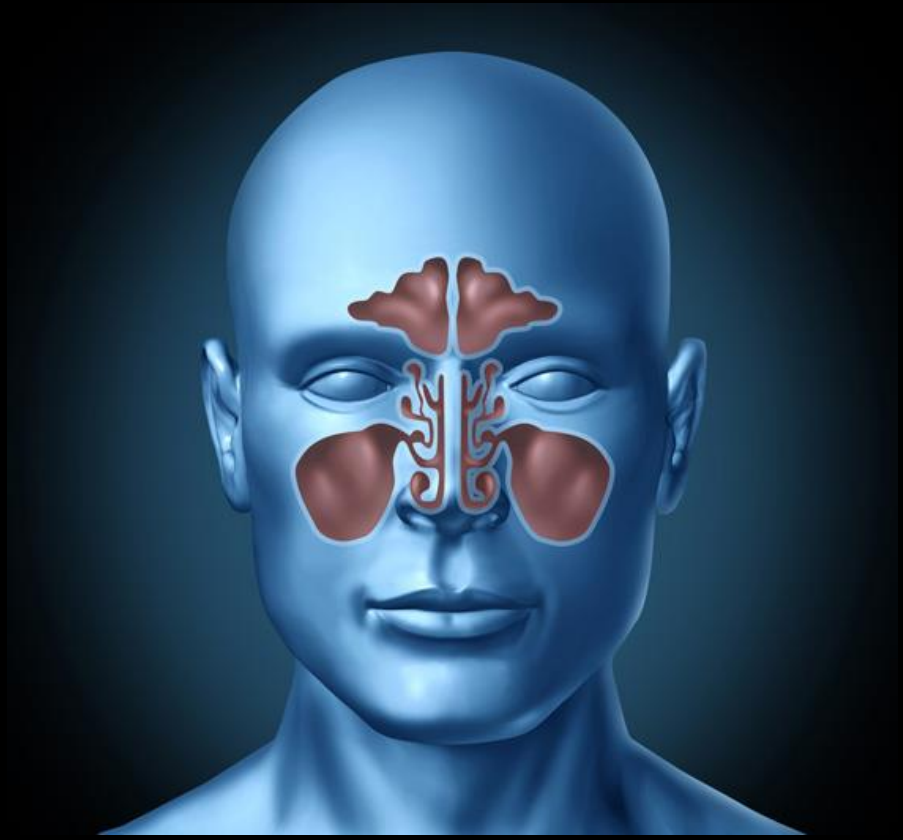
ANATOMY OF THE NOSE & OLFACTORY



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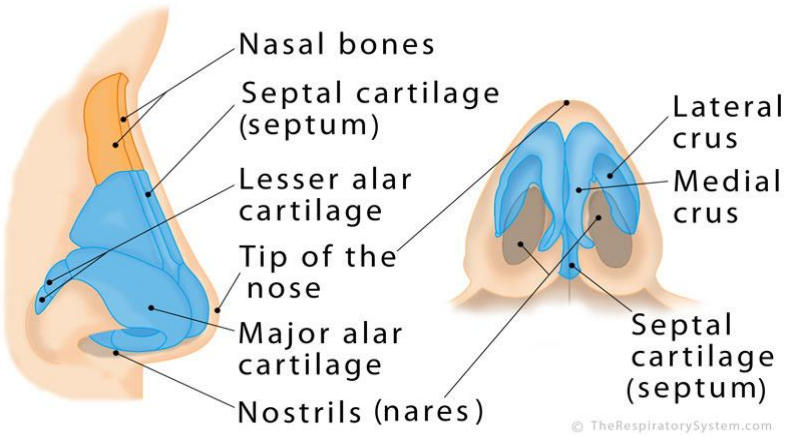
OBJECTIVES

At the end of the lecture, the students should be able to:

- **Describe the boundaries and functions of the nose and nasal cavity.**
- **Describe the nasal conchae and meati.**
- **Demonstrate the openings in each meatus.**
- **Describe the arterial supply and innervation of the nose.**
- **Describe the paranasal sinuses and their functions**
- **Describe the clinical significances of the nose and nasal cavity.**

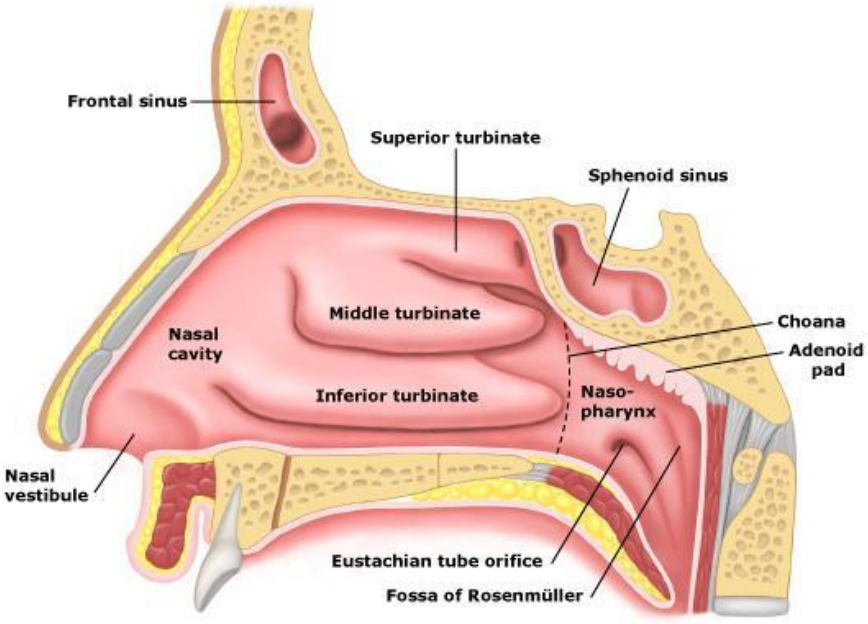
THE NOSE

- **The external (anterior) nares or nostrils lead to the nasal cavity.**
- **Formed above by bony skeleton.**
- **Formed below by plates of hyaline cartilage.**



NASAL CAVITY

- It is a large air filled space above and behind the nose in the middle of the face.
- Each cavity is the continuation of one of the two nostrils.
- It extends from nostrils anteriorly to turbinate (Concha) posteriorly.
- It is divided into right and left parts by the nasal septum.
- It communicates with the nasopharynx posteriorly.
- It consists of Vestibule, Respiratory and Olfactory regions.
- Each contains, roof, floor, lateral and medial walls.

