

Morphology of the nasal cavity and paranasal sinuses

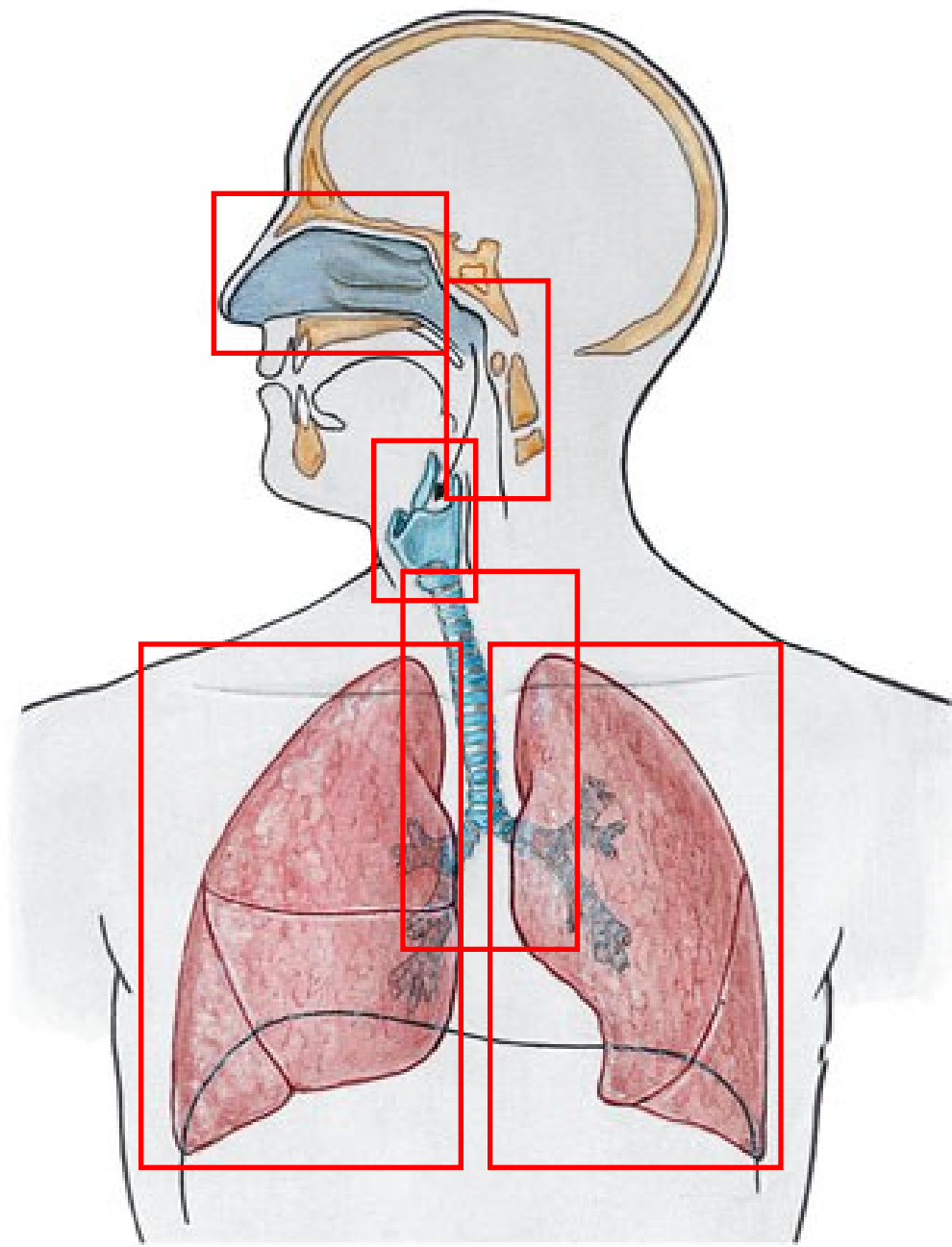
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Respiratory system

- gas exchange
 - (external respiration: between pulmonary circulation and air)
- respiratory tracts
- vocalization



Respiratory tract:

-upper:

nasal cavity

paranasal sinuses

pharynx (*naso-, oro-, laryngopharynx*)

-lower:

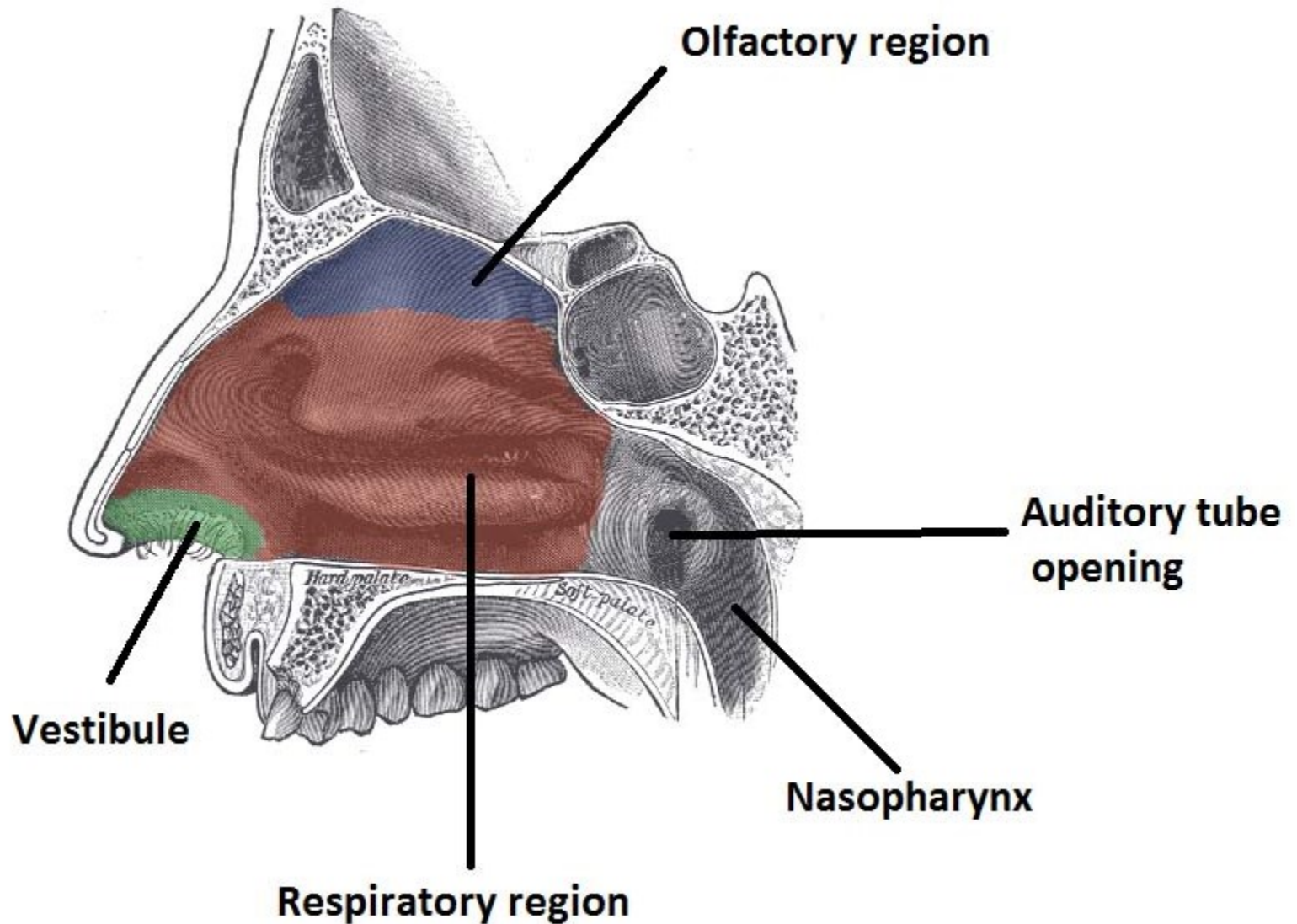
larynx

trachea

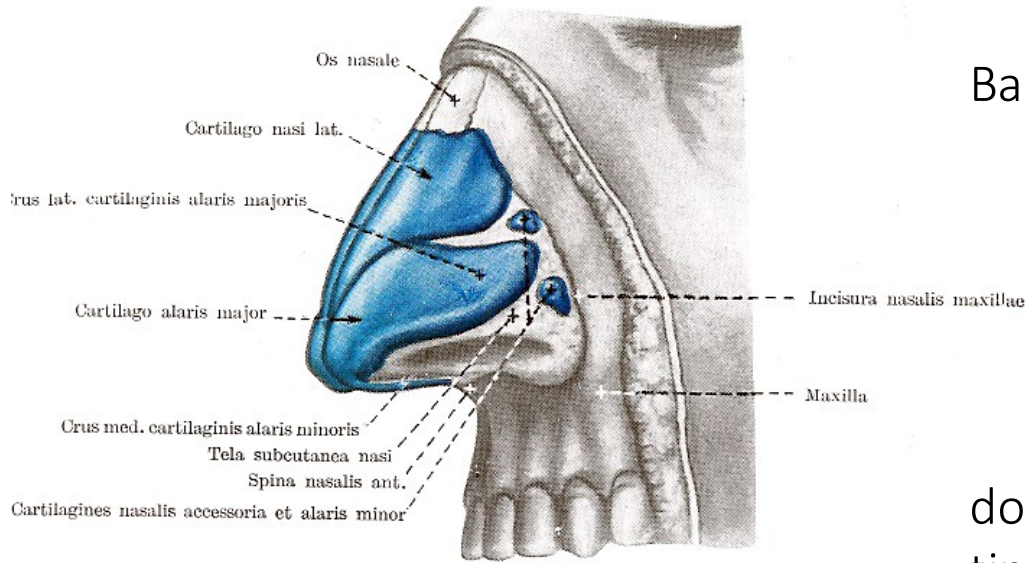
main bronchi

bronchial system

Nasal cavity



External nose

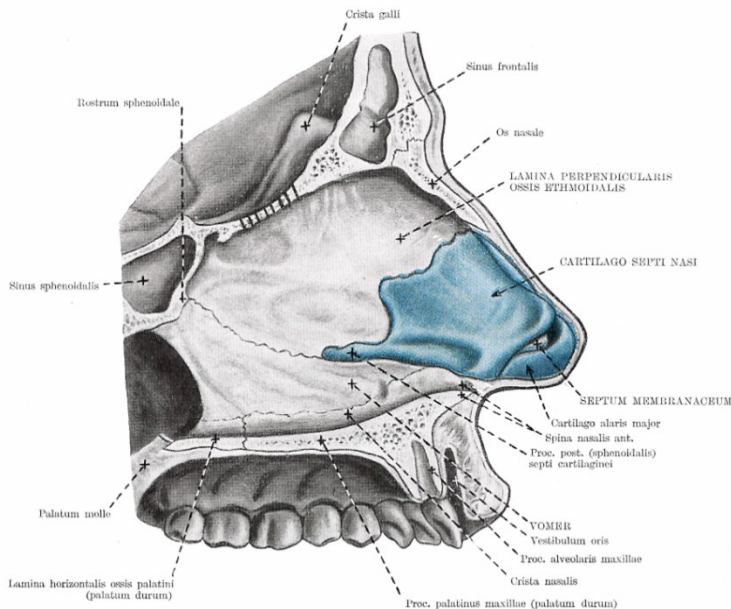


Basis:

