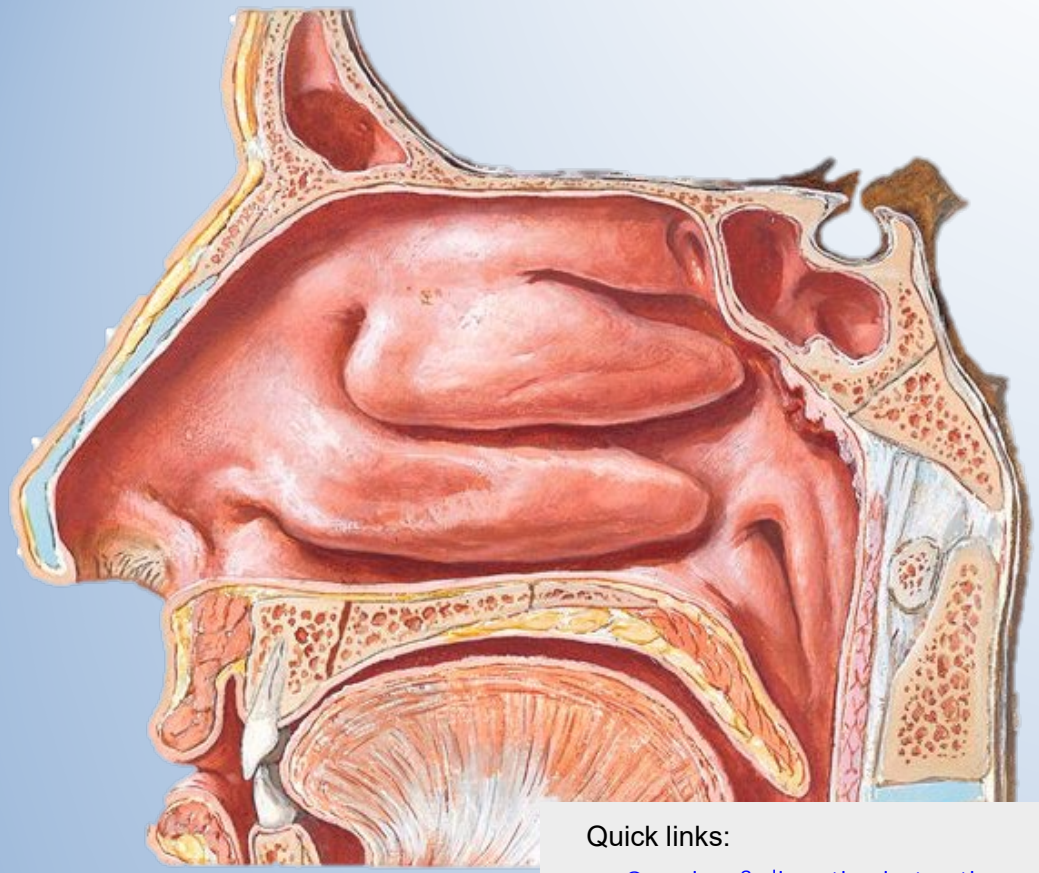
Nasal and Oral Cavities and Sinuses



Anatomy Interactive Guide

Greg Kincheloe, PhD Candidate

Evan Goldman, PhD

Quick links:

- Overview & dissection instructions
- Nasal cavity bones
- Nasal cavity and paranasal sinuses
- Nasal cavity blood supply and innervation
- Oral cavity
- Musculature around the palate
- Tongue
- Salivary glands

Run this in presentation mode!

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OVERVIEW & DISSECTION INSTRUCTIONS

Students regularly tell us that the anatomy LAB is where anatomy starts to make sense.

> *Your success in anatomy is strongly correlated with knowing information* ***before*** *you walk into lab then using lab to consolidate your understanding.*
> *THEREFORE…*

The purpose of the first section of this AIG is to prepare you for lab. It includes an overview of the AIG. Dissection instructions are integrated into the overview to make it clear what you are to do in lab. Step-by-step instructions are only included when relevant. For those who prefer to follow step-by-step instructions while dissecting, these are available in Grants dissector (library and lab).

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- **Your role:** Prior to lab, carefully look through this section AND *familiarize* yourself with the rest of the AIG. You do not need to KNOW all the information in the AIG in this first pass.
- **Our role:** In lab, the instructors will help you *understand* the anatomy and will try to recognize and help you through any knowledge deficiencies; we expect you will then work towards reducing your deficiencies by going back through the AIGs.

  The combination of your pre-lab preparations, followed by your ACTIVE engagement in the lab, will prepare you for working through the AIG a second time at which point you should begin to solidify your mastery of the material.

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OVERVIEW

- The bones, arteries, and nerves of the nasal cavity will be covered in this AIG. These structures will be seen by *bisecting* some of the cadavers. We will help you with this process!
- The "sinuses" discussed in this AIG are the *paranasal* sinuses. There are other "sinuses" throughout the body (e.g. transverse pericardial sinus, sigmoid sinus, cavernous sinus); to assure clear communication, we use "paranasal sinuses" to refer to the sinuses surrounding the nasal cavity. These four pairs of paranasal sinuses drain into the nasal cavity (4 on each side).
- The oral cavity will similarly be explored in the *bisected* cadaver.

Bisected view of nasal and oral cavities

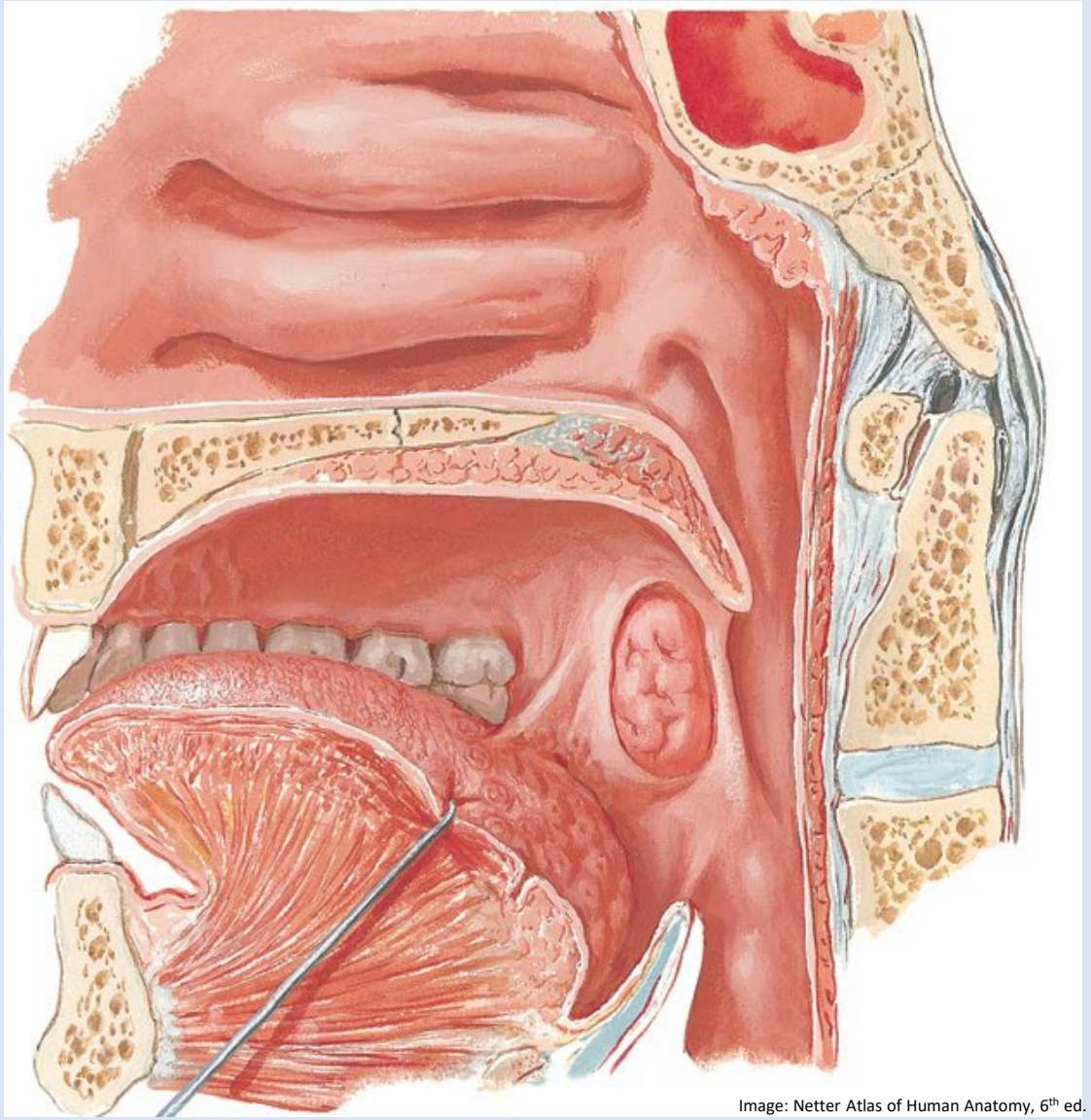


Image: Netter Atlas of Human Anatomy, 6th ed.

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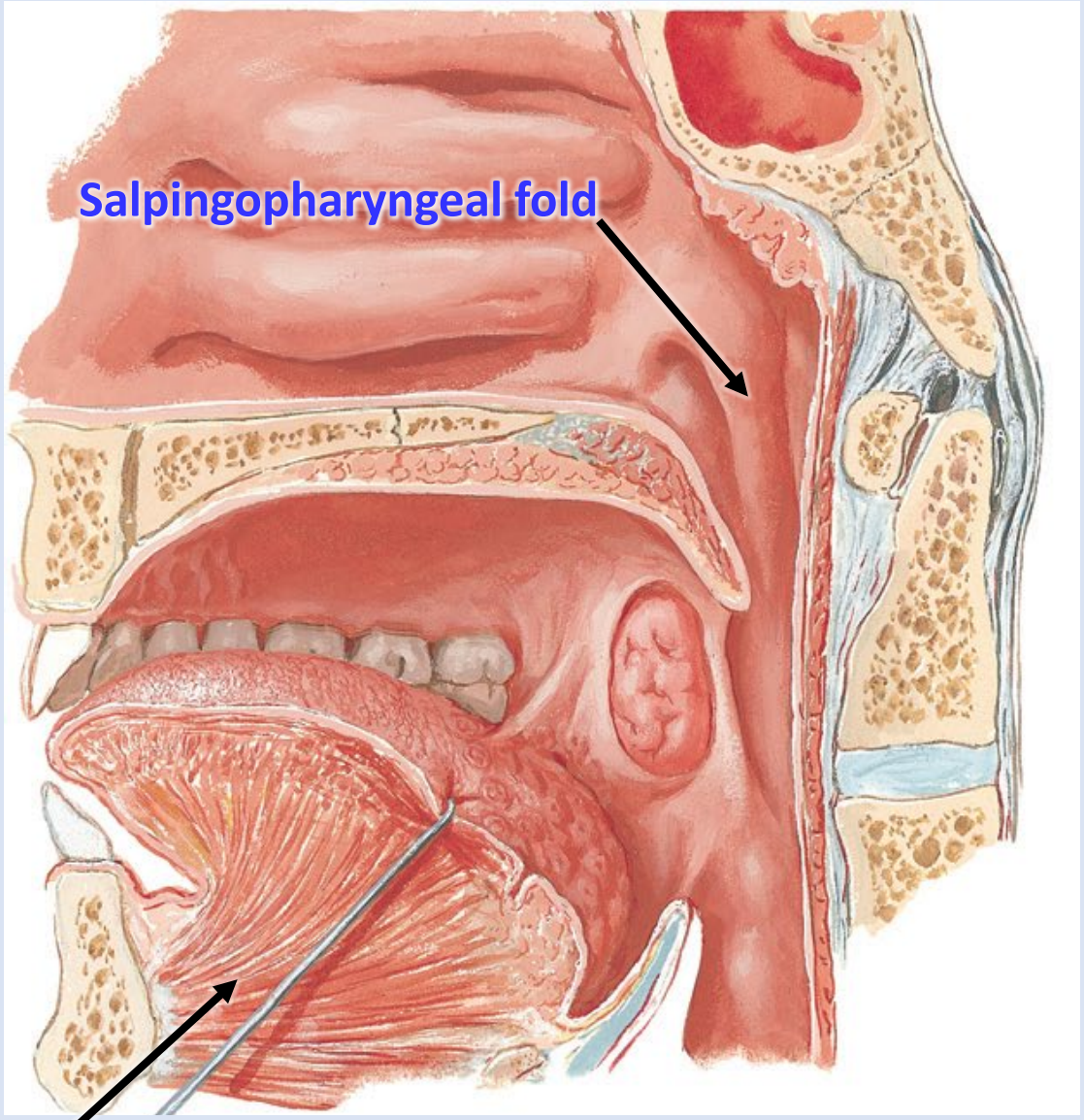
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OVERVIEW and DISSECTION Instructions

- The nasal and oral cavities each contain a series of named folds or arches. A common exam question is: "What muscle lies deep to the tagged fold/structure/ridge".
  - For example, deep to the "**salpingopharyngeal fold**" is the salpingopharyngeus muscle.

- On one side of the cadaver only, carefully remove the mucosa to reveal the underlying muscles. If the first group has not done this, the second group should do it.
- If your cadaver will not be bisected, you will need to view these structures on a different cadaver.

- Multiple cranial nerves innervate. You will need to know which nerves carry taste, motor, and general sensation.
- Many muscles are involved with tongue movement. If a word contains "**glossus**", think "tongue"!



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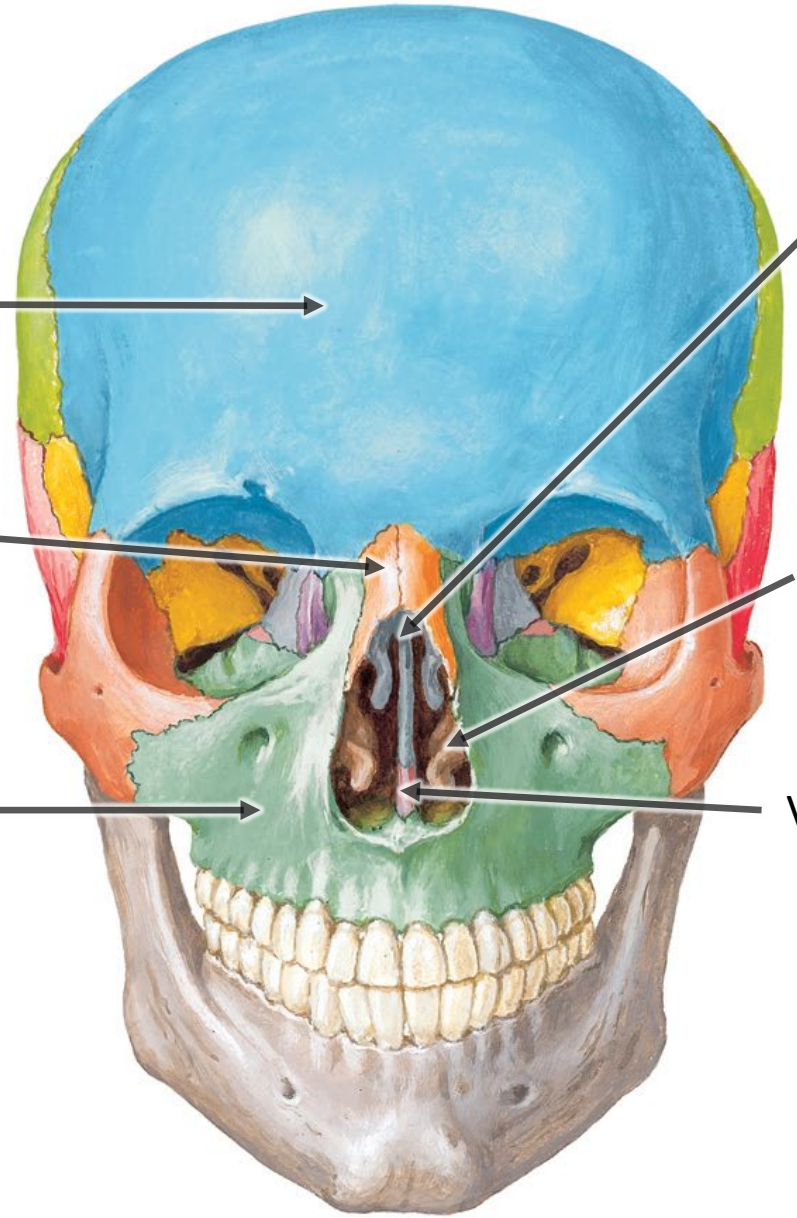
Bones of the Nasal Cavity

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Bony Framework

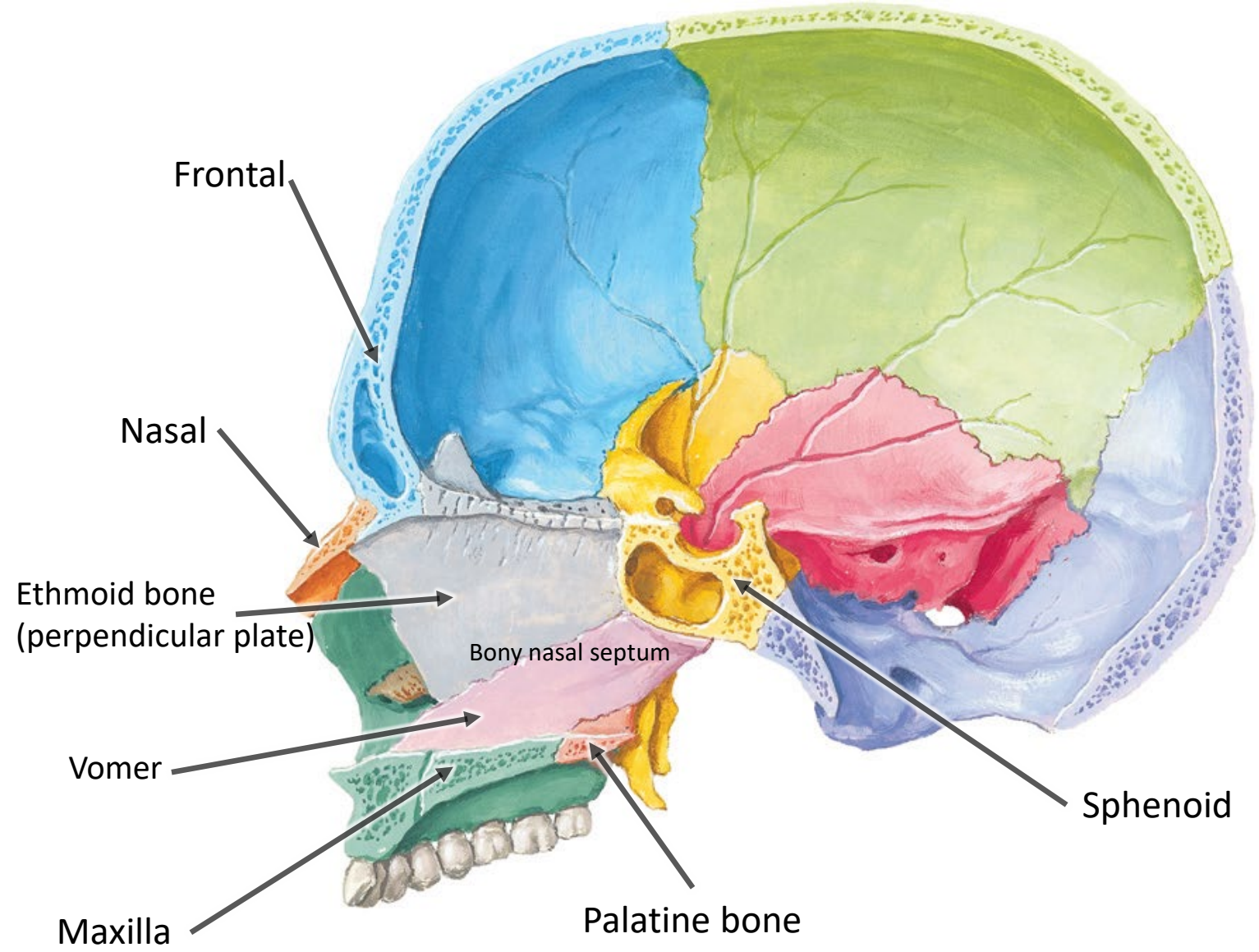
Let's review some bony skull anatomy!

ARROW through the slides to reveal important bones for the nasal cavity.



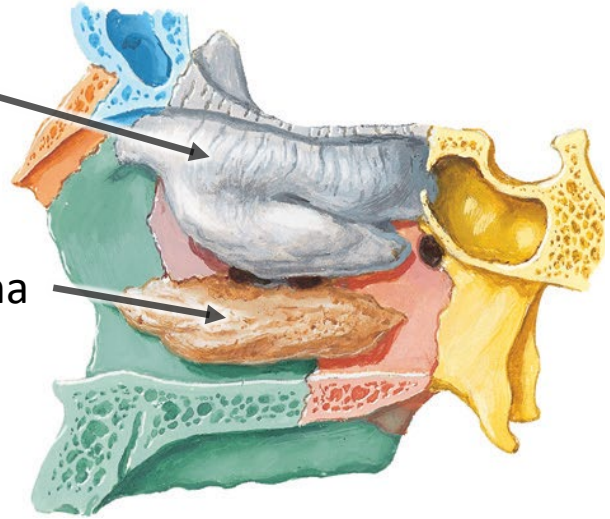
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Bony Framework



Ethmoid bone (superior and middle nasal conchae)

Inferior nasal concha



Lateral to the nasal septum

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The Ethmoid Bone

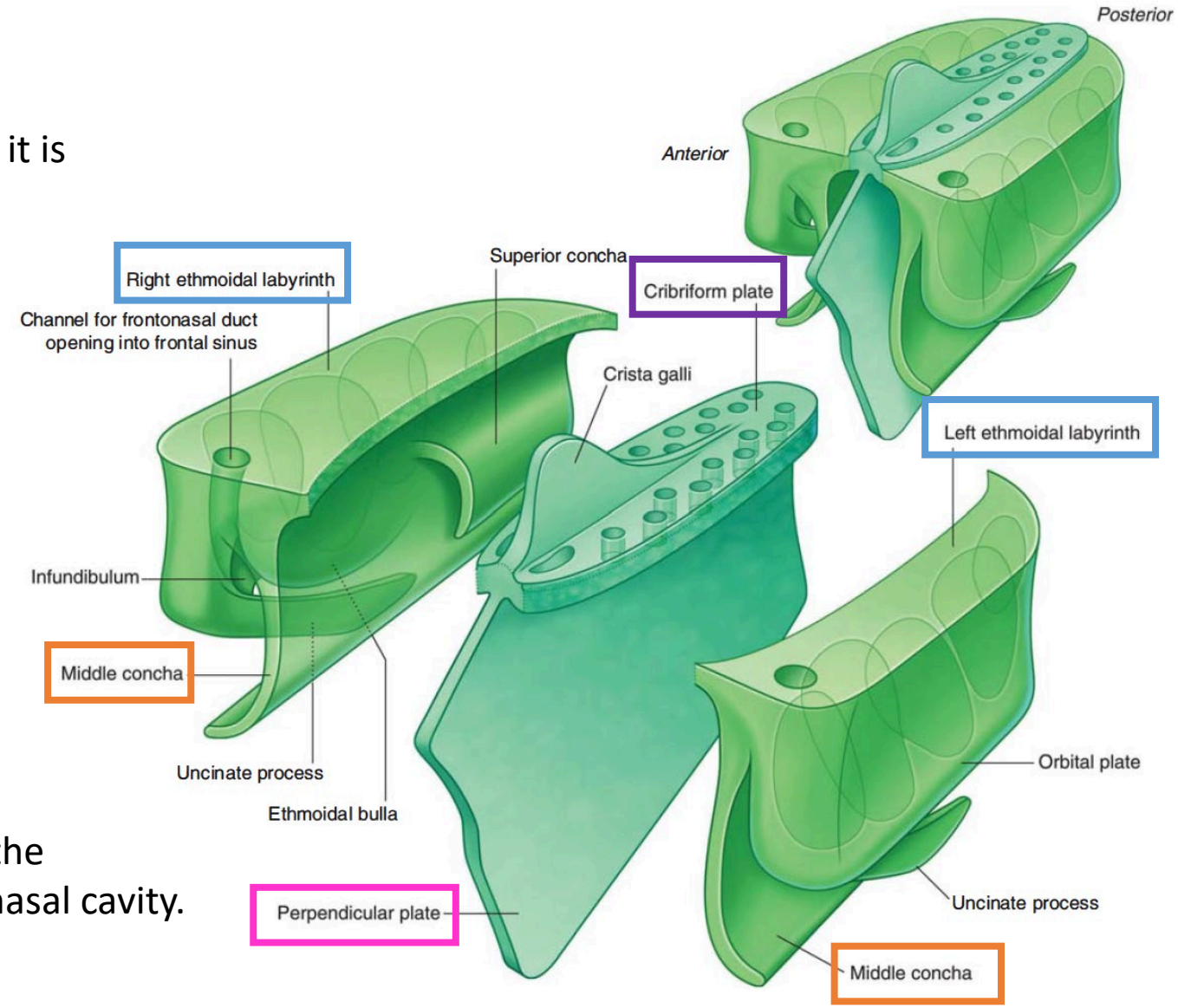
The ethmoid bone is important for both the nasal cavity and the orbit. While relatively large in size, it is porous like a sponge so it is very light.

Travelling down the median plane and forming part of the nasal septum is the perpendicular plate of the ethmoid bone.

Flanking this on either side are the middle nasal conchae.

Surrounding these are hollow air pockets called the ethmoid air cells (part of the labyrinth).

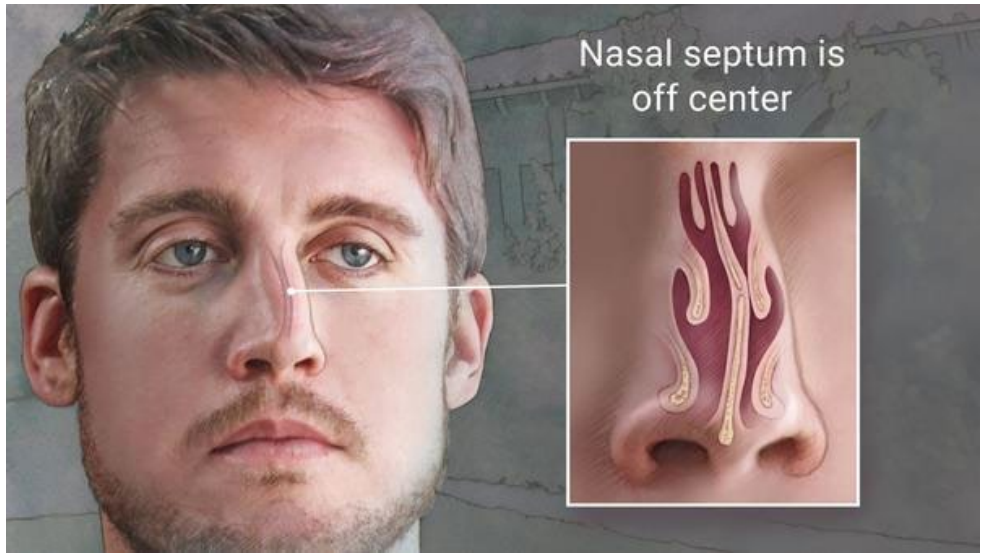
Superiorly is the cribriform plate, through which the olfactory nerve (CN I) sends projections into the nasal cavity.