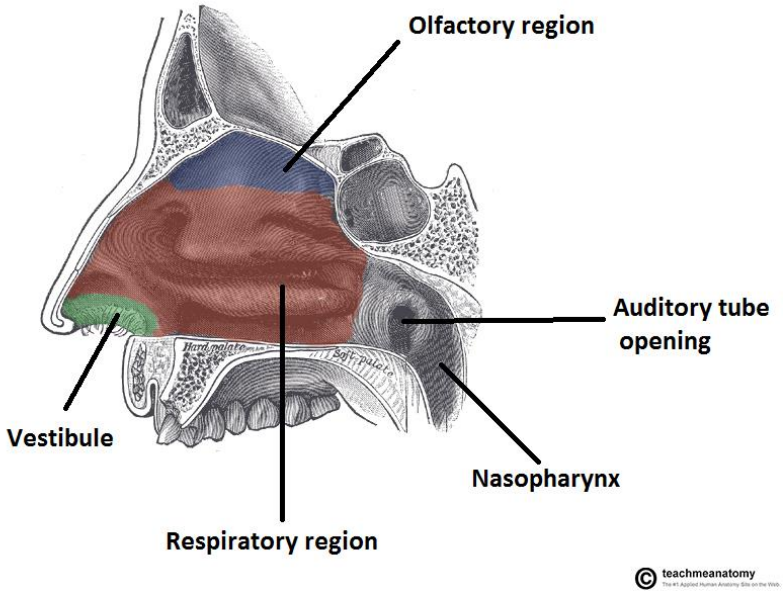


FUNCTIONS

- **Olfaction**
  - **smell**
- **Respiration**
  - **breathing**
- **Warming the inspired air**
  - **submucous venous plexus**
- **Filtration of dust**
- **Humidification of the inspired air**
  - **mucous**
- **Reception of secretions from the paranasal sinuses and nasolacrimal duct.**

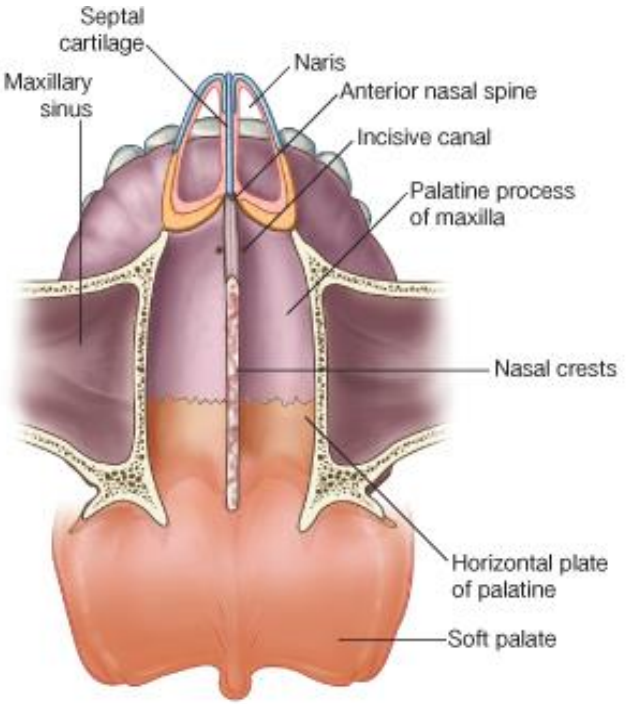
DIVISIONS

- **Vestibule Region**
  - The area surrounding the external opening to the nasal cavity.
  - Lined by modified skin, provided with hairs, and sebaceous glands, to filter the incoming air.
    - exocrine glands in the skin that secrete an oily or waxy matter called sebum to lubricate and waterproof the skin and hair
- **Respiratory Region**
  - The largest region.
  - Lined with mucous that is continuous with that of Nasal Sinuses, Lacrimal sac, Conjunctiva, and Nasopharynx.
- **Olfactory Region**
  - Located at the apex of the nasal cavity.
  - It is lined by olfactory cells with olfactory receptors.



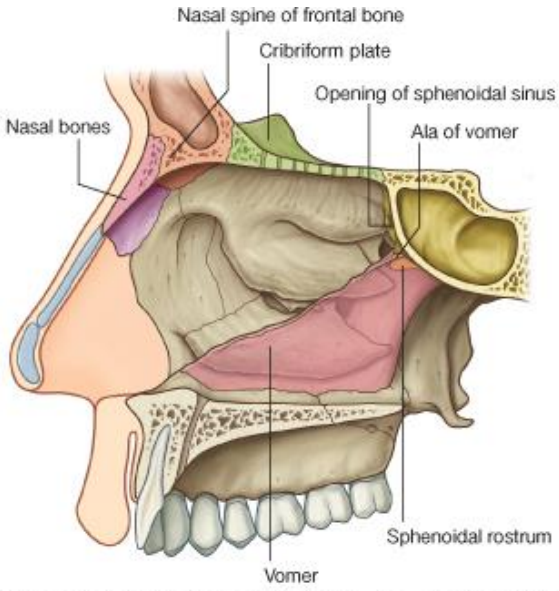
FLOOR

- **It is formed by:**
  - **The nasal surface of the hard palate;**
    - **Palatine process of maxilla.**
    - **Horizontal plate of palatine bone.**



