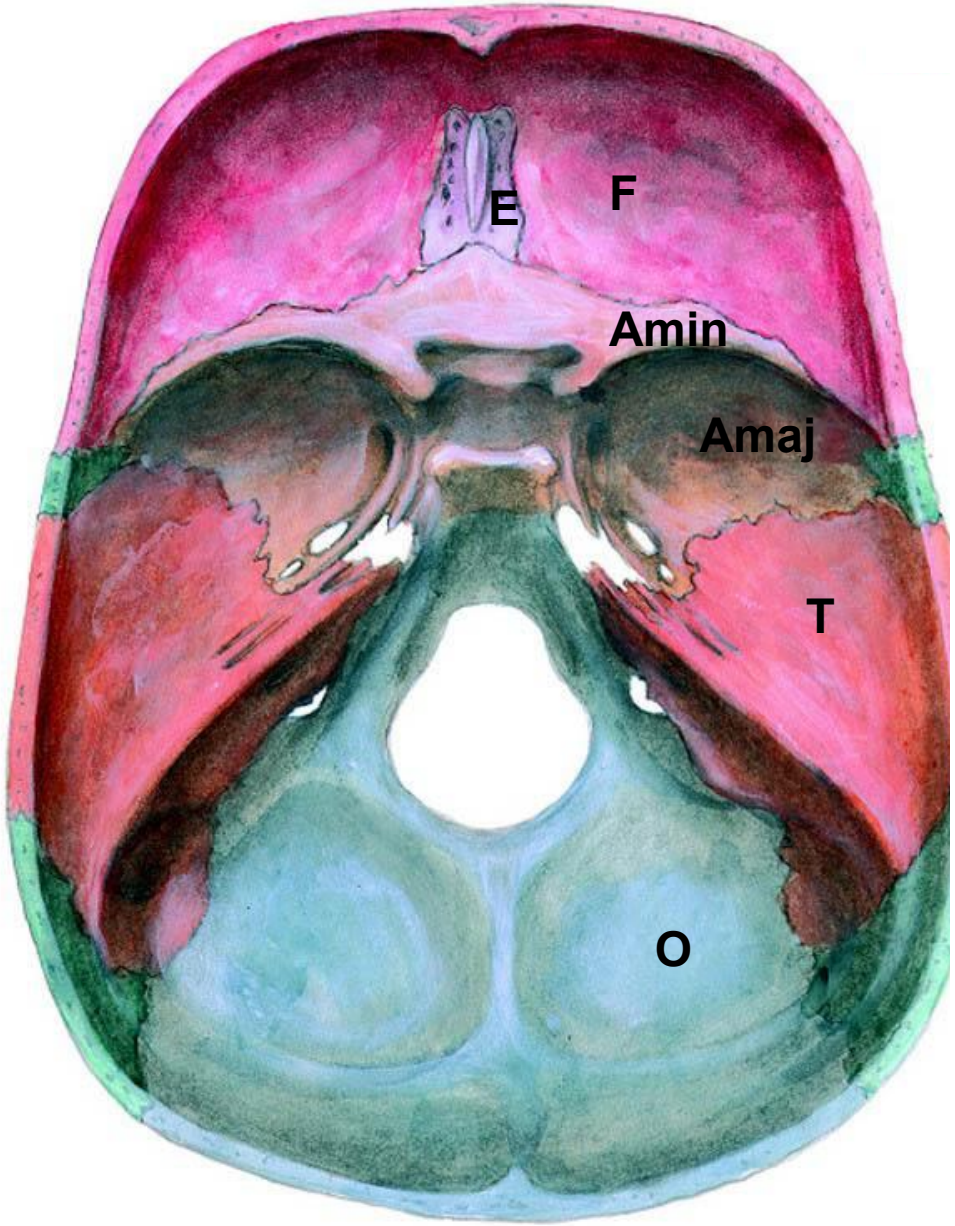
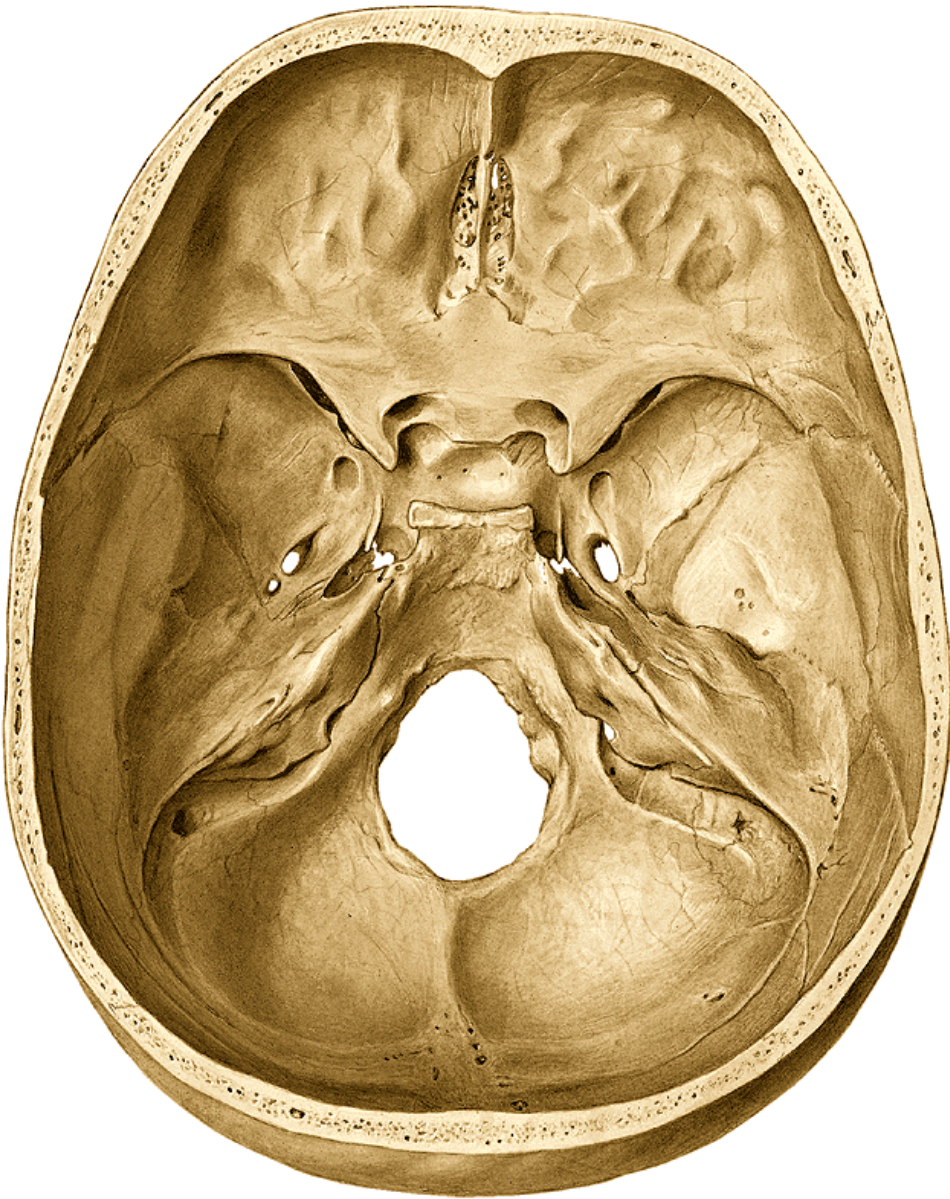


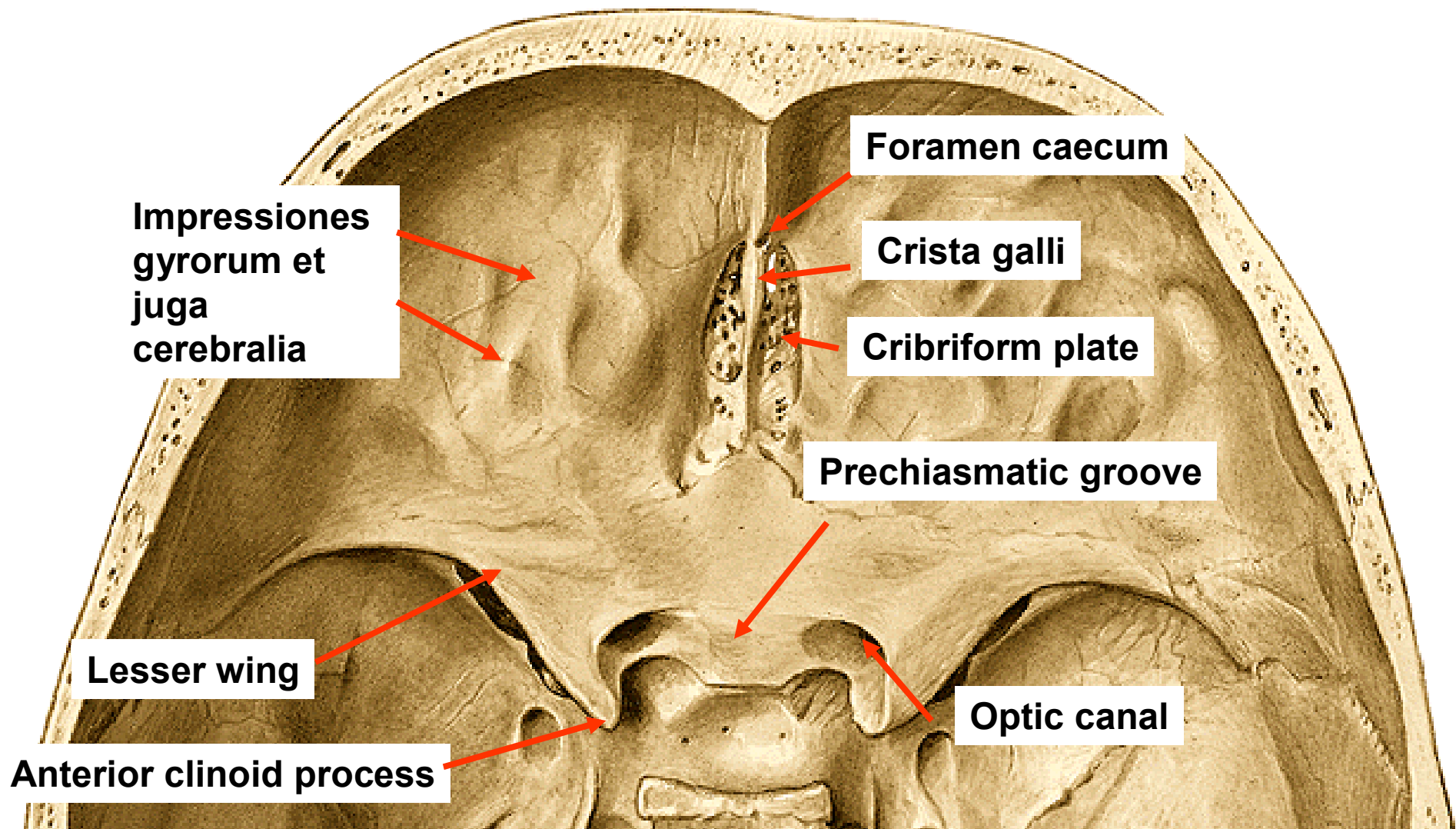
# Cavities and spaces of the skull, paranasal sinuses, opening in the skull bases

MUDr. Veronika Němcová, CSc.

