Nasal and Oral Cavities

SCRUBS

STUDENT COLLABORATIVE RESOURCES FOR UNDERSTANDING AND BRODY SUCCESS

Bryce Pugh, BSOM 2027

Resources used
Coursepack Illustration Supplement - BSOM

Mission Statement

SCRUBS is a student-driven initiative that aims to develop supplemental resources for current and future cohorts that will pass through Brody. Members of **SCRUBS** participate in a variety of sub-committees working to create resources for students, by students. These resources aim to offer unique perspectives from students that have walked in the same shoes, developing resources that we wish we had been exposed to during our time in the course.

The hope is this organization will become a staple of the Brody student body, exemplifying the unique collaborative community that Brody offers. If this is a mission that aligns with your goals and you have the desire to help those that will come behind you, as well as a goal to leave your mark on Brody as a whole, we invite you to join the team!

Disclaimer

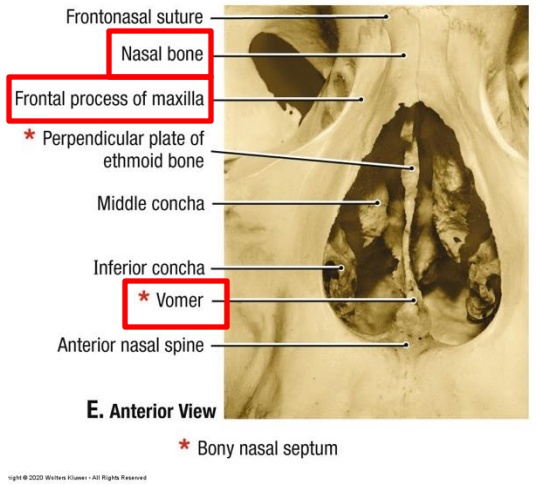
The resources that are included in this document are made by students and not the faculty. As such, there is the possibility for errors in our development, although this is mitigated via a team approach to development with multiple stages of vetting. If there is a contradiction with the coursework presented within your course, please go by the course documents. Additionally, **SCRUBS** aims to supply ***supplemental resources***, however these are in no way replacements to the instruction of the Brody faculty. Use these resources as a supplement, but not as your primary source for course material.

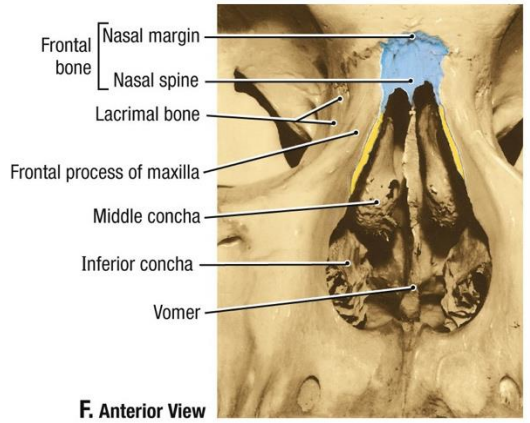
Nasal Cavity

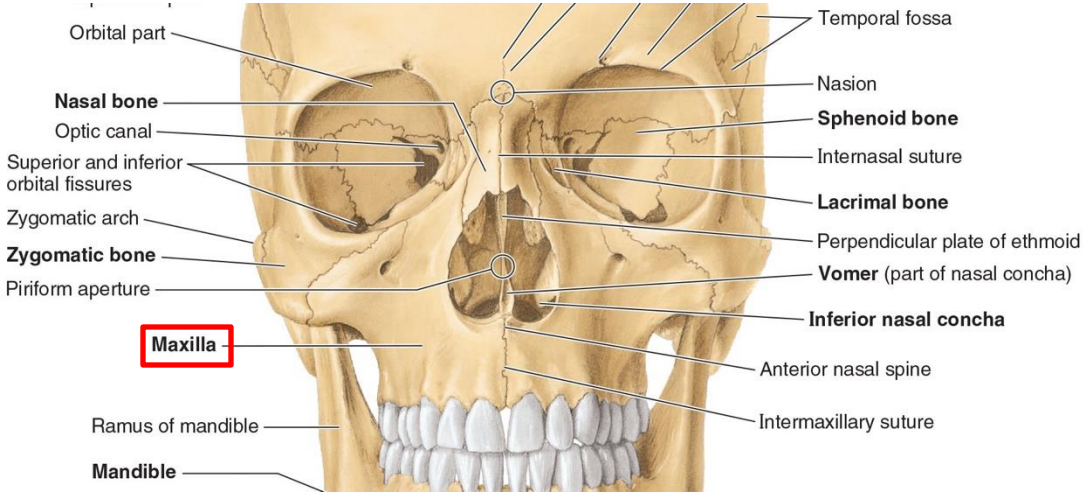
Osteology

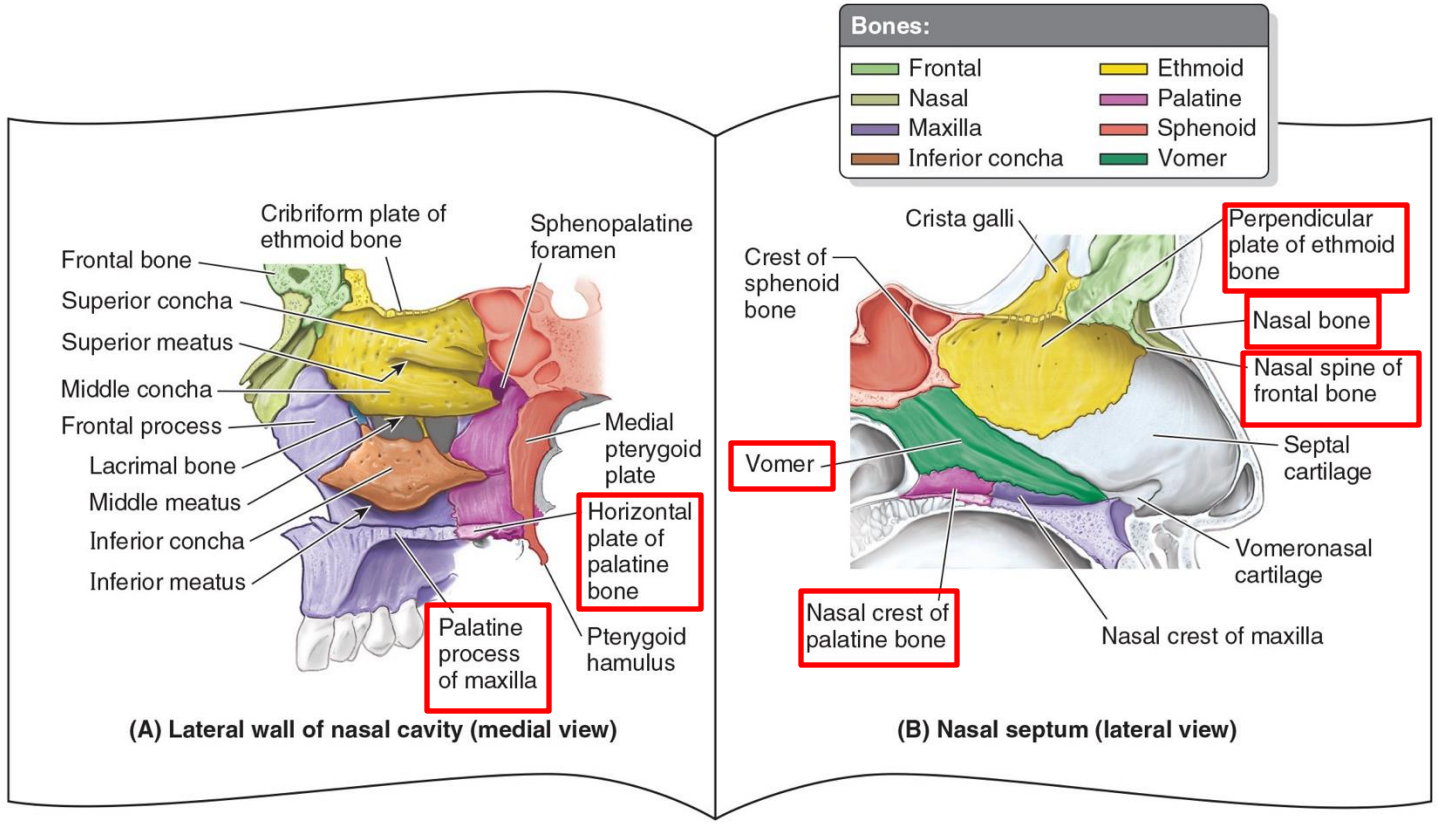
Important structures to know

- Maxilla
- Perpendicular plate of the ethmoid
- Vomer
- Nasal bone
- Nasal part of the frontal bones (form the dorsum of the nose)
- Frontal processes of maxillae
- Palatine bone
- Palatine process of maxilla