- cartilage
 - lateral cartilage*
 - alar cartilage*
 - septal cartilage*
- bone (*nasal bone*)
- dense irregular connective tissue

dorsum
tip/apex
nares/nostrils
ala nasi
septum

cartilaginous part
bony part

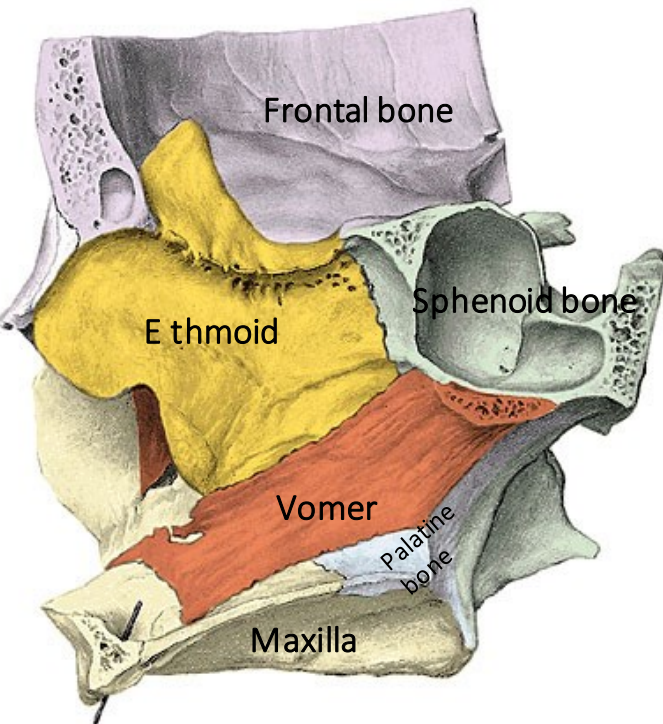


Skin (mimetic/ facial muscles: by forced respiration the ala nasi is moving!)

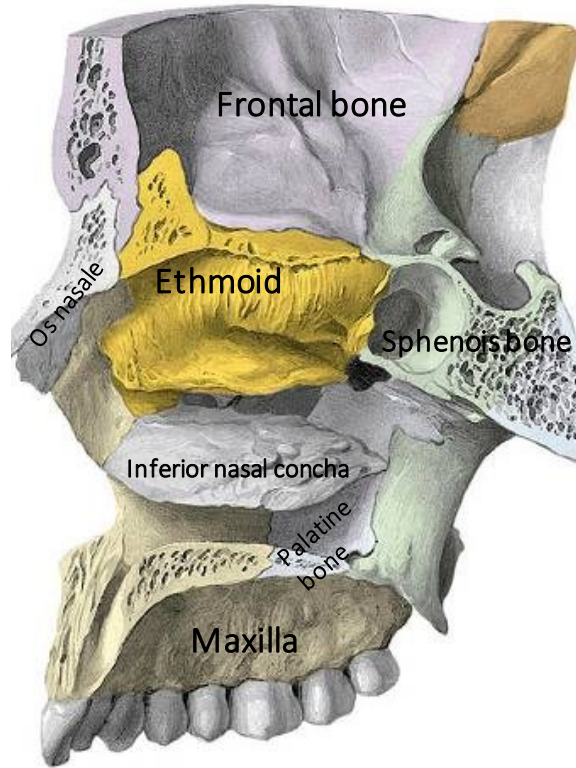
Nasal cavity

Warming and moistening of inspired air, mucociliary transport, mucosal barrier (defence mechanism), resonance, smell, reflexes

Medial wall



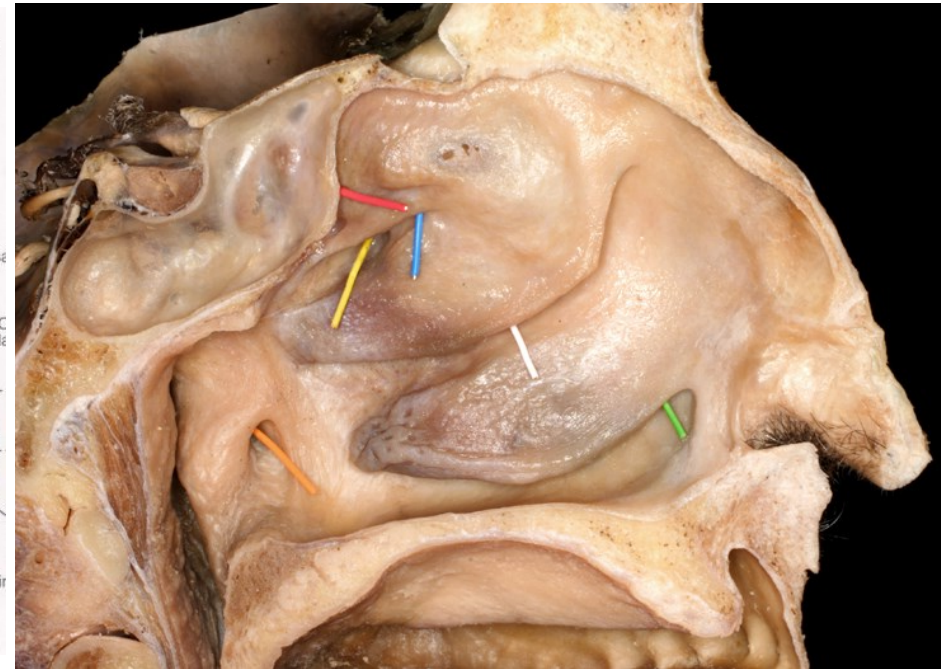
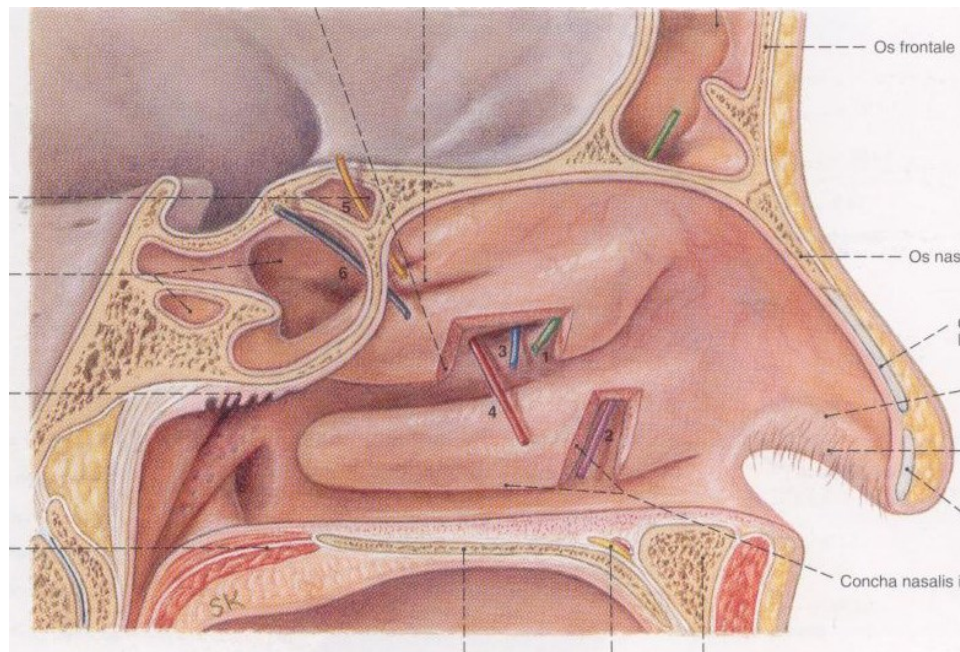
Lateral wall



Frontal view



Nasal meatuses



Common nasal meatus

- piriform aperture
- cribriform plate
- incisive canal
- sphenopalatine foramen
- aperture of the sphenoidal sinus
sphenothmoidal recess
- choanae

