

ORAL CAVITY

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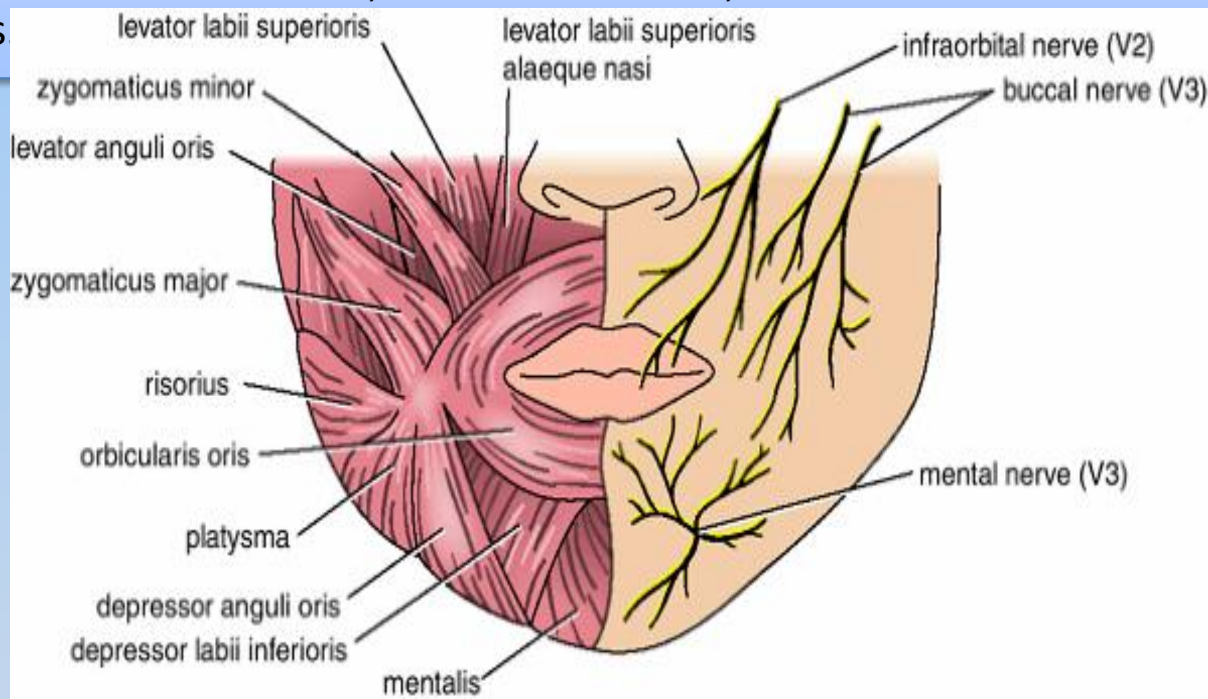
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Oral Cavity

The Lips

- The lips are two fleshy folds that surround the oral orifice.
- They are covered on the outside by skin and are lined on the inside by mucous membrane.
- The **substance** of the lips is made up by the orbicularis oris muscle and the muscles that radiate from the lips into the face.
- Also included are the labial blood vessels and nerves, connective tissue, and many small salivary glands.
- The **philtrum** is the shallow vertical groove seen in the midline on the outer surface of the upper lip.
- Median folds of mucous membrane, the **labial frenulae**, connect the inner surface of the lips to the gums



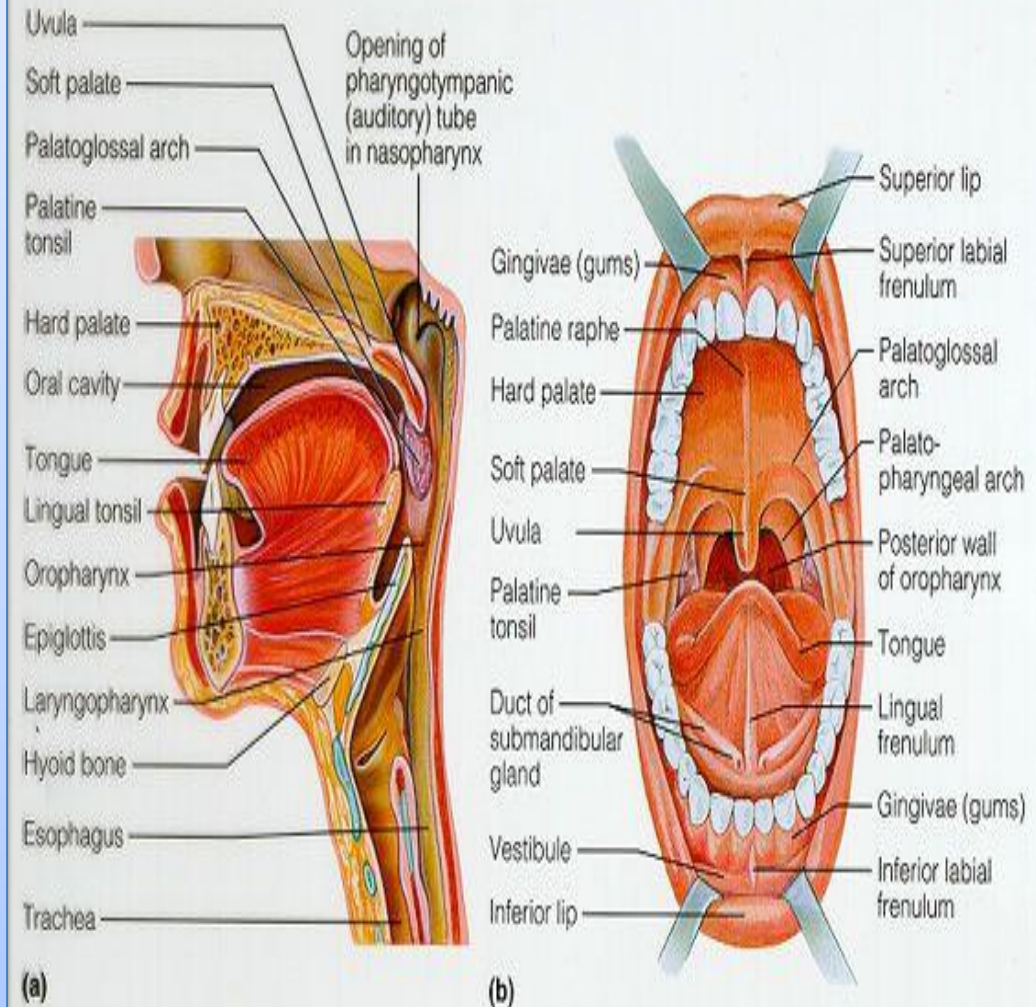
The Mouth Cavity

- The mouth extends from the lips to the pharynx.
- The entrance into the pharynx, the **oropharyngeal isthmus**, is formed on each side by the **palatoglossal fold** .
- The mouth is divided into the **vestibule** and the **mouth cavity proper**.

Vestibule

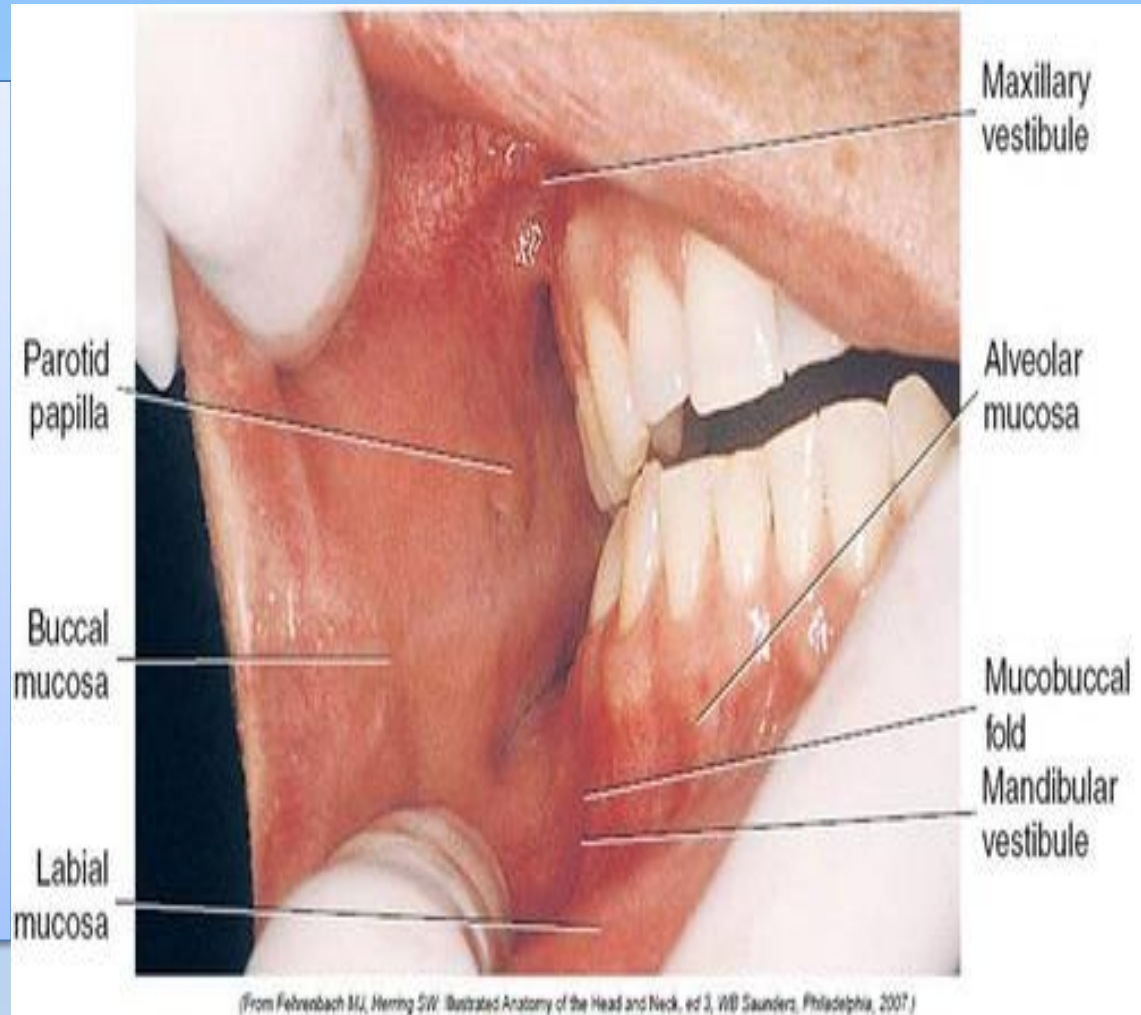
- The vestibule lies between the lips and the cheeks externally and the gums and the teeth internally.
- This slitlike space communicates with the exterior through the oral fissure between the lips.
- When the jaws are closed, it communicates with the mouth proper behind the third molar tooth on each side.
- The **vestibule is limited above** and below by the reflection of the mucous membrane from the lips and cheeks to the gums.
- The lateral wall of the vestibule is formed by the cheek, which is made up by the **buccinator muscle**, which is covered on the outside by fascia and skin and is lined by mucous membrane.
- The **duct of the parotid salivary** gland opens on a small papilla into the vestibule opposite the upper second molar tooth.

Anatomy of the oral cavity (mouth) (Figure 24.7)



Mucous Membrane of the Mouth In the vestibule

- In the **vestibule**, the mucous membrane is tied to the buccinator muscle by elastic fibers in the **submucosa** that prevent redundant folds of mucous membrane from being bitten between the teeth when the jaws are closed.
- The mucous membrane of the gingiva, or gum, is strongly attached to the **alveolar periosteum**.