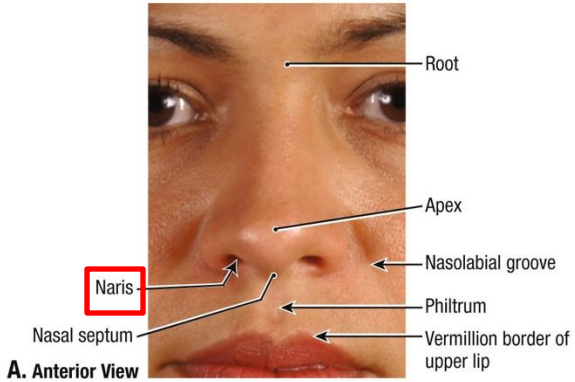


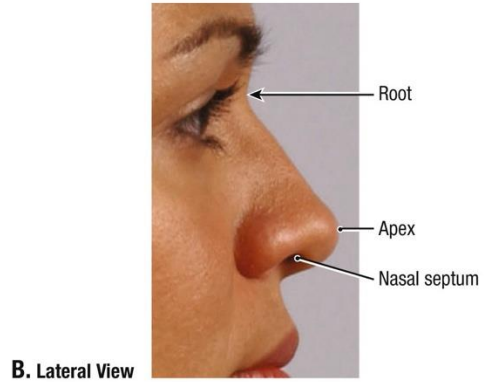


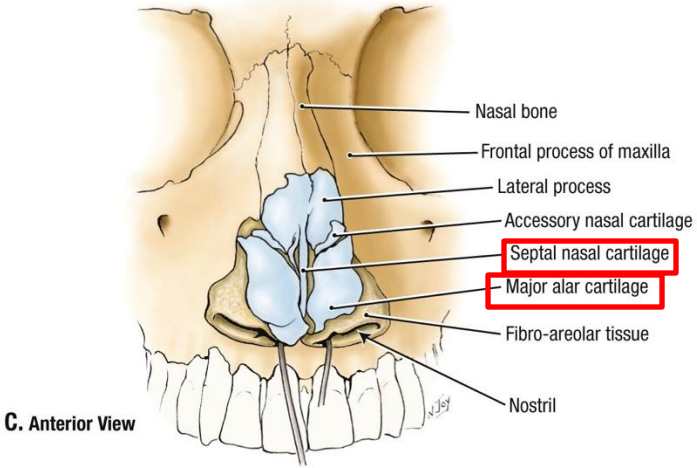


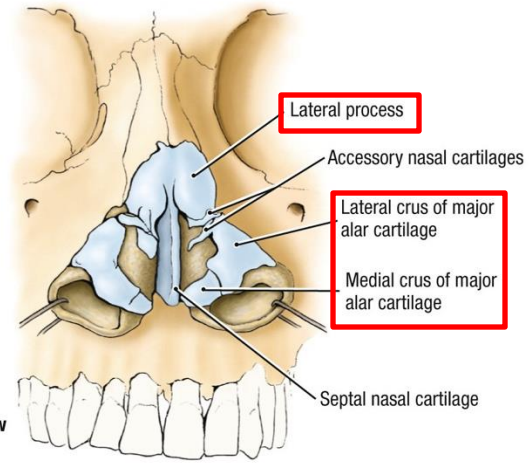
The Nose - Overview

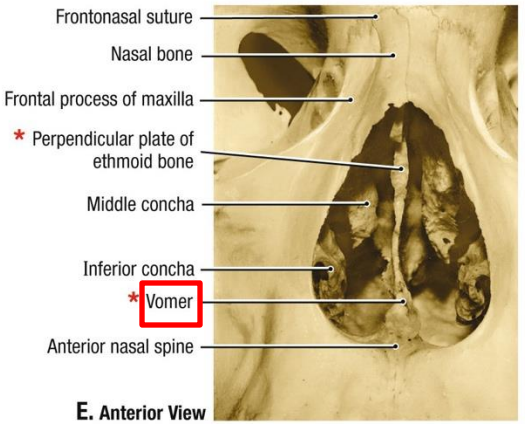
- Anterior facial portion of nasal cavities
- Naris (nostril): openings of nose
- **Cartilage structures:**
  - Median septal cartilage – separates the nares.
    - Articulates anteriorly with the maxillae
    - Articulates posteriorly with the vomer & perpendicular plate of the ethmoid
    - Articulates laterally with alar cartilage & lateral nasal cartilage
  - Alar cartilage – U-shaped, define nostril shape
  - Lateral nasal cartilage – provide mobility to distal nose

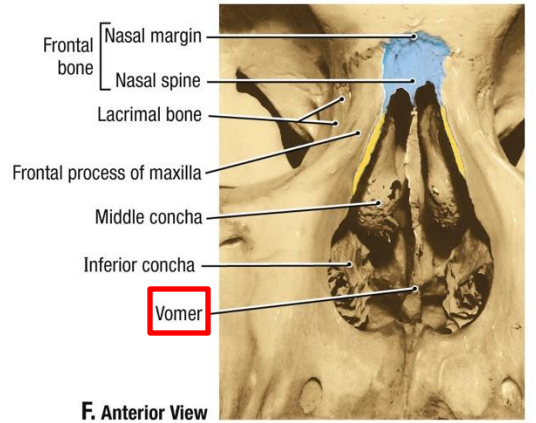






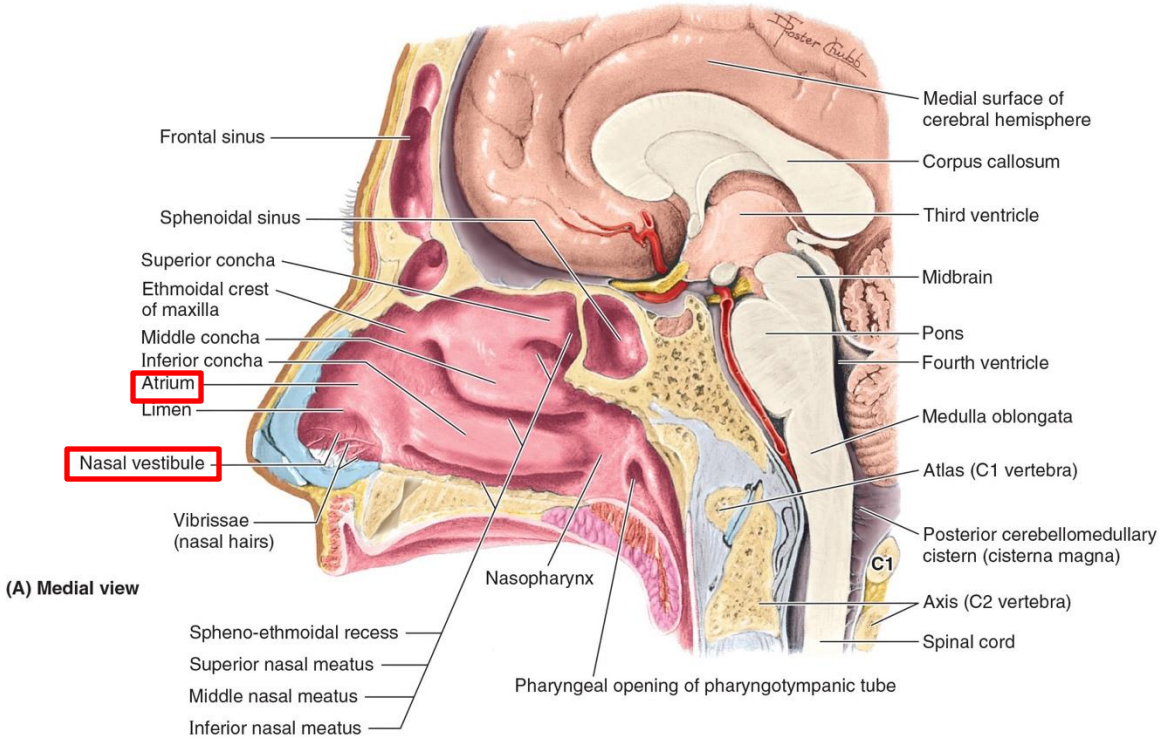


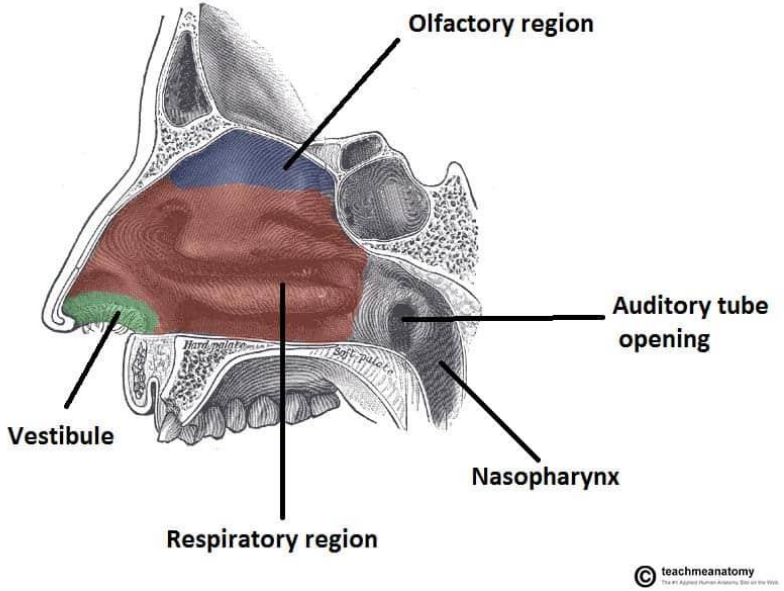




Nasal Cavity

- Composed of **<u>3 triangular cavities</u>**
  - Vestibule: lined w skin & hair
  - Atrium: respiratory nasal mucosa
  - Cranial posterior portion
- Separately classified into 2 functional regions
  - Olfactory area – superior 1/3
  - Respiratory area – inferior 2/3 (including atrium)