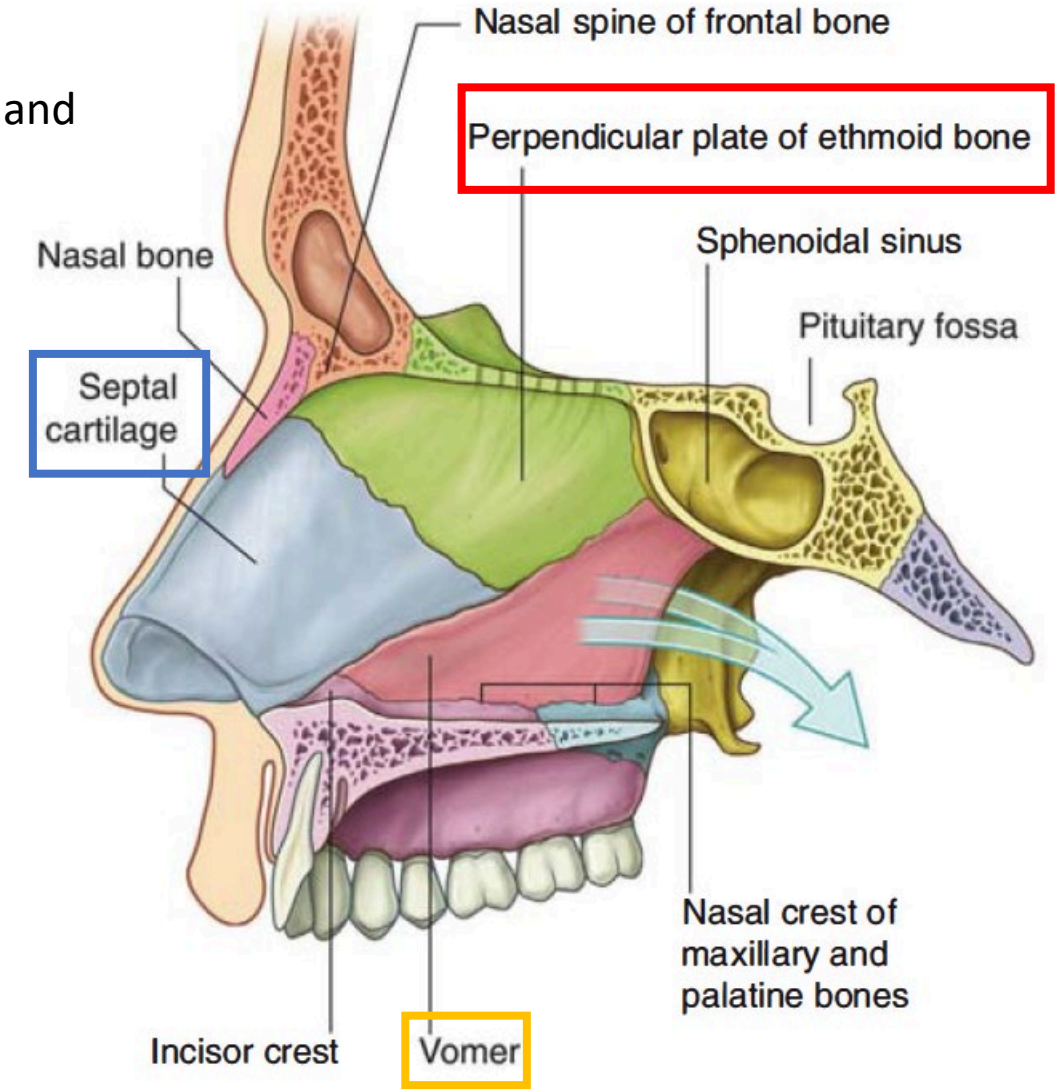
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Nasal Septum

The nasal septum is formed from septal cartilage (anterior), the perpendicular plate of the ethmoid bone (posterior and superior), and the vomer (posterior and inferior).



Deviated septa are fairly common (look at some of the skulls in the MDL!) and may be aligned with surgery.



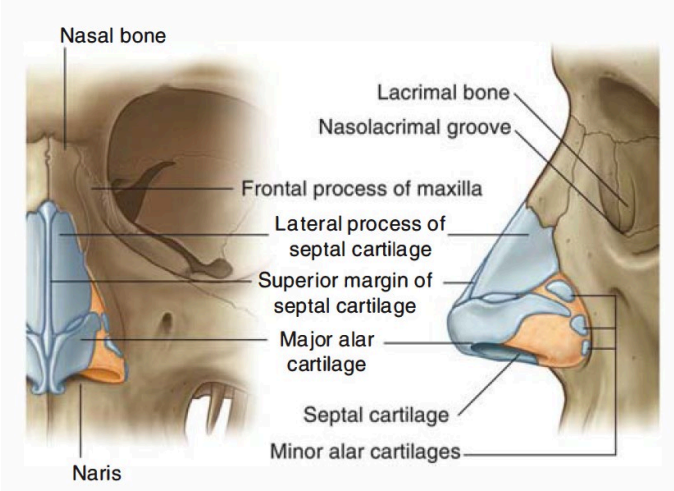
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Nasal Cavity and Paranasal Sinuses

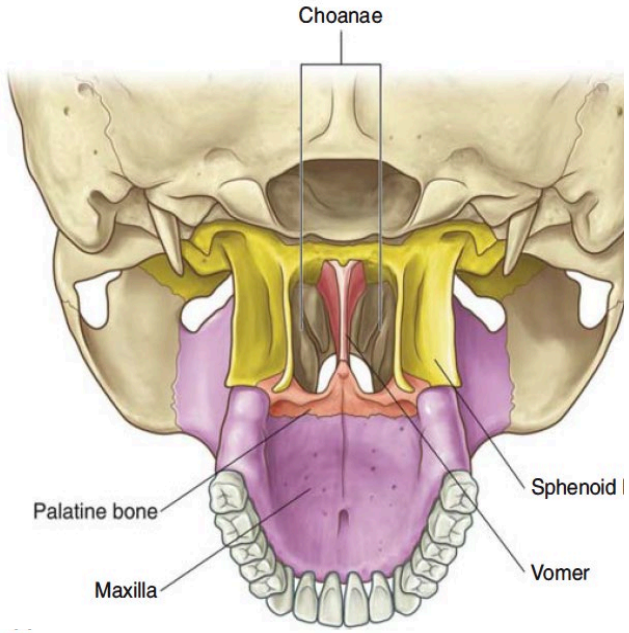
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Nasal Cavity

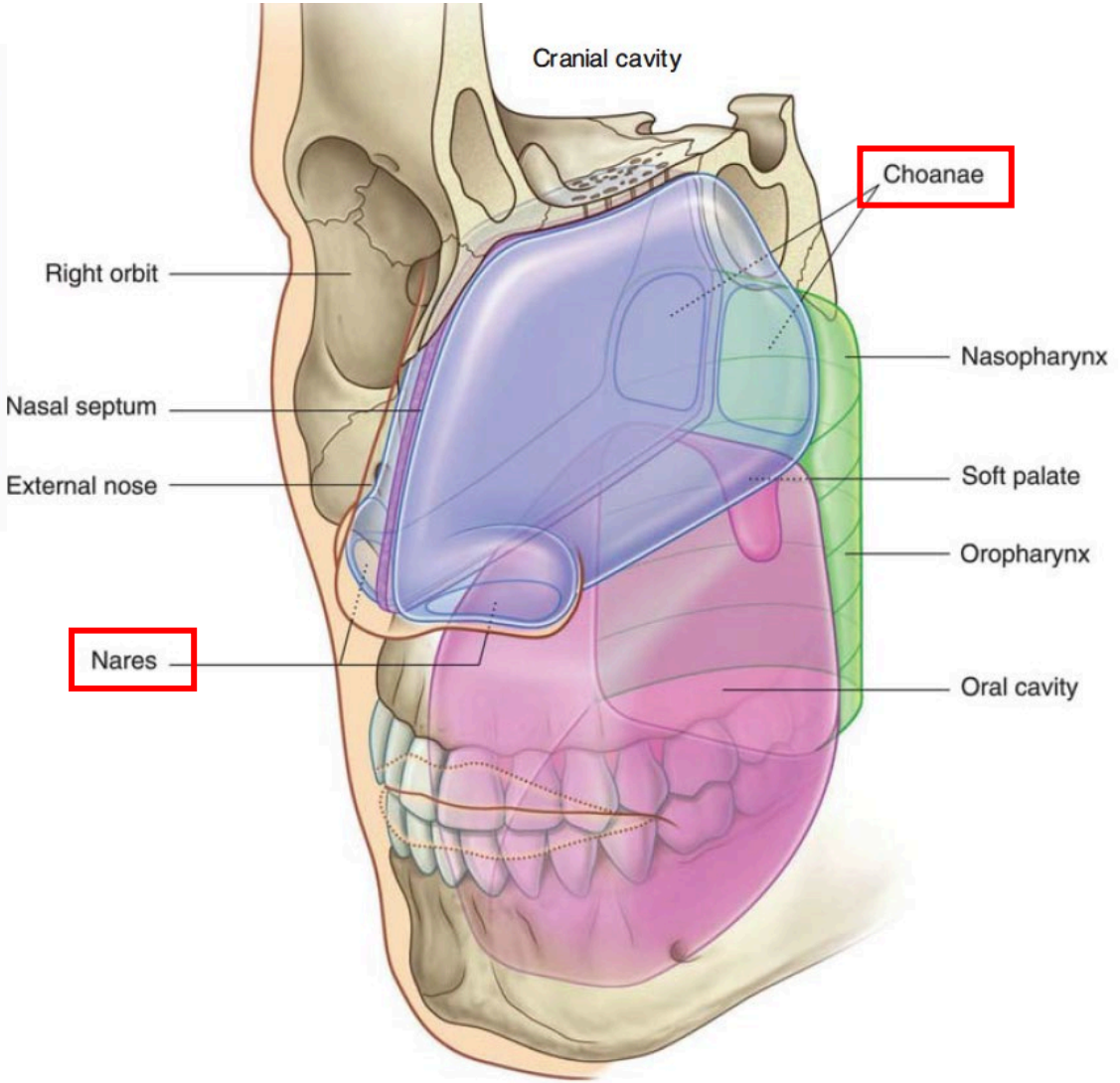
The anterior apertures of the nasal cavity are the nares (nostrils). These are formed from cartilage.



The posterior apertures of the nasal cavity are the choanae, which lead to the nasopharynx. The borders of the choanae are bone.



POSTERIOR VIEW

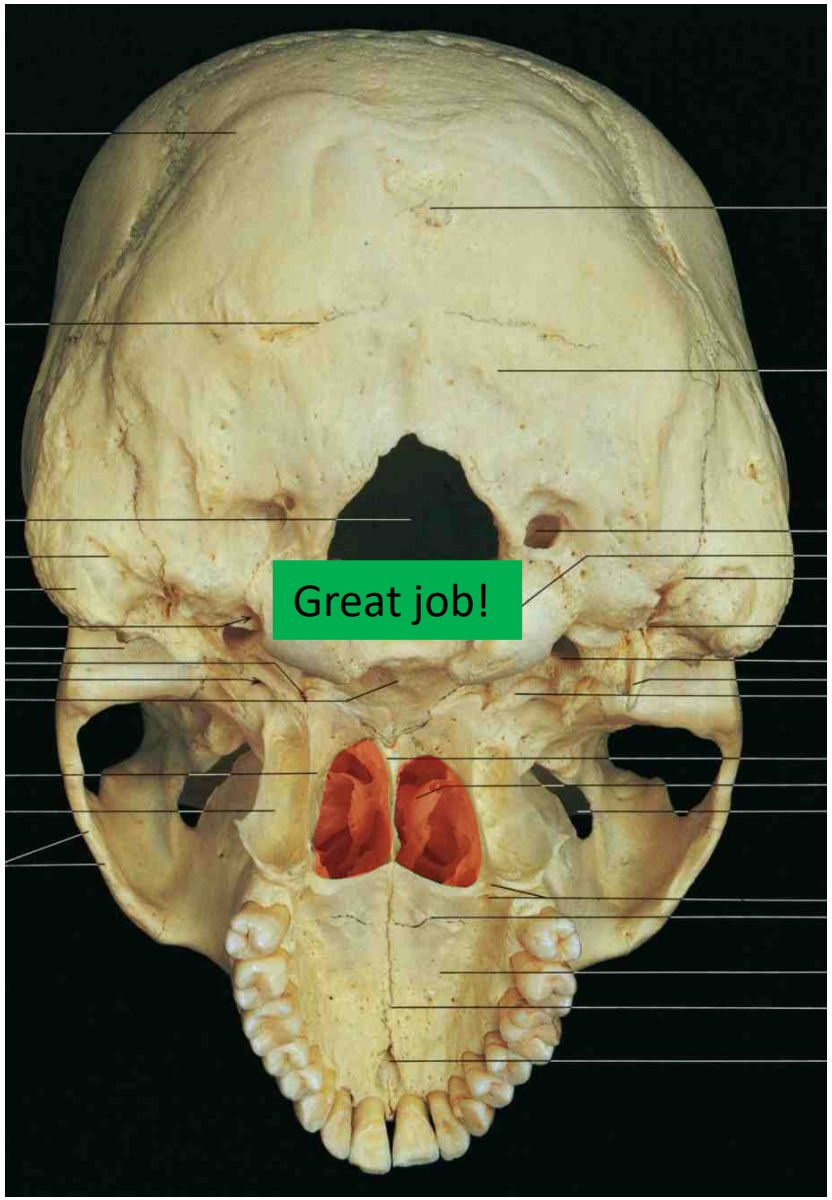


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Test Your Knowledge

Here we see an inferior view of the skull. Click on the choanae forming the posterior apertures of the nasal cavity!

Not quite, try again!



FUN FACT!
"Choana" is pronounced like "Ko'-uh-nuh." Pronounce this word correctly in lab to impress your TAs!

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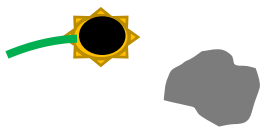
Nasal Cavity

The nasal cavity has three regions.

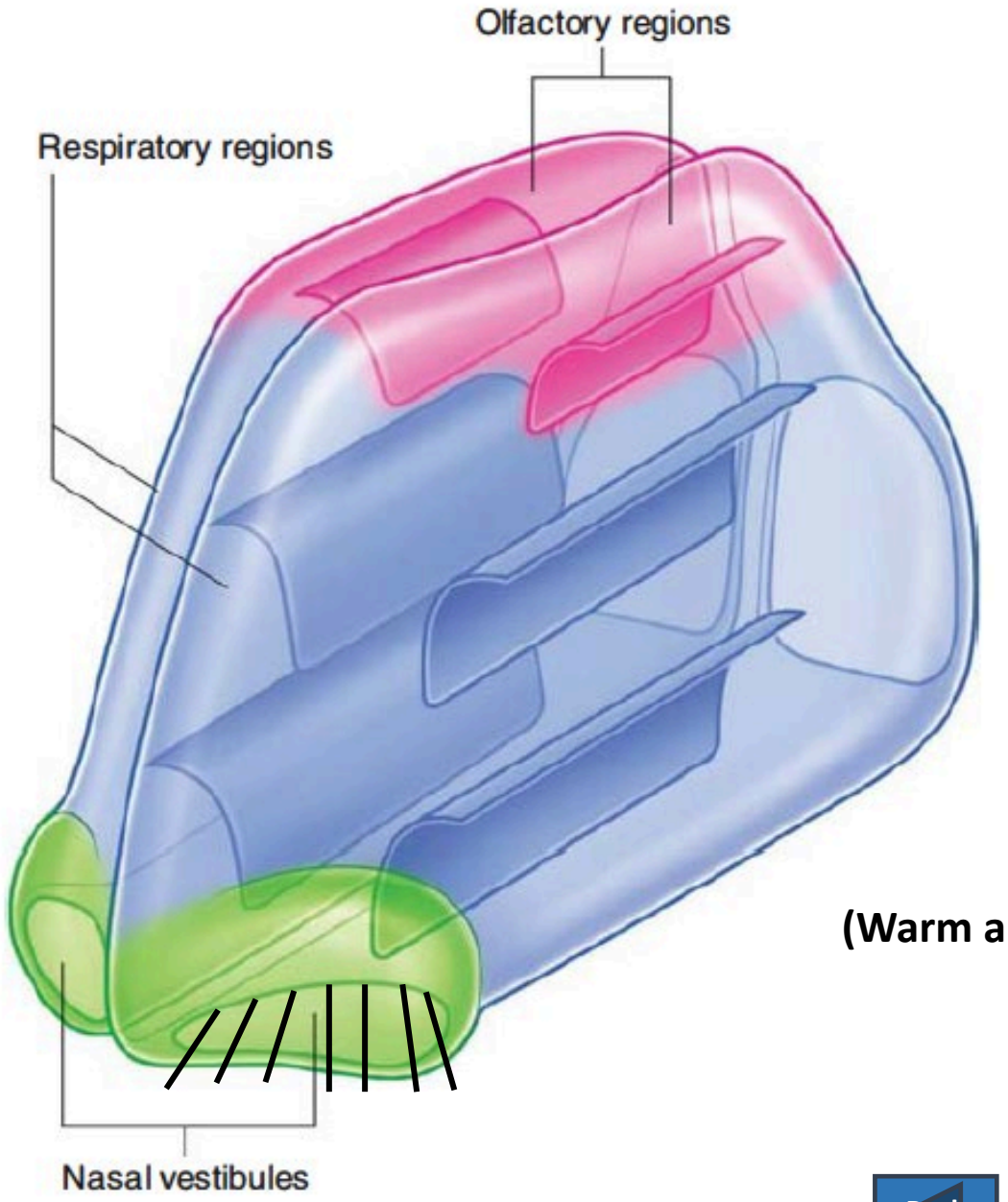
The nasal vestibule is internal to the nares (singular: nare) and is lined with skin and hairs. These hairs prevent debris from entering your lungs!

The respiratory region is lined with respiratory epithelium and mucous membranes to warm and humidify the air before entering the lungs.

The olfactory region is the most superior part of the nasal cavity and is lined by olfactory epithelium. Olfactory receptors are here, which allow us to smell. We inhale with more force in order to smell something because that forces more air into the superior nasal cavity!



O_2 **(Cold)**



(Warm and moist)

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Nasal Septum

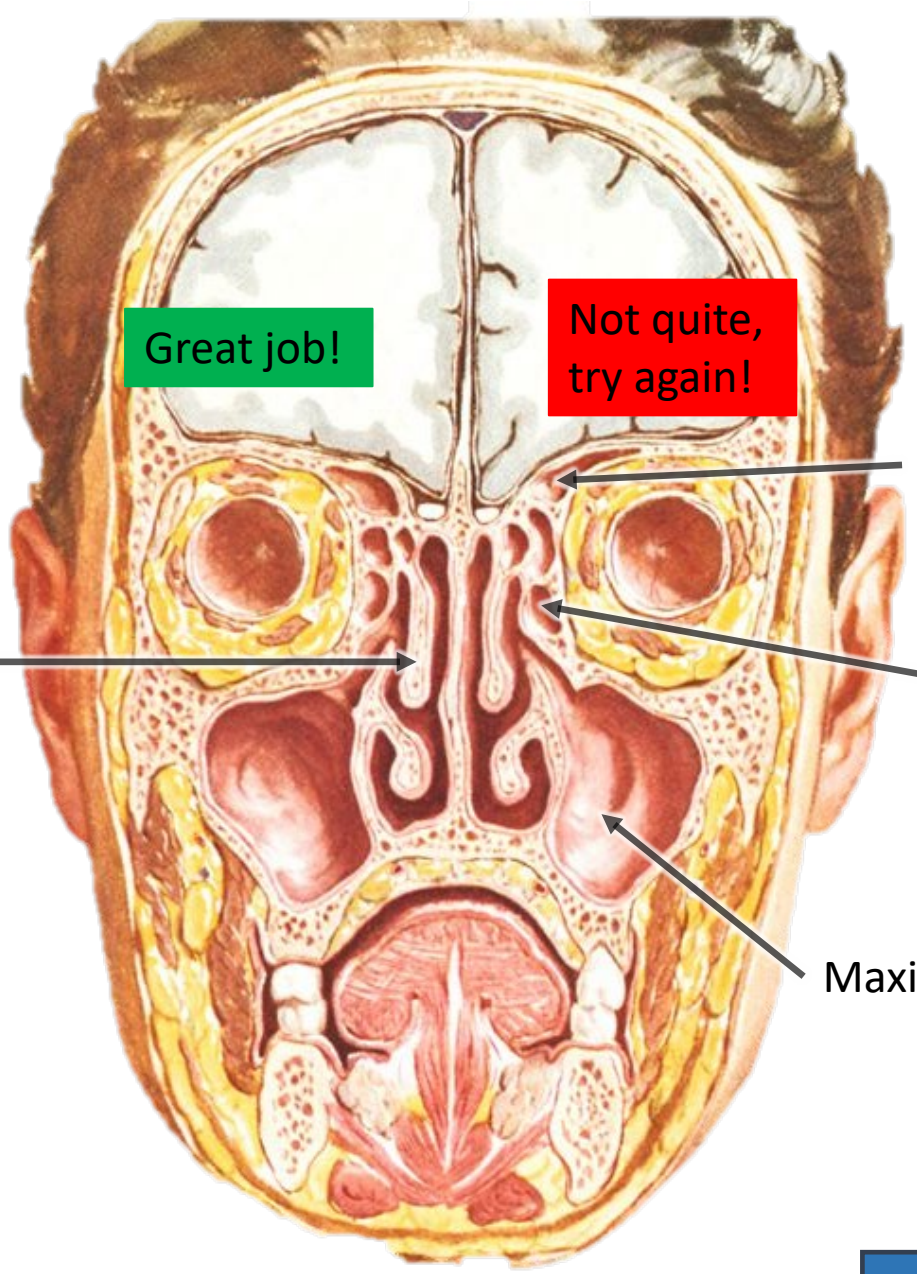
CLICK on where the perpendicular plate of the ethmoid bone is on this image!

How about the vomer?

Middle nasal conchae (part of the ethmoid bone)

Great job! But can you identify the inferior nasal conchae?

Here are some more parts of the nasal cavity that we will learn soon!



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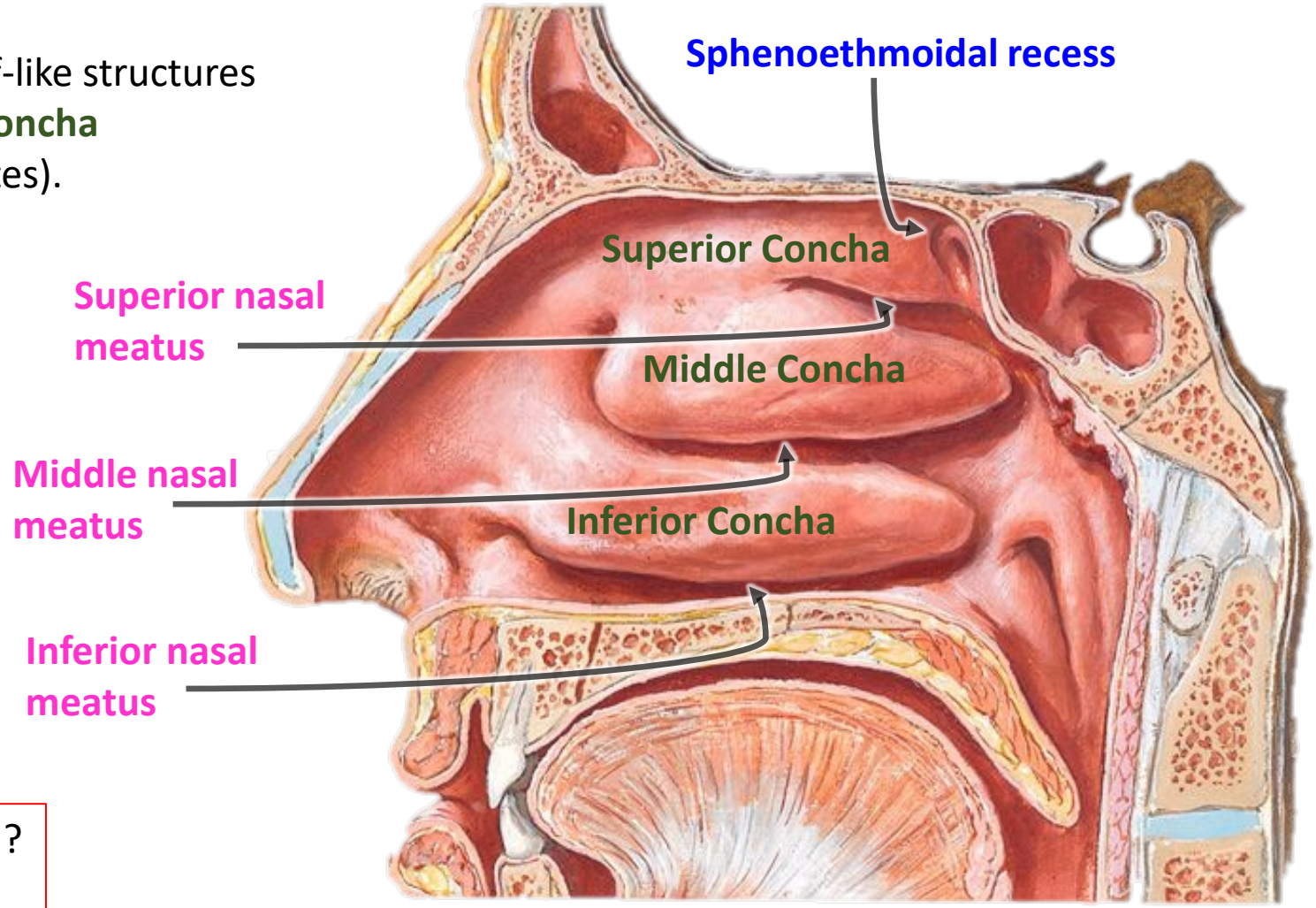
Nasal Cavity structures

Each side of the nasal cavity contains three shelf-like structures called the **superior**, **middle**, and **inferior nasal concha** (pronounced like “konk-uh”)(also called turbinates).

