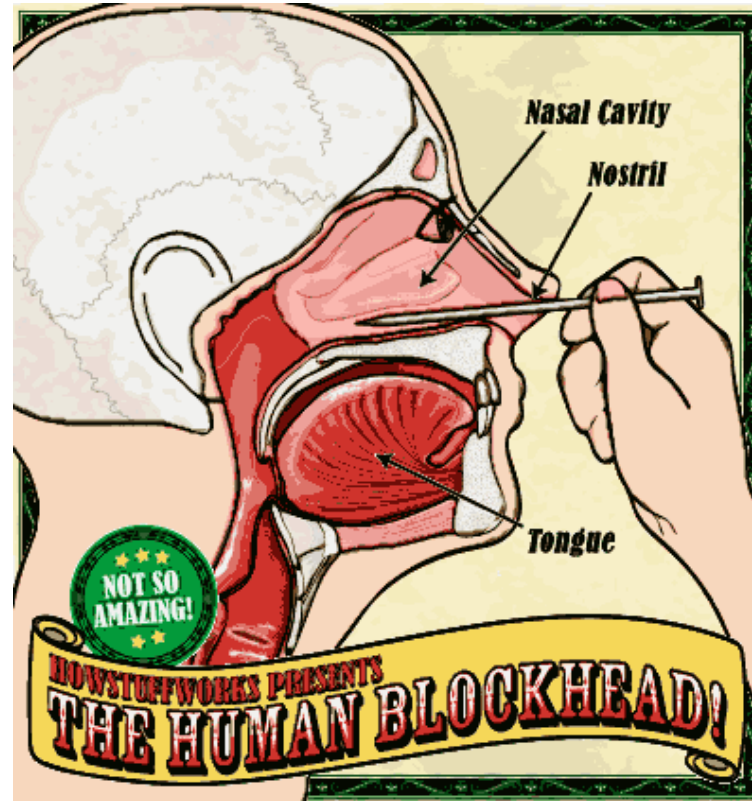


# ANATOMY OF THE NASAL CAVITY, PARANASAL SINUSES



Dr. Andrea D. Székely

# THE NOSE

- Warming/moistening of inspired air
- Mucociliary transport
- Mucosal barrier (defence mechanism)
- Resonance
- Olfaction
- Reflexes

Nares

Vestibulum

Cavum

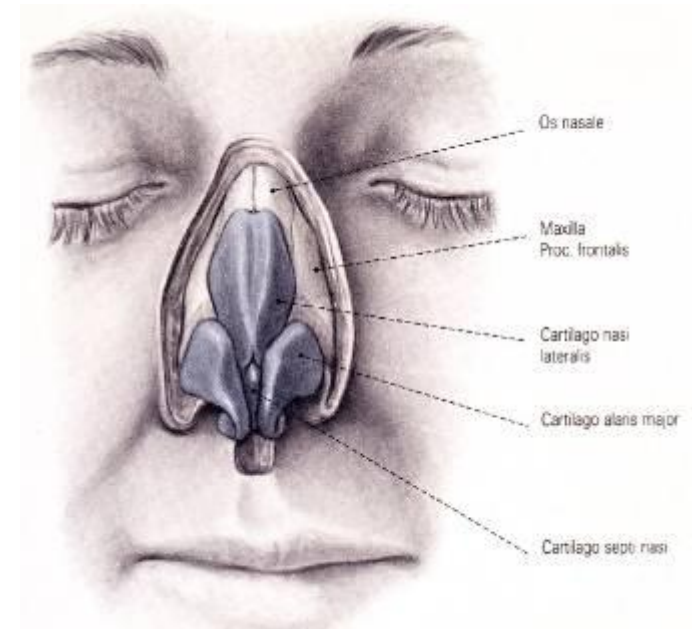
Choanae



# THE EXTERNAL NOSE

- Osseous pyramid composed of *frontal* and *nasal* bones plus the *maxillae*.
- Cartilaginous „dorsum”, formed by the *septal* and *dorsal cartilages*
- The tip (apex) is composed of the *alar* and *septal cartilages*

*The diameter of the nostrils will define the size of the vestibule*

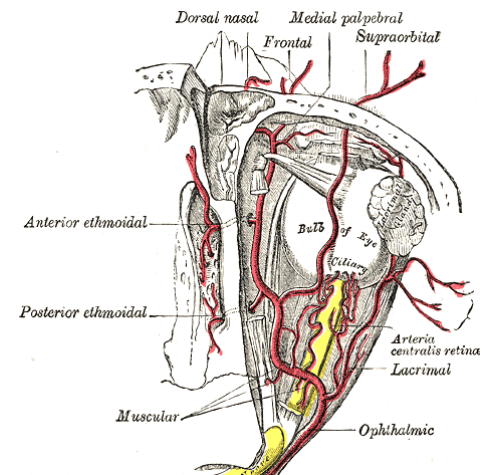
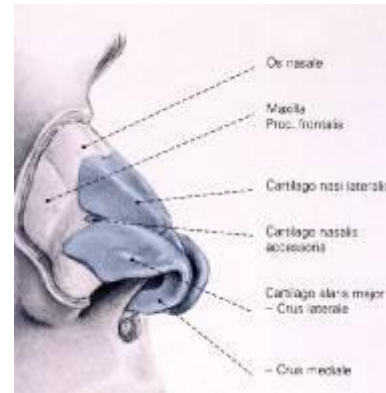


## BLOOD SUPPLY

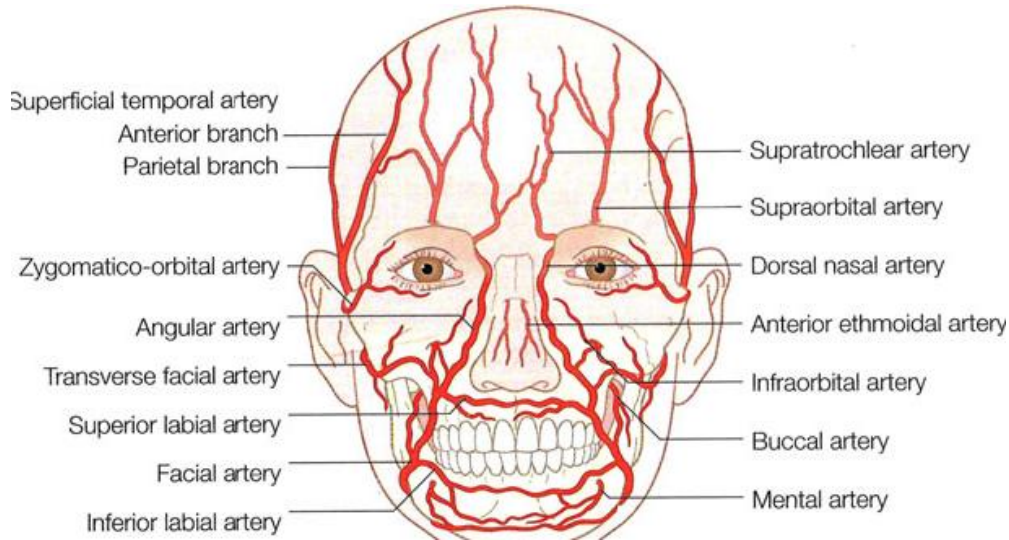
- Arterious: by the **facial** artery, becoming the **angular** artery. The alar and dorsal regions of the nose are supplied by the **infraorbital** branches of the maxillary artery (**external carotid**) and **ophthalmic** arteries (**internal carotid** system)
- Venous: by the **ophthalmic vein** and **cavernous sinus**

## CUTANEOUS INNERVATION

- **Branches of ophthalmic & maxillary nerves**



# BLOOD SUPPLY

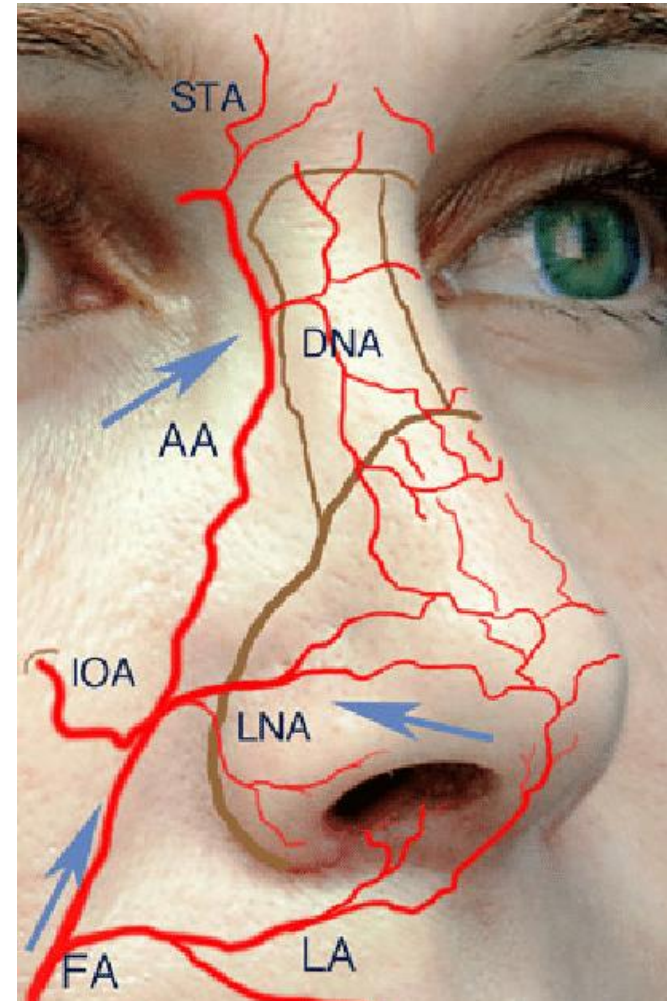


## **ECA**

- *facial*
  - *angular*
  - *lateral nasal*
  - *superior labial*
- *infraorbital*

## **ICA**

- *Branches of the ophthalmic a.*



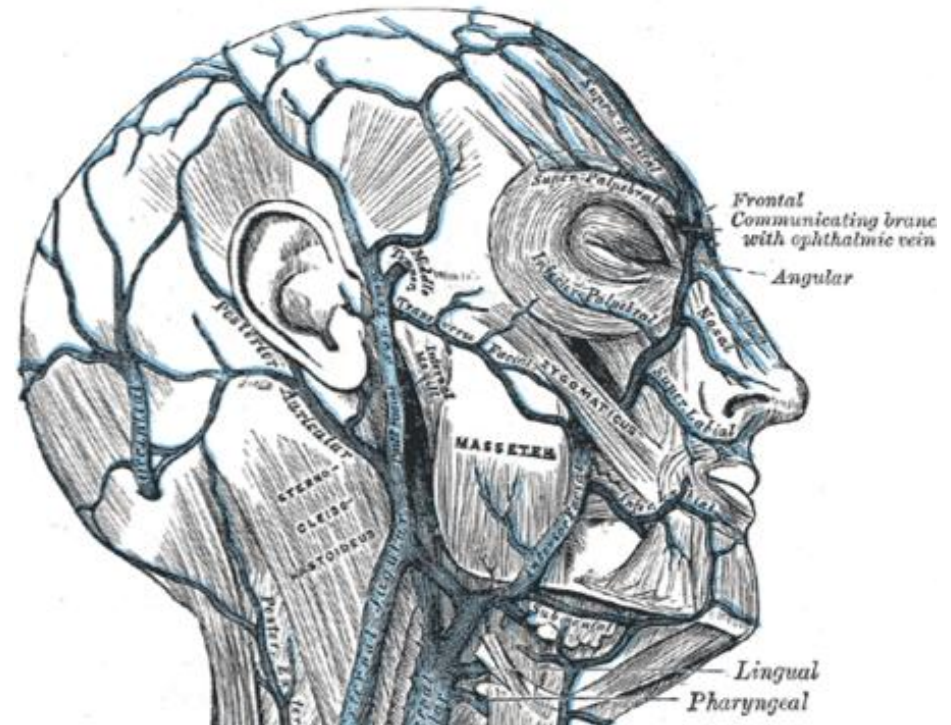
# FACIAL VEINS

## Veins of head and neck

### "Danger triangle of the face"

- lies between root of nose and two angles of mouth
- In this area the facial vein has no valves