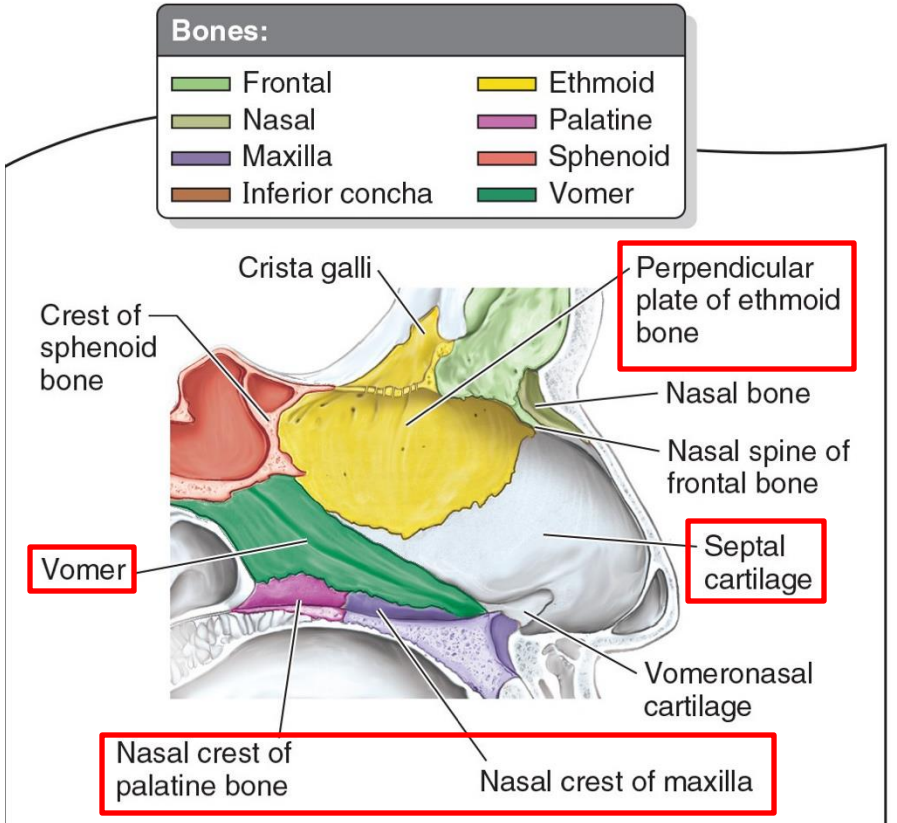


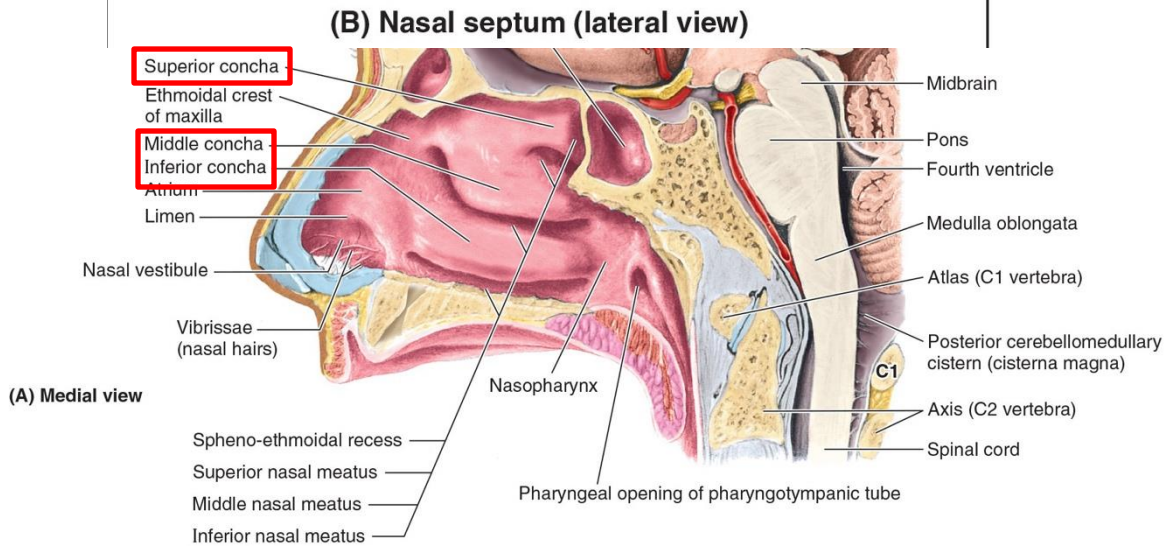


Jones O. The Nasal Cavity. Teachmeanatomy.info. https://teachmeanatomy.info/head/organs/the-nose/nasal-cavity/

Nasal Cavity

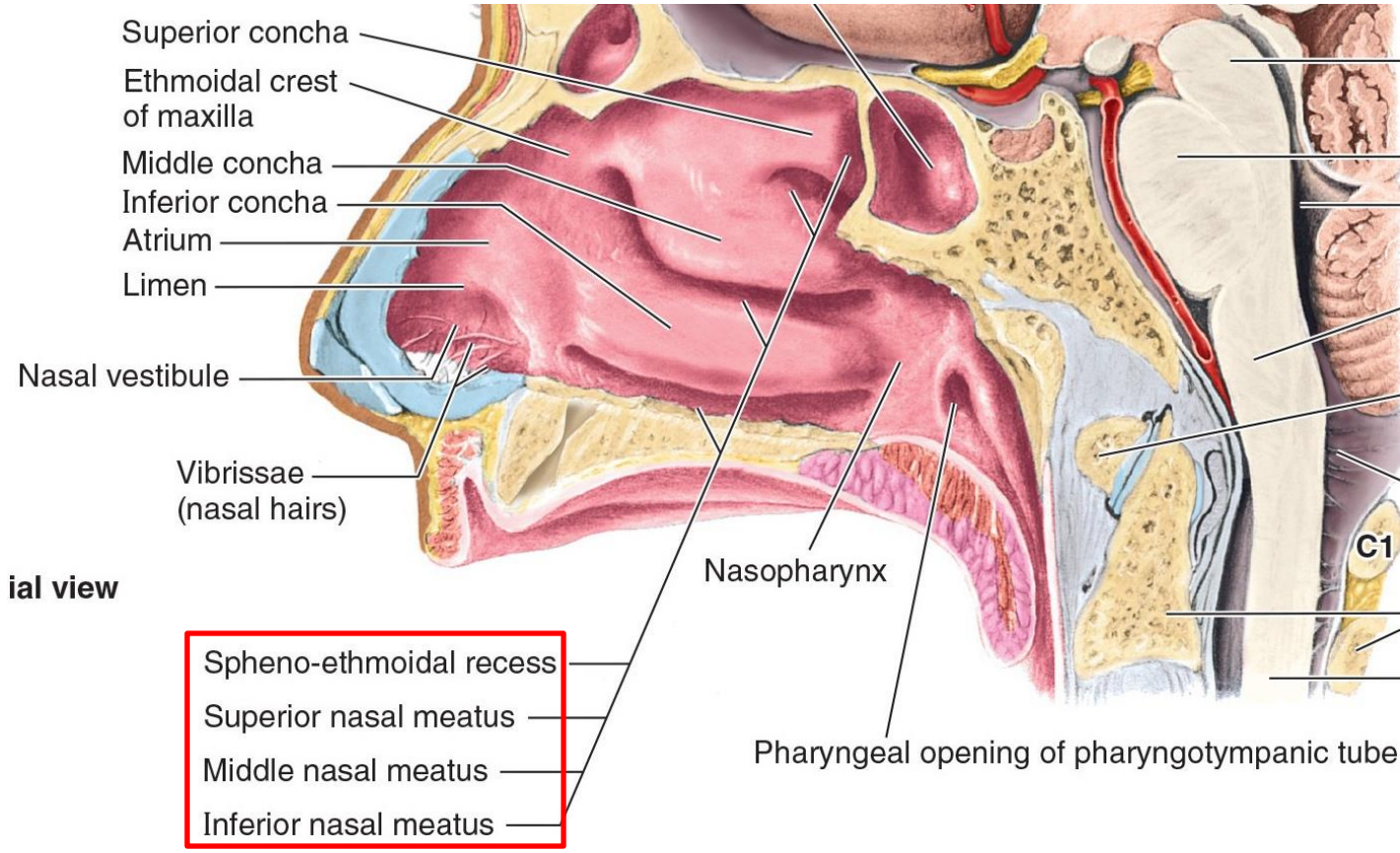
- Boundaries of nasal cavity:
  - **Floor**: Palatine & maxilla bones
  - **Medial wall**: Septal cartilage, vomer, perp. plate of ethmoid
  - **Lateral wall**: conchae





Conchae

- Shelf-like processes
  - Increase surface area & cause turbulence of air – allows warming & humidification of air
- 3 conchae: Superior, middle, inferior
- **Ethmoid bone** forms the superior & middle
- **Inferior concha bone** forms the inferior
- A passageway runs inferolateral to each concha – superior/middle/inferior meatus
- Sphenoethmoidal recess: small space superoposterior to to sup. concha

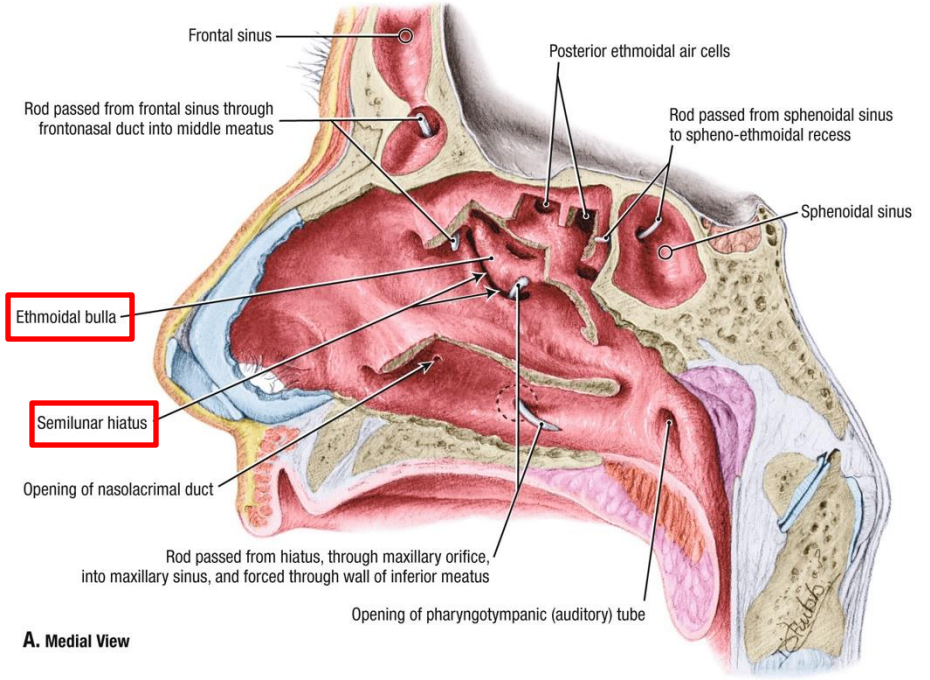


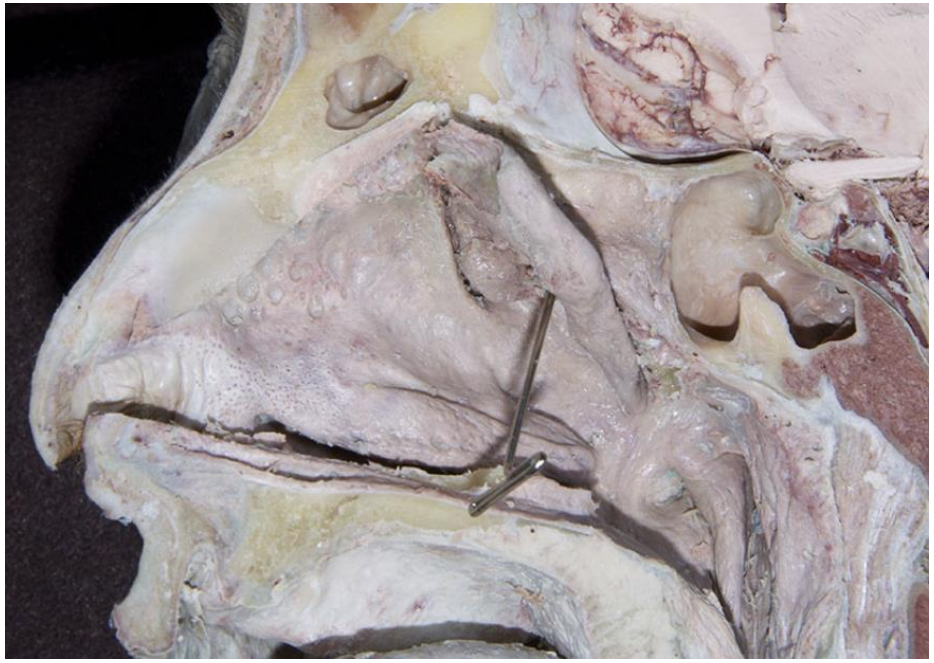
Nasal Cavity

- Hiatus semilunaris: depression in lateral wall of middle meatus
- Ethmoid bulla: mound produced by middle ethmoid sinuses
- Paranasal sinuses connect to nasal cavity by openings to the superior meatus, middle meatus, & sphenoethmoidal recess
  - Equilibration of atm. pressure & drainage of mucosal secretions