Mouth Cavity Proper

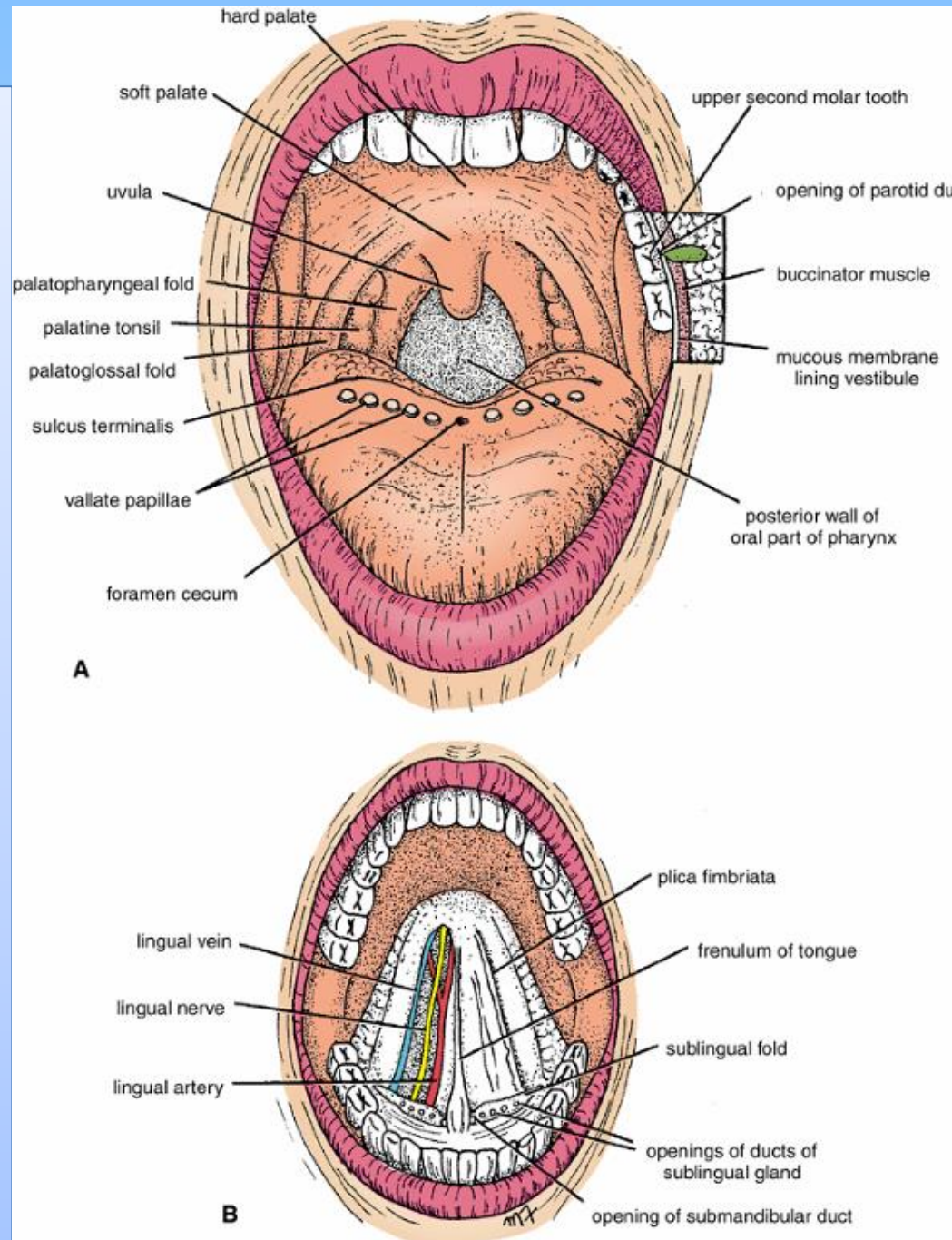
The mouth proper has a roof and a floor.

Roof of Mouth

- The roof of the mouth is formed by the hard palate in front and the soft palate behind .

Floor of Mouth

- The floor is formed largely by the anterior two thirds of the tongue and by the reflection of the mucous membrane from the sides of the tongue to the gum of the mandible.
- A fold of mucous membrane called the **frenulum of the tongue** connects the undersurface of the tongue in the midline to the floor of the mouth.
- The **submandibular duct** of the submandibular gland opens onto the floor of the mouth on the summit of a small papilla on either side of the frenulum of the tongue
- The sublingual gland projects up into the mouth, producing a low fold of mucous membrane, the **sublingual fold**.
- Numerous ducts of the gland open on the summit of the fold.
- On the lateral side of the frenulum, the **deep lingual vein** can be seen through the mucous membrane. Lateral to the lingual vein, the mucous membrane forms a fringed fold called the **plica fimbriata**.

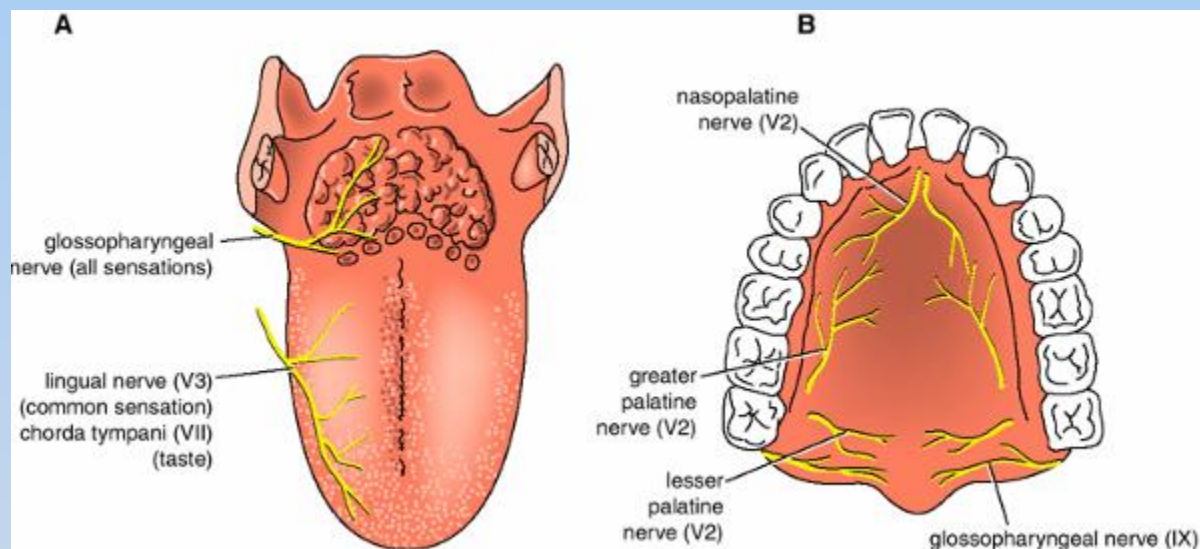


Sensory Innervation of the Mouth

Roof: The greater palatine and nasopalatine nerves from the maxillary division of the trigeminal nerve

Floor: The lingual nerve (common sensation), a branch of the mandibular division of the trigeminal nerve. The taste fibers travel in the chorda tympani nerve, a branch of the facial nerve.

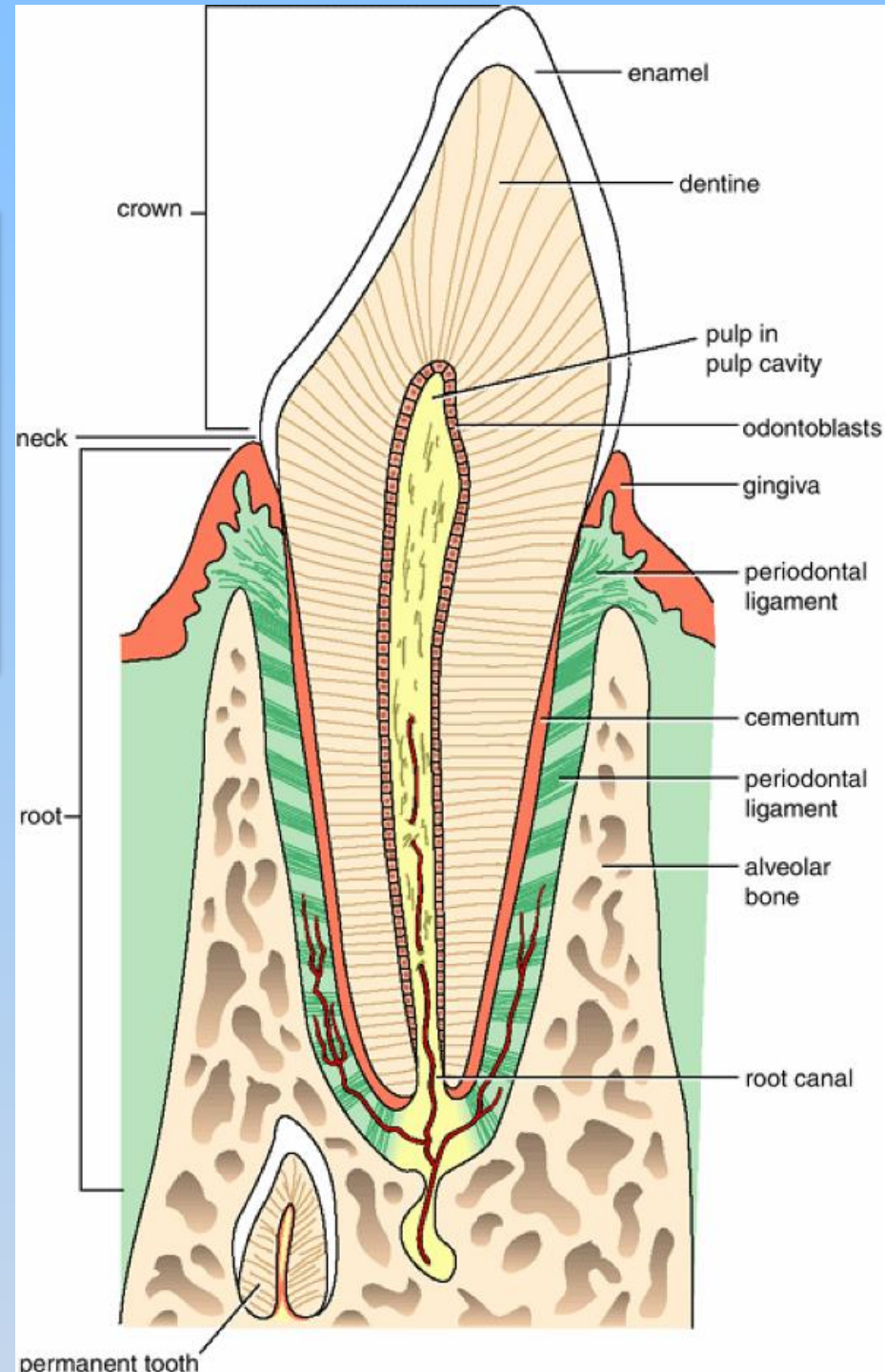
Cheek: The buccal nerve, a branch of the mandibular division of the trigeminal nerve (the buccinator muscle is innervated by the buccal branch of the facial nerve)



The Teeth

Deciduous Teeth

- There are 20 deciduous teeth: four incisors, two canines, and four molars in each jaw.
- They begin to erupt about 6 months after birth and have all erupted by the end of 2 years.
- The teeth of the lower jaw usually appear before those of the upper jaw.



