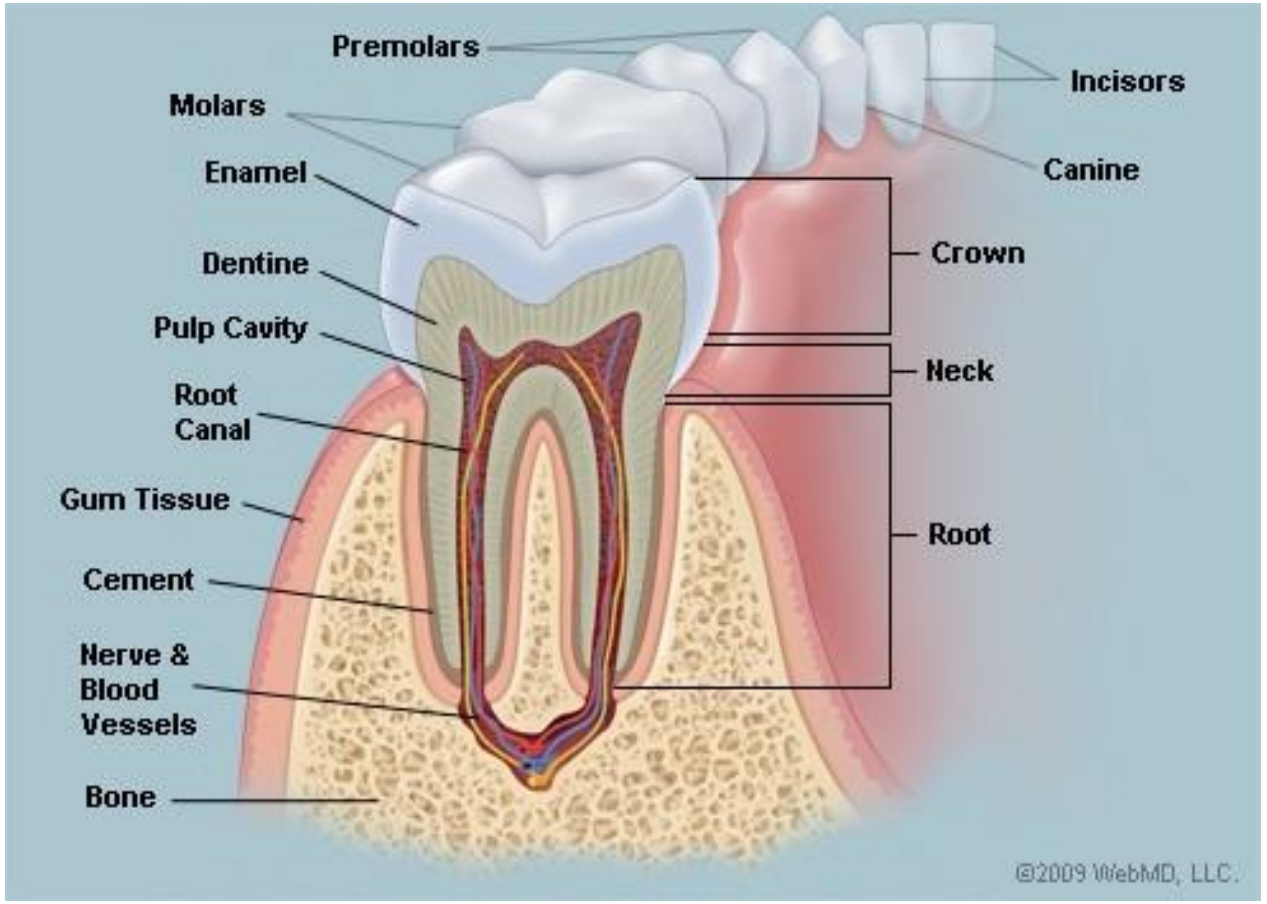
**Cement:** is specialized calcified substance that **cover the roots** and the periodontal ligament is inserted into it.

**The dentine of tooth:**

**It is calcified connective tissue that gives the tooth the basic shape and rigidity.**

The dentin is covered by the enamel at the crown and is covered by the cement at the root.

Dentine surrounds a cavity known as **the pulp cavity**.

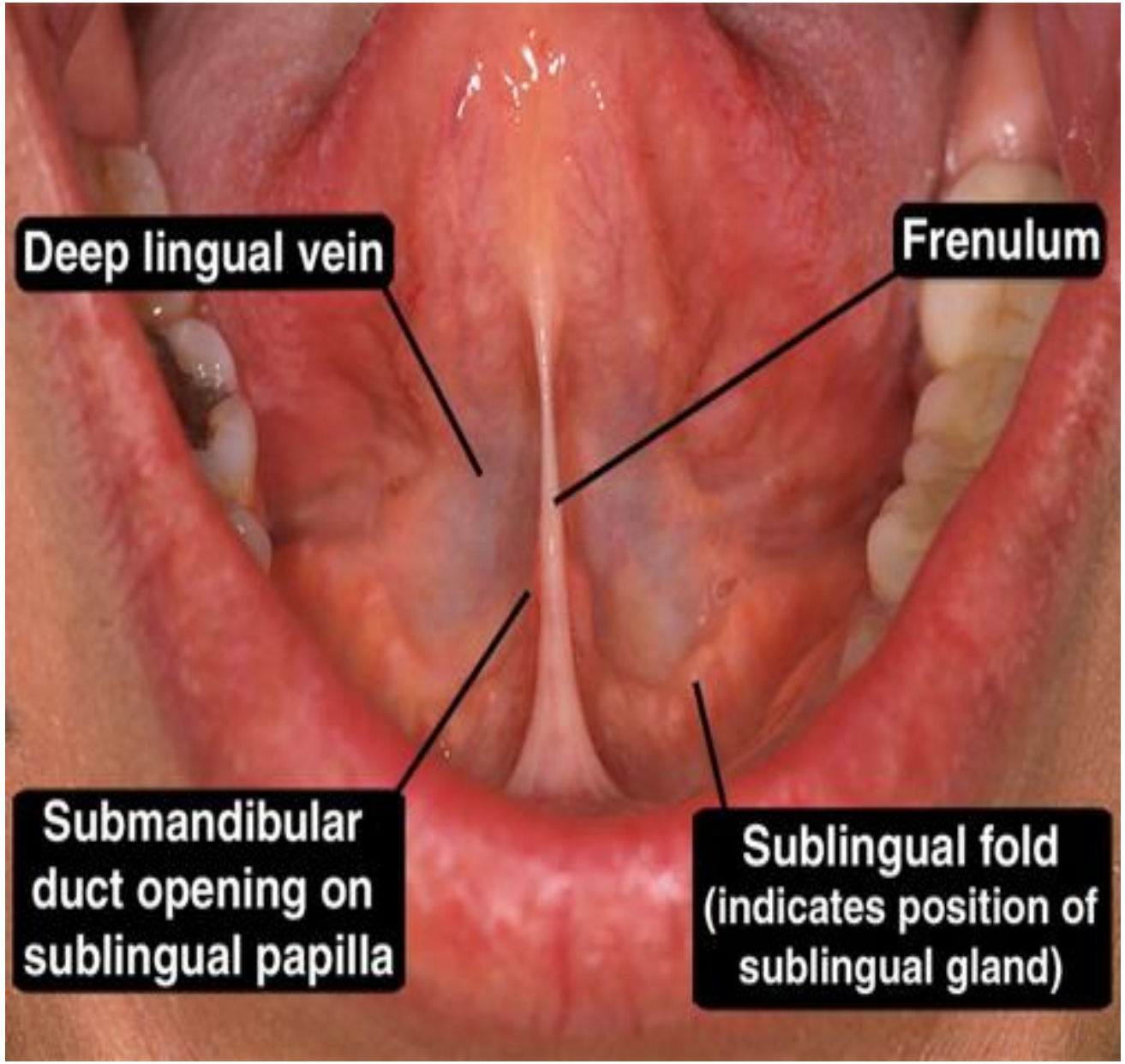



Within the dentin lie microscopic chanels called **the dentinal tubules**.
**The pulp cavity** is filled by the dental pulp. The pulp consists of a loose connective tissue in which nerves, and blood are embedded.
Inferiorly, the pulp cavity becomes continuous with a narrow canals run through the root(s), the root canals.
Each one of these canals has foramen at its base, through which nerves, and blood vessels pass.

# Floor of oral cavity proper

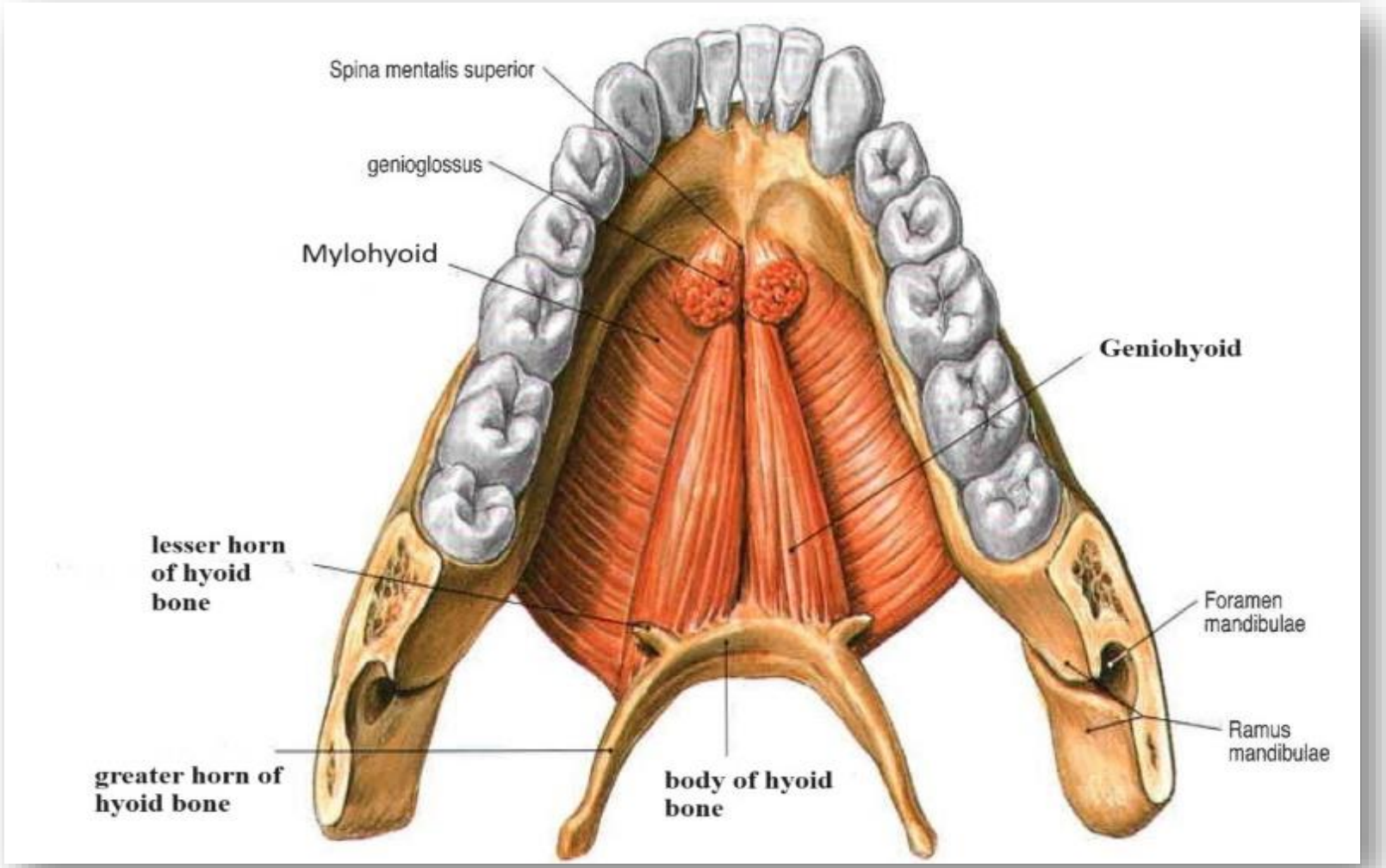
**The floor is formed by:**

- The anterior two-thirds of the tongue.
- The reflection of the mucous membrane from the tongue to the internal surface of the gum of the lower jaw.
- **The frenulum** is a prominent median fold of mucous membrane connects the ventral surface of the tongue to the floor of the mouth.
- On either side of the frenulum of the tongue, the mucous membrane of the floor of the mouth presents an elevation, the **Sublingual fold**, (which is produced by the underlying sublingual gland) & **Sublingual papilla**.



# Floor of oral cavity proper

- The **mylohyoid**, genioglossus & **geniohyoid** muscles form the muscular floor of the oral cavity.



# Tongue

**Definition:** it is muscular organ of deglutition, taste and speech. It is partly oral and partly pharyngeal **in position**, and is attached by its muscles to the hyoid bone, mandible, styloid processes & soft palate.