Connections to paranasal sinuses

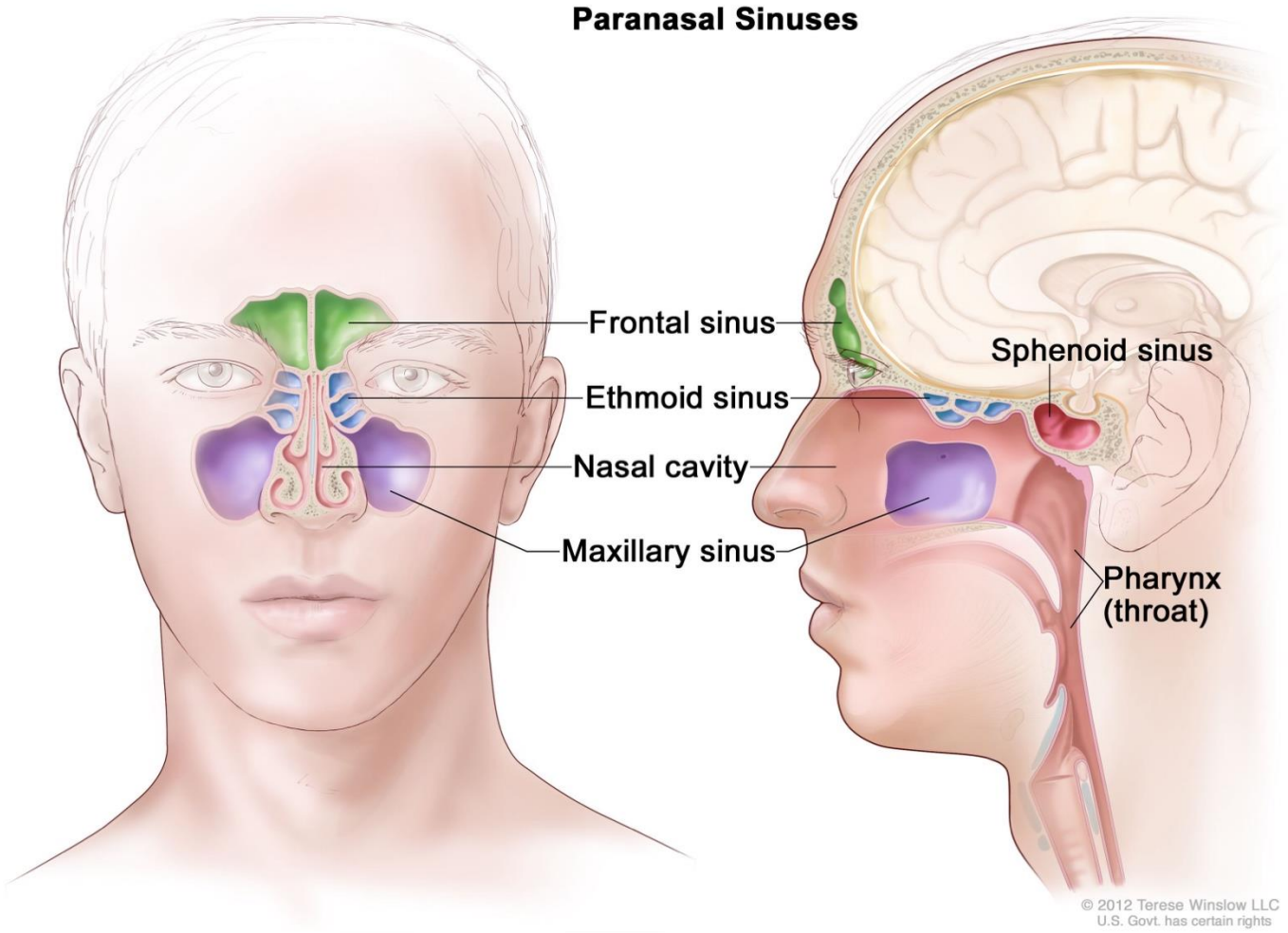
- Sphenoethmoidal recess -> sphenoid sinus
- Sup. meatus -> posterior ethmoid sinus
- Middle meatus -> frontal/anterior/middle ethmoid sinuses, and maxillary sinuses





Paranasal Sinuses

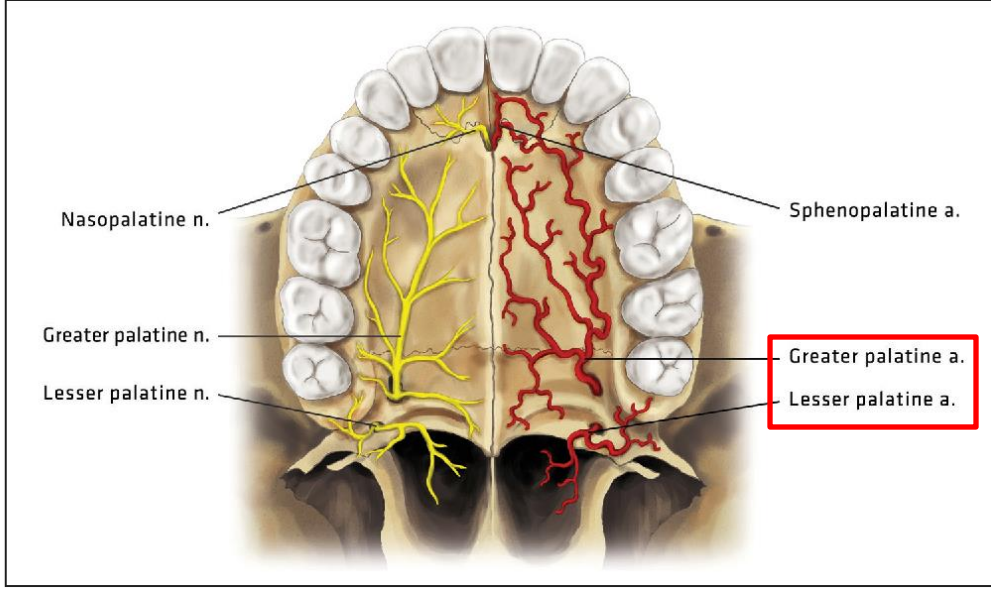
- Mucosa-lined, air-filled spaces of nasal cavity into ethmoid, sphenoid, & maxillary bones
- Frontal sinus:
  - Can be 1 or more on each side
  - Drain into middle meatus via frontonasal ducts
- Ethmoid sinus:
  - b/w nasal cavity & orbit
  - Multiple air cells divided into anterior, middle, & posterior
- Sphenoid sinus:
  - Left & right within sphenoid bone
  - Lateral & superior walls have important relationship to pituitary gland, optic nerve & tract, & cavernous sinus
- Maxillary sinus:
  - Largest paranasal sinus
  - Roof forms the floor of the orbit