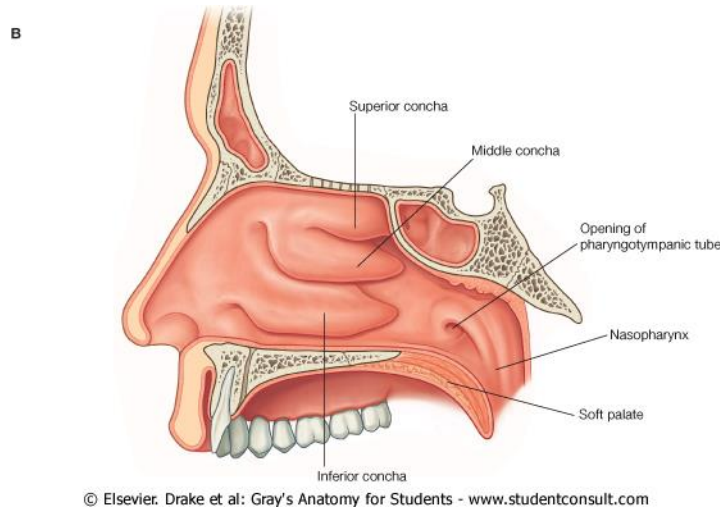
ROOF

- **It is formed by:**
  - **Body of sphenoid**
  - **Cribriform plate of ethmoid**
  - **Frontal bone**
  - **Nasal bones**



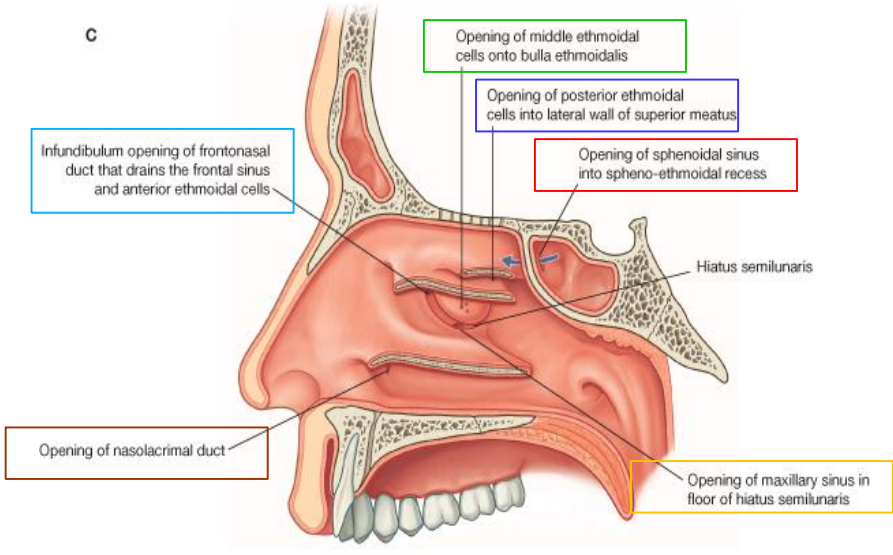
LATERAL WALL

- **It is marked by three projections; (nasal conchae)**
  - **Superior, middle, and inferior nasal conchae**
- **The space below each concha is called (meatus);**
  - **Superior, middle, and inferior meatuses.**



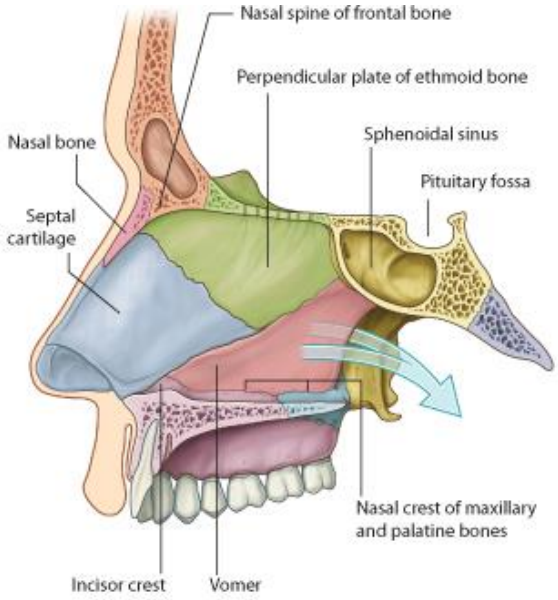
LATERAL WALL

- Sphenoethmoidal recess, opening of sphenoid air sinus
- Superior meatus - receives openings of posterior ethmoidal sinuses.
- Middle meatus; for opening of middle ethmoidal sinus.
- Hiatus semilunaris, for openings of maxillary sinus.
- Infundibulum for frontal and anterior ethmoidal sinus.
- Inferior meatus - receives opening of nasolacrimal duct.