**On the dorsum (posterosuperior surface) of the tongue, there is V-shaped sulcus terminalis which divide the tongue into:**

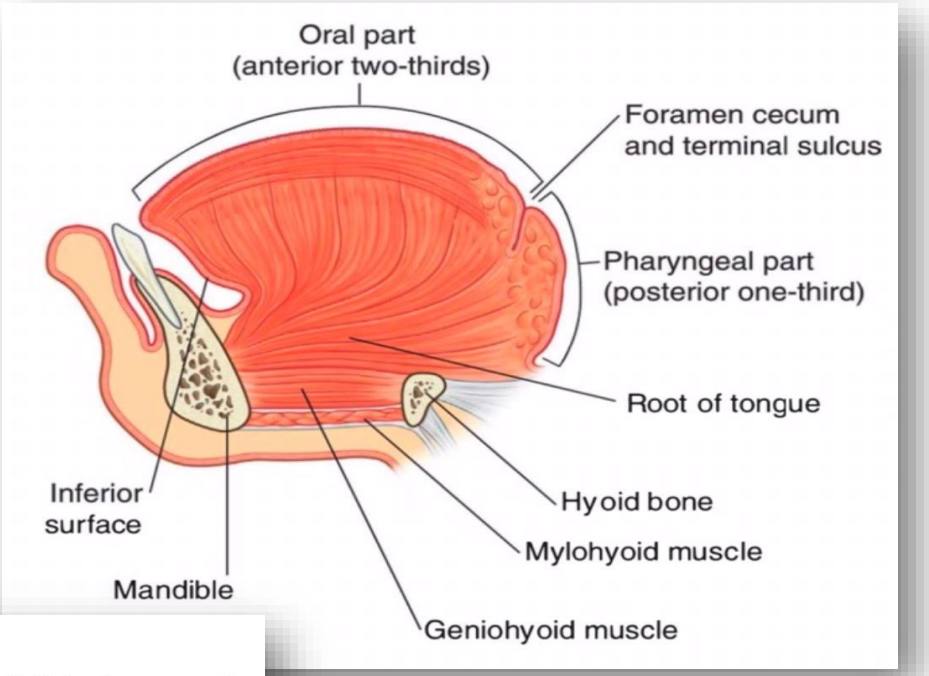
**1- Anterior (oral) part: it is part anterior to sulcus terminalis, it represents the anterior two-thirds. (mobile tongue).**

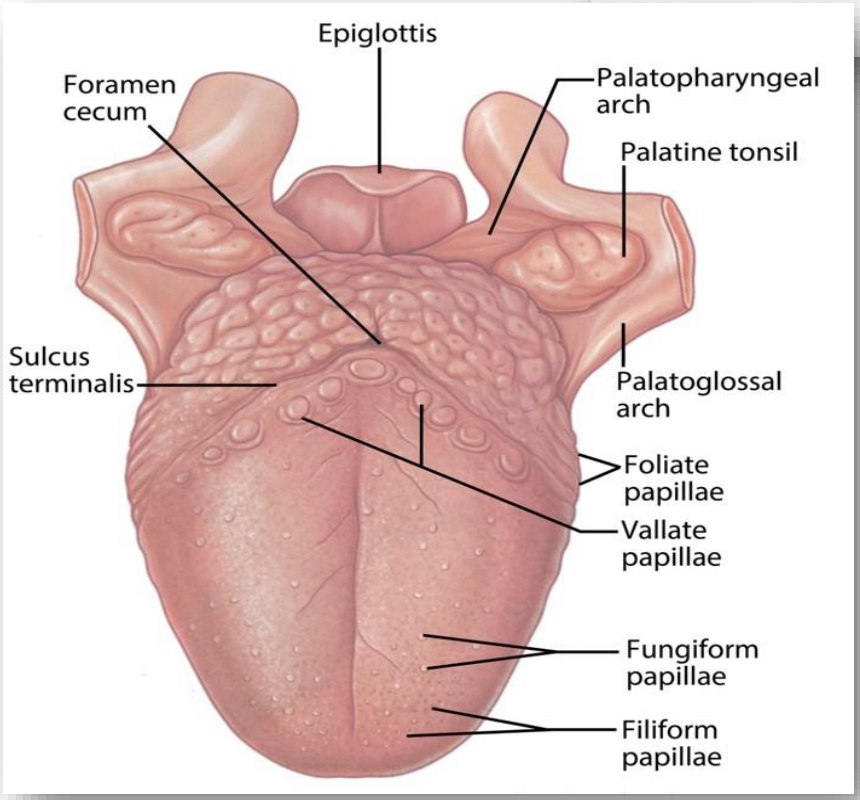
**2- Posterior (pharyngeal) part (base of tongue): it is part posterior to sulcus terminalis, it represents the posterior one- third**.

N.B. The apex of the sulcus is directed posterior & shows foramen caecum.

**Root of tongue:**

It is part of the tongue deep to the anterior mobile 2/3 of the tongue and anterior to the base of the tongue.



# Oral part of tongue

**It is located in the floor of the oral cavity.**

**It lies anterior to the palatoglossal arches**

**It has:**

a- **Apex** touching the incisor teeth.

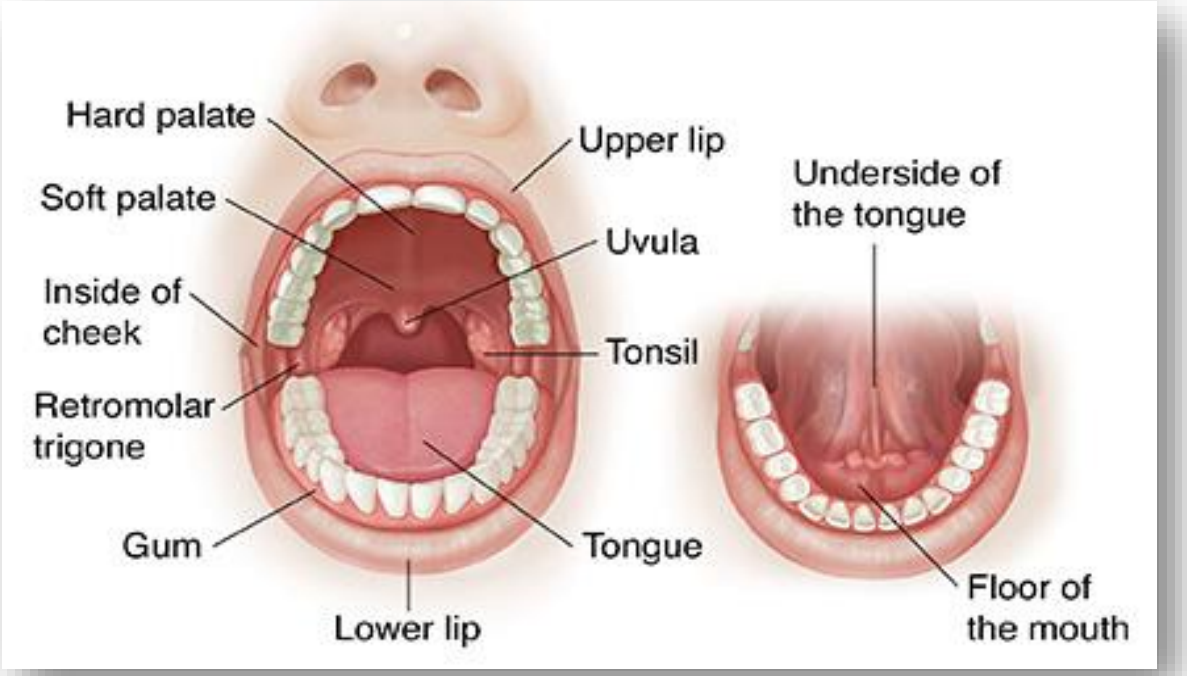
b- **Margins** in contact with the gums and teeth.

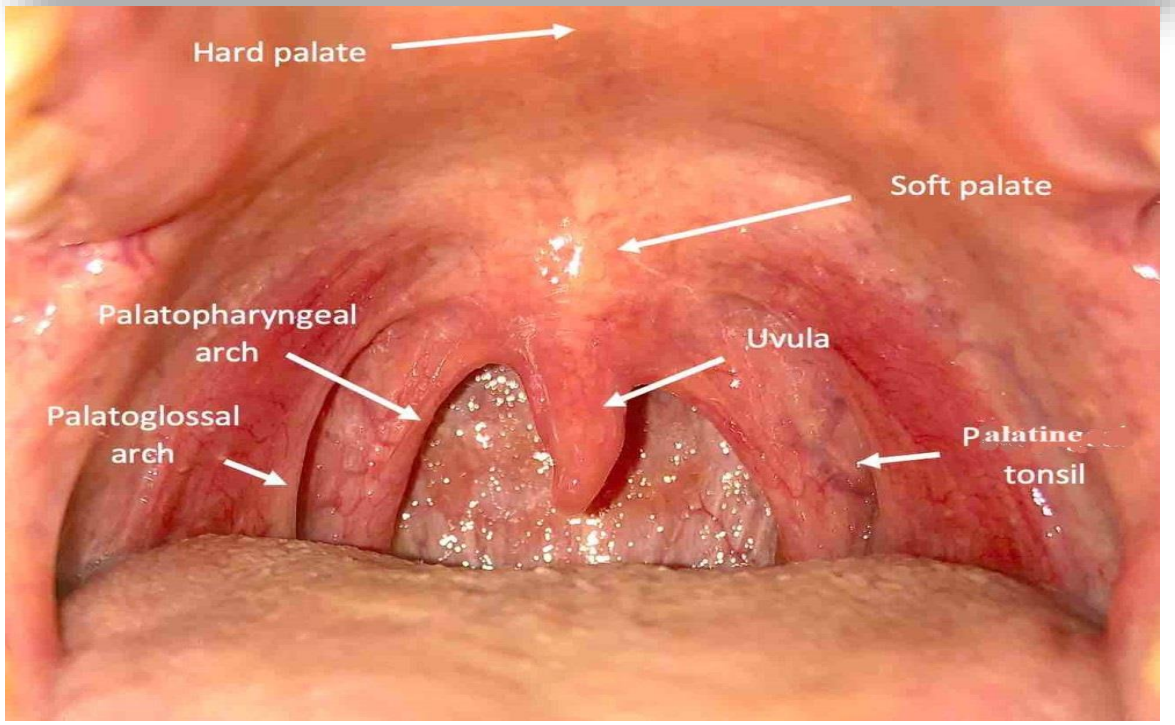
c- **Superior surface (dorsum):**

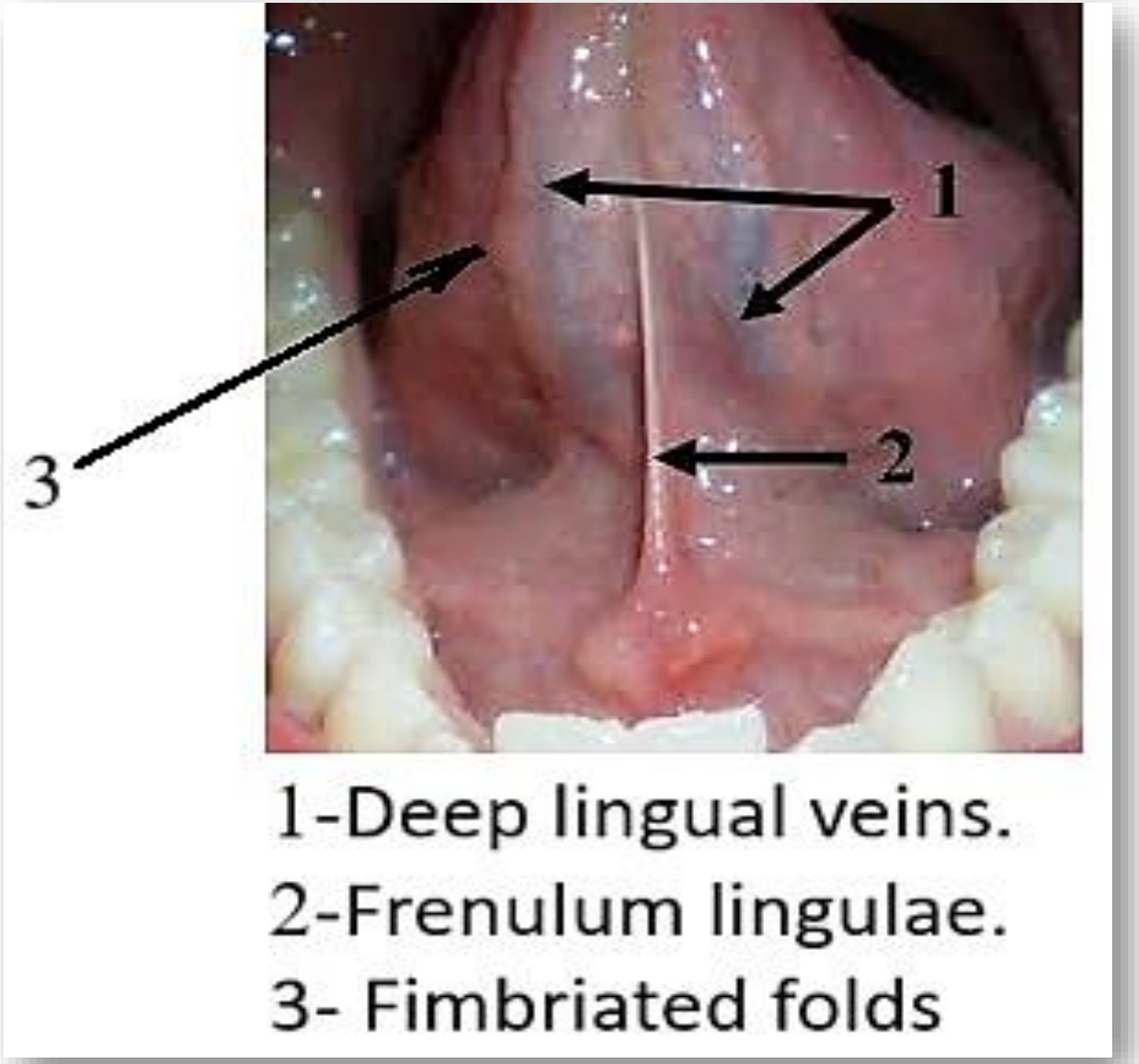
- **It faces upwards.**
- It is related to the hard and soft palates.
- The dorsal mucosa is **covered by** filiform, fungiform and circumvallate **papillae.**

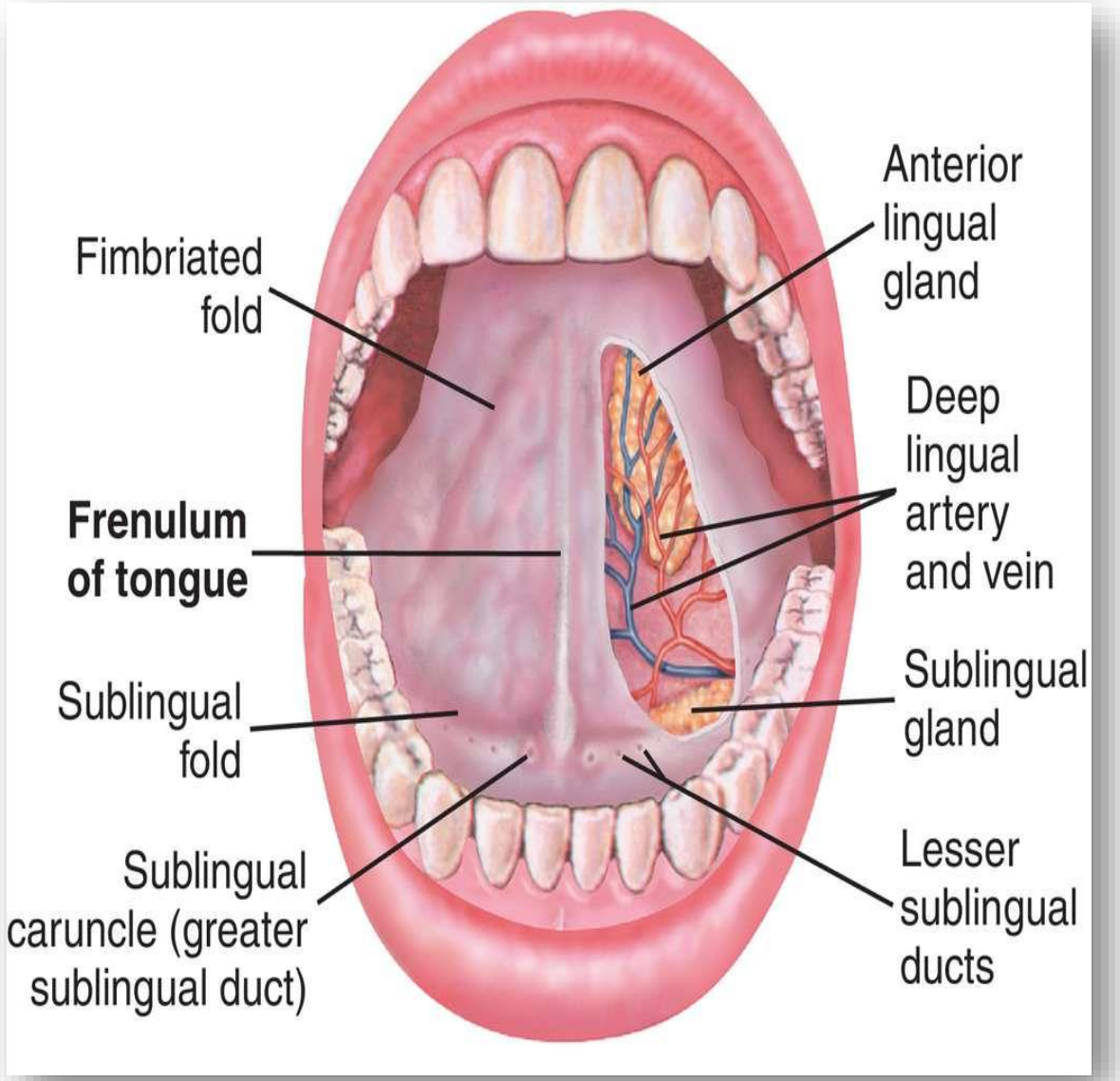
**d- Inferior (ventral) surface:**

- Its mucosa is smooth and reflected onto the oral floor and gums.
- It is connected to the oral floor anteriorly by the lingual frenulum.
- The deep lingual vein, which is visible, lies lateral to the frenulum on either side. Deep lingual artery accompany it.
- The plica fimbriata (fimbriated fold), a fringed mucosal ridge lies lateral to the vein.