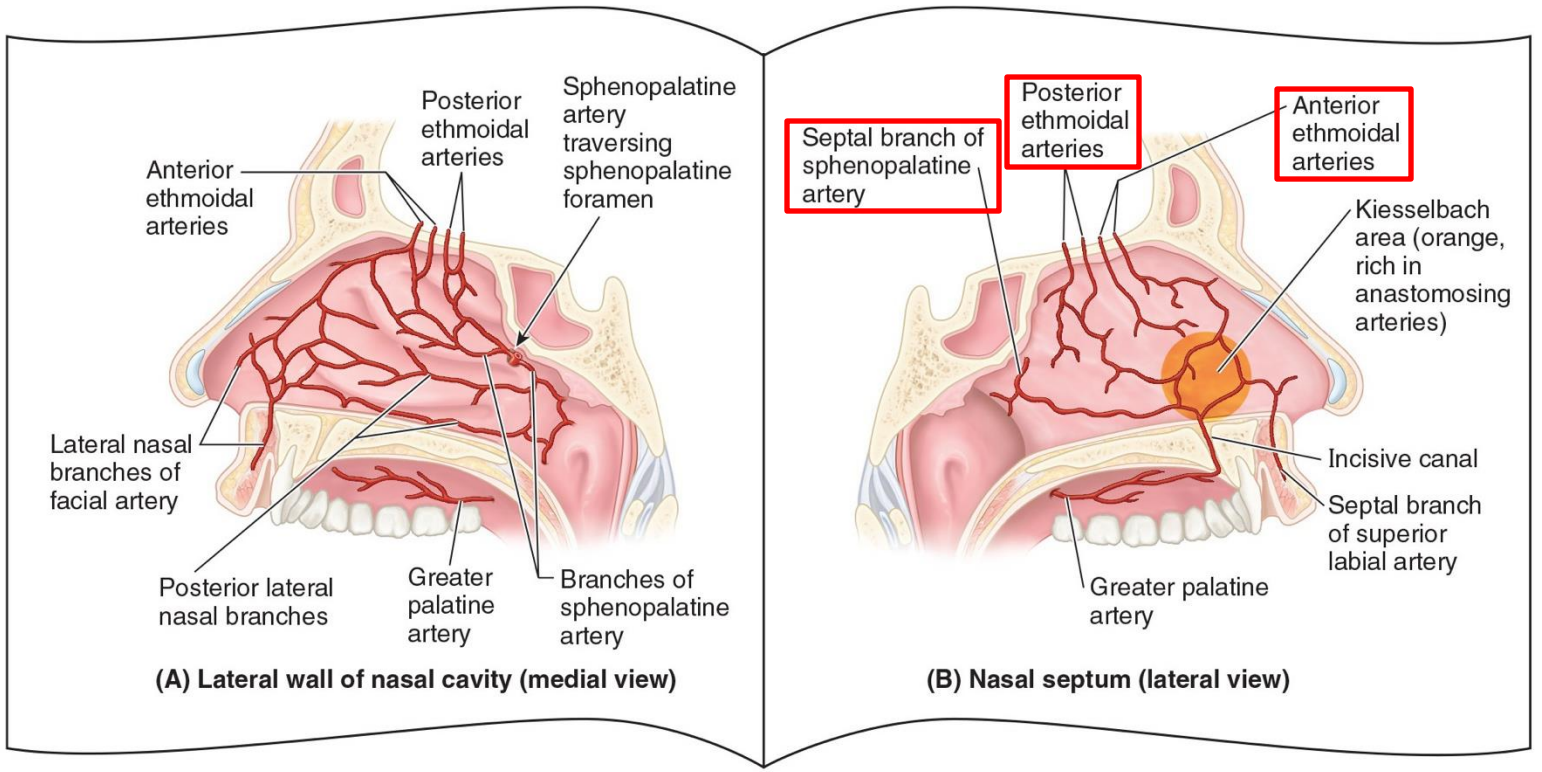


Paranasal Sinus and Nasal Cavity. National Cancer Institute. 2019. https://www.cancer.gov/types/head-and-neck/patient/adult/paranasal-sinus-treatment-pdq

Vasculature of Nasal Cavities

- **Posterior ethmoidal** arteries supply posterior nasal cavity
- Anterior region supplied primarily by the nasal branches of the **anterior ethmoidal** arteries
  - Internal carotid -> ophthalmic arteries -> anterior ethmoidal -> nasal branches
  - Contributions from the facial & greater palatine arteries
    - External carotid -> maxillary -> descending palatine (splits into greater (hard palate) & lesser (soft palate) palatine)
- Greater palatine arteries enter the nasal cavity via the incisive foramen & anastomose w branches of the sphenopalatine a.
- Sphenopalatine arteries
  - CNV3 -> sphenopalatine (sphenopalatine fossa to nasal cavity)
  - Supply posterior regions of lateral walls of nasal septum

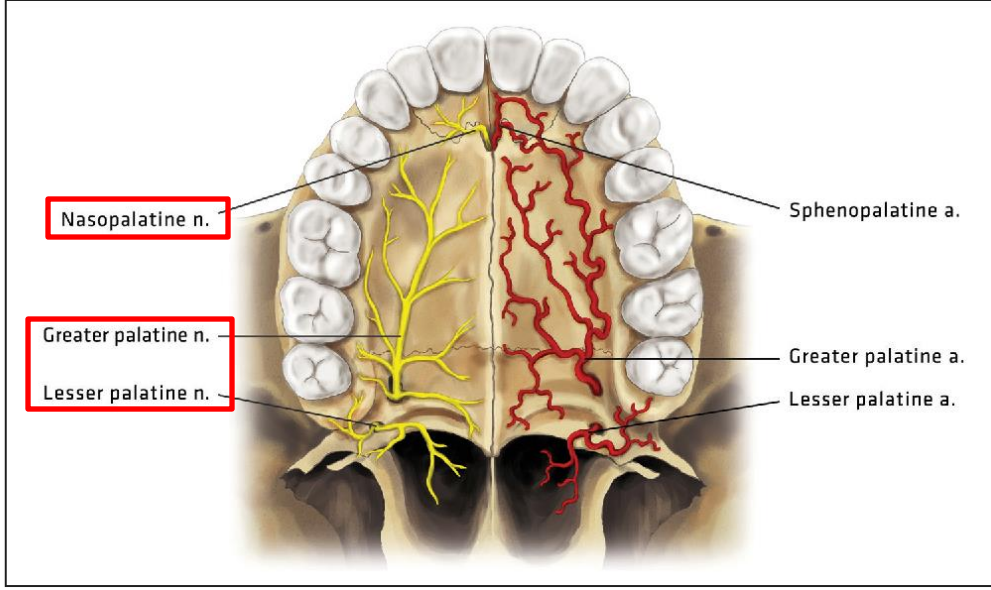


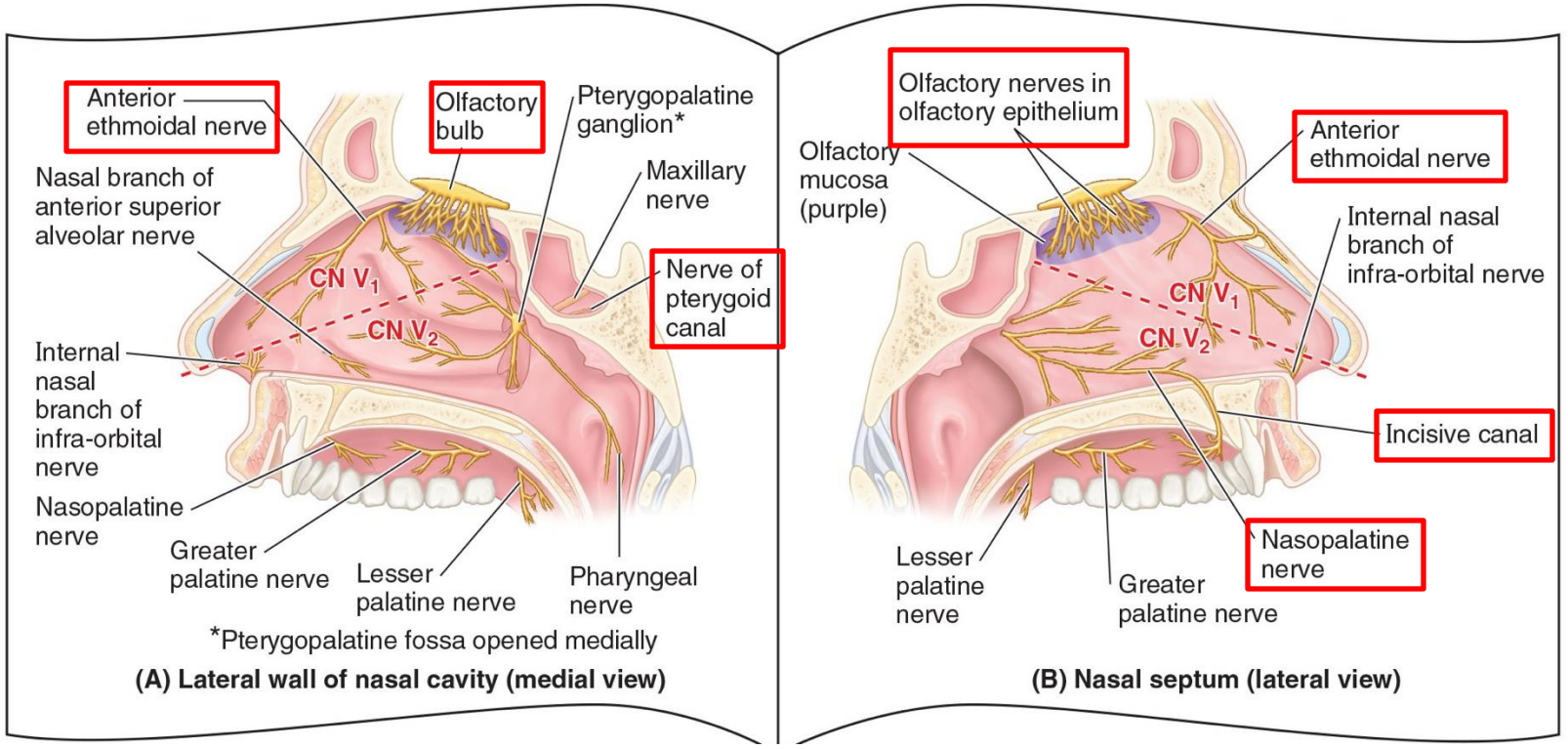


Open-book view

Innervation of Nasal Cavities

- Olfactory area supplied by the olfactory nerve (CNI) (Smell)
- Respiratory area (GSA)
  - V1: anterior ethmoidal nerves - septum & anterior region of lateral wall
  - V2:
    - nasopalatine nerves - mostly septum; travel w sphenopalatine a. before entering oral cavity via the incisive foramen
    - Posterior superior lateral nasal nerves & branches of the greater palatine nerves supply posterior region of lateral walls
- Nerve of the pterygoid canal (CNVII) will give symp. & parasymp. innervation to mucosal glands in nasal cavities & paranasal sinuses