Internal surface of the cranial base

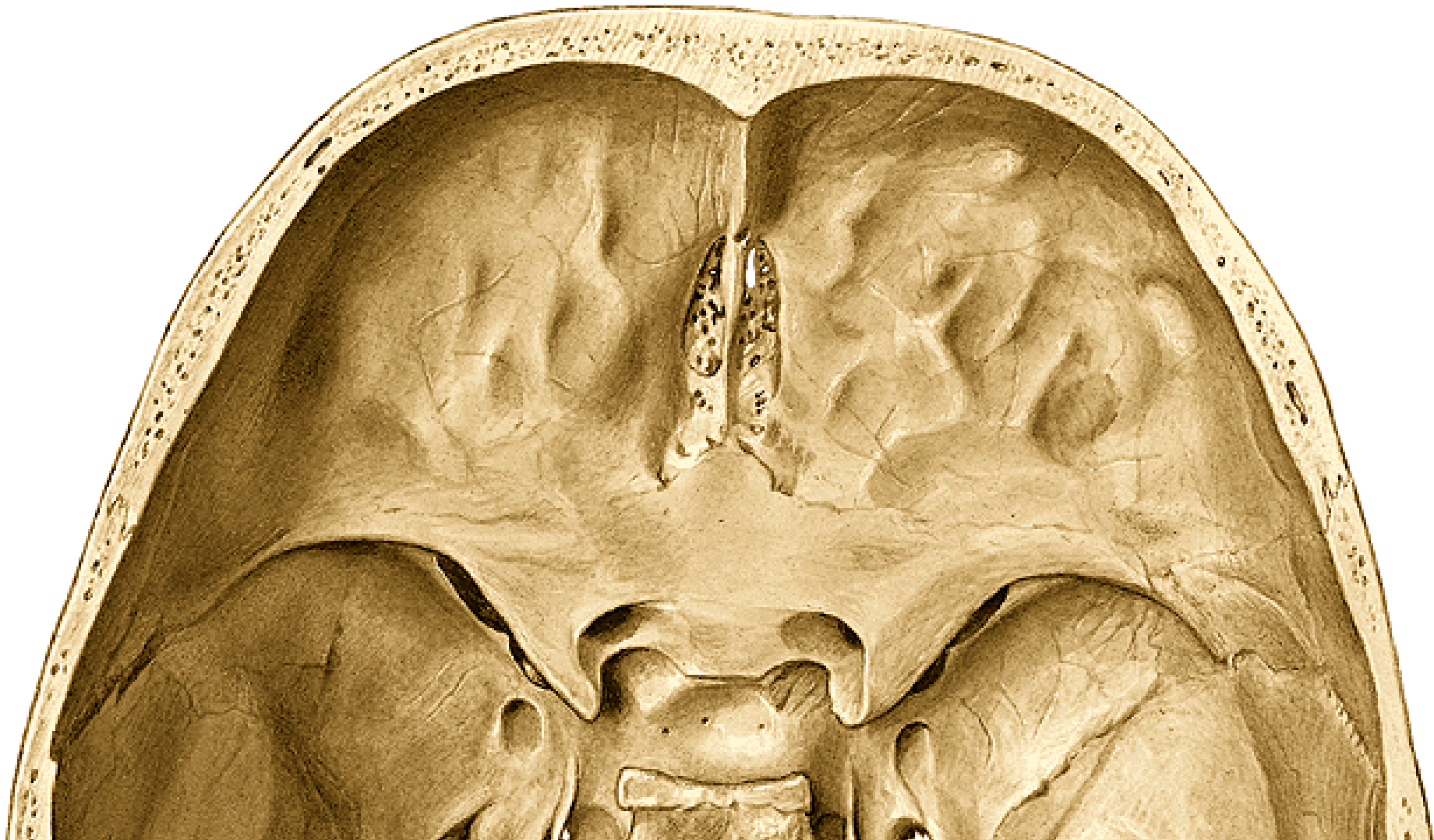


# Anterior cranial fossa

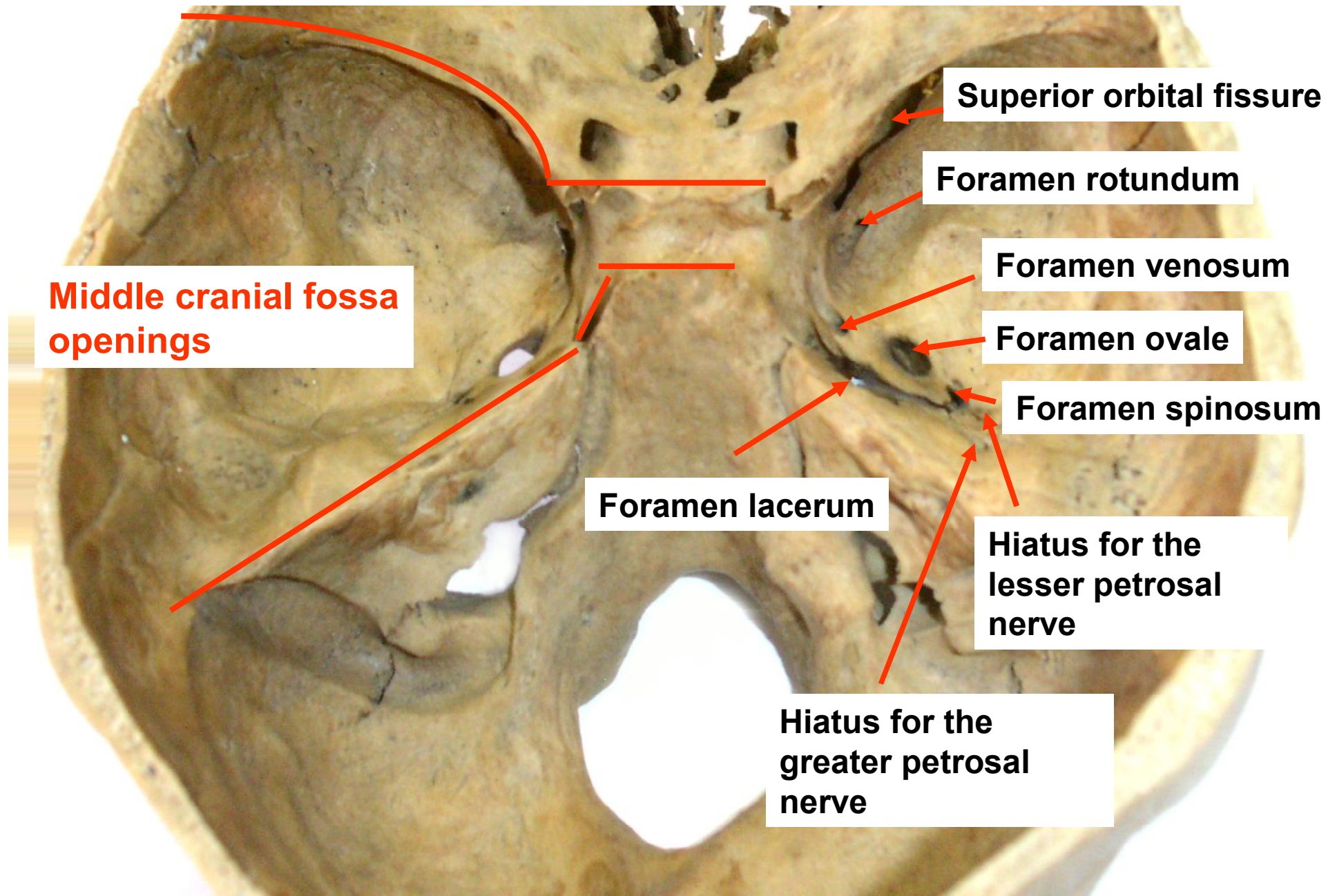




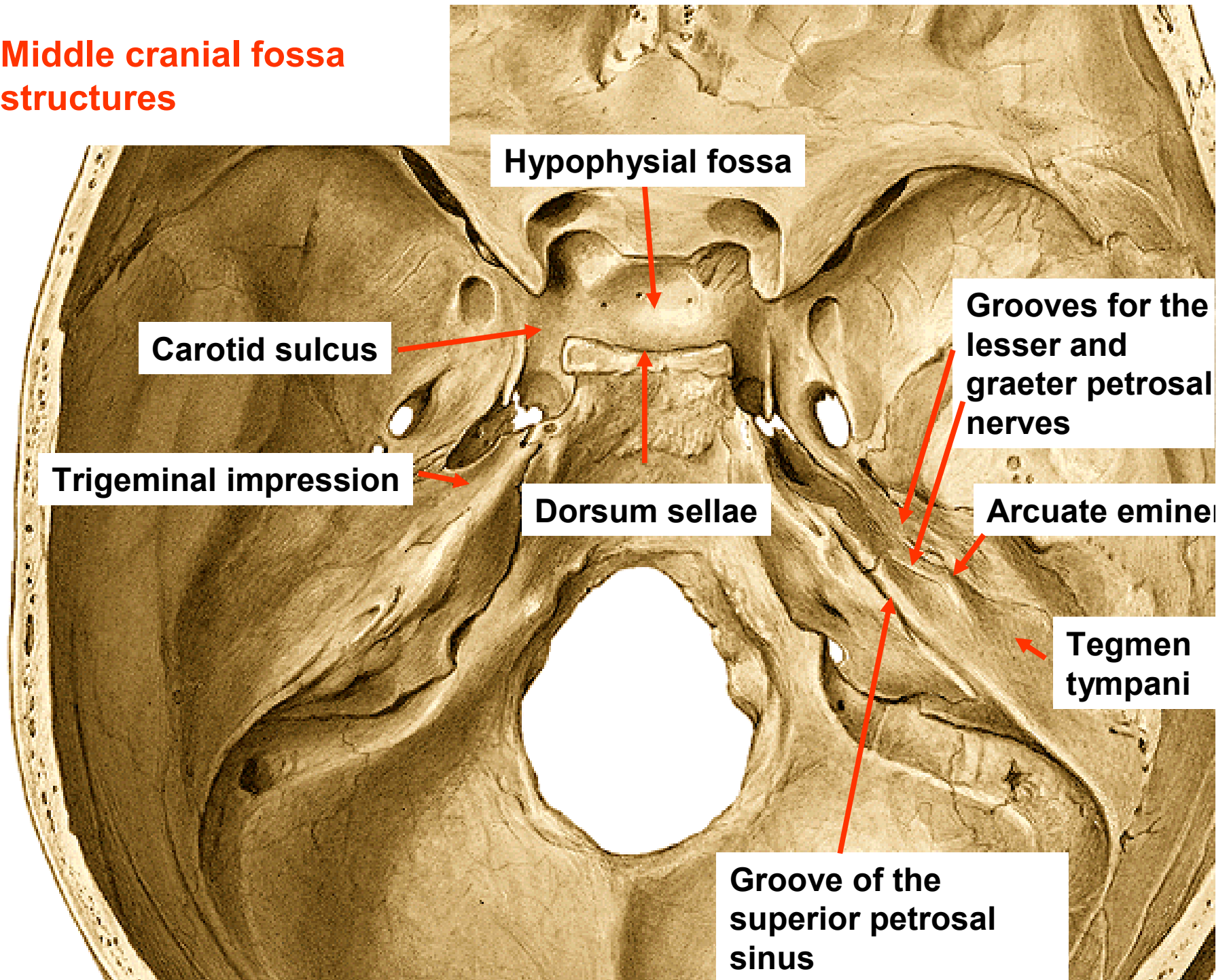
# Anterior cranial fossa - repetition







## Middle cranial fossa structures



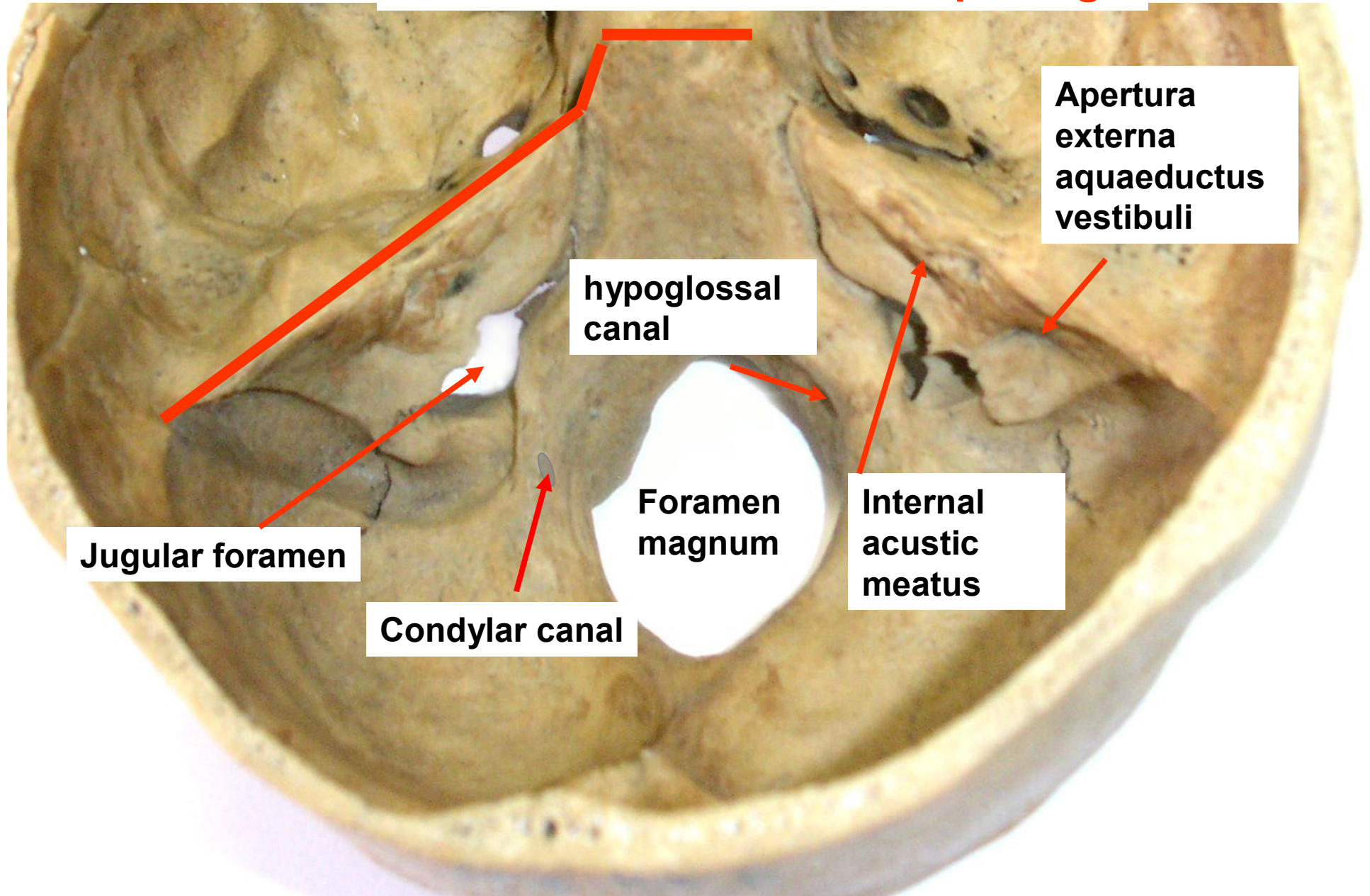


## Middle cranial fossa - repetition

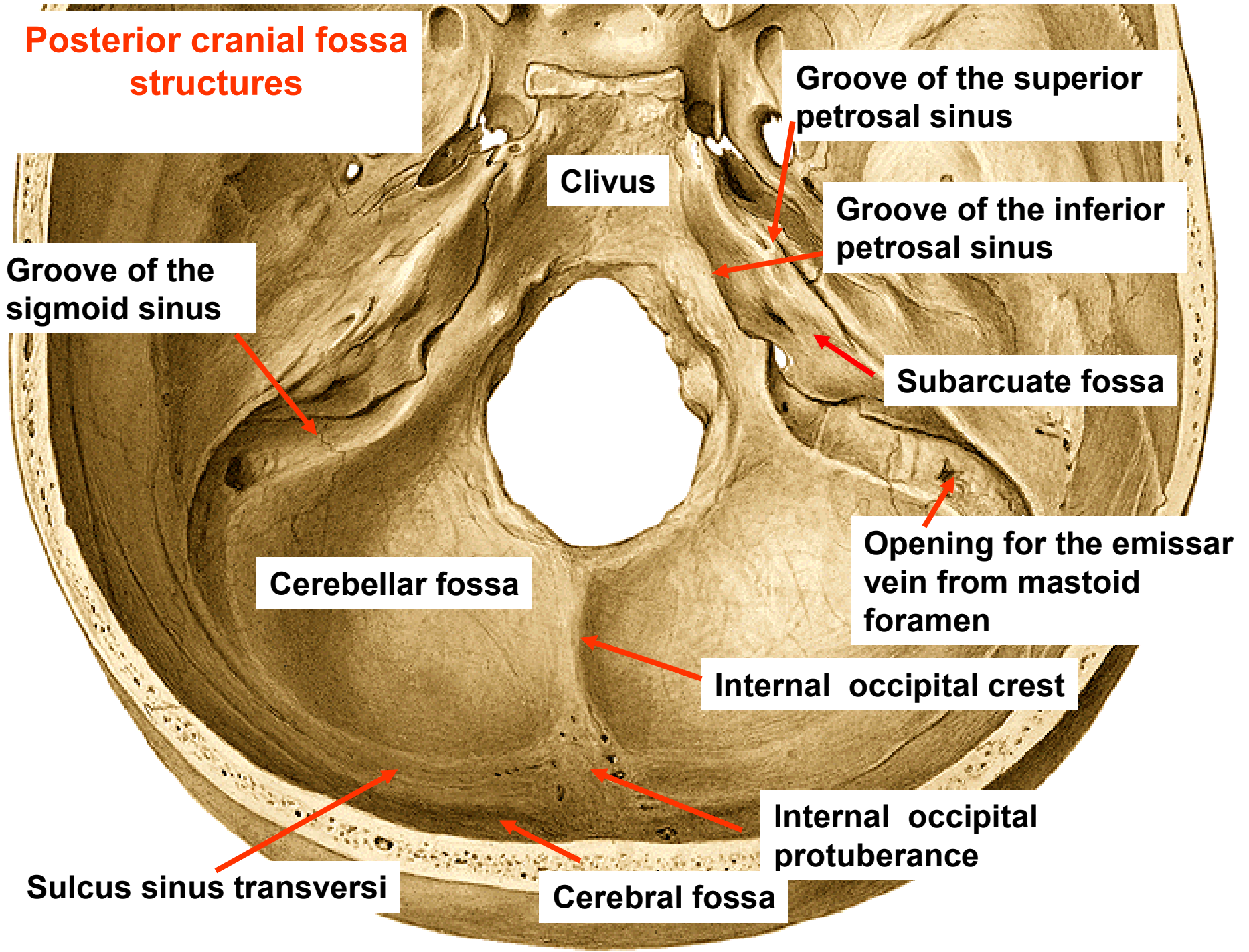




## Posterior cranial fossa - openings

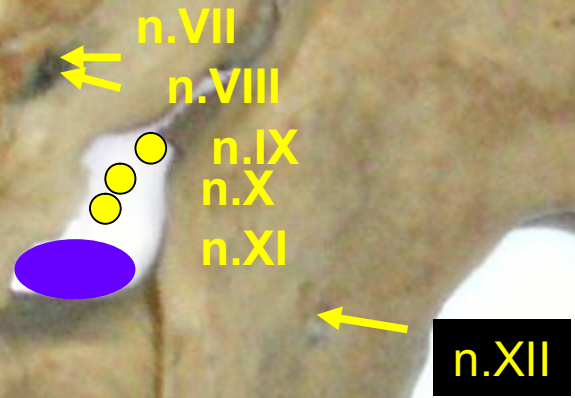


**Posterior cranial fossa structures**



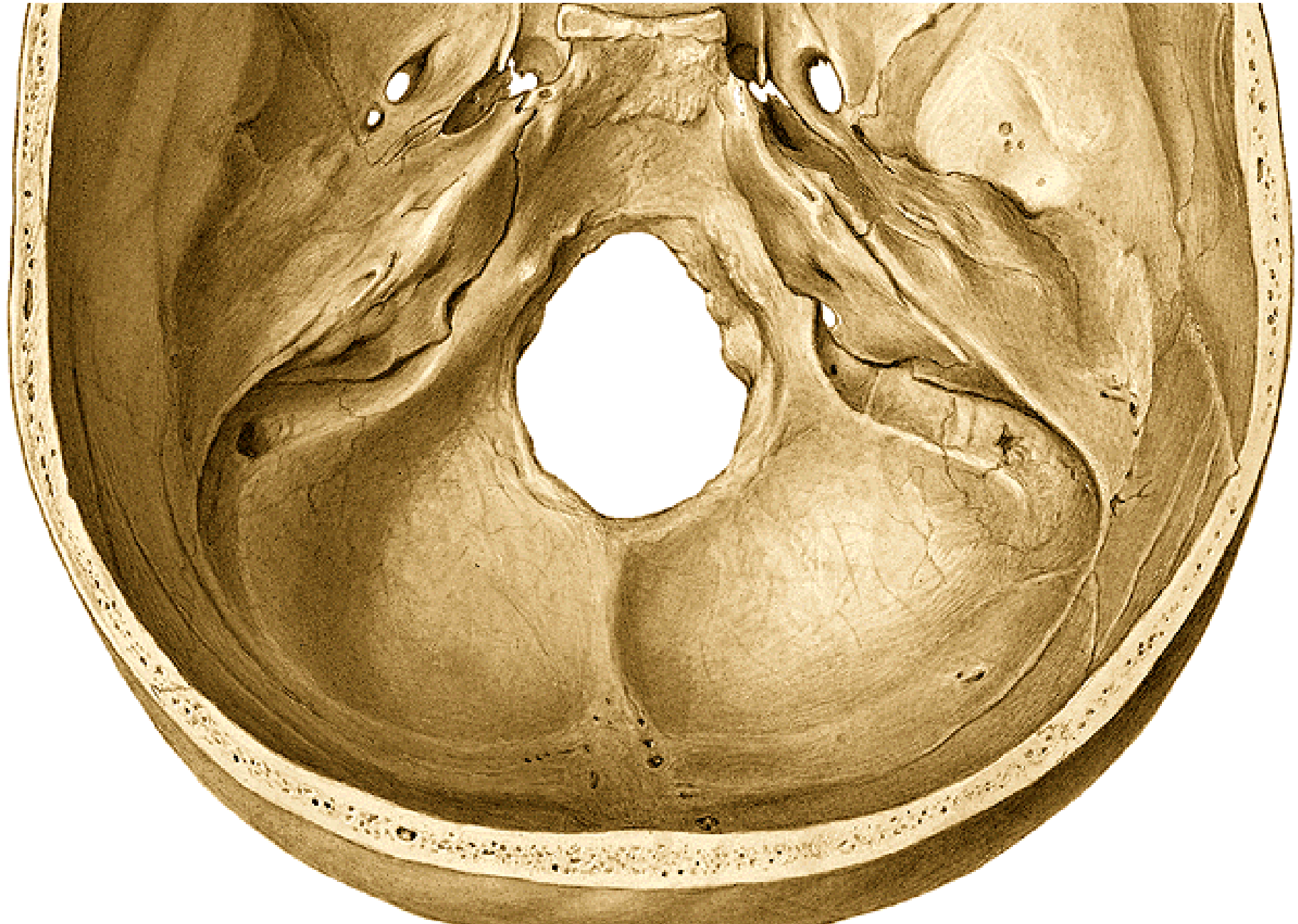


**Sites for passage for nerves in the posterior cranial fossa**



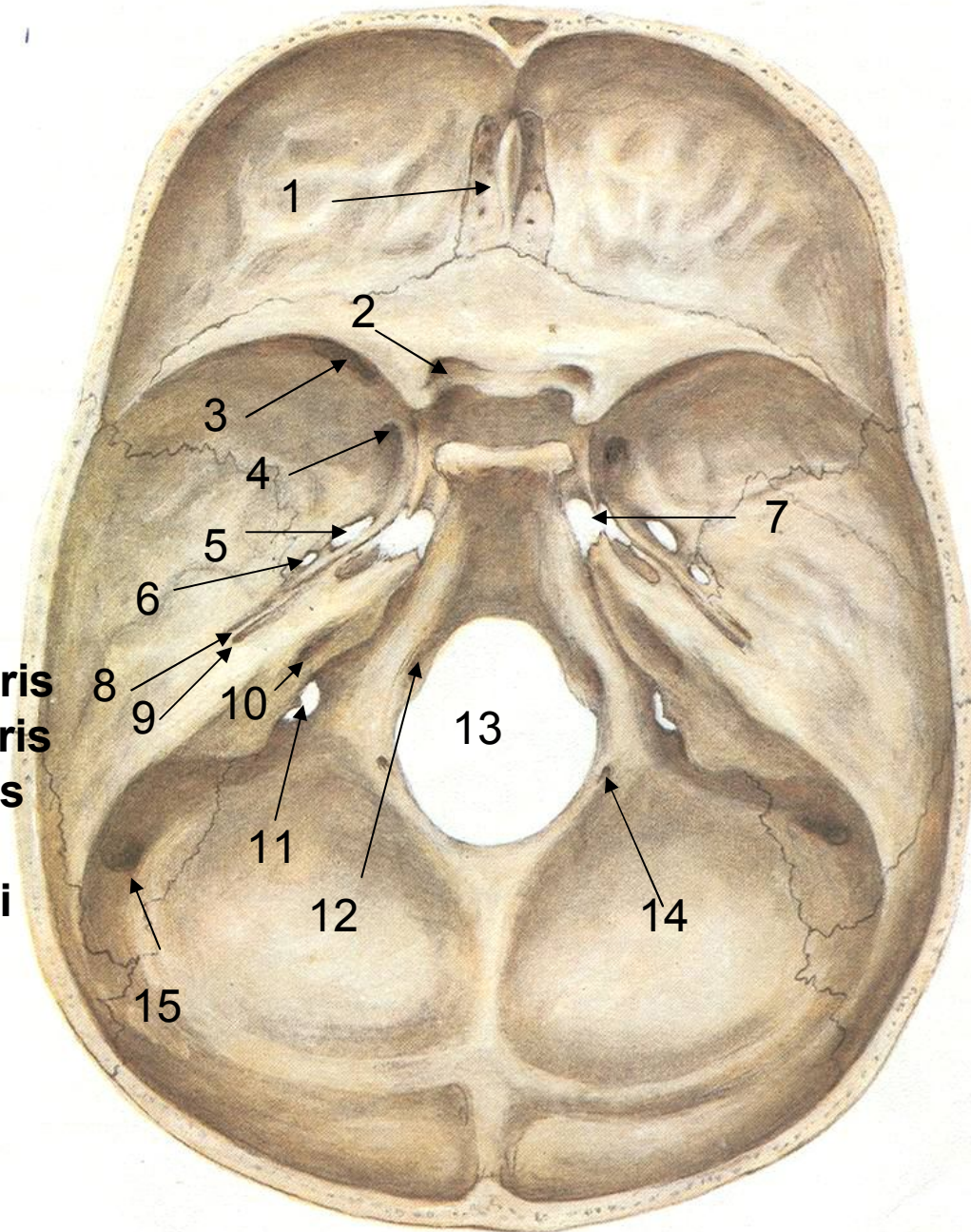


## Fossa cranii posterior -repetition



# Openings in the internal surface of cranial base

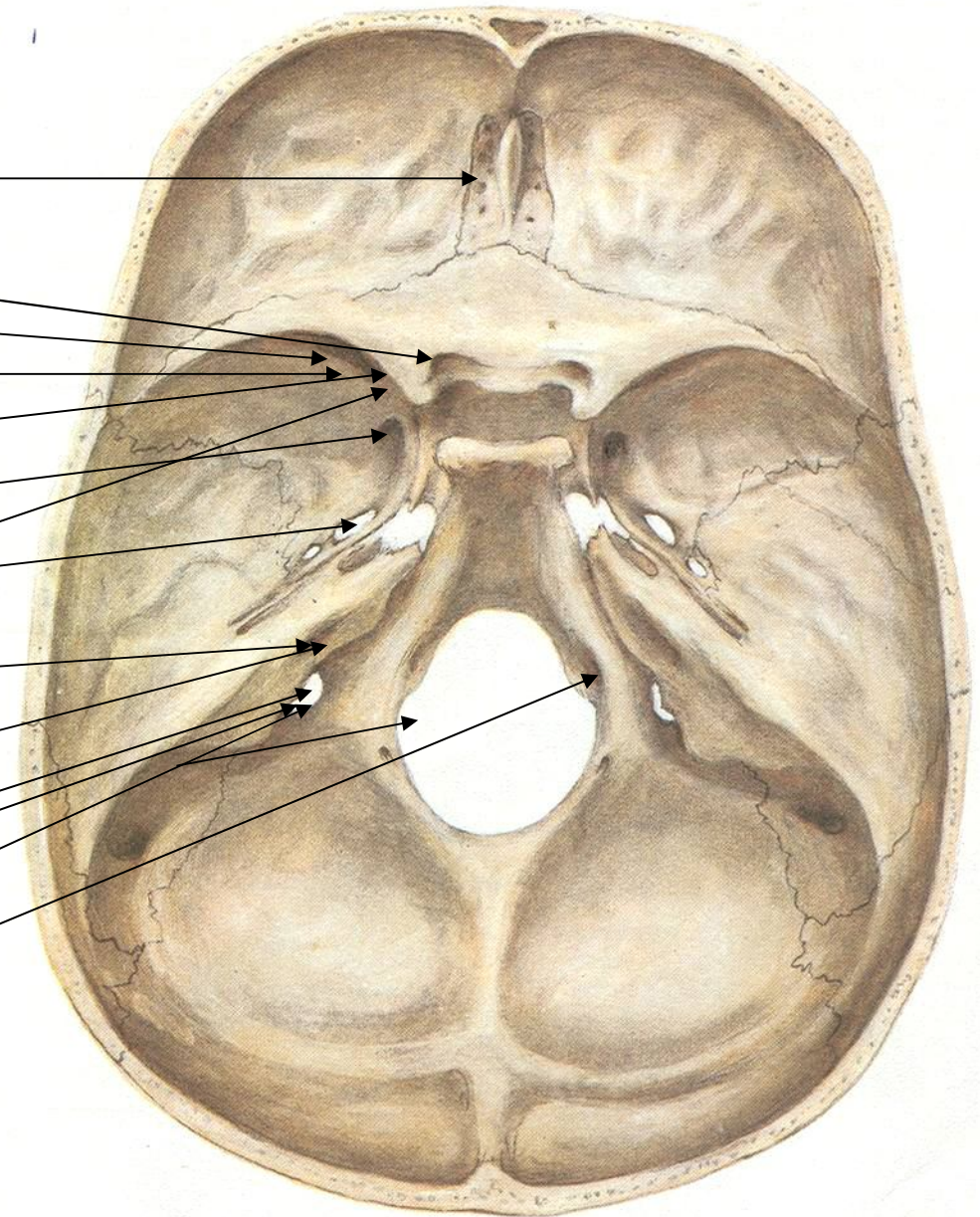
- 1-lamina cribrosa
- 2-canal is opticus
- 3-fissura orbitalis superior
- 4-foramen rotundum
- 5-foramen ovale
- 6-foramen spinosum
- 7-foramen lacerum
- 8-hiatus nervi petrosi minoris
- 9-hiatus nervi petrosi majoris
- 10-porus acusticus internus
- 11-foramen jugulare
- 12-canal is nervi hypoglossi
- 13-foramen magnum
- 14-canal is condylaris
- 15-foramen mastoideum





# Cranial nerves

- I. Olfactory nerves
- II. Optic nerve
- III. Oculomotor nerve
- IV. Trochlear nerve
- V. Trigeminal 1.Ophthalmic  
2.Maxillary  
3.Mandibular
- VI. Abducent nerve
- VII. Facial nerve
- VIII. Vestibulocochlear nerve
- IX. Glossopharyngeal nerve
- X. Vagus
- XI. Accessory nerve
- XII. Hypoglossal nerve





# Basis cranii interna

## Anterior cranial fossa

Frontal lobes, n.I. a n.II.,  
falx cerebri  
orbitocranial canal

Posterior border of lesser wings  
and prechiasmatic sulcus

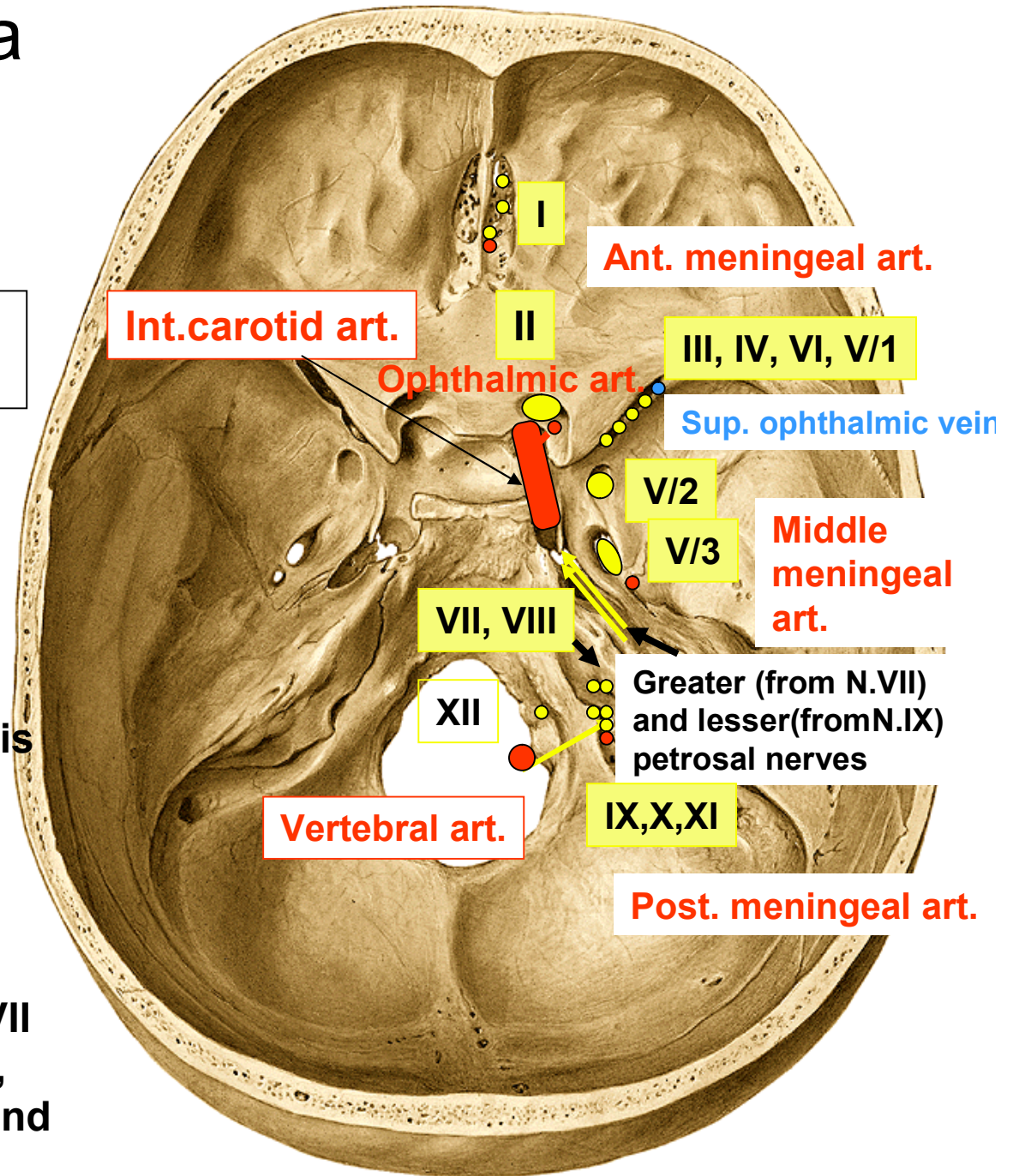
## Middle cranial fossa

temporal lobes,  
hypophysis cerebri,  
eye-muscle nerves and V/1,  
branches of n.V, cavernous  
sinus, middle meningeal art.,  
sphenopetrosal synchondrosis

Crista pyramidis, dorsum sellae

## Posterior cranial fossa,

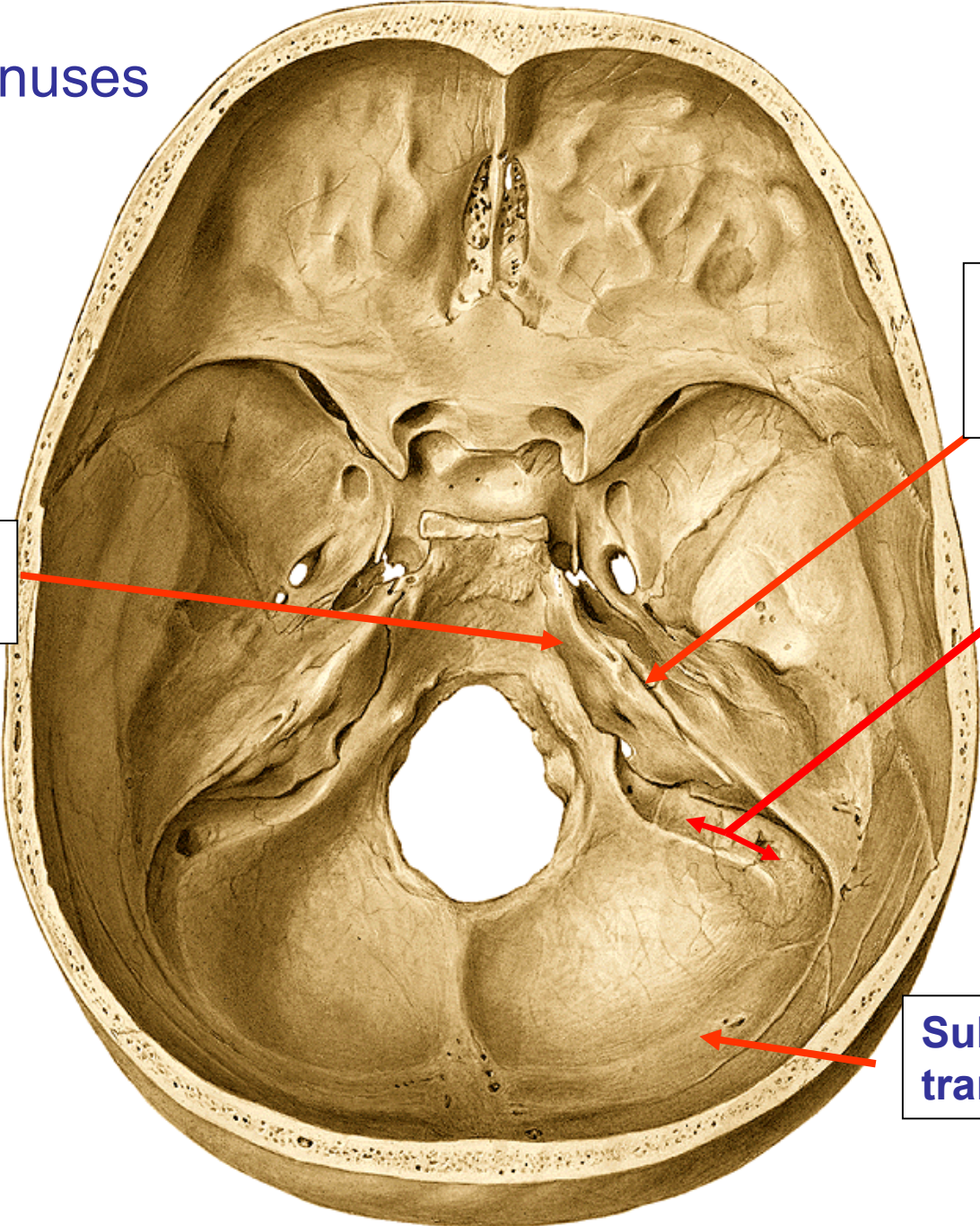
brainstem, cerebellum,  
occipital lobes, grooves of  
sinuses, emissary veins, n.VII  
a n.VIII, endolymphatic duct,  
nn.IX,X,and XI, spinal cord and  
n.XI and vertebral art., n.XII





# Grooves of sinuses

Sulcus sinus petrosi inferioris

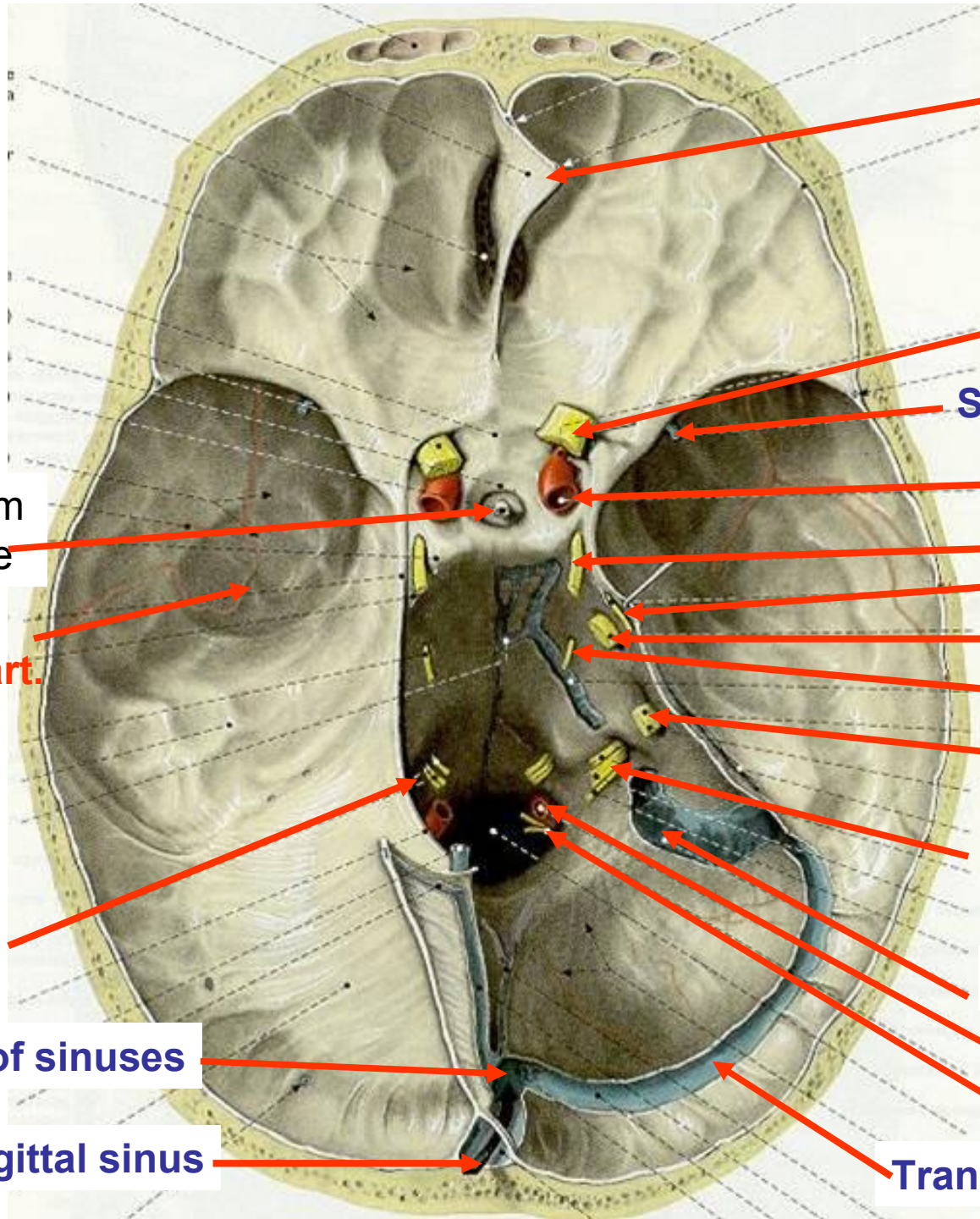


Sulcus sinus petrosi superioris

Sulcus sinus sigmoidei

Sulcus sinus transversi





Falx cerebri

n.II

Sup. ophthalmic vein

Int. carotid art.

n.III

n.IV.

n.V

n.VI

n.VII and n.VIII

n.IX., X., IX

Sigmoid sinus

Vertebral art.

r. spinalis n.XI.