The superior and middle nasal conchae are part of the ethmoid bone. The inferior nasal concha is its own bone.

There is space above the superior concha (**sphenoethmoidal recess**) and a space below/behind each of the conchae. These 3 spaces are called **meatuses**.

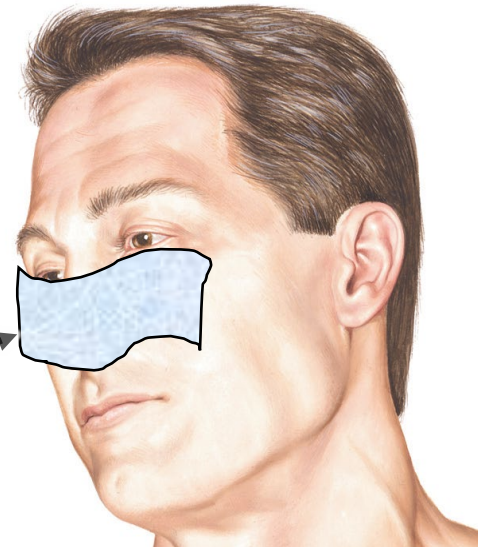
But why are our nasal cavities shaped like this?!? Please proceed to have your mind blown.



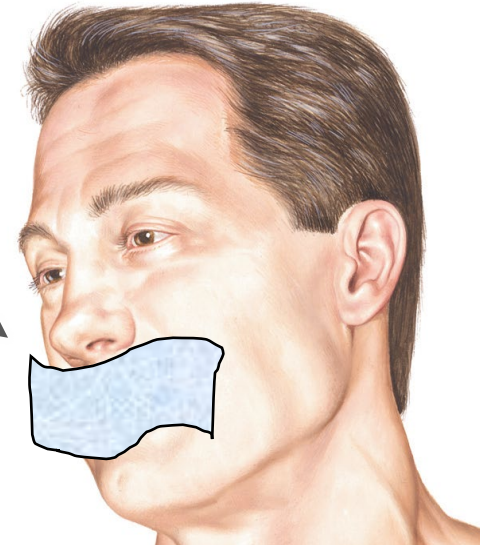
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Interactive Nasal Cavity Experiment

Let's try a silly experiment that will illustrate just one reason why our nasal cavities have conchae and meatuses (here's a hint: it has something to do with surface area).



1) Grab a tissue and place it against your naris, but do not blow your nose. Just breath for a few seconds against the tissue.
2) Now feel the tissue. Is it damp?
3) Next take a new tissue and place it over your mouth. Breath from your mouth for a few seconds through the tissue and then feel it. It's more damp than the nose tissue isn't it?



Conclusion: Breathing through your nose results in less loss of moisture from the body!

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Nasal Cavity conchae

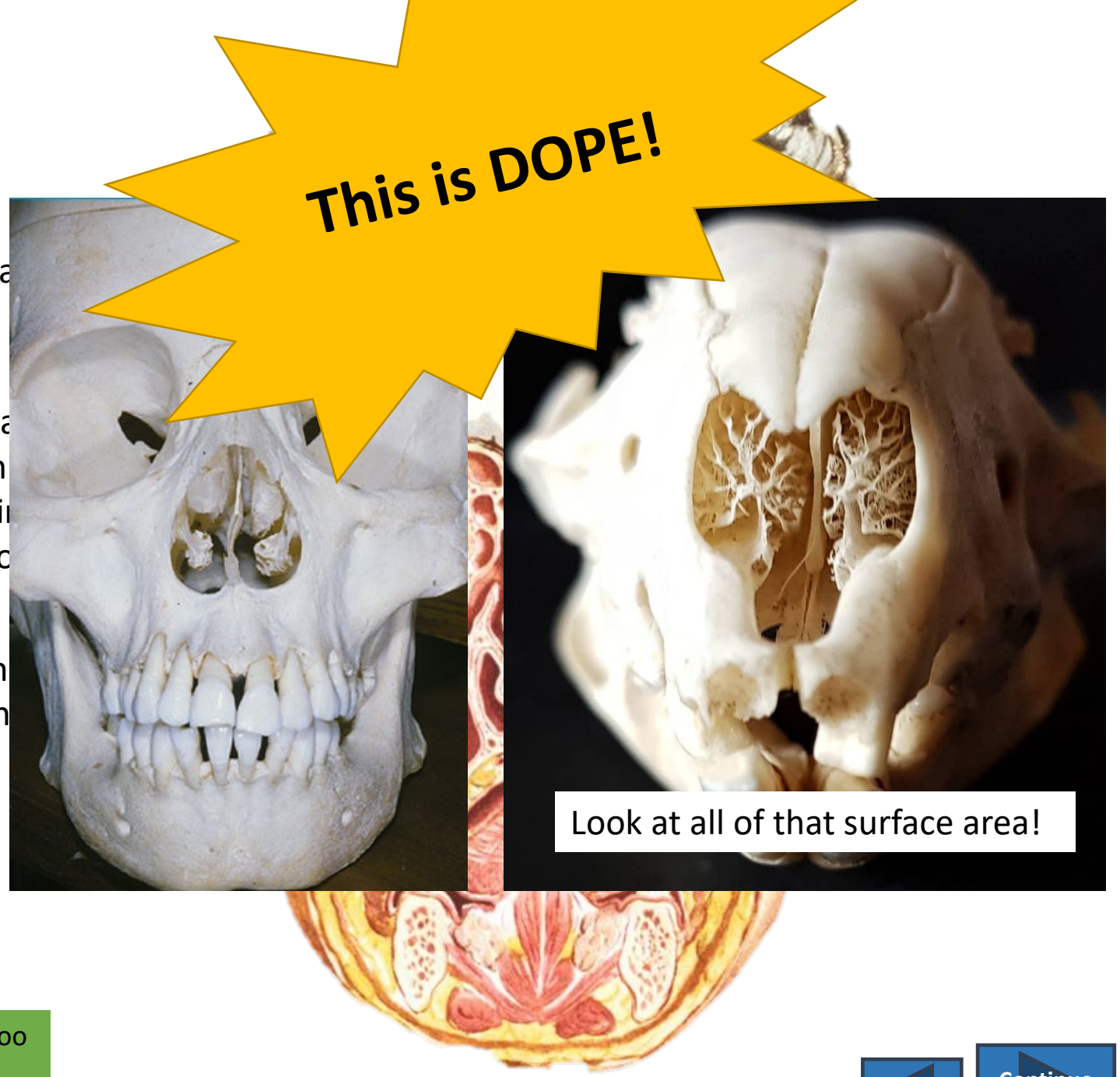
As cold air from outside is inspired and enters the nasa
cavity, it is warmed by the surrounding tissue and
humidified as it travels to the lungs.

When it is time for expiration, the air entering the nasa
cavity from the nasopharynx is warmer and more hum
than the surrounding tissue, resulting in the surroundi
tissue *reabsorbing* moisture and heat from the air befo
breathing it out.

A higher surface area in the nasal cavity makes this wh
process more efficient, which is why we have the stran
shaped nasal conchae!

FUN FACT! Desert animals often have much more developed nasal conchae than humans in order to maximize surface area for water retention!

CLICK for a comparison between a human's nasal cavity and a kangaroo rat's (native to deserts in the American Southwest) nasal cavity!



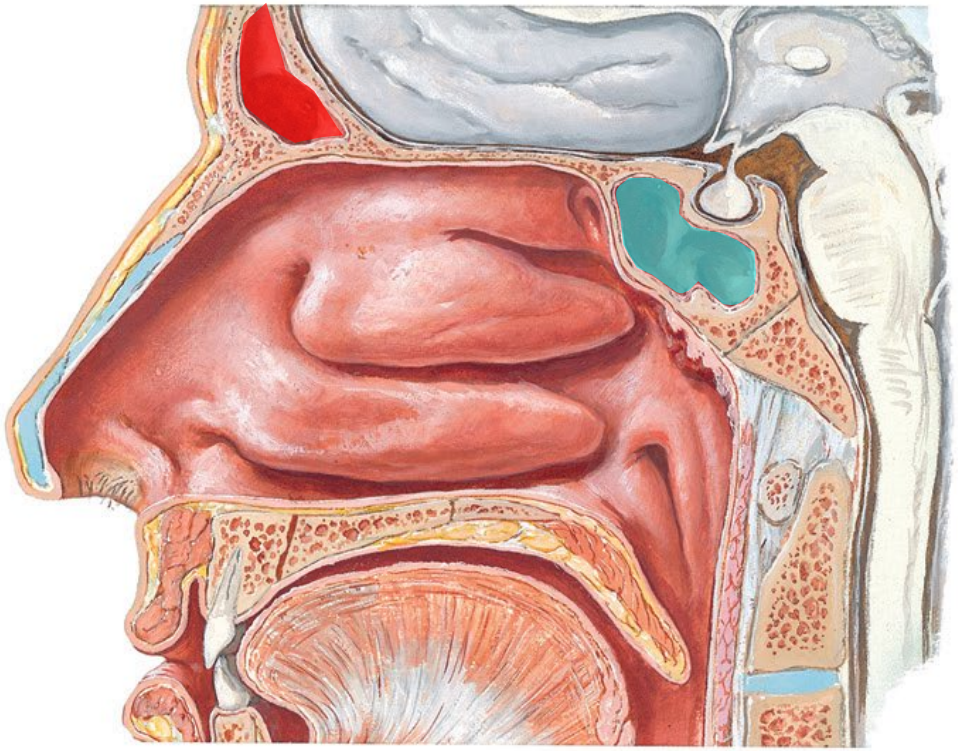
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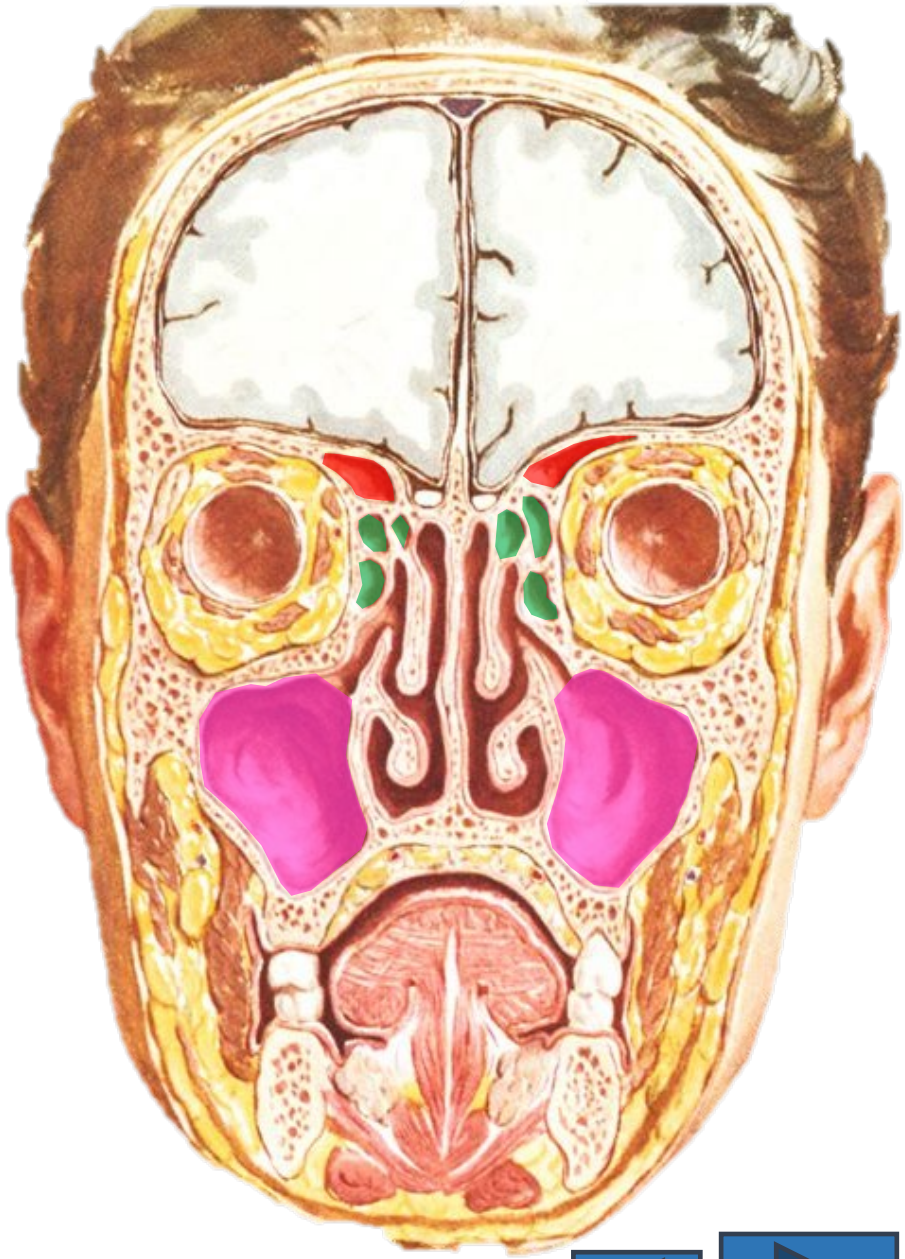
Paranasal Sinuses

The respiratory part of the nasal cavity contains bonus extensions that extend further into the surrounding facial bones. These are called the paranasal sinuses and are named after whichever bone they are inside.

Your paranasal sinuses are:

1) Frontal sinuses
2) Ethmoidal air cells (Classified as anterior, middle or posterior, depending on where they are located.)
3) Sphenoid sinus
4) Maxillary sinuses





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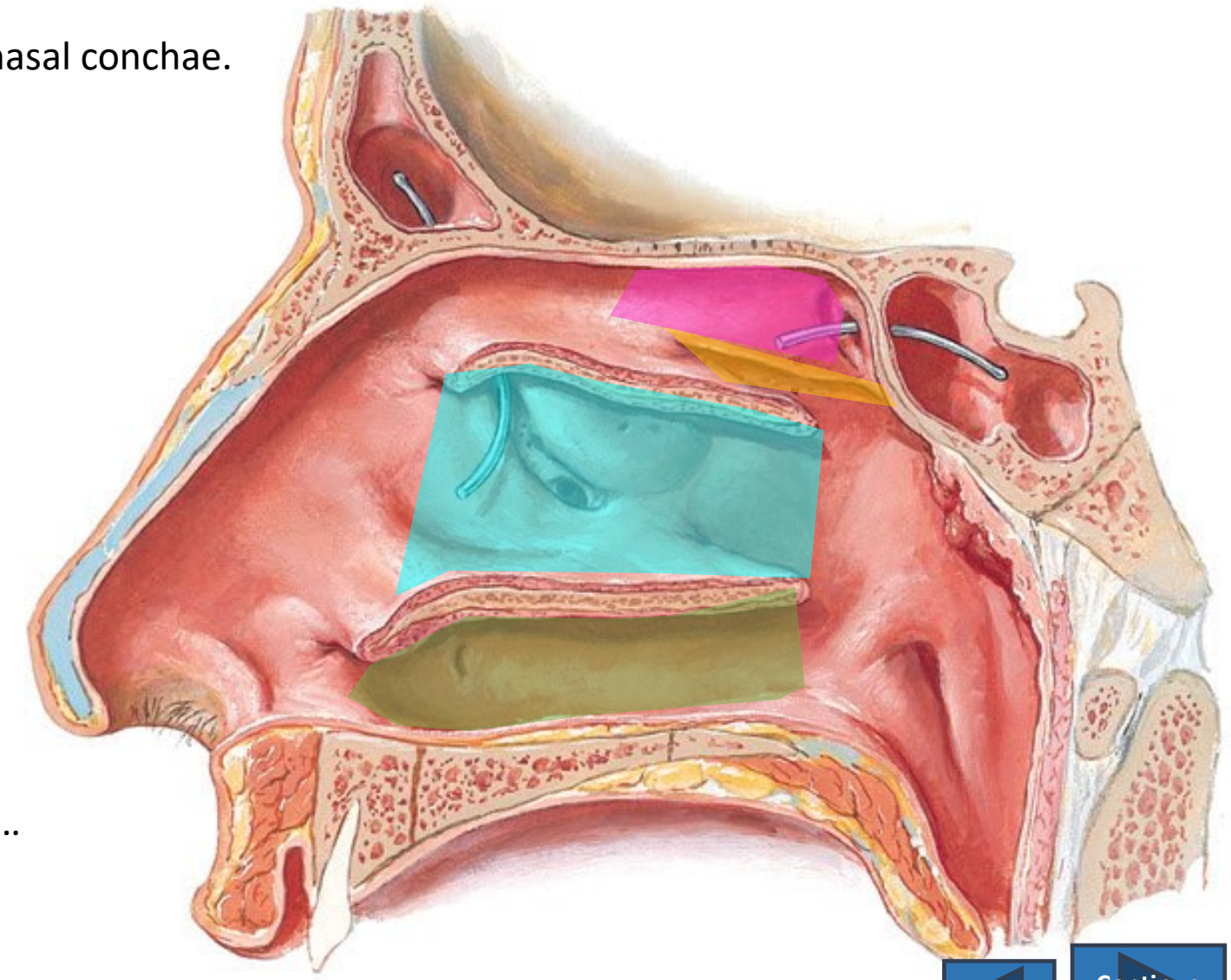
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Drainage Points

In this image, we have cut away the middle and inferior nasal conchae.

Thus, we can see the following:
Sphenoethmoidal recess
Superior nasal meatus
Middle nasal meatus
Inferior nasal meatus



Let's take a closer look at the sphenoethmoidal recess…

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Sphenoethmoidal Recess and Superior Meatus

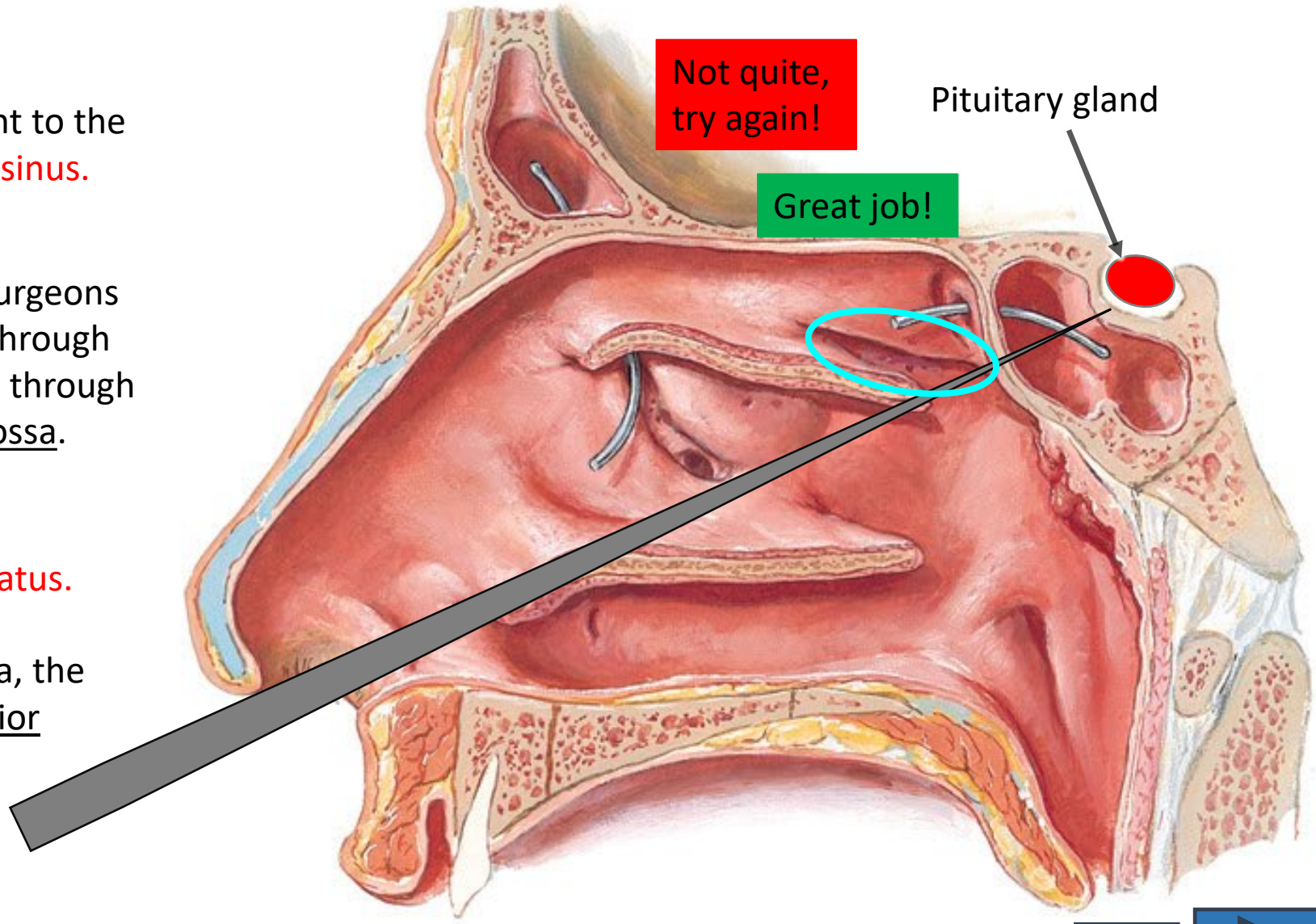
The sphenoethmoidal recess provides communication and and a drainage point to the sphenoid sinus. CLICK on the sphenoid sinus.

The sphenoid sinus provides a way for surgeons to access the pituitary gland by drilling through the inferior aspect of the sinus and then through the inferior aspect of the hypophyseal fossa.

Click here to continue

Now CLICK on the superior nasal meatus.

Just inferior to the superior nasal concha, the superior nasal meatus drains the posterior ethmoid air cells.



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Middle Nasal Meatus

The middle nasal meatus contains two additional structures that drain surrounding sinuses. Before we go over them, CLICK on the frontal sinus.

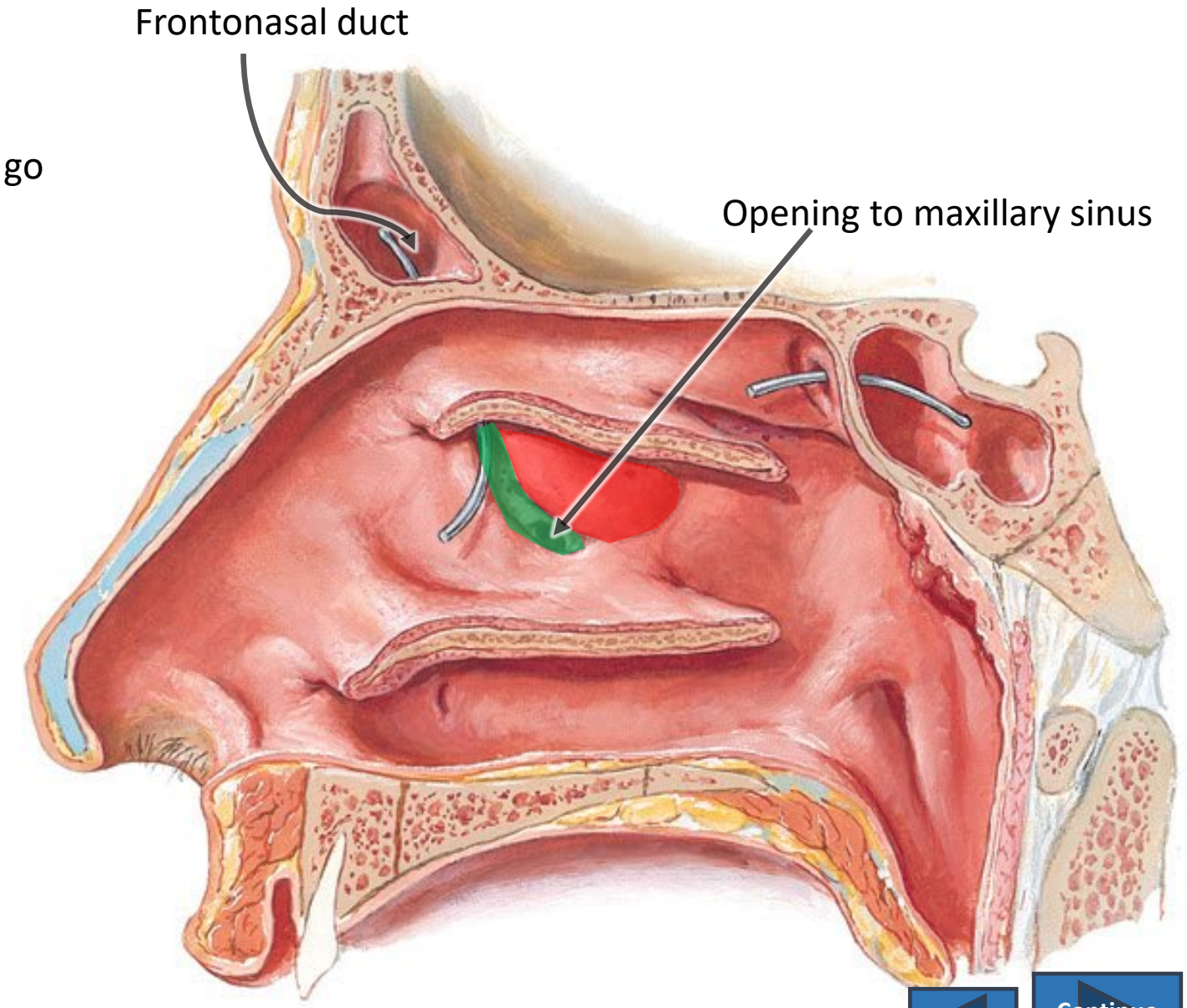
Not quite, try again!

Great job!

The ethmoid bulla (Latin for "bubble") is created by and drains the middle ethmoid air cells.

CLICK HERE for more information about the hiatus semilunaris!

The hiatus semilunaris is anterior to the ethmoid bulla and connects to the frontal sinuses superiorly by way of the frontonasal duct (shown with a wire passing through in the image). It also drains the anterior ethmoid air cells superiorly and the maxillary sinuses inferiorly.