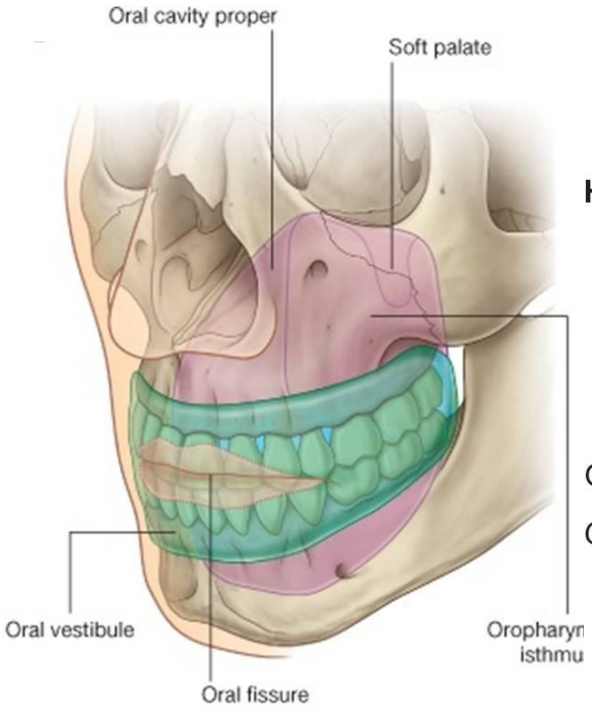


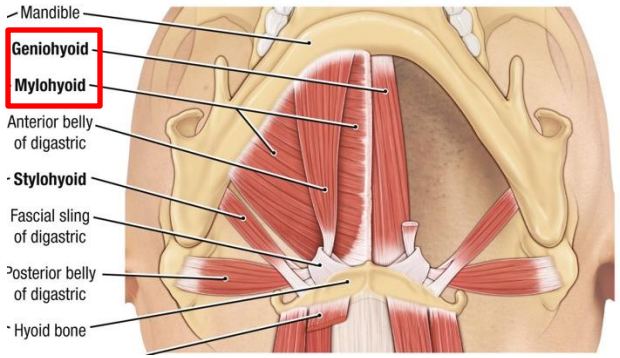


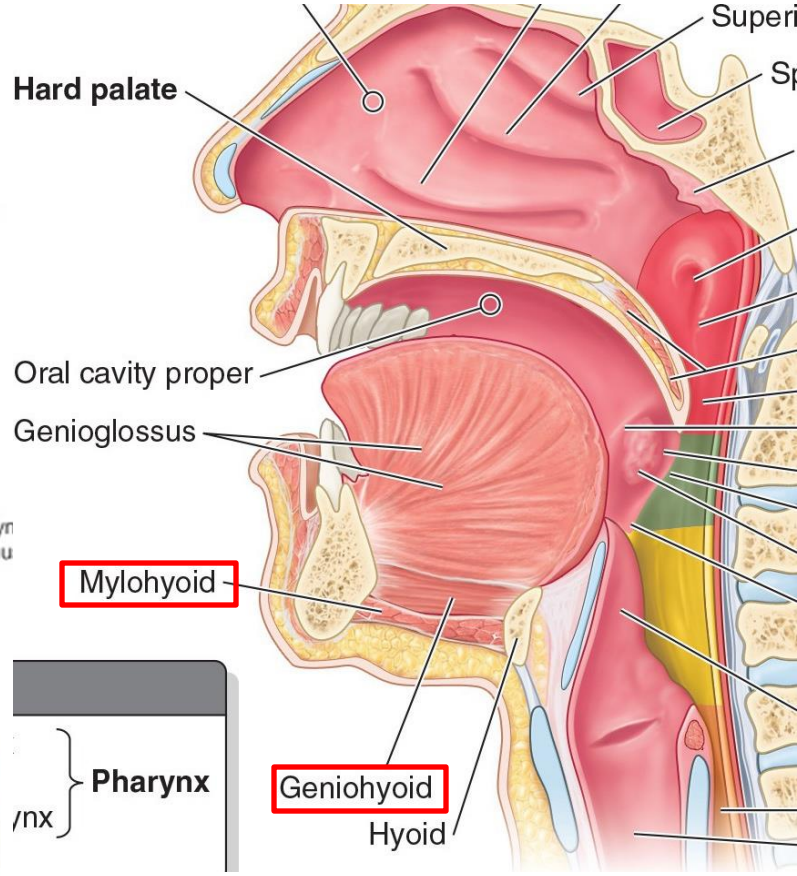
Oral Cavity

Oral Cavity - Overview

- From oral orifice to oropharynx & tonsillar arches
- **Boundaries**
  - **Anterolateral (externally)**: Lips & cheeks
  - **Superior (Roof)**: Hard & soft palate
  - **Inferior (Floor)**: Tongue & mucous mbr. (continues onto gums)
    - Supported by the geniohyoid & mylohyoid
- Divided into 2 parts
  - Vestibule: U-shaped interval b/w lips, teeth, & gums
  - Oral cavity proper: within arches of teeth



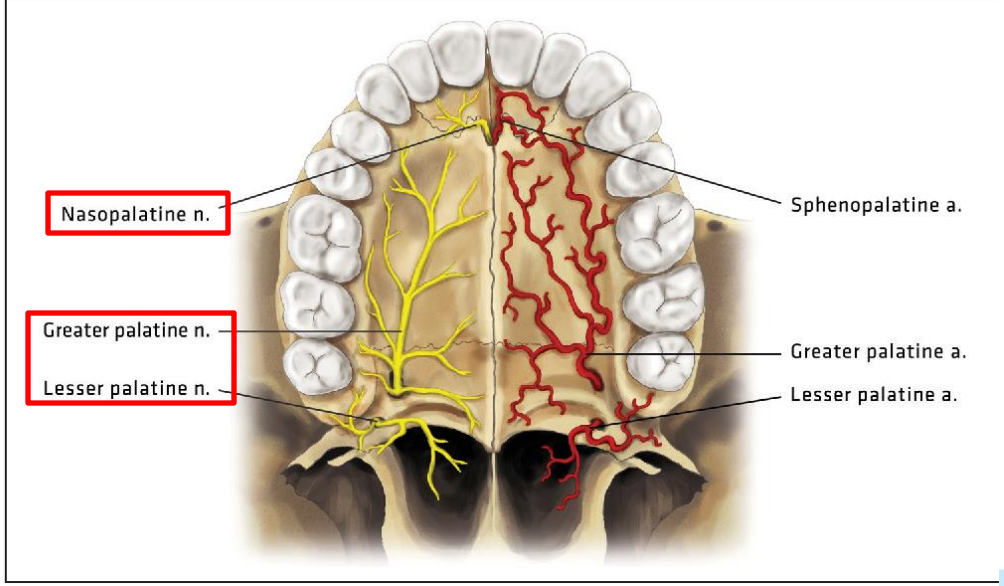


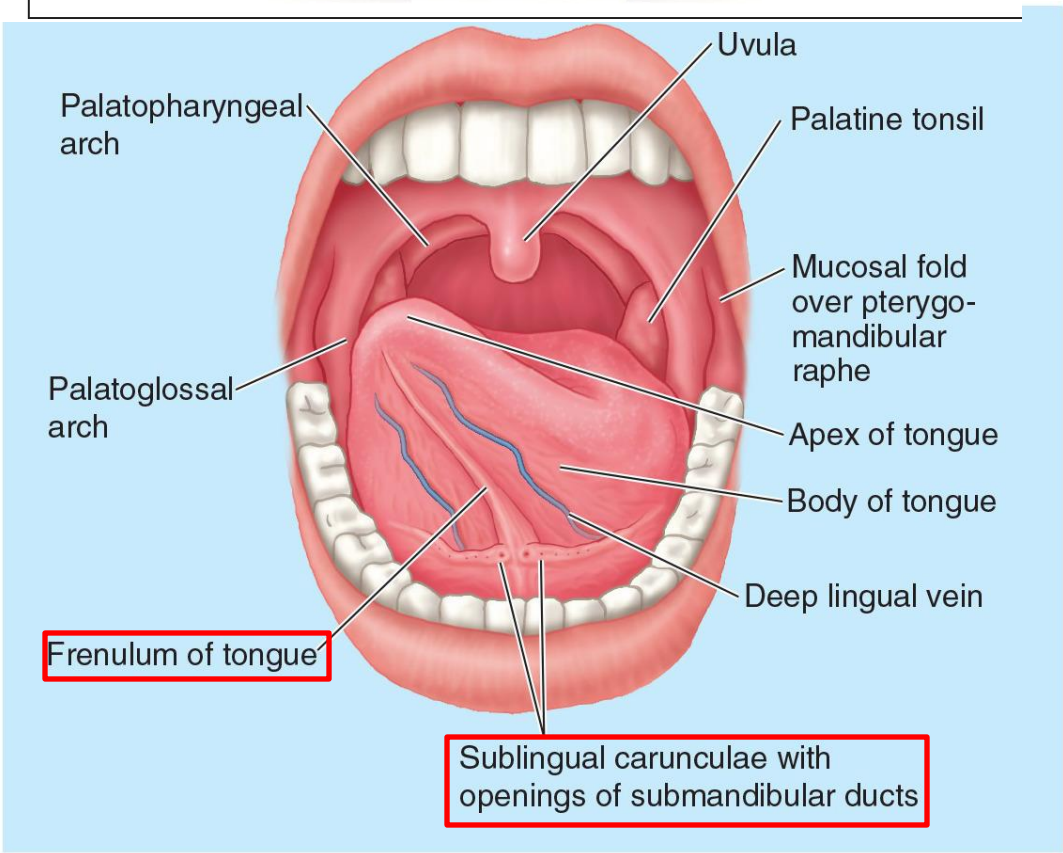


https://www.chegg.com/flashcards/exam-2-909c4635-6e5a-4994-a159-51d0b5a077fe/deck

