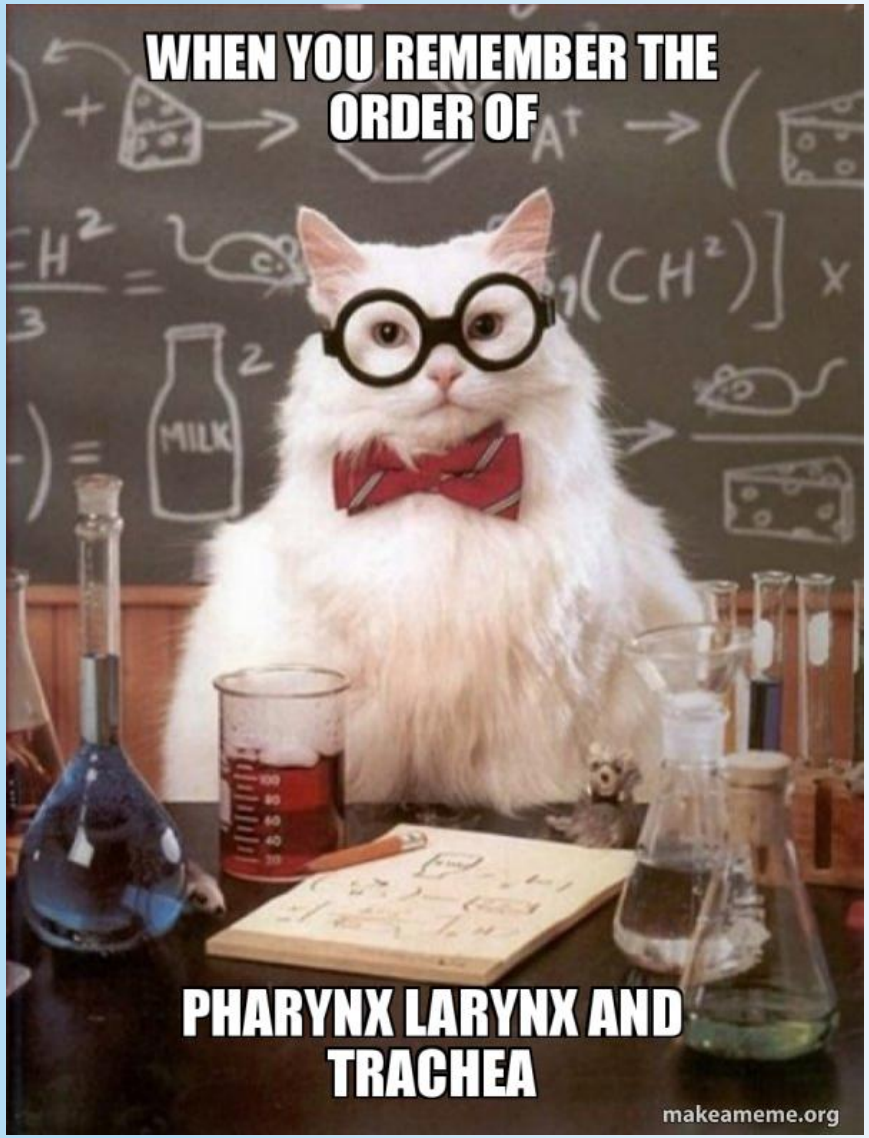
# Throat and neck anatomy

## Oral cavity, Pharynx, larynx and thyroid

By Glenn André Breivik

# Agenda

- Oral cavity *(Quick part)*
- Pharynx (Practical prep)
- Larynx *(Theoretical prep)*
- Thyroid *(Theoretical prep)*
- Ansa cervicalis *(Theoretical prep)*

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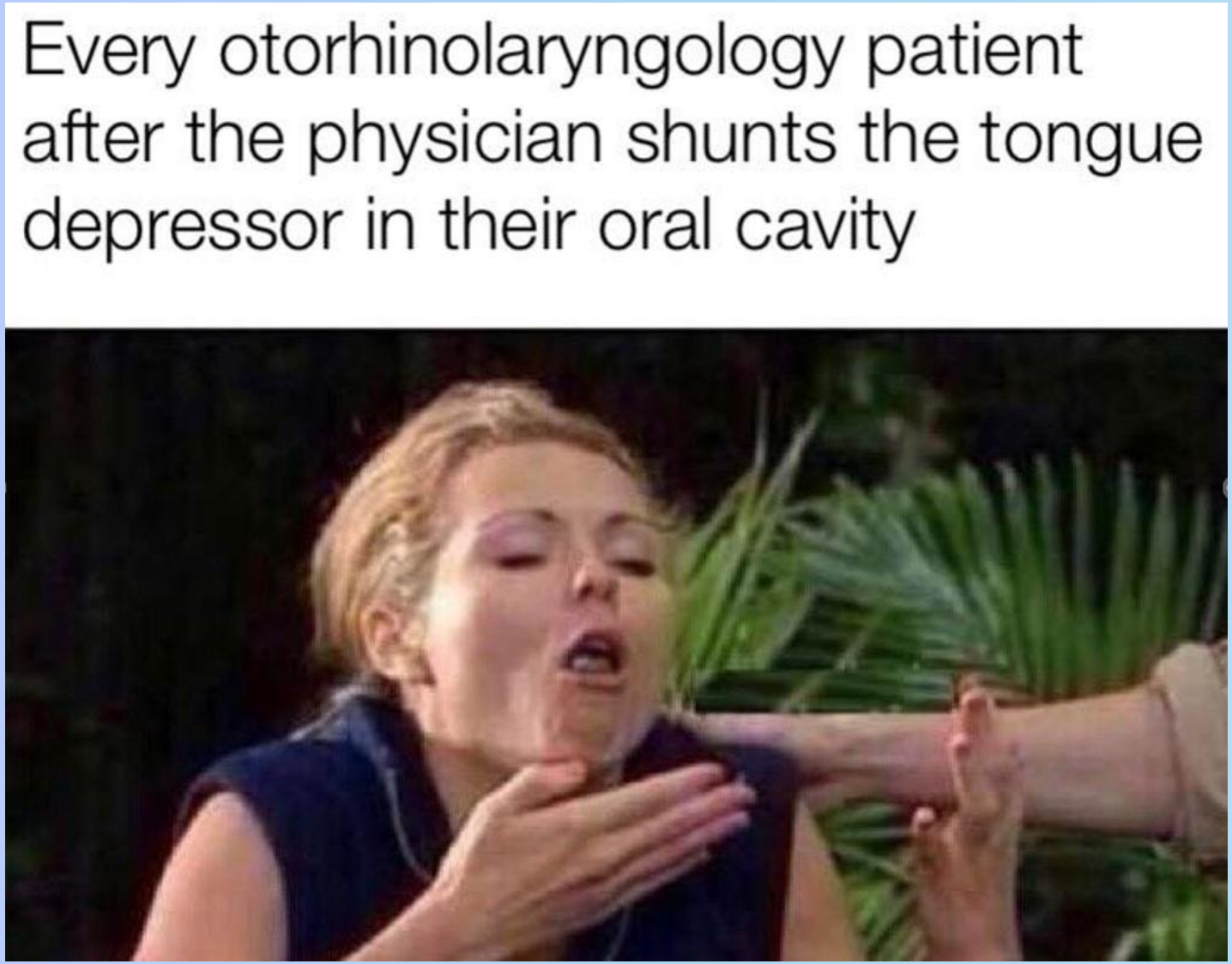
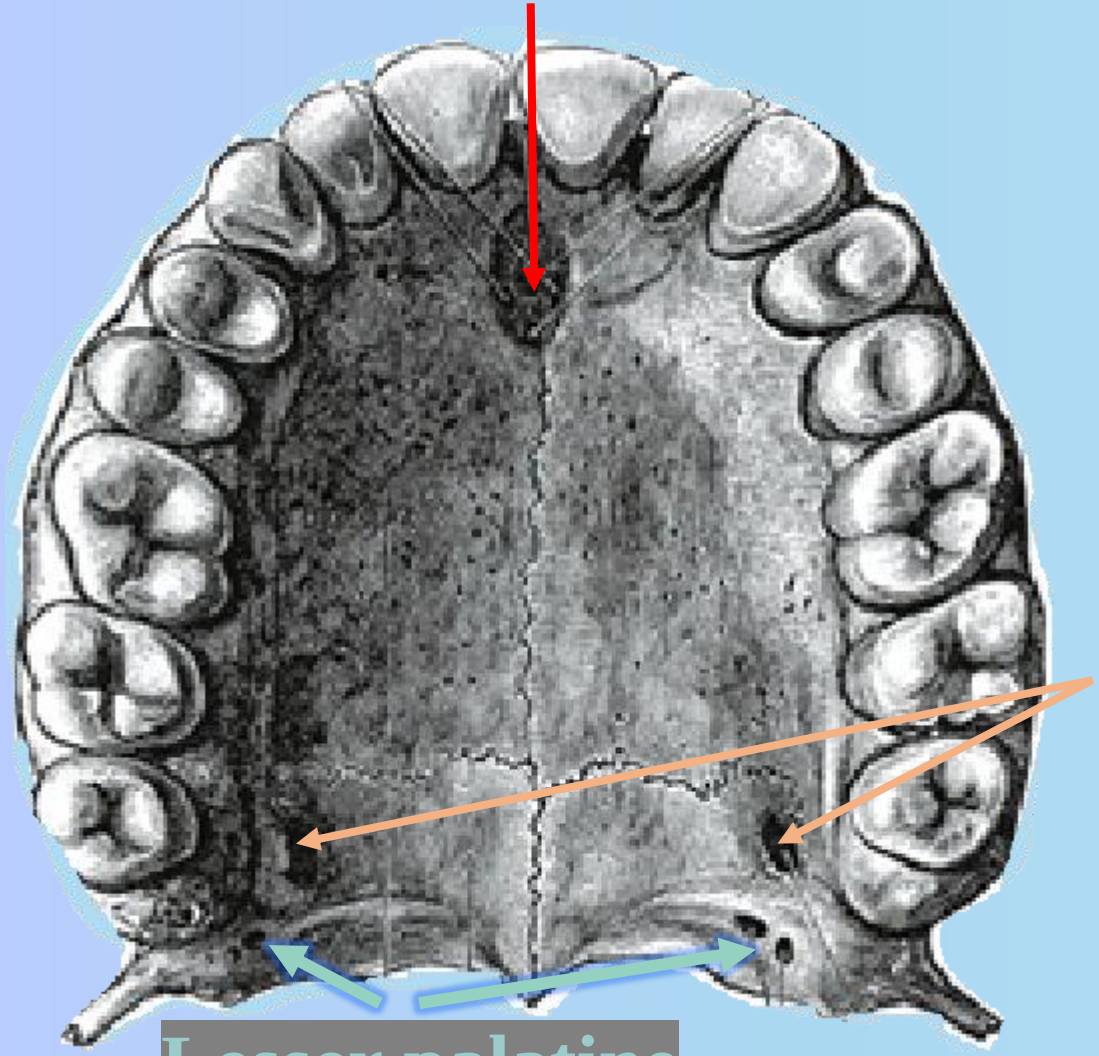
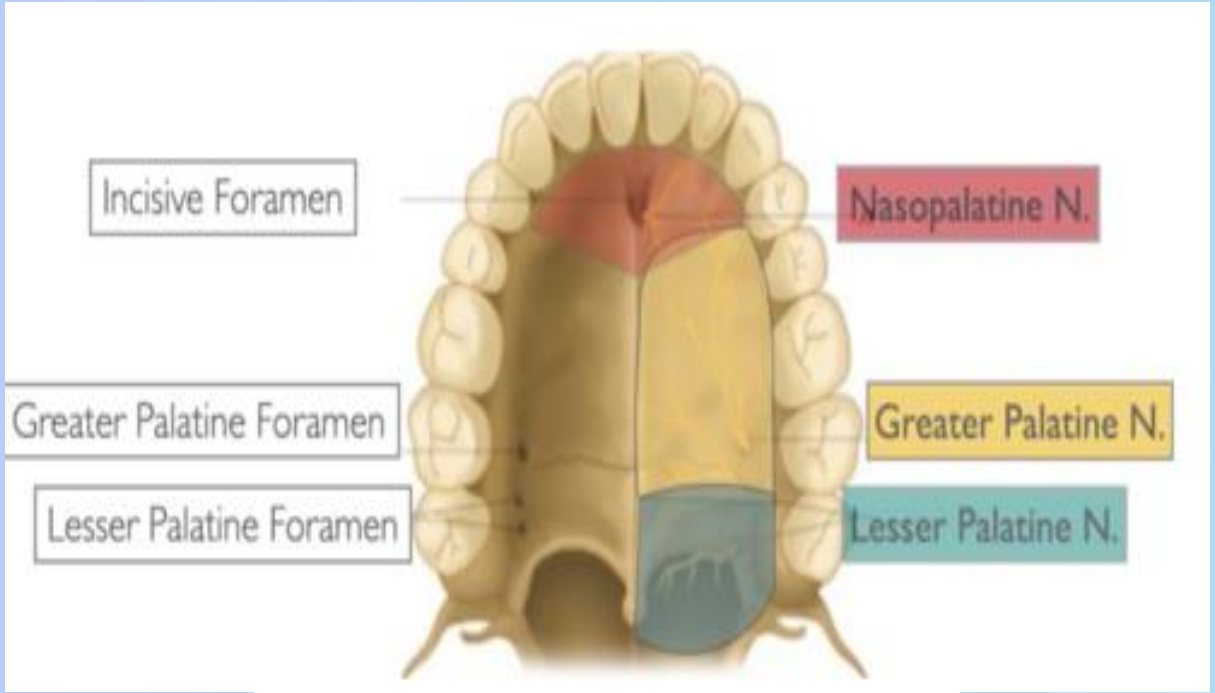