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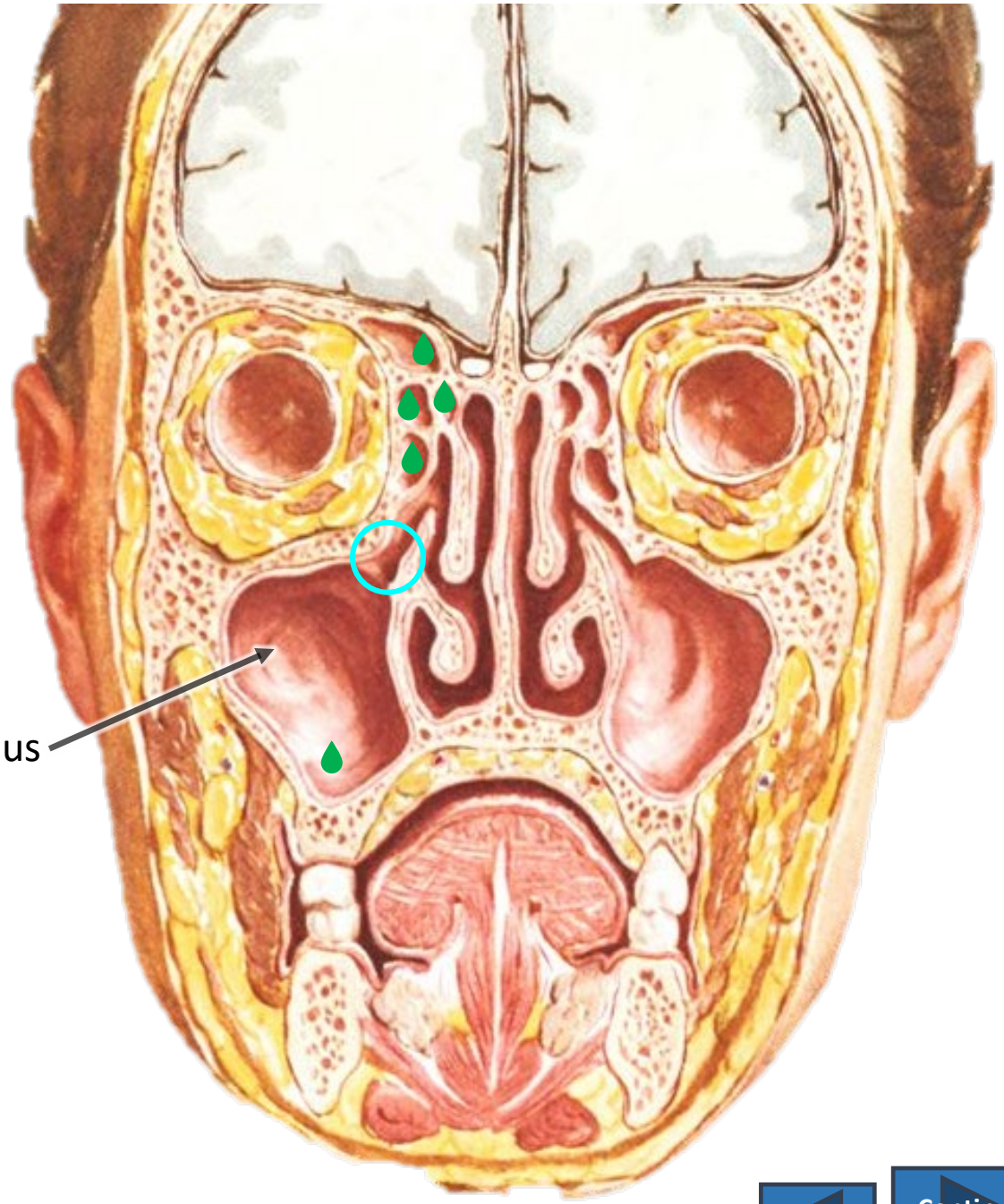
Maxillary Sinuses

The maxillary sinuses are the largest of the paranasal sinuses, taking up a majority of the body of the maxilla bones. They drain into the inferior aspect of hiatus semilunaris.

The opening into the sinus is on the superomedial aspect, meaning that gravity does not drain the maxillary sinuses if you are standing upright.

This difficulty in drainage results in the maxillary sinus being the most commonly infected of all of the paranasal sinuses.

CLICK here to compare the drainage of the frontal, ethmoidal, and maxillary sinuses in the upright position! (Sphenoid sinus not visible in this image)



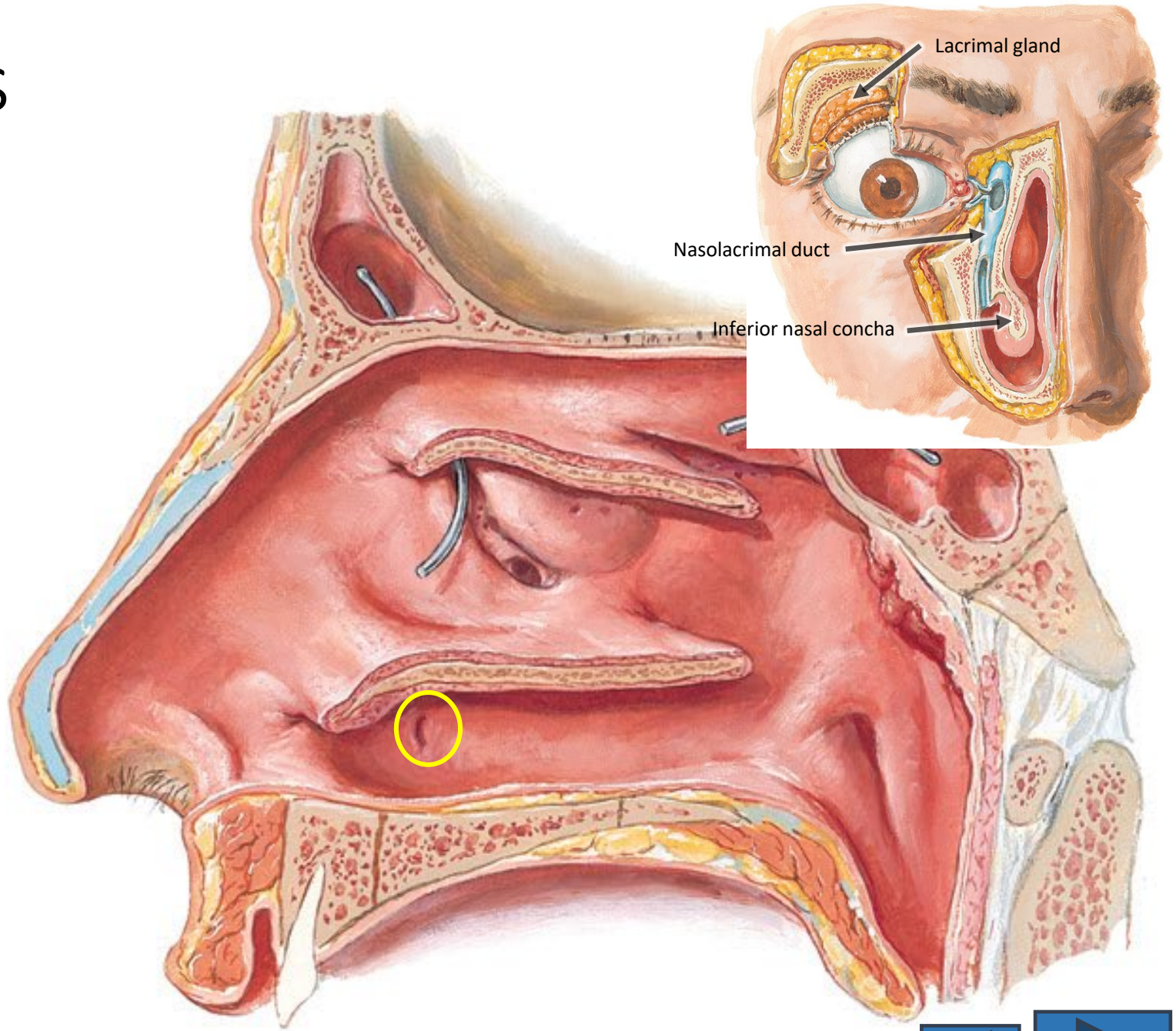
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Inferior Nasal Meatus

The Inferior nasal meatus is inferior to the inferior nasal concha and contains the opening to the nasolacrimal duct.

Tears produced by the lacrimal gland travel across the eyes and drain into the nasolacrimal duct.

This means that when you cry, the lacrimal gland produces more tears, which in turn drain out to your nasal cavity. So that runny nose that you get when you cry is actually tears!



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Nasal Cavity Blood Supply and Innervation

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Pathways into the Nasal Cavity

Nerves and arteries may take different paths into the nasal cavity other than just the choanae and the naris.

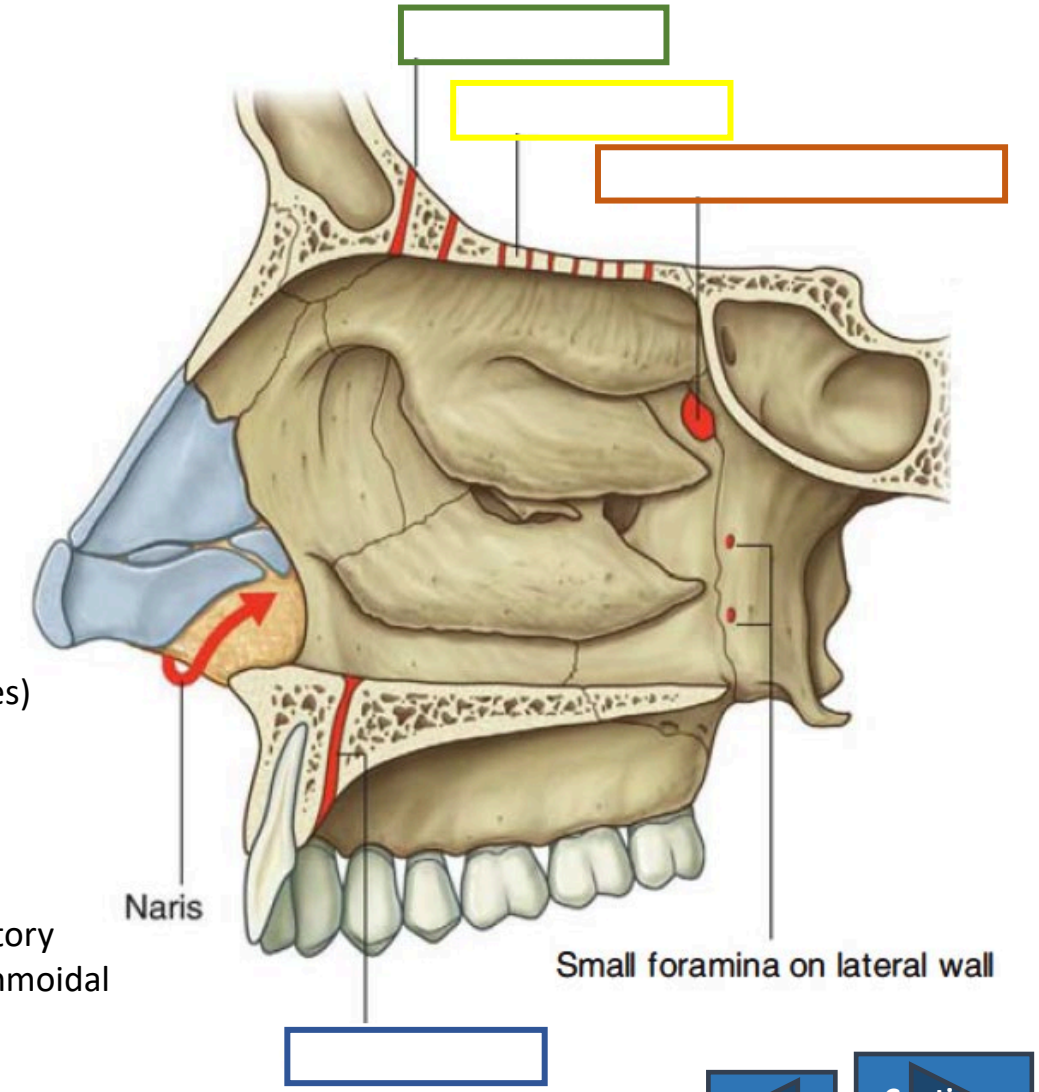
CLICK on the following pathways to reveal them on the picture to the right!

Foramen cecum -anterior ethmoidal nerve and artery may travel through this!

Sphenopalatine foramen -Transmits the sphenopalatine artery and the nasopalatine nerve (in addition to smaller nasal nerves)

Incisive canal -Transmits the greater palatine artery and the distal portion of the nasopalatine nerve.

Cribriform plate of the ethmoid bone -Transmits olfactory nerves to the olfactory region of the nasal cavity along with ethmoidal arteries.



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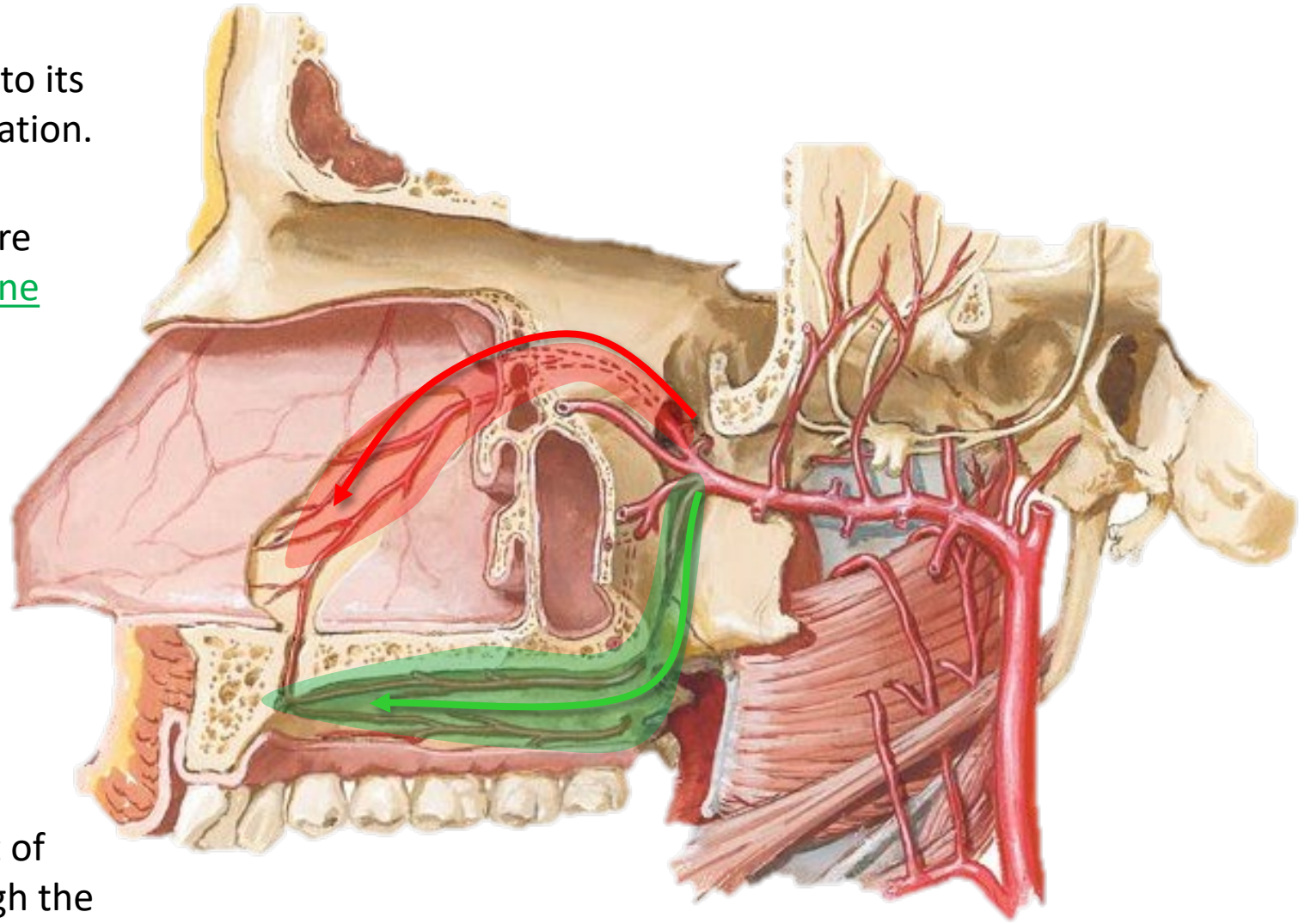
Blood Supply

The nasal cavity has a very rich blood supply due to its function of warming and cooling air during respiration.

The primary arteries supplying the nasal cavity are the sphenopalatine artery and the greater palatine artery.

The sphenopalatine artery enters the nasal cavity from the pterygopalatine fossa via the sphenopalatine foramen and divides into a number of branches that supply the concha (not shown in this image) and nasal septum. It is the last branch of the maxillary artery.

The greater palatine artery descends from the maxillary a then travels along the superior aspect of the palate before entering the nasal cavity through the incisive foramen to anastomose with branches of the sphenopalatine artery.



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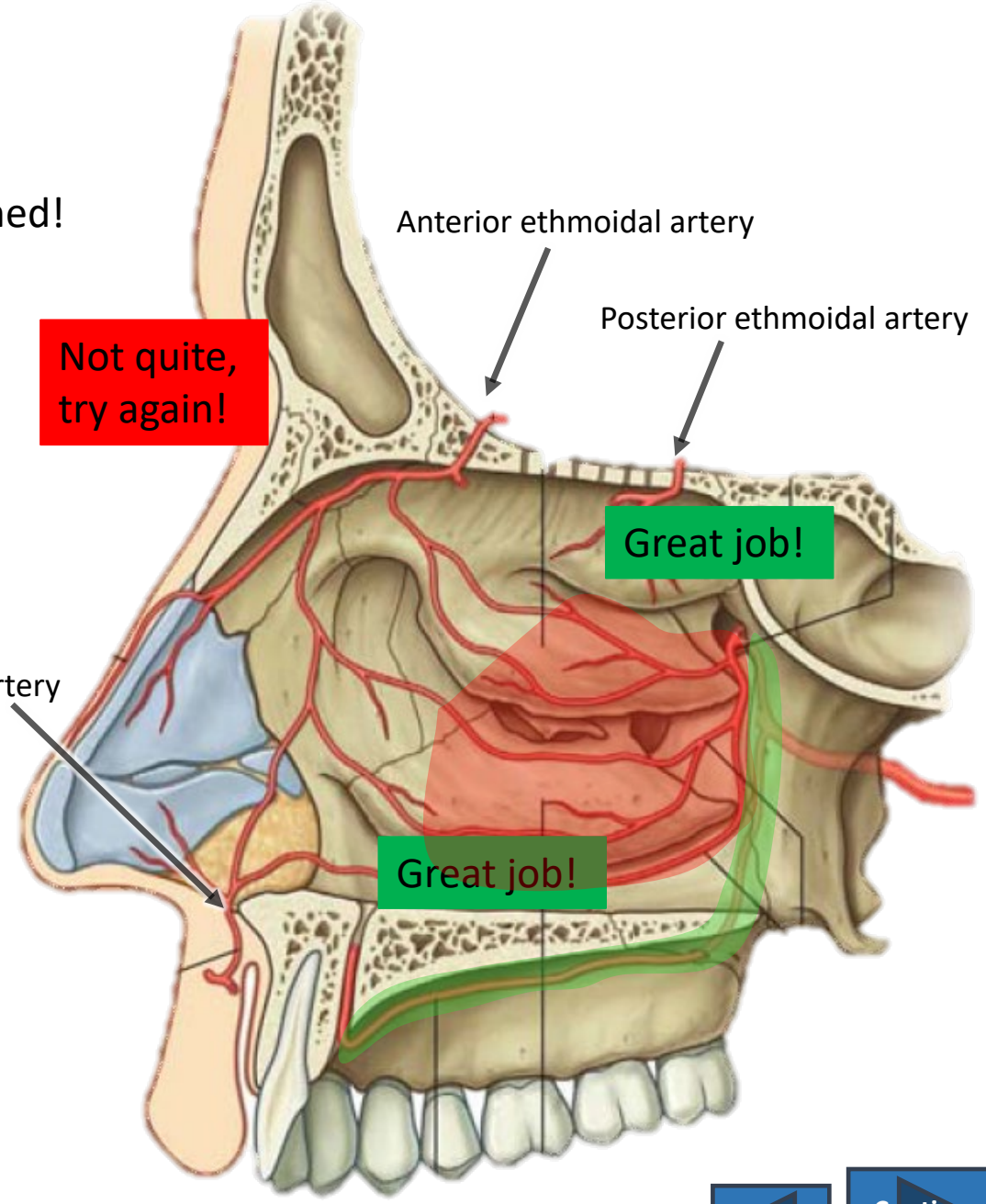
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Blood Supply

Before we cover more arterial branches, let's review what we just learned!

This anastomotic network of 5 arteries (anterior ethmoid, posterior ethmoid, sphenopalatine, greater palatine, and superior labial artery) is called the **Kiesselbach plexus**. It is located very superficially which is a reason why epistaxis (nosebleeds) are so common!

Other arteries that anastomose within the nasal cavity are the anterior and posterior ethmoidal arteries (branches of the ophthalmic artery) as well as alar and septal branches ascending into the nasal cavity from the superior labial artery!

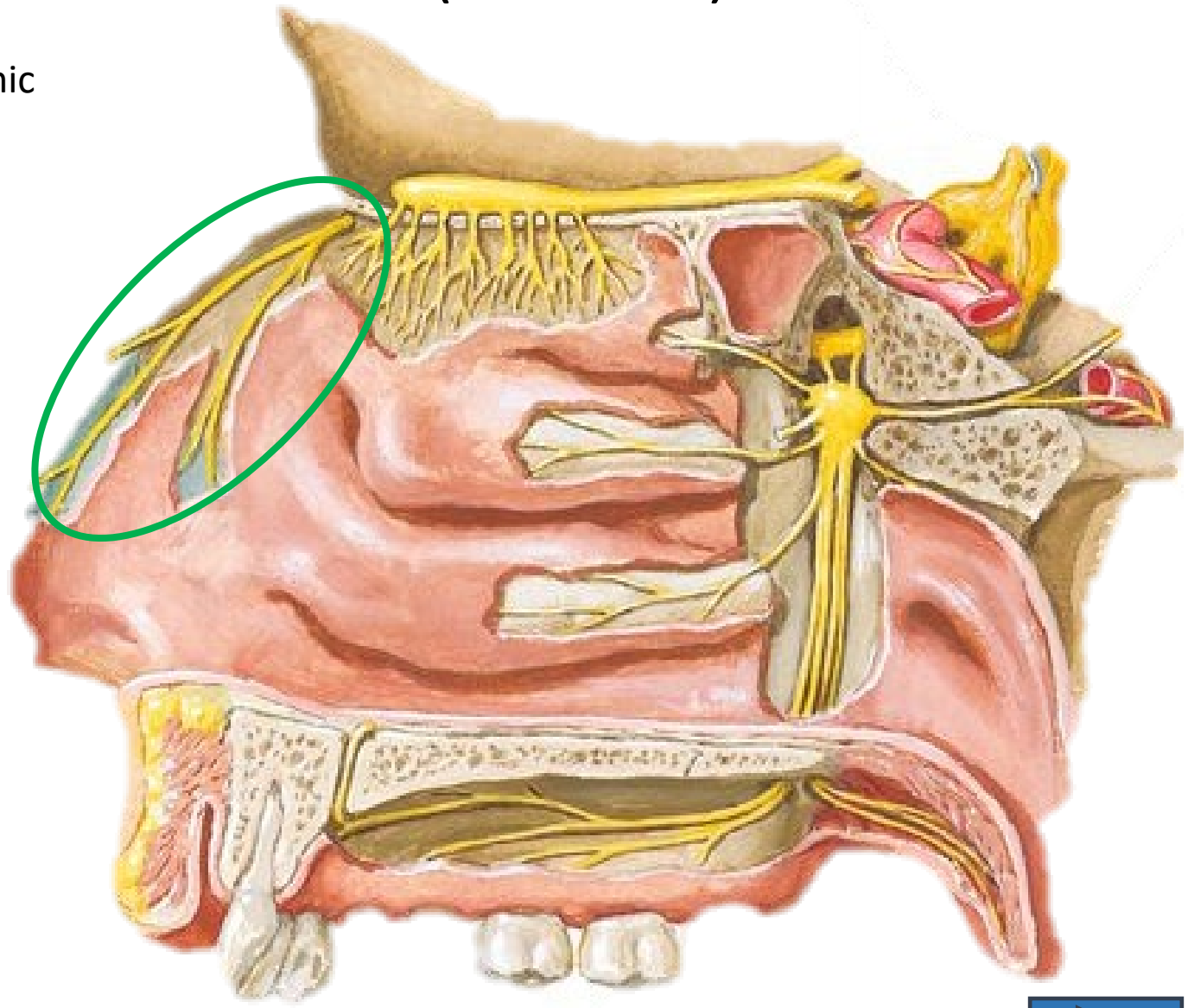


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Innervation from Opthalmic Nerve (CN V1)

The nasal cavity is innervated by branches of the ophthalmic nerve (CN V1) and the maxillary nerve (CN V2).

The ophthalmic nerve (CN V1) gives off the anterior ethmoidal nerve, which descends into the nasal cavity anterior to the cribriform plate of the ethmoid bone.



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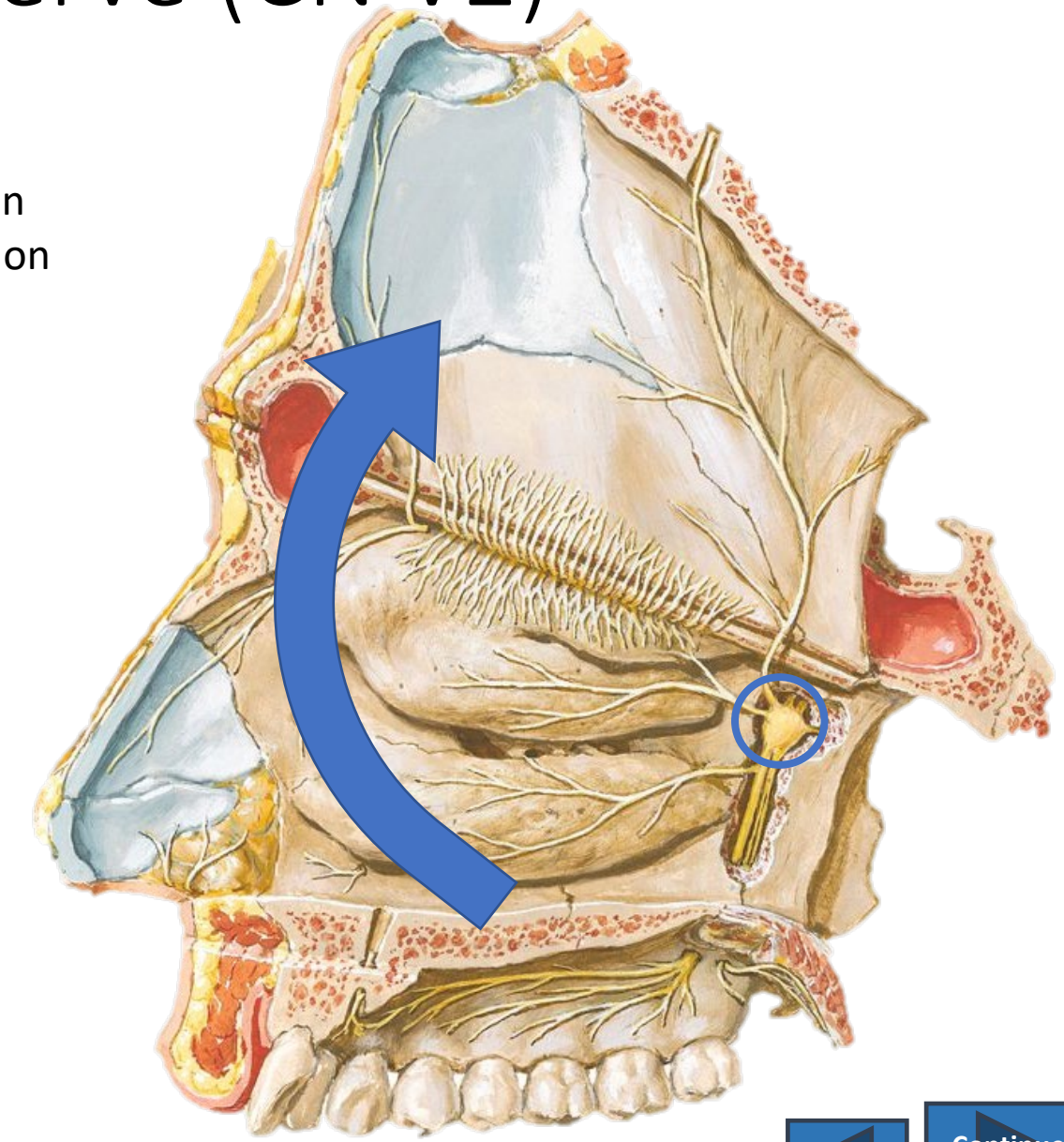
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Innervation from Maxillary Nerve (CN V2)

The pterygopalatine ganglion (largest of the parasympathetic ganglia in the head) provides a junction for multiple branches of CN V2 to enter on their way to either the nasal or oral cavities.