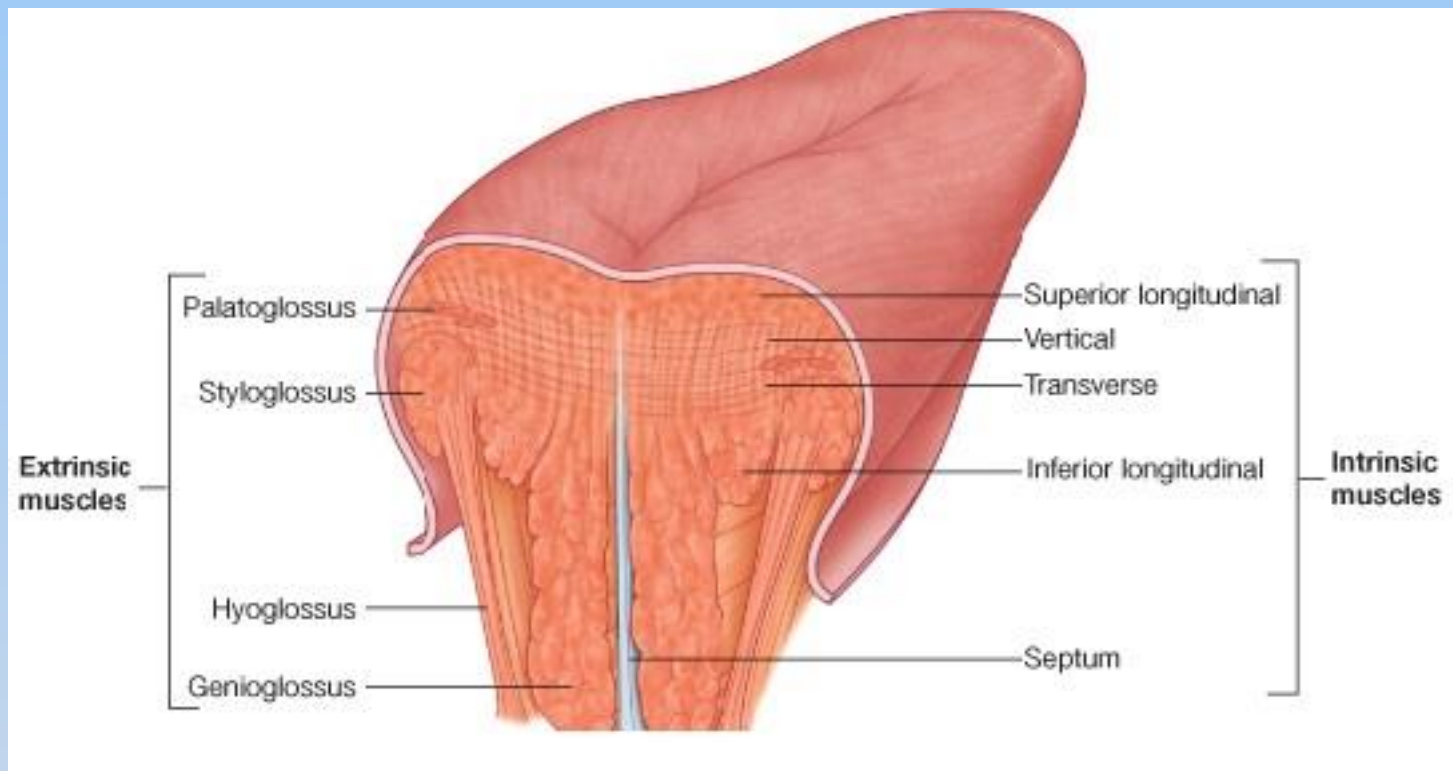
Permanent Teeth

- There are 32 permanent teeth: 4 incisors, 2 canines, 4 premolars, and 6 molars in each jaw.
- They begin to erupt at 6 years of age.
- The last tooth to erupt is the third molar, which may happen between the ages of 17 and 30 years.
- The teeth of the lower jaw appear before those of the upper jaw.



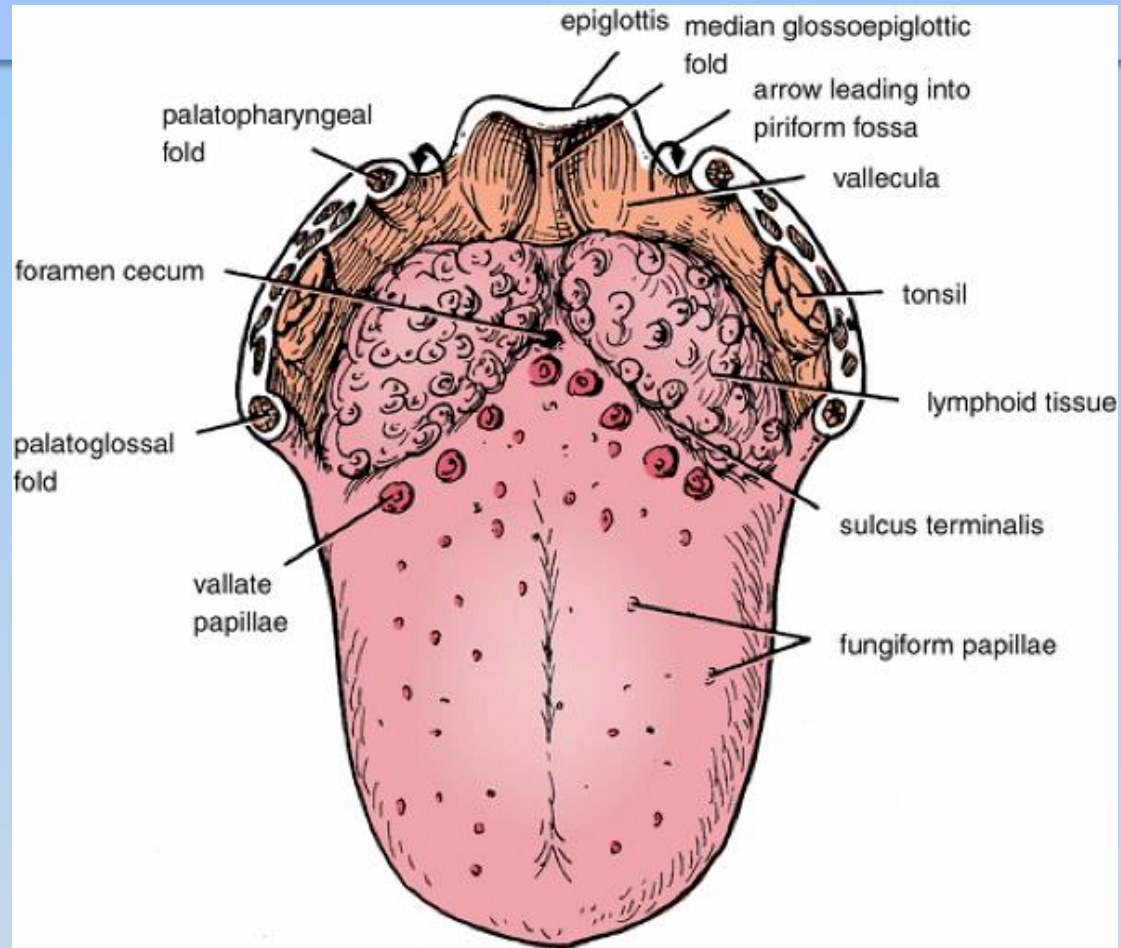
The Tongue

- The tongue is a mass of striated muscle covered with mucous membrane.
- The muscles attach the tongue to the **styloid process** and the **soft palate** above and to the **mandible** and the **hyoid bone** below.
- The tongue is divided into right and left halves by a **median fibrous septum**.

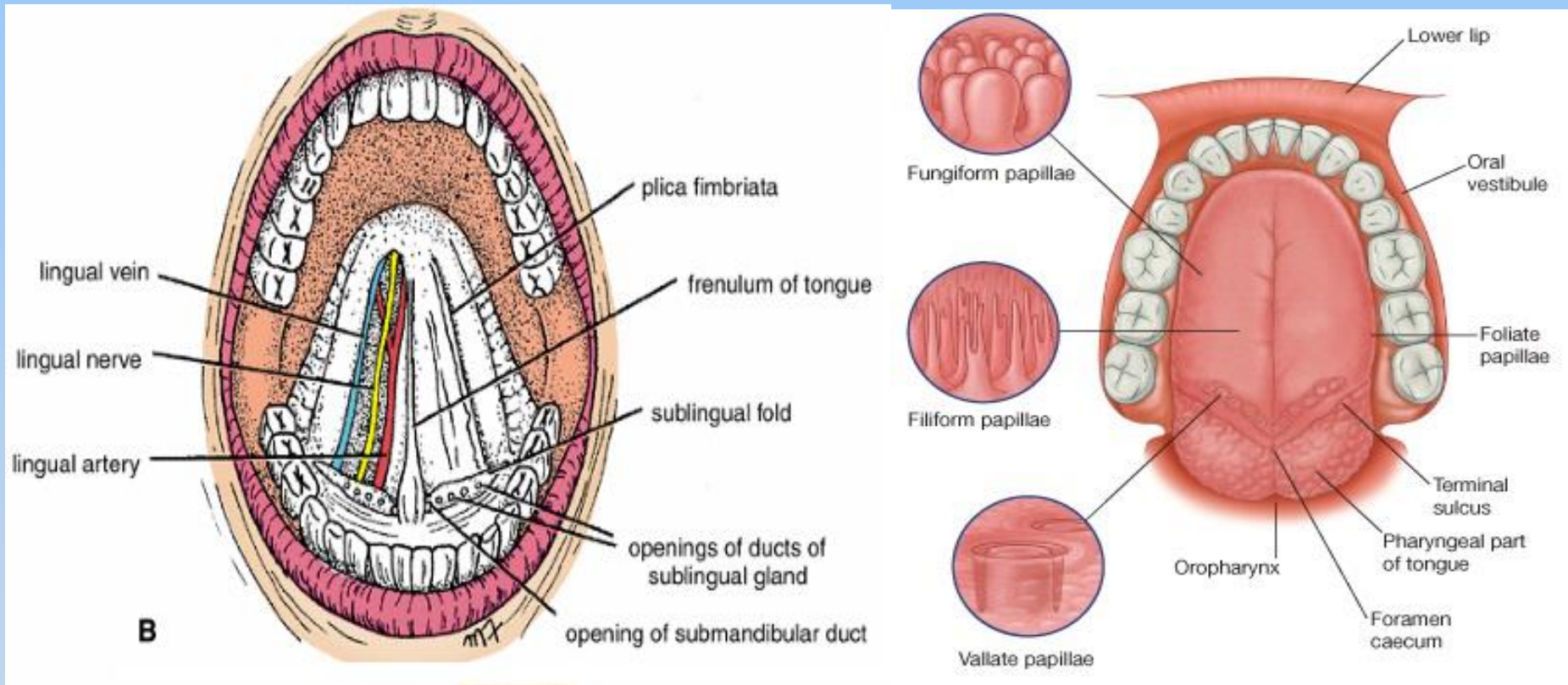


Mucous Membrane of the Tongue

- The mucous membrane of the upper surface of the tongue can be divided into anterior and posterior parts by a V-shaped sulcus, the **sulcus terminalis**.
- The apex of the sulcus projects backward and is marked by a small pit, the **foramen cecum**.
- The sulcus serves to divide the tongue into the anterior two thirds, or **oral part**, and the posterior third, or **pharyngeal part**.
- The foramen cecum is an embryologic remnant and marks the site of the upper end of the thyroglossal duct.



- Three types of papillae are present on the upper surface of the anterior two thirds of the tongue: the **filiform papillae**, the **fungiform papillae**, and the **vallate papillae**.
- The mucous membrane covering the posterior third of the tongue is devoid of papillae but has an irregular surface, caused by the presence of underlying lymph nodules, the **lingual tonsil**.
- The mucous membrane on the inferior surface of the tongue is reflected from the tongue to the floor of the mouth. In the midline anteriorly, the undersurface of the tongue is connected to the floor of the mouth by a fold of mucous membrane, the **frenulum of the tongue**.