Connections with cavernous sinus and pterygoid venous plexus

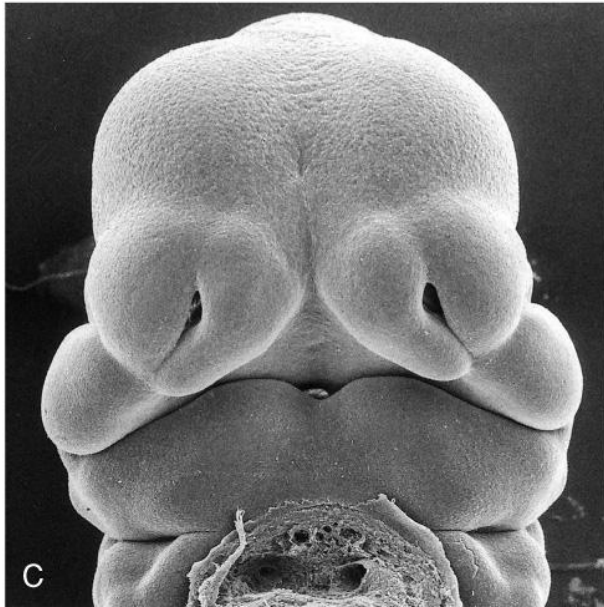
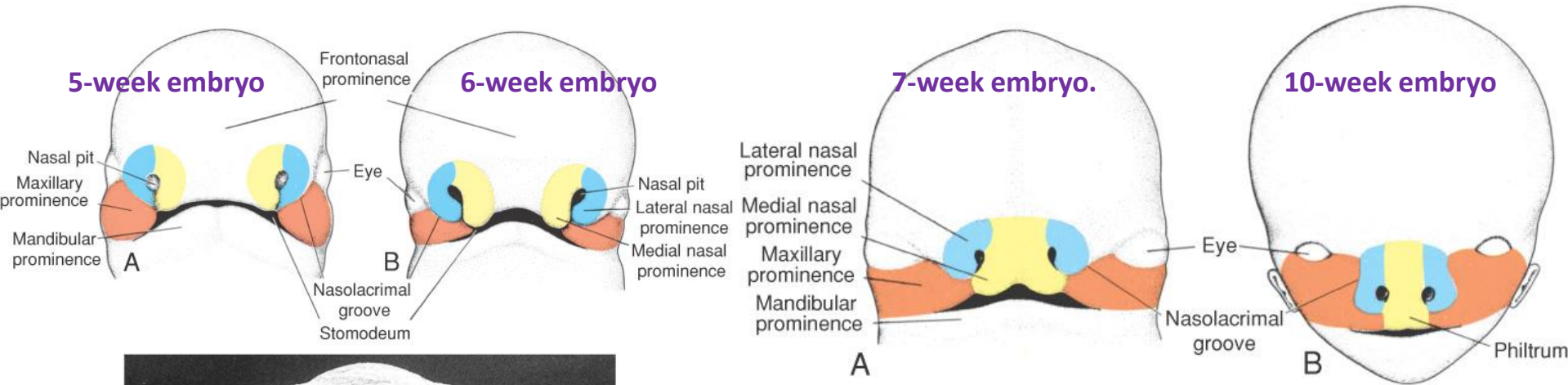


Veins in the nose essentially follow the arterial pattern. They are significant for their direct communication with the cavernous sinus and for their lack of valves; these features potentiated the intracranial spread of infection. Even with the abundant blood supply of the nose, smoking does compromise postoperative healing.

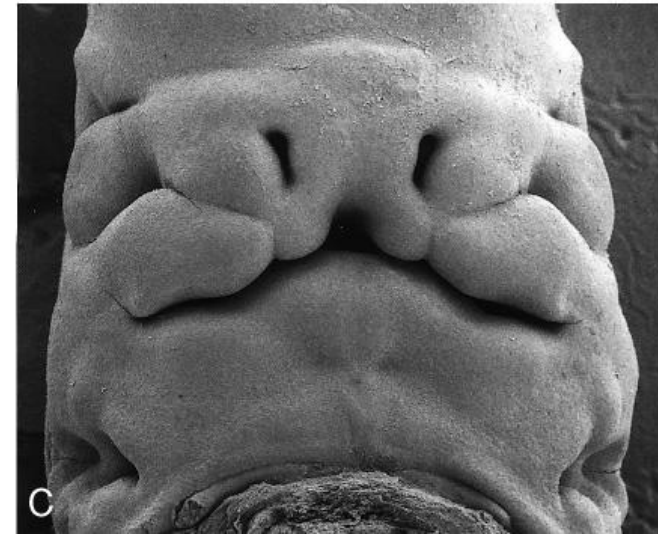
## IMPORTANT ANASTOMOSIS:

Between the **angular vein** and the **inferior ophthalmic vein** - a direct conduit towards the **cavernous sinus**

# DEVELOPMENT OF THE NOSE



The nasal prominences are gradually separated from the maxillary prominence by deep furrows.  
C. Scanning electron micrograph of a mouse embryo at a stage similar to that of B.

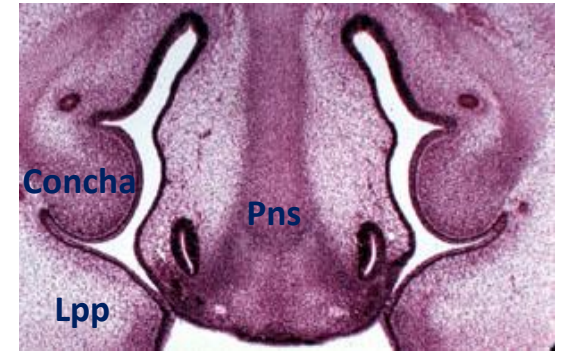
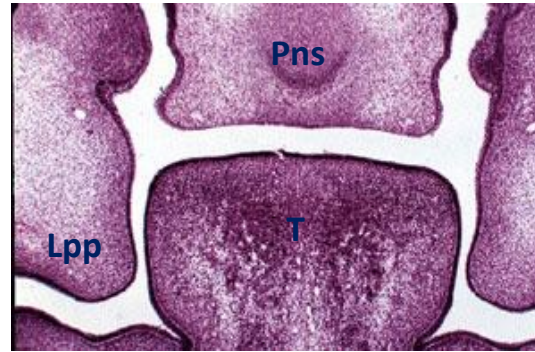
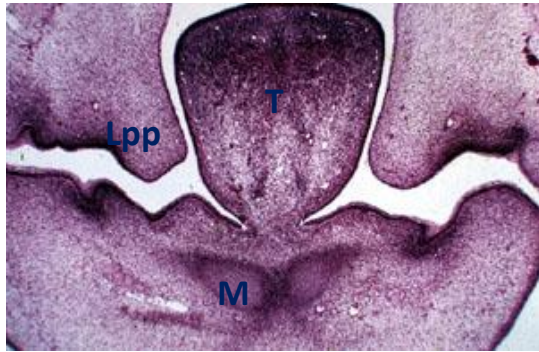


Maxillary prominences have fused with the medial nasal prominences. C. Scanning electron micrograph of a human embryo at a stage similar to that of A.

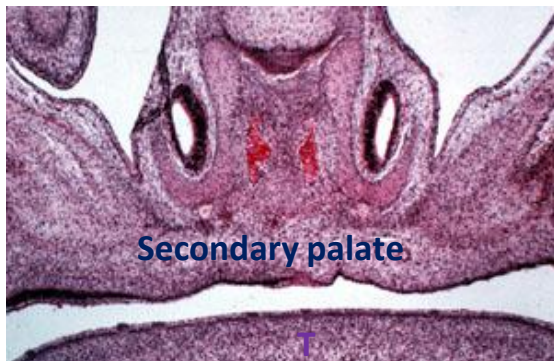
# DEVELOPMENT OF THE NASAL CAVITIES AND THE HARD PALATE

As the secondary palate is formed, the nasal septum grows inferiorly toward it.

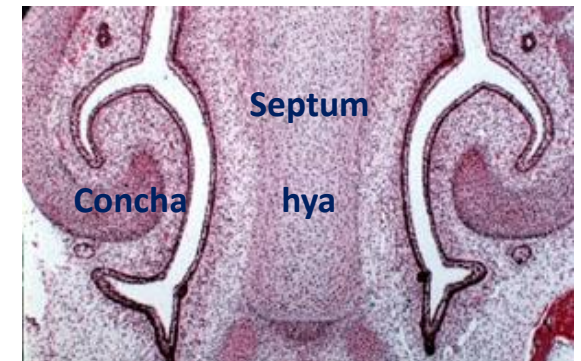
The nasal septum and the two palatine shelves unite to form separate right and left nasal chambers, an oral cavity, and the definitive choanae.



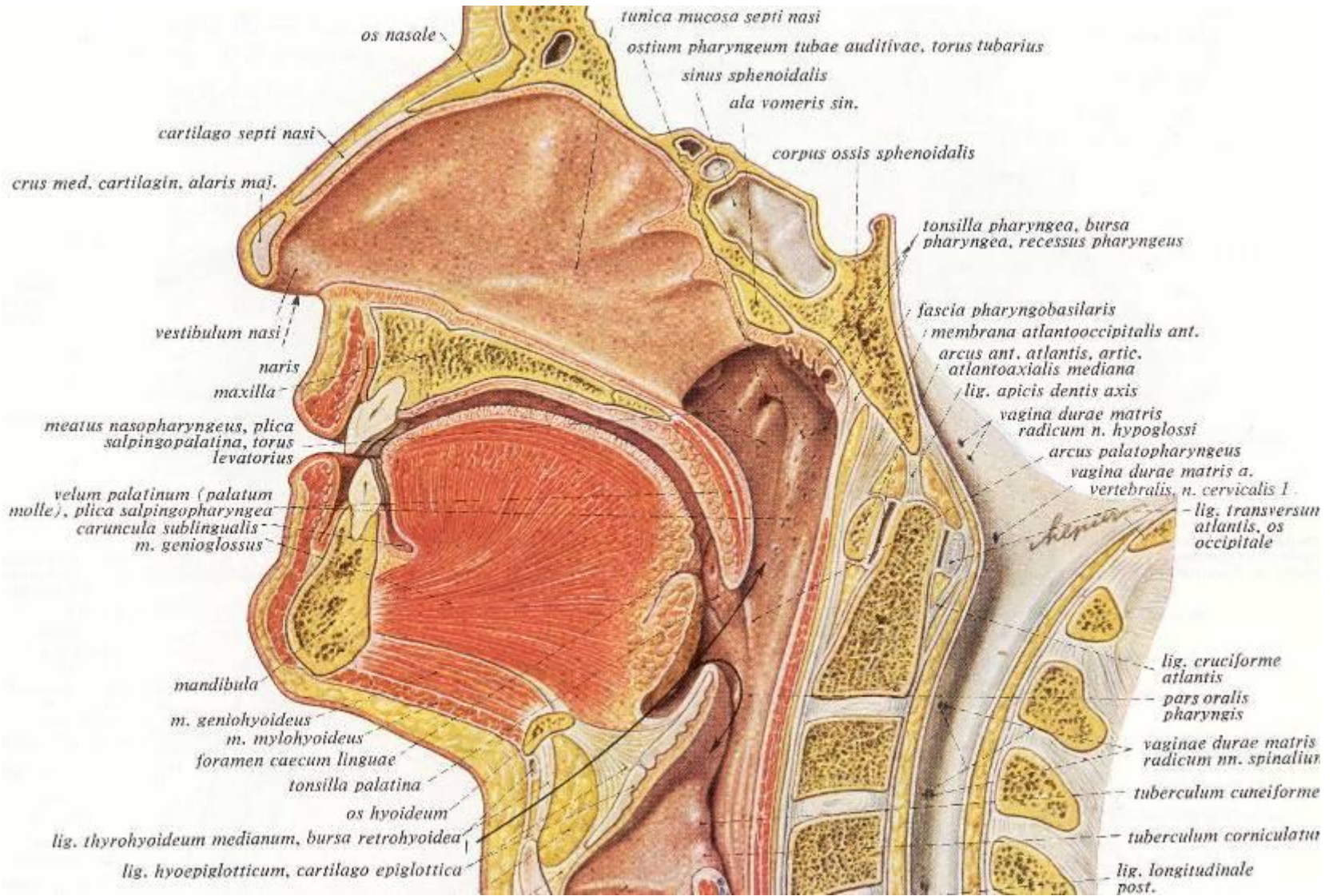
The tongue occupies the center of the stomodeum. The lateral palatine processes (palatal shelves) are located at the lateral borders of the tongue. The Meckel's cartilage, providing a template for the development of the mandible, is located at the base of the tongue. The primitive nasal septum descends.



By fusion the palate separates the nasal cavity from the oral cavity. Observe the fetal hyaline cartilage and the areas of intramembranous bone formation within the nasal septum which divides the nasal cavity into left and right chambers.