Before we learn these branches, let's orient ourselves first with the "hinge view" of the nasal cavity to the right.

We are looking at the right nasal cavity with the nasal septum flipped superiorly, as if on a hinge! So this image shows us both the right lateral nasal cavity as well as the right medial aspect of the nasal septum.



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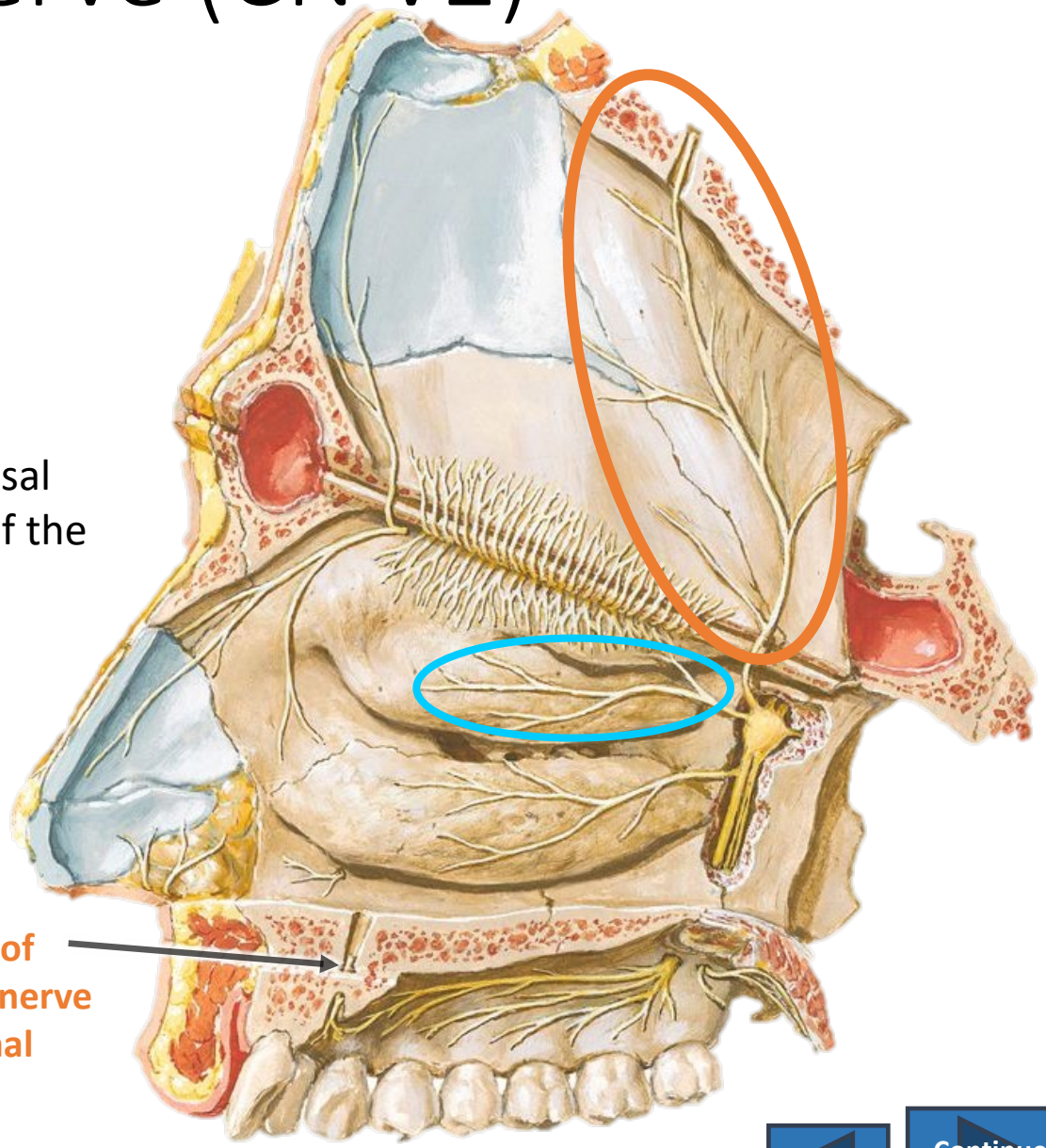
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Innervation from Maxillary Nerve (CN V2)

Exiting the pterygopalatine ganglion and entering the nasal cavity via the sphenopalatine foramen are the **nasopalatine nerve** and the **posterior superior lateral nasal nerve**.

The **nasopalatine nerve** descends along and innervates part of the nasal septum before entering the incisive foramen to assist in innervation of the hard palate.

The **posterior superior lateral nasal nerve** innervates the superior and middle nasal conchae and meatuses.



Continuation of nasopalatine nerve in incisive canal

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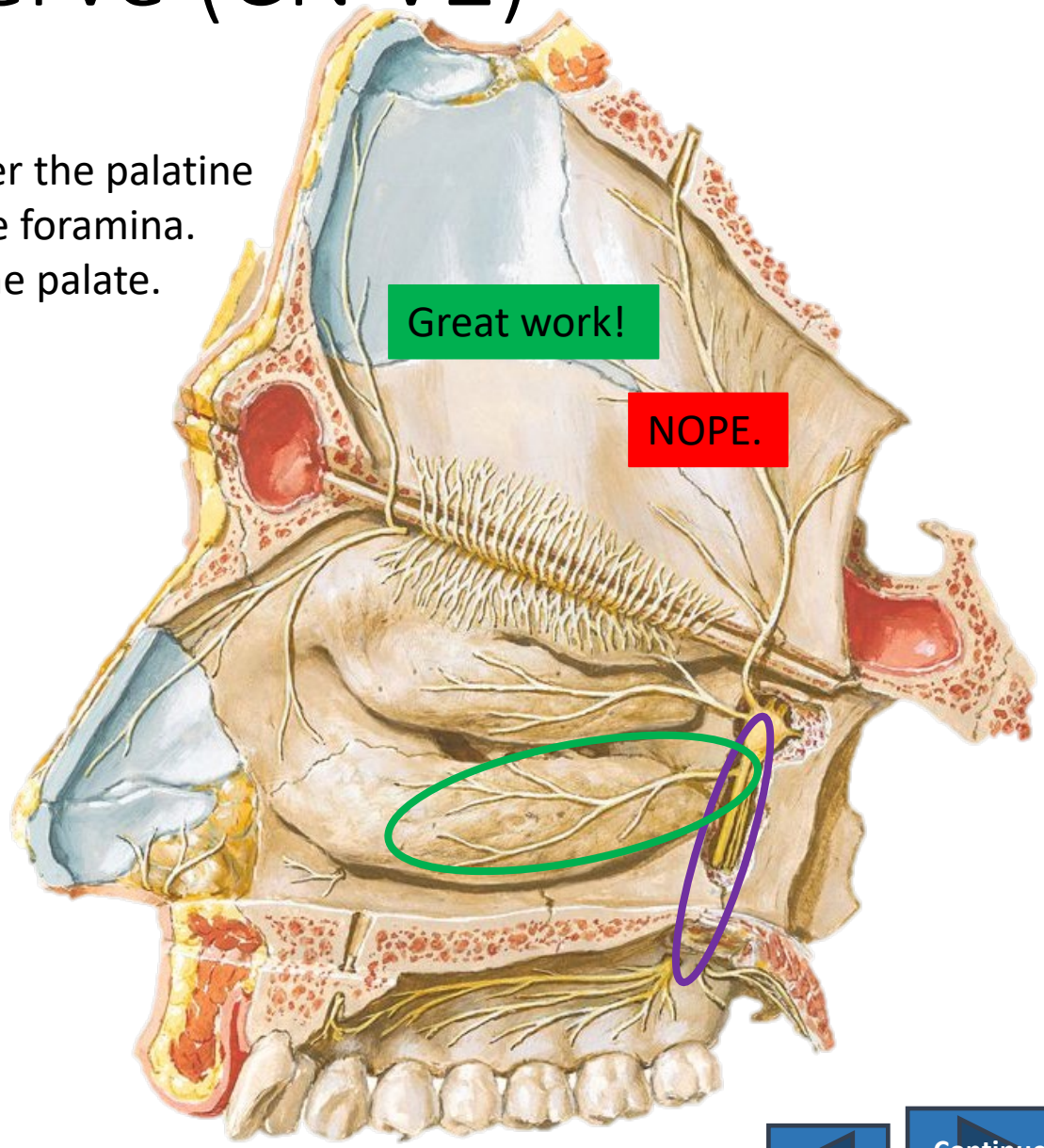
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Innervation from Maxillary Nerve (CN V2)

The pterygopalatine ganglion also has branches that descend and enter the palatine canal before entering the oral cavity via the greater and lesser palatine foramina. These are the greater and lesser palatine nerves and they innervate the palate.

While the greater palatine nerve is in the palatine canal, it gives off the posterior inferior lateral nasal nerve, which innervates the lateral wall of the nasal cavity with the posterior superior lateral nasal nerve.

For funsies, CLICK on the olfactory nerve (CN I). This is in the olfactory region and where all of the olfactory receptors can be found in the nasal cavity!



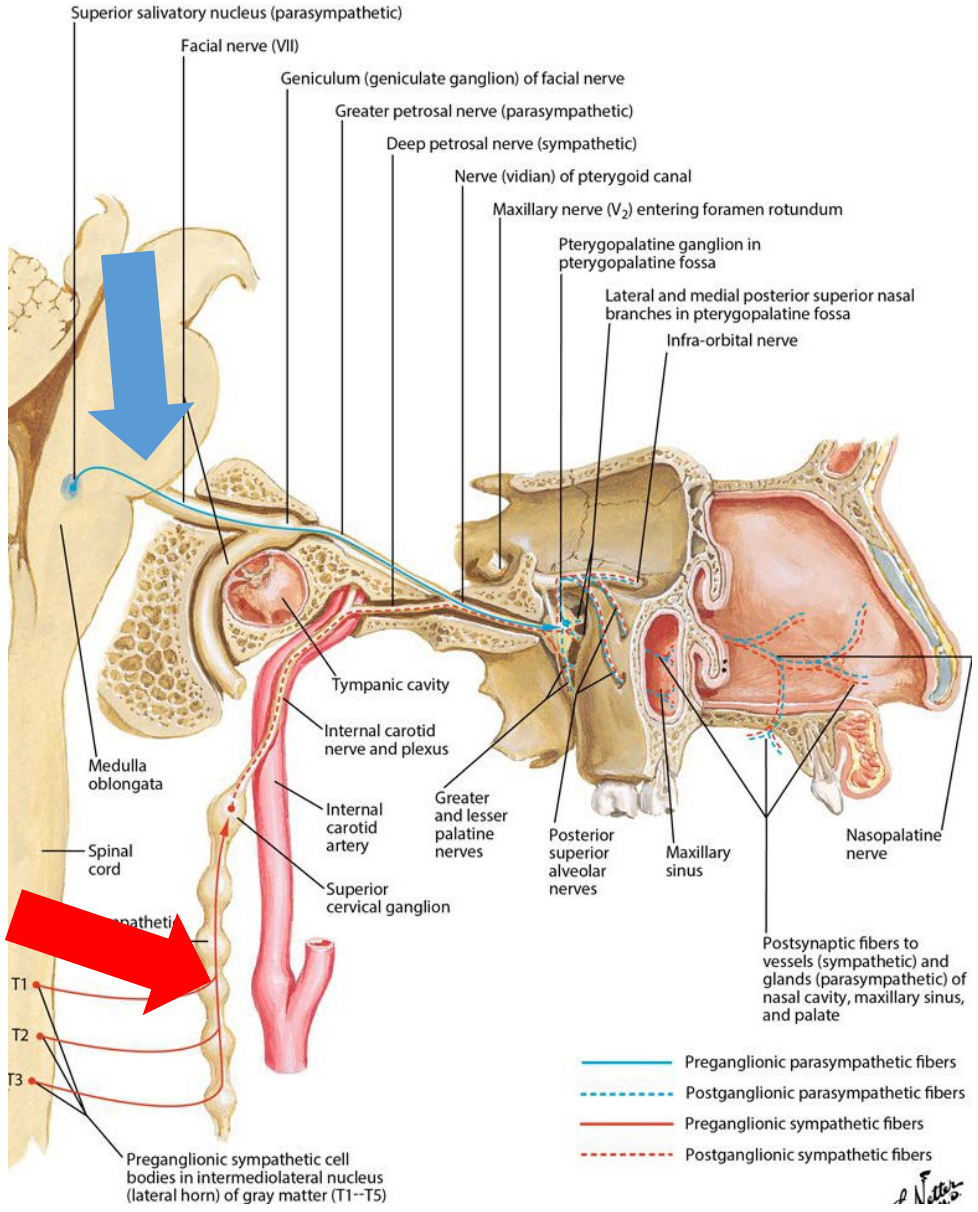
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Autonomic Innervation

Both sympathetic fibers and parasympathetic fibers hitchhike on branches of the maxillary nerve (CN V2) in order to reach the nasal cavity.

Sympathetic fibers regulate blood flow to the nasal mucosa.

Parasympathetic fibers affect the secretomotor activity of the glands in the nasal mucosa and paranasal sinuses.



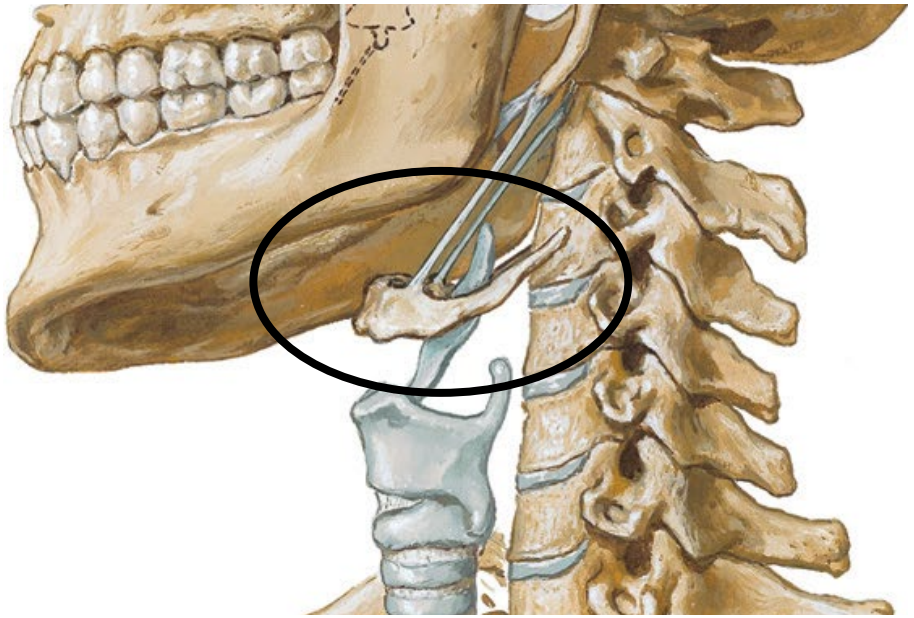
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Oral Cavity

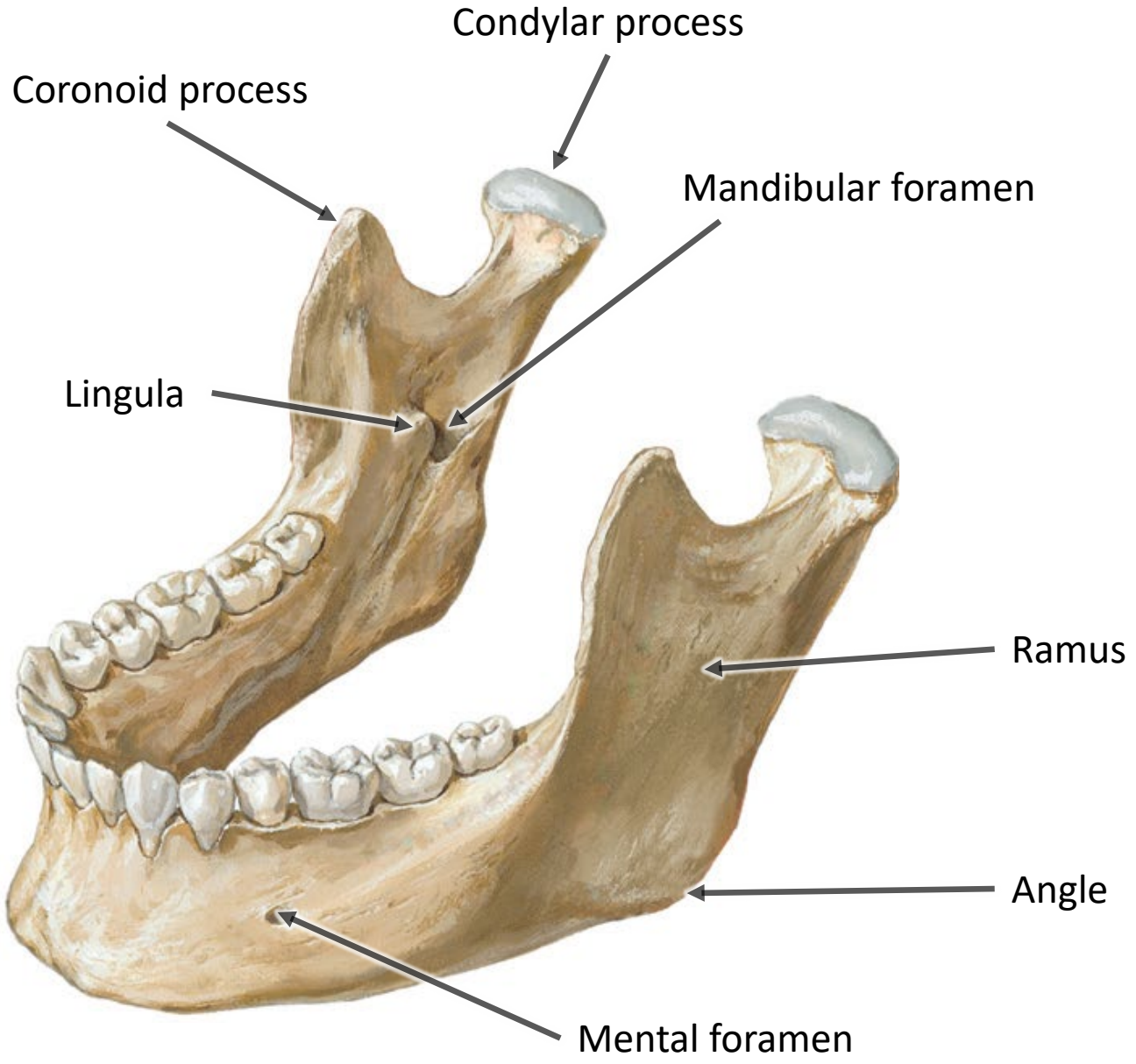
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Bones

Let’s quickly review some aspects of the mandible.



And we can’t forget about the hyoid bone!



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Muscles

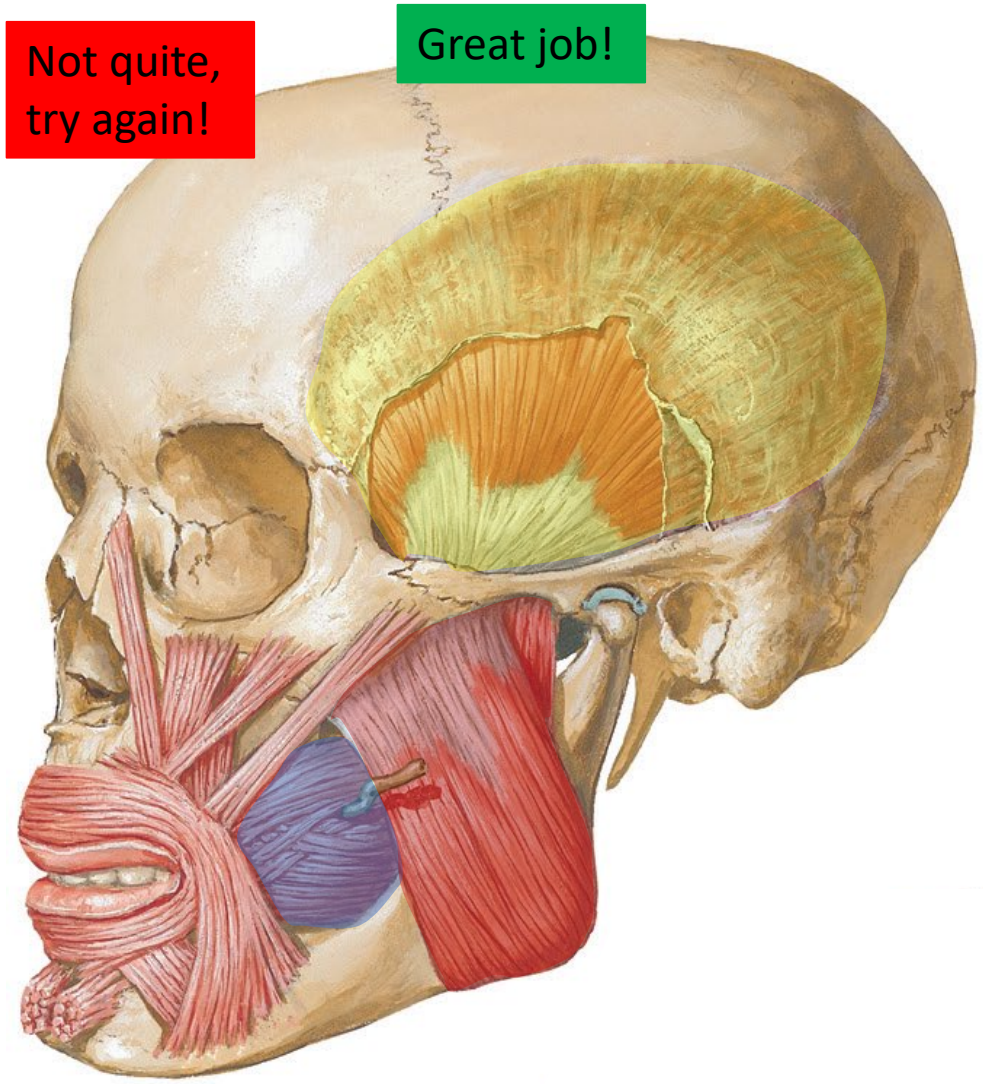
Before we learn the oral cavity, let us review some of the facial muscles that act on the mandible!

CLICK on the buccinator muscle.

CLICK on the masseter muscle.

CLICK on the temporalis muscle.

Recall that sensory innervation to these muscles is through branches of the trigeminal nerve (CN V), while motor innervation to the buccinator muscle is through branches of the facial nerve (CN VII).



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Oral Cavity Overview

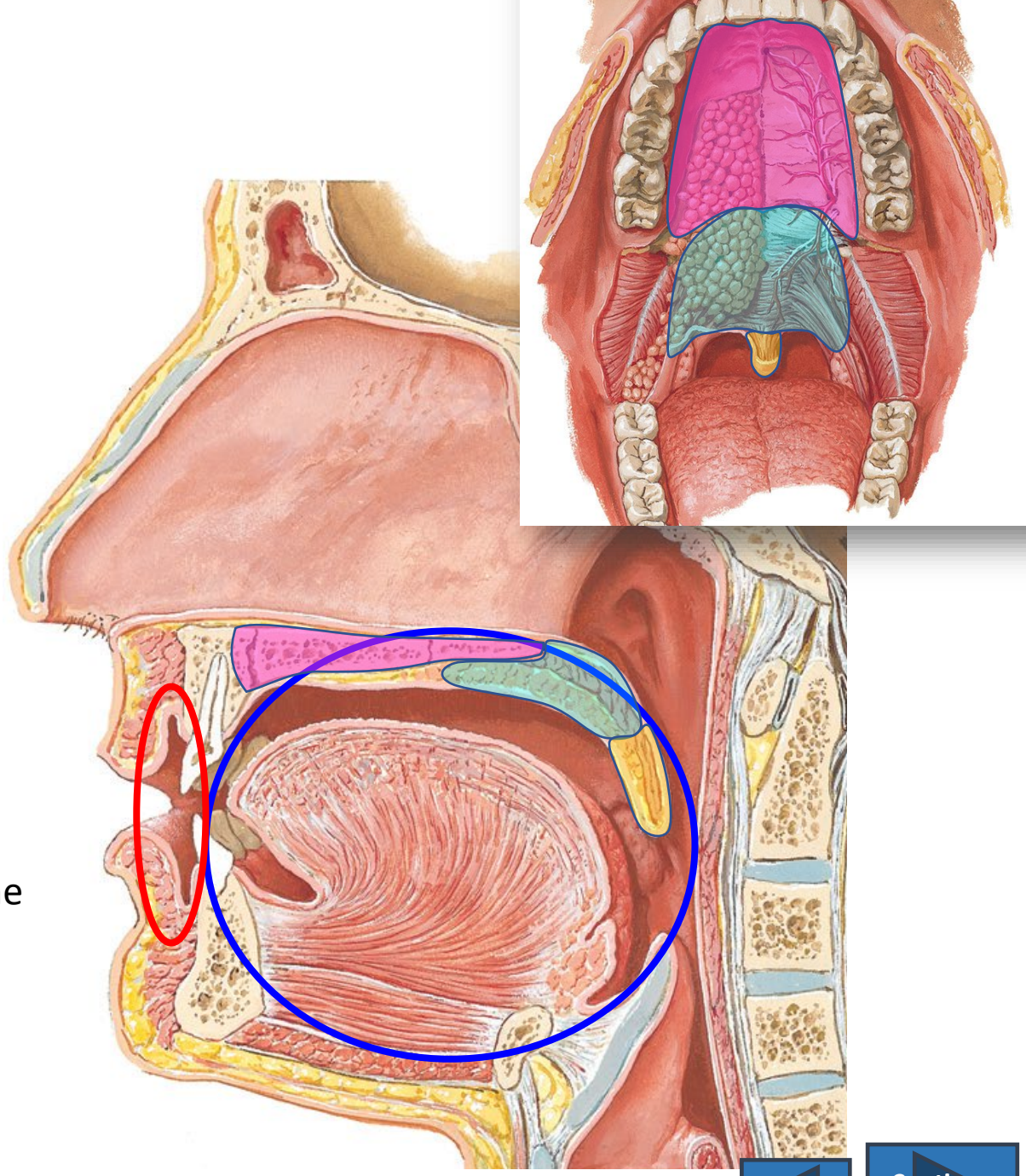
The oral cavity consists of the outer oral vestibule (between your teeth and lips/cheeks) and the oral cavity proper (extending posterior all the way to the oropharynx)

The oral cavity is bounded superiorly by the hard palate, soft palate, and uvula.