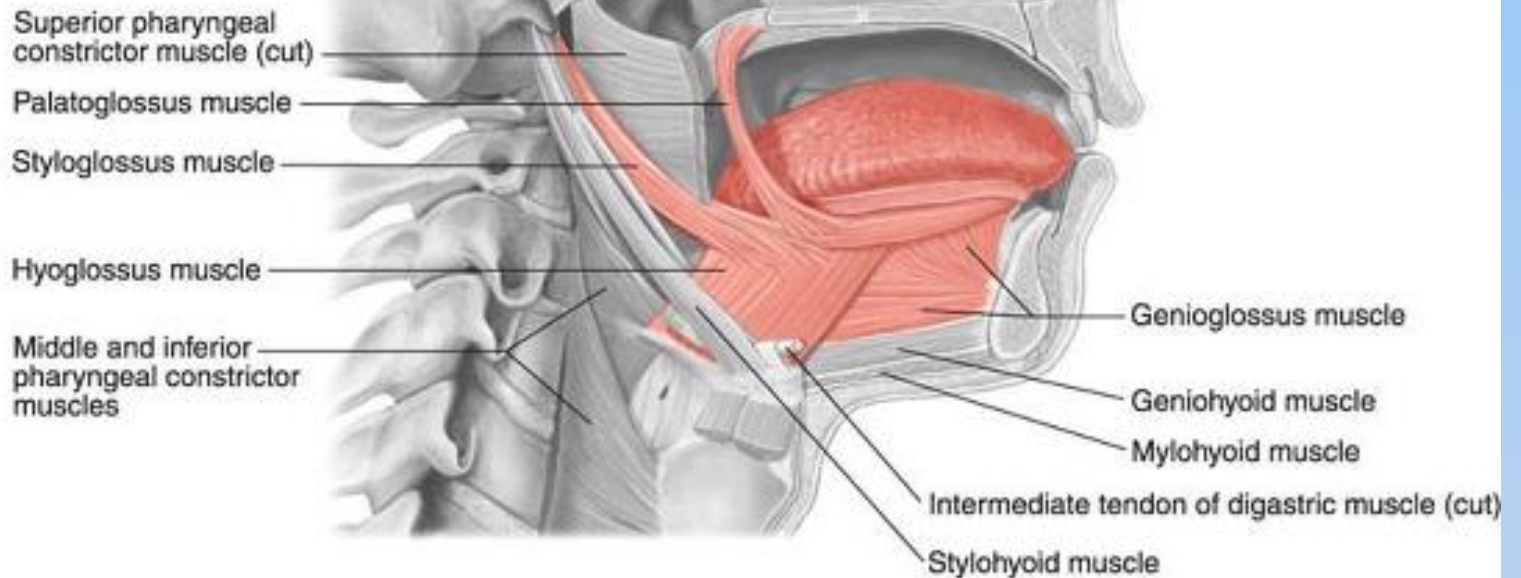
Muscles of the Tongue

- **Shape changes:** Intrinsic muscles.
- **Protrusion:** Genioglossus muscles on both sides acting together.
- **Depression:** Hyoglossus on both sides acting together,
- **Retraction:** Styloglossus and hyoglossus on both sides acting together.
- **Retraction and elevation:** Styloglossus and palatoglossus on both sides acting together.

Muscles of Tongue				
Muscle	Origin	Insertion	Nerve Supply	Action
Intrinsic Muscles				
Longitudinal Transverse Vertical	Median septum and submucosa	Mucous membrane	Hypoglossal nerve	Alters shape of tongue
Extrinsic Muscles				
Genioglossus	Superior genial spine of mandible	Blends with other muscles of tongue	Hypoglossal nerve	Protrudes apex of tongue through mouth
Hyoglossus	Body and greater cornu of hyoid bone	Blends with other muscles of tongue	Hypoglossal nerve	Depresses tongue
Styloglossus	Styloid process of temporal bone	Blends with other muscles of tongue	Hypoglossal nerve	Draws tongue upward and backward
Palatoglossus	Palatine aponeurosis	Side of tongue	Pharyngeal plexus	Pulls roots of tongue upward and backward, narrows oropharyngeal isthmus

Muscles of the Tongue

A. Extrinsic muscles



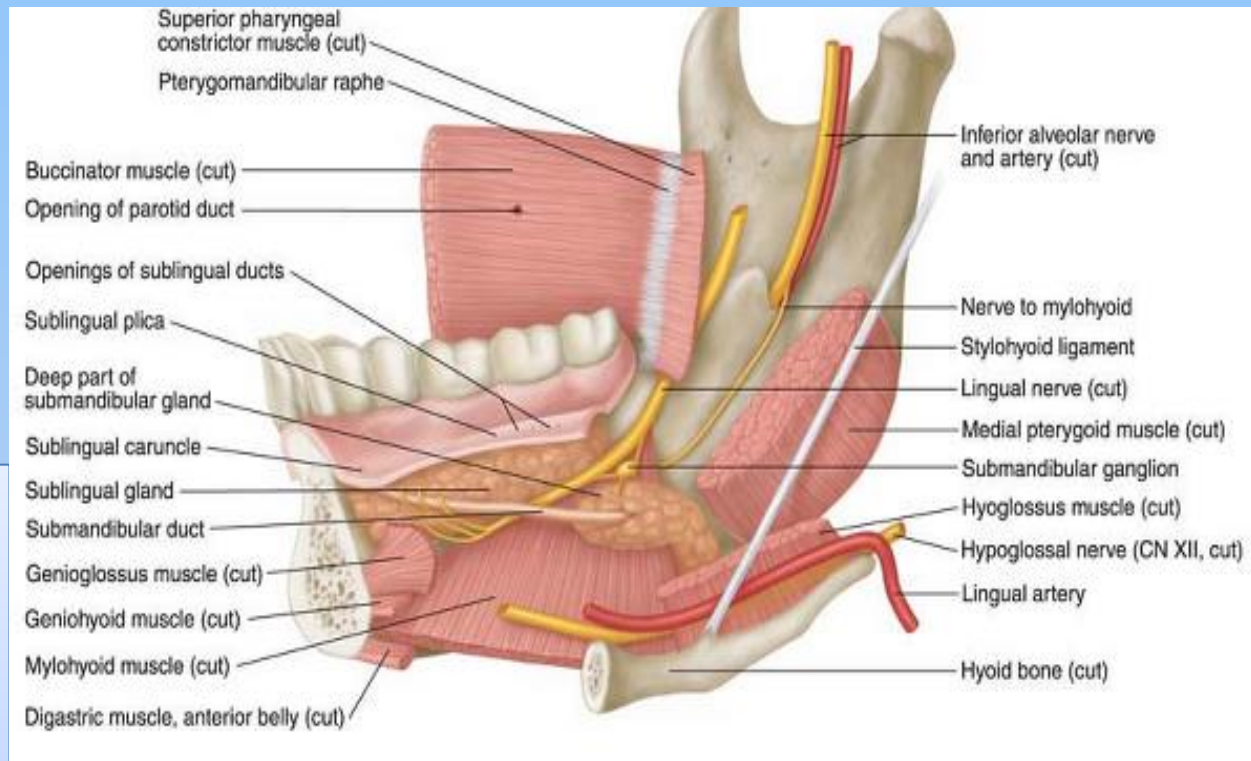
Blood Supply of Tongue

Blood Supply

- The **lingual** artery
- The **tonsillar** branch of the facial artery
- The **ascending pharyngeal** artery.
- The veins drain into the **internal jugular** vein.

Lymph Drainage

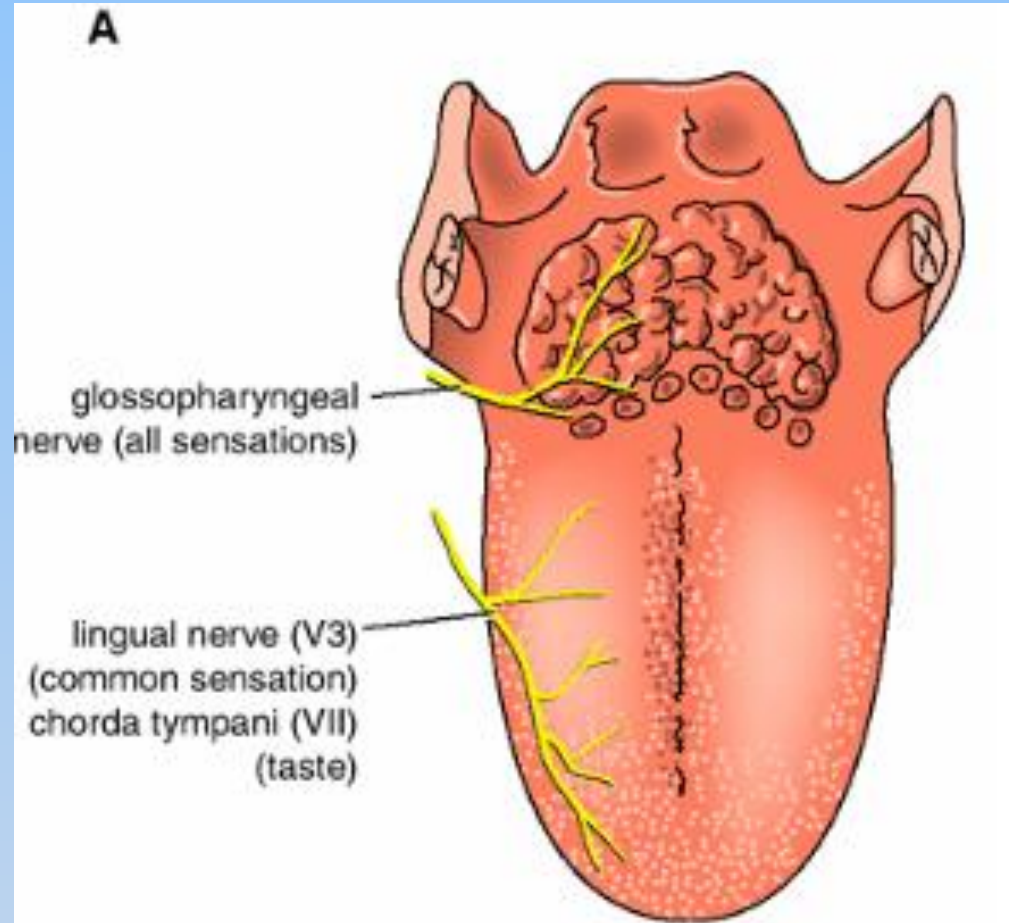
- Tip: Submental lymph nodes
- Sides of the anterior two thirds: Submandibular and deep cervical lymph nodes
- Posterior third: Deep cervical lymph nodes



Nerve of Tongue

Sensory Innervation

- Anterior two thirds:
Lingual nerve branch of mandibular division of trigeminal nerve (general sensation) and **chorda tympani** branch of the facial nerve (taste)
- Posterior third:
Glossopharyngeal nerve (general sensation and taste)



The Palate

- The palate forms the roof of the mouth and the floor of the nasal cavity.
- It is divided into two parts: the **hard palate** in front and the **soft palate** behind.

Hard Palate

- The hard palate is formed by the palatine processes of the maxillae and the horizontal plates of the palatine bones.
- It is bounded by the alveolar arches, and behind it is continuous with the soft palate.
- The undersurface of the hard palate is covered with mucoperiosteum and possesses a median ridge, on either side of which the mucous membrane shows corrugations.