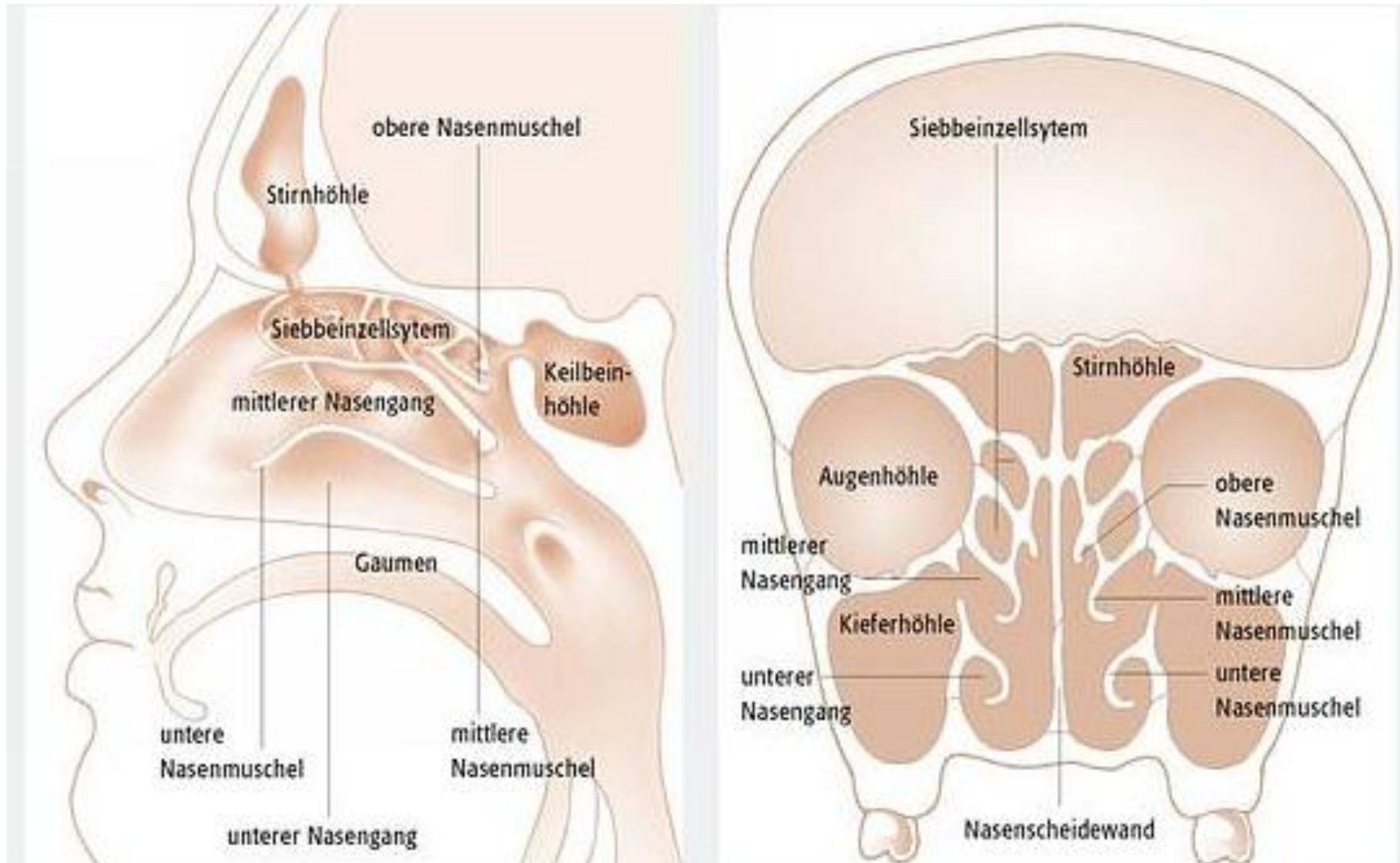


# TOPOGRAPHY OF THE NASAL CAVITY

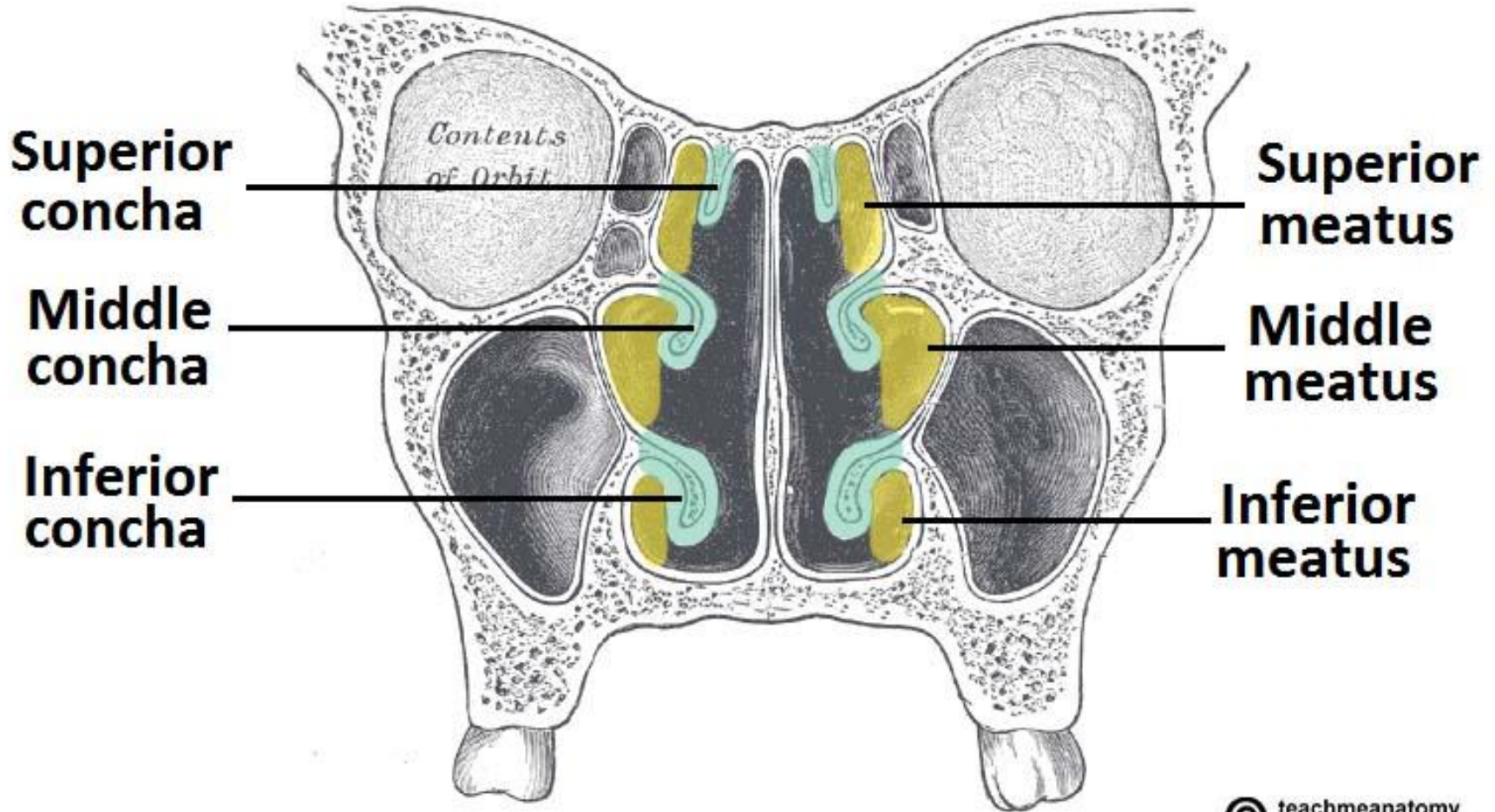




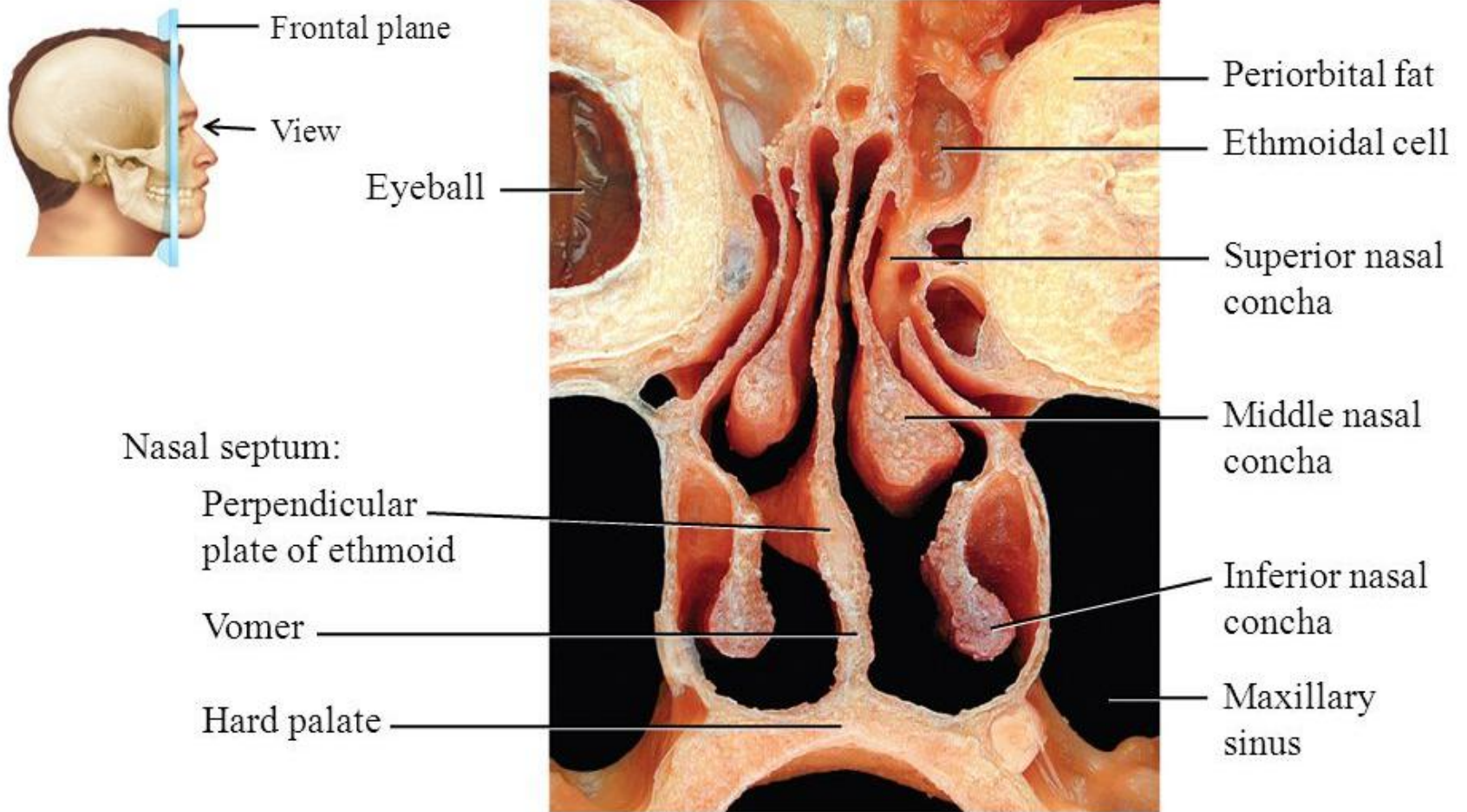
# TOPOGRAPHY OF THE NASAL CAVITY



# DIVISIONS OF THE