



# Skull-2

Norma Basalis Interna

Norma Basalis Externa

Dr. Heba Kalbouneh

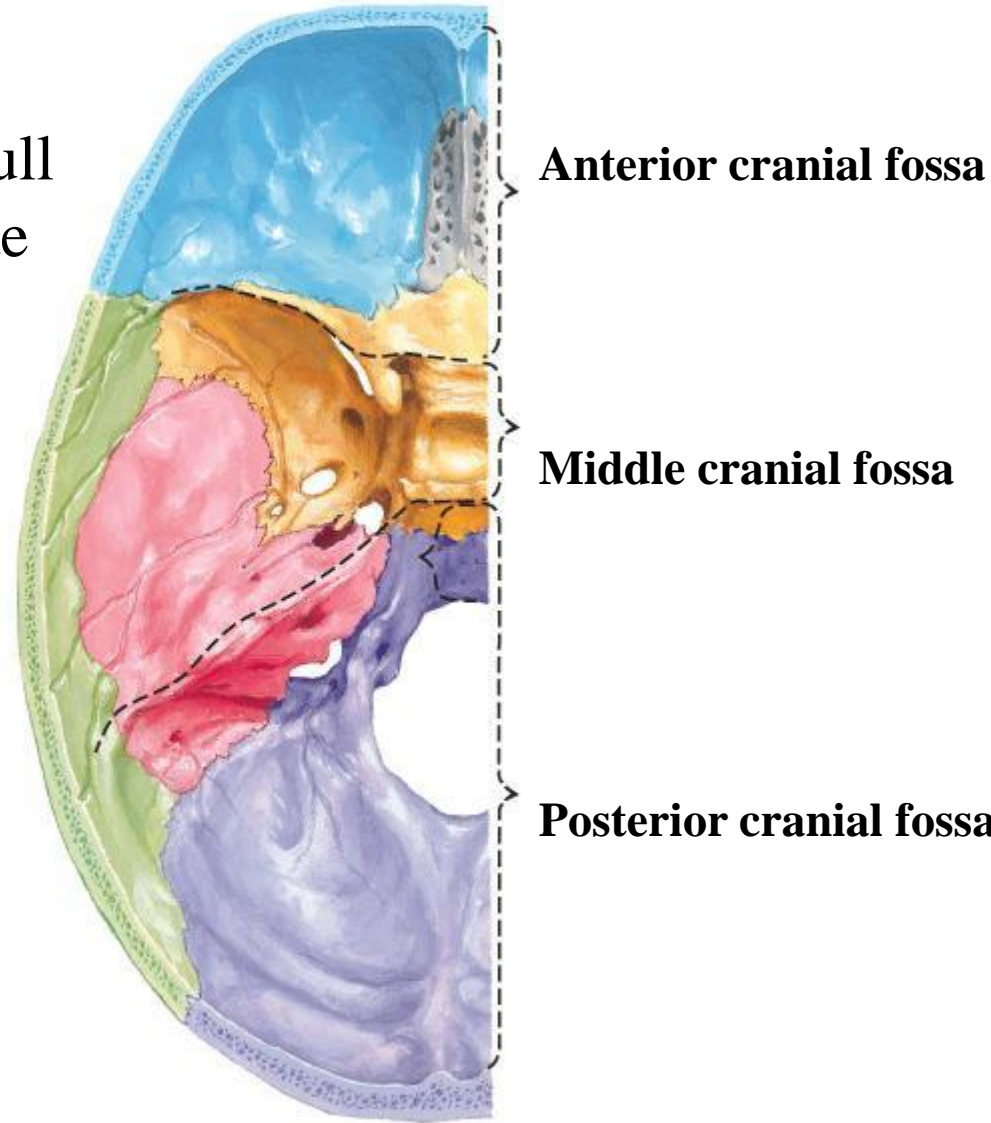
DDS, MSc, DMD/PhD

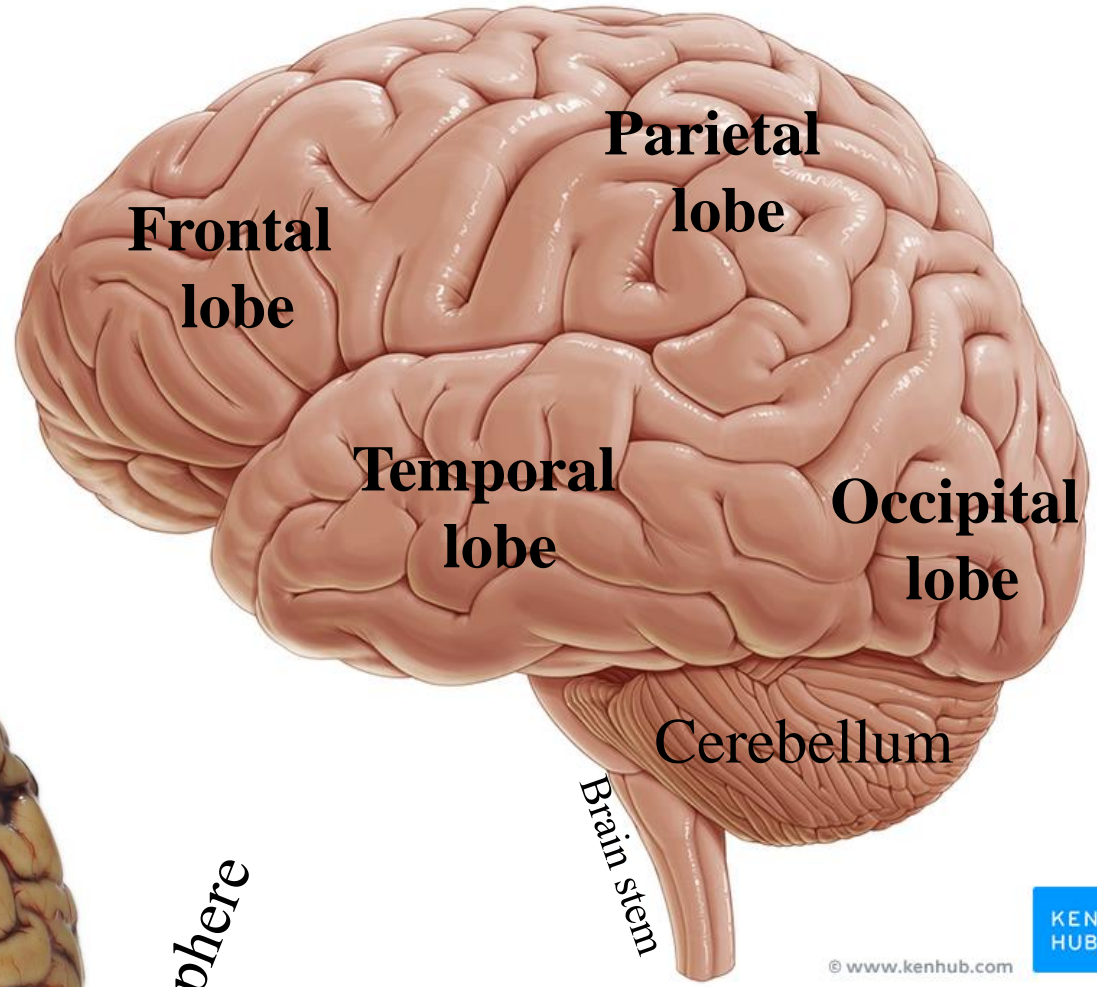
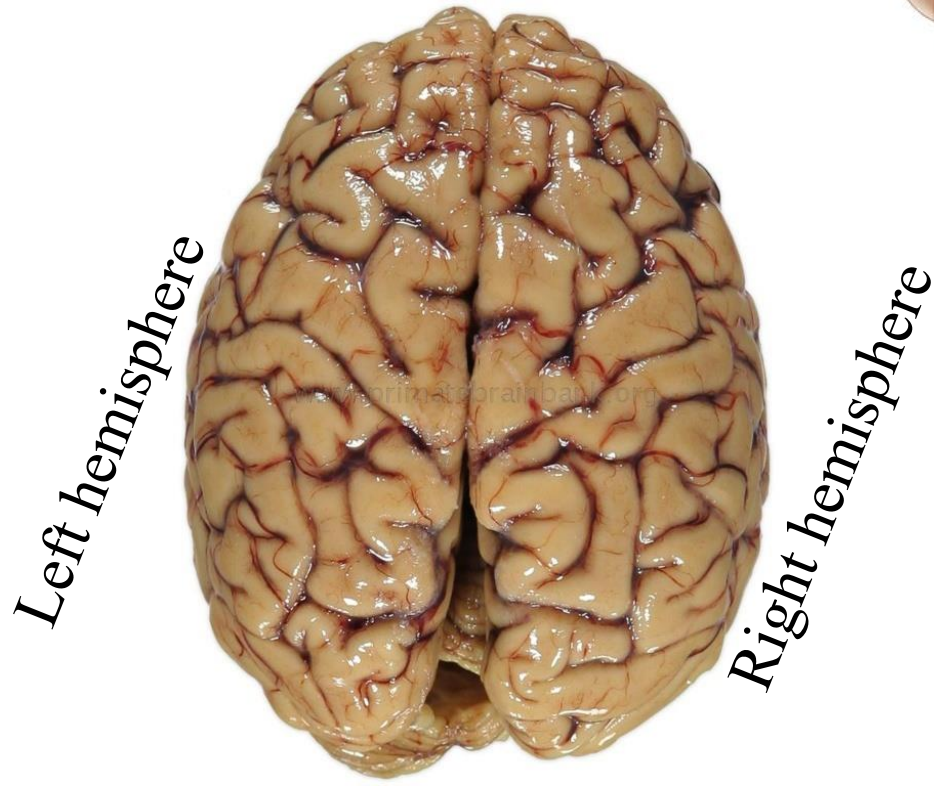
Professor of Anatomy, Histology and Embryology

