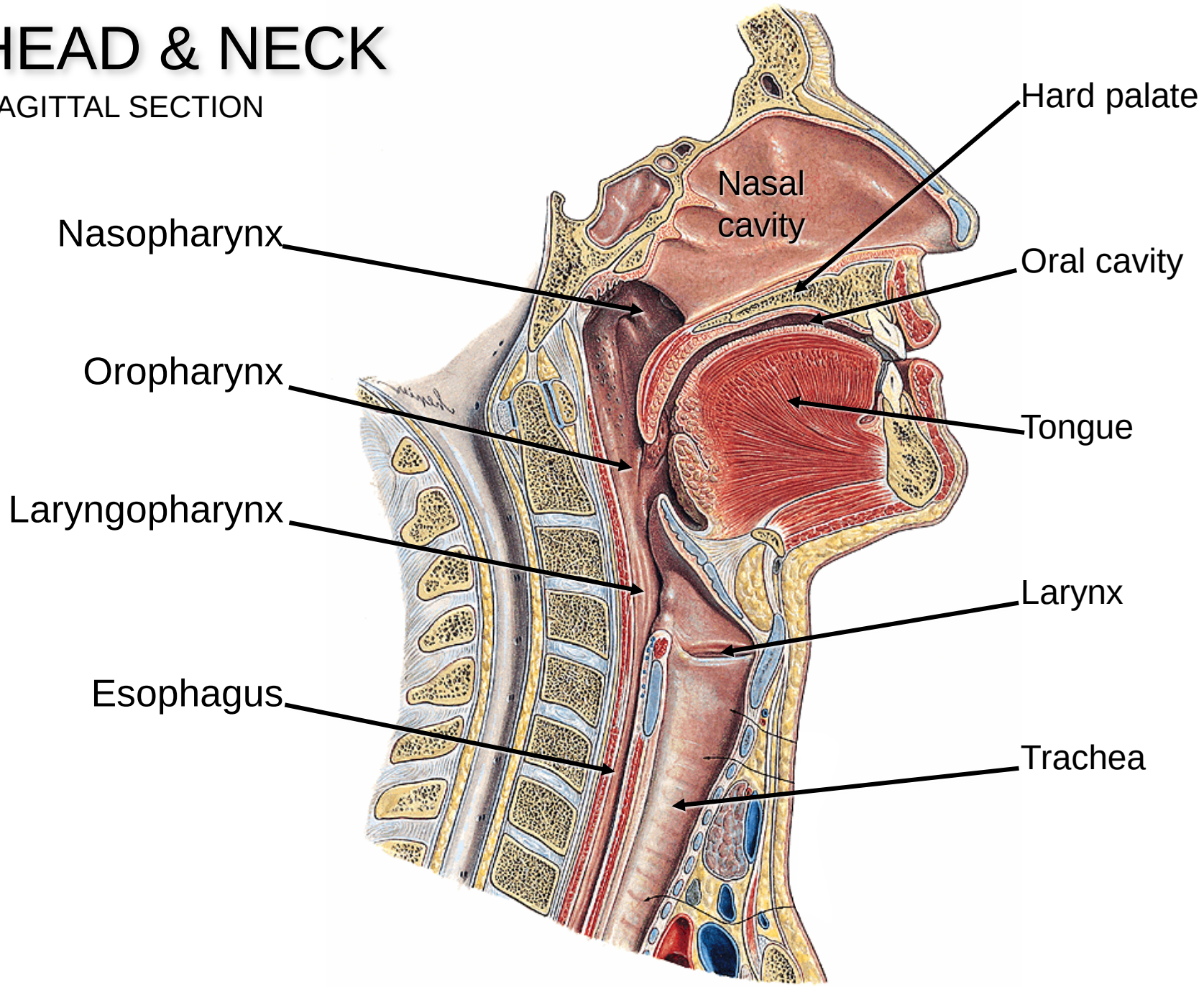
Nasal cavity, Oral cavity, Pharynx

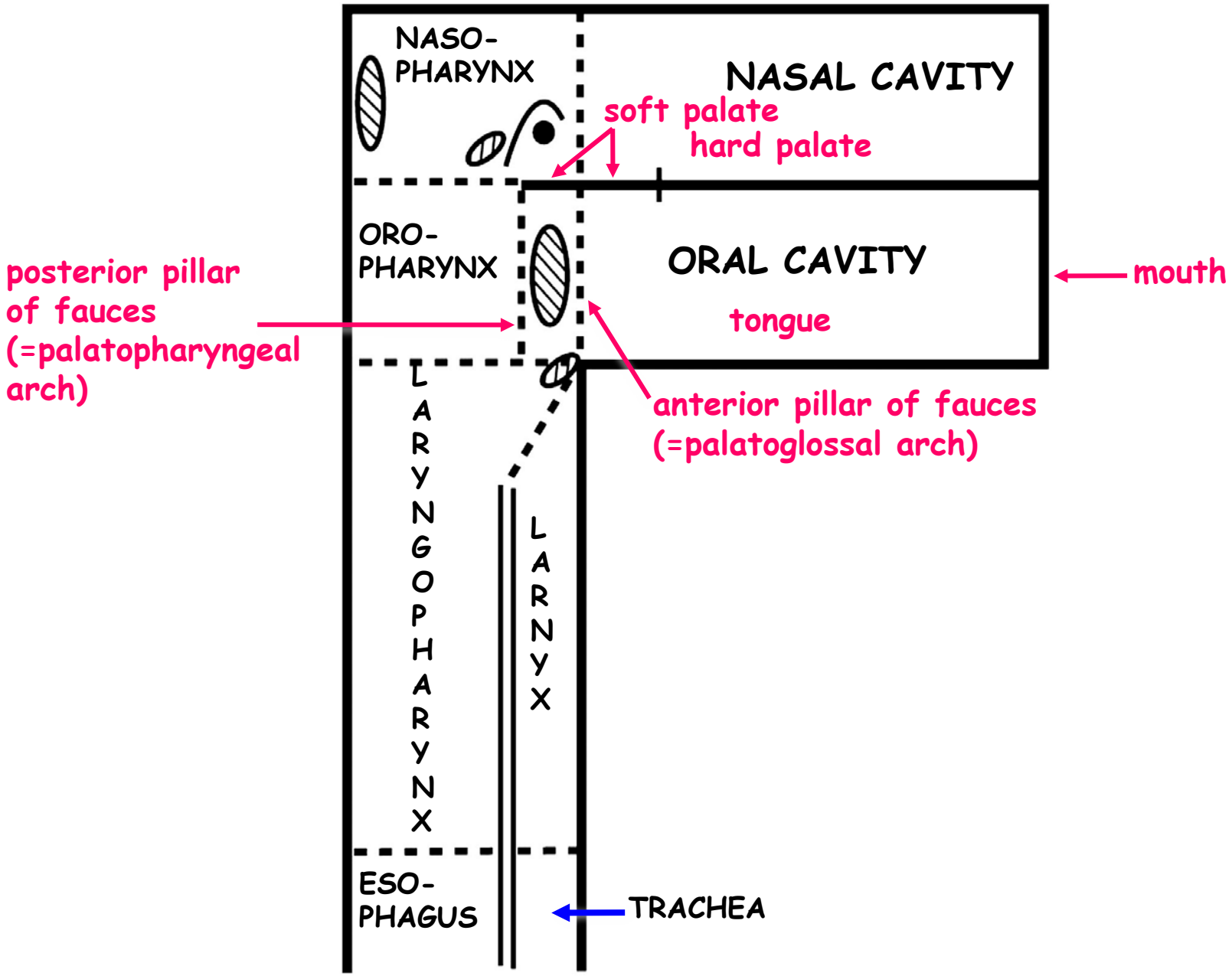
Oral Region

- **Overview of oral cavity and oral vestibule**
- **Hard and soft palate**
- Salivary glands
- Muscles of submandibular region
- Tongue
- Gingiva & teeth
- Pharynx

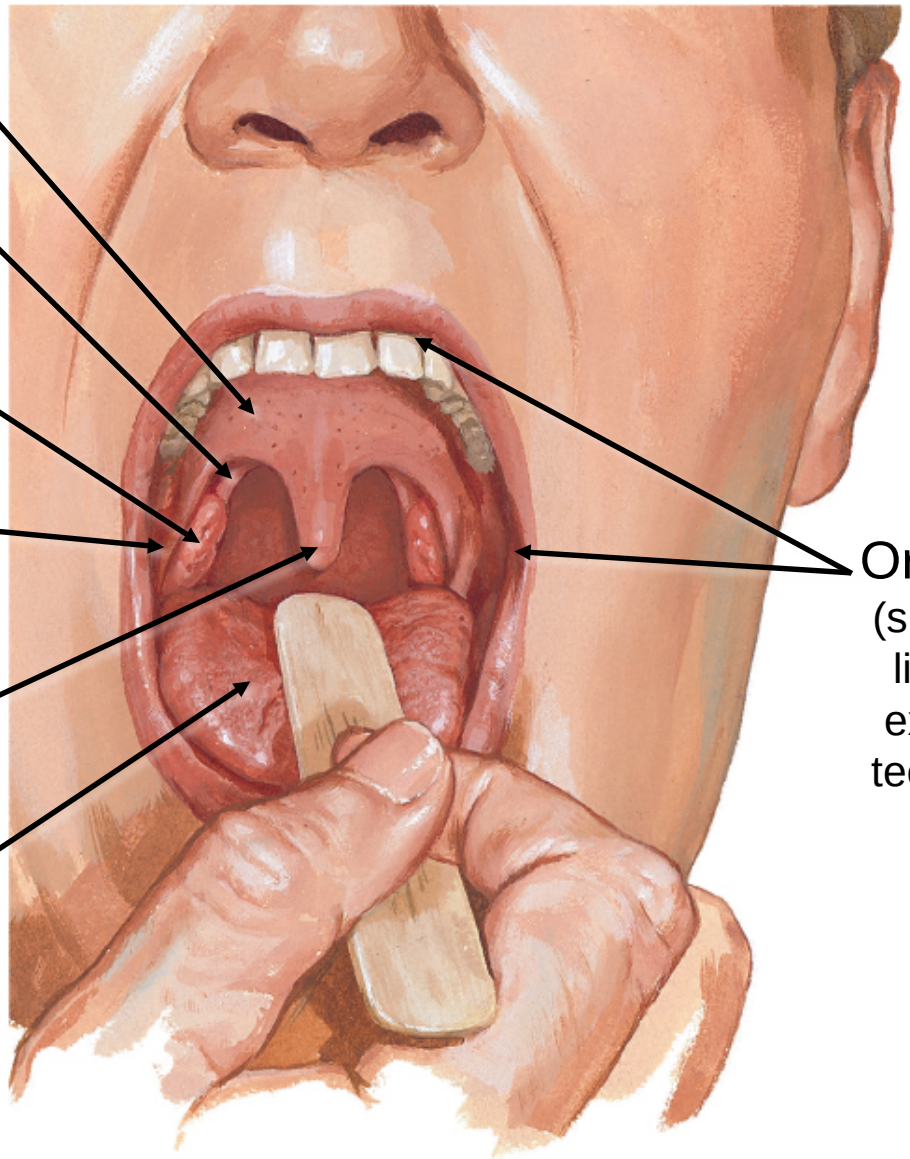
HEAD & NECK

SAGITTAL SECTION

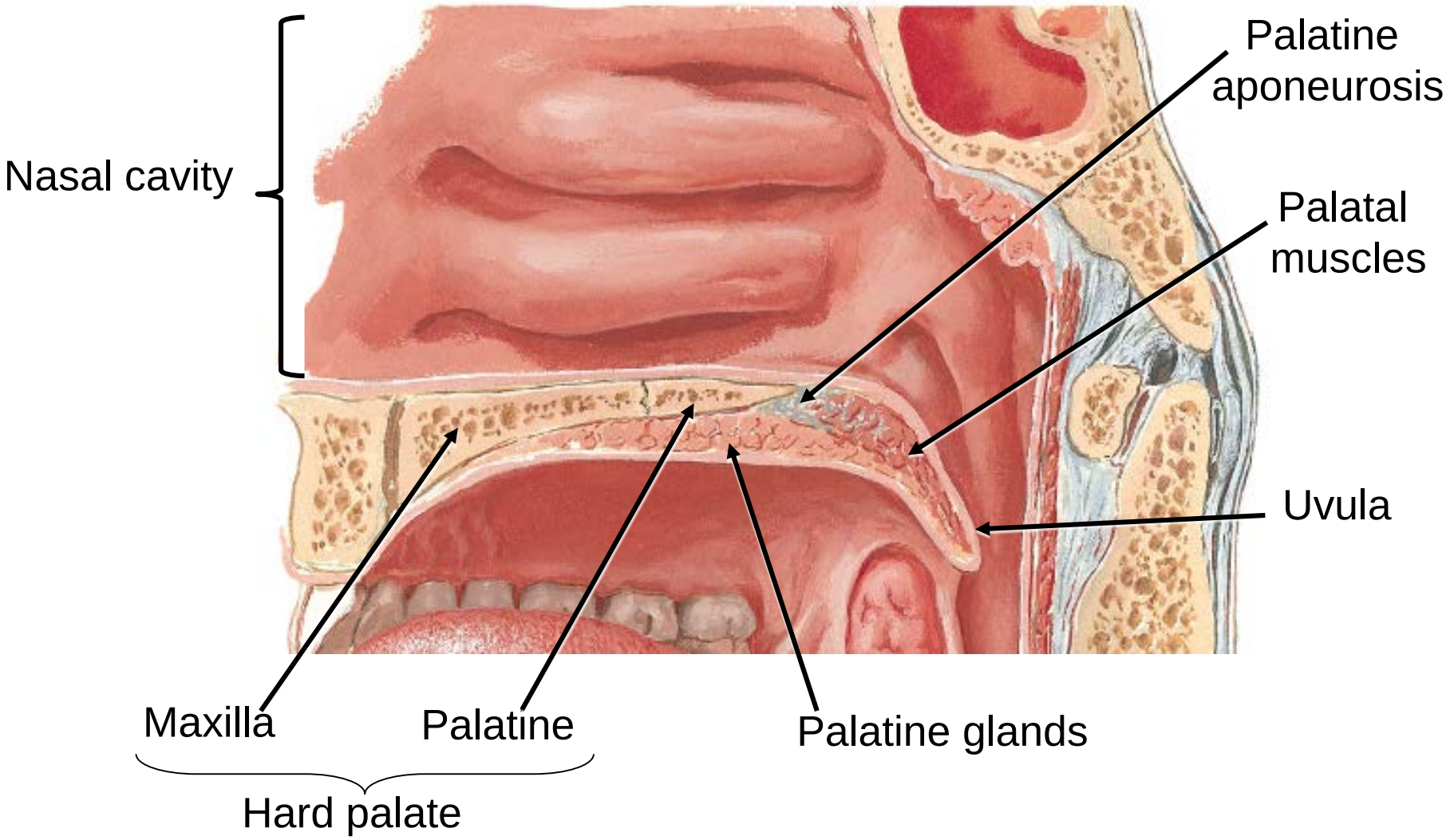



NASO-
PHARYNX
NASAL CAVITY
soft palate
hard palate
ORO-
PHARYNX
ORAL CAVITY
tongue
mouth
posterior pillar
of fauces
(=palatopharyngeal
arch)
anterior pillar of fauces
(=palatoglossal arch)
LARYNGOPHARYNX
LARNYX
ESO-
PHAGUS
TRACHEA

ORAL CAVITY AND ORAL VESTIBULE

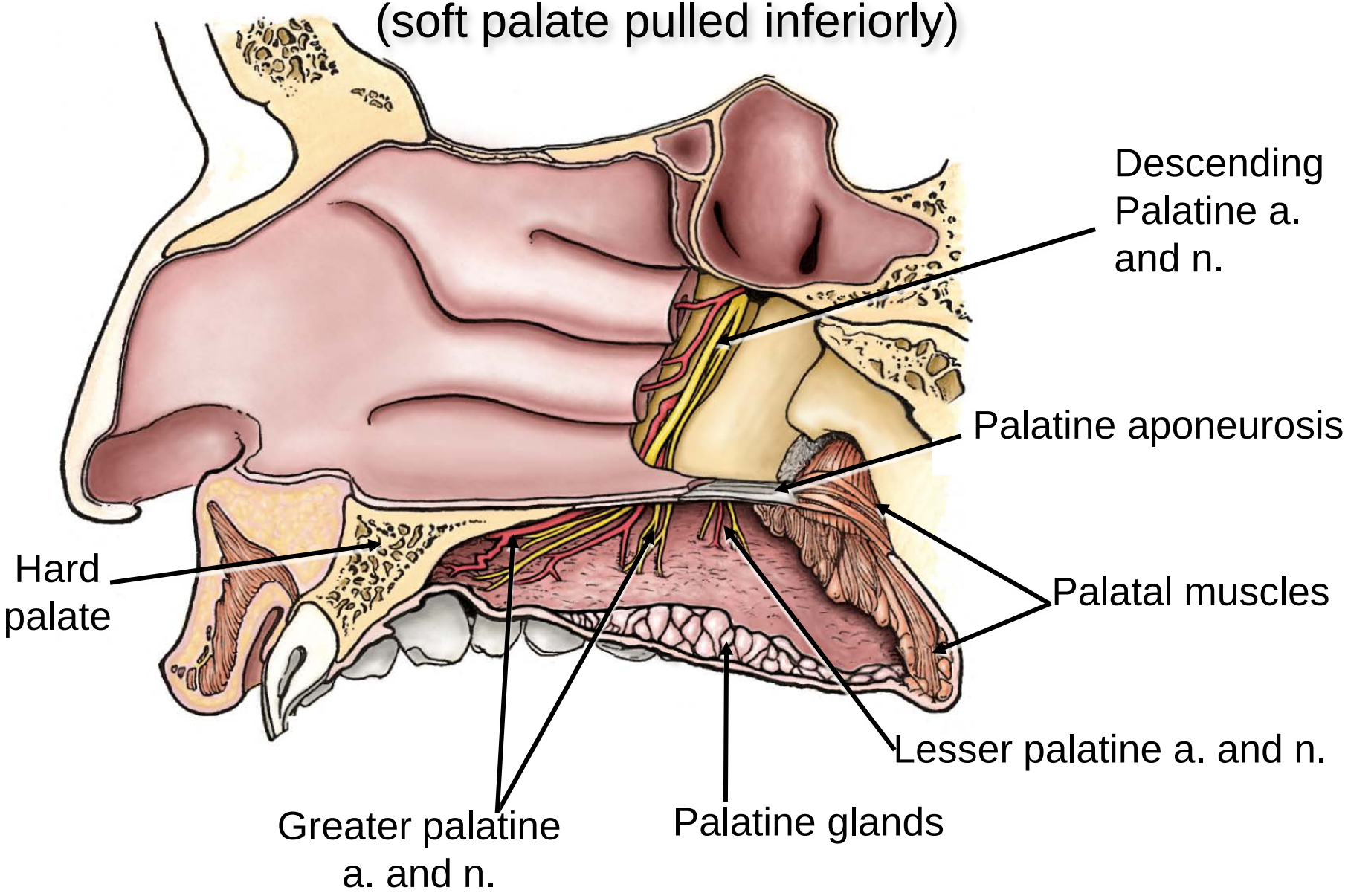


HARD AND SOFT PALATE



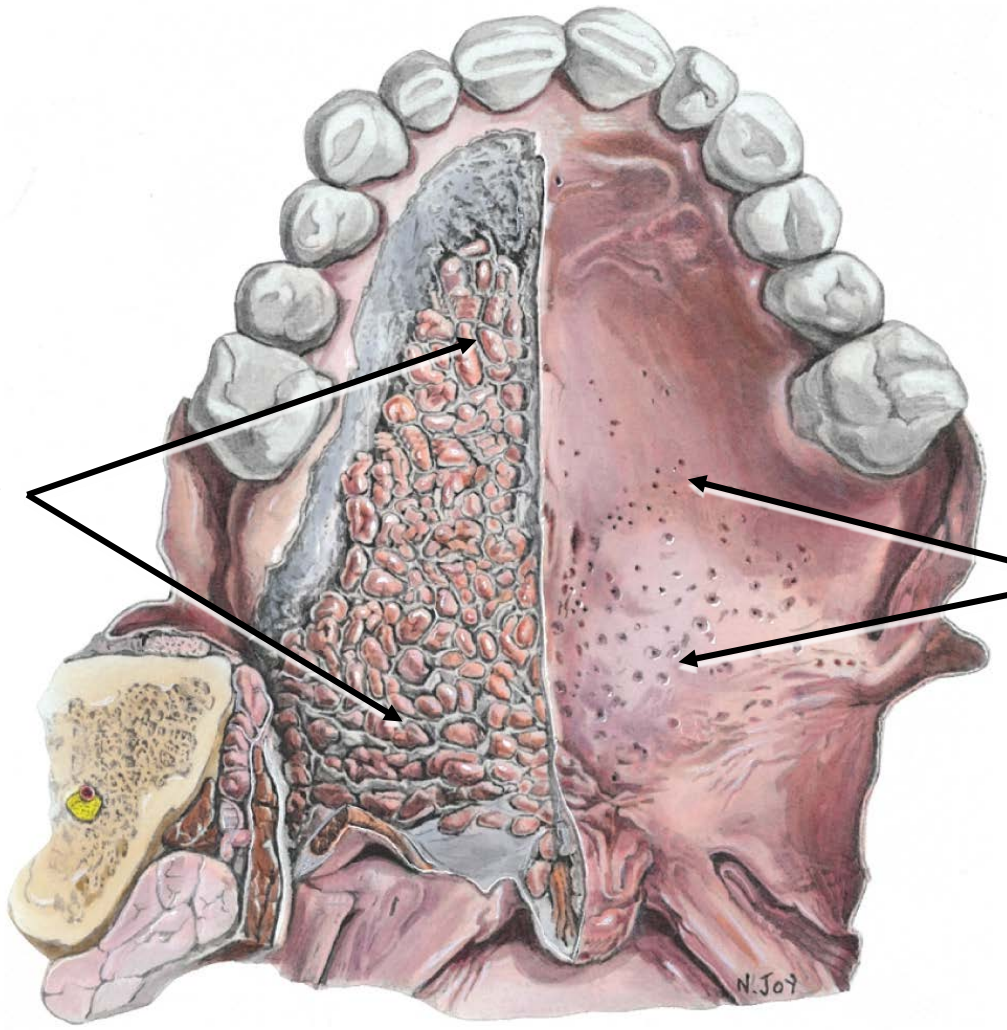
HARD AND SOFT PALATE

(soft palate pulled inferiorly)



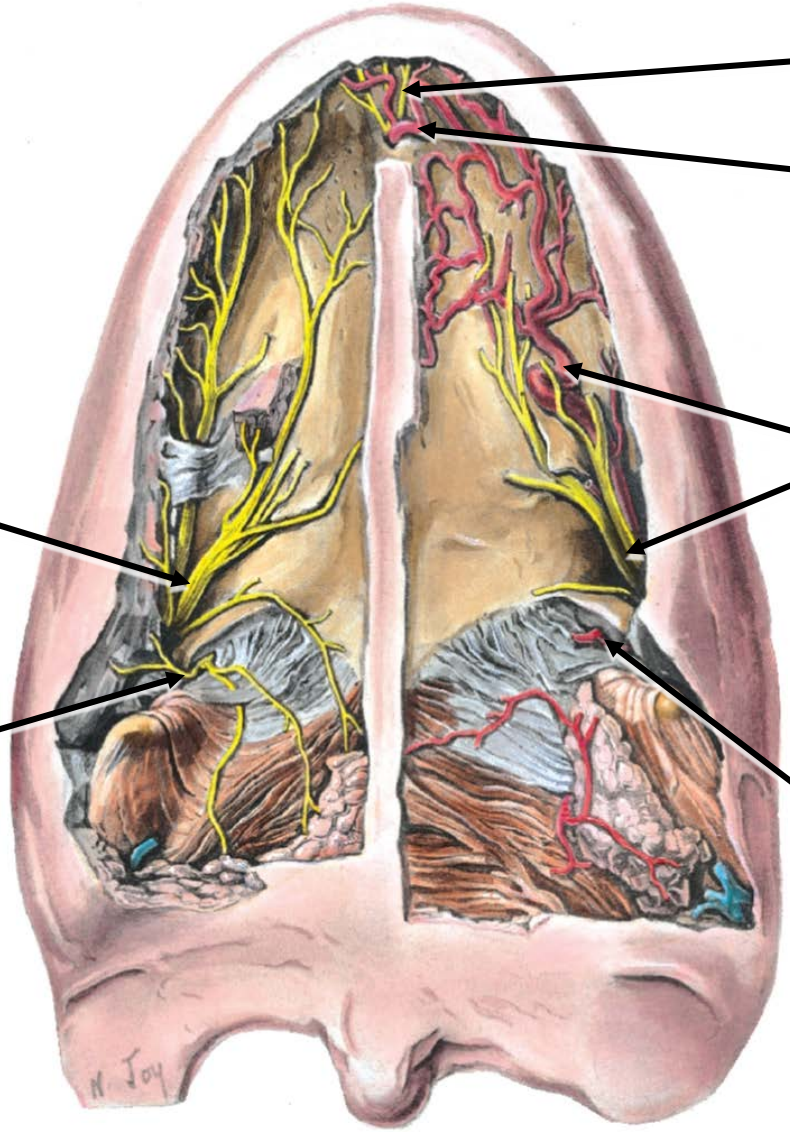
HARD AND SOFT PALATE

(Inferior view)



HARD AND SOFT PALATE

(Inferior view – edentulous individual)



Nasopalatine n.

Termination of post. septal br. of **spheno-palatine a**. (anastomoses with great palatine a.)

Greater palatine a. and n. (emerge opposite gap between 2nd & 3rd maxillary molars)

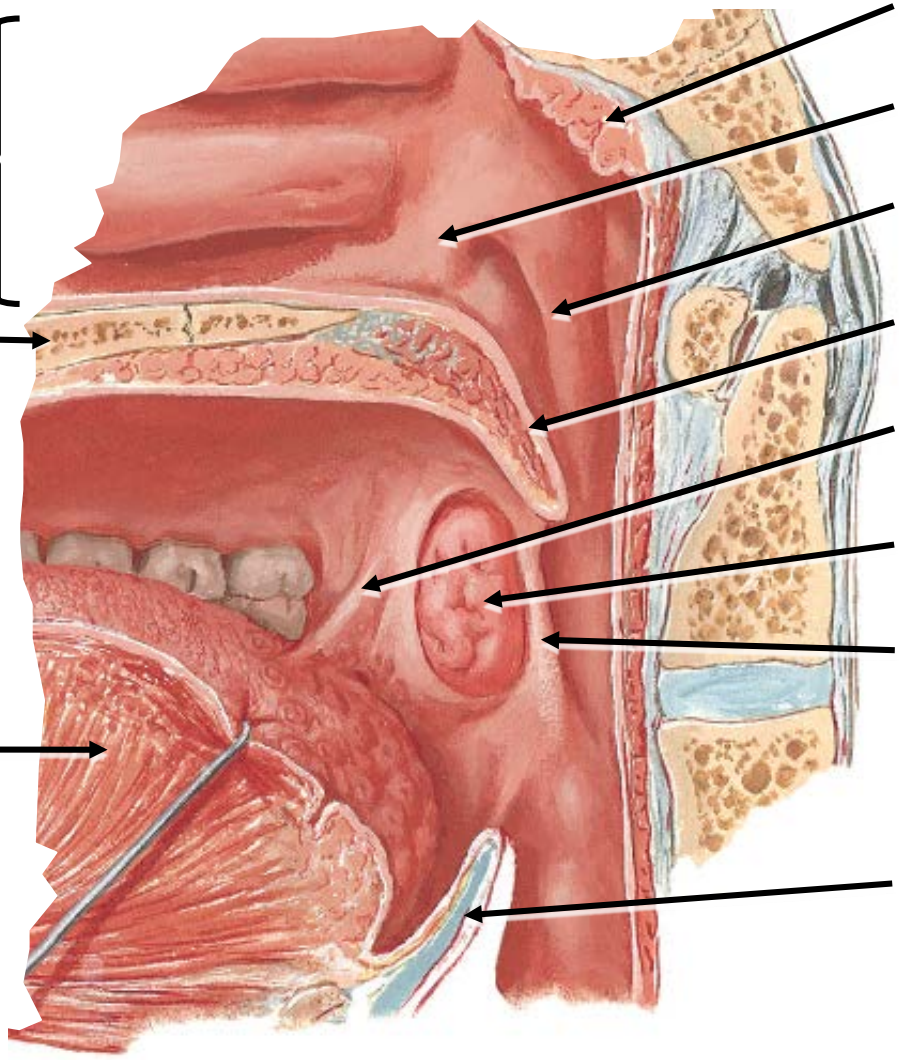
Greater palatine n.

Lesser palatine n.

Lesser palatine a.

SOFT PALATE AND PHARYNX

(Medial View of Sagittal Section)



Nasopharyngeal tonsil

Salpingopalatal fold

Salpingopharyngeal fold

Uvula

Palatoglossal arch

Palatine tonsil

Palatopharyngeal arch

Epiglottis

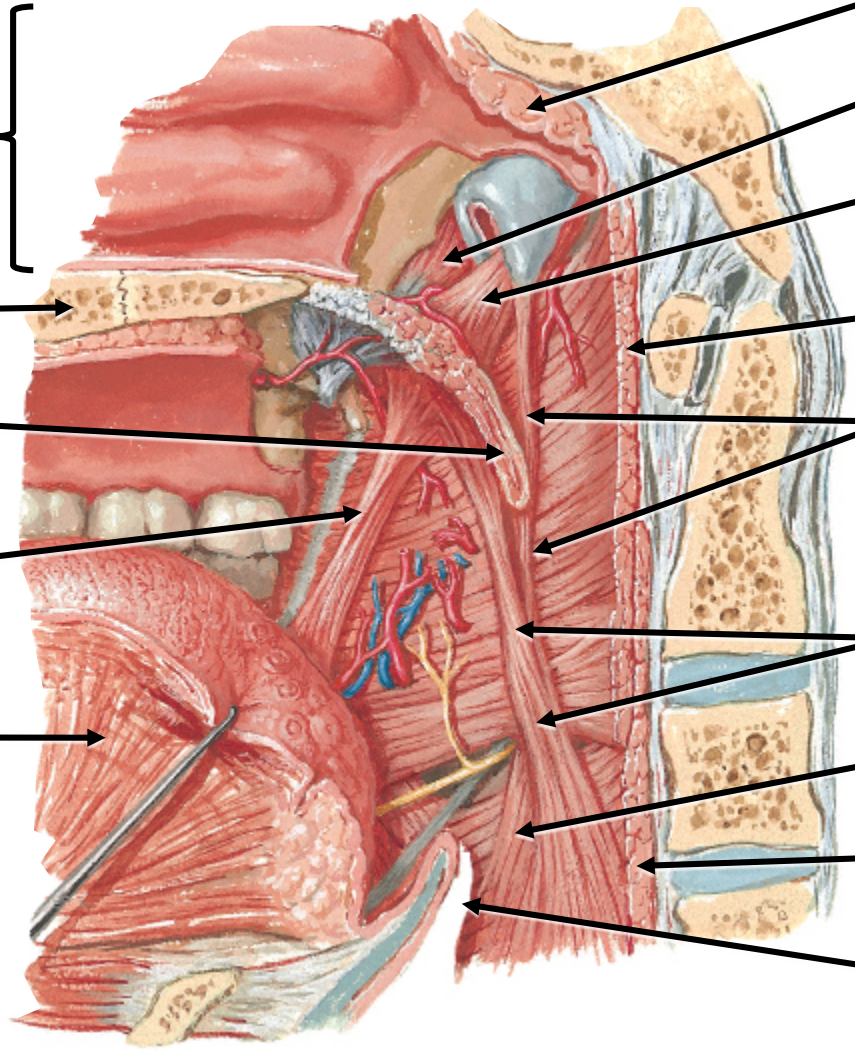
Nasal cavity

Hard palate

Tongue (retracted)

MUSCLES OF SOFT PALATE AND PHARYNX

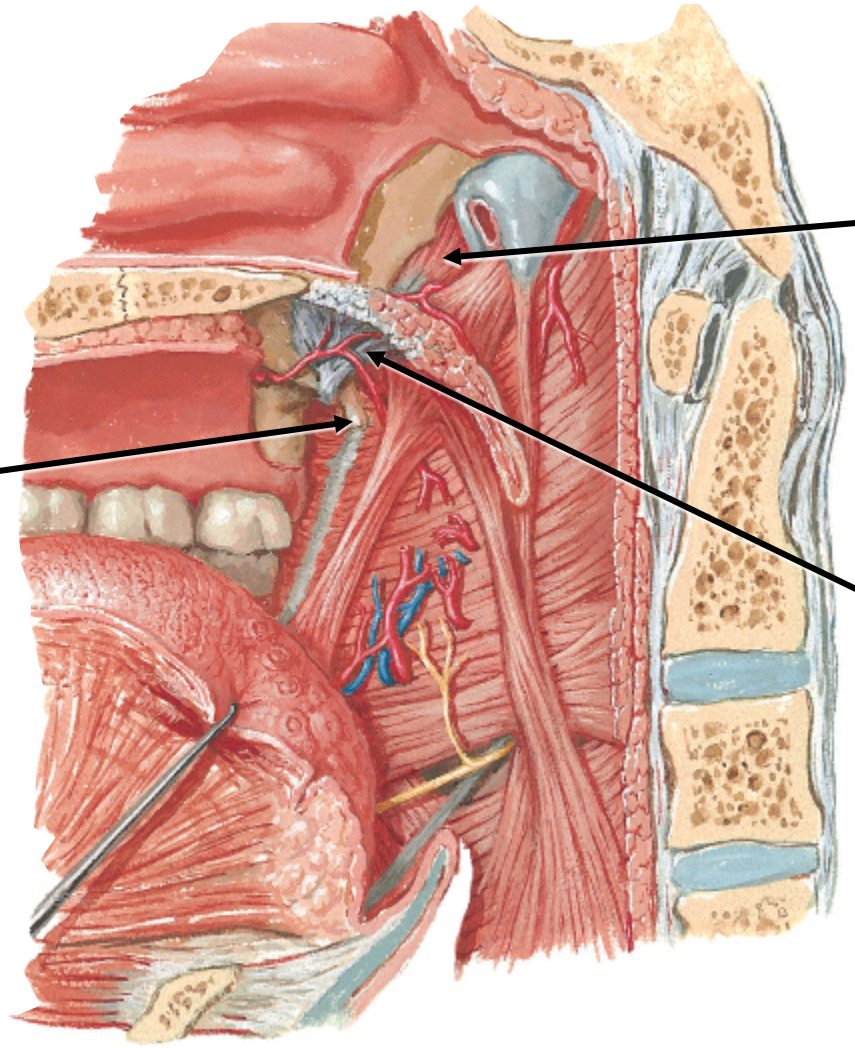
(Medial View of Sagittal Section)



Nasopharyngeal tonsil
Tensor veli palatini
Levator veli palatini
Nasal cavity
Hard palate
Superior constrictor
Musculus uvulae
Salpingopharyngeus
Palatoglossus
Palatopharyngeus
Tongue (retracted)
Stylopharyngeus
Middle constrictor
Epiglottis

MUSCLES OF SOFT PALATE AND PHARYNX

(Medial View of Sagittal Section)



Hamulus

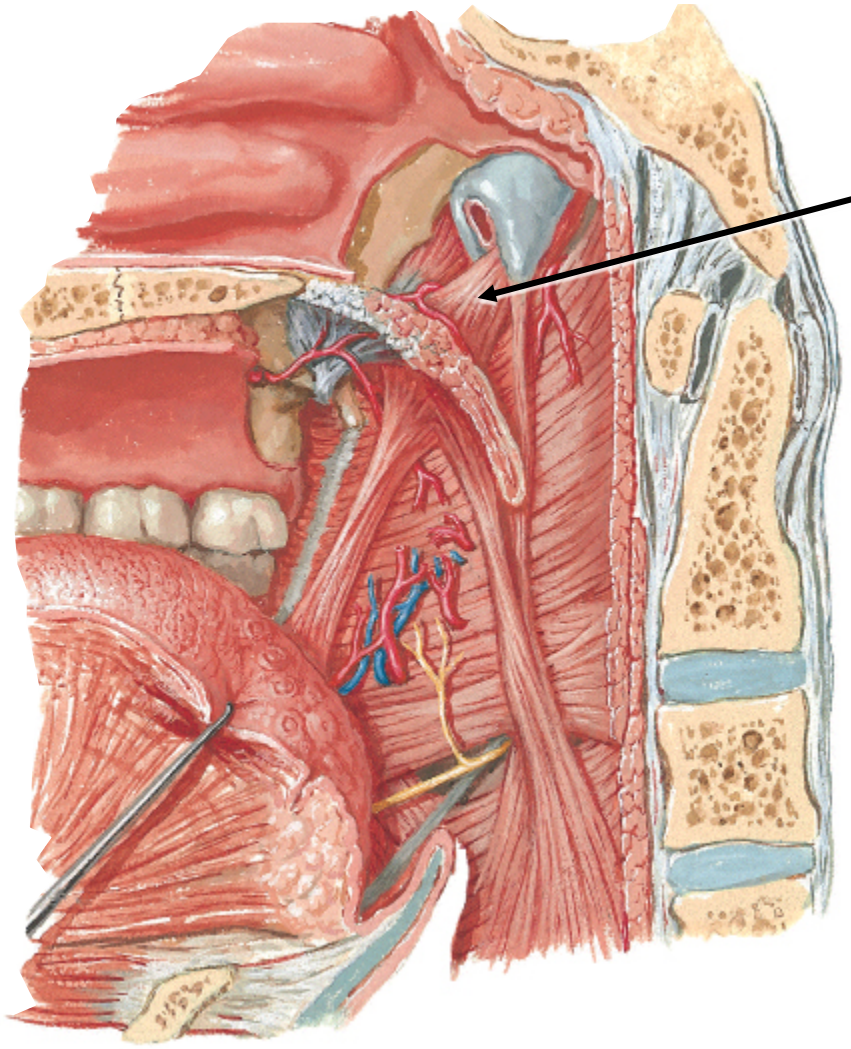
TENSOR VELI PALATINI

Origin:
- Scaphoid fossa, sphenoid spine, cartilaginous part of pharyngotympanic tube

Insertion:
- Passes around hamulus to form palatine aponeurosis

MUSCLES OF SOFT PALATE AND PHARYNX

(Medial View of Sagittal Section)



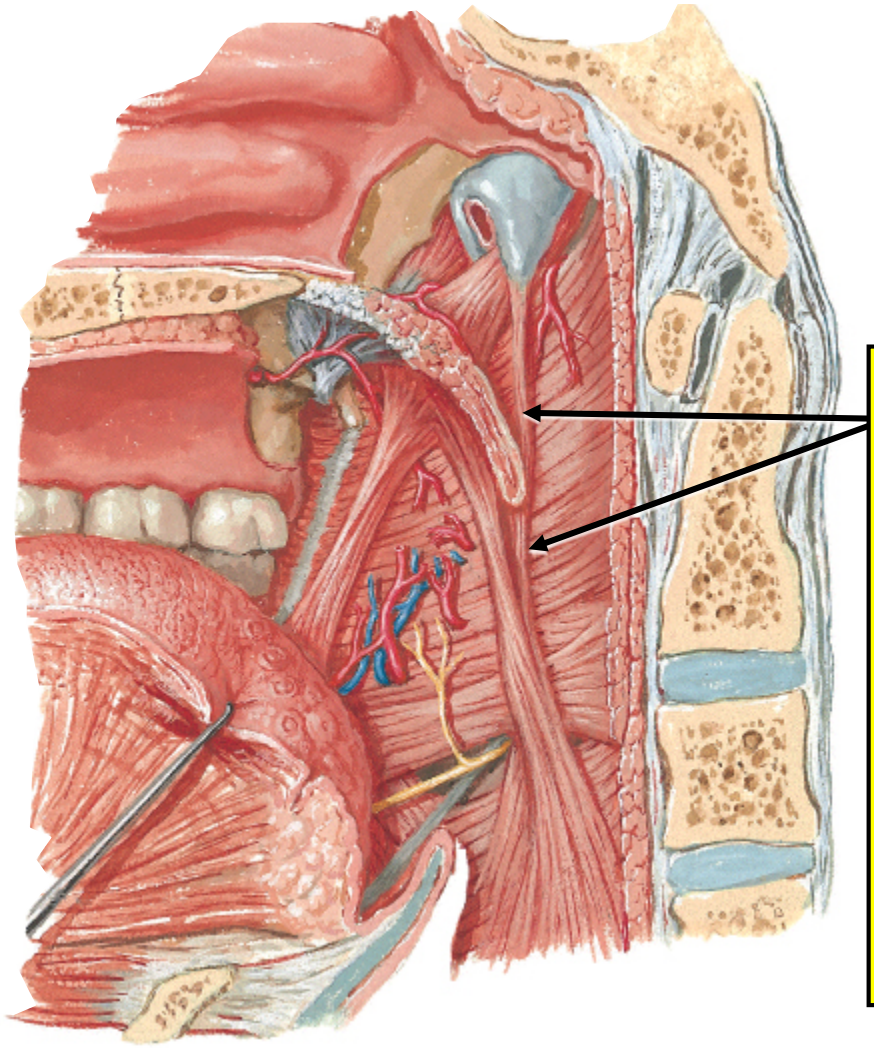
LEVATOR VELI PALATINI

Origin:
Pharyngotympanic tube, petrous part of temporal bone

Insertion:
Palatine aponeurosis

MUSCLES OF SOFT PALATE AND PHARYNX

(Medial View of Sagittal Section)



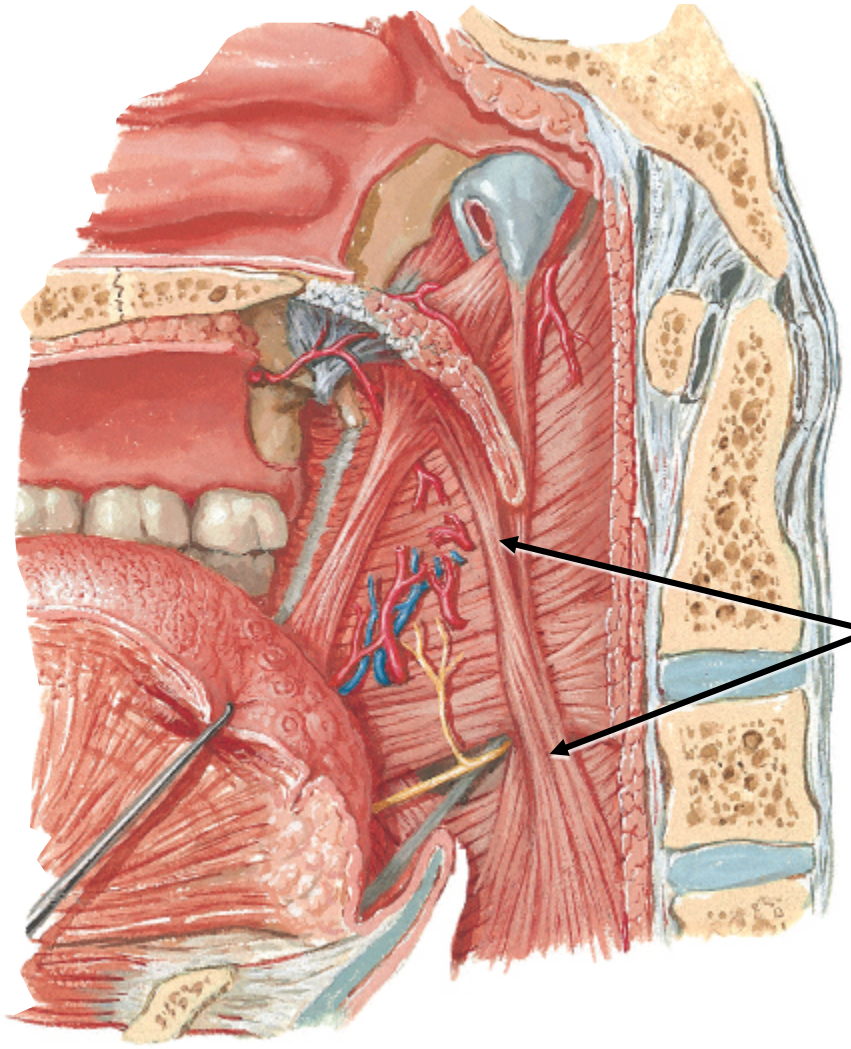
SALPINGO-PHARYNGEUS

Origin:
Cartilage of pharyngo-tympanic tube

Insertion:
Blends with palato-pharyngeus

MUSCLES OF SOFT PALATE AND PHARYNX

(Medial View of Sagittal Section)