Oral Cavity Proper

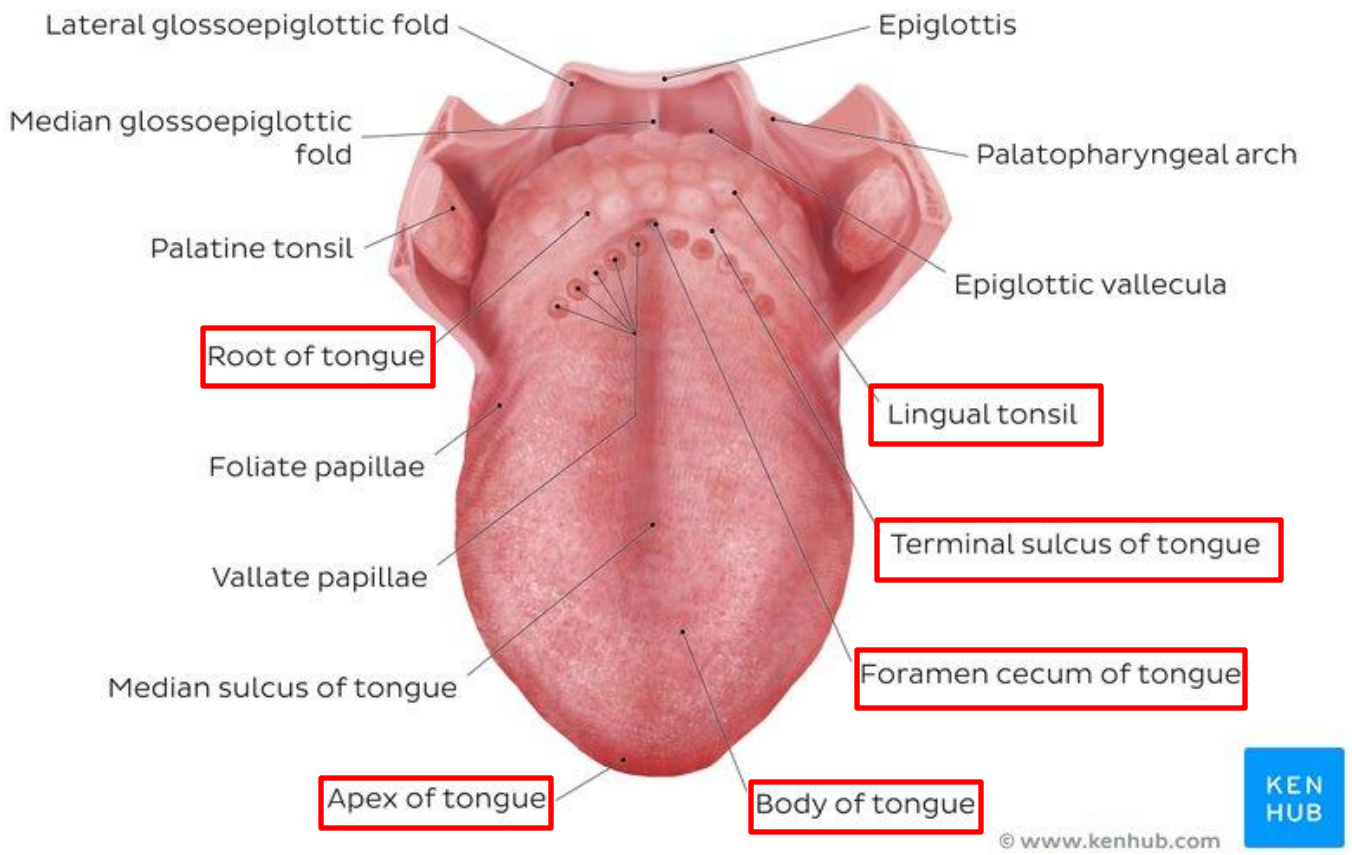
- Major focuses are <u>tongue</u> & <u>sublingual mucosa</u>
- Frenulum: median fold on lower surface of tongue in anterior midline
  - Ducts of submandibular glands open on either side of frenulum
- **Innervation**
  - <u>Roof (palates)</u>: V2 branches
    - Nasopalatine, greater & lesser palatine
  - <u>Floor</u>: lingual n. (V3)
- **Vasculature**
  - Maxillary, facial, & lingual arteries





The Tongue

- Highly muscular organ; very mobile due suspension from mandible, styloid process, & hyoid
- Composed of 2 parts:
  - Anterior 2/3 in oral cavity
  - Posterior 1/3 in oropharynx
- Main chunk is the body, tip is the apex
- Dorsum: Upper surface of tongue
  - Covered with mucosal projections (papillae). Taste buds associated w some types of papillae
- The posterior/vertical portion is the root of the tongue
  - Dorsum here lacks papillae, but has a lot of lymphoid follicles that comprise the lingual tonsil
- Terminal sulcus: V-shaped groove on dorsum separating oral and pharyngeal parts
  - Apex of sulcus directed posteriorly & ends in a blind pit – the foramen cecum (the point of origin for the thyroglossal duct

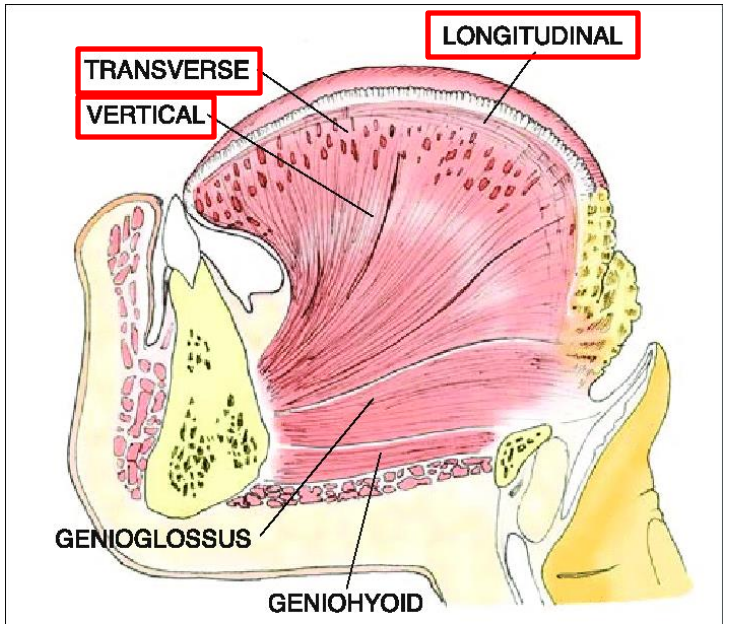


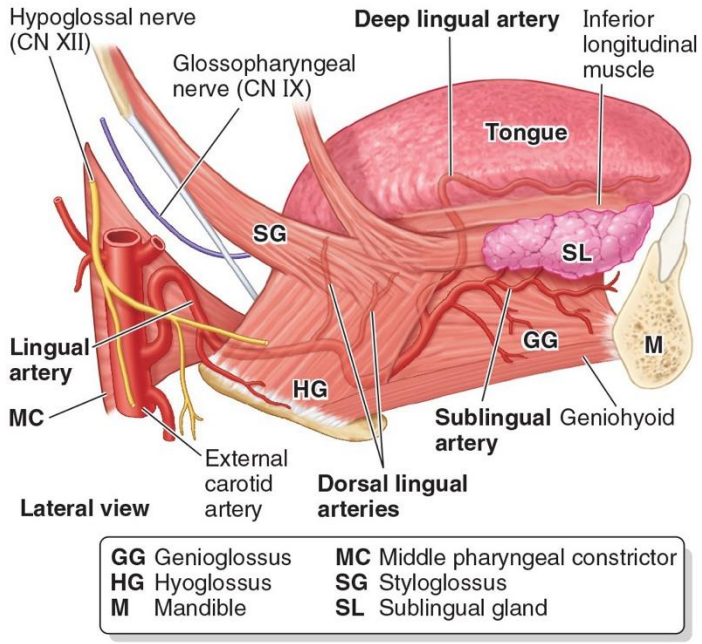
Tongue. Kenhub. 2014. https://www.kenhub.com/en/library/anatomy/tongue

The Tongue Muscles

2 types

- Intrinsic: entirely within the tongue
  - Innervated by the hypoglossal n. (CNXII)
  - Arranged to allow for changing shape of tongue (flatten/curl)
    - Longitudinal
    - Vertical
    - Transverse
- Extrinsic: Attach outside of tongue to move it