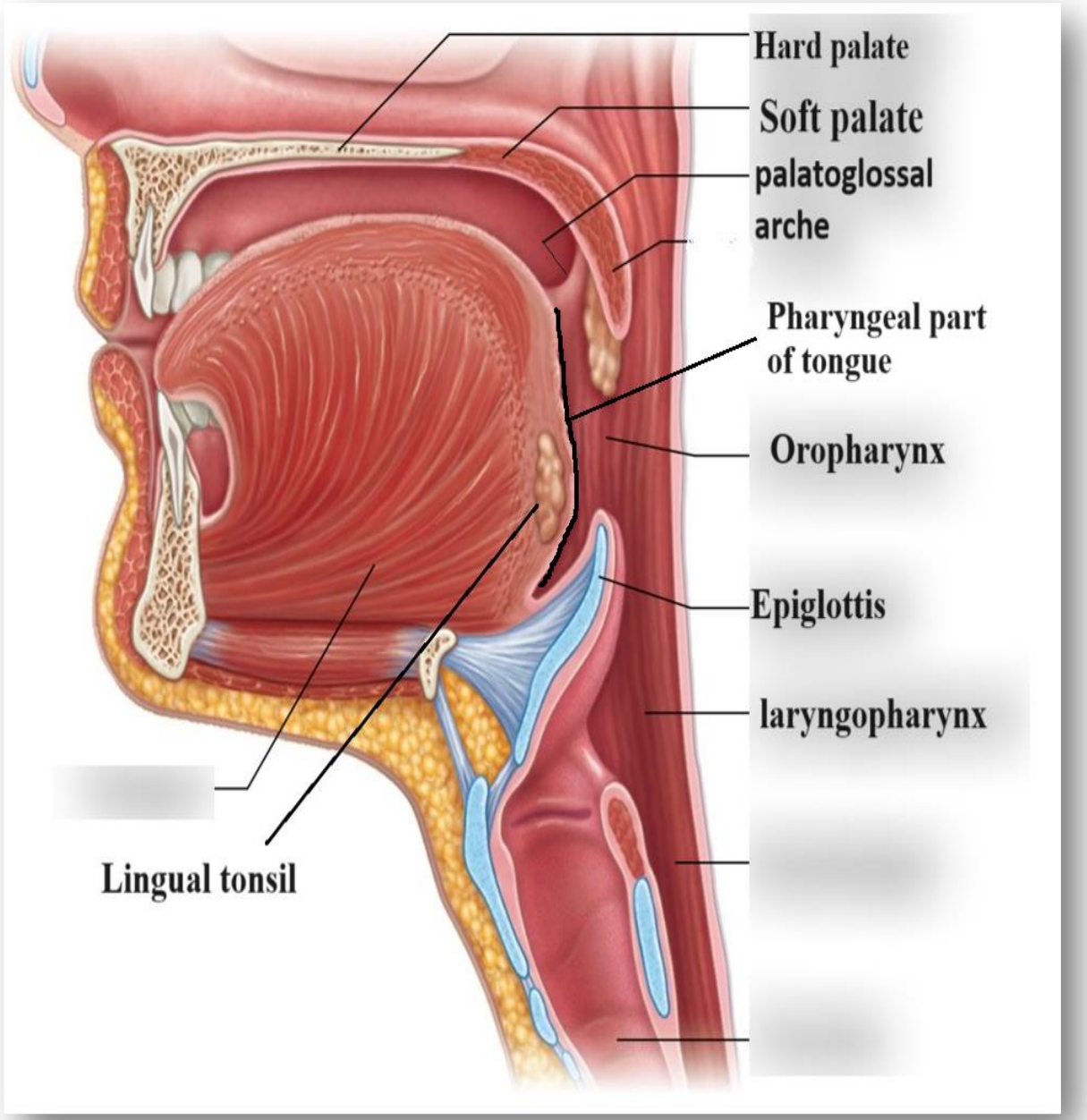



**Figs. Show Inferior surface of tongue**

# Pharyngeal part of tongue

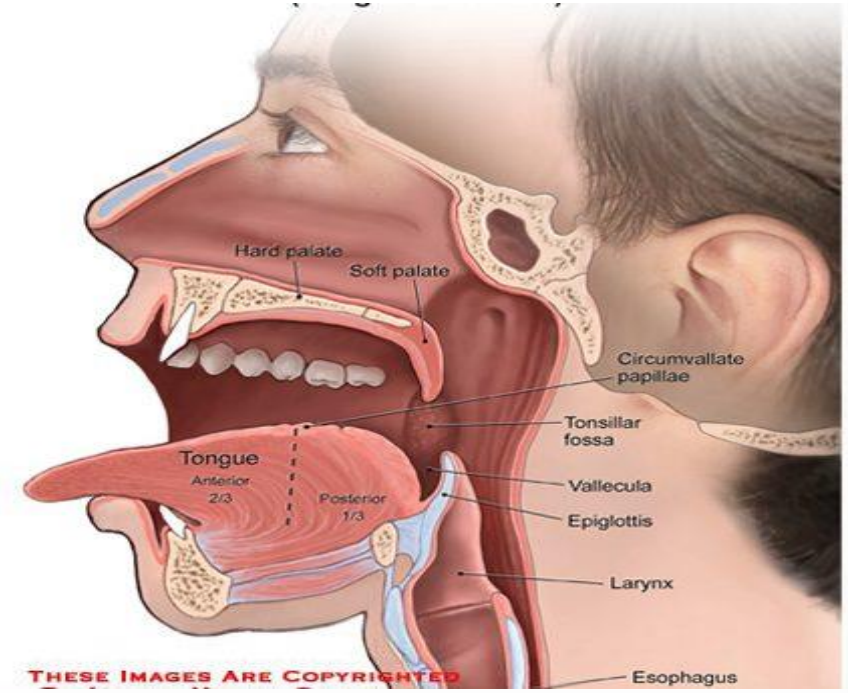
- **It faces posteriorly.**
- **It lies posterior to the palatoglossal arches.**
- **It forms part of the anterior wall of the oropharynx.**
- **It is devoid of** papillae.
- There are lymphoid nodules which are embedded in it's submucosa termed **the lingual tonsil**.
- **It constitutes the base of tongue**.
- Its mucosa is reflected laterally onto the pharyngeal wall mucosa.
- **Its mucosa is reflected posteriorly onto the epiglottis forming two depressions called valleculae** as there is one median and two lateral glosso-epiglottic folds, which surround these valleculae.

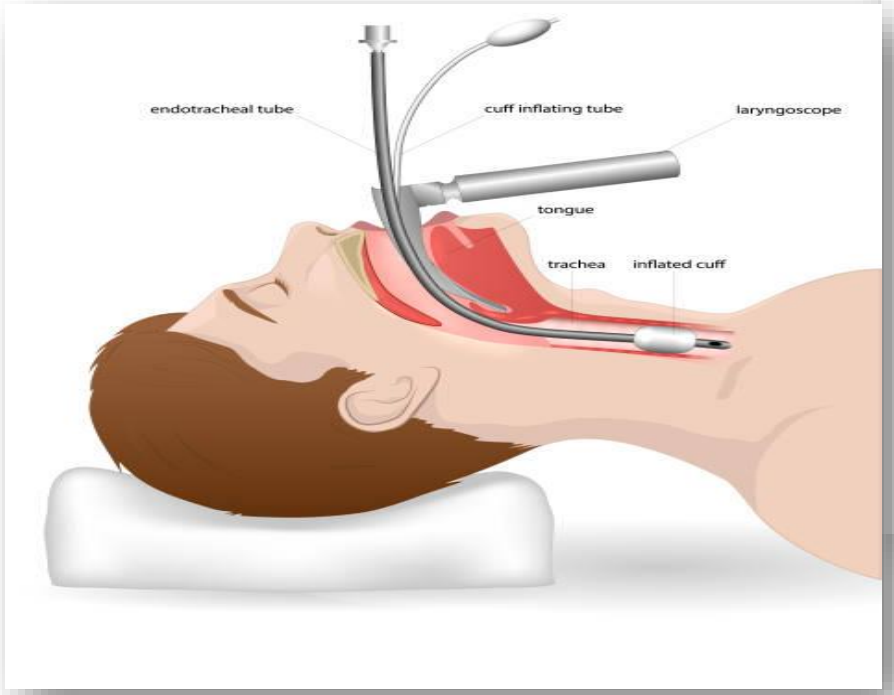


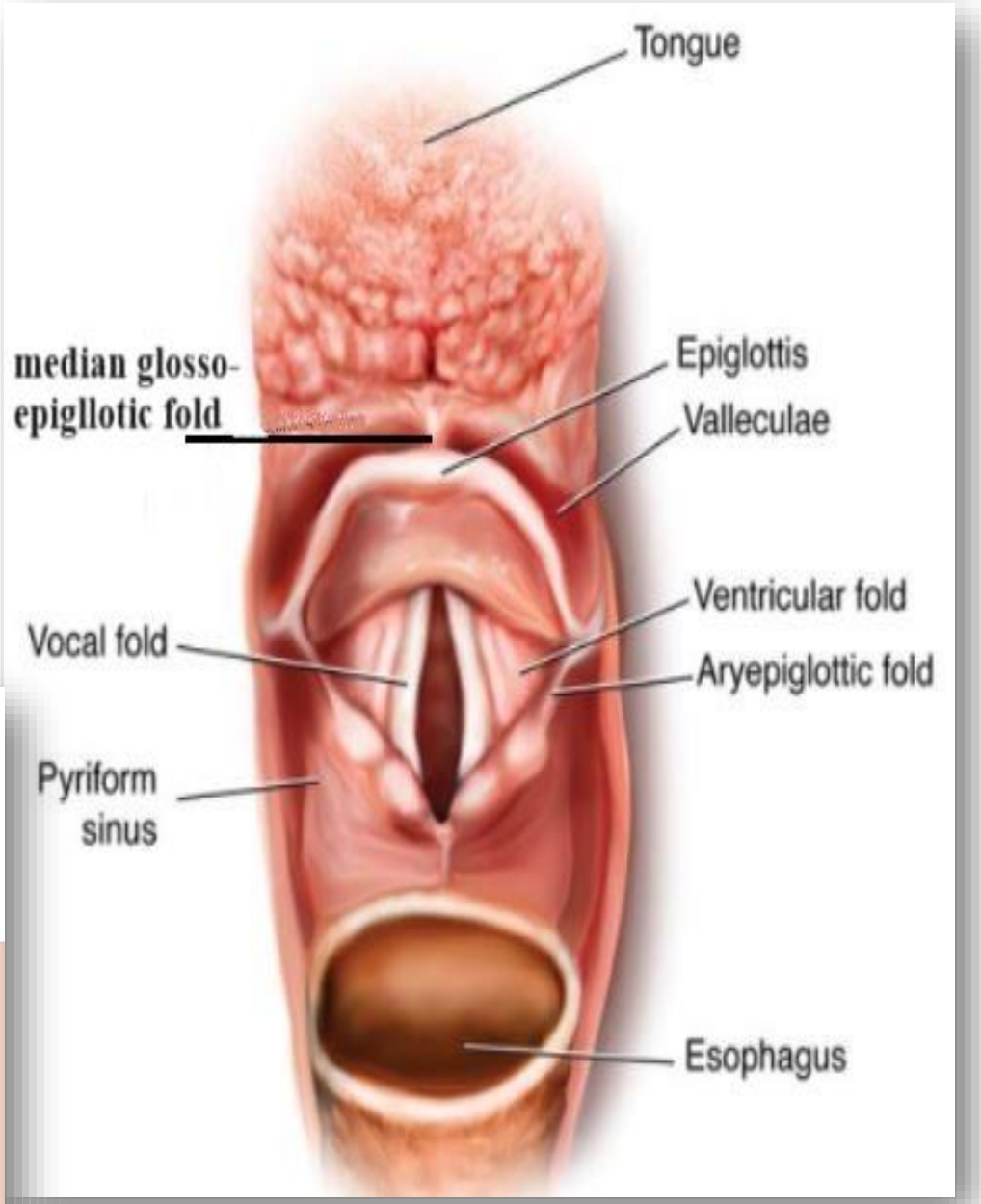
# Vallecullae

**The primary function of the valleculae** is to facilitate the swallowing process. As bolus of food reaches the valleculae, the epiglottis folds down, sealing off the larynx and ensuring the bolus moves into the esophagus instead of the trachea. This mechanism prevents choking and aspiration, protecting the airway during swallowing.

The valleculae is an **important anatomical landmark**, serves as a guide, allowing physicians to position the laryngoscope blade correctly, and subsequently insert the endotracheal tube.