# Norma basalis interna

Base of the skull- superior view

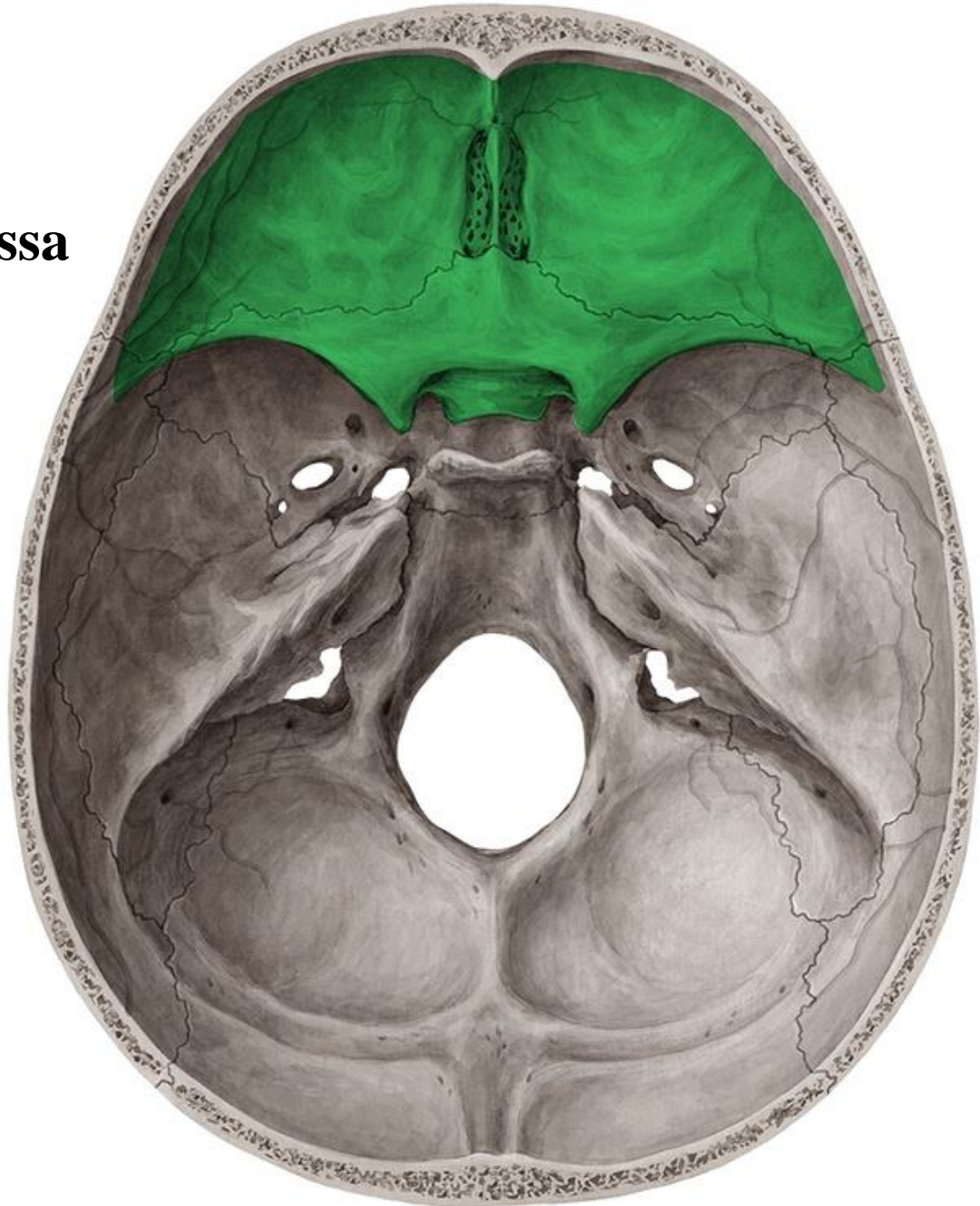
The interior of the base of the skull is divided into three cranial fossae