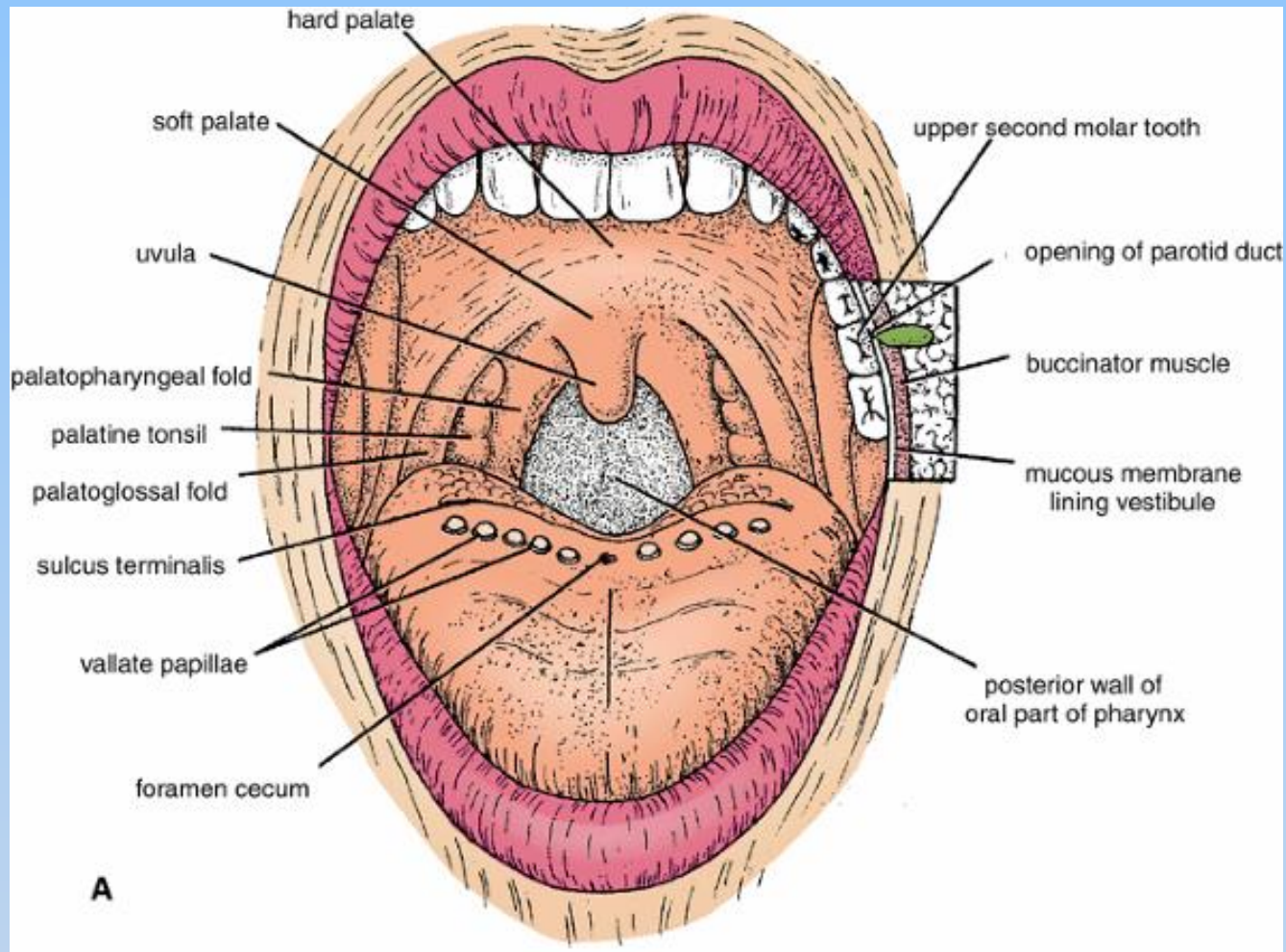
Palatine Aponeurosis

- The palatine aponeurosis is a fibrous sheet attached to the posterior border of the hard palate.
- It is the expanded tendon of the **tensor veli palatini** muscle.

Soft Palate

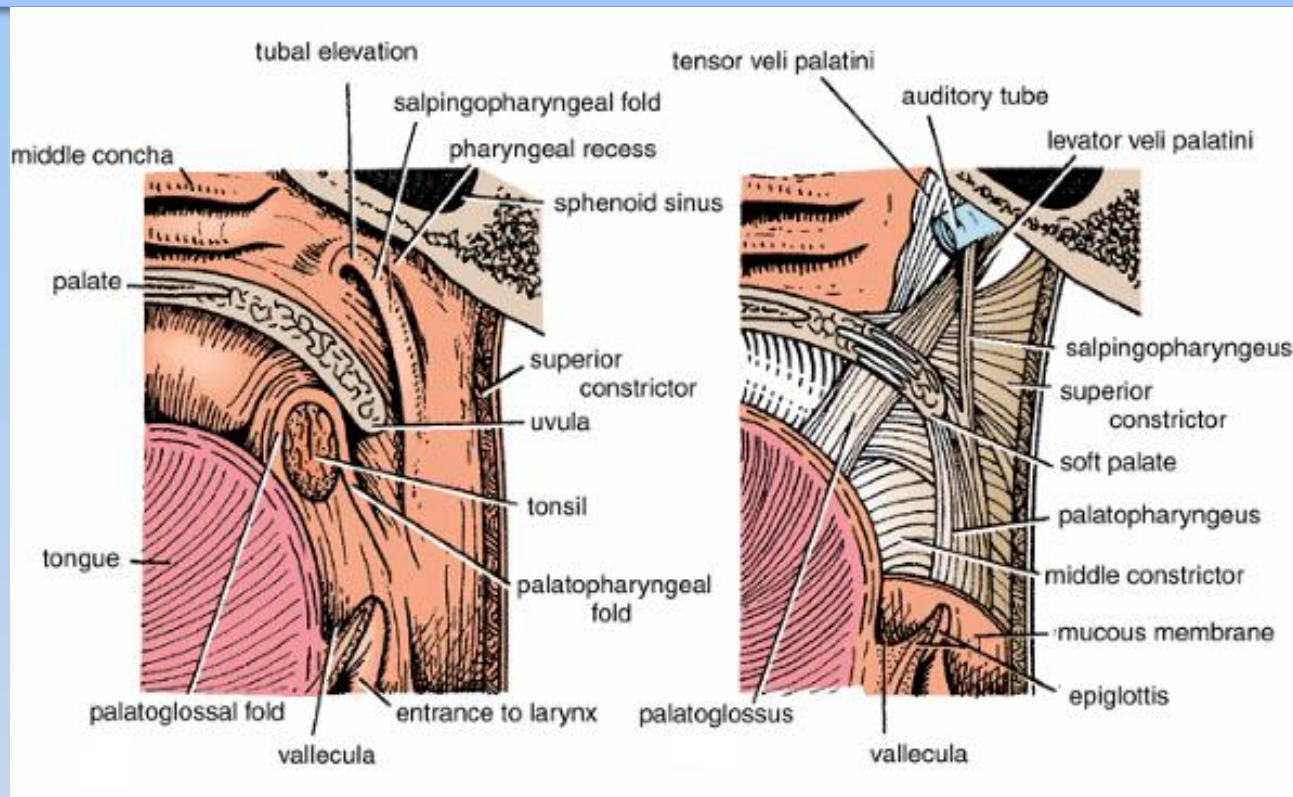
- The soft palate is a mobile fold attached to the posterior border of the hard palate.
- Its free posterior border presents in the midline a conical projection called the **uvula**. The soft palate is continuous at the sides with the lateral wall of the pharynx.
- The **soft palate is composed of mucous membrane, palatine aponeurosis, and muscles.**

Hard and Soft Palate



Muscles of the Soft Palate

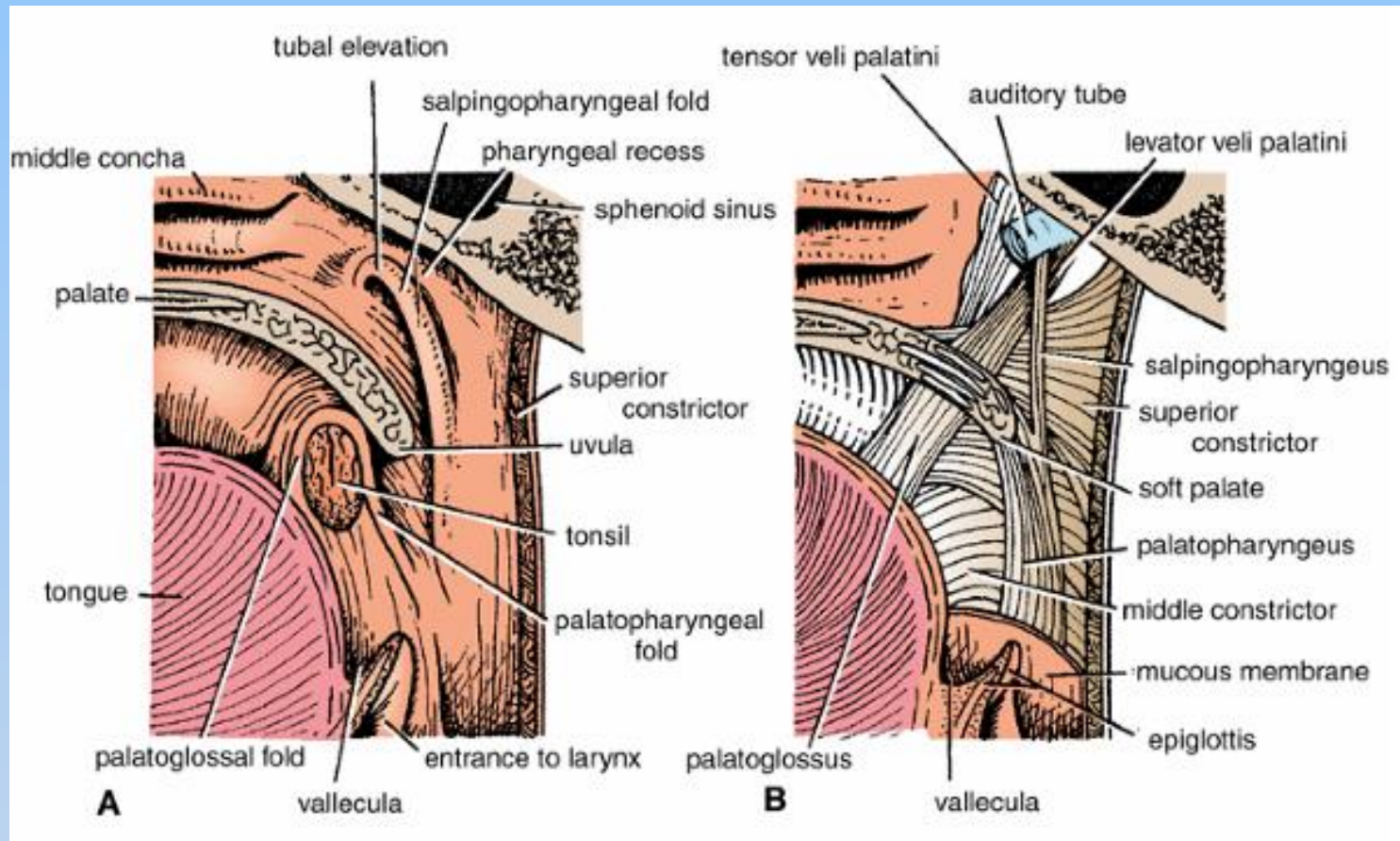
- The muscles of the soft palate are the **tensor veli palatini**, the **levator veli palatini**, the **palatoglossus**, the **palatopharyngeus**, and the **musculus uvulae**.
- The muscle fibers of the tensor veli palatini converge as they descend from their origin to form a narrow tendon, which turns medially around the pterygoid hamulus.
- The tendon, together with the tendon of the opposite side, expands to form the **palatine poneurosis**.
- When the muscles of the two sides contract, the soft palate is tightened so that the soft palate may be moved upward or downward as a tense sheet.