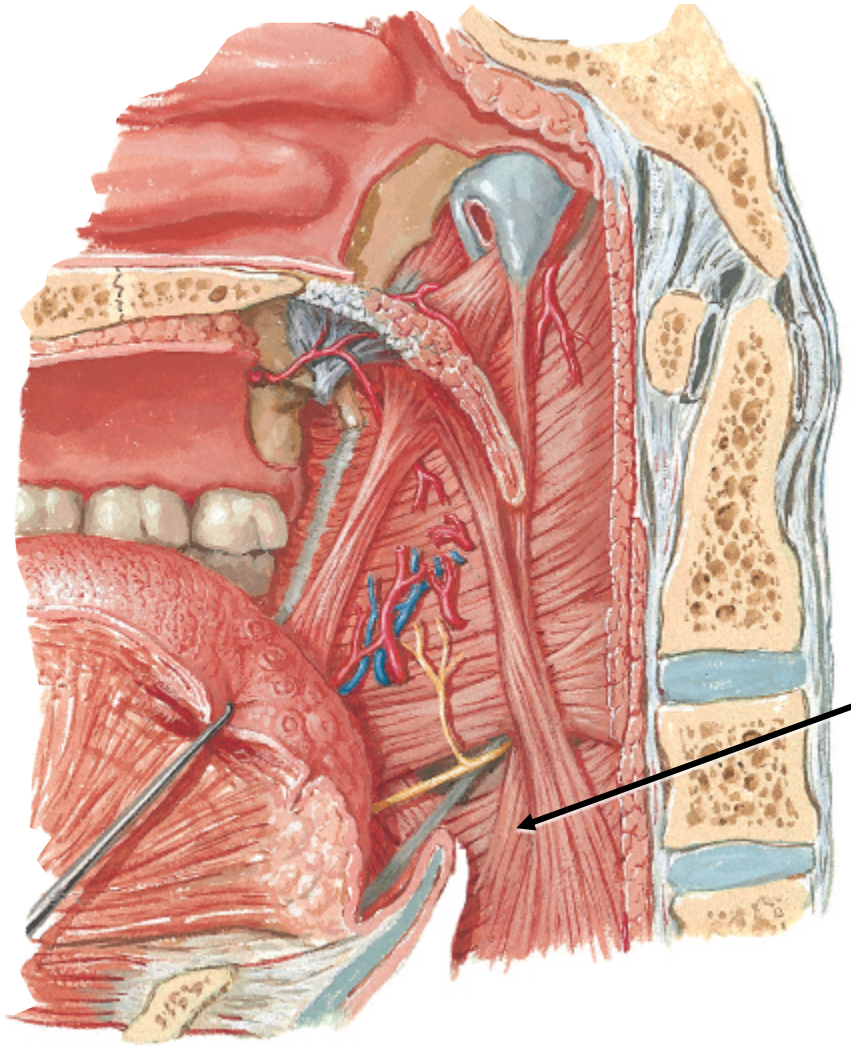
PALATO-PHARYNGEUS

Origin:
Hard palate and palatine aponeurosus

Insertion:
Inside of pharynx and thyroid cartilage

MUSCLES OF SOFT PALATE AND PHARYNX

(Medial View of Sagittal Section)



STYLO-PHARYNGEUS

Origin:
Styloid process

Insertion:
Inside of pharynx and thyroid cartilage

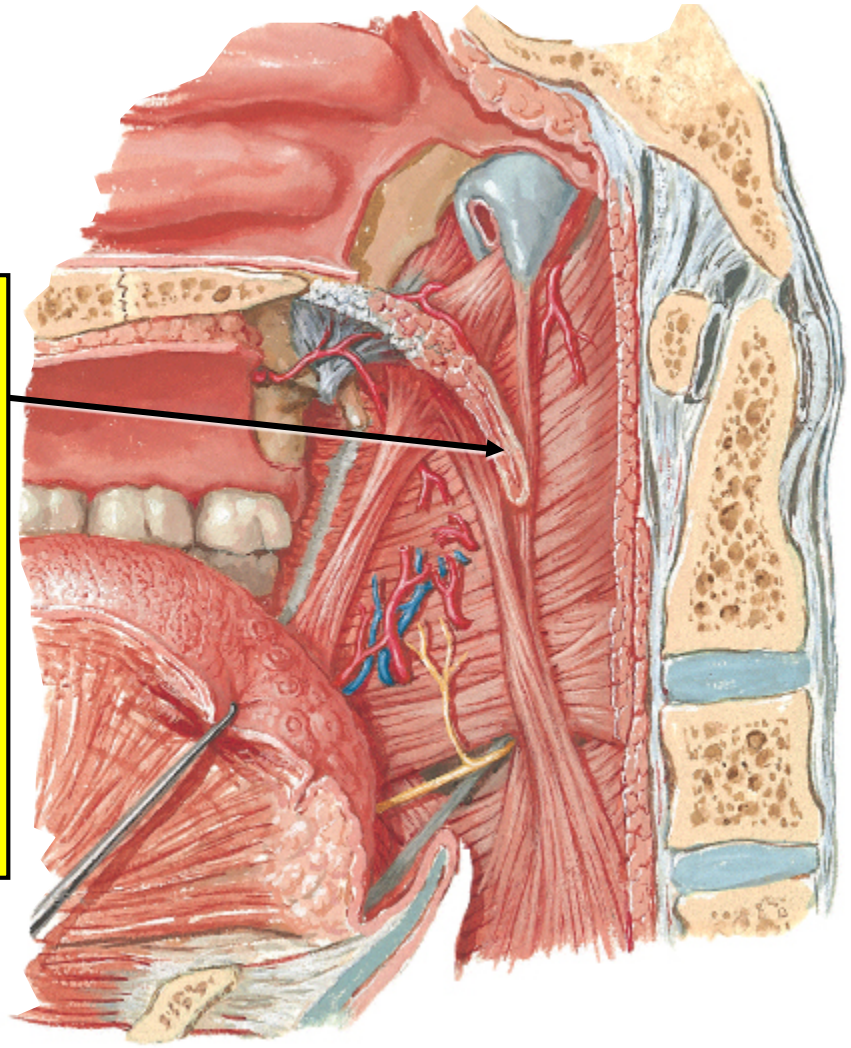
MUSCLES OF SOFT PALATE AND PHARYNX

(Medial View of Sagittal Section)

MUSCULUS UVULAE

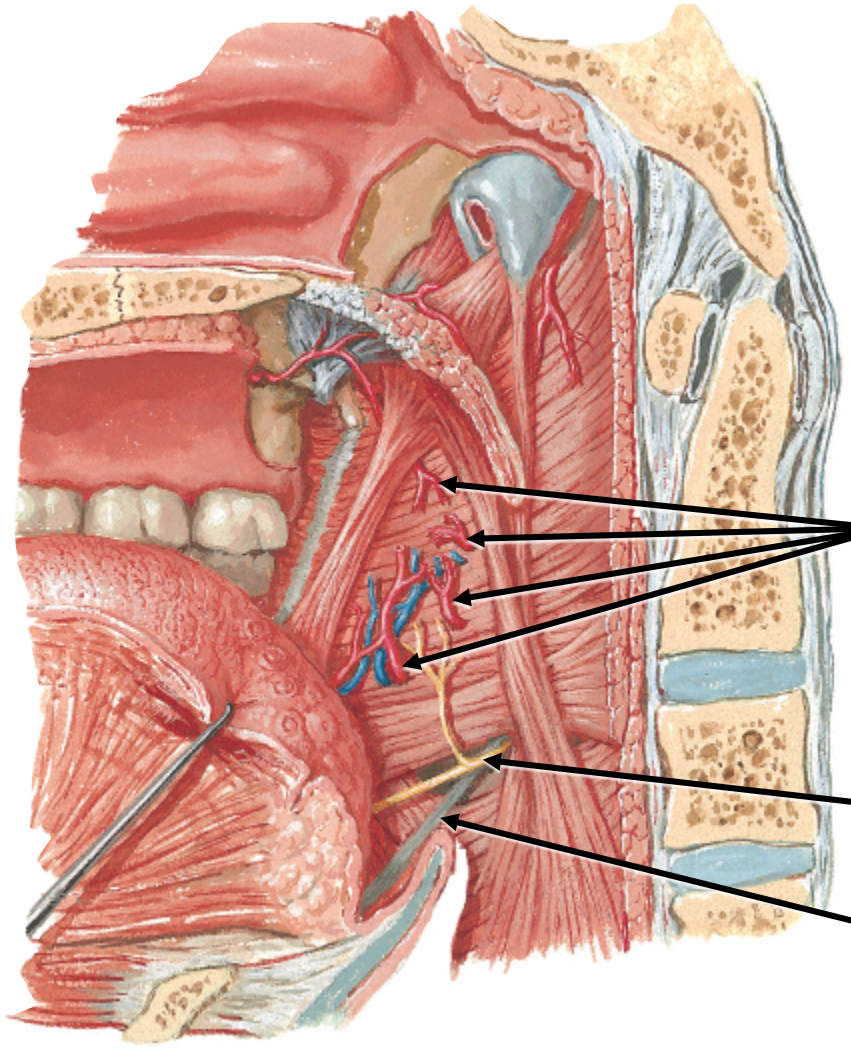
Origin:
Posterior nasal spine, palatine aponeurosus

Insertion:
Mucosa of uvula



ARTERIES AND NERVES IN OROPHARYNX

(Medial View of Sagittal Section)



Tonsillar branches of lesser palatine, ascending pharyngeal, ascending palatine, facial, and dorsal lingual arteries

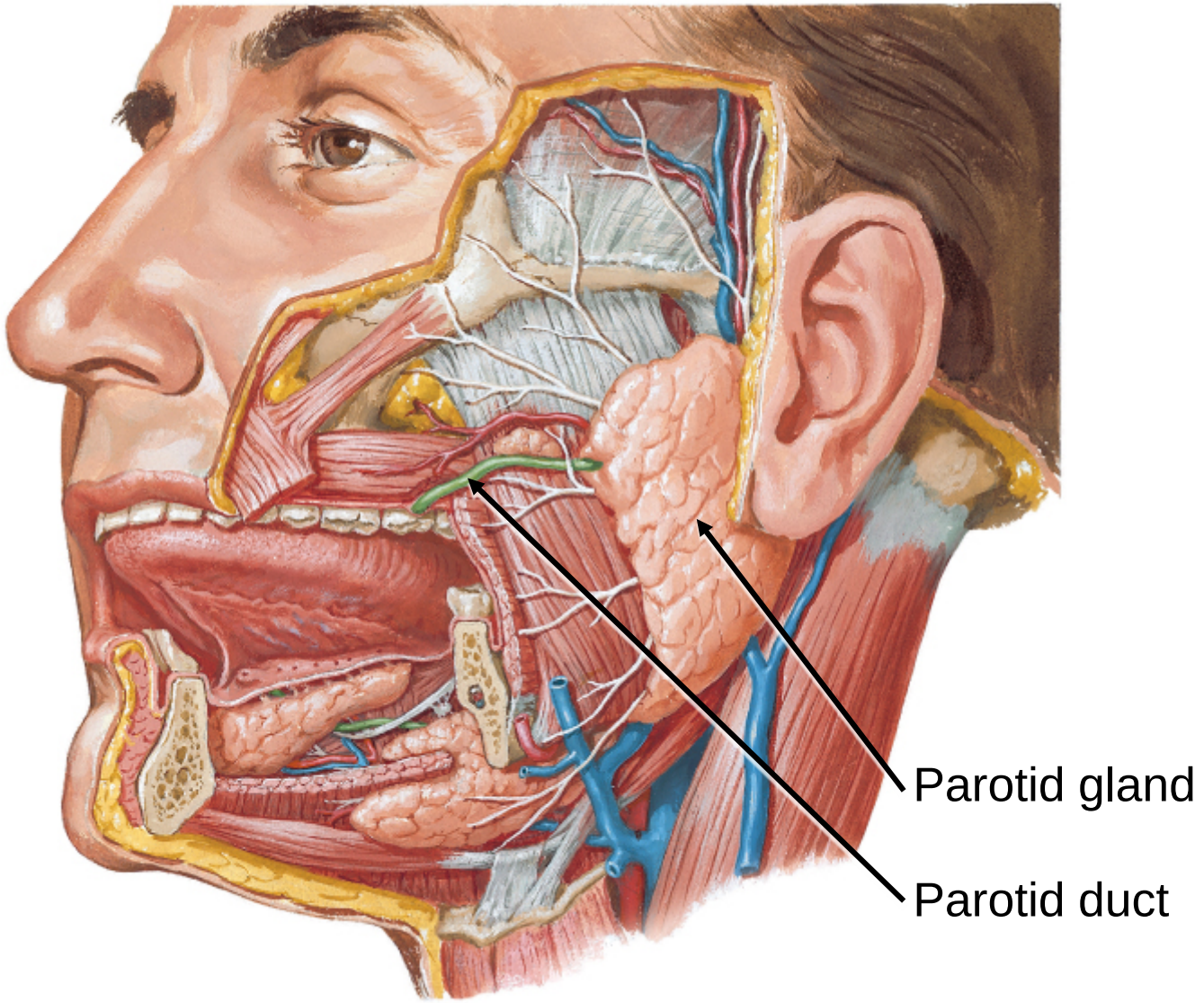
Glossopharyngeal n.

Stylohyoid ligament

Oral Region

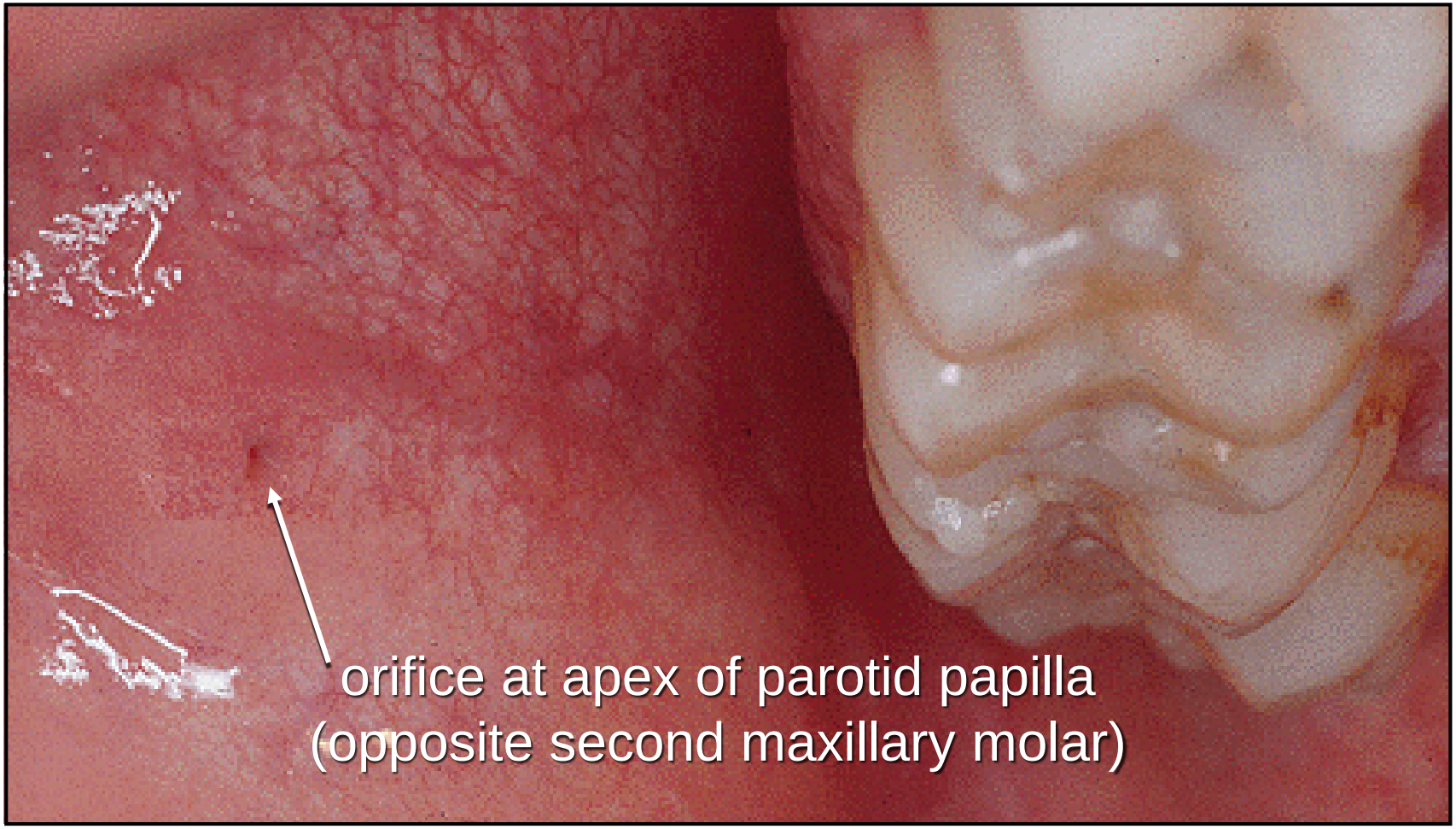
- Overview of oral cavity and oral vestibule
- Hard and soft palate
- **Salivary glands**
- Muscles of submandibular region
- Tongue
- Gingiva & teeth
- Pharynx

SALIVARY GLANDS AND DUCTS

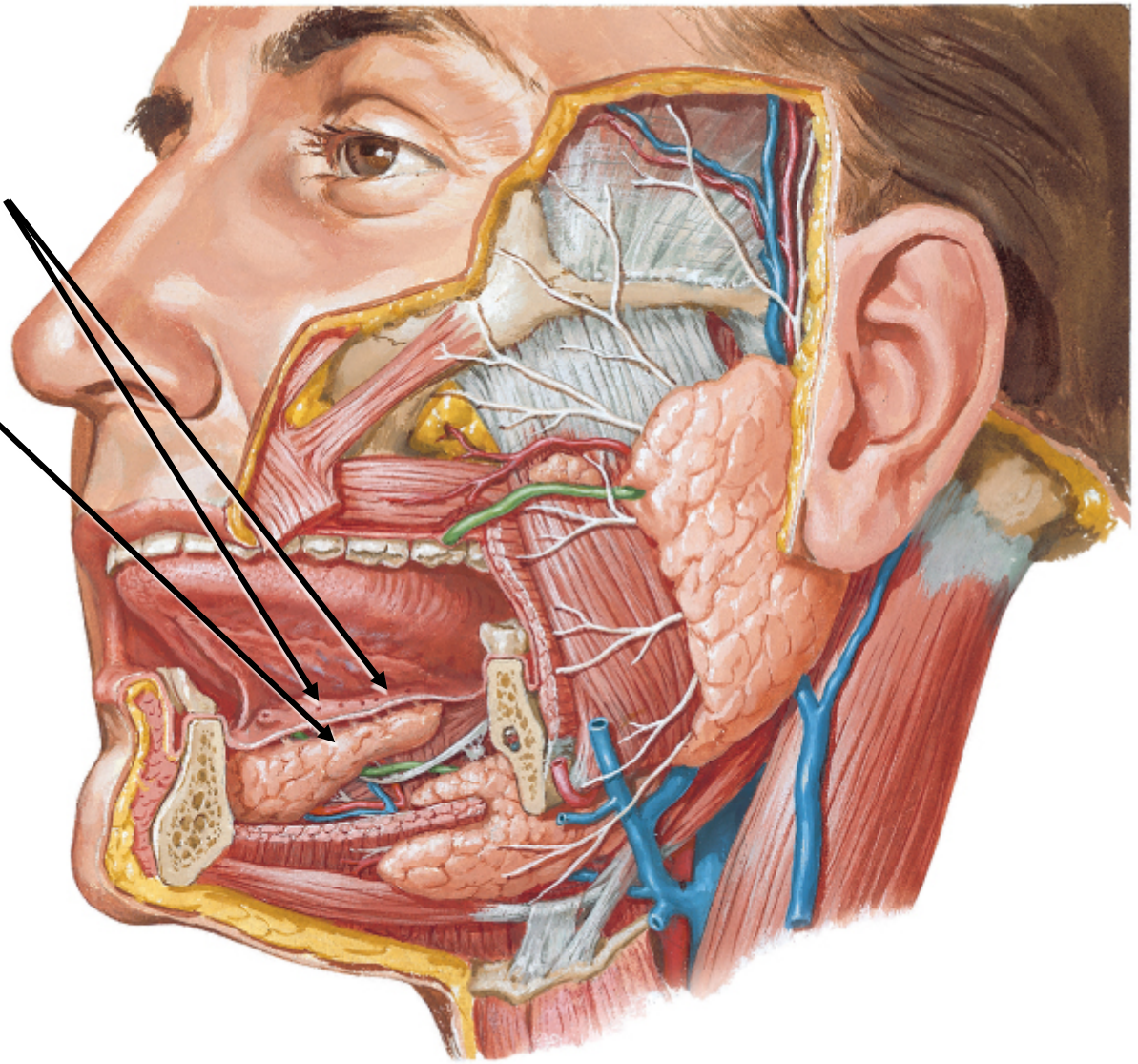


ORIFICE OF PAROTID DUCT

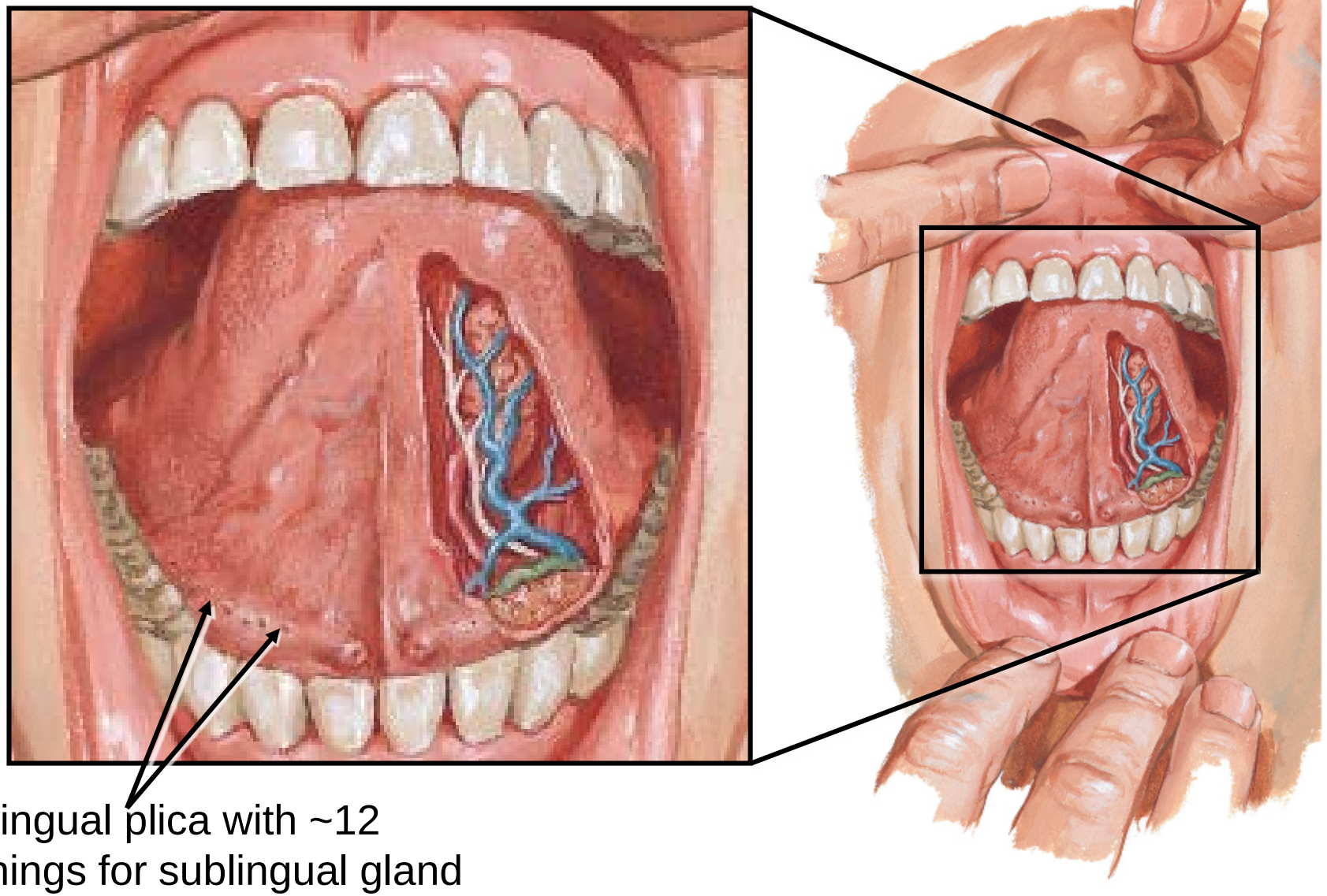
(in oral vestibule opposite 2nd maxillary molar)



SALIVARY GLANDS AND DUCTS

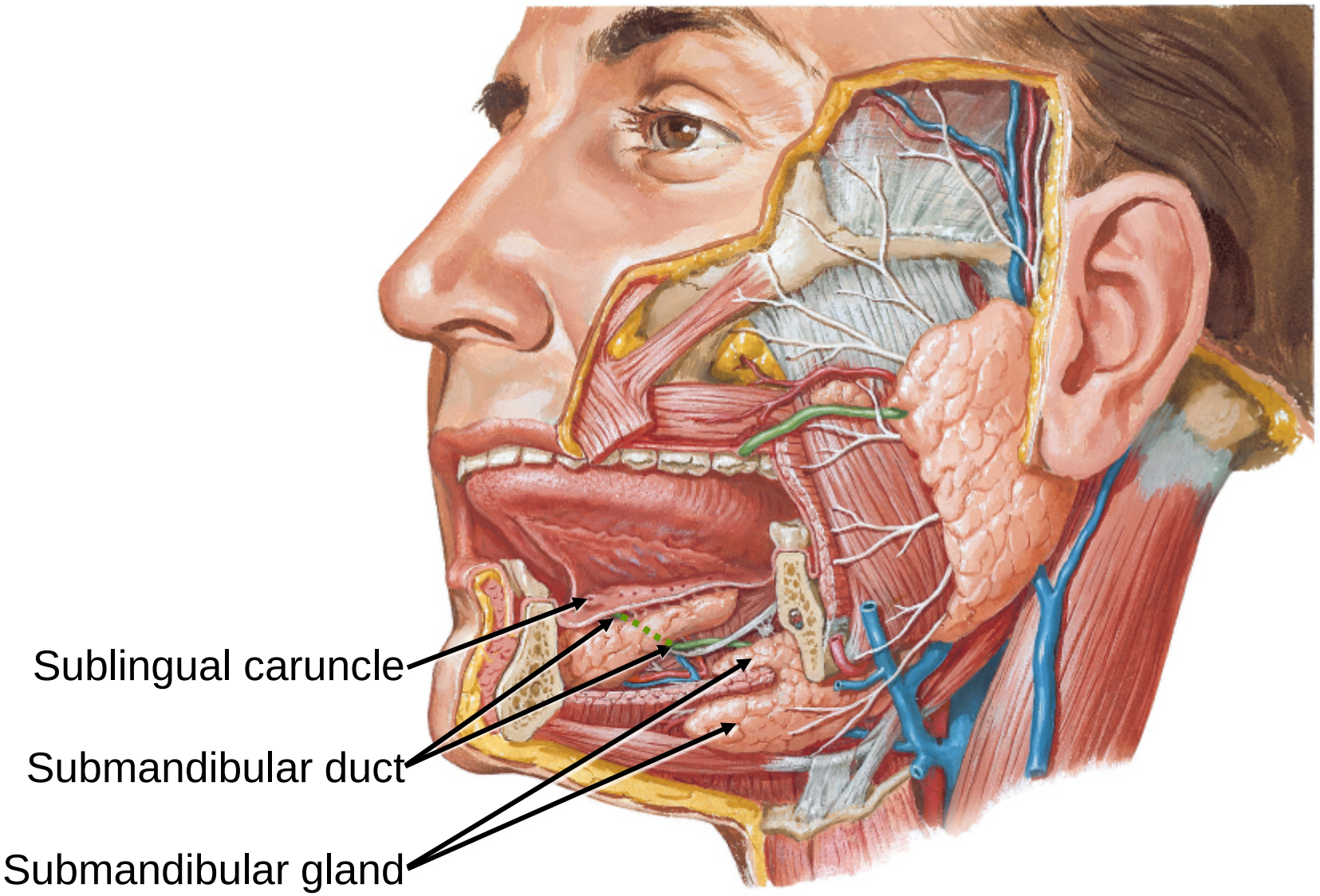


SALIVARY GLANDS AND DUCTS

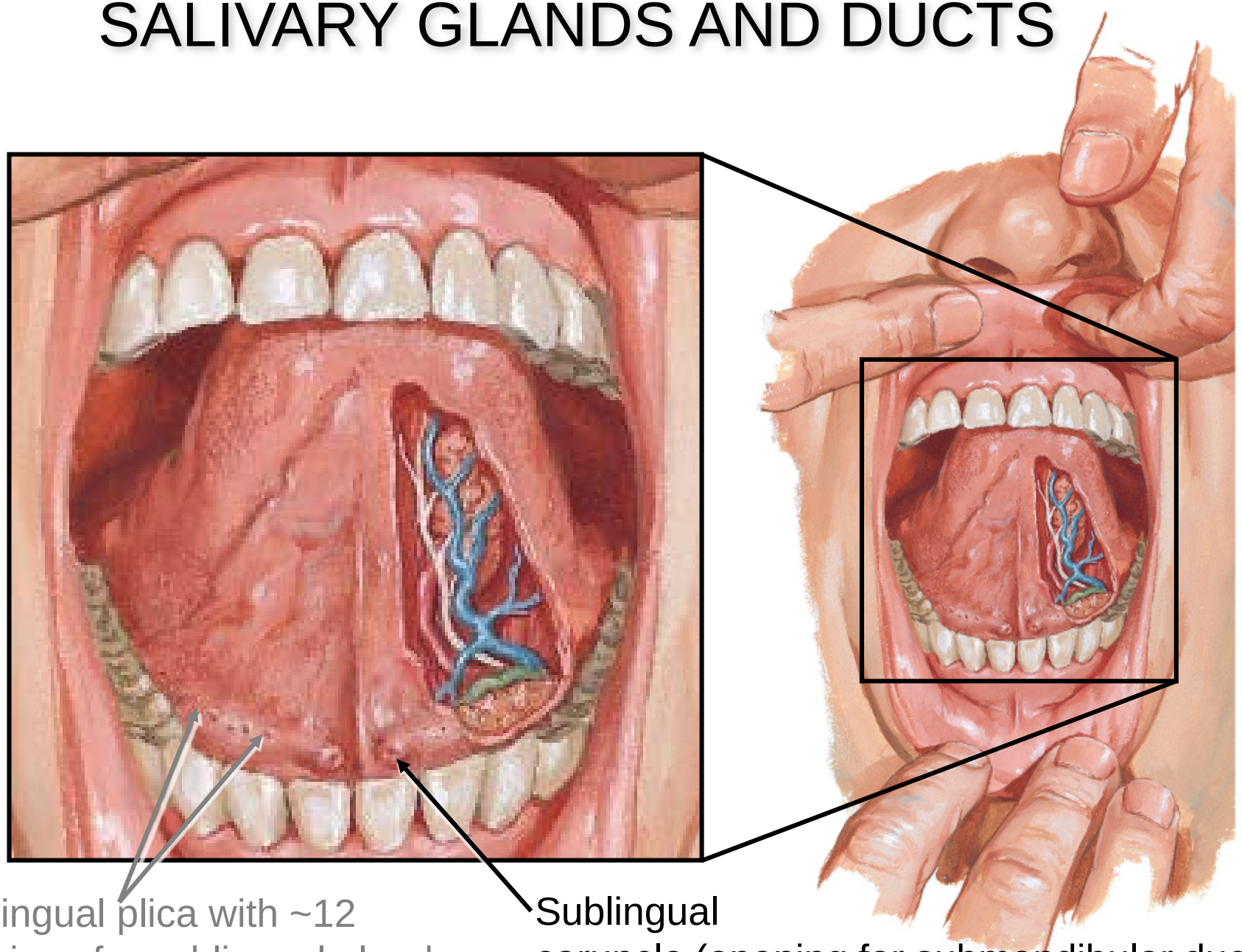


Sublingual plica with ~12 openings for sublingual gland

SALIVARY GLANDS AND DUCTS



SALIVARY GLANDS AND DUCTS



Sublingual plica with ~12 openings for sublingual gland

Sublingual caruncle (opening for submandibular duct)

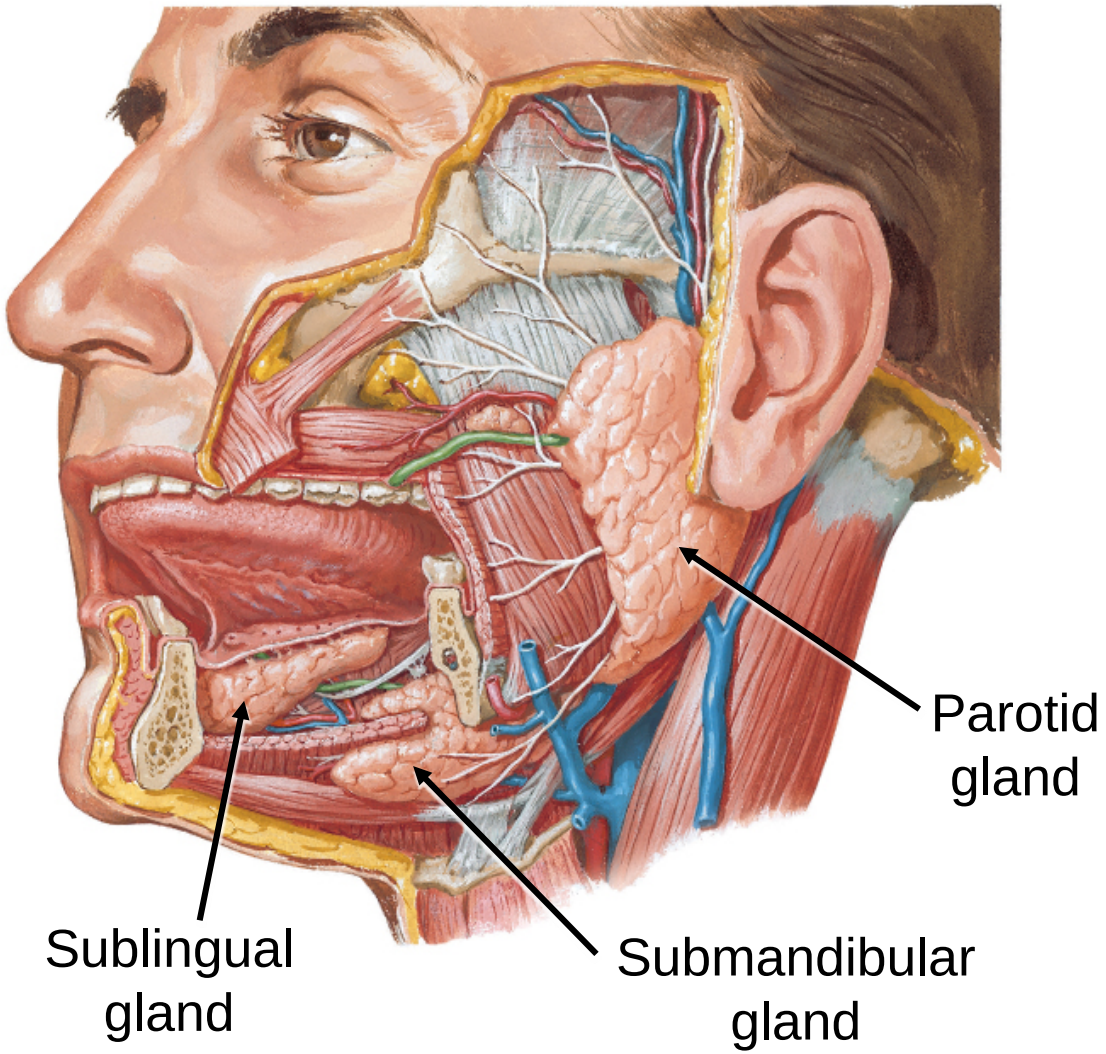
INNERVATION OF SALIVARY GLANDS

PARASYMPATHETIC

- C.N. IX to parotid gland
- C.N. VII to submandibular and sublingual glands
- induces water and electro-lyte release

SYMPATHETIC

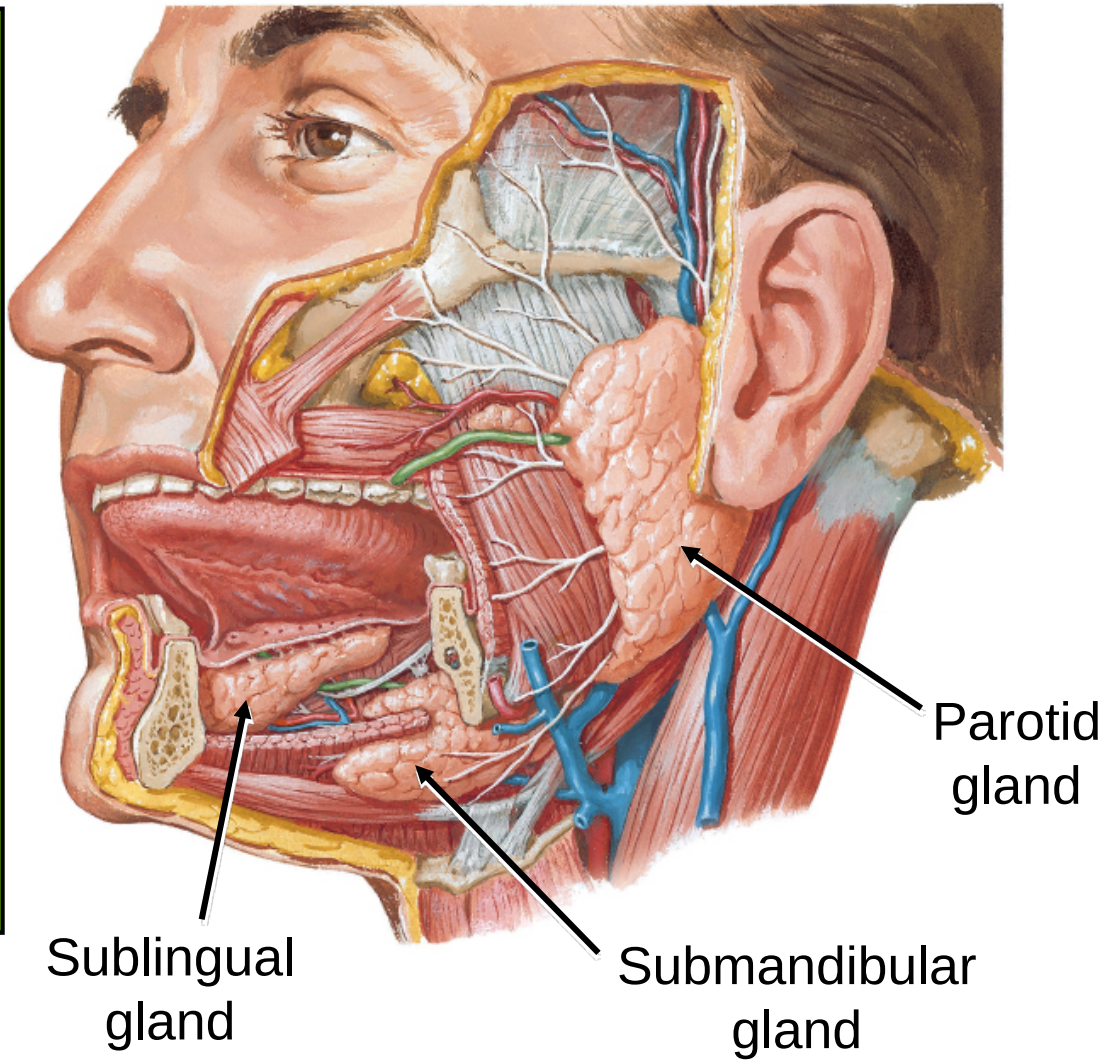
- along branches of external carotid a. (superficial temp-oral a. to parotid gland; facial a. to submandibular gland; sublingual a. to sublingual gland).
- sympathetic stimulation induces protein secretion



INNERVATION OF SALIVARY GLANDS

SALIVA

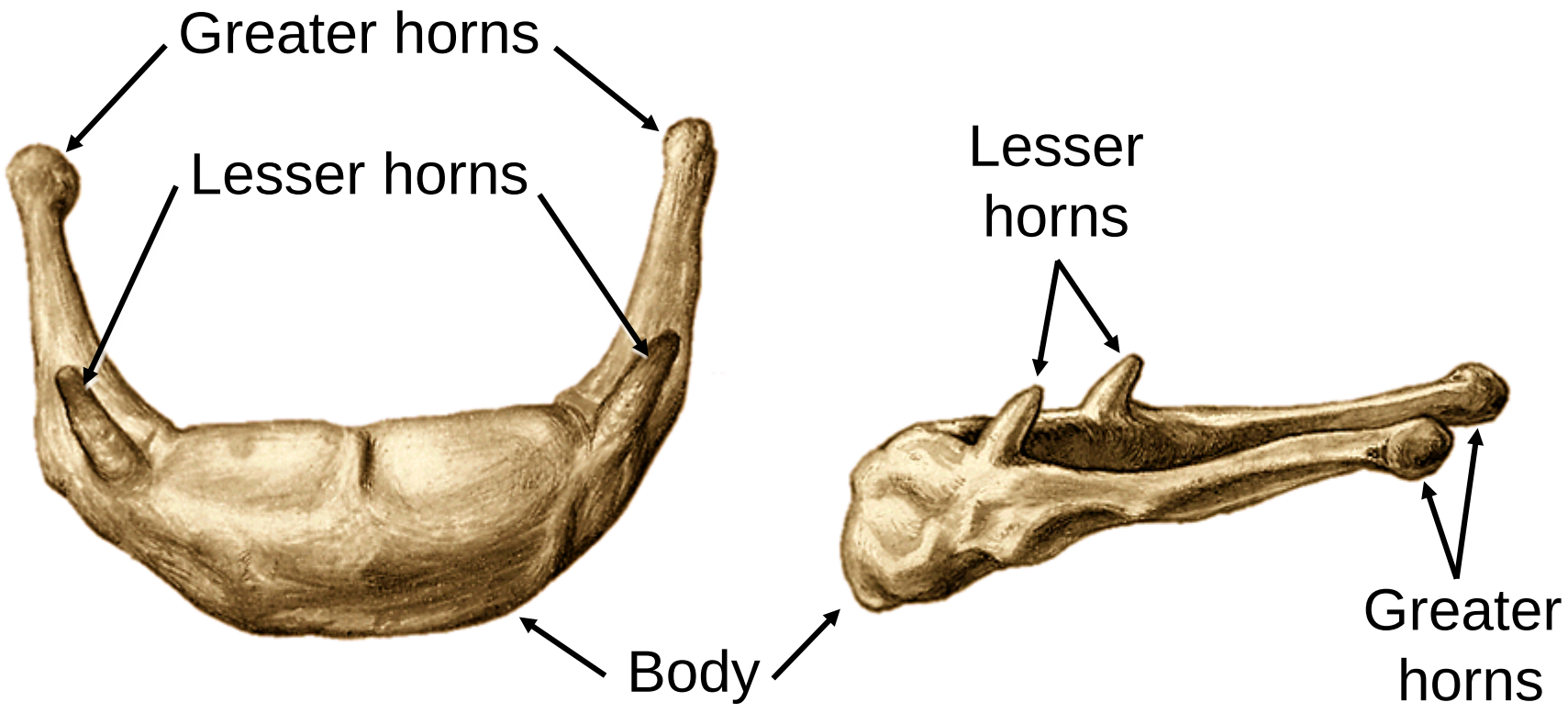
- important in mastication and early stages of food processing
- plays a role in posteruptive maturation of enamel
- can remineralize early carious lesions
- produce 640-1200 mL/day (approx. 22-41 oz)
- produce only ~10 mL at night