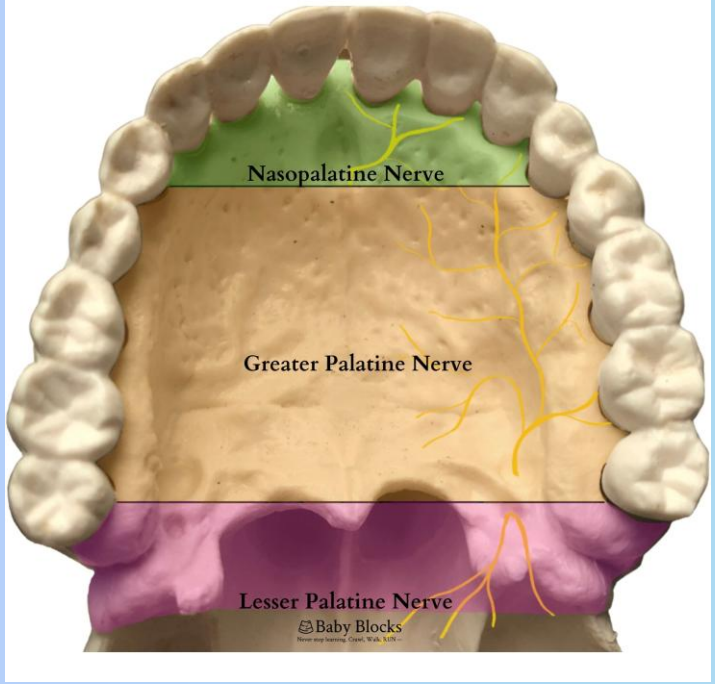

# Oral cavity

# 3 foramina in the palate

1. Incisive foramen
2. Greater palatine foramen
3. Lesser palatine foramen






# What **exits** each foramen?

1. Incisive foramen:
   - Nasopalatine nerve

   *(Greater palatine artery only ENTERS!)*

2. Greater palatine foramen:
   - Greater palatine nerve
   +
   - Greater palatine artery

3. Lesser palatine foramen:
   - Lesser palatine nerve
   +
   - Lesser palatine artery

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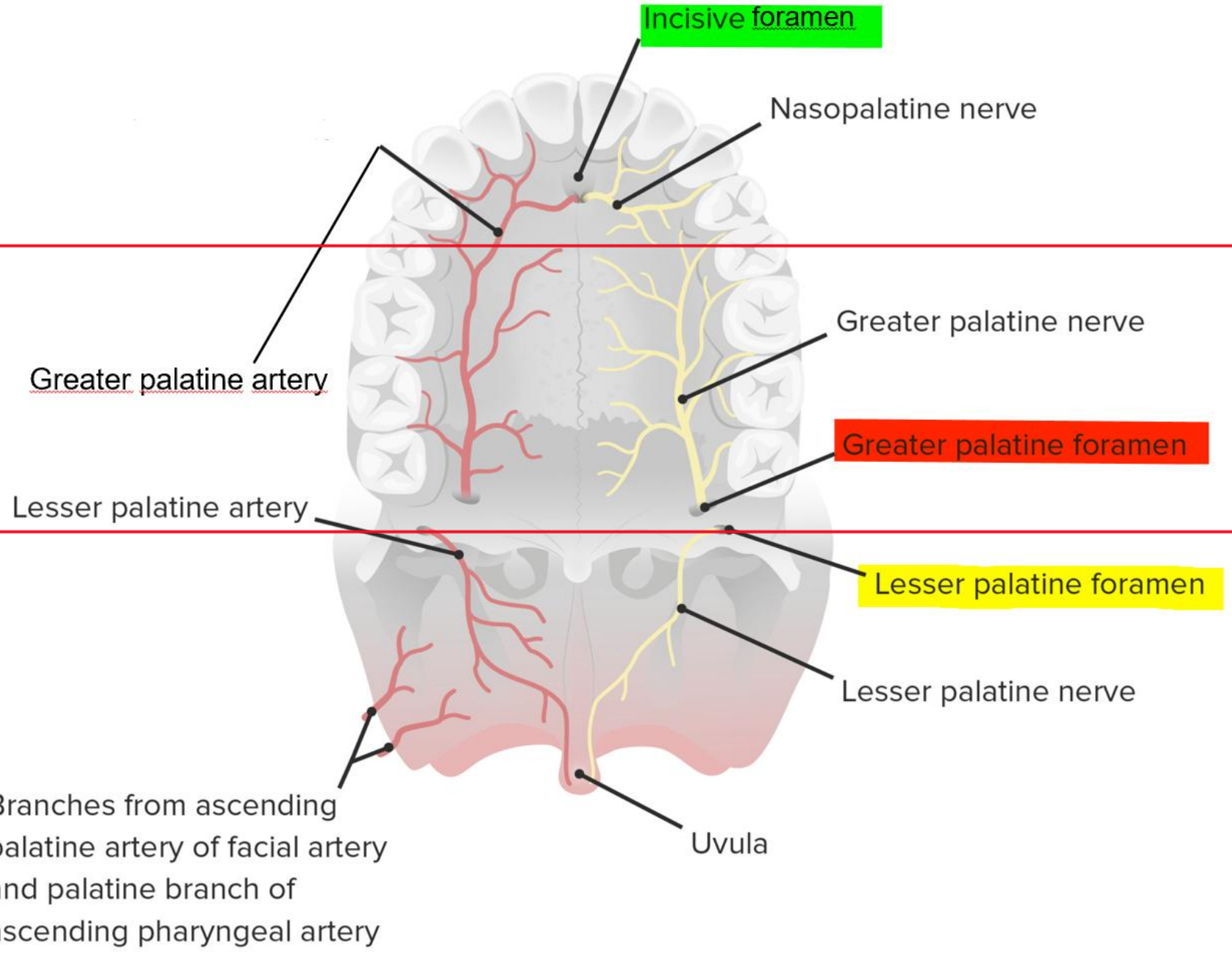



**Incisive area**
**(hard palate)**

**Greater palatine area**
**(hard palate)**

**Lesser palatine area**
**(soft palate)**

# Which artery and nerve does what?

- **Nasopalatine nerve**
  → Anterior 1/3 of hard palate and gingiva + posteroinferior portion of nasal septum

**Incisive area (hard palate)**

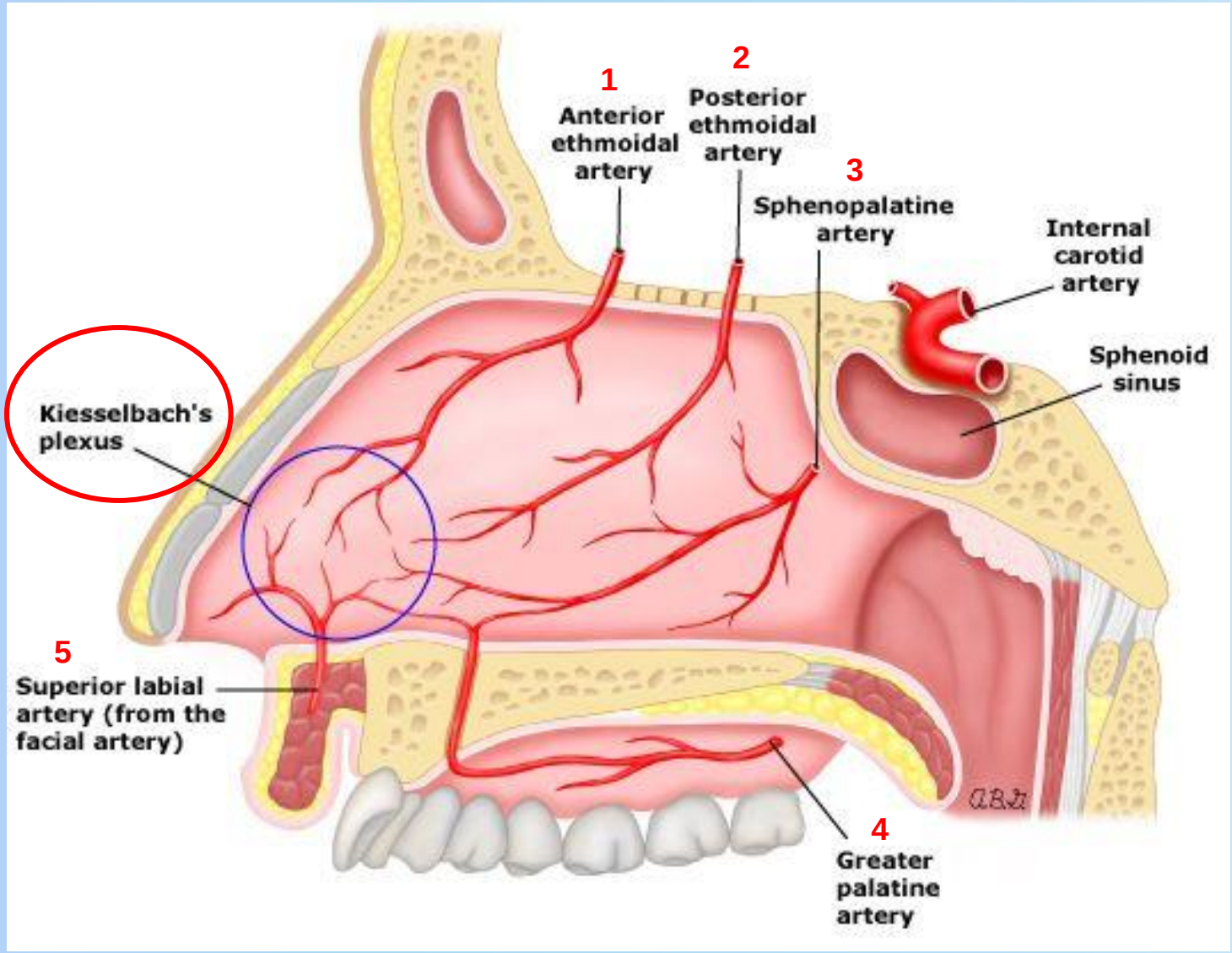
- **Greater palatine artery** (Supplies ***all*** of the palate)
  → Hard palate + nasal septum through the sphenopalatine artery by **entering** the incisive foramen.
- **Greater palatine nerve**
  → Posterior 2/3 of the hard palate, glands and gingiva.

**Greater palatine area (hard palate)**

- **Lesser palatine artery** (Supplies ***all*** of the soft palate)
  → Soft palate + palatine tonsils
- **Lesser palatine nerve**
  → Anterior part of the soft palate, sensory innervation of the uvula and superior part of the palatine tonsils.

**Lesser palatine area (soft palate)**

**NB:**
Posterior part of the soft palate is innervated by the pharyngeal branches of the trigeminal nerve (CN V) and glossopharyngeal nerve (CN IX)




- **Kiesselbach`s plexus is often called Little`s area**

- **Kiesselbach`s plexus is often the reason/location for nosebleeds**

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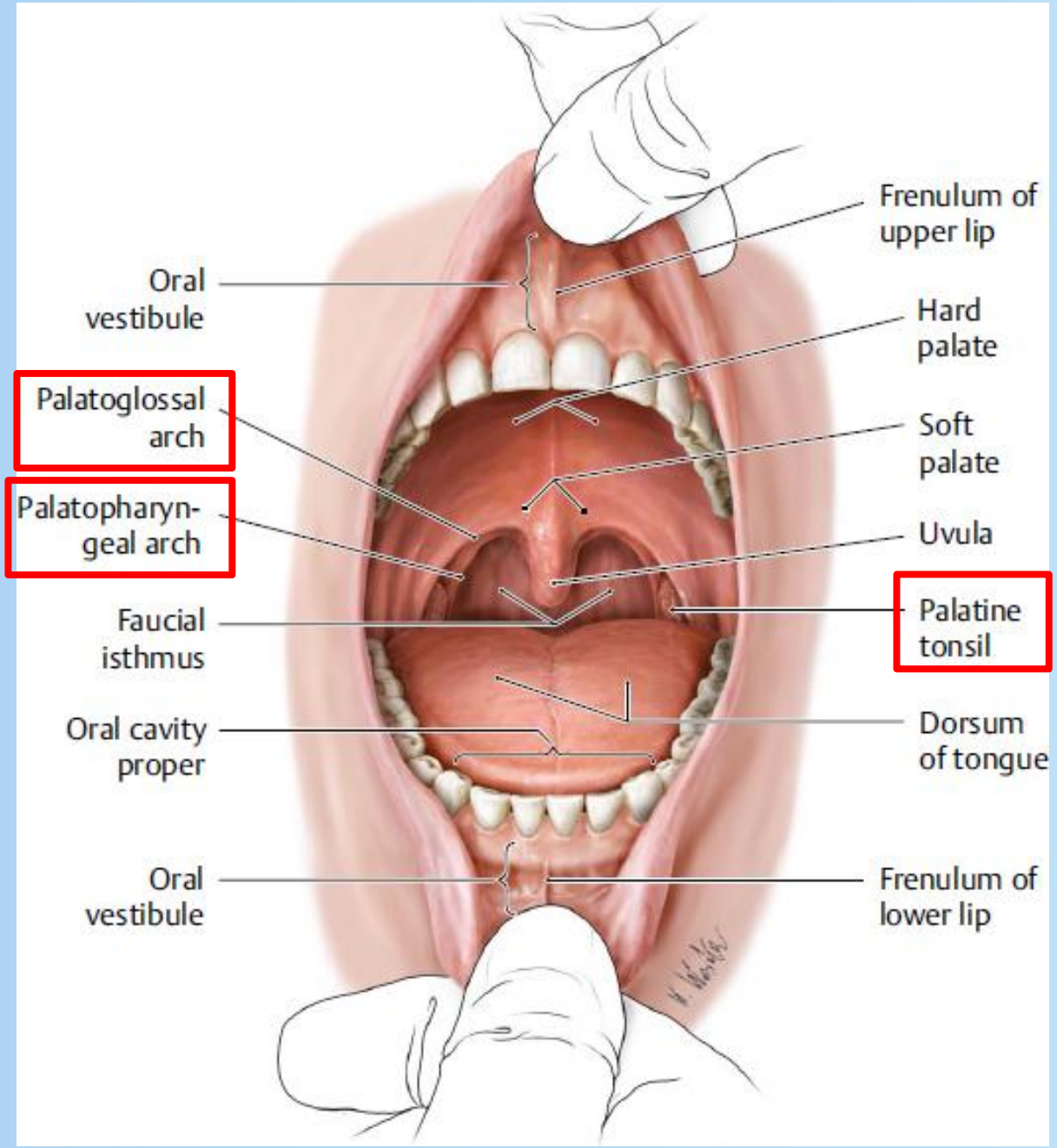
**The palatopharyngeal arch is the border from oral cavity to the pharynx (oropharynx)**