The hard palate is made from the maxilla and palatine bones.

The soft palate is made from muscle fibers covered by a mucus membrane. It is partially responsible for closing off access to the nasal cavity when we swallow (you don't want food up there).

The uvula is the midline extension of the soft palate and aids in the closing of access to the nasopharynx.



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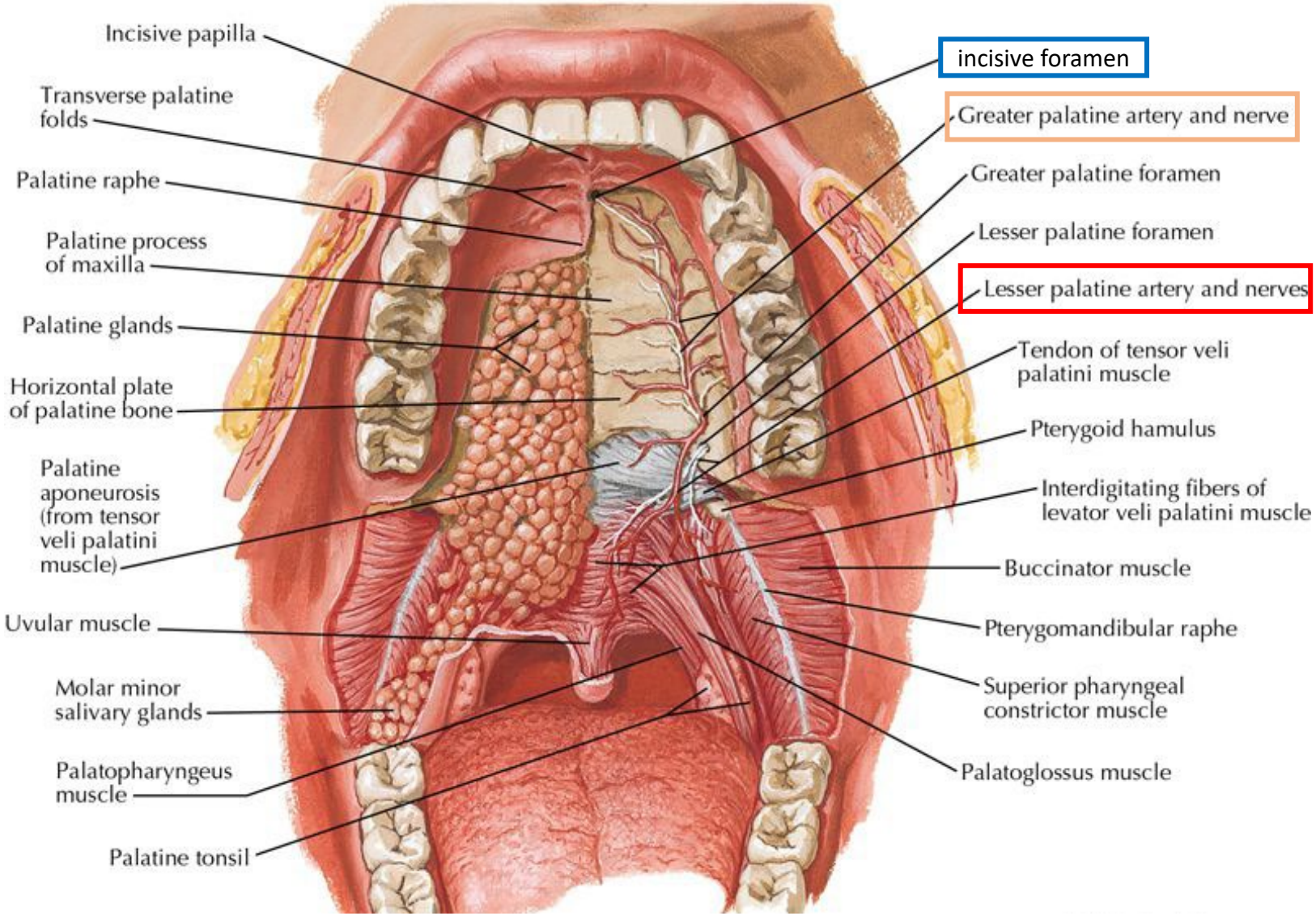
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Neurovasculature of the Palate

As mentioned previously, the palate is supplied with blood by the greater palatine artery, the lesser palatine artery, and the sphenopalatine artery (via its anastomosis with the greater palatine artery at the incisive foramen). The greater and lesser palatine arteries are branches of the greater (descending) palatine artery (a further branch from the maxillary artery).

Sensory innervation is provided by the nasopalatine nerve (as it descends through the incisive foramen from the nasal cavity), the greater palatine nerve (soft palate and hard palate), and lesser palatine nerve (soft palate and uvula). All are branches of CN V2.



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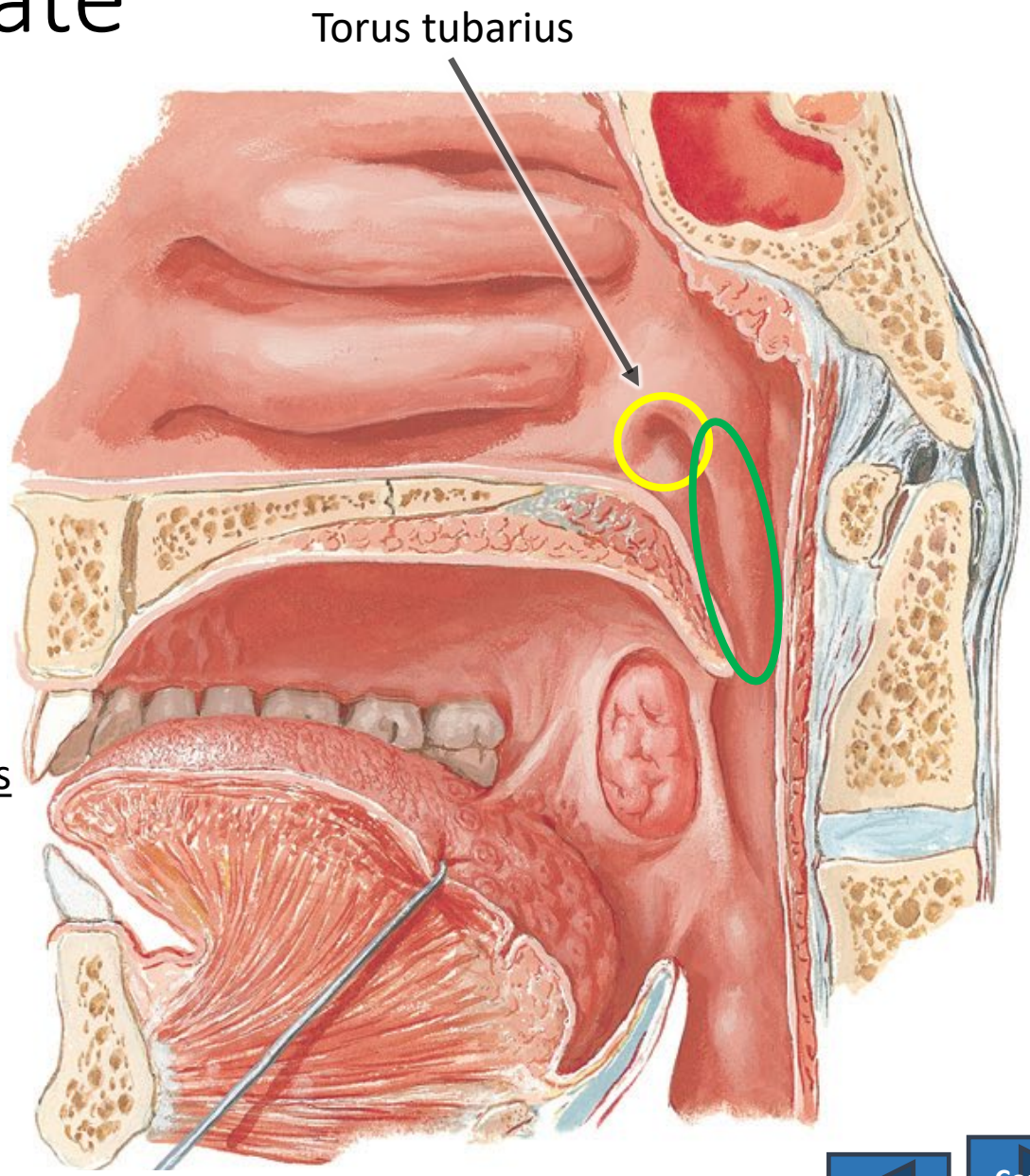
Musculature around the Palate

Before we talk about musculature, let's take a look at some of the more superficial structures in the area to provide us with landmarks!

This is the opening to the pharyngotympanic tube (Eustachian tube). This tube connects the nasopharynx to the middle ear and functions to equalize pressure in the middle ear.

The entrance to this tube is cartilaginous and forms a protrusion called the torus tubarius.

Descending from the opening of the tube is the salpingopharyngeal fold. This is formed by the salpingopharyngeus muscle, which opens the tube during swallowing and yawning.



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Pharyngotympanic Tube

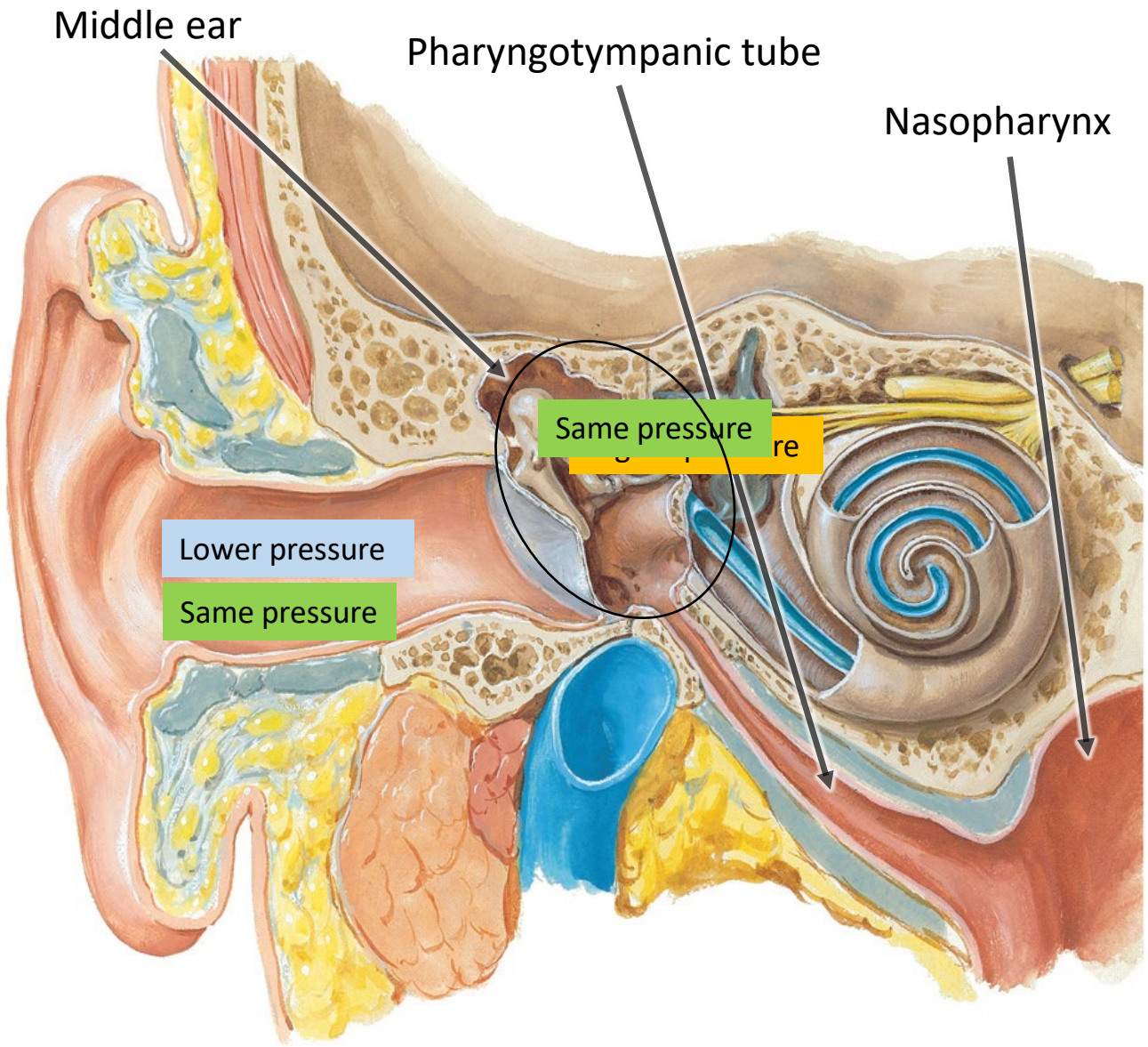
Imagine you are climbing a mo tain. The air pressure of the atmosphere is getting r an ower.

As a result, the exter c membrane (or eardrum) experie n the internal pa where the middle ear is

This o be muffled! Additionall ressure can alter the shape and can be very painful.

Opening th otympanic tube by swallowing or yawning equalize e pressure in the middle ear with the surrounding atmosphere. You may feel or hear pops in your ear as the cartilaginous end of the tube opens and pressure equalizes. This also applies for dramatic drops in altitude, or diving as well.

Nifty!



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Musculature around the Palate

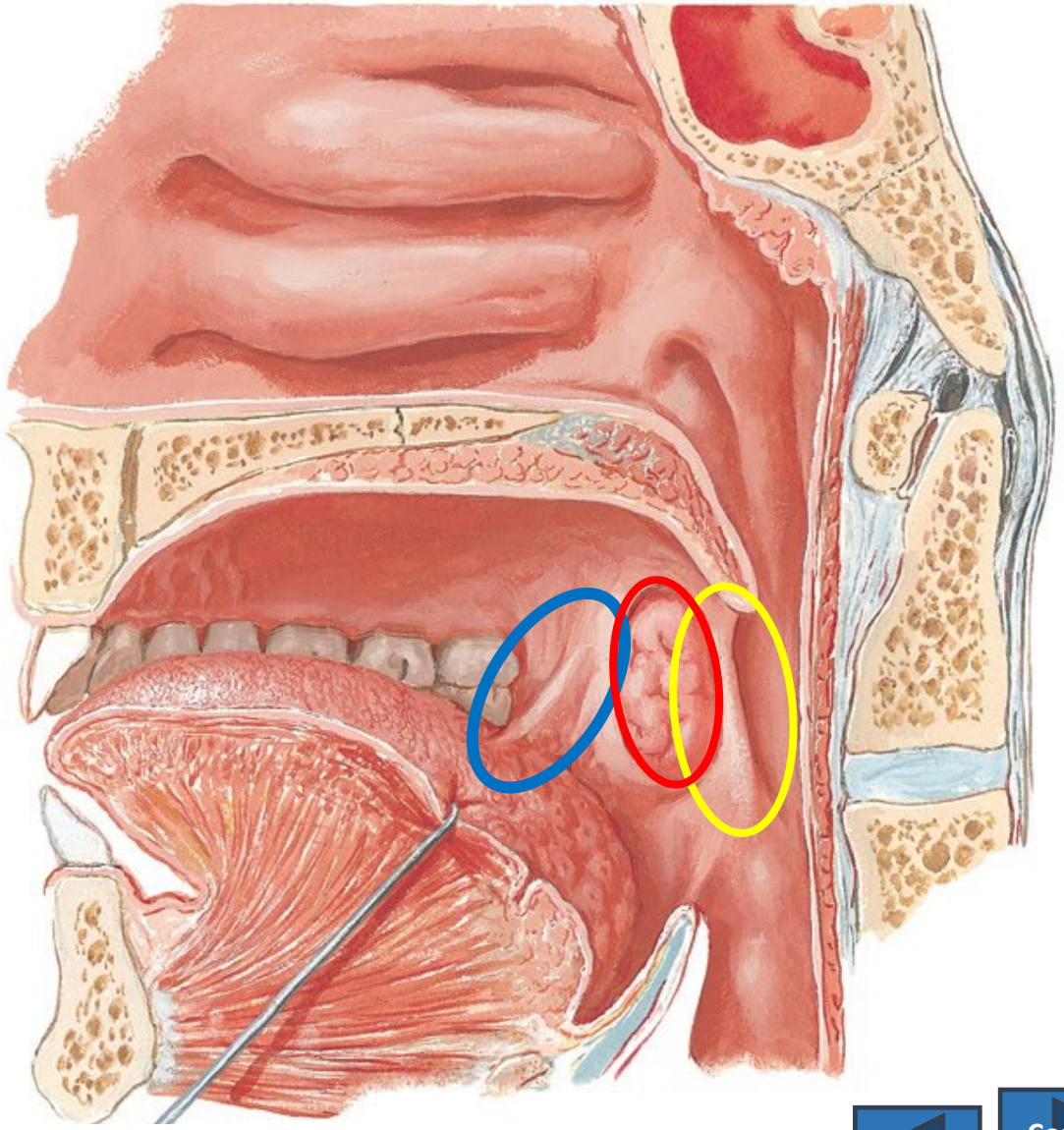
Inferior to the soft palate, there are two arches in the oral mucosa.

This is the palatoglossal arch. It is created by the palatoglossus muscle just deep to it. This muscle elevates the posterior part of the tongue and is the only tongue muscle not innervated by the hypoglossal nerve. Instead, it is innervated by the pharyngeal branch of CN X (vagus nerve).

This is the palatopharyngeal arch. It is created by the palatopharyngeus muscle just deep to it. This muscle elevates the pharynx and larynx and is also innervated by the pharyngeal branch of CN X.

Between these two arches sits the palatine tonsil.

Remembering these arches should be easy…the tongue is anterior to the pharynx, so it follows that the palatoglossal arch is anterior to the palatopharyngeal arch!



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Musculature around the Palate

Here we have removed the pharyngeal and oral mucosa to see the muscles deep to it.

See if you can identify the muscles on this image based on which folds and arches they create!

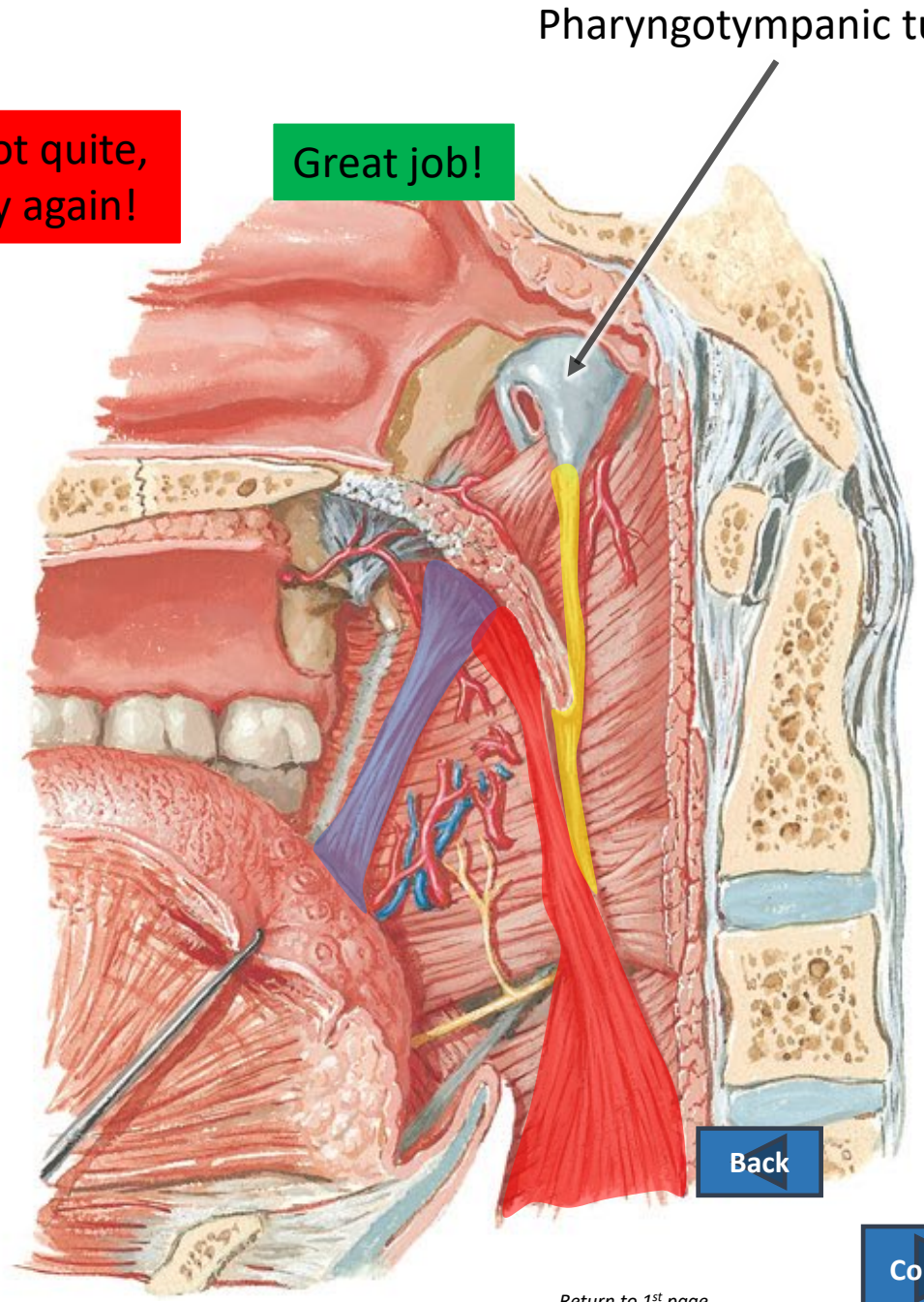
CLICK on the palatoglossus muscle.

CLICK on the palatopharyngeus muscle.

CLICK on the salpingopharyngeus muscle.

Not quite, try again!

Great job!



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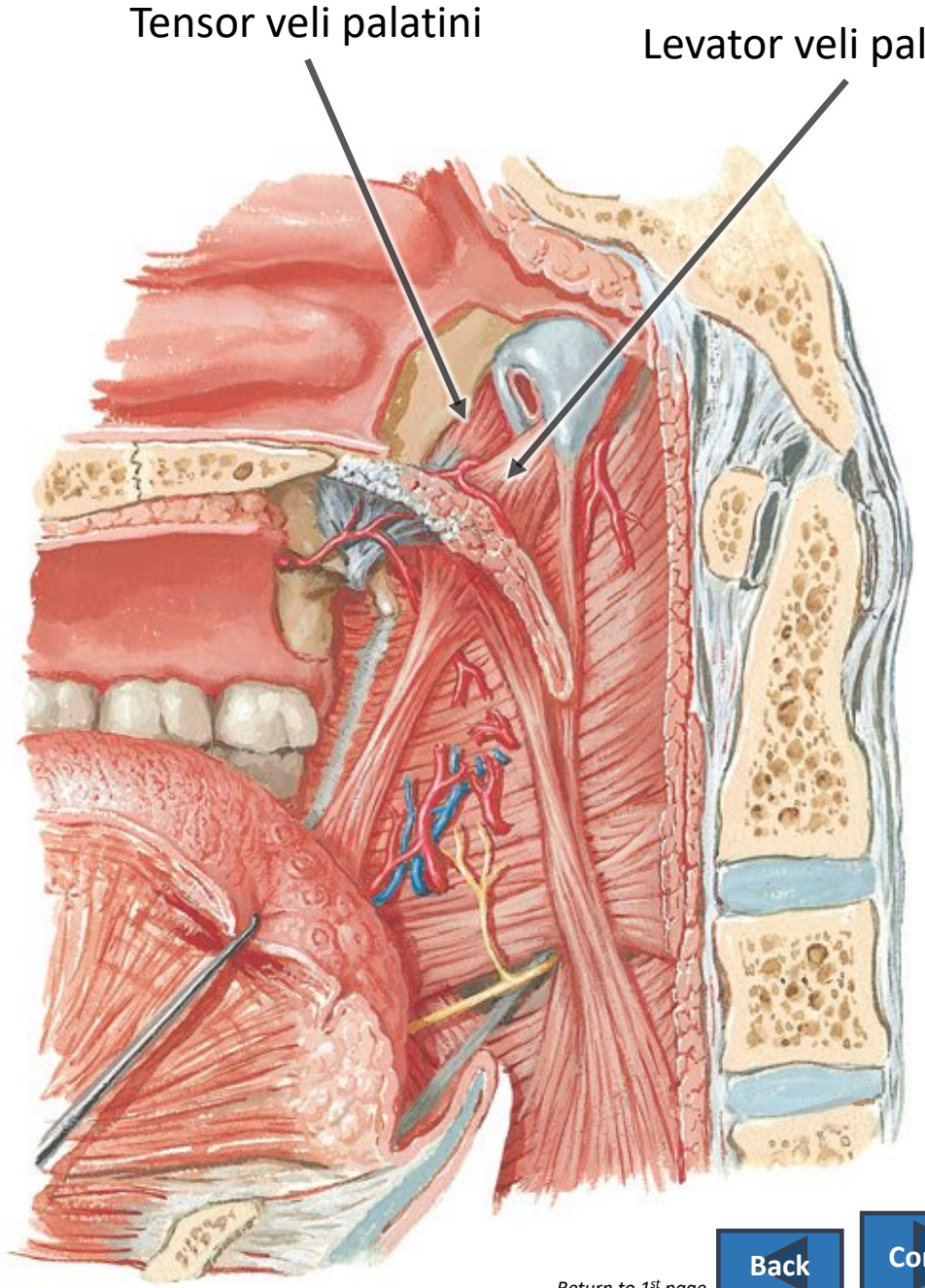
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Musculature around the Palate

Two more muscles can be found near the soft palate.

