

***Salivary glands** may be classified according to the:

- 1. Size into: Major and minor.**
- 2. Type of secretion into: Serous, mucous and mixed. Minor salivary glands** are numerous and scattered throughout the oral mucosa and include labial, buccal, palatoglossal, palatal and lingual glands. They secrete saliva more or less continuously and moisten and lubricate the oral mucous membrane.

- **Major salivary glands** are three pairs of large glands; they open by ducts into the mouth. They **don't secrete continuously** but only when the sensory nerve endings in oral mucous membrane are activated by mechanical, chemical or thermal stimuli or as a result of psychic or olfactory stimulation.

Parotid (*serous = watery saliva*) is largest salivary glands has lobulated appearance and an irregular wedge shape. It is covered by a capsule (**parotid sheath**).

The gland has **three surfaces:**

A. Superficial is triangular in outline.

The gland extends **upwards** to the zygomatic arch, **backwards** to the external auditory meatus and anterior border of sternocleidomastoid muscle and **forwards** over the surface of masseter muscle.

B. Antromedial is a U – Shaped and is in contact with the posterior surface the ramus of the mandible and with the masseter and medial pterygoid muscles.

C. Postromedial lies against mastoid process, sternocleidomastoid muscle and posterior belly of digastric muscle.

The **lower part** of the gland extends downwards into the neck between the angle of the mandible and SCM muscle.

A limited **superior surface** of the gland is in contact with cartilaginous and bony floor of external acoustic meatus.

The **parotid duct** arises from the most prominent part of anterior border of the gland, passes forwards on the masseter muscle. It enters the mouth vestibule at the level of upper 2nd molar.

***Structures present within the gland:**

1. External Carotid artery divides within the gland into the **maxillary A.**, which passes from antromedial surface of the gland.

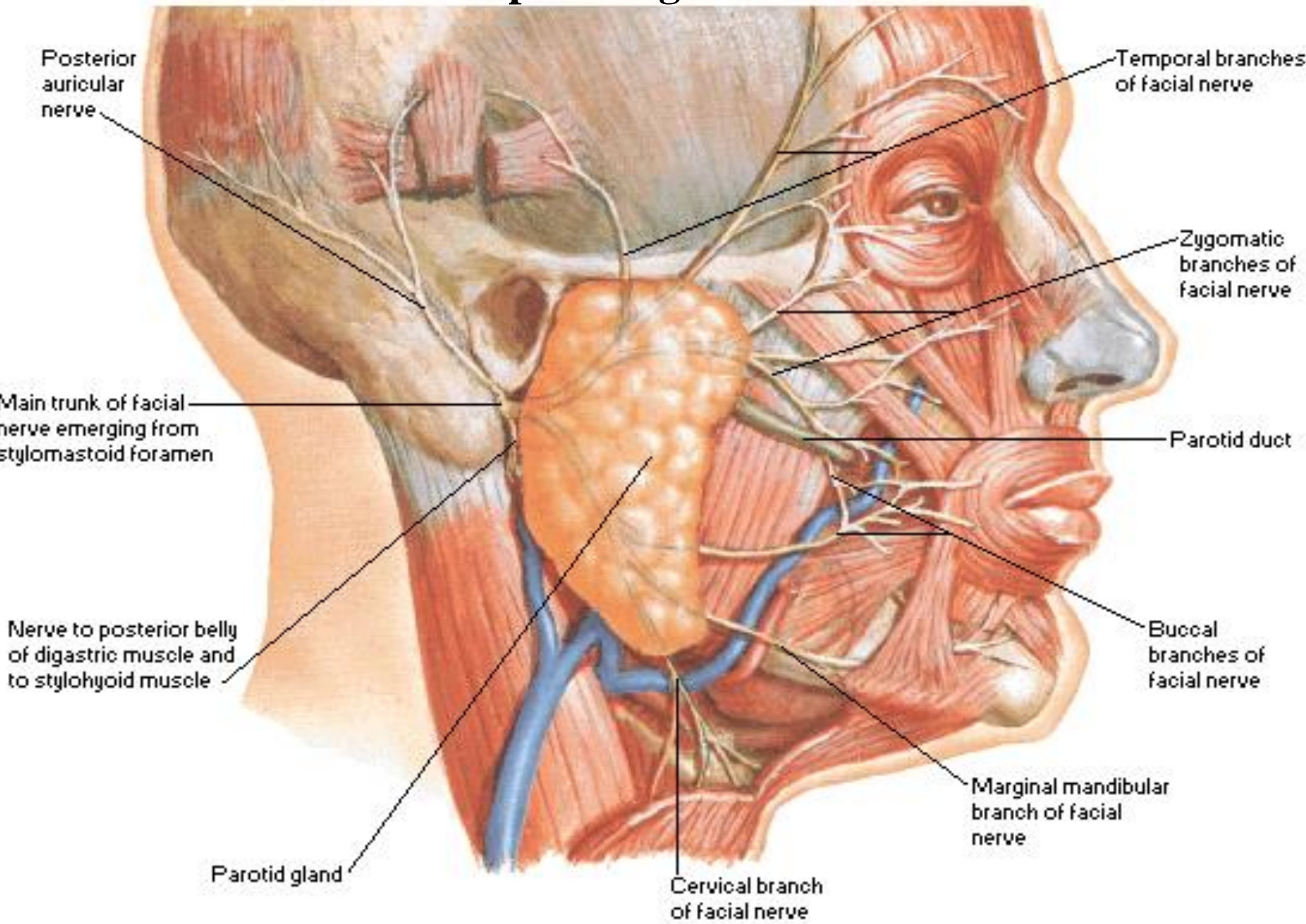
2. Super. temp A. that emerges from the upper border.

3. Retromand V. is formed within the gland by union of **superficial temporal** and **maxillary veins**.

4. **VII nerve** divides **within** the gland into the terminal branches that appear at the anterior border.

5. **Lymph nodes** may be found inside the capsule or even embedded **within** the gland its self.

Facial nerve branches and parotid gland in situ.



***Submandibular** (*mixed and mainly serous*) has a lobulated appearance, consists of an oval – shaped **main (superficial) part**, situated in the digastric triangle partly under cover of the body of the mandible.

A **small deep part** lying in the floor of the mouth above the mylohyoid muscle as far as the posterior part of the sublingual gland. The two portions are continuous around the free posterior border the mylohyoid muscle.

Relations:

- 1.** The **upper part** of the **superficial portion of the gland** is related to the submandibular fossa and medial pterygoid muscle. While the **lower part** is covered by deep fascia, platysma, subcutaneous tissue and skin.
- 2.** Some **lymph nodes** lie superficial to the glands or embedded in it.
- 3.** **Facial vein** passes backwards and downwards near its posterior part.

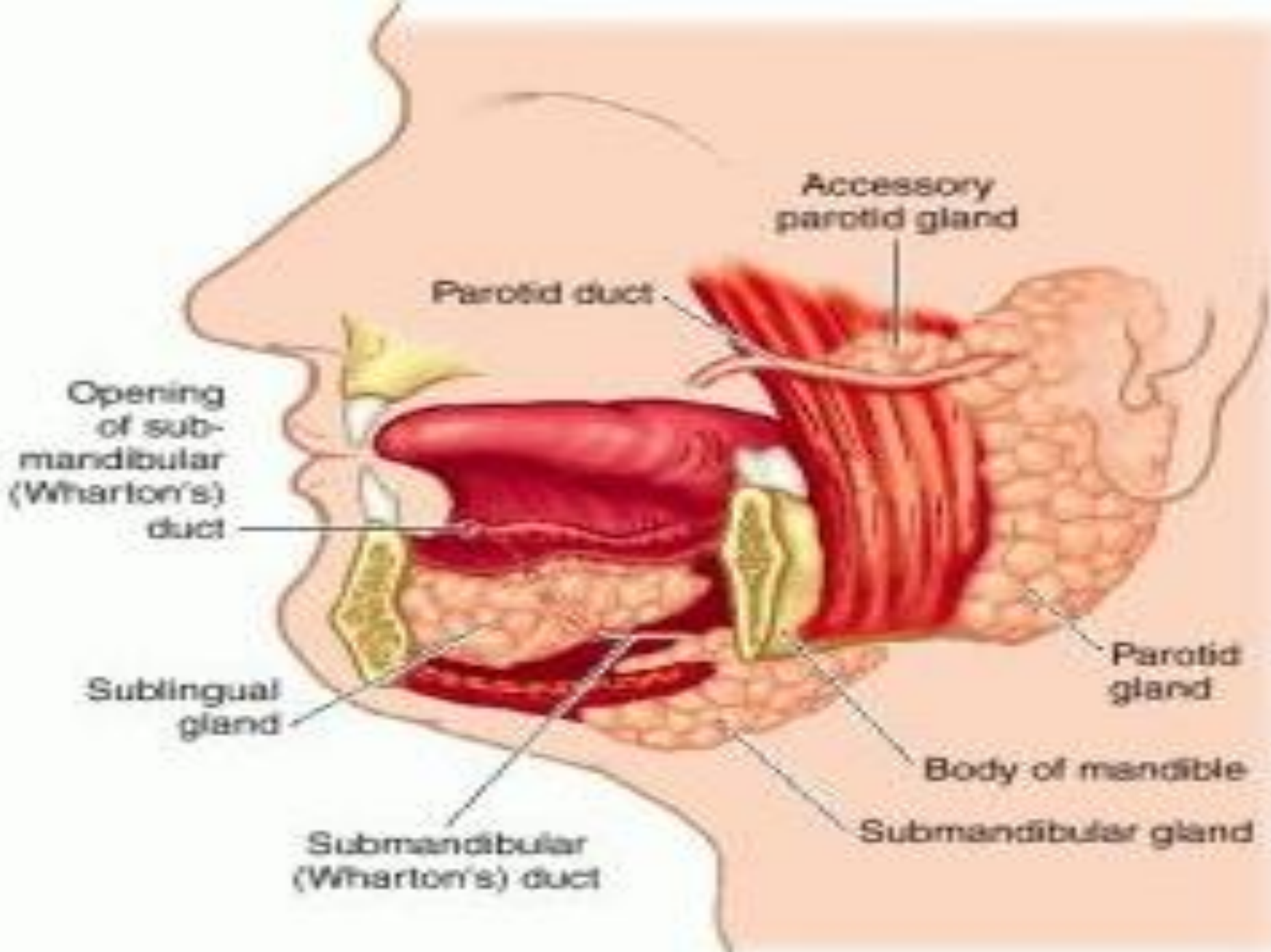
4. Below, the medial surface overlaps the posterior belly of digastric muscle and stylohyoid muscle.

5. Above, is covered by mucous membrane of the mouth and rests on the mylohyoid in front and hyoglossus muscles behind.

6. The **XII** and **lingual** nerves lie on the hyoglossus muscle.

7. Facial artery grooves the posterior part of the gland and emerges between it and the mandible.

The **submandibular duct** open in the mouth at the anterior edge of the **sublingual fold** at the side of the frenulum of the tongue. It lies above the **lingual nerve**.



***Sublingual** (*mixed and mainly mucous*) is smallest one, situated in the floor of the mouth where it produces an elevation (**sublingual fold**), between the tongue and mandible.

Relations:

- 1. Below**, the gland rests on the mylohyoid muscle.
- 2. Above**, is covered by mucous membrane of the mouth.

3. Medially, it is related to genioglossus muscle.

4. Laterally, is sublingual fossa.

5. Posteriorly, deep part of submandibular gland.

-The **lobules** of the gland are loosely held together by connective tissue.

-The **ducts** are of **two** types;

Lesser & greater sublingual that opens into submandibular duct.

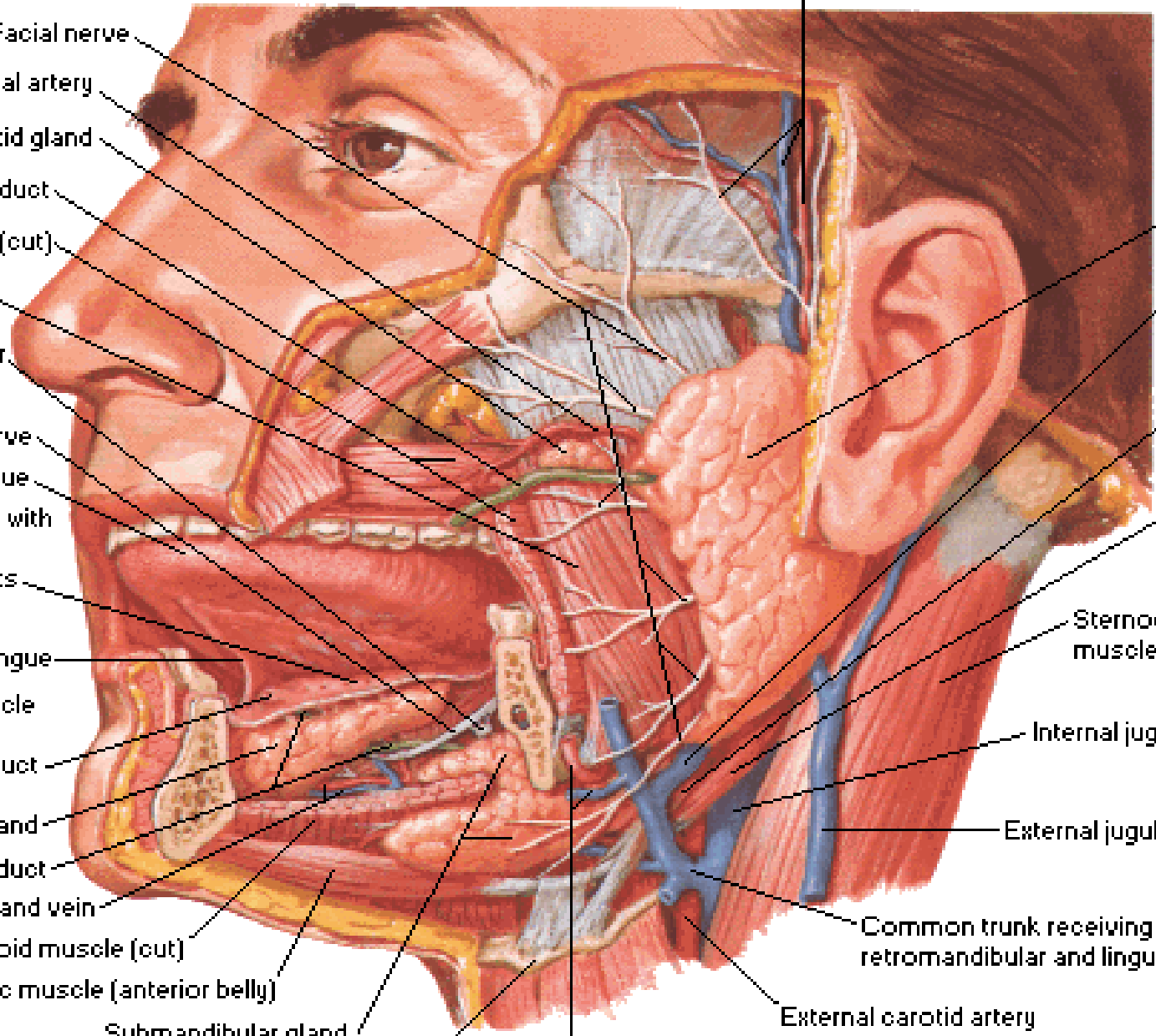
The vessels and nerves of salivary glands:

-Parotid gland receives branches from **external carotid artery** as they pass through the gland. The veins drain into **external jugular and facial veins**. The nerve supply, impulses come, from the brain stem as **parasympathetic with IX nerve via lesser petrosal nerve** to the otic ganglion. The parasympathetic (auriculotemporal nerve) as secretomotor to the gland sympathetic from **superior cervical sympathetic** ganglion through the otic ganglion (without synapse) via auriculotemporal nerve (The sensory pass from the gland via auriculotemporal nerve also).

Dissection of the salivary glands.

Superficial temporal artery and vein and auriculotemporal nerve

- Branches of facial nerve
- Transverse facial artery
- Accessory parotid gland
- Parotid duct
- Buccinator muscle (cut)
- Masseter muscle
- Submandibular ganglion
- Lingual nerve
- Tongue
- Sublingual fold with openings of sublingual ducts
- Frenulum of tongue
- Sublingual caruncle with opening of submandibular duct
- Sublingual gland
- Submandibular duct
- Sublingual artery and vein
- Mylohyoid muscle (cut)
- Digastric muscle (anterior belly)



- Parotid gland
- Retromandibular vein
- Stylohyoid muscle
- Digastric muscle (posterior belly)
- Sternocleidomastoid muscle
- Internal jugular vein
- External jugular vein
- Common trunk receiving facial, retromandibular and lingual veins
- External carotid artery

- Submandibular gland
- Hyoid bone
- Facial artery and vein

*Submandibular gland supplied by branches of **facial and lingual arteries** and drained by the corresponding veins. The lymphatics reach the nodes of deep cervical chain.

*The nerve supply of both glands, impulses come, from **superior salivatory nucleus** in the brain stem as parasympathetic with the nervous intermedius of VII nerve via **chorda tympani** to the lingual nerve and then to the submandibular ganglion. The parasympathetic goes directly to the submandibular gland and to the sublingual gland by lingual nerve. The **sympathetic** from superior cervical sympathetic ganglion comes via plexus around facial artery.

*The sensory pass from the gland via **lingual nerve**.

The nasal cavity

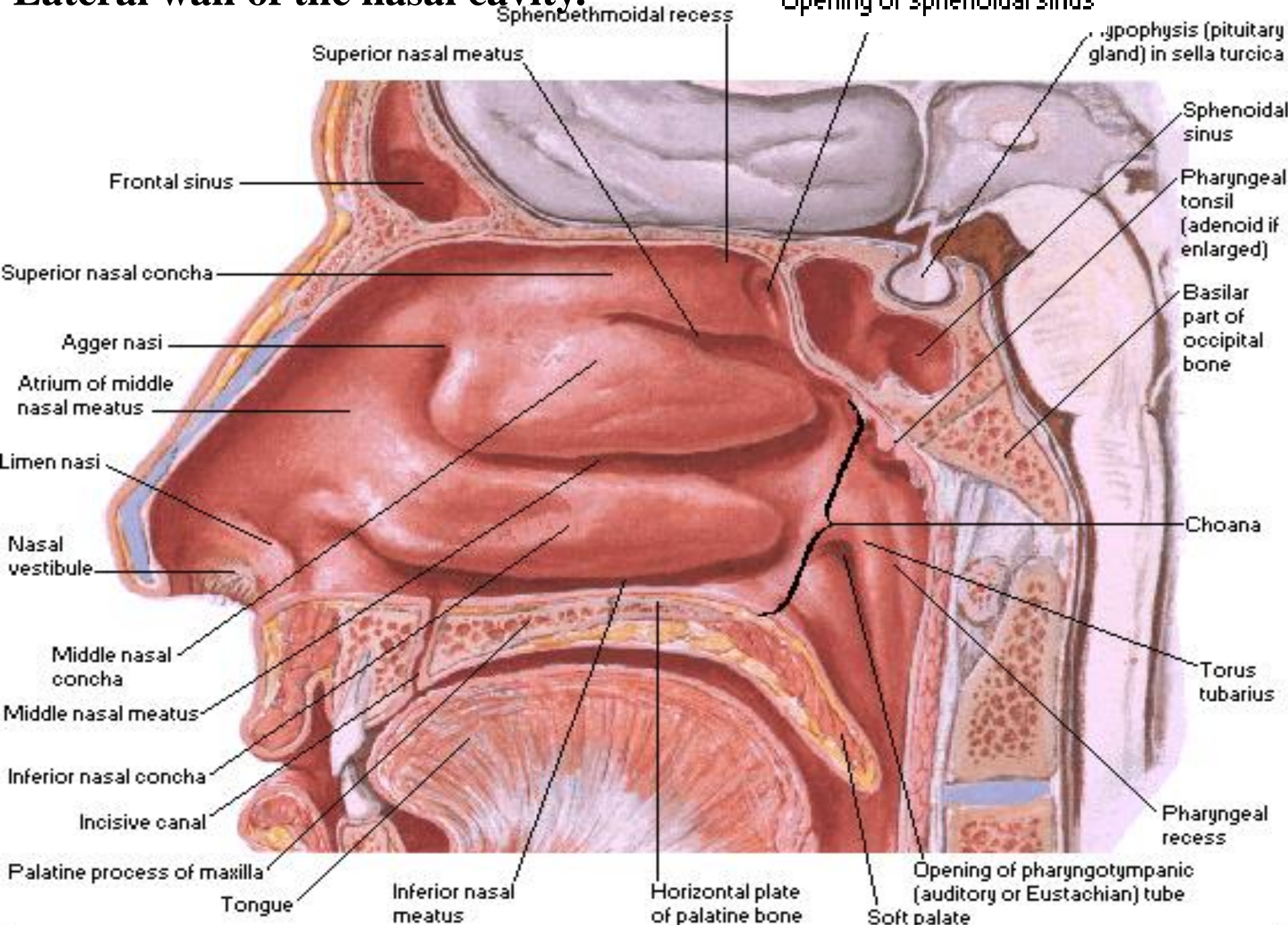
* It is divided into two narrow cavities by the **nasal septum**. Immediately above the **nostril**, the septum is slightly concave where it forms the medial wall of the **vestibule** of the nose, the skin of which carries a number of stiff hairs. The remainder of the septum is covered with **respiratory mucous epithelium** which is thick, spongy and highly vascular and contains numerous mucous glands.

. The **lower** larger area is known as the **respiratory region** while the **upper** third is called the **olfactory region** because its epithelium contains the olfactory nerve cells.

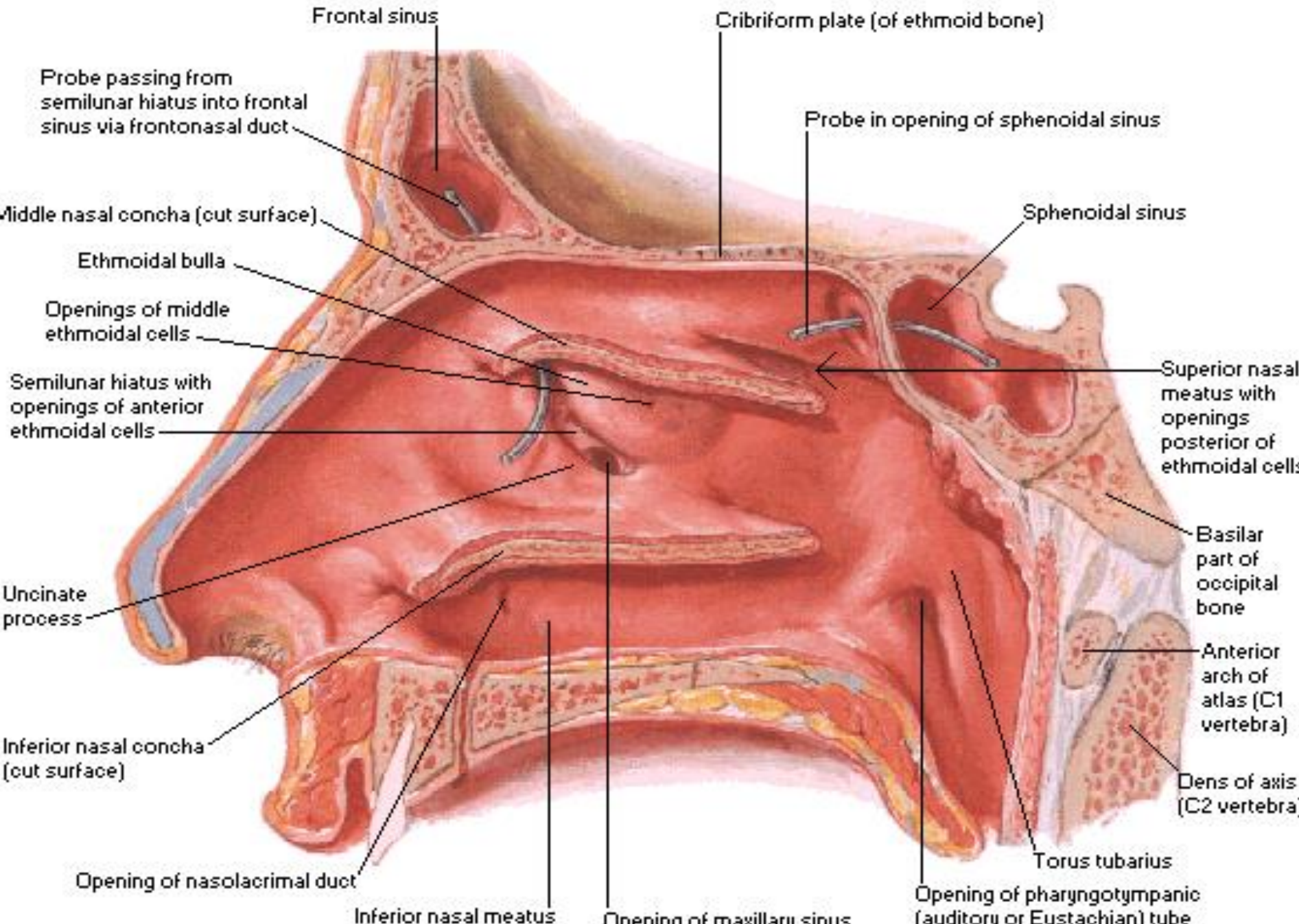
The **nerves and vessels of the septum** are:
The **nasopalatine nerve** enters the nasal cavity through the **sphenopalatine foramen** to supply the mucous membrane in the anterior part of the hard palate & postrosuperior parts of the nasal septum while the medial nasal branches of the **anterior ethmoidal nerve** run on the **anterosuperior** part of the nasal septum. The **arteries** of the nasal septum are **sphenopalatine, ethmoidal** and branches of the **superior labial** arteries.

The nerves and vessels of the lateral wall of the nose are all the nerves of common sensation arise from branches of maxillary nerve except for the anterior ethmoidal. All these nerves convey also sympathetic and parasympathetic.

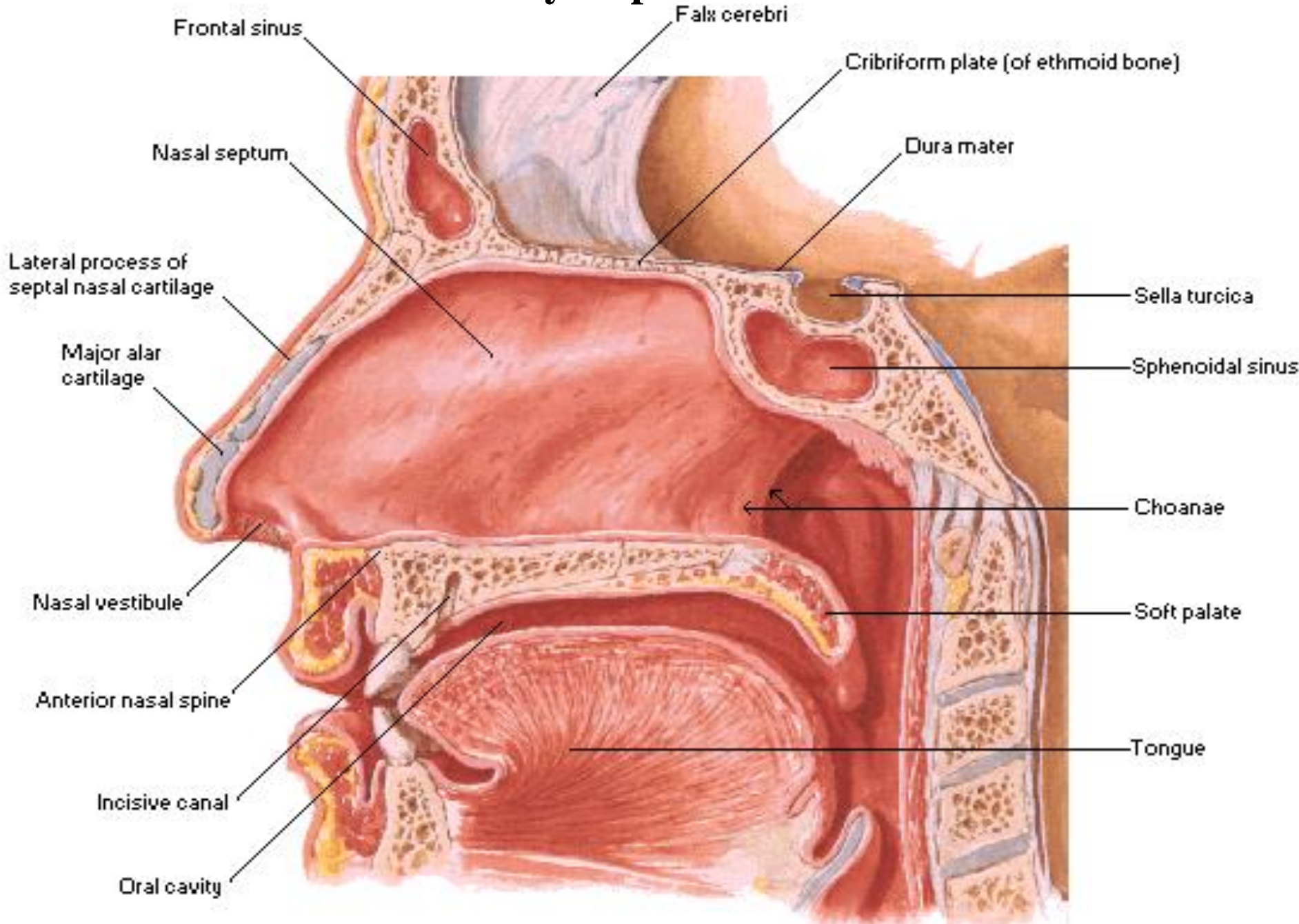
Lateral wall of the nasal cavity.