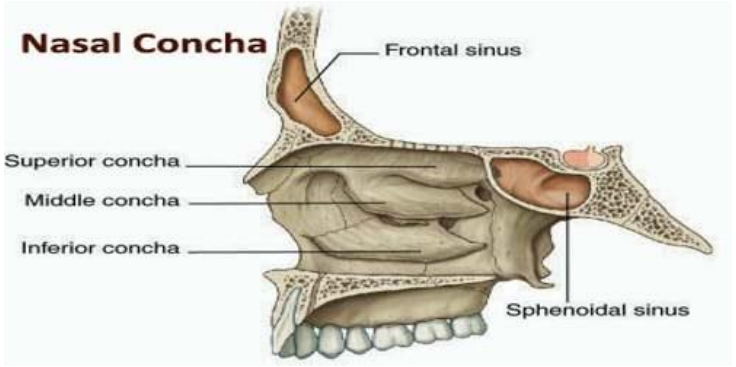
MEDIAL WALL

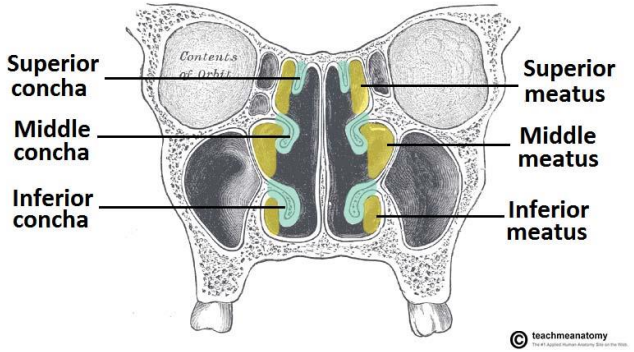
- **The nasal septum:**
  - **Vertical plate of ethmoid**
  - **Vomer**
  - **Septal cartilage**



NASAL CONCHAE

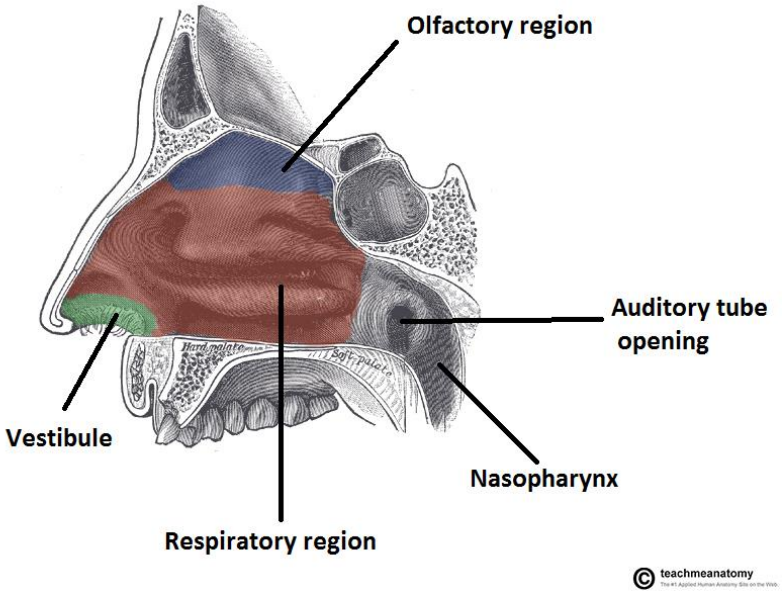
- **Projecting out of the lateral walls of the nasal cavity are curved shelves of bone.**
- **They project into the nasal cavity, creating four pathways for the air to flow. These pathways are called meatuses:**
  - **Inferior meatus: lies between the inferior concha and floor of the nasal cavity.**
  - **Middle meatus: lies between the inferior and middle concha.**
  - **Superior meatus: lies between the middle and superior concha.**
  - **Spheno-ethmoidal recess: lies superiorly and posteriorly to the superior concha.**
- **The function of the conchae is to increase the surface area of the nasal cavity to increases the amount of inspired air that can come into contact with the cavity walls.**
- **They also disrupt the fast flow of the air, making it slow. The air spends longer in the nasal cavity, so that it can be humidified.**





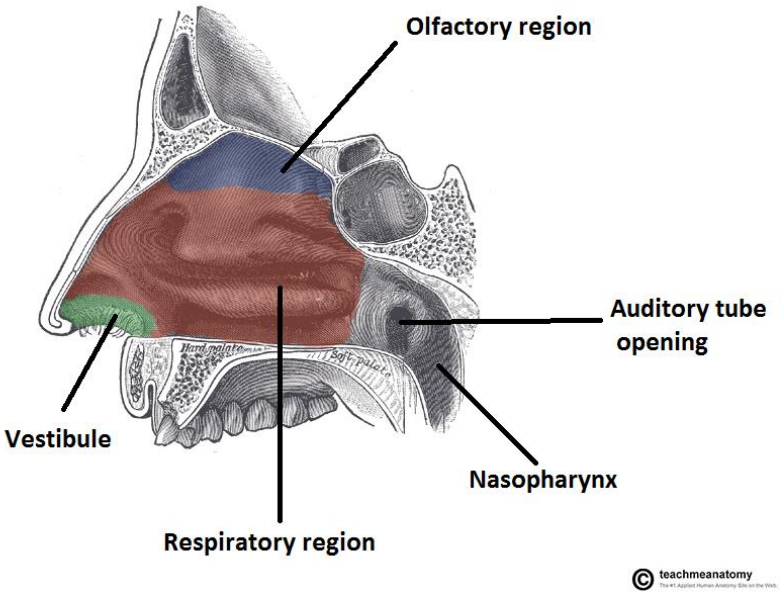
OLFACTORY MUCOSA

- The mucosa or mucous membrane is a type of tissue that lines the nasal cavity, and it is usually moist tissues that are bathed by secretions such as in the nose.
- The olfactory mucosa is located in the upper region of the nasal cavity and is made up of the olfactory epithelium.
- It is delicate and contains olfactory nerve cells.
- It is present in the roof, lateral wall and upper part of nasal septum.
- On the lateral wall, it lines the upper surface of the superior concha and the sphenoethmoidal recess.
- On the medial wall, it lines the superior part of the nasal septum.