Transverse sinus

infundibulum hypophysae

Middle meningeal art.

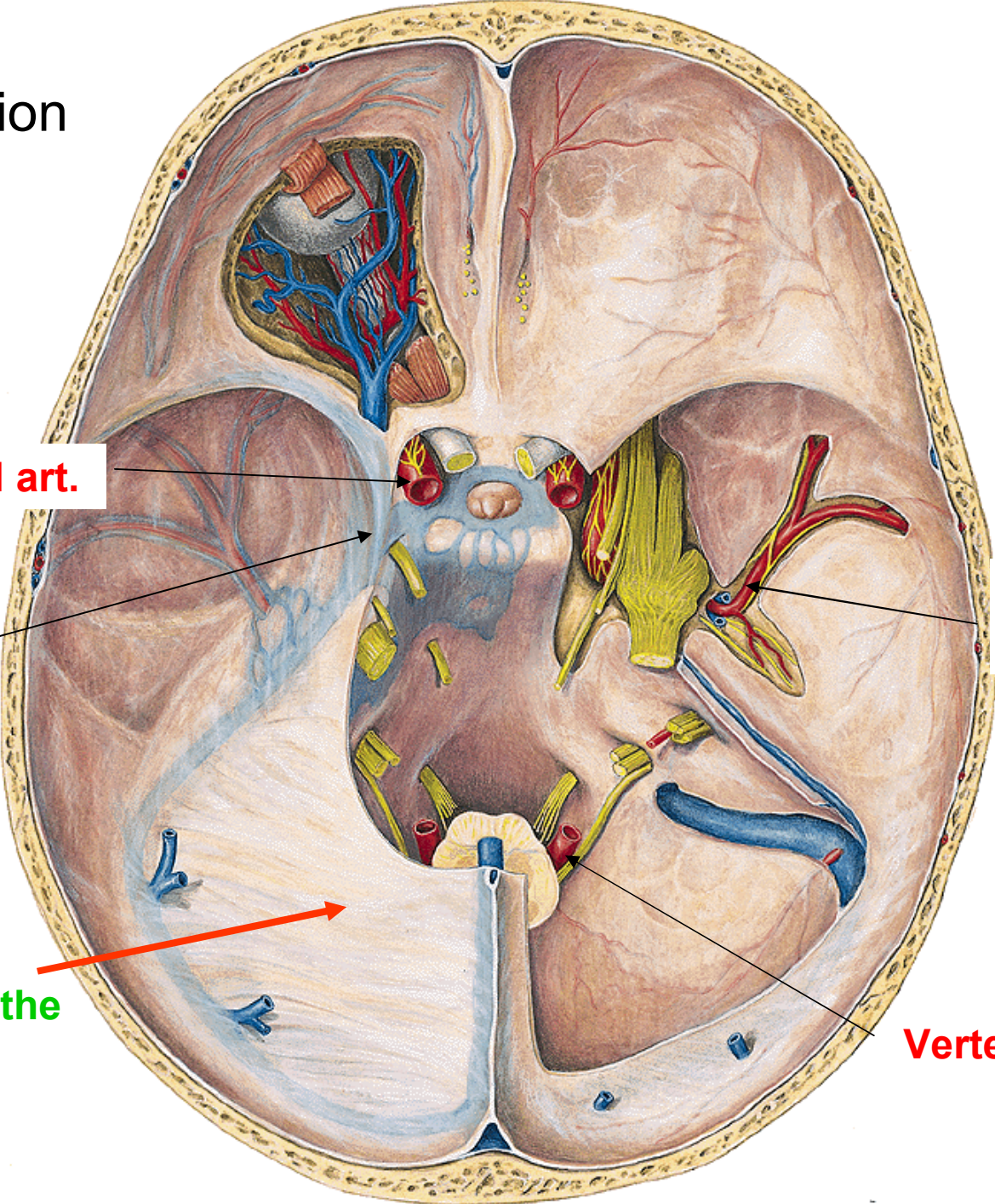
n.XII

confluens of sinuses

Sup. sagittal sinus



Repetition



Int. carotid art.

Cavernous sinus

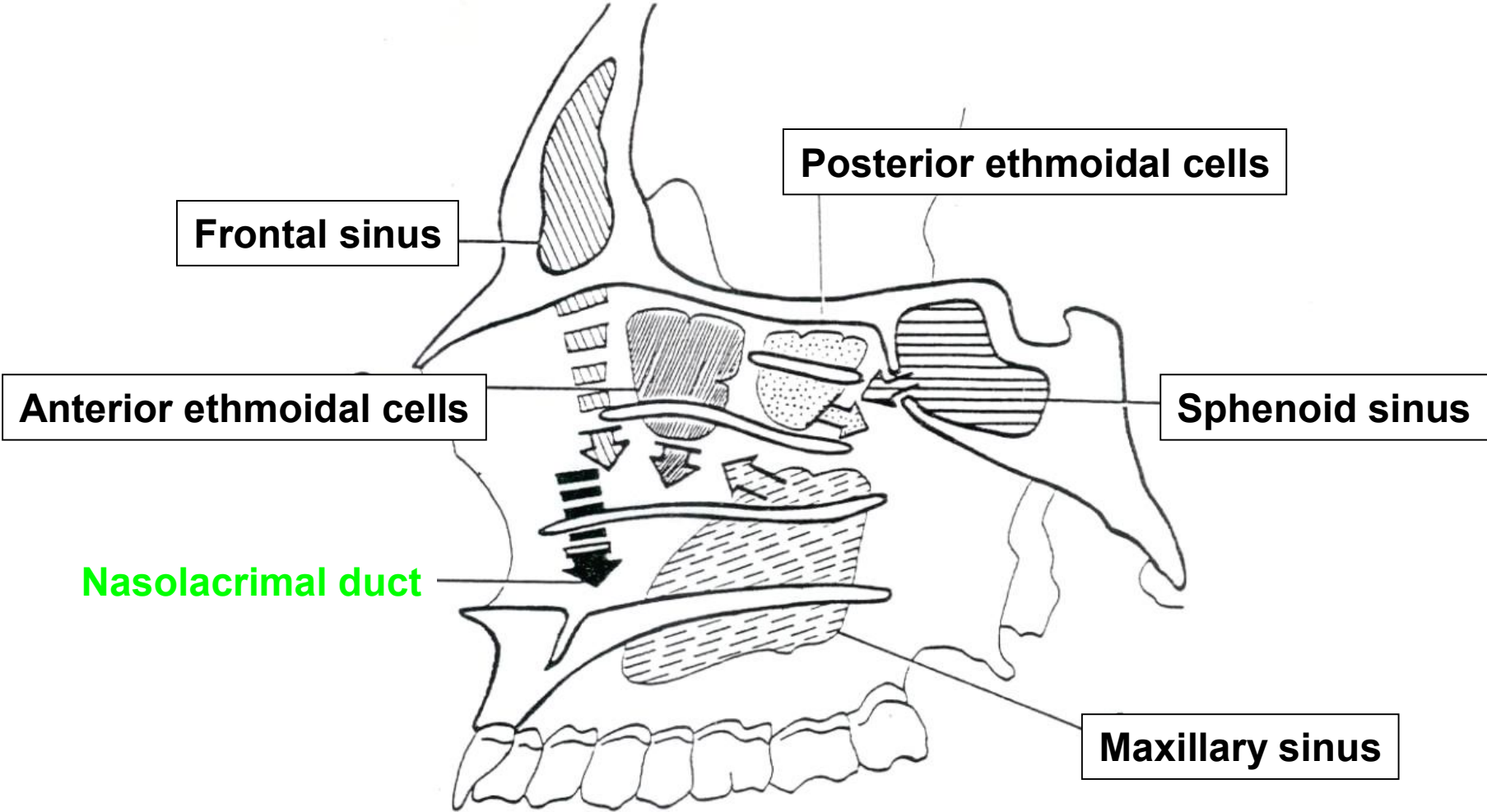
Middle meningeal art.

Tentorium of the cerebellum

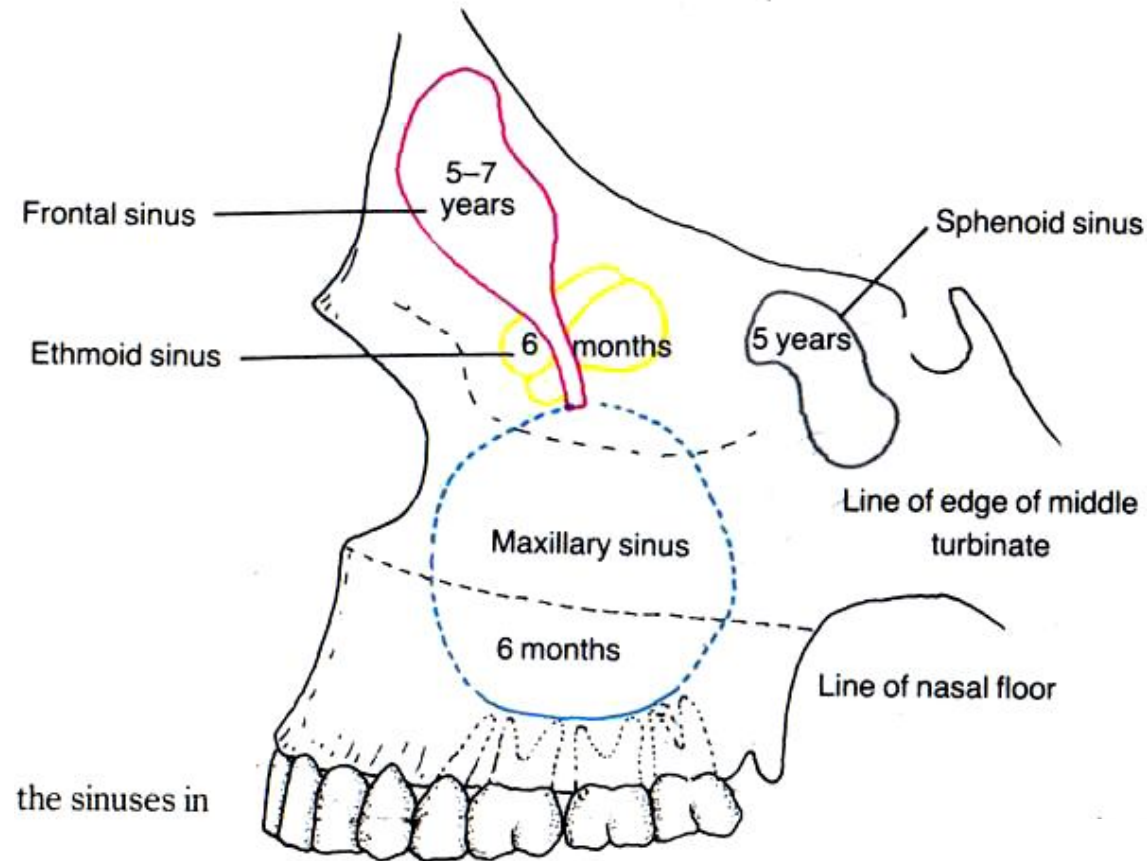
Vertebral art.