**Still located in the oral cavity!**


# Pharynx

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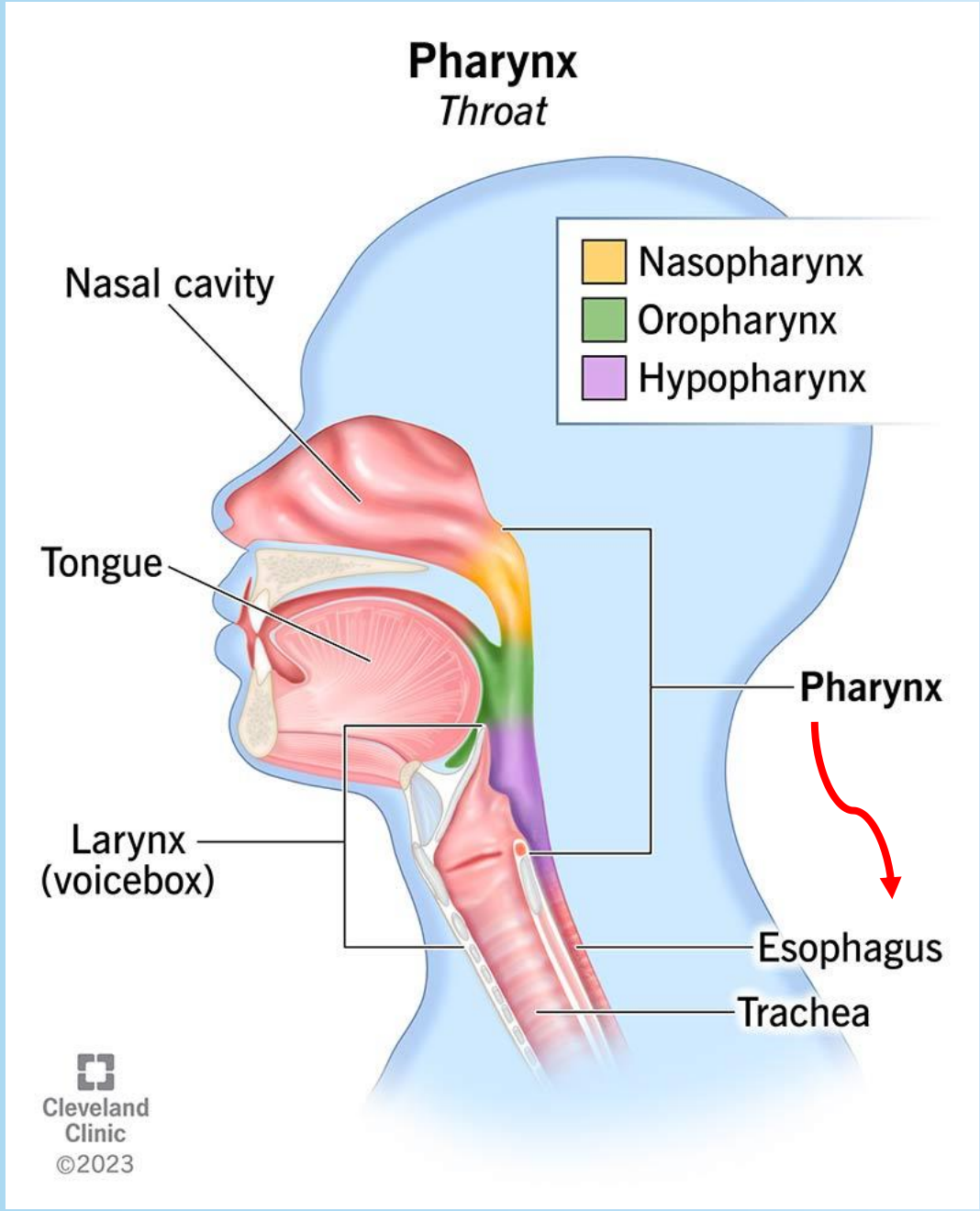
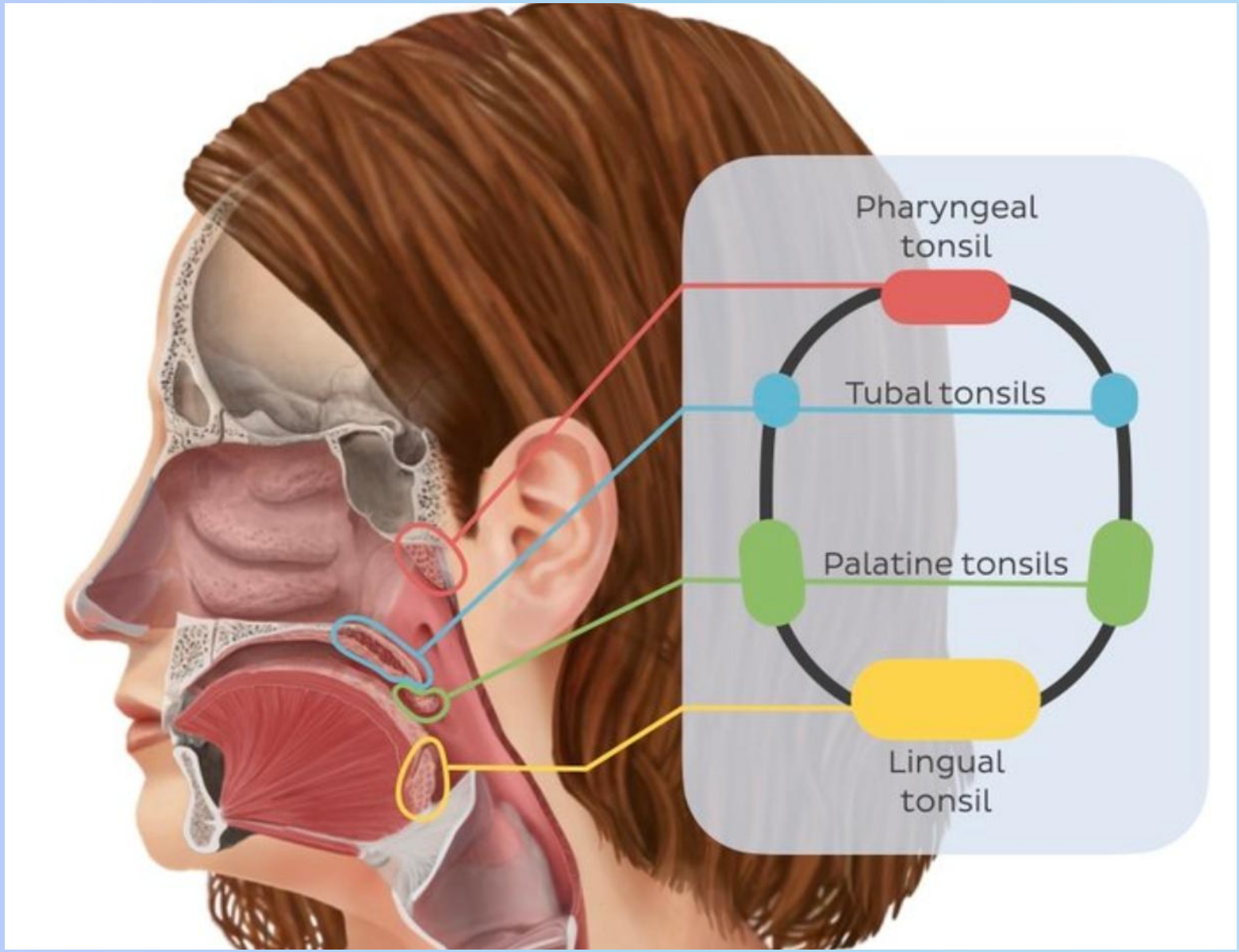
Pharynx = Esophagus

Larynx = Trachea

**Epiglottis is the «border»**

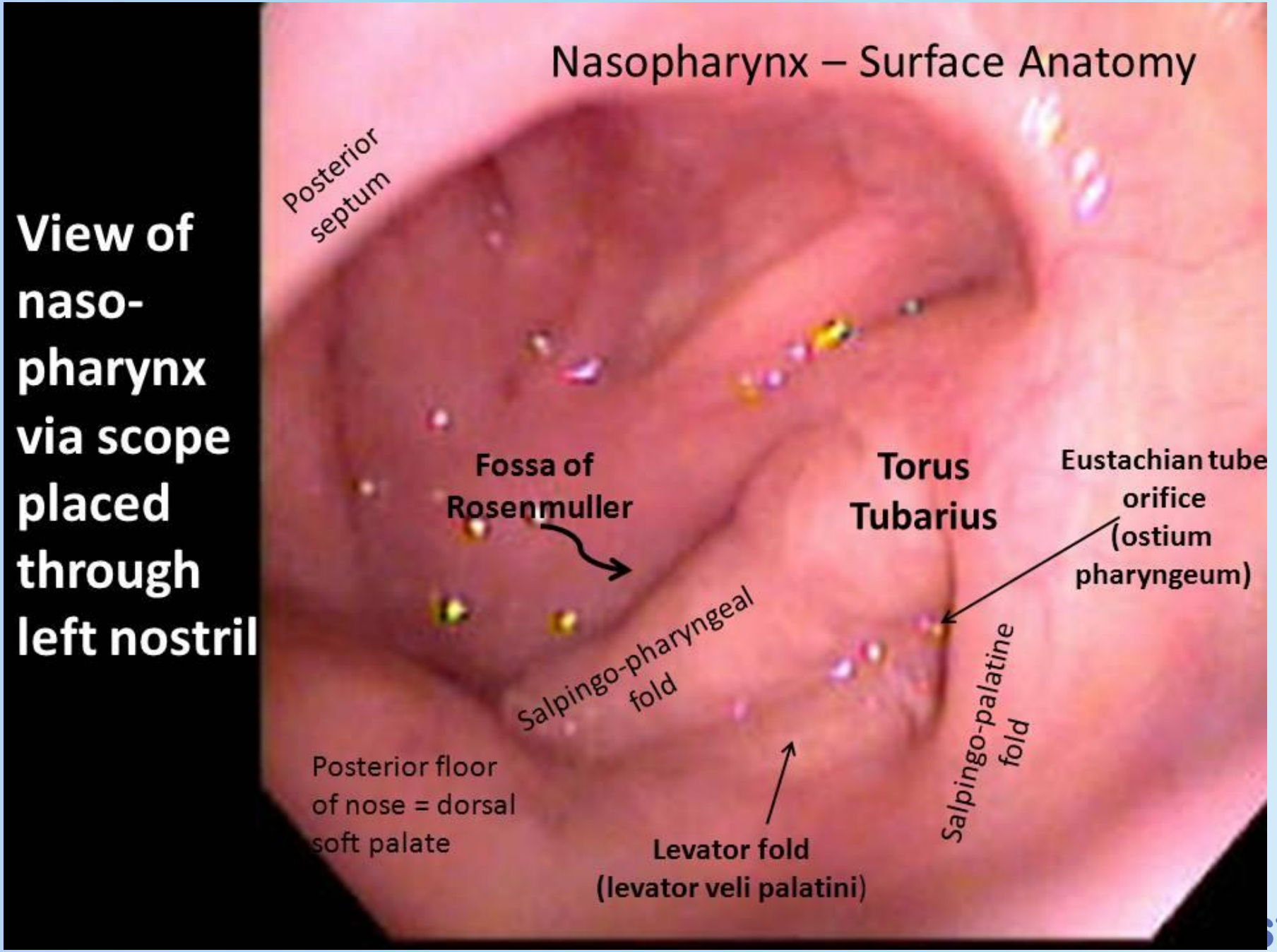


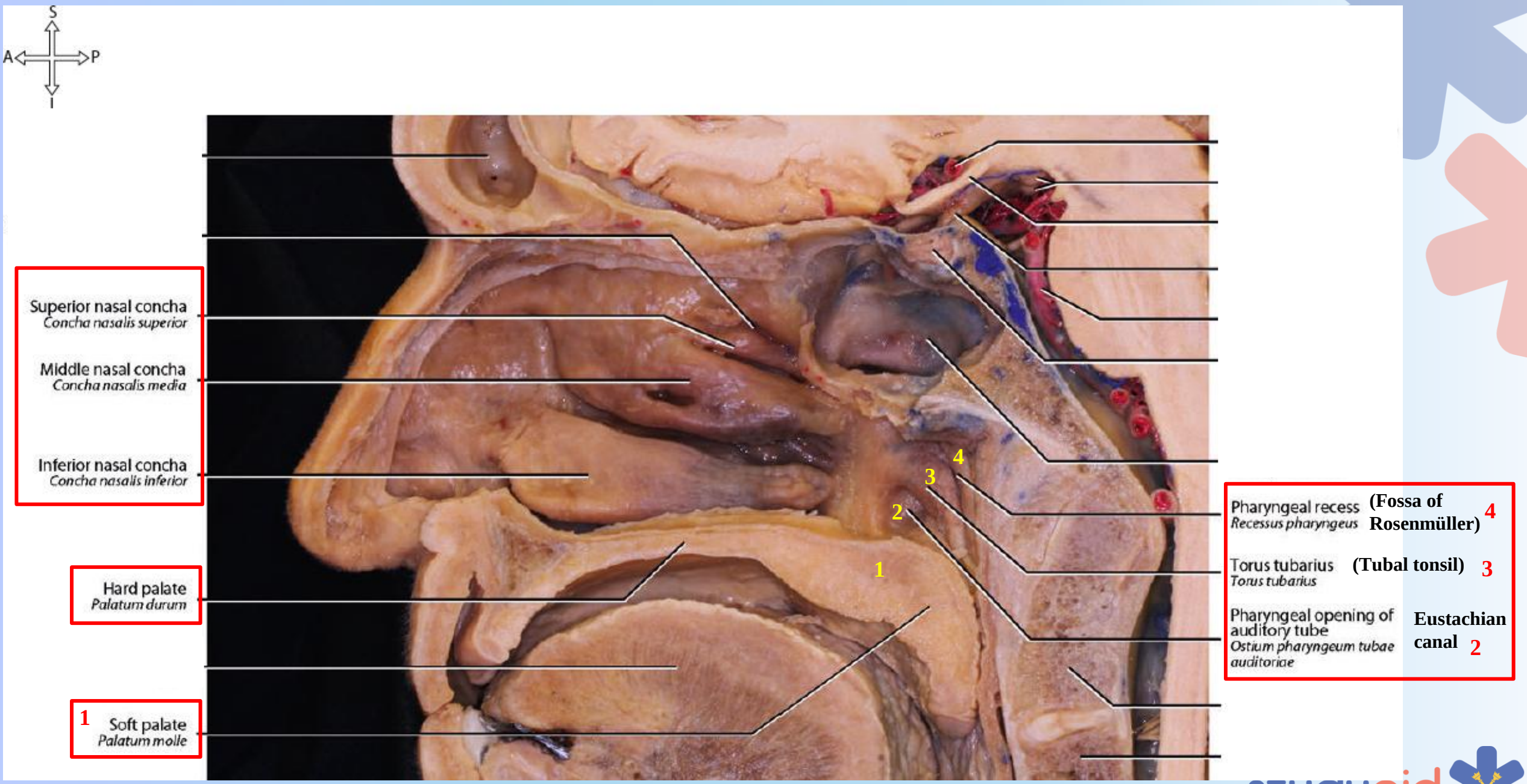
# Ring of Waldeyer



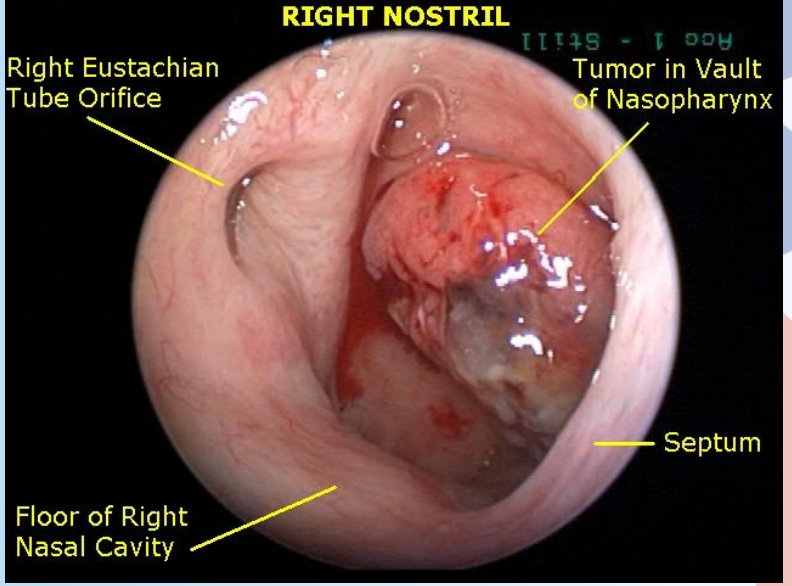

- Tonsils are lymphoid organs – *they protect*
- **Tubal tonsil:** Situated close to the Eustachian opening to protect the inner ear