RESPIRATORY MUCOSA

- It is thick, ciliated highly vascular and contains mucous glands & goblet cells.
- It lines the lower part of the nasal cavity.
- It functions to moisten, clean and warm the inspired air.
- The air is moistened by the secretion of numerous serous glands.
- It is cleaned by the removal of the dust particles via ciliary action of the columnar ciliated epithelium that covers the mucosa.
- The air is warmed by a submucous venous plexus.
- The vestibule is lined by skin.

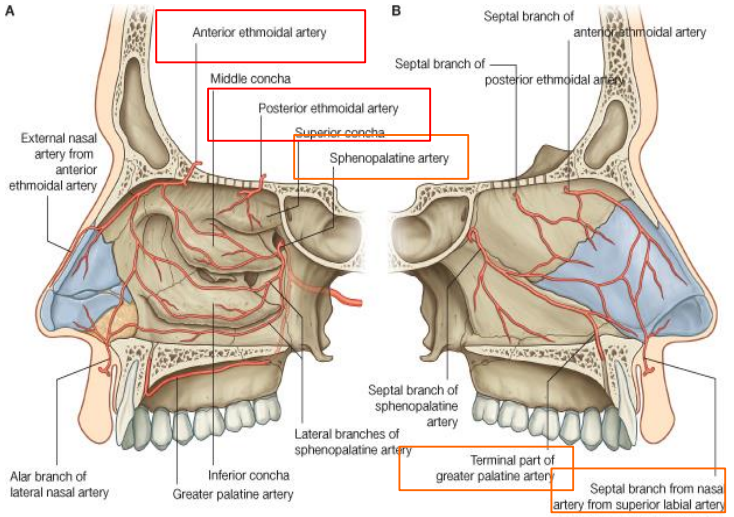


BLOOD SUPPLY

Arterial Supply

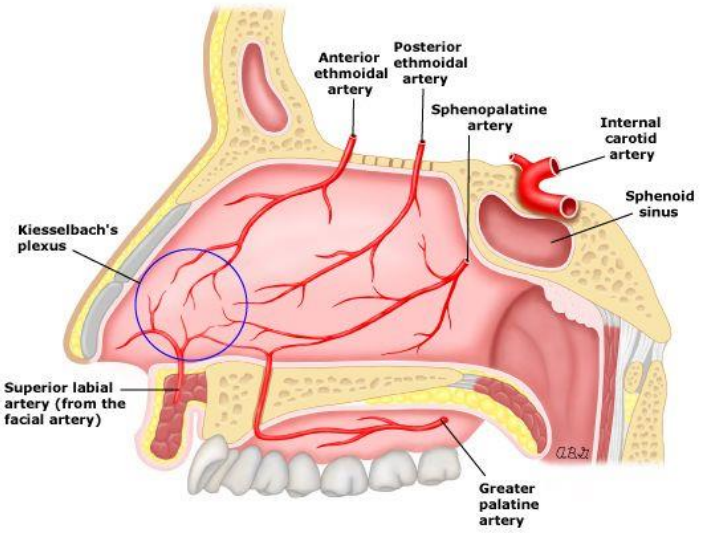
The nasal cavity receives blood from both the internal and external carotid arteries:

- **Internal carotid branches:**
  - **Anterior and posterior ethmoidal arteries**
    - **Branch of ophthalmic artery**
- **External carotid branches:**
  - **Sphenopalatine artery (maxillary)**
  - **Superior labial (facial)**
  - **Greater palatine artery (maxillary)**
  - **Lateral nasal arteries (facial)**



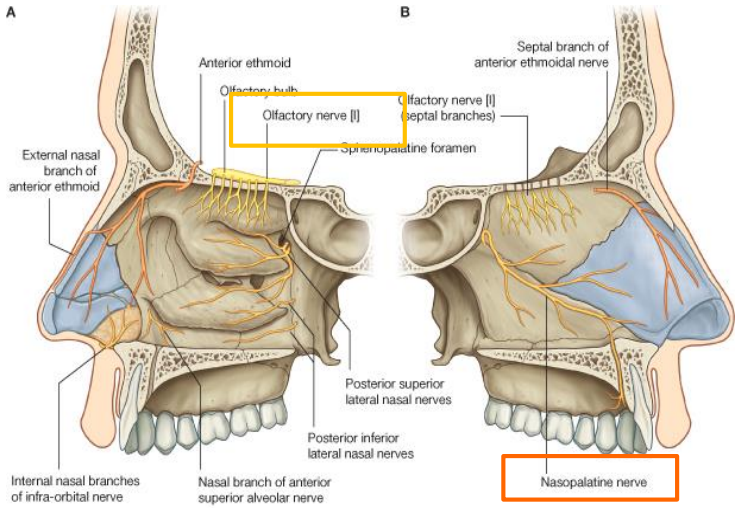
Venous Drainage

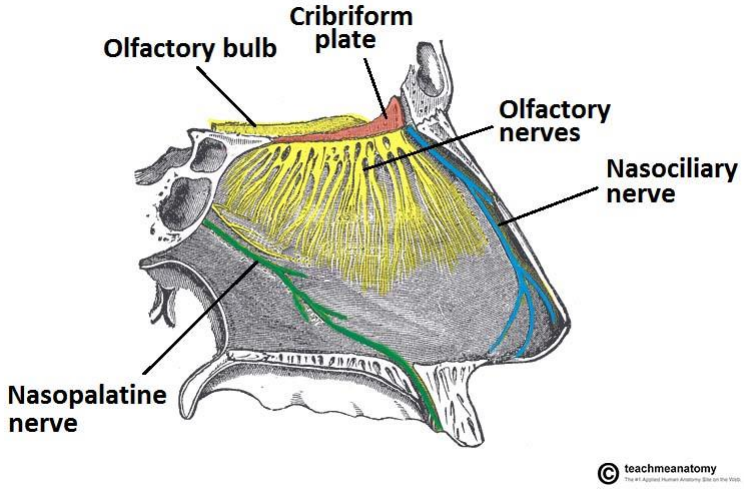
- **Plexus in submucosa by veins accompany the arteries.**
- **They drain into the pterygoid plexus, facial vein or cavernous sinus.**