Superior nasal meatus

- posterior air cells of the ethmoid

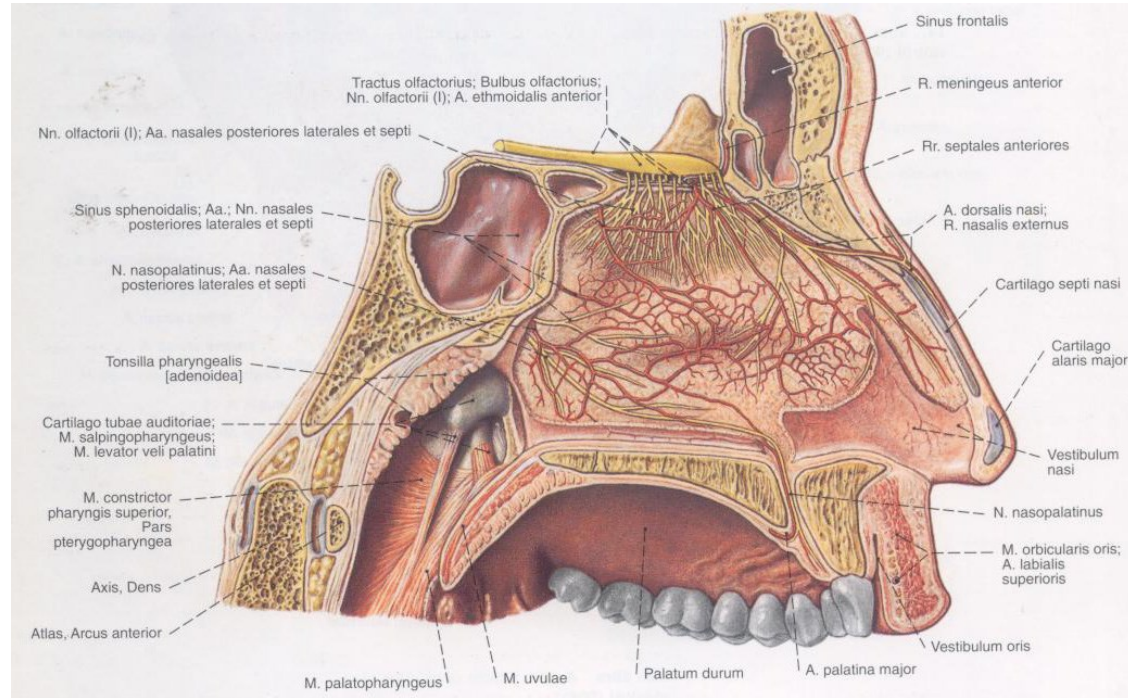
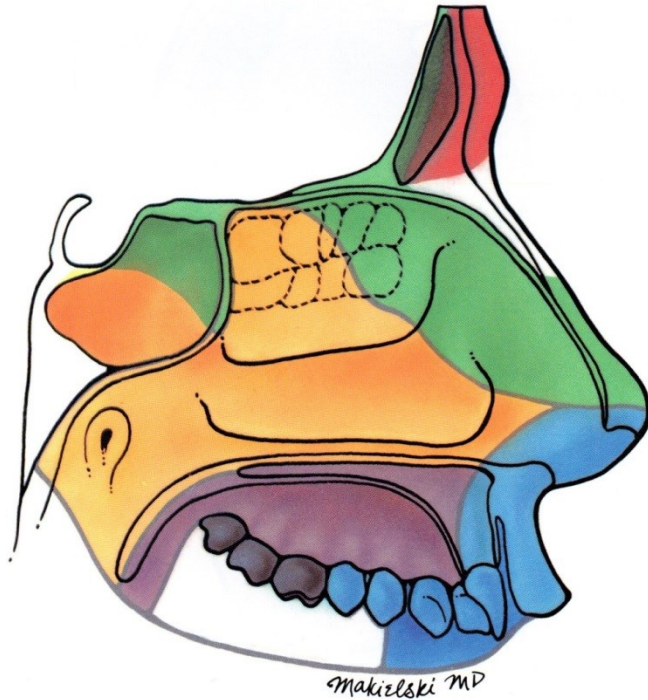
Medial nasal meatus

- semilunar hiatus:
ethmoidal infundibulum, aperture for the maxillary sinus,
anterior and medial air cells of the ethmoid

Inferior nasal meatus

- nasolacrimal duct

Innervation



Ant. ethmoidal nerve (branch of the nasociliary nerve V/1)

Sphenopalatine nerve (V/2)

Infraorbital nerve (V/2)

Ant. and med. sup. alveolar nerve (branch of the infraorbital nerve)

Post. sup. alveolar nerve (branch of the infraorbital nerve)

Olfactory nerve

Lymphnodes

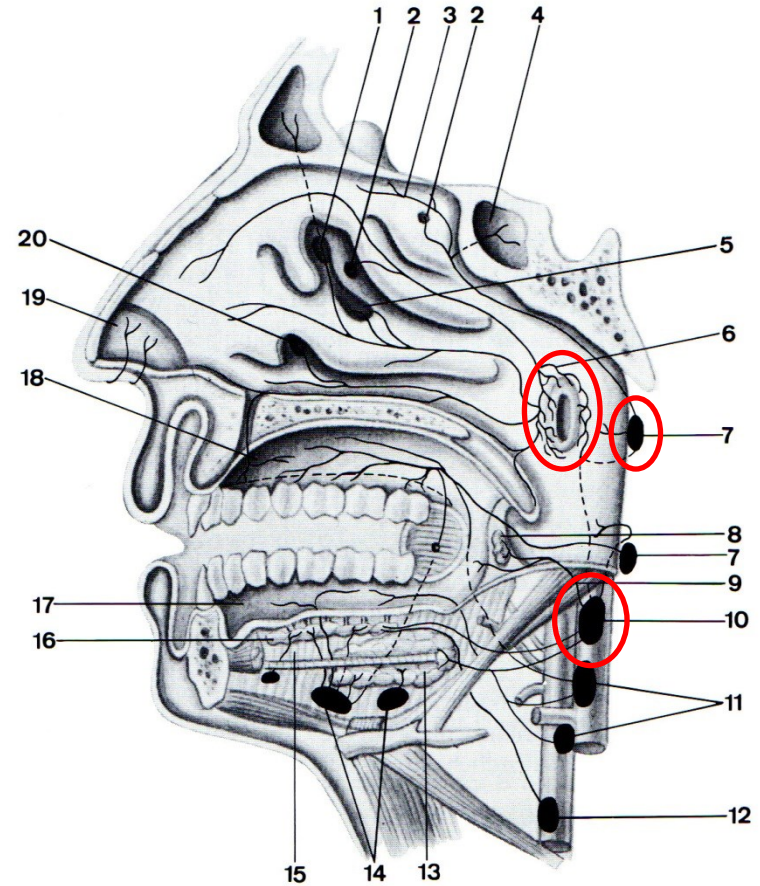
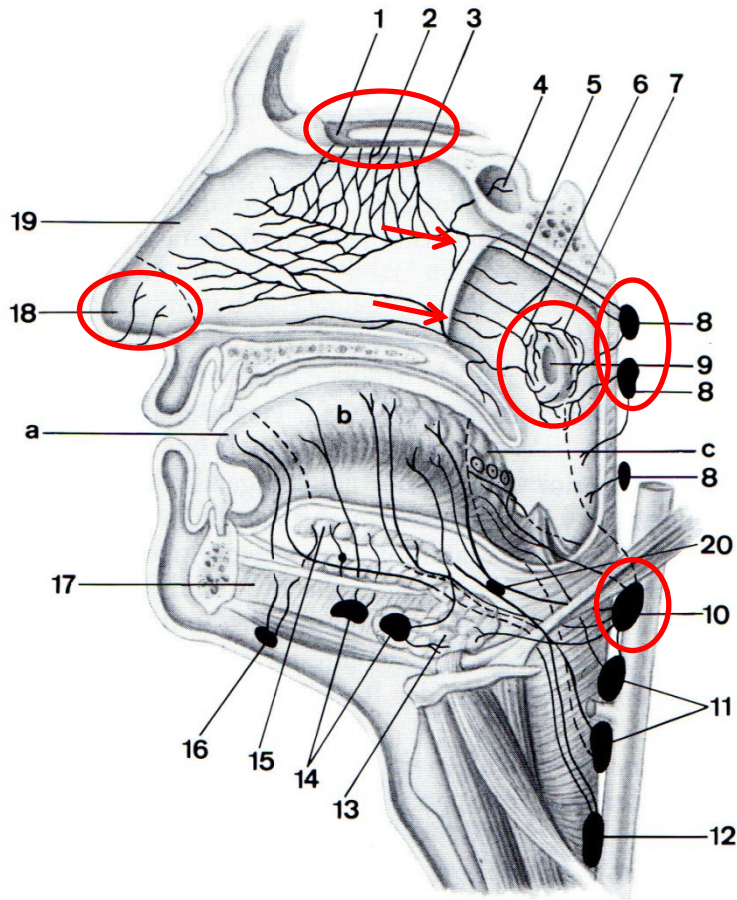
Olfactory region: connection with the intracranial space (infection)

Respiratory region: drains to the post. direction (except: vestibule)

Peritubar plexus: around the auditory tube

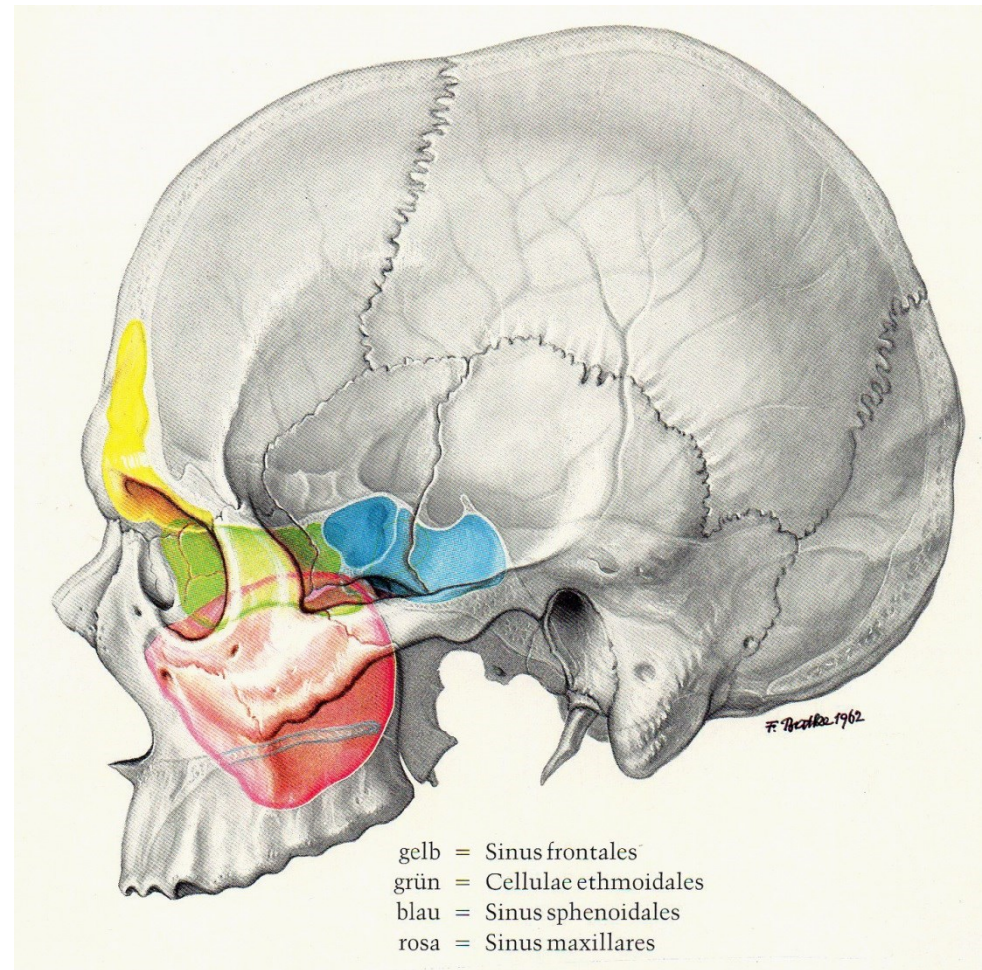
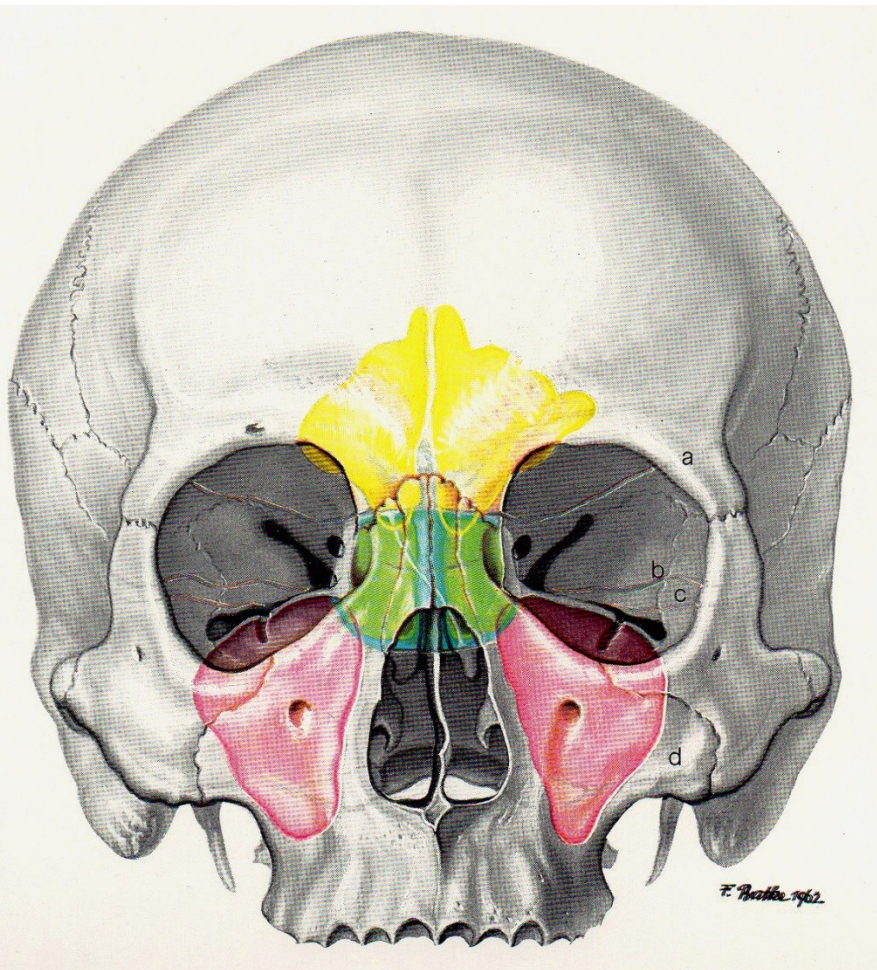
Lateral retropharyngeal lymph nodes (just from the upper part)