Oral Region

- Overview of oral cavity and oral vestibule
- Hard and soft palate
- Salivary glands
- **Muscles of submandibular region**
- Tongue
- Gingiva & teeth
- Pharynx

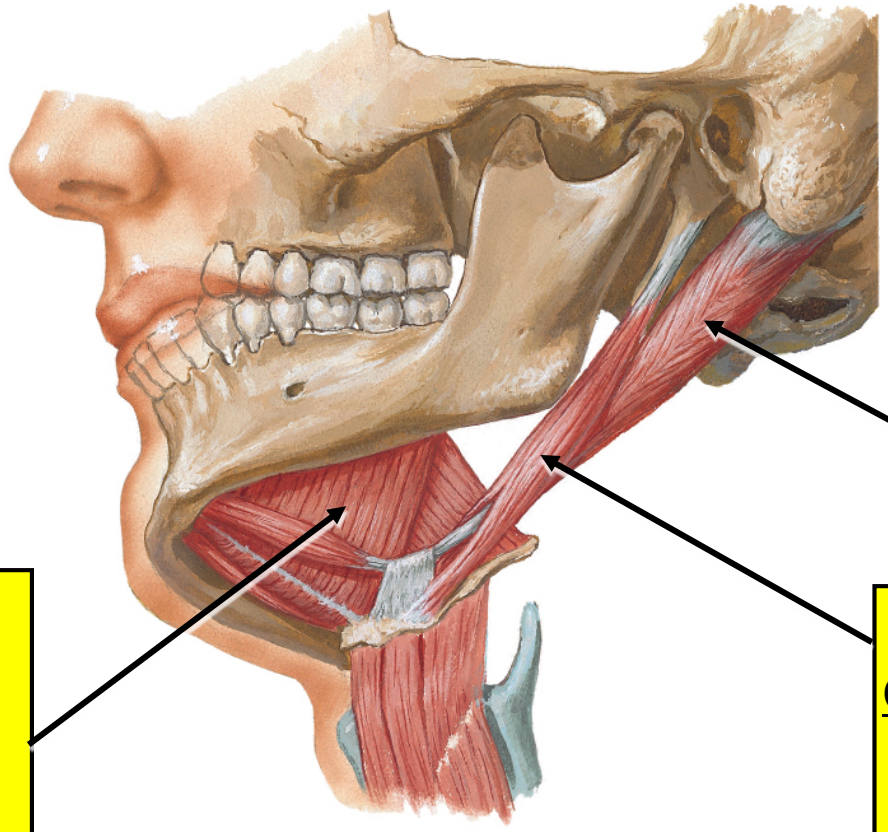
HYOID BONE



ANTERIOR VIEW

LEFT LATERAL VIEW

MUSCLES OF SUBMANDIBULAR REGION



DIGASTRIC

Origin:
Mastoid (=digastric) notch

Insertion:
Digastric fossa

Intermediate tendon attaches to hyoid

MYLOHYOID

Origin:
Mylohyoid line of mandible

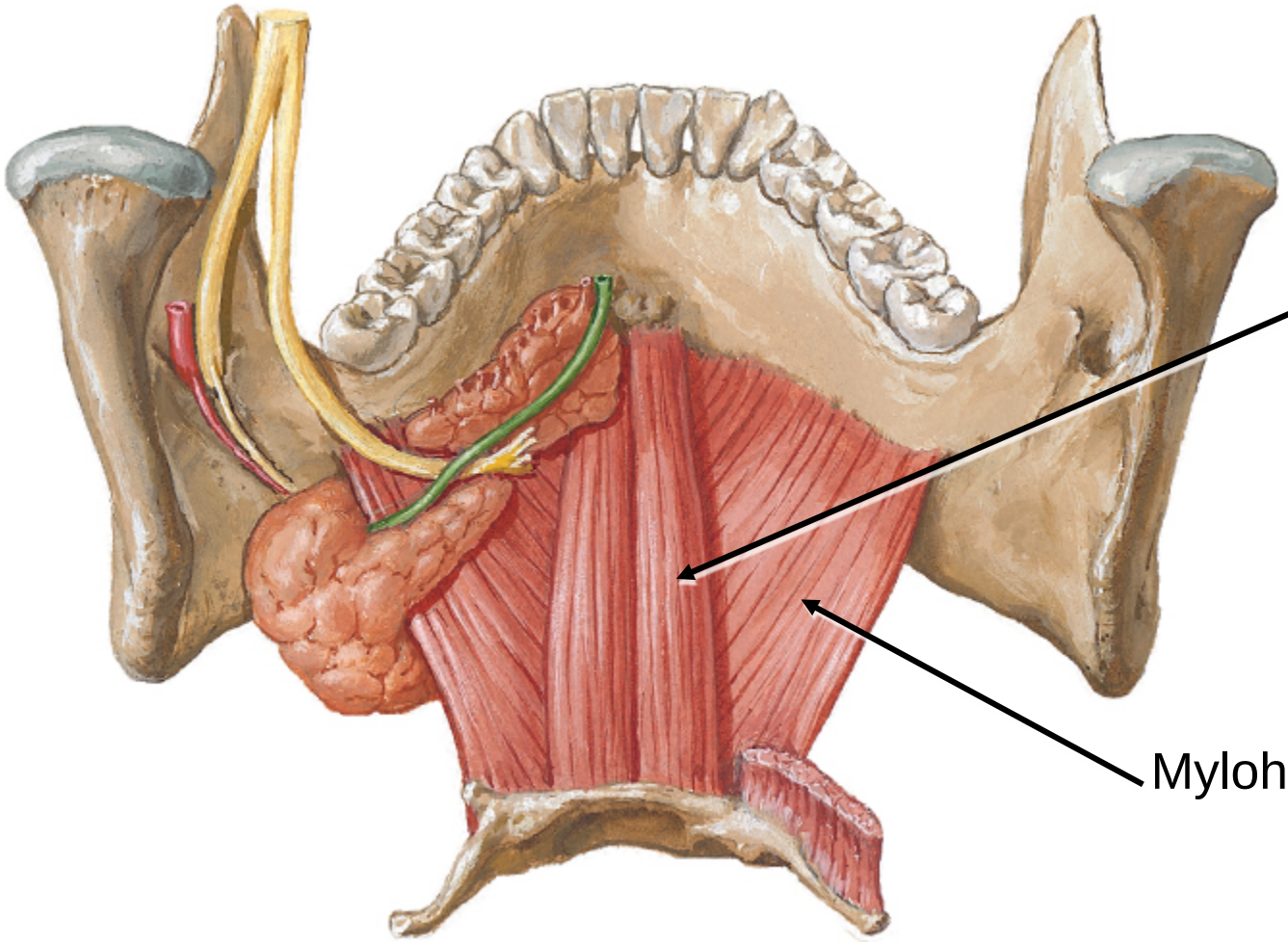
Insertion:
Midline raphe anteriorly and body of hyoid posteriorly

STYLOHYOID

Origin:
Styloid process of temporal bone

Insertion:
Greater horn of hyoid bone (tendon splits around intermediate tendon of digastric)

MUSCLES OF SUBMANDIBULAR REGION

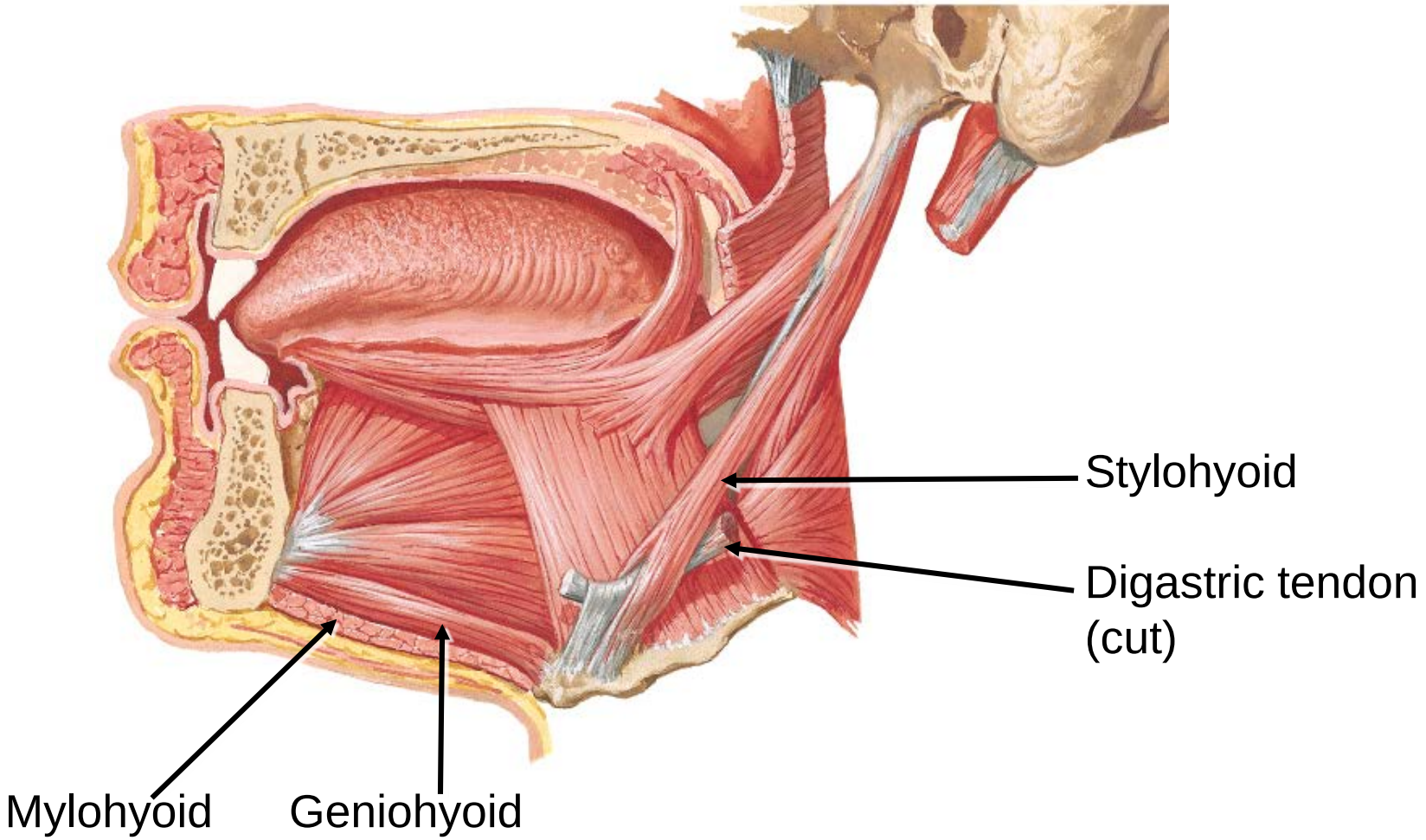


GENIOHYOID

Origin:
Genial tubercles (inferior set), below origin of genioglossus m.

Insertion:
Front of body of hyoid

MUSCLES OF SUBMANDIBULAR REGION



Oral Region

- Overview of oral cavity and oral vestibule
- Hard and soft palate
- Salivary glands
- Muscles of submandibular region
- **Tongue**
- Gingiva & teeth
- Pharynx

MUSCLES OF THE TONGUE

EXTRINSIC – those that act on tongue from outside

- Genioglossus
- Hyoglossus
- Styloglossus
- Palatoglossus

INTRINSIC – those that act on tongue from inside

- Superior longitudinal
- Inferior longitudinal
- Transverse
- Vertical

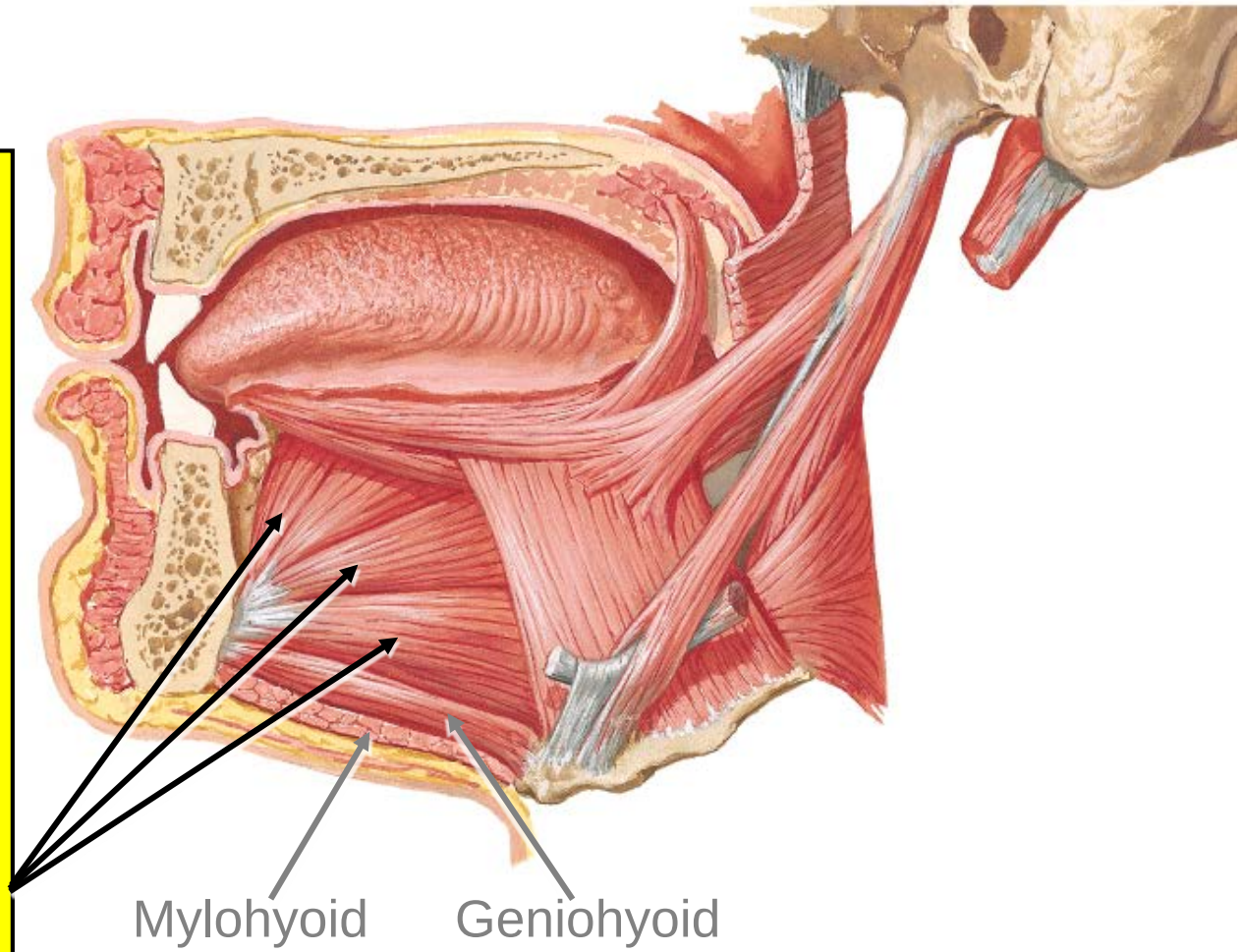
EXTRINSIC MUSCLES OF TONGUE

GENIOGLOSSUS

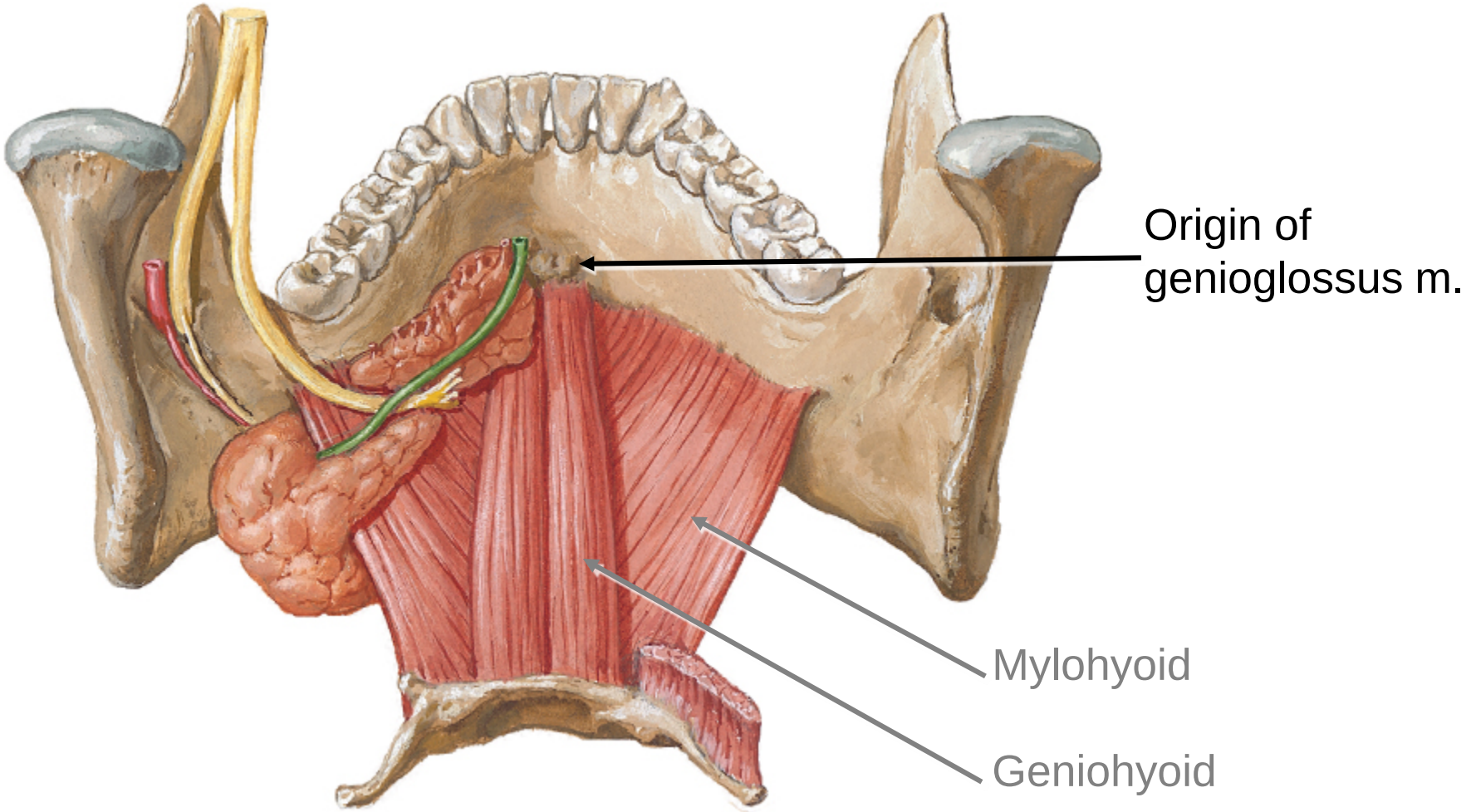
Origin:
Genial tubercles (superior set)

Insertion:
Fibers radiate into inf. aspect of tongue. Inferiormost fibers insert onto hyoid

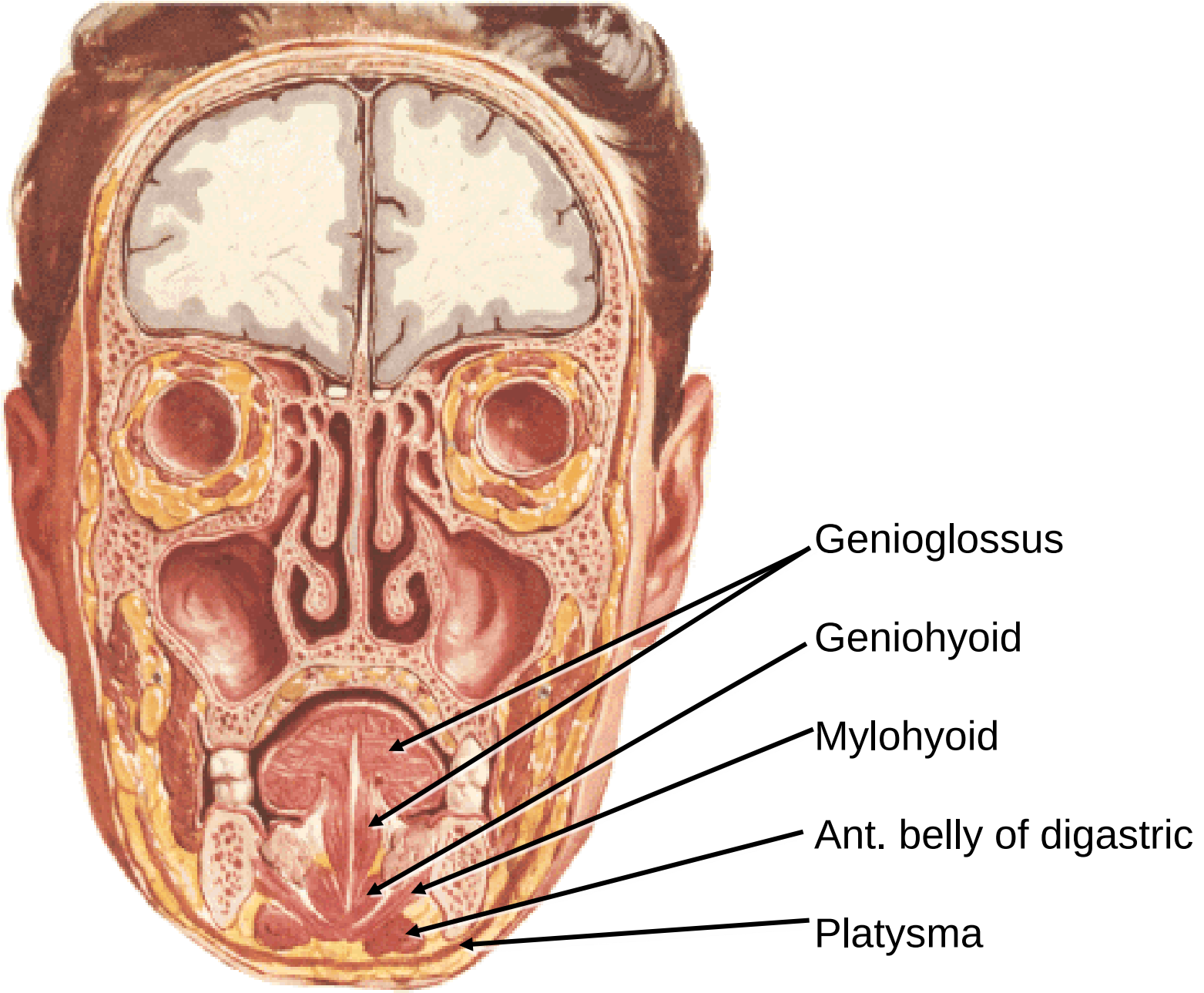
Action:
Posterior and middle fibers pull base of tongue anteriorly and down and therefore protrude tongue



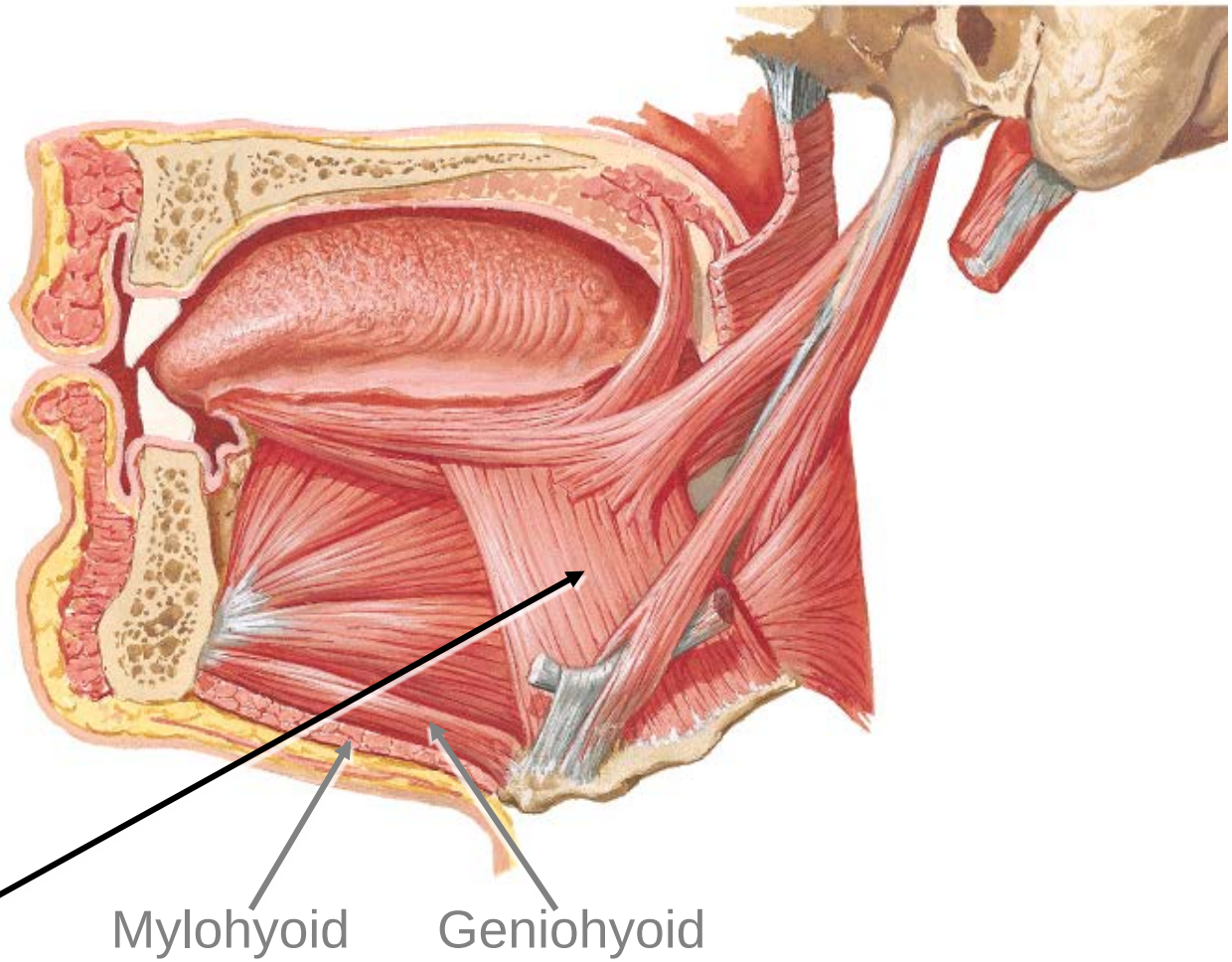
MUSCLES OF SUBMANDIBULAR REGION



MUSCLES OF TONGUE AND FLOOR OF MOUTH



EXTRINSIC MUSCLES OF TONGUE



HYOGLOSSUS

Origin:
Greater horn and body of hyoid

Insertion:
Side and inferior aspect of tongue

Action:
Depression of tongue

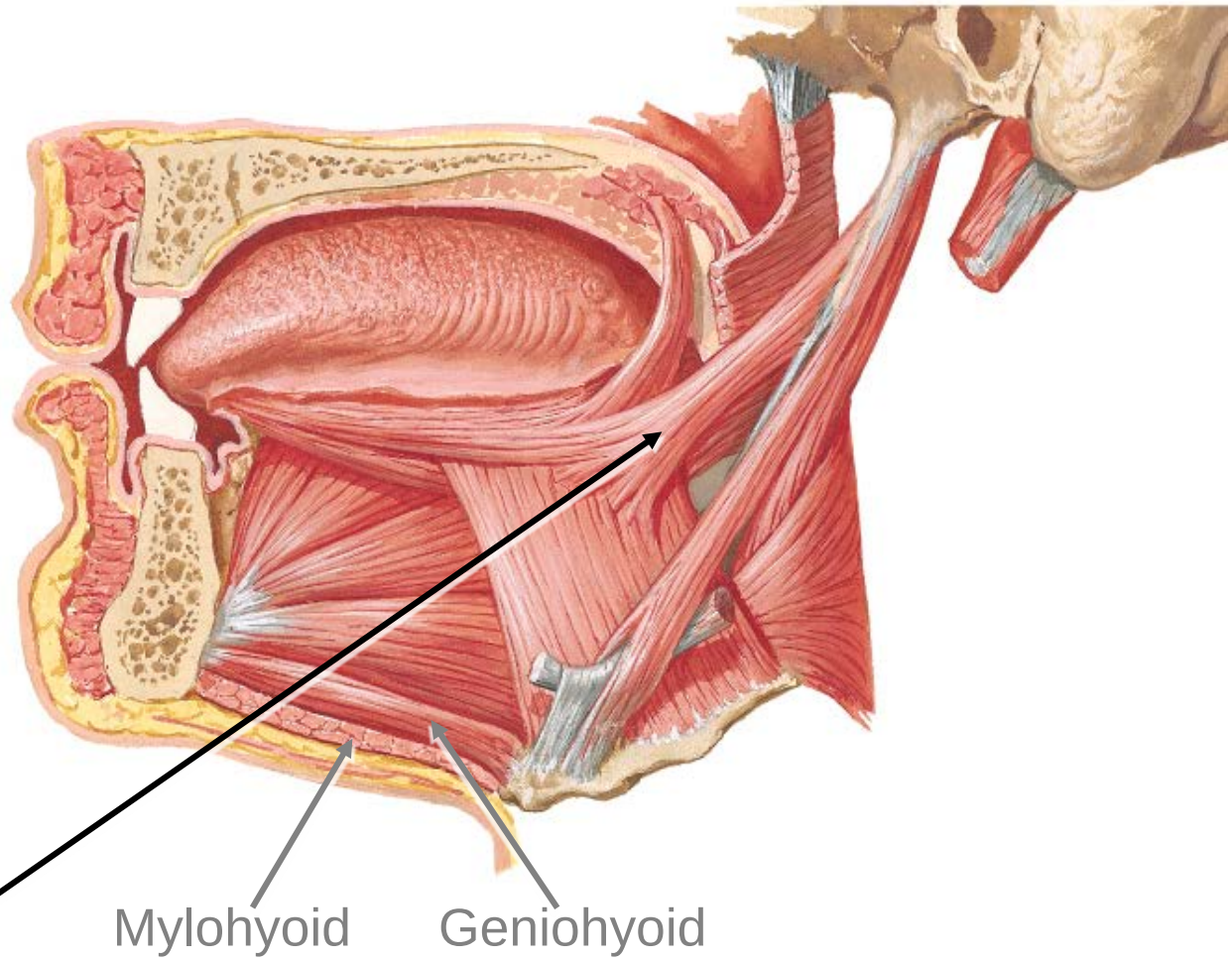
EXTRINSIC MUSCLES OF TONGUE

STYLOGLOSSUS

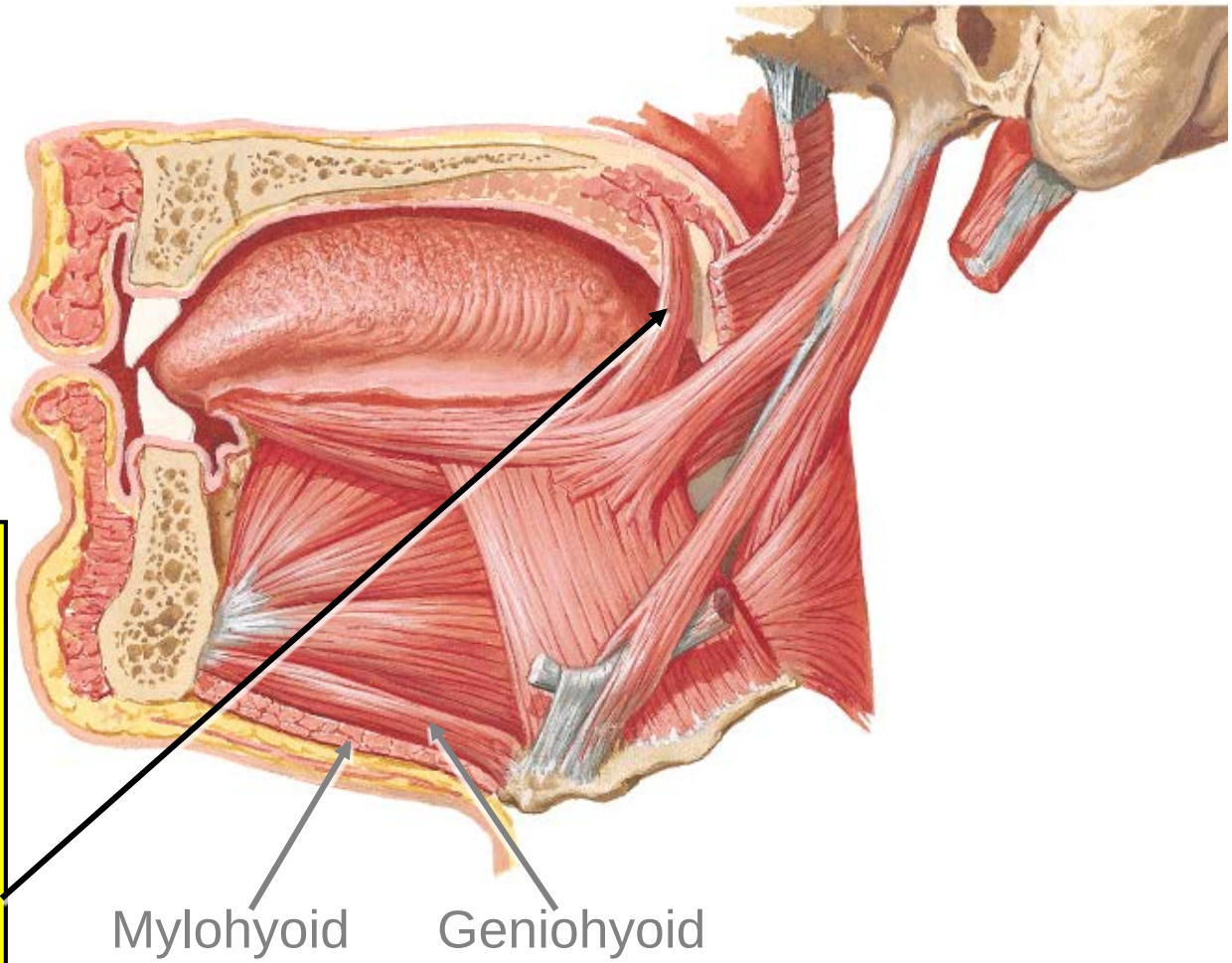
Origin:
Styloid process

Insertion:
Side and inferior aspect of tongue

Action:
Elevation and, coupled with anterior fibers of genioglossus, retraction



EXTRINSIC MUSCLES OF TONGUE



PALATOGLOSSUS

Origin:
Palatine aponeurosis

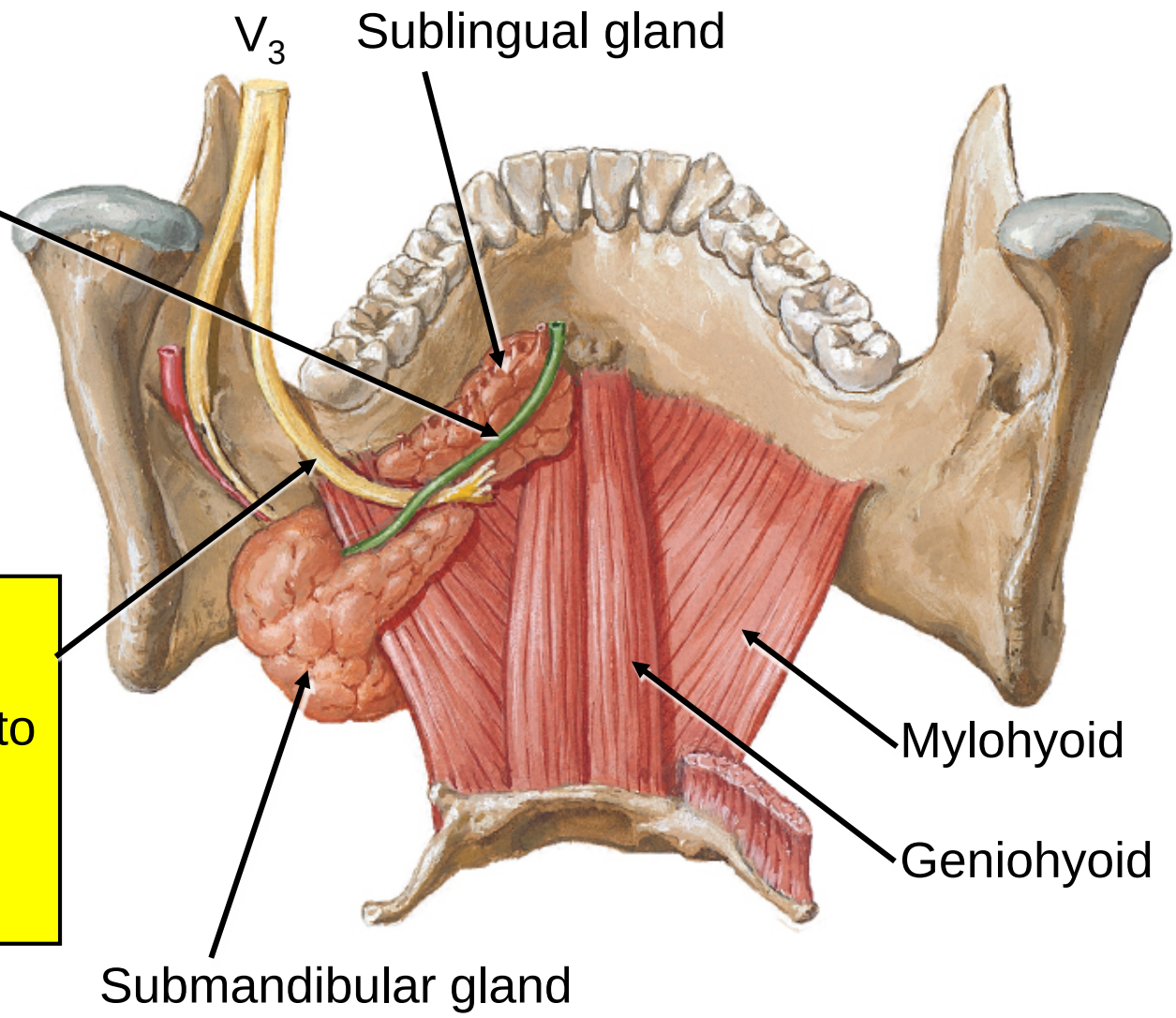
Insertion:
Side of tongue along with styloglossus

Action:
Acts with styloglossus to elevate posterior part of tongue

NERVES, VESSELS & DUCTS IN FLOOR OF MOUTH

Submandibular duct
- originates from submandibular salivary gland
- runs superior to mylohyoid m., deep to sublingual gland

Lingual nerve
- passes lateral to, then inferior to, then medial to submandibular duct
- passes up to anterior two-thirds of tongue



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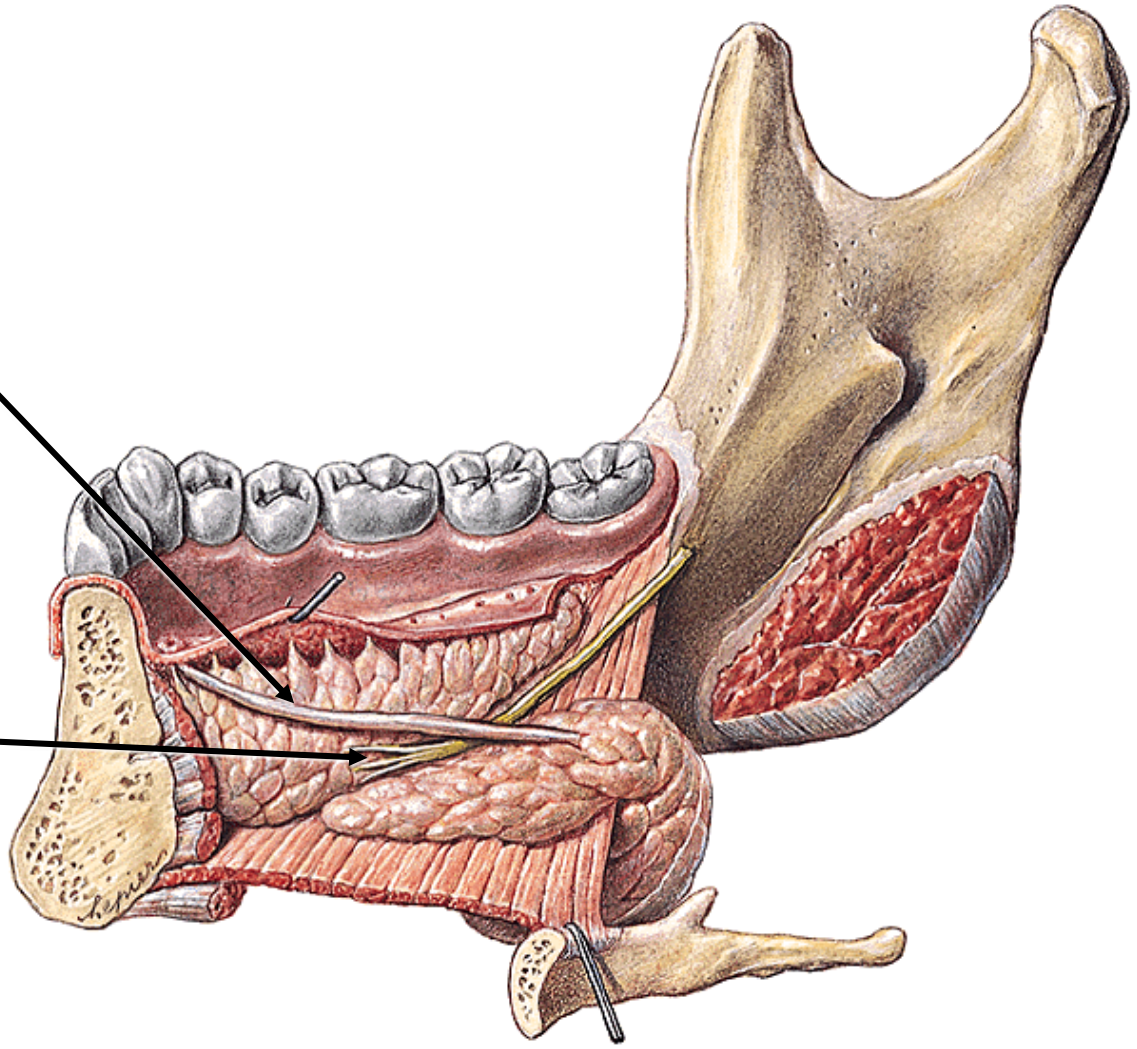