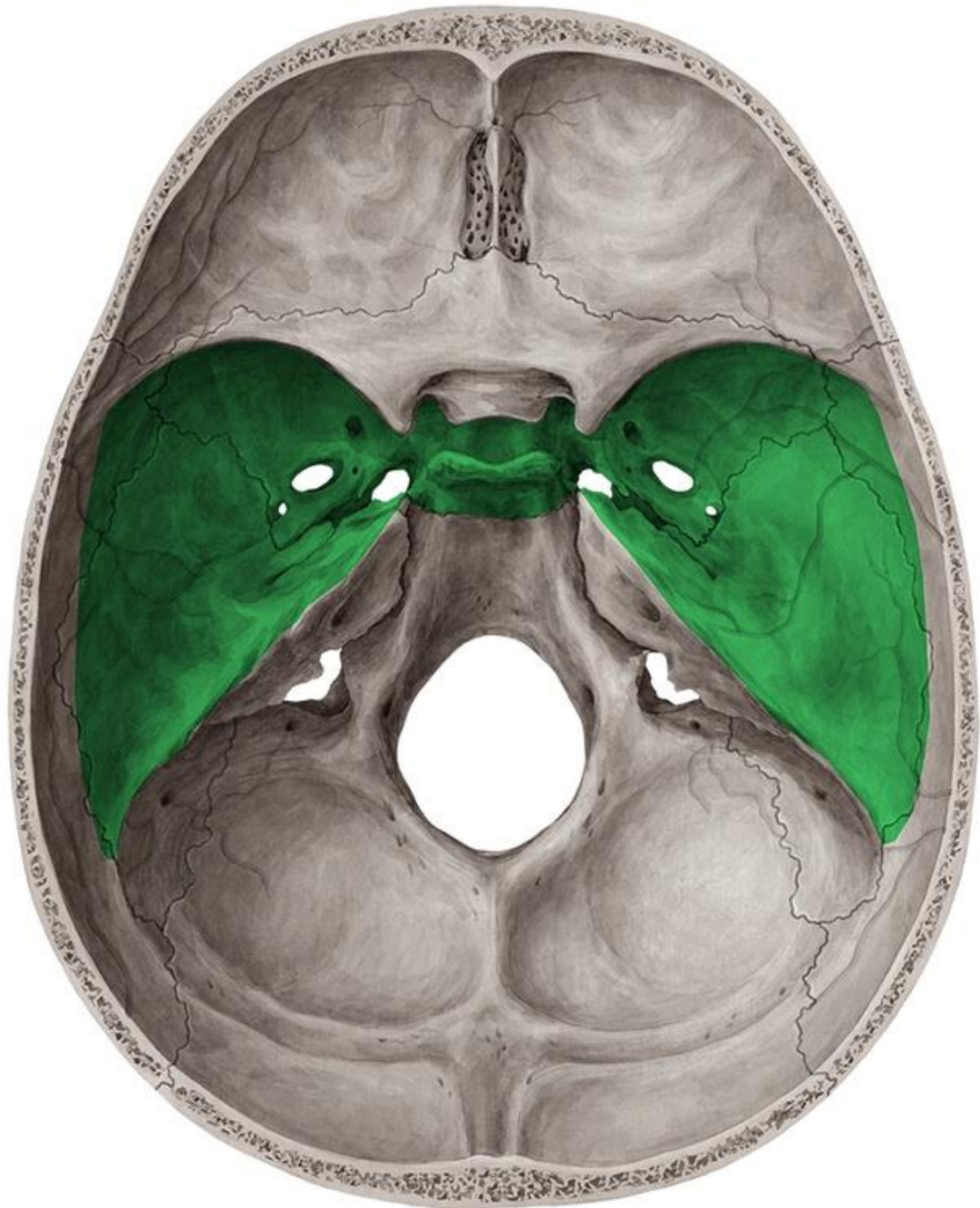
# Anterior cranial fossa

Contains frontal lobes



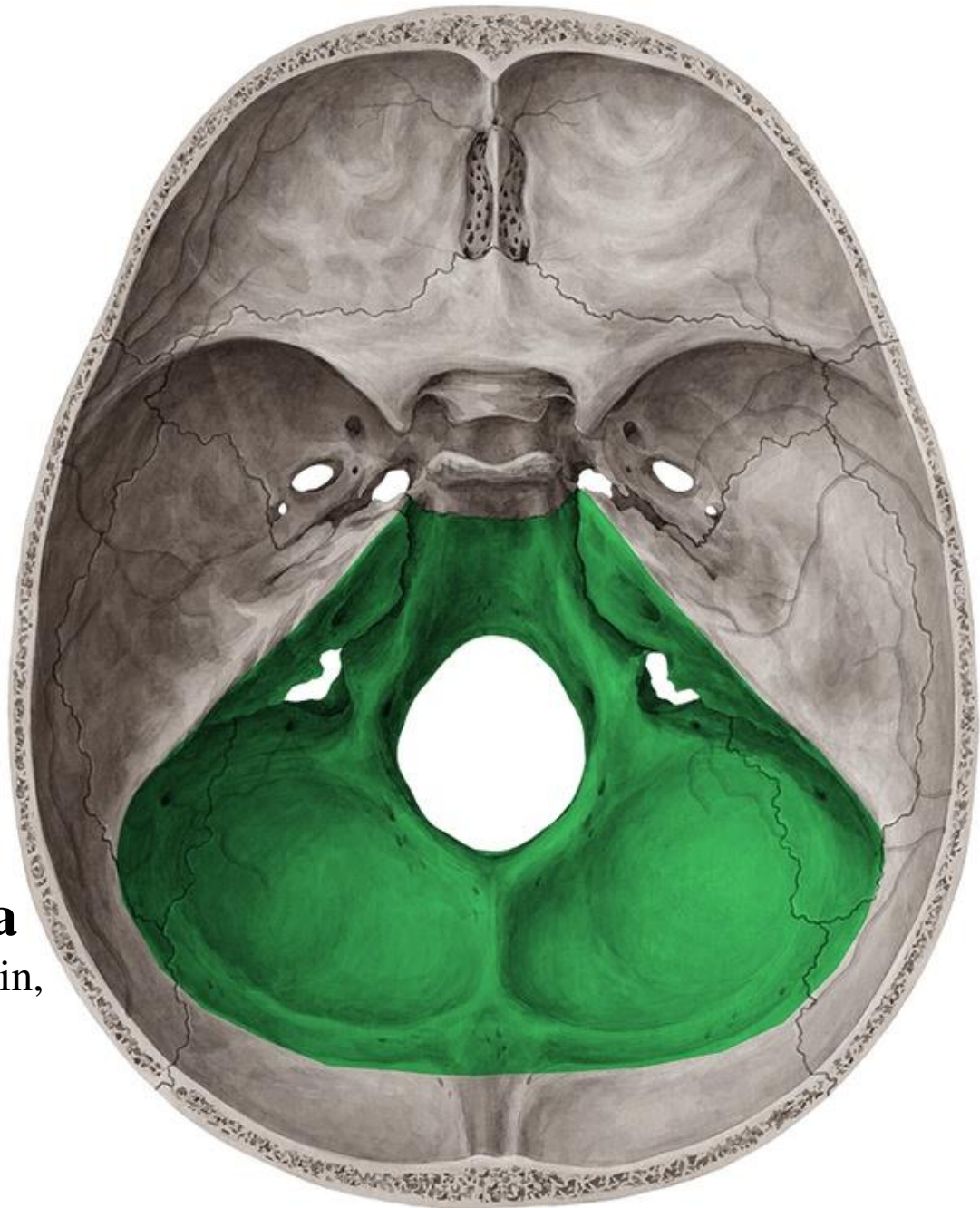


**Middle cranial fossa**  
Contains temporal lobes