**View of naso-pharynx via scope placed through left nostril**



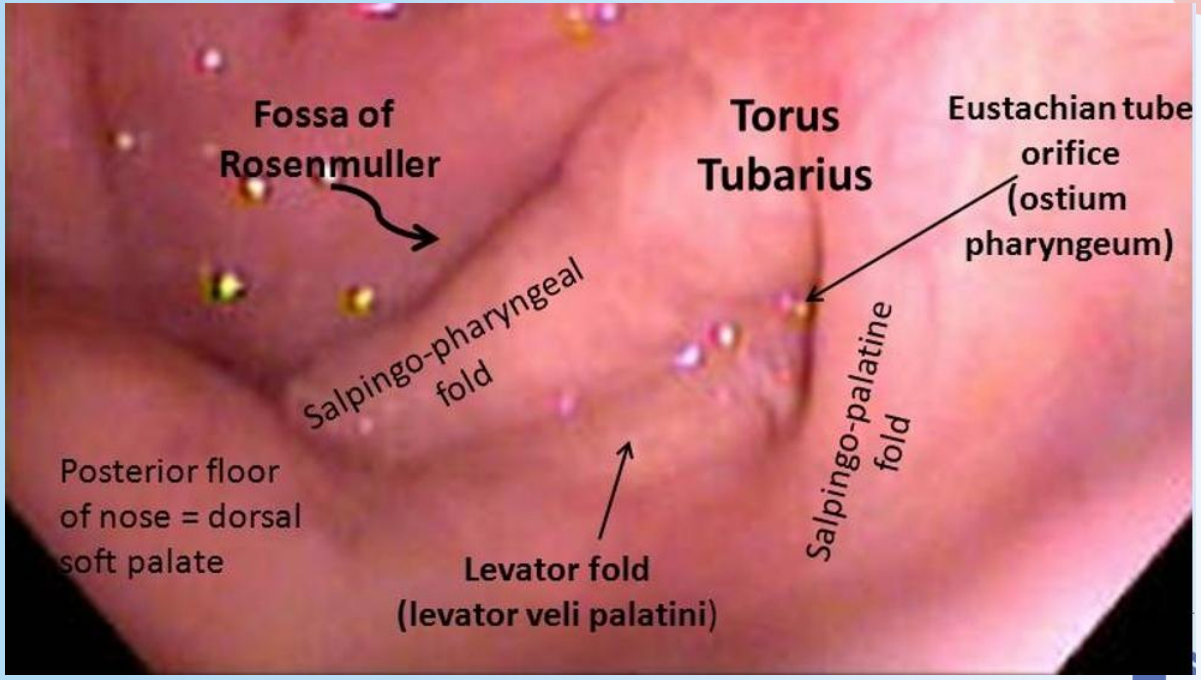

S
A
P
I
Superior nasal concha
Concha nasalis superior
Middle nasal concha
Concha nasalis media
Inferior nasal concha
Concha nasalis inferior
Hard palate
Palatum durum
1
Soft palate
Palatum molle
4
3
2
1
Pharyngeal recess
Recessus pharyngeus
(Fossa of Rosenmüller)
4
Torus tubarius
Torus tubarius
(Tubal tonsil)
3
Pharyngeal opening of auditory tube
Ostium pharyngeum tubae auditoriae
Eustachian canal
2

# What is the structure`s purpose?




- **Fossa of Rosenmüller (pharyngeal recess):**

Often seen with nasopharyngeal carcinoma (NPC)




- **Salpingopharyngeal fold/muscle:**

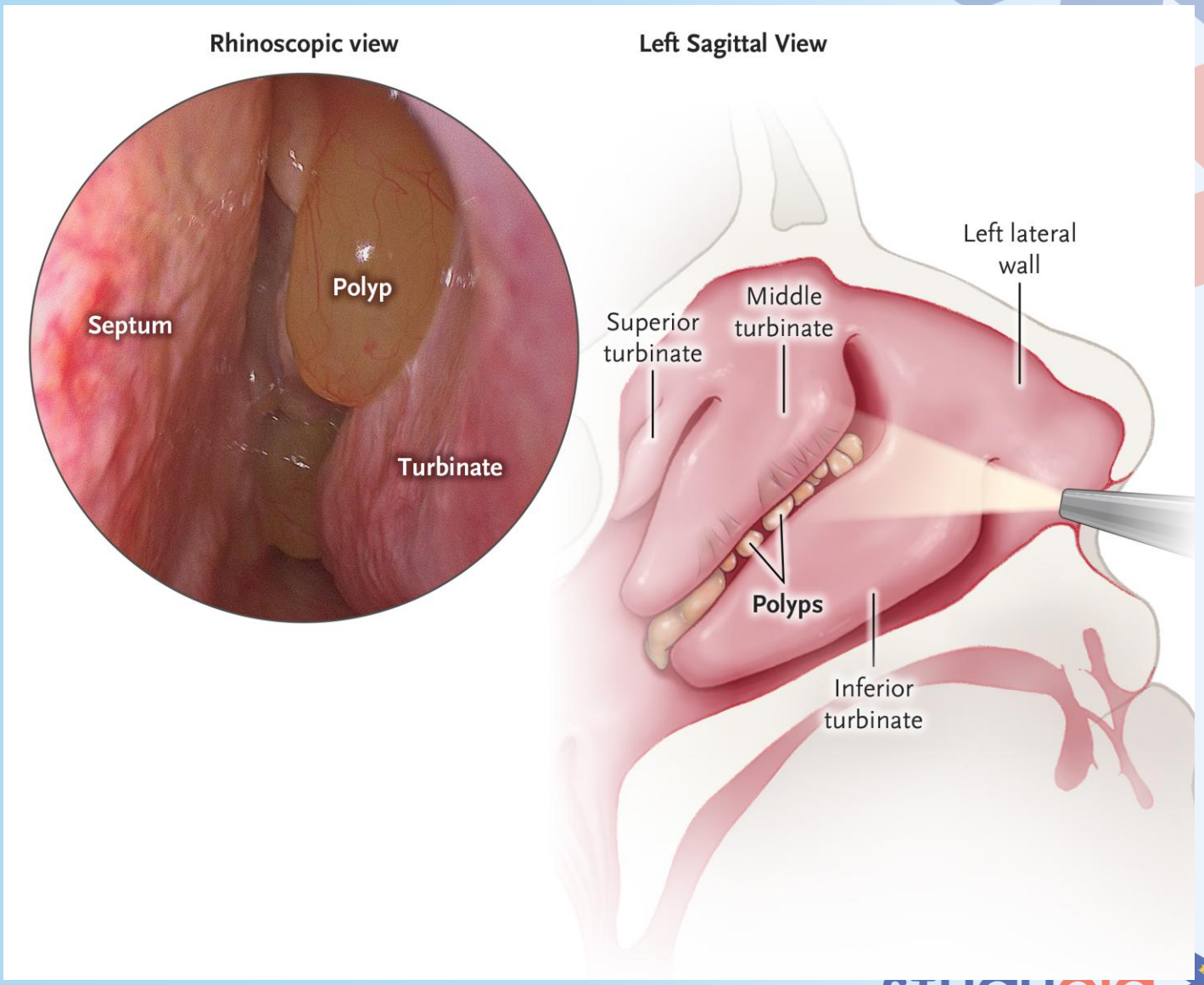
Participates in the mechanism of swallowing, and **opens up** the Eustachian canal

- **Salpingopalatine fold/muscle:**

Participates in the mechanism of swallowing, and **opens up** the Eustachian canal

# What is the purpose of the conchae and the nasal meatus?

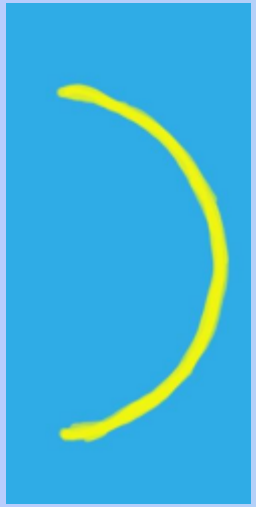
- Inferior, middle and superior conchae are also called «**turbinates**»
- They mix and warm up the air you breathe in
- **Clinically important:** *Nasal polyps* can be found and removed from the conchae.



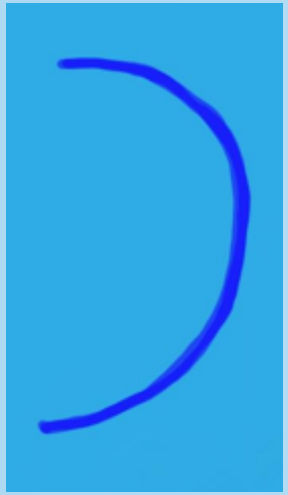
# Tympanic membrane

- An embryologist`s favourite structure!

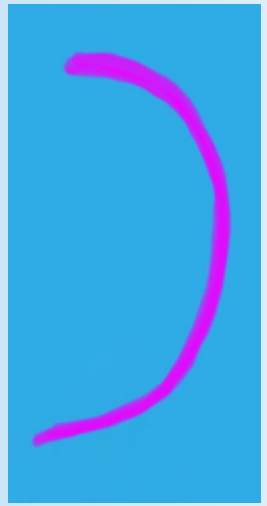
## Consists of 3 layers:



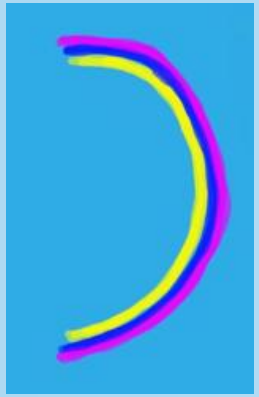
Skin
(most external)



Connective
tissue

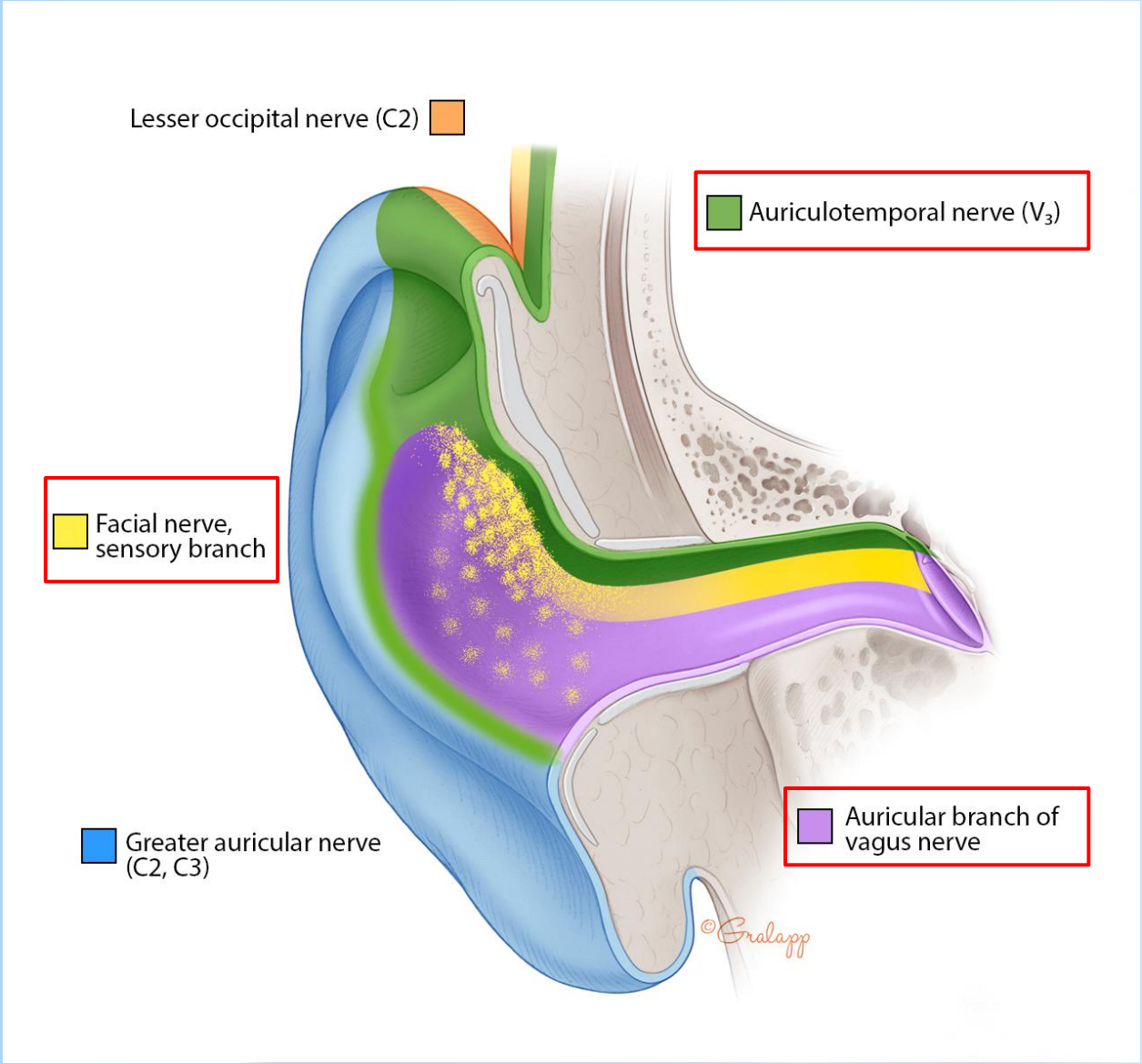


Mucosal
layer (most internal)