NERVES, VESSELS & DUCTS IN FLOOR OF MOUTH

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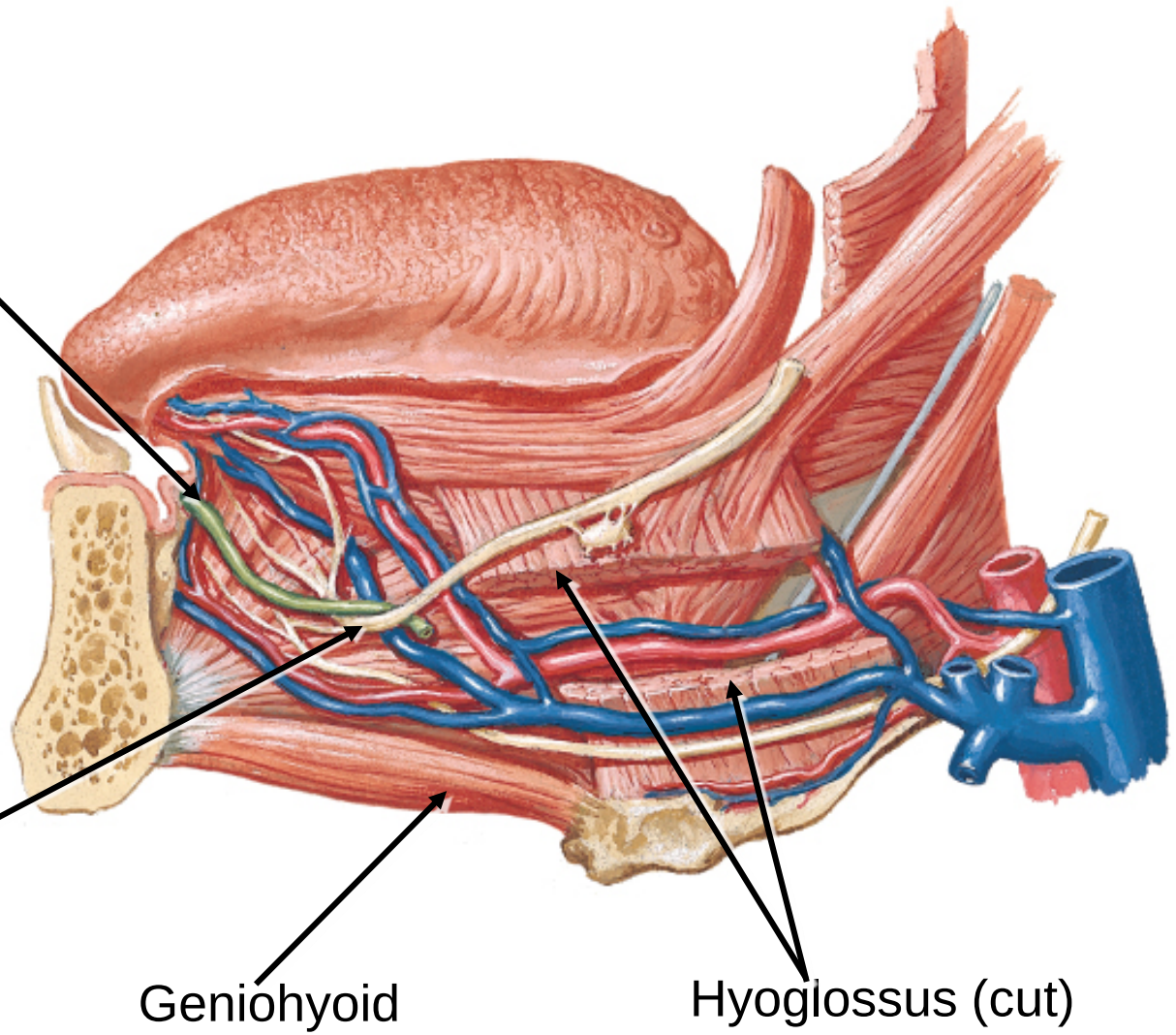
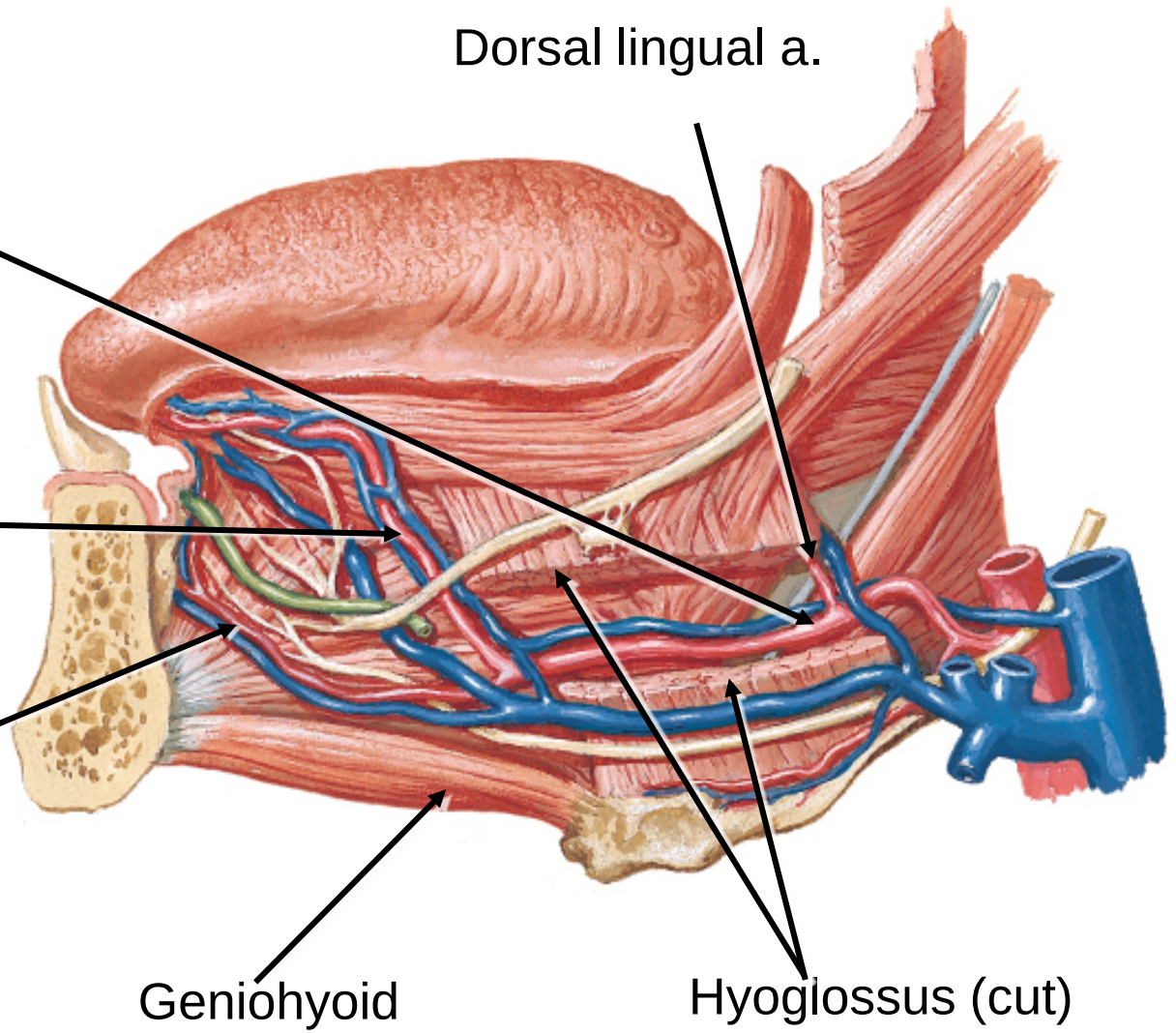


NERVES, VESSELS & DUCTS IN FLOOR OF MOUTH

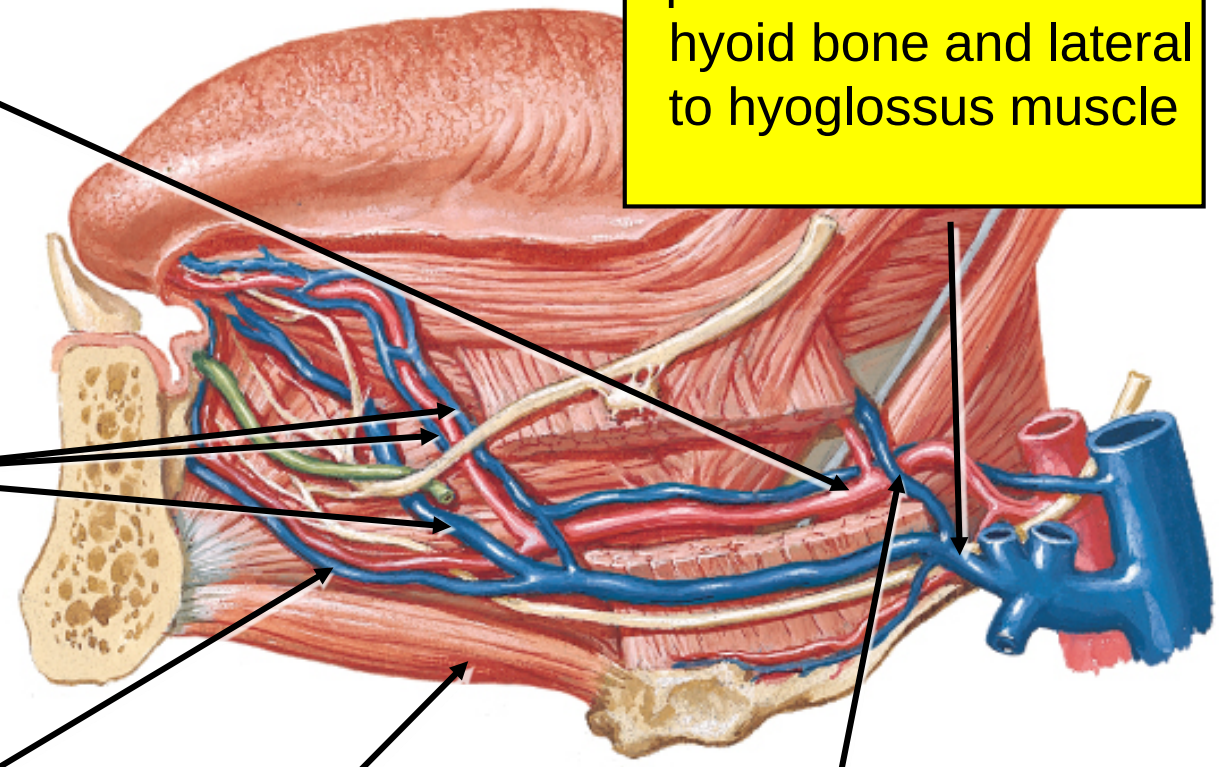
Lingual artery
- branch of external carotid artery
- passes above level of hyoid bone and deep to hyoglossus muscle



NERVES, VESSELS & DUCTS IN FLOOR OF MOUTH

Lingual artery
- branch of external carotid artery
- passes above level of hyoid bone and deep to hyoglossus muscle

Lingual vein
- Tributary of internal jugular vein
- passes above level of hyoid bone and lateral to hyoglossus muscle

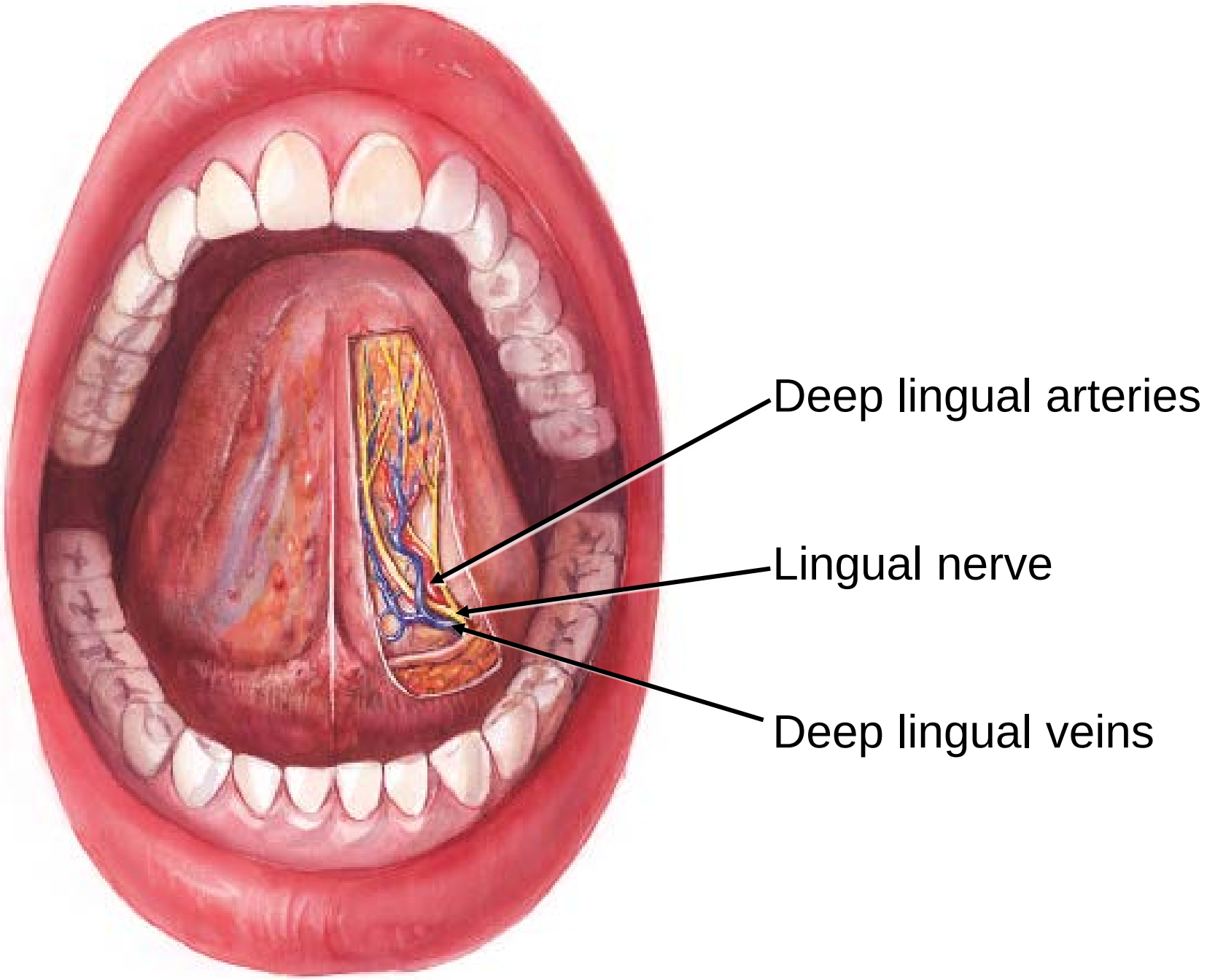


Deep lingual veins

Sublingual vein

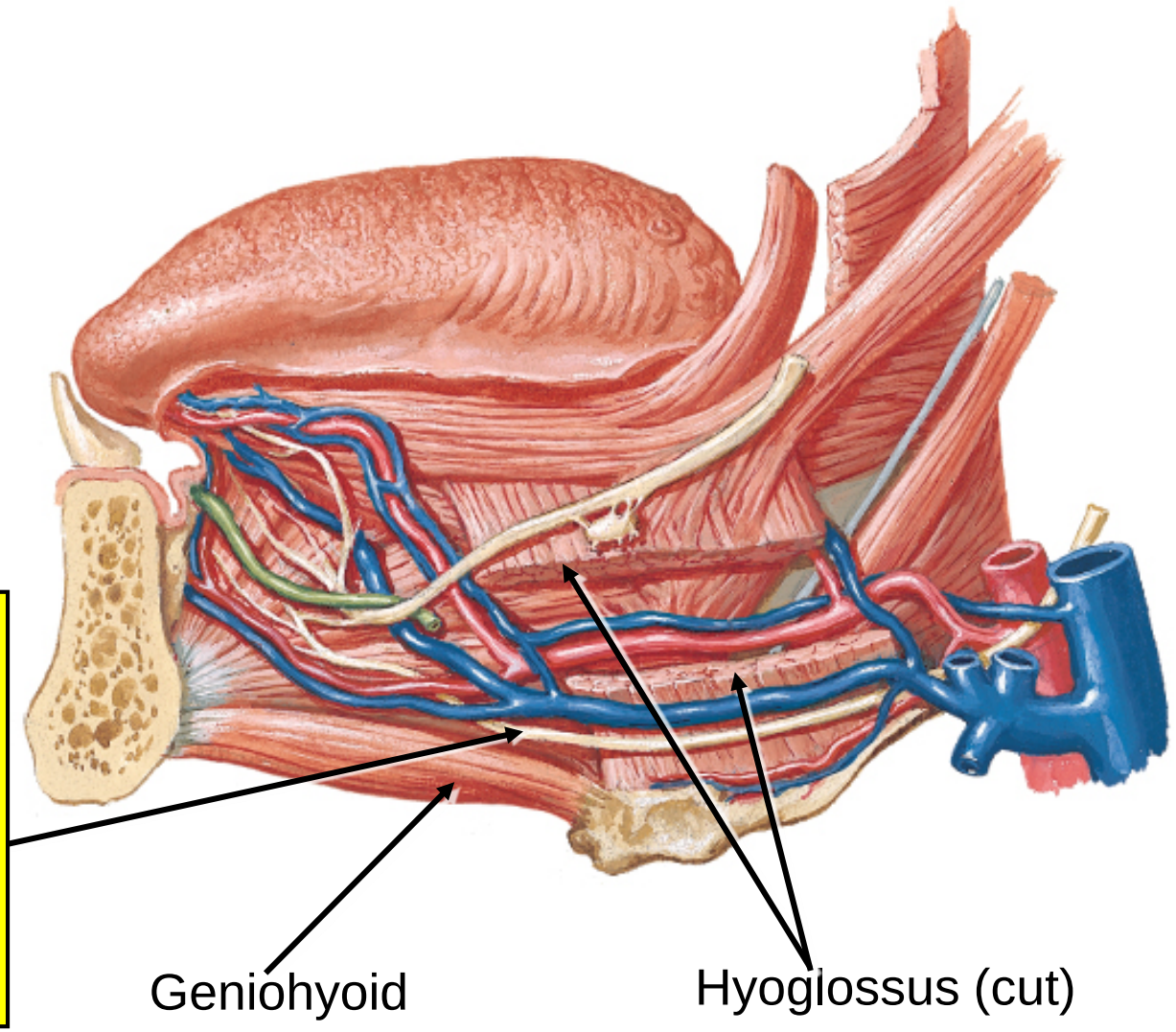
Geniohyoid

Dorsal lingual vein

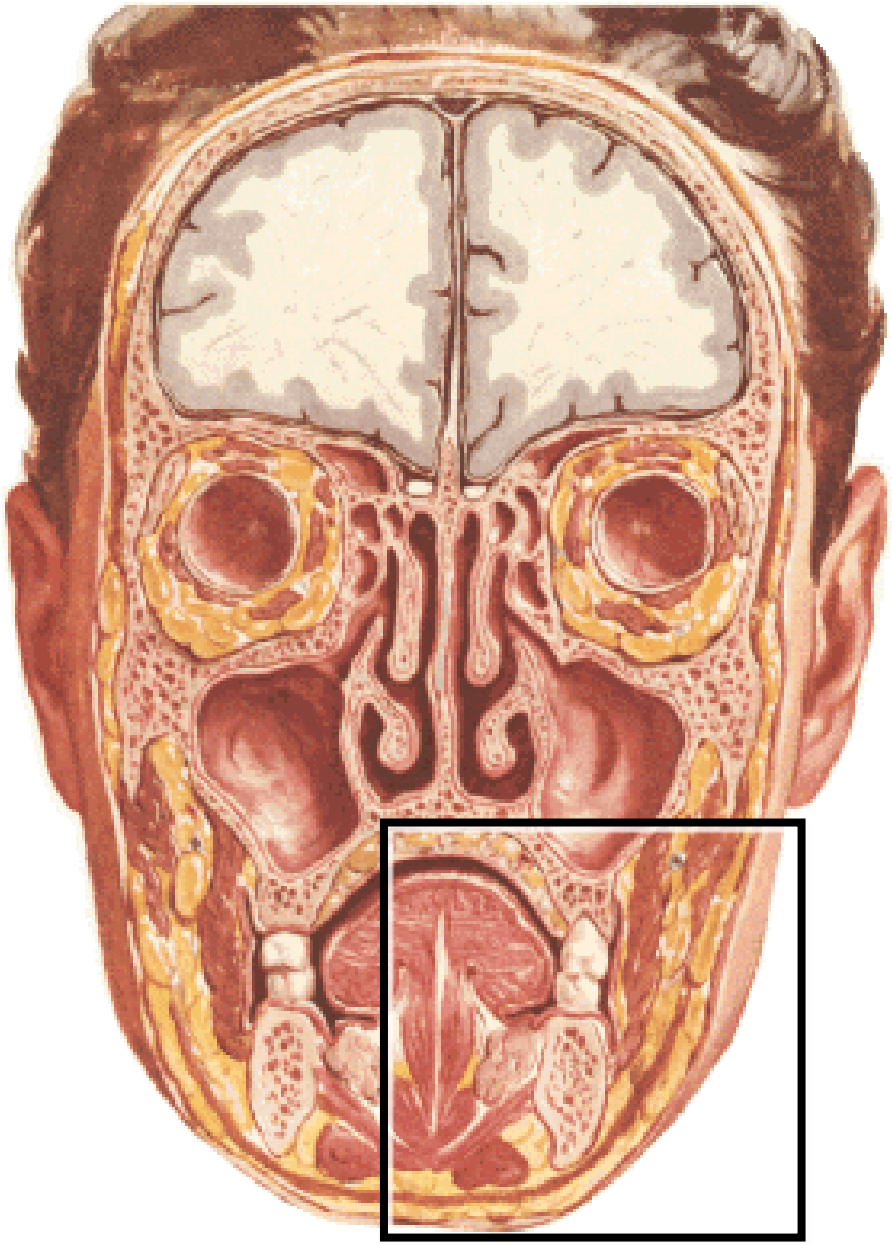

Deep lingual arteries
Lingual nerve
Deep lingual veins

NERVES, VESSELS & DUCTS IN FLOOR OF MOUTH

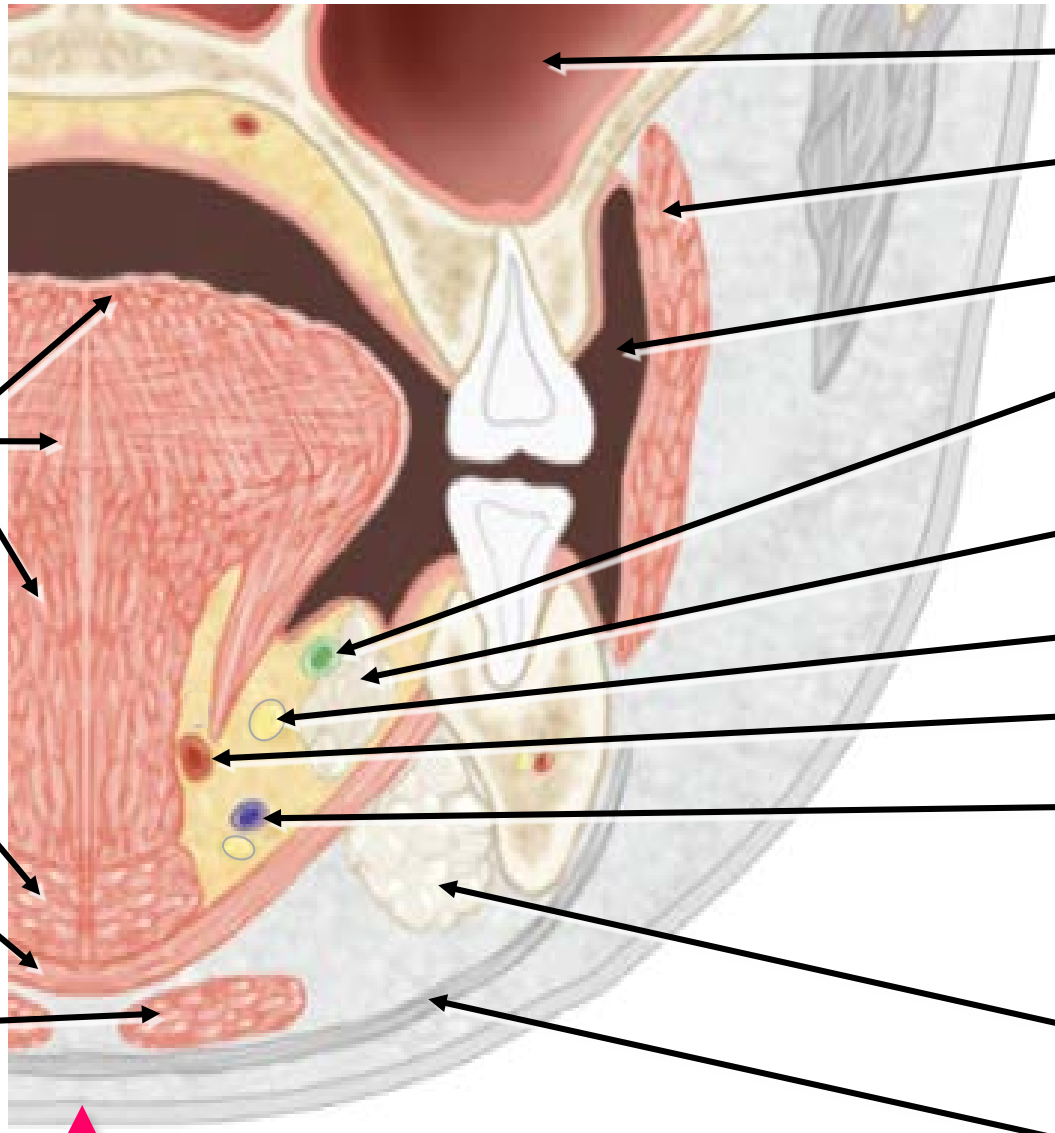
Hypoglossal nerve
- runs anteriorly above level of hyoid
- passes lateral to hyoglossus but medial to stylohyoid and digastric muscles (not seen here)



CORONAL SECTION OF ORAL CAVITY

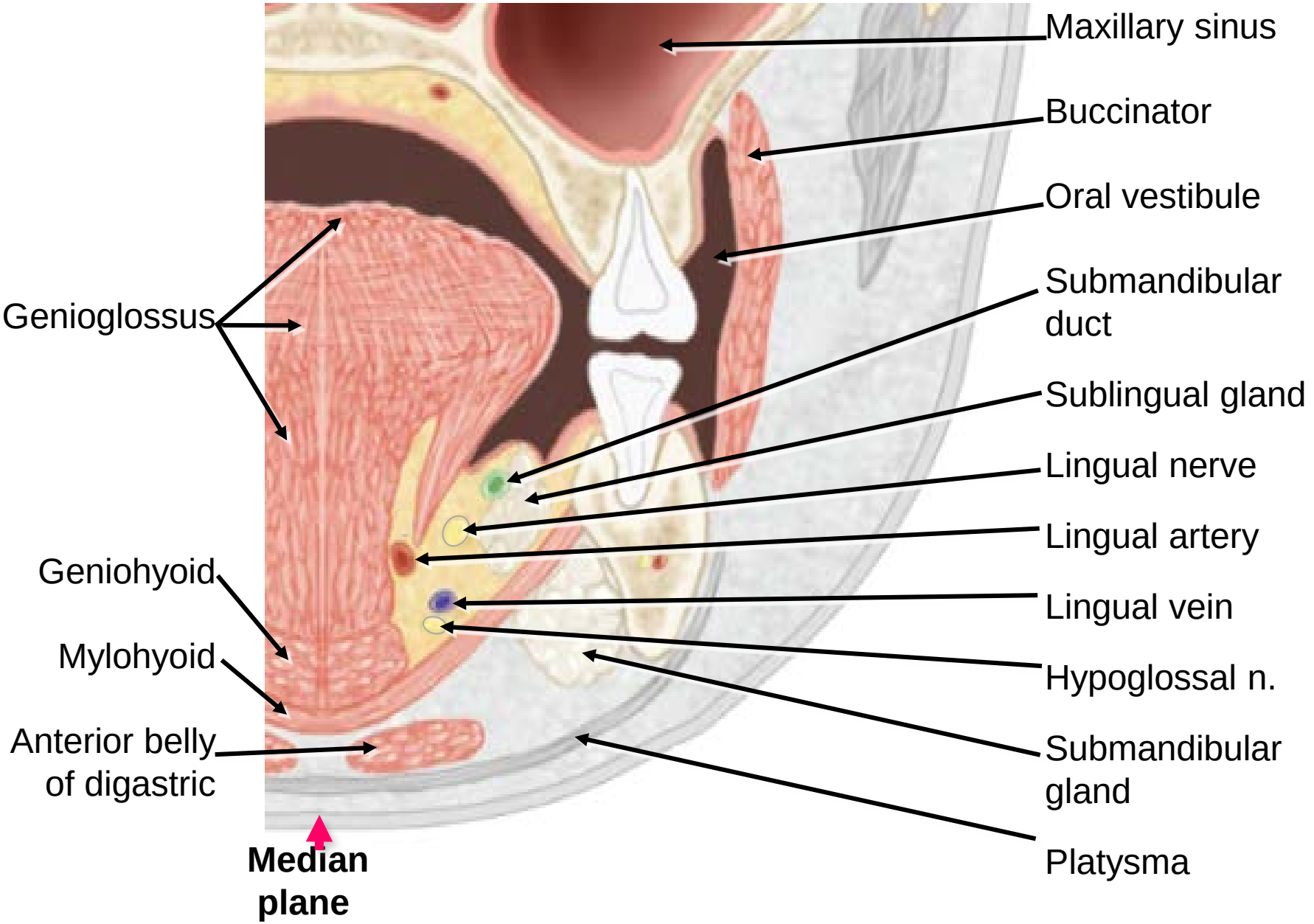


CORONAL SECTION OF ORAL CAVITY



Maxillary sinus
Buccinator
Oral vestibule
Submandibular duct
Sublingual gland
Lingual nerve
Lingual artery
Lingual vein
Submandibular gland
Platysma
Genioglossus
Geniohyoid
Mylohyoid
Anterior belly of digastric
Median plane

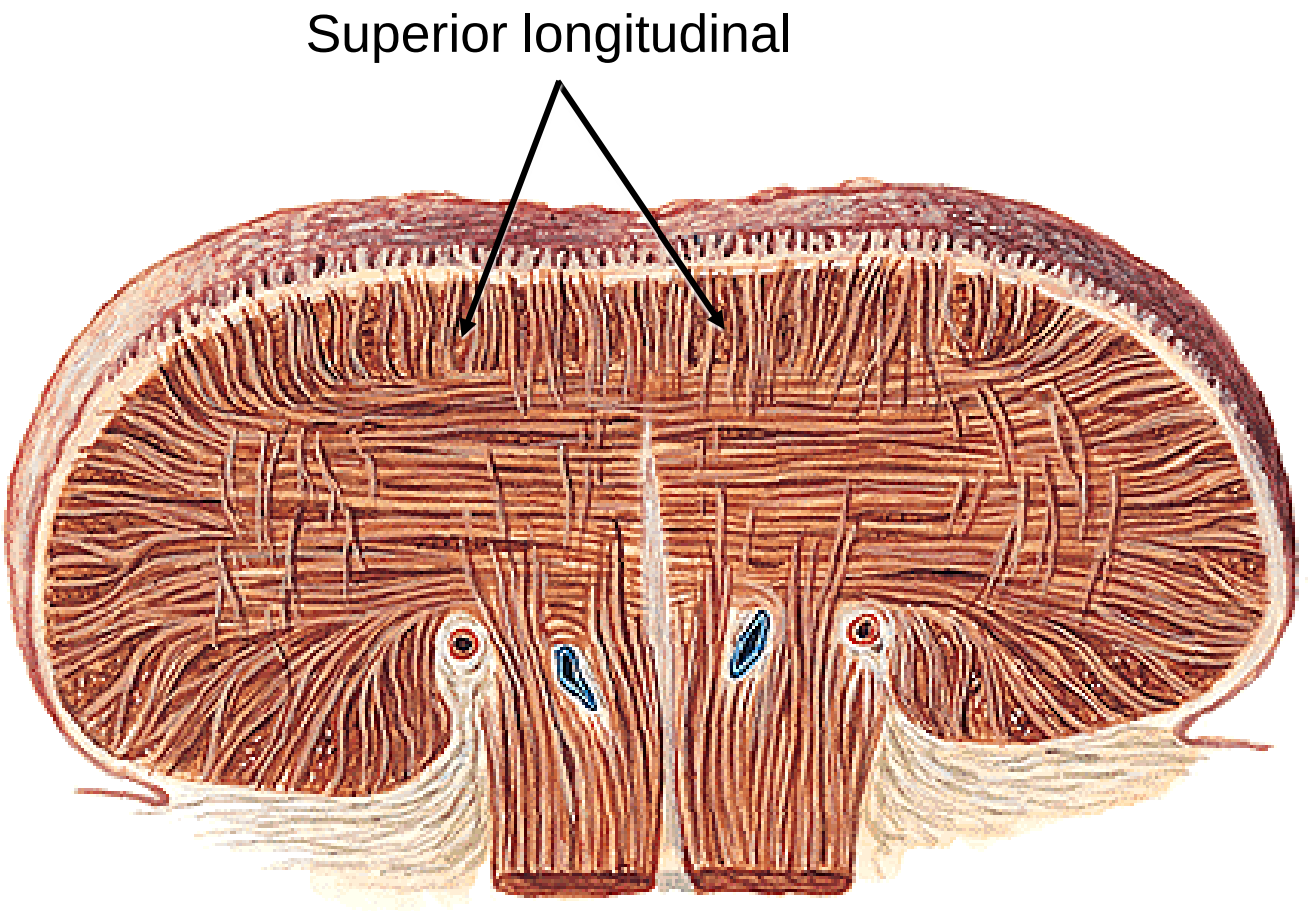
CORONAL SECTION OF ORAL CAVITY



INTRINSIC MUSCLES OF TONGUE

Coronal Section

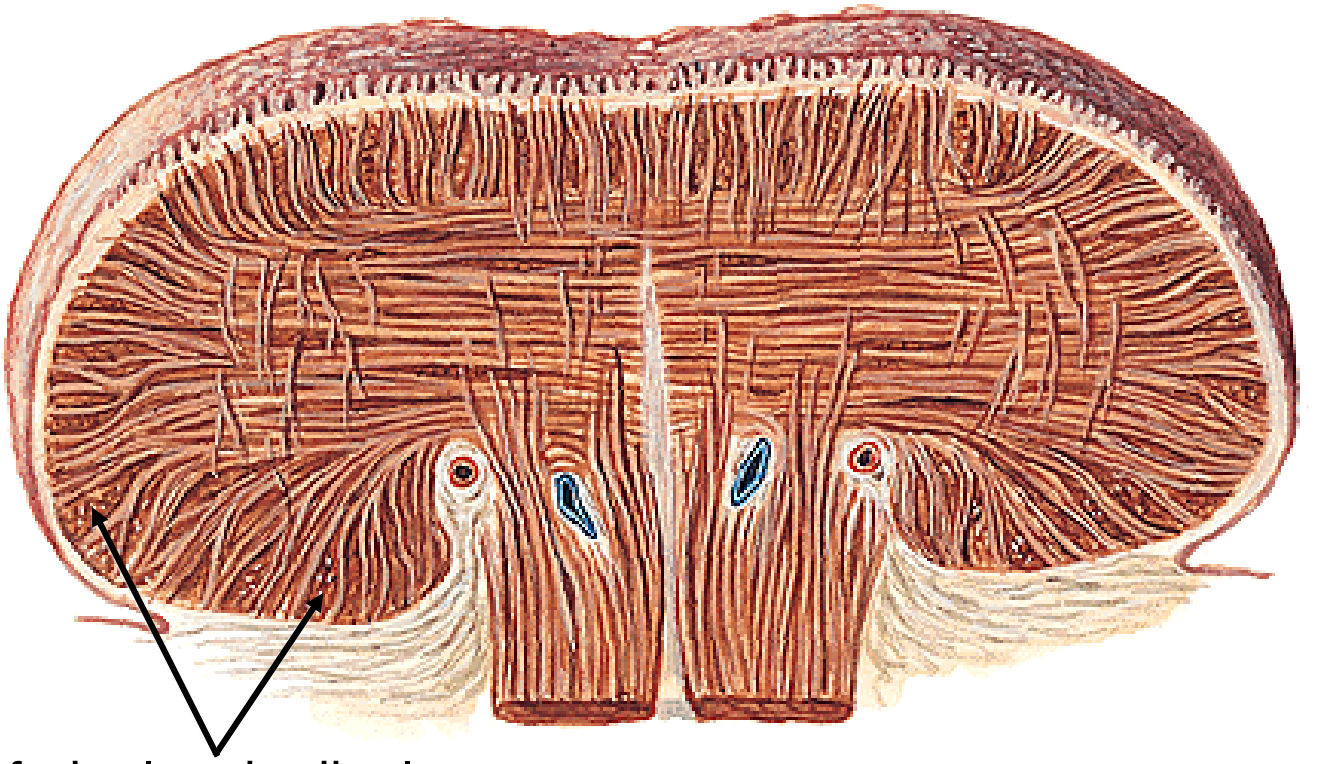
- from root to apex, along dorsum
- curls tip and sides of tongue superiorly (makes dorsum of tongue concave)



INTRINSIC MUSCLES OF TONGUE

Coronal Section

- from root to apex, along inferior surface
- curls tip inferiorly (makes dorsum convex)

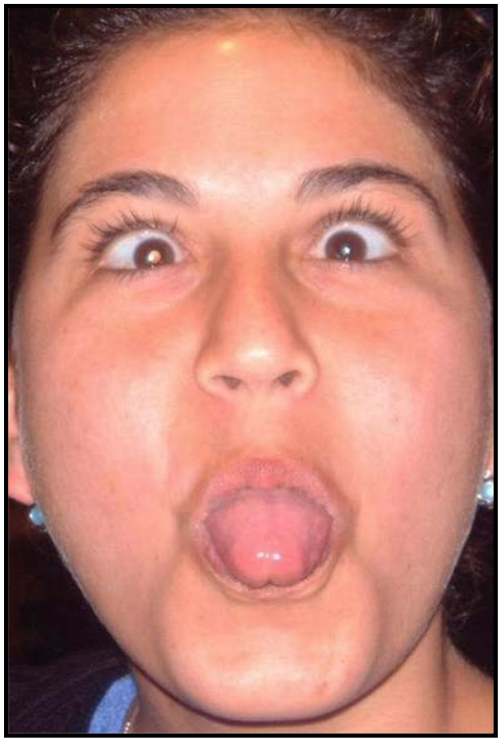


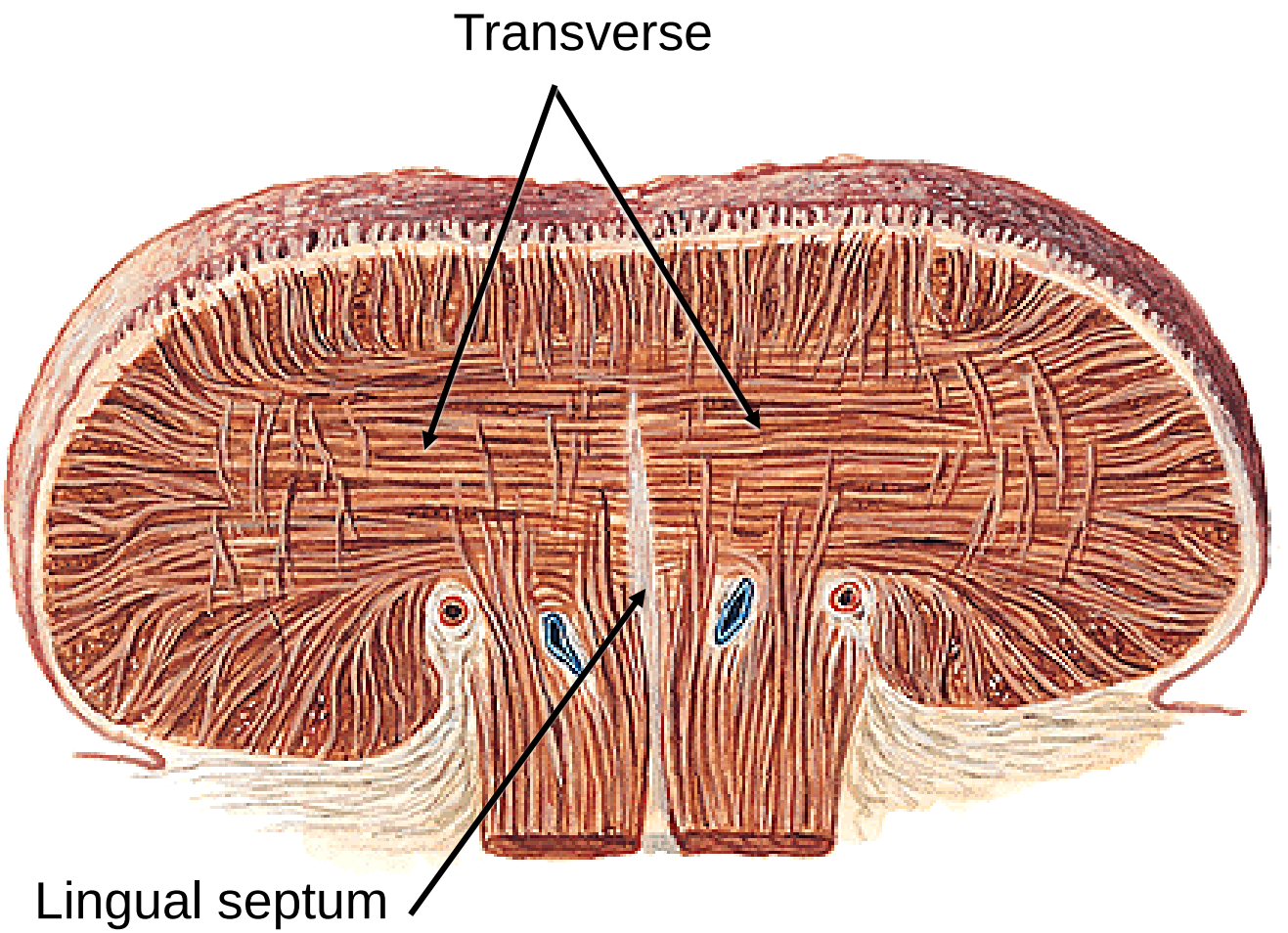
Inferior longitudinal

INTRINSIC MUSCLES OF TONGUE

Coronal Section

- runs laterally from lingual septum
- lies inferior to superior longitudinal muscle
- narrows and increases height of tongue