Jugulodigastric lymph node



Paranasal sinuses

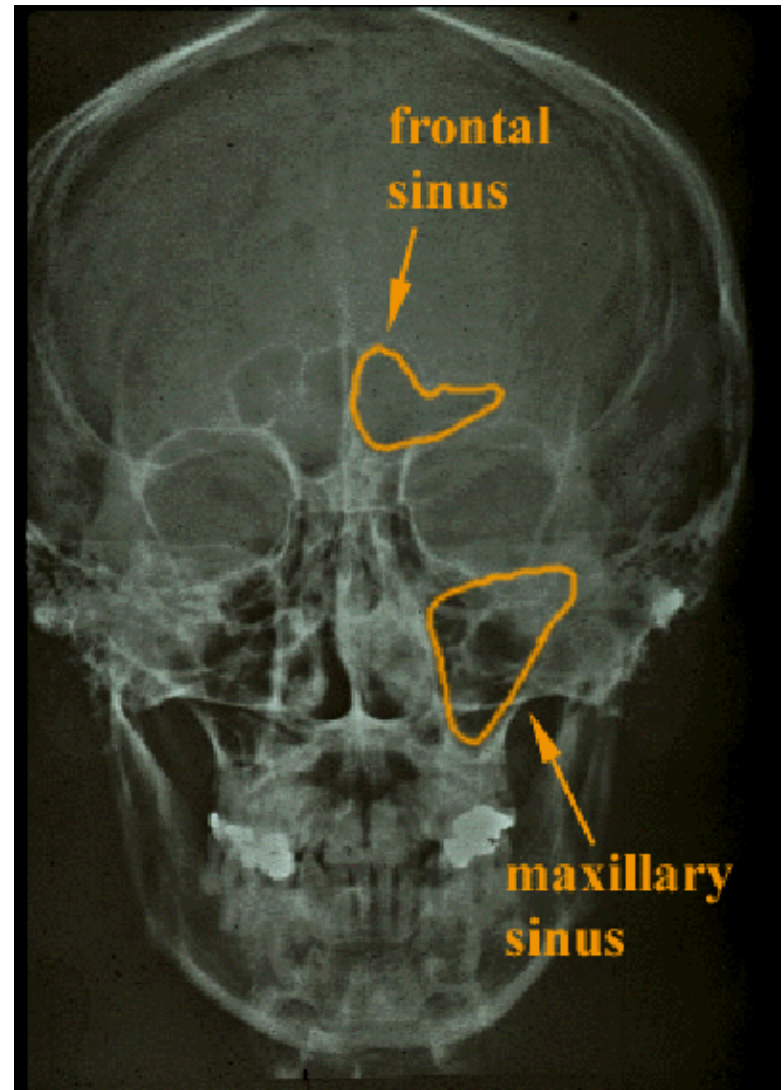
Warming of the inspired air, „buffer“, „makes the head lighter“



Frontal sinus

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

Innervation: supraorbital n.

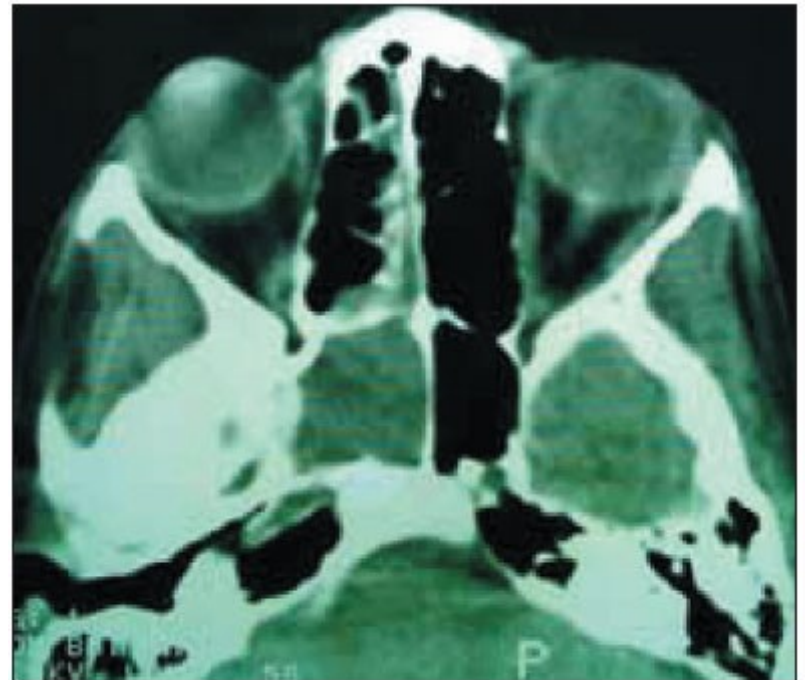


Sphenoidal sinus

Paired cavities in the body of sphenoid

Openings - apertura sinus sphenoidalis –
separately within the sphenothmoidal recess

Innervation: maxillary n.

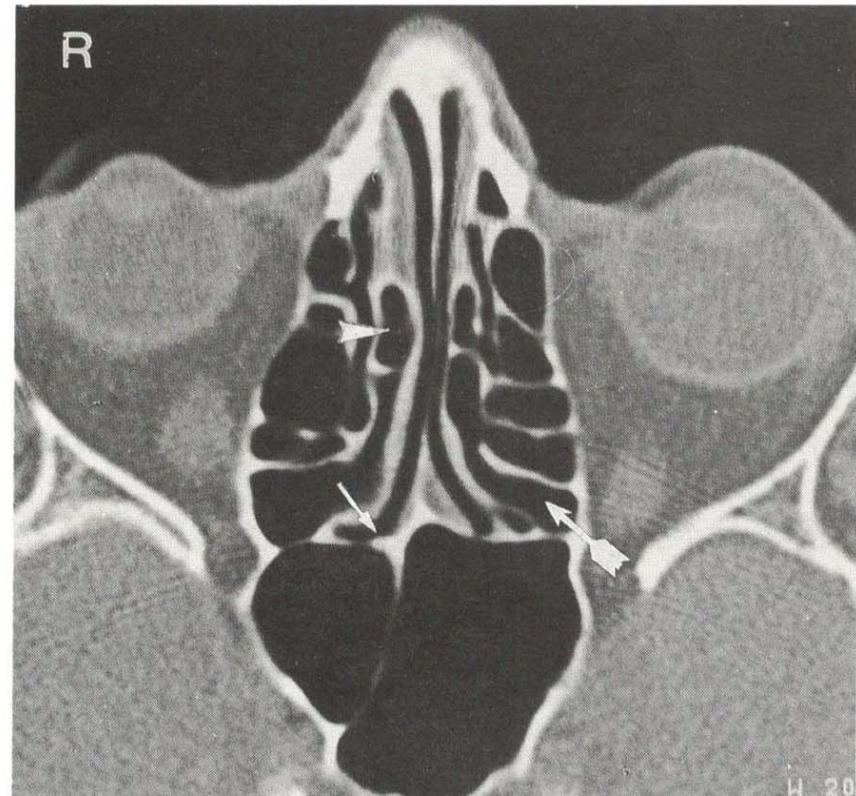


Ethmoidal sinus (labirynth)

Numerous openings

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

Innervation: branches of the maxillary n.