# Nasal cavity and paranasal sinuses



# Paranasal sinuses - development





**Anteriorly**

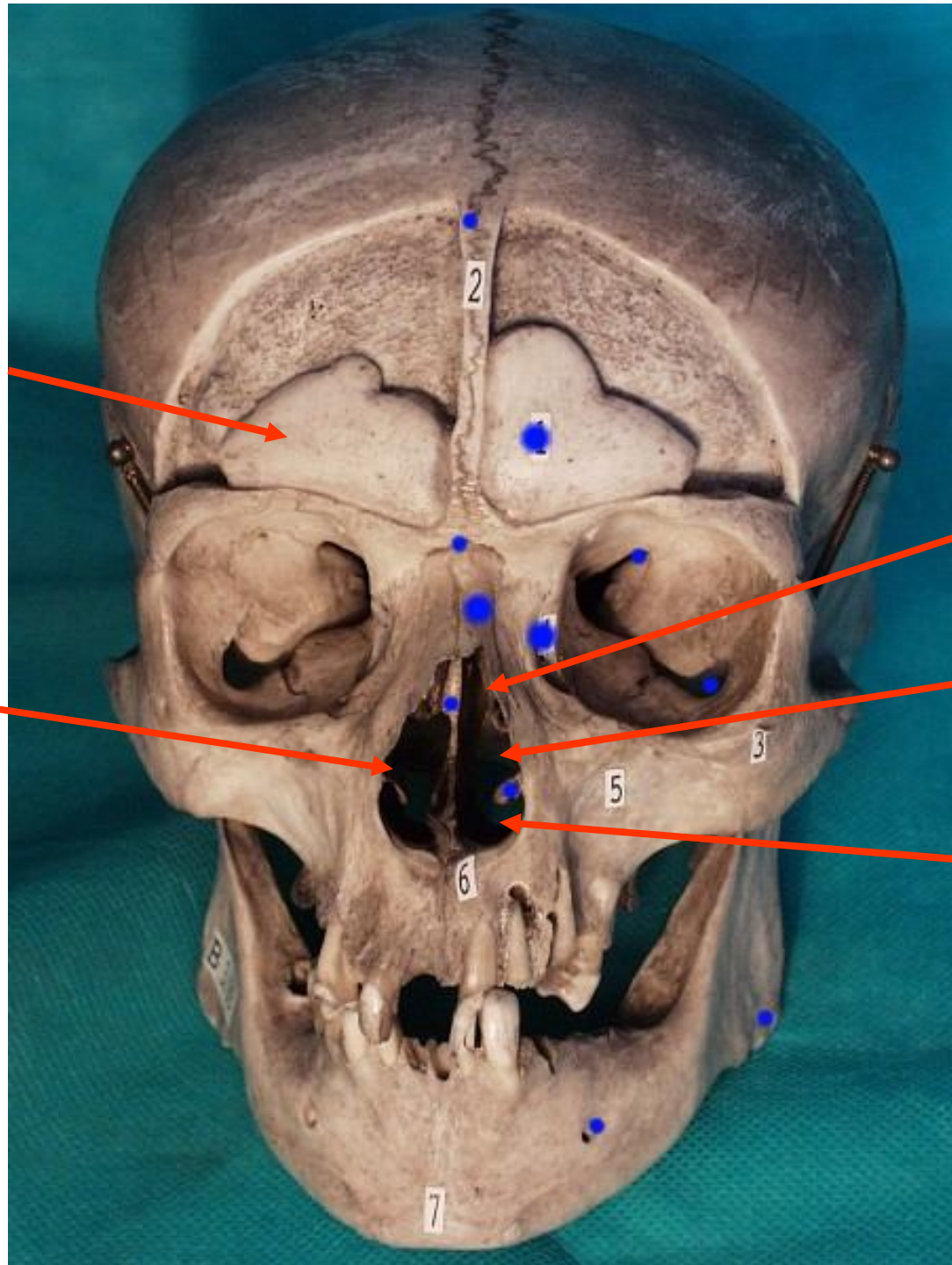
**Frontal sinus**

**Piriform aperture**

**Superior nasal meatus**

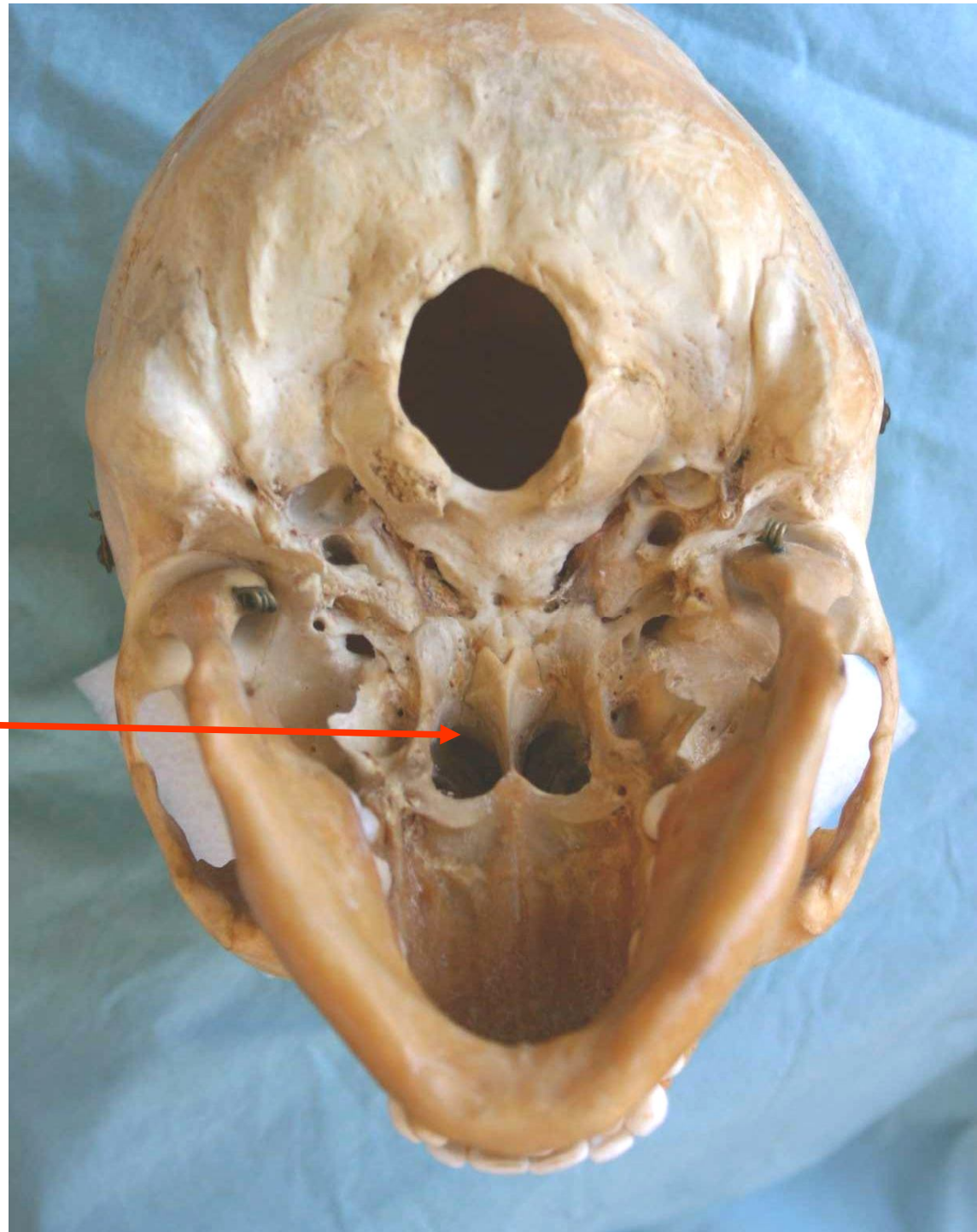
**Middle nasal meatus**

**Inferior nasal meatus**



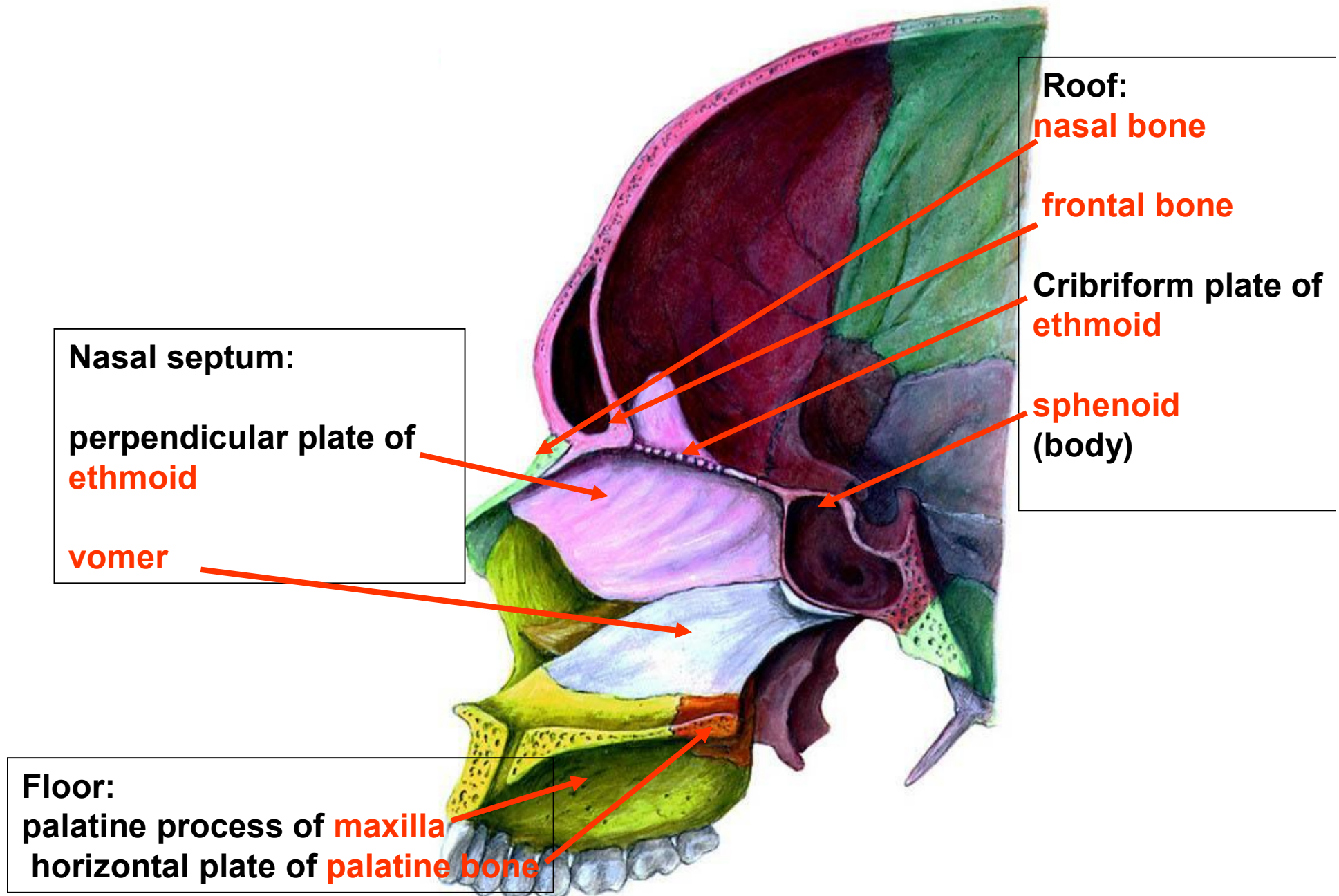
Posteriorly

**Choana**





# Cavum nasi osseum



# Lateral wall of the nasal cavity

Frontal process and body of maxilla

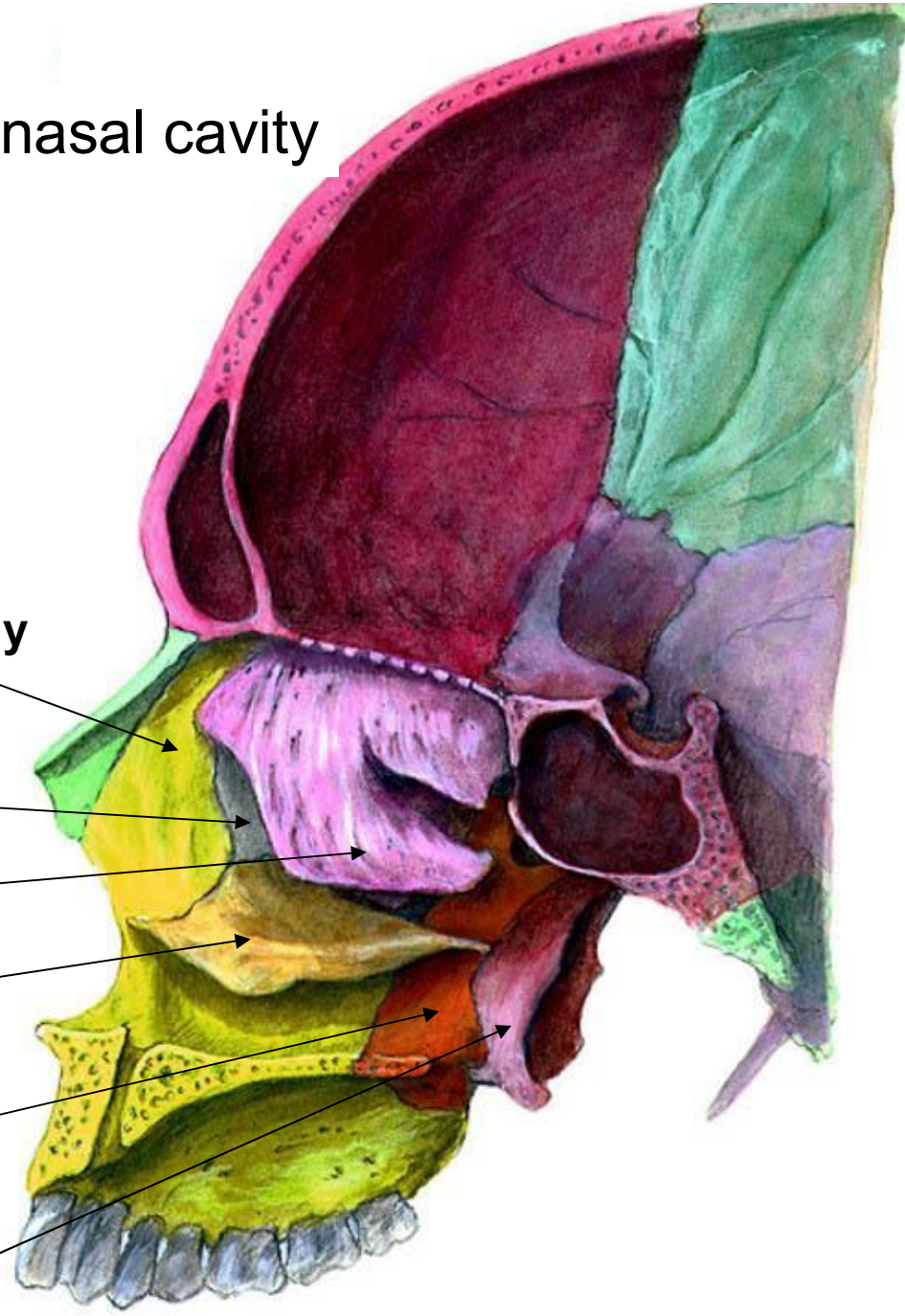
Lacrimal bone

Ethmoid

Inferior nasal concha

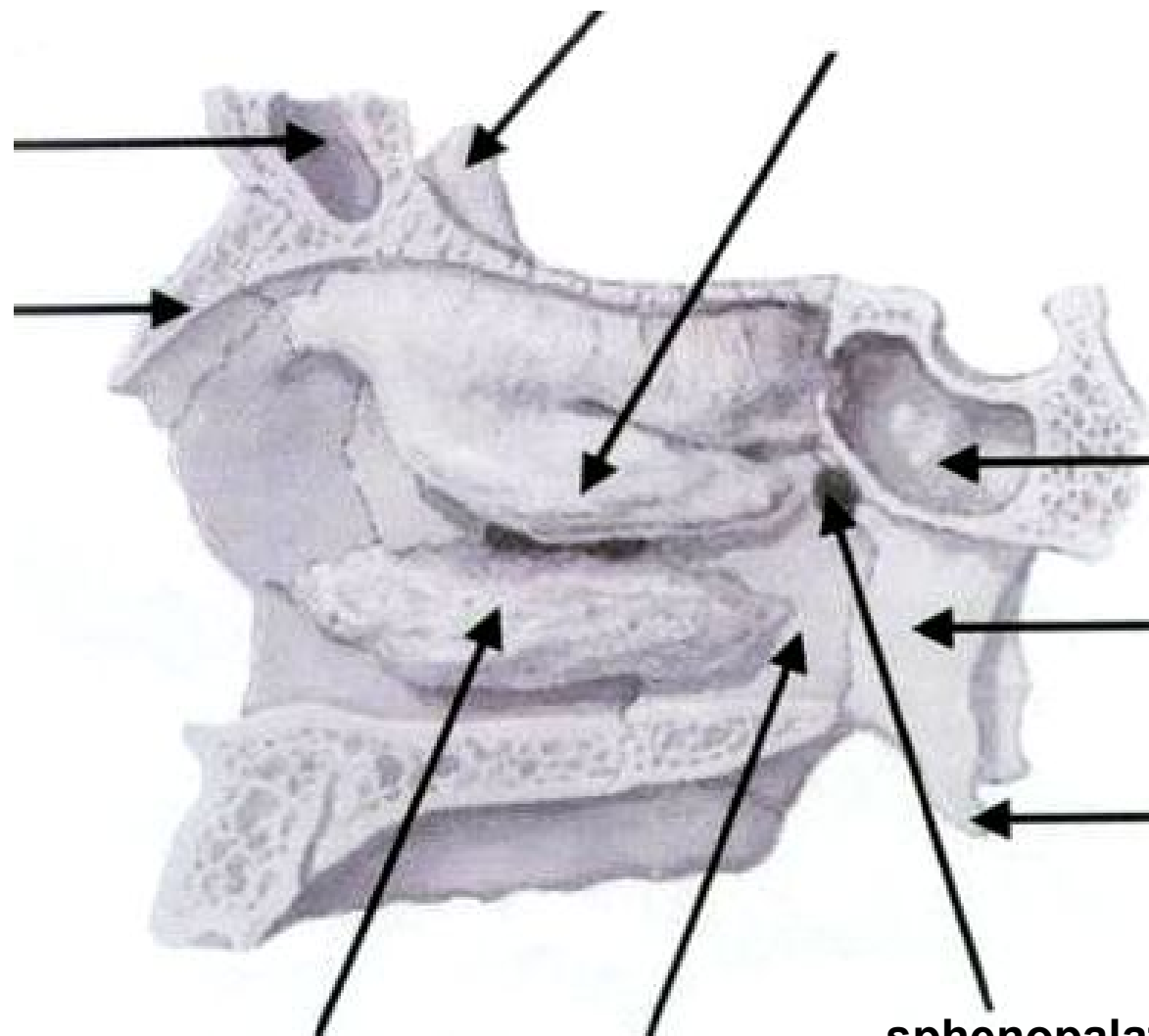
Perpendicular plate of palatine bone

Medial lamina of pterygoid process



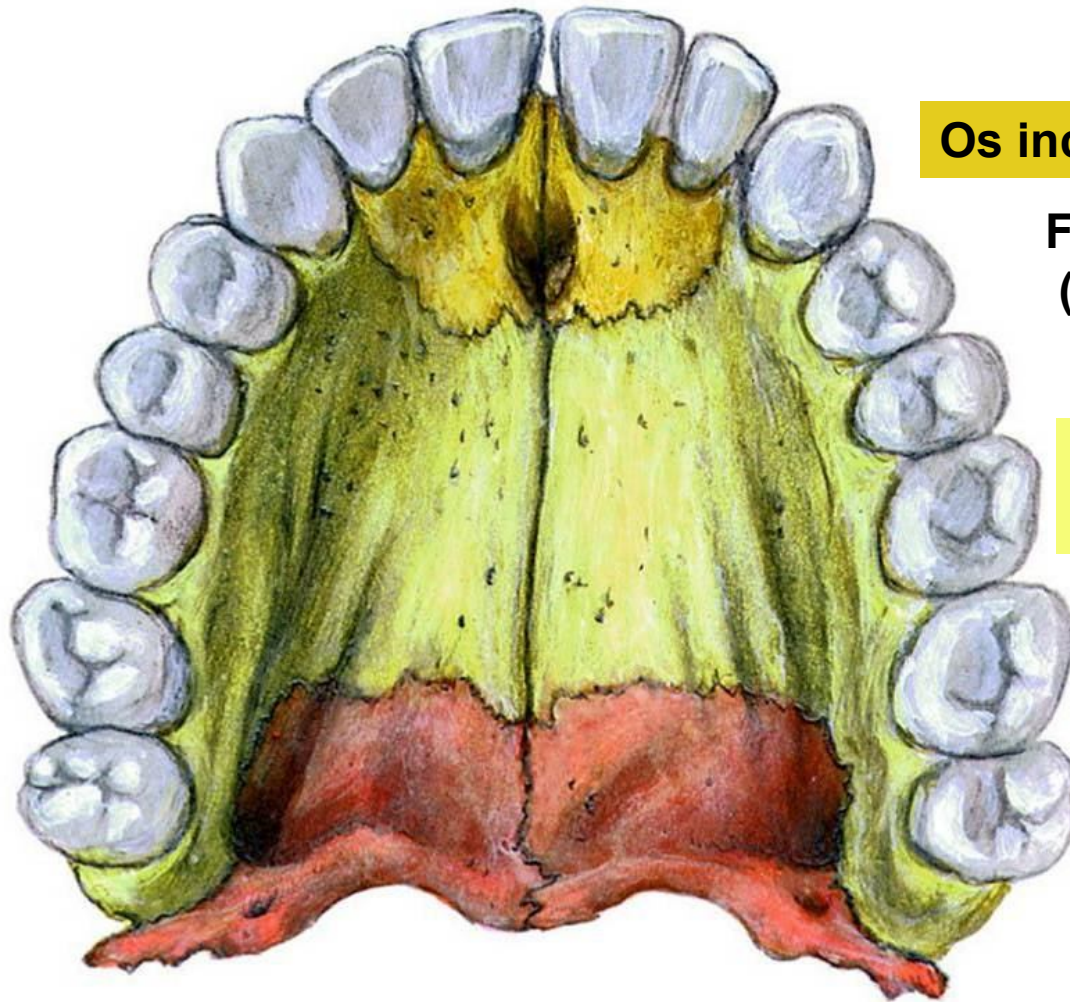


## Bony nasal cavity - repetition



sphenopalatine foramen

# Palatum durum



**Os incisivum**

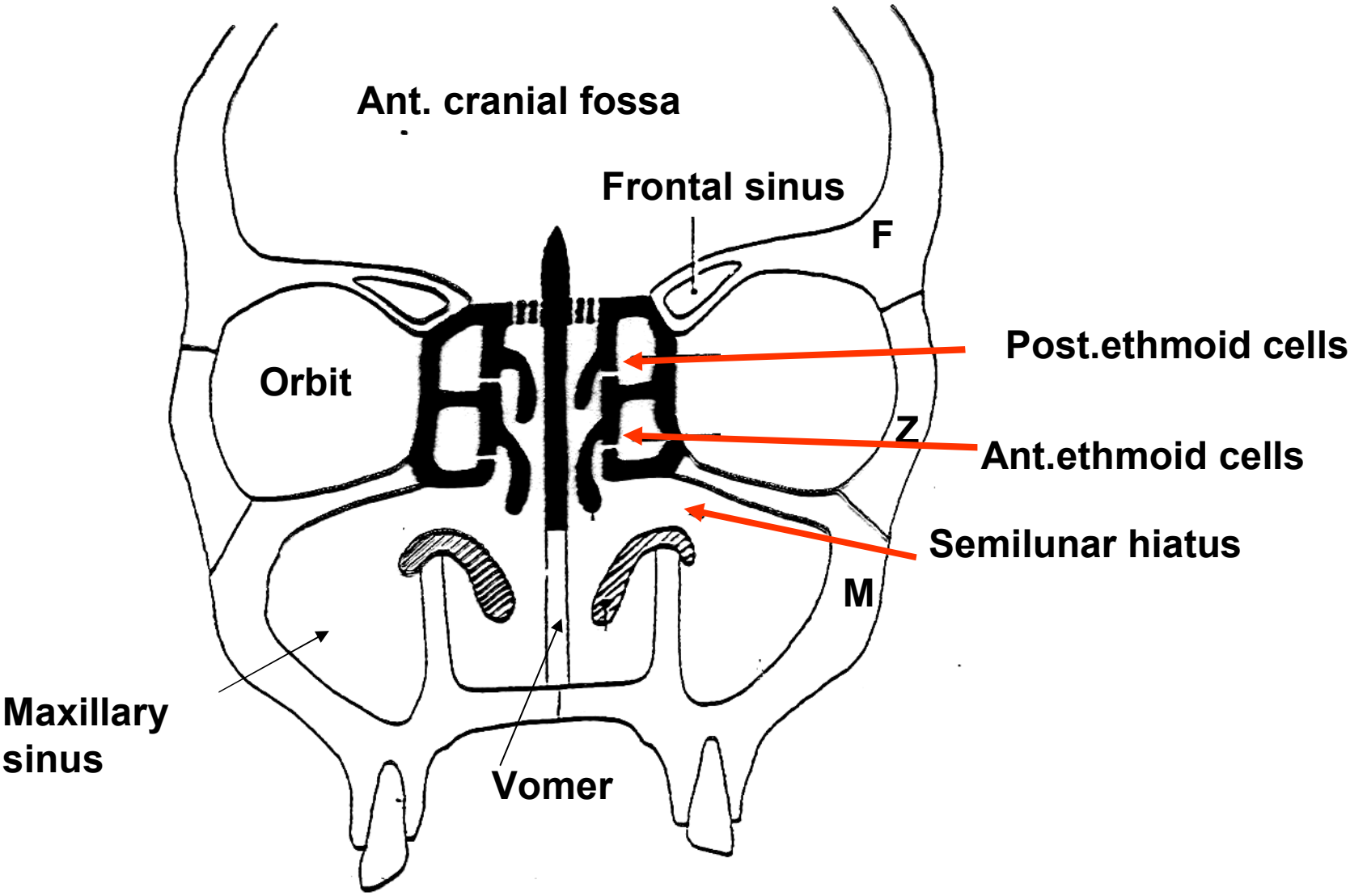
**Foramen incisivum  
(nervus nasopalatinus)**

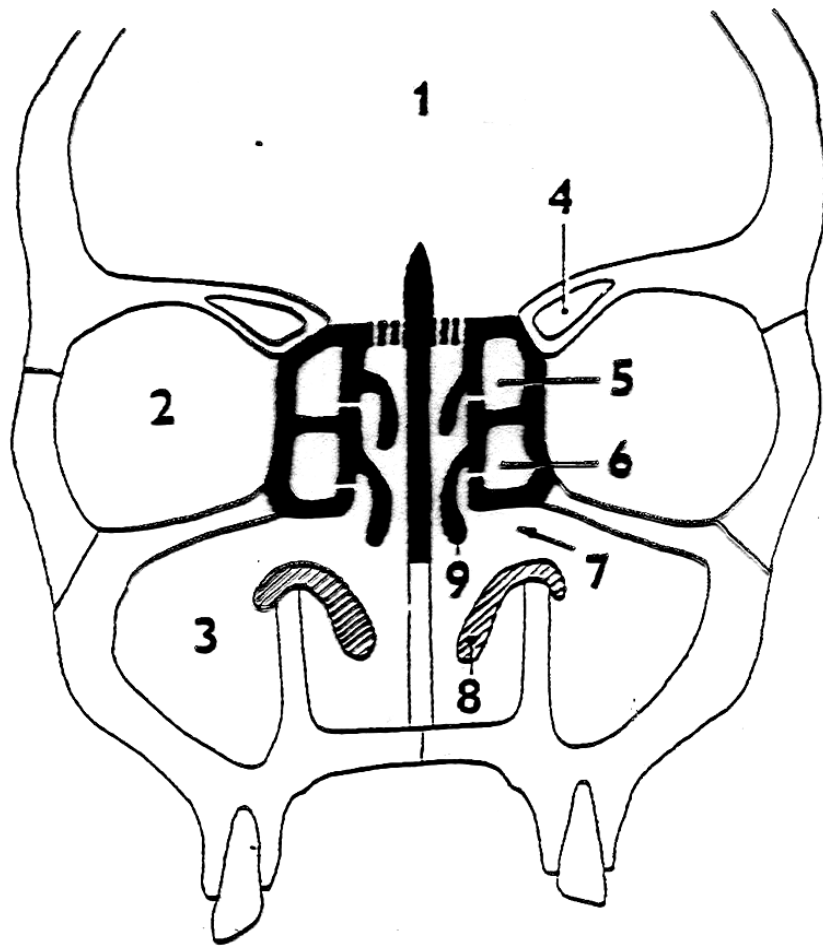
**Processus palatinus  
maxillae**

**Lamina horizontalis  
ossis palatini**

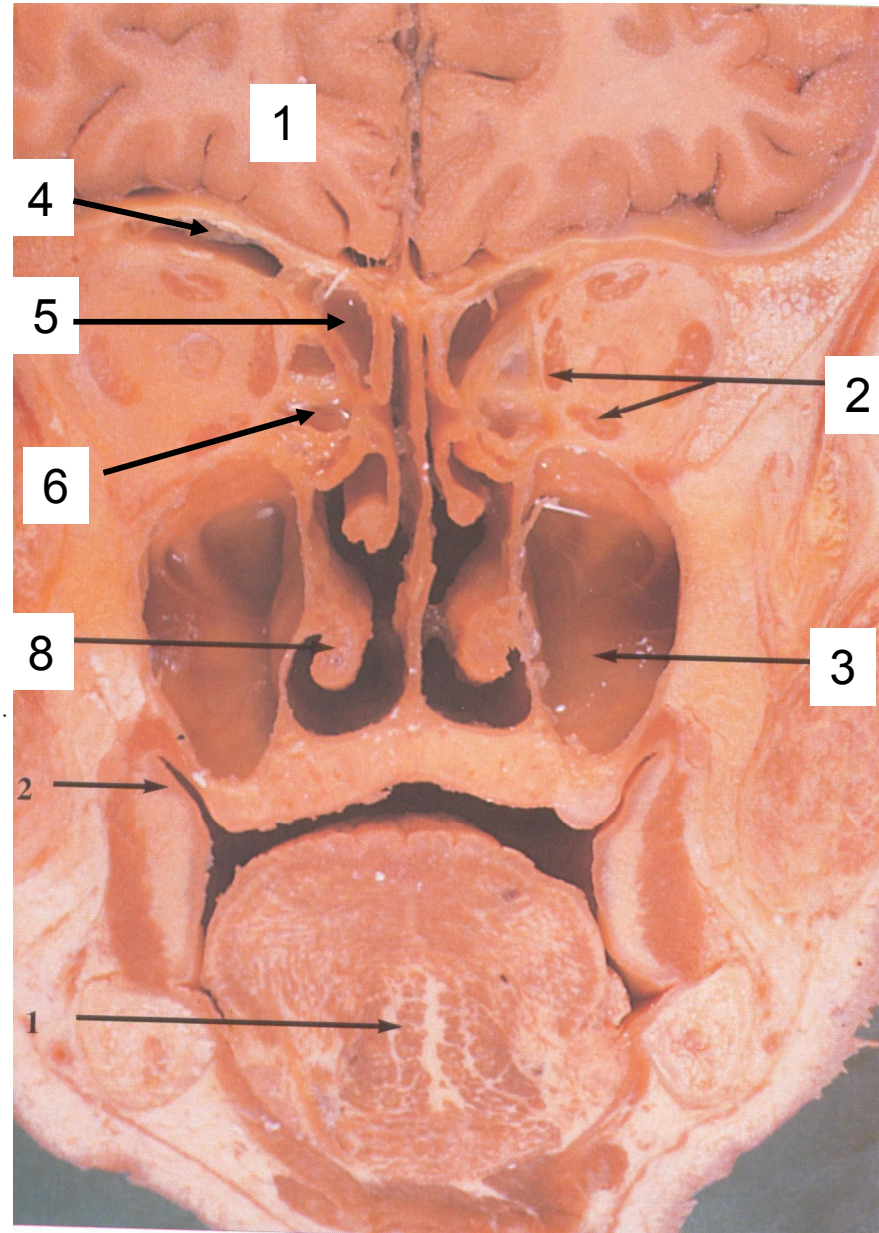


# Frontal section through the maxillary sinus (schema)



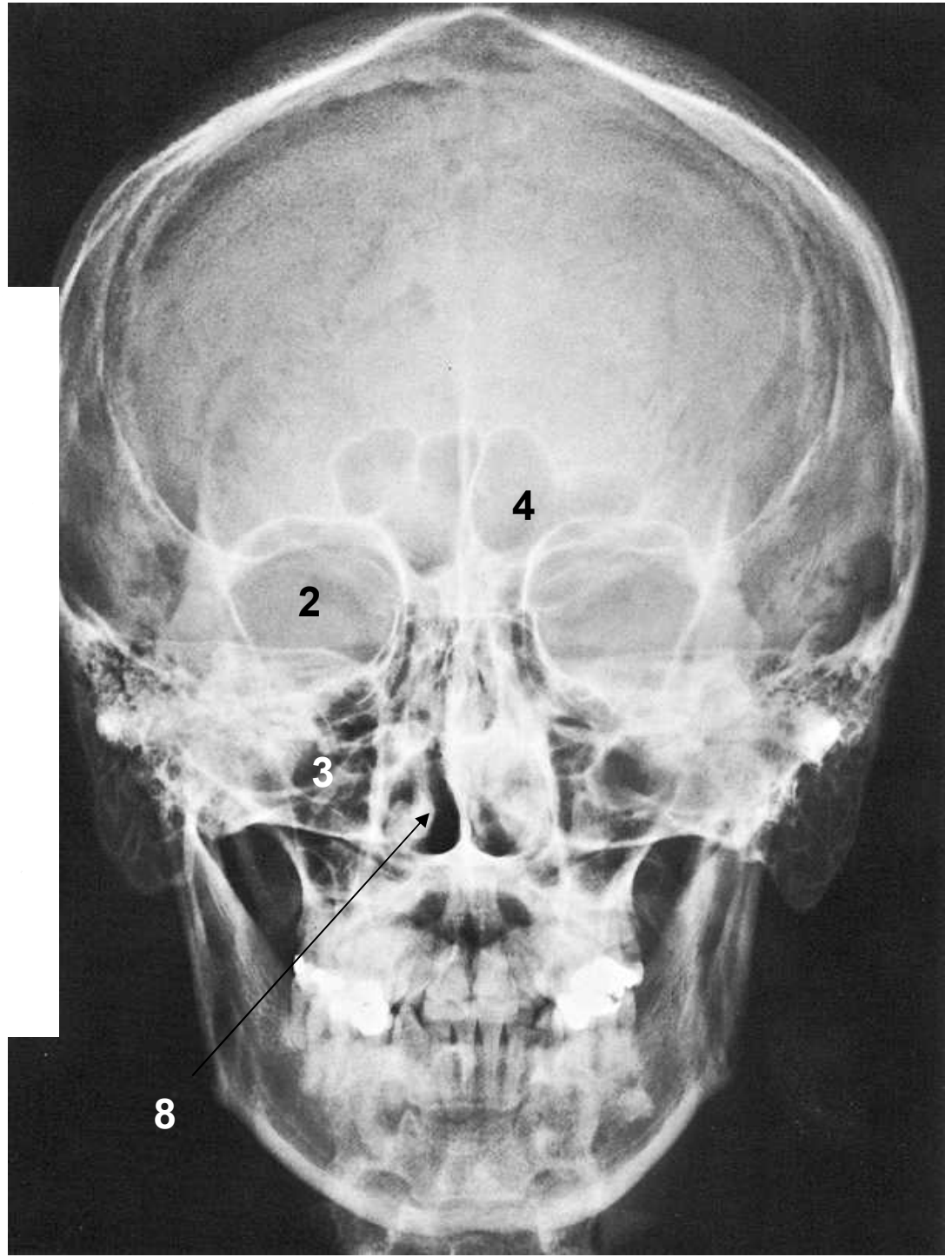
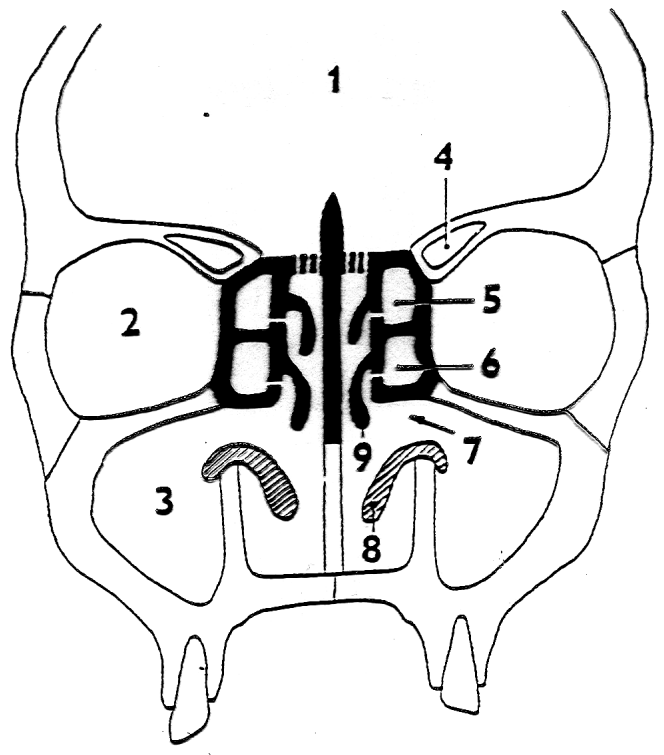


**Frontal section through the maxillary sinus**

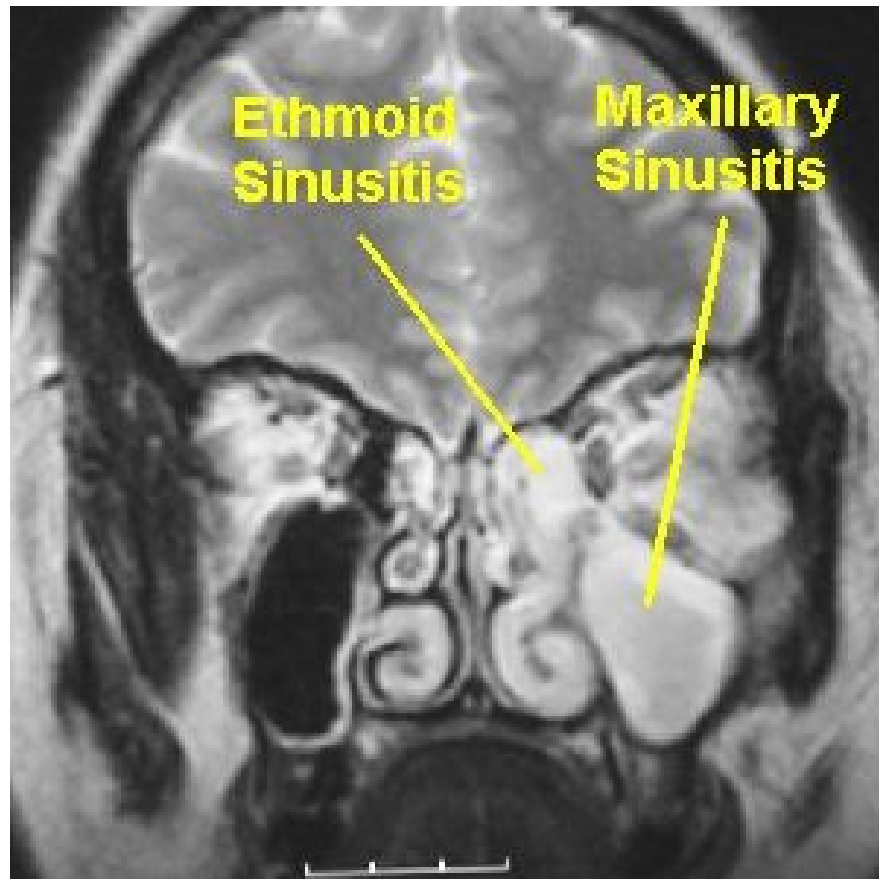




X-ray picture of the skull  
AP projection



# Sinusitis



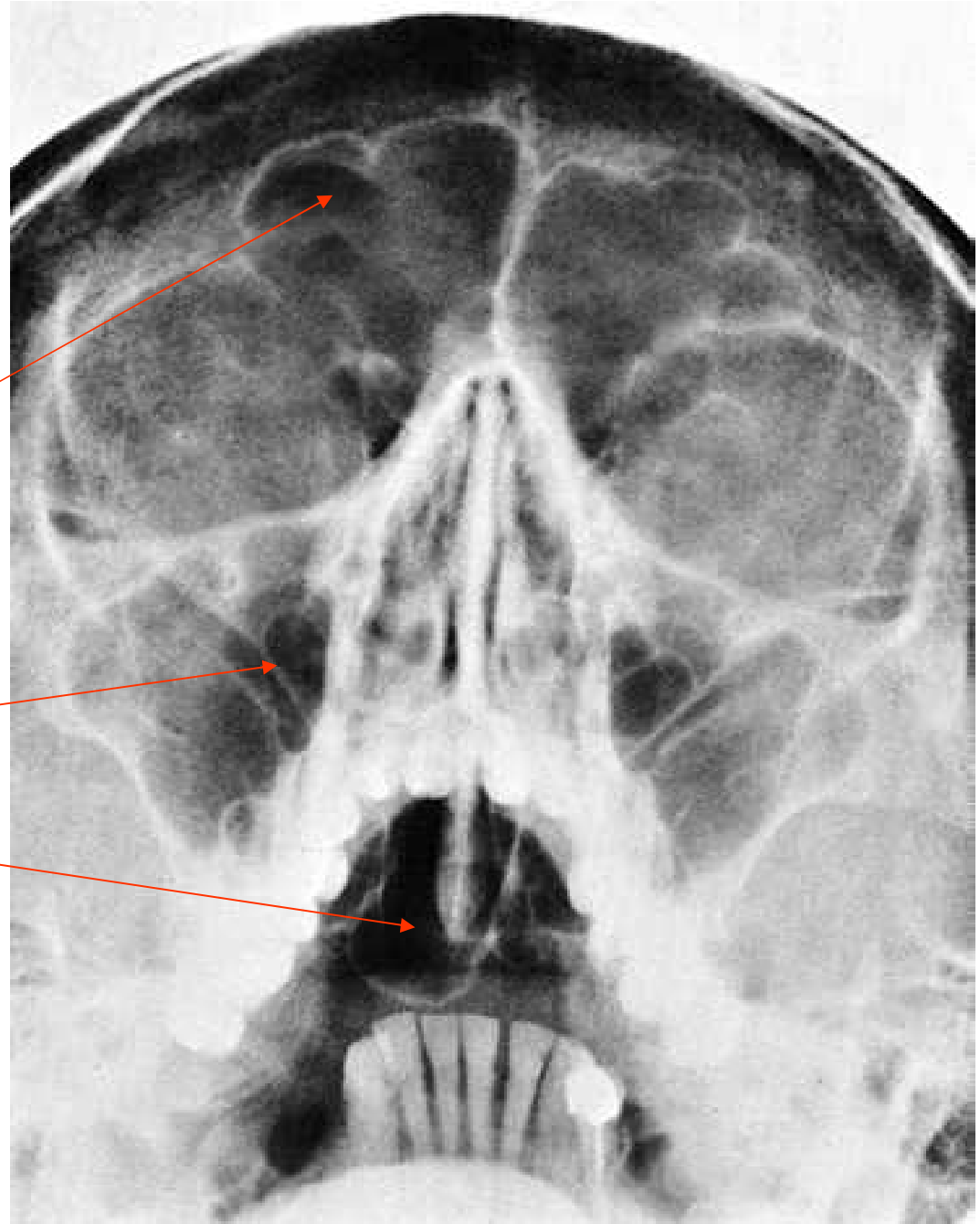


X-ray picture of  
paranasal sinuses  
(Waters projection)