## **Posterior cranial fossa**

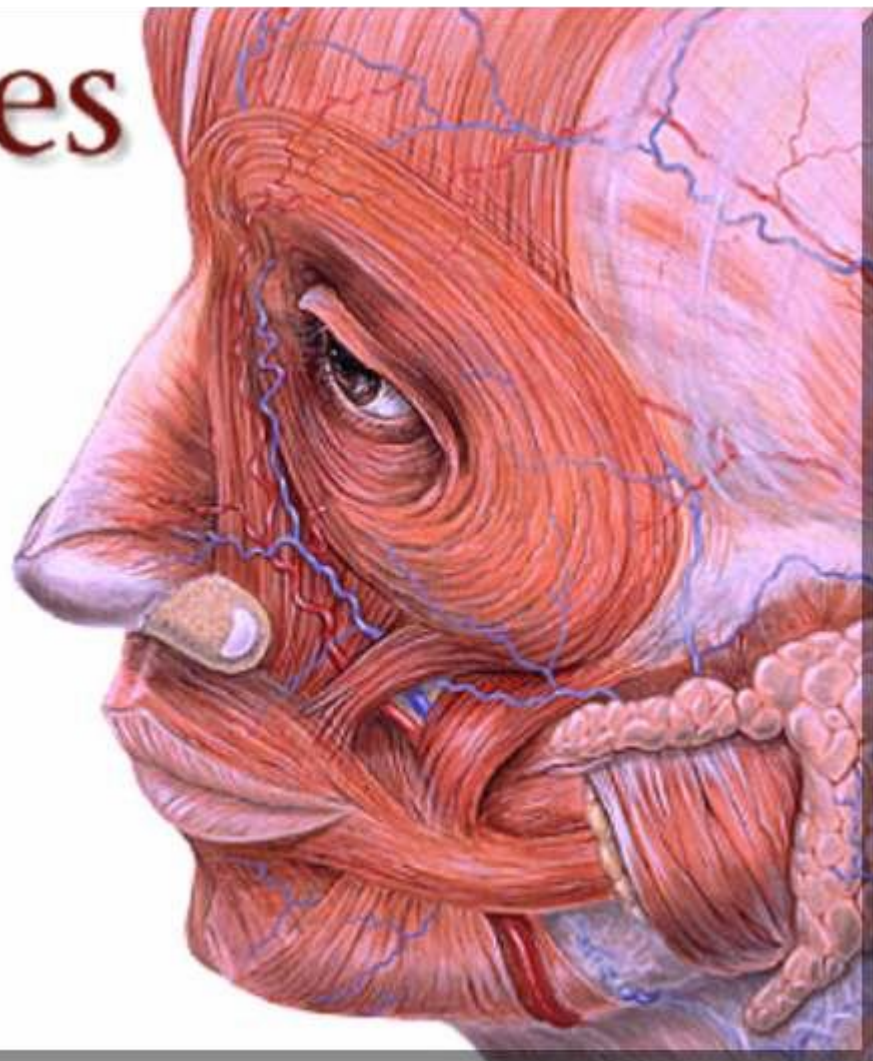
Contains the brain stem (midbrain, pons and medulla oblongata) and cerebellum