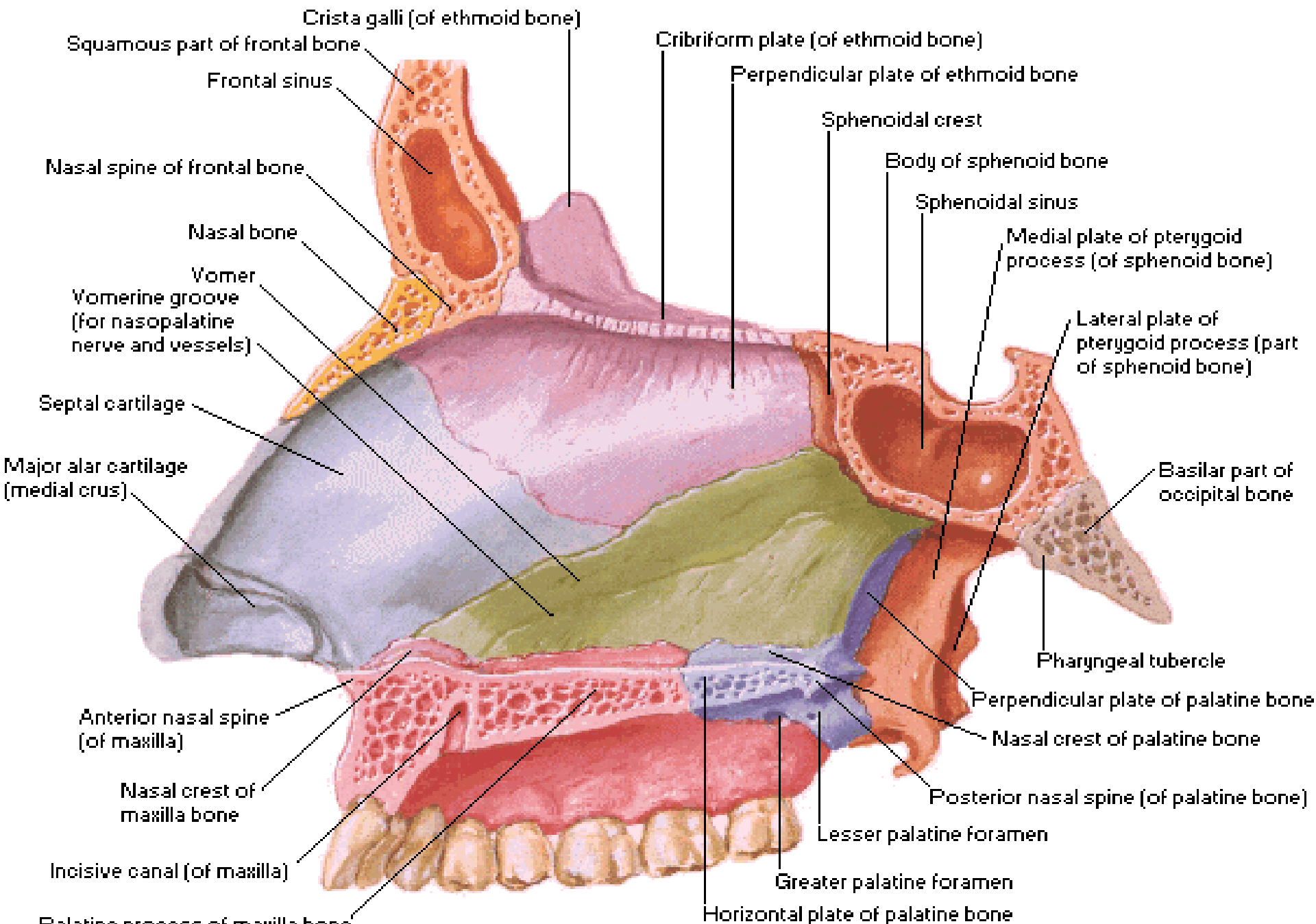
Lateral wall of the nasal cavity. Nasal conchae removed.



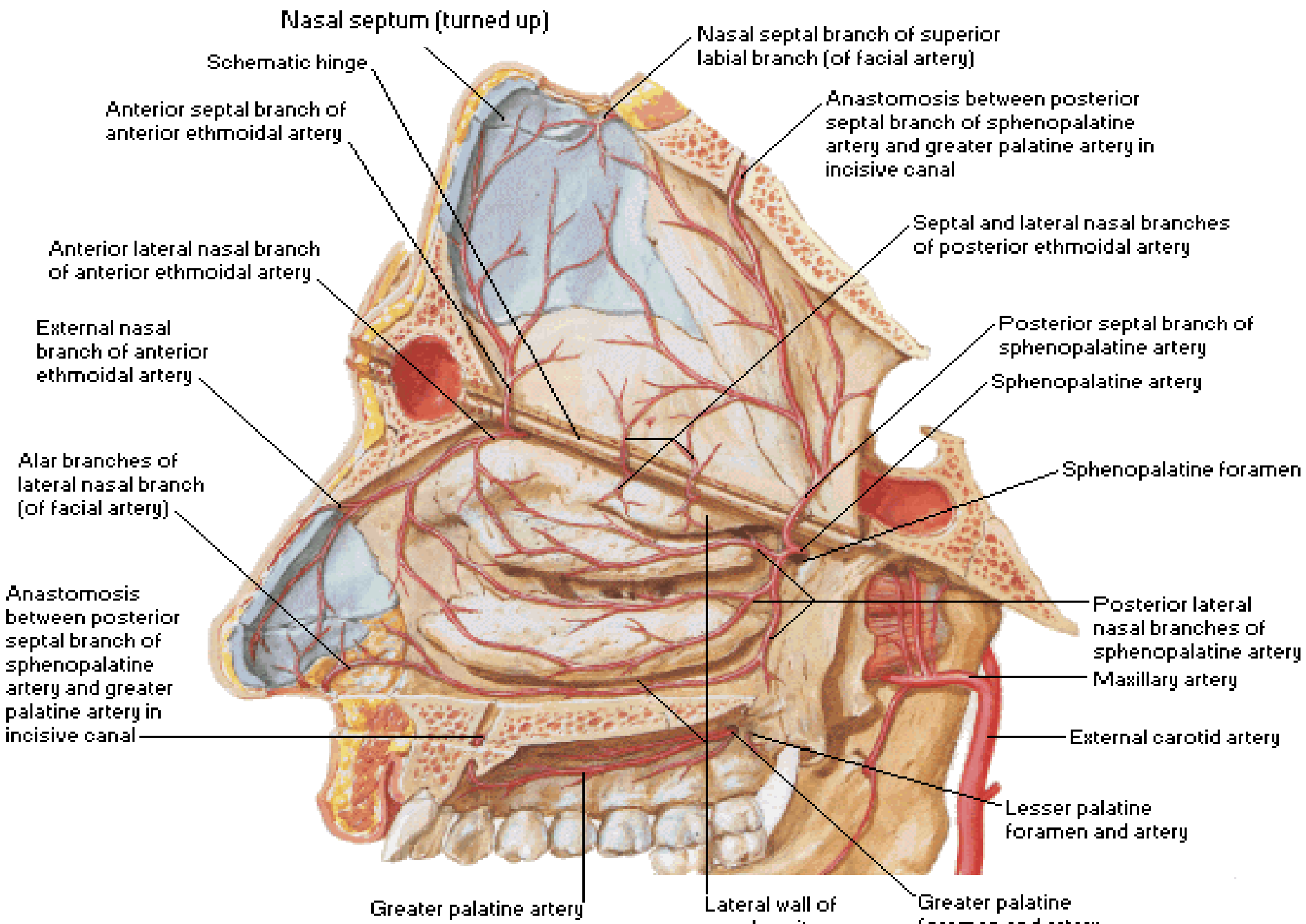
Medial wall of the nasal cavity. Septum.



Medial wall of the nasal cavity. Septum. Bones and cartilages.

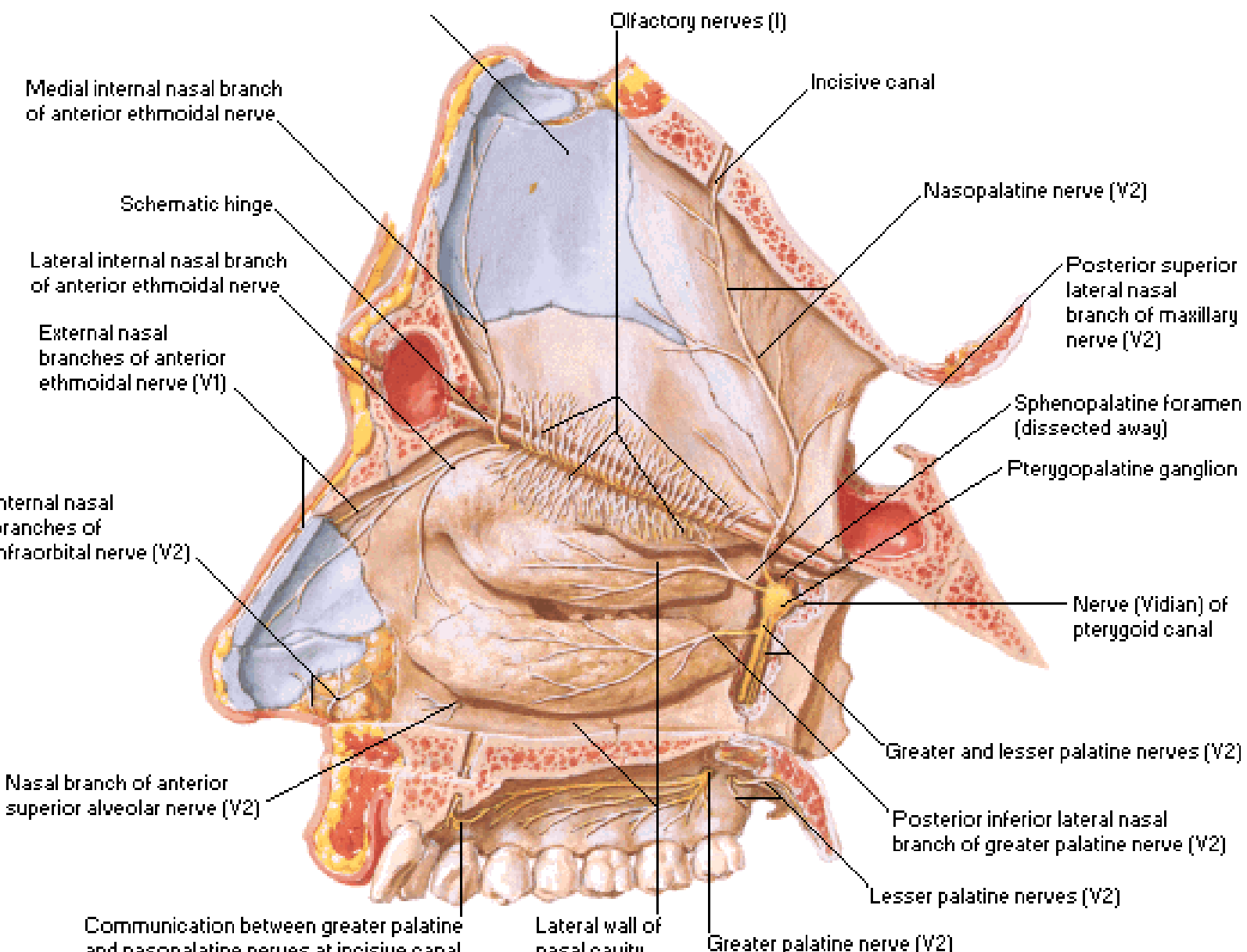


Arteries of the nasal cavity.



Nerves of the nasal cavity.

Nasal septum (turned up).



Olfactory nerves (I)

Incisive canal

Medial internal nasal branch of anterior ethmoidal nerve

Nasopalatine nerve (V2)

Schematic hinge

Posterior superior lateral nasal branch of maxillary nerve (V2)

Lateral internal nasal branch of anterior ethmoidal nerve

External nasal branches of anterior ethmoidal nerve (V1)

Sphenopalatine foramen (dissected away)

Pterygopalatine ganglion

Internal nasal branches of infraorbital nerve (V2)

Nerve (Vidian) of pterygoid canal

Nasal branch of anterior superior alveolar nerve (V2)

Greater and lesser palatine nerves (V2)

Posterior inferior lateral nasal branch of greater palatine nerve (V2)

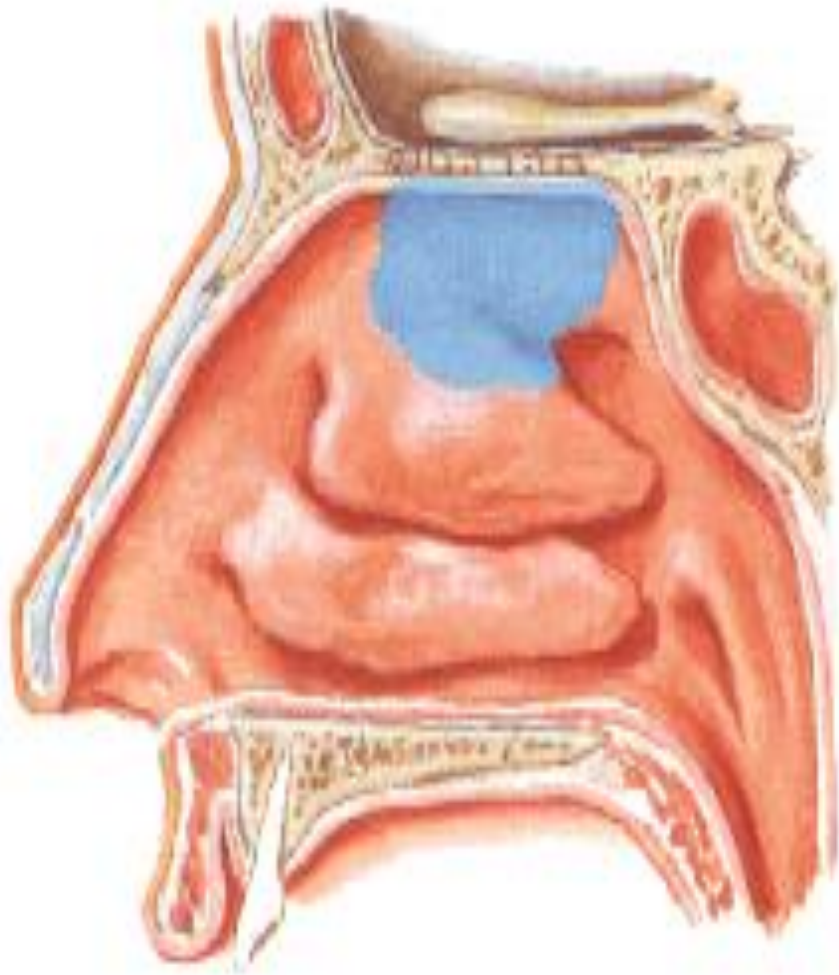
Lesser palatine nerves (V2)

Communication between greater palatine and nasopalatine nerves at incisive canal

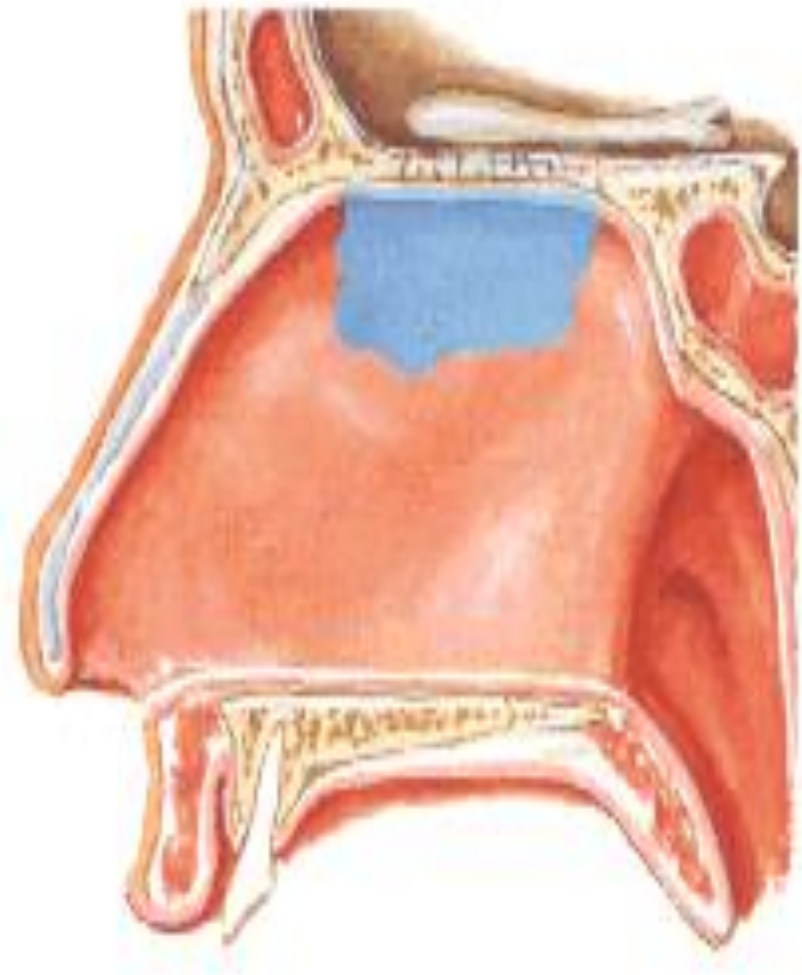
Lateral wall of nasal cavity

Greater palatine nerve (V2)

Nerves of the nasal cavity. Distribution of olfactory mucosa (blue region).



Lateral wall of nasal cavity



Nasal septum

Nerves of the lateral wall of the nasal cavity.

Lateral internal nasal branch of anterior ethmoidal nerve (V1)

Olfactory bulb

Cribriform plate (of ethmoid bone)

Olfactory tract

Posterior superior lateral nasal branches from maxillary nerve (V2)

Maxillary nerve (V2) (sphenopalatine foramen dissected away)

Pterygopalatine ganglion

Greater petrosal nerve

Deep petrosal nerve

Nerve (Vidian) of pterygoid canal

Pharyngeal branch of maxillary nerve (V2)

Nasopalatine nerve (V2) passing to septum (cut)

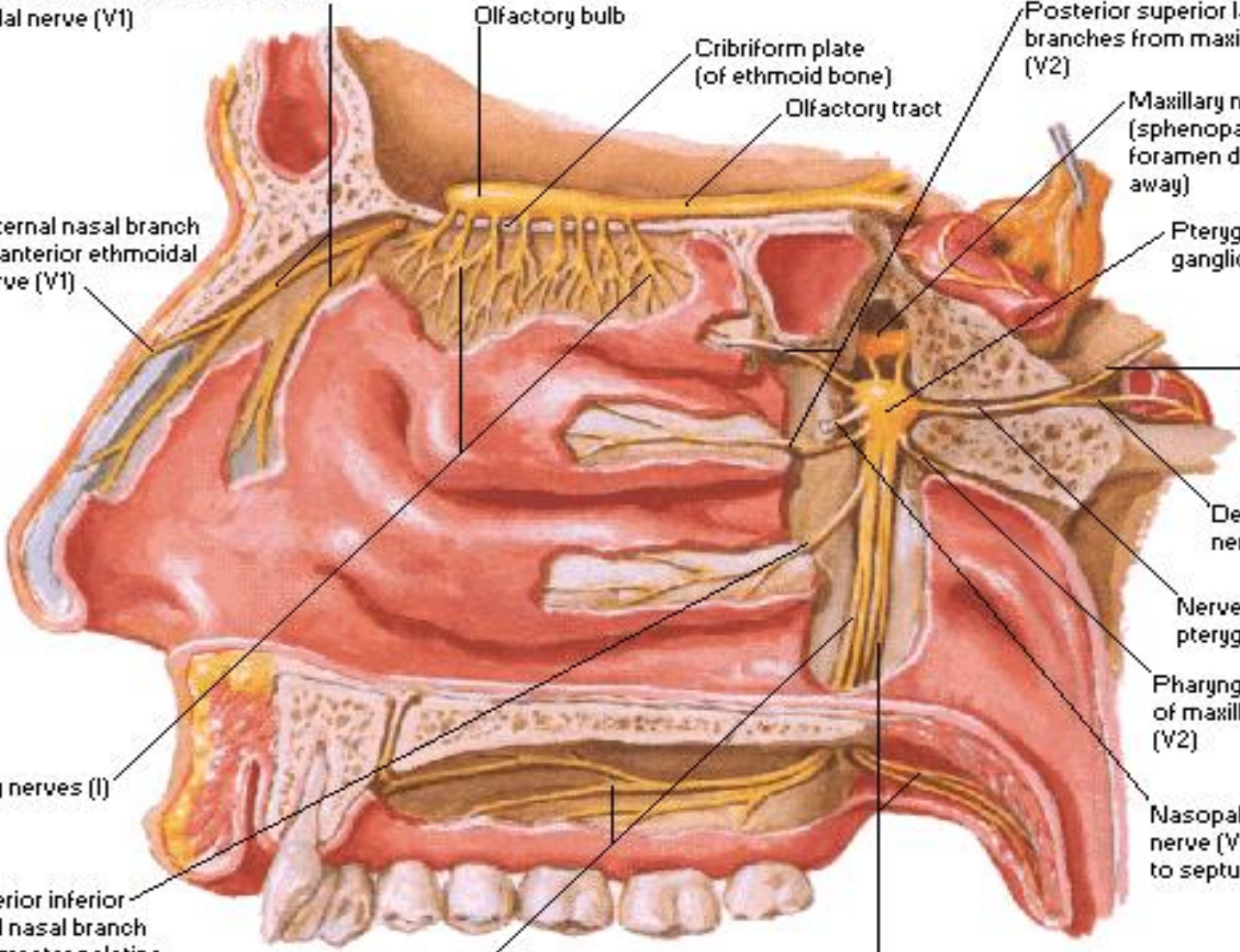
Lesser palatine nerves (V2)

External nasal branch of anterior ethmoidal nerve (V1)

Olfactory nerves (I)

Posterior inferior lateral nasal branch from greater palatine nerve (V2)

Greater palatine nerves (V2)



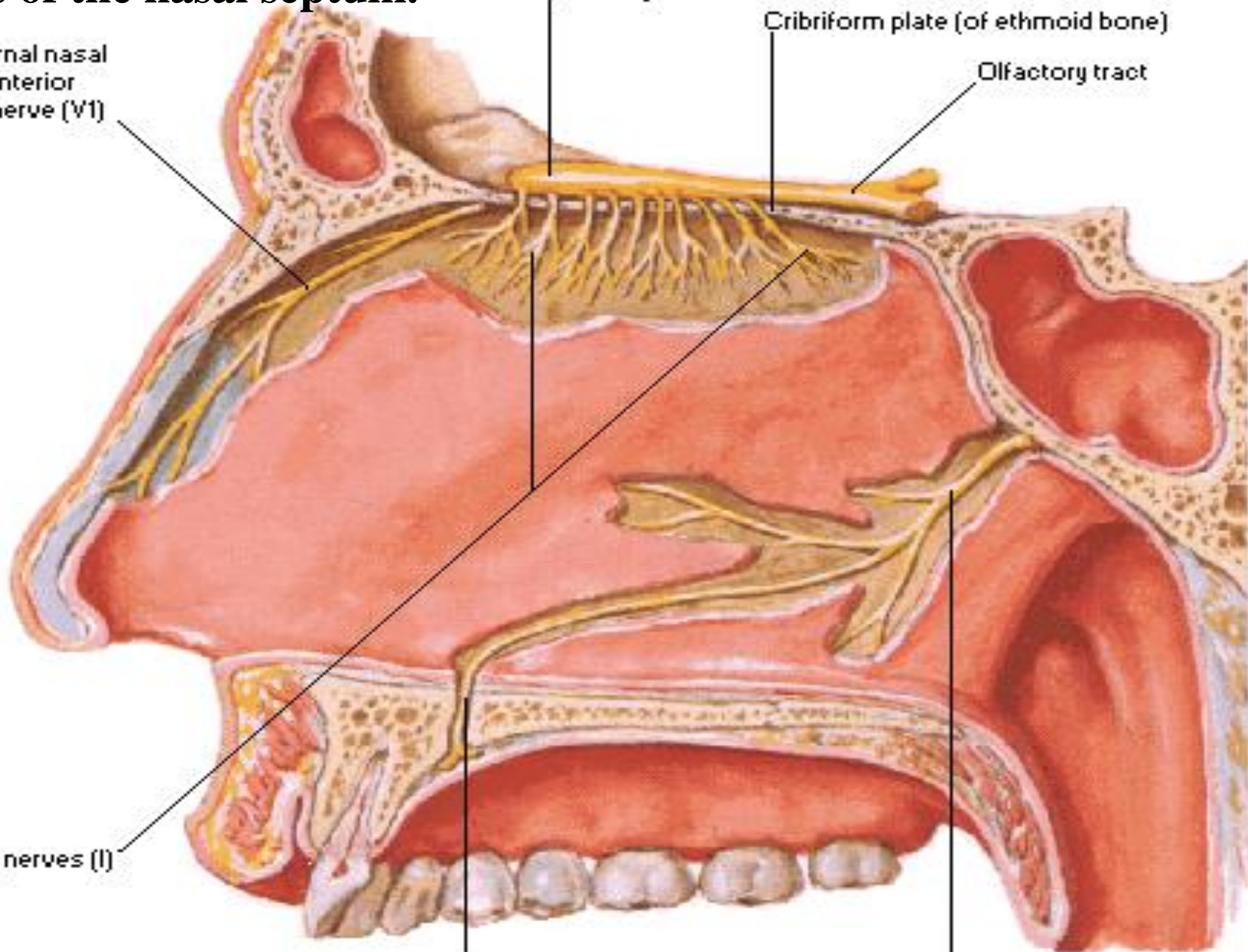
Nerves of the nasal septum.