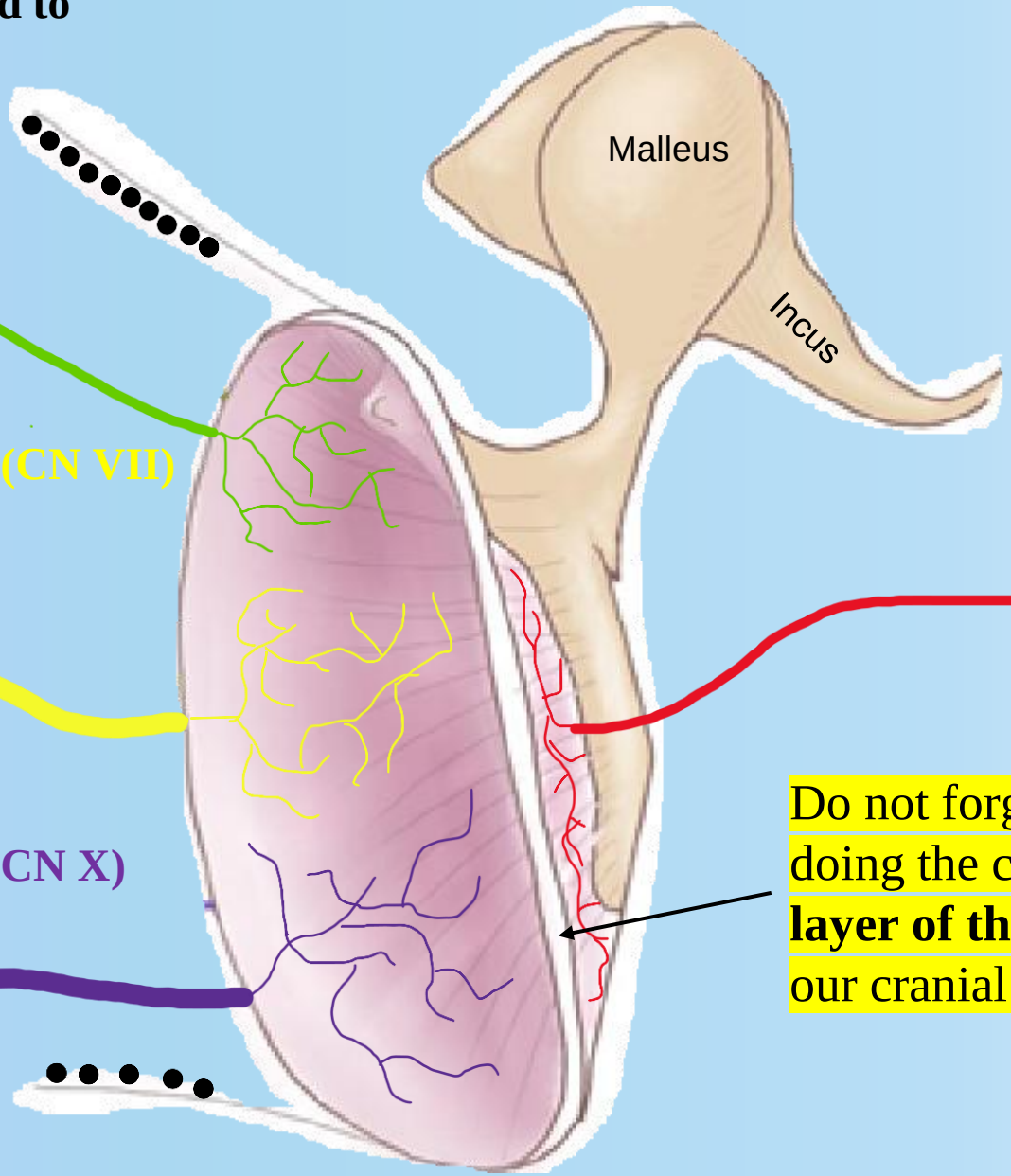


Tympanic membrane

# Nerve innervation of the tympanic membrane



**Which pharyngeal arch is related to which nerves?**




Auriculotemporal nerve (V3)

Sensory branch of the Facial nerve (CN VII)

Auricular branch of vagus nerve (CN X)

Jacobson`s nerve of Glossopharyngeal nerve (CN IX)

Do not forget about the ***neural crest cells*** doing the connective tissue layer (**middle layer of the membrane)** and helping out our cranial nerves!

1st pharyngeal groove

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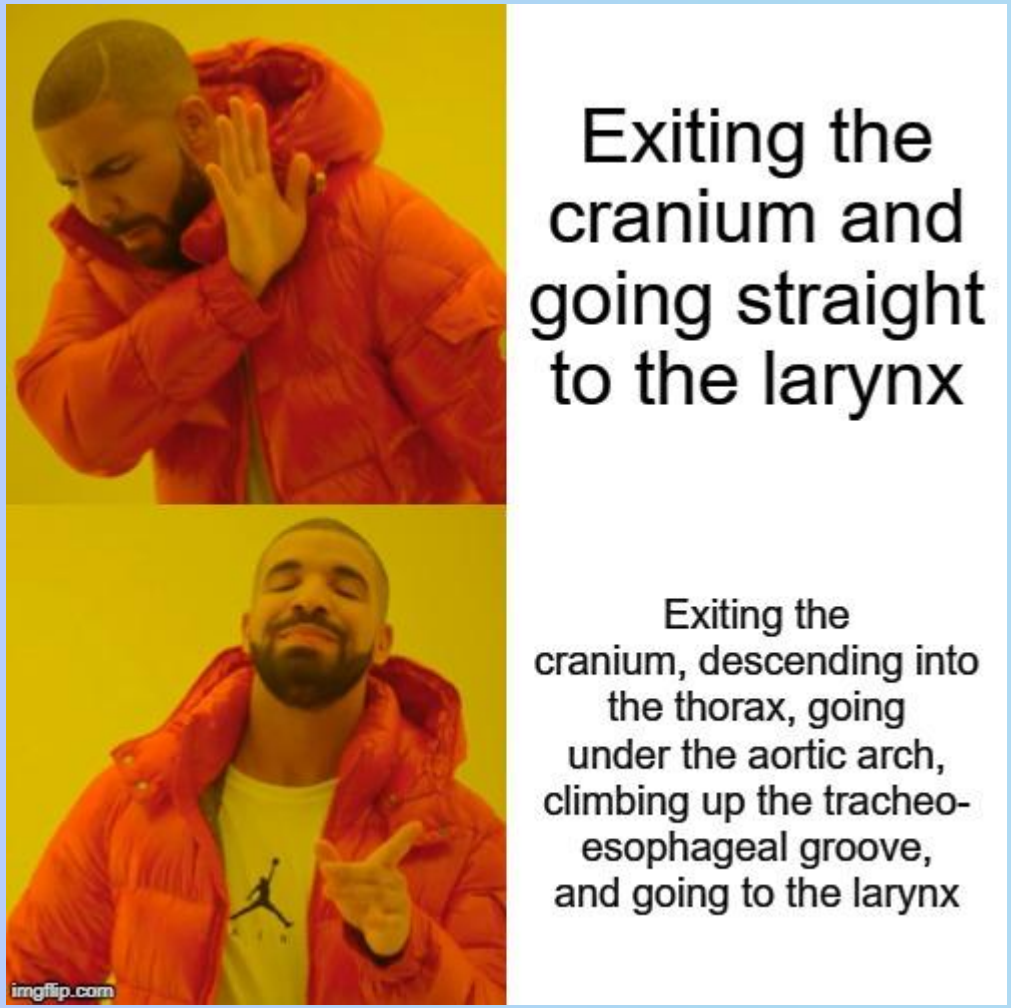
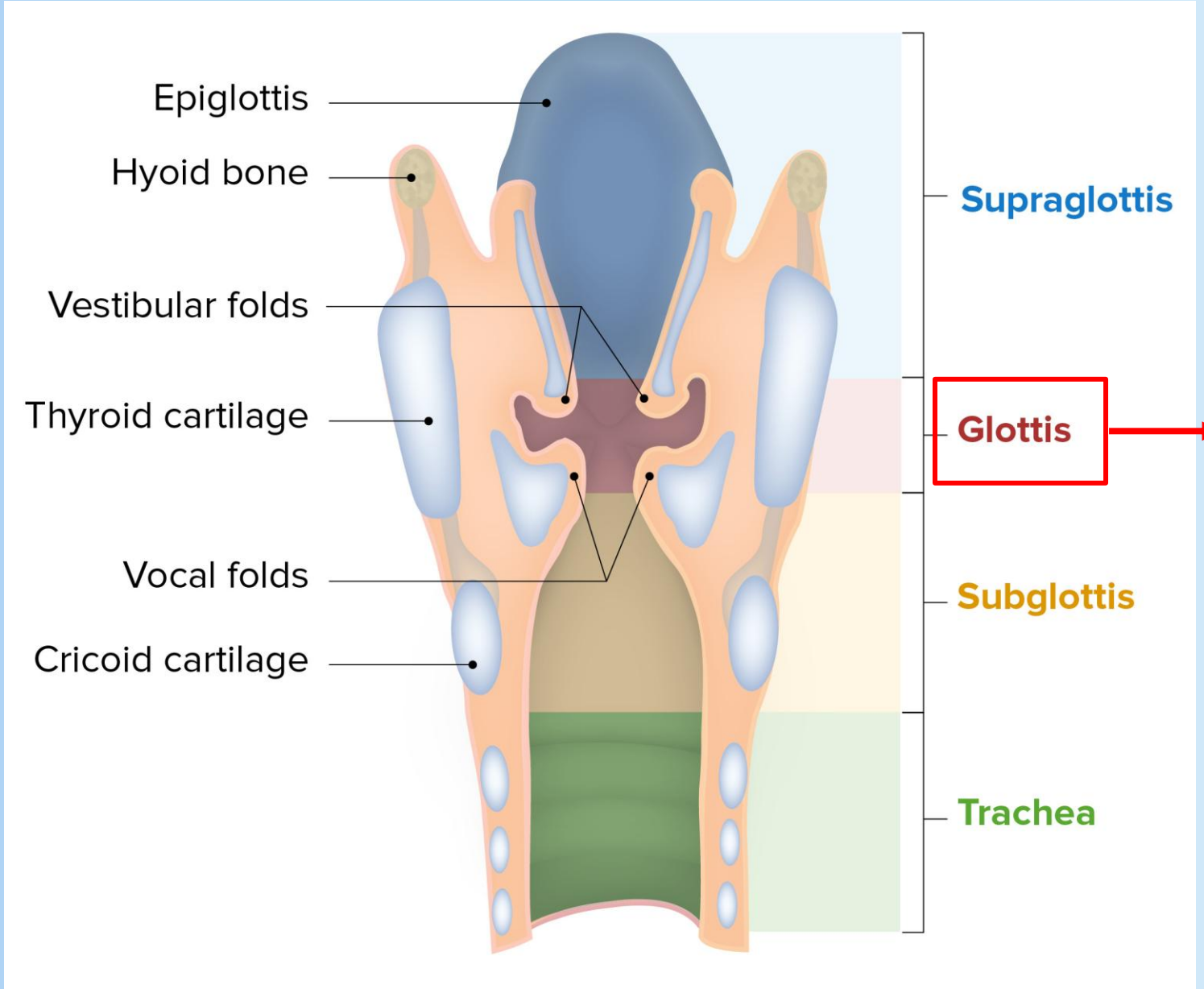