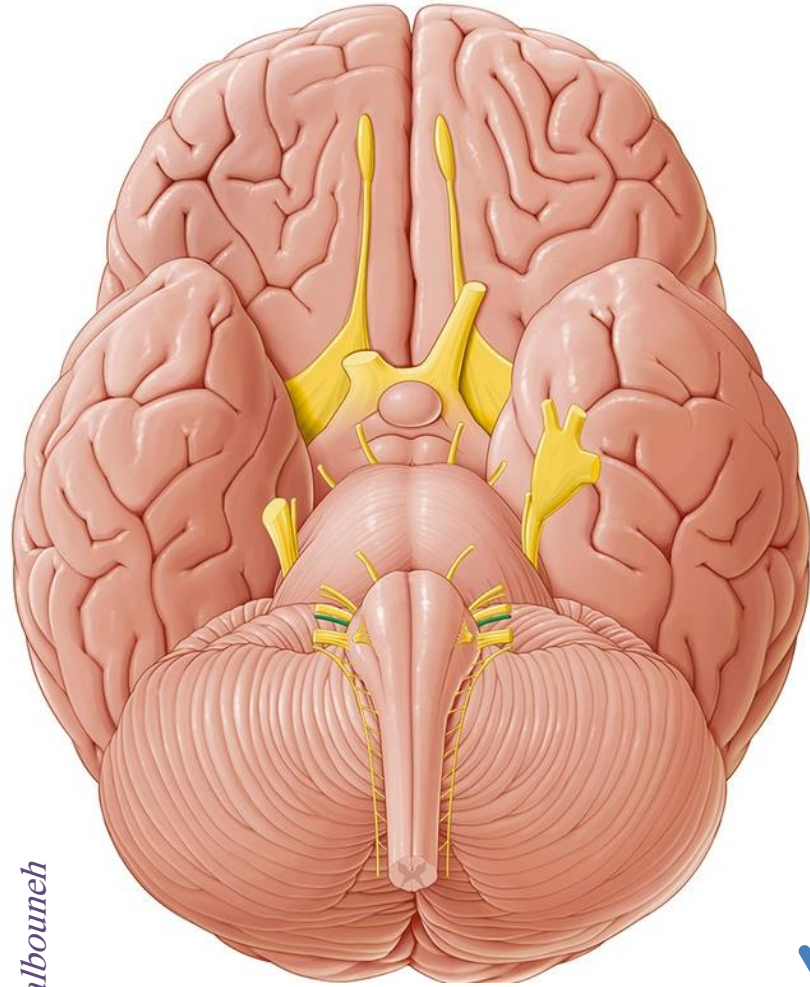


# Cranial Nerves

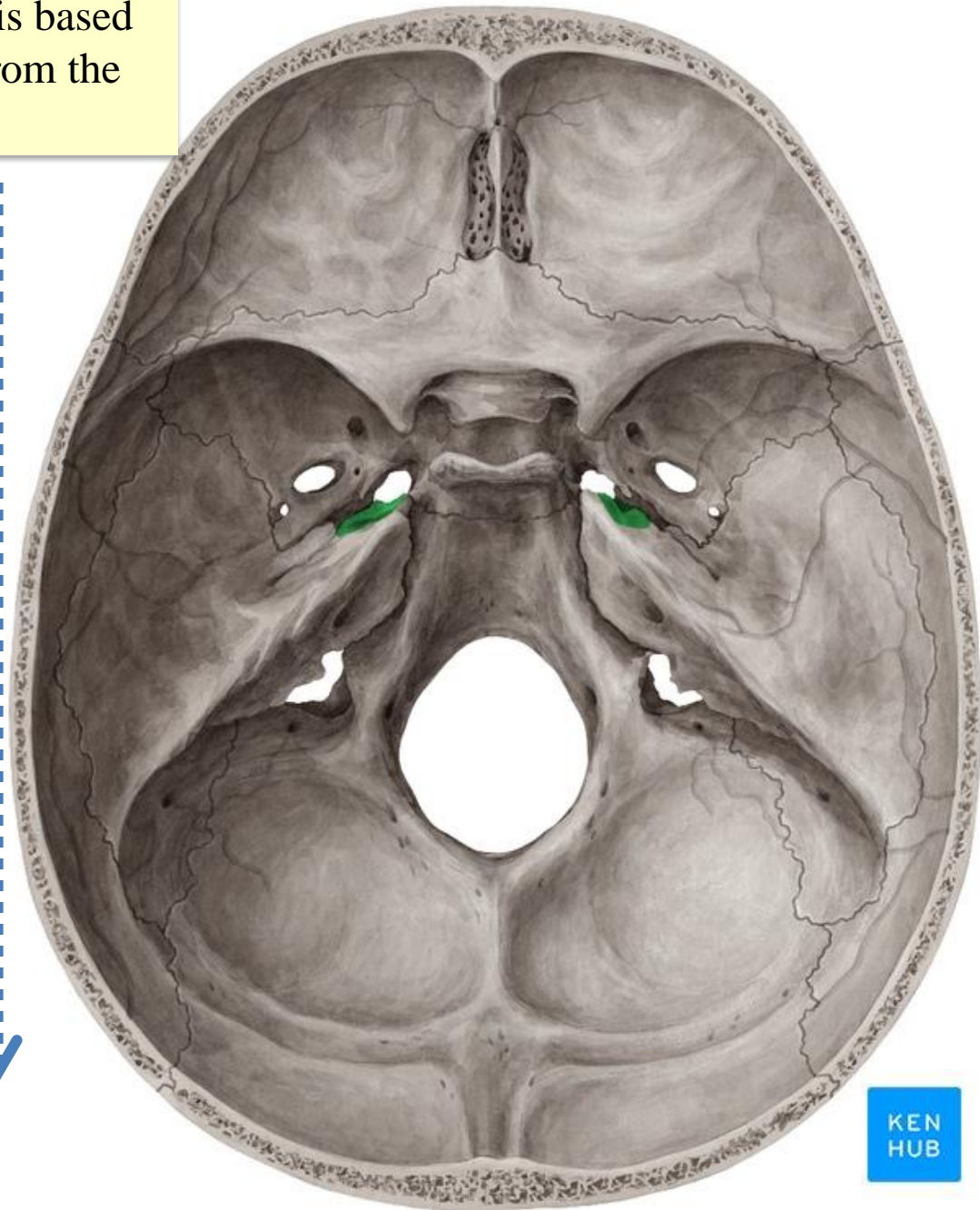
- I Olfactory
- II Optic
- III Oculomotor
- IV Trochlear
- V Trigeminal
- VI Abducens
- VII Facial
- VIII Vestibulocochlear
- IX Glossopharyngeal
- X Vagus
- XI Accessory
- XII Hypoglossal



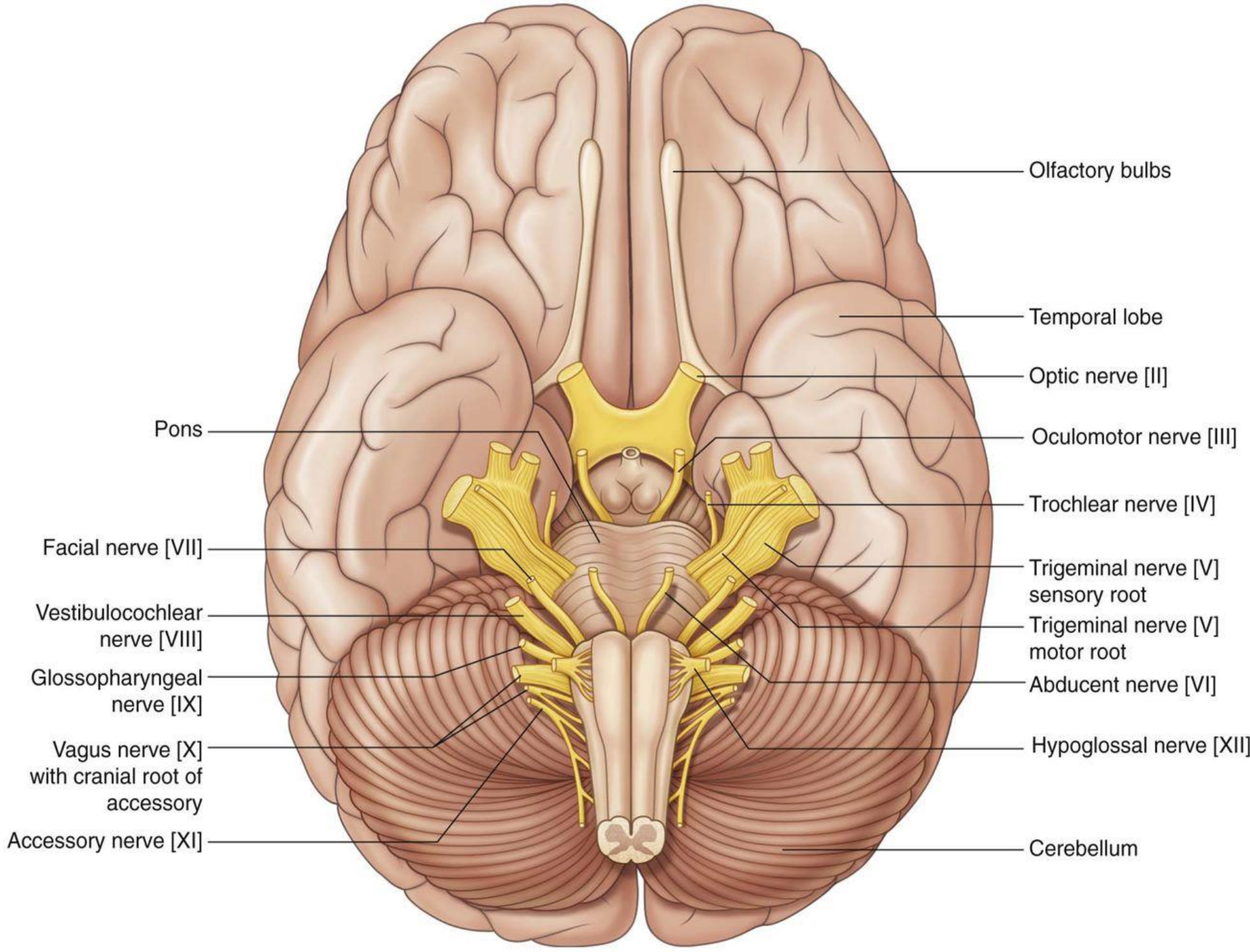
The numbering of the cranial nerves is based on the order in which they emerge from the brain, front to back