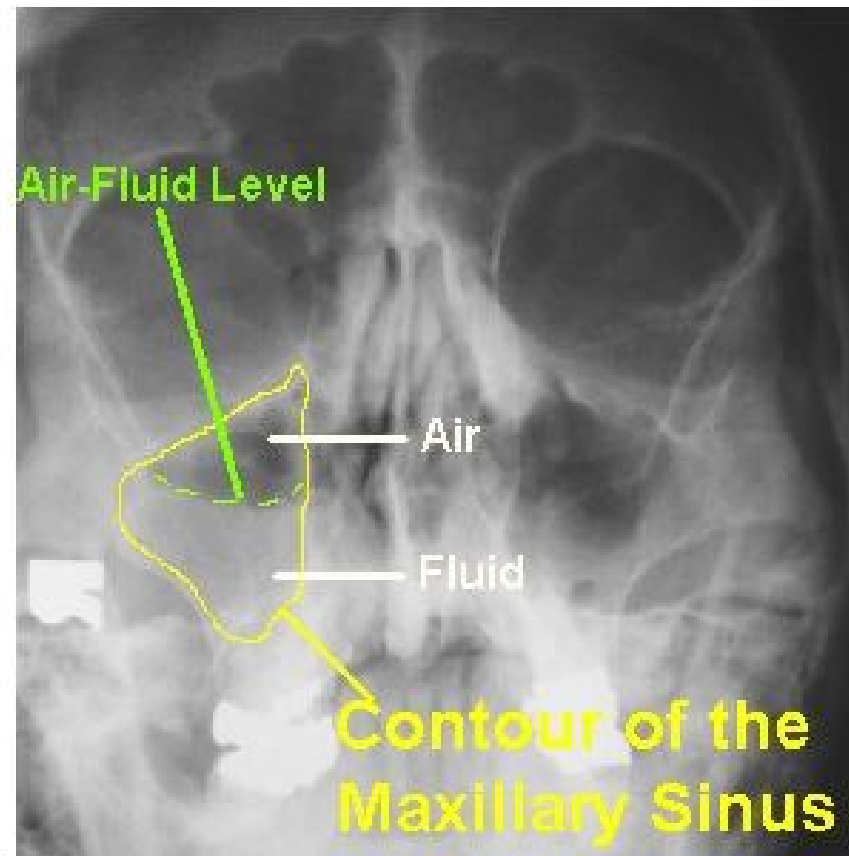
**Frontal sinus**

**Maxillary sinus**

**Sphenoid sinus**

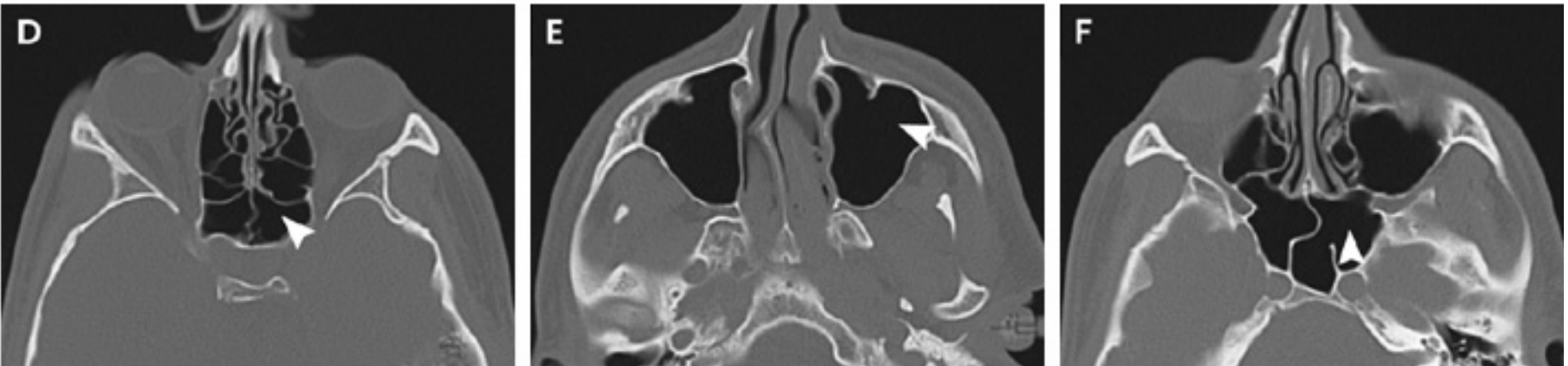
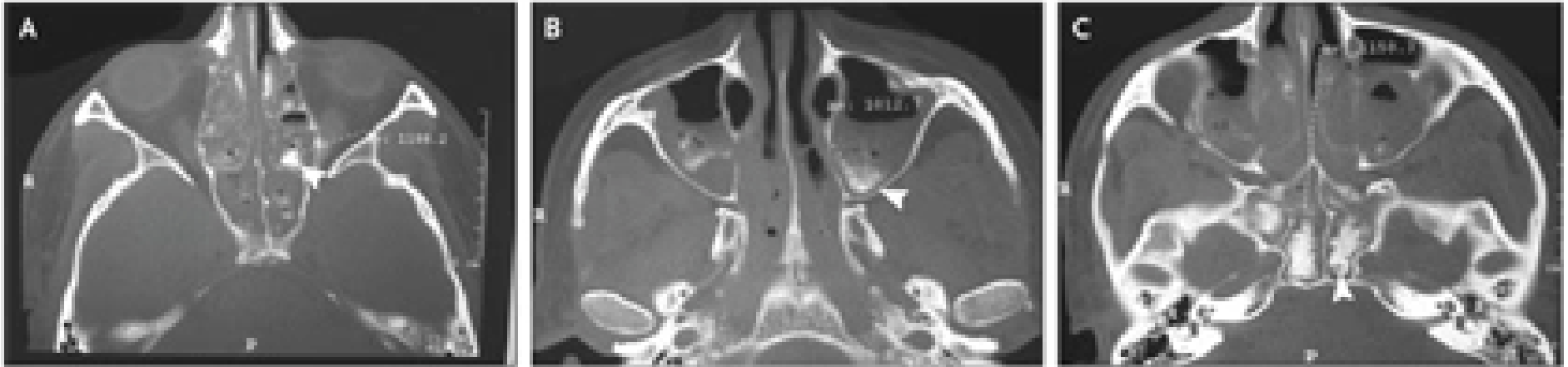


## RTG Waters projection - sinusitis





**Pansinusitis after tsunami**



**Normal CT of paranasal sinuses on the same levels**

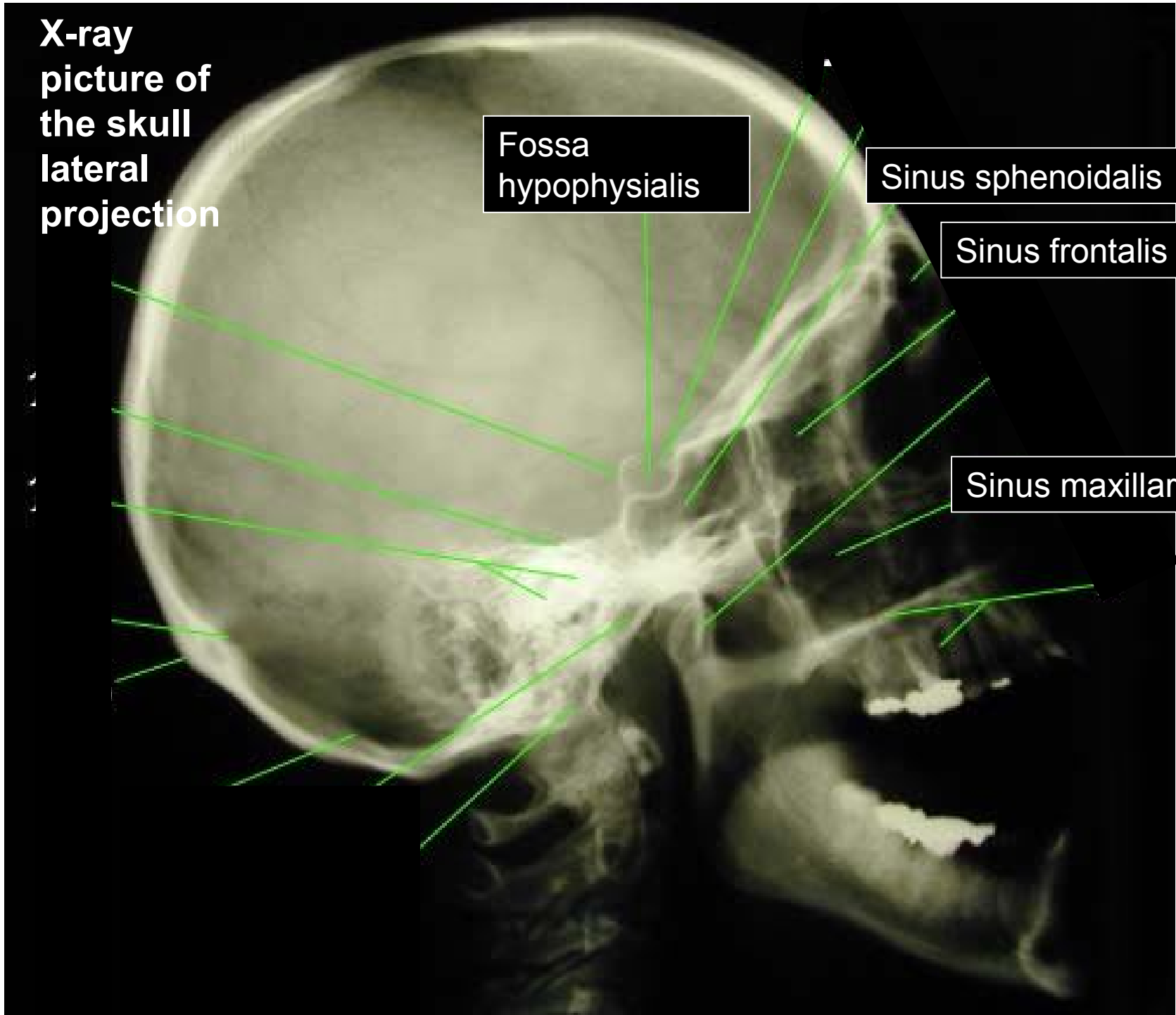
**X-ray  
picture of  
the skull  
lateral  
projection**

Fossa  
hypophysialis

Sinus sphenoidalis

Sinus frontalis

Sinus maxillaris





# Infratemporal fossa



## Borders:

Sup.: infratemporal crest

Ant.: maxillary tuberosity

Lat.: ramus of the mandible

Med.: lateral plate of the pterygoid process

## Content:

**Pterygoid muscles**

**Pterygoid plexus**

**Maxillary artery**

Branches of the mandibular nerve

Otic ganglion

Buccal adipose body

# Infratemporal fossa openings

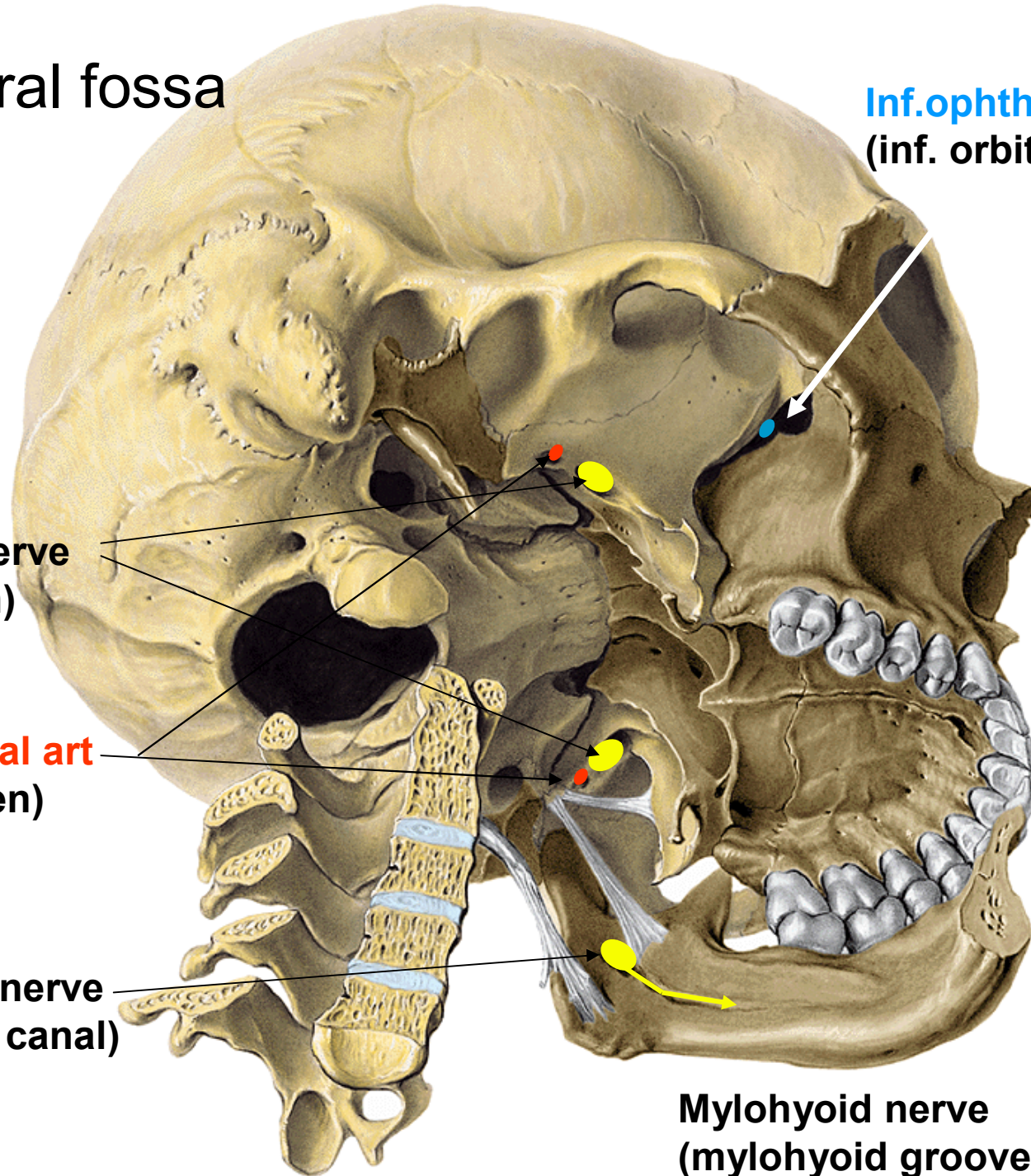
**Inf.ophthalmic vein**  
(inf. orbital fissure)

**Mandibular nerve**  
(oval foramen)

**Middle meningeal art**  
(spinous foramen)

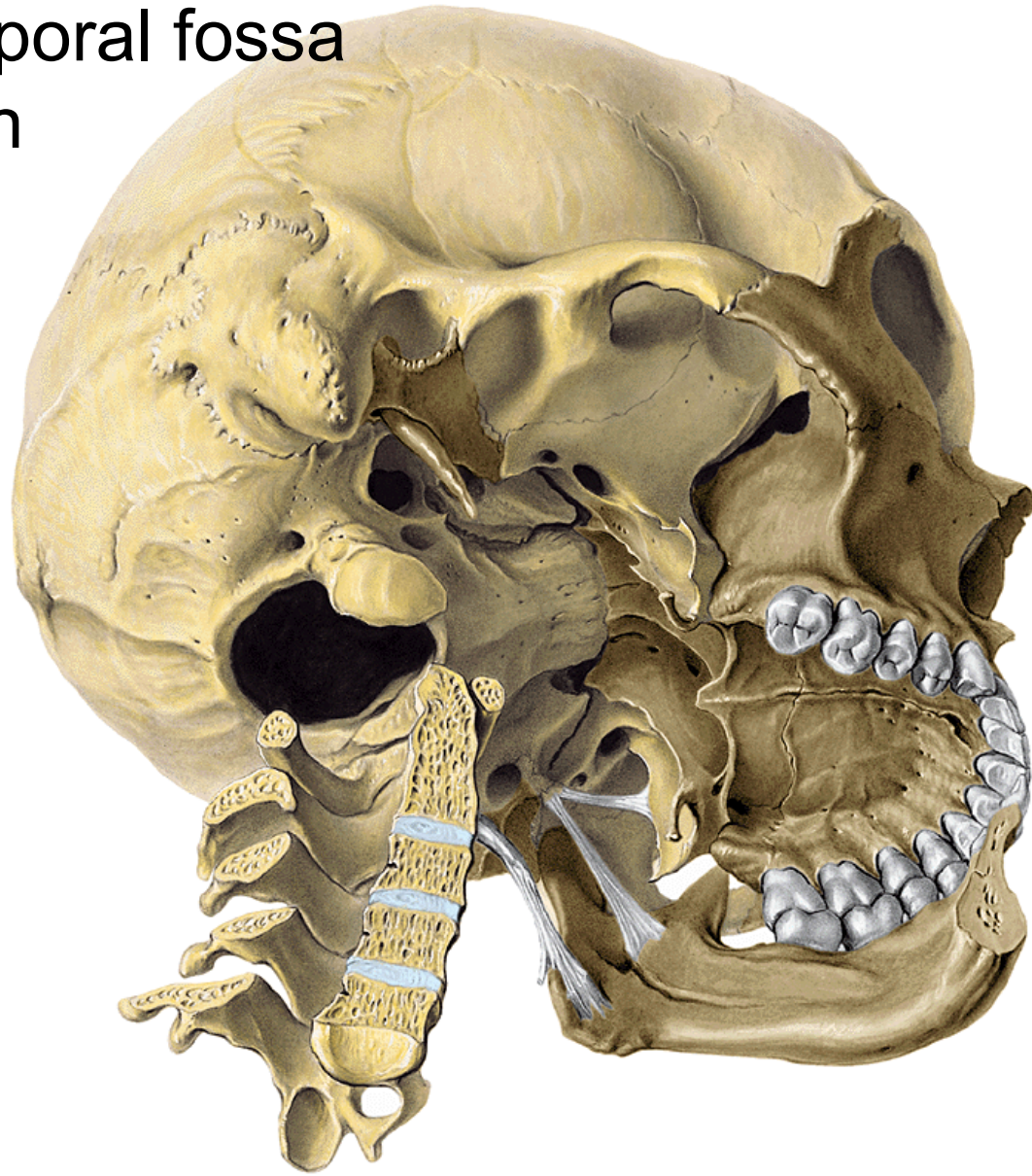
**Inf. alveolar nerve**  
(mandibular canal)