INNERVATION

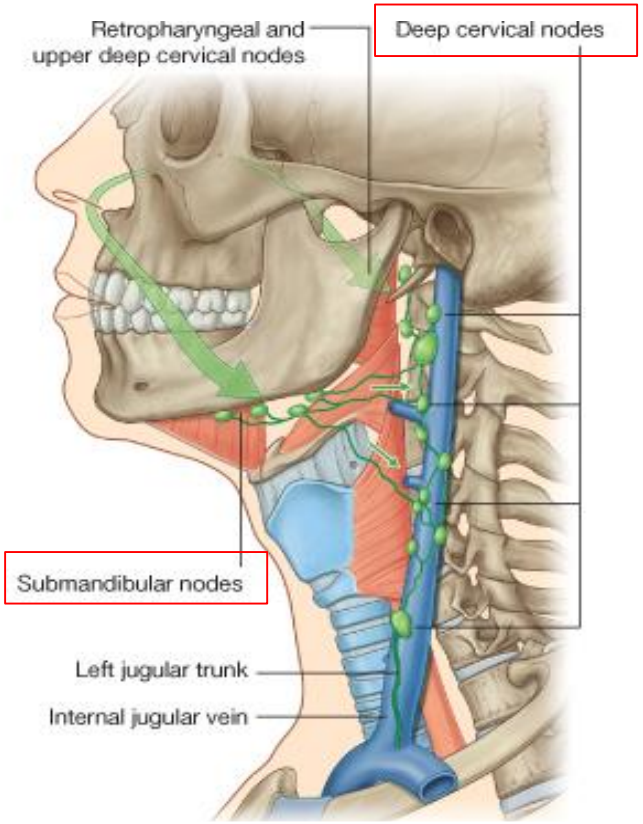
- The innervation of the nose can be functionally divided into special and general innervation.
  - Special sensory innervation due to the ability of the nose to smell. This is carried out by the olfactory nerves (Cr. I).
  - General sensory innervation to the septum and lateral walls is delivered by the nasopalatine nerve (branch of maxillary nerve) and the nasociliary nerve (branch of the ophthalmic nerve).
- Innervation to the external skin of the nose is supplied by the trigeminal nerve.





LYMPH DRAINAGE

- Submandibular nodes.
- Upper deep cervical nodes.



CLINICAL SIGNIFICANCES

NOSEBLEED

- It is common case due to rich blood supply of the node.
- Most likely occur in anterior third of nasal cavity.
- Cause could be local due to trauma or systemic due to hypertension.

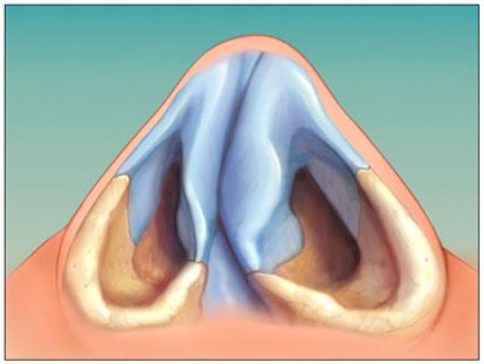
DISEASES OF THE NASAL CAVITY INCLUDE:

- Viral
- Bacterial
- Fungal infections
- Nasal cavity tumors
- Inflammations of the nasal mucosa

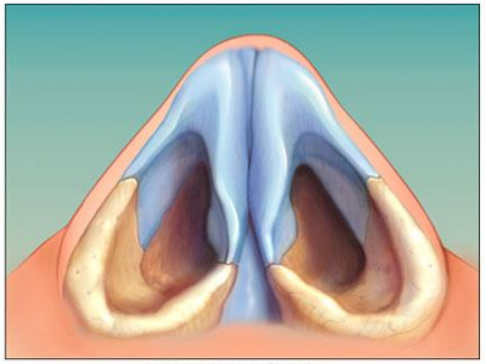
CLINICAL SIGNIFICANCES

Deviated Septum

- **Occurs when the thin wall (nasal septum) between the nasal passages is displaced to one side.**
- **In many people, the nasal septum is displaced or deviated making one nasal passage smaller.**
- **When a deviated septum is severe, it can block one side of the nose and reduce airflow, causing difficulty breathing.**
- **Nasal obstruction can occur from a deviated nasal septum, from swelling of the tissues lining the nose, or from both.**
- **Treatment of nasal obstruction may include medications to reduce the swelling or nasal dilators that help open the nasal passages.**
- **To correct a deviated septum, surgery is necessary.**