NASAL CAVITY

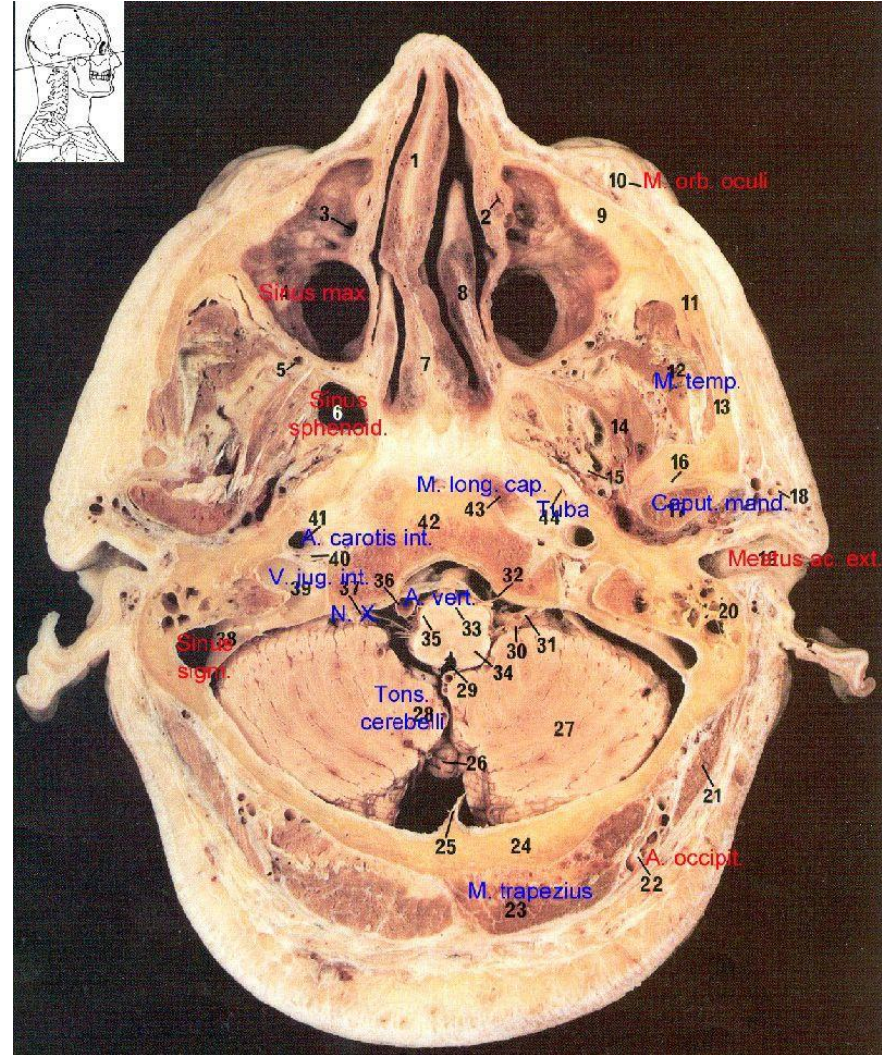
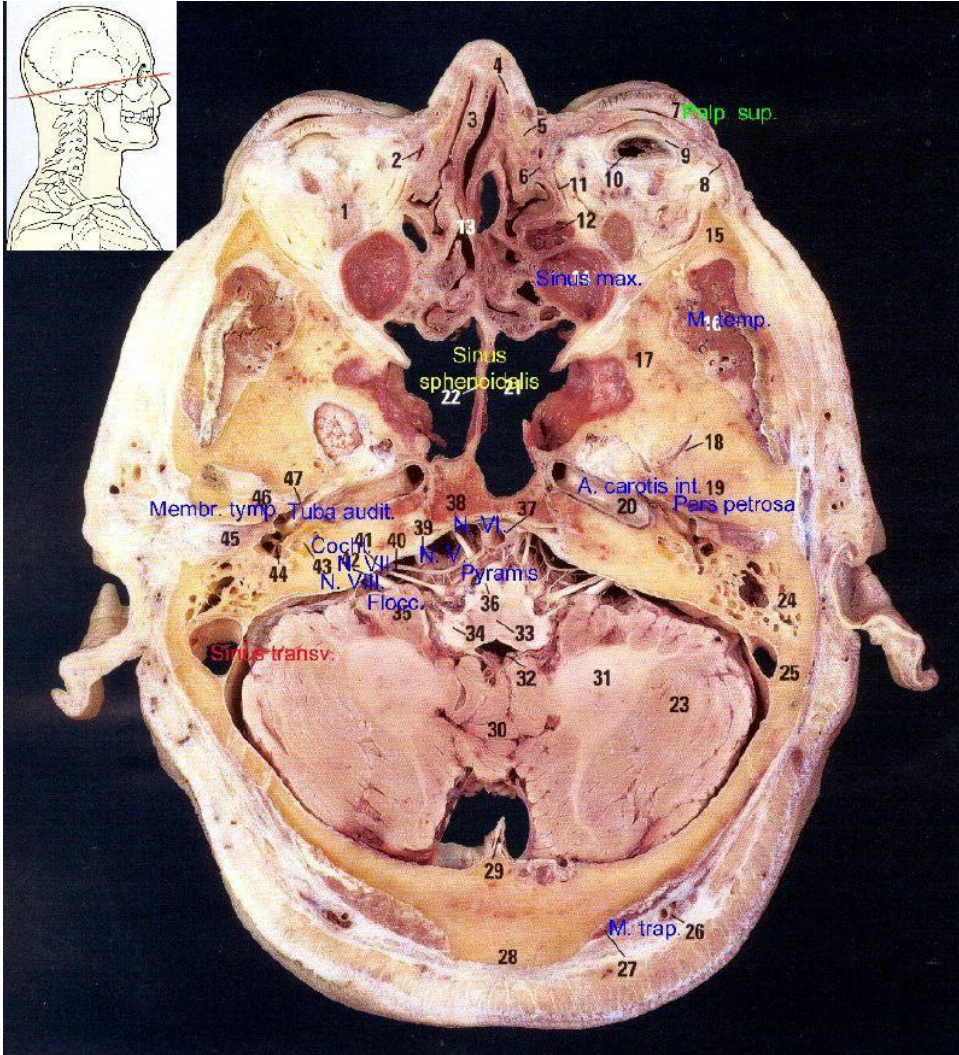


# DIVISIONS OF THE NASAL CAVITY

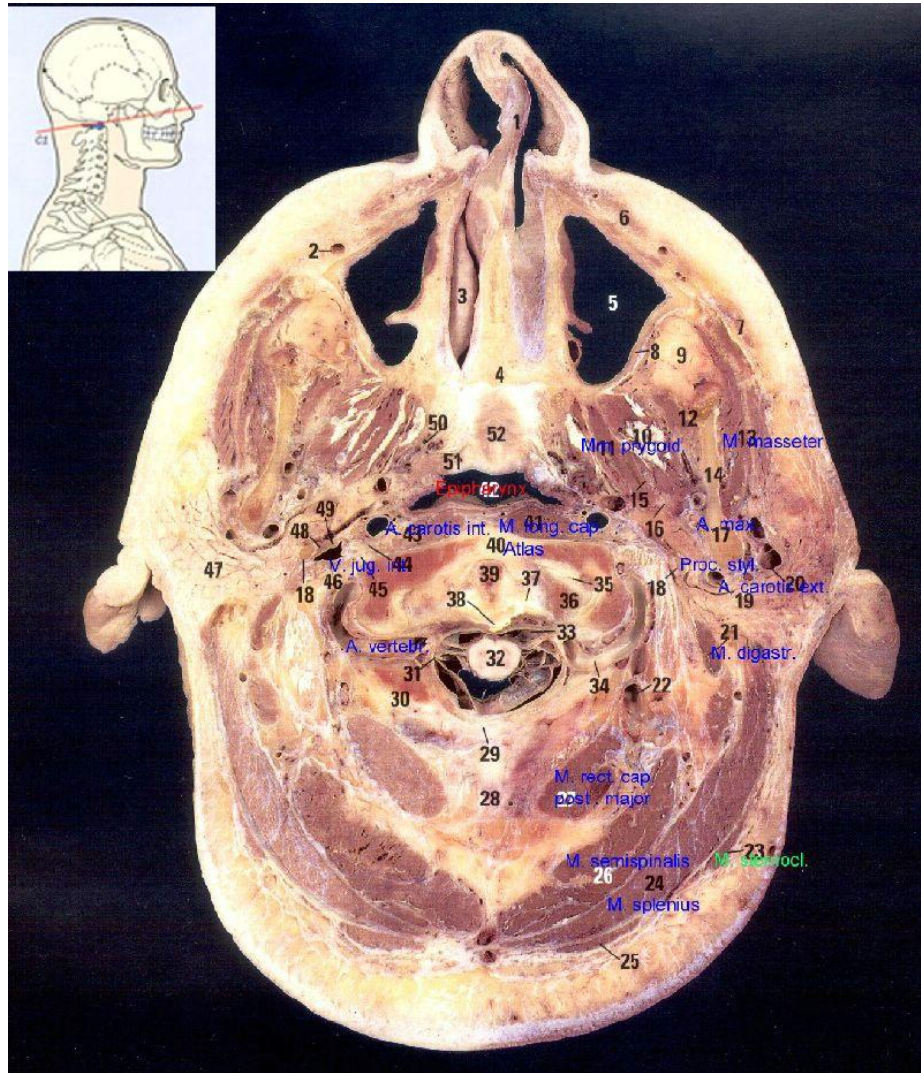
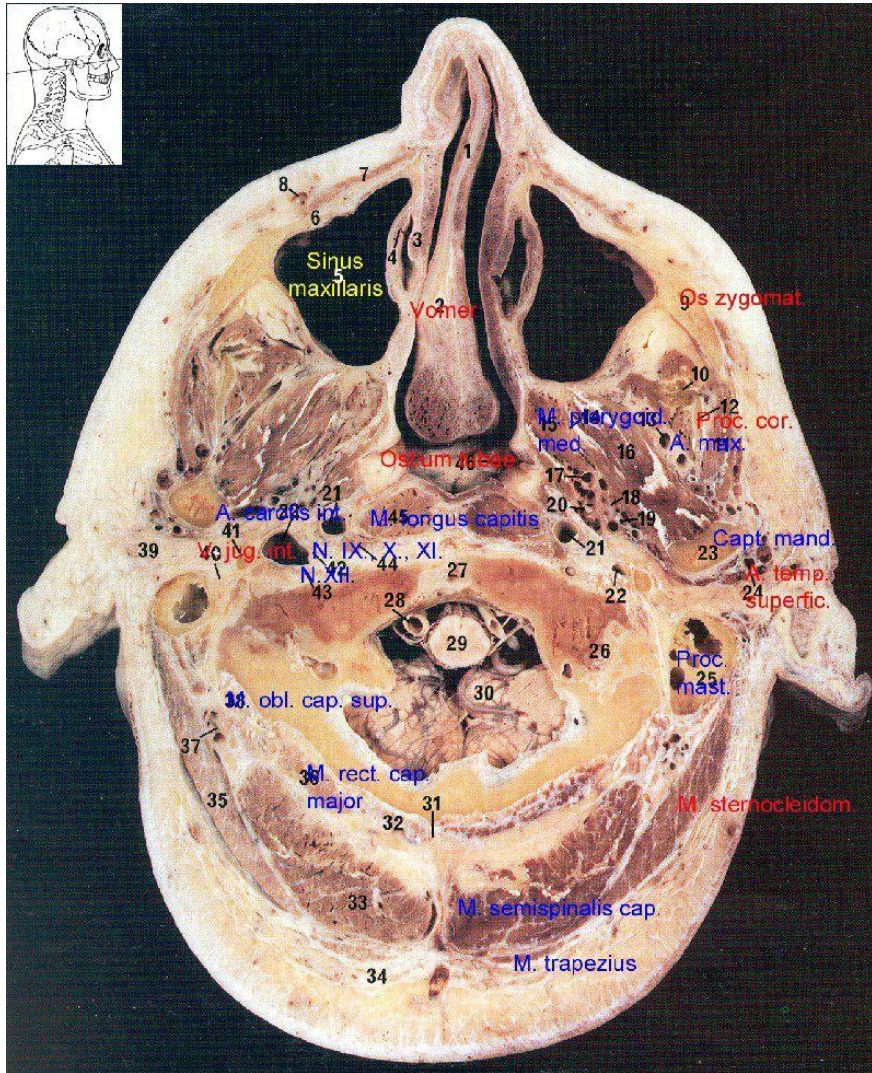