**Mylohyoid nerve**  
(mylohyoid groove)

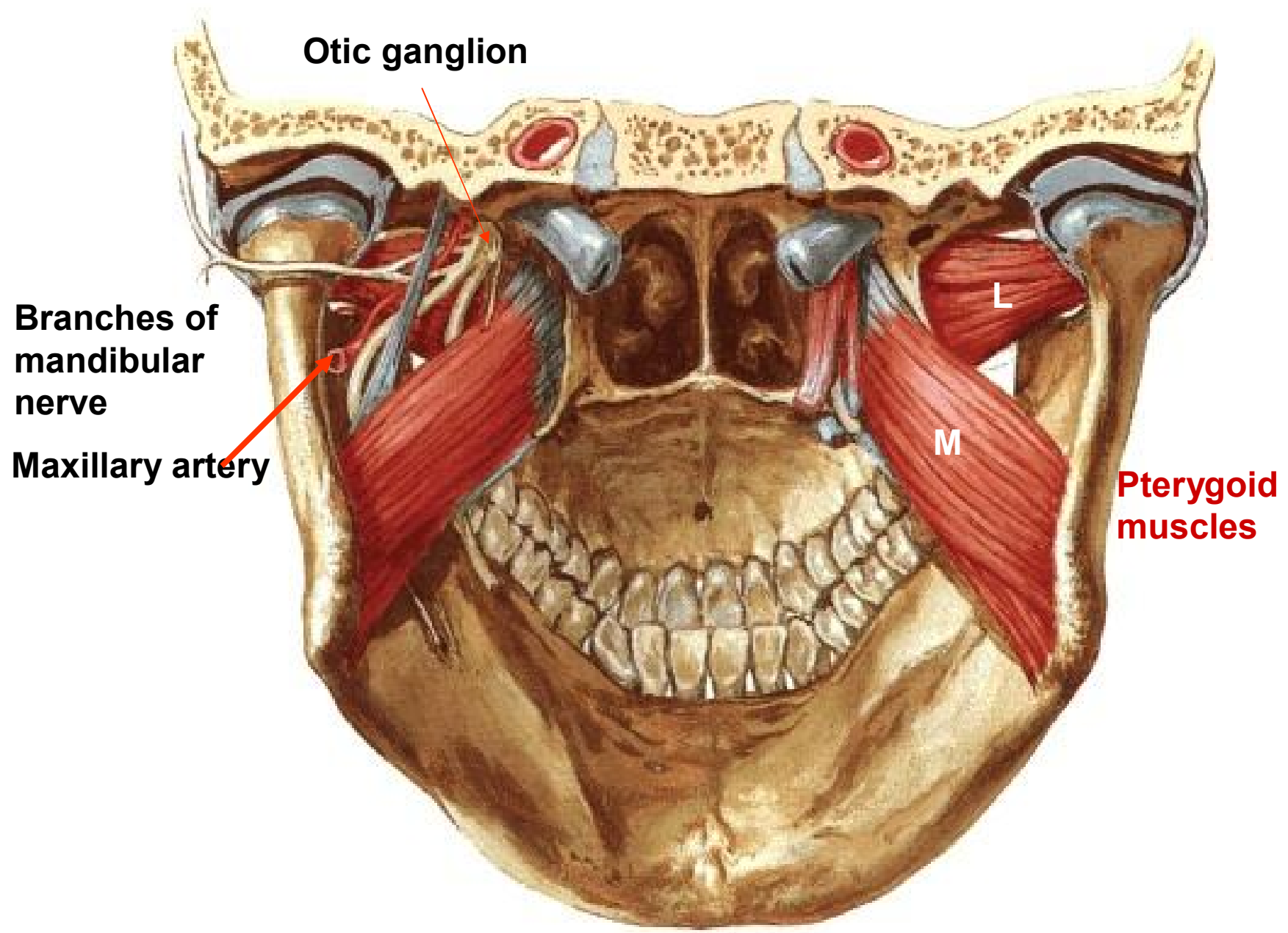




Infratemporal fossa  
repetition







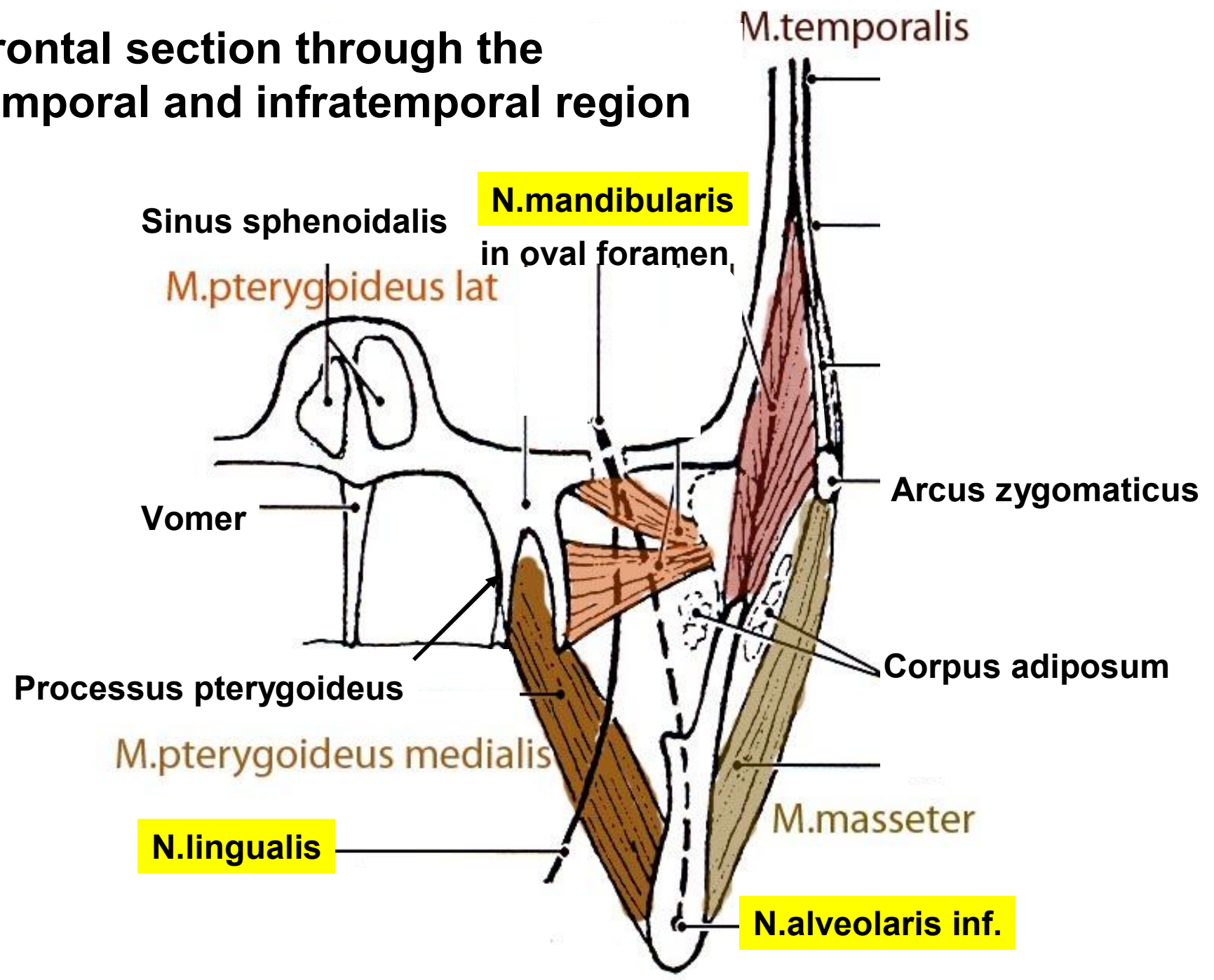
Otic ganglion

Branches of  
mandibular  
nerve

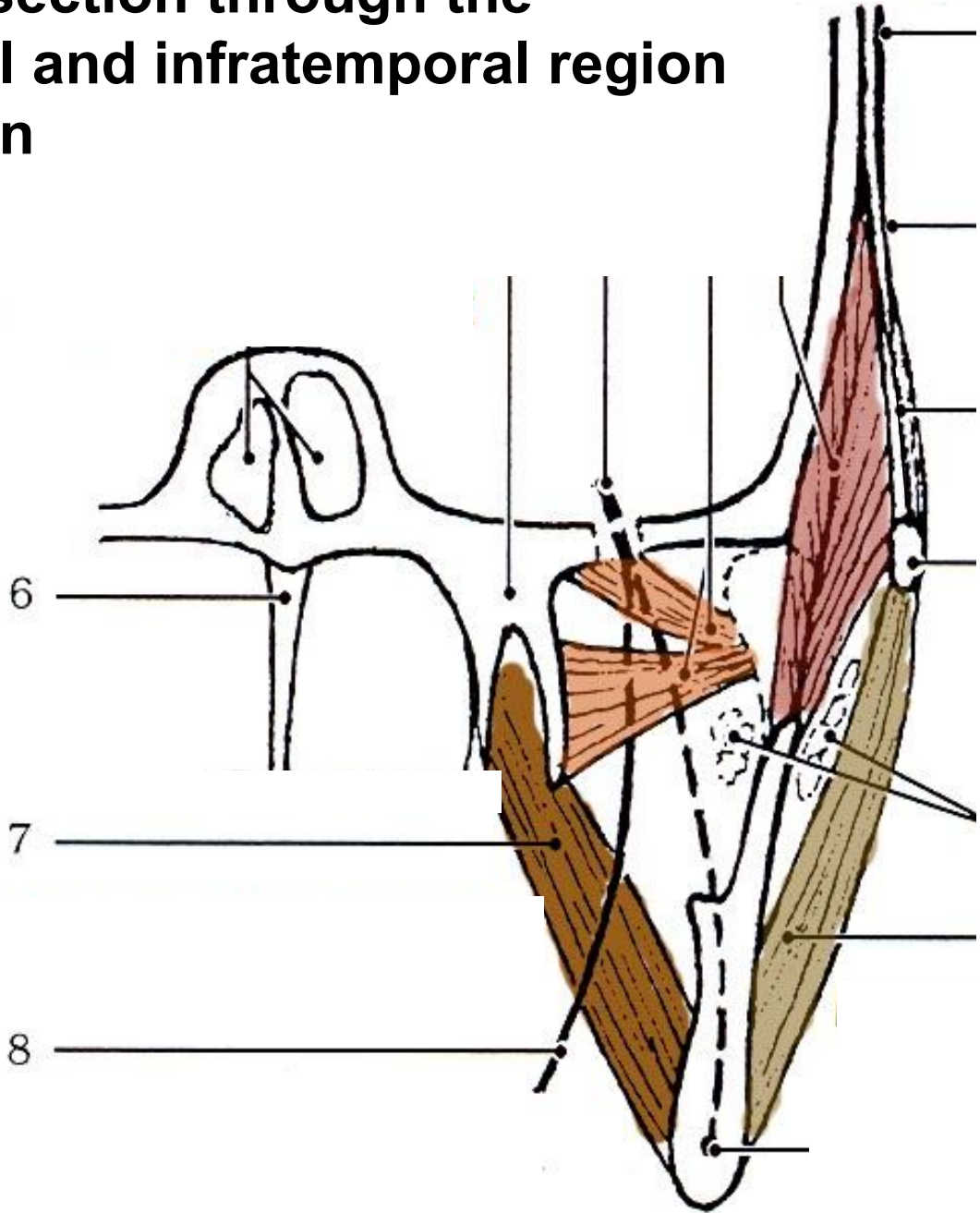
Maxillary artery

Pterygoid  
muscles

# Frontal section through the temporal and infratemporal region

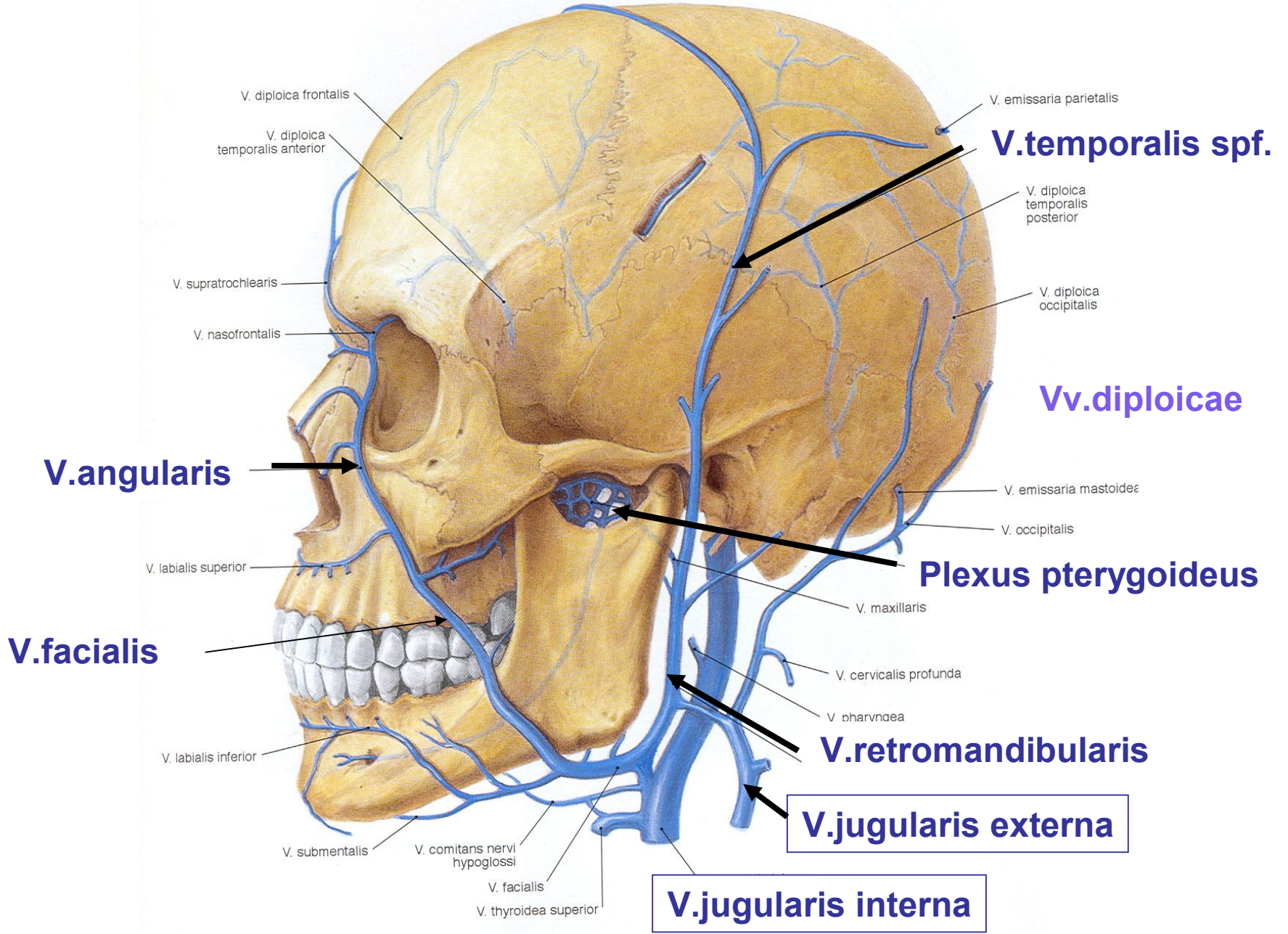


# Frontal section through the temporal and infratemporal region repetition

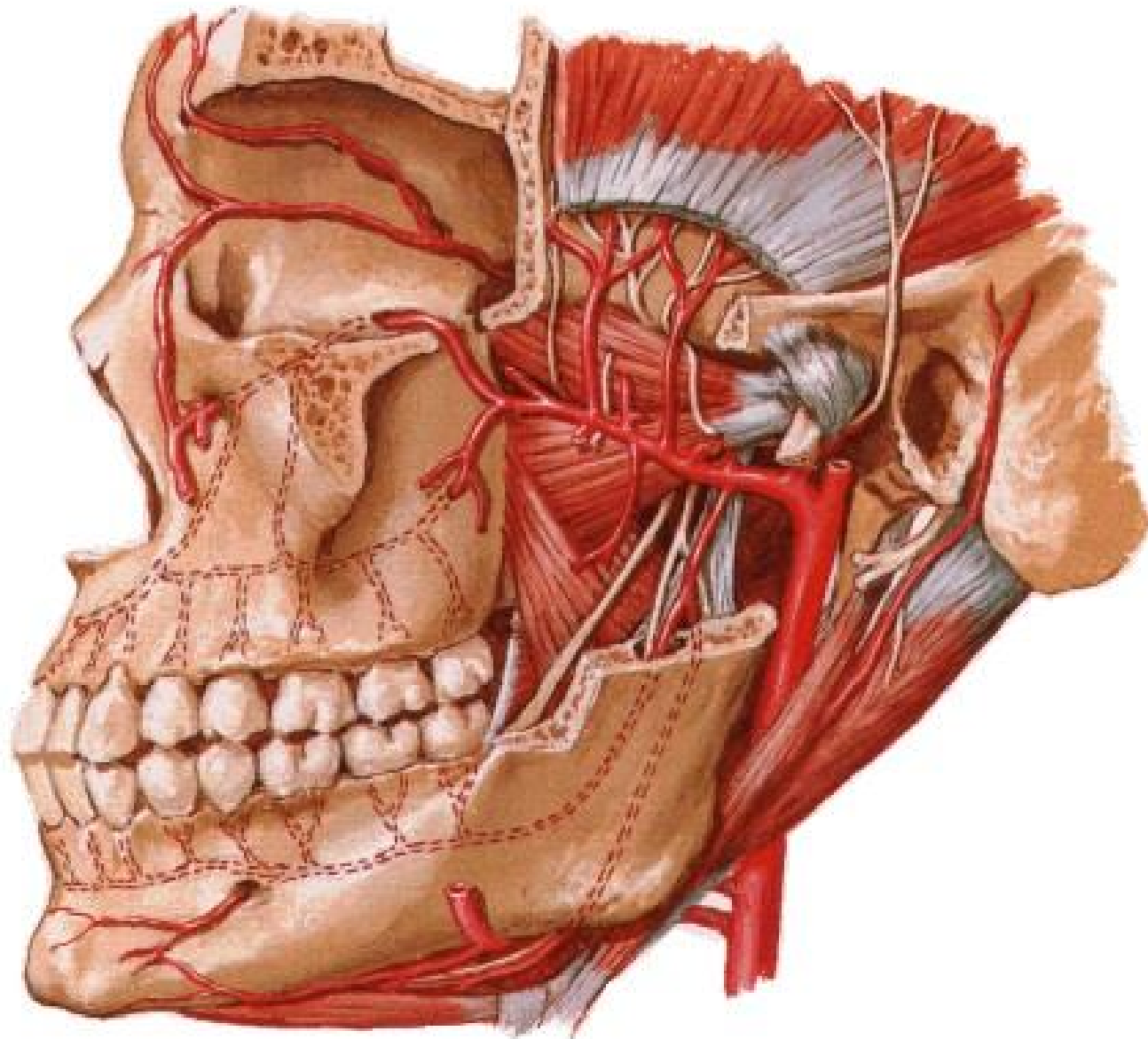




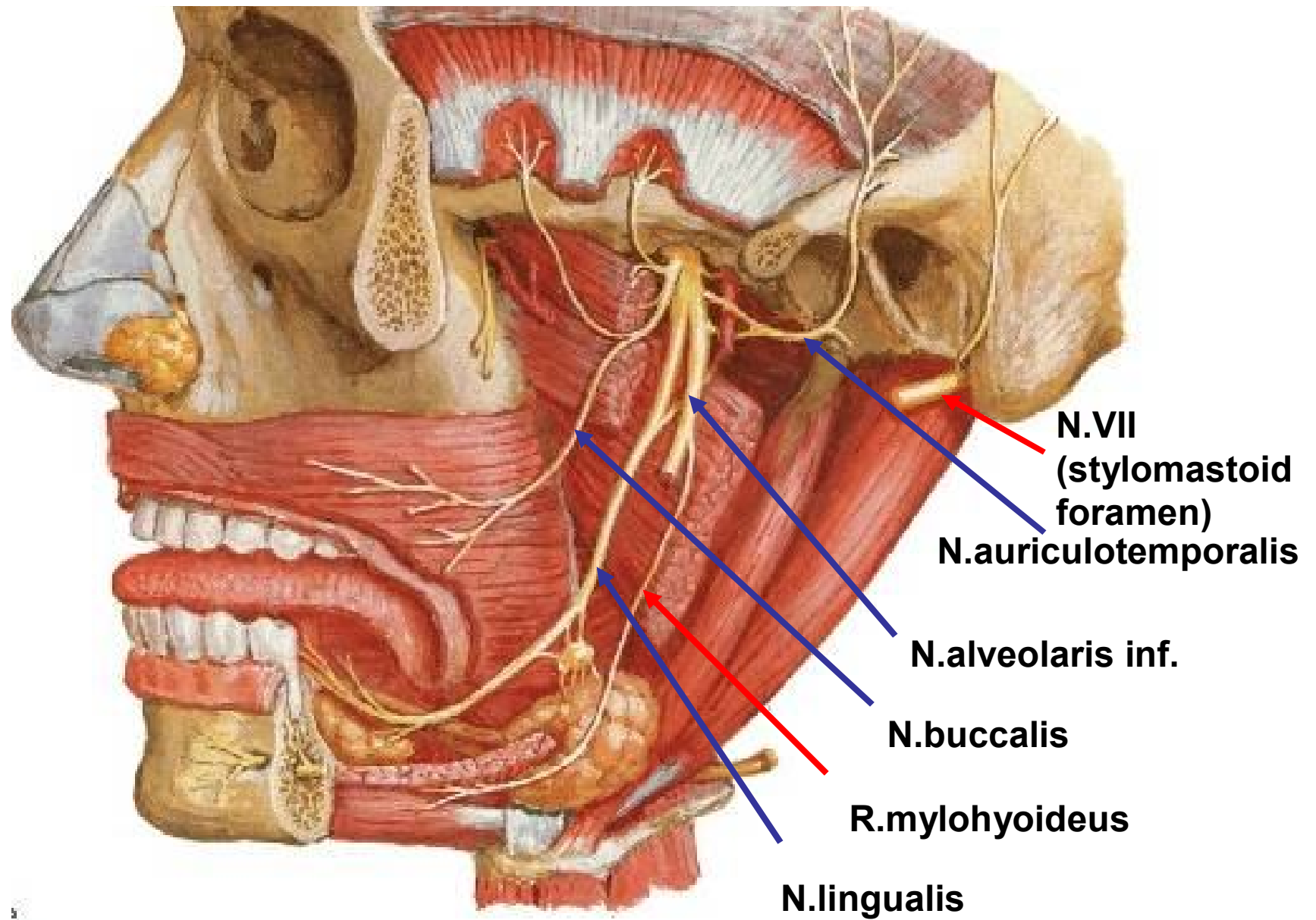
# Pterygoid plexus in the infratemporal fossa



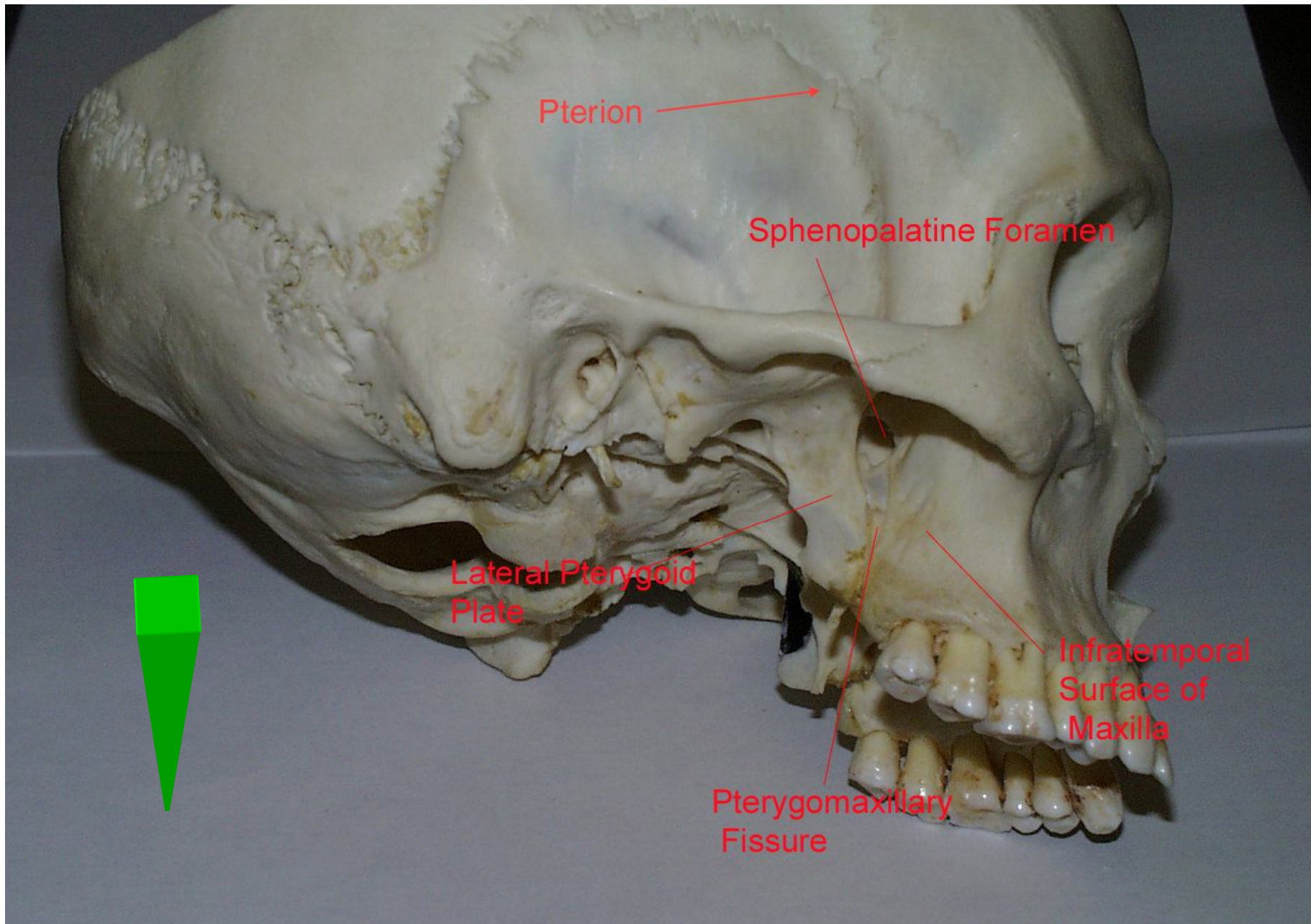
## Maxillary artery in the infratemporal fossa