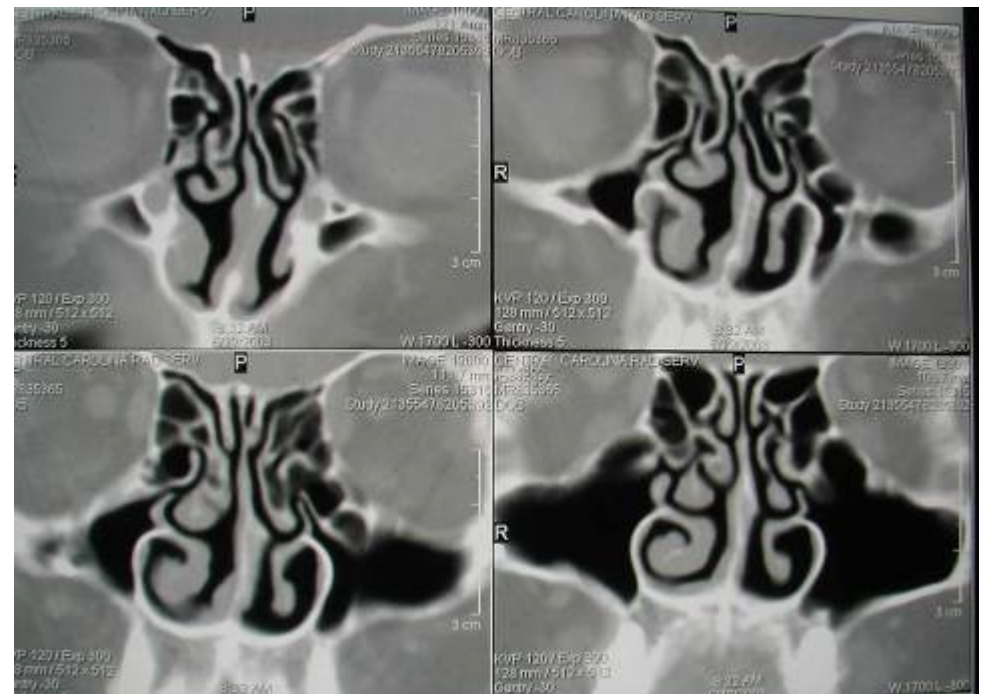
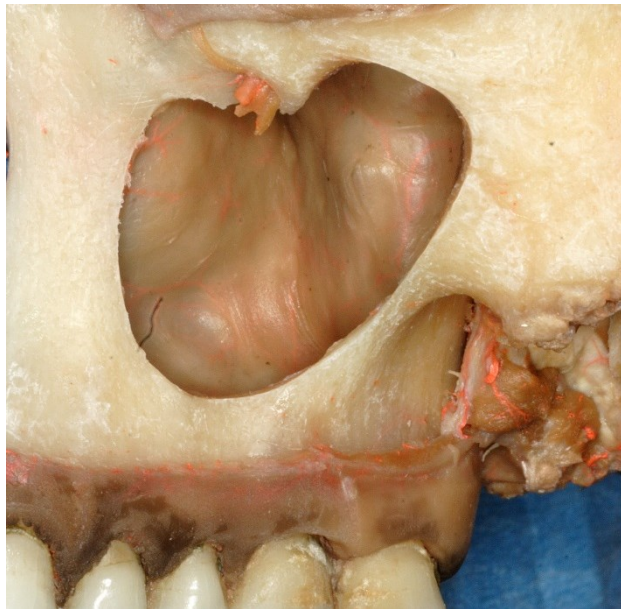
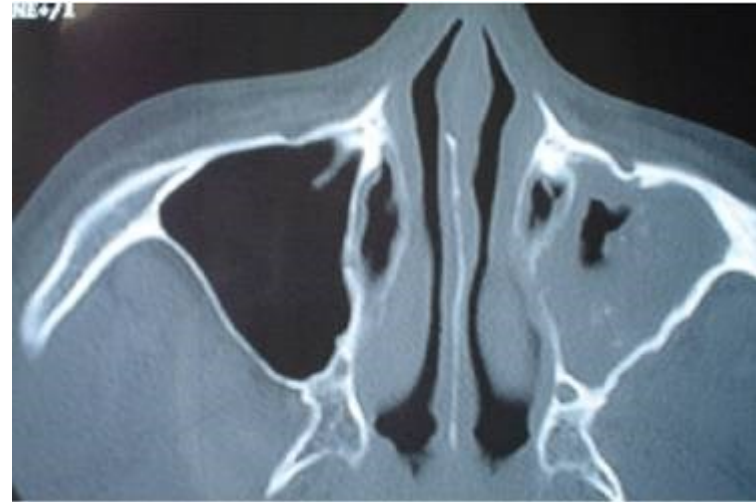


Maxillary sinus (sinus of Highmore)

The largest sinus.

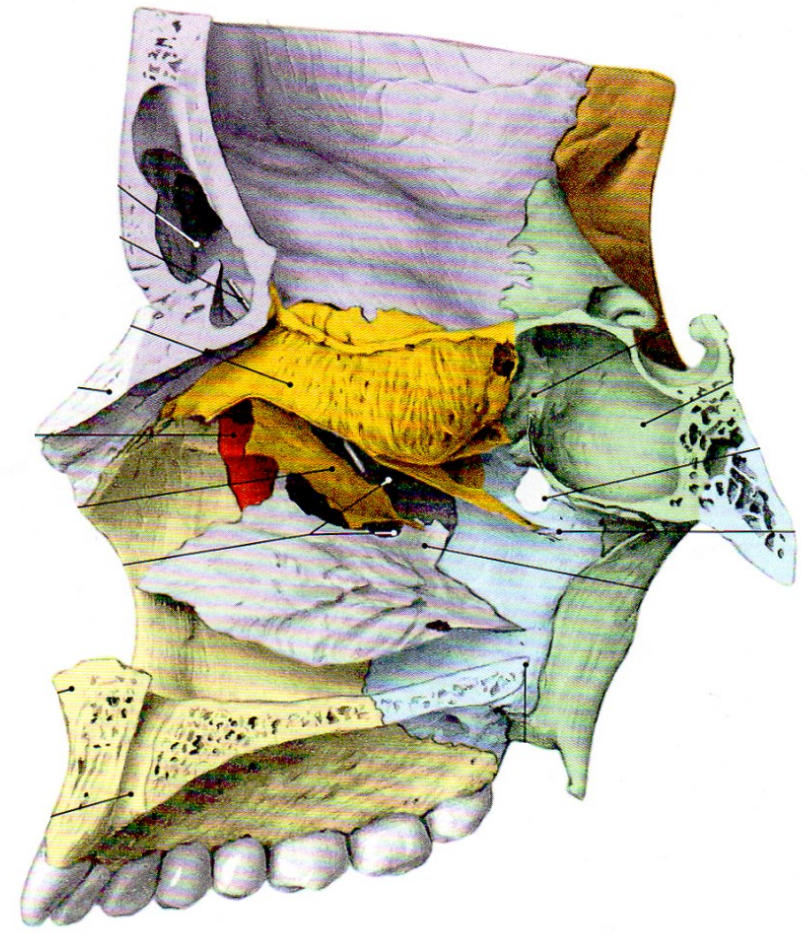
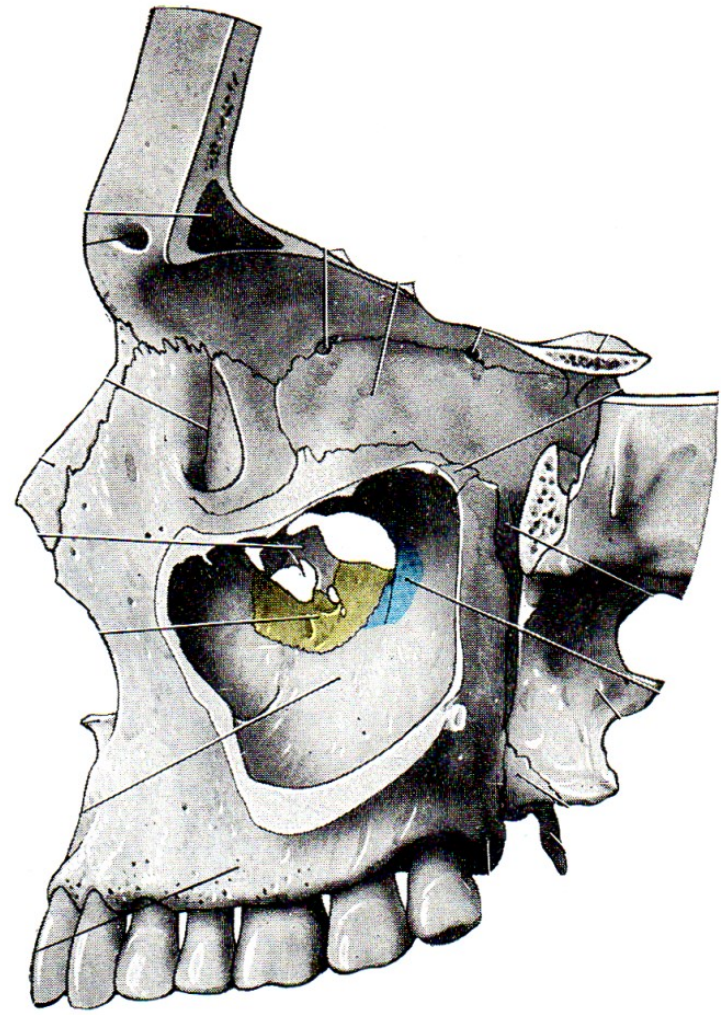
Opens via the semilunar hiatus.