(c) Frontal section showing conchae

# CROSS SECTIONS



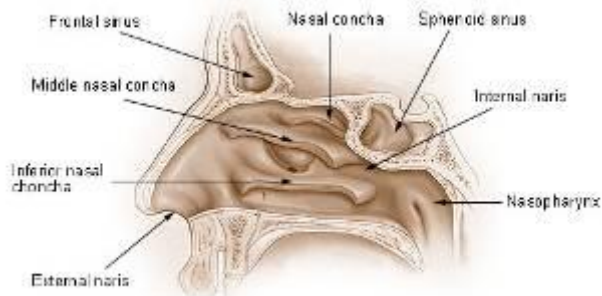
# CROSS SECTIONS



# THE NASAL CAVITY - INTERNAL FEATURES

Separated by the nasal septum - 2 halves

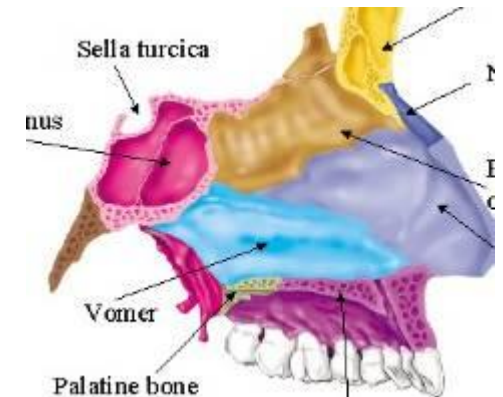
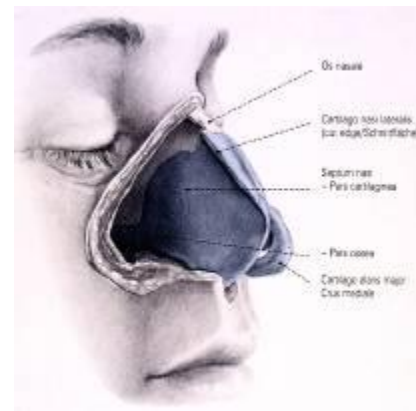
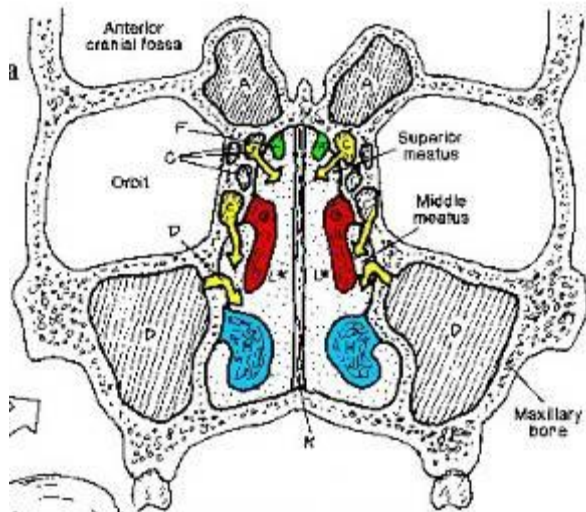
**Nose and Nasal Cavities**



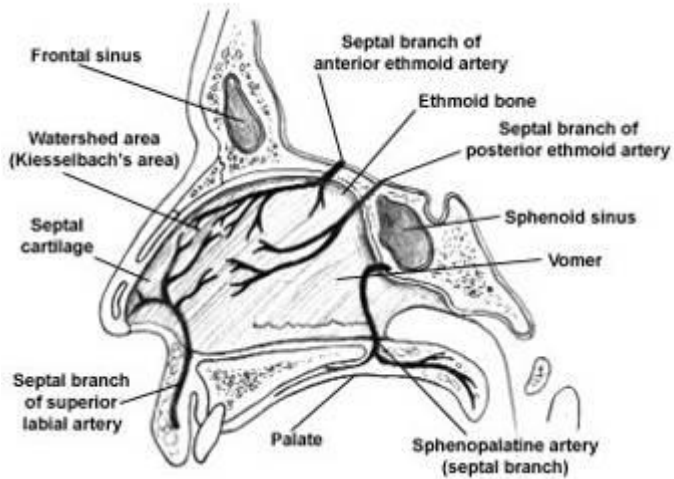
## NASAL SEPTUM

Composed of the **vomer**, the **perpendicular plate of ethmoid** and the **septal cartilage**.

Mucosa covering: respiratory epithelium upon lamina propria (*rich vascular supply!!*)

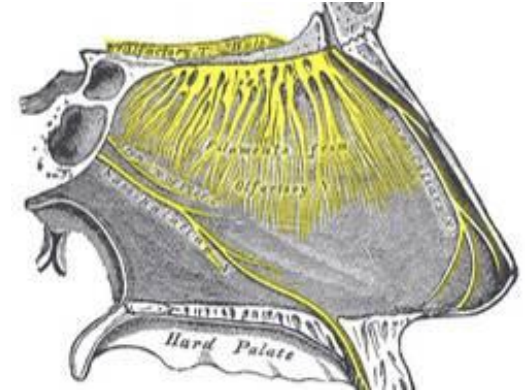


# NASAL CAVITY (MEDIAL WALL)



## INNERVATION

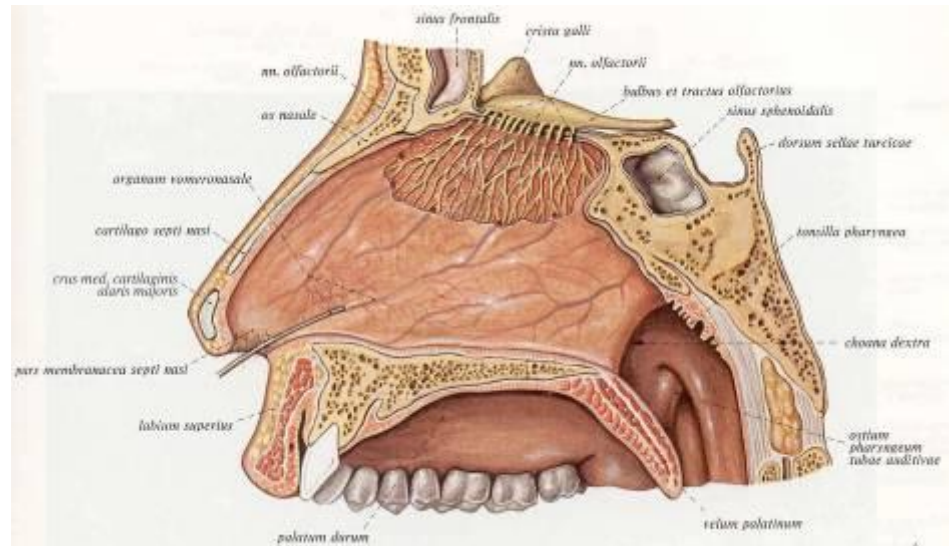
Medial (or septal) branches of the **nasociliary** and the **nasopalatine** nerves



## BLOOD SUPPLY

**sphenopalatine**  
**anterior and posterior ethmoid** arteries,  
**superior labial** artery (anteriorly) and the  
**greater palatine** artery (posteriorly).

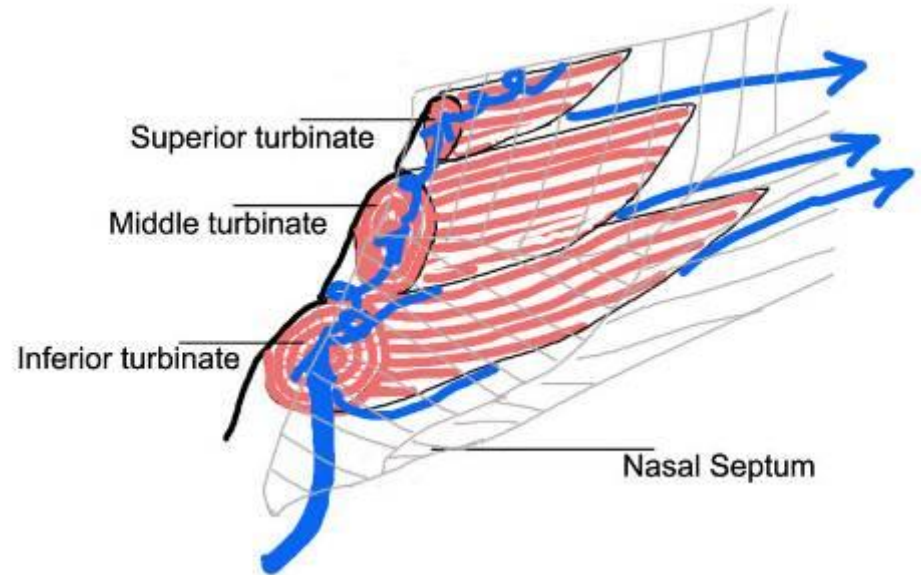
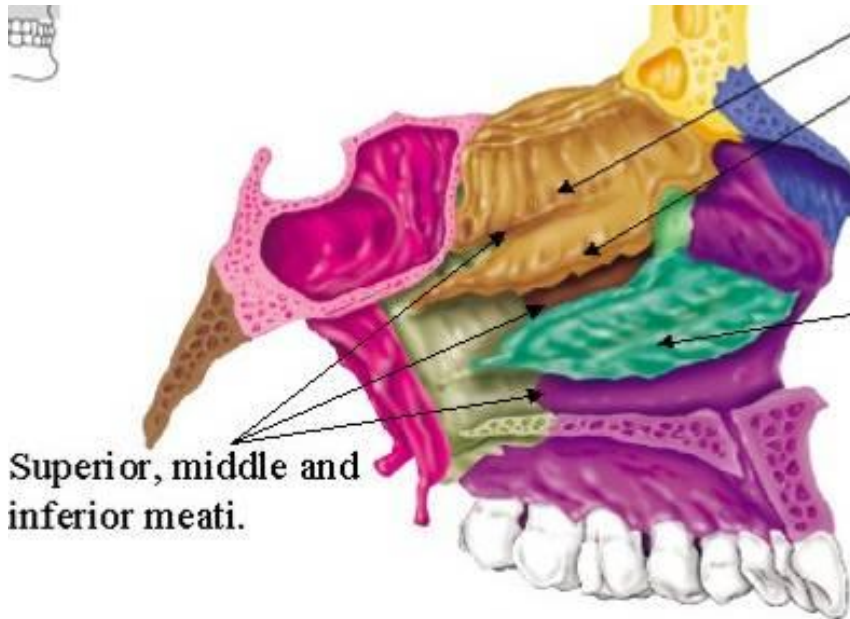
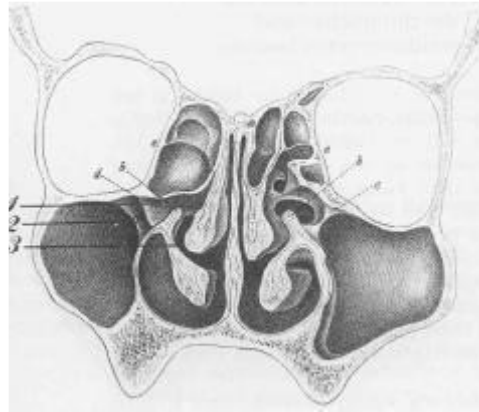
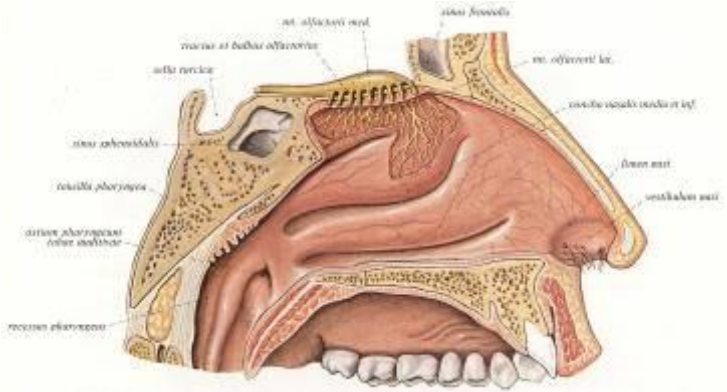
The Kiesselbach plexus, or the Little area, represents a region in the anteroinferior third of the nasal septum, where all 3 of the chief blood supplies to the internal nose converge.