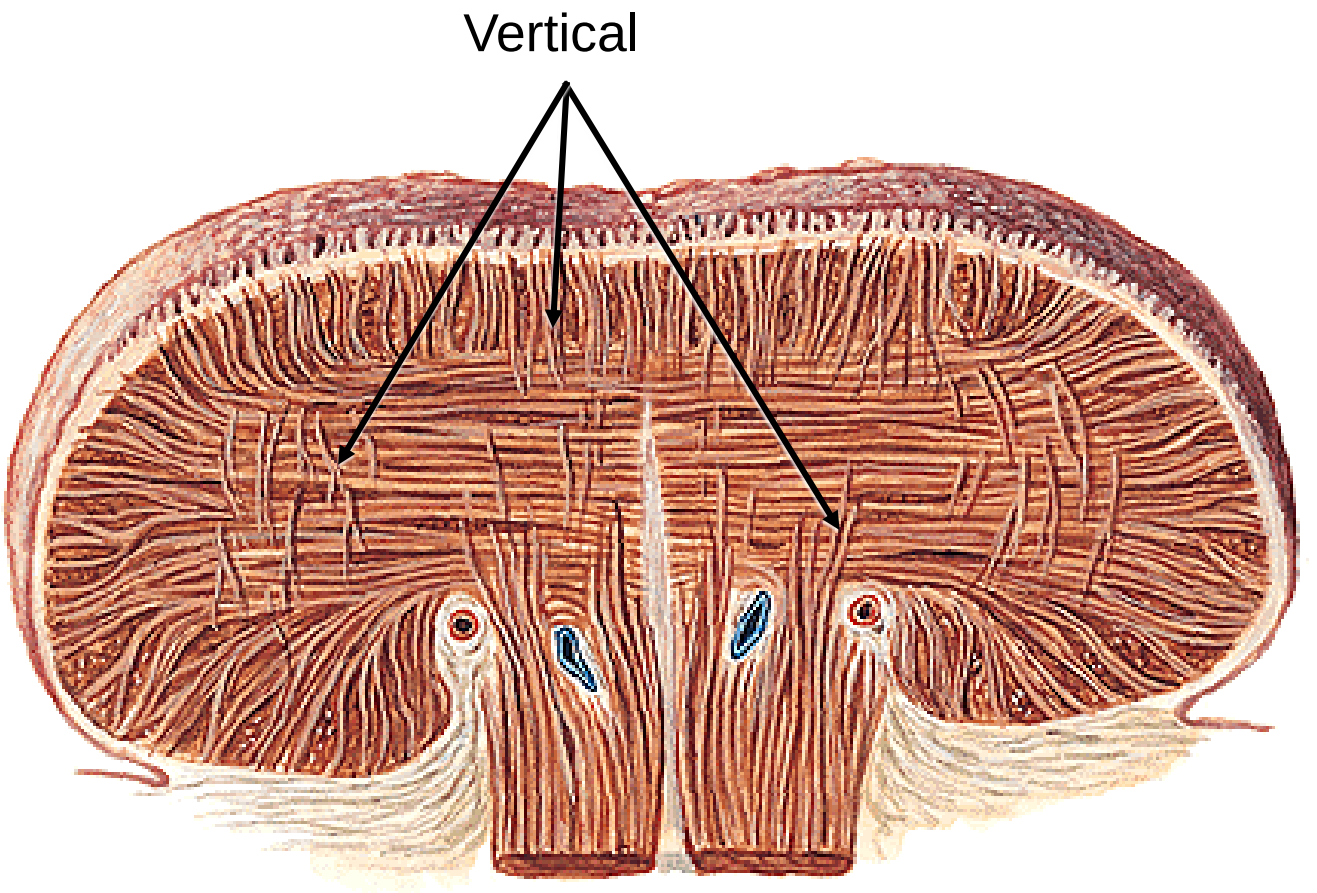




INTRINSIC MUSCLES OF TONGUE

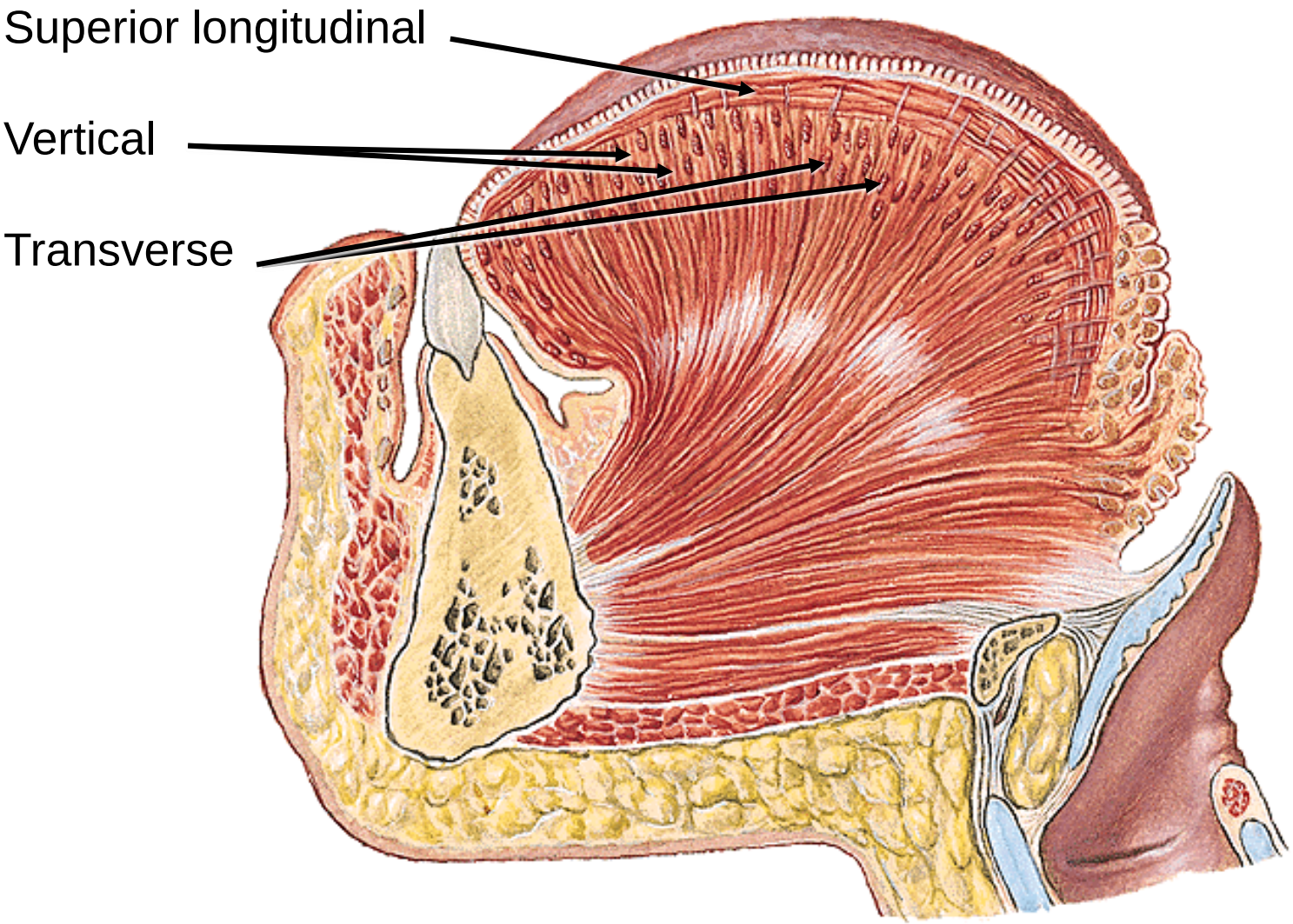
- from dorsum to inferior surface
- decussates with transverse fibers
- flattens and broadens tongue
- acts with transverse fibers to protrude tongue by lengthening it

Coronal Section

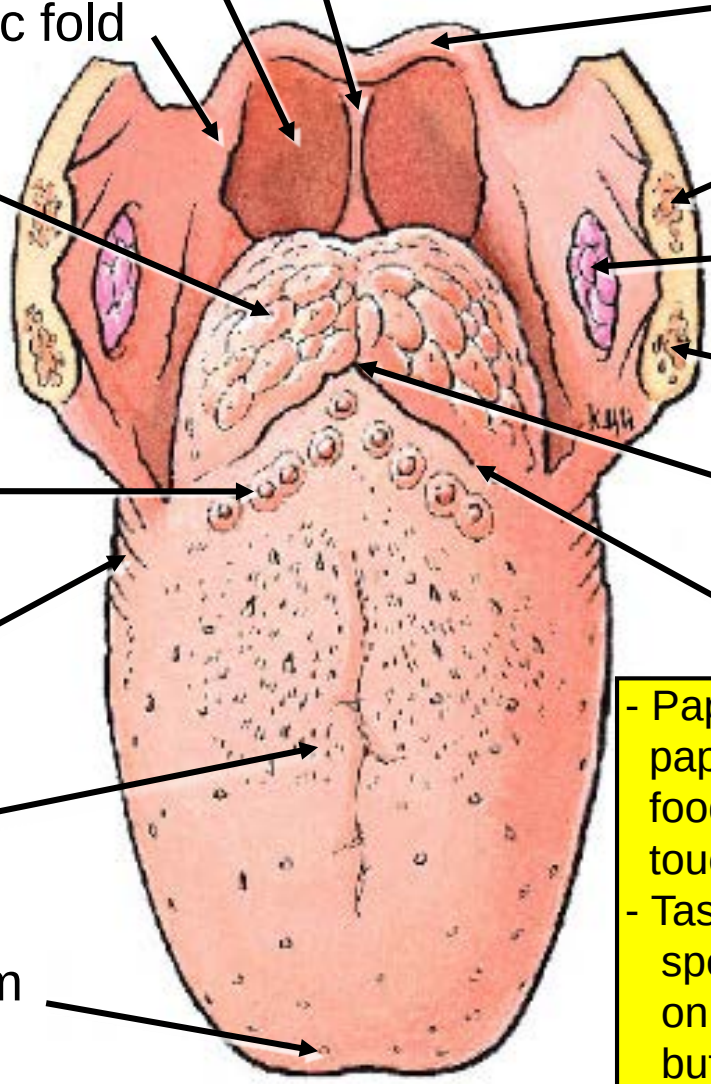


INTRINSIC MUSCLES OF TONGUE

Sagittal Section



MOUTH AND DORSUM OF TONGUE



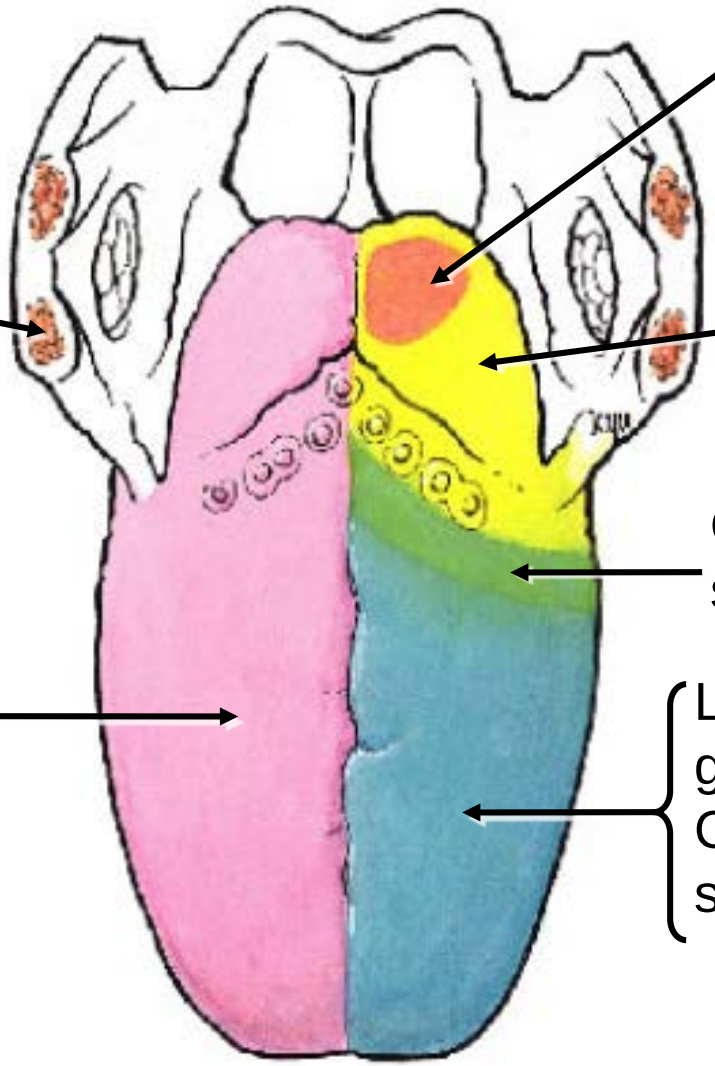
Median glossoepiglottic fold
Vallecula
Lateral glossoepiglottic fold
Lingual follicles
Epiglottis
Palatopharyngeus
Palatine tonsil
Palatoglossus
Foramen cecum
Sulcus terminalis
Papillae
Vallate
Foliate
Filiform
Fungiform

- Papillae, especially filiform papillae, primarily used in handling food; they have highly sensitive touch receptors.
- Taste buds are receptor organs for special sensation of taste. Some on filiform and fungiform papillae but most are in troughs around vallate papillae.

INNERVATION OF TONGUE

MOTOR NERVES

SENSORY NERVES



Internal laryngeal n. (CN X), general & special sensory (taste)

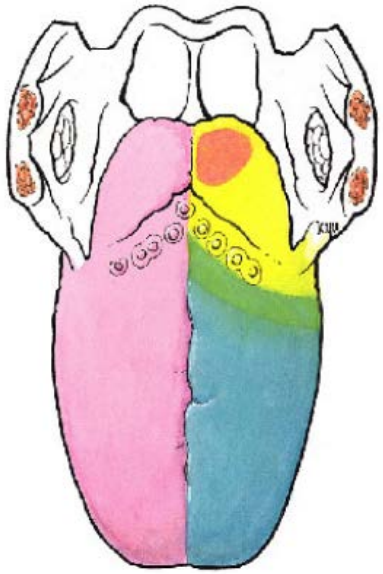
Palatoglossus (vagus, CN X)

Glossopharyngeal n. (CN IX), general & special sensory (taste)

Overlapping nerve supply

Hypoglossal nerve (CN XII), all other muscles of tongue

Lingual nerve (CN V_3), general sensory + Chorda tympani (CN VII), special sensory (taste)



INNERVATION OF TONGUE

	MOTOR	GENERAL SENSORY	SPECIAL SENSORY
POSTERIOR 1/3 + VALLATE PAPILLAE	Hypoglossal nerve (except vagus nerve to palato-glossus muscle)	Glossopharyngeal nerve, plus vagus in most posterior part (internal laryngeal nerve)	Glossopharyngeal nerve, plus vagus in most posterior part (internal largyngeal nerve)
ANTERIOR 2/3 EXCEPT VALLATE PAPILLAE	Hypoglossal nerve	Lingual nerve (V_3)	Chorda tympani nerve (VII)

SOME TASTE ON PHARYNX AND SOFT PALATE

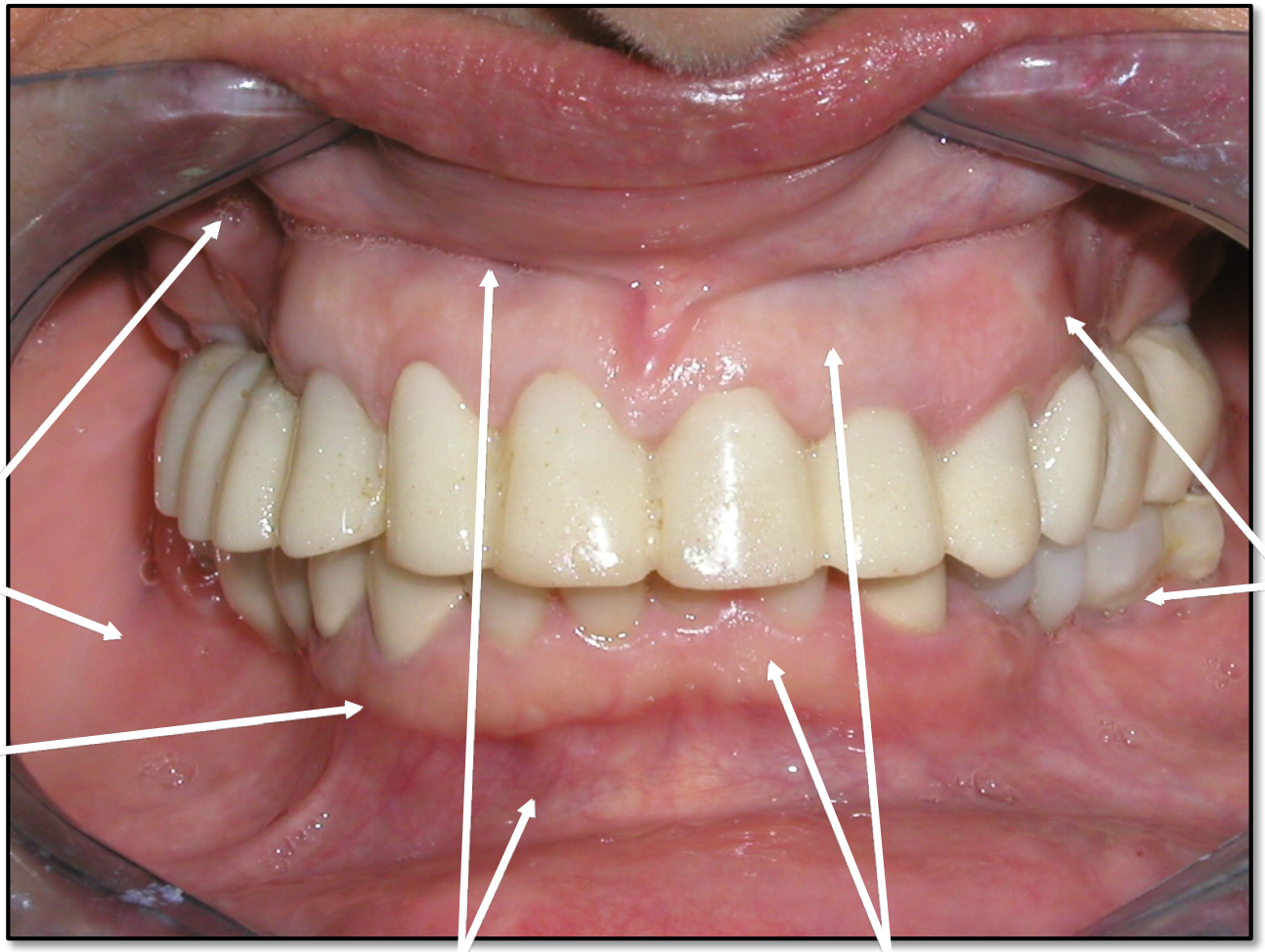
PHARYNX − internal laryngeal nerve

SOFT PALATE − greater and lesser palatine nerves (ascend to pterygopalatine ganglion → nerve of pterygoid canal → greater petrosal nerve → geniculate ganglion → facial)

Oral Region

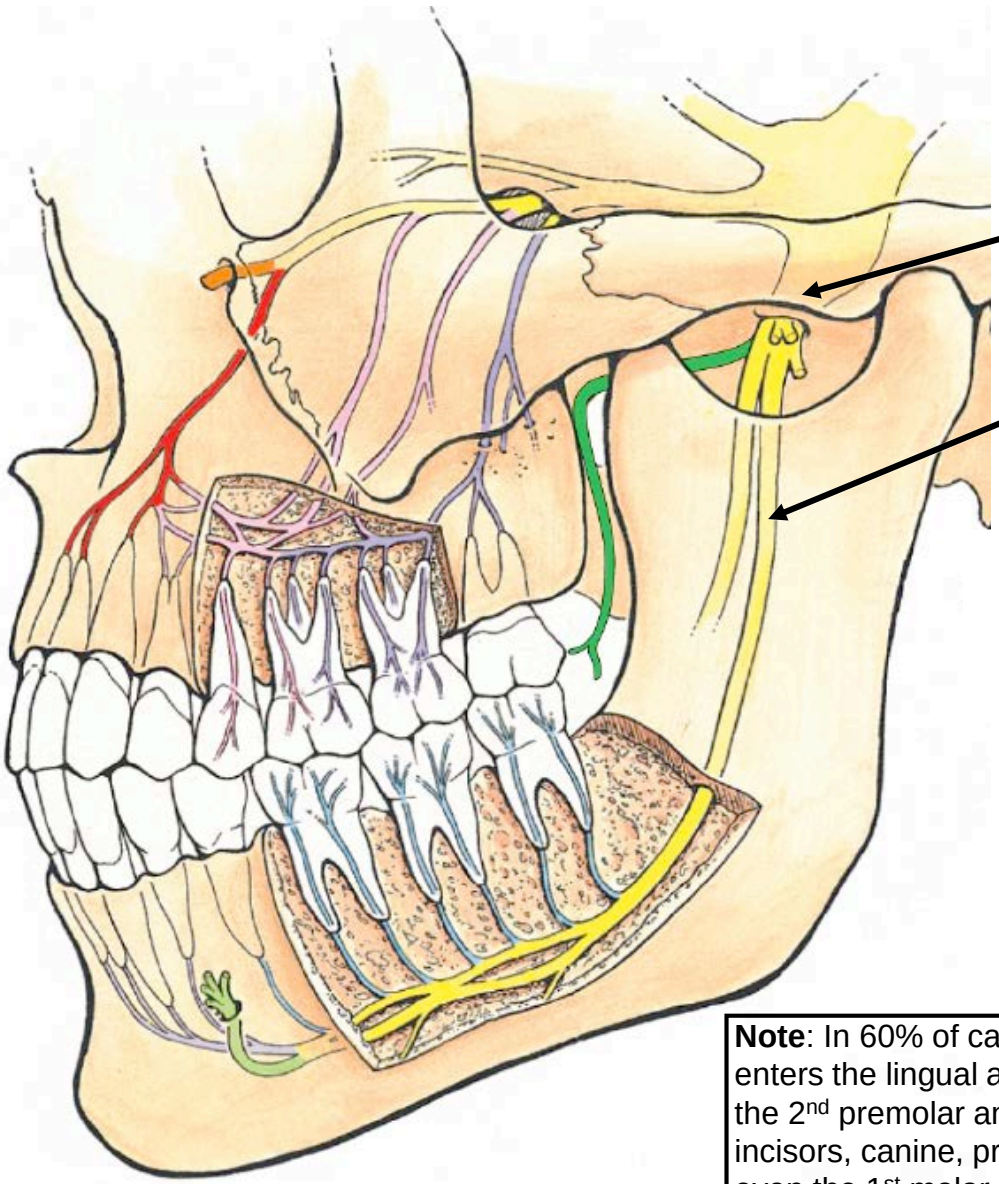
- Overview of oral cavity and oral vestibule
- Hard and soft palate
- Salivary glands
- Muscles of submandibular region
- Tongue
- **Gingiva & teeth**
- Pharynx

Some Basic Terminology



– in general, the term “labial” refers to buccal tissue from canine to canine

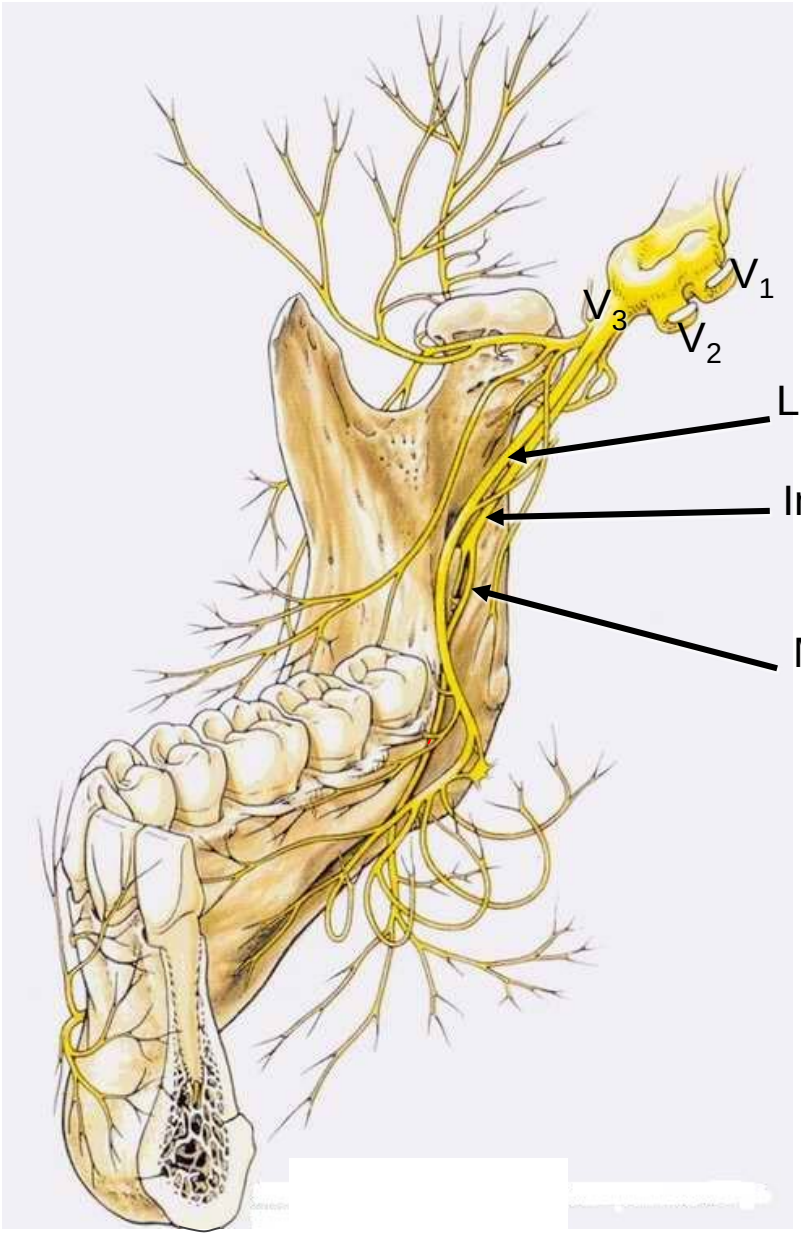
Innervation of Permanent Lower Dentition



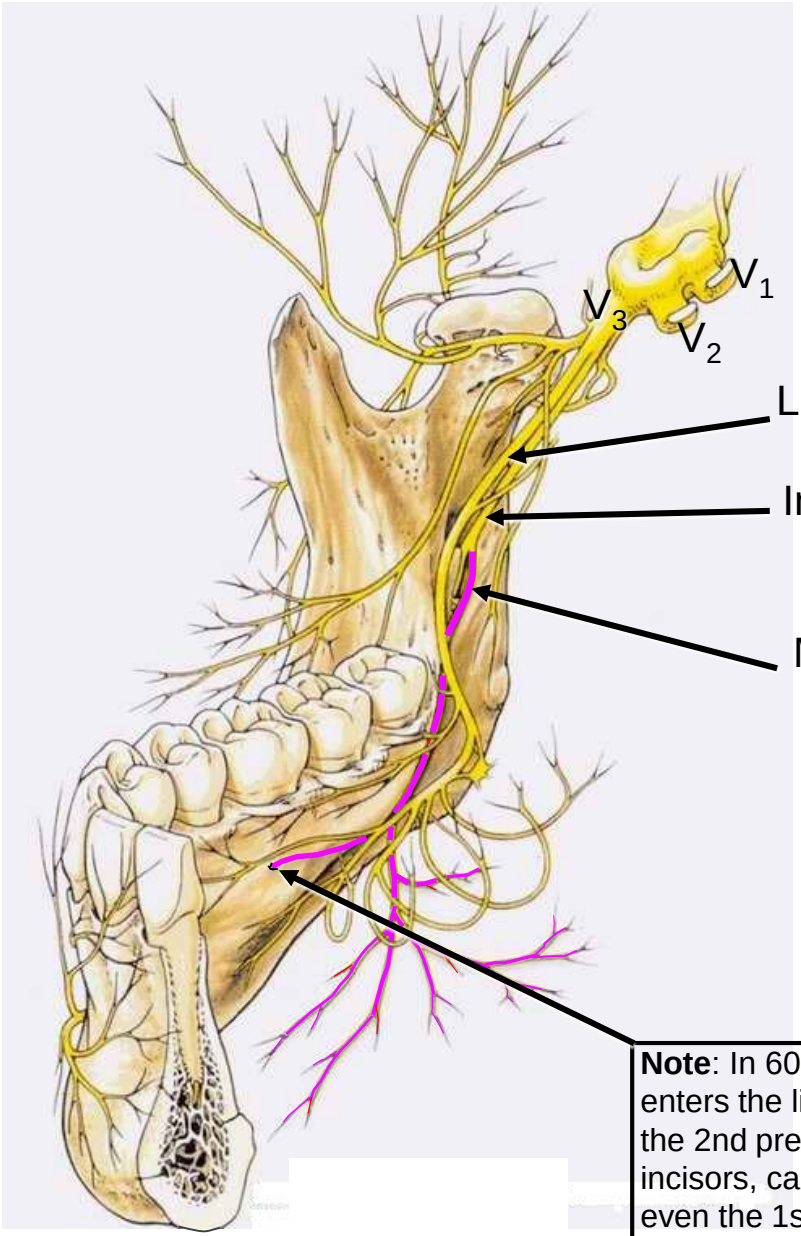
Note: In 60% of cases, the mylohyoid nerve enters the lingual aspect of the mandible near the 2nd premolar and carries sensation from the incisors, canine, premolars and sometimes even the 1st molar (Blanton and Jeske, 2003).

(Moore et al., 2010)

Innervation of Permanent Lower Dentition

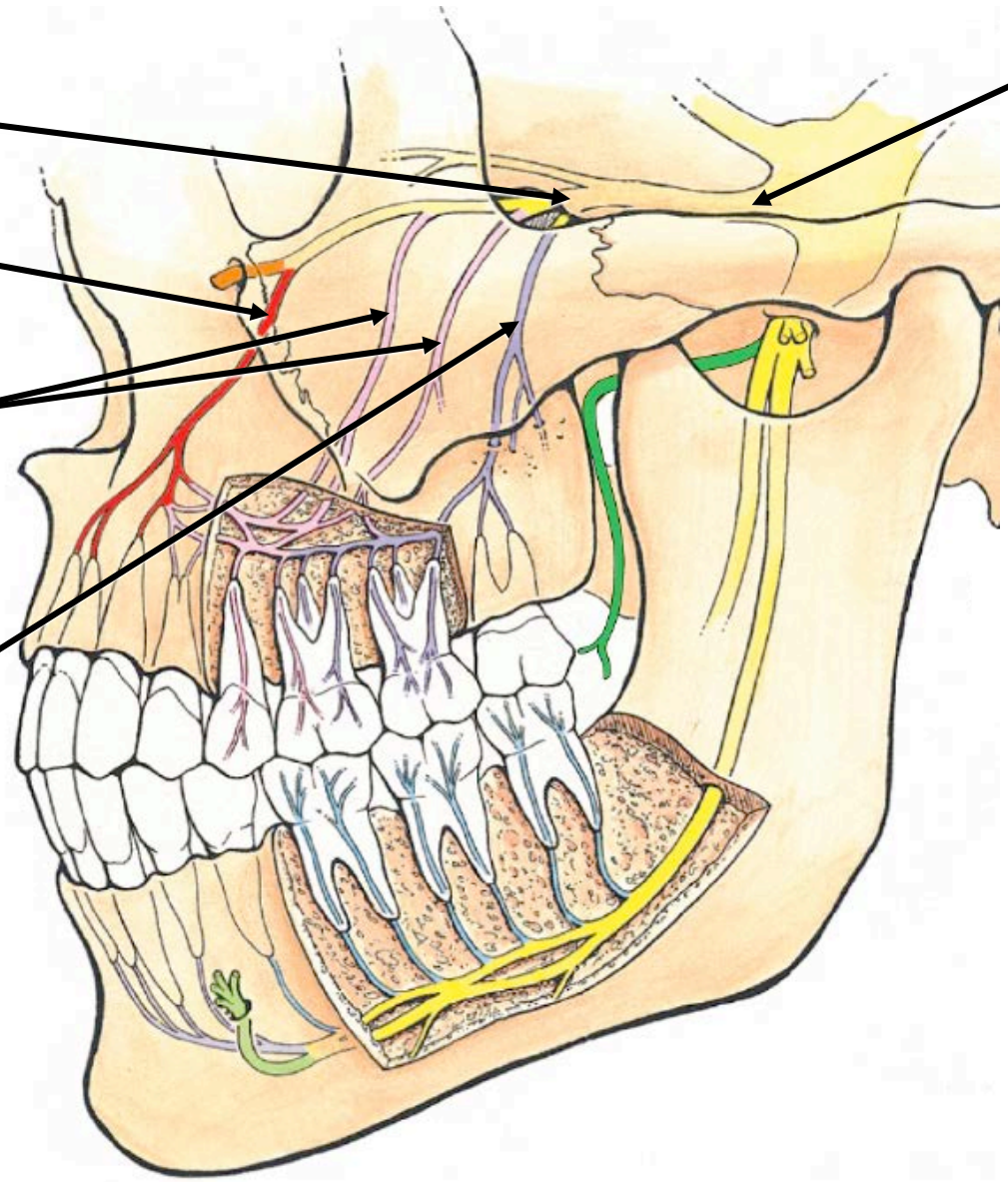


Innervation of Permanent Lower Dentition



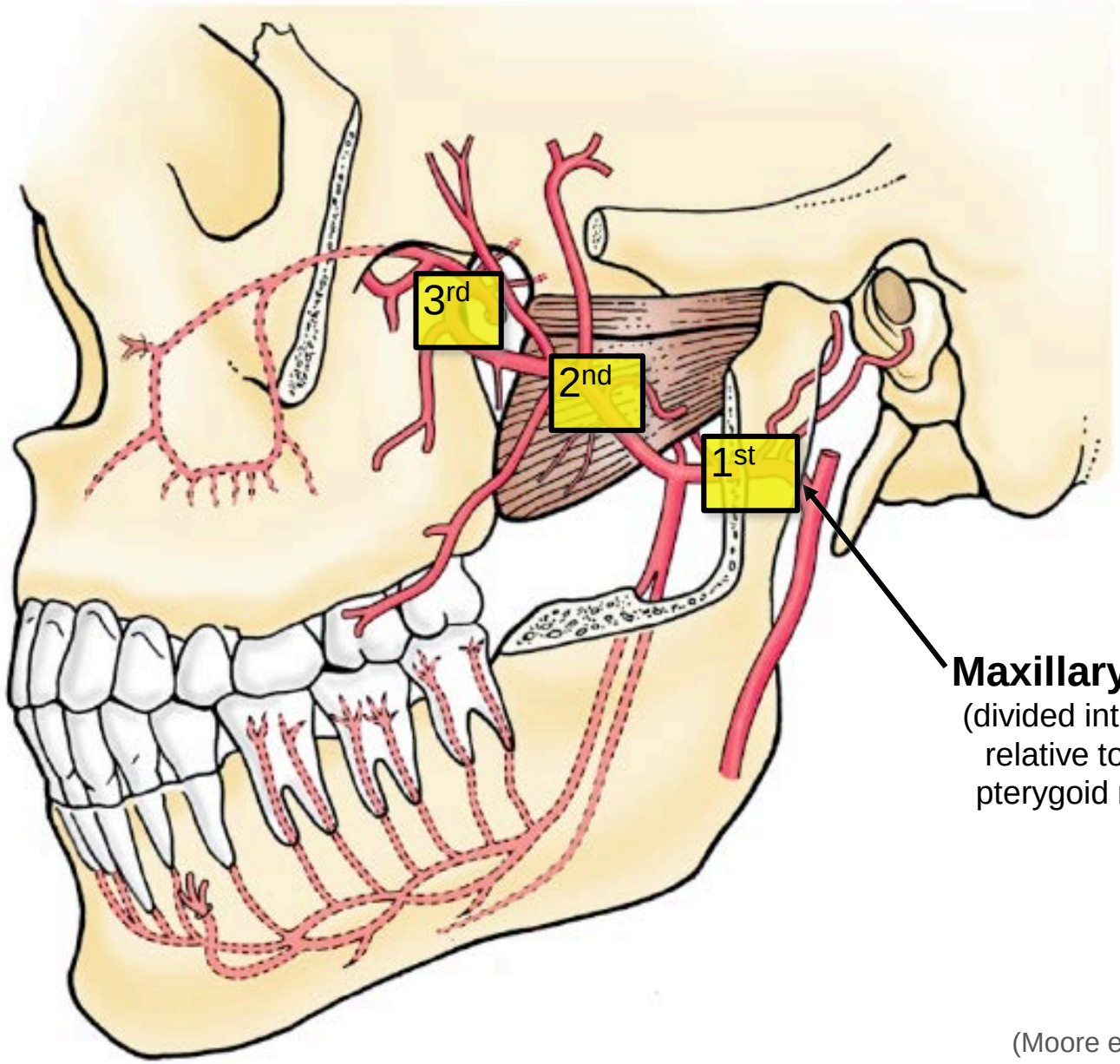
Note: In 60% of cases, the mylohyoid nerve enters the lingual aspect of the mandible near the 2nd premolar and carries sensation from the incisors, canine, premolars and sometimes even the 1st molar (Blanton and Jeske, 2003)

Innervation of Permanent Upper Dentition



(Moore et al., 2010)

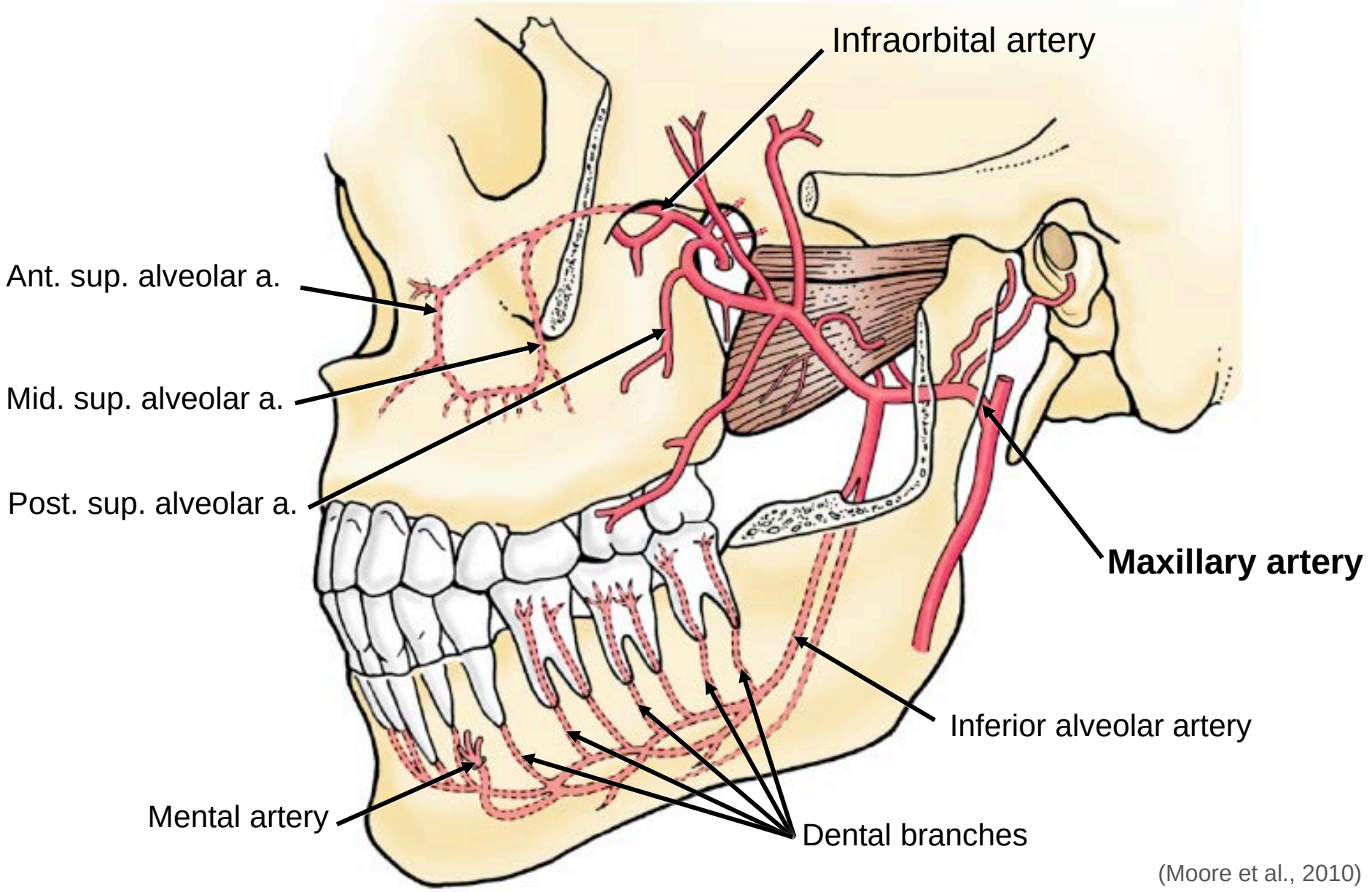
Blood Supply to Permanent Dentition



Maxillary artery
(divided into 3 parts relative to lateral pterygoid muscle)

(Moore et al., 2010)

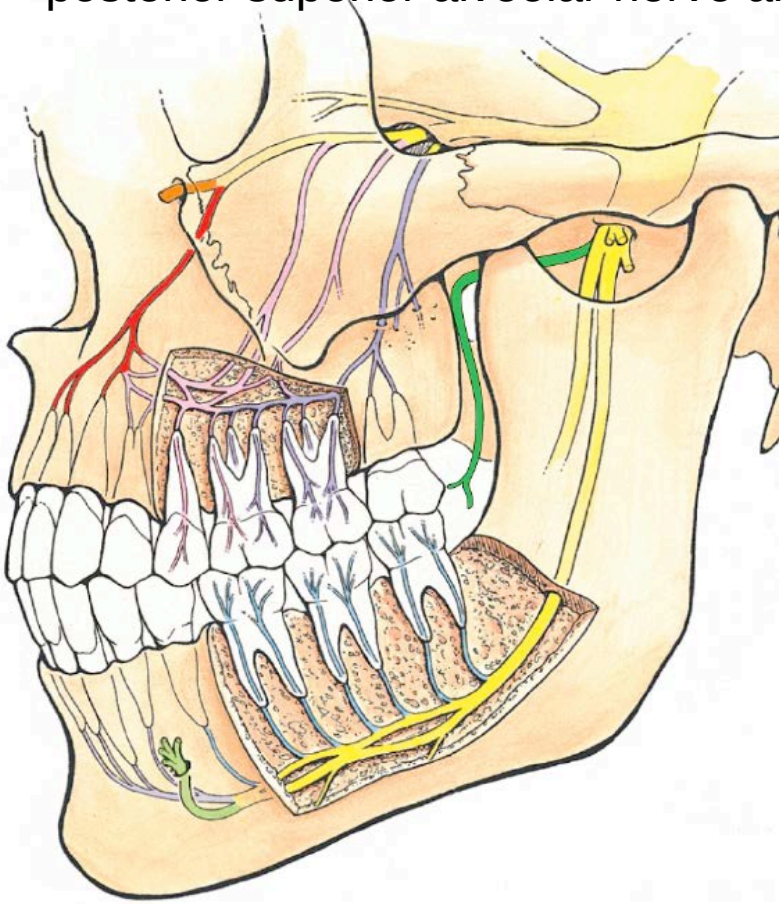
Blood Supply to Permanent Dentition

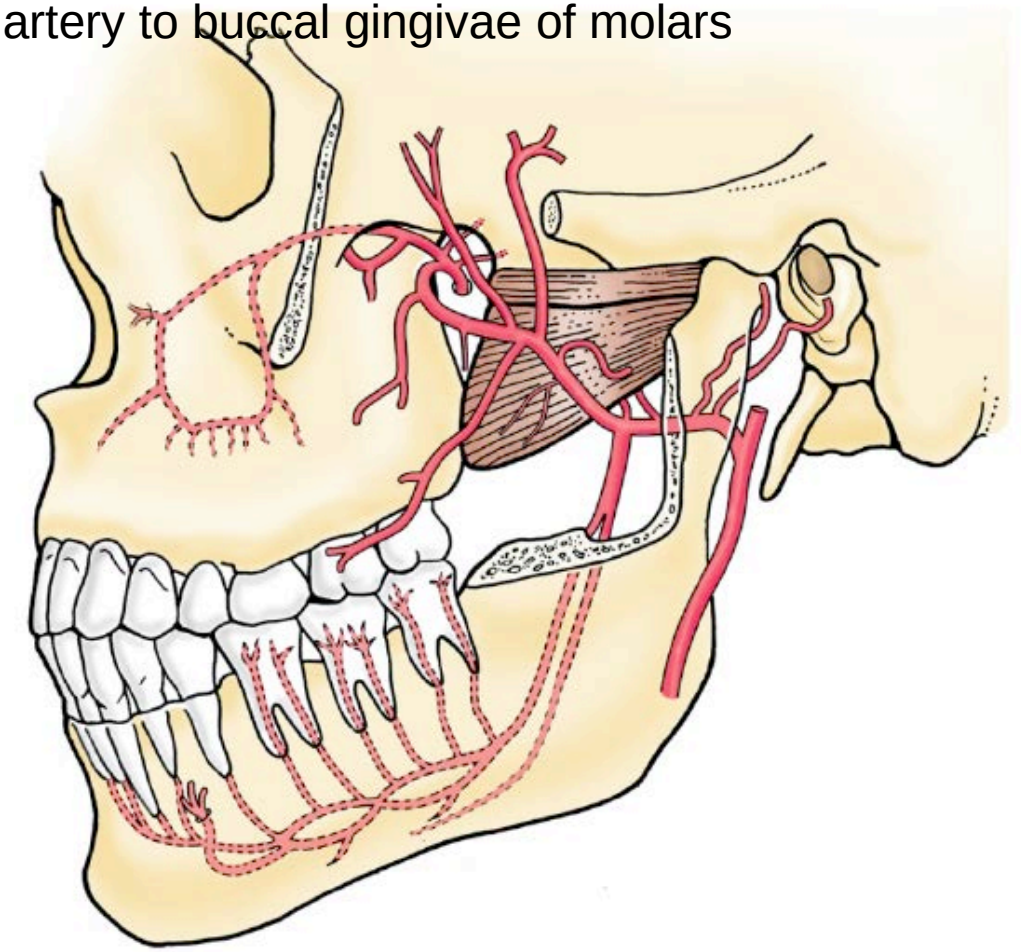


(Moore et al., 2010)

Innervation & Blood Supply to Maxillary Buccal Gingivae

- essentially the same as for the teeth
- anterior superior alveolar nerve and artery to buccal gingivae of incisors and canine
- middle superior alveolar nerve and artery to buccal gingivae of premolars
- posterior superior alveolar nerve and artery to buccal gingivae of molars



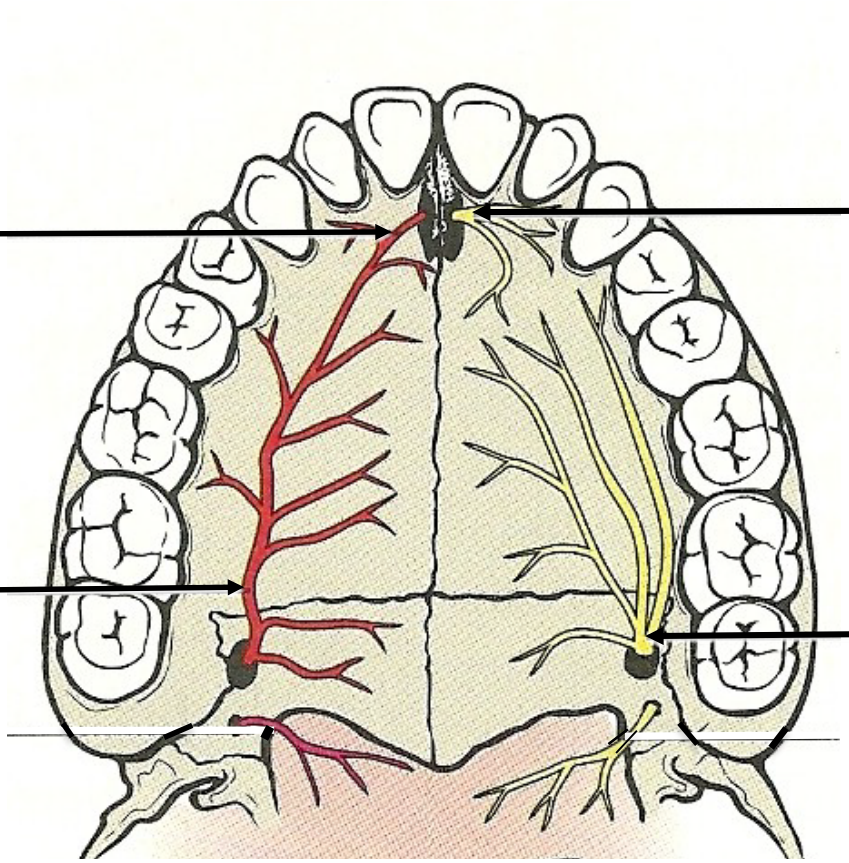


Innervation & Blood Supply to Palatal Gingivae

ARTERIES

Greater palatine a. enters incisive canal to anastomose with post. septal a. (branch of sphenopalatine a.)