# Larynx

- Cartilage
- Muscles
- Nerves




**Important checkpoint for nerve innervation**

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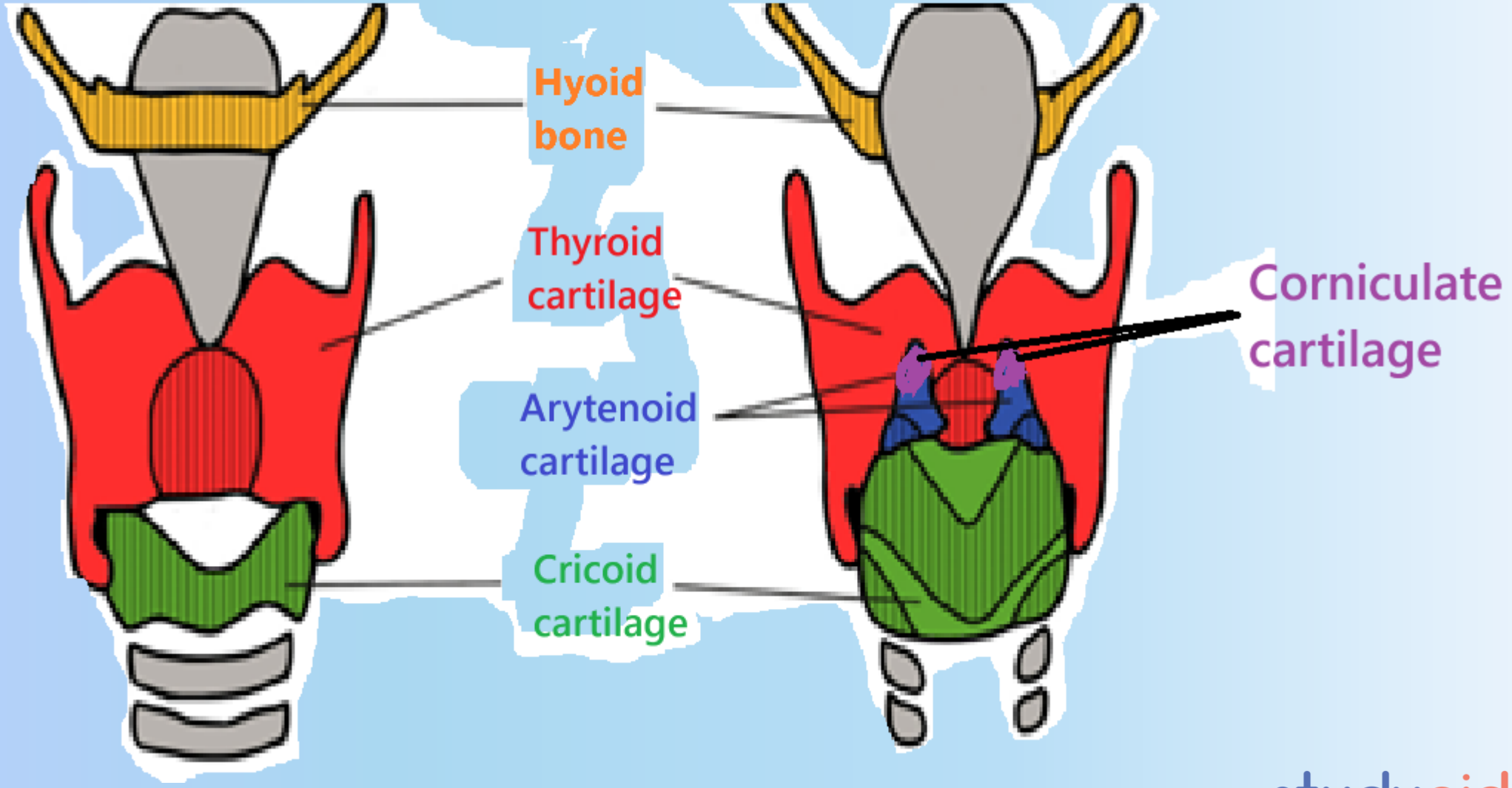
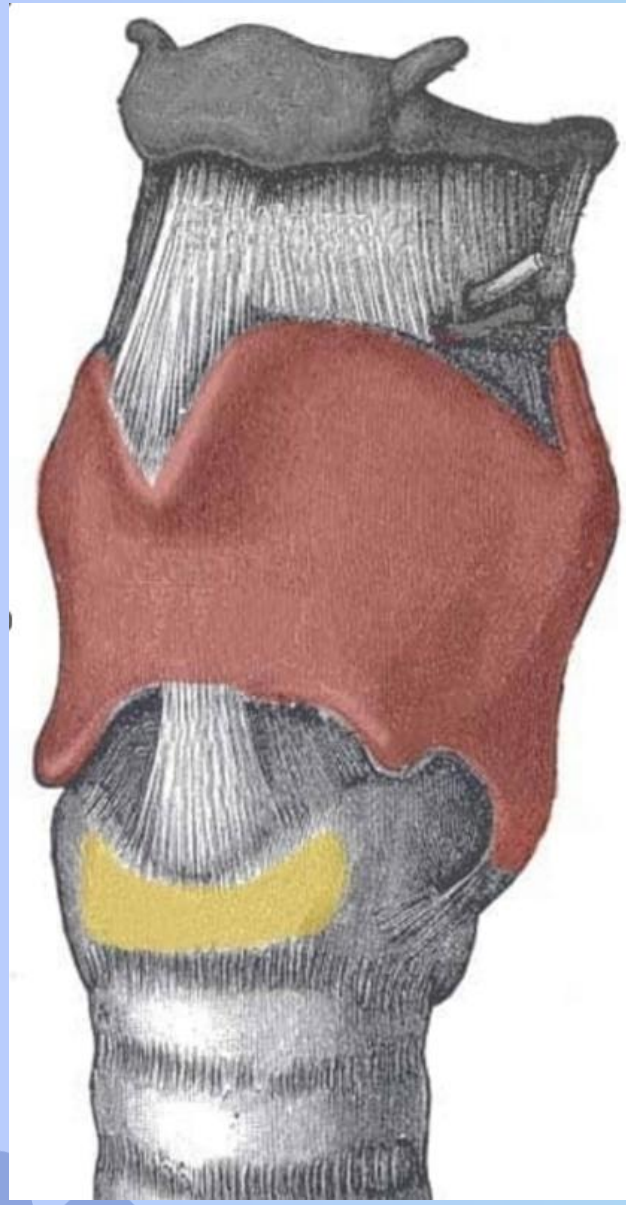
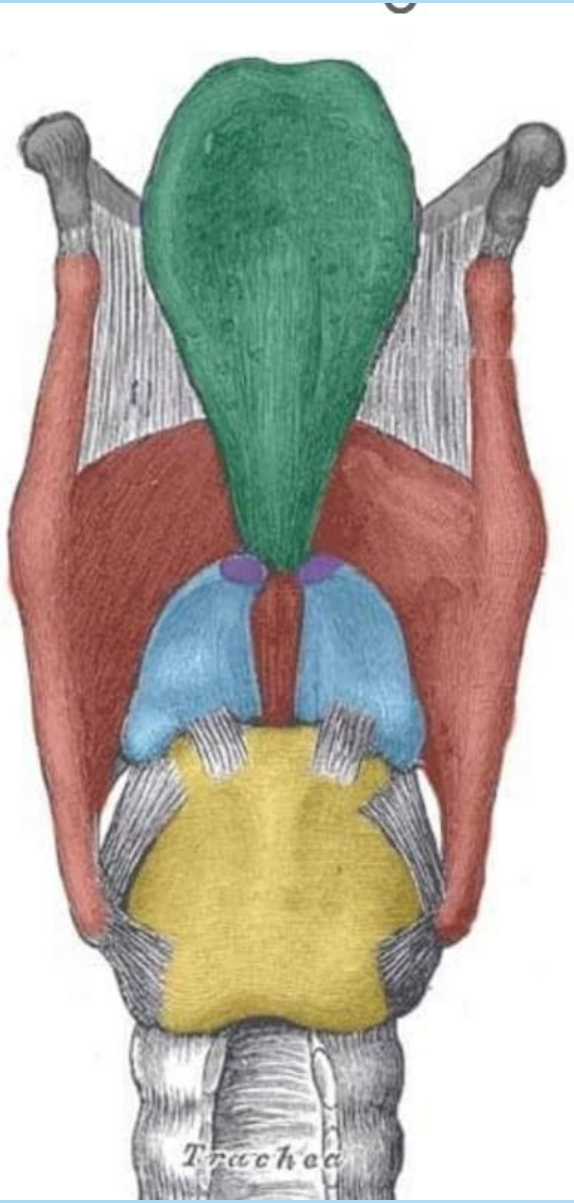
# ANTERIOR VIEW

# POSTERIOR VIEW








- Epiglottis
- Thyroid cartilage
- Arytenoid cartilages
- Cricoid cartilage
- Corniculate cartilages
- Thyrohyoid membrane

**«Arytenoid» refers to the larynx, which is related to important cartilage/muscles that we need to have in order to produce sound. They often originate «from the back» and attach to the front.**

# Function of the laryngeal cartilage

- **Epiglottis:**
  → Close when we swallow and lift up the thyroid cartilage

- **Thyroid cartilage:**
  → Protects the trachea and supports the vocal cords.

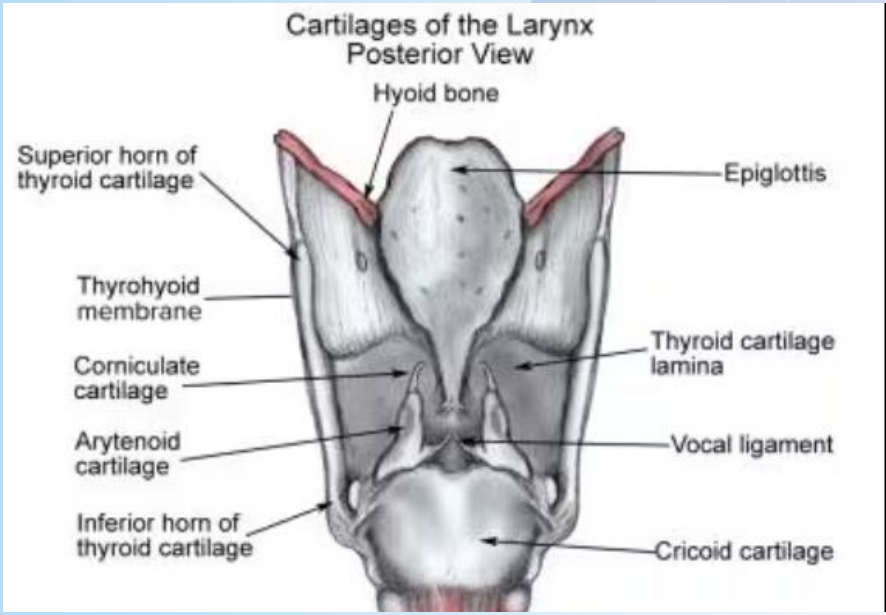
- **Arytenoid cartilage:**
  → Participates in moving the vocal folds and *create tension*

- **Cuneiform cartilage/tubercle:** **Very pinnable**
  → Strengthening the *vocal folds* and supporting the epiglottis

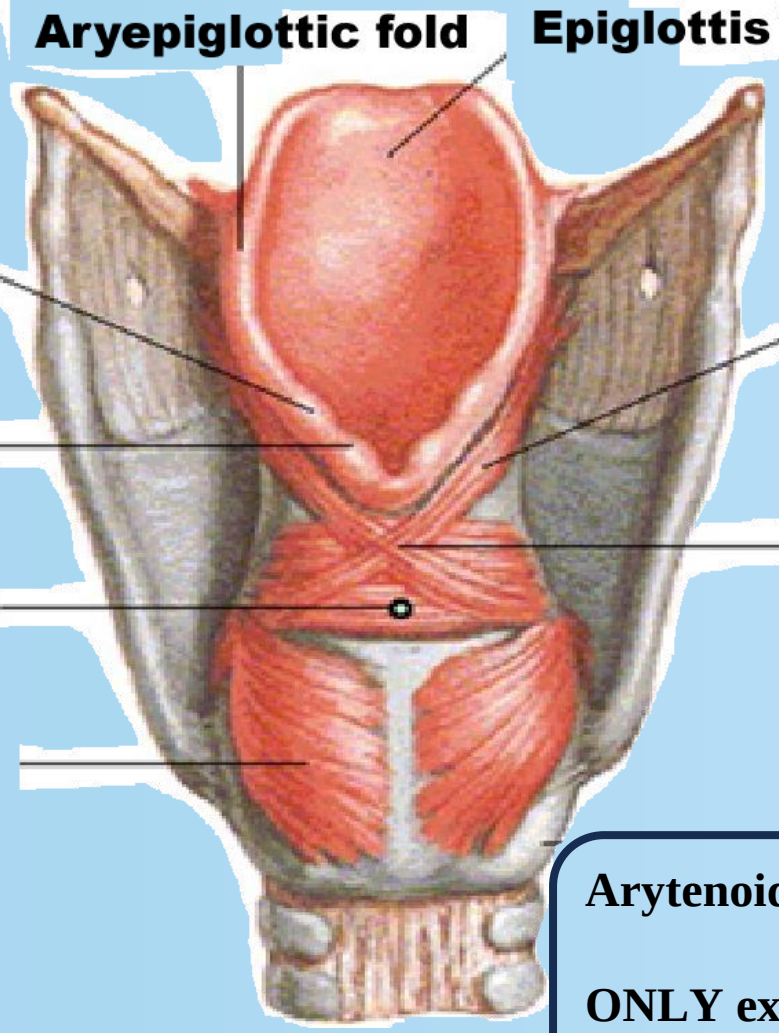
- **Corniculate cartilage/tubercle:** **Very pinnable**
  → Strengthens and supports the *aryepiglottic fold*

- **Cricoid cartilage:**
  →Important attachment points for muscles that serve the airway

- **Thyrohyoid membrane:**
  → Supports the thyroid cartilage in the swallowing function, and it works as a passage for nerves and arteries.



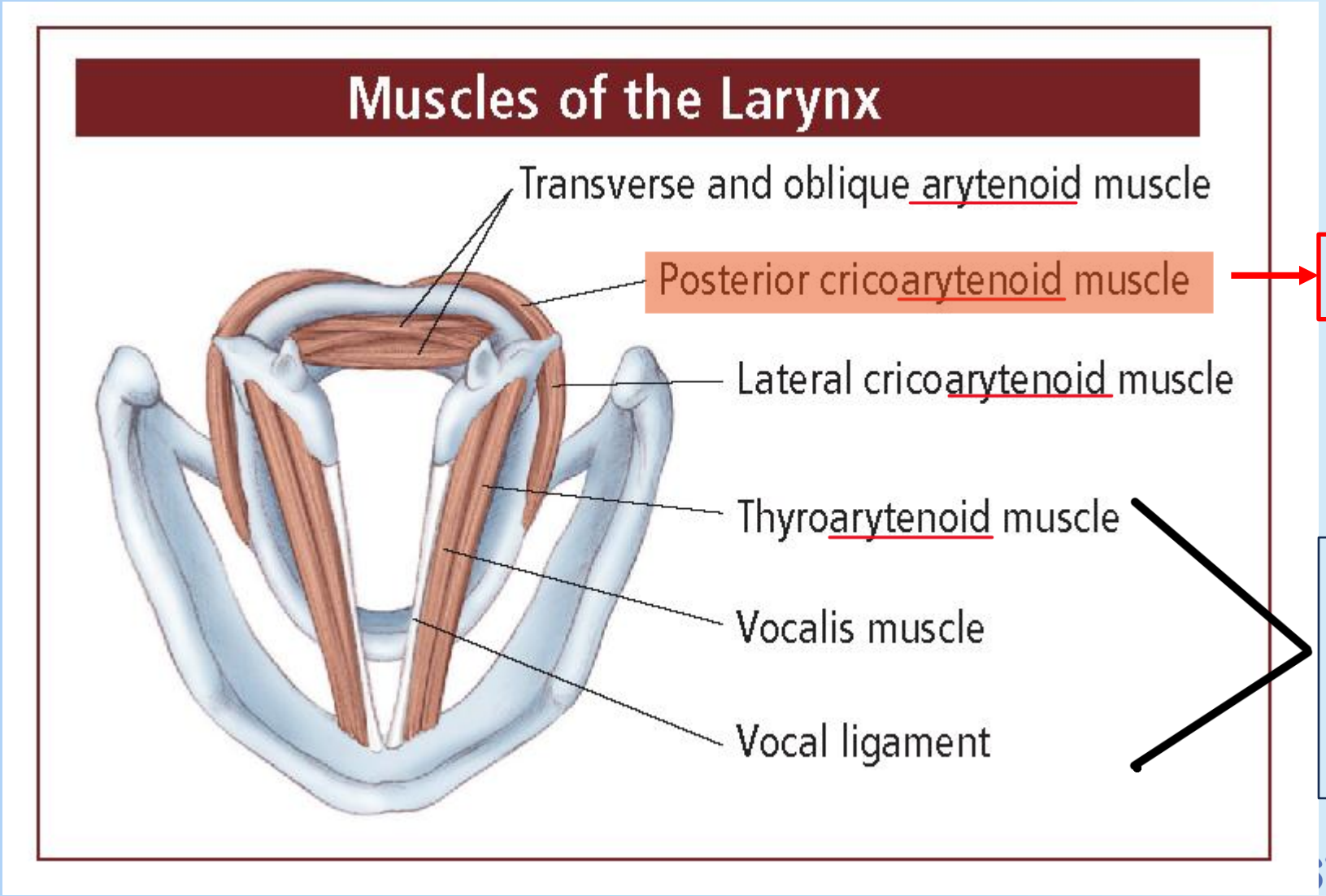
# Intrinsic muscles, posterior view




Arytenoid muscles functions to **adduct** the vocal cords.