Medial internal nasal branch of anterior ethmoidal nerve (V1)

Olfactory bulb

Cribriform plate (of ethmoid bone)

Olfactory tract

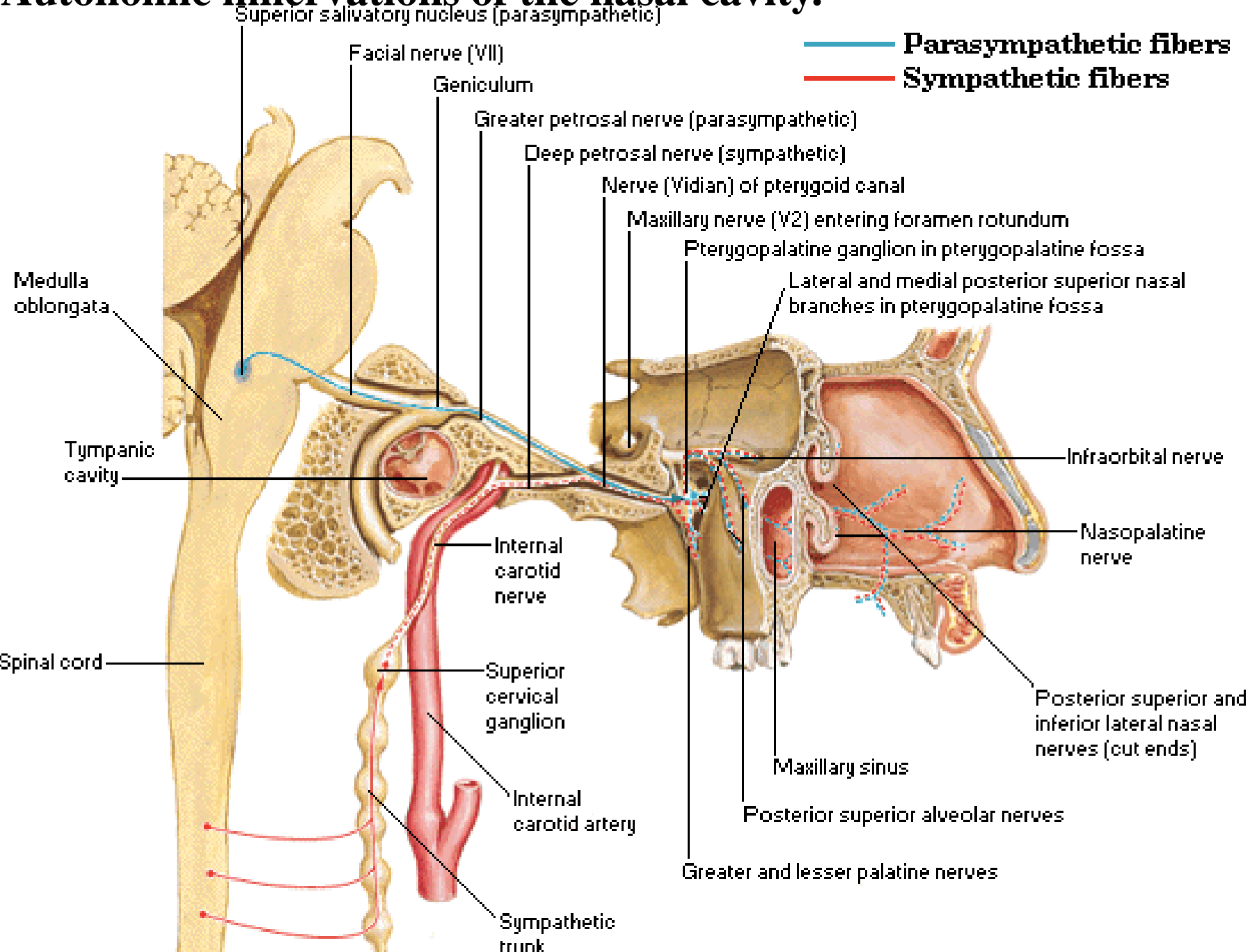


Olfactory nerves (I)

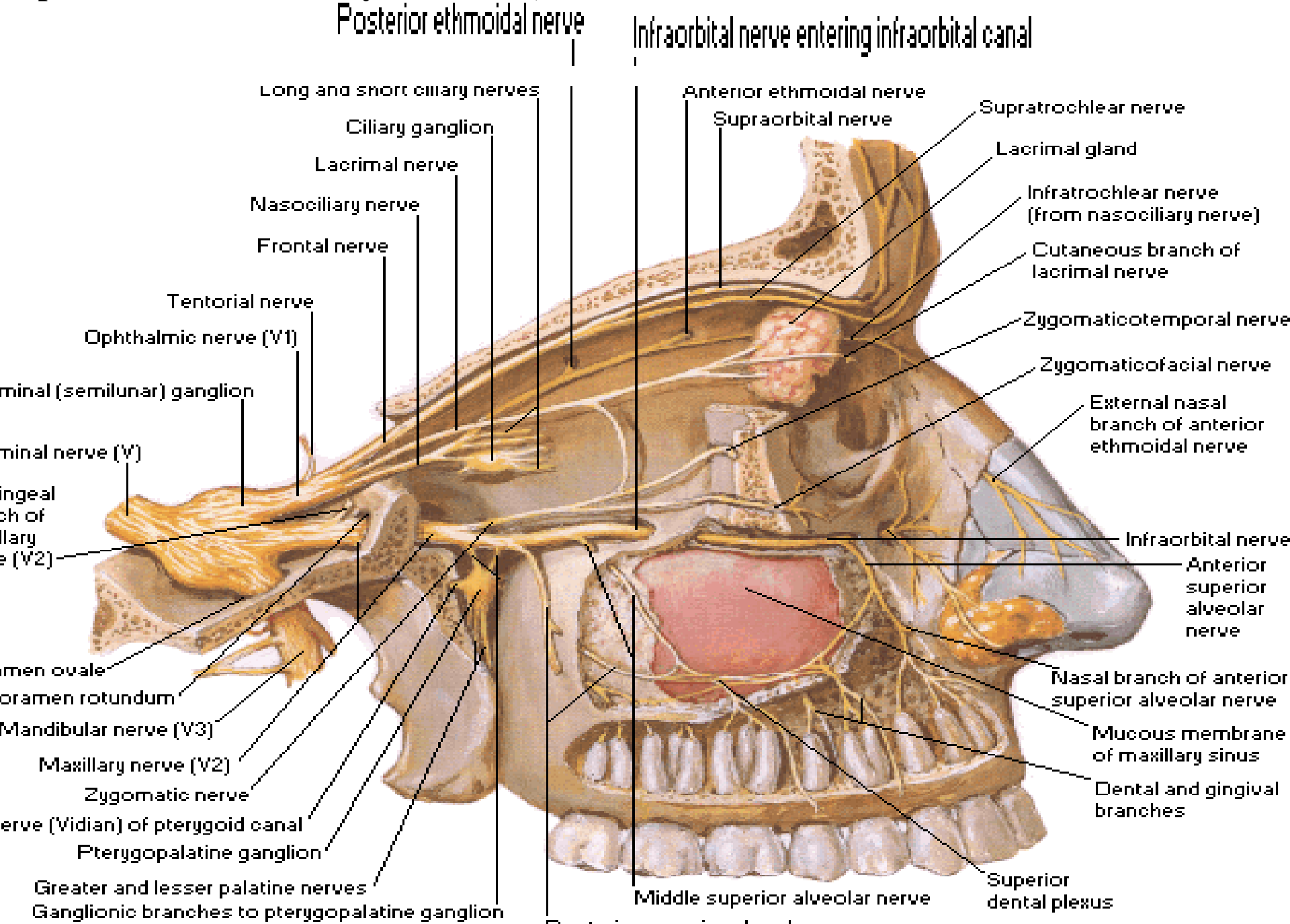
Incisive canal

Nasopalatine nerve (V2)

Autonomic innervations of the nasal cavity.



Ophthalmic and maxillary nerves (V1,V2).



Posterior ethmoidal nerve

Anterior ethmoidal nerve

Supraorbital nerve

Supratrochlear nerve

Ciliary ganglion

Lacrimal gland

Lacrimal nerve

Infratrochlear nerve (from nasociliary nerve)

Nasociliary nerve

Cutaneous branch of lacrimal nerve

Frontal nerve

Zygomaticotemporal nerve

Tentorial nerve

Zygomaticofacial nerve

Ophthalmic nerve (V1)

External nasal branch of anterior ethmoidal nerve

Trigeminal (semilunar) ganglion

Trigeminal nerve (V)

Infraorbital nerve

Lingual branch of ciliary nerve (V2)

Anterior superior alveolar nerve

Foramen ovale

Foramen rotundum

Nasal branch of anterior superior alveolar nerve

Mandibular nerve (V3)

Mucous membrane of maxillary sinus

Maxillary nerve (V2)

Zygomatic nerve

Dental and gingival branches

Nerve (Vidian) of pterygoid canal

Pterygopalatine ganglion

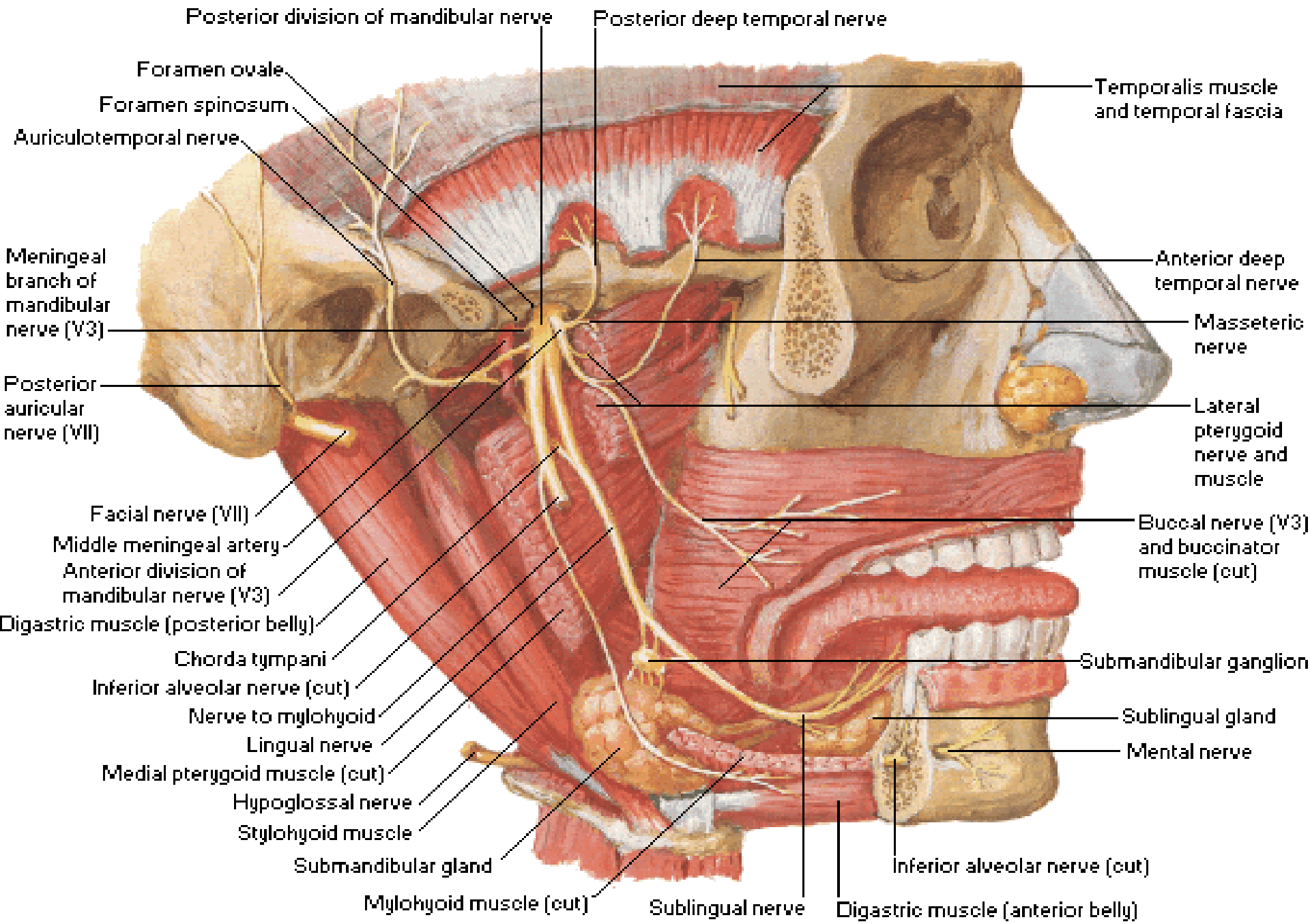
Middle superior alveolar nerve

Superior dental plexus

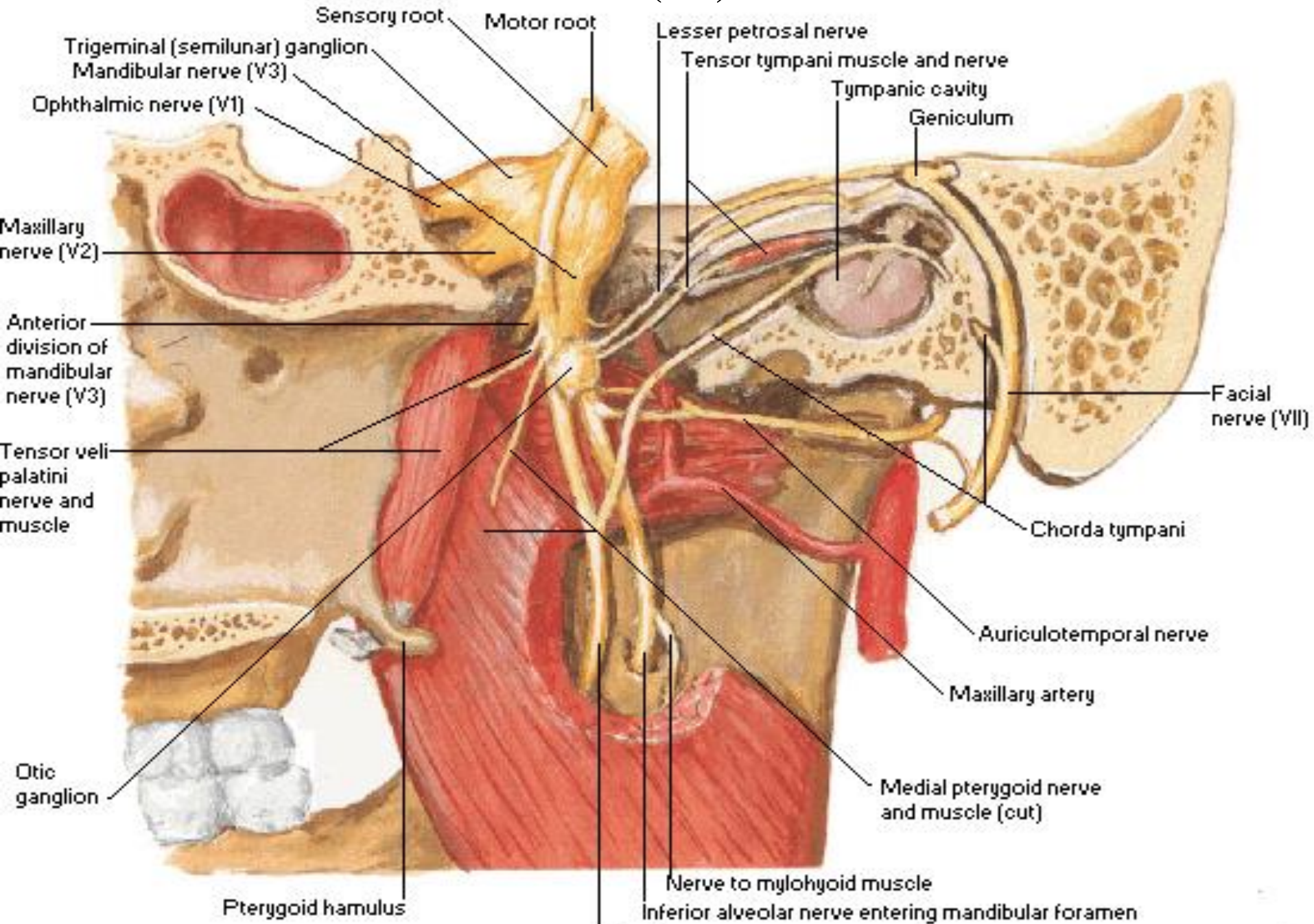
Greater and lesser palatine nerves

Ganglionic branches to pterygopalatine ganglion

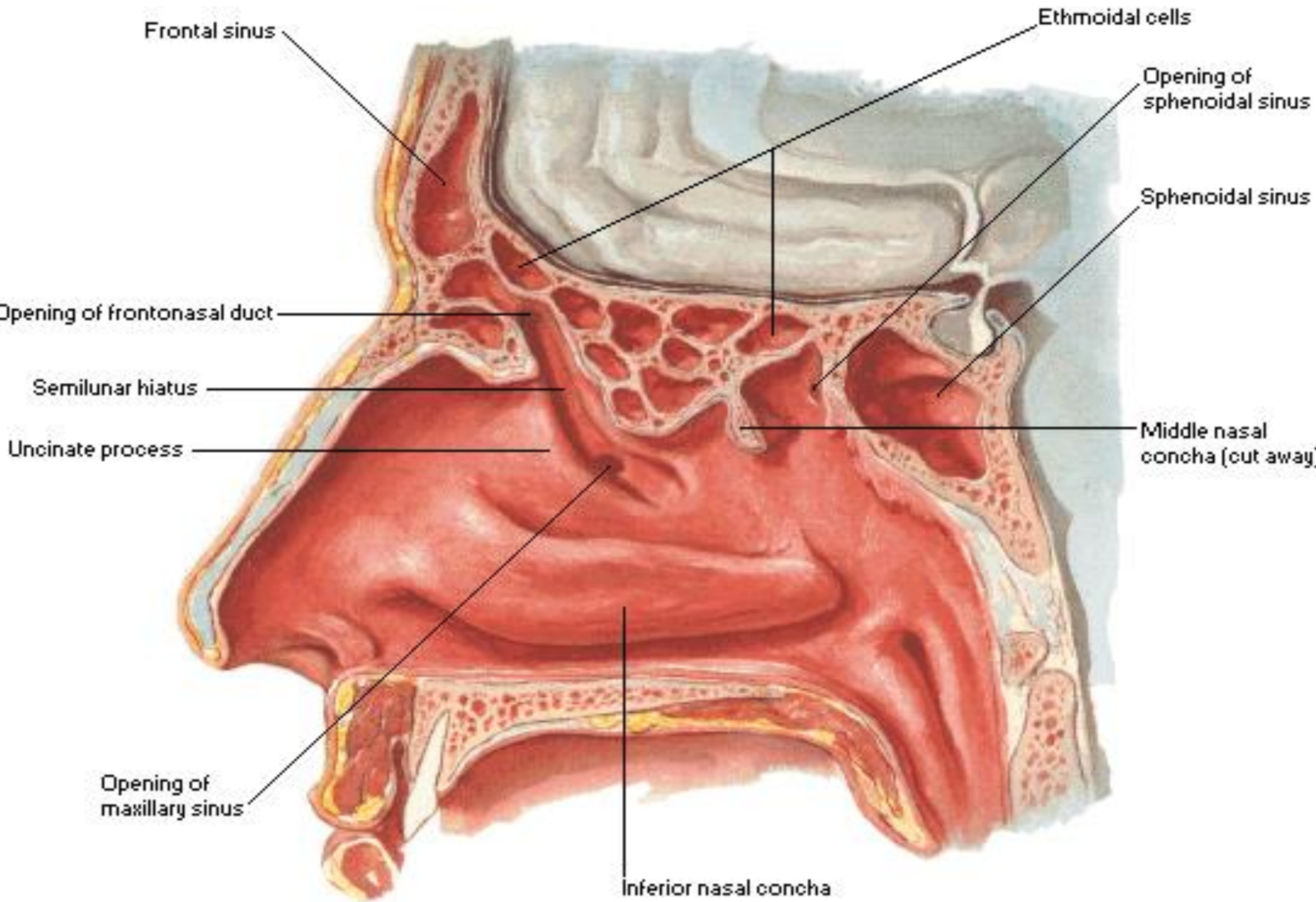
Lateral view of mandibular nerve (V3).



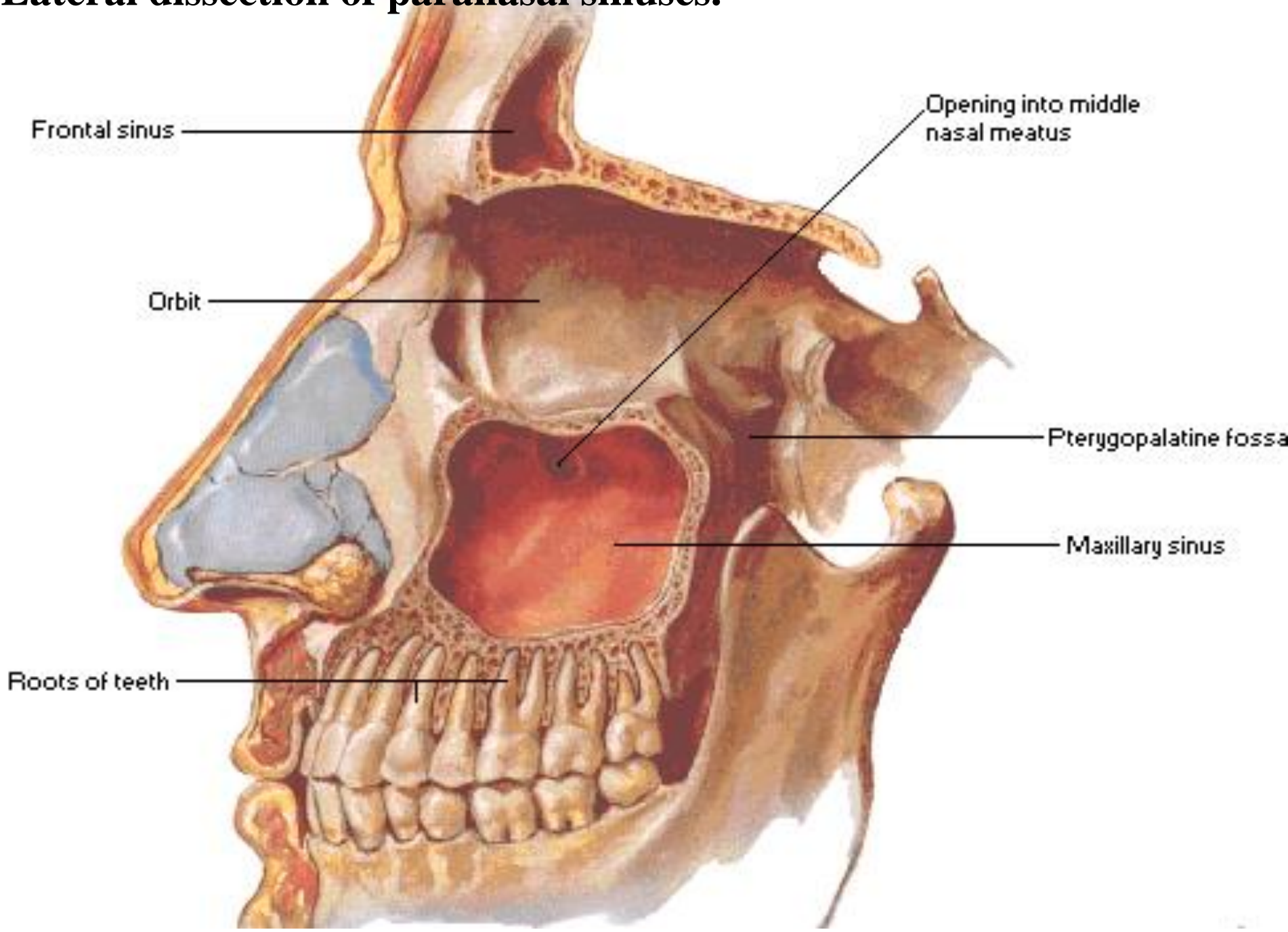
Medial view of mandibular nerve (V3).



Sagittal section of paranasal sinuses.

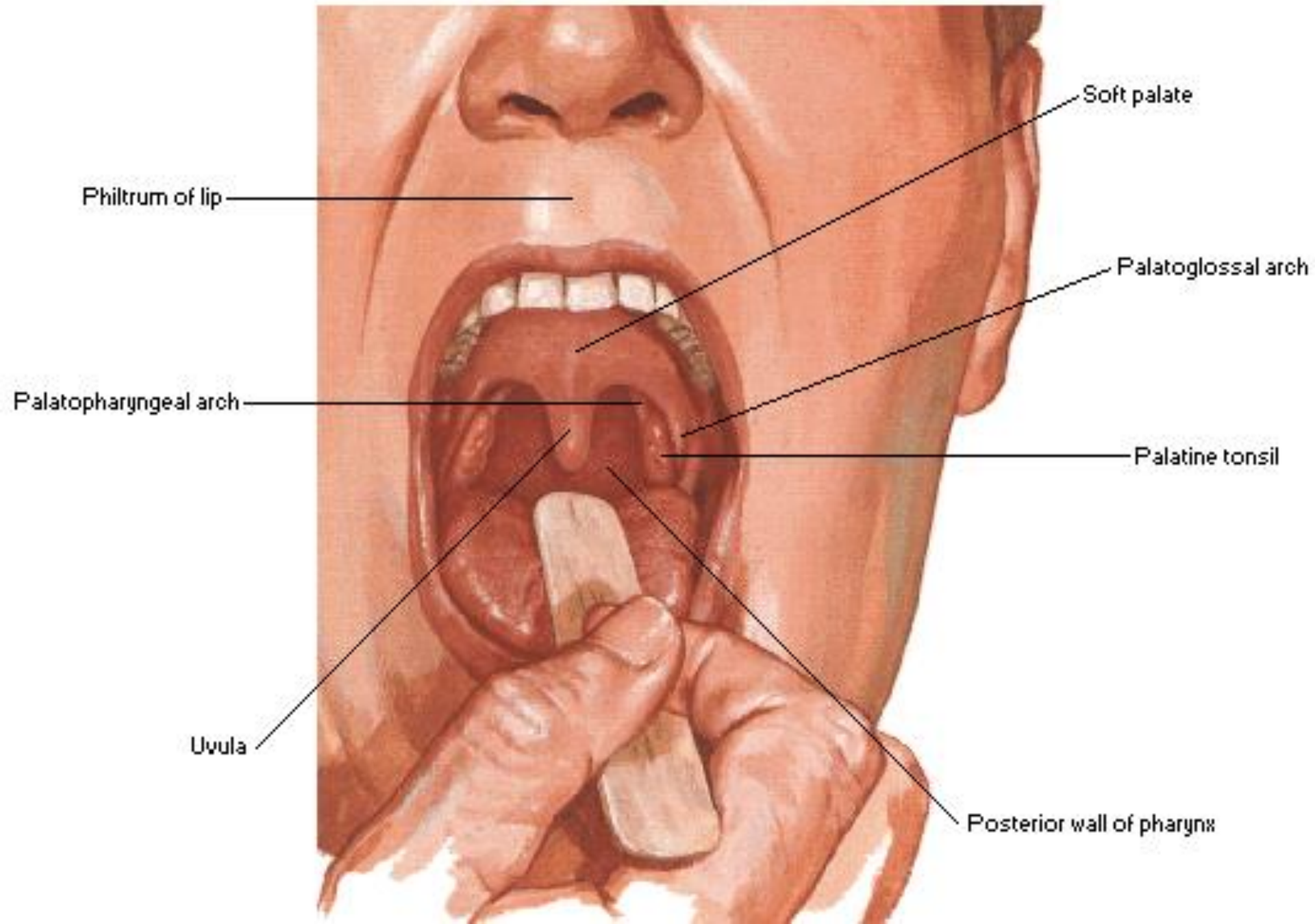


Lateral dissection of paranasal sinuses.

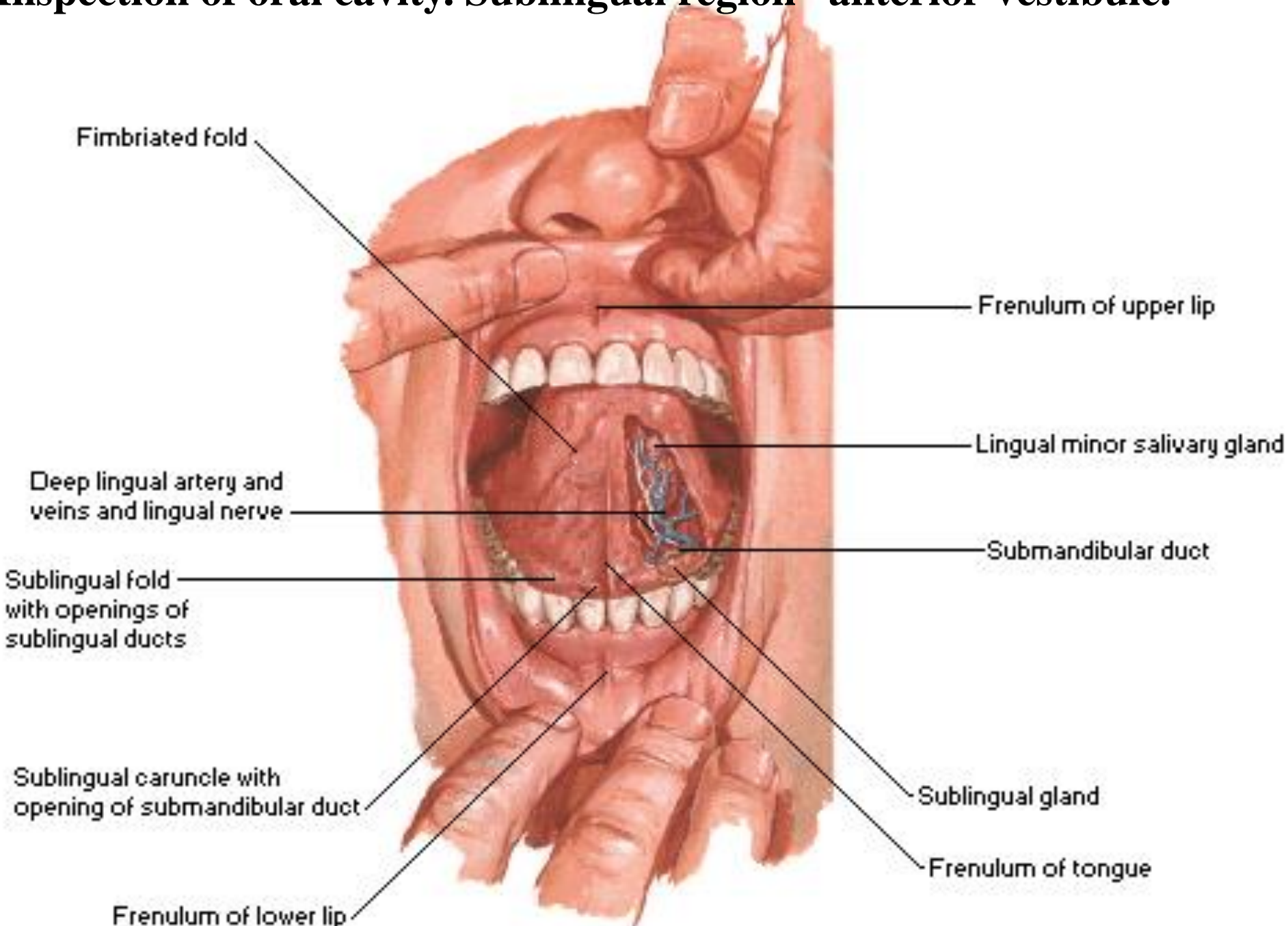


**The Mouth,
Pharynx &
Larynx**

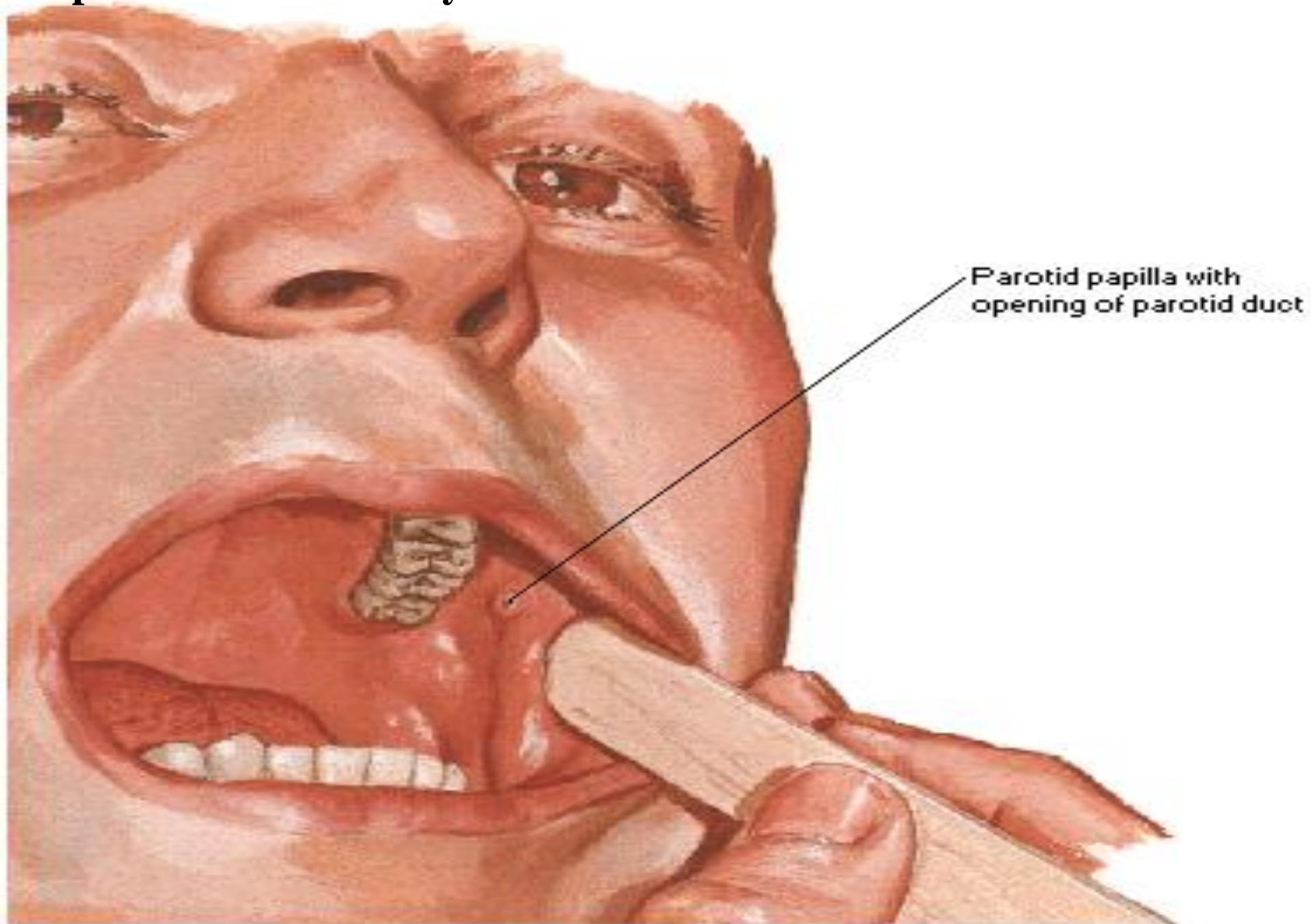
Inspection of oral cavity. Dorsum of the tongue and palate.