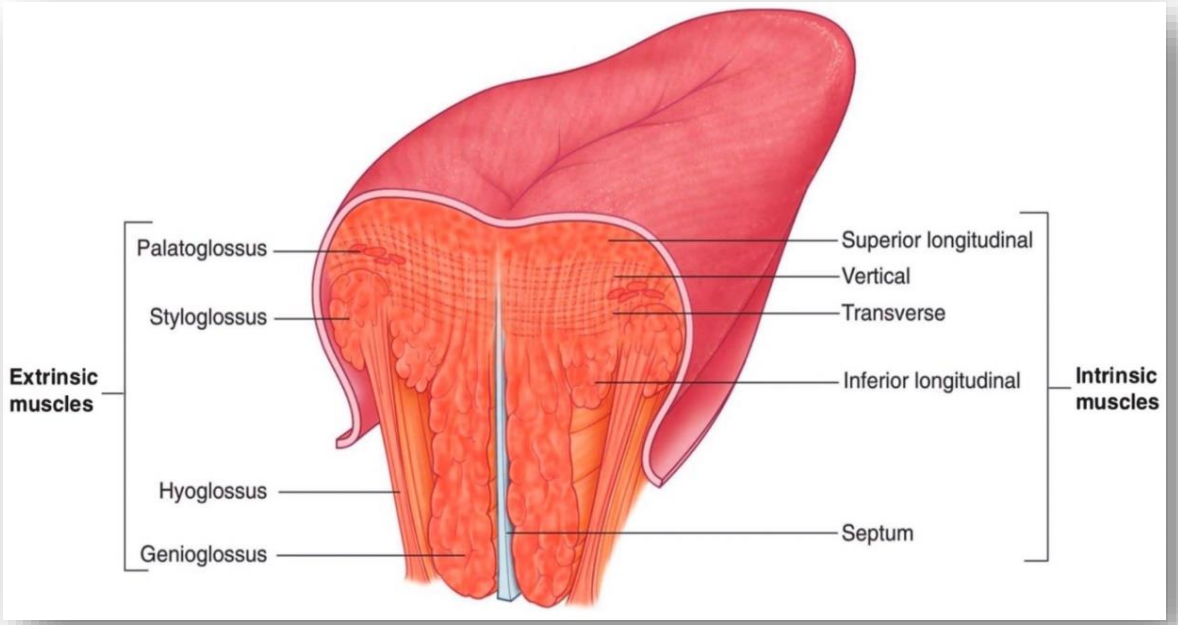


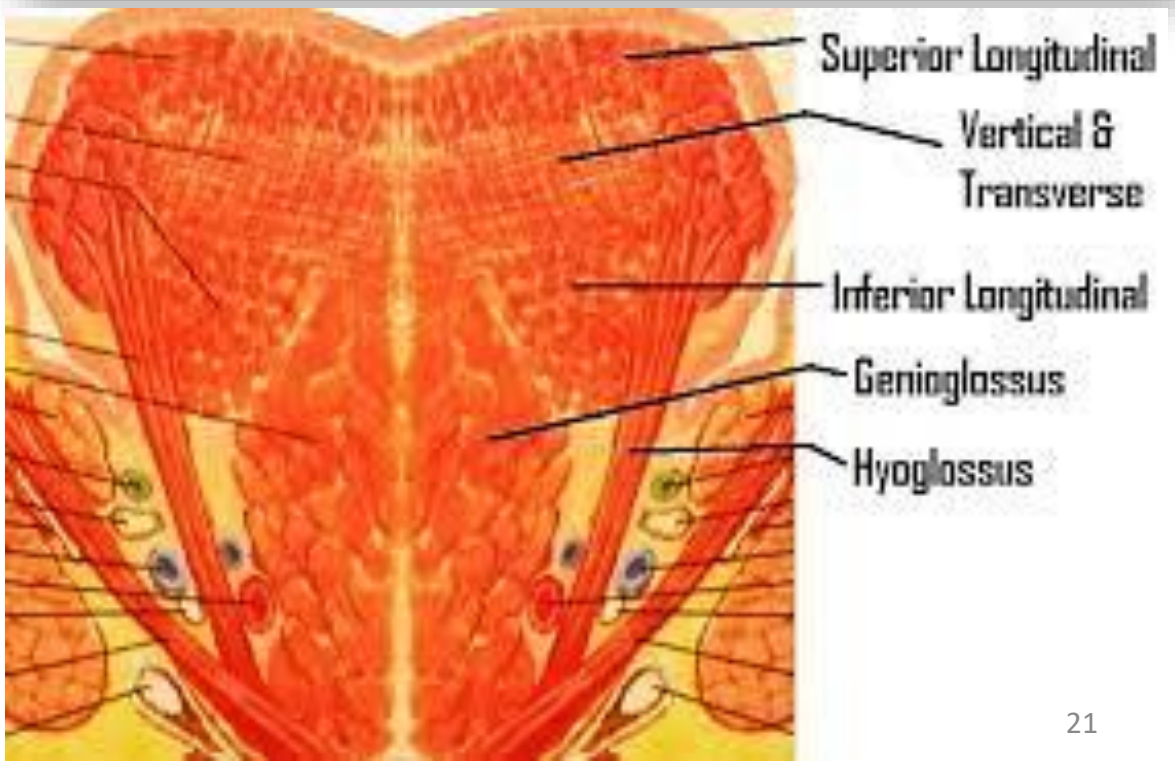



# Muscles of the Tongue

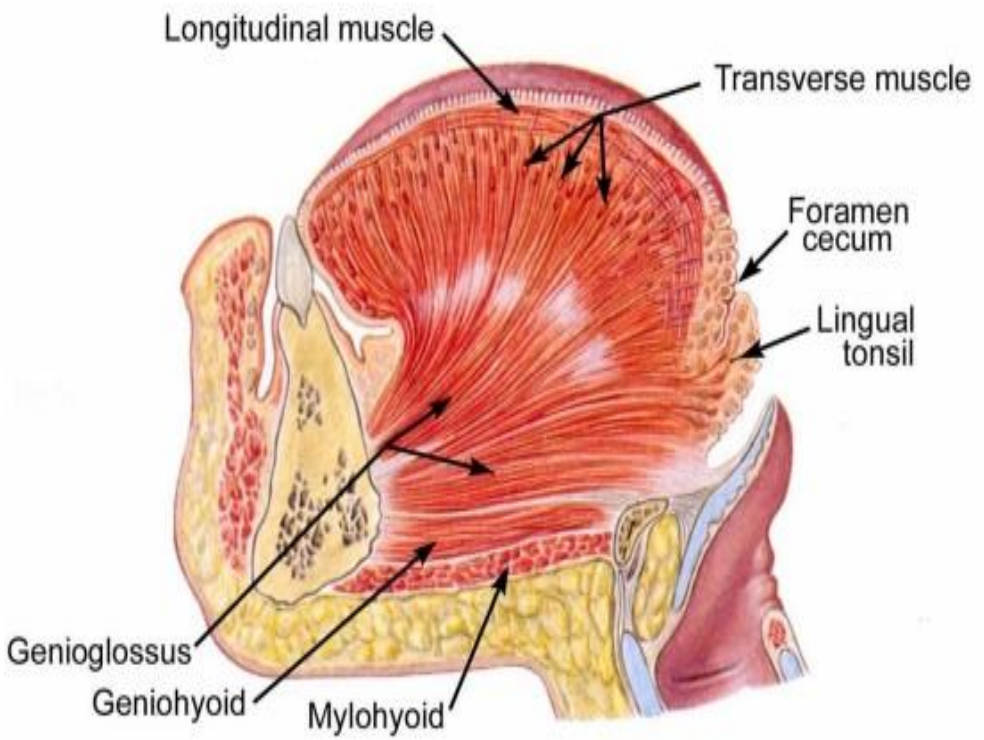
| Intrinsic Muscles | Extrinsic Muscles |
|---|---|
| • They originate and attach to structures within the tongue.<br>• **Have no** bony attachment outside the tongue.<br>• They change the shape of the tongue. | • **Arise from nearby bones or structures**.<br>• Inserted in the tongue.<br>• They move the tongue & change its shape. |
| **They are four paired of:**<br>**1- Superior longitudinal fibers (on dorsum)**<br>**2- Inferior longitudinal fibers (on inferior surface).**<br>**3- Vertical fibers (between 1&2).**<br>**4- Transverse fibers.** | **They are four paired:**<br>**1- Genioglossus**<br>**2- Styloglossus**<br>**3- Hyoglossus**<br>**4- Palatoglossus** |
| **Nerve supply:** all by hypoglossal nerve | All by hypoglossal nerve except palatoglossus. |



# Muscles of the Tongue

Showing change of shape of tongue




Showing muscles of tongue

# Extrinsic muscles of tongue

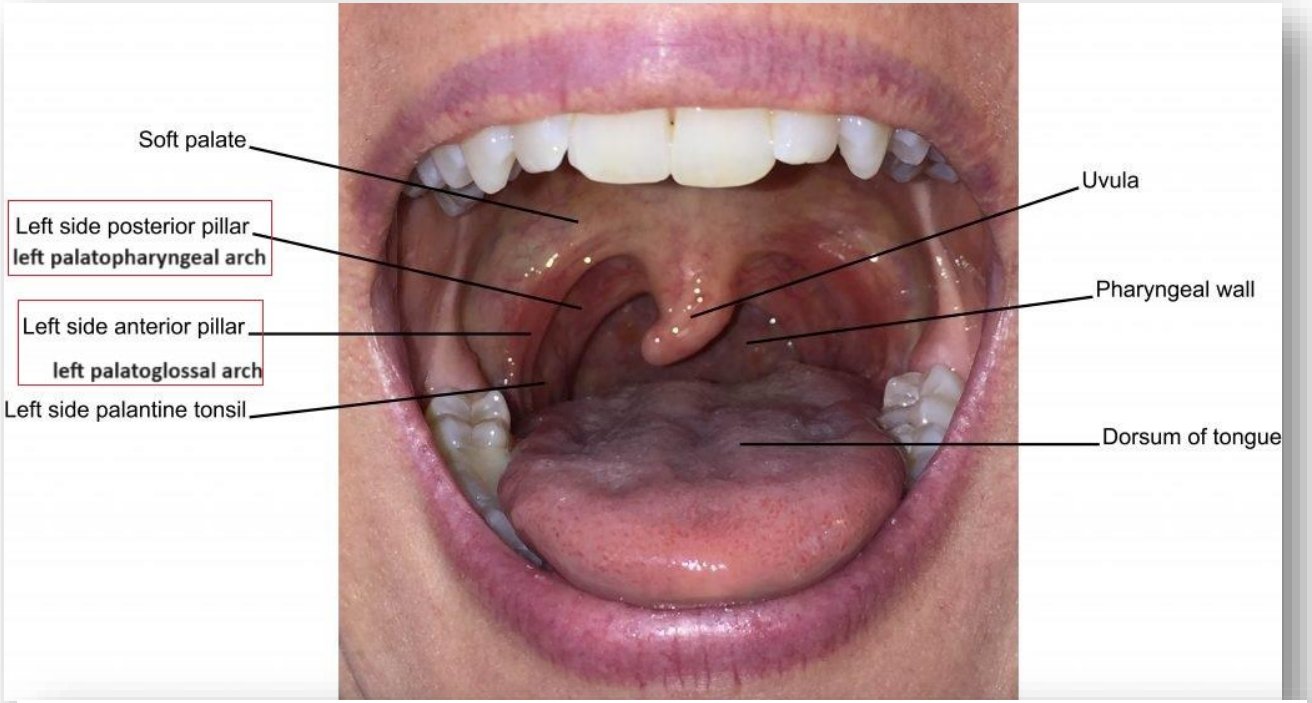
## 1-Palatoglossus

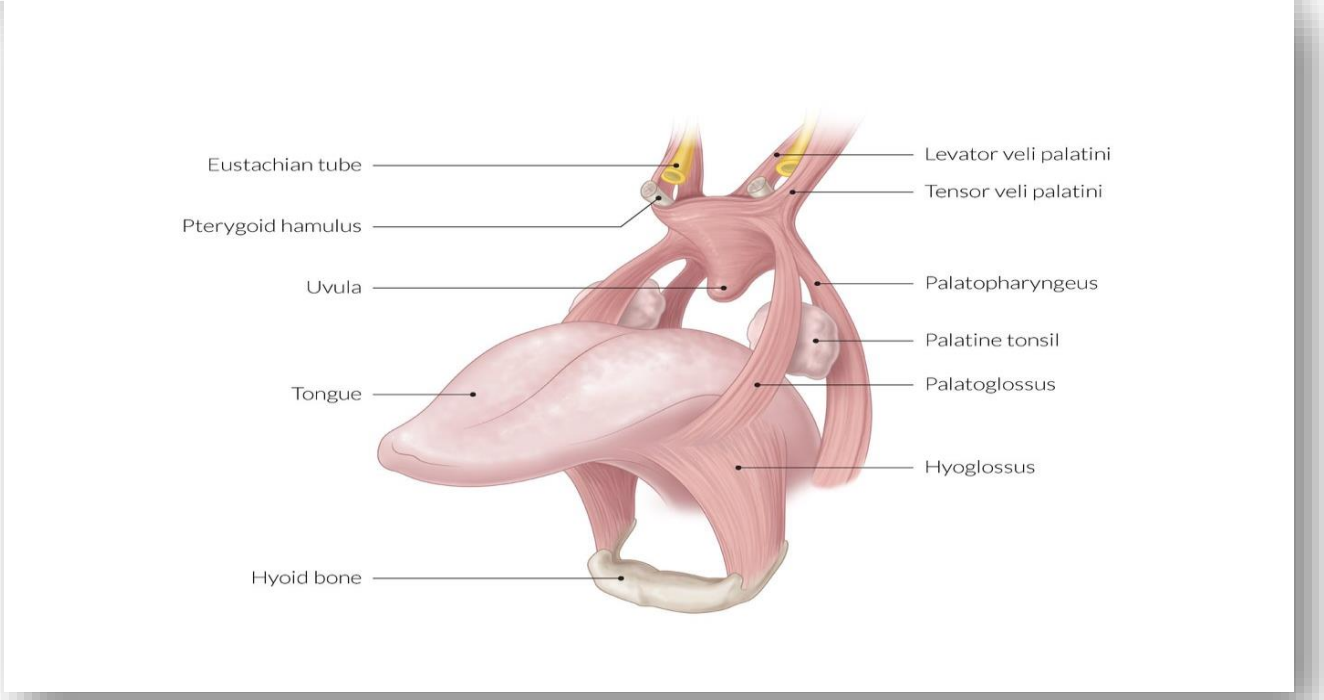
**Origin:** Lower surface of **palatine** aponeurosis.