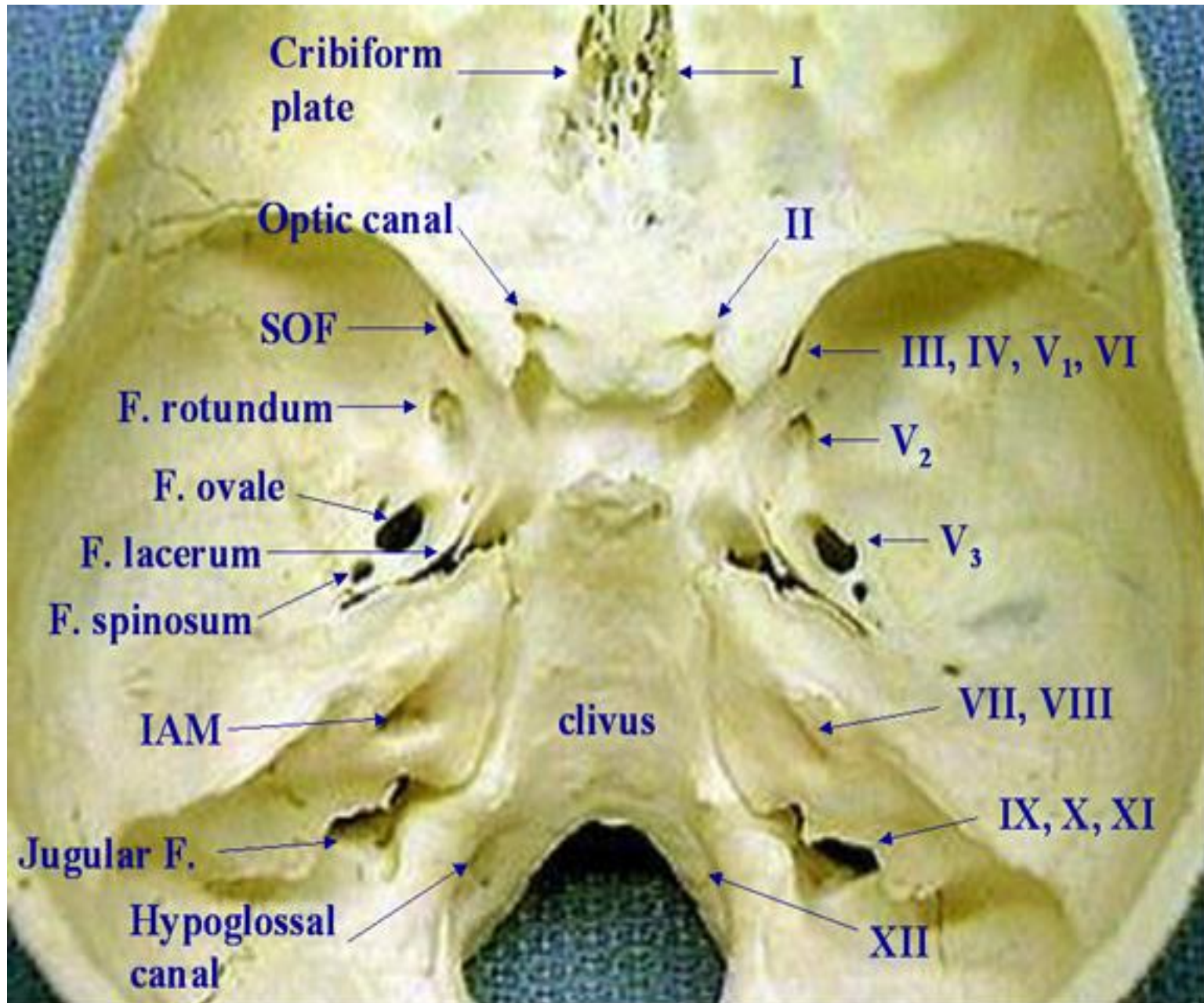
Inferior surface of brain







# Foramina of skull and cranial nerves passing through





# Anterior cranial fossa

Formed by:

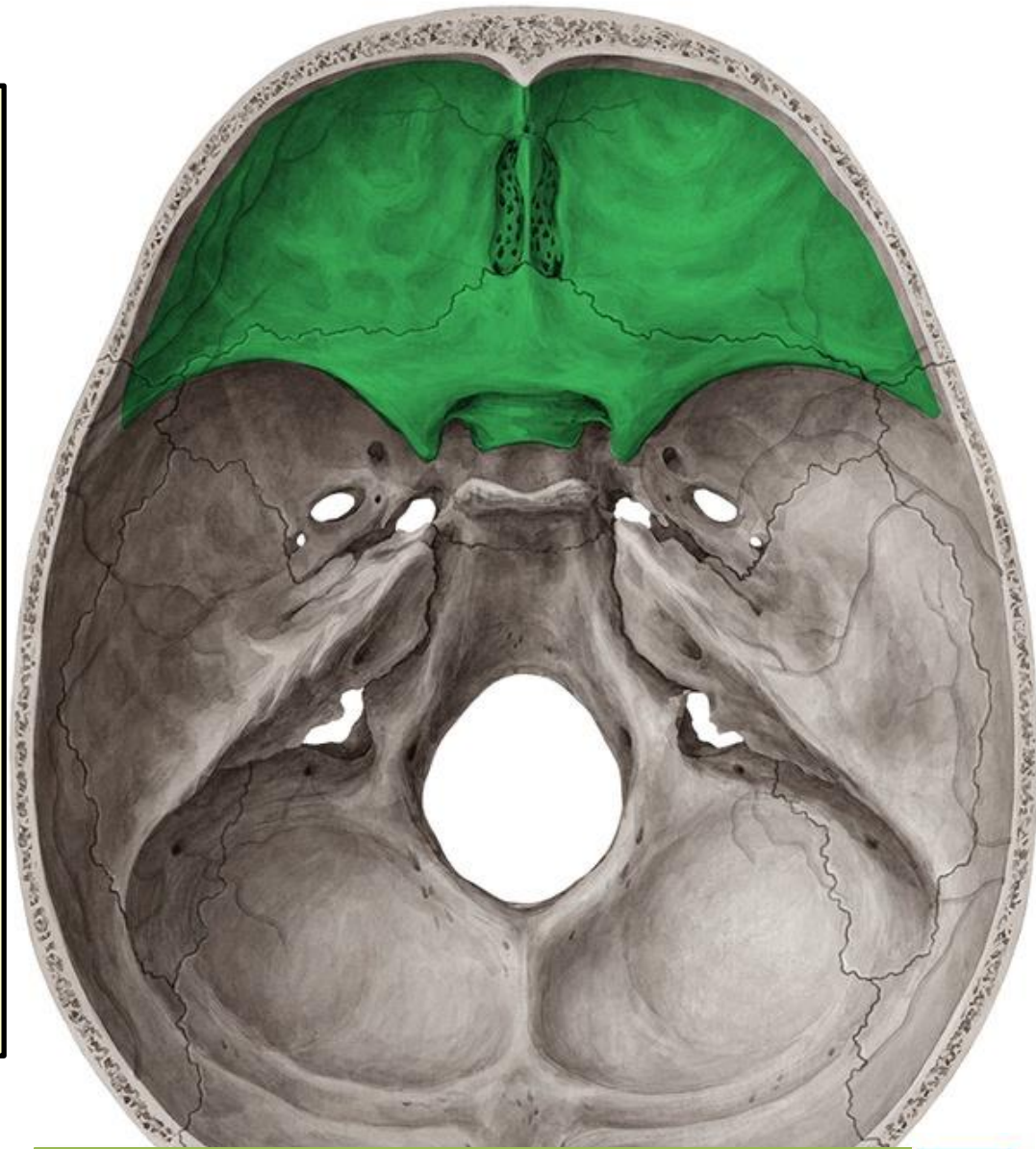
- 1- Frontal bone
- 2- Ethmoid bone in the midline
- 3- Two parts of the sphenoid bone, the body (midline) and the lesser wings (laterally)