Greater palatine a. (gingival branches associated with premolars & molars)



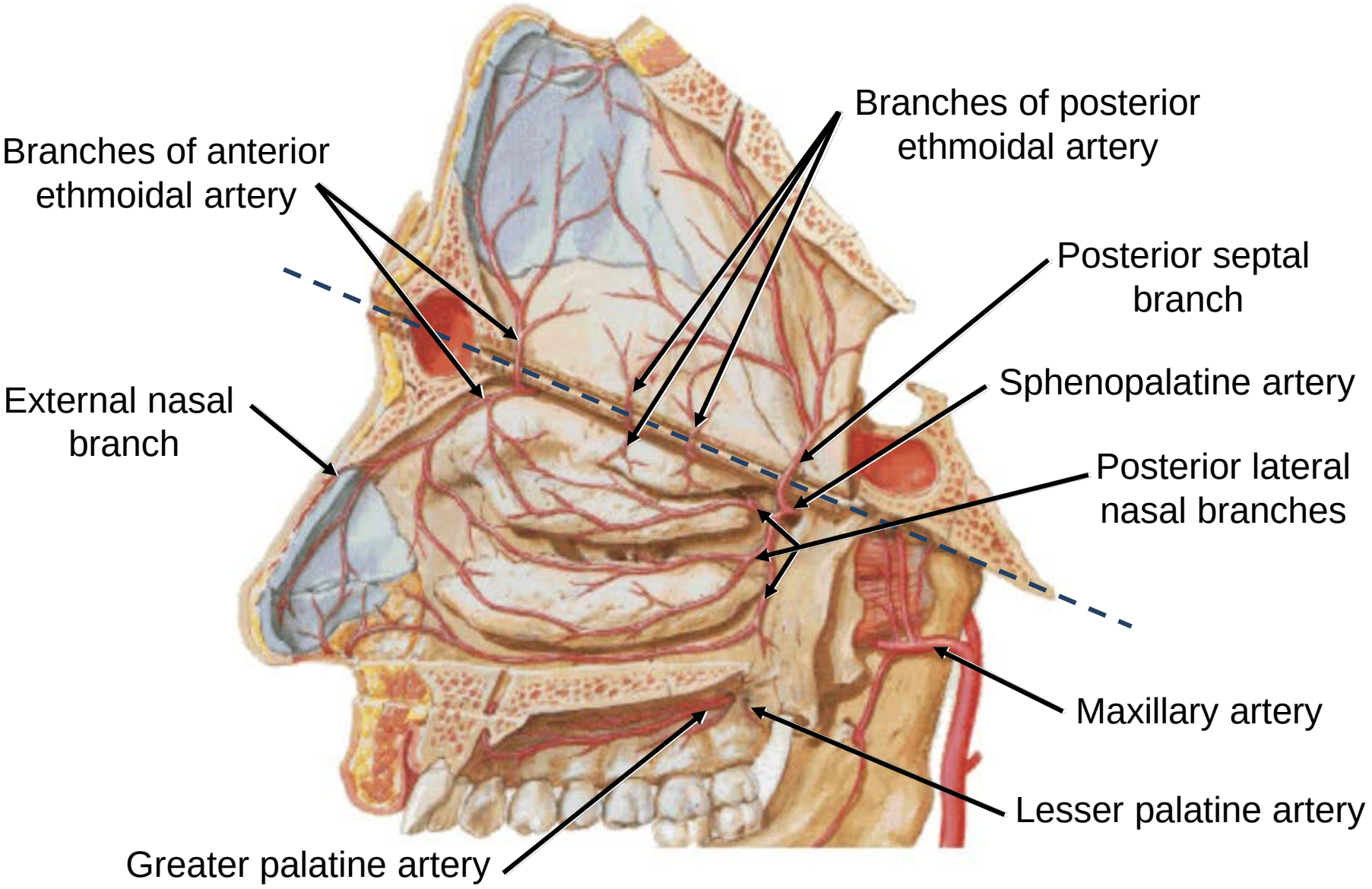
NERVES

Nasoplatine n. (gingival branches associated with incisors & canine)

Greater palatine n. (gingival branches associated with premolars & molars)

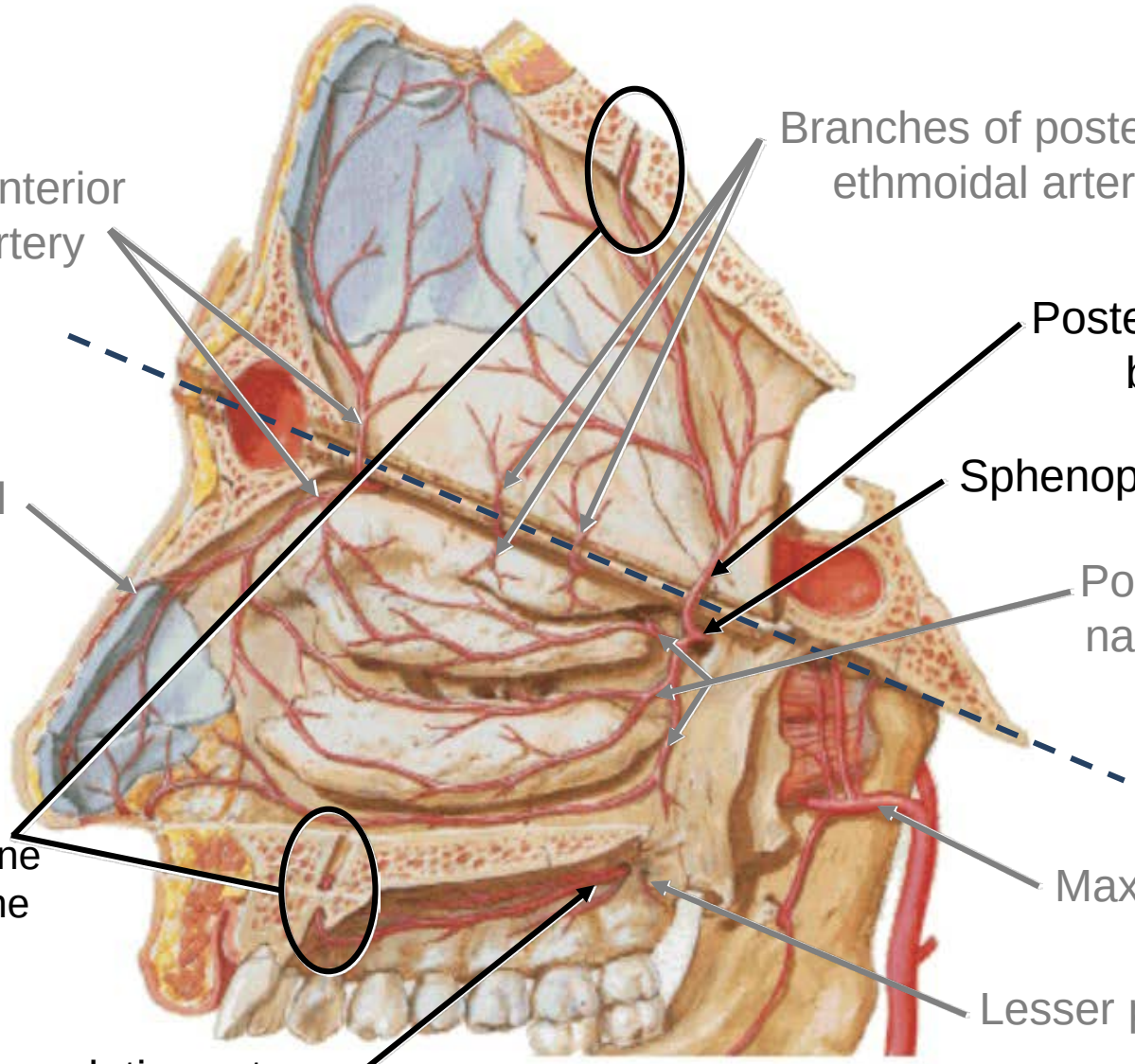
ARTERIES OF THE NASAL CAVITY

(nasal cavity split on schematic hinge)

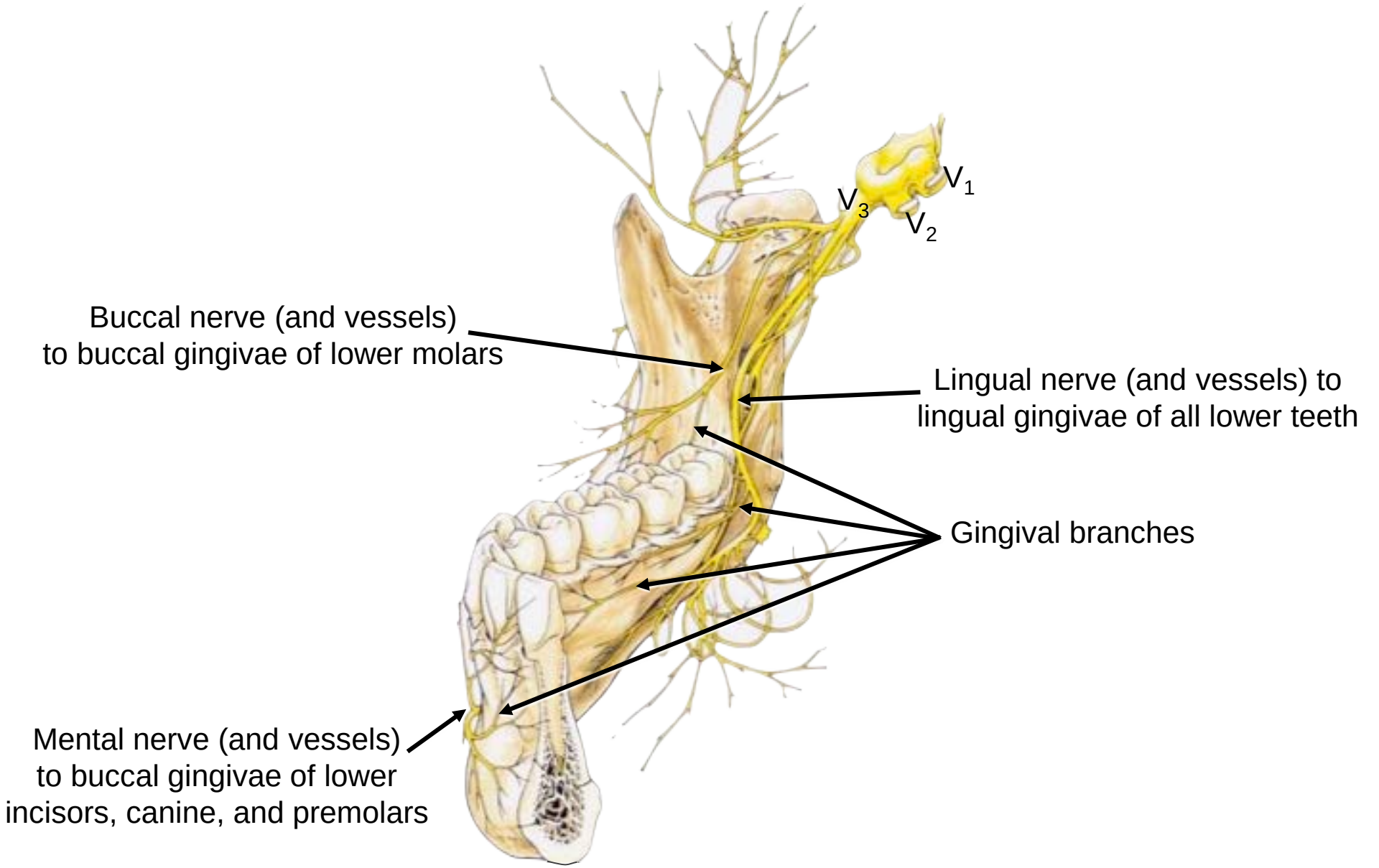


ARTERIES OF THE NASAL CAVITY

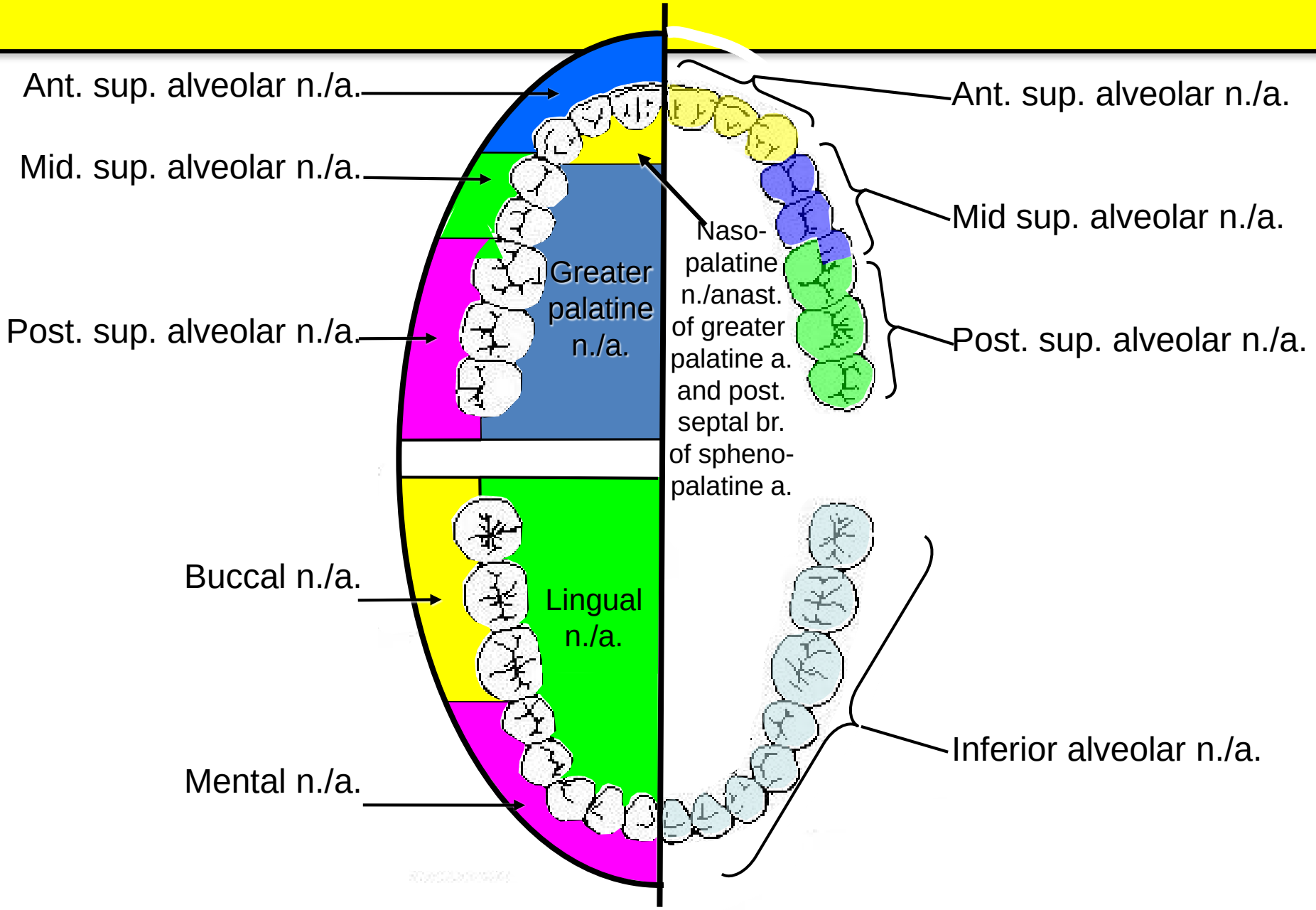
(nasal cavity split on schematic hinge)



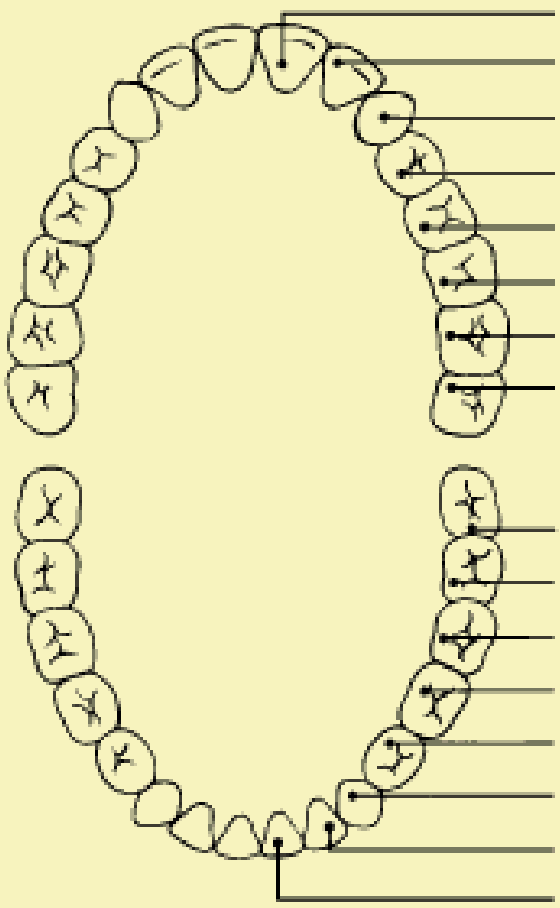
Innervation & Blood Supply to Mandibular Gingivae



Innervation and Blood Supply to Gingivae and Teeth



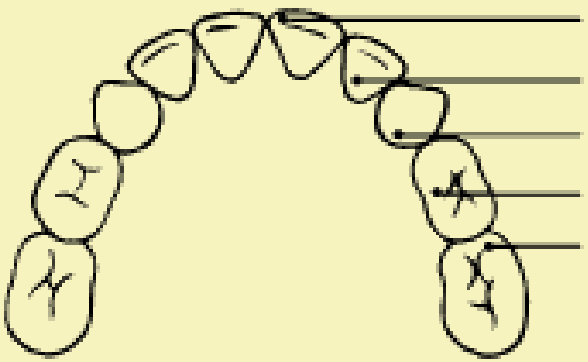
Eruption Sequence of Permanent Teeth



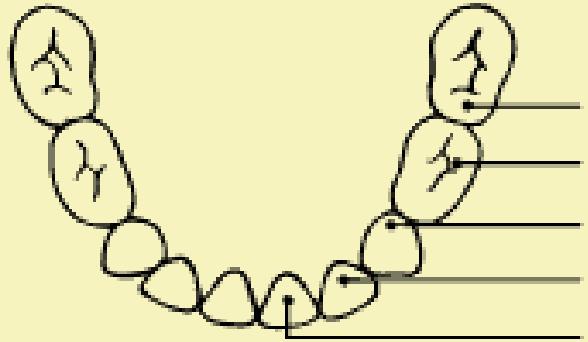
Upper Teeth	Erupt
Central incisor	7-8 yrs.
Lateral incisor	8-9 yrs.
Canine (cuspid)	11-12 yrs.
First premolar (first bicuspid)	10-11 yrs.
Second premolar (second bicuspid)	10-12 yrs.
First molar	6-7 yrs.
Second molar	12-13 yrs.
Third molar (wisdom tooth)	17-21 yrs.

Lower Teeth	Erupt
Third molar (wisdom tooth)	17-21 yrs.
Second molar	11-13 yrs.
First molar	6-7 yrs.
Second premolar (second bicuspid)	11-12 yrs.
First premolar (first bicuspid)	10-12 yrs.
Canine (cuspid)	9-10 yrs.
Lateral incisor	7-8 yrs.
Central incisor	6-7 yrs.

Eruption Sequence of Primary Teeth



Upper Teeth	Erupt	Shed
Central incisor	8-12 mos.	6-7 yrs.
Lateral incisor	9-13 mos.	7-8 yrs.
Canine (cuspid)	16-22 mos.	10-12 yrs.
First molar	13-19 mos.	9-11 yrs.
Second molar	25-33 mos.	10-12 yrs.



Lower Teeth	Erupt	Shed
Second molar	23-31 mos.	10-12 yrs.
First molar	14-18 mos.	9-11 yrs.
Canine (cuspid)	17-23 mos.	9-12 yrs.
Lateral incisor	10-16 mos.	7-8 yrs.
Central incisor	6-10 mos.	6-7 yrs.

Innervation of Primary Dentition

Reminder: the primary molars are replaced by the permanent premolars

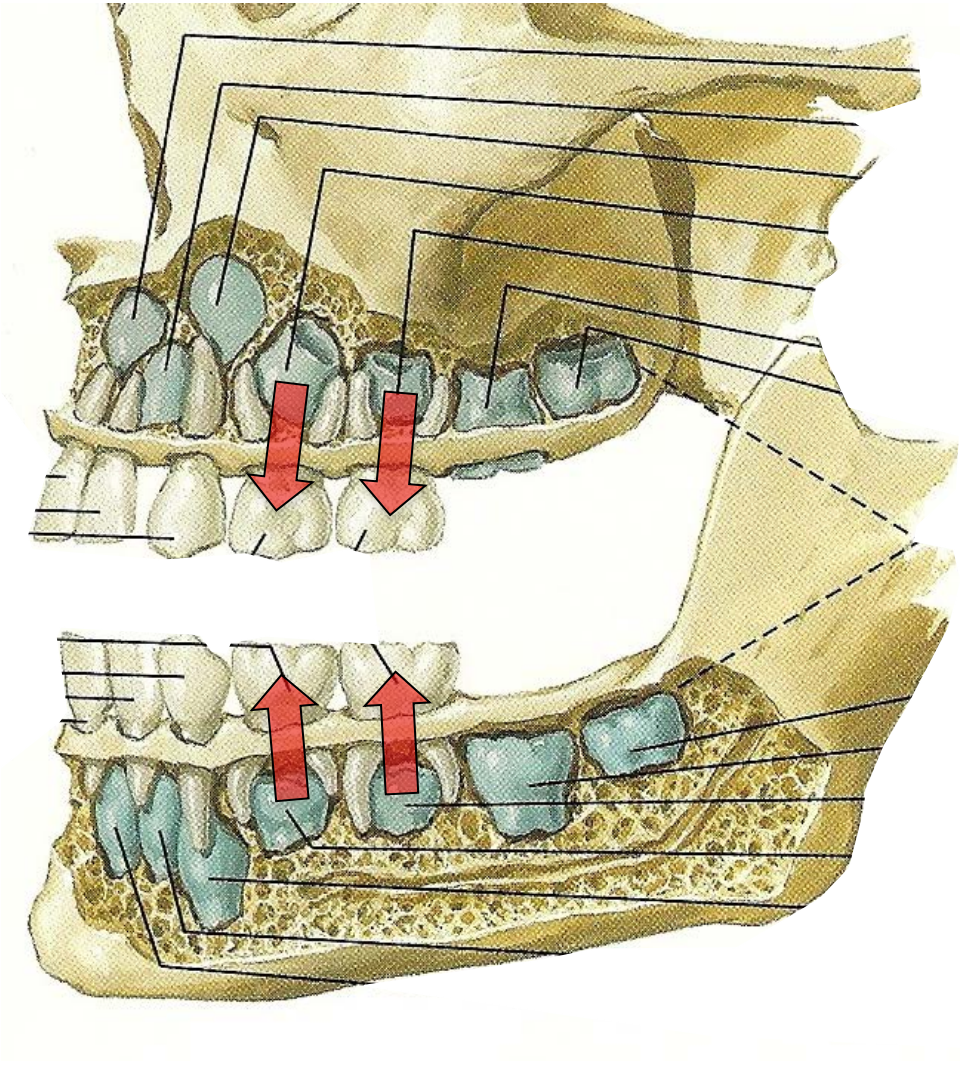
Maxillary Teeth

– primary central incisor, lateral incisor & canine innervated by anterior superior alveolar nerve

– primary first and second molars innervated by middle superior alveolar nerve

Mandibular Teeth

– all primary mandibular teeth innervated by inferior alveolar nerve (same as for all permanent mandibular teeth)

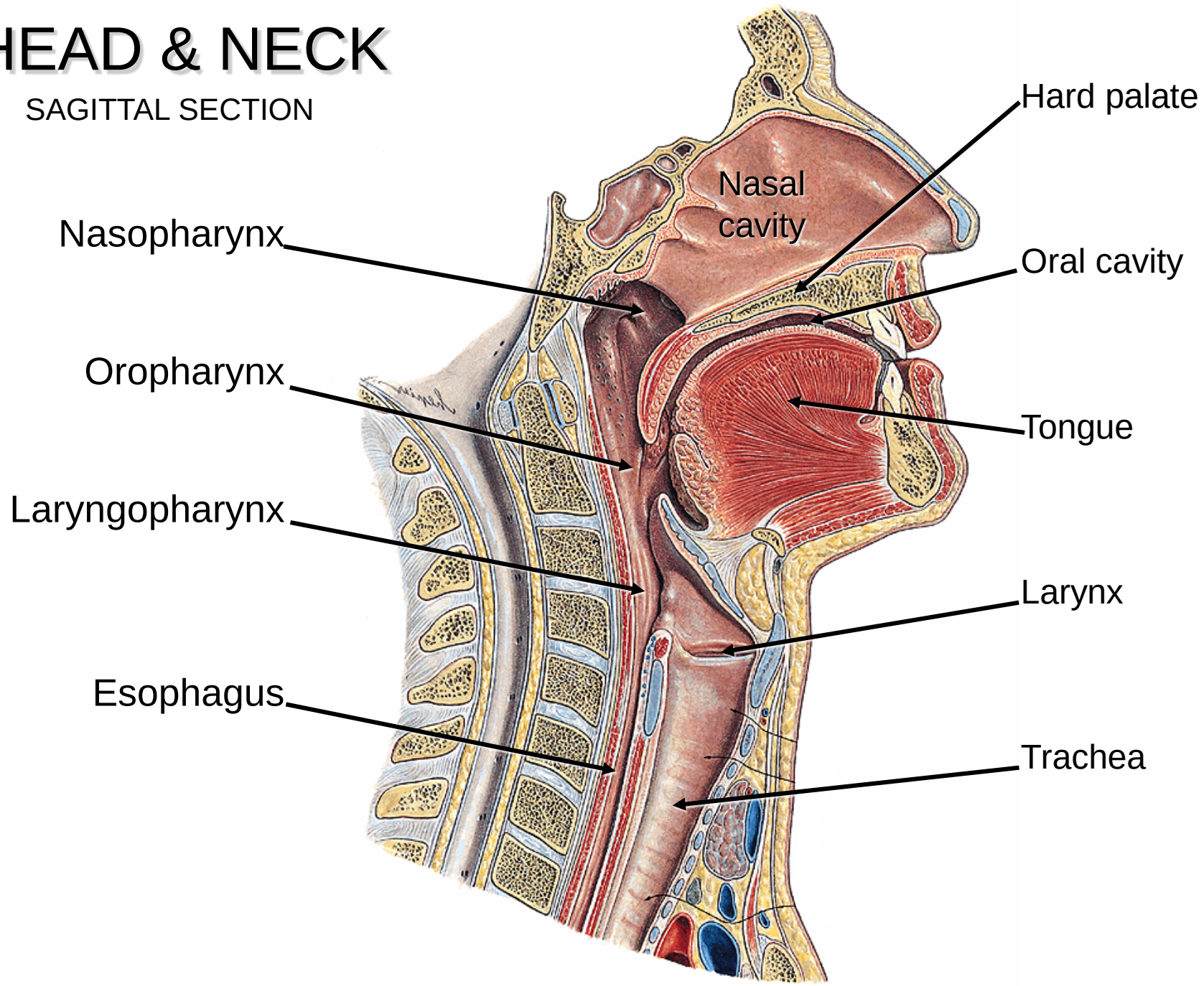


Oral Region

- Overview of oral cavity and oral vestibule
- Hard and soft palate
- Salivary glands
- Muscles of submandibular region
- Tongue
- Gingiva
- **Pharynx**