## Vomeronasal organ of Jacobson

# NASAL CAVITY (LATERAL WALL)

3 conchae – 3 corresponding meatuses draining the paranasal sinuses

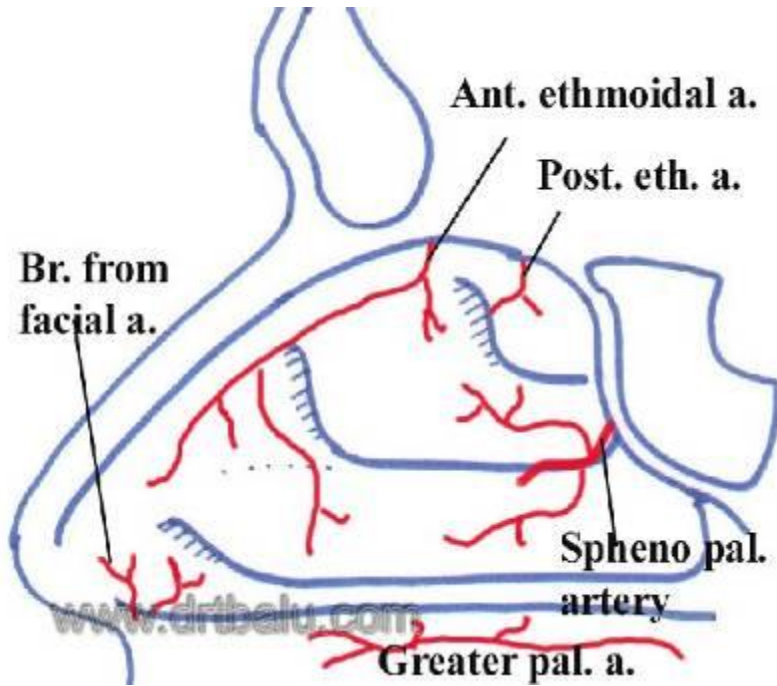






# NASAL CAVITY (LATERAL WALL)

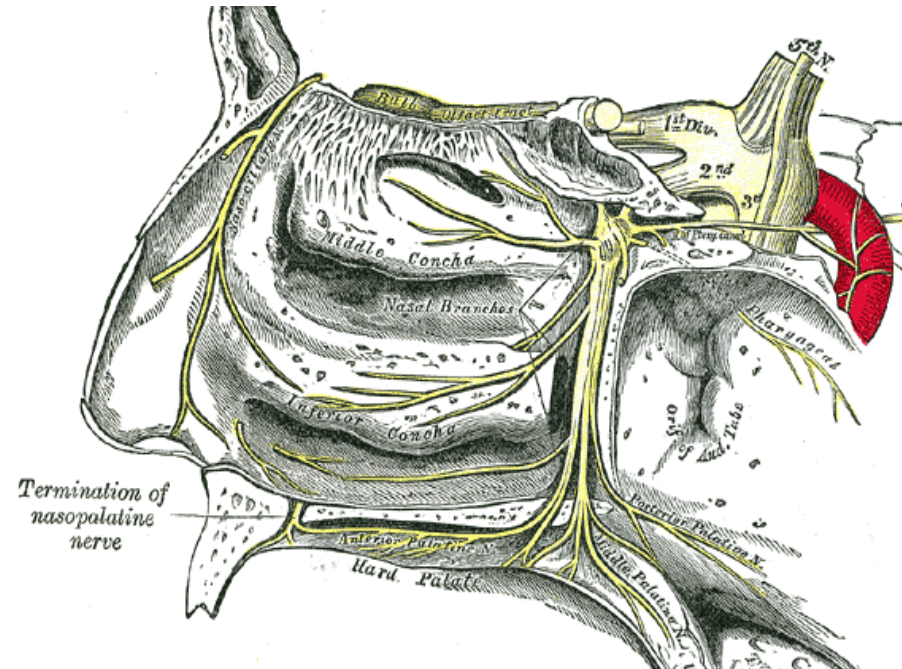
## BLOOD SUPPLY



Posterior: **sphenopalatine artery**  
superior: **anterior and posterior ethmoid arteries.**

## INNERVATION

Lateral branches of the nasociliary and the nasopalatine nerves

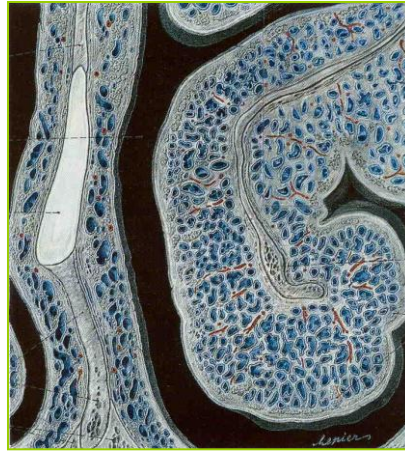


# HISTOLOGICAL FEATURES

## Nasal mucosa



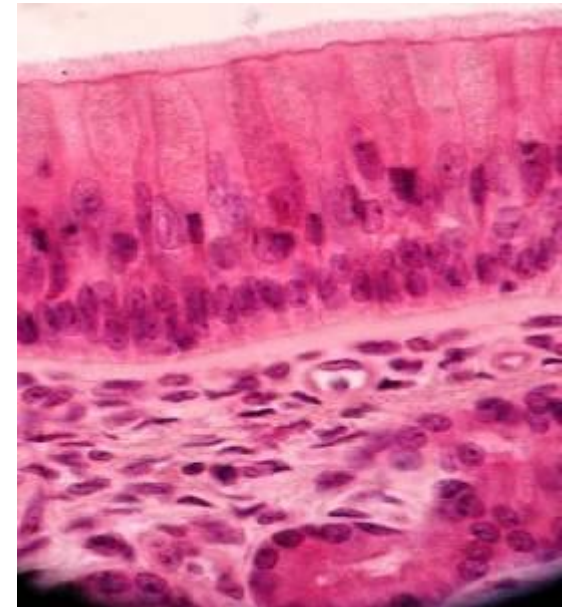
## Nasal concha



## Olfactory epithelium



- Thickness: 8 –12  $\mu\text{m}$
- Transport speed: 3 – 12 mm/s
- Daily secretory production: 200 g
- Emptying of all paranasal sinuses towards the pharynx
- Funktion of the nasal mucosa:
  - defence mechanisms (immune system)
  - moistenig and cleaning the air
  - olfaction



# MORPHOLOGY OF THE PARANASAL SINUSES

## FUNCTION

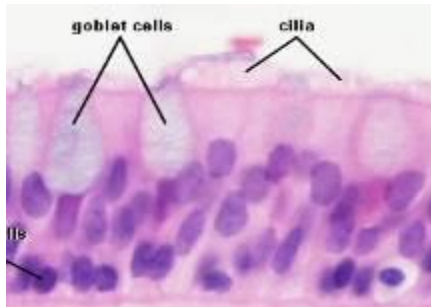
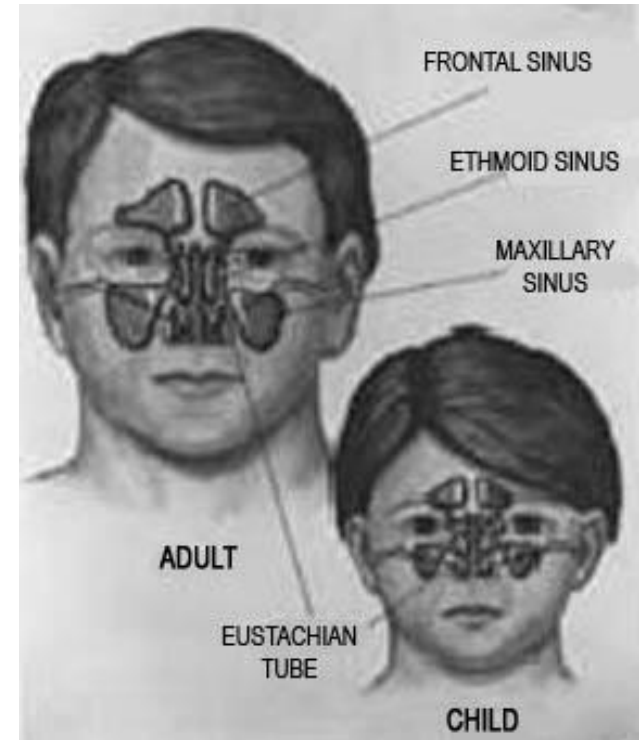
- Warming of the inspired air
- „Buffer”
- „Makes the head lighter”

## HISTOLOGY

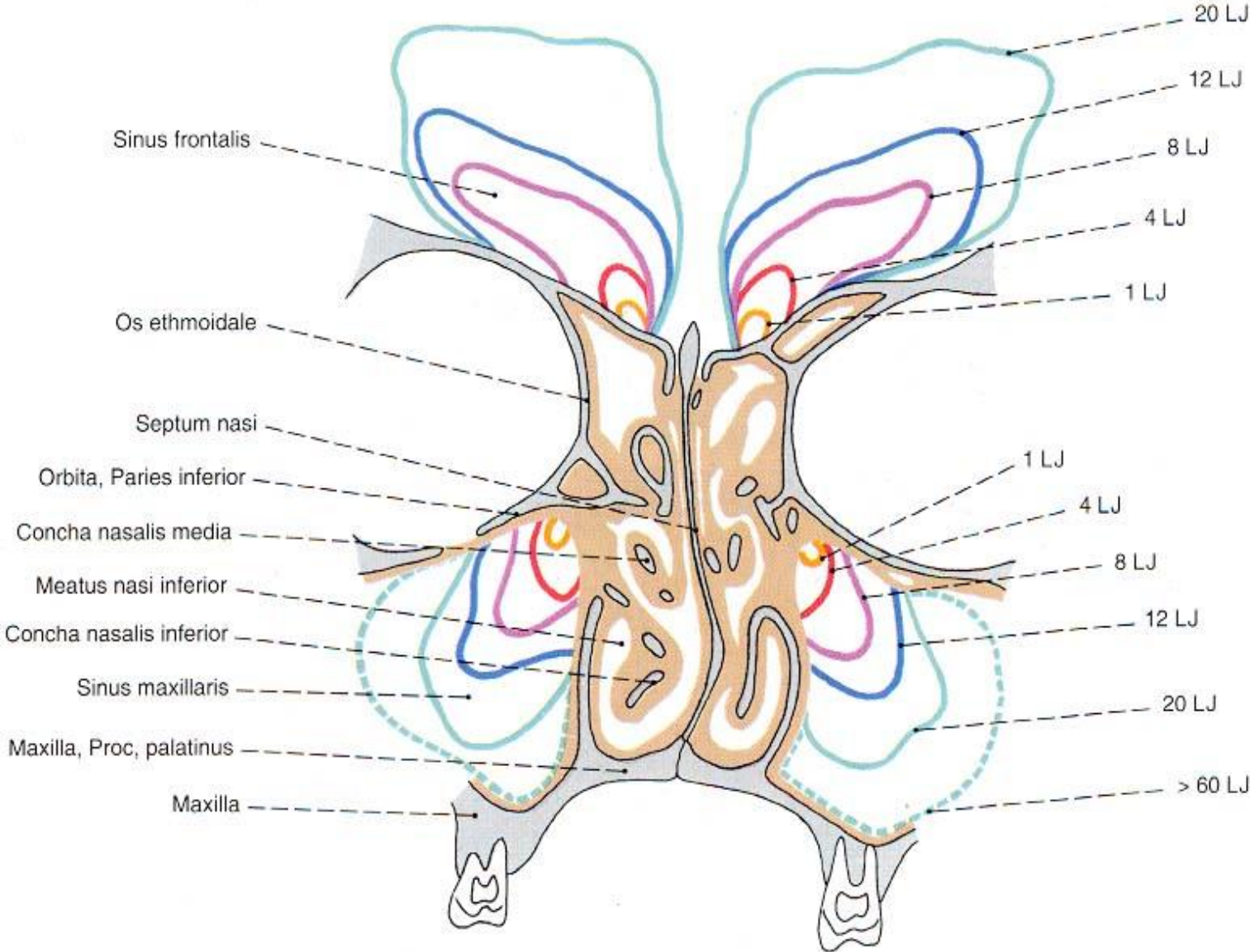
Respiratory epithelium upon lamina propria

Goblet cells

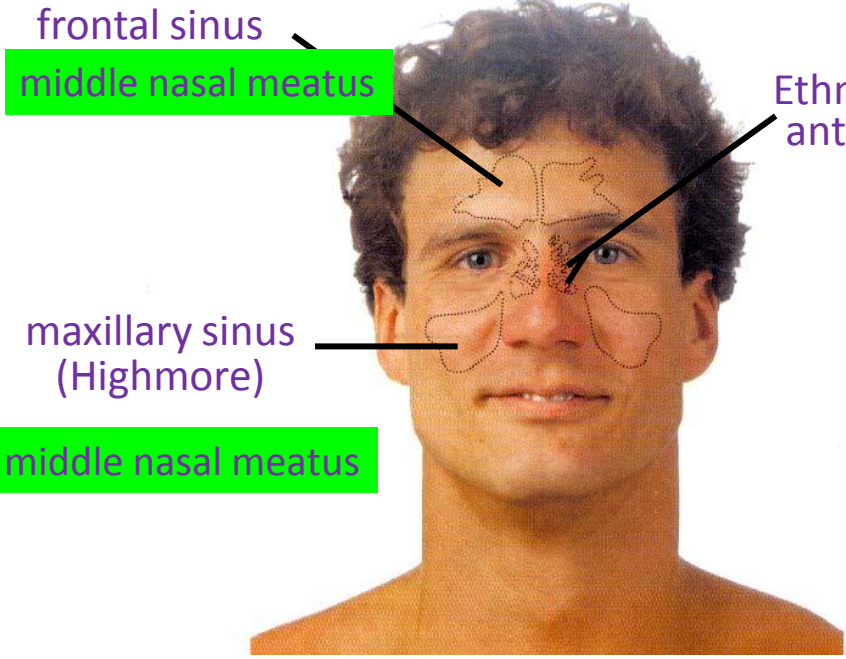
Mixed merocrine glands (seromucous)



# DEVELOPING SINUSES



# PARANASAL SINUSES



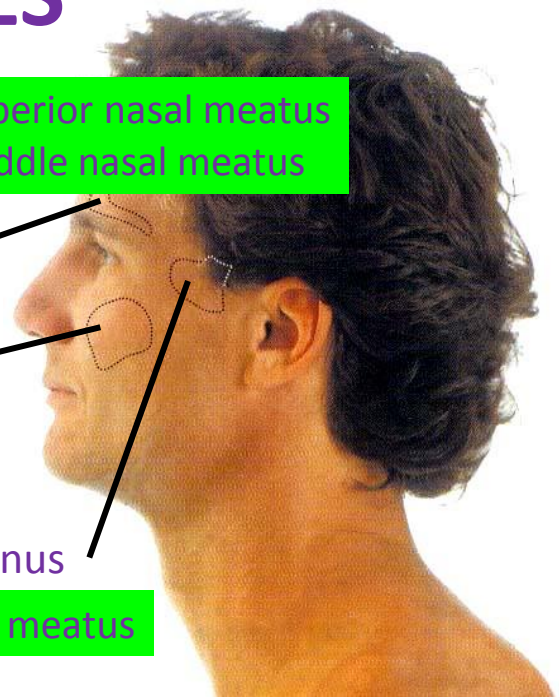
Ethmoidal air cells ant., medii, post.