The levator veli palatini inserts onto the soft palate and elevates it during swallowing to prevent food from entering the nasal cavity. It is found anterior and inferior to the opening to the pharyngotympanic tube. This is innervated by the pharyngeal branch of vagus nerve (CN X).

The tensor veli palatini is found anterolateral to the levator veli palatini and assists in the elevation of the soft palate by tensing it. This is innervated by a motor branch of the mandibular nerve (CN V3).



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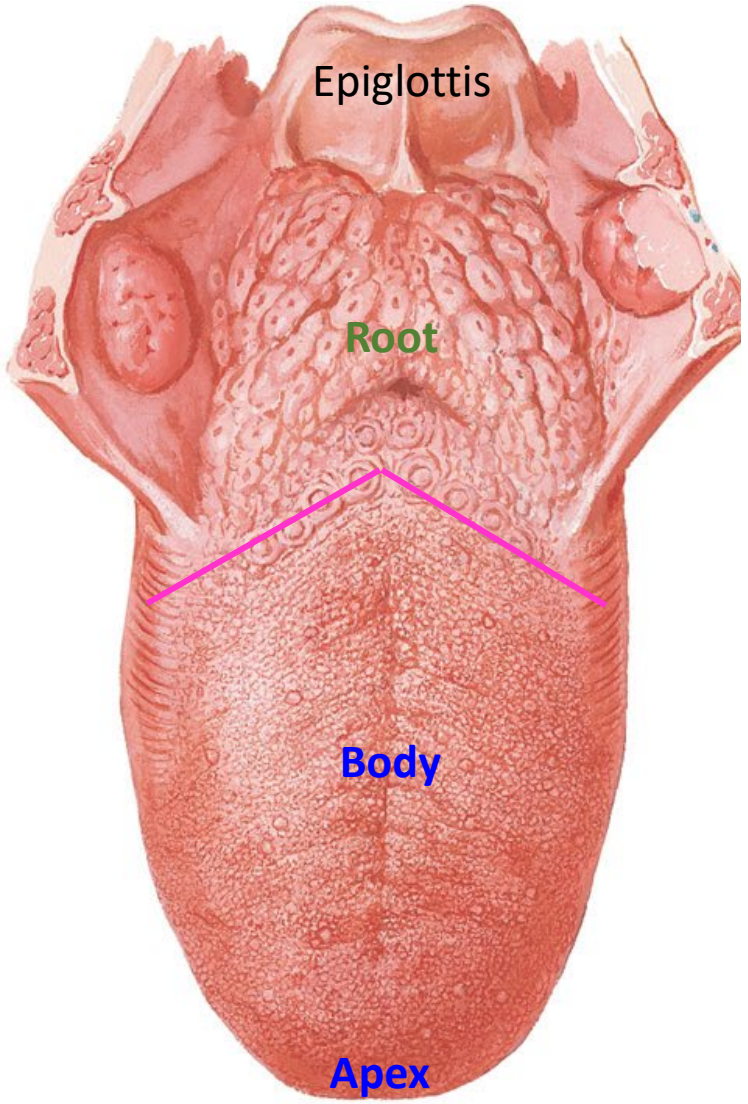
Tongue “division” overview

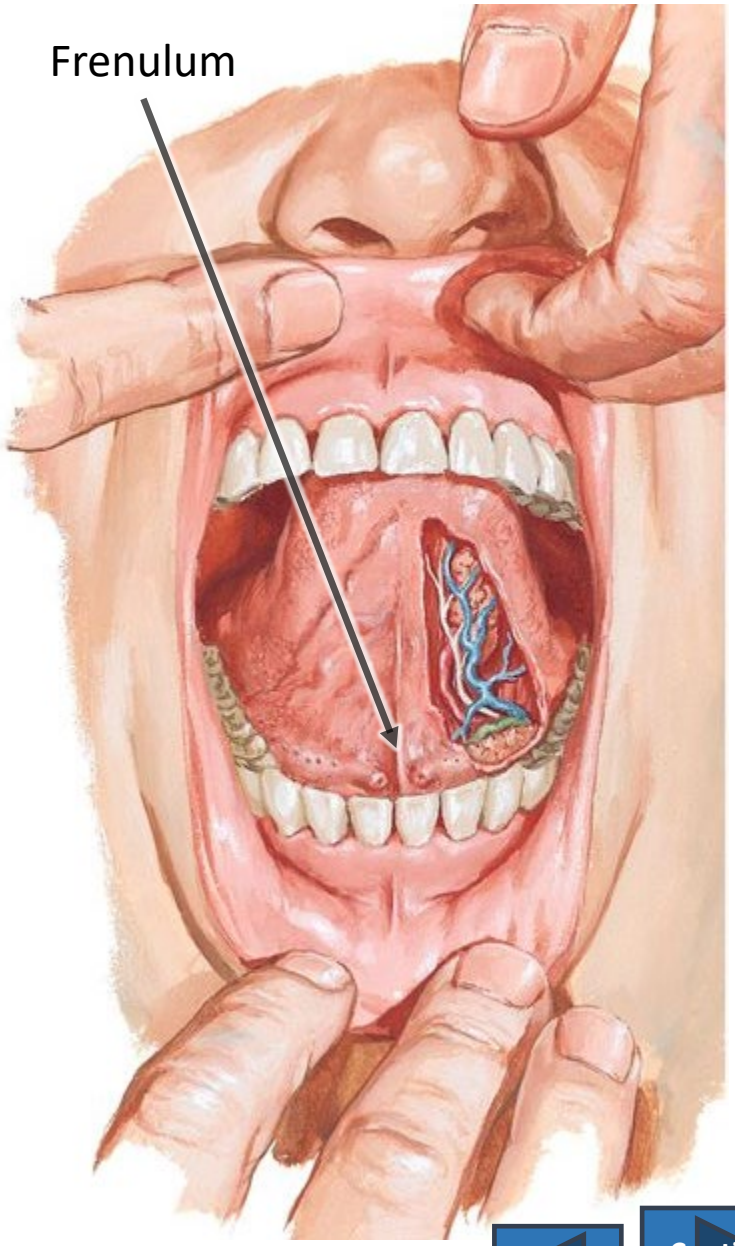
The tongue is conceptually split into two parts, based on its innervations (more on this in a moment!)

The anterior 2/3 of the tongue can be found on the horizonal plane in the oral cavity. This includes the **apex and body** of the tongue.

The **root** of the tongue is the posterior 1/3 and is separated from the anterior 2/3 by the V-shaped terminal sulcus.

The undersurface of the tongue contains no papillae, though it does have a single median fold called the frenulum.





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Tongue Musculature

As discussed before, the palatoglossus muscle is the only tongue muscle that is not innervated by the hypoglossal nerve. All other muscles that end in "-glossus" (Latin: tongue) are innervated by the hypoglossal nerve.

The genioglossus muscle ("genio-" is "chin") allows us to extend our tongues out of our oral cavities.

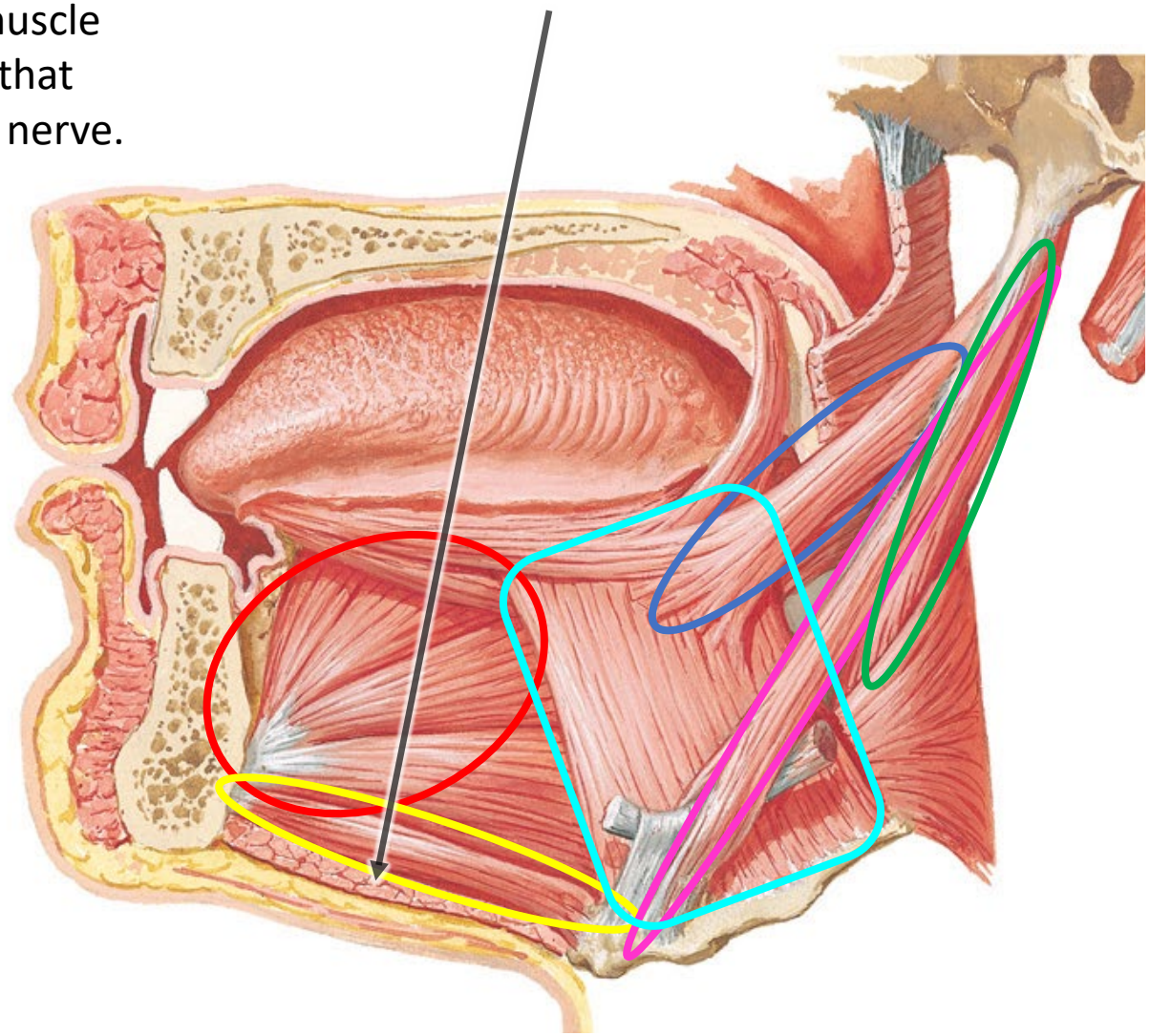
This should not be confused with the geniohyoid muscle, which is inferior and connects the mandible and the hyoid bone.

The styloglossus muscle connects the styloid process of the temporal bone to the tongue. It retracts the tongue back into the oral cavity as well as elevates it.

This should not be confused with the stylohyoid muscle or stylopharyngeus muscle, which connect to the pharynx and hyoid bone, respectively.

Lastly, there is the hyoglossus muscle, connecting the hyoid bone to the tongue. It both retracts and depresses the tongue. This muscle is an important landmark for neurovasculature, so we will see it again!

And don't forget about the mylohyoid muscle, superficial to the geniohyoid!



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Tongue Musculature

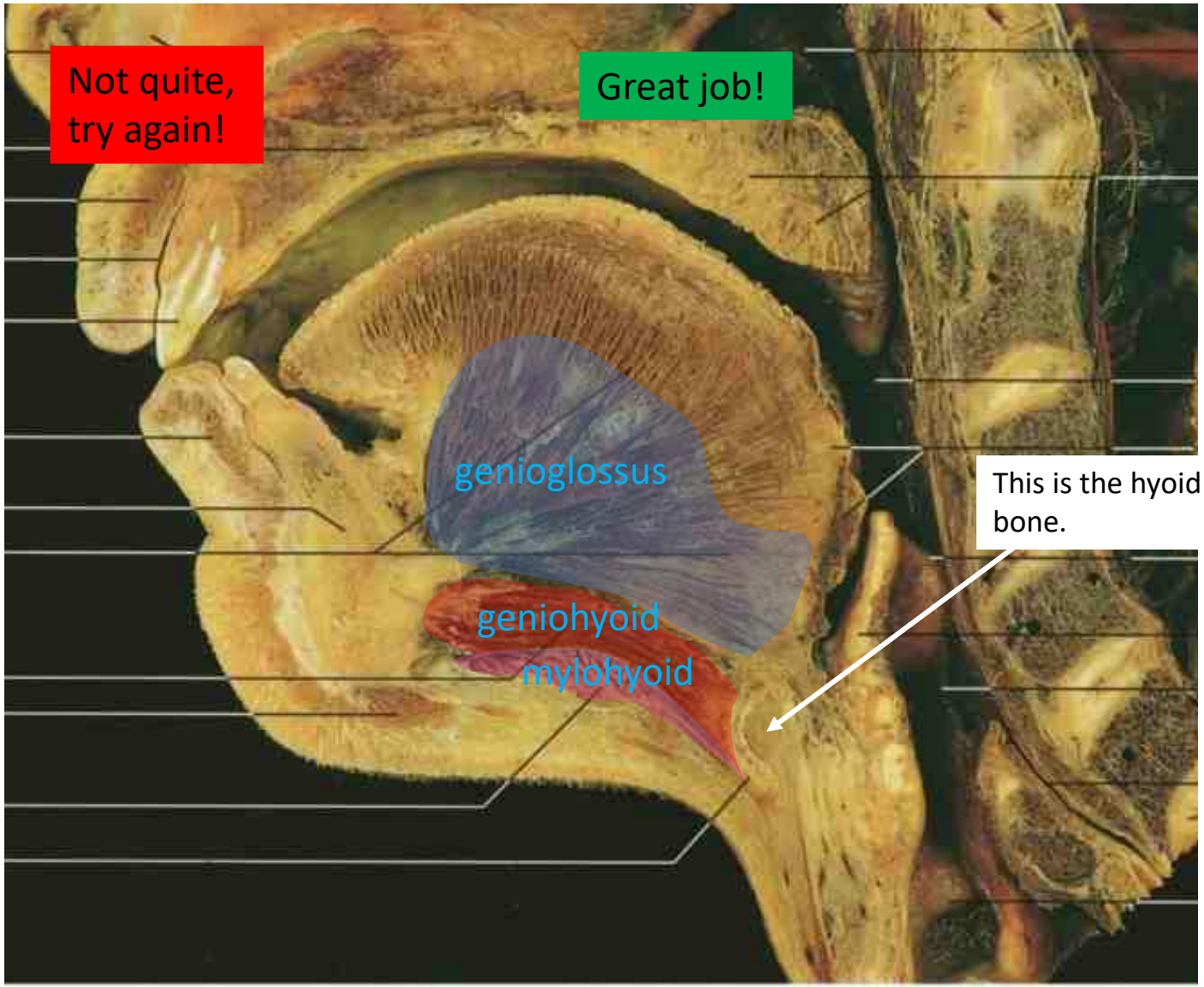
Wow! That was a lot of musculature! See if you can identify the following muscles. (Hint: look what two structures the muscle fibers are running between.)

CLICK on the genioglossus muscle.
Click again to hide.

CLICK on the geniohyoid muscle.

CLICK on the mylohyoid muscle.

Click here to show/hide
all 3 muscles



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Tongue Musculature

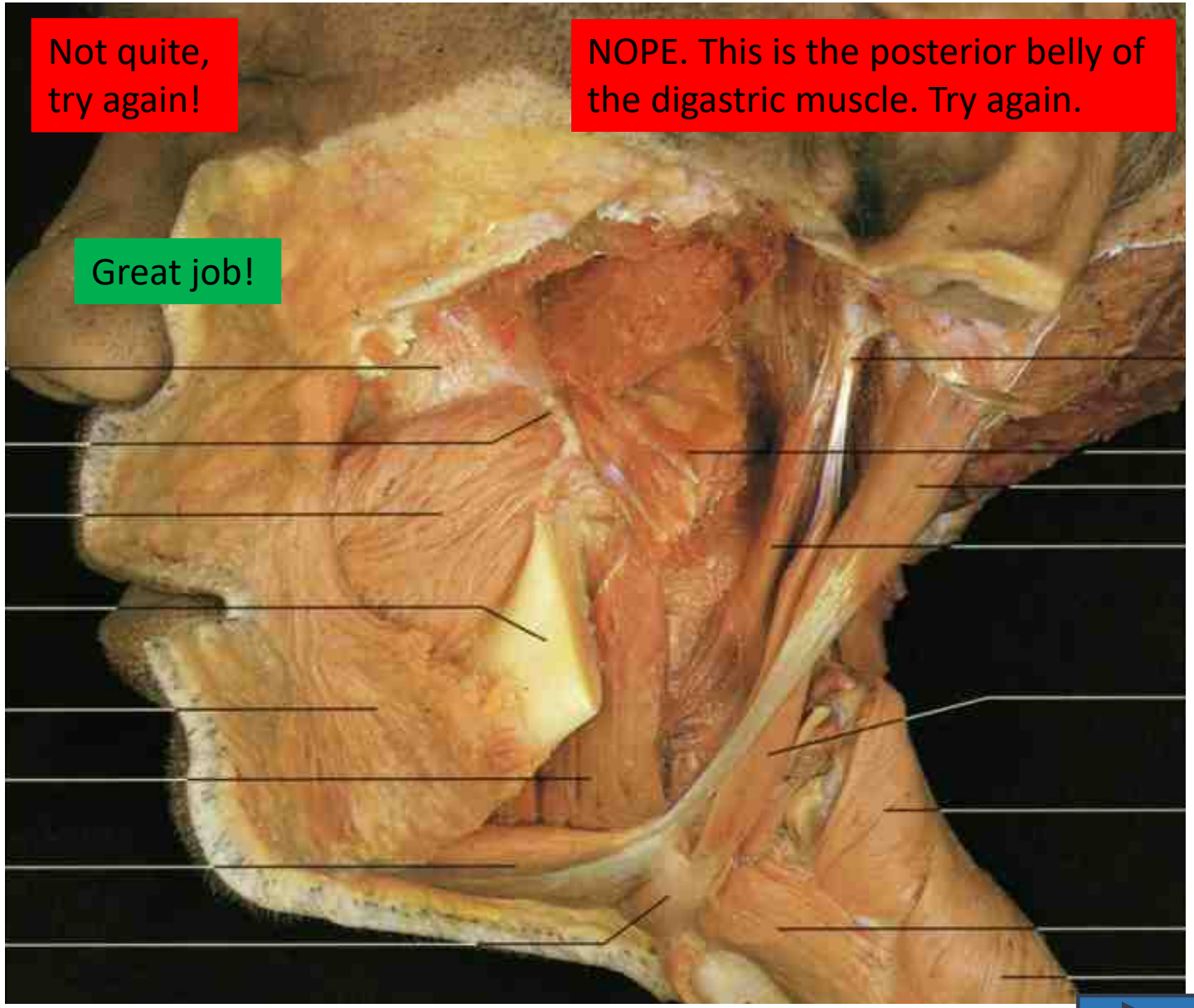
The genioglossus, styloglossus, and hyoglossus muscles are the EXTRINSIC muscles of the tongue. The next slide will highlight some of the intrinsic muscles of the tongue. But first, a quiz…

CLICK on the hyoglossus muscle.

CLICK on the styloglossus muscle.

CLICK on the stylohyoid muscle.

Great work! These are tough muscles to identify!



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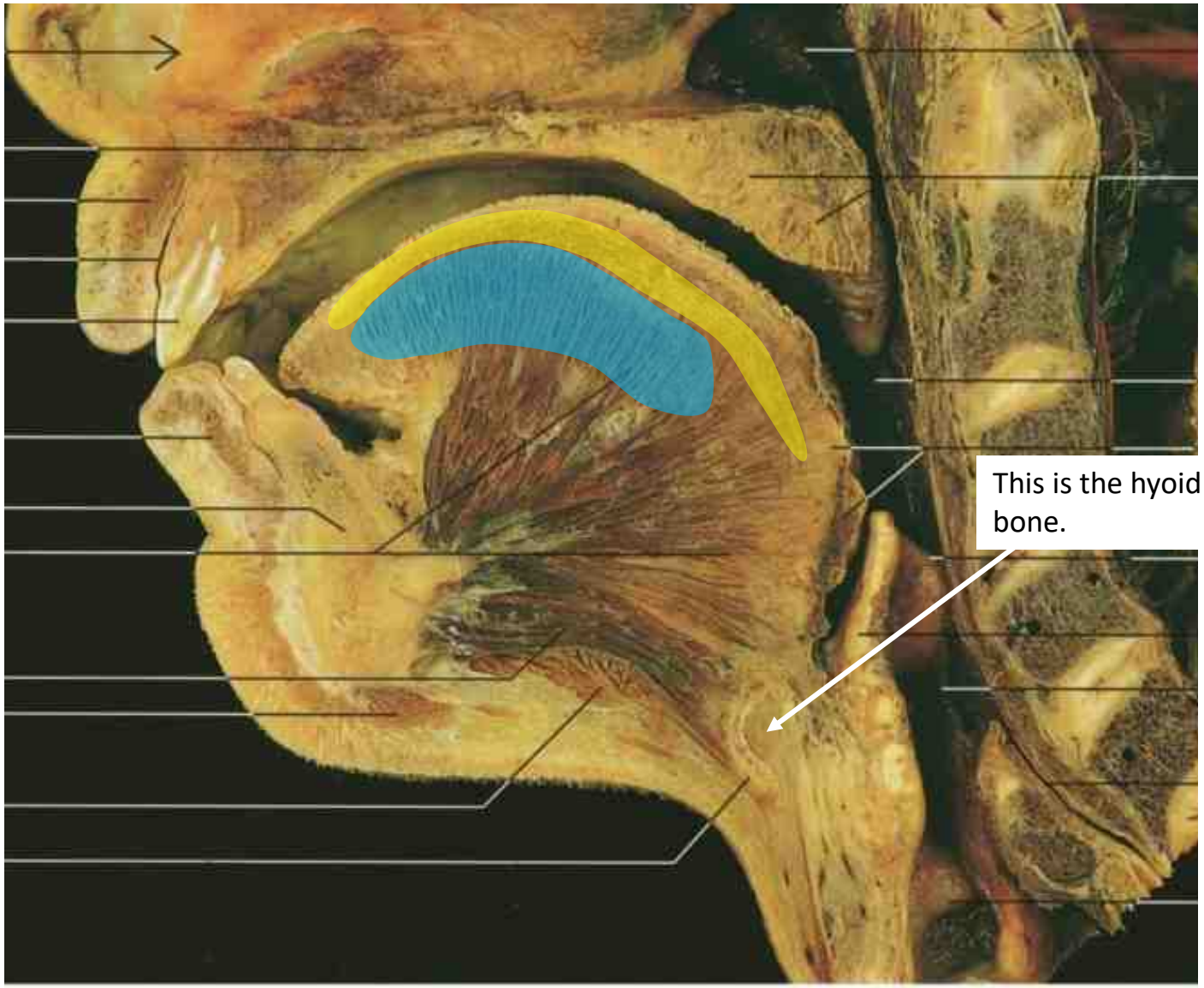
Tongue Musculature

The extrinsic muscles of the tongue control the tongue but *lie outside the tongue.* The intrinsic muscles control the tongue and are *present inside the tongue*. There are multiple intrinsic muscles, but you will be responsible only for two!

These two muscles can be seen on a sagittal section. Click on each to show/hide

Vertical muscle

Superior longitudinal muscle



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Tongue Innervation

The innervation of the tongue is split between the anterior 2/3 and the posterior 1/3.

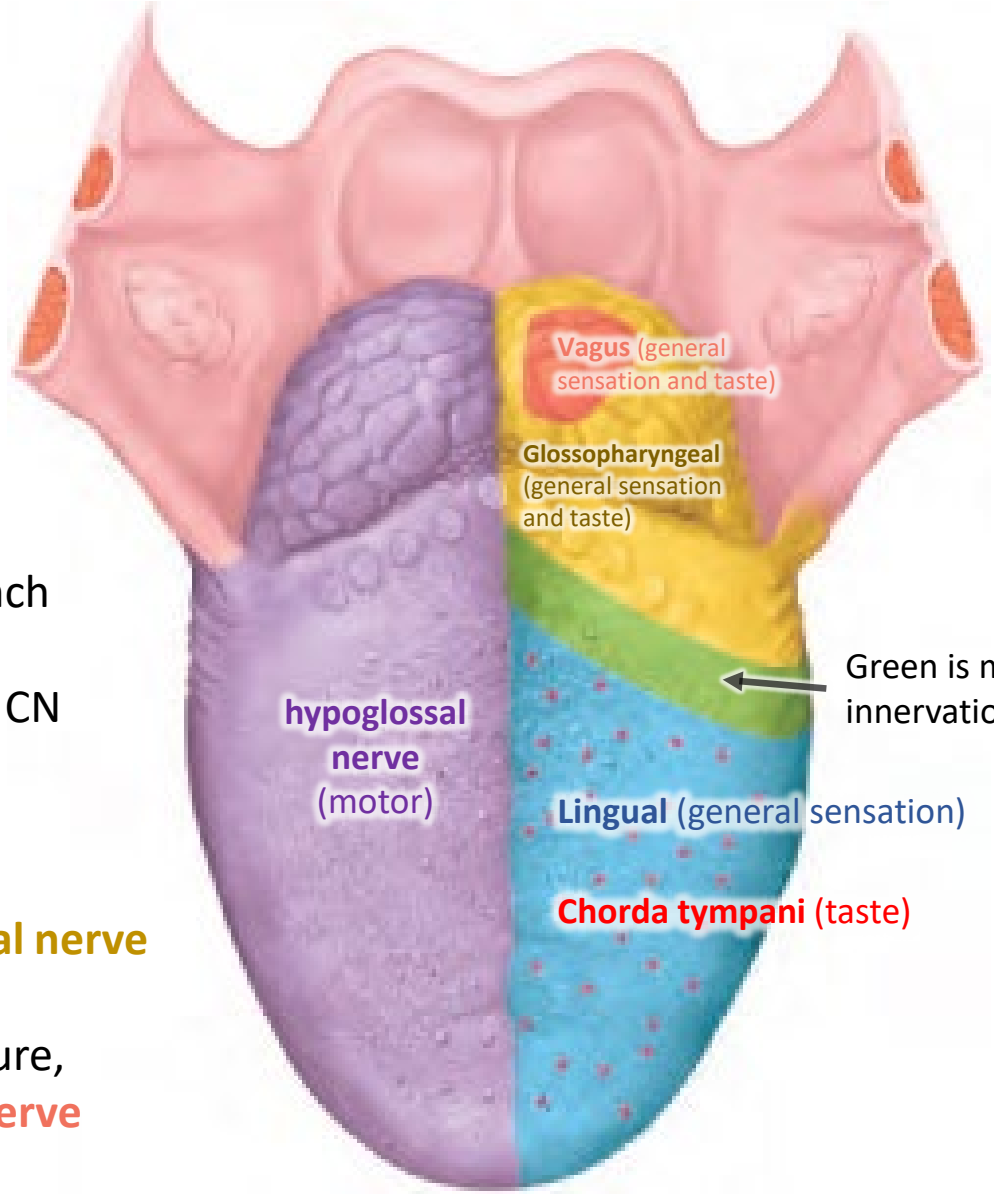
The motor of the whole tongue (with the exception of the palatoglossus muscle) is controlled by the **hypoglossal nerve.**

<u>Anterior 2/3 of the tongue</u>

- Touch, temperature, and pain is carried by the **lingual nerve** (a branch of the mandibular nerve aka CN V3)
- Taste is carried by the **chorda tympani** (a branch of facial nerve aka CN VII) (marked by the red dots anteriorly)

<u>Posterior 1/3 of the tongue</u>

- Touch, temperature, pain, AND taste controlled by **glossopharyngeal nerve** (CN IX)
- A small area on the posterior 1/3 is innervated for touch, temperature, pain, and taste by the internal laryngeal nerve (a **branch of vagus nerve** aka CN X)



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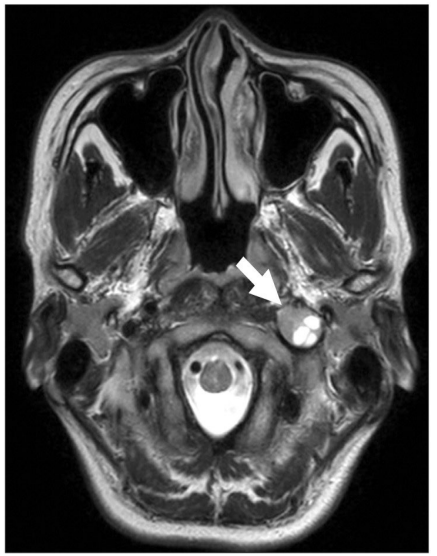
Clinical Correlate - check your knowledge!