Important topographical relation:
Roots of the upper teeth and orbit

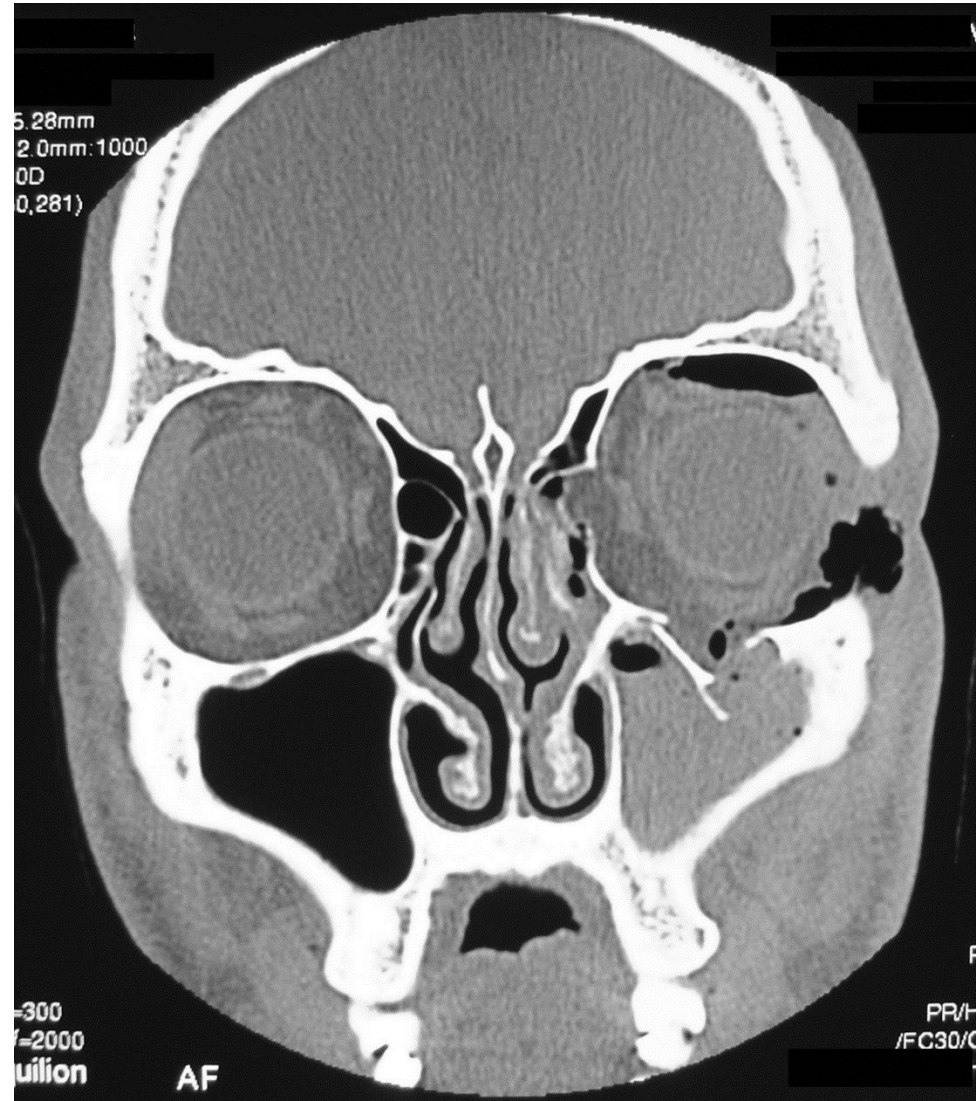
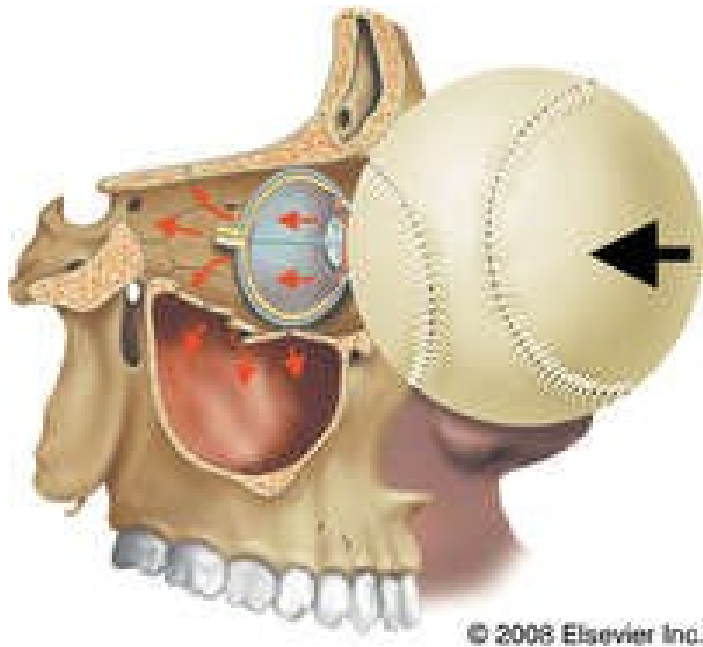


Aperture of the maxillary sinus

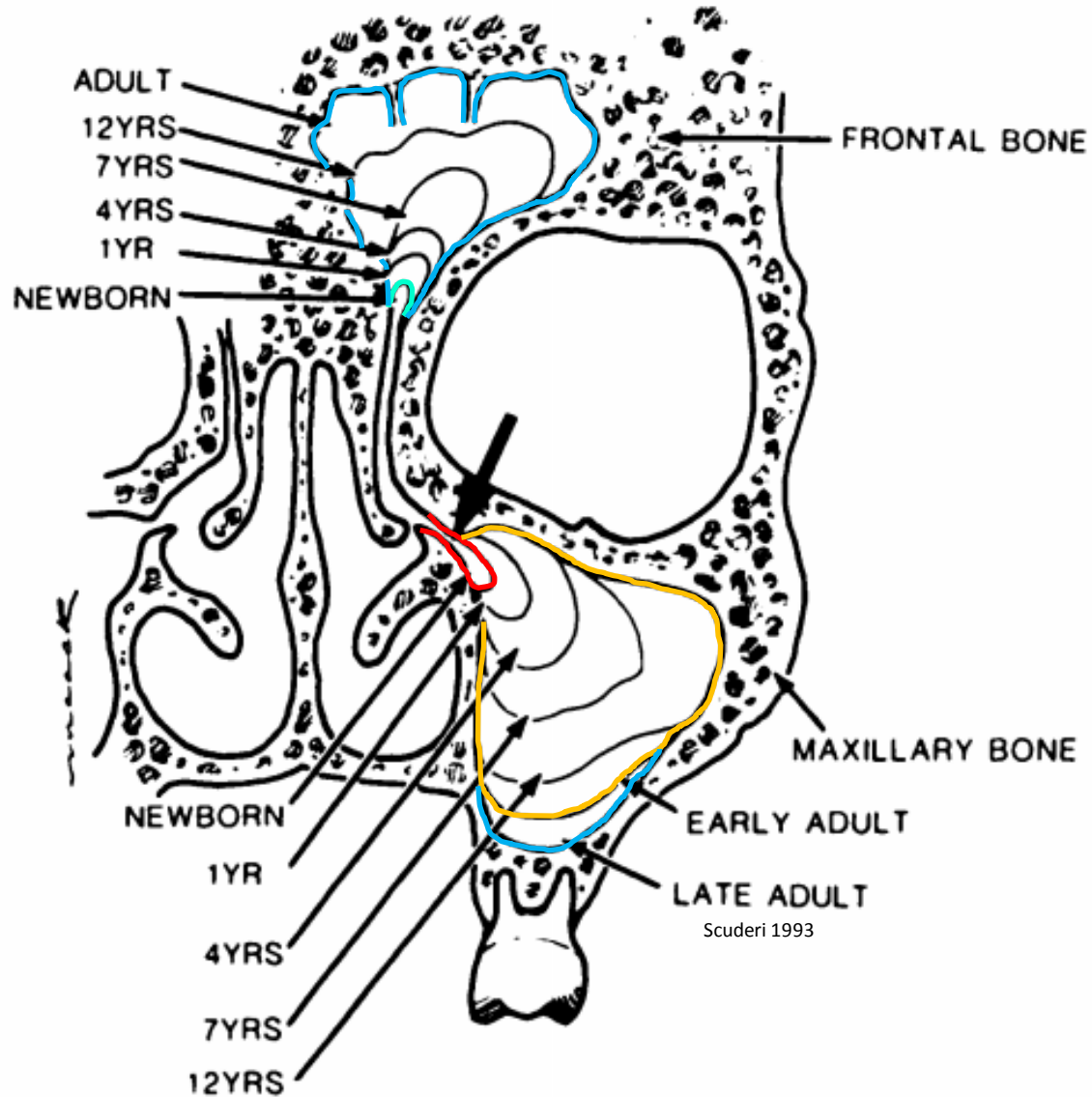
- Palatine bone
- Ethmoid bone
- Lacrimal bone
- Inferior nasal concha



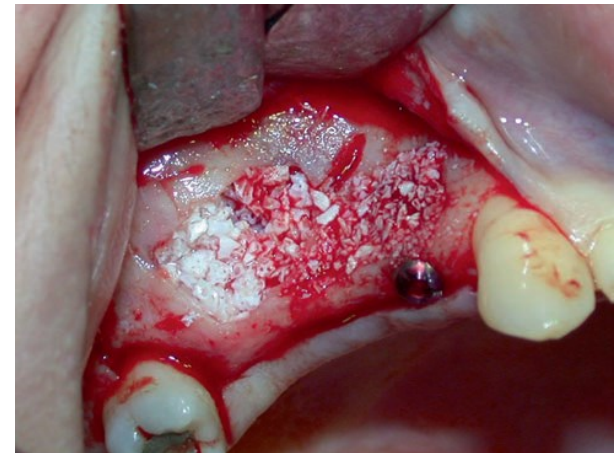
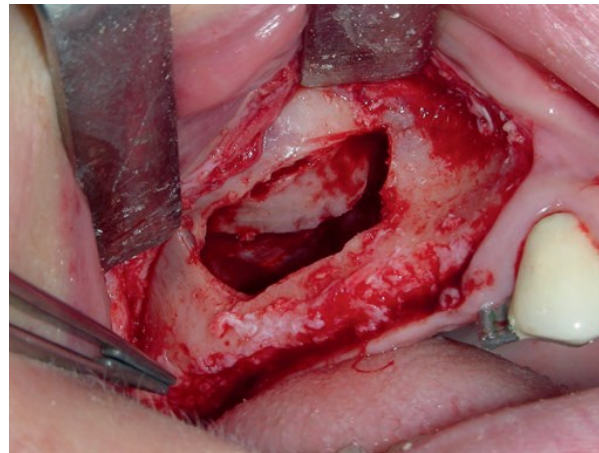
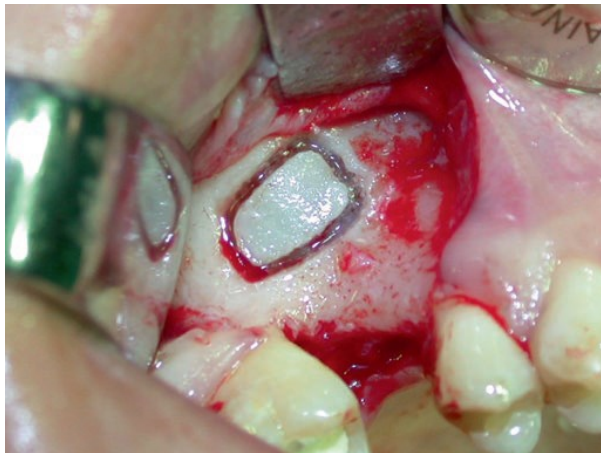
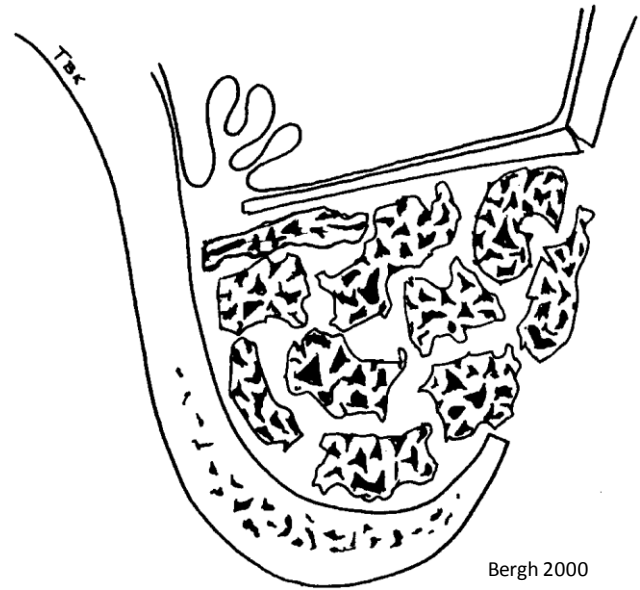
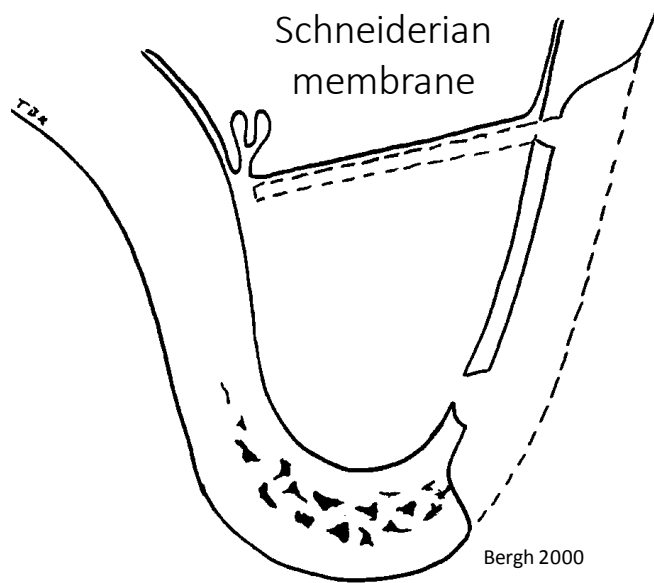
Blow out fracture