**Insertion:** Posterior 1/3 of the **side** of tongue.

**Action:**

- **It pulls the tongue up towards the palate in 1st stage of deglutition.**
- **It approximates the palatoglossal arch to its contralateral fellow, thus shutting off the oral cavity from the oropharynx (acts as sphincter at the oropharyngeal isthmus).**



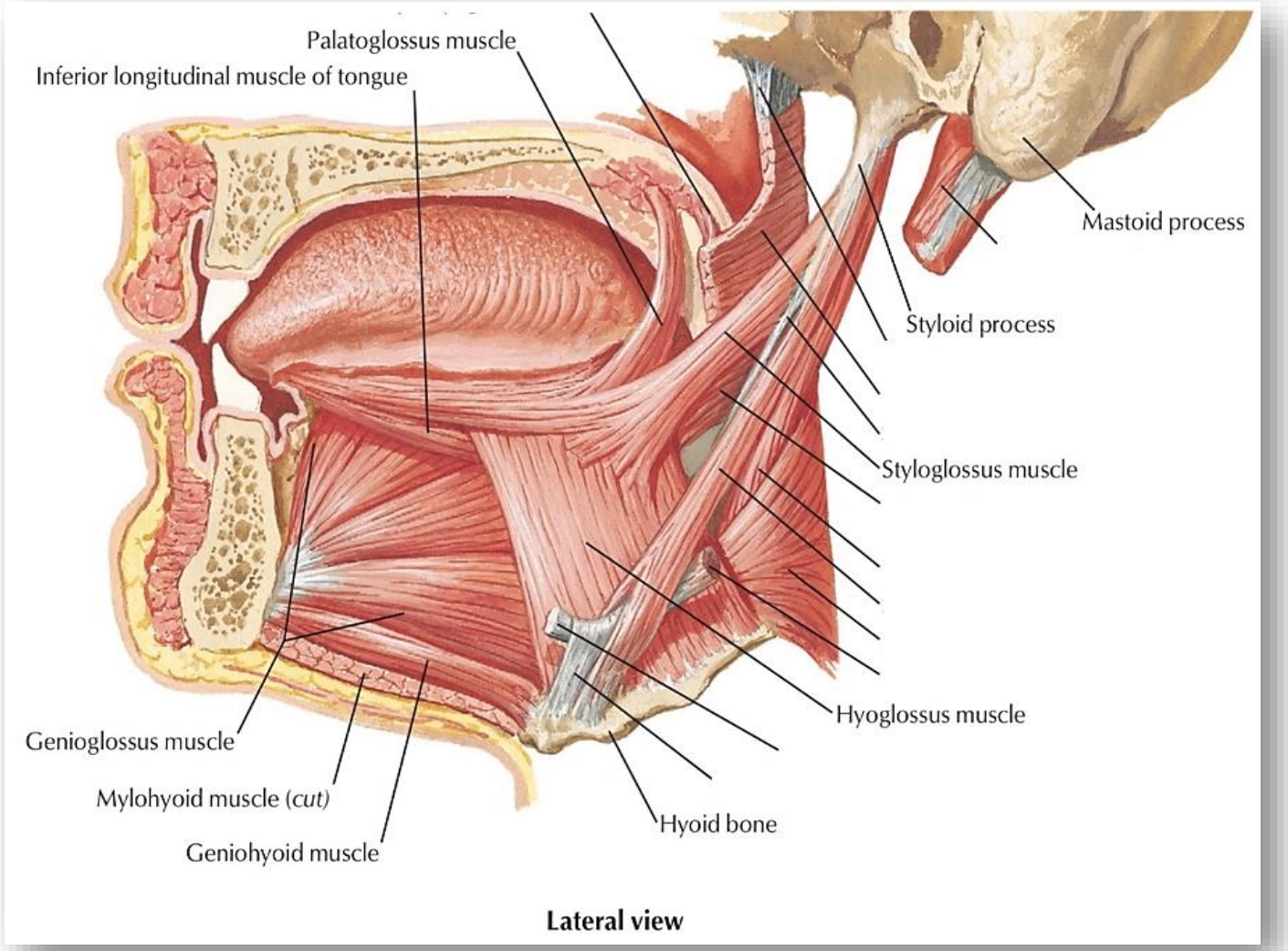
# Extrinsic muscles of tongue

## 2-Hyoglossus:

**Origin:** Body and greater horn of the **hyoid bone**

**Insertion:** Posterior ½ of the **side** of the tongue

**Action:** **Depresses the tongue.**



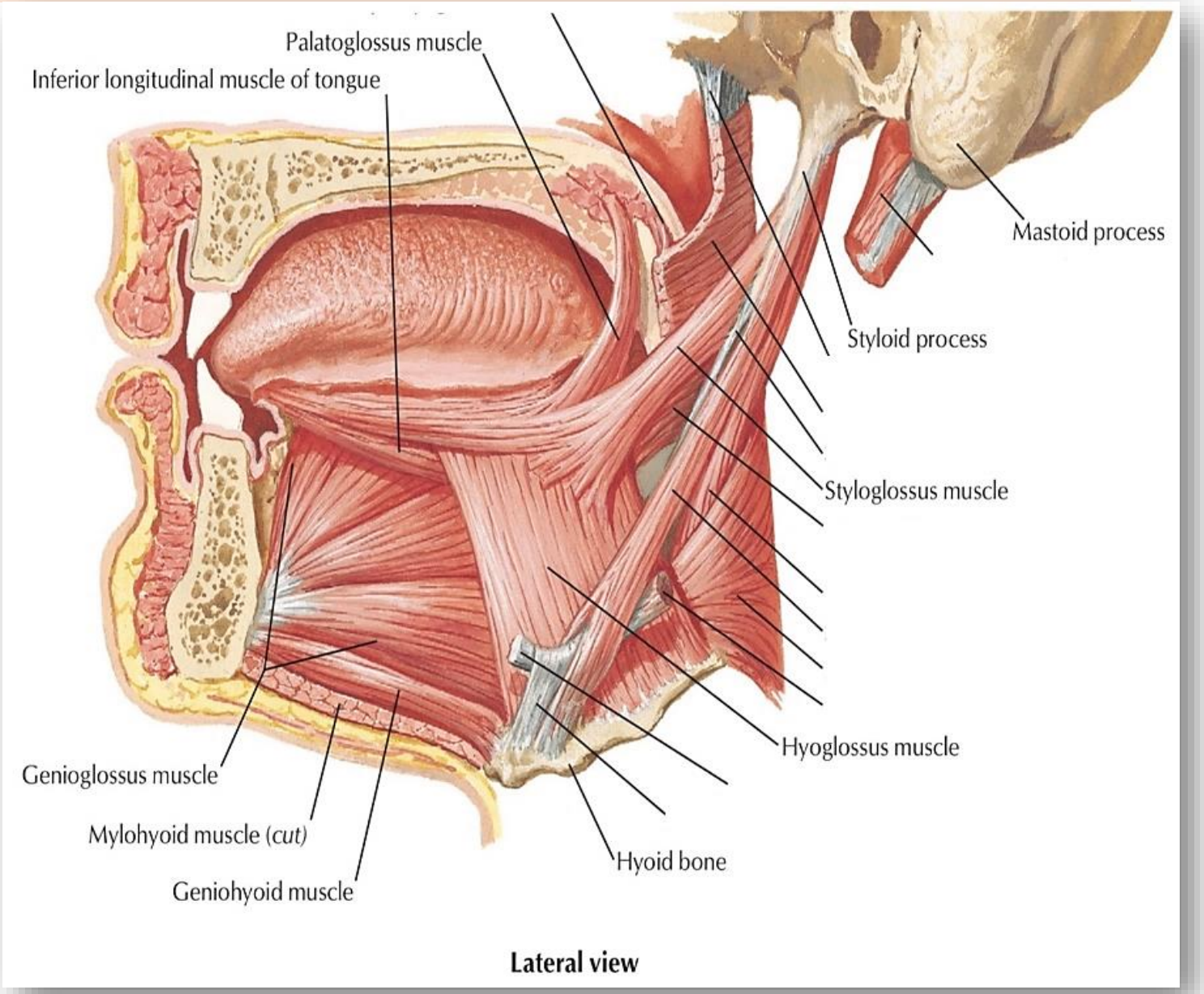
# Extrinsic muscles of tongue

## 3-Styloglossus

**Origin:** From **styloid** process.

**Insertion:** Along whole length of the **side** of the tongue.

**Action:** **Pulls tongue upwards and backwards.**



# Extrinsic muscles of tongue

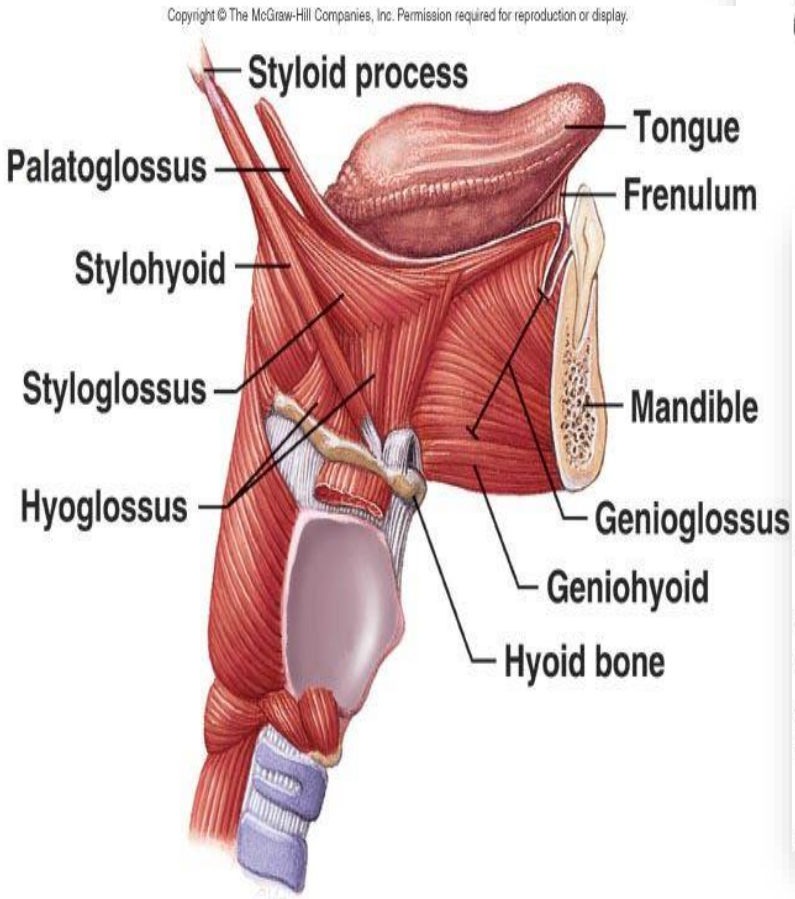
## 4-Genioglossus:

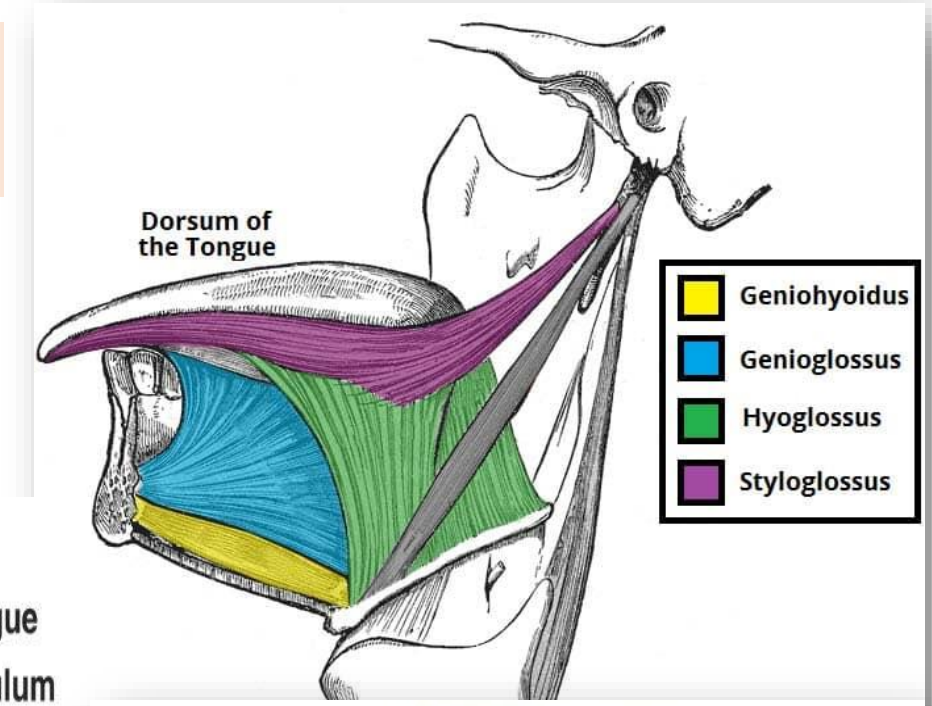
**Origin:** Upper genial tubercle of the mandible.

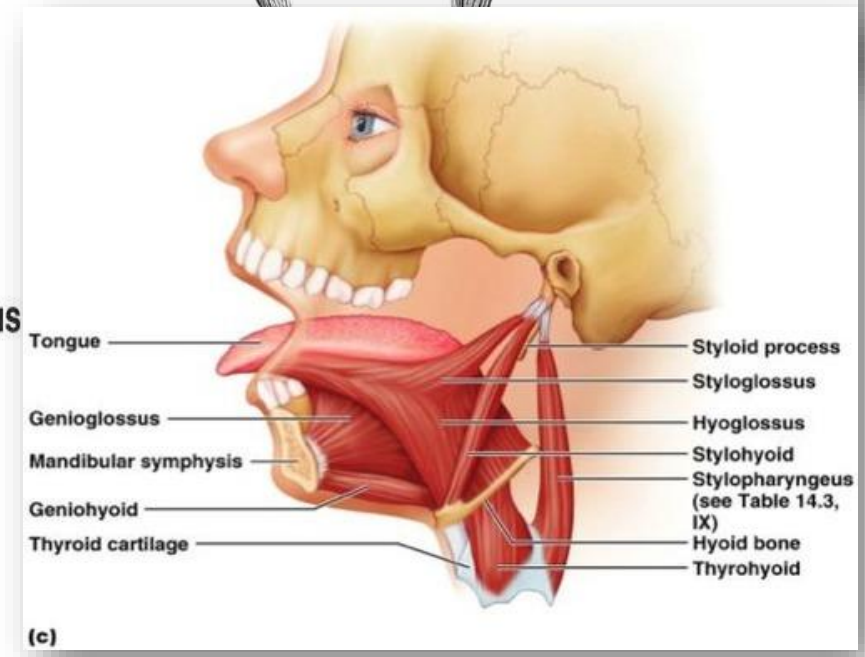
**Insertion:** Along the whole length of **under surface** of tongue and the body of hyoid bone.