Muscles of the Soft Palate

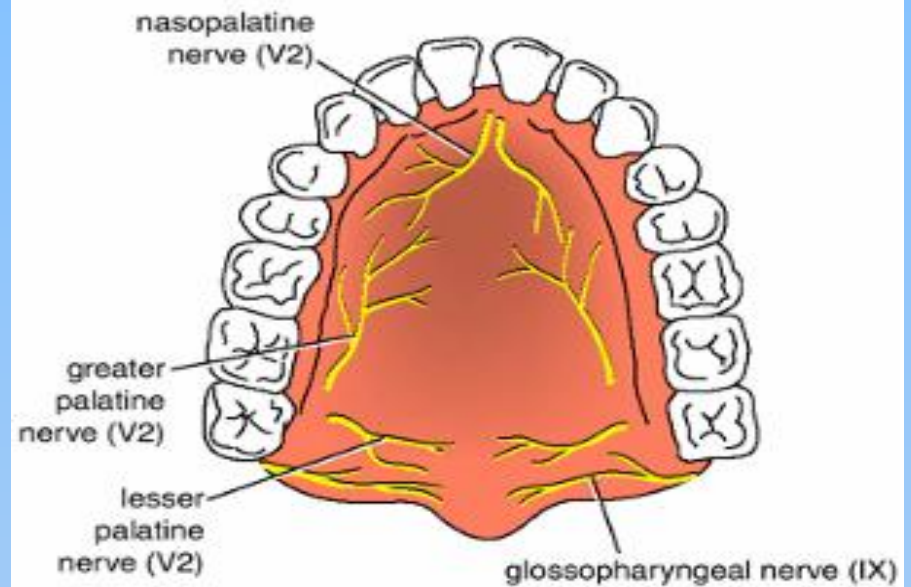
Muscle	Origin	Insertion	Nerve Supply	Action
Tensor veli palatini	Spine of sphenoid, auditory tube	With muscle of other side, forms palatine aponeurosis	Nerve to medial pterygoid from mandibular nerve	Tenses soft palate
Levator veli palatini	Petrous part of temporal bone, auditory tube	Palatine aponeurosis	Pharyngeal plexus	Raises soft palate
Palatoglossus	Palatine aponeurosis	Side of tongue	Pharyngeal plexus	Pulls root of tongue upward and backward, narrows oropharyngeal isthmus
Palatopharyngeus	Palatine aponeurosis	Posterior border of thyroid cartilage	Pharyngeal plexus	Elevates wall of pharynx, pulls palatopharyngeal folds medially
Musculus uvulae	Posterior border of hard palate	Mucous membrane of uvula	Pharyngeal plexus	Elevates uvula

Muscles of soft palate



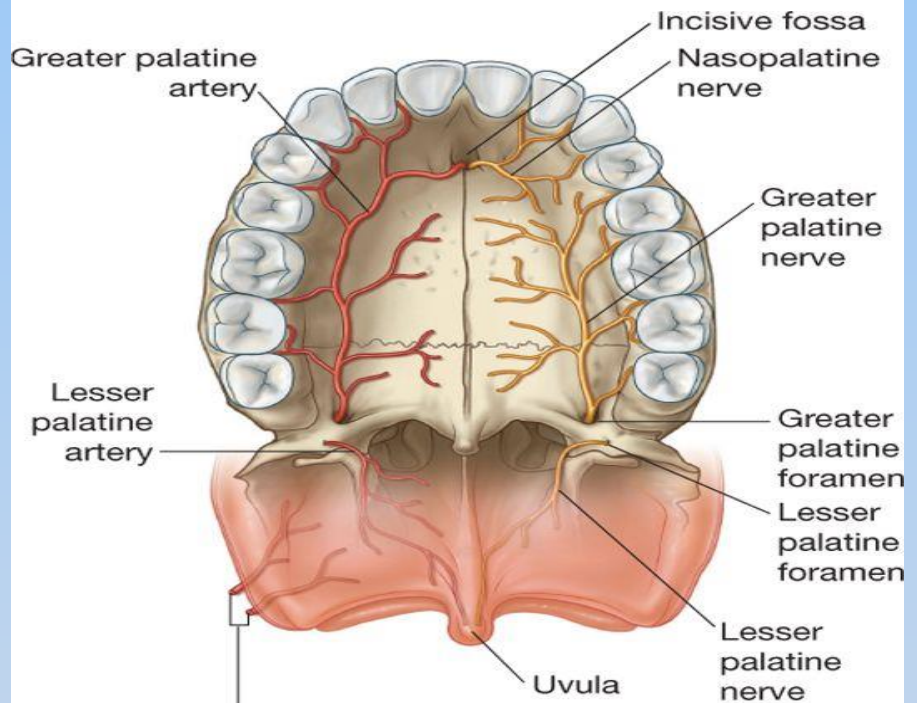
Nerve Supply of the Palate

- The greater and lesser palatine nerves from the maxillary division of the trigeminal nerve enter the palate through the greater and lesser palatine foramina.
- The nasopalatine nerve, also a branch of the maxillary nerve, enters the front of the hard palate through the incisive foramen.
- The glossopharyngeal nerve also supplies the soft palate.



Blood Supply of the Palate

- The greater palatine branch of the maxillary artery,
- The ascending palatine branch of the facial artery,
- The ascending pharyngeal artery.



Lymph Drainage of the Palate

- Deep Cervical Lymph Nodes

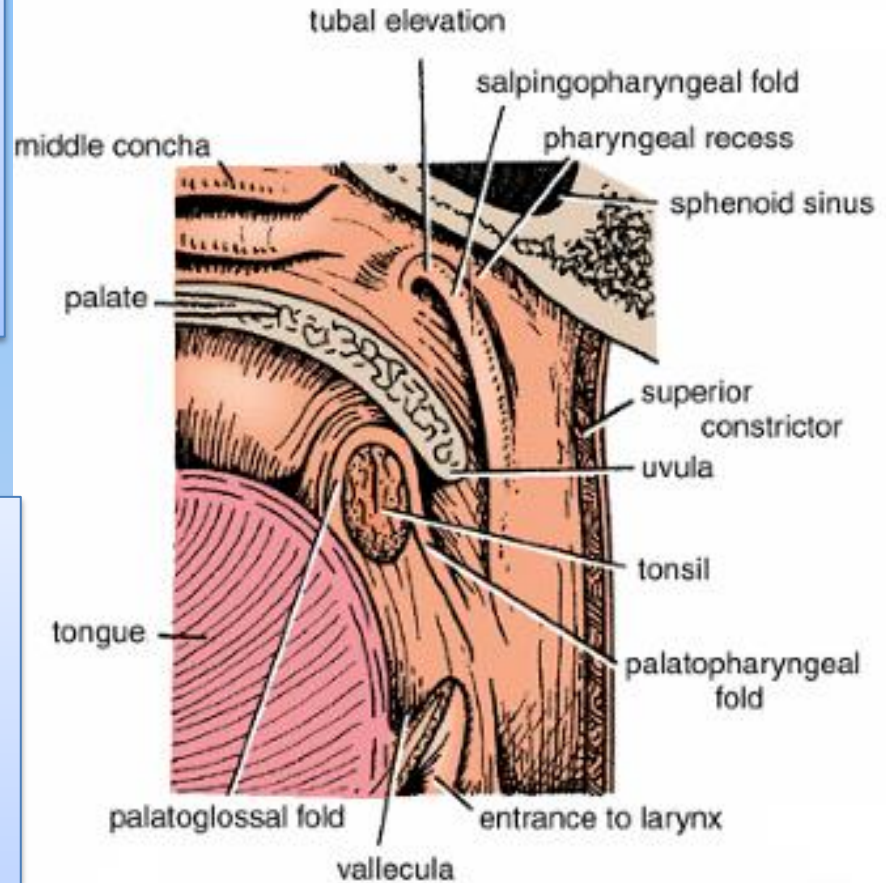
Branches from ascending palatine artery of facial artery and palatine branch of ascending pharyngeal artery

Palatoglossal Arch

- The palatoglossal arch is a fold of mucous membrane containing the **palatoglossus muscle**, which extends from the soft palate to the side of the tongue.
- The palatoglossal arch marks where the mouth becomes the pharynx.

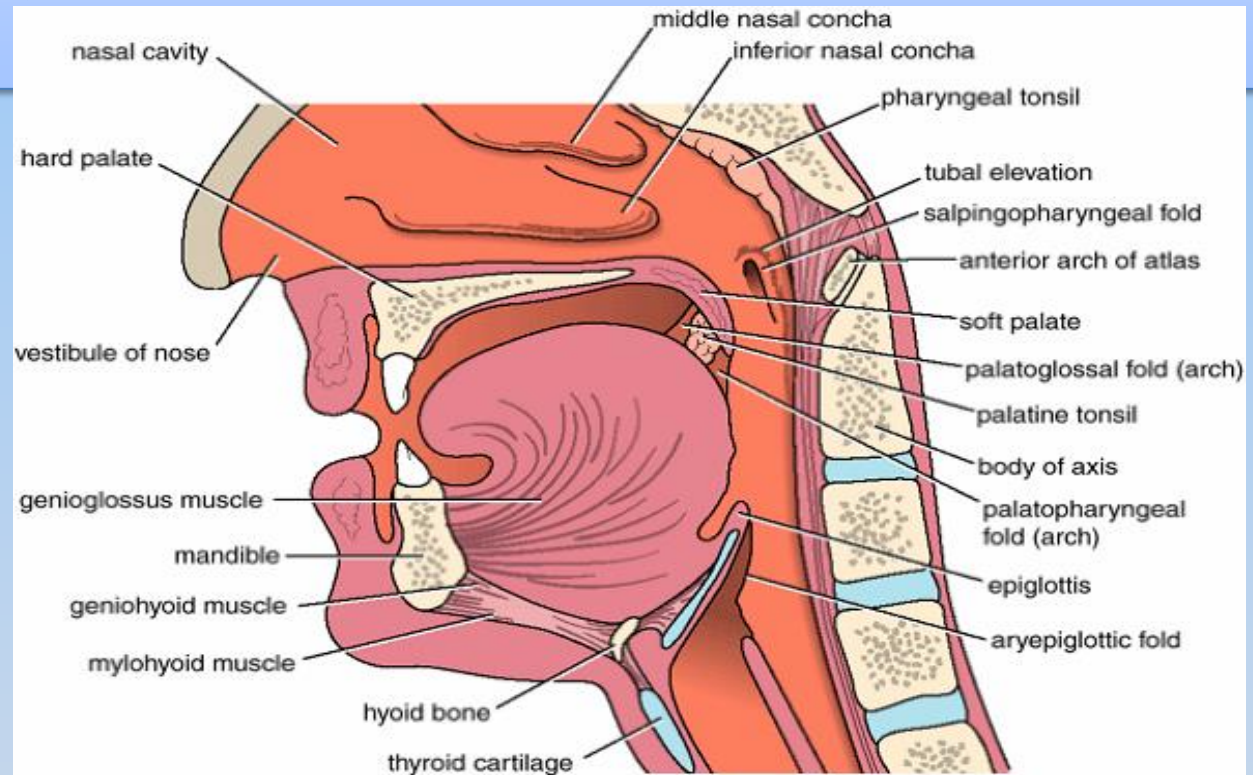
Palatopharyngeal Arch

- The palatopharyngeal arch is a fold of mucous membrane behind the palatoglossal arch that runs downward and laterally to join the pharyngeal wall.
- The muscle contained within the fold is the **palatopharyngeus muscle**.
- The **palatine tonsils**, which are masses of lymphoid tissue, are located between the palatoglossal and palatopharyngeal arches.