- A 61 year-old male presents to his primary care physician with a complaint of difficulty eating and swallowing. When asked to "stick his tongue out", the tongue deviates to the left. A follow-up MRI scan reveals a neck mass. Assuming the neck mass is the cause of the symptoms and the deviation, (a) which nerve is affected, and (b) which side of the neck is the mass on?

Click here to reveal answer



https://synapse.koreamed.org/articles/1156613



https://www.e-arm.org/journal/view.php?number=790

A. The hypoglossal nerve controls muscles that move the tongue (palatoglossus is the exception). A lesion of the hypoglossal nerve will result in atrophy of the muscles on the side of the nerve lesion.

B. The right and left genioglossus muscles normally work in tandem to pull the tongue forward (the muscle pulls the tongue towards the genial spine of the mandible). When the muscle works unilaterally (e.g. only the right side is functional) it pushes the tongue forward and slightly medial; if medial movement is not opposed by the contralateral muscle (left muscle), the tongue will deviate towards the side with the lesion (left side). The neck mass was therefore found on the patient's left side.

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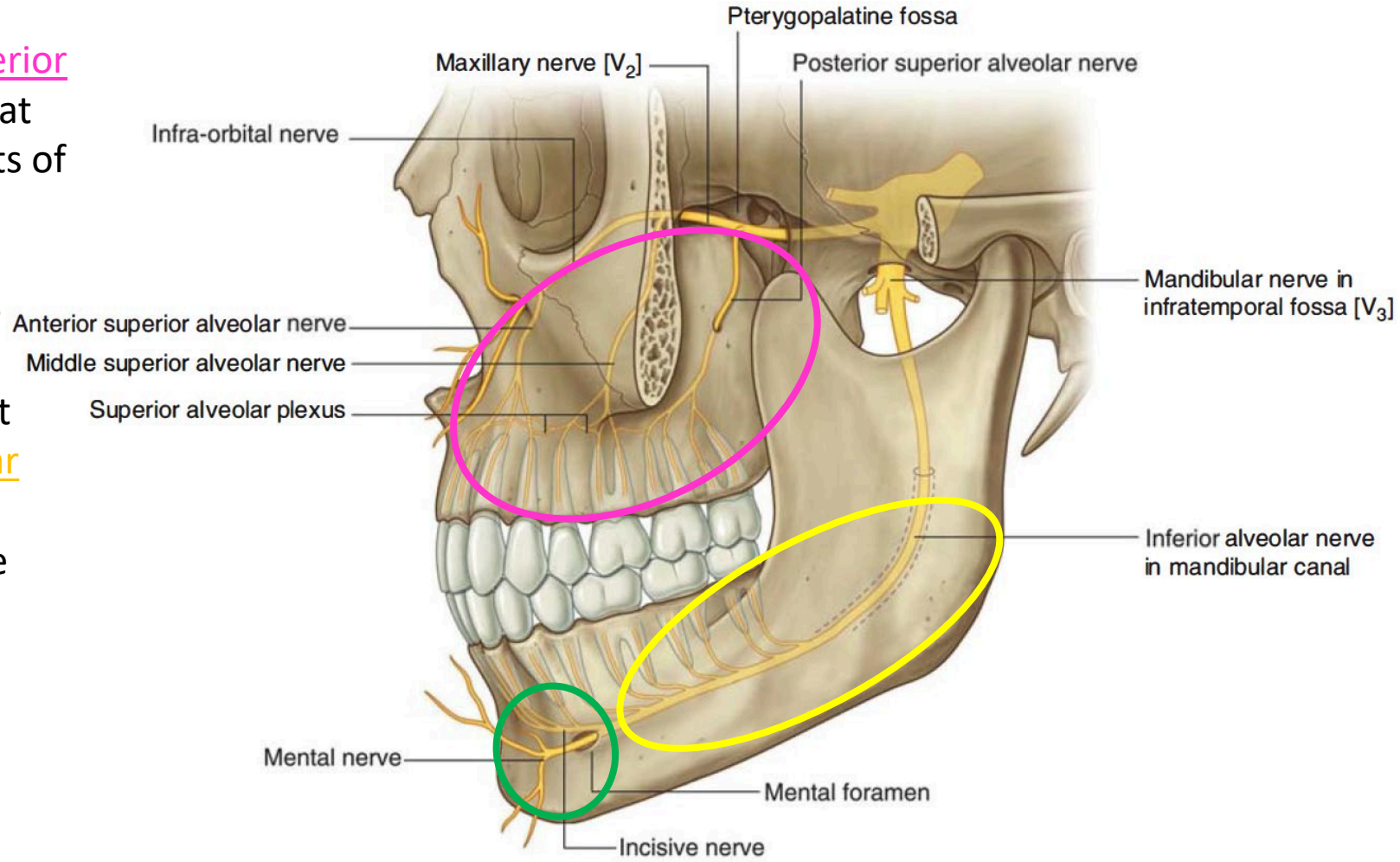
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Further Innervation of the oral cavity

Maxillary nerve (CN V2) gives off multiple superior alveolar nerves in the pterygopalatine fossa that enter the maxilla bones and innervate the roots of the superior teeth.

The mandibular nerve (CN V3) descends in the infratemporal fossa on its way to the mandibular foramen. It enters the mandible at the mandibular foramen as the inferior alveolar nerve and innervates the roots of the inferior teeth before exiting the mental foramen as the mental nerve. BUT….



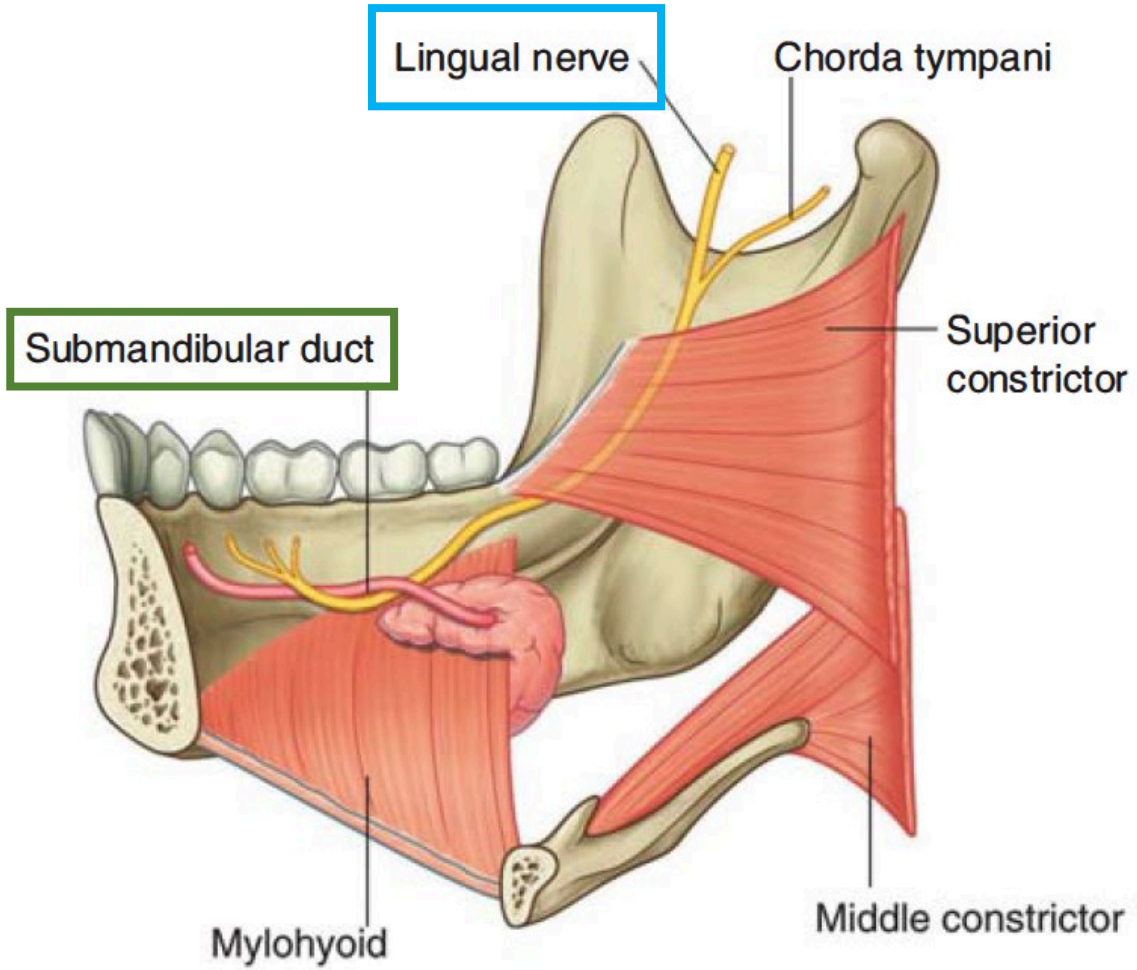
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Further Innervation of the oral cavity

Maxillary nerve (CN V2) gives off multiple superior alveolar nerves in the pterygopalatine fossa that enter the maxilla bones and innervate the roots of the superior teeth.

The mandibular nerve (CN V3) descends in the infratemporal fossa on its way to the mandibular foramen. It enters the mandible at the mandibular foramen as the inferior alveolar nerve and innervates the roots of the inferior teeth before exiting the mental foramen as the mental nerve. BUT….

BEFORE the inferior alveolar nerve enters the mandible, it gives off the **lingual nerve** (which contains CN VII fibers from chorda tympani) which passes inferior to the **submandibular duct** on its way to innervate the tongue (this is a good relationship to know for lab). Note: the lingual nerve often branches directly from V3 near the foramen ovale.



Let's look at one more good relationship to know for identifications in lab!

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Hyoglossus Relationships

Recall that the **hyoglossus muscle** runs between the hyoid bone and the tongue. The left hyoglossus (and right mandible) are shown in this cartoon image.

On its way to the tongue from the external carotid artery, the **lingual artery** will travel **deep** to the hyoglossus muscle.

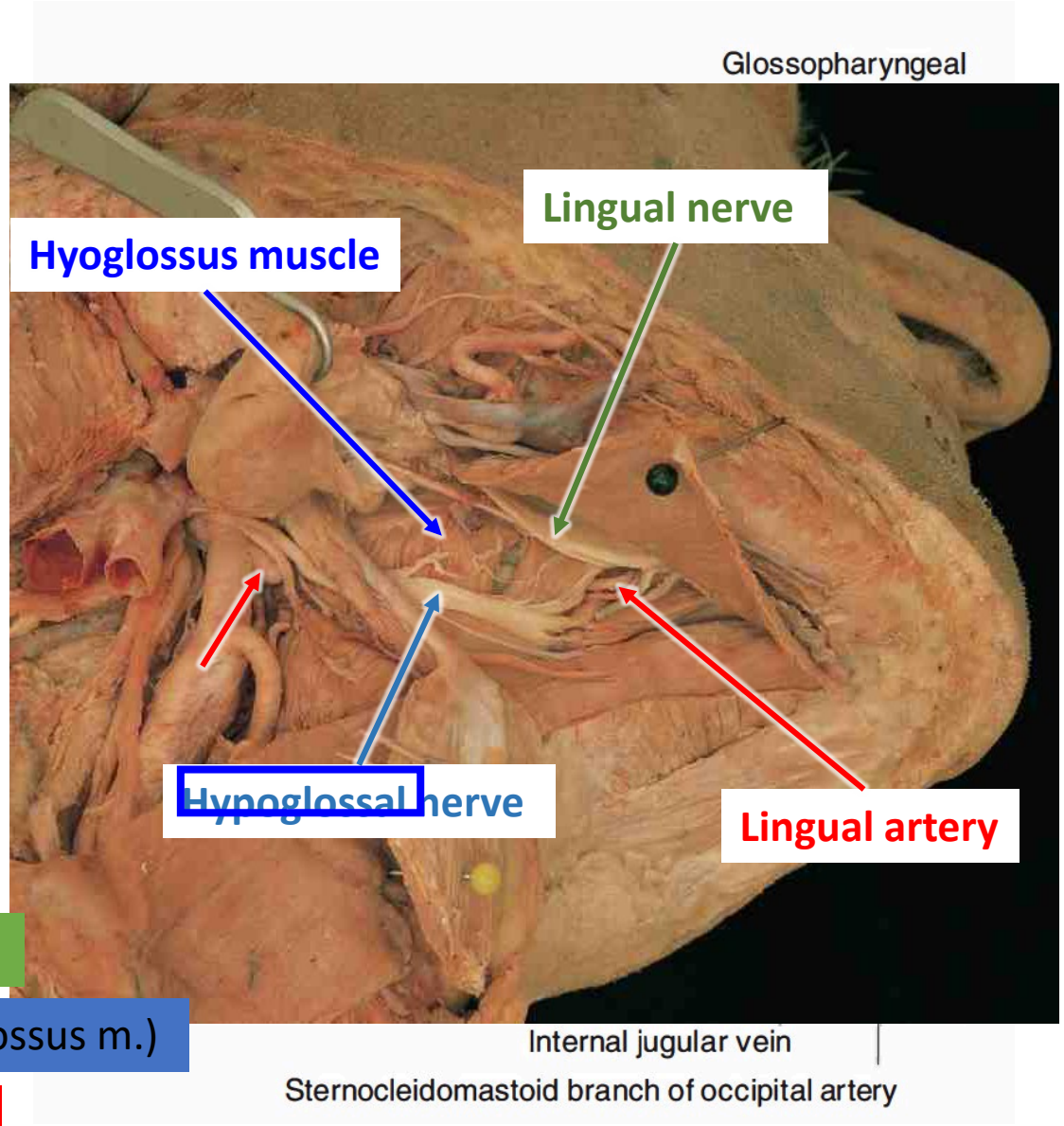
This is in contrast to the **lingual nerve** and **hypoglossal nerve**. Both of these will travel **superficial** to the hyoglossus muscle (lingual nerve from the pterygopalatine fossa and hypoglossal nerve from the neck). The hypoglossal nerve will be seen inferior to the lingual nerve.

CLICK HERE to reveal the hyoglossus muscle

CLICK HERE to reveal lingual nerve (superficial to hyoglossus m.)

CLICK HERE to reveal the hypoglossal nerve (superficial to hyoglossus m.)

CLICK HERE to reveal the lingual artery (deep to hyoglossus m.)

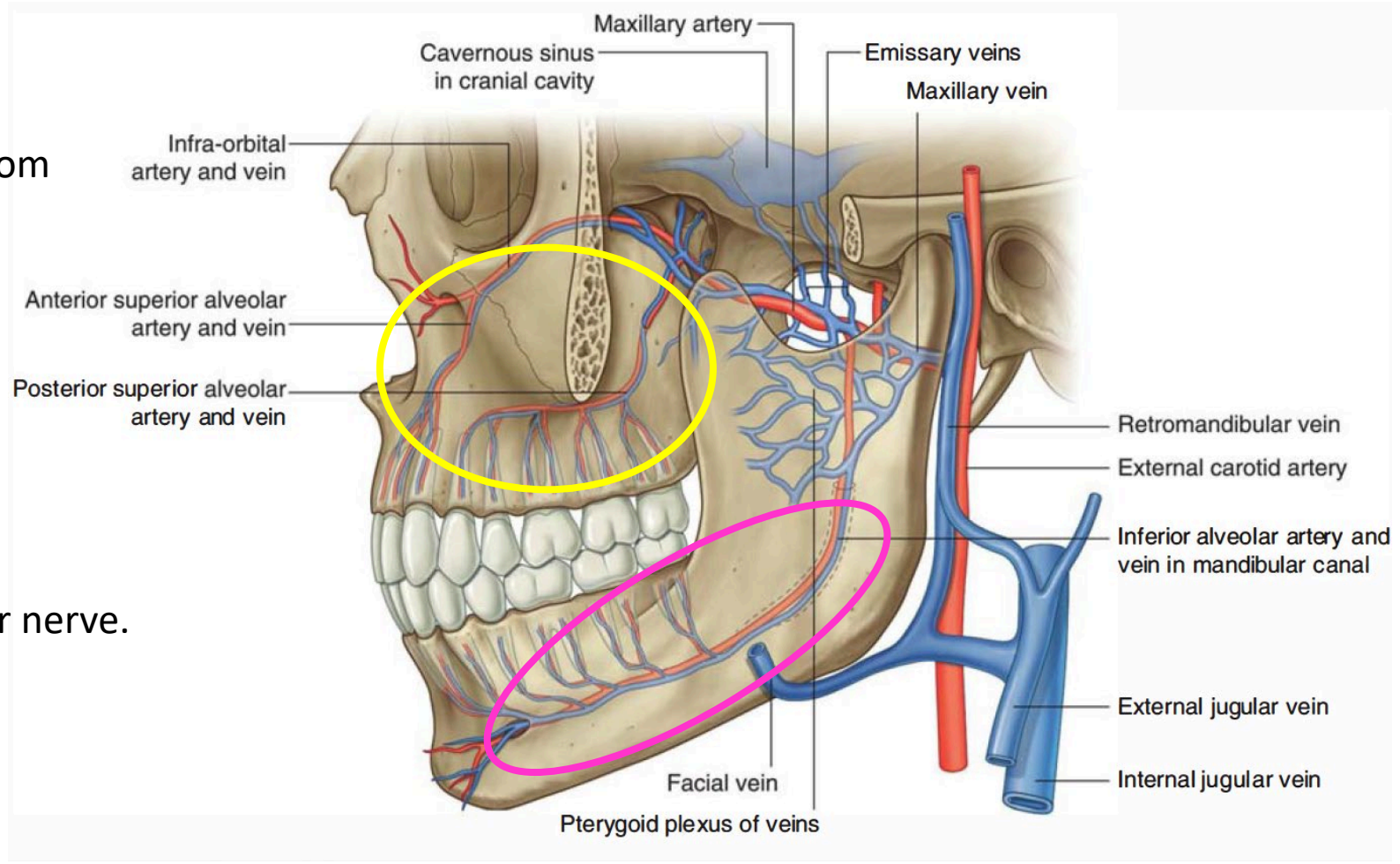


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Teeth Blood Supply

The superior teeth are supplied with blood from the anterior and posterior superior alveolar arteries (branches of the maxillary artery).

The inferior teeth are supplied by the inferior alveolar artery, which travels through the mandibular foramen with the inferior alveolar nerve.



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Salivary Glands

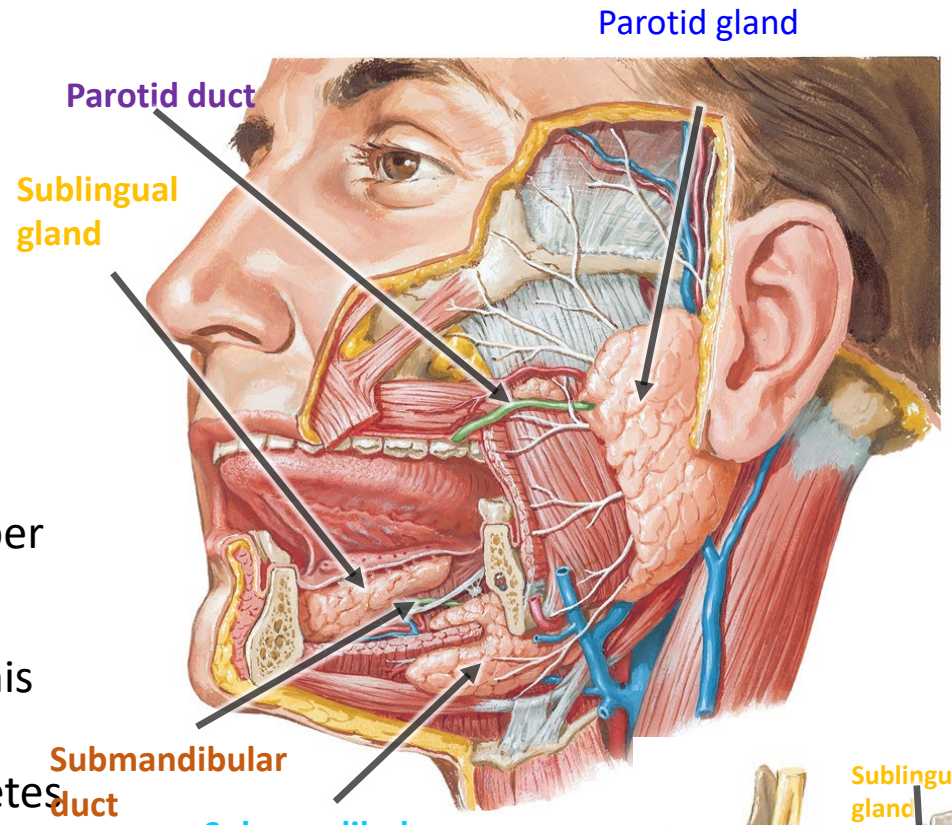
There are three large bilateral salivary glands that secrete saliva into the oral cavity.

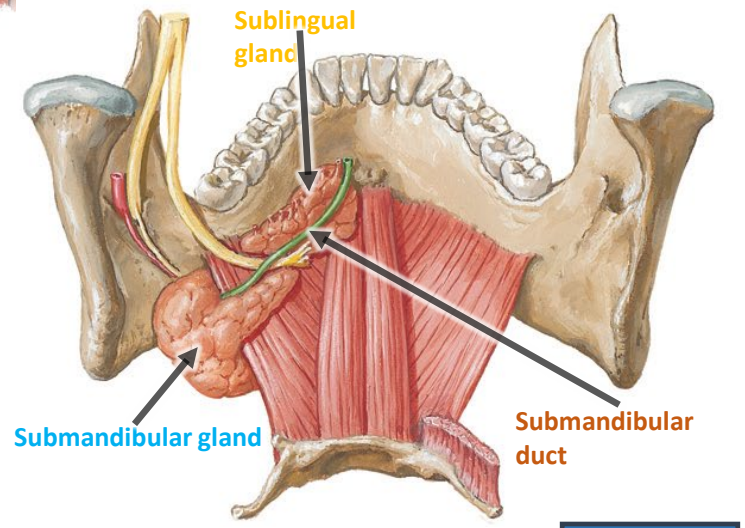
The largest of these glands is the **parotid gland**, found superficial to the masseter muscle. It secretes saliva into the oral cavity via the **parotid duct**, which pierces the buccinator muscle and opens adjacent to the second upper molar. Try to find this opening on yourself in a mirror!

The second largest gland is the **submandibular gland**. This gland has both a deep and superficial part, according to where it sits in relation to the mylohyoid muscle. It secretes saliva through the **submandibular duct** (aka Wharton's duct), which opens inferior to the tongue near the base of the frenulum. You can find this on yourself as well!

The third gland is the **sublingual gland**, found directly inferior to the tongue. It secretes saliva through many different smaller ducts.

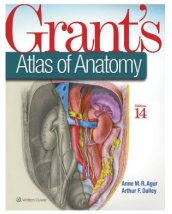
CLICK HERE to see another view of the submandibular and sublingual glands! Click again to hide.

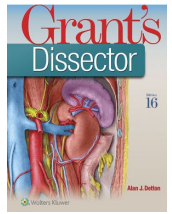


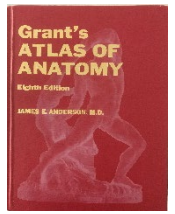


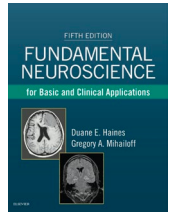
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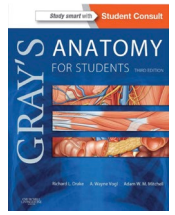
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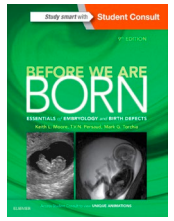


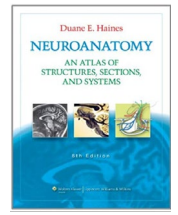




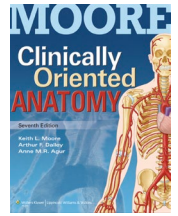


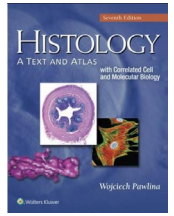


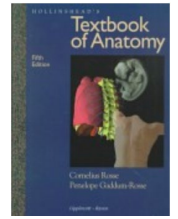




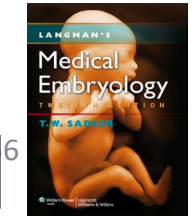












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