**Action:**

- **The two muscles together; protrude (propel) the tongue foreward.**
- **Acting unilaterally; the protruded tongue deviate to the opposite side.**
- **Also they depress the middle part of the tongue.**



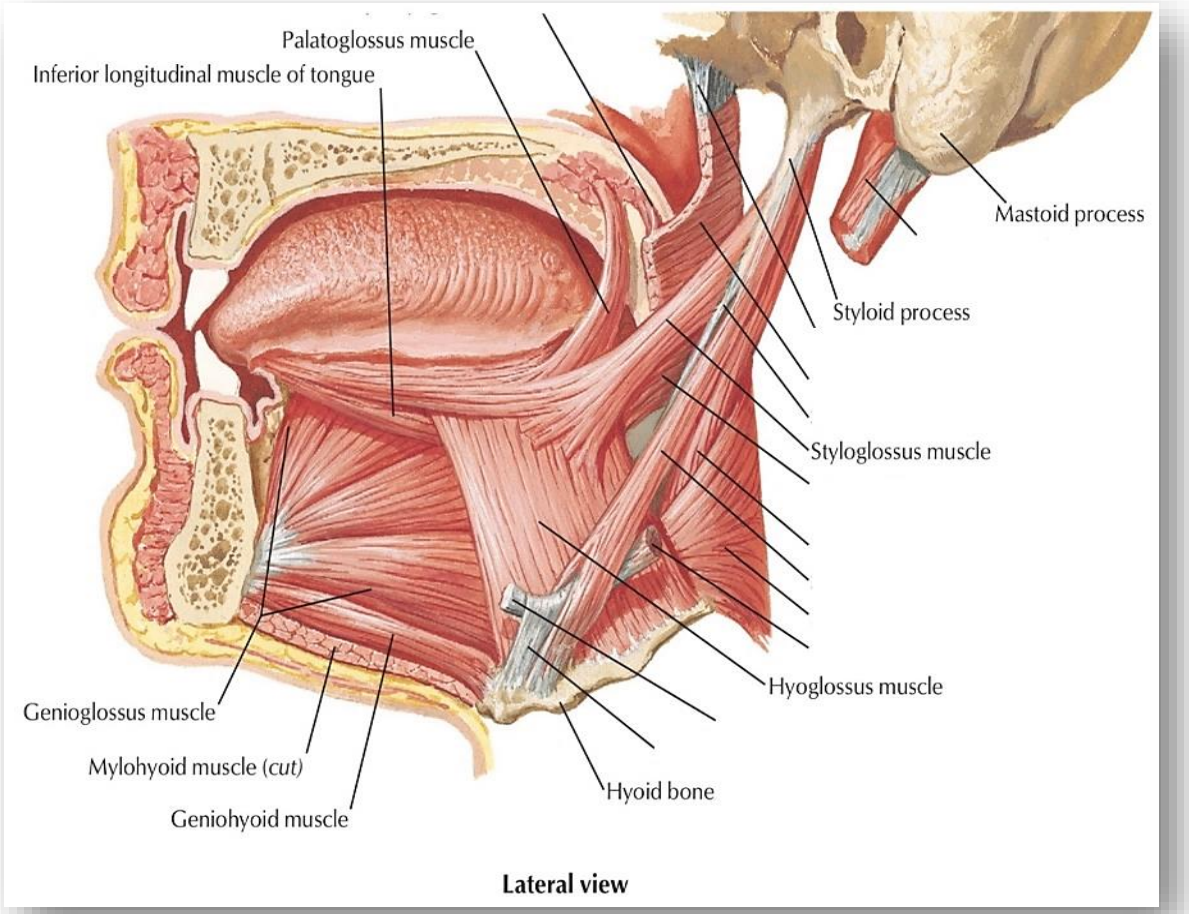



# Extrinsic muscles of tongue

**In case of hypoglossal nerve (12$^{th}$ N.) palsy, the protruded tongue deviated toward the paralyzed side.** e.g. in right 12$^{th}$ nerve damage lead to paralysis of right genioglossus muscle. The intact left genioglossus acts alone→ tip of tongue deviated to the right side.

# Extrinsic muscles of tongue

| Muscle | Origin | Insertion | Action |
|---|---|---|---|
| 1-Palatoglossus | Lower surface of palatine aponeurosis | Posterior 1/3 of the side of tongue | elevates the tongue and approximates the palatoglossal arch to its contralateral fellow, thus shutting off the oral cavity from the oropharynx. |
| 2-Hyoglossus | Body and greater horn of the hyoid bone | Posterior ½ of the side of the tongue | Depresses the tongue. |
| 3-Styloglossus | From styloid process. | Along whole length of the side of the tongue | Pulls tongue upwards and backwards. |
| 4-Genioglossus (Fan-shaped muscle) | Upper genial tubercle of the mandible | Along the whole length of under surface of tongue and the body of hyoid bone | -The two muscles together protrude the tongue fore ward.<br>-Acting unilaterally, the protruded tongue deviate to the opposite side. |



# Nerve supply of the Tongue

## 1. Motor Supply:

**Hypoglossal nerve supplies all tongue muscles except Palatoglossus muscle which is supplied by cranial part of the accessory nerve via the pharyngeal plexus.**

## 2. Sensory Supply:

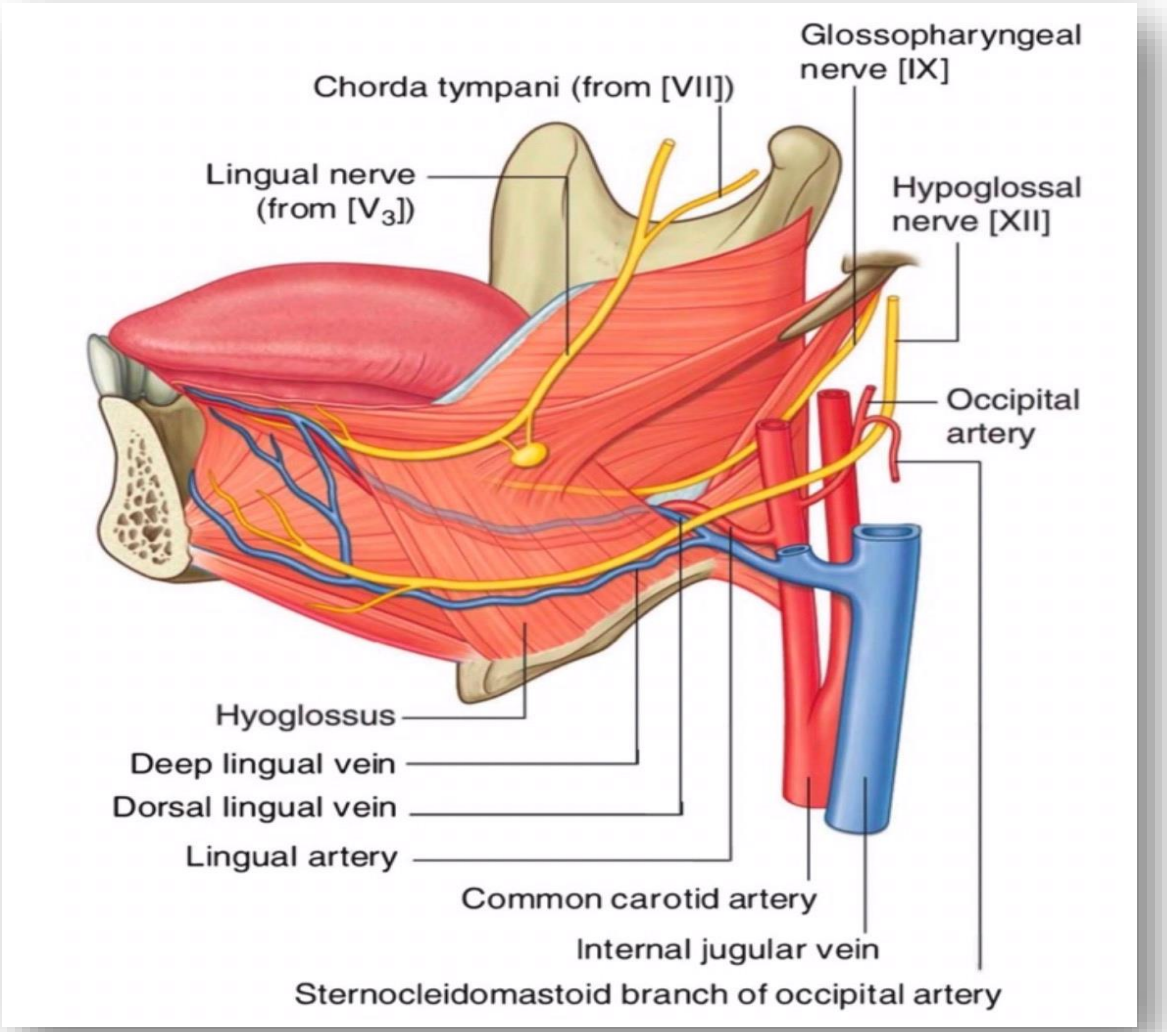
### Anterior 2/3 of the tongue:

General sensation: (pain, touch, temperature) by **Lingual nerve (V).**

Taste sensation: carried by **chorda tympani nerve (VII).**

### Posterior 1/3 of the tongue:

All sensations are carried by **Glossopharyngeal nerve (IX).**



# Blood Supply

**Arterial Supply:** lingual artery (from external carotid artery).

**Venous drainage:** The lingual vein ends in the I.J.V.

**Lymphatic drainage:**

**Anterior 2/3 of the tongue:**

The tip → bilateral submental lymph nodes.

The margins → unilateral submandibular lymph nodes.

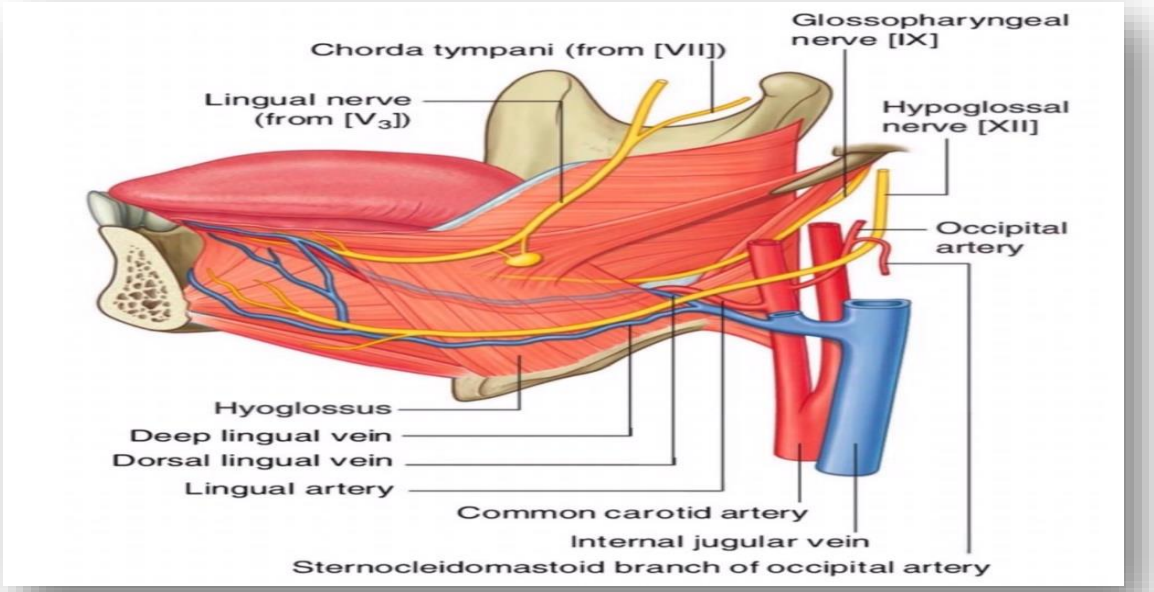
**Central part → bilateral submandibular lymph nodes, bilateral deep cervical lymph nodes.**

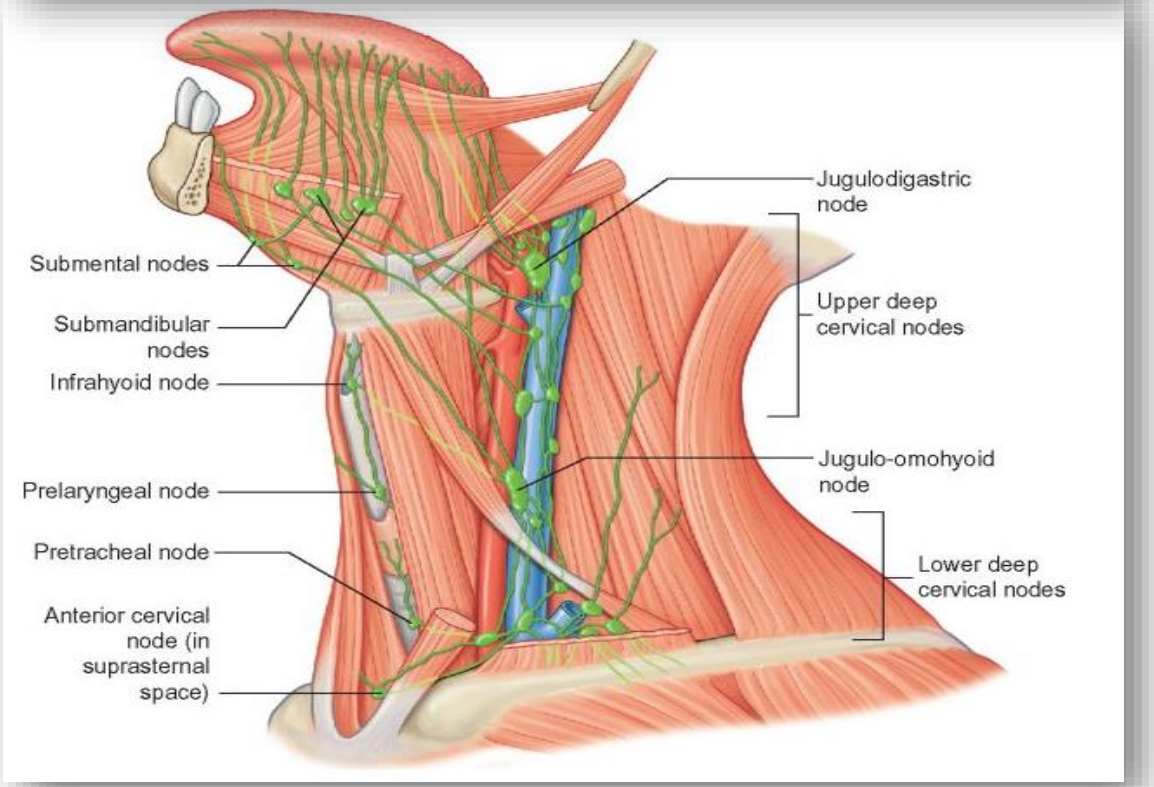
**Posterior 1/3 of the tongue** → deep cervical lymph nodes.

Final lymph drainage → deep cervical lymph nodes.

The more central regions may drain bilaterally, and this must be borne in mind when planning to remove malignant tumours of the tongue that are approaching the midline. If the tumour has a propensity for lymphatic spread, both cervical chains may be involved.