Development and pneumatization

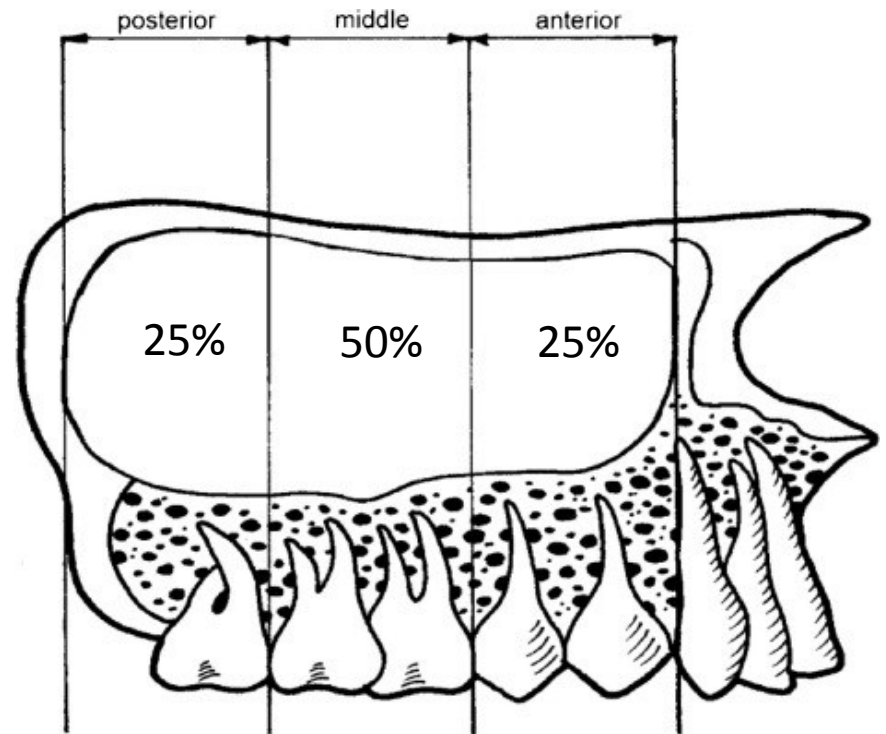
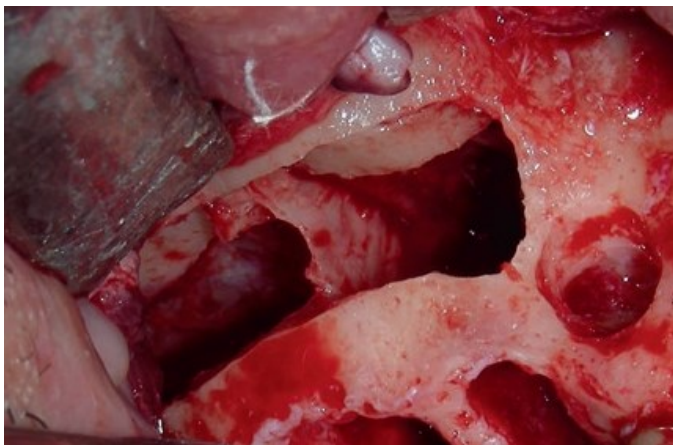


Sinus lifting



Septum sinus maxillaris

- 25-33%
- 99% incomplete
- horizontal



Hungerbühler 2019

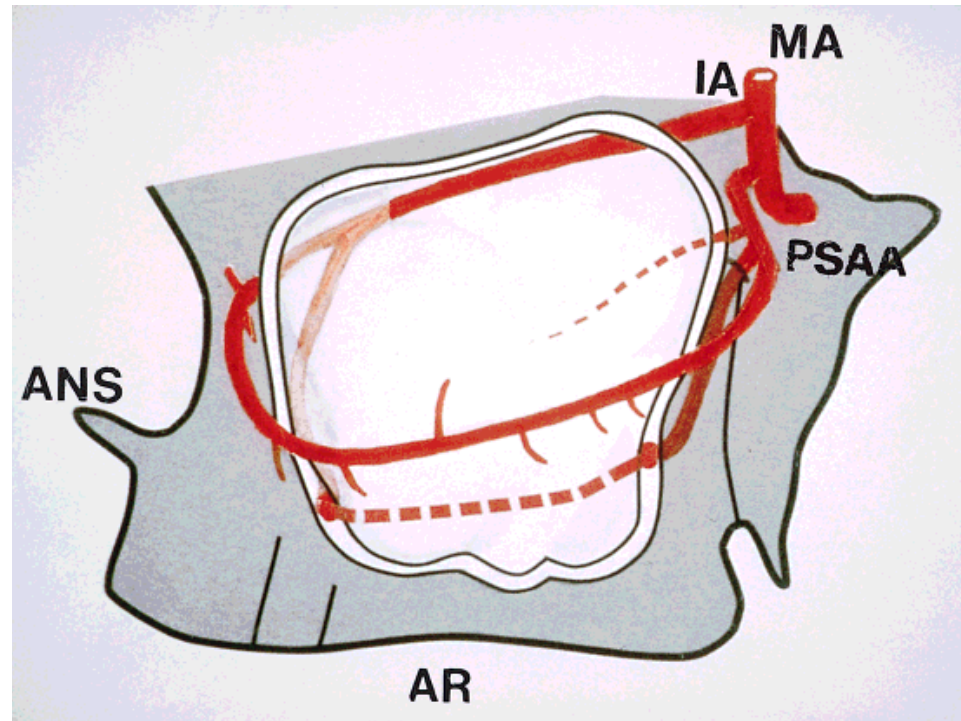
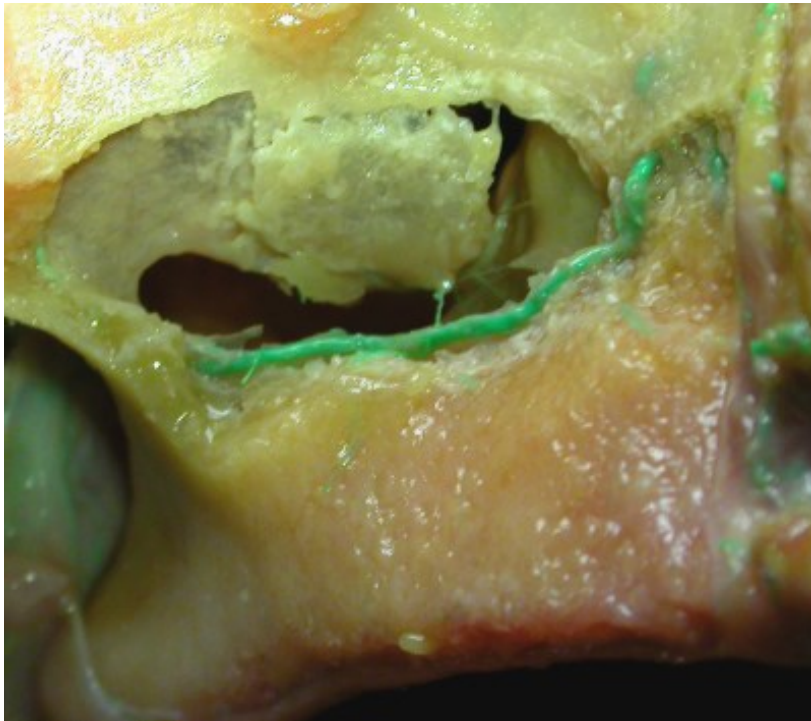