Inspection of oral cavity. Sublingual region – anterior vestibule.



Inspection of oral cavity. Lateral oral vestibule.



The **nerve supply** of the OMM:

1. The upper lip = **infraorbital** nerve.
2. The lower lip = **mental** nerve.
3. The cheeks = **buccal** nerve.
4. Floor of the mouth = **lingual** nerve.
5. Pillars of fauces = **IX** nerve .
6. Sympathetic innervation from plexus around the adjacent arteries.
7. Parasympathetic innervations from the nerves supply the different regions of the oral mucous membrane.

The **palate** is divided into **hard** and **soft** palate.

The **hard palate** has **palatine raphe** as a pale low ridge in the midline; anteriorly it ends behind central incisor in an oval elevation (**incisive papilla**). **Palatine rugae** are irregular folds of mucous membrane extending laterally from incisive papilla and palatine raphae.

Pterygomandibular raphe is a fold of mucous membrane extending obliquely downwards and outwards from pterygoid hamulus towards the mandible behind lower 3rd molar region.

The **nerve supply** of the hard palate is by **nasopalatine** and **greater palatine** nerves.

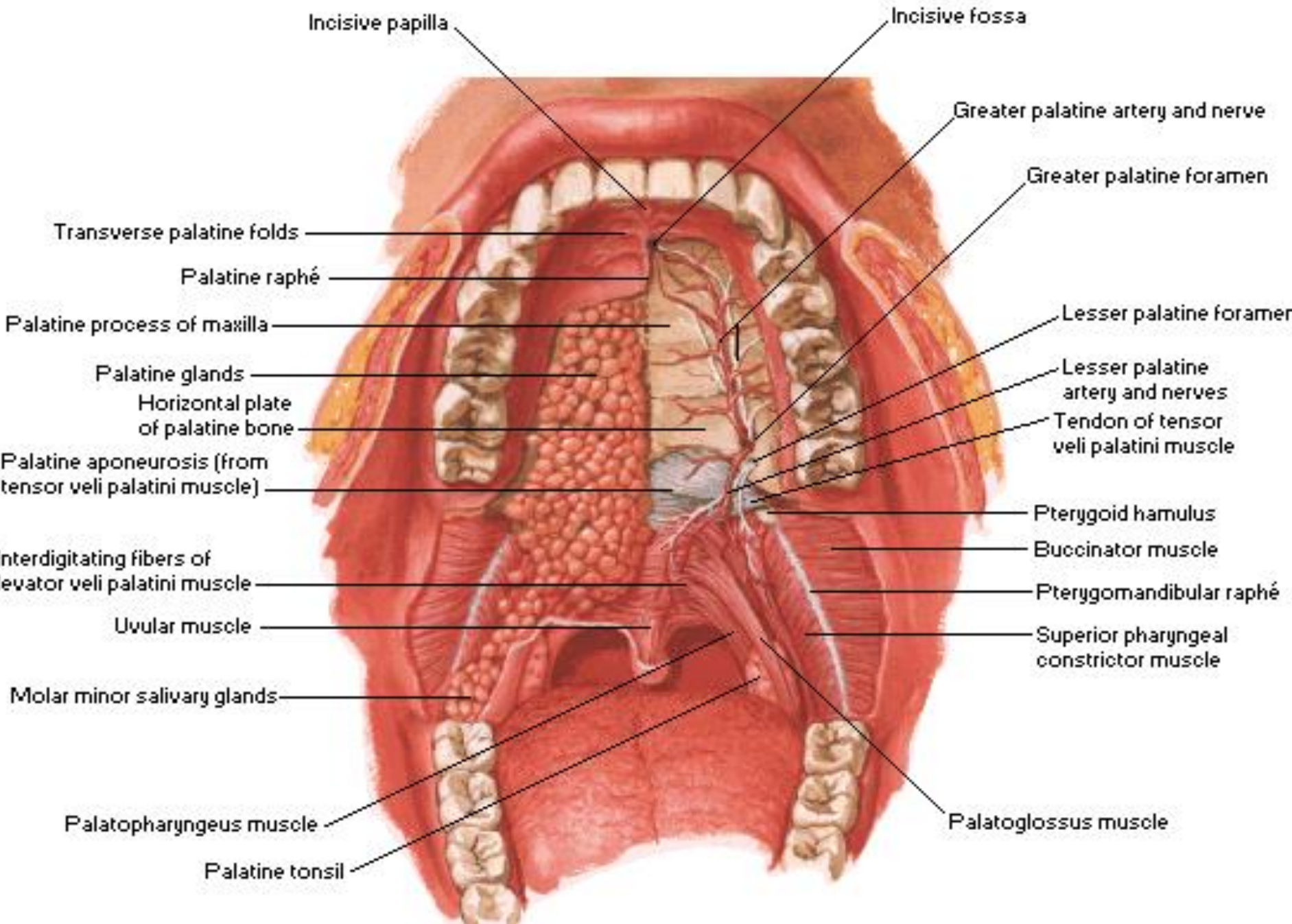
The **soft palate** is a flexible muscular flap that extends postroinferiorly from posterior edge of hard palate into the pharyngeal cavity.

It is also attached to the lateral walls of the pharynx and has **uvula** hanging down from the middle of its free posterior border that is continuous with **palatopharyngeal arch** on each side.

The **soft palate** is made up of a fold of mucous membrane, which encloses parts of **five pairs of muscles**.

Only **uvular** muscle is **intrinsic**. Each of the remaining pairs of muscles forms a sling; the two muscles are meeting in the midline of the soft palate where they are partly attached to **palatal aponeurosis** (an intermediate fibrous sheet formed from tendons of tensor palate muscles).

Anterior view of the hard and soft palate.



Tensor palati has a linear origin that extends from scaphoid fossa to medial surface of spine of sphenoid and margin of greater wing of sphenoid. Between them, the muscle arises from anterolateral wall of auditory tube. After curving round **pterygoid hamulus**, the tendon of tensor palati muscle fans out to form **palatal aponeurosis**.

Actions:

- 1.** When two muscles act together, tighten soft palate.
- 2.** By conjunction with levator palati muscle to close the nasopharynx.
- 3.** Those fibers of tensor palati muscle that attached to auditory tube open the tube by pulling on its wall.

Palatoglossus is a small counterpart of levator palati on the inferior surface of palate. It is attached to inferior surface of **palatal aponeurosis** and meets the opposite muscle in midline.

It converges on palatoglossal arch to mingle with muscles of posterolateral part of tongue.

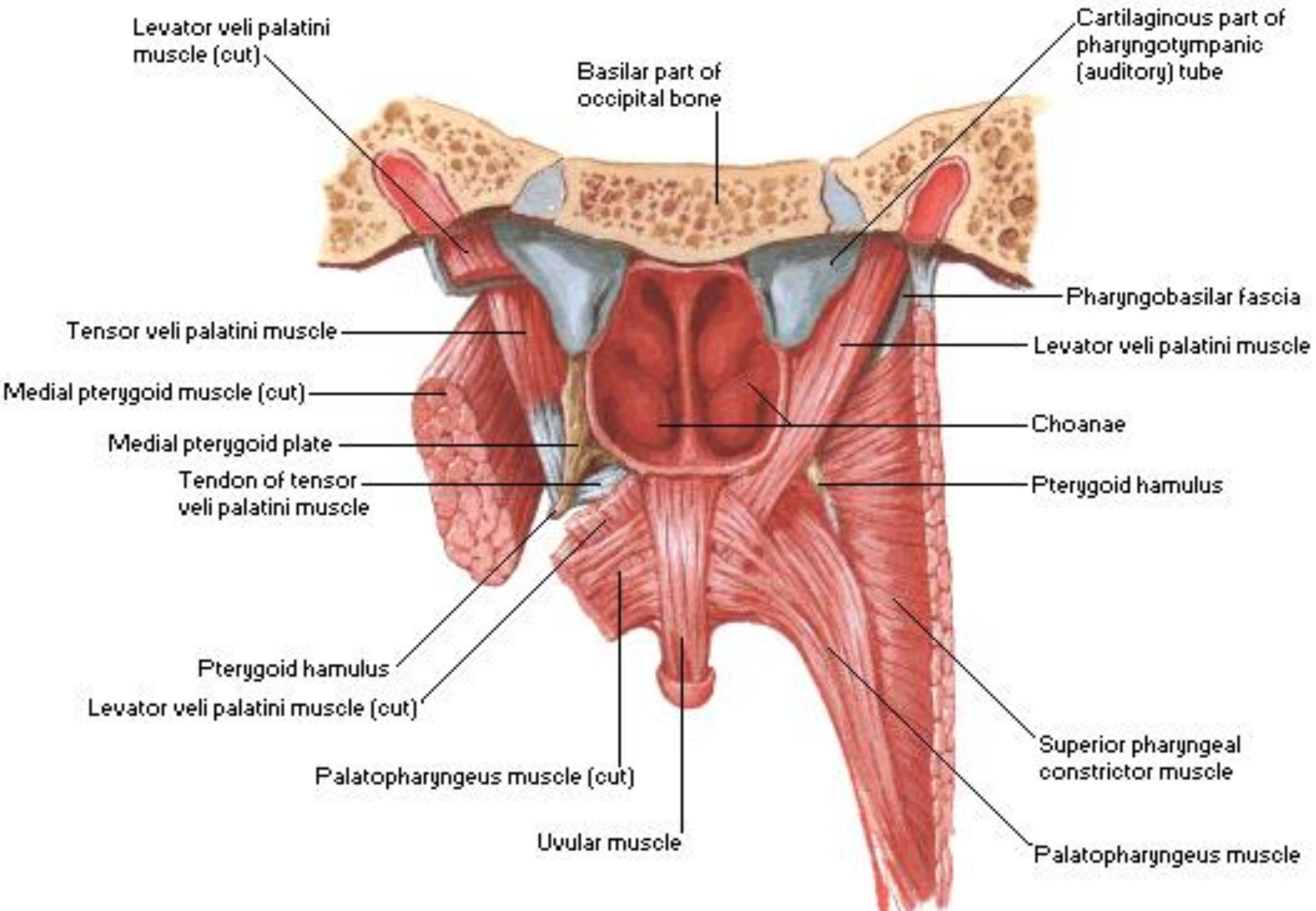
Action: Acting together to draw soft palate inferiorly on the dorsum of tongue.

Palatopharyngeus arises from soft and hard palate. Most of the muscle converges on palatopharyngeal arch and runs inferiorly in it on internal surfaces of constrictor muscles.

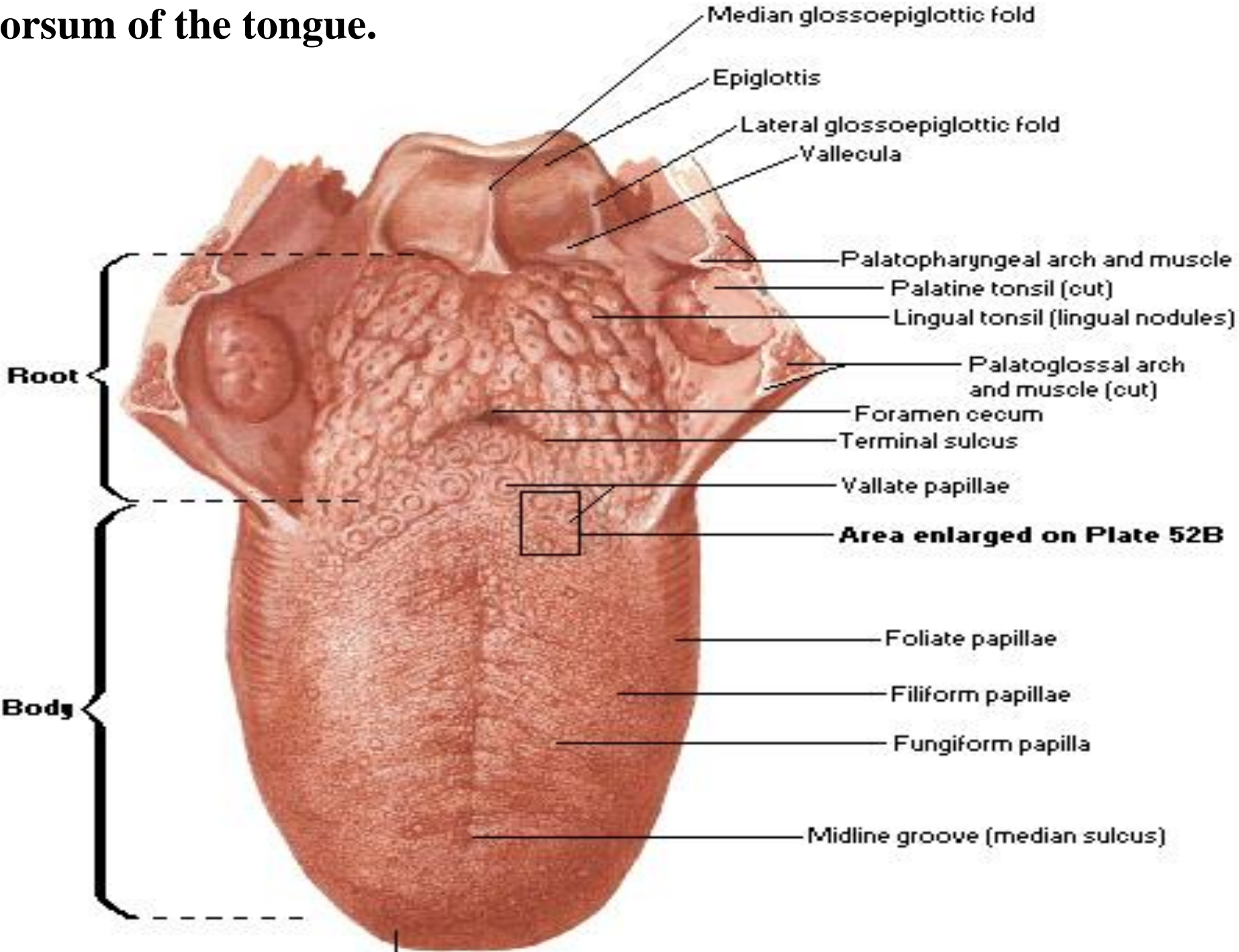
Action: The main mass of muscle **depresses palate** on the posterior part of the dorsum of tongue and prevents soft palate from being forced into nasal pharynx when blowing through mouth against resistance.

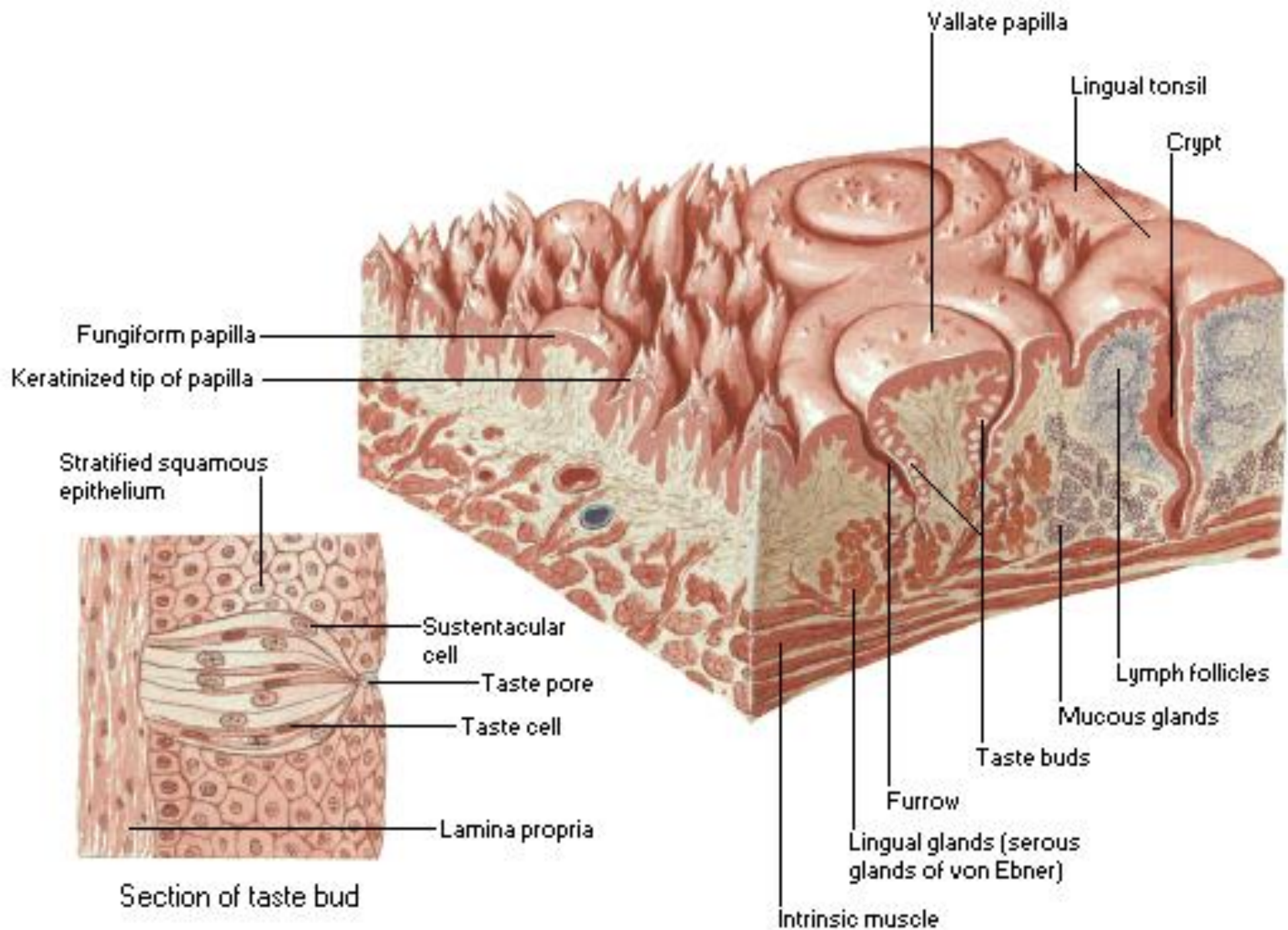
All the muscles of palate and pharynx are supplied by **pharyngeal plexus** (branches of IX, X nerves) **except tensor palati** muscle that supply by mandibular division of **V** nerve and **stylopharyngeus** supplied by **IX** nerve. **Blood supply of the palate** is by **ascending palatine** artery from facial artery which supplemented by **lesser** and **greater palatine** arteries.

Posterior view of the soft palate.



Dorsum of the tongue.





The **uvular** muscle lie on the superior surface of aponeurosis and run side by side in midline from posterior nasal spine to mucous membrane of uvula. **Action:** Shortens and tenses uvula.

Levator palati muscle arises from medial side of auditory tube and adjacent part of petrous temporal bone. It descends behind auditory tube inside free upper border of superior constrictor muscle of the pharynx and curves medially to join the opposite muscle.

Action: To raise the posterior part of soft palate and pull it slightly backwards.

Taste pathways.

Ventral posteromedial (VPM) nucleus of thalamus

— Usual Pathway
- - - Accessory Pathway

Lateral hypothalamic area

Sensory cortex (just below face area)

Mesencephalic nucleus of trigeminal nerve

Amygdaloid body

Pontine taste area

Motor nucleus of trigeminal nerve

Trigeminal (semilunar) ganglion

Pons

Ophthalmic nerve (V1)

Trigeminal nerve (V)

Maxillary nerve (V2)

Greater petrosal nerve

Pterygopalatine ganglion

Geniculate ganglion

Nerve (Vidian) of pterygoid canal

Facial nerve (VII)

Mandibular nerve (V3)

Intermediate nerve

Lingual nerve

Otic ganglion

Fungiform papillae

Nucleus of solitary tract (rostral part)

Chorda tympani

Foliate papillae

Medulla oblongata (lower part)

Vallate papillae

Glossopharyngeal nerve (IX)

Epiglottis

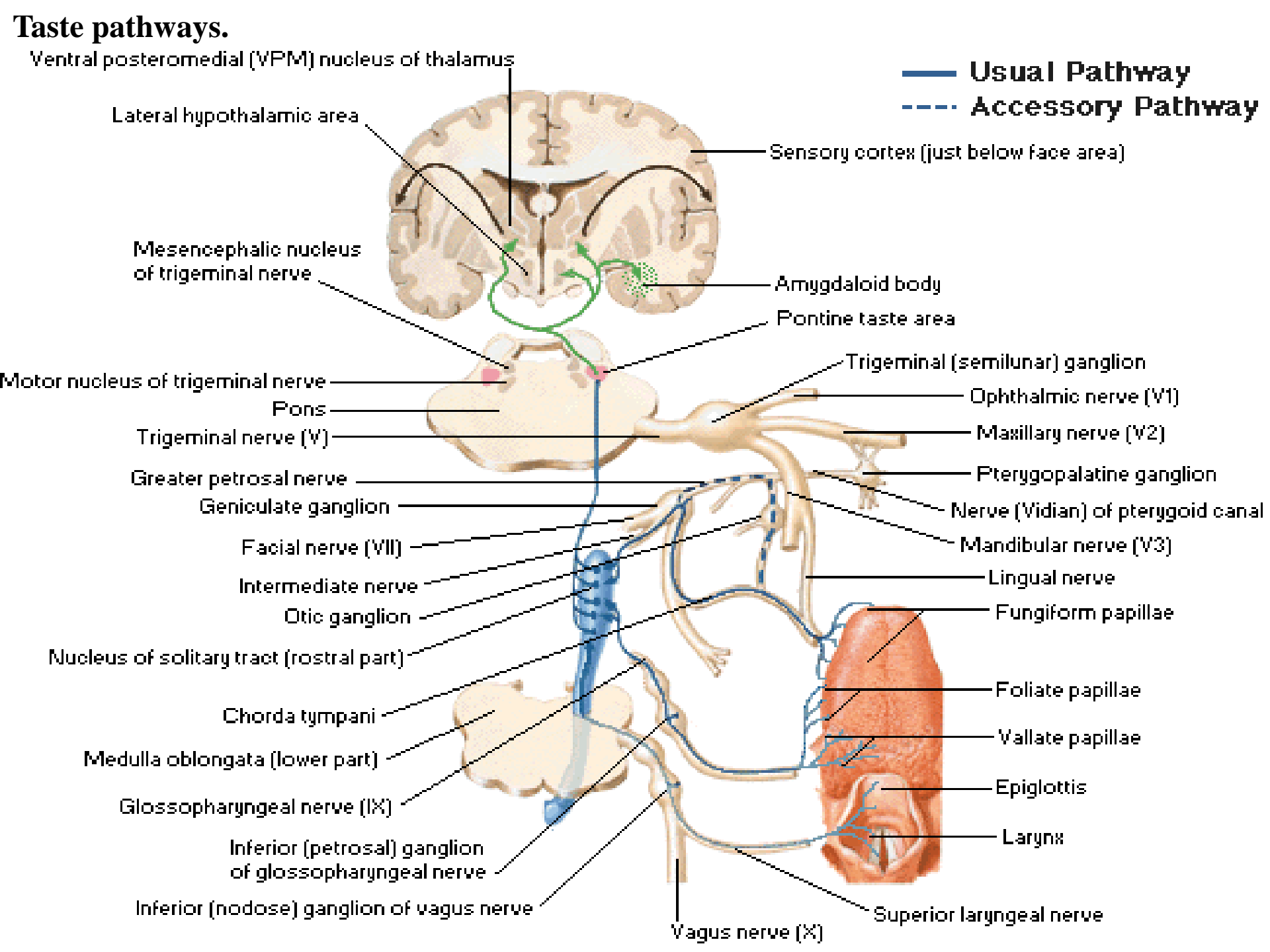
Inferior (petrosal) ganglion of glossopharyngeal nerve

Larynx

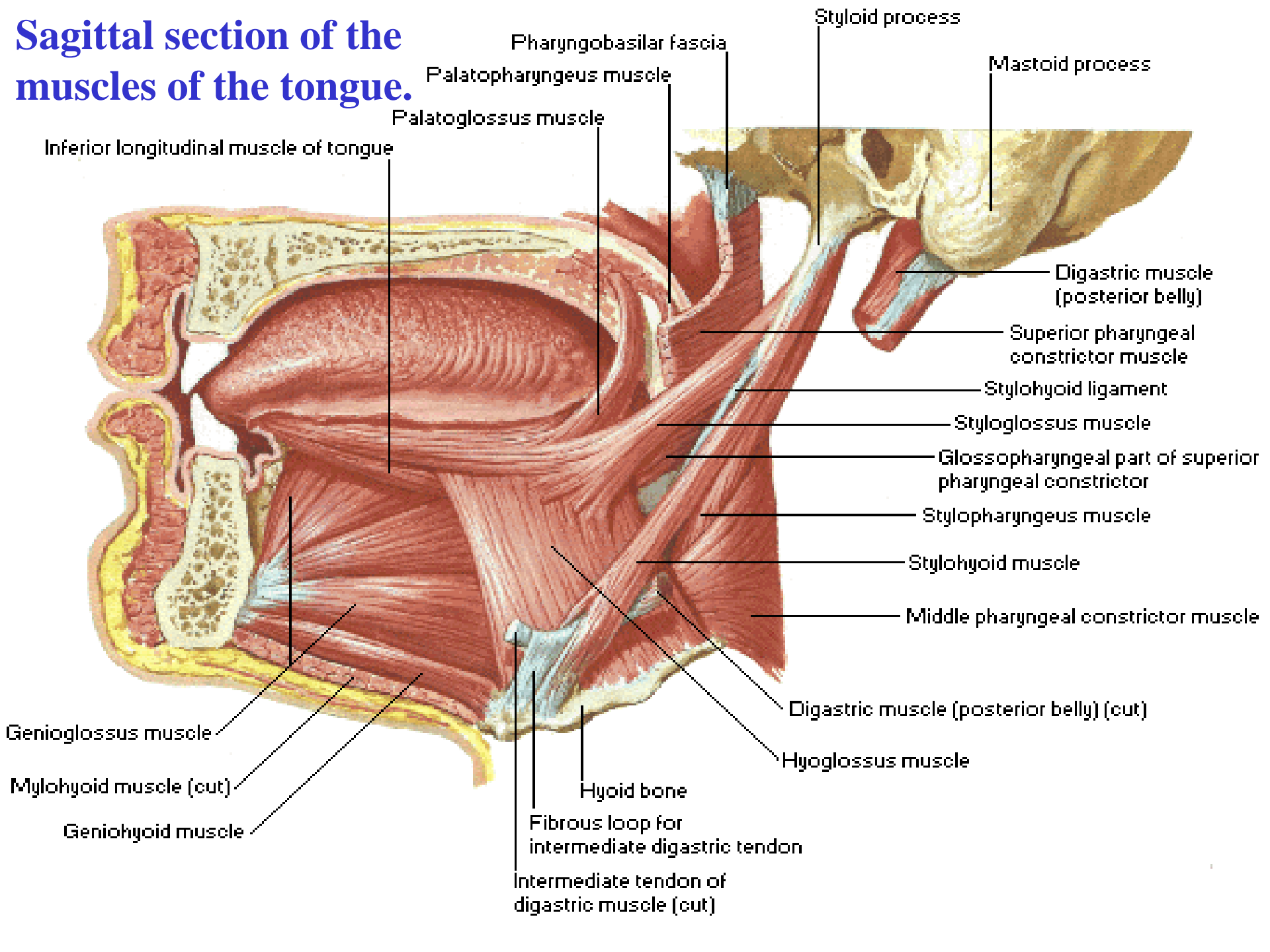
Inferior (nodose) ganglion of vagus nerve

Vagus nerve (X)

Superior laryngeal nerve



Sagittal section of the muscles of the tongue.