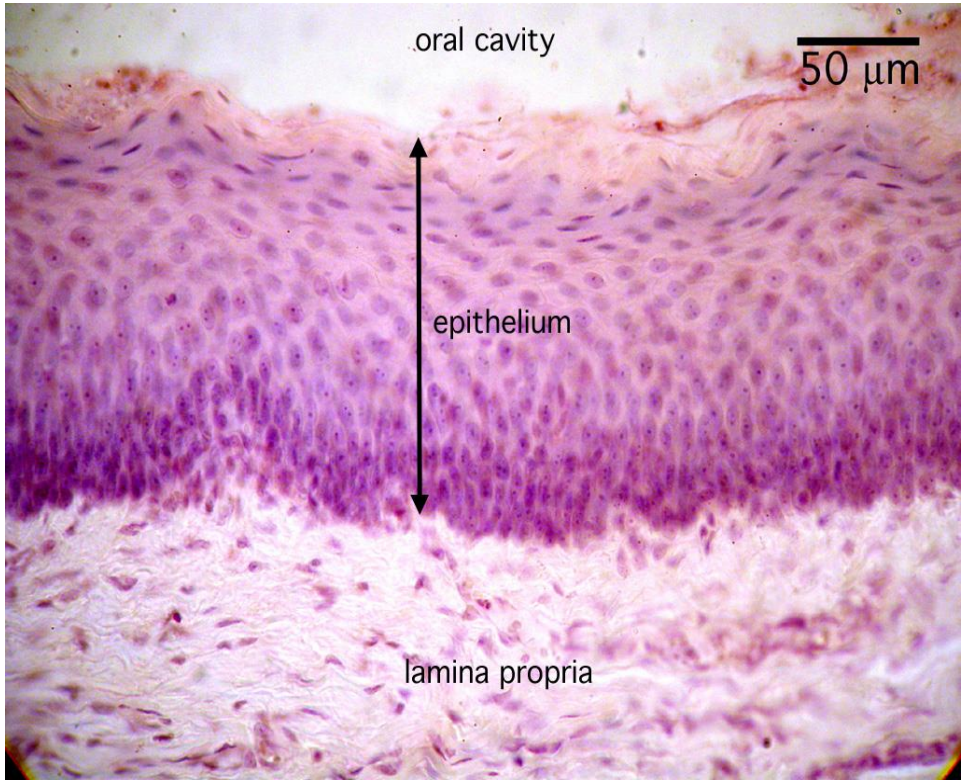



# Oral mucosa

**Types of oral mucosa:**

**A- Masticatory:** that covers gums, hard palate& dorsum of tongue, **is thick, firmly attached to underlying tissues, keratinized stratified squamous epithelium (variable degree of keratinization).**

**B- lining oral mucosa else where in oral cavity:** (soft palate, floor of the mouth, and the dorsal surface of the posterior third of tongue and the inferior surface of the tongue), **thin, loosely attached to underlying tissues non-keratinized stratified squamous epithelium.**



# Structure of tongue

## Mucosa of dorsal surface:

Masticatory mucosa, firmly attached to underlying tissue **modified to form lingual papillae in ant. 2/3.**

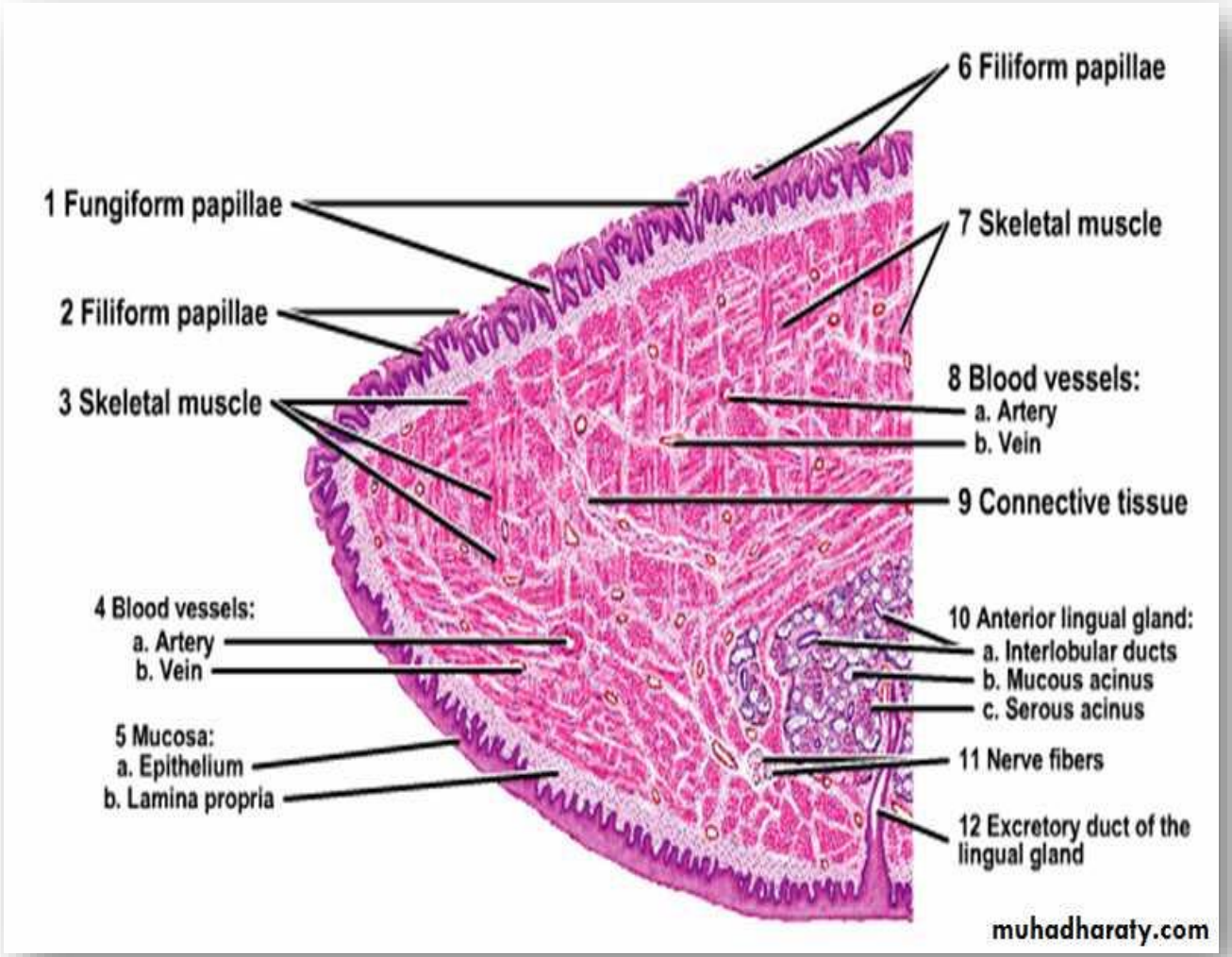
The mucous membrane covering dorsal surface of posterior third of tongue has a nodular appearance due to the presence of underlying mucous and serous glands and aggregations of lymphoid follicles, **the lingual tonsil**

## Mucosa of ventral surface:

Covered by oral mucosa, thin &loosely attached to underlying tissue .

## The main bulk of tongue:

Formed of **striated muscle fibers** run in three directions, embedded in **loose areolar connective tissues** to allow maximal mobility of tongue.



# Lingual papillae

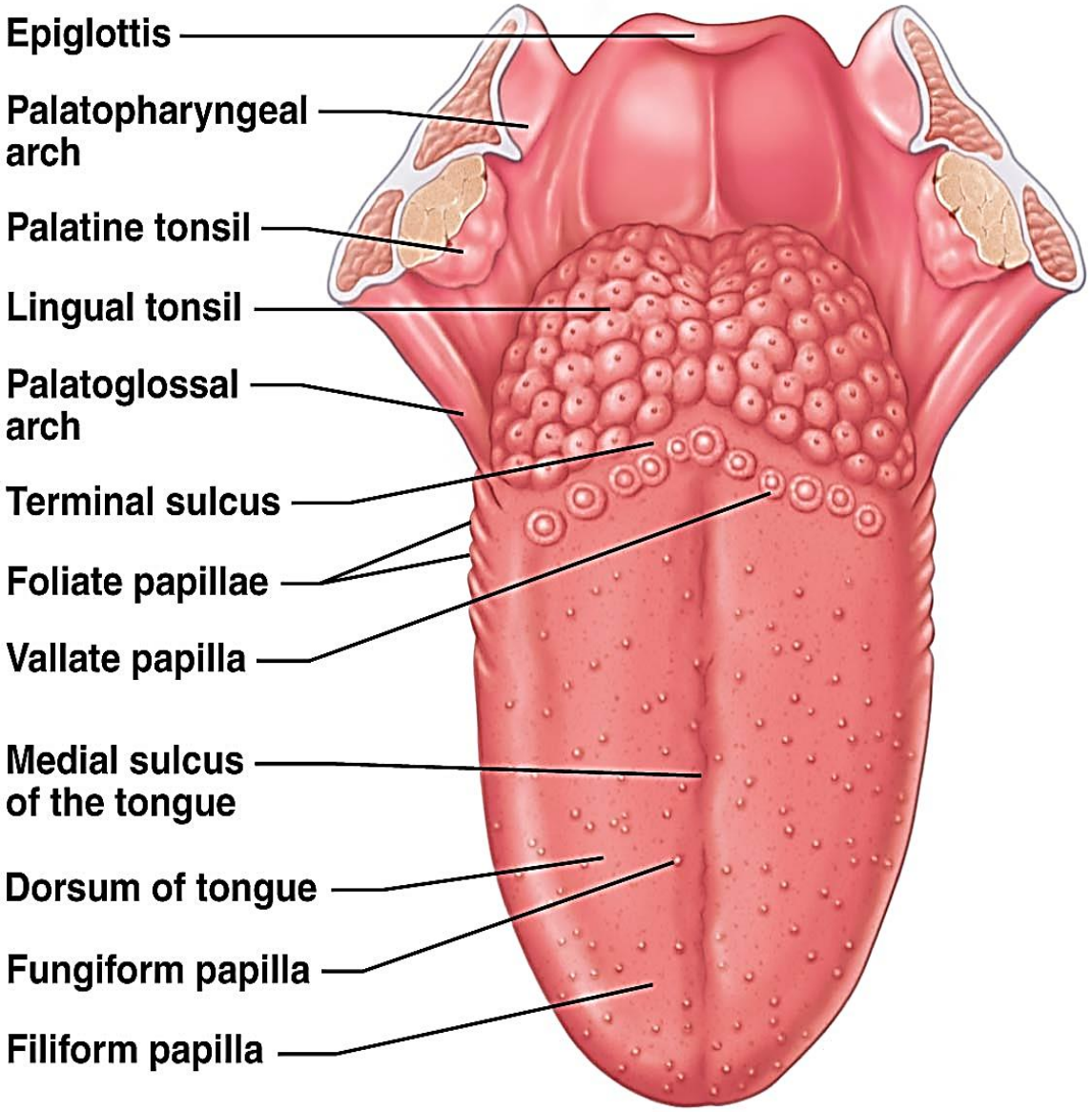
**Def.;** Elevations on dorsal surface of the ant. 2/3 of tongue.

**Function:** It increase surface area of tongue.

**Structure:** **Each papilla has** a core of connective tissue covered by stratified squamous epithelium with variable degree of keratinization.

**Types:**

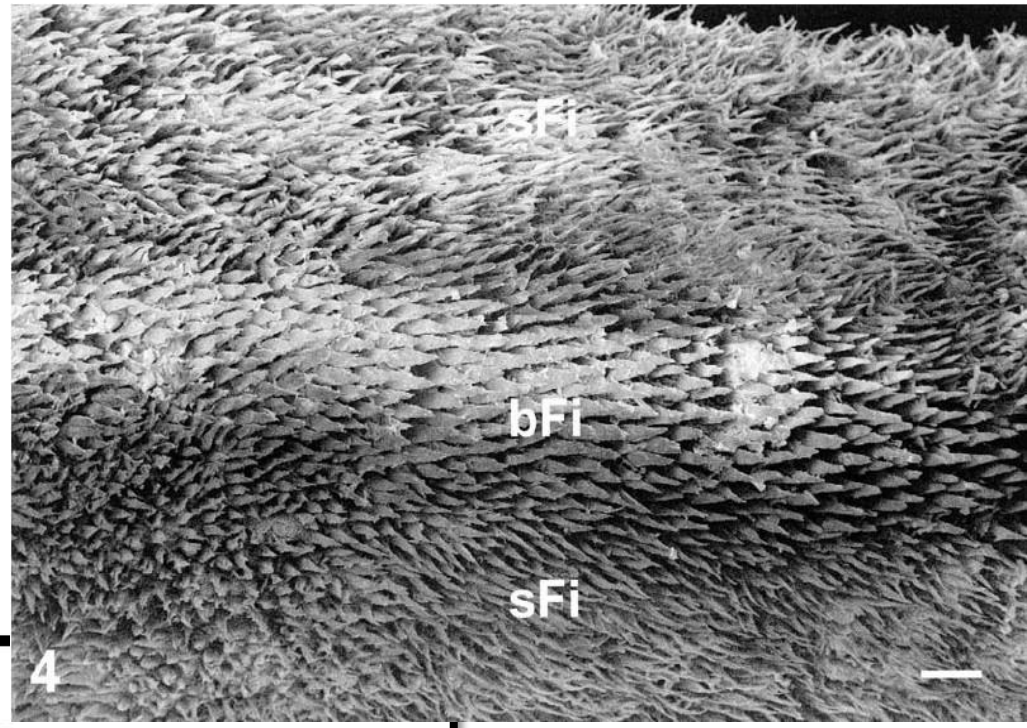
1- Filiform papillae.
2- Fungiform papillae.
3- Circumvallate papillae.
4-Foliate papillae not recognized in adult human.