The Pharynx

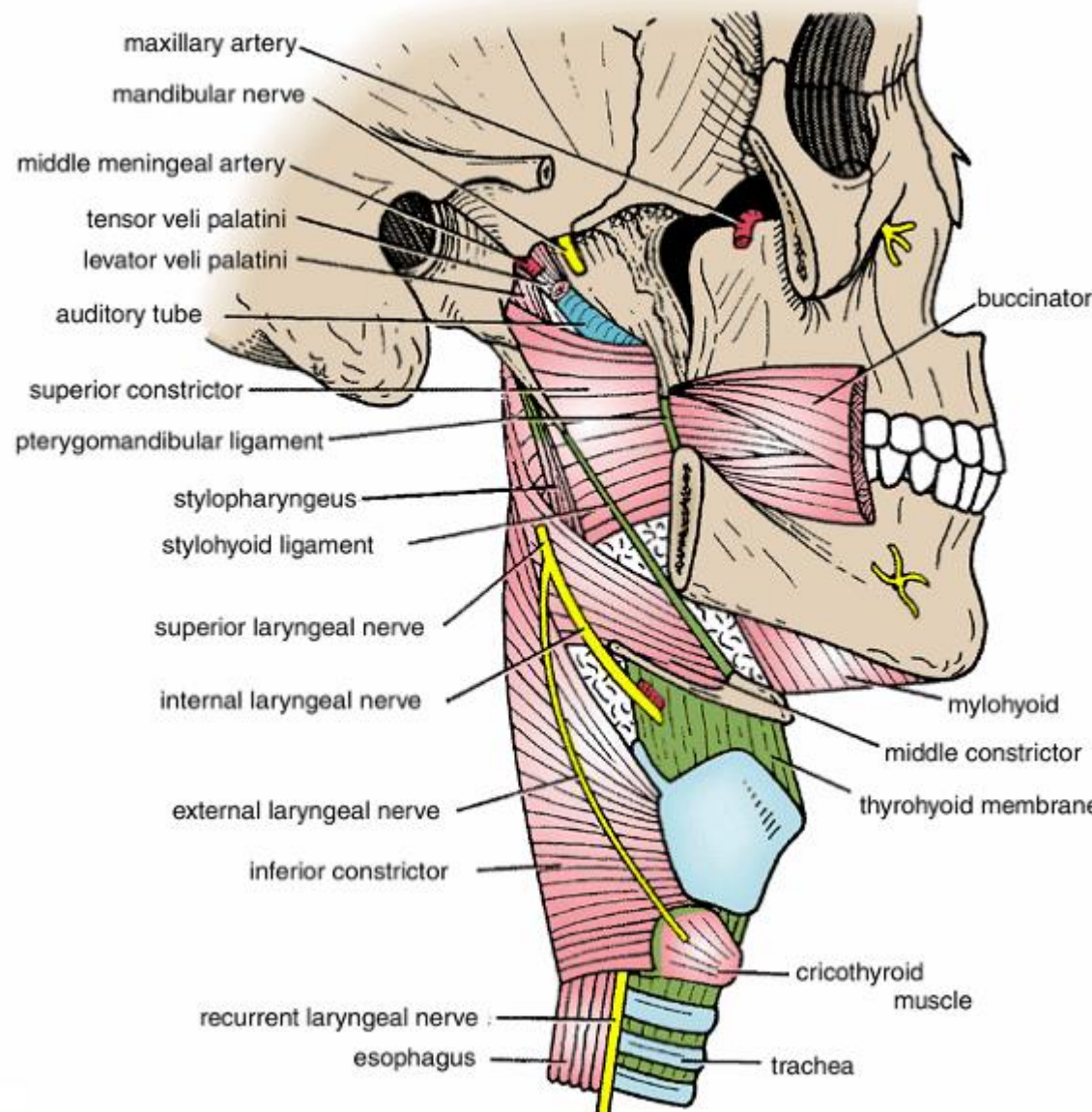
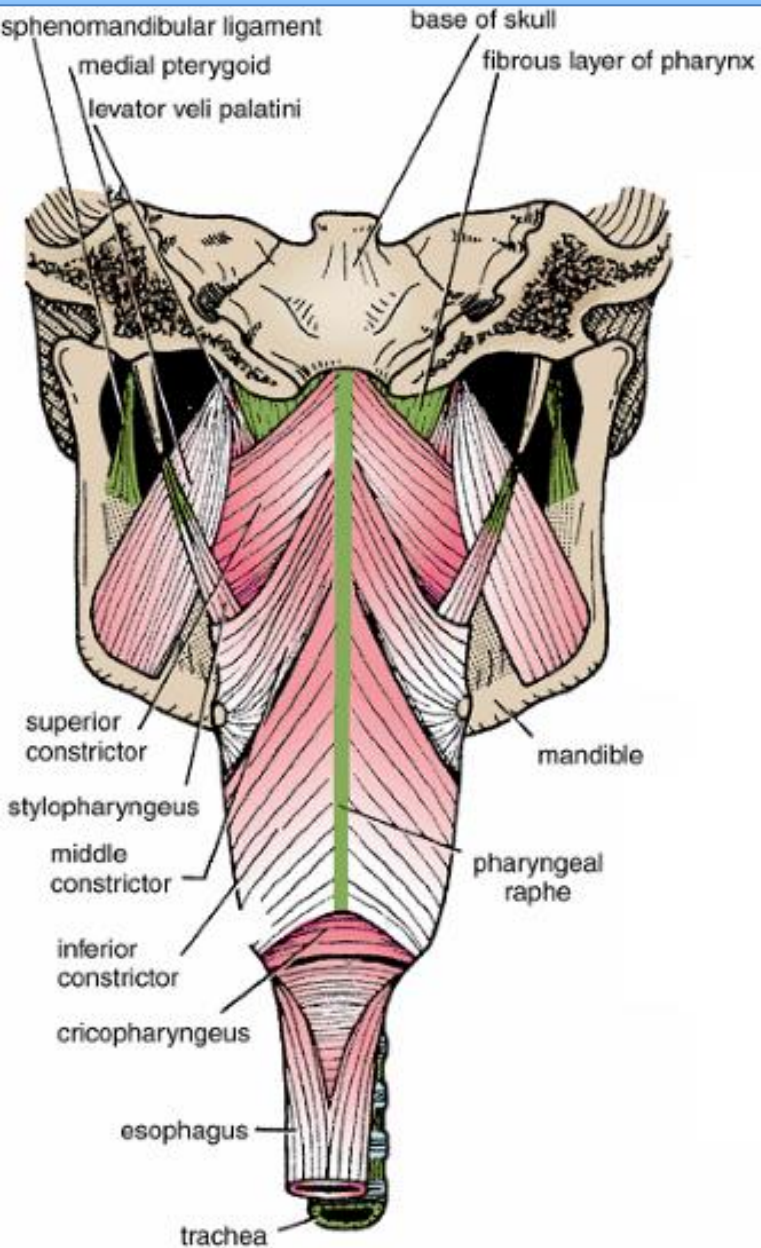
- The pharynx is situated behind the nasal cavities, the mouth, and the larynx and may be divided into **nasal**, **oral**, and **laryngeal parts**.
- The pharynx is funnel shaped, its upper, wider end lying under the skull and its lower, narrow end becoming continuous with the esophagus opposite the 6th cervical vertebra.
- The pharynx has a musculomembranous wall, which is deficient anteriorly. Here, it is replaced by the posterior openings into the nose (choanae), the opening into the mouth, and the inlet of the larynx.
- By means of the auditory tube, the mucous membrane is also continuous with that of the tympanic cavity.



Muscles of the Pharynx

- The muscles in the wall of the pharynx consist of the **superior, middle, and inferior constrictor muscles**, whose fibers run in a somewhat **circular direction**, and the **stylopharyngeus**, **salpingopharyngeus** muscles, and **palatopharyngeus** muscle. these fibers run in a somewhat **longitudinal direction**
- The three constrictor muscles extend around the pharyngeal wall to be inserted into a fibrous band or raphe that extends from the pharyngeal tubercle on the basilar part of the occipital bone of the skull down to the esophagus.
- The lower part of the inferior constrictor, which arises from the cricoid cartilage, is called the **cricopharyngeus muscle**.
- The fibers of the cricopharyngeus pass horizontally around the lowest and **narrowest part of the pharynx and act as a sphincter**.

Muscles of the Pharynx



Muscles of the Pharynx

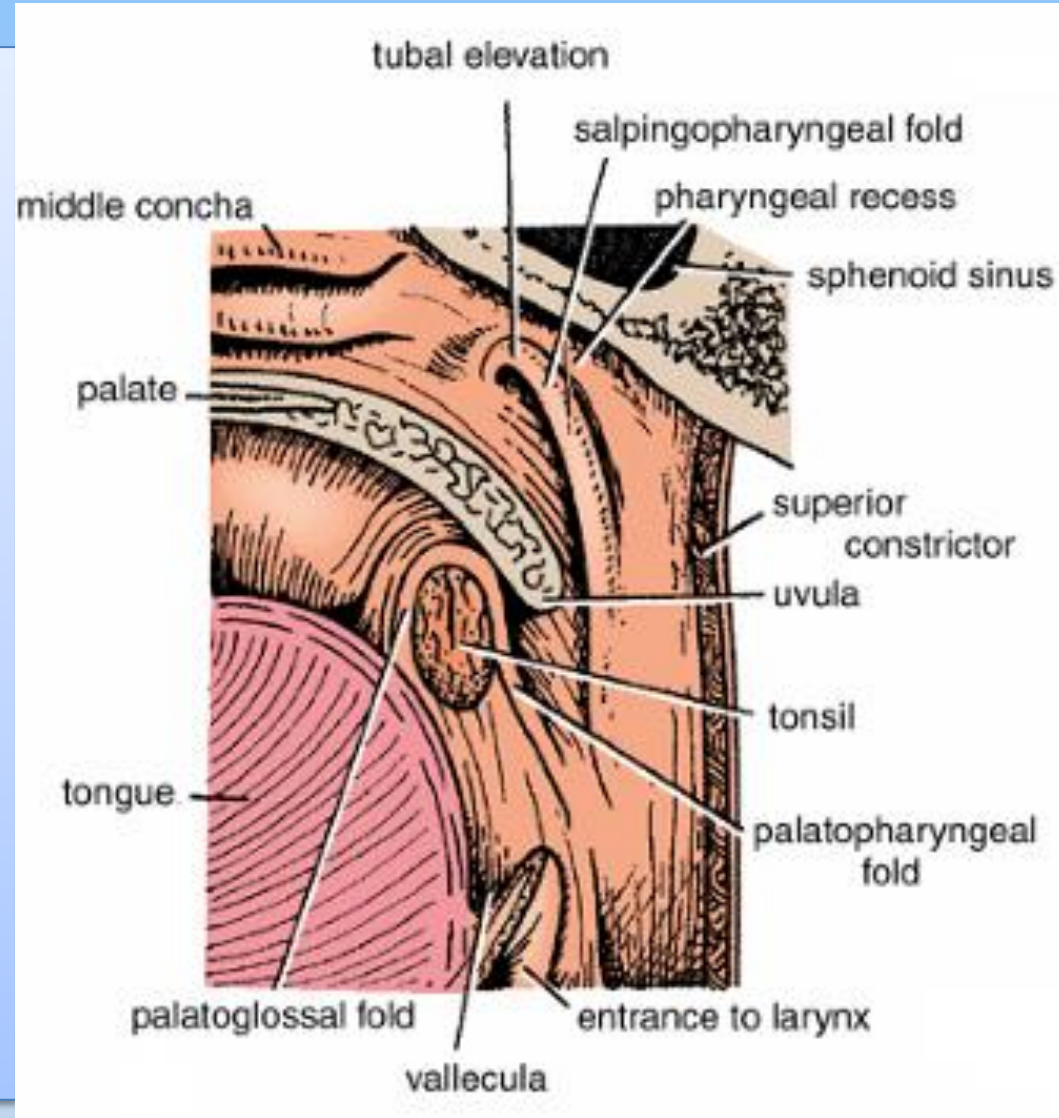
Muscle	Origin	Insertion	Nerve Supply	Action
Superior constrictor	Medial pterygoid plate, pterygoid hamulus, pterygomandibular ligament, mylohyoid line of mandible	Pharyngeal tubercle of occipital bone, raphe in midline posteriorly	Pharyngeal plexus	Aids soft palate in closing off nasal pharynx, propels bolus downward
Middle constrictor	Lower part of stylohyoid ligament, lesser and greater cornu of hyoid bone	Pharyngeal raphe	Pharyngeal plexus	Propels bolus downward
Inferior constrictor	Lamina of thyroid cartilage, cricoid cartilage	Pharyngeal raphe	Pharyngeal plexus	Propels bolus downward
Cricopharyngeus	Lowest fibers of inferior constrictor muscle			Sphincter at lower end of pharynx
Stylopharyngeus	Styloid process of temporal bone	Posterior border of thyroid cartilage	Glossopharyngeal nerve	Elevates larynx during swallowing
Salpingopharyngeus	Auditory tube	Blends with palatopharyngeus	Pharyngeal plexus	Elevates pharynx
Palatopharyngeus	Palatine aponeurosis	Posterior border of thyroid cartilage	Pharyngeal plexus	Elevates wall of pharynx, pulls palatopharyngeal arch medially

The pharynx is divided into three parts: the **nasal pharynx**, the **oral pharynx**, and the **laryngeal pharynx**.