Pharyngobasilar fascia
Palatopharyngeus muscle
Palatoglossus muscle
Styloid process
Mastoid process

Inferior longitudinal muscle of tongue

Digastric muscle (posterior belly)

Superior pharyngeal constrictor muscle

Stylohyoid ligament

Styloglossus muscle

Glossopharyngeal part of superior pharyngeal constrictor

Stylopharyngeus muscle

Stylohyoid muscle

Middle pharyngeal constrictor muscle

Digastric muscle (posterior belly) (cut)

Hyoglossus muscle

Hyoid bone

Fibrous loop for intermediate digastric tendon

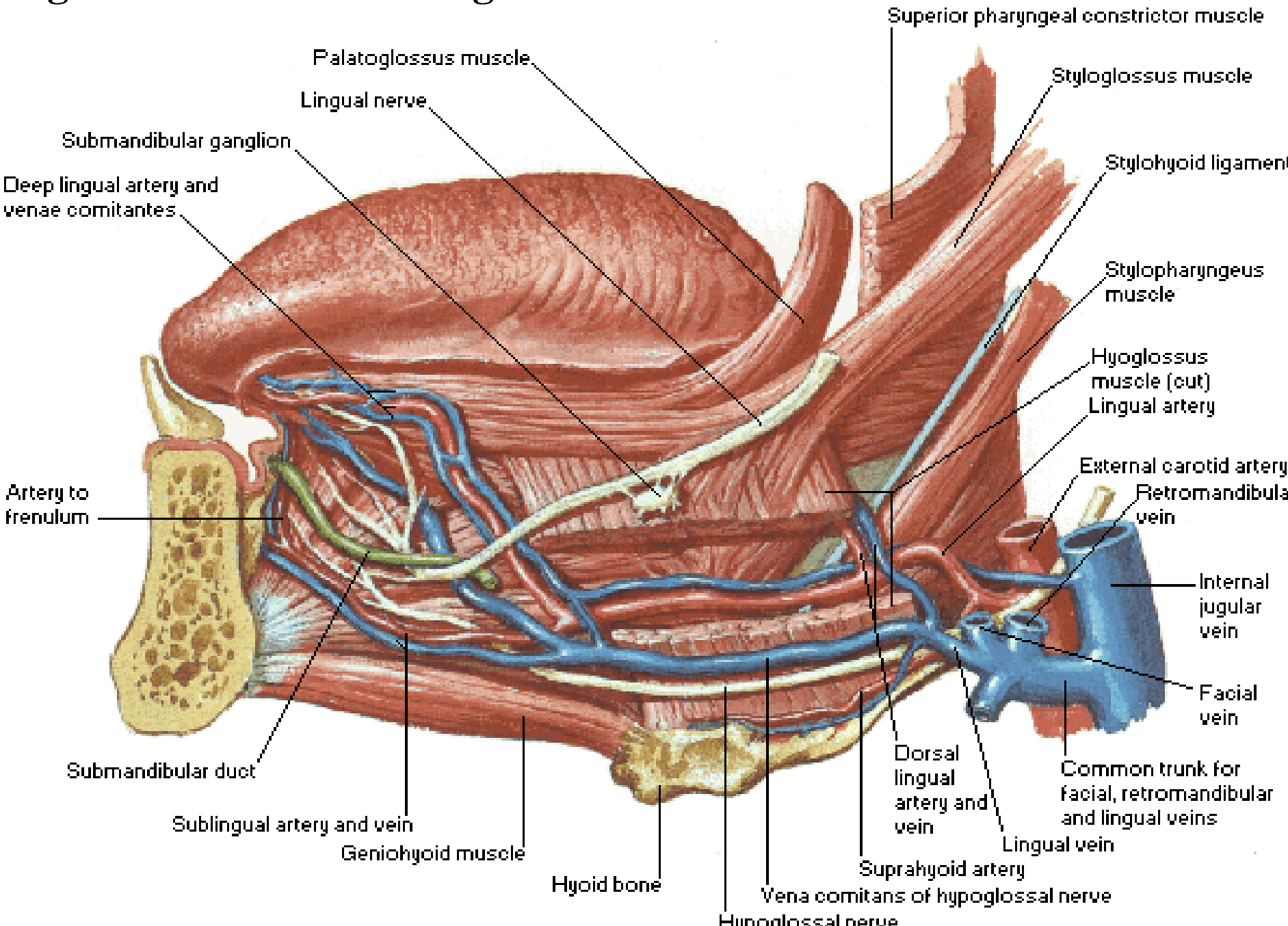
Intermediate tendon of digastric muscle (cut)

Genioglossus muscle

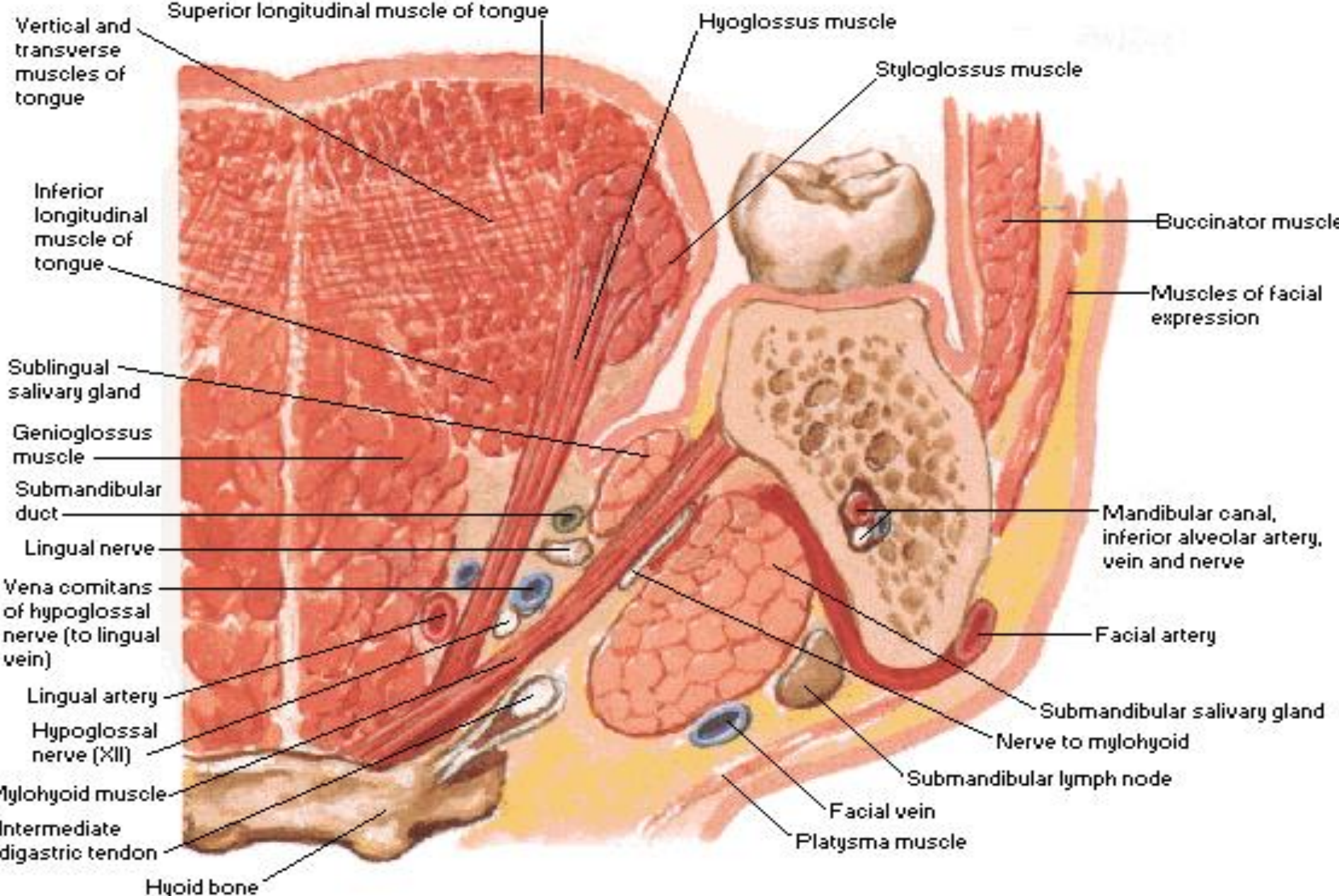
Mylohyoid muscle (cut)

Geniohyoid muscle

Sagittal section of the tongue and related structures.

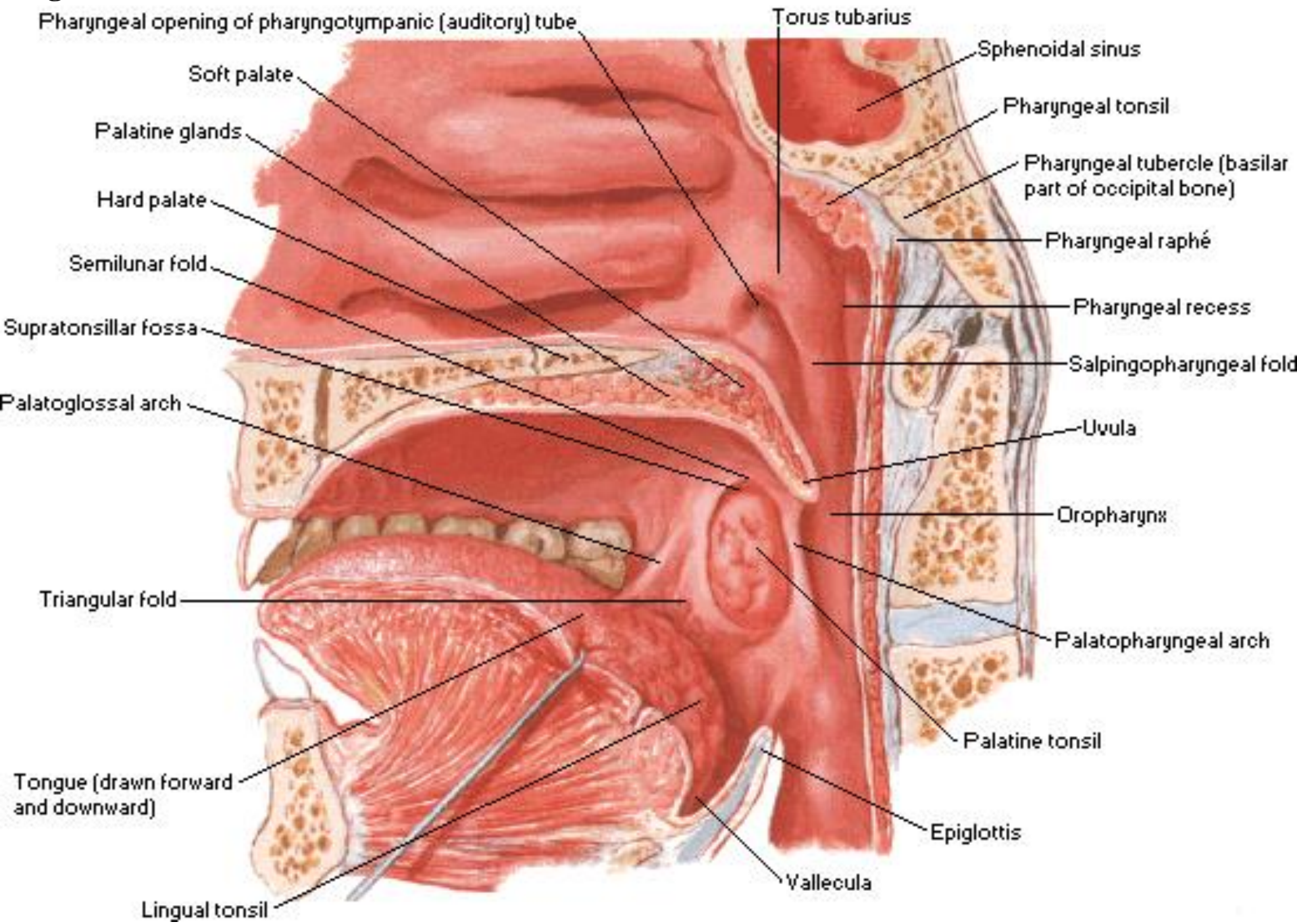


Anterior view of the frontal section of the tongue and mouth (behind the first molar).

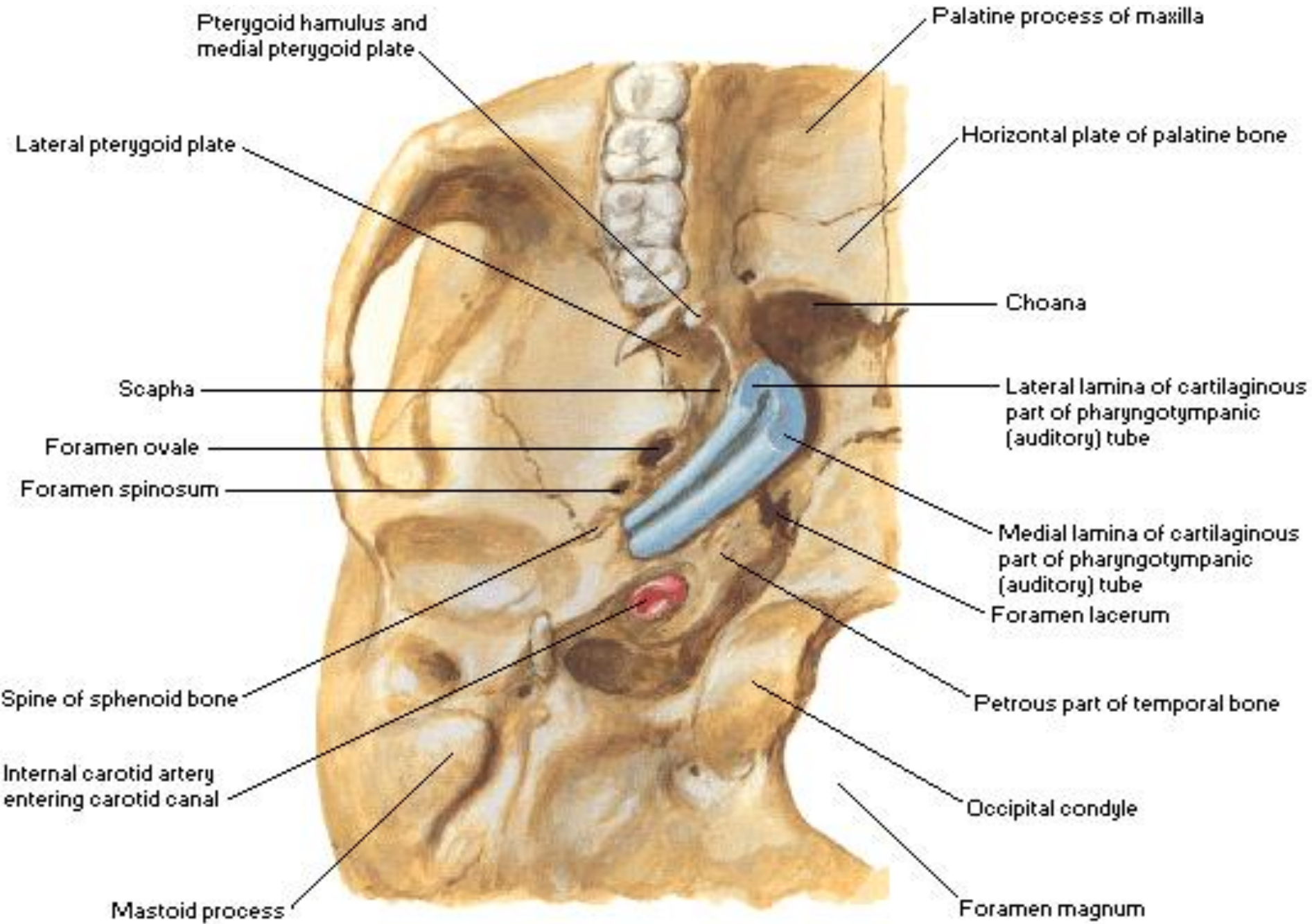


The Pharynx

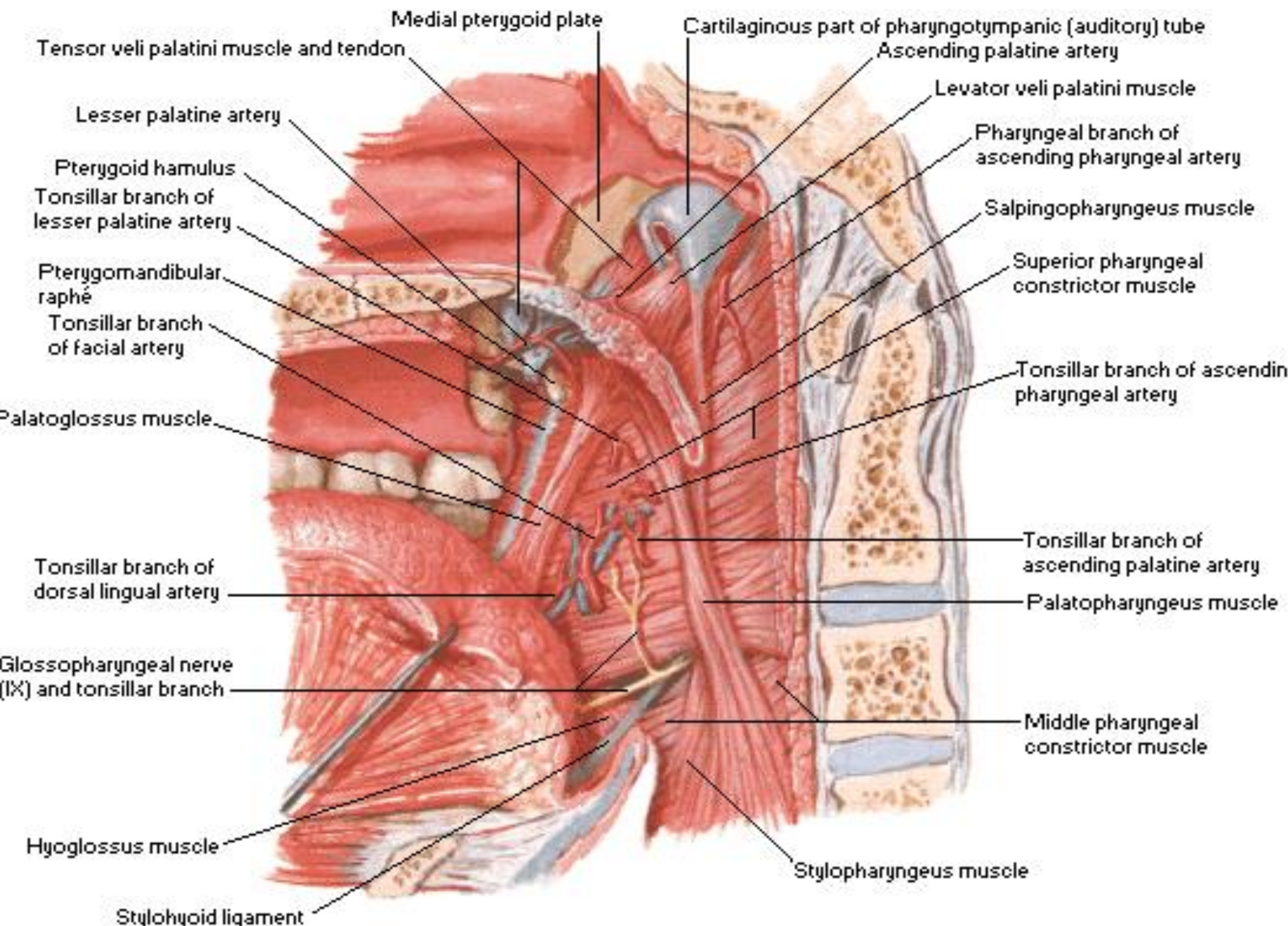
Sagittal section of the fauces.



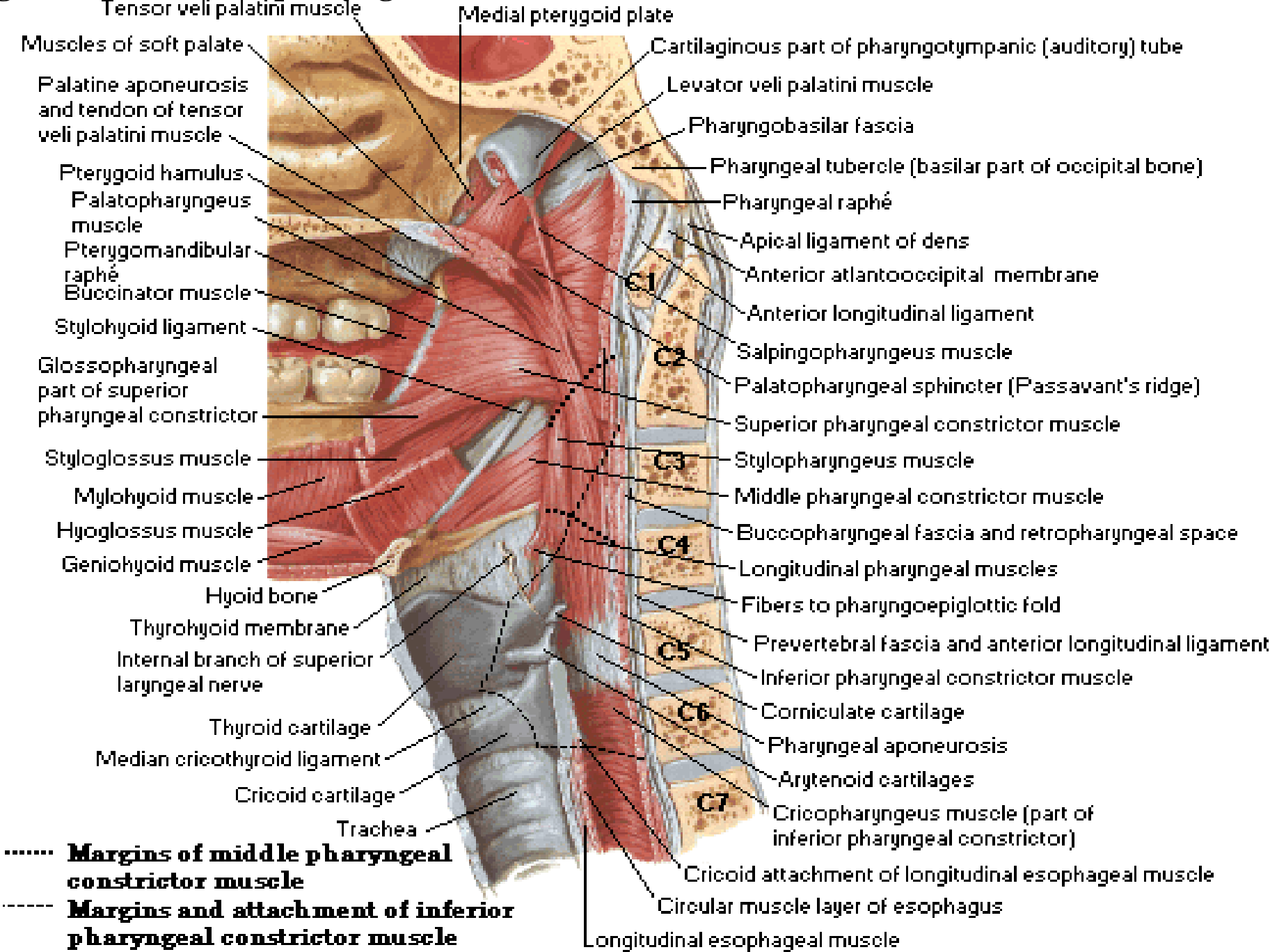
Inferior view of cartilaginous portion of auditory tube.



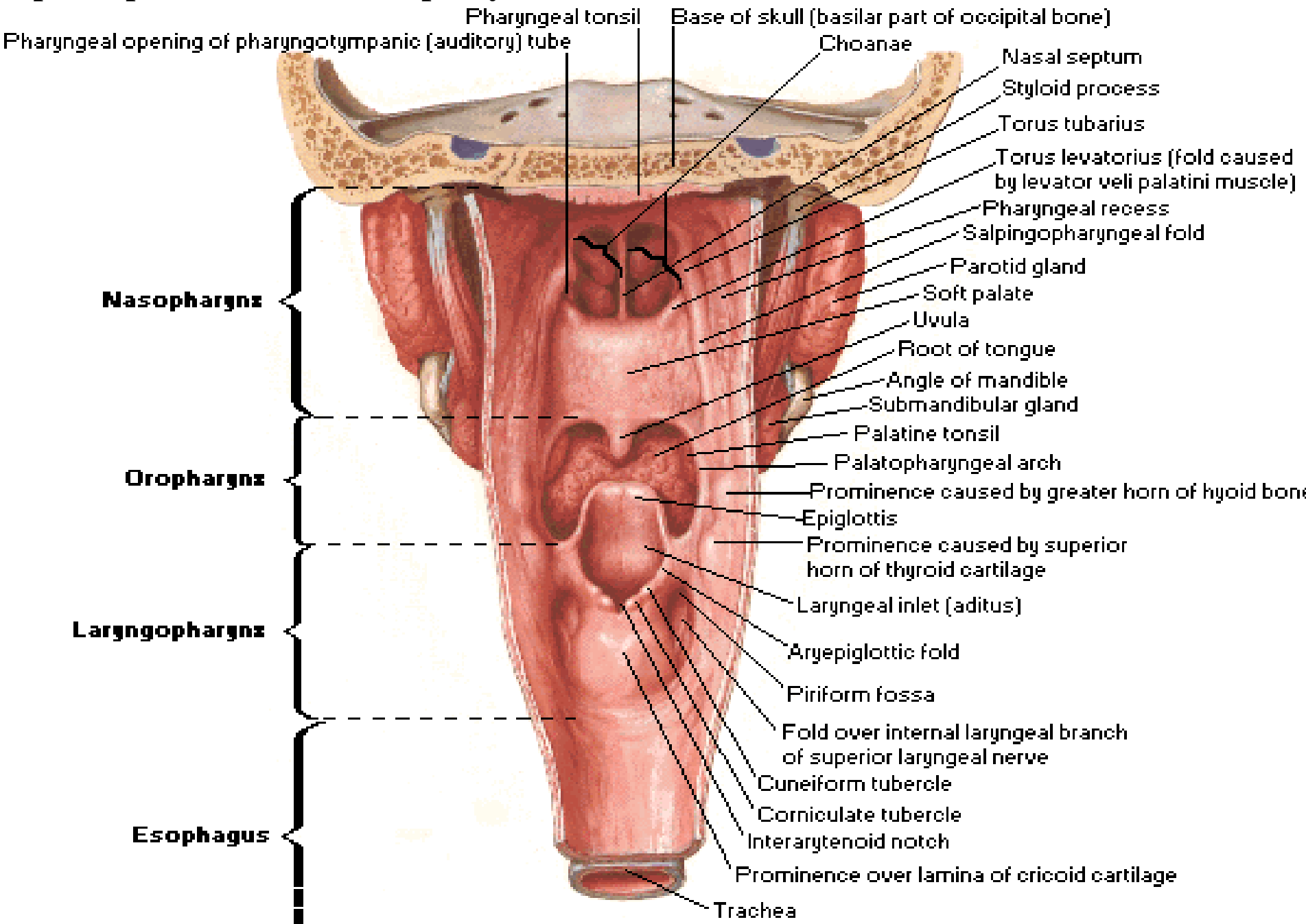
Fauces. Pharyngeal mucosa removed.



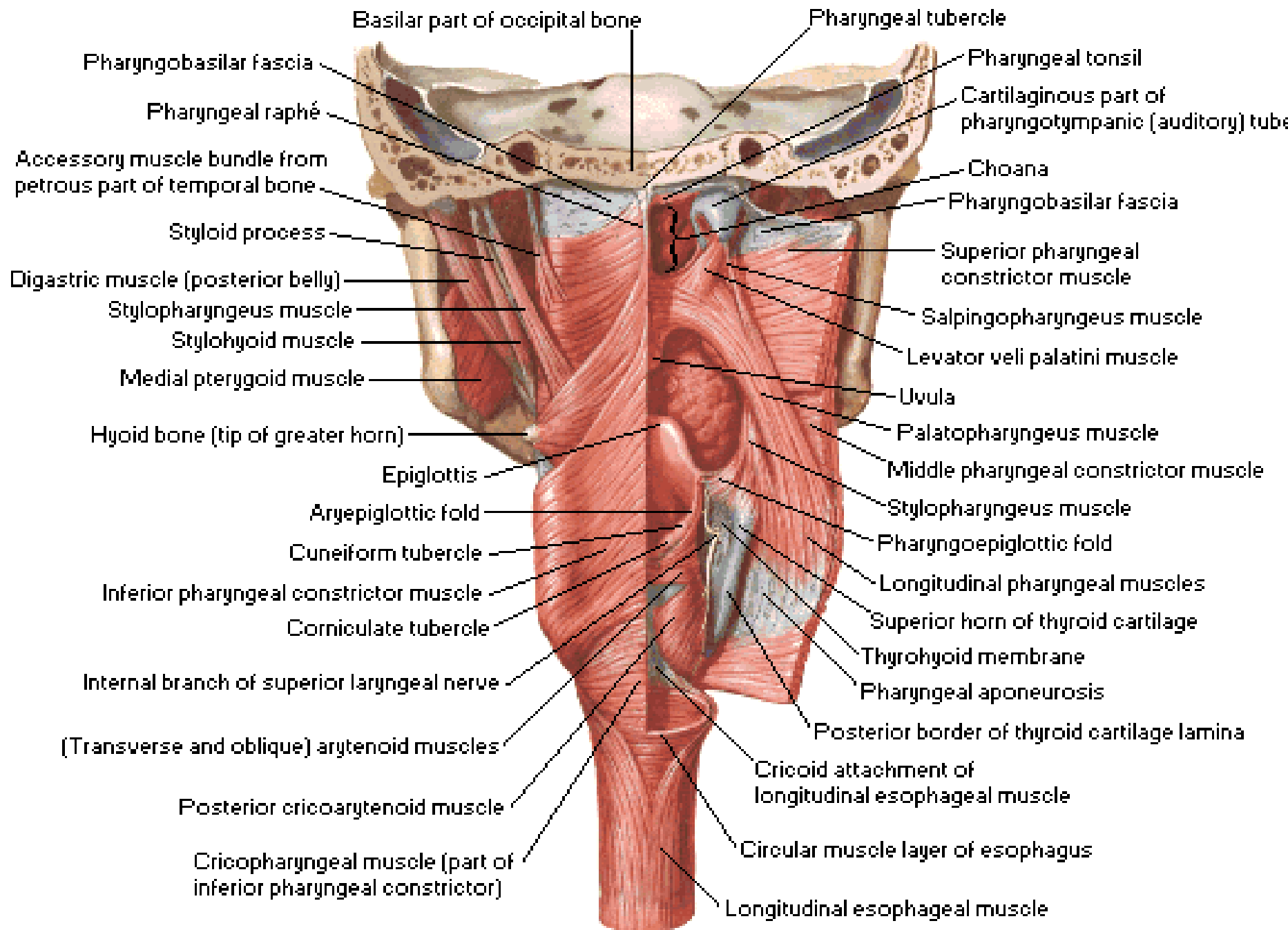
Sagittal section of the pharyngeal muscles.