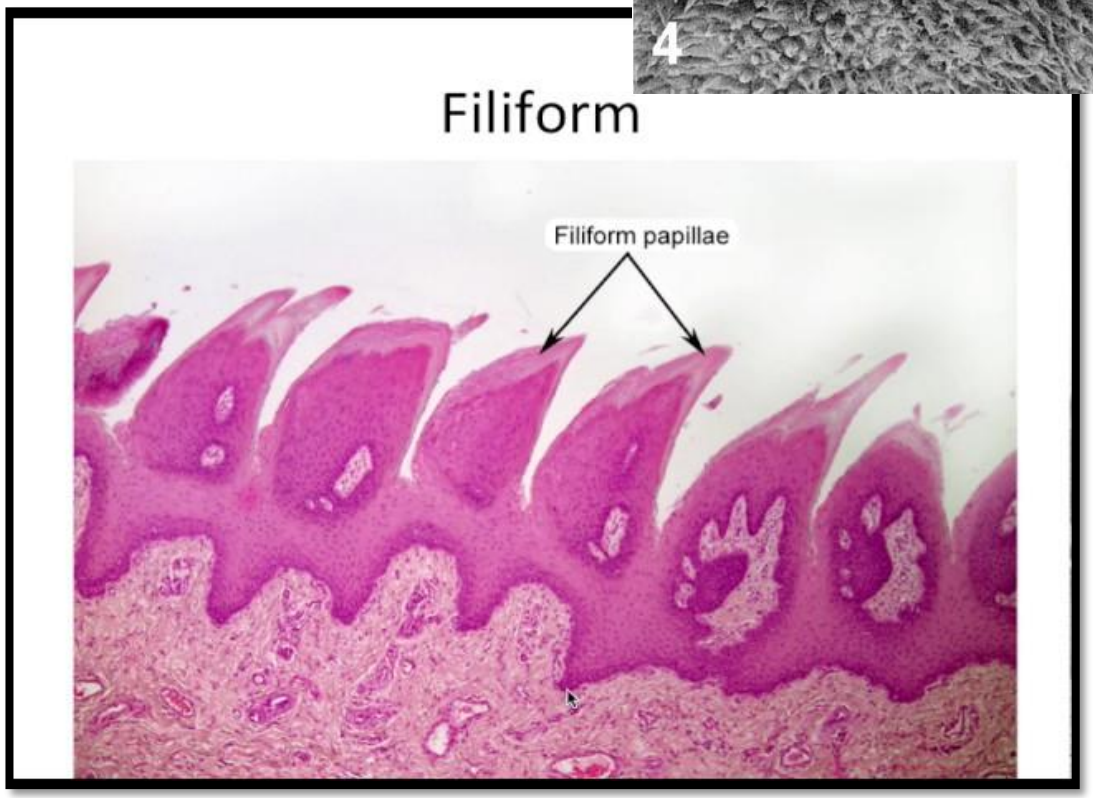
# Lingual papillae

**1- Filiform papillae:**

- Are the **smallest** but the most **numerous** papillae.
- They are minute conical projections.
- They are present **throughout** the dorsal surface of the anterior two-thirds.
- **Have no** taste bud.




Scanning electron micrograph of tongue



# Lingual papillae

## 2- Fungiform papillae:

- Are larger and less numerous than the filiform papillae.
- They resemble mushroom and are **visible as a bright red spots** (vascular connective tissue core).
- Although they are scattered throughout the dorsum of anterior two-thirds of tongue, but are especially **numerous near sides and tip of the tongue.**
- **Have few taste bud**, for taste perception for sweet, salt& sour.


# Lingual papillae

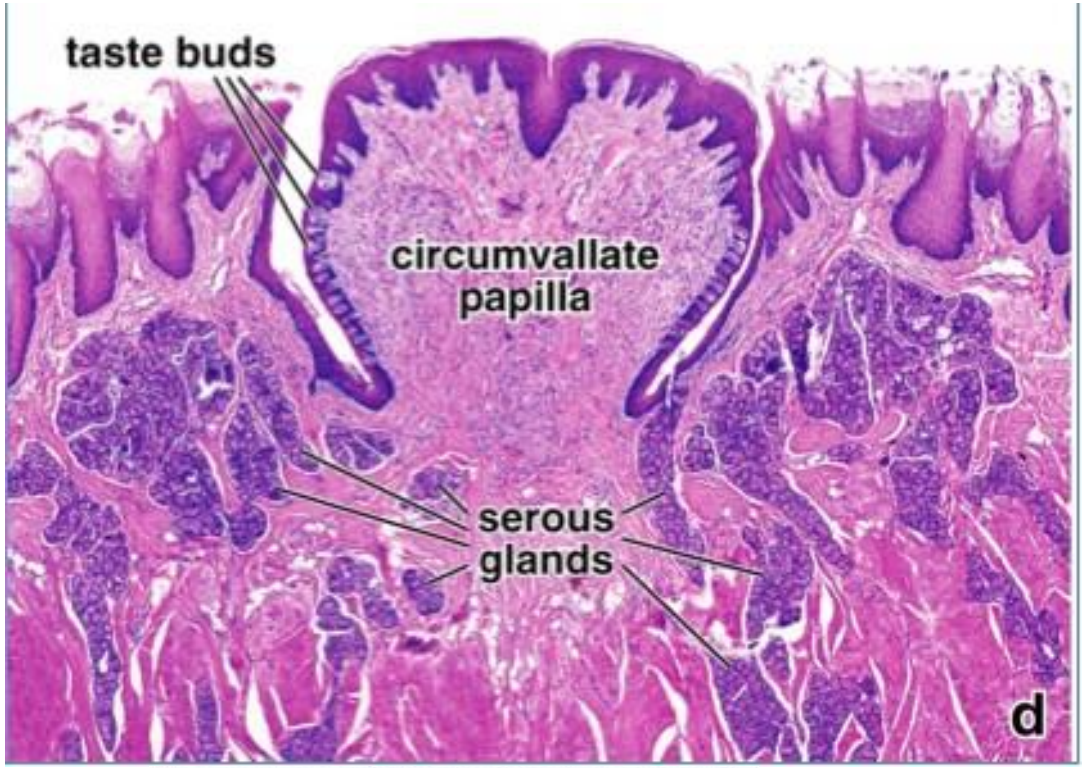
## 3- Circumvallate papillae:

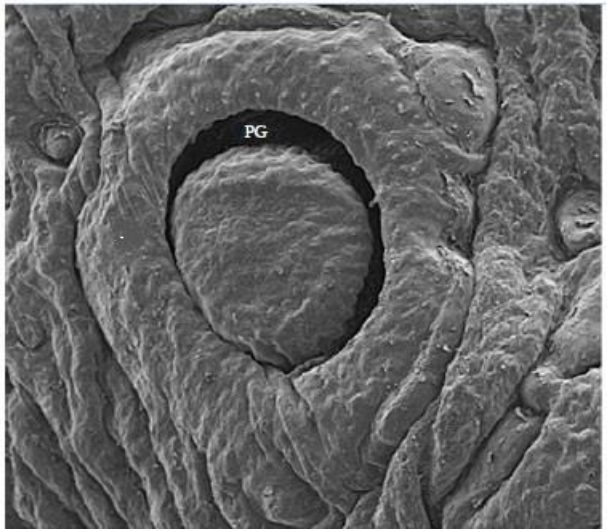
- Are the **largest** form.
- They are **circular-shaped**, vary from 8–12 papillae **arranged in** the form of a V-shaped row, immediately in front and parallel with the sulcus terminalis.
- **Have numerous taste bud** present along side of papilla for bitter senation.

Each circumvallate papilla is surrounded by **a deep circular sulcus containing opening of VonEbners gland (serous lingual salivary glands).**

Their secretions dissolves food particles &facilitate perception of taste. And after that wash food particles.

Their secretion contain lipase prevent formation of hydrophobic layer.




Scanning electron micrograph of tongue

# Taste buds

- **Definition:** they are onion-shaped neuroepithelial structures, **specialized for perception of taste sensation.**
- **Site:** embedded within the epithelium of the lingual papillae and also present in epithelium of palate &epiglottis.
- **Structure:** pale structures, rests on the basal lamina connected to the surface by small opening taste pore. It **contains three types of cells:**

**1- Neuroepithelial cells known as the taste cells**.

○ Spindle in shape with **apical microvilli** (gustatory hairs) project through taste pores, their **base associated with the afferent nerve fibers.**

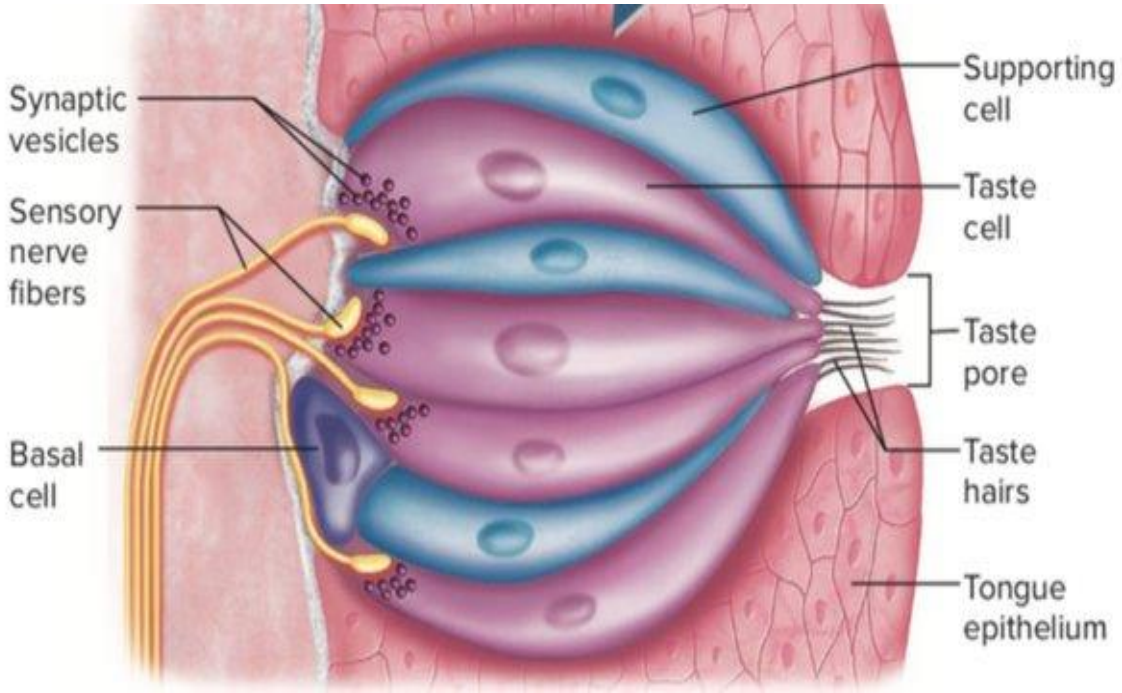
○ Food dissolved in saliva stimulate gustatory hairs.

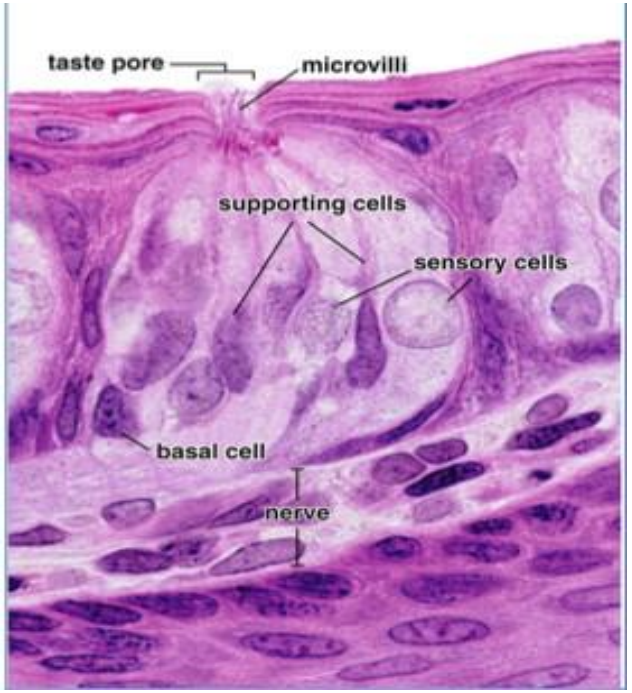
**2- Supporting cells.**

**3- Basal cells:**

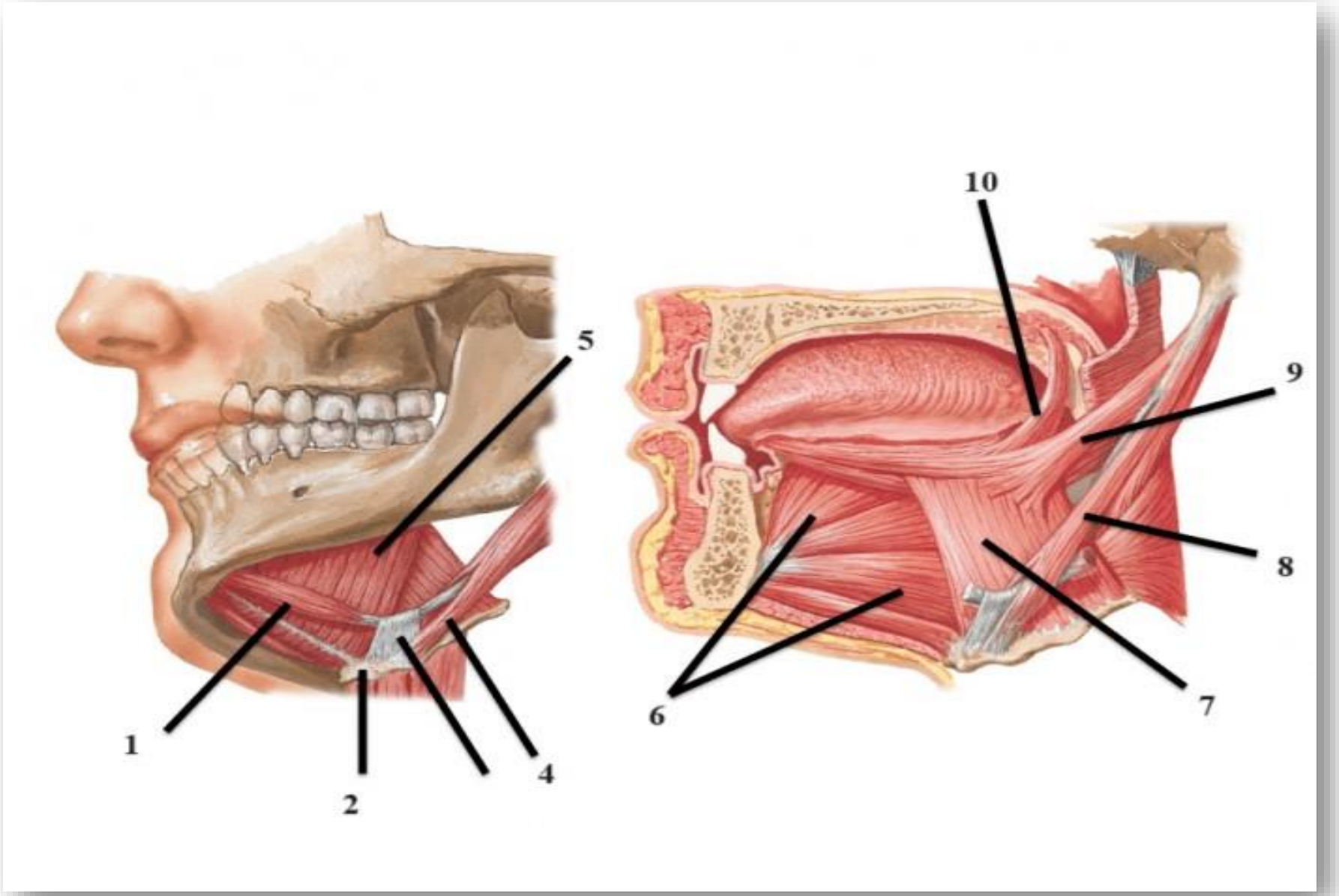
○ Small &pyramidal cells, found between the bases of other cells.

○ These cells are responsible for the replacement of all cell types and renewal taste cells every 10 days.



# Image Quiz




Thank you for listening
ANY
QUESTIONS?