**Orbital plates of the frontal bone** are thin plates of frontal bone, form the roof of the orbit

**Frontal crest** is a small crest projects from frontal bone

**Crista galli** is a sharp upward projection of the ethmoid bone in the midline

**Cribriform plate of the ethmoid** is a sieve-like structure lateral to crista galli

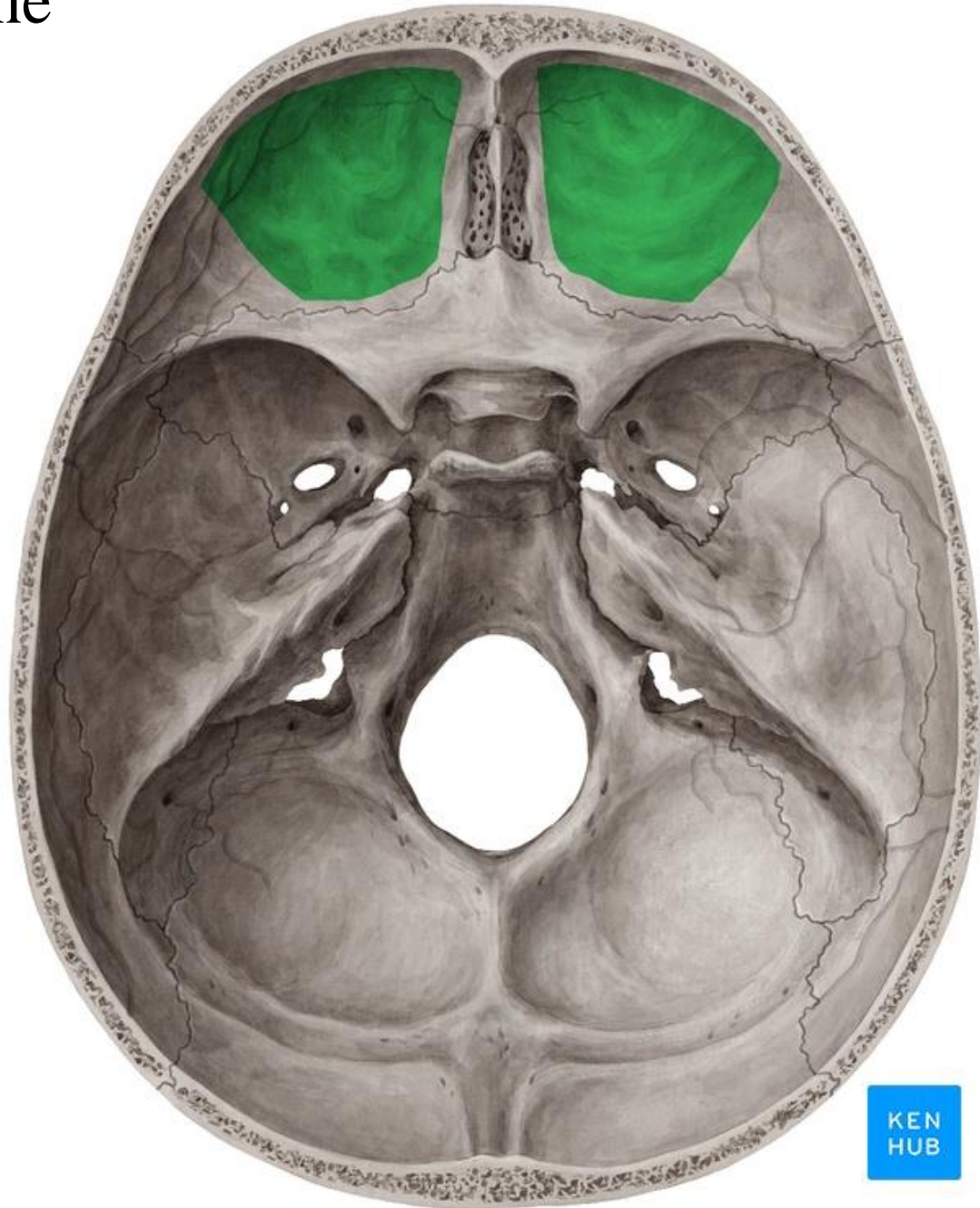


Note the anterior cranial fossa is above the nasal cavity and the orbits

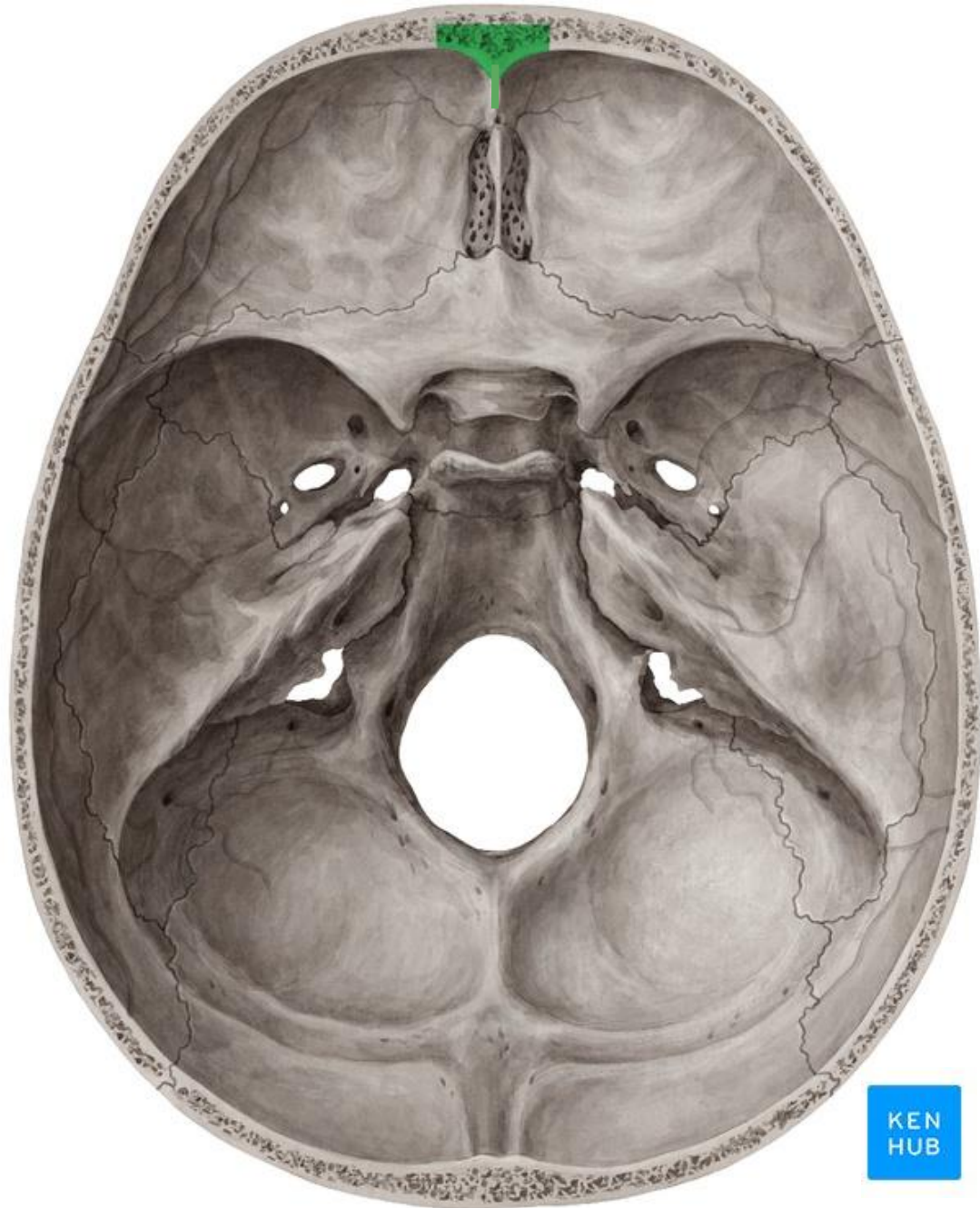
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# Orbital plates of frontal bone