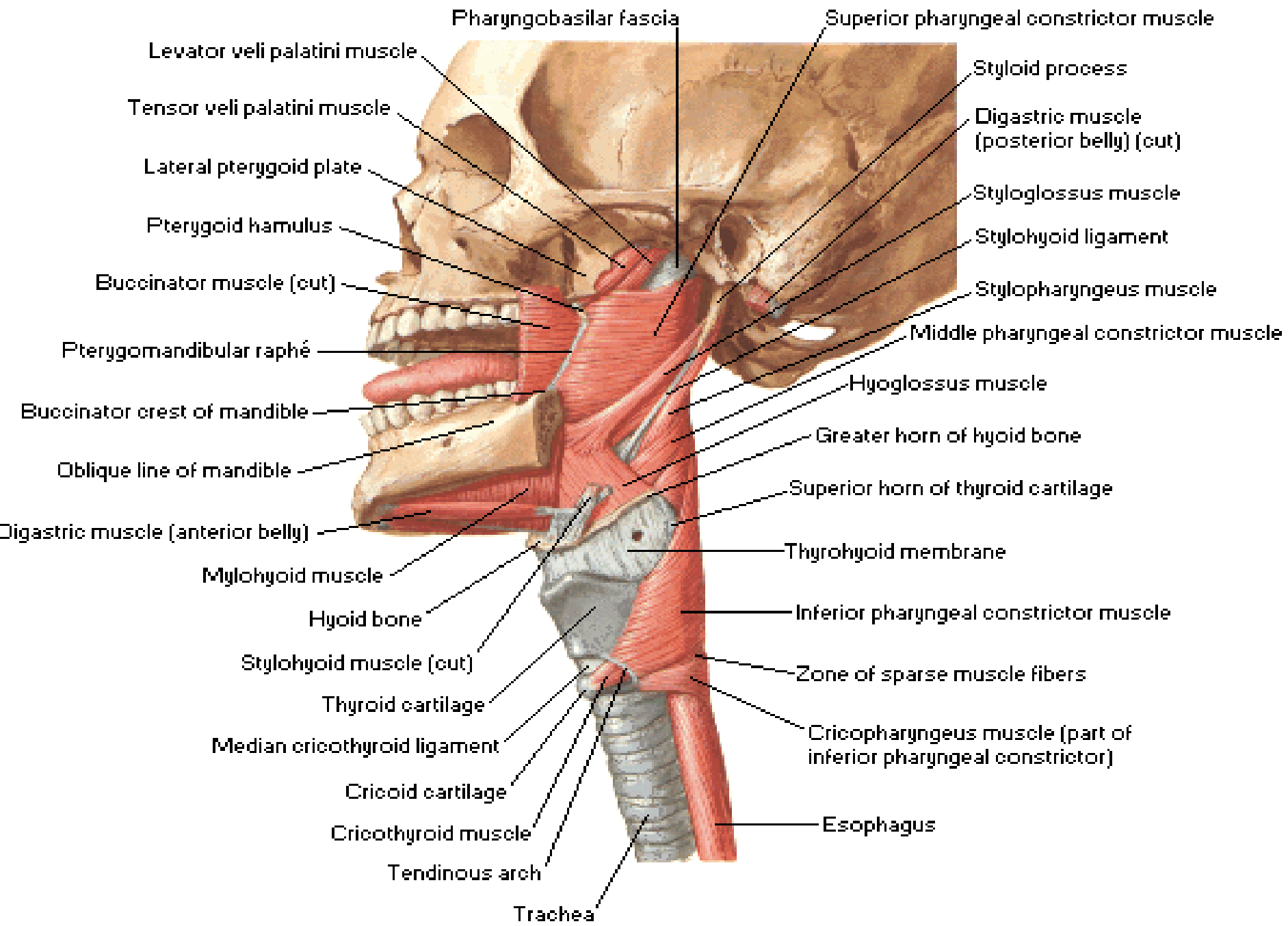
Opened posterior view of the pharynx.



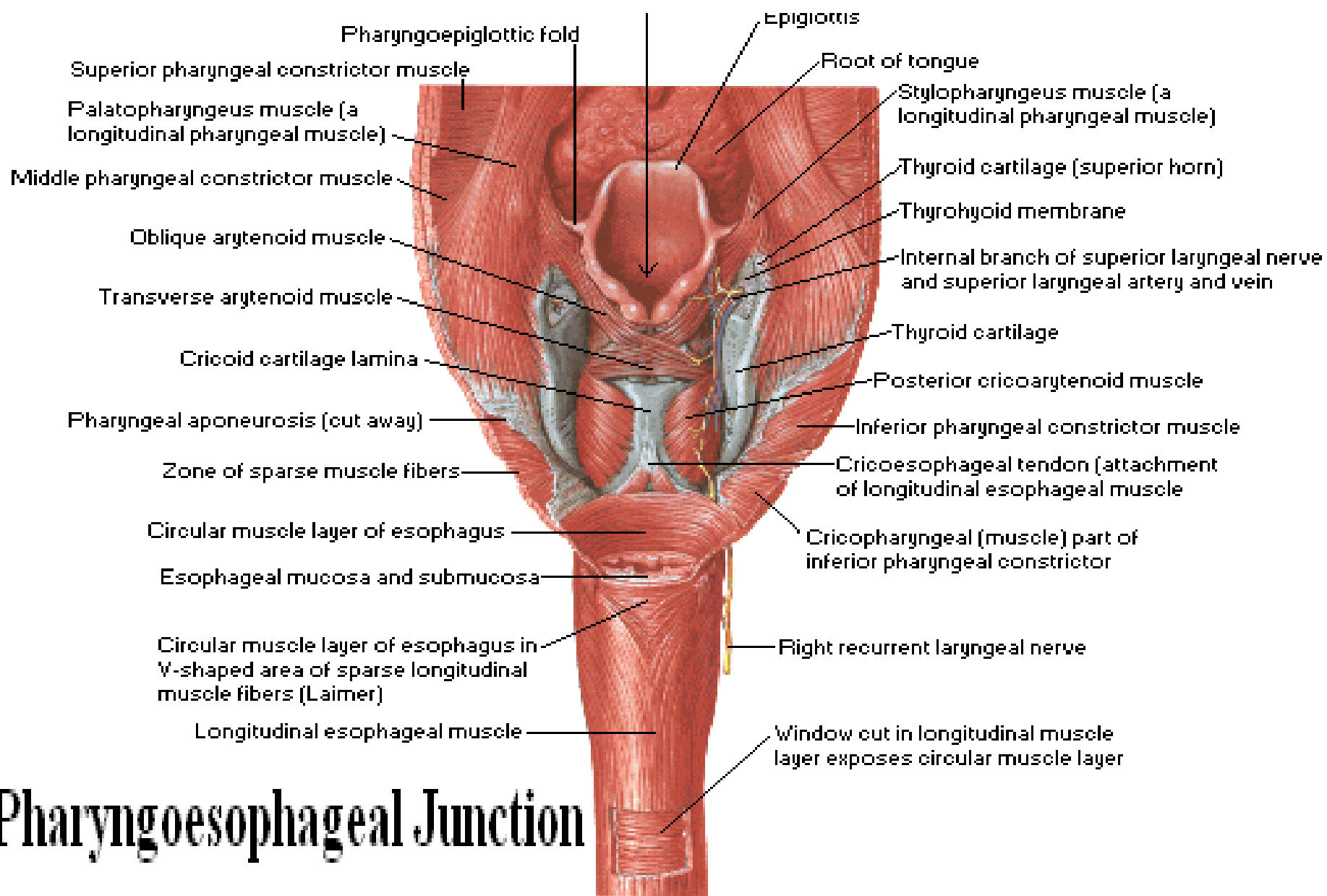
Partially opened posterior view of the pharyngeal muscles.



Lateral view of the pharyngeal muscles.



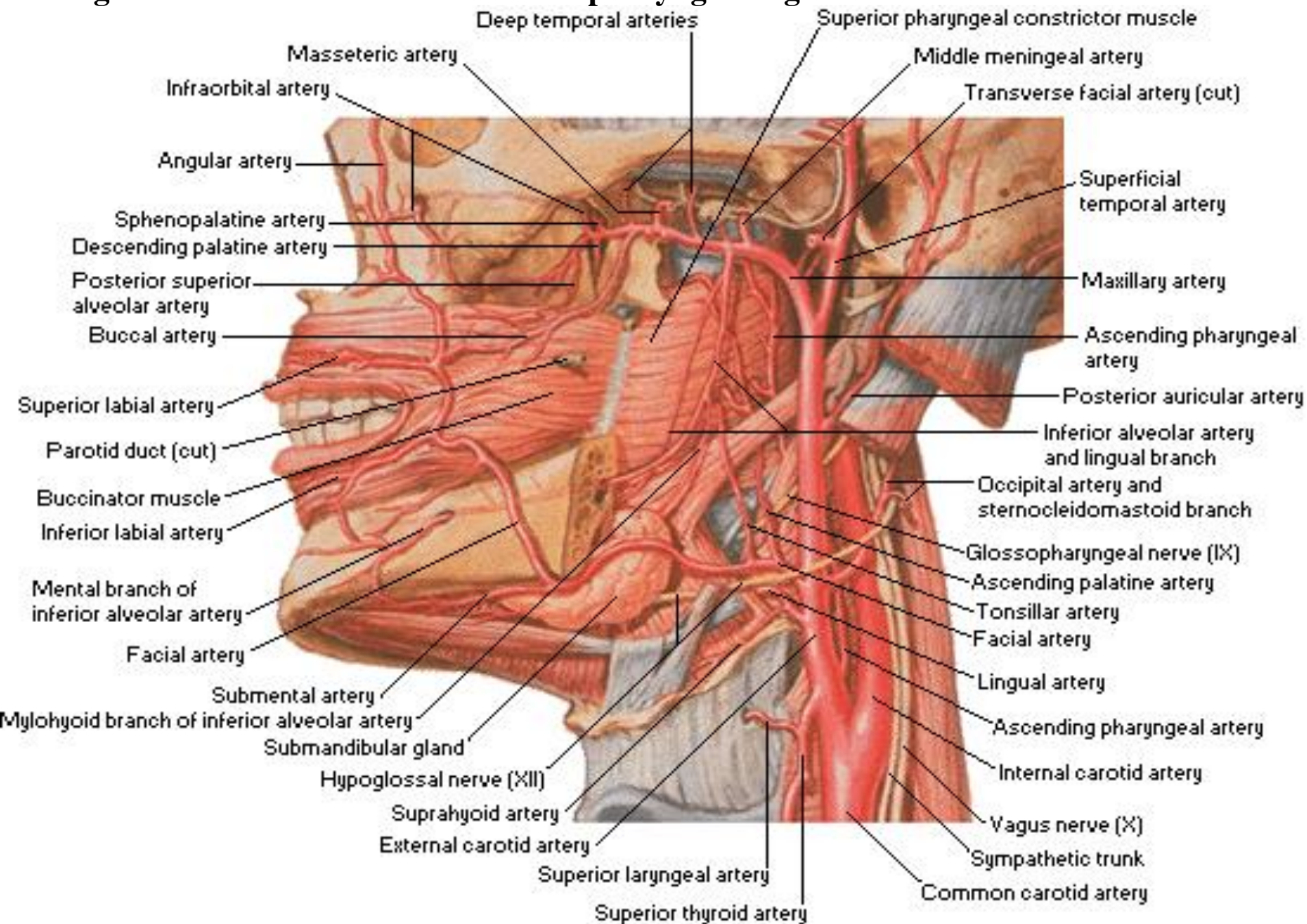
Laryngeal inlet (aditus)



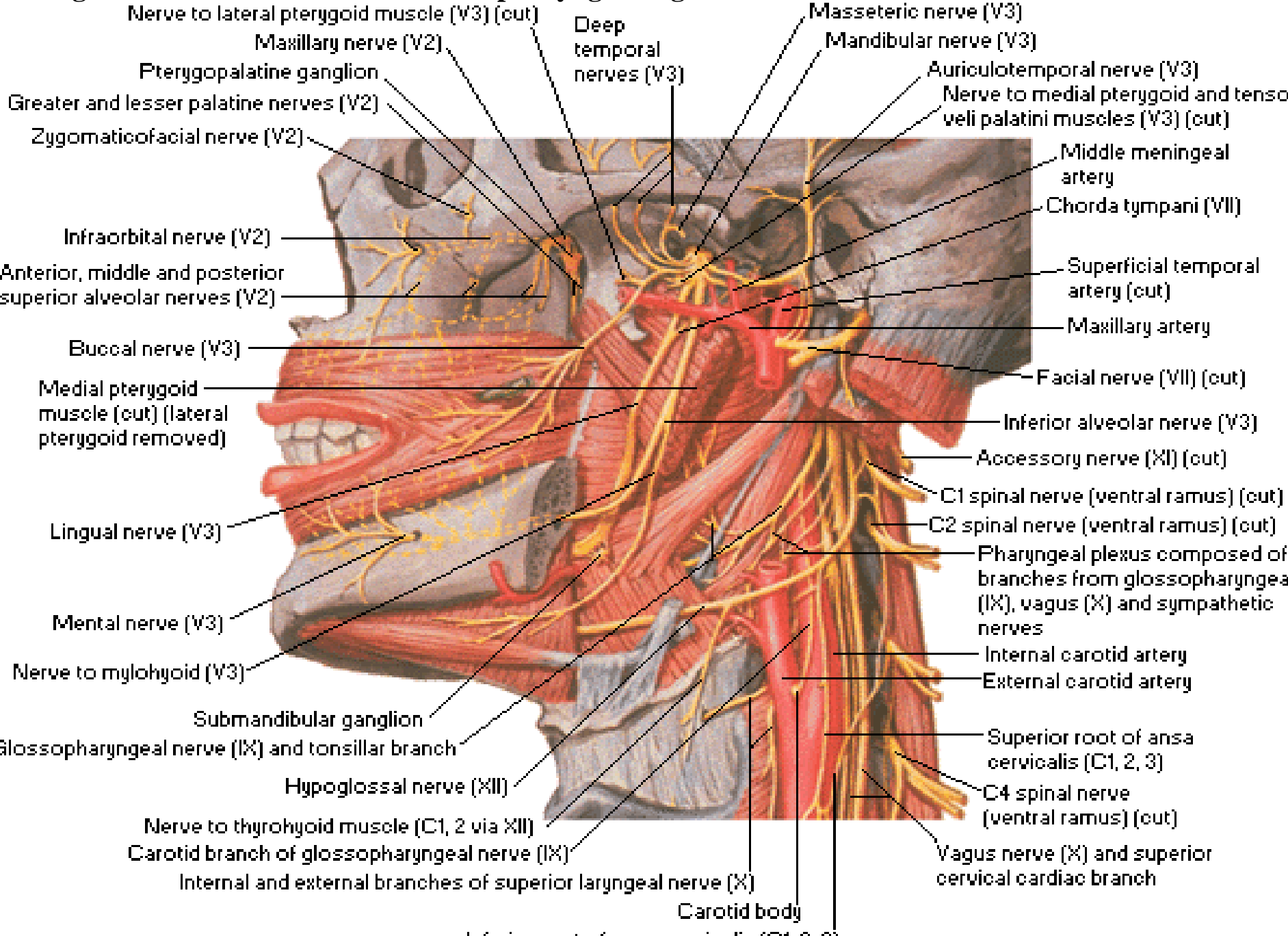
Pharyngo-esophageal Junction

Posterior view with pharynx opened and mucosa removed

Enlarged view of the arteries of oral and pharyngeal regions.



Enlarged view of the nerves of oral and pharyngeal regions.



Nerve to lateral pterygoid muscle (V3) (cut)

Maxillary nerve (V2)

Pterygopalatine ganglion

Greater and lesser palatine nerves (V2)

Zygomaticofacial nerve (V2)

Infraorbital nerve (V2)

Anterior, middle and posterior superior alveolar nerves (V2)

Buccal nerve (V3)

Medial pterygoid muscle (cut) (lateral pterygoid removed)

Lingual nerve (V3)

Mental nerve (V3)

Nerve to mylohyoid (V3)

Deep temporal nerves (V3)

Masseteric nerve (V3)

Mandibular nerve (V3)

Auriculotemporal nerve (V3)

Nerve to medial pterygoid and tensor veli palatini muscles (V3) (cut)

Middle meningeal artery

Chorda tympani (VII)

Superficial temporal artery (cut)

Maxillary artery

Facial nerve (VII) (cut)

Inferior alveolar nerve (V3)

Accessory nerve (XI) (cut)

C1 spinal nerve (ventral ramus) (cut)

C2 spinal nerve (ventral ramus) (cut)

Pharyngeal plexus composed of branches from glossopharyngeal (IX), vagus (X) and sympathetic nerves

Internal carotid artery

External carotid artery

Superior root of ansa cervicalis (C1, 2, 3)

C4 spinal nerve (ventral ramus) (cut)

Vagus nerve (X) and superior cervical cardiac branch

Submandibular ganglion

Glossopharyngeal nerve (IX) and tonsillar branch

Hypoglossal nerve (XII)

Nerve to thyrohyoid muscle (C1, 2 via XII)

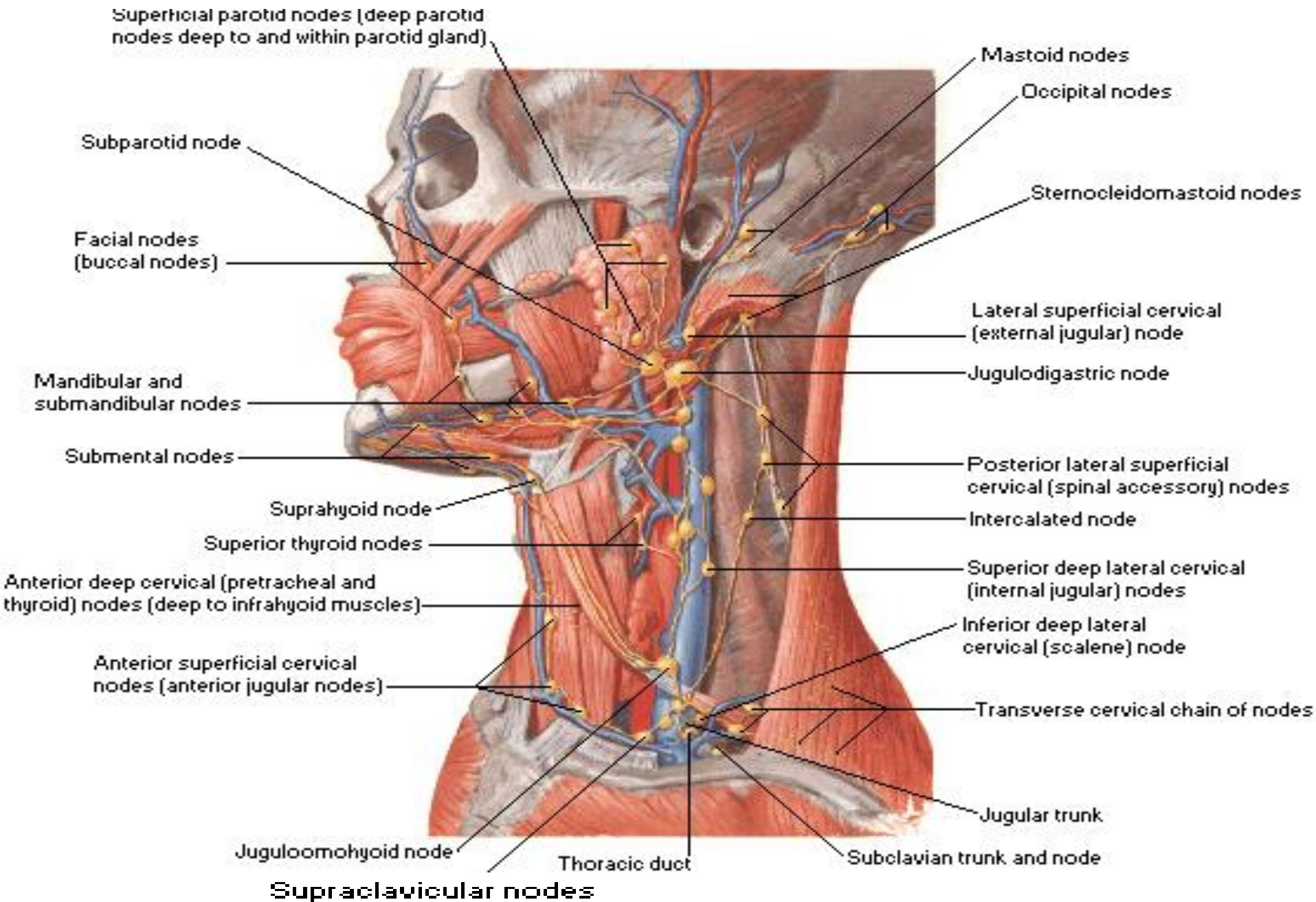
Carotid branch of glossopharyngeal nerve (IX)

Internal and external branches of superior laryngeal nerve (X)

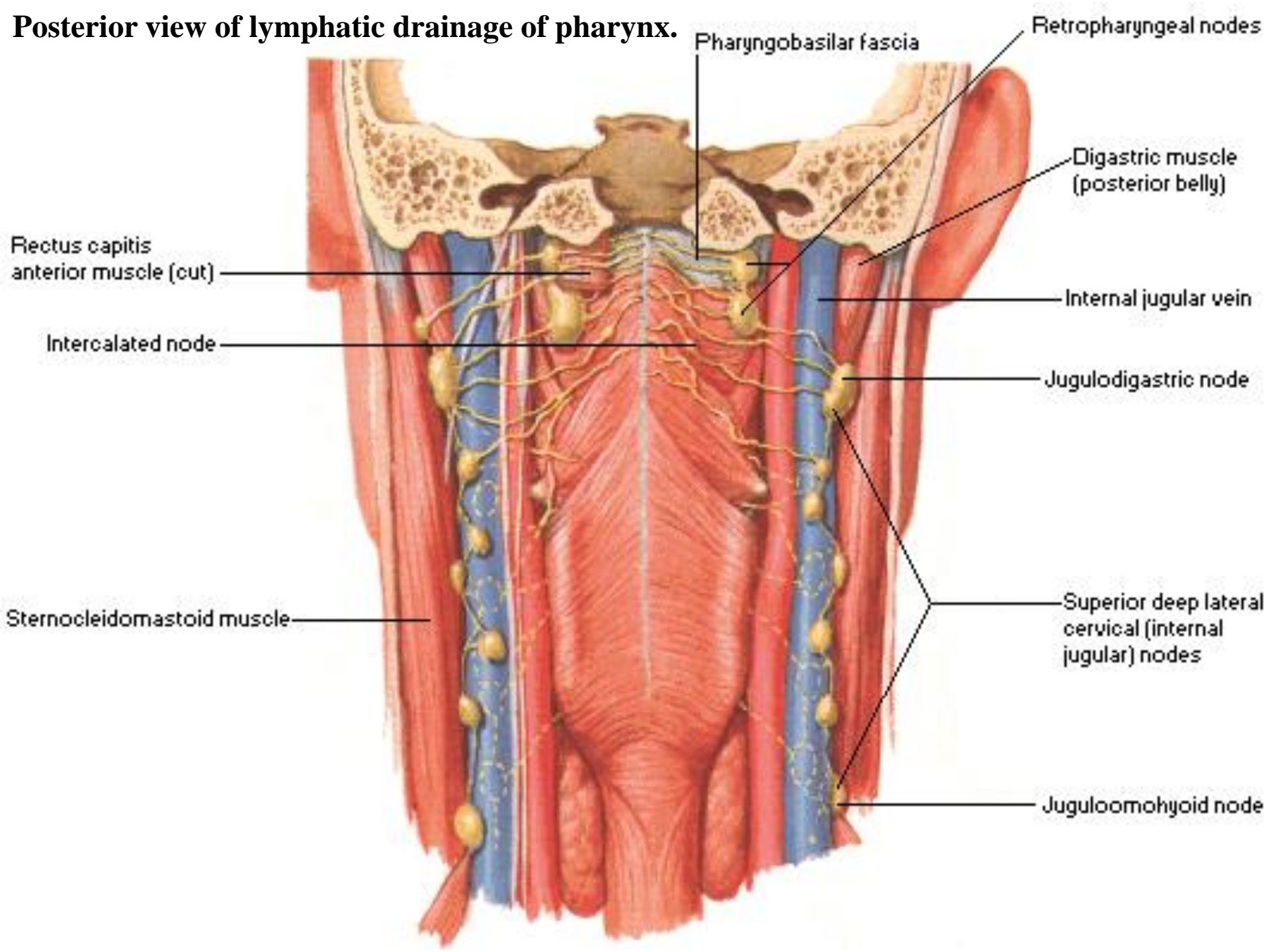
Carotid body

Inferior root of ansa cervicalis (C1, 2, 3)

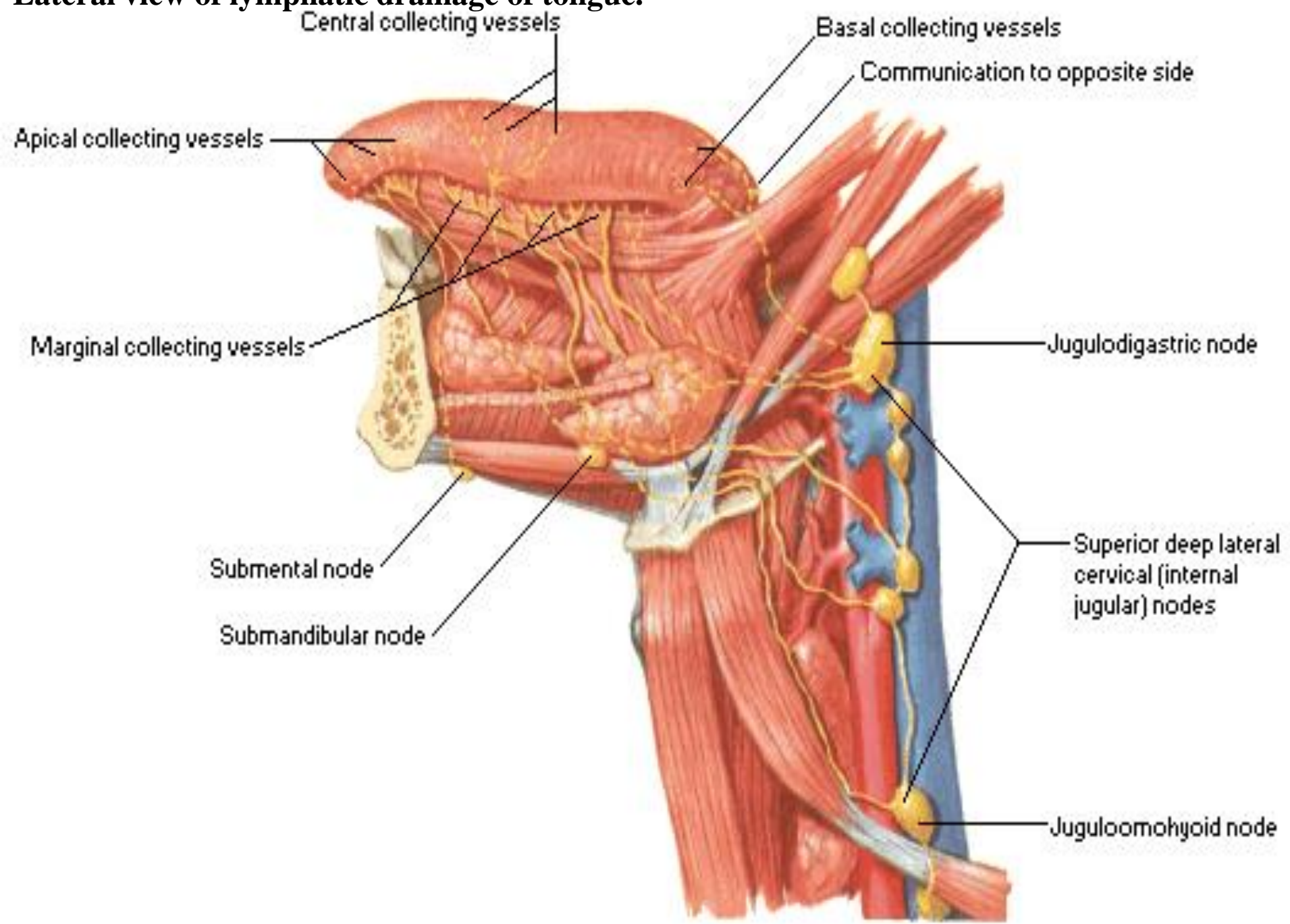
Lymph vessels and nodes of oral and pharyngeal regions.