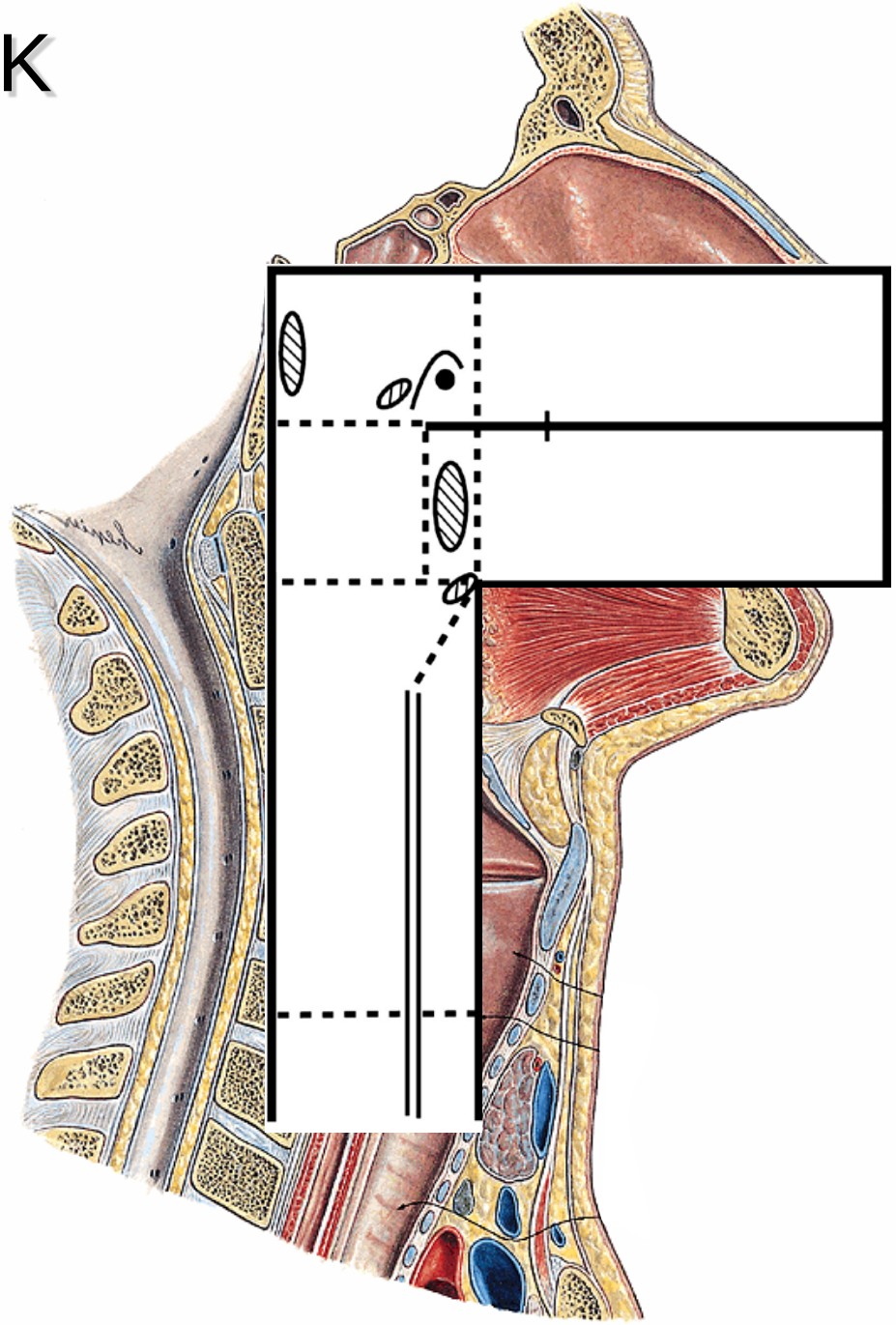
HEAD & NECK

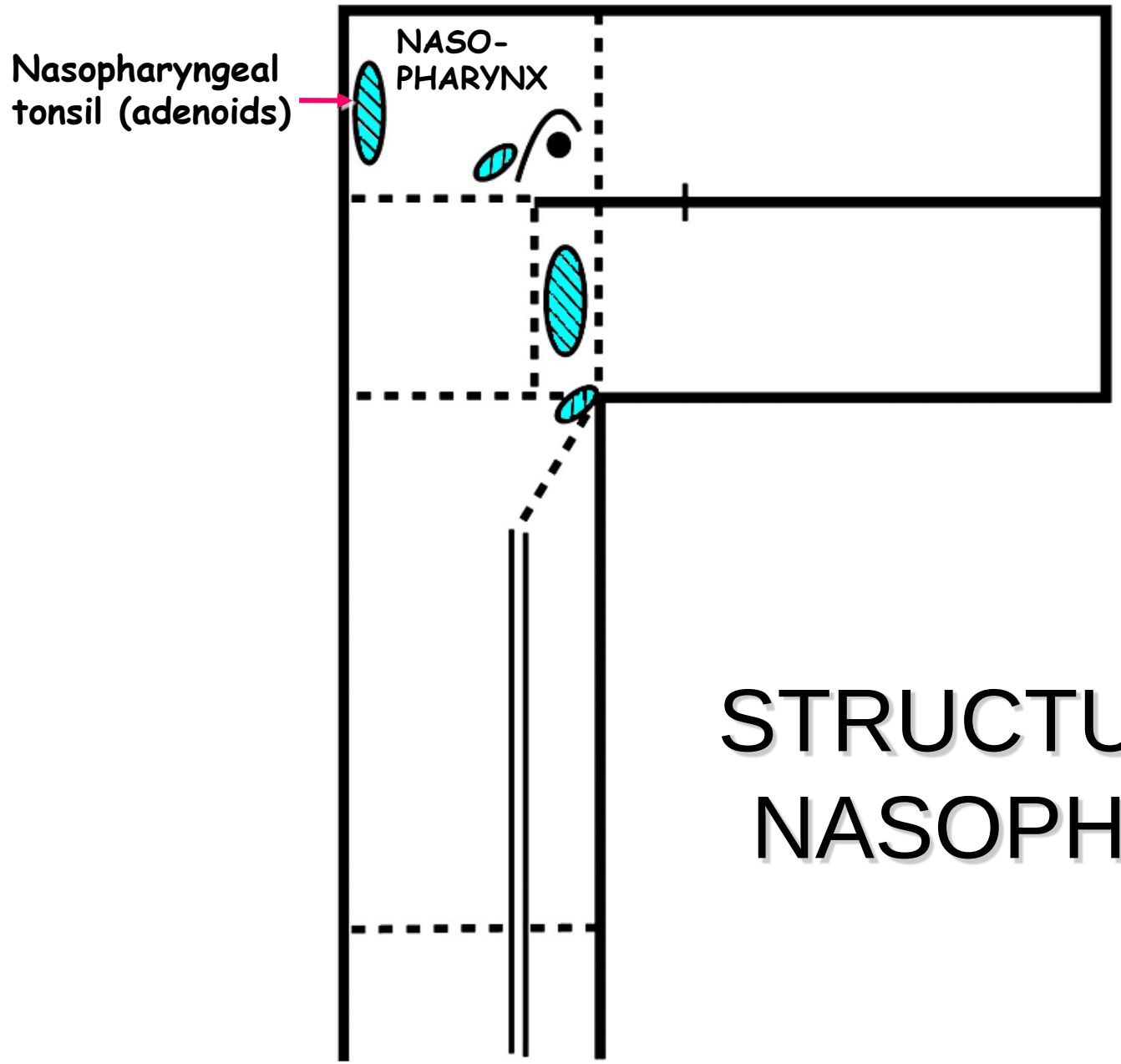
SAGITTAL SECTION



HEAD & NECK

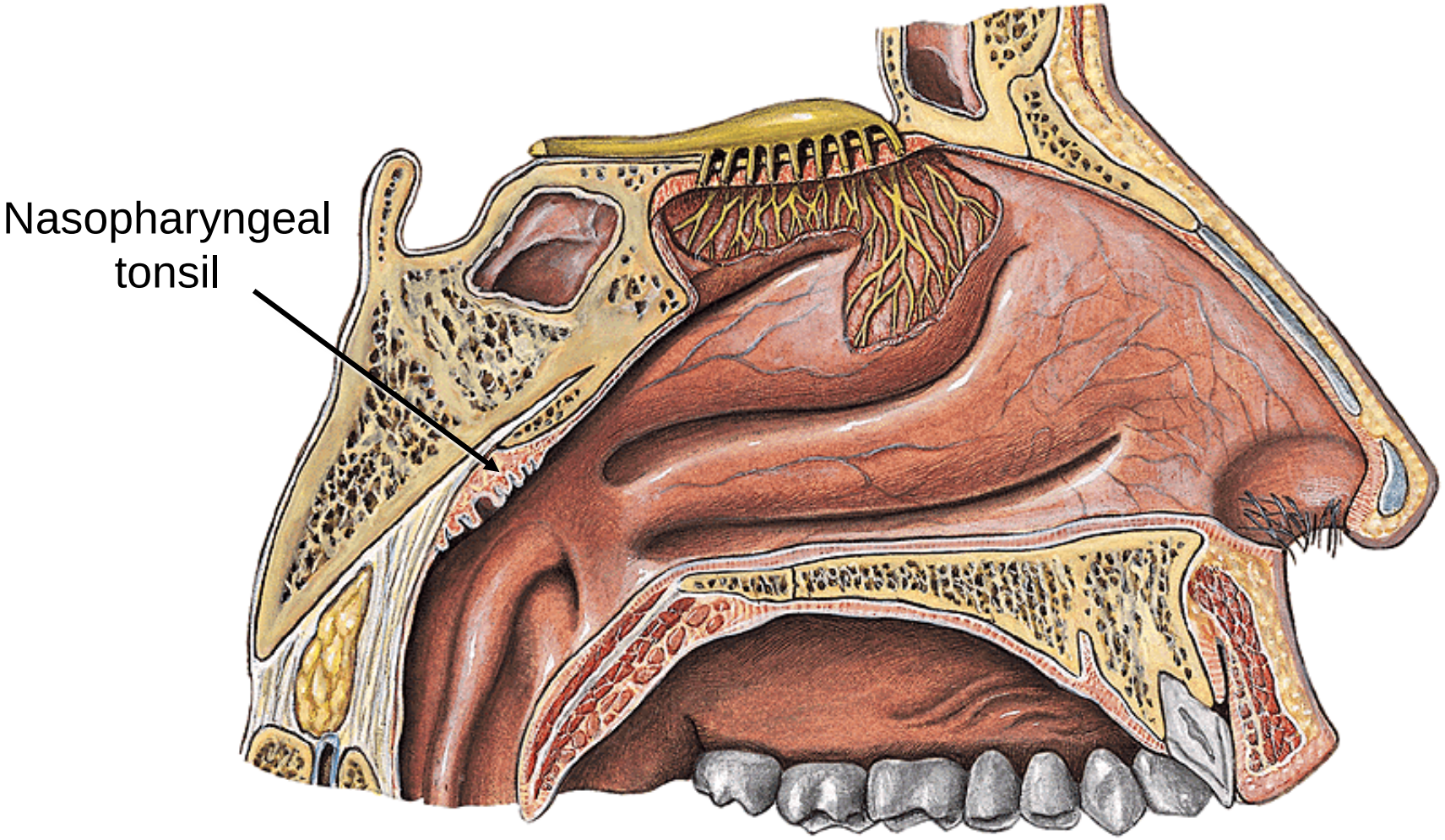
SAGITTAL SECTION

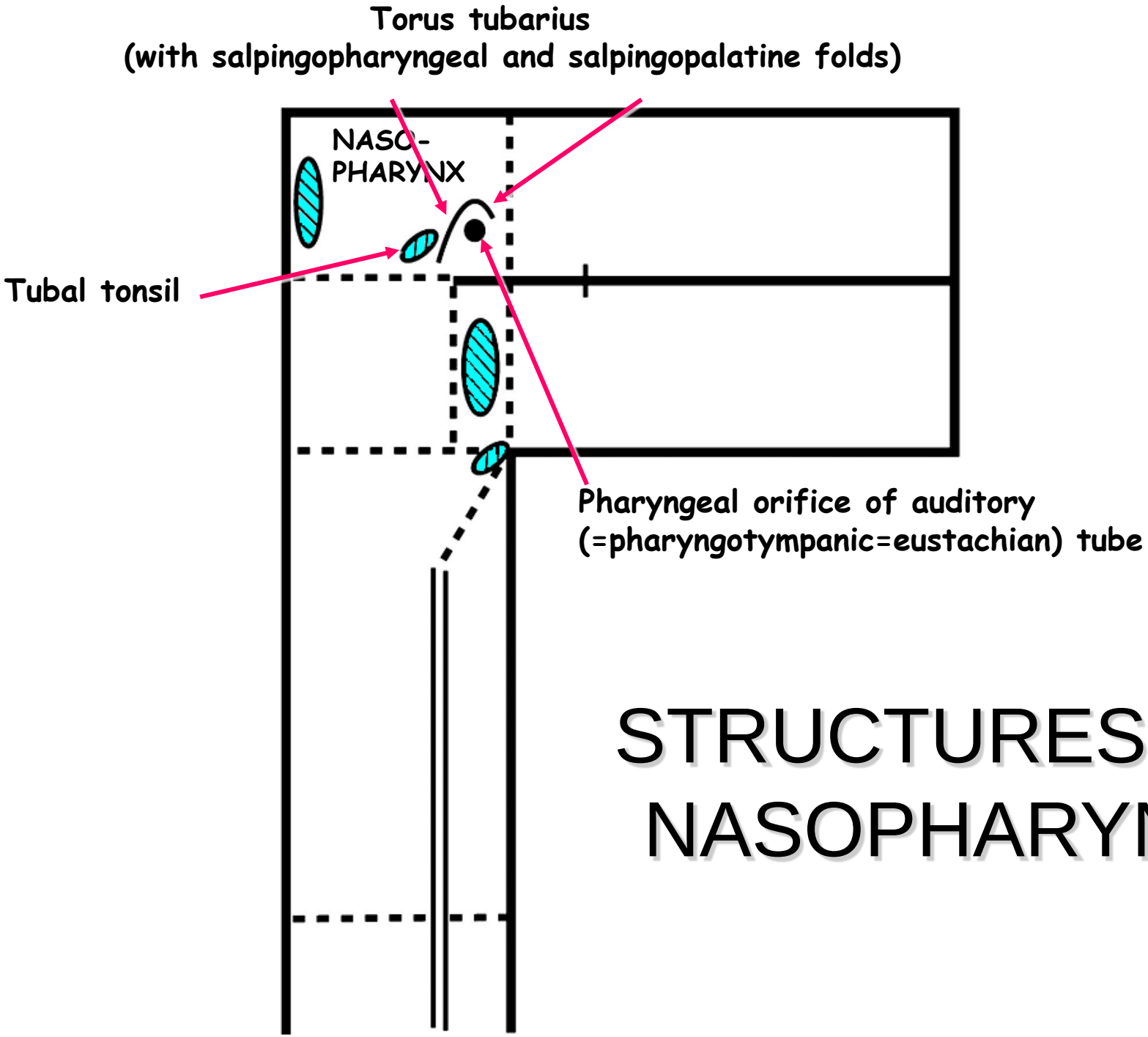




STRUCTURES IN NASOPHARYNX

STRUCTURES IN NASOPHARYNX





STRUCTURES IN NASOPHARYNX

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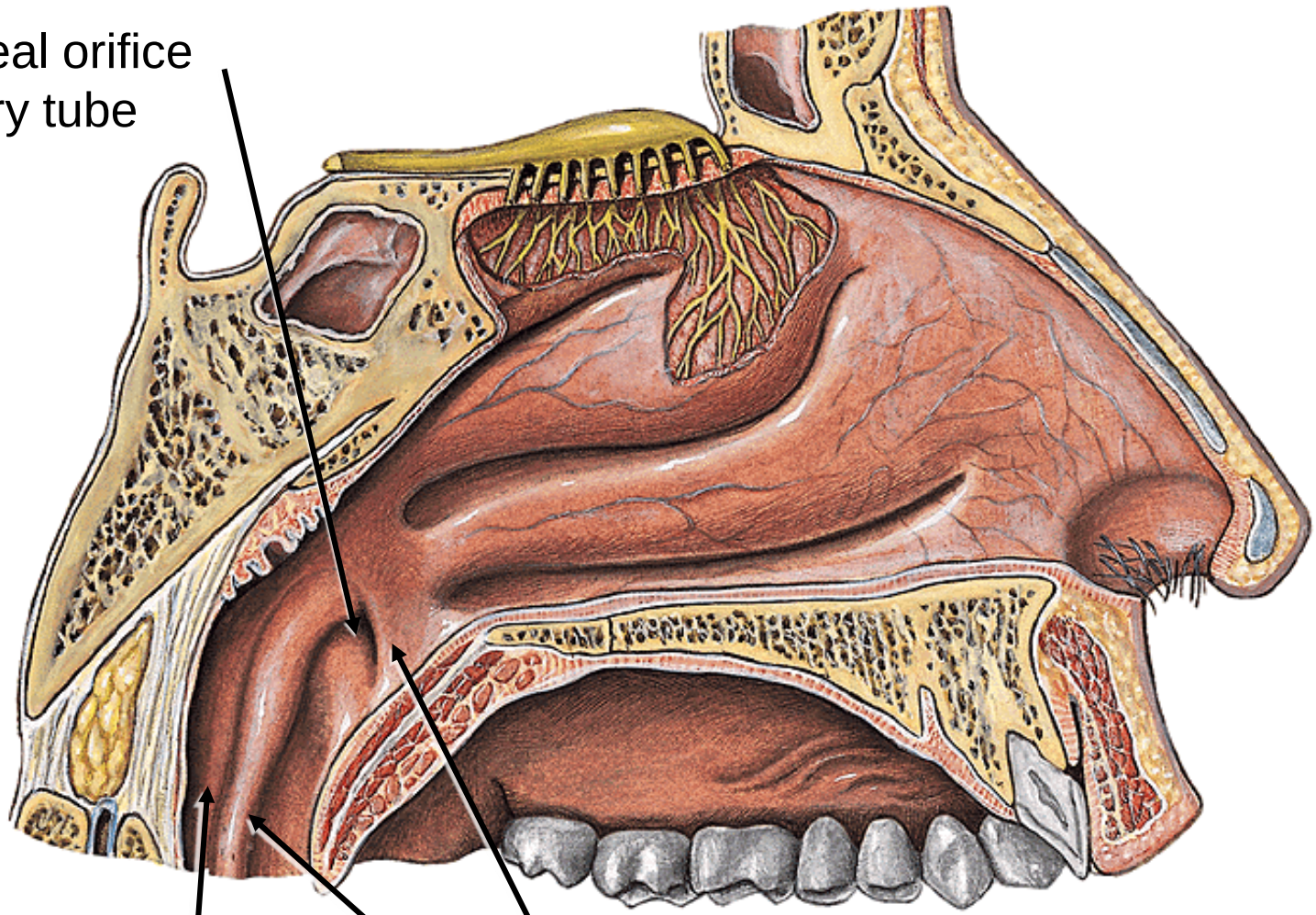
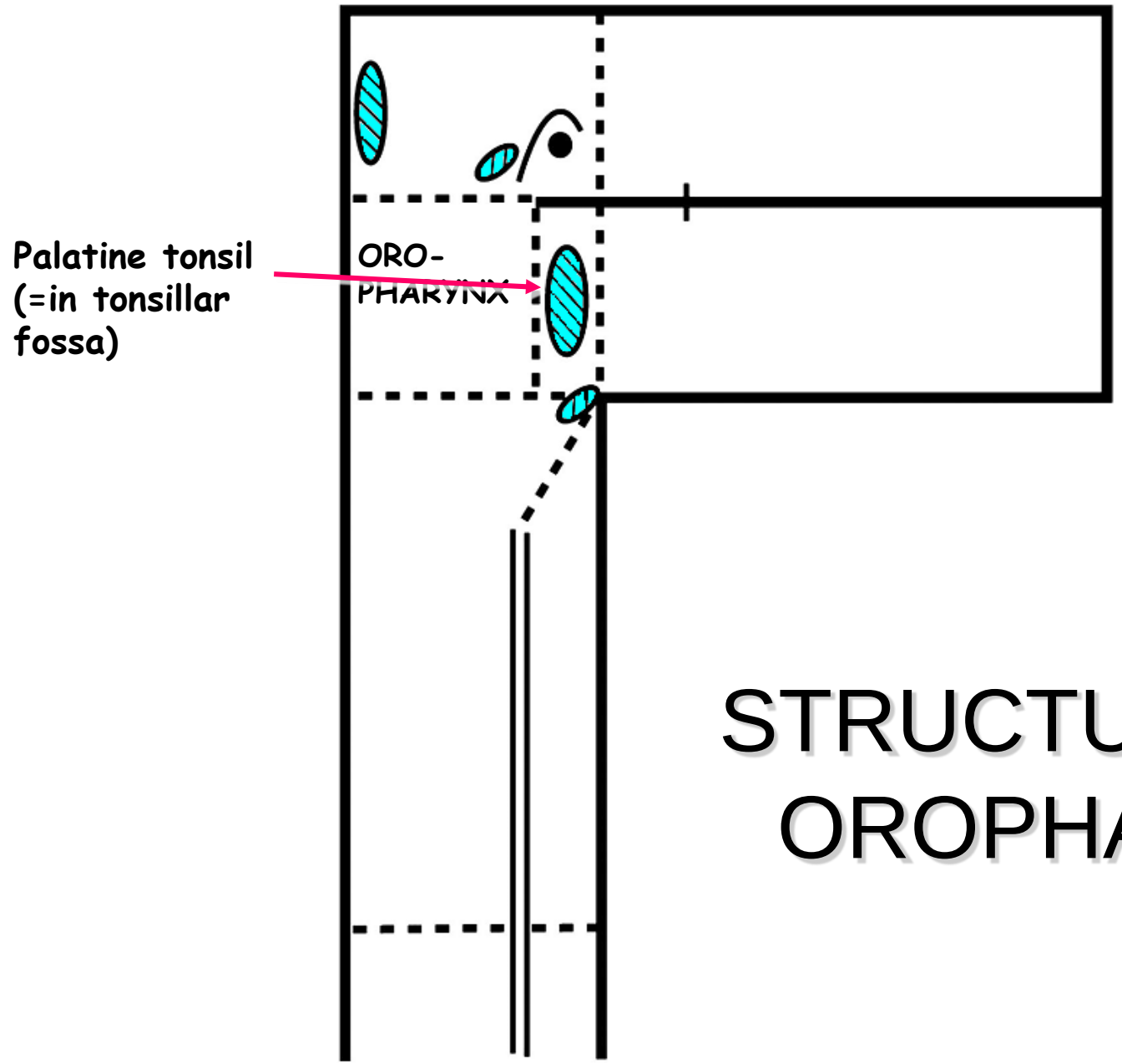
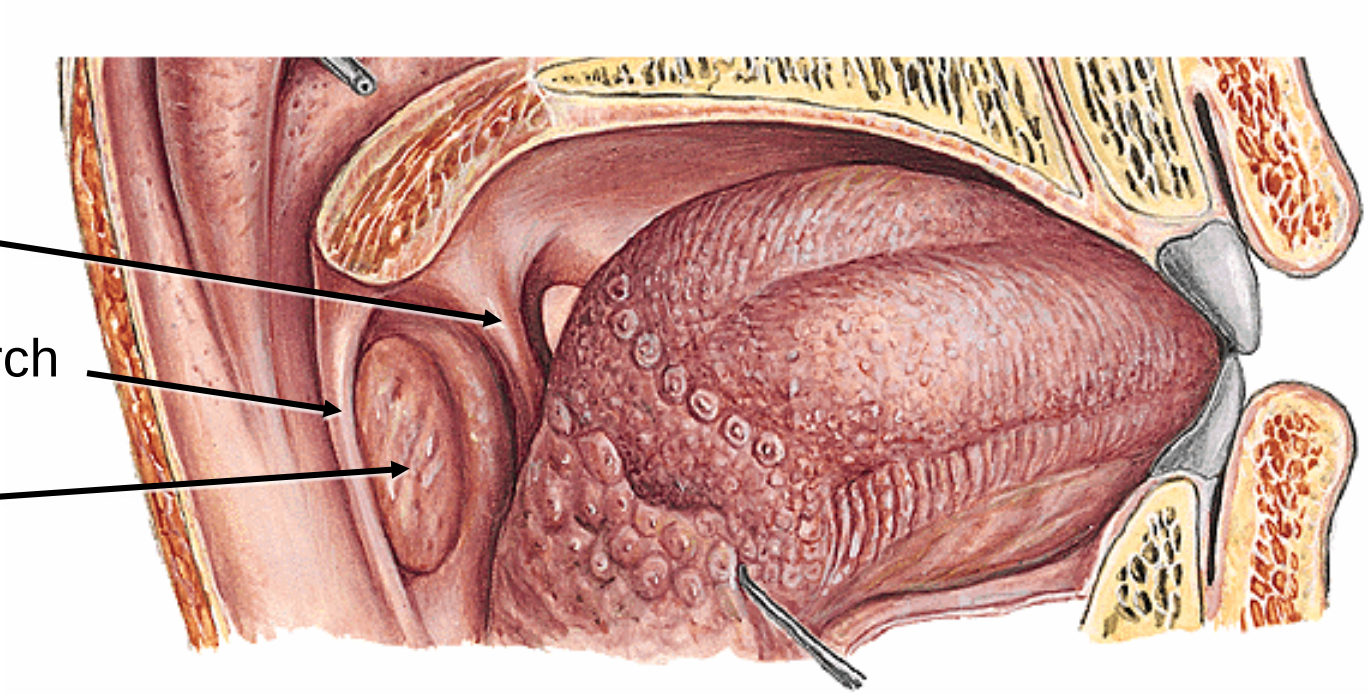


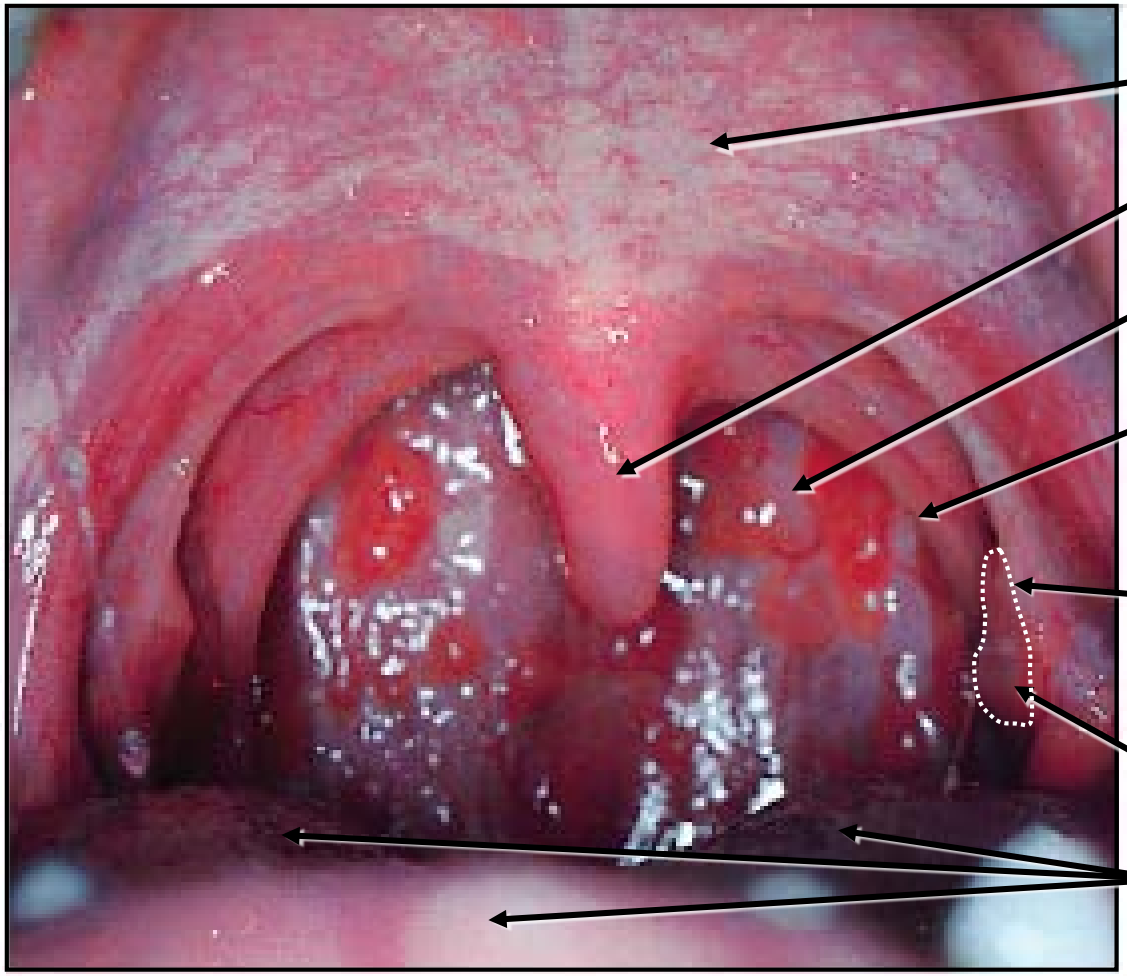


STRUCTURES IN OROPHARYNX

STRUCTURES IN OROPHARYNX



ORAL CAVITY AND OROPHARYNX



Soft palate

Uvula

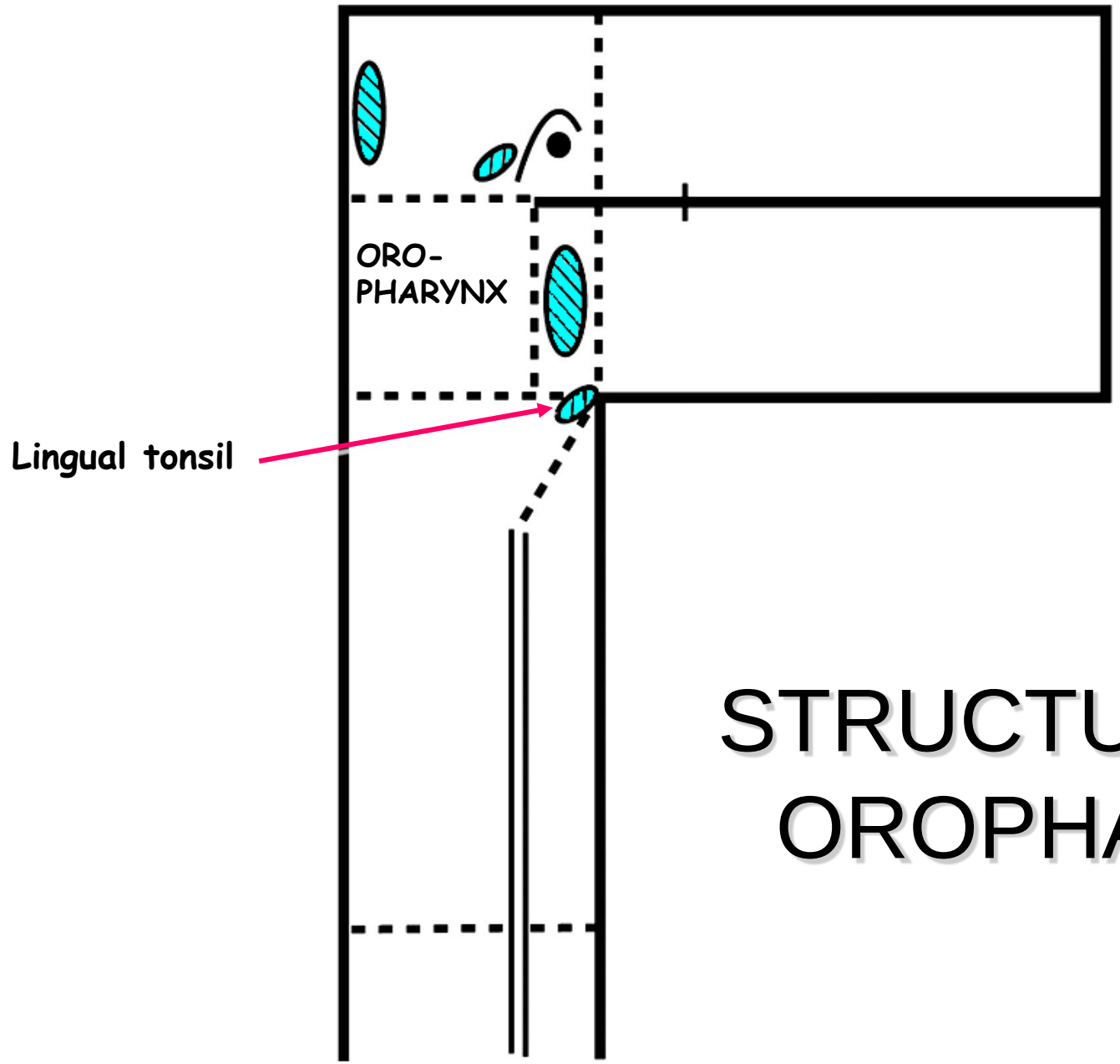
Posterior wall of oropharynx

Palatopharyngeal arch
(= posterior pillar of the fauces)

Palatoglossal arch
(= anterior pillar of the fauces)

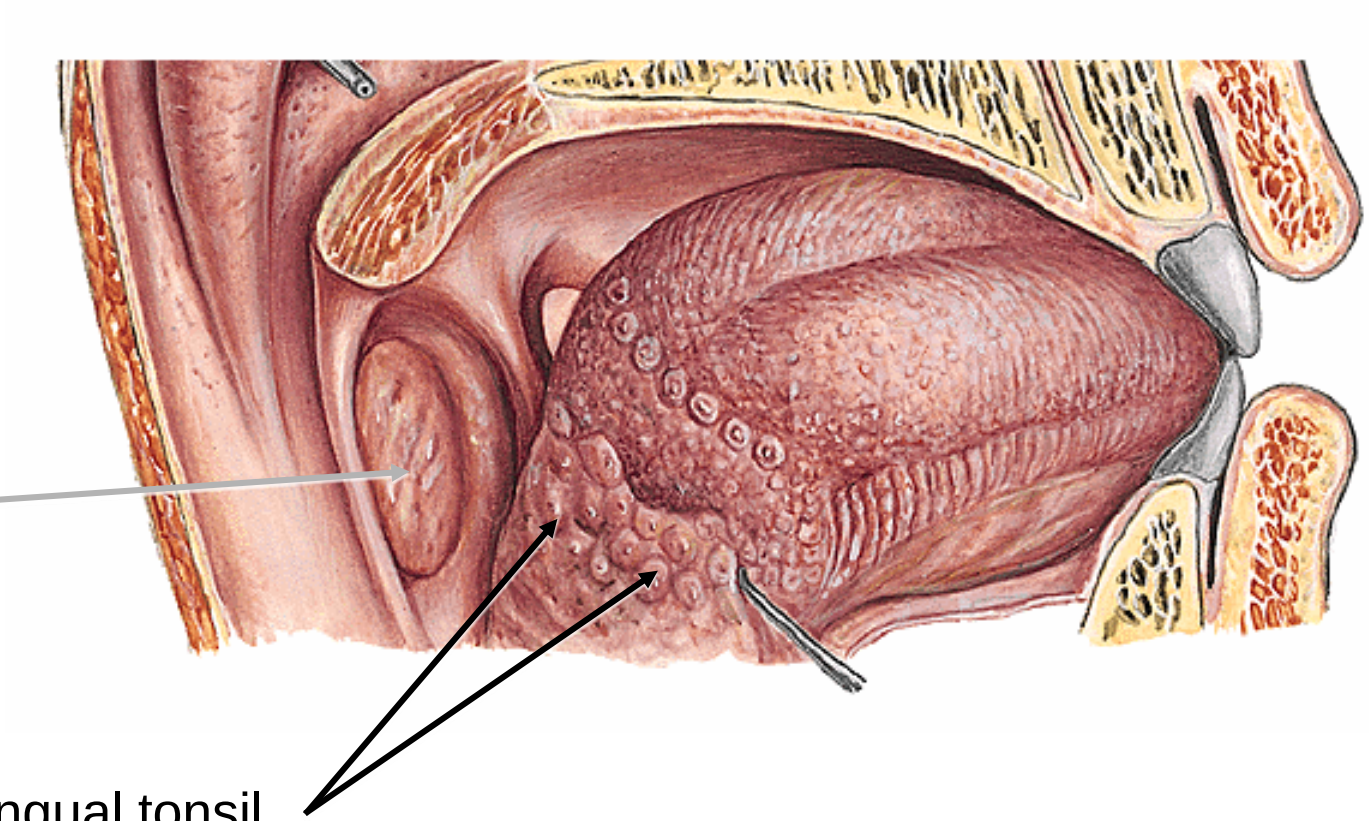
Palatine tonsil

Dorsum of tongue



STRUCTURES IN OROPHARYNX

STRUCTURES IN OROPHARYNX

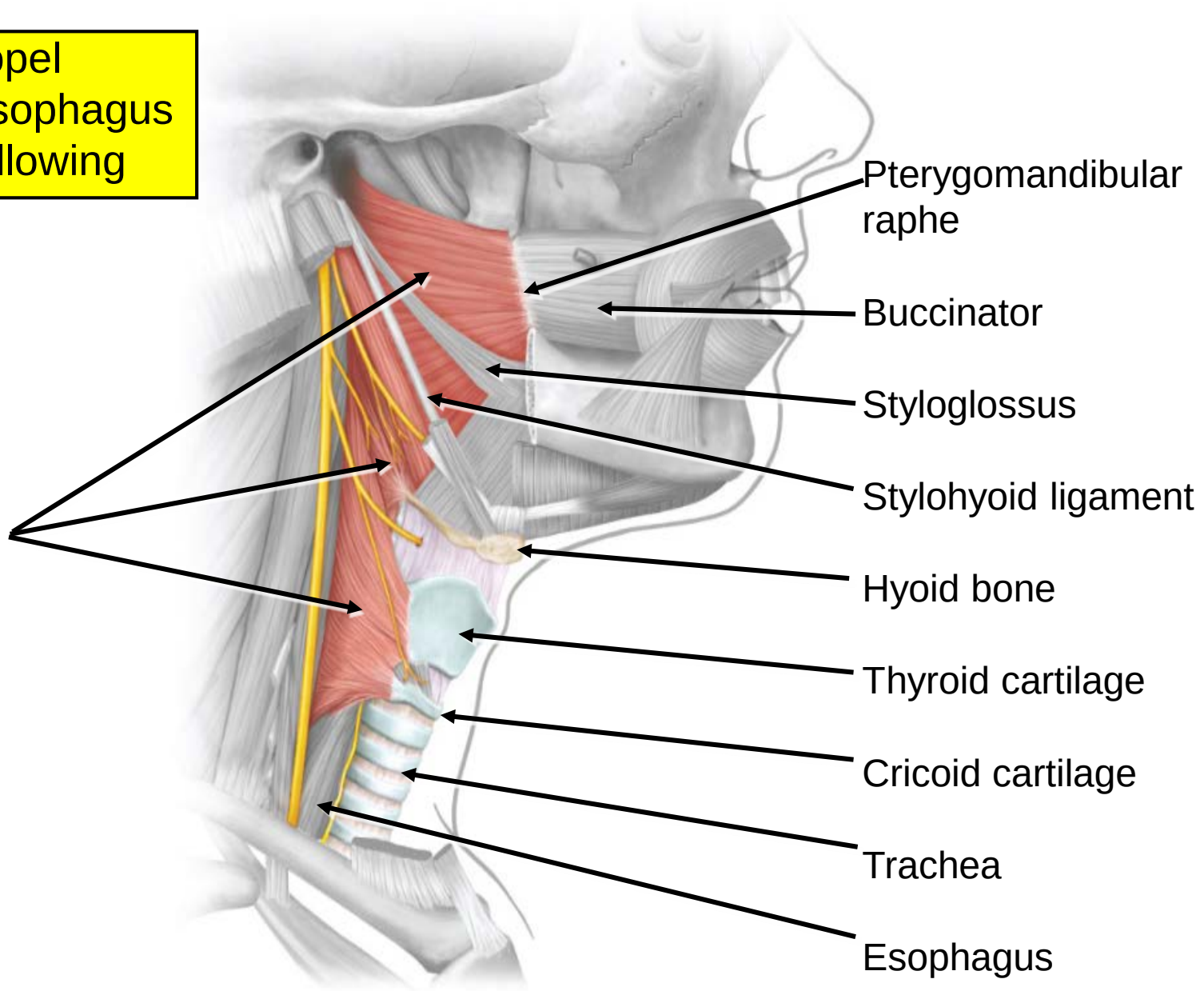


Palatine tonsil
(in tonsillar fossa)

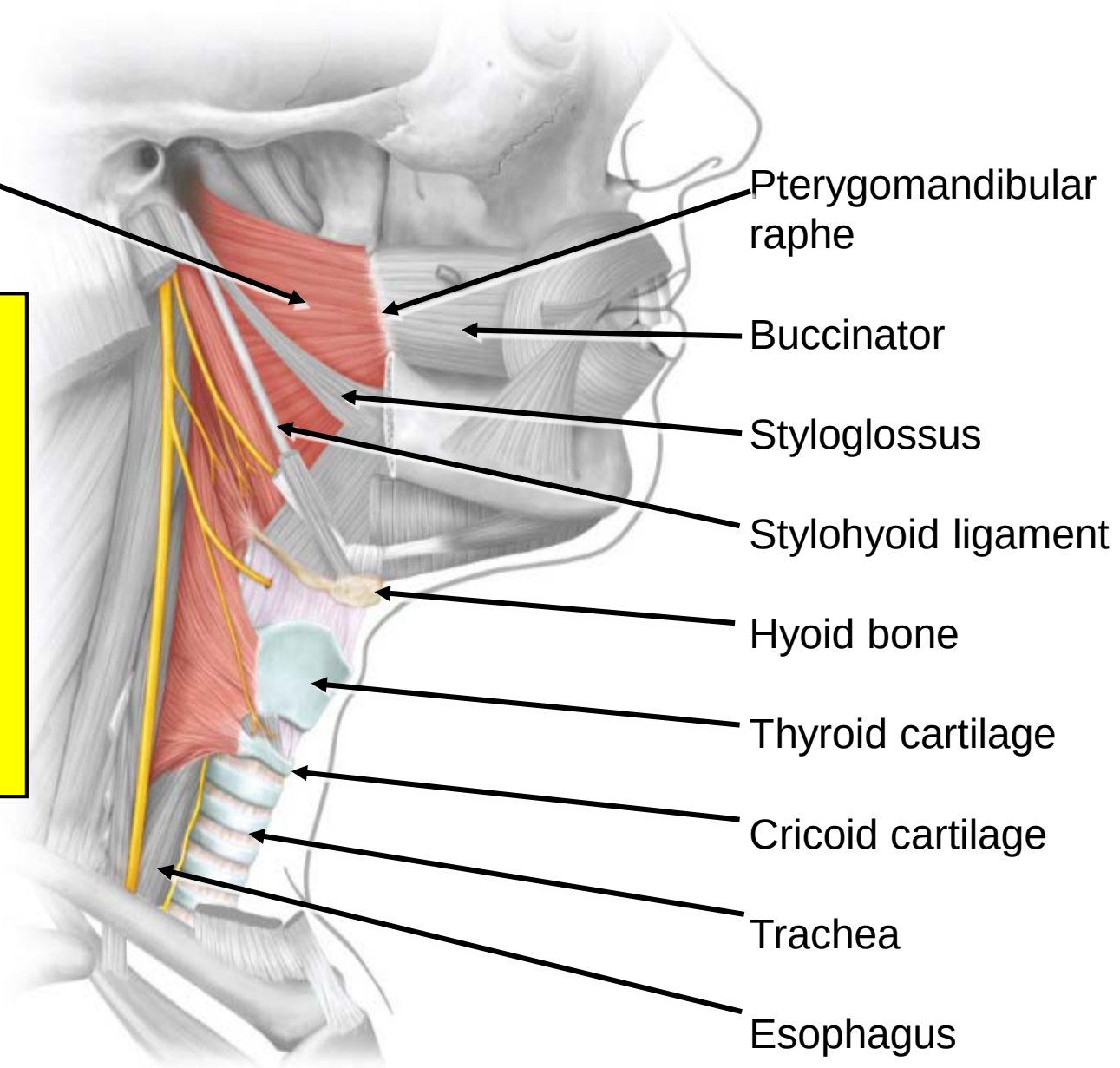
Lingual tonsil
(= lingual follicles)

PHARYNGEAL CONSTRICTORS

- used to propel food into esophagus during swallowing



PHARYNGEAL CONSTRICTORS

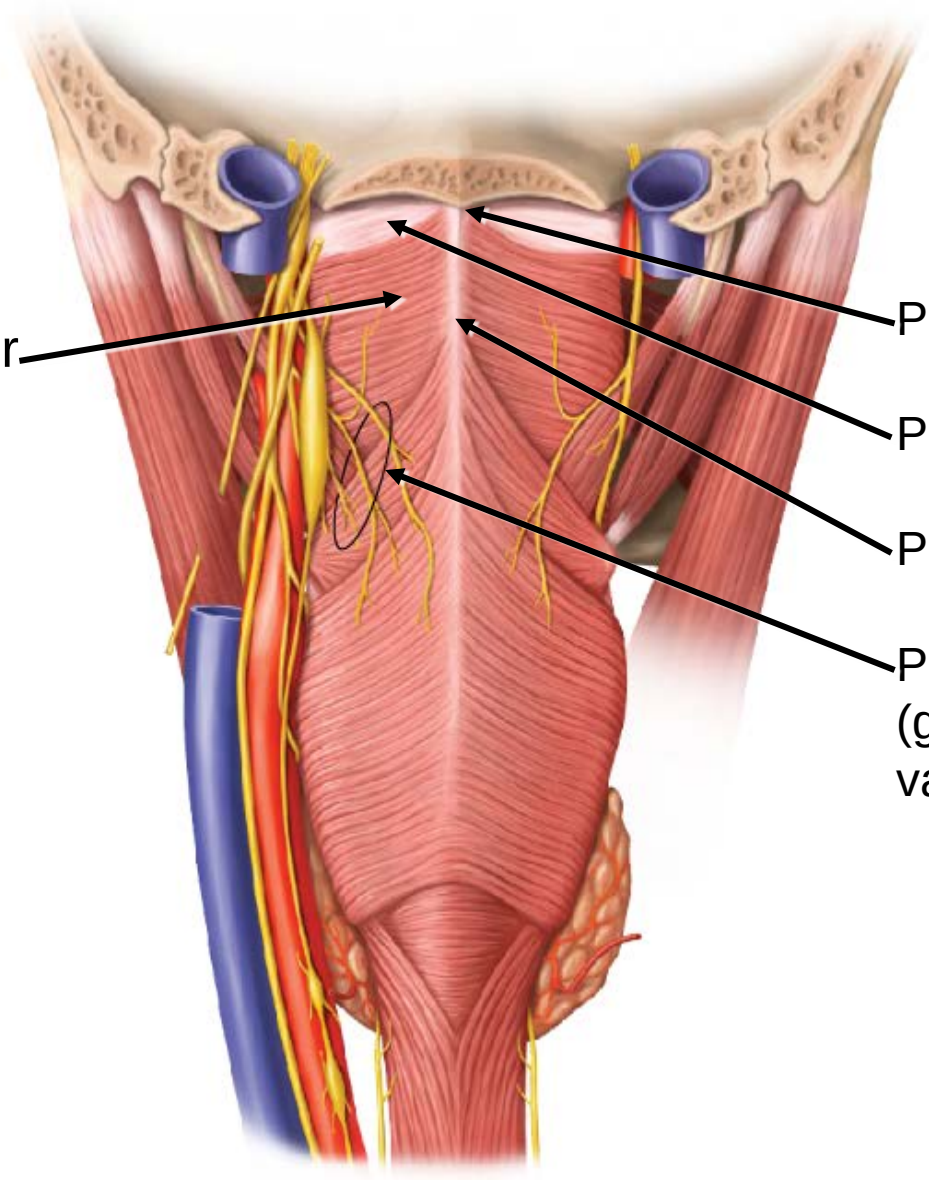


Origin
- primarily from pterygo-mandibular raphe

Insertion
-pharyngeal raphe, which attaches to pharyngeal tubercle

Innervation
- pharyngeal plexus (vagus)

PHARYNGEAL CONSTRICTORS



Superior constrictor

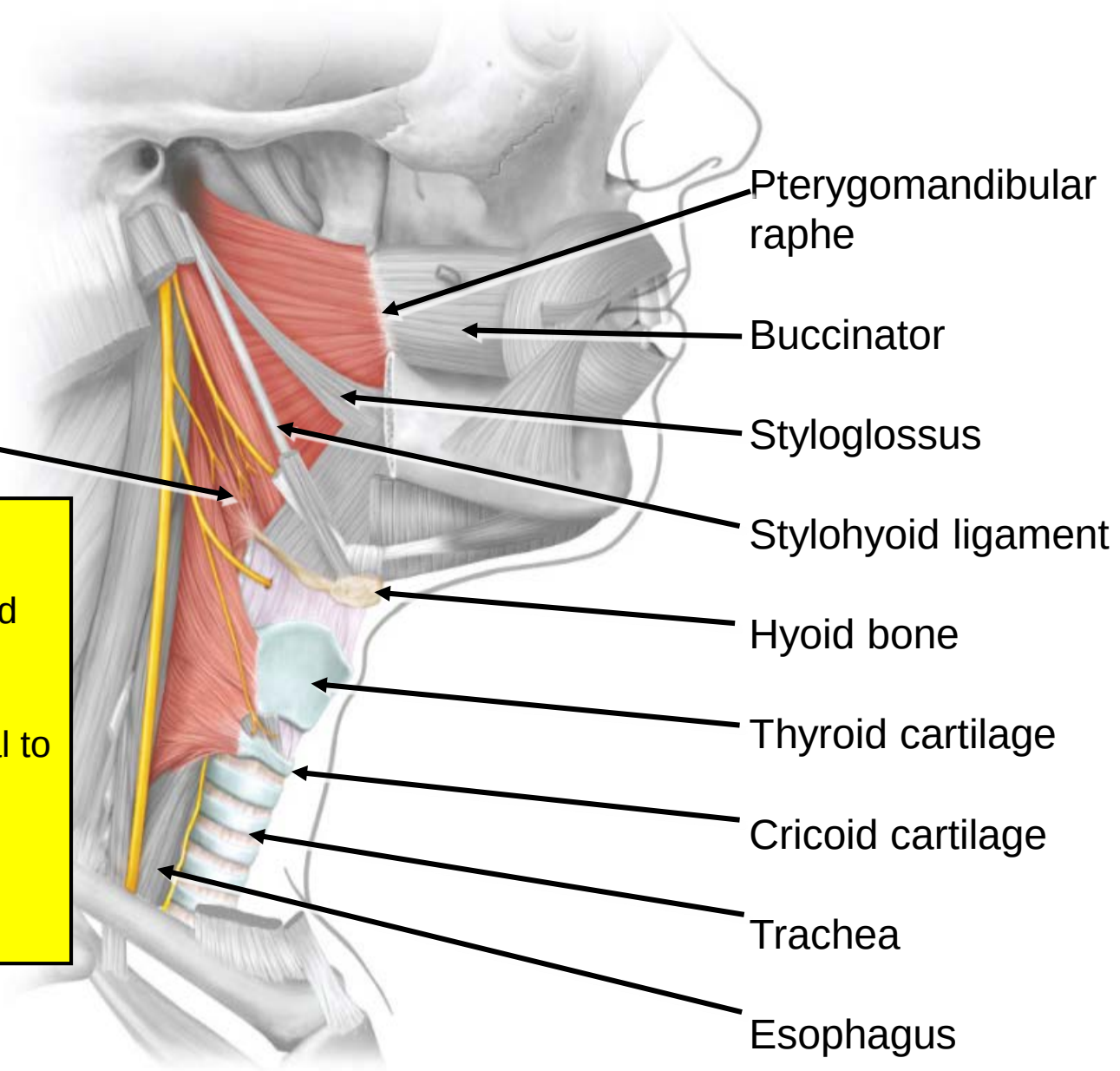
Pharyngeal tubercle

Pharyngobasilar fascia

Pharyngeal raphe

Pharyngeal plexus
(glossopharyngeal +
vagus + sympathetics)

PHARYNGEAL CONSTRICTORS



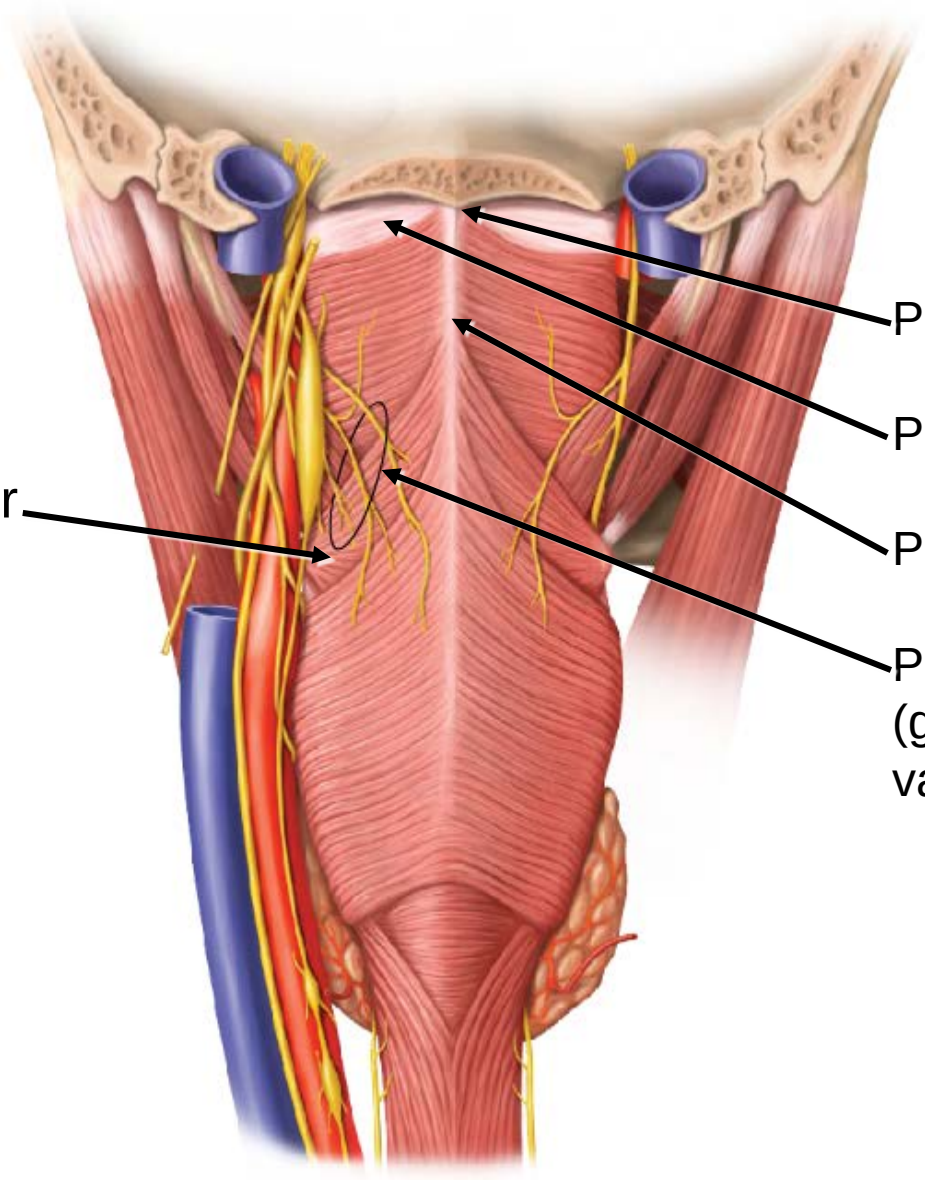
Middle constrictor

<u>Origin</u>
-lower part of stylohyoid ligament + both horns of hyoid

<u>Insertion</u>
-pharyngeal raphe (superficial to superior constrictor)

<u>Innervation</u>
- pharyngeal plexus (vagus)