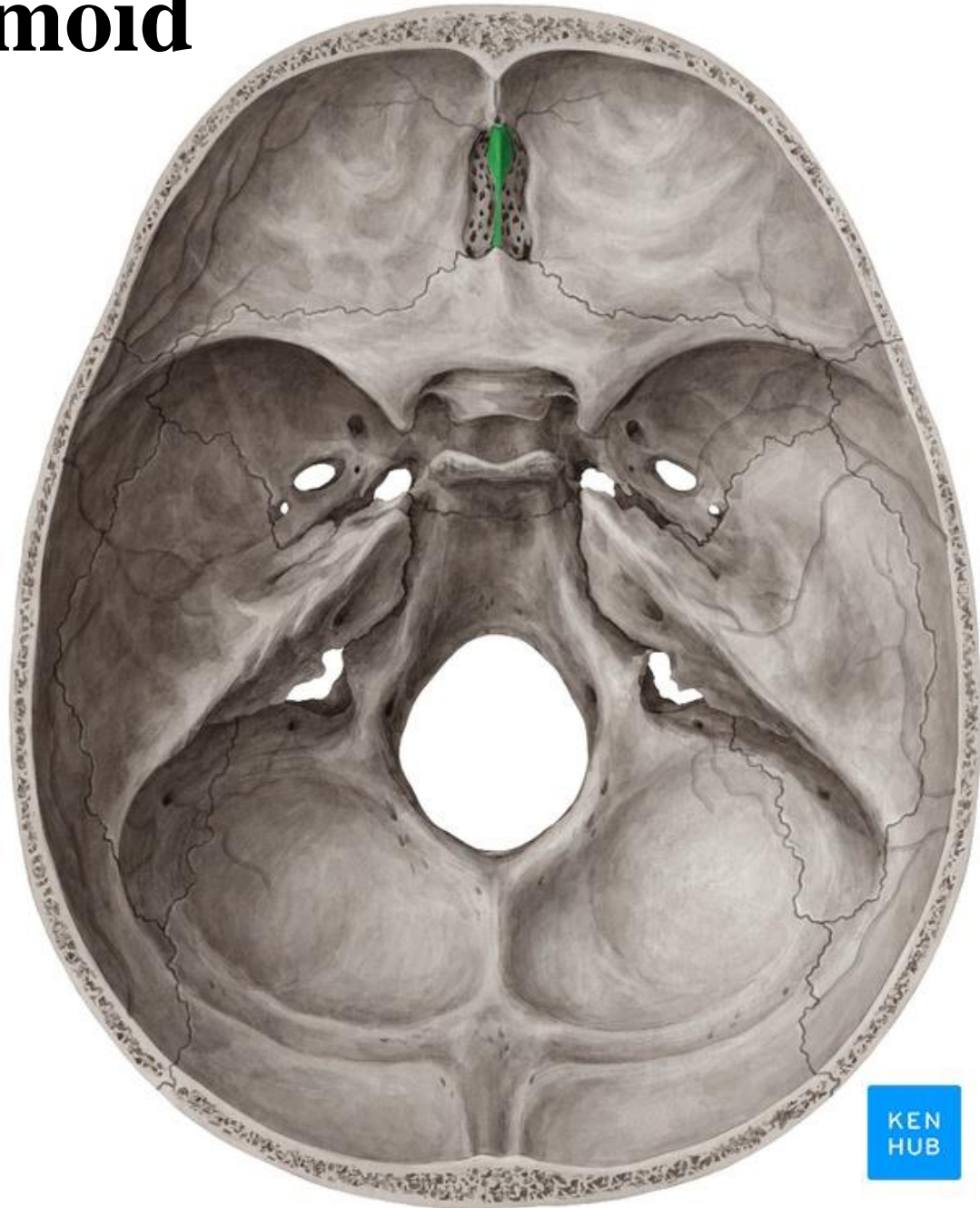


# Frontal crest



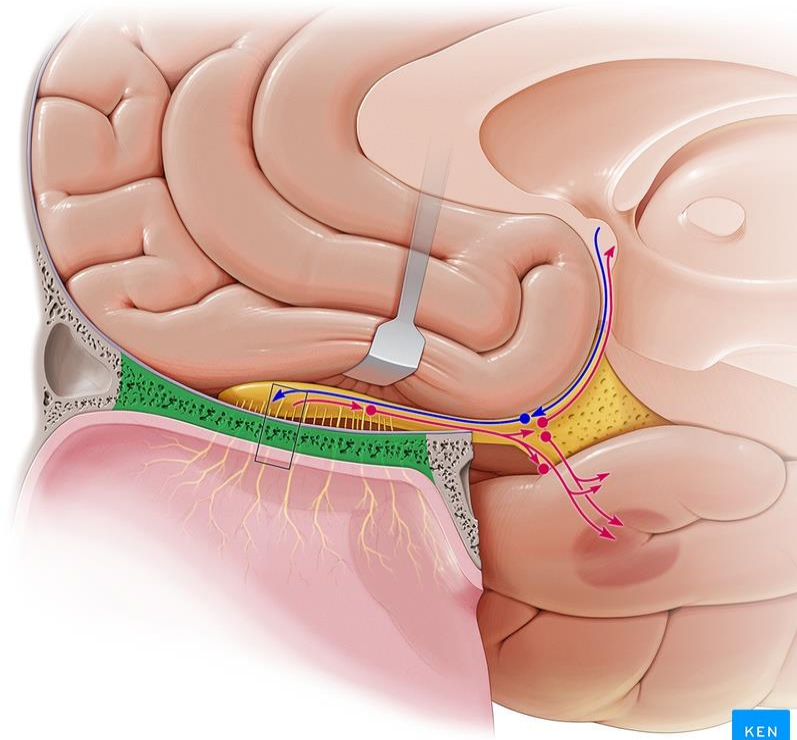
# Crista galli of ethmoid

*Latin: Crest of the rooster*