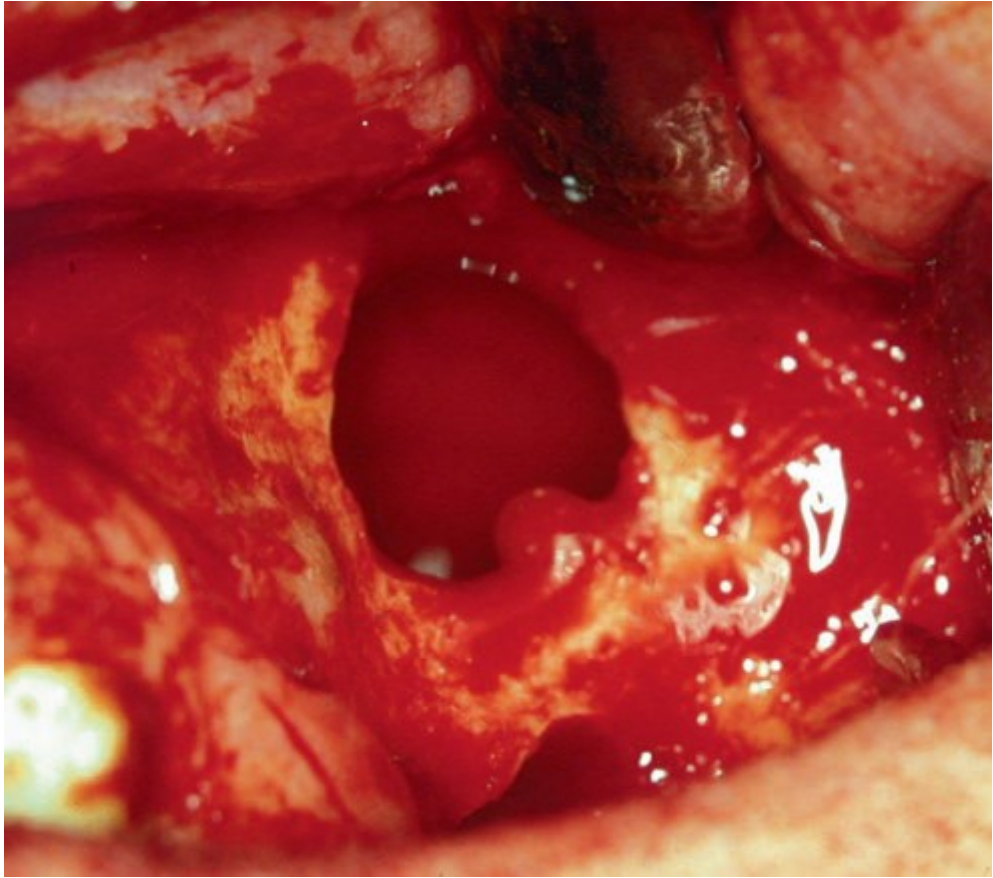
Bergh 2000

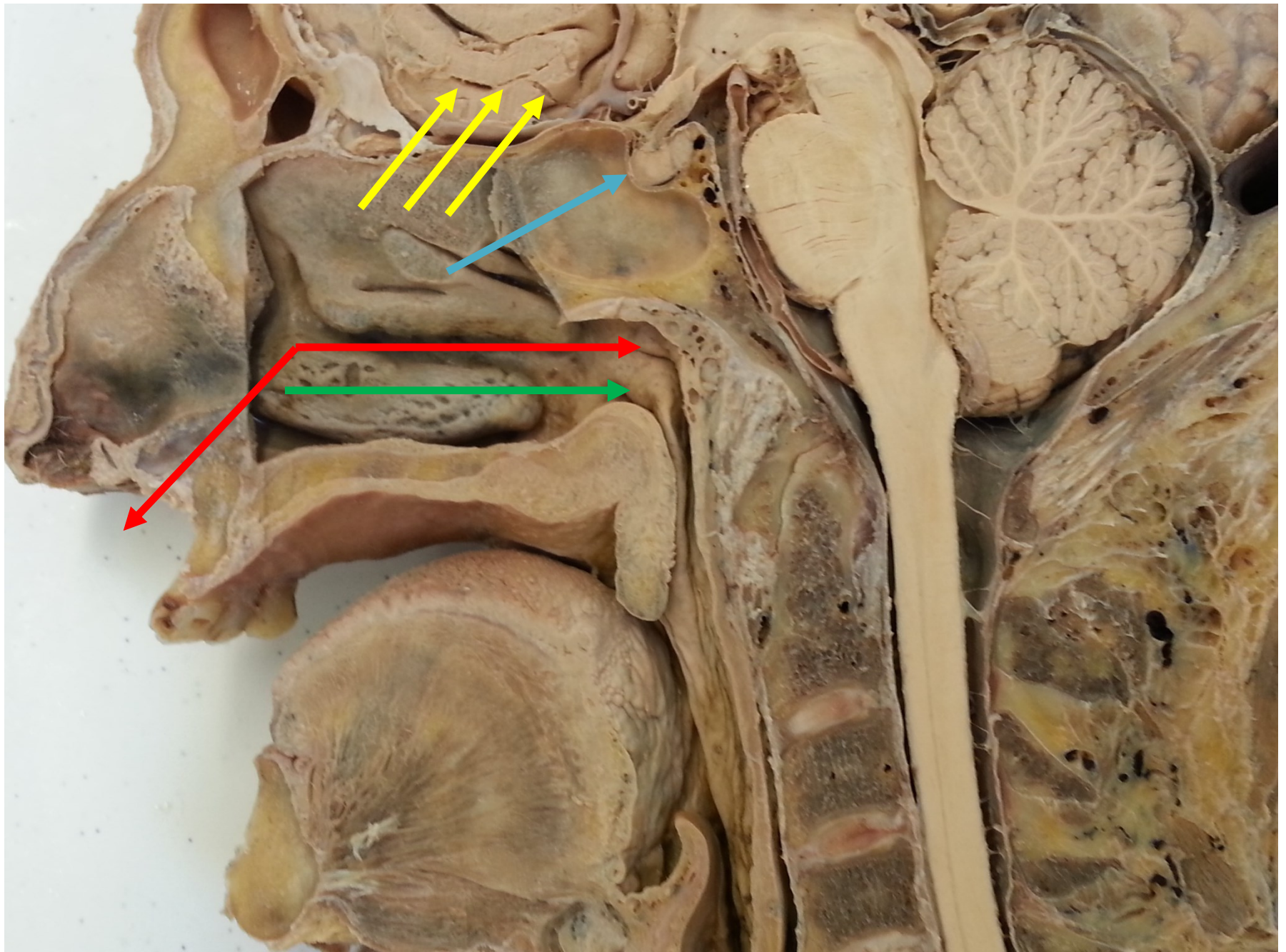
Blood supply of the sinus maxillaris

- Sup. post. alveolar artery (PSSA)
- Infraorbital artery (IA)

→ intraosseal anastomosis







nosebleed (*epistaxis*)

cribriform plate fracture

ear infection

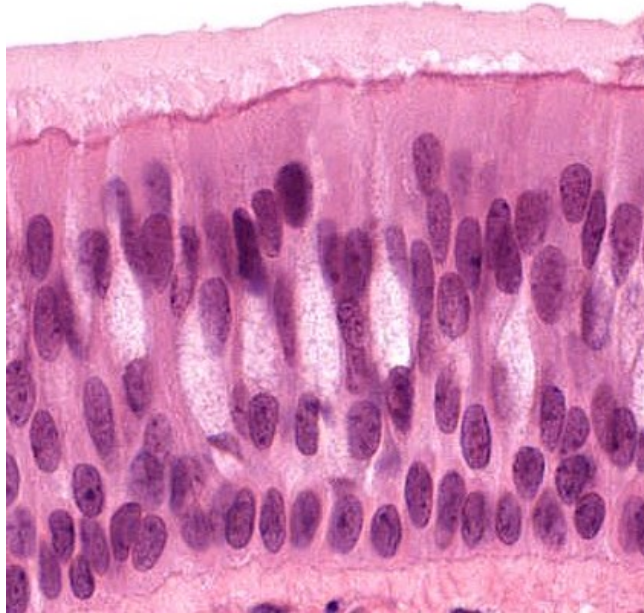
sella turcica + pituitary gland

Histological features of the nasal cavity

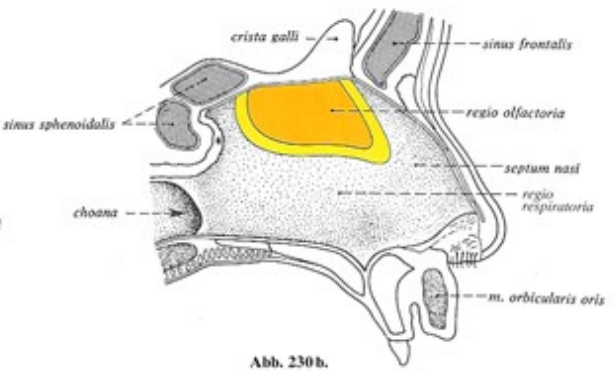
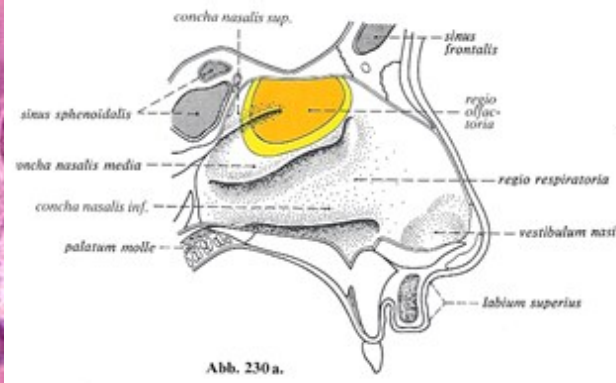
vestibule: stratified ceratinized squamous epithelium

respiratory region: ciliated pseudostratified columnar epithelium

olfactory region: sensory epithelium



40 μ m



Thank you for your attention!

Literature

Dr. Baksa Gábor: Kehlkopfskelett, Gelenke, Bänder, Kehlkopfmuskulatur

Dr. Bárány László: Orrüreg

Dr. Herbert-Minkó Krisztina: Légzőrendszer

Dr. Réthelyi Miklós: Sinus paranasales

Dr. Székely Andrea: Anatomy of the nasal cavity. Paranasal sinuses.

Dr. Székely Andrea: Larynx

Szenágothai, Réthelyi: Funkcionális anatómia (Semmelweis Kiadó, 1994)

Khale, Leonhardt, Platzer: Taschenatlas der Anatomie – Innere Organe (Thieme, 1991)

Pernkopf: Atlas der topografischen und angewandten Anatomie des Menschen (Urban und Schwarzenbert, 1963)

Sobotta: Az ember anatómiájának atlasza (Urban és Fischer, 2000)

www.histologyguide.com

<https://teachmeanatomy.info/head/organs/the-nose/nasal-cavity/>

Photos: Dr. Baksa Gábor, Dr. Grimm András