## Nerves in the infratemporal fossa – branches of mandibular nerve (V/3)



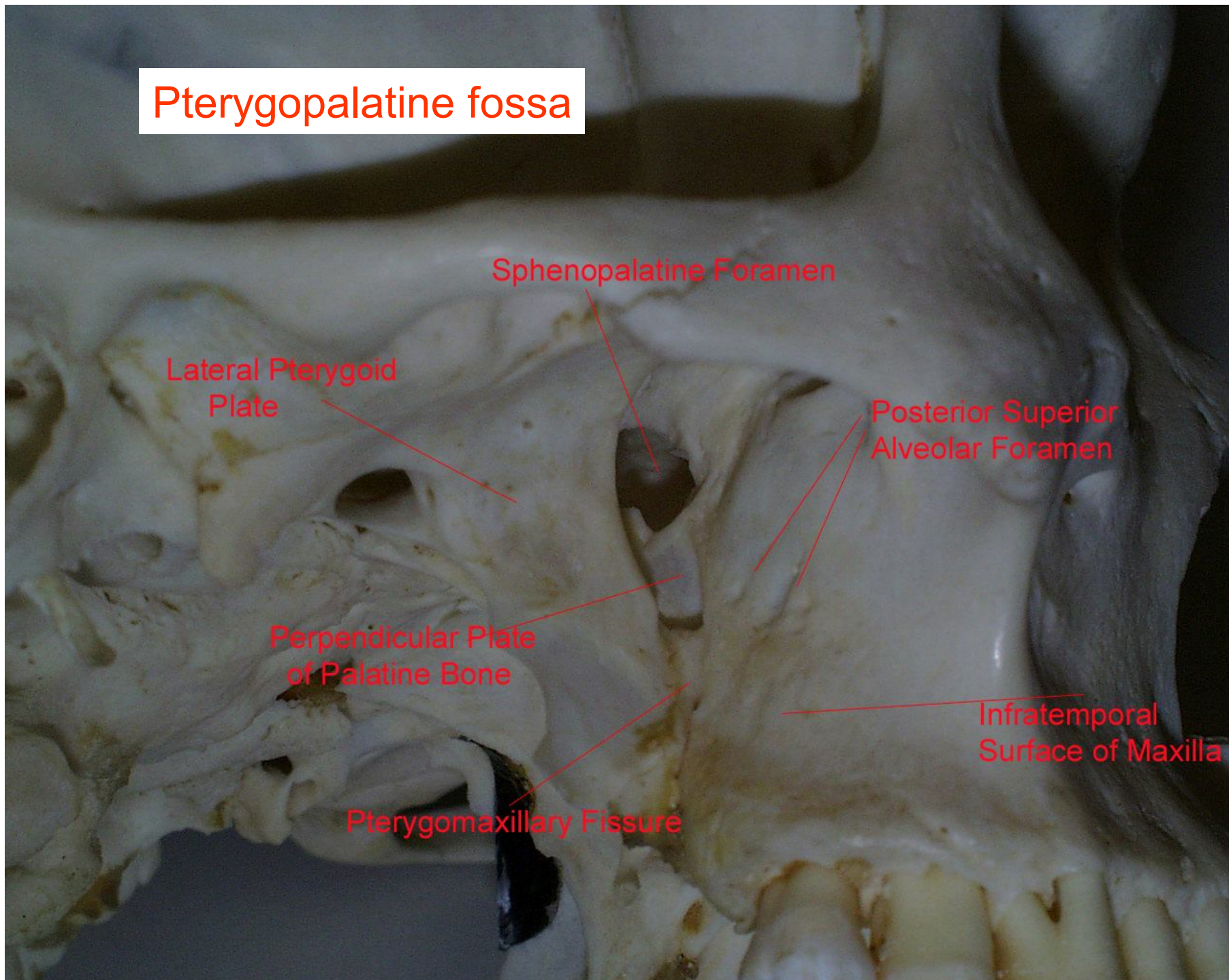




Pterygopalatine fossa – deepest part of the infratemporal fossa



# Pterygopalatine fossa



# Pterygopalatine fossa

## Borders:

Ant. - maxilla

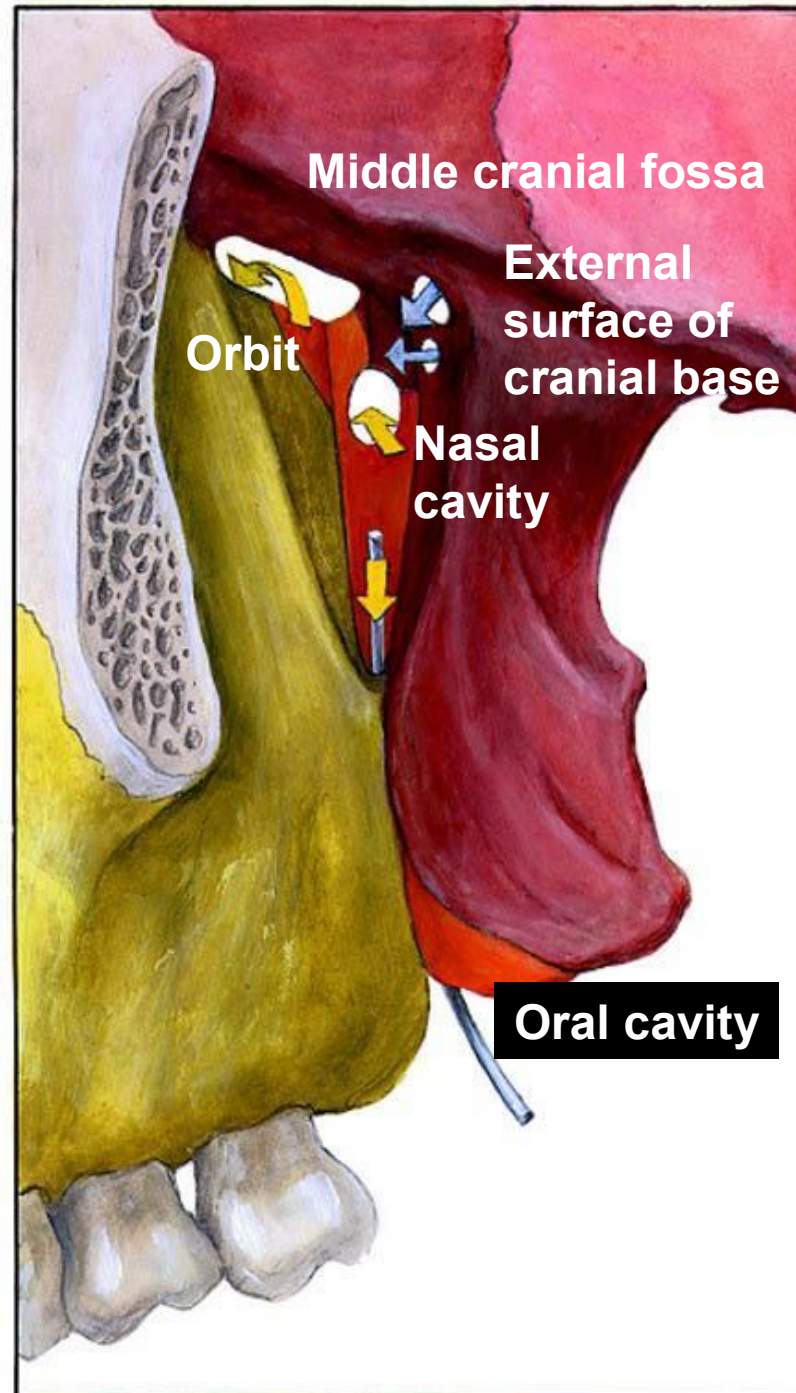
Post. – pterygoid process

Med.- perpendicular plate  
of palatine bone

Lat.-pterygomaxillary  
fissure

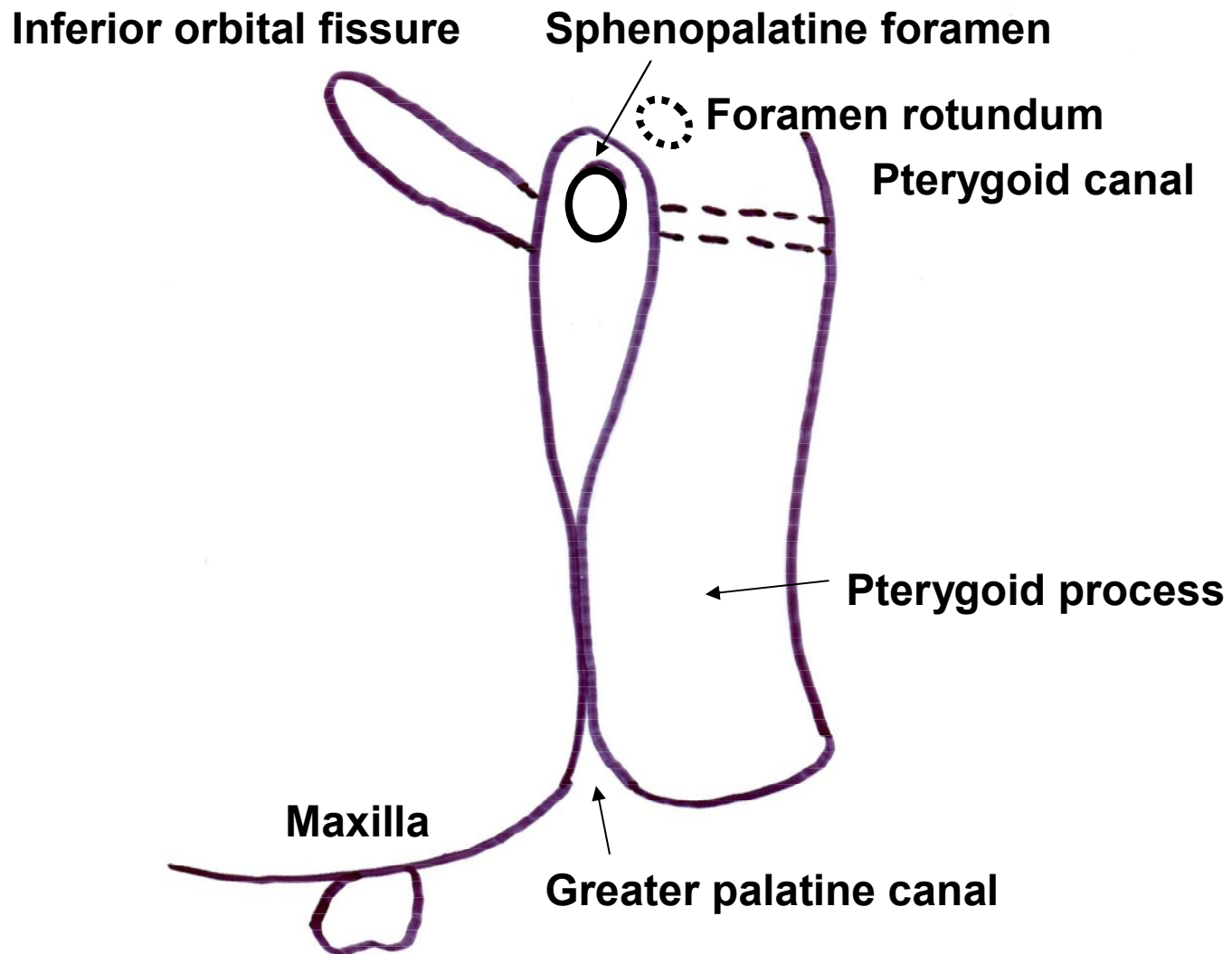
Sup.- greater wing of  
sphenoid

Inf. – foramen palatinum  
majus

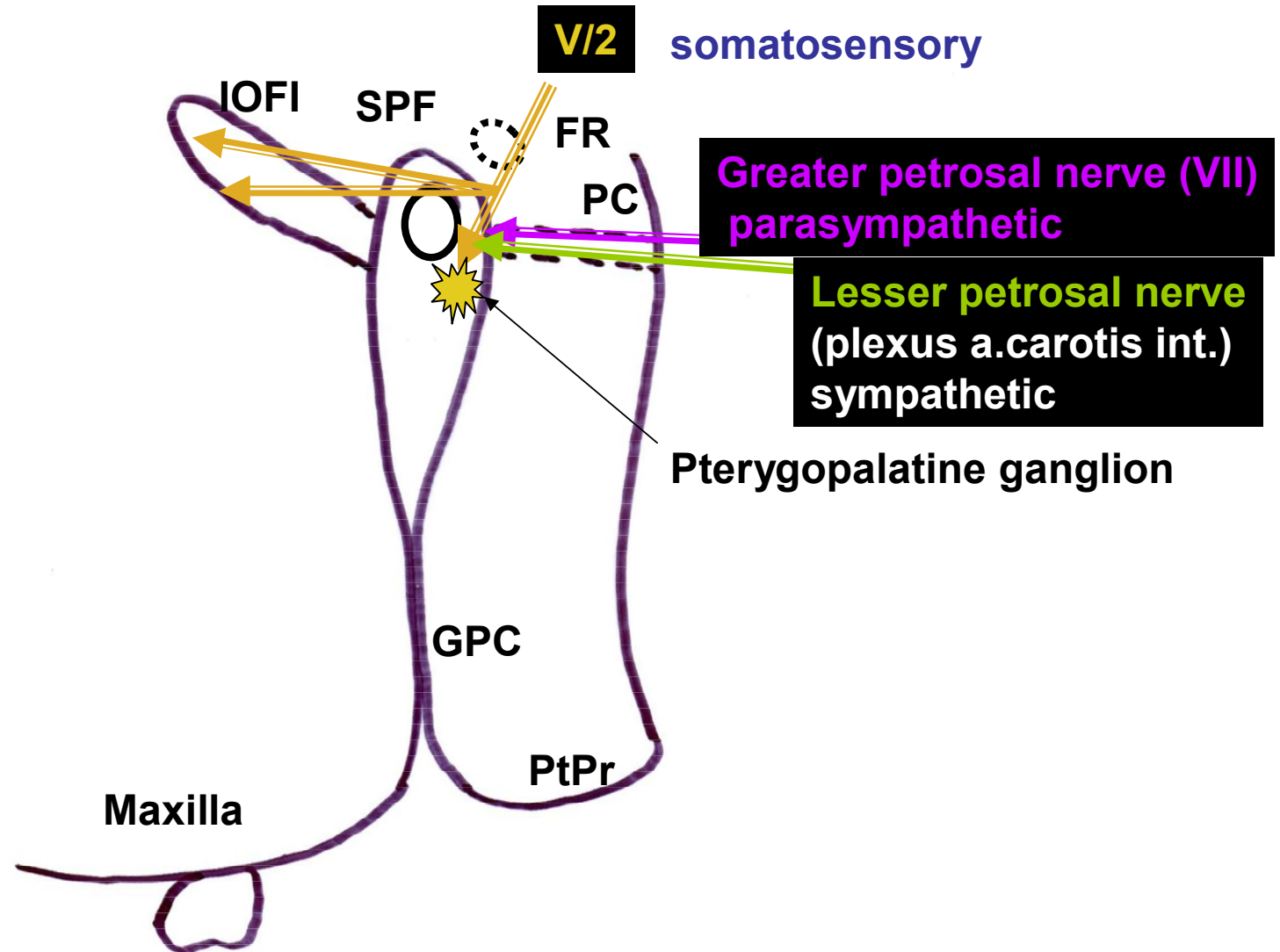




# Pterygopalatine fossa lateral aspect -schema



# Pterygopalatine fossa schema - nerves



# Pterygopalatine fossa lateral aspect - nerves

communicating branch to zygomatic nerve  
(for lacrimal gland)

nn. pterygopalatini  
somatosensory

V/2

Infraorbital nerve

Zygomatic nerve

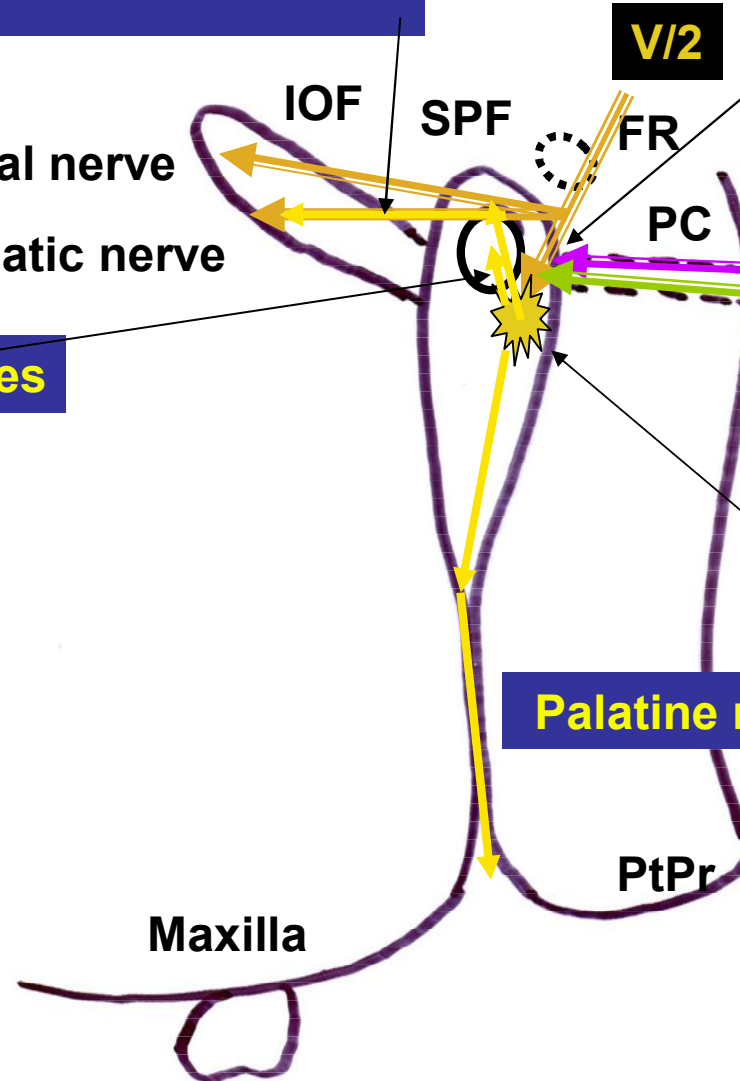
Greater petrosal nerve (VII)  
parasympathetic

Nasal branches

Lesser petrosal nerve  
(plexus a. carotis int.)  
sympathetic

Pterygopalatine ganglion

Palatine nerves (greater and lesser)

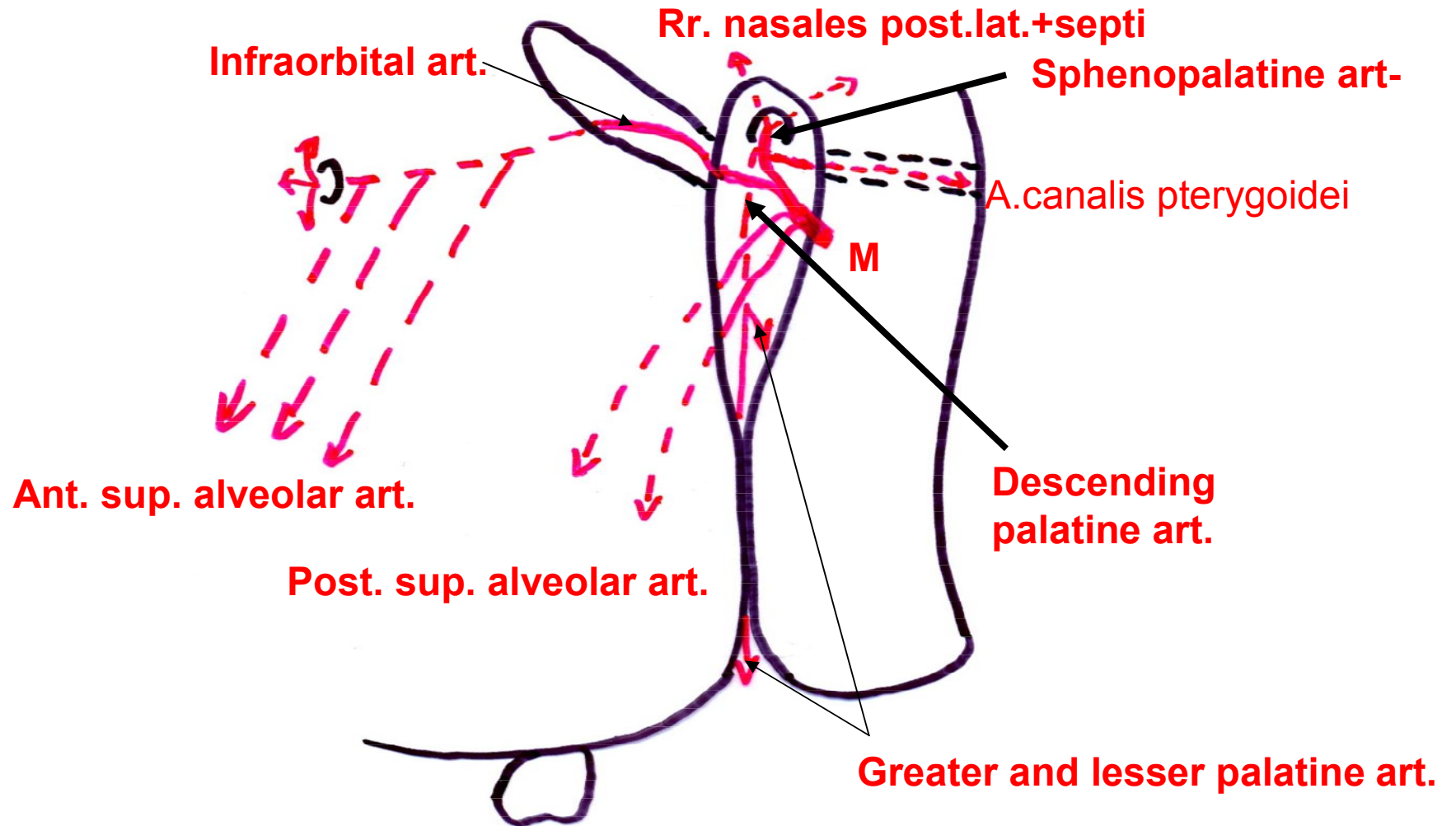


Maxilla

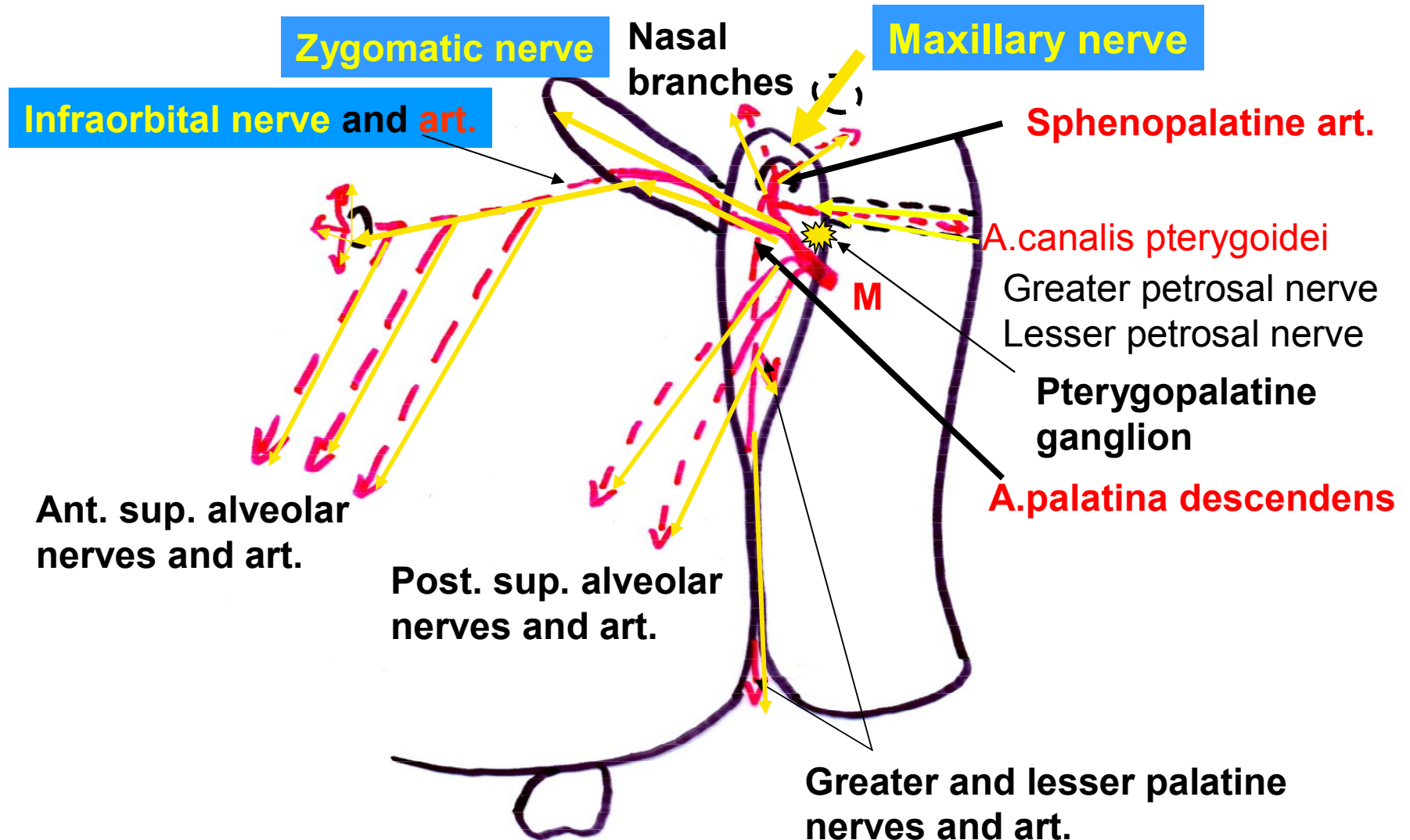
PtPr



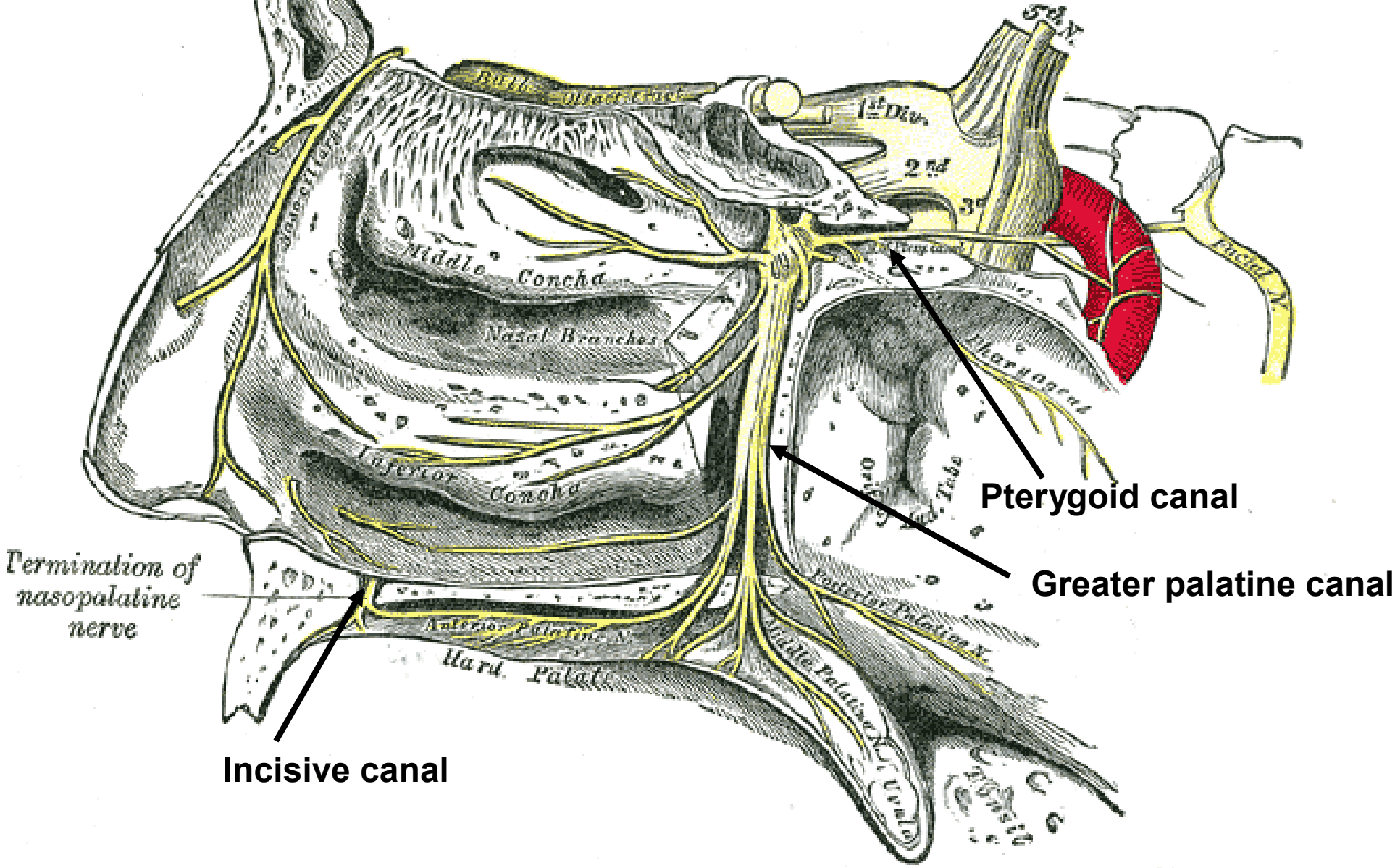
# Fossa pterygopalatina schema– branches of maxillary artery