- superior nasal meatus  
- middle nasal meatus

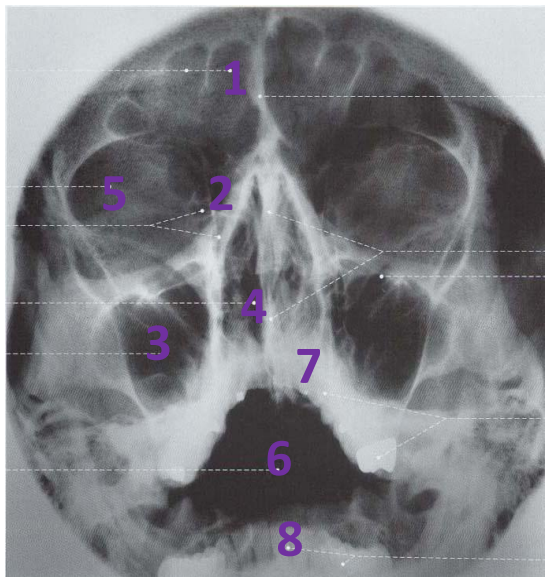
frontal sinus

maxillary sinus (Highmore)

sphenoidal sinus  
common nasal meatus

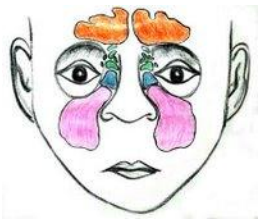


1. Frontal sinus
2. Ethmoidal air Cells
3. Maxillary sinus (Highmore)
4. Common nasal meatus
5. Orbit
6. Oral cavity proper
7. Superior teeth
8. Inferior teeth



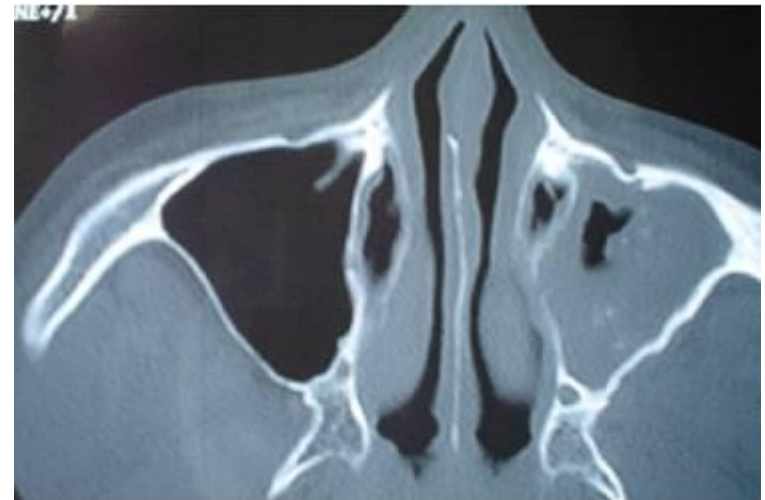
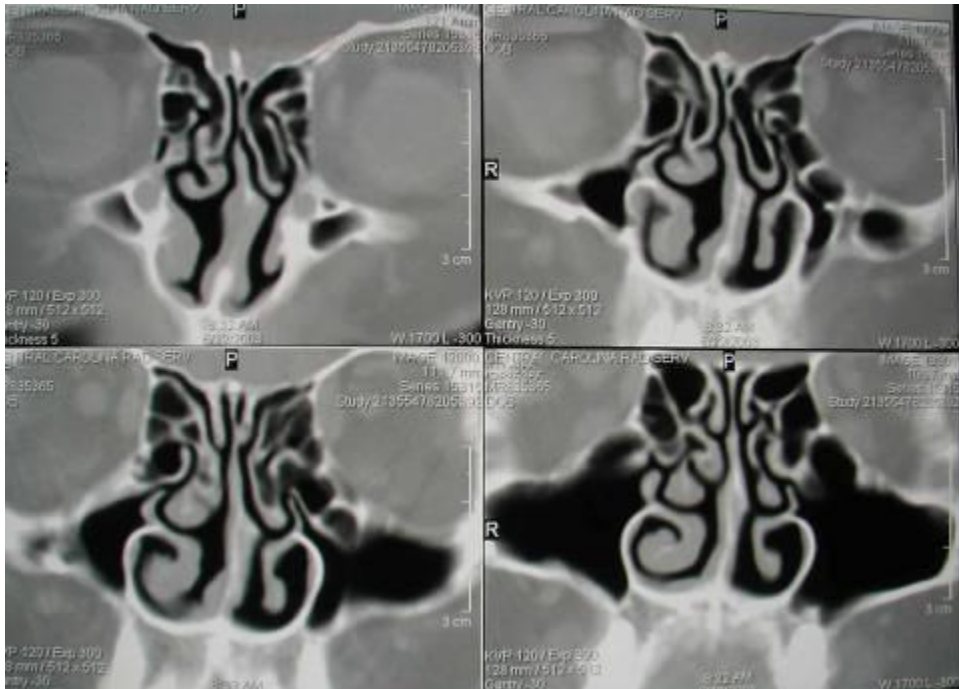
## Function:

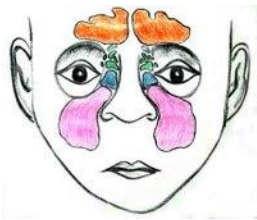
- reducing the weight of the skull by „employing” pneumatized bones
- resonator space for vocalization
- air conditioning



# MAXILLARY SINUS

The largest sinus (of Highmore)  
Opens via the semilunar hiatus  
Important topographical relation:  
Roots of the upper teeth and orbit

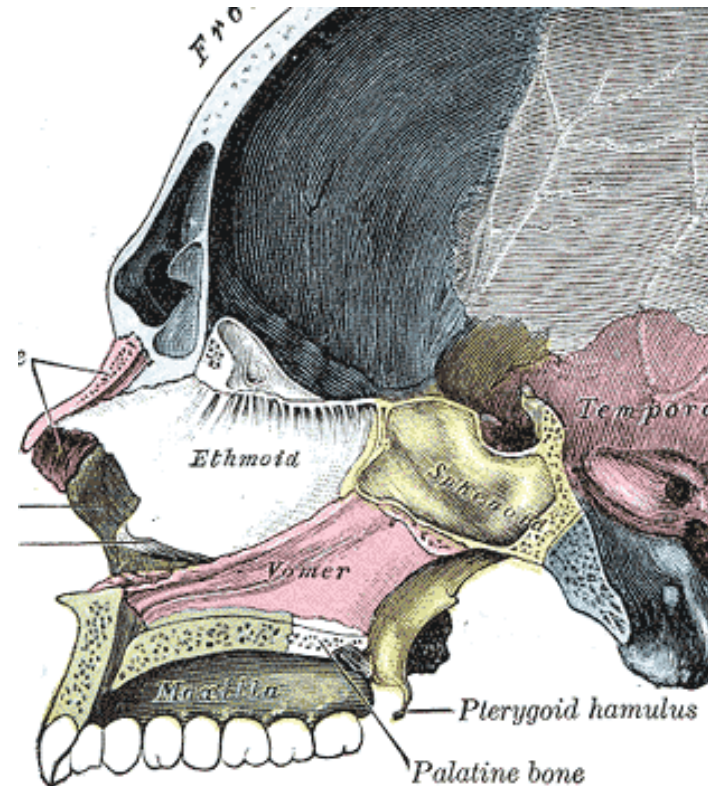
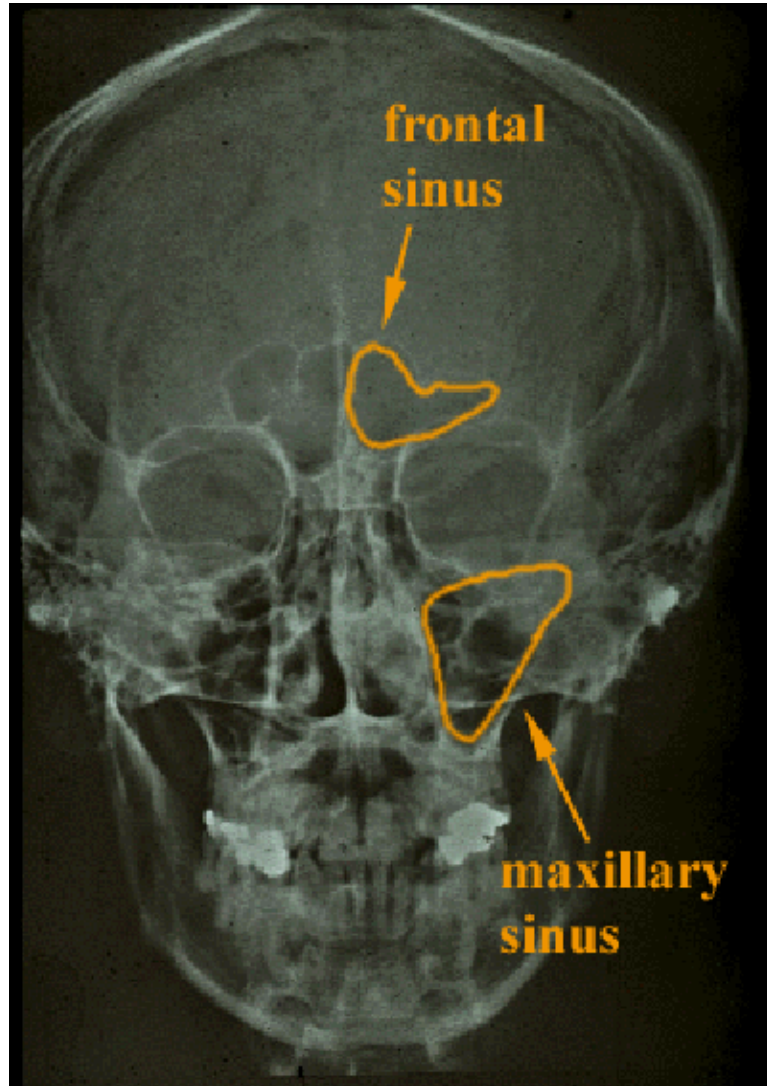




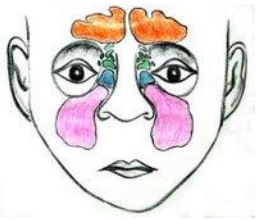
# FRONTAL SINUS

Opens via the ethmoidal infundibulum (frontonasal duct) at the semilunar hiatus (anterior aspect)

Innervation: supraorbital n.