ONLY exception is the **posterior cricoarytenoid muscle,** which **abducts** the vocal cords (opens them)

# Muscles related directly to the vocal cords




**The only abductor**

**Changes the pitch of the voice by mostly adducting the vocal cords**

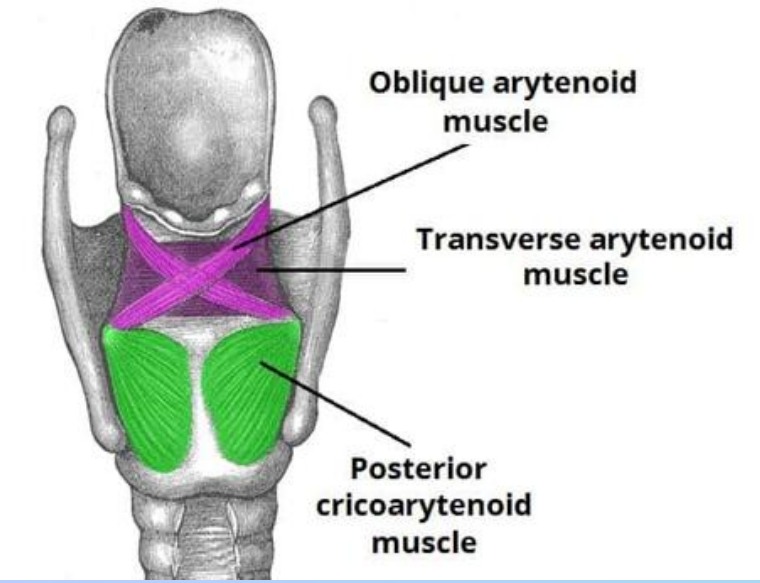
**(Small adjustments)**

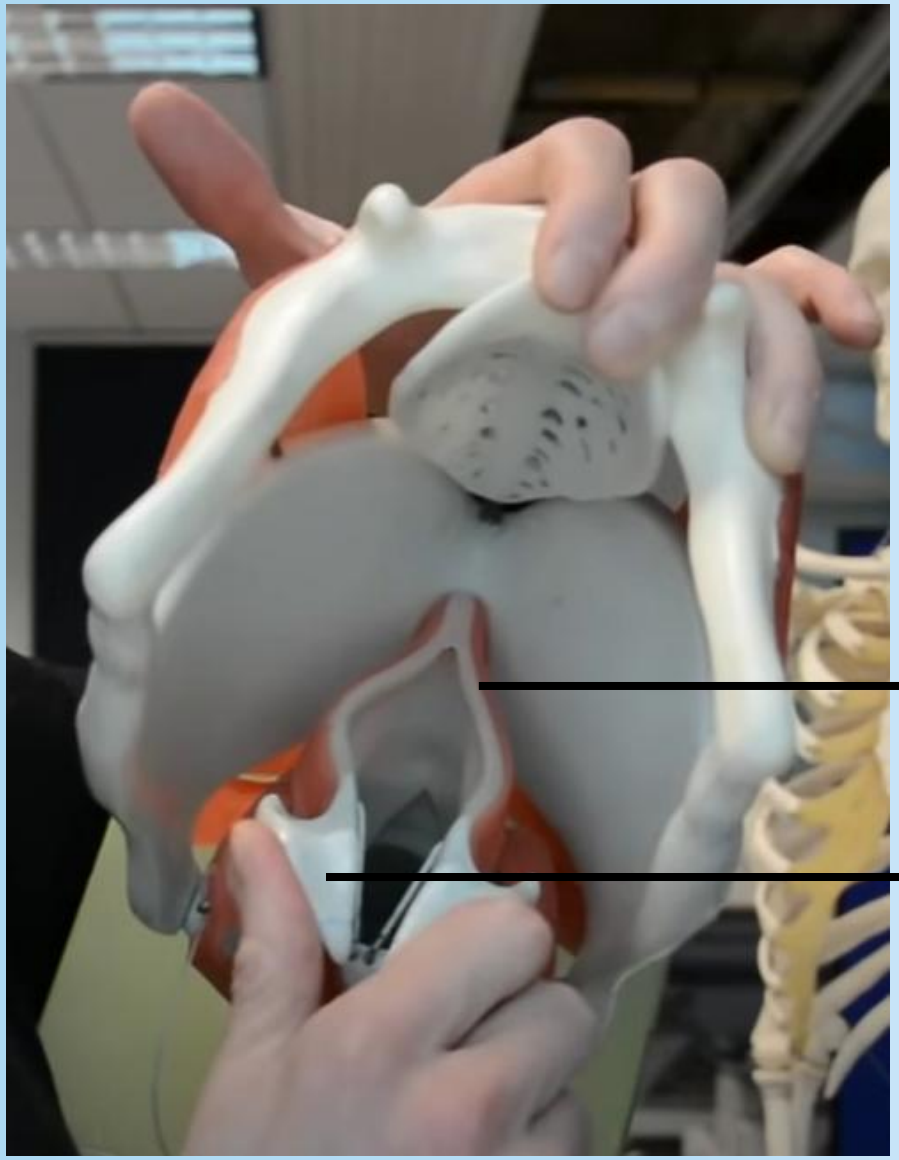
# Importance of arytenoid cartilage

**Adducts:**
(Closes) vocal cords

**Abducts:**
vocal (Opens) cords

- Posterior cricoarytenoid muscle
- Lateral cricoarytenoid muscle
- Transverse arytenoid muscle
- Oblique arytenoid muscle



**Vocalis ligament**
**+**
**vocalis muscle and thyroarytenoid muscle**

**Arytenoid cartilage**

**The hand works as the posterior cricoarytenoid muscle**

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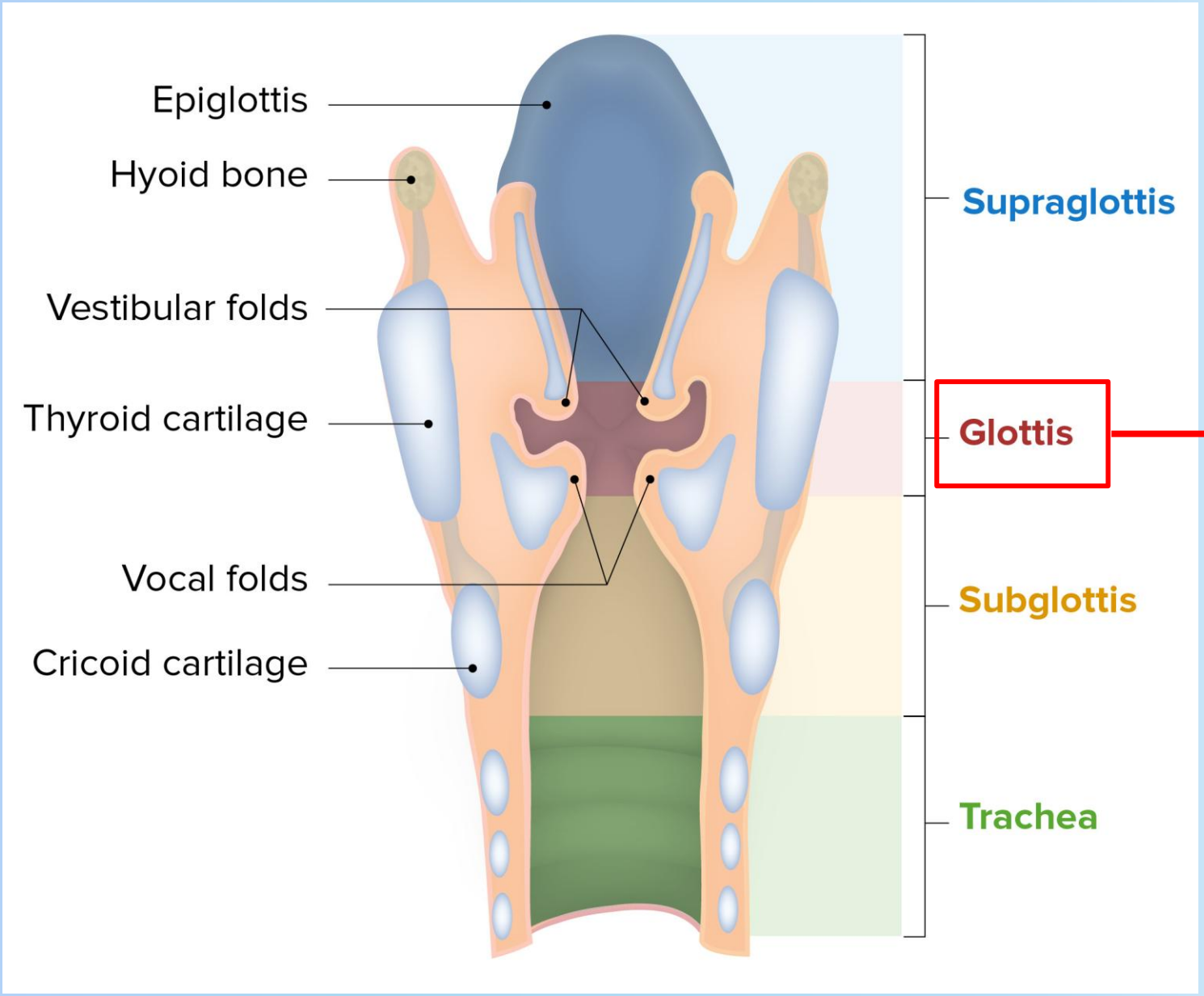
# Nerve innervation of the larynx

1. Superior laryngeal nerve 
2. Inferior laryngeal nerve
3. Internal laryngeal nerve
4. External laryngeal nerve
5. Recurrent laryngeal nerve 

**What do these nerves have in common other than mostly carrying the same type of nerve fibres and that they innervate the larynx together?**




**Important checkpoint for nerve innervation**

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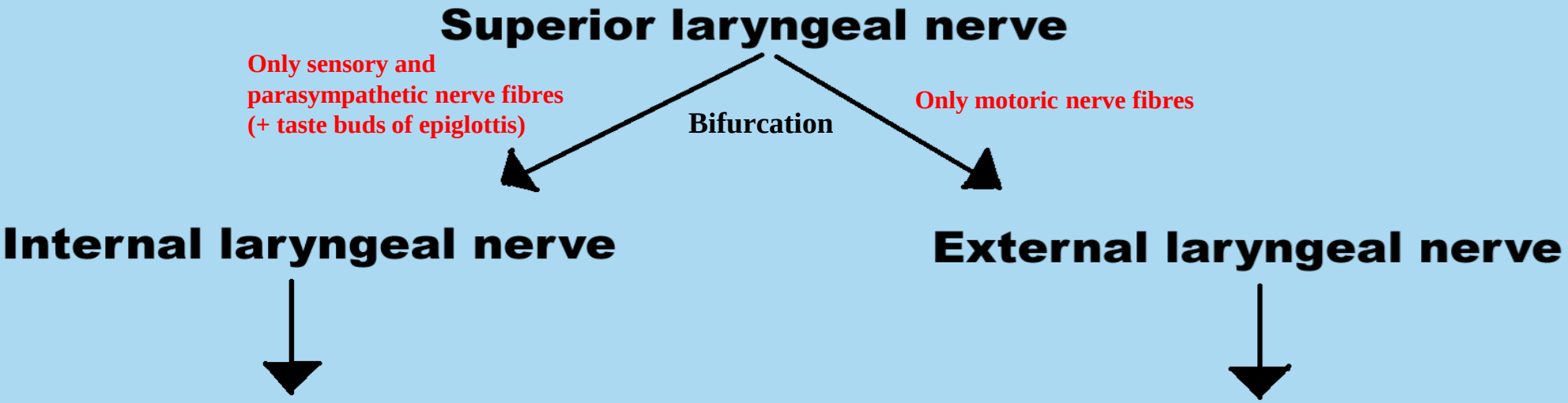
# Let`s group the nerves




- Sensory innervation to mucosa above the vocal cords and false vocal cord (vestibular fold).

- Parasympathetic innervation to the mucosal glands

- Motor innervation to cricothyroid muscle and parts of the superior pharyngeal muscle

# Recurrent laryngeal nerve

This is a continuation of the nerve (or a terminal branch), not an actual new branch

## Inferior laryngeal nerve

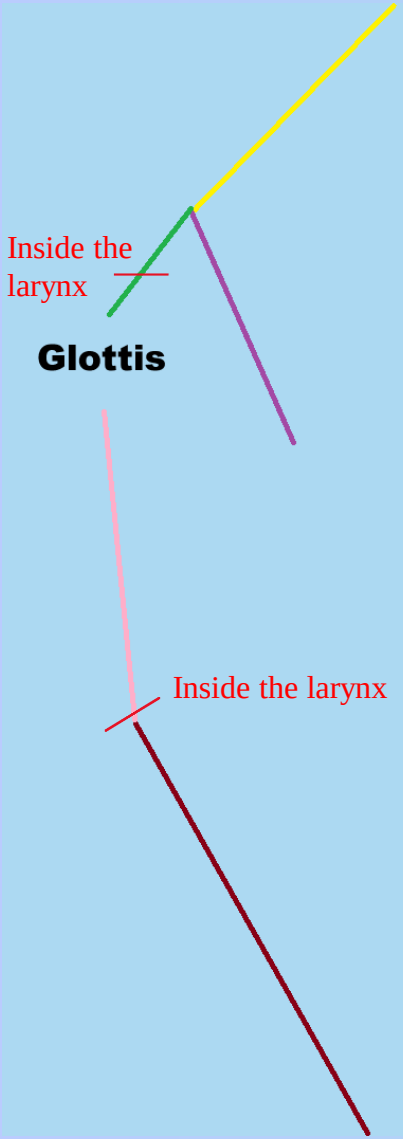
- Has motor, sensory and parasympathetic nerve fibres.

- Innervates "everything" below the glottis + true vocal cords

- Innervates ALL intrinsic laryngeal muscles EXCEPT for the cricothyroid muscle.