# Fossa pterygopalatina schema – nerves and arteries

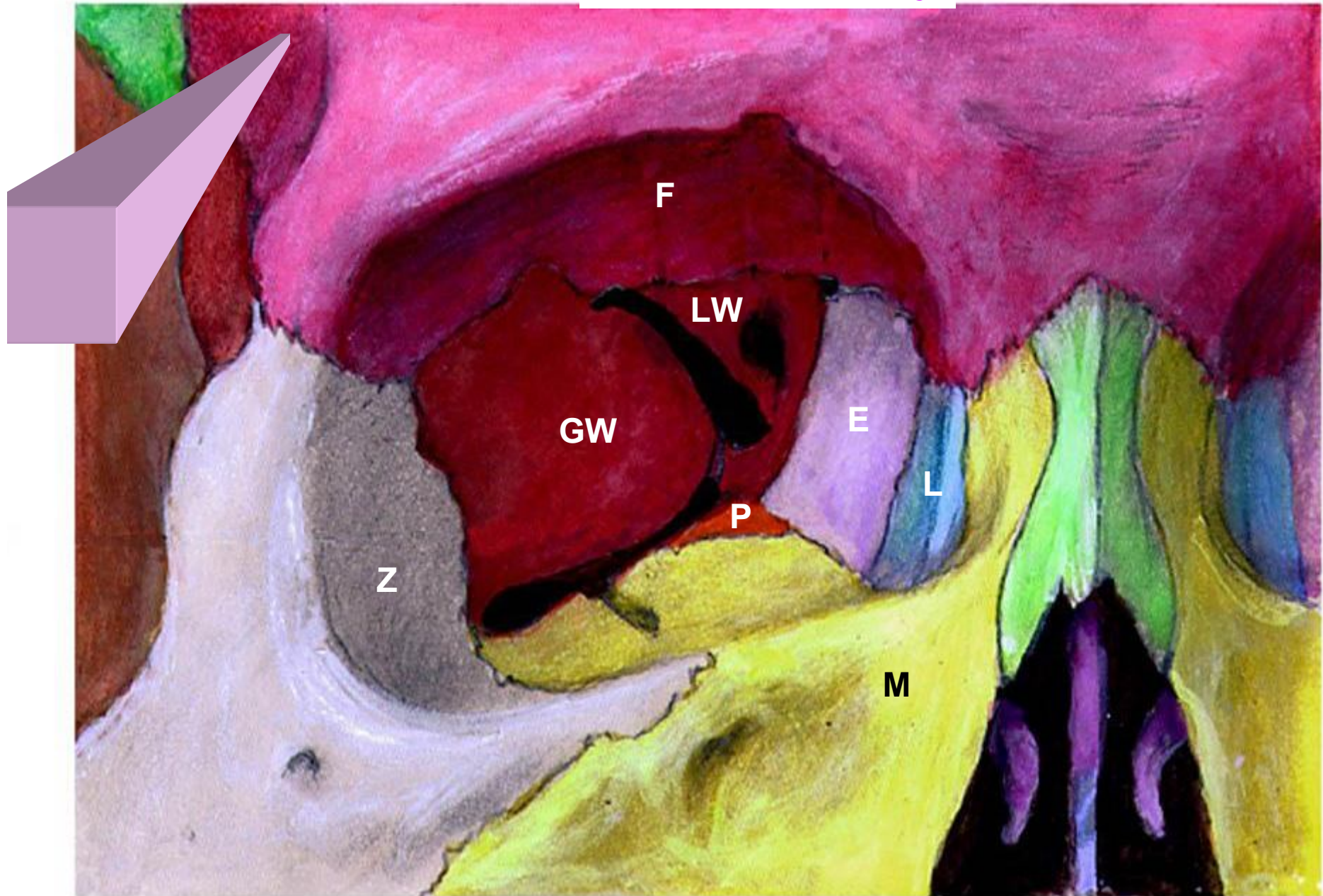


**Pterygopalatine fossa medial aspekt  
lamina perpendicularis ossis palatini removed**

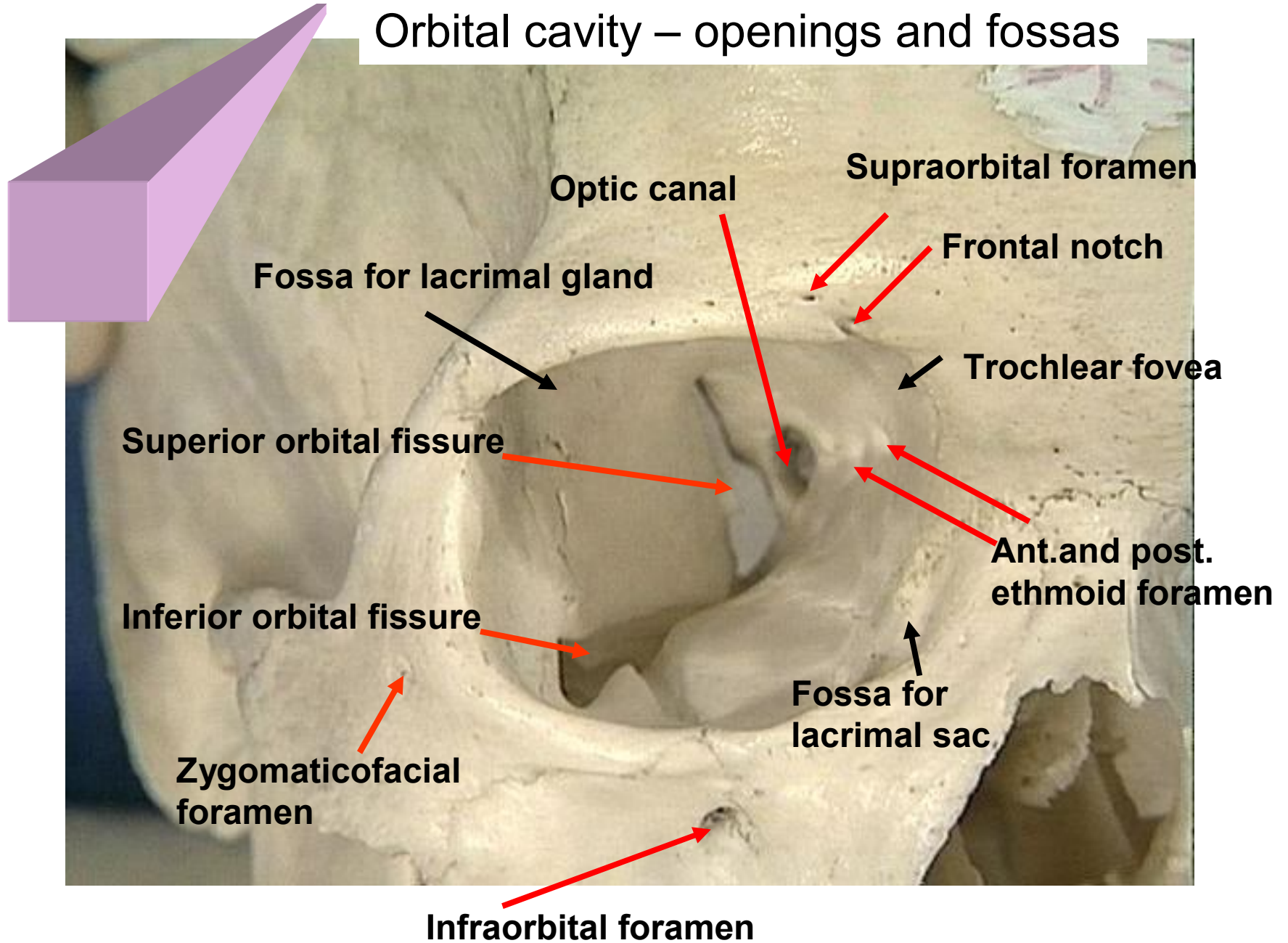




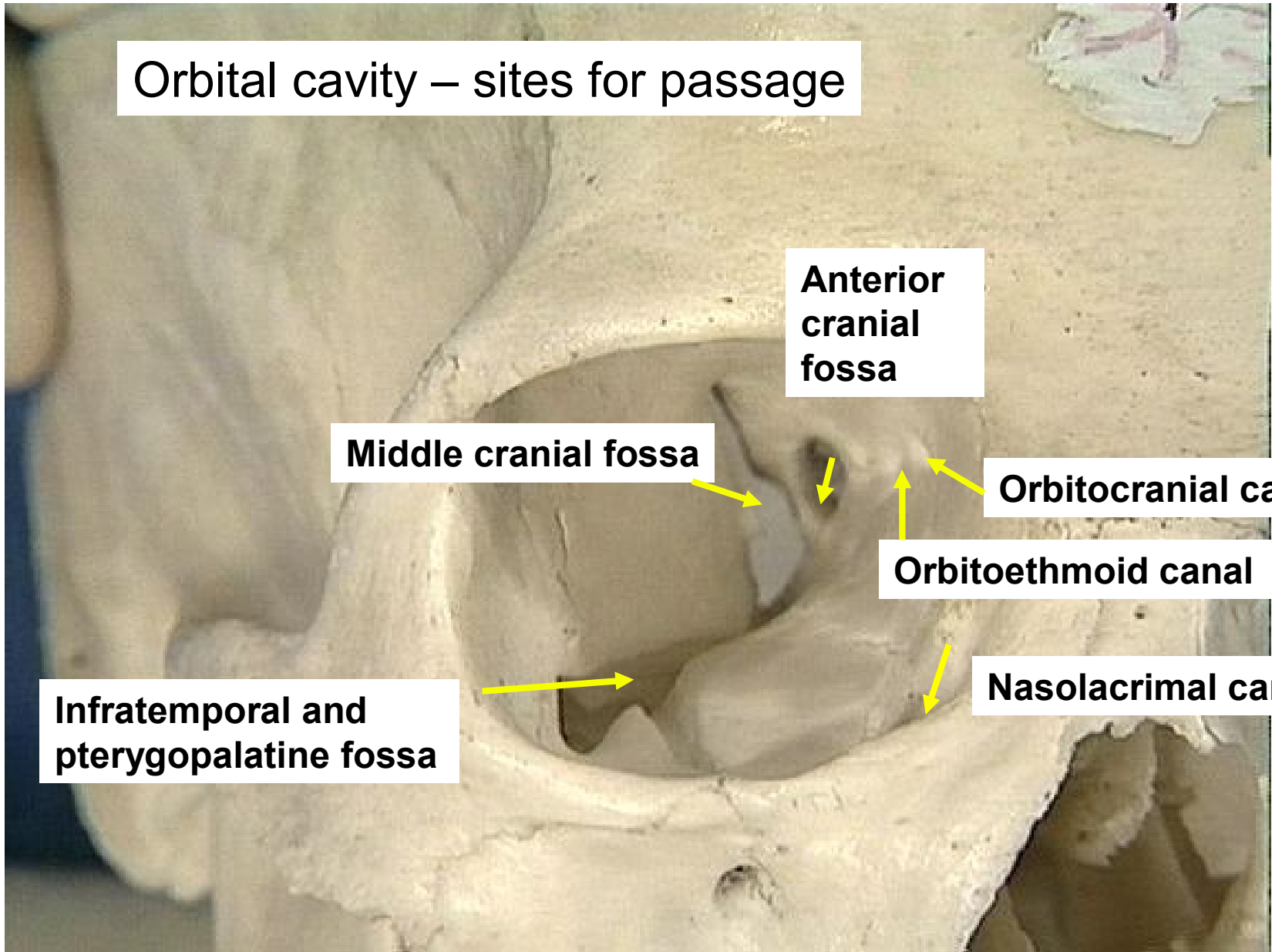
# Orbital cavity



# Orbital cavity – openings and fossas



**Orbital cavity – sites for passage**



**Anterior  
cranial  
fossa**

**Middle cranial fossa**

**Orbitocranial canal**

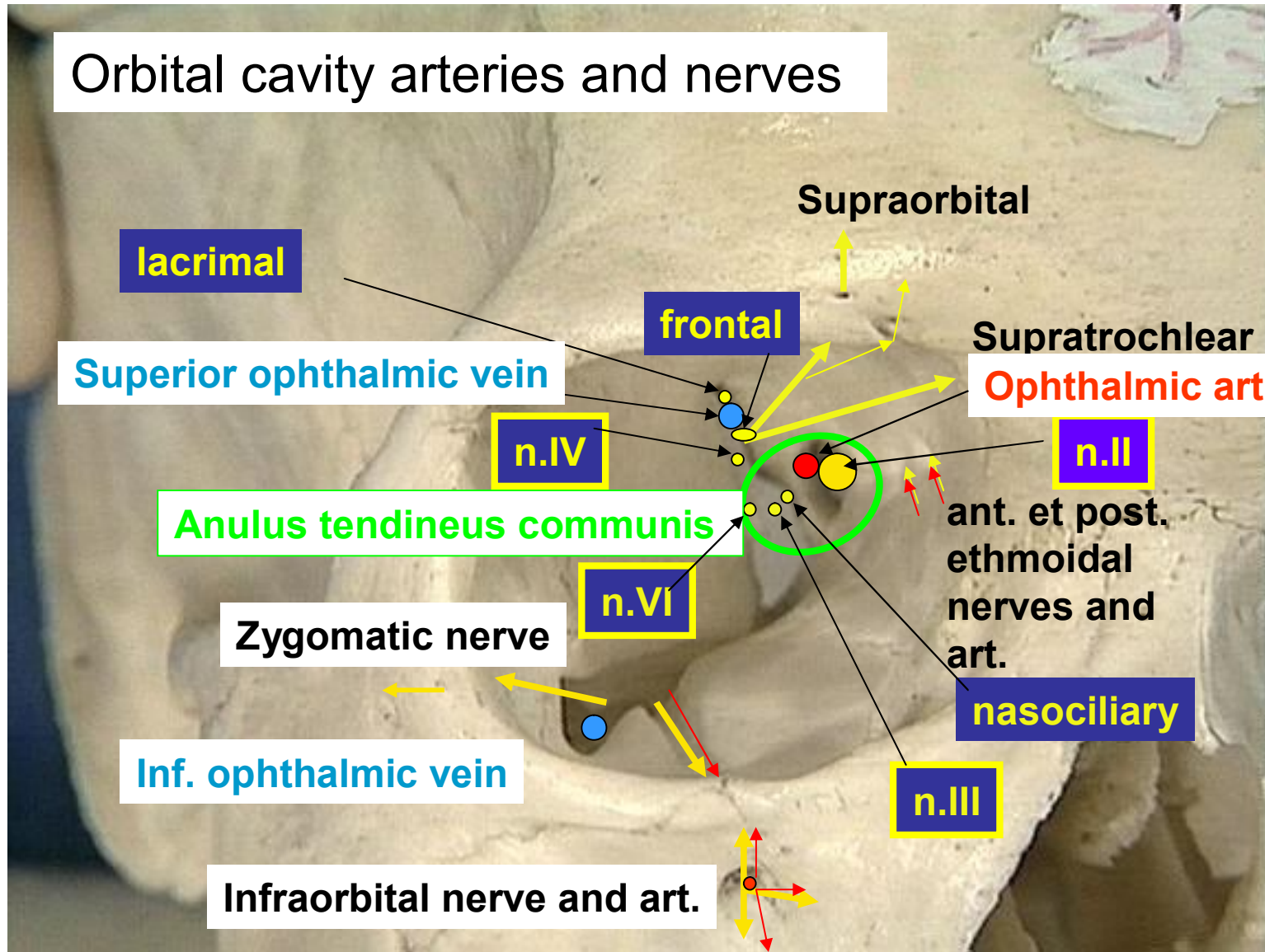
**Orbitoethmoid canal**

**Nasolacrimal canal**

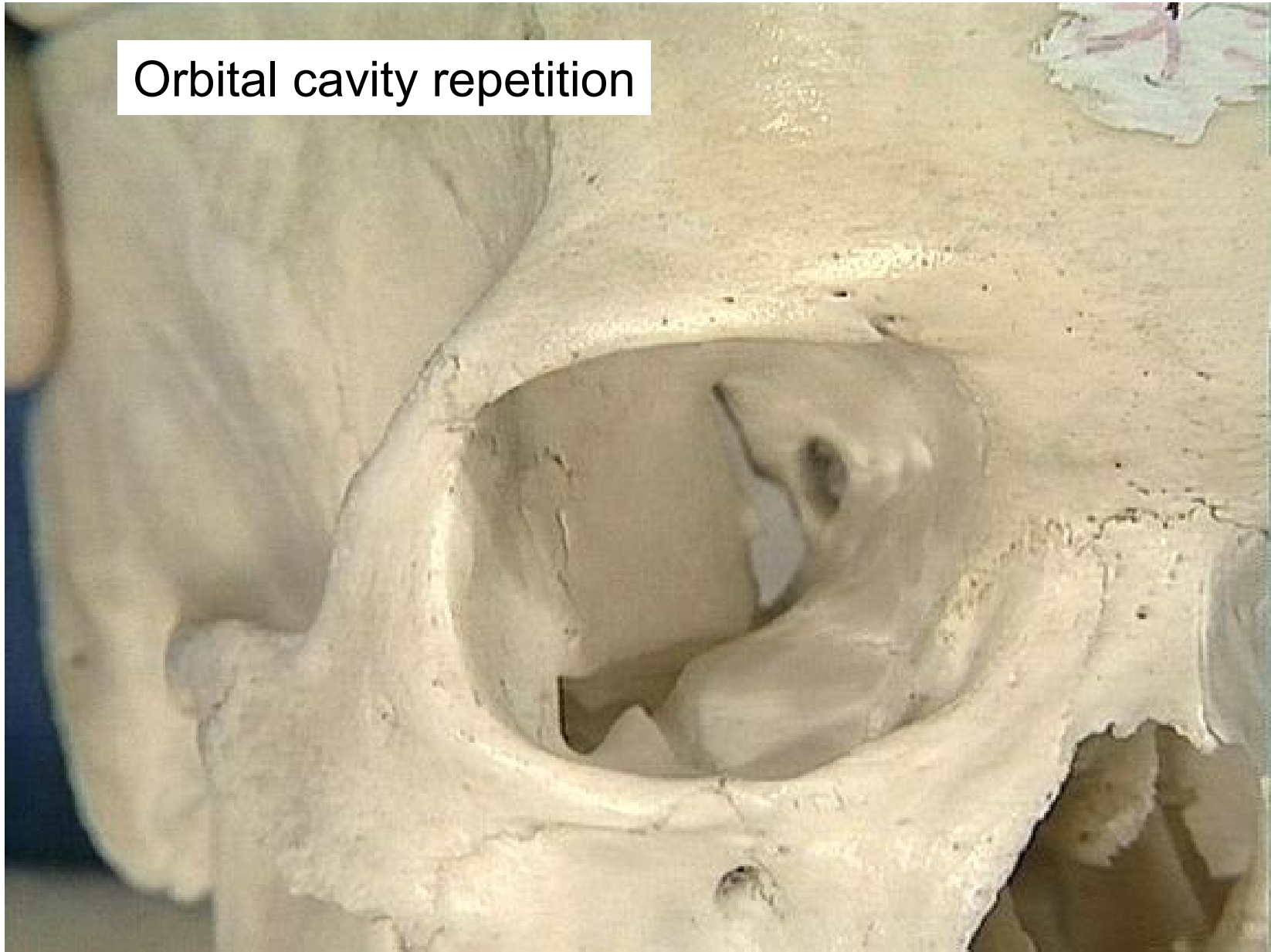
**Infratemporal and  
pterygopalatine fossa**



# Orbital cavity arteries and nerves



Orbital cavity repetition



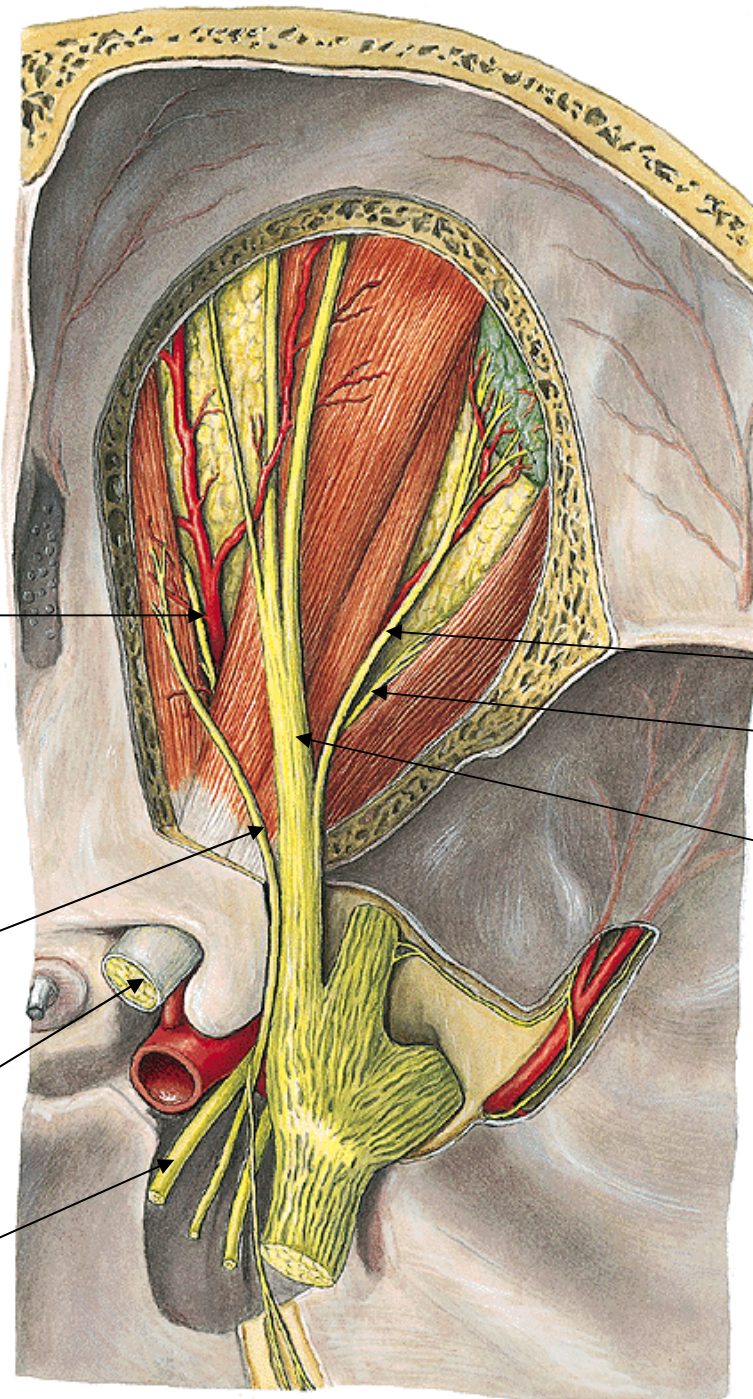
## Nerves in the superior part of the orbite

nasociliary nerve -  
from V/1  
and ophthalmic art.

trochleary nerve(IV)

optic nerve(II)

oculomotory (III)



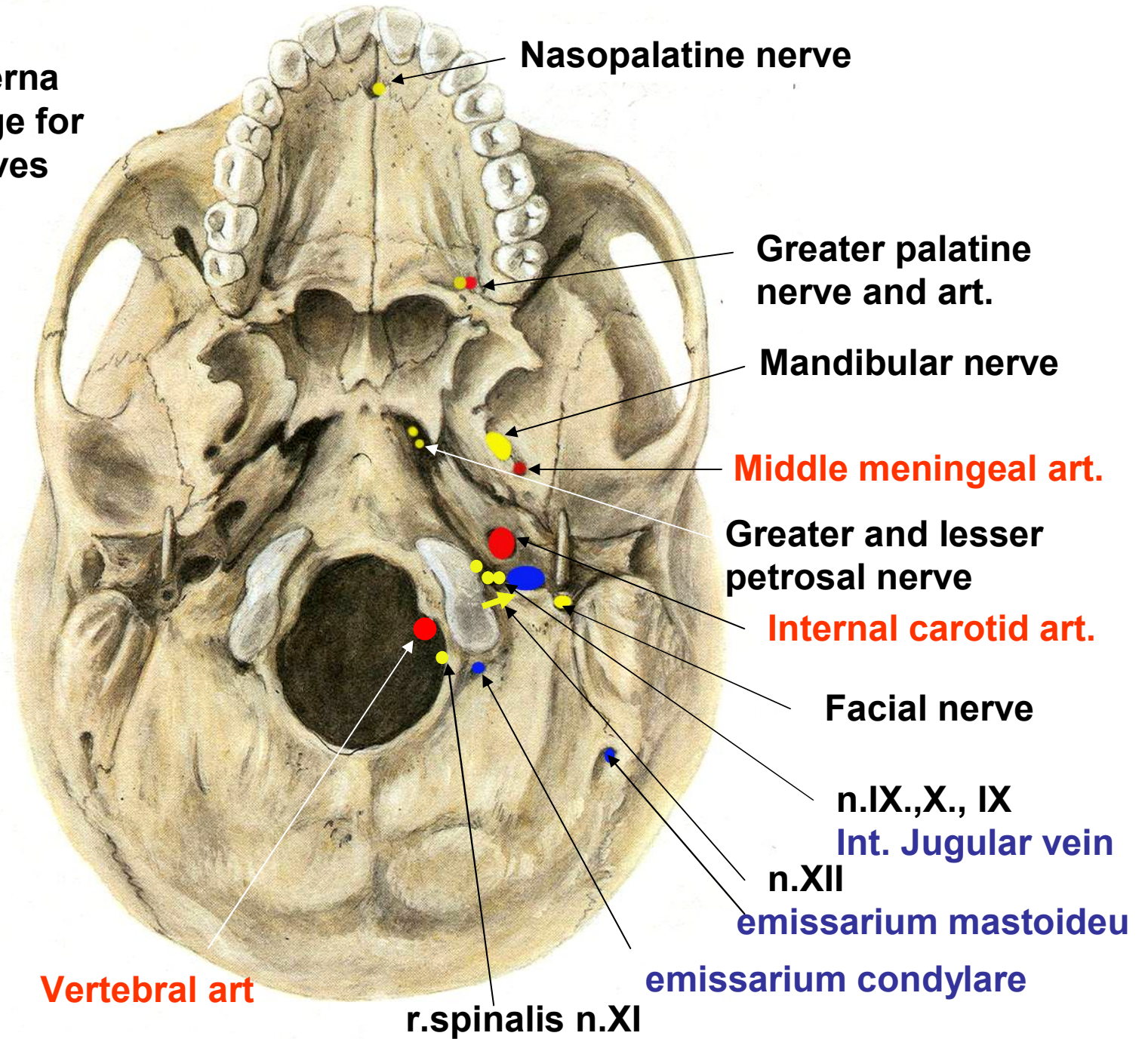
lacrimal nerve from V/1

n. abducens (VI)

frontal nerve from V/1

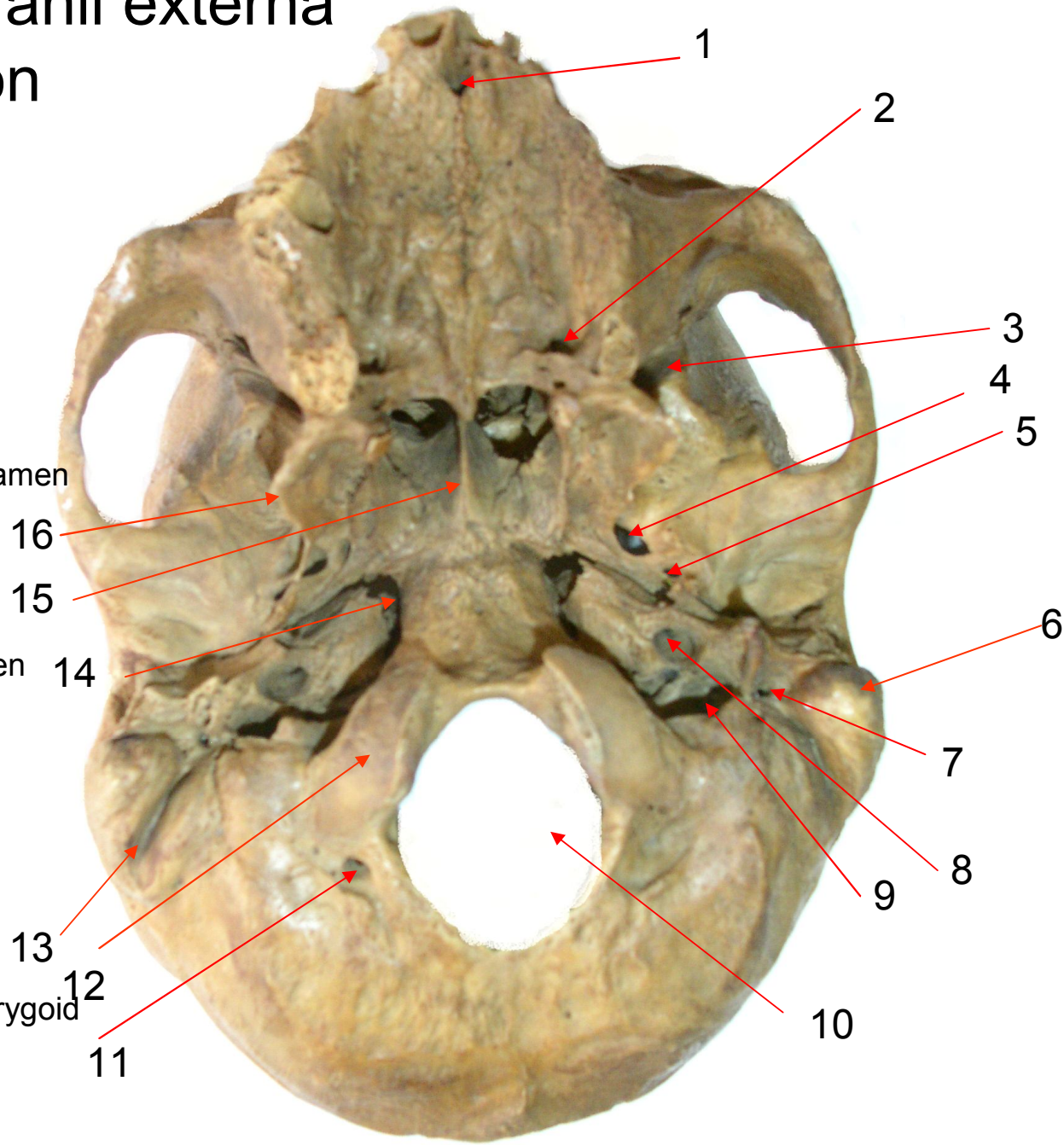


**Basis cranii externa**  
-sites for passage for  
vessels and nerves



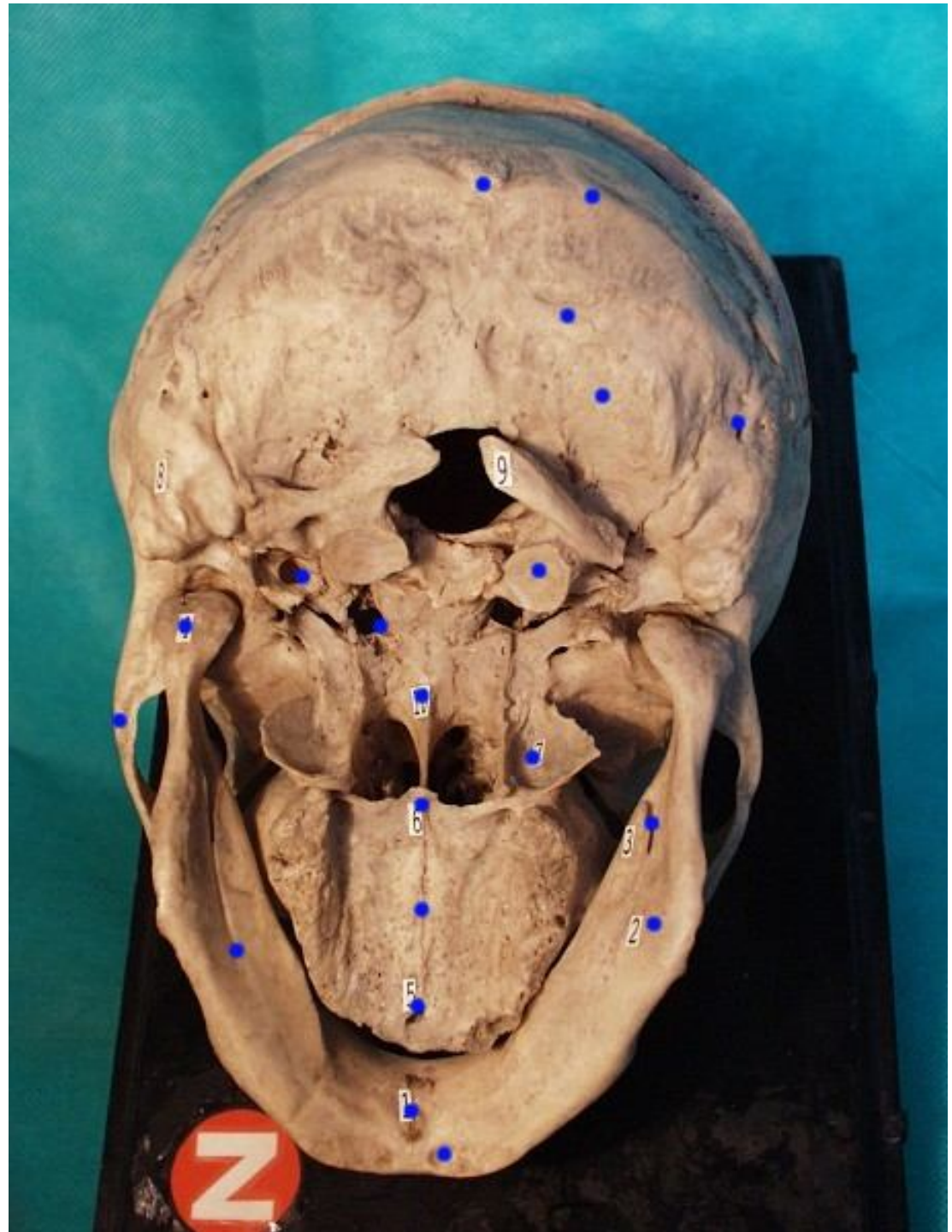
# Basis cranii externa repetition

- 1-incisive canal
- 2-greater palatine foramen
- 3-inf.orbital fissure
- 4-foramen ovale
- 5-foramen spinosum
- 6-mastoid process
- 7-stylomastoid foramen
- 8-carotid canal
- 9-jugular foramen
- 10-foramen magnum
- 11-condylar canal
- 12-occipital condyle
- 13-mastoid notch
- 14-foramen lacerum
- 15-vomer
- 16-lateral plate of pterygoid process





# Basis cranii externa repetition





# Sources

- Čihák, Anatomie 1
- Gray, Anatomy
- Petrovický a spol., Anatomie 1
- Sobotta , Atlas anatomie člověka
- <http://anat.lf1.cuni.cz/muzeum/kranio.html>
- Personal archive