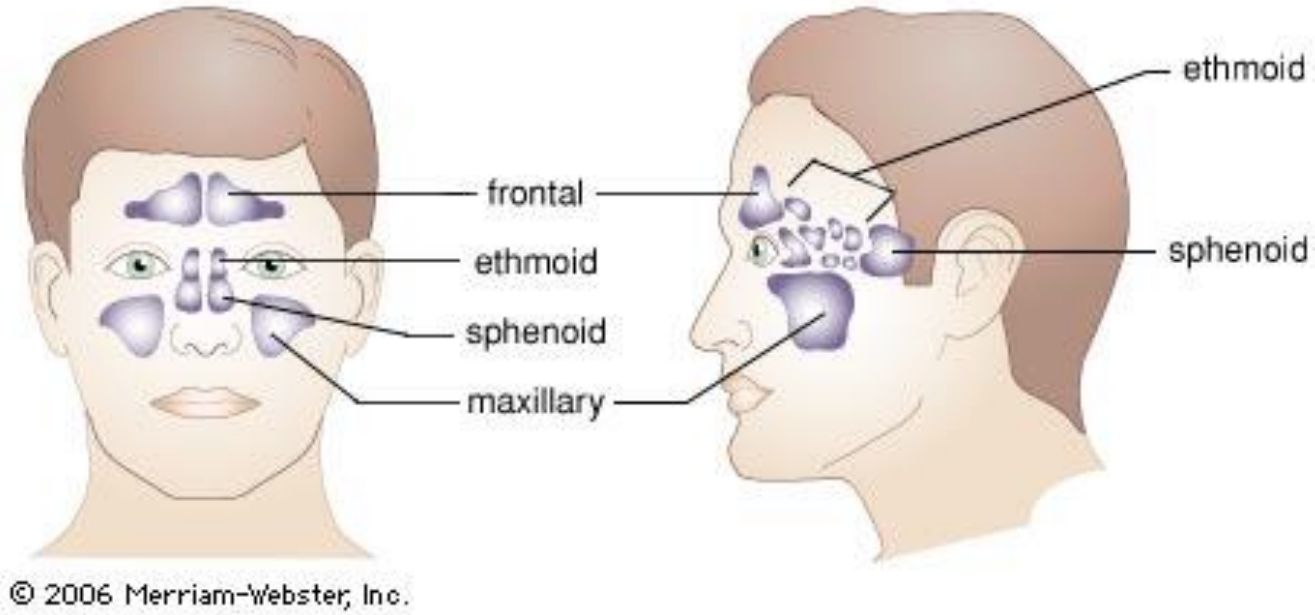
Deviated nasal septum



Straightened nasal septum

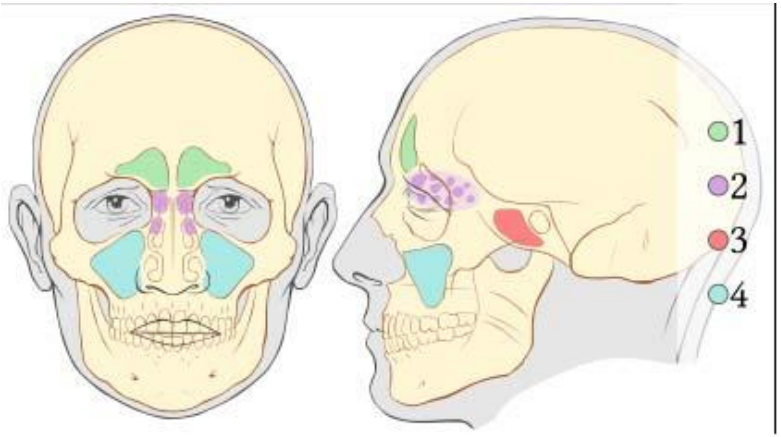
PARANASAL SINUSES

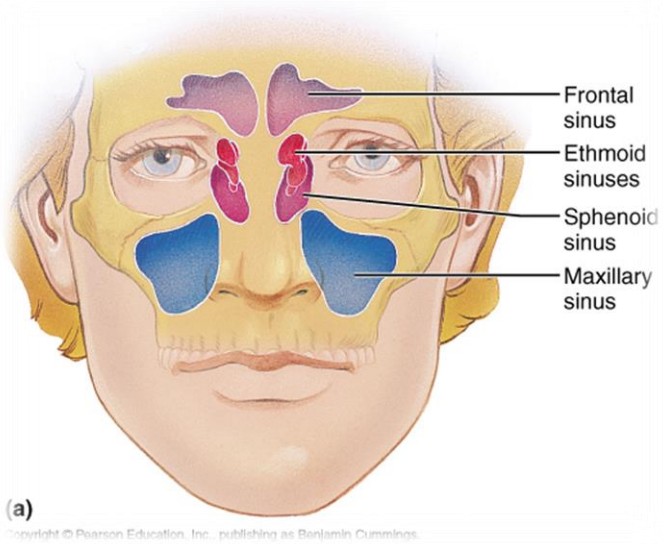
- **Paranasal sinuses are a group of four paired air-filled spaces that surround the nasal cavity.**



STRUCTURS

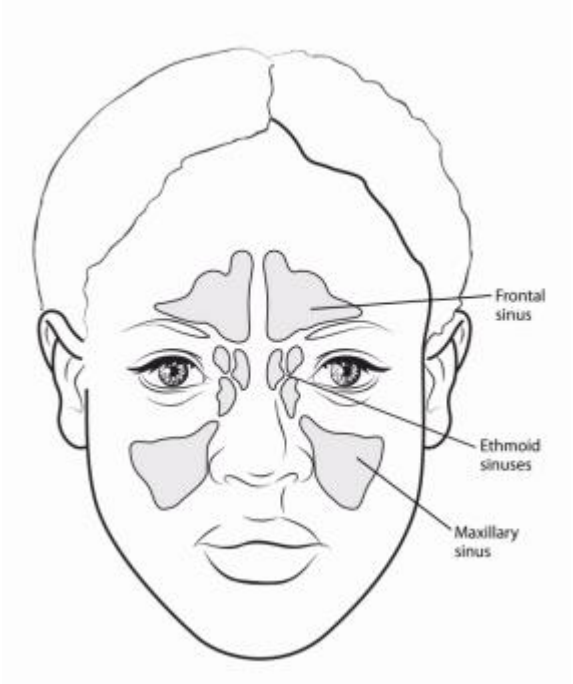
- The paranasal air sinuses are lined with respiratory epithelium (ciliated pseudostratified columnar epithelium).
- There are four paired of paranasal sinuses, divided into subgroups that are named according to the bones within which the sinuses located:
- **The Maxillary Sinuses**
  - the largest of the paranasal sinuses, located under the eyes, in the maxillary bones.
- **The Frontal Sinuses**
  - superior to the eyes, in the frontal bone, which forms the hard part of the forehead.
- **The Ethmoidal Sinuses**
  - formed from several discrete air cells within the ethmoid bone between the nose and the eyes.
- **The Sphenoidal Sinuses**
  - in the sphenoid bone.