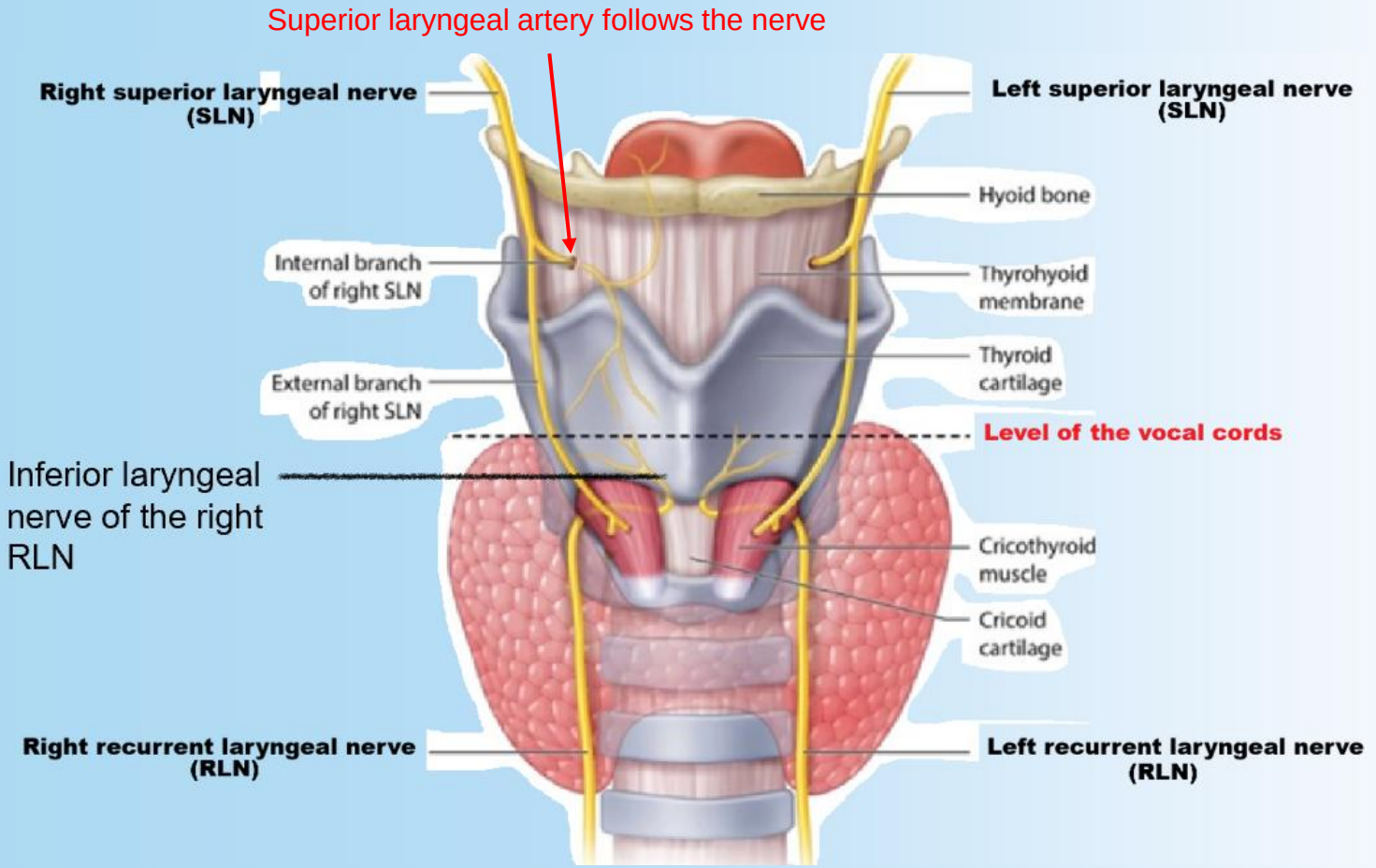
- Is the nerve in charge of innervating the true vocal cords, and therefore impacts our speech when affected.

# Schematic drawing




- Superior laryngeal nerve
- Internal laryngeal nerve
- External laryngeal nerve
- Recurrent laryngeal nerve
- Inferior laryngeal nerve

# Visualised drawing




- What happens if the right or left RLN or inferior laryngeal nerve is affected?

- What happens if ***BOTH*** RLN or inferior laryngeal nerves is affected?

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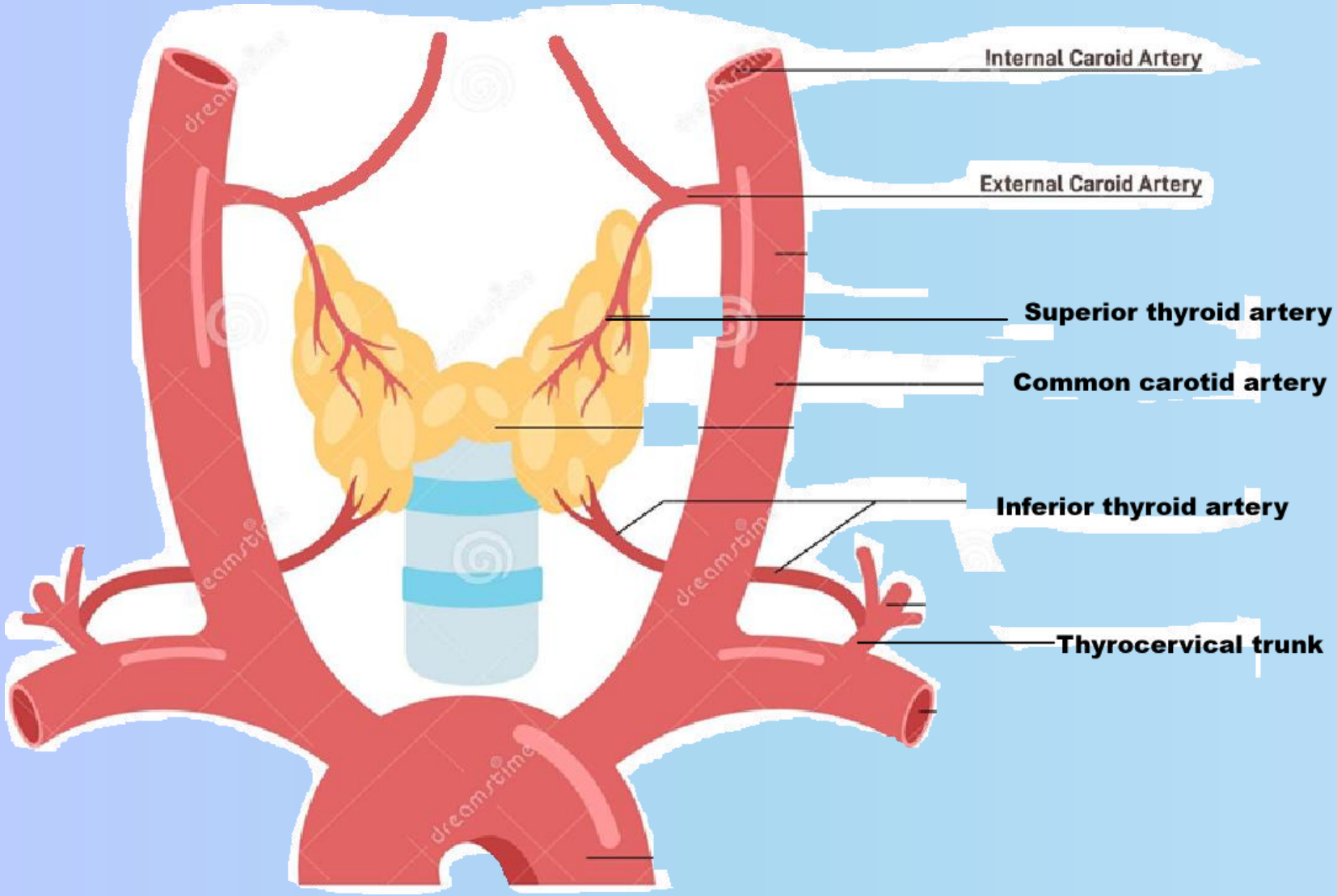
# Thyroid

## Blood supply




External carotid artery → Superior thyroid artery

Thyrocervical trunk → inferior thyroid artery

# Ansa cervicalis

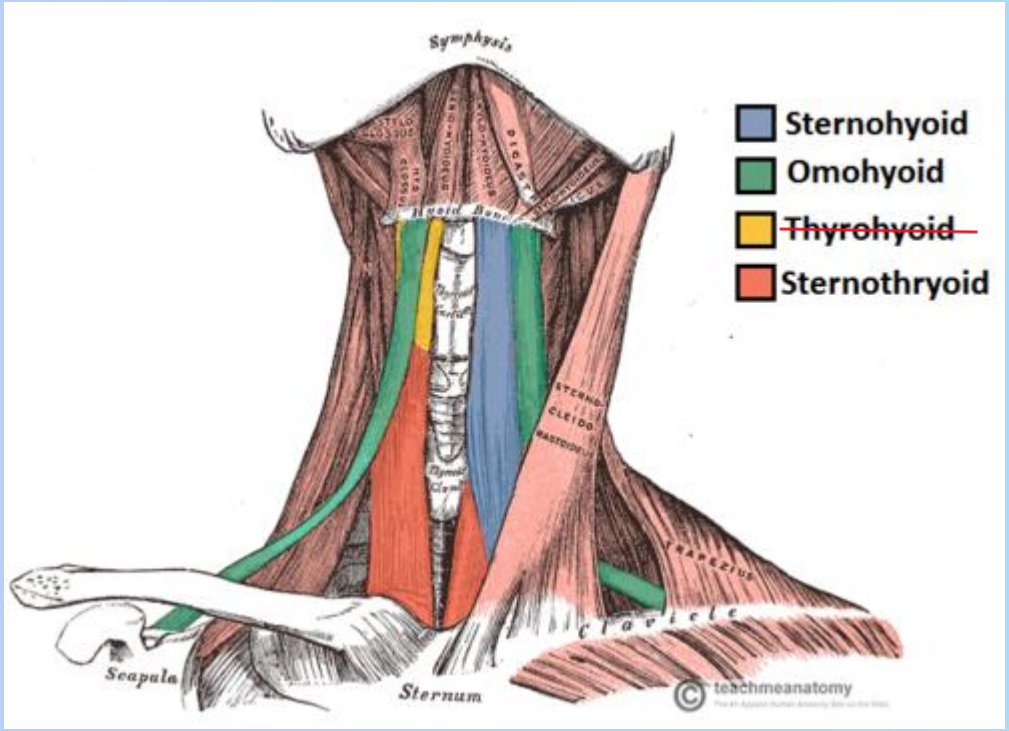
- Originates from C1, C2 and C3 and the nerve fibres hike with the hypoglossal nerve.
- **Consists of 2 nerves:**
  Superior root (C1 and C2) and inferior root (C2 and C3) → They meet each other to form a loop
- The nerves often loop around the carotid sheath

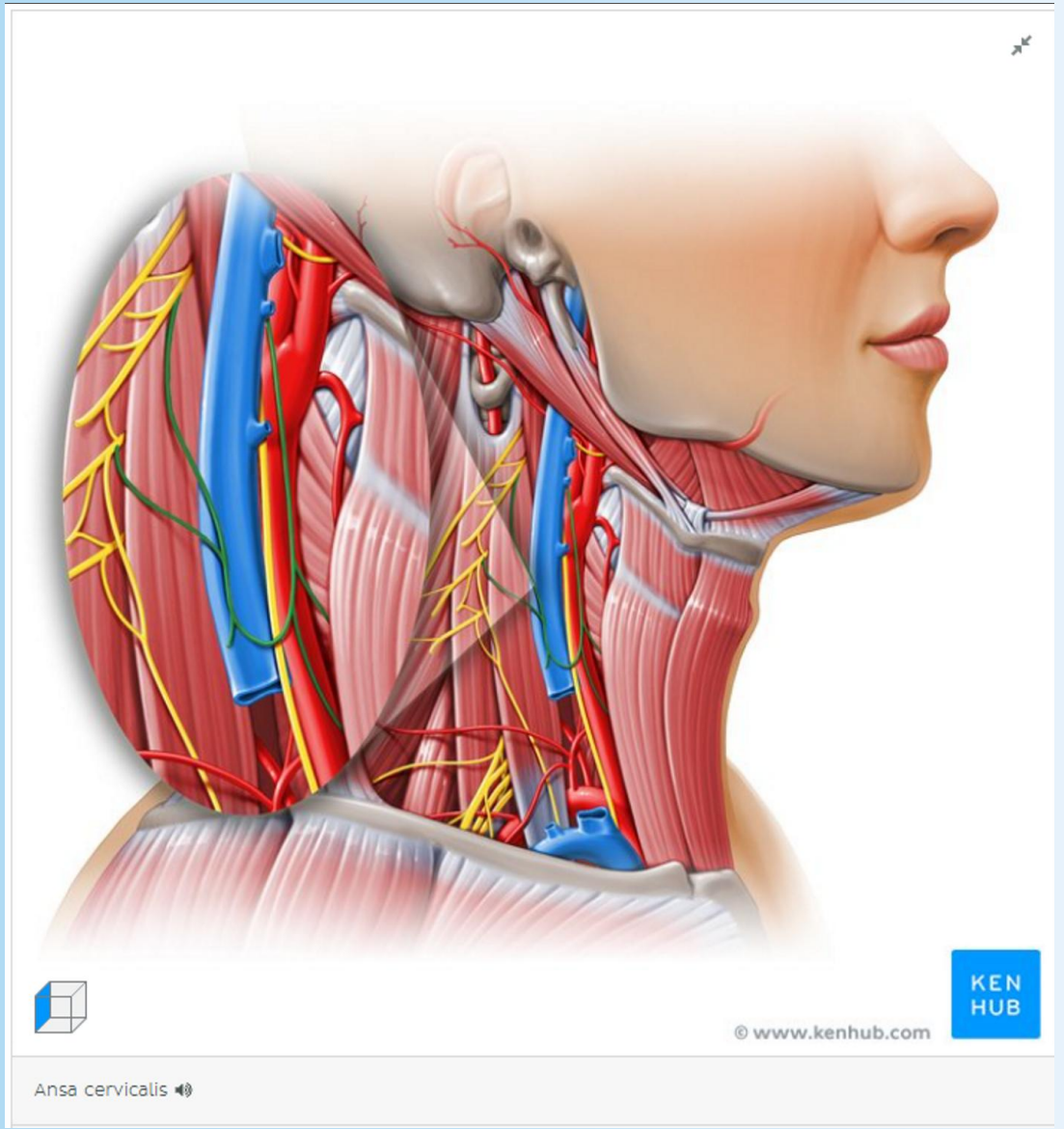
**Innervates 3 muscles:**

**1.** Sternohyoid muscle

**2.** Sternothyroid muscle

**3.** Omohyoid muscle


Sternohyoid
Omohyoid
Thyrohyoid
Sternothryoid
Symphysis
Scapula
Sternum
Clavicle
Trapezius
teachmeanatomy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Ansa cervicalis

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