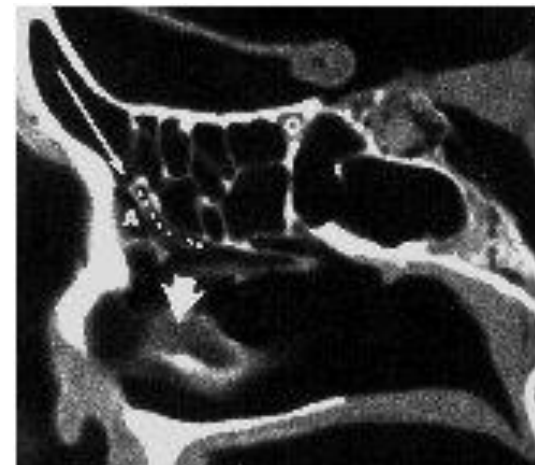
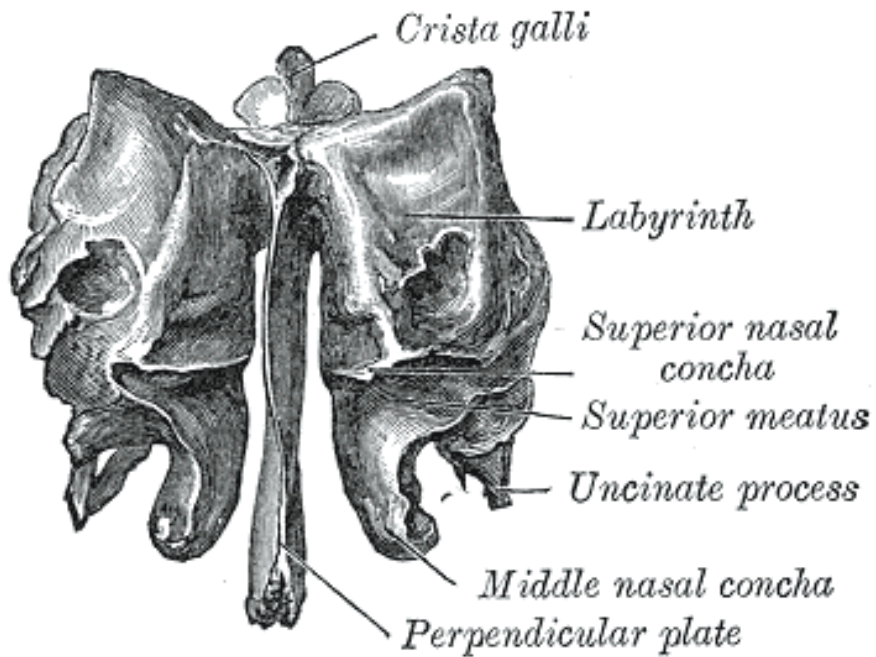


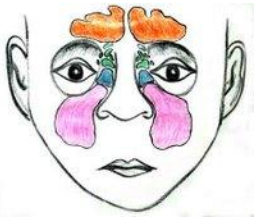
# ETHMOIDAL SINUS (LABIRYNTH)

## Numerous openings

- anterior and medial air cells – at the semilunar hiatus
- posterior air cells - superior nasal meatus

Innervation: branches of the maxillary n.



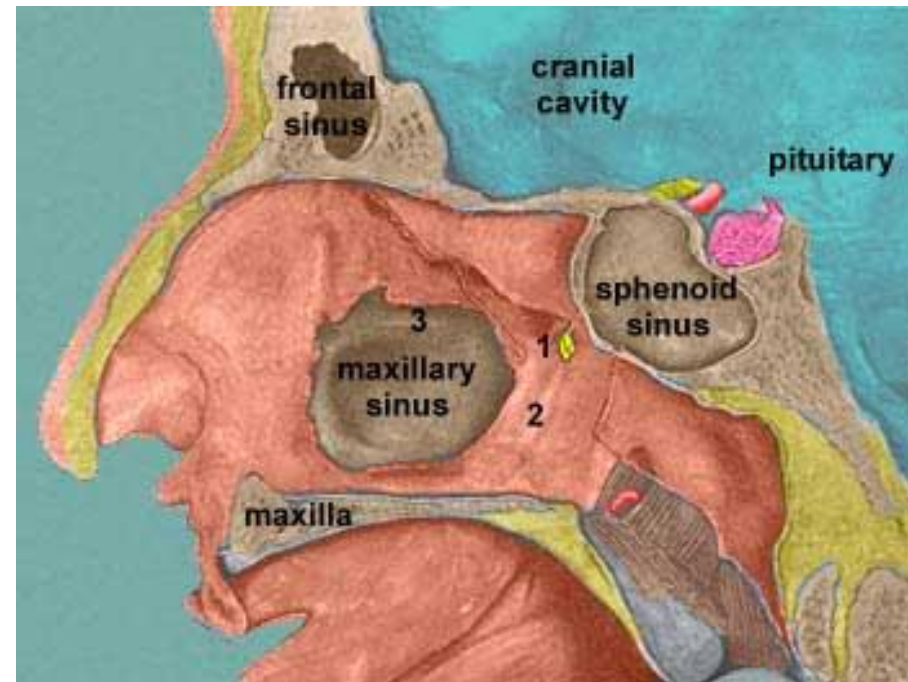
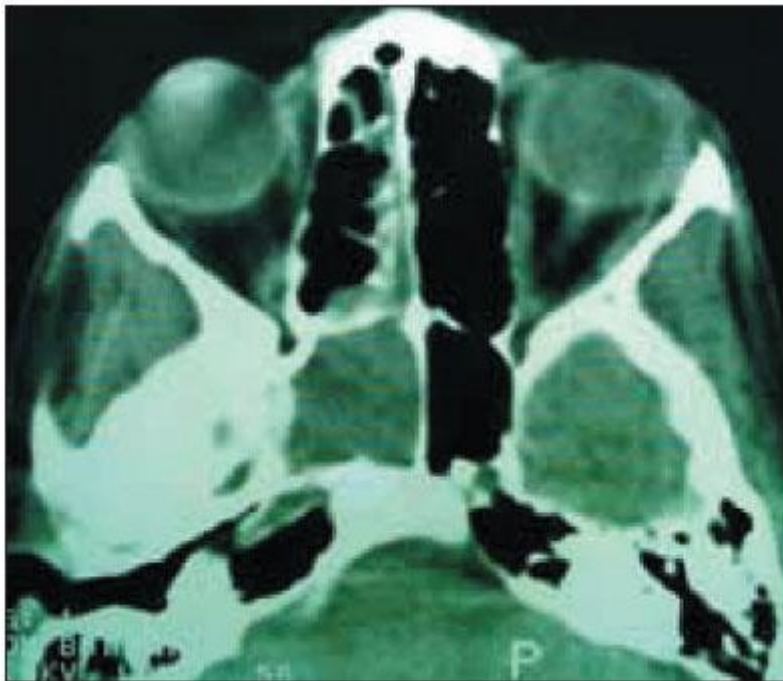


# SPHENOIDAL SINUS

Paired cavities in the body of sphenoid

Opens – through the aperture of the sphenoidal sinus – separately within the sphenoidal recess

Innervation: maxillary n.

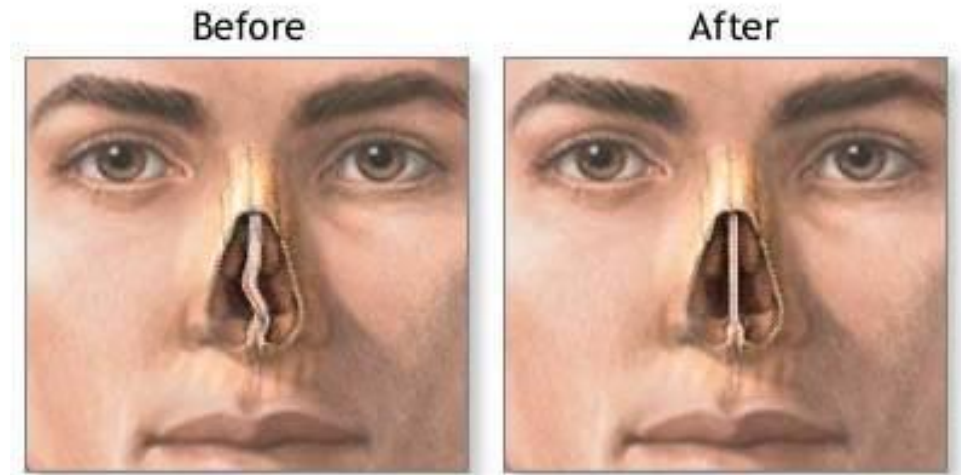


# REASONS FOR A BLOCKED NOSE

Nasal polypus



Septum deviation



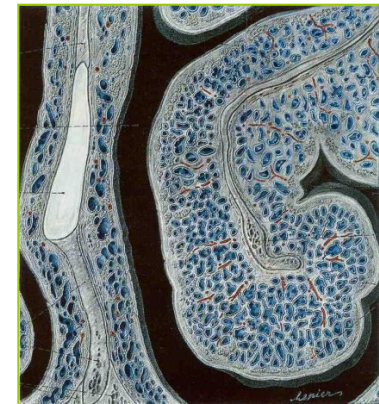
**Chronic swelling/enlargement of the conchae due to:**

Allergic rhinitis

Non-allergic or vasomotor rhinitis

Chronic nonspecific rhinitis

Abuse of nasal decongestant sprays



# ANATOMY OF SNORRING

Up to 93 dB (*current champion*) noise caused by vibration of:

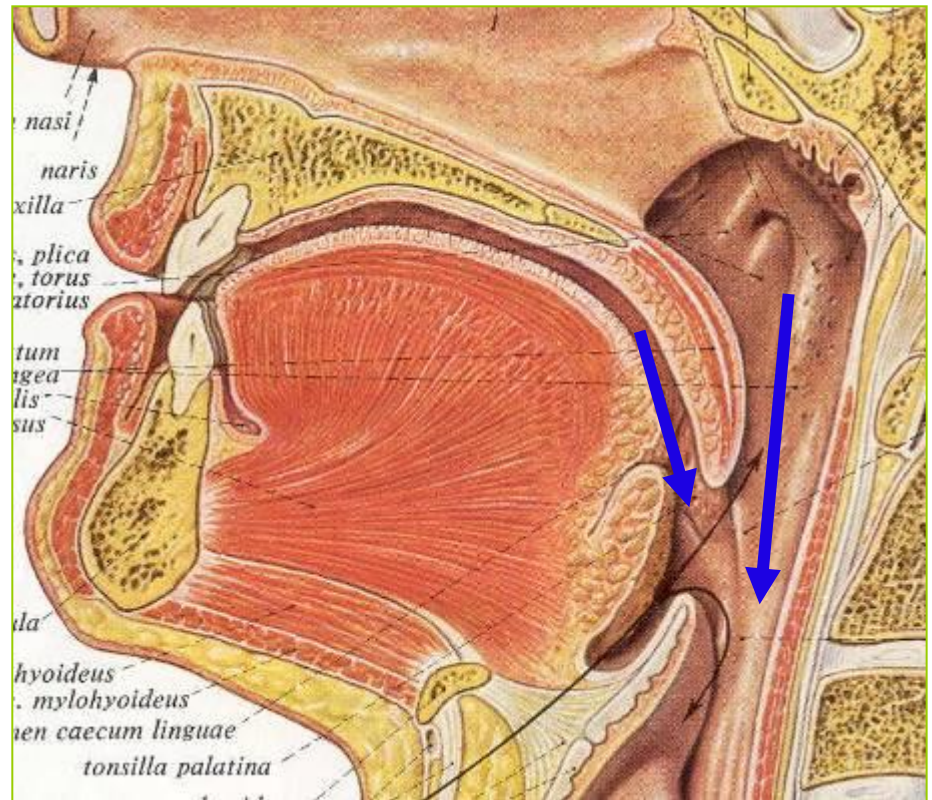
Soft palate

Uvula

Wall of pharynx

Root of the tongue

Epiglottis



Main courses of air

# TREATMENT OPTIONS

## CONSERVATIVE (SELF)TREATMENT

WEIGHT LOSS, Changes in the sleeping position (sides of the body)

Keeping to the correct biological day-night cycle,

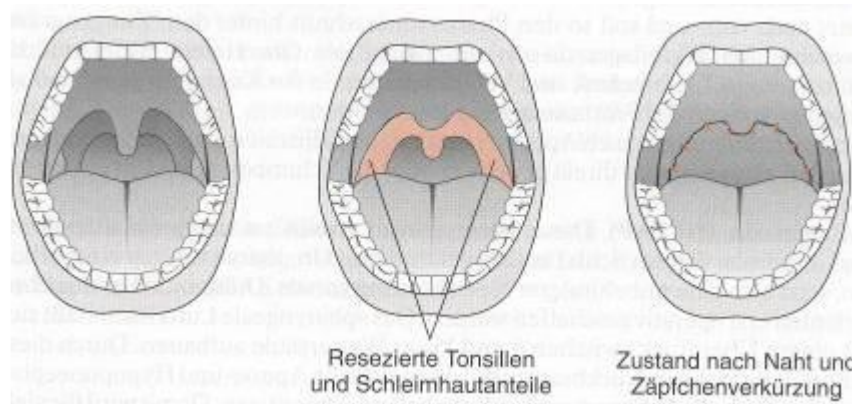
fewer alcoholic beverages,

less or no smoking, less or no sleeping pills

## SURGICAL TREATMENT

**UPPP (Uvulo-palato-pharyngo-plastic surgery)**

**LAUP (Laser-assisted Uvulo-palato-plastic surgery)**





**THANK YOU FOR YOUR ATTENTION**