FUNCTIONS

- **Decreasing** the relative weight of the front of the skull, and especially the bones of the face.
- **Increasing** resonance of the voice.
- **Providing** a buffer against facial trauma.
- **Insulating** sensitive structures like dental roots and eyes from rapid temperature change in the nasal cavity.
- **Humidifying** and heating of inhaled air because of slow air turnover in this region.



CLINICAL SIGNIFICANCES

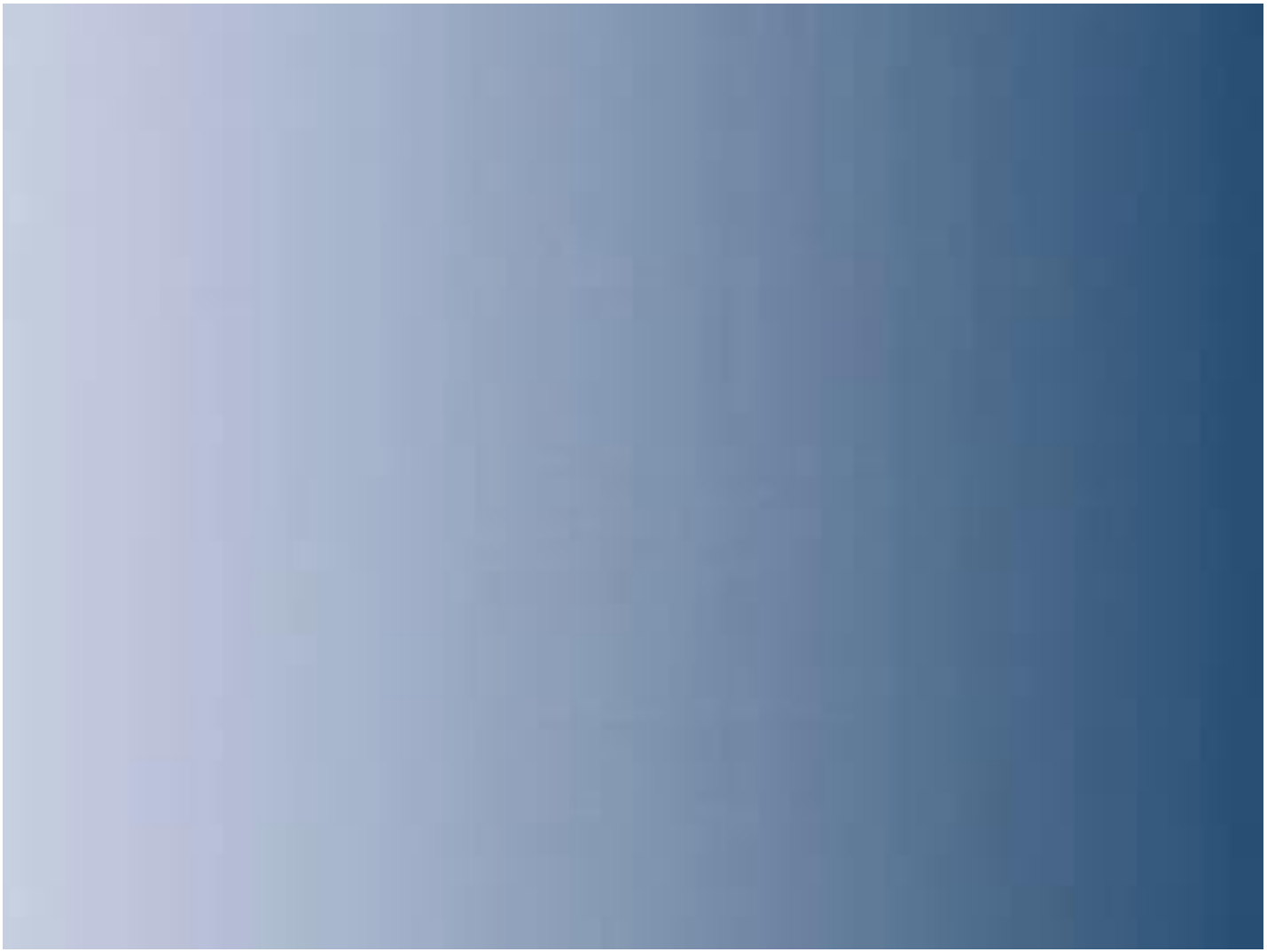
Inflammation

- The paranasal sinuses are joined to the nasal cavity via small orifices called **ostia**. These become blocked easily by **allergic inflammation**, or by **swelling** in the nasal lining that occurs with a cold. If this happens, normal drainage of mucus within the sinuses is disrupted, and **sinusitis** may occur.
- Because the maxillary posterior teeth are close to the maxillary sinus, this can also cause clinical problems if any disease processes are present, such as an **infection** in any of these teeth.

Cancer

- Malignancies of the paranasal sinuses comprise approximately 0.2% of all malignancies.
- About 80% of these malignancies arise in the maxillary sinus.
- They most often occur in the age group between 40 and 70 years.
- Carcinomas are more frequent than sarcomas.
- Tumours of the sphenoid and frontal sinuses are extremely rare.

VIDEO



QUESTIONS!