Extrinsic Muscles of the Tongue

All innervated by hypoglossal n. EXCEPT PALATOGLOSSUS

Genioglossus

O: *Mandible*

I: *Hyoid & other tongue muscles*

N: *Hypoglossal n. (CNXII)*

A: *Depresses tongue – Sticking tongue out*

Hyoglossus

O: *Hyoid*

I: *Tongue*

N: *Hypoglossal n. (CNXII)*

A: *Depresses tongue*

Styloglossus

O: *Styloid process*

I: *Side of tongue*

N: *Hypoglossal n. (CNXII)*

A: *Retract tongue*

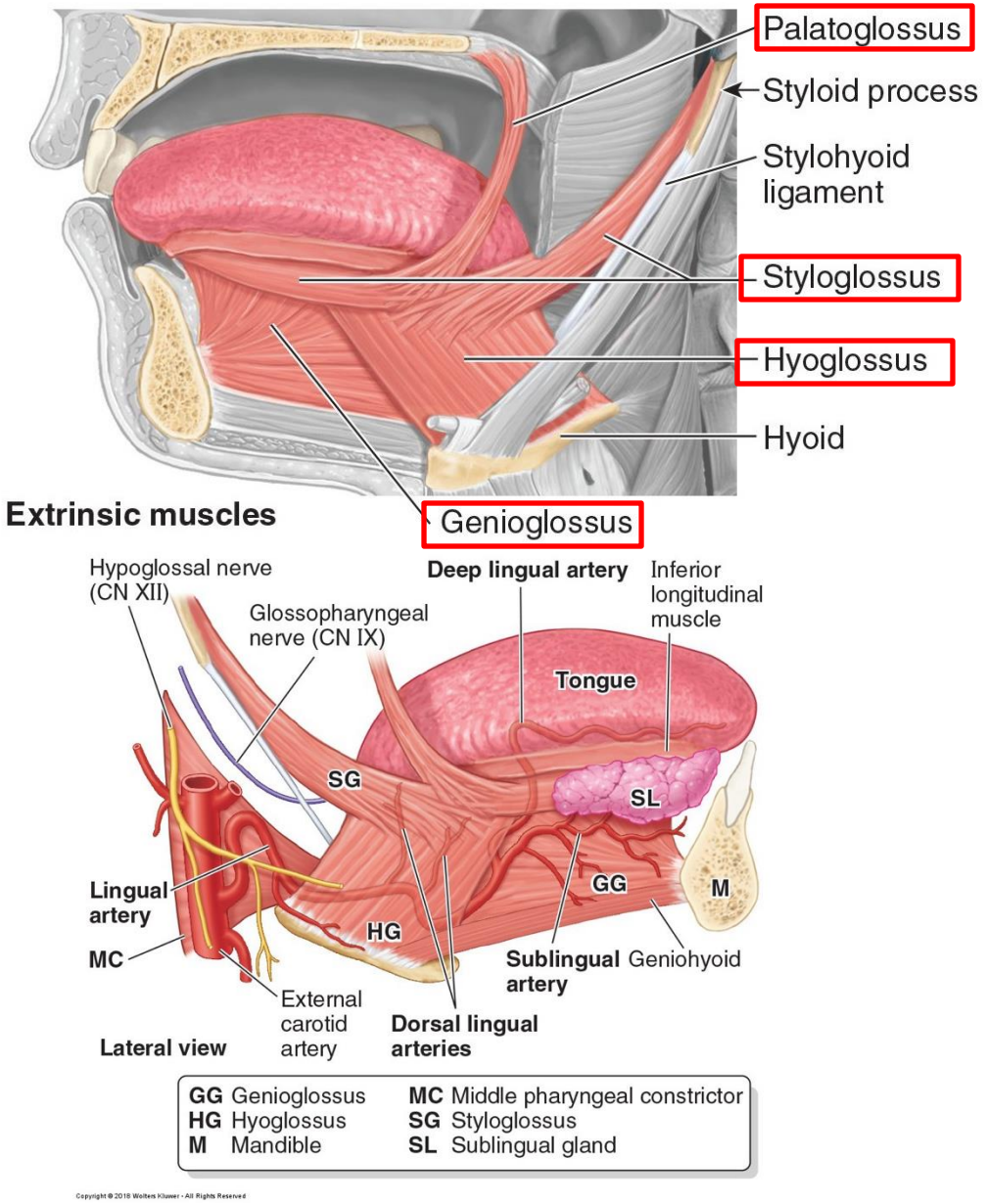
Palatoglossus

O: *Palatine aponeurosis*

I: *Side of tongue*

N: *Vagus (CNX)*

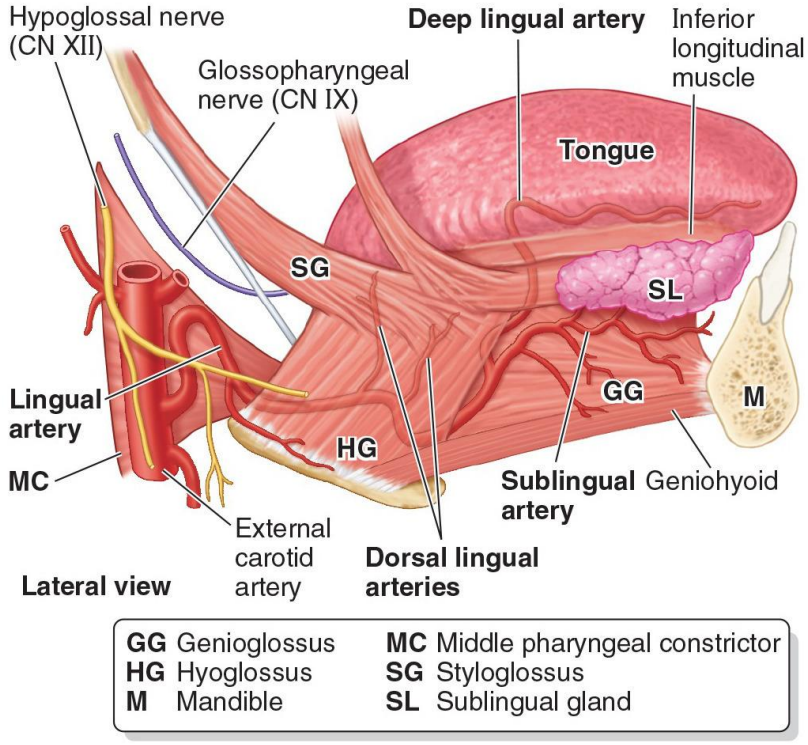
A: *Elevation of tongue*

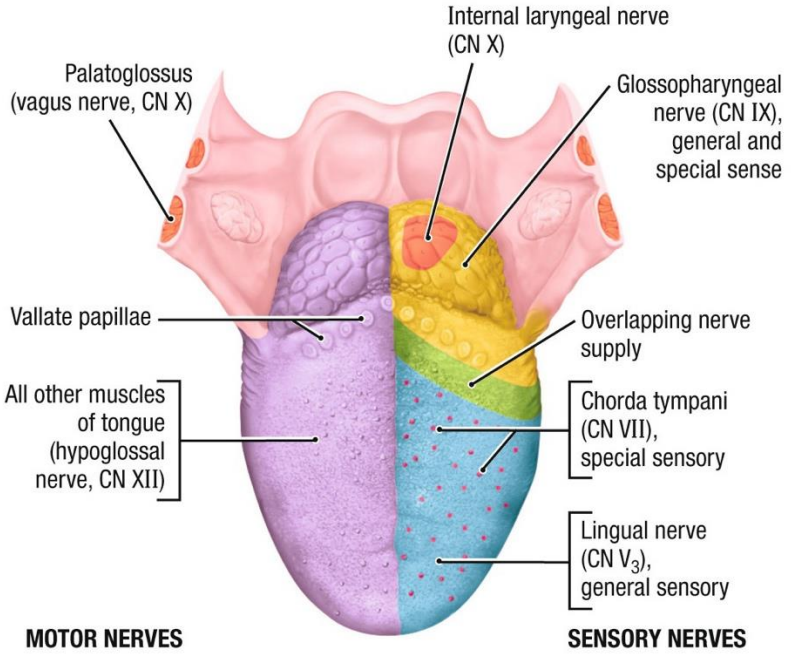


Geniohyoid is fan shaped & comprises most of the bulk of tongue

Innervation & vasculature

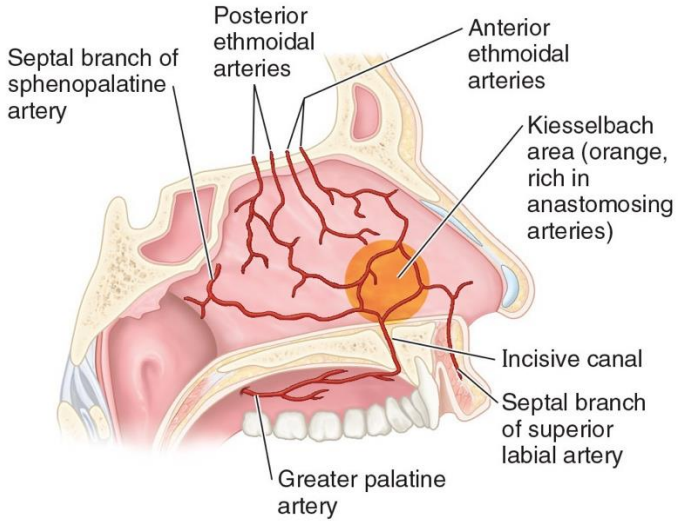
- Lingual artery gives blood to tongue
  - Runs medial to hyoglossus
- Lateral to hyoglossus:
  - Lingual n., submandibular ganglion, submandibular duct, sublingual gland, & hypoglossal n.
- **Muscle** innervation almost entirely CNXII
  - Except palatoglossus (CNX)
- Sensory innervation from 4 cranial nerves
  - Lingual (V3): GSA to anterior 2/3 of mucosa
  - Chorda tympani (CNVII): taste to anterior 2/3 mucosa (except vallate papillae)
  - Glossopharyngeal (CNIX): GSA & taste to posterior 1/3 mucosa & vallate papillae
  - Vagus (CNX): a few taste buds near epiglottis



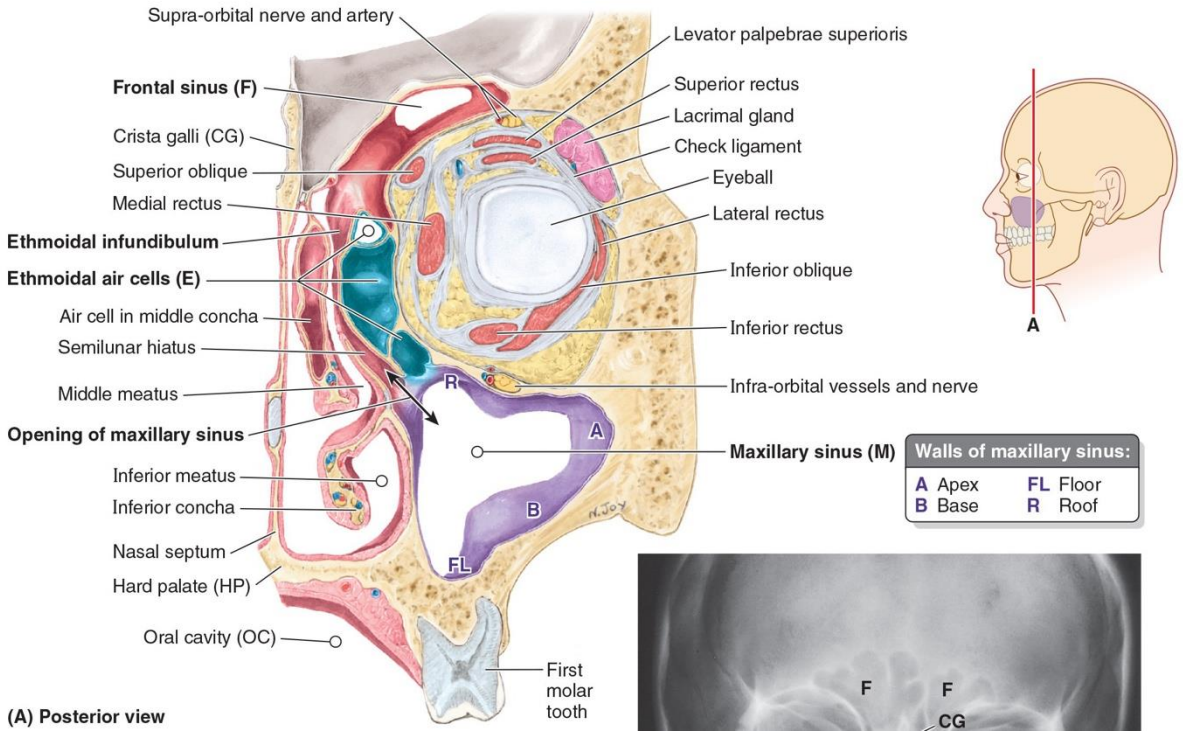


Clinical Anatomy

- Nose fracture is common b/c bony portion of nasal septum (vomer & perpendicular plate of ethmoid) is very thin
  - Trauma can also dislocate nasal cartilages & deviate septum (because they are attached to septal cartilage
- Extensive bleeding w trauma of nose results from disruption of extensive vascular plexus that functions to warm inspired air
- Sinus headache results from pressure buildup due to blockage of paranasal sinus drainage
- Long roots of maxillary molars may penetrate bony floor of maxillary sinus.
  - Abscesses of these molars or trauma may therefore damage floor of sinus & allow communication b/w this sinus & oral cavity
- A tongue blade is used to depress the oral portion of tongue for examination of:
  - Pharyngeal portion of tongue, epiglottis, & posterior wall of oropharynx
- Risk of suffocation w deep general anesthesia
  - Induces total relaxation of genioglossus
  - Tongue will relapse posteriorly as a result of its own weight



(B) Nasal septum (lateral view)



(A) Posterior view