Nasal Pharynx

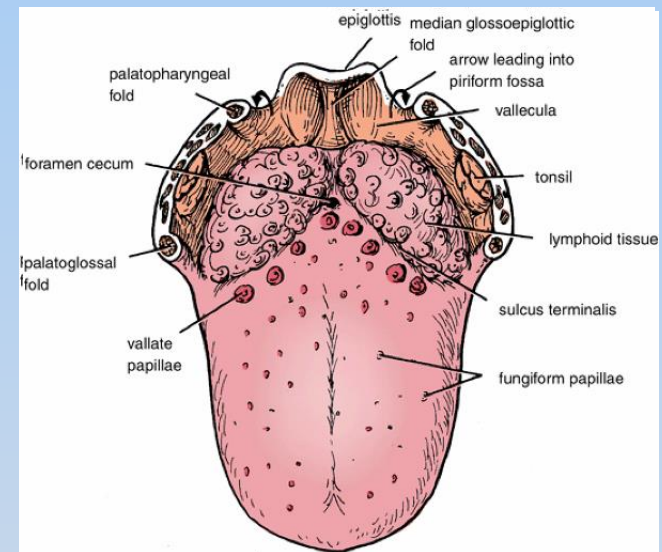
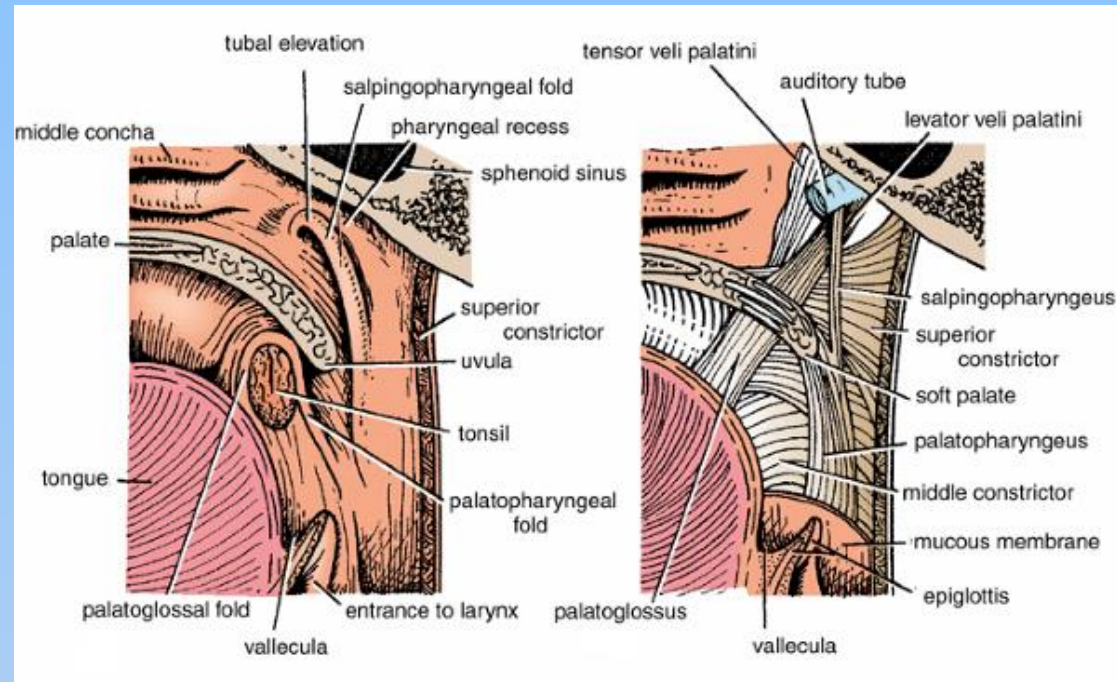
- This lies above the soft palate and behind the nasal cavities.
- In the submucosa of the roof is a collection of lymphoid tissue called the **pharyngeal tonsil**.
- On the lateral wall is the opening of the **auditory tube**, the elevated ridge of which is called the **tubal elevation**.
- The collection of lymphoid tissue in the submucosa of the pharynx near the pharyngeal opening of the auditory tube is the **tubal tonsil**.
- The **pharyngeal recess** is a depression in the pharyngeal wall behind the tubal elevation.
- The **salpingopharyngeal fold** is a vertical fold of mucous membrane covering the salpingopharyngeus muscle.

Interior of the Pharynx



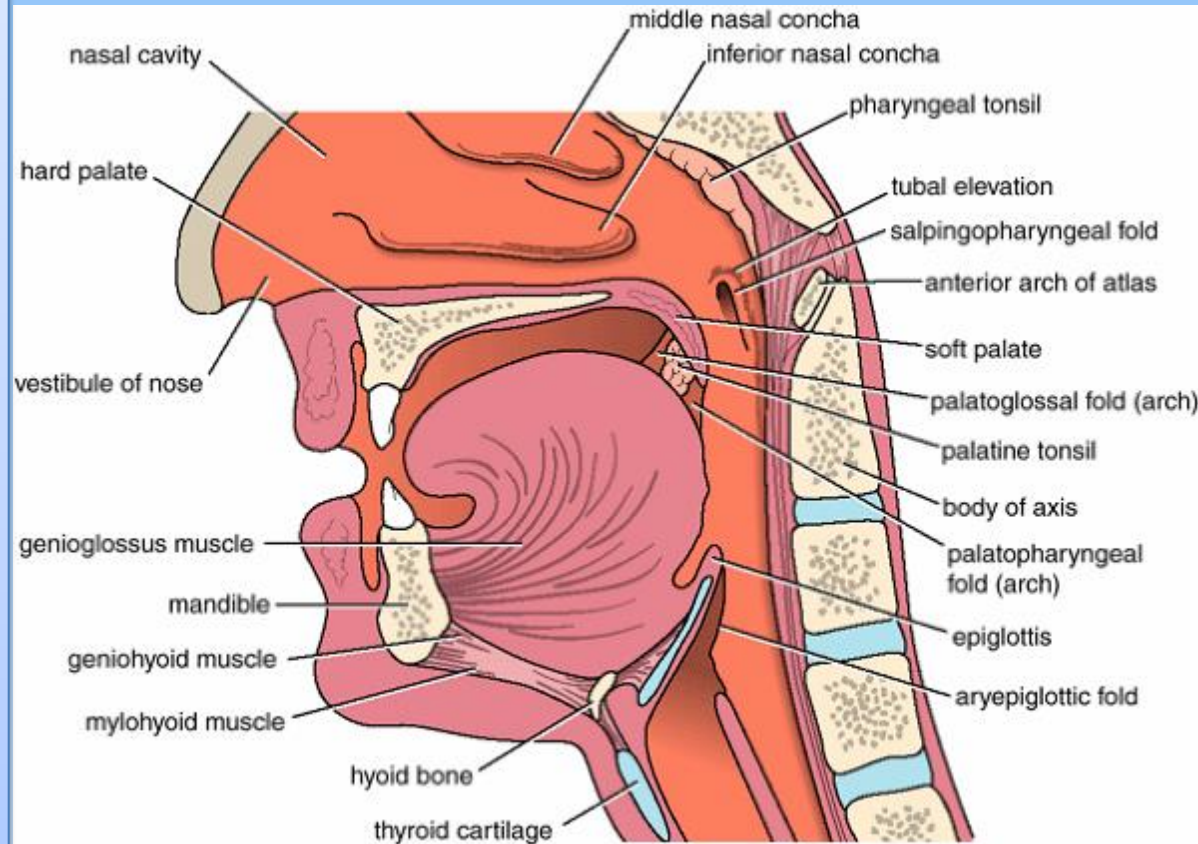
Oral Pharynx

- This lies behind the oral cavity. The floor is formed by the posterior one third of the tongue and the interval between the tongue and epiglottis.
- In the midline is the **median glossoepiglottic fold**, and on each side the **lateral glossoepiglottic fold**. The depression on each side of the median glossoepiglottic fold is called the **vallecula**.
- On the lateral wall on each side are the palatoglossal and the palatopharyngeal arches or folds and the palatine tonsils between them.
- The palatoglossal arch is a fold of mucous membrane covering the palatoglossus muscle.
- The interval between the two palatoglossal arches is called the **oropharyngeal isthmus** and marks the boundary between the mouth and pharynx.
- The palatopharyngeal arch is a fold of mucous membrane covering the palatopharyngeus muscle. The recess between the palatoglossal and palatopharyngeal arches is occupied by the **palatine tonsil**.



Laryngeal Pharynx

- This lies behind the opening into the larynx.
- It extends between the upper border of the **epiglottis** and the lower border of the **cricoid cartilage**.
- The lateral wall is formed by the **thyroid cartilage** and the **thyrohyoid membrane**.
- The **piriform fossa** is a depression in the mucous membrane on each side of the laryngeal inlet.
- It leads obliquely downward and backward from the region of the back of the tongue to the esophagus.
- The piriform fossa is bounded medially by **aryepiglottic** and laterally by the **lamina** of the **thyroid cartilage** and the **thyrohyoid membrane**.



Blood and Nerve Supply of the Pharynx

Blood Supply of the Pharynx

- Ascending pharyngeal,
- Tonsillar branches of facial arteries, and
- Branches of maxillary and lingual arteries.

Sensory Nerve Supply of the Pharyngeal Mucous Membrane

- Nasal pharynx: The maxillary nerve (V2)
- Oral pharynx: The glossopharyngeal nerve
- Laryngeal pharynx (around the entrance into the larynx): The internal laryngeal branch of the vagus nerve.

Motor Nerve Supply of the Pharynx

- is derived from the cranial part of the **accessory nerve**, which, via the branch of the **vagus** to the pharyngeal plexus, supplies all the muscle of the pharynx except the stylopharyngeus, which is supplied by the **glossopharyngeal nerve**.

Lymph Drainage of the Pharynx

- Directly into **the deep cervical lymph nodes** or indirectly via the retropharyngeal or paratracheal nodes into the deep cervical nodes

Palatine Tonsils

- The **palatine tonsils** are two masses of lymphoid tissue, each located in the depression on the lateral wall of the oral part of the pharynx between the palatoglossal and palatopharyngeal arches.
- Each tonsil is covered by mucous membrane, and its free medial surface projects into the pharynx. The surface is pitted by numerous small openings that lead into the **tonsillar crypts**.
- The tonsil is covered on its lateral surface by a **fibrous capsule**.
- The capsule is separated from the superior constrictor muscle by loose areolar tissue, and the **external palatine vein** descends from the soft palate in this tissue to join the pharyngeal venous plexus.
- The tonsil reaches its maximum size during early childhood, but after puberty it diminishes considerably in size.

Blood Supply of the Tonsil

- The tonsillar branch of the facial artery.
- The veins pierce the superior constrictor muscle and join the external palatine, the pharyngeal, or the facial veins

Lymph Drainage of the Tonsil

- The upper deep cervical lymph nodes, just below and behind the angle of the mandible.

Waldeyer's Ring of Lymphoid Tissue

- The lymphoid tissue that surrounds the opening into the respiratory and digestive systems forms a ring.
- The Lateral part of the ring is formed by the **palatine tonsils** and **tubal tonsils** (lymphoid tissue around the opening of the auditory tube in the lateral wall of the nasopharynx).
- The **pharyngeal tonsil** in the roof of the nasopharynx forms the upper part, and the **lingual tonsil** on the posterior third of the tongue forms the lower part.

The Mechanism of Swallowing

- The food is broken down in the mouth by grinding action of the teeth, and is mixed with the saliva by the movements of the tongue and the action of the buccinator muscle.
- The thoroughly mixed food is now formed into a bolus on the dorsum of the tongue and pushed upward and backward against the undersurface of the hard palate. This is brought about by the contraction of the styloglossus muscles on both sides, which pull the root of the tongue upward and backward.
- The contraction of the palatoglossus muscles now squeezes the bolus backward into the oral part of the pharynx. The process of the swallowing is an involuntary act from this point.
- The nasal part of the pharynx is now shut off from the oral part of the pharynx by the elevation of the soft palate, the pulling forward of the posterior pharyngeal wall by the superior constrictor muscle, and the contraction of the palatopharyngeus muscle.
- The larynx and the laryngeal part of the pharynx are now pulled upward by the contraction of the stylopharyngeus, salpingopharyngeus, thyrohyoid, and palatopharyngeus muscle. The main part of the larynx is thus elevated to the posterior surface of the epiglottis, and the entrance to the larynx is closed.
- The bolus moved downward over the epiglottis, the closed entrance into the larynx, and reaches the lower part of the pharynx as a result of successive contractions of the superior, middle, and inferior constrictors muscles. Some of the food slide down the grooves on either side of the entrance of the larynx, that is down through the piriform fossae.
- Finally the lower fibers of the inferior constrictor muscle and the cricopharyngeus muscle relax, and the bolus enters the esophagus.