PHARYNGEAL CONSTRICTORS



Middle constrictor

Pharyngeal tubercle

Pharyngobasilar fascia

Pharyngeal raphe

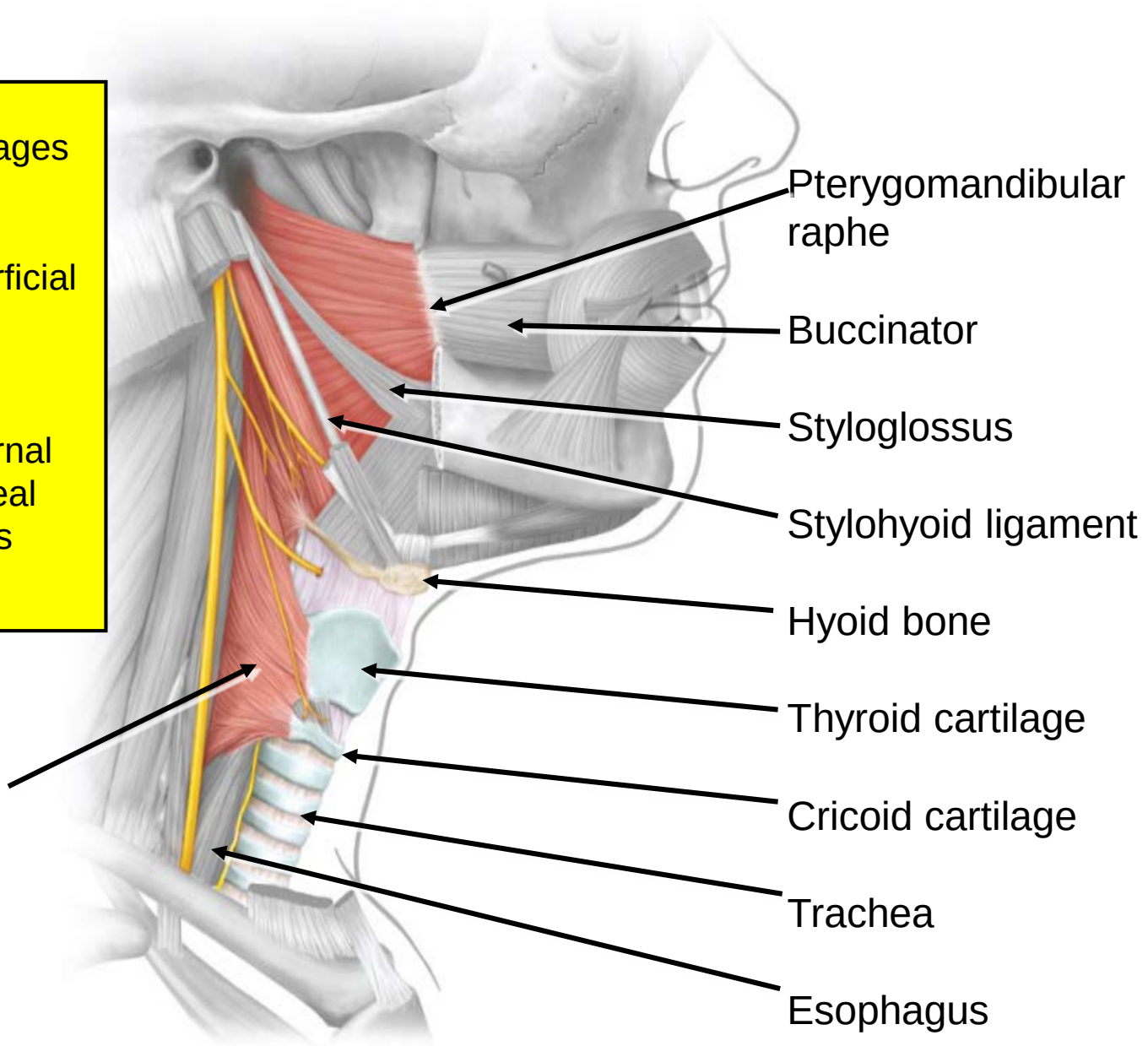
Pharyngeal plexus
(glossopharyngeal +
vagus + sympathetics)

PHARYNGEAL CONSTRICTORS

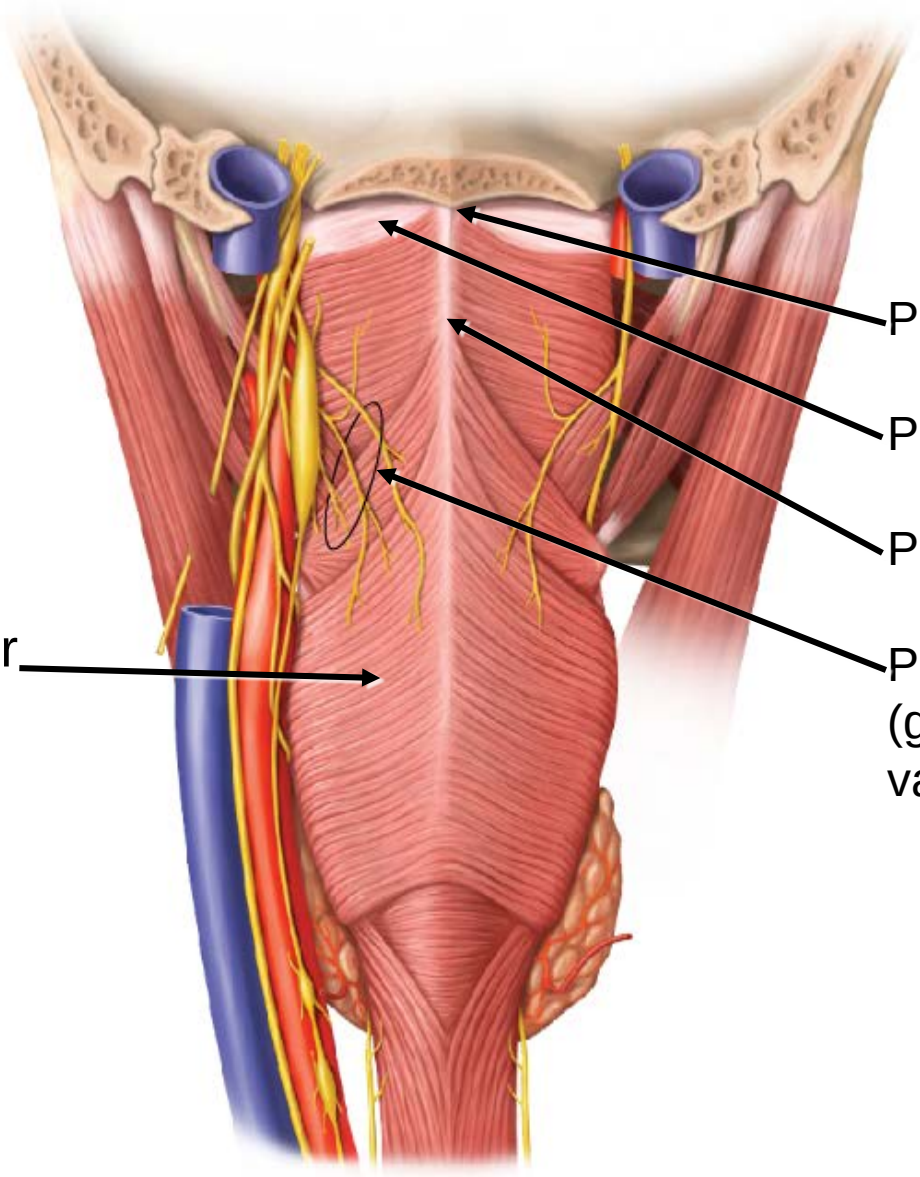
Origin
- thyroid and cricoid cartilages

Insertion
- pharyngeal raphe (superficial to middle constrictor)

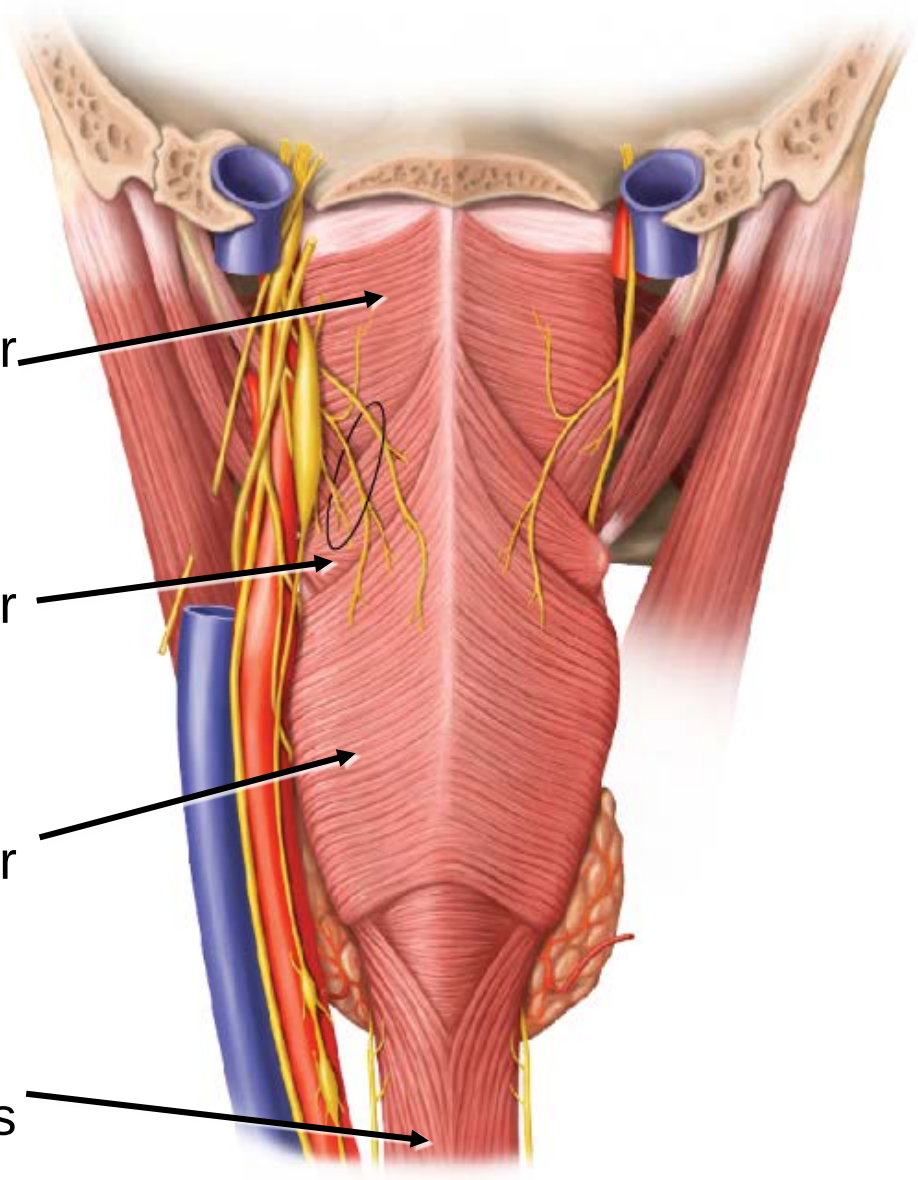
Innervation
- pharyngeal plexus, external branch of superior laryngeal nerve (which also supplies cricothyroid m.)



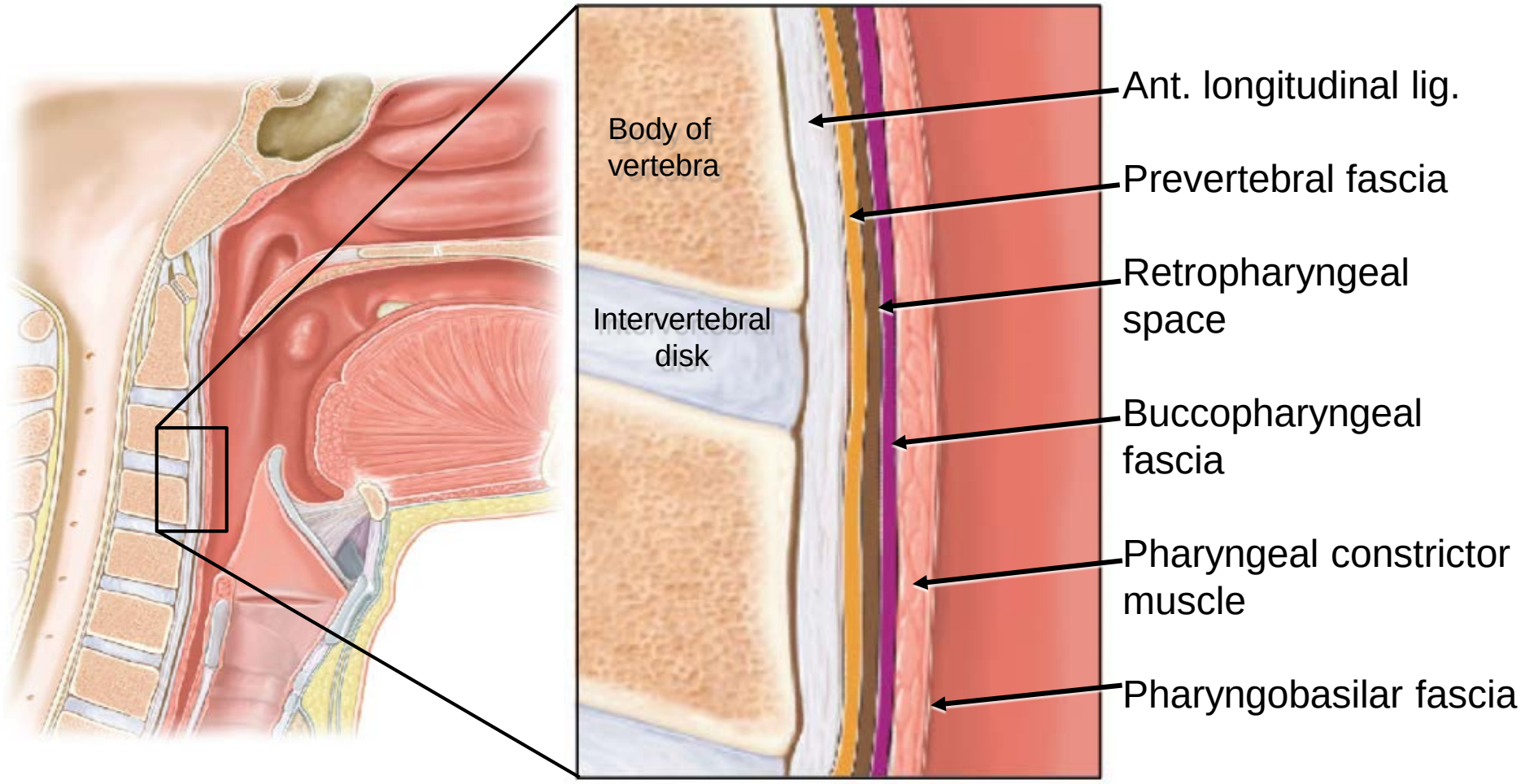
PHARYNGEAL CONSTRICTORS



PHARYNGEAL CONSTRICTORS



LAYERS OF THE PHARYNX



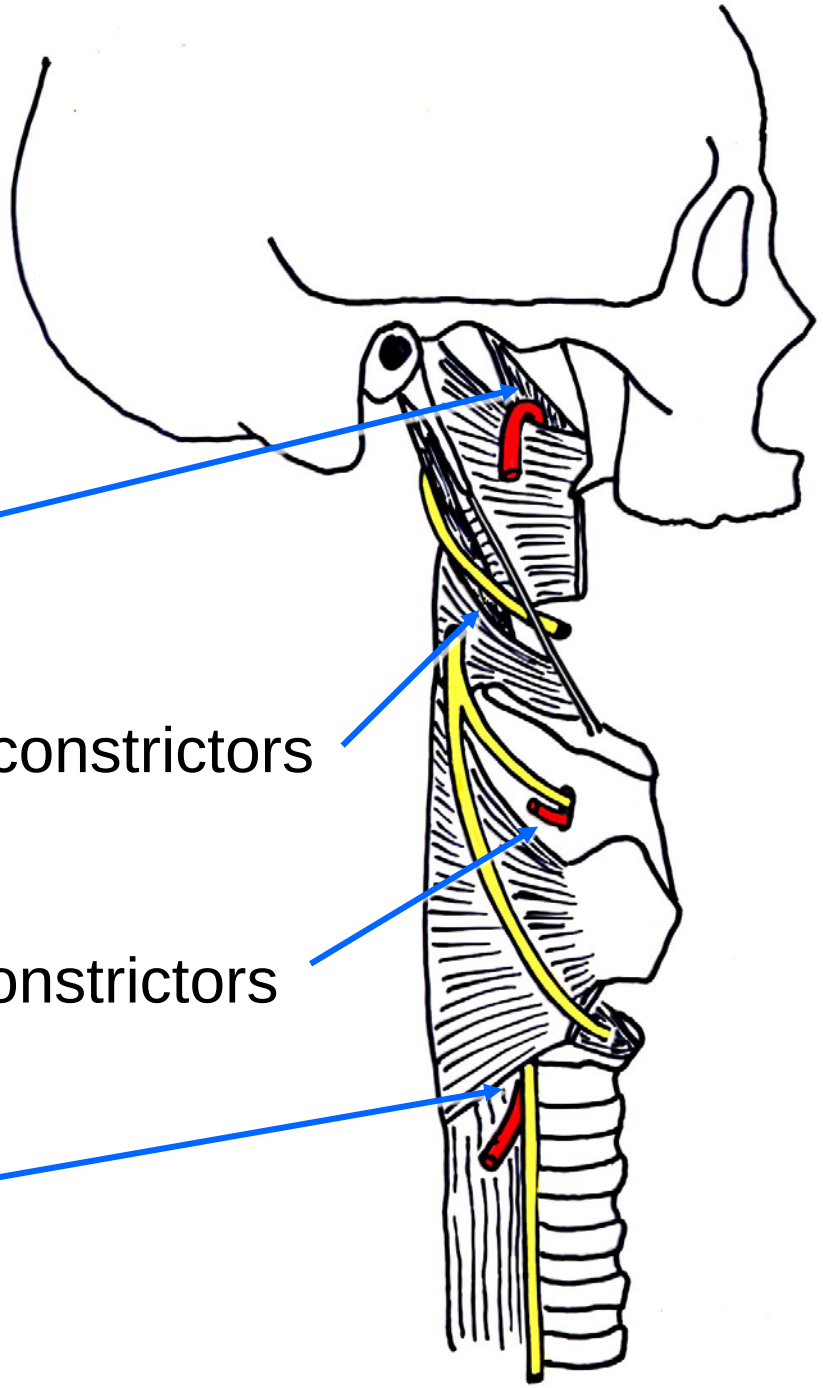
PHARYNGEAL GAPS

- above superior constrictor

- between superior and middle constrictors

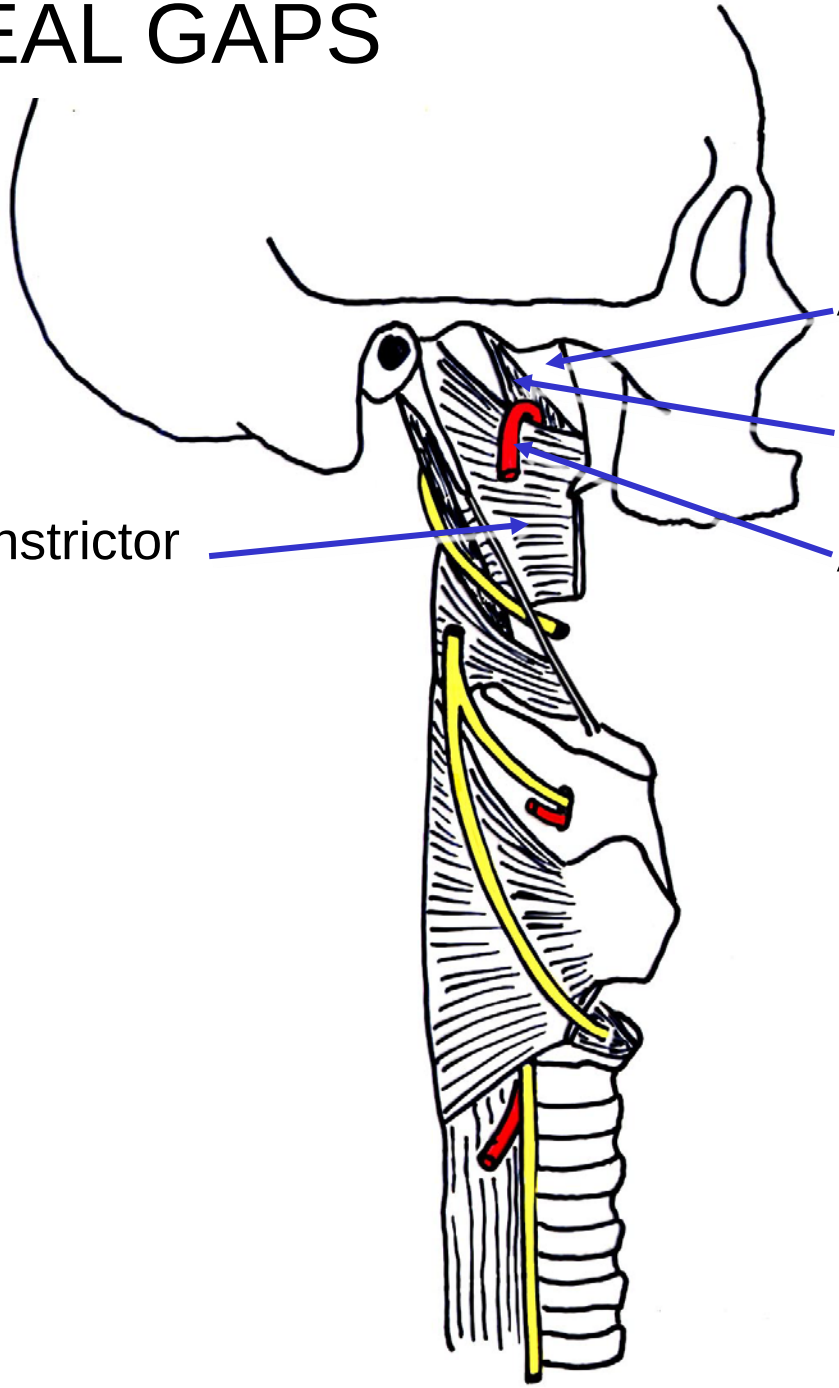
- between middle and inferior constrictors

- below inferior constrictor



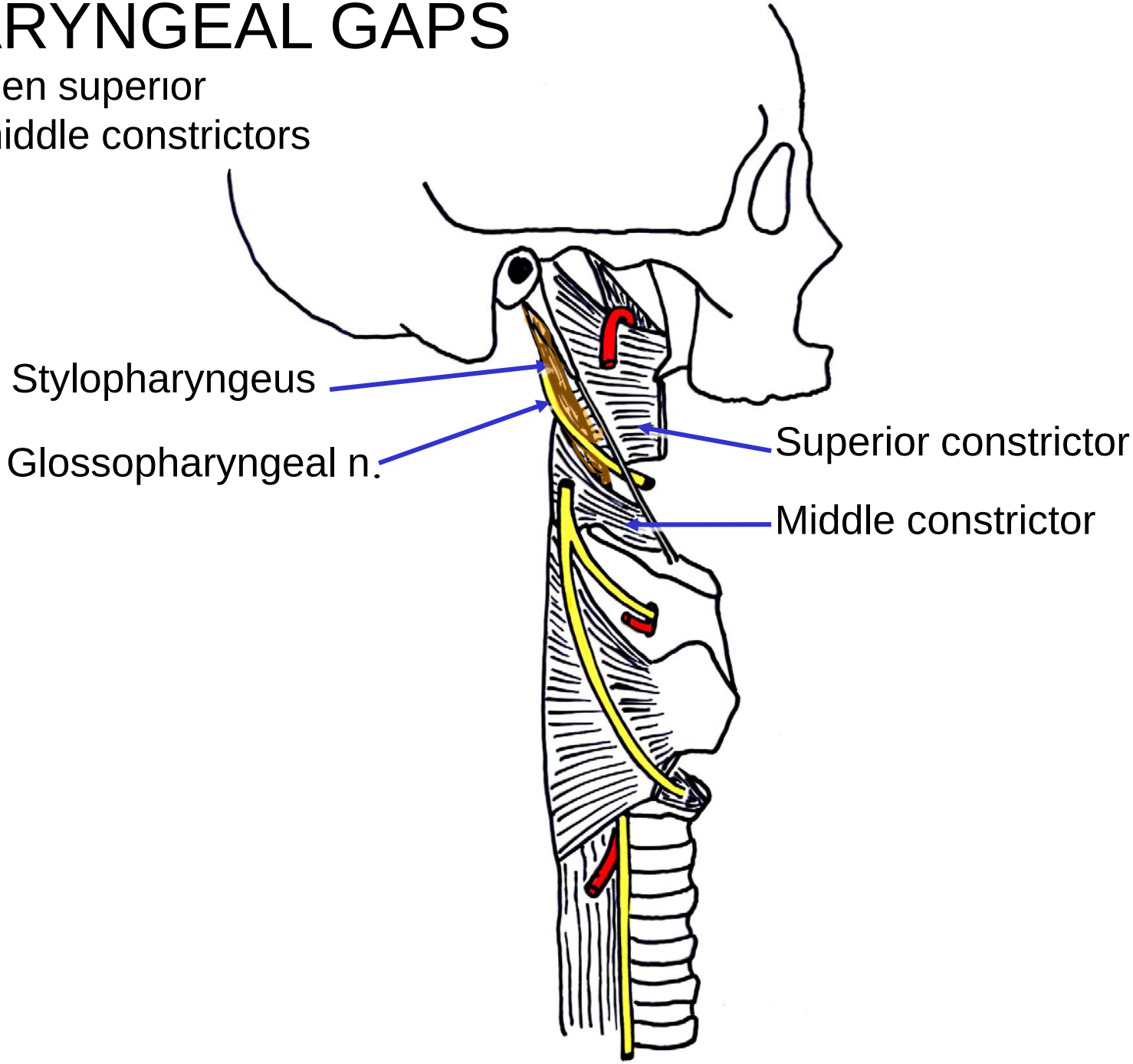
PHARYNGEAL GAPS

- above superior constrictor

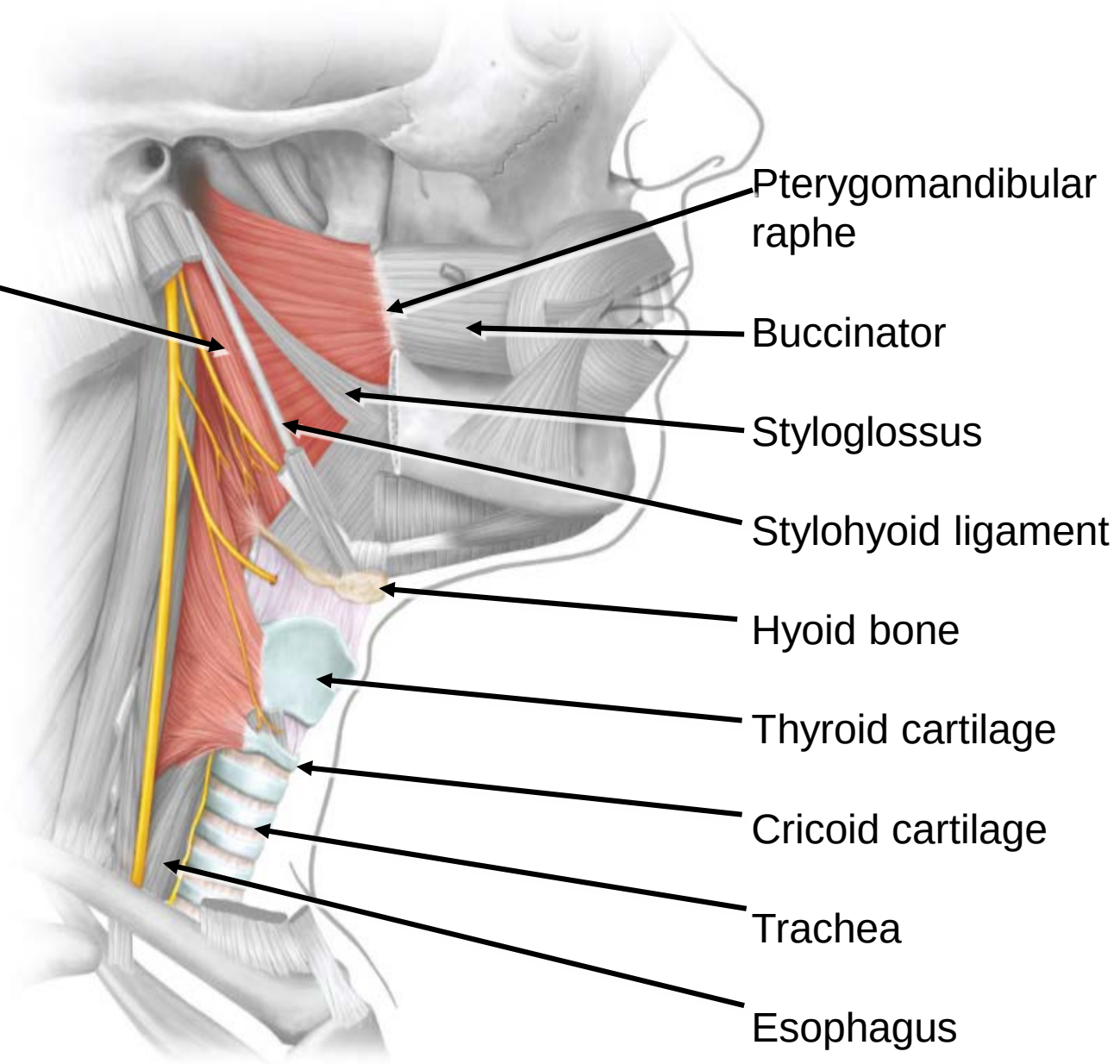


PHARYNGEAL GAPS

- between superior and middle constrictors



STYLOPHARYNGEUS MUSCLE



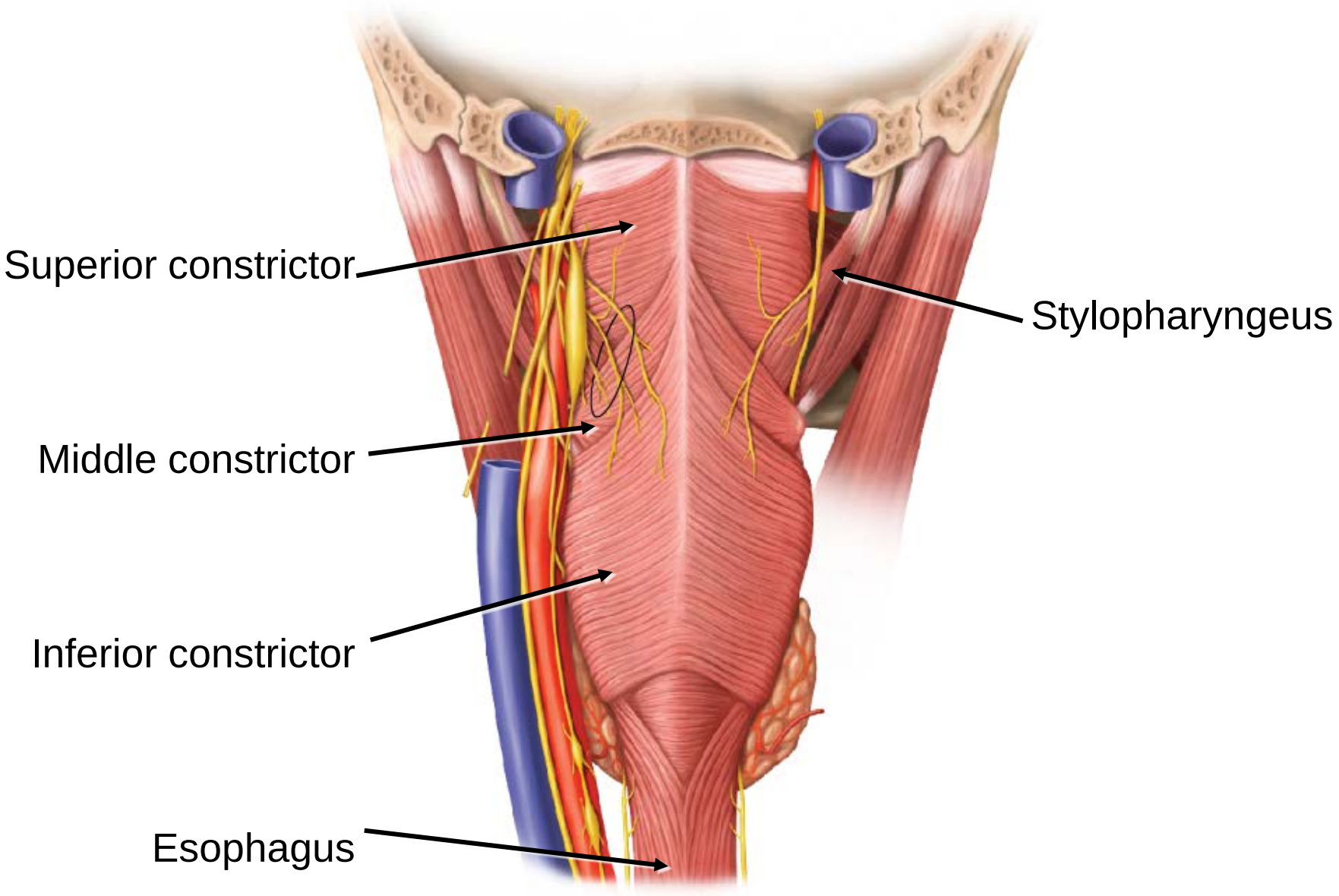
<u>Origin</u>
- styloid process

<u>Insertion</u>
- posterior edge of thyroid cartilage
- merges with pharyngeal constrictors

<u>Innervation</u>
- glossopharyngeal nerve

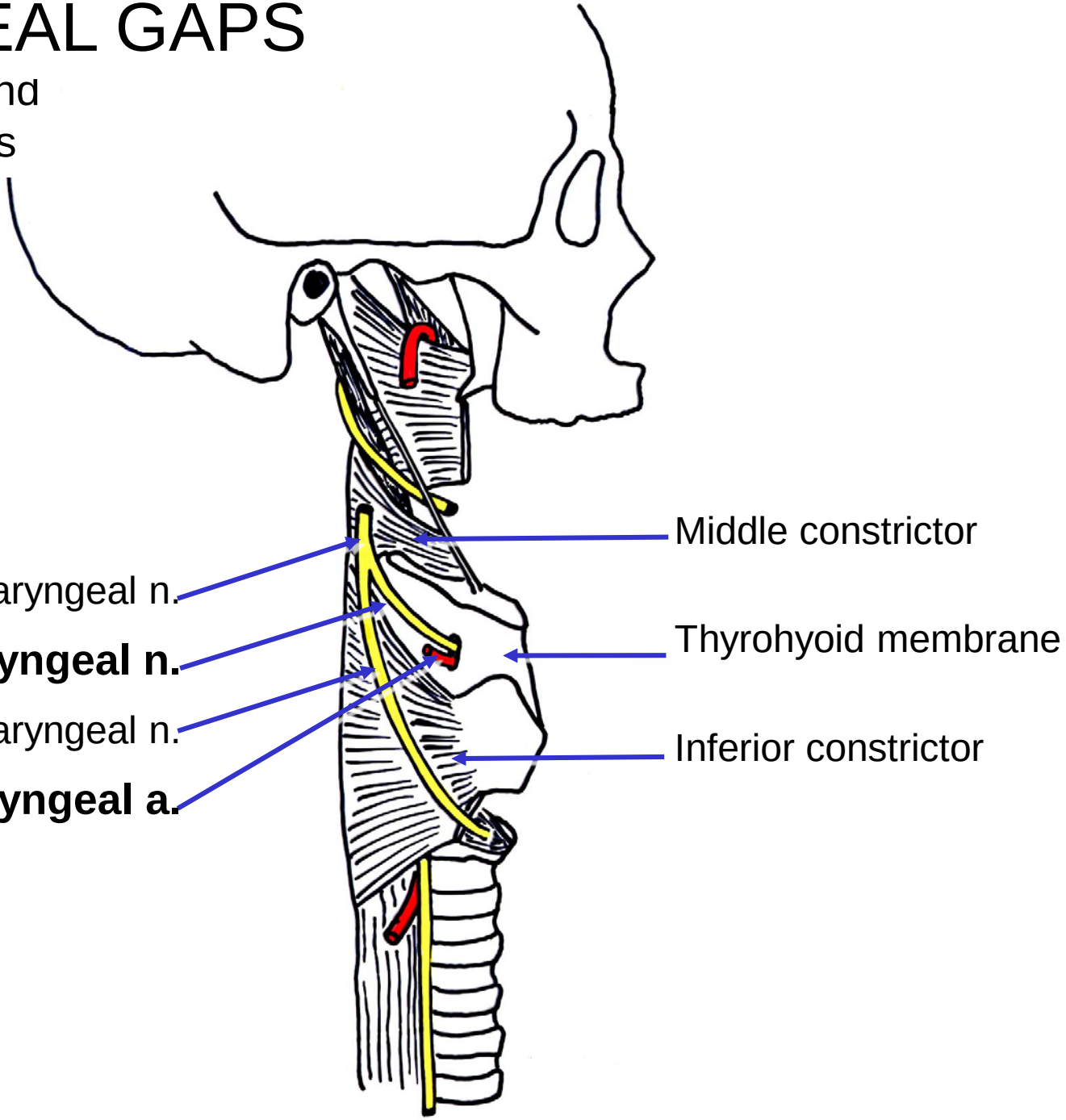
<u>Action</u>
- elevates pharynx during swallowing

STYLOPHARYNGEUS MUSCLE



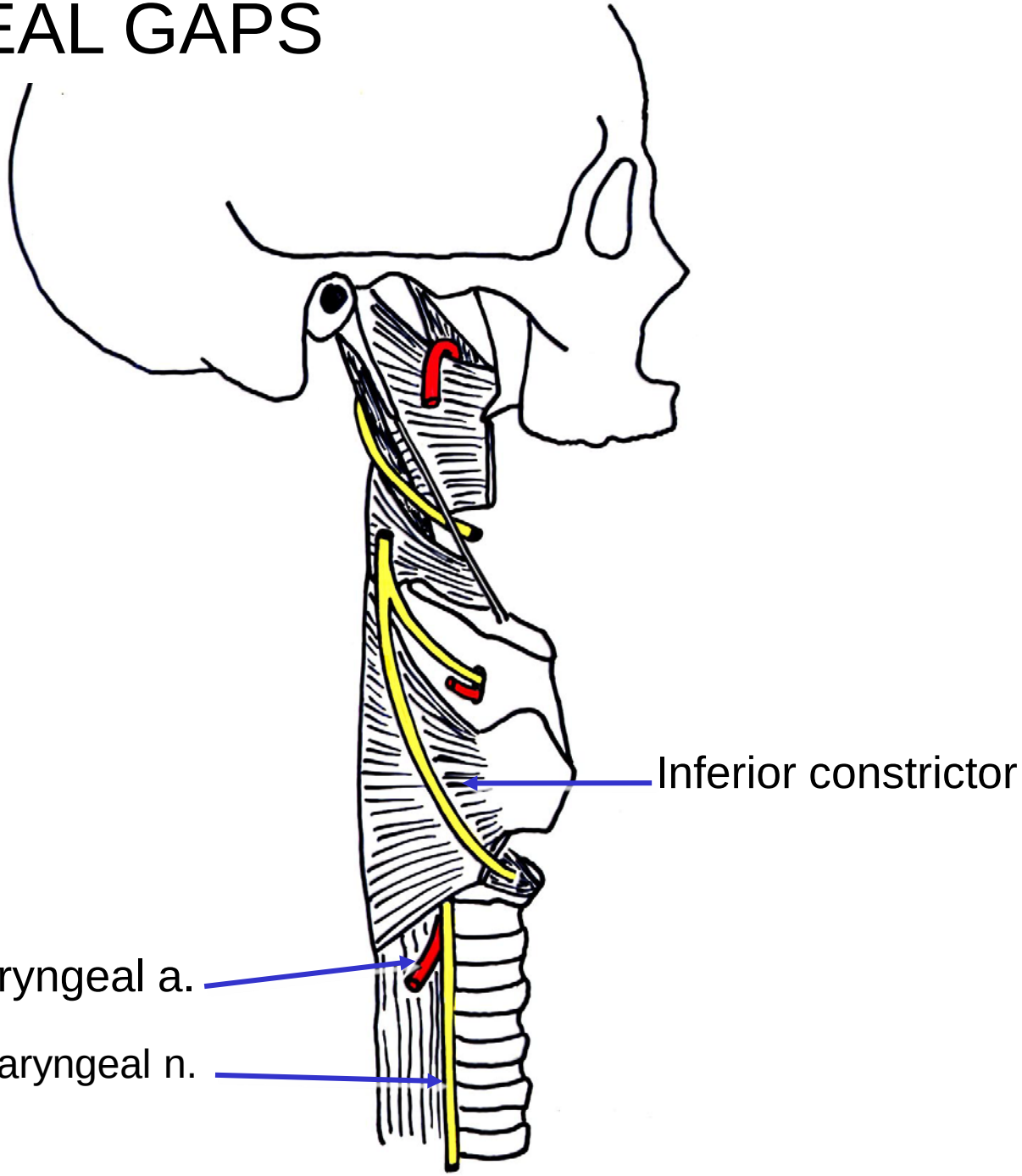
PHARYNGEAL GAPS

- between middle and inferior constrictors



PHARYNGEAL GAPS

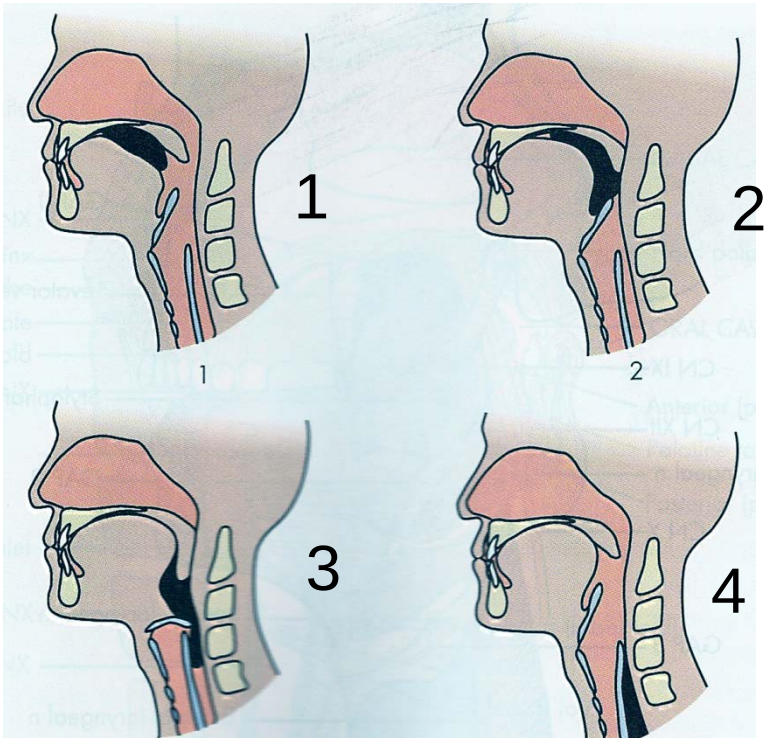
- below inferior constrictor



SWALLOWING

-divided into four different stages occurring in:

1) mouth
2) pharynx
3) pharynx
4) esophagus



Once food is pushed into oropharynx, rest of swallowing occurs by reflex action (Stages 2-4).

SWALLOWING

1) TONGUE presses chewed food into a bolus against the palate and then posteriorly

2a) SOFT PALATE reflexively elevates to seal off nasopharynx

2b) LARYNX is reflexively raised by stylopharyngeous, palatopharyngeous and suprahyoid muscles

2c) INTRINSIC LARYNGEAL MUSCLES reflexively contract to help seal laryngeal inlet

3) PHARYNGEAL CONSTRICTOR MUSCLES reflexively contract in peristaltic waves

4) ESOPHAGUS reflexively contracts as bolus reaches end of pharynx