Posterior view of lymphatic drainage of pharynx.



Lateral view of lymphatic drainage of tongue.



The Larynx

Is upper expanded part of windpipe that is modified for production of voice. It is supported by number of cartilages:

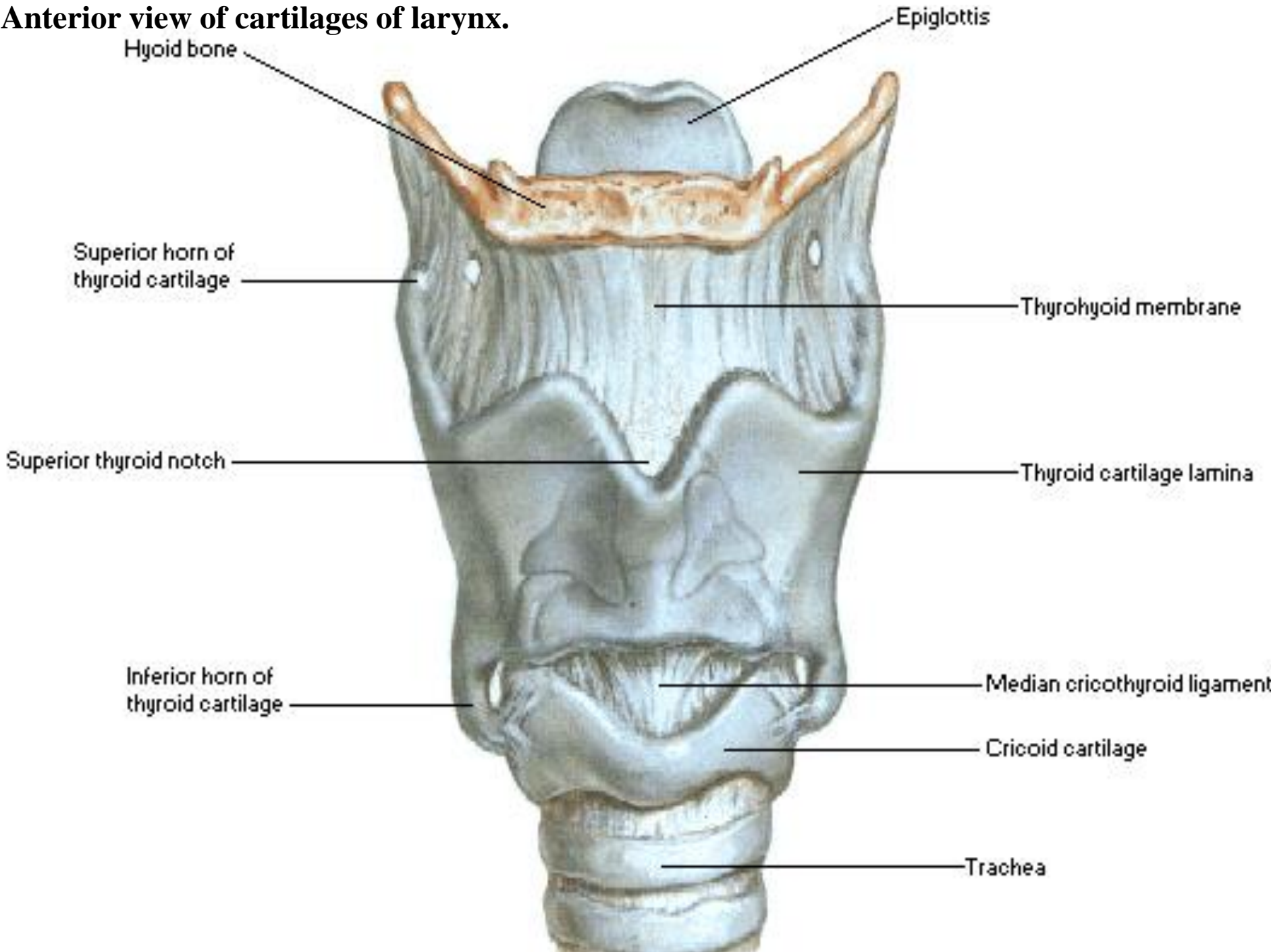
1. V – shaped **thyroid**.
2. Ring – like **cricoid** inferiorly.
3. **Epiglottics**.
4. **Arytenoids**.
5. **Corniculate** and **cuniform**.

Thyroid cartilage is the largest laryngeal cartilage, consists of two laminae of hyaline cartilage fused anteriorly in their inferior 2/3 but separated above by deep superior thyroid notch to form **laryngeal prominence**. Each posterior margin of thyroid extends superiorly and inferiorly to form **horns (cornua)**.

Superior horn attached to the tip of greater horn of hyoid bone by **thyrohyoid ligament**. **Inferior horn** articulates with **cricoid cartilage**. The lateral surfaces of **thyroid cartilage** are relatively flat, but where they thicken to form the posterior margins, there is on each side a raised **oblique line** that extends from superior to inferior tubercle. The **inferior constrictor muscle**, **pretracheal fascia** are attached to **oblique line**. Anteriorly, **thyrohyoid membrane** is thickened to form **thyrohyoid ligament**.

The **cricoid cartilage** is signet ring, its horizontal, inferior margin, at the level of 6th cervical vertebra, attached to trachea by membranous elastic **cricotracheal ligament**. The narrow arch lies anteriorly. Each **arytenoid cartilage** has a synovial articulation with upper surface of **cricoid lamina**, the inferior horns of **thyroid cartilage** articulate at inferolateral angles of **cricoid lamina**, therefore, displacing **arytenoid cartilage** backwards and forwards with lamina. In midline anteriorly, the arch of **cricoid** is attached to lower margin of **thyroid** by **cricothyroid ligament**.

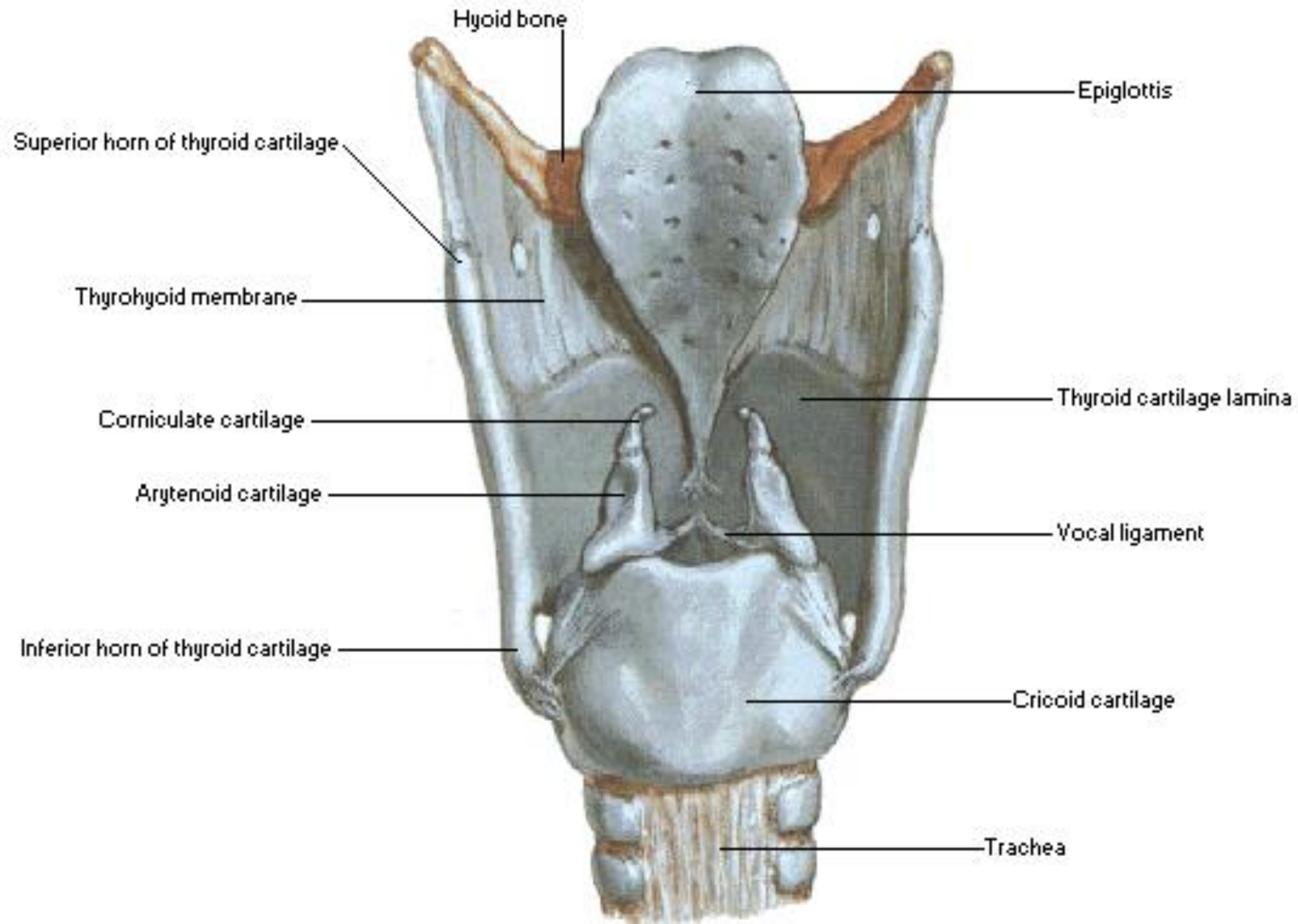
Anterior view of cartilages of larynx.



Arytenoid cartilage is three sided pyramids forms a synovial joint with superior border of lamina of **cricoid cartilage**. **Arytenoid cartilage** projects laterally to form **muscular process** to which **cricoarytenoid muscles** are attached and anteriorly to form **vocal process** to which **vocal ligament** is attached. **Transverse arytenoid muscle** is attached to the posterior surface of each **arytenoid cartilage** while anterolateral surfaces have **thyroarytenoid** and **vocalis muscles** attached to them.

Cricoarytenoid joints are synovial joints make **arytenoid** cartilage to move so as to approximate or separate their **vocal processes** and hence **vocal ligament**. The **thyroid, cricoid** and basal parts of **arytenoid** cartilages are **hyaline** (**ossify early in life**) while the **apex** and **vocal process** of **arytenoid** cartilage and other cartilages are **fibroelastic** cartilage (**not ossify**).

Posterior view of cartilages of larynx.



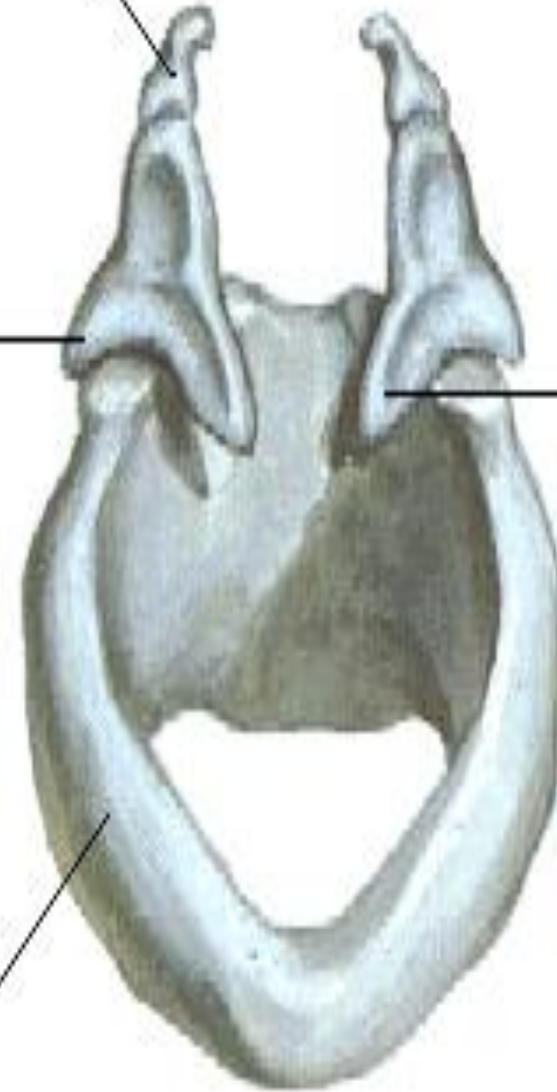
Anterosuperior view of cartilages of larynx.

Corniculate cartilage

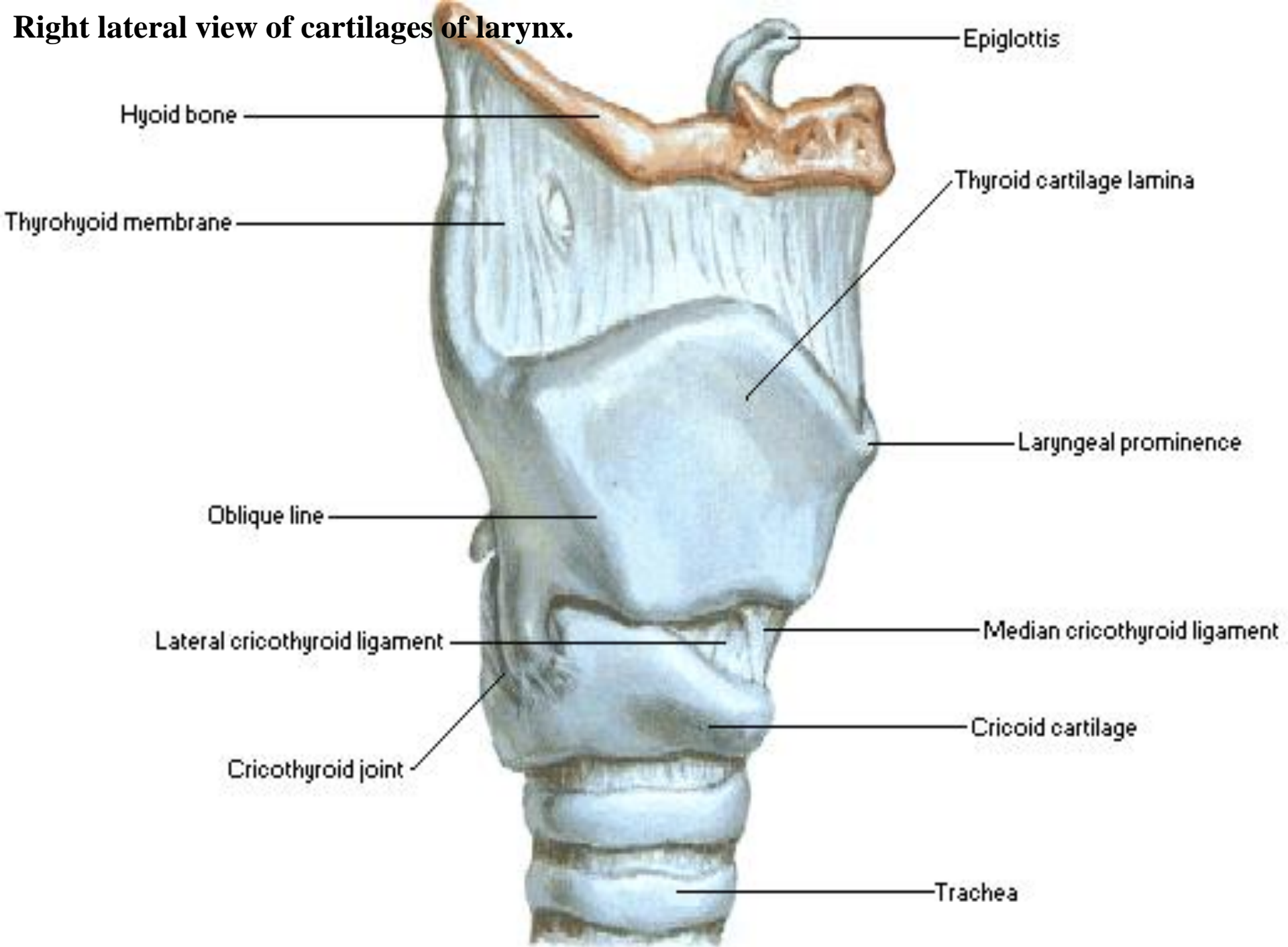
Muscular process of arytenoid cartilage

Vocal process of arytenoid cartilage

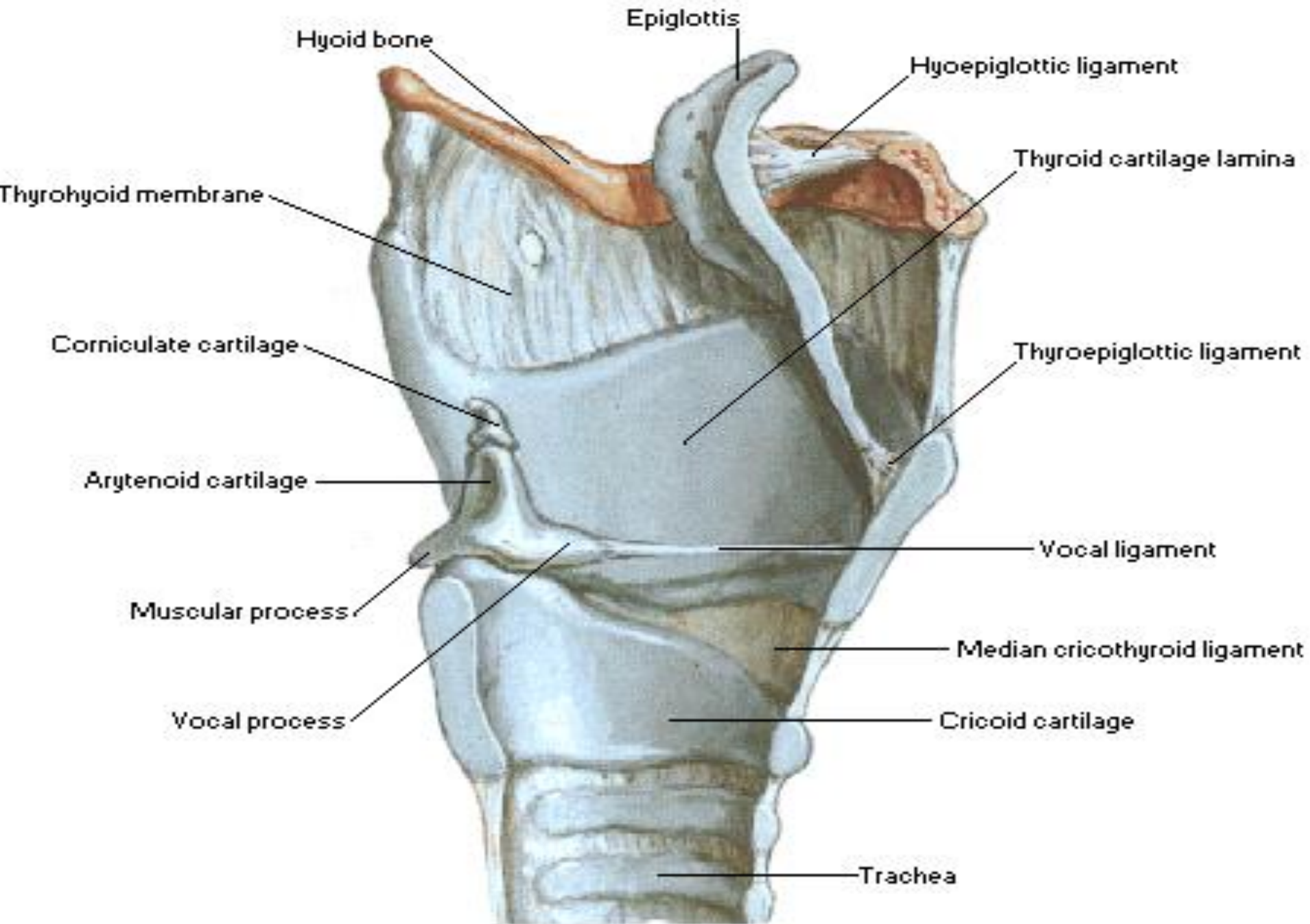
Cricoid cartilage



Right lateral view of cartilages of larynx.



Sagittal section of cartilages of larynx.



The interior of the larynx is a cavity which divided into **superior part (vestibule)** and **inferior part** by two anteroposterior vocal folds of mucous membrane, one of which projects from each lateral wall. Above each of these is **vestibular fold** that is separated from corresponding **vocal fold** by narrow horizontal groove (**ventricle of the larynx**). The **aryepiglottic folds** enclose in their margins: Slender **aryepiglottic** and **thyroepiglottic** **muscles**, and **corniculate** and **cuneiform** cartilages.

The **vestibular fold** is soft folds of mucous membrane that extend between thyroid and arytenoid cartilages and **contains**; mucous glands, fibroelastic and few muscle fibers. The **rima vestibuli** is the space between two vestibular folds. **Saccule** is a narrow blind diverticulum that passes posterosuperiorly between vestibular fold and thyroid cartilage. Each **vocal fold** consists of **conus elasticus**, **vocal ligament** and **muscle fibers**. All covered with mucous membrane. The **rima glottidis** is anteroposterior fissure separating free margins of vocal fold and vocal processes of arytenoid cartilage lies behind thyroid cartilage.

The muscles of the larynx are small muscles move the parts of it on each other and are particularly concerned with **alterations in length** and **tension** of **vocal fold** in voice production and in changing the size of **rima glottidis** to facilitate or prevent passage of air to and from the lungs.

1. Intrinsic muscles:

A. Cricothyroid passes from **cricoid** cartilage to inferior horn of thyroid cartilage. **Action:** Draws arch of **cricoid** cartilage posterosuperiorly, rotating entire cartilage around **cricothyroid joints**, so that lamina is tilted posteriorly. This elongates and tightens **vocal ligaments**, thus raising pitch of voice.

B. Posterior cricoarytenoid arises from posterior surface of **cricoid** cartilage lamina and converges on laterally directed muscular process of **arytenoid** cartilage. **Action:** Upper more horizontal fibers rotate **arytenoids** so that its vocal process swings laterally, opening **rima glottidis**. Lower more vertical fibers pull.

C. Transverse and oblique arytenoids muscles cross between arytenoids cartilage and draw them together, **closing rima glottidis**. The continuity of **oblique** and **aryepiglottic** muscles helps in **closing larynx during food passage**.

D. Lateral cricoarytenoid passes from cricoid arch to muscular process. **Action:** Pulls muscular process anteriorly, **closing rima glottidis.**

E. Thyroarytenoid arises from posterior surface of thyroid cartilage close to midline and is attached to arytenoid cartilage. Some of deeper fibers arise from **vocal ligament** and pass to vocal process of arytenoid cartilage (**vocalis muscle**). The upper lateral fibers sweep superior to epiglottic (**thyroepiglottic muscle**). **Action:** The main mass pulls arytenoids anteriorly, slacking vocal ligament. **Vocalis muscle** tightens anterior part of ligament and slacking posterior as in whispering.

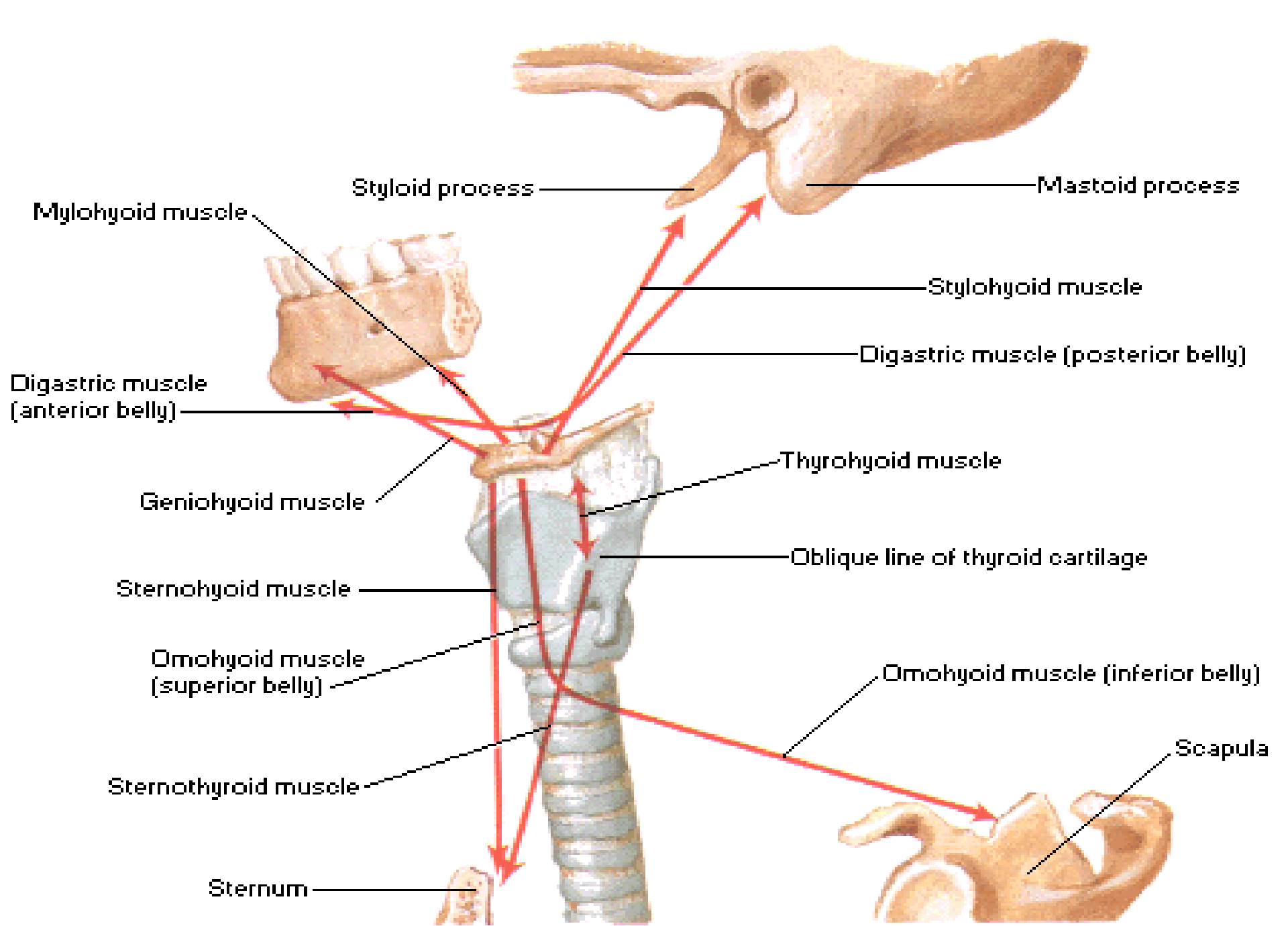
2. Extrinsic muscles (infrahyoid muscles): Their **actions** to move the larynx and hyoid bone in speech and swallowing. Their **nerve supply** by **ansa cervicalis (C1, 2,3)**.

Sternohyoid from posterior surface of manubrium and medial end of the clavicle to lower border of hyoid bone adjacent to midline.

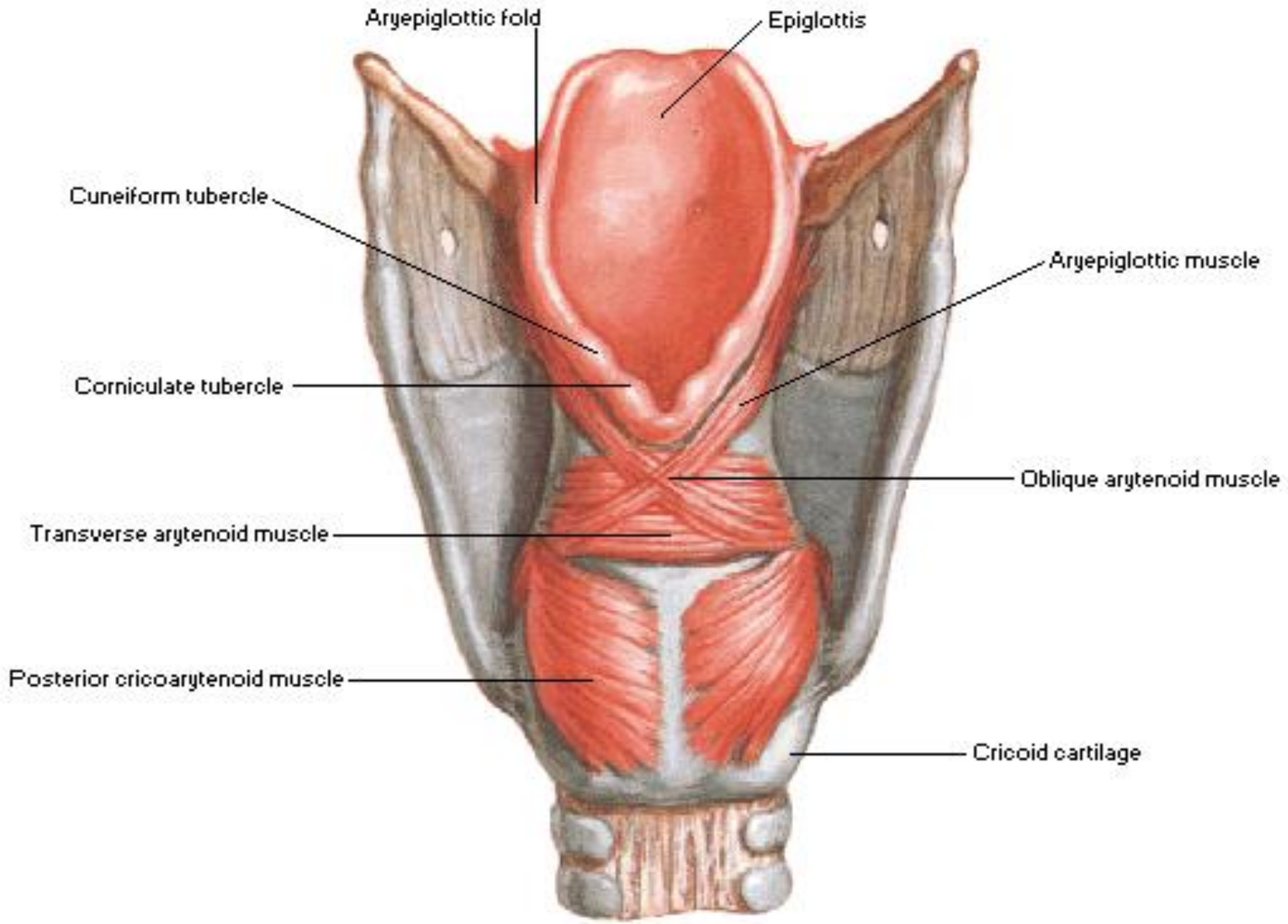
Omohyoid (superior belly) passes from inferior surface of the body and greater horn of hyoid bone to the intermediate tendon. The **inferior belly** arises from the superior transverse scapular ligament and the adjacent scapula.

Thyrohyoid is upward continuation of sternothyroid from oblique line to lower border of greater horn of hyoid bone.

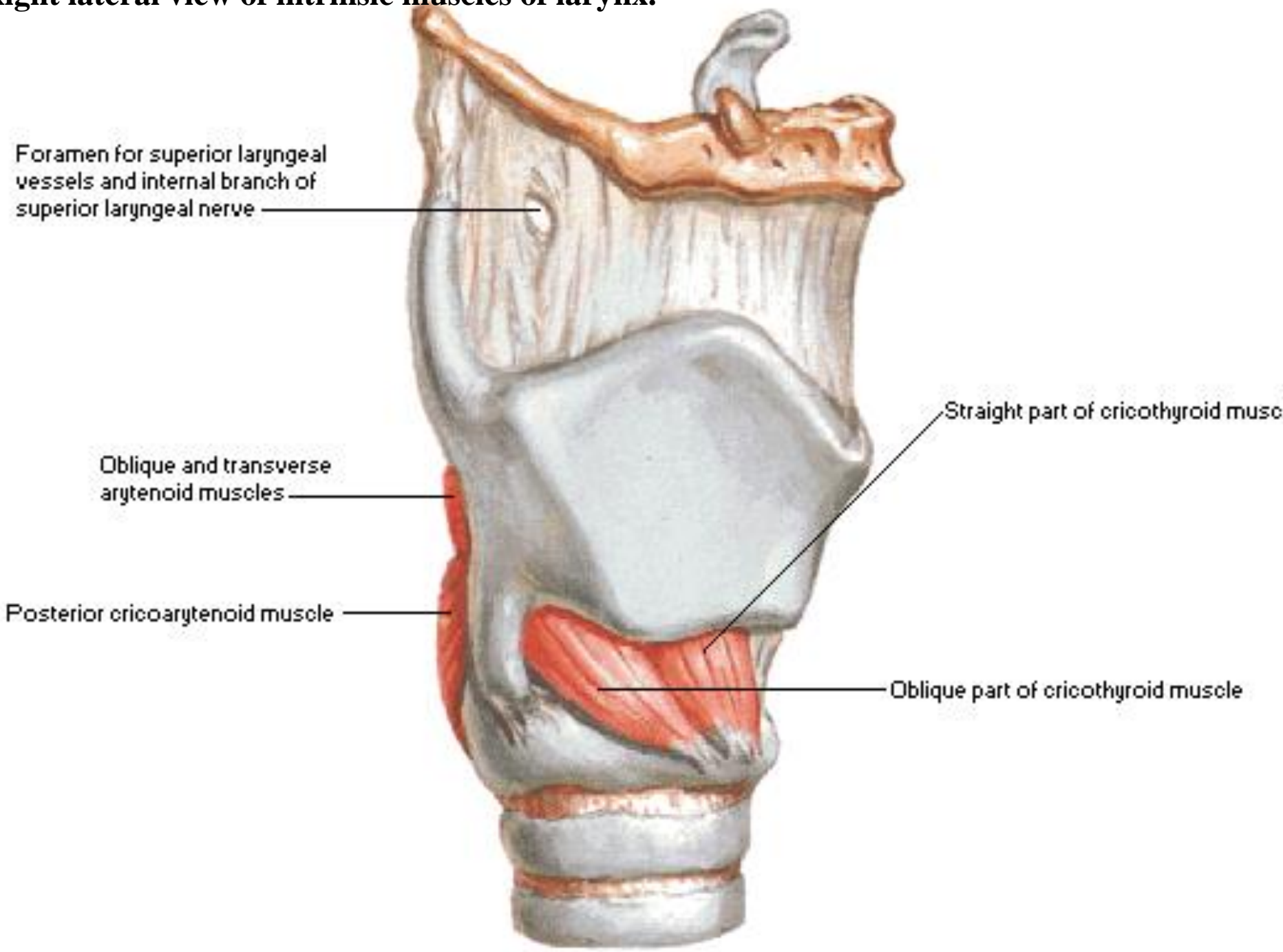
Sternothyroid shorter, wider and deeper than sternohyoid arises from the sternum and 1st costal cartilage. It ascends to oblique line on the lateral surface of thyroid cartilage.



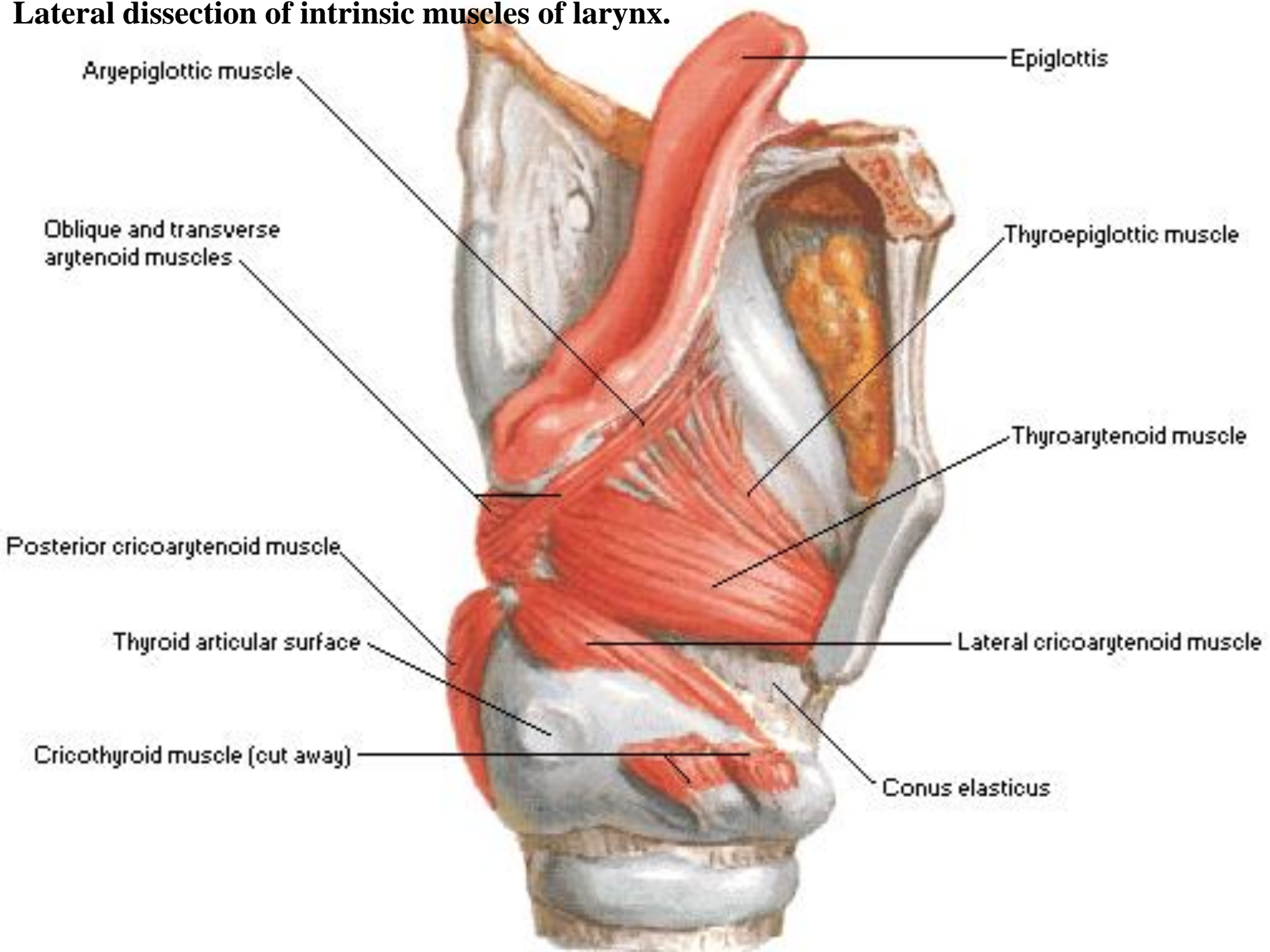
Posterior view of intrinsic muscles of larynx.



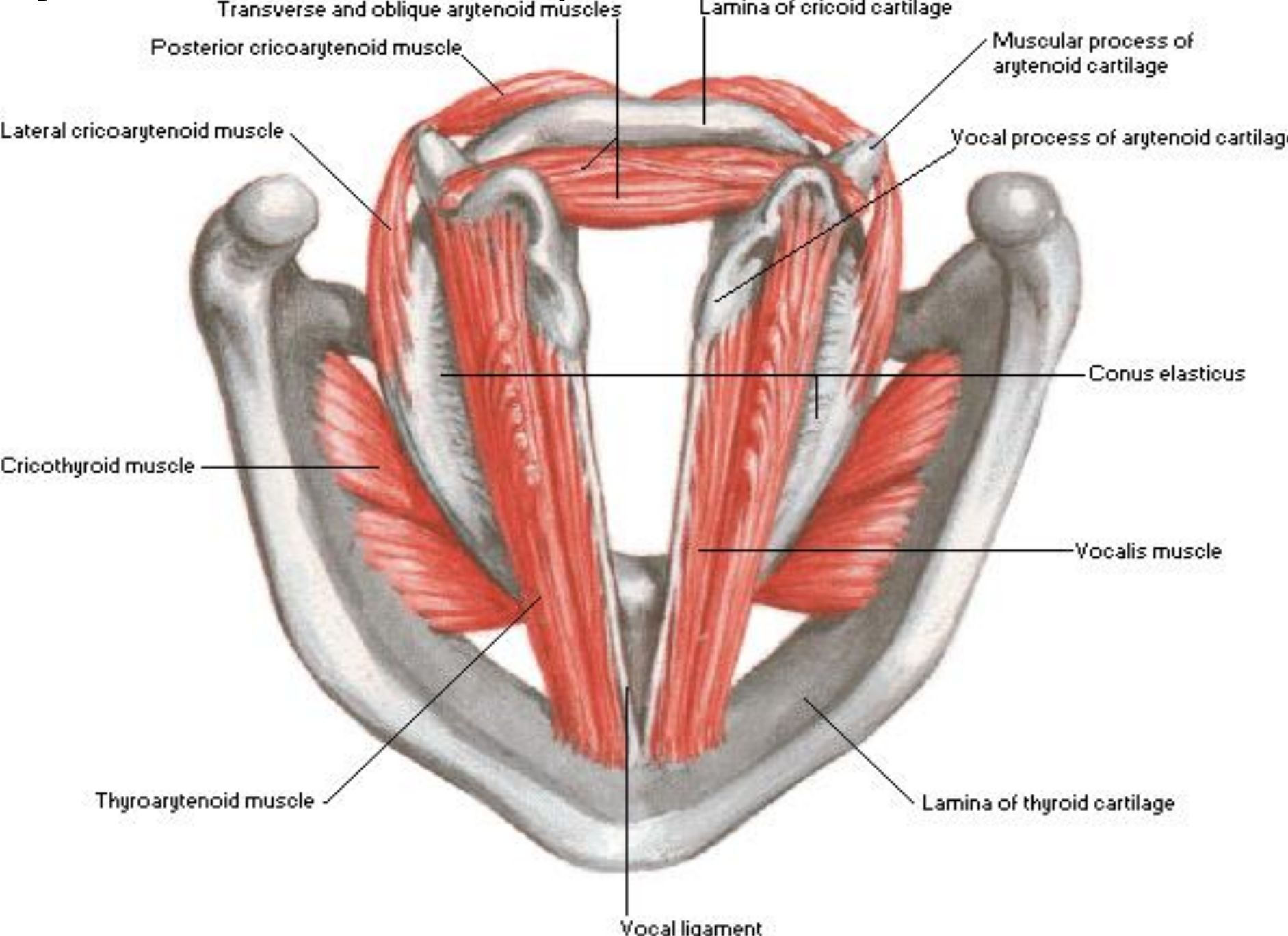
Right lateral view of intrinsic muscles of larynx.



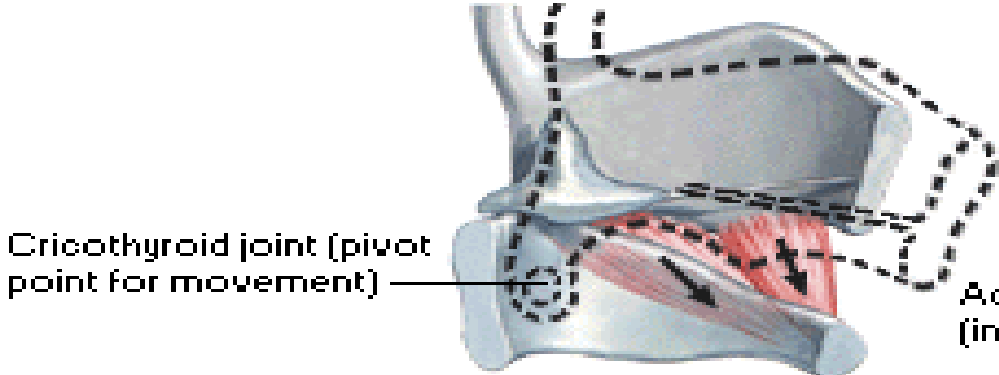
Lateral dissection of intrinsic muscles of larynx.



Superior view of intrinsic muscles of larynx.



Action of intrinsic muscles of larynx.

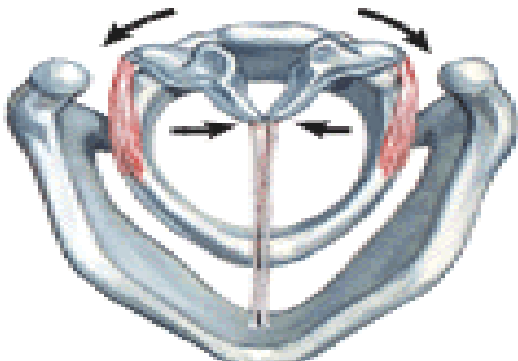


Cricothyroid joint (pivot point for movement)

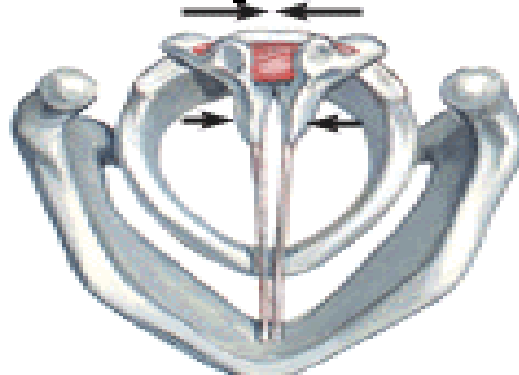
Action of cricothyroid muscle: Lengthening (increasing tension) of vocal ligaments



Action of posterior cricoarytenoid muscles: Abduction of vocal ligaments



Action of lateral cricoarytenoid muscles: Adduction of vocal ligaments



Action of arytenoid muscle: Adduction of vocal ligaments



Action of vocalis and thyroarytenoid muscles: Shortening (relaxation) of vocal ligaments

Nerve supply and blood supply of the larynx:

Superior laryngeal nerve (X) that divide into; **external** branch to supply **cricothyroid** and **inferior constrictor muscles**. The **internal** branch is sensory and autonomic to supply mucous membrane of the pharynx and larynx down to vocal fold.

All intrinsic muscles (**except** cricothyroid) supplied by **recurrent laryngeal nerve** and mucous membrane below the level of vocal fold. It also gives off cardiac branches and supplies trachea, esophagus and inferior part of the pharynx. **Blood supply of the larynx** is by sup. Lary. A (from **ECA**) and inferior laryngeal artery (from **thyrocerv. trunk of subclav.A**).

Right lateral view of nerves of larynx.

Superior laryngeal nerve

Internal branch of superior laryngeal nerve

External branch of superior laryngeal nerve

Inferior pharyngeal constrictor muscle

Cricopharyngeus muscle (part of inferior pharyngeal constrictor)

Aryepiglottic muscle

Transverse and oblique arytenoid muscles

Posterior cricoarytenoid muscle

Cricothyroid muscle

Anterior and posterior branches of inferior laryngeal nerve

Sensory branches to larynx

Ansa of Galen

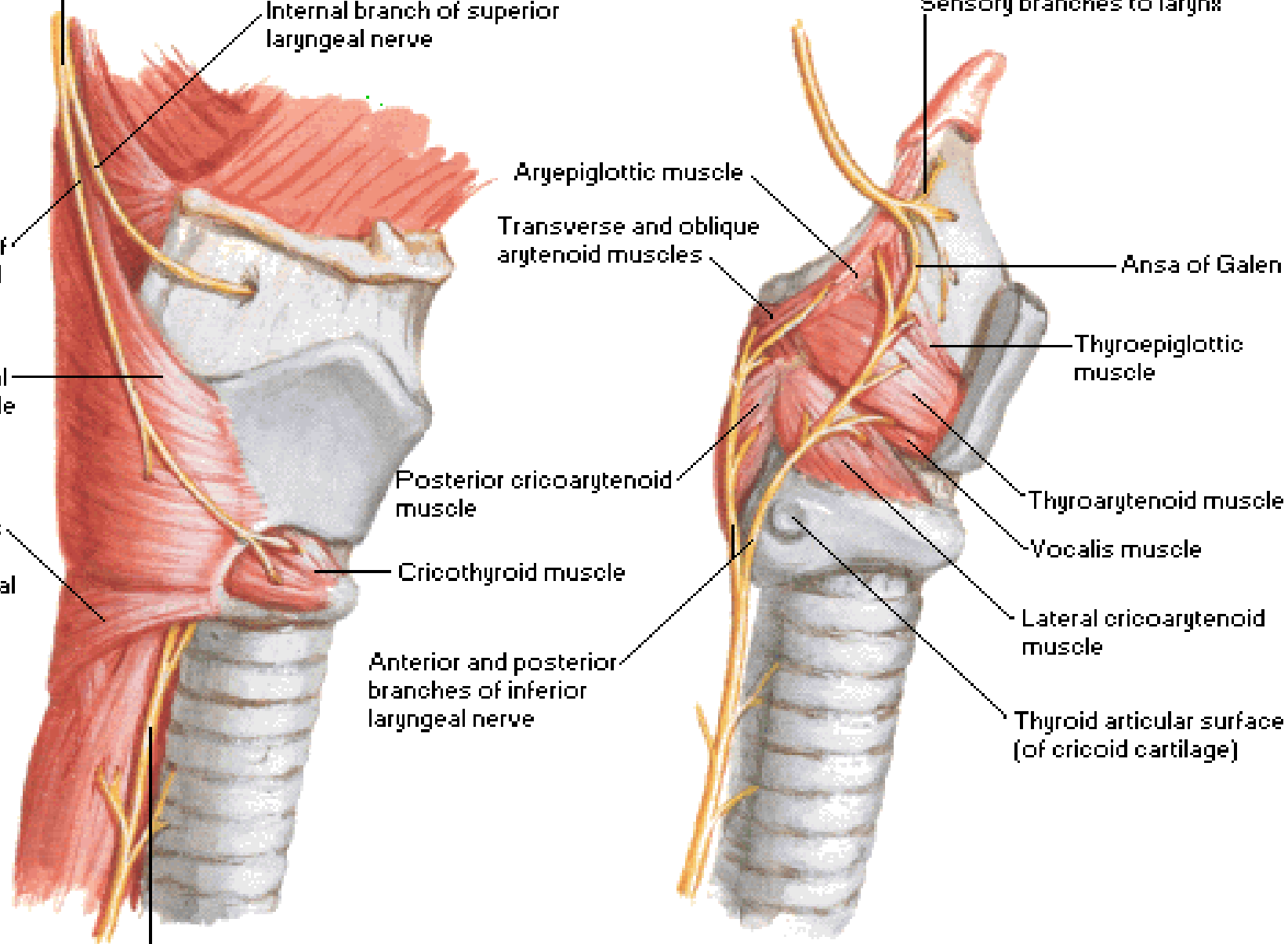
Thyroepiglottic muscle

Thyroarytenoid muscle

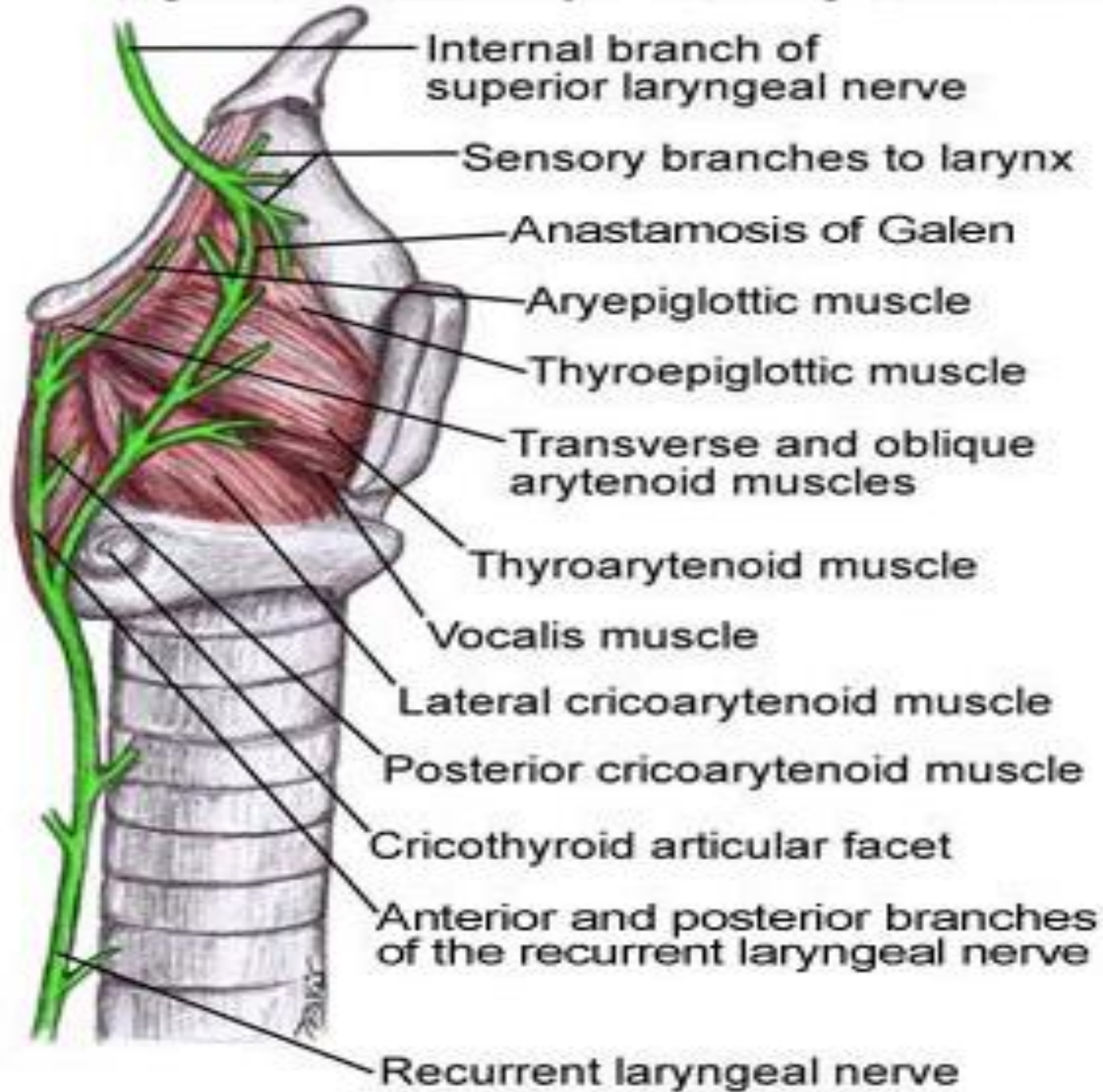
Vocalis muscle

Lateral cricoarytenoid muscle

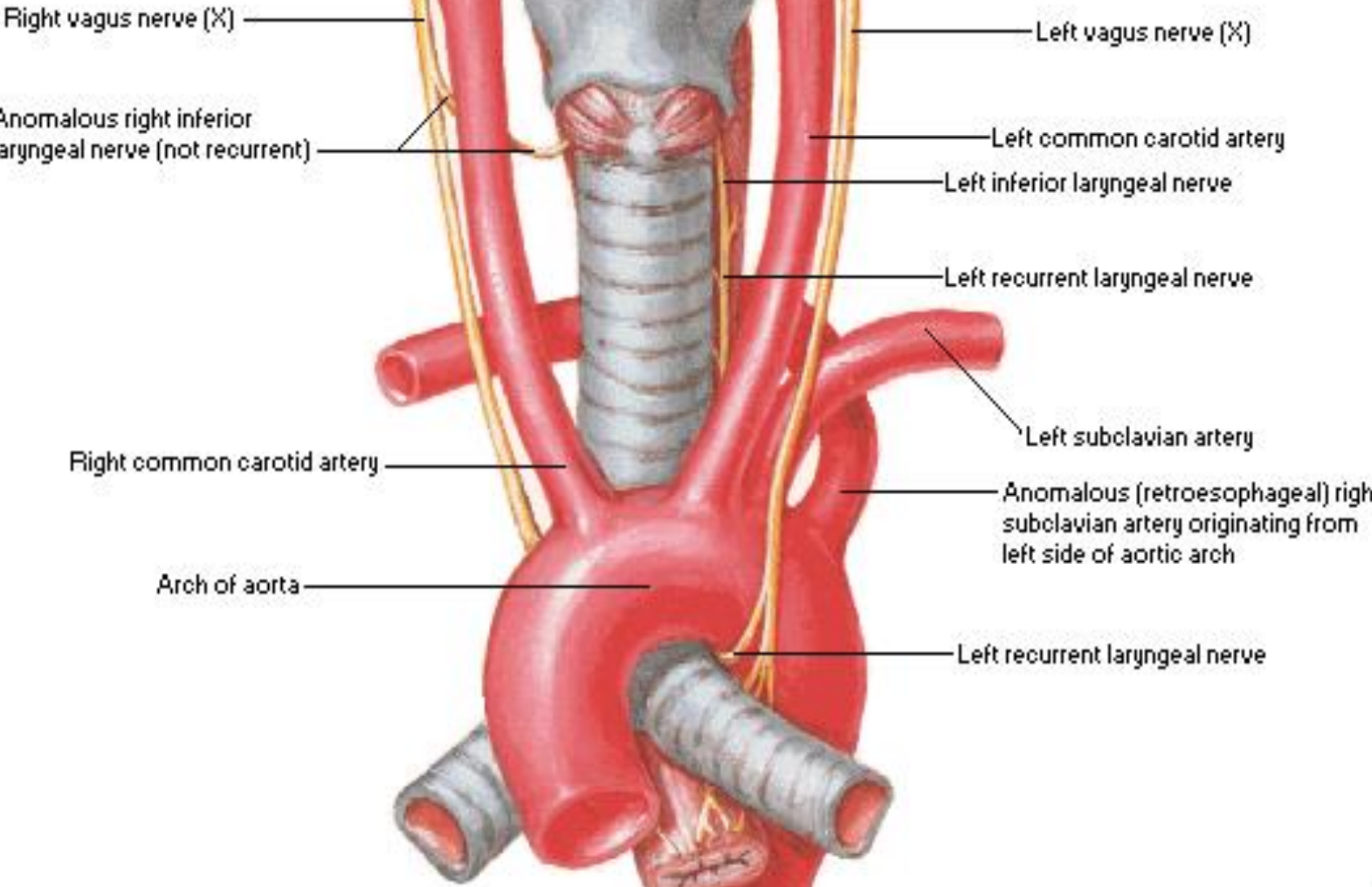
Thyroid articular surface (of cricoid cartilage)



Right lateral view: thyroid cartilage lamina removed



Anterior view of nerves of larynx.



**GOOD LUCK WITH
BEST WISH
SEE YOU NEXT IN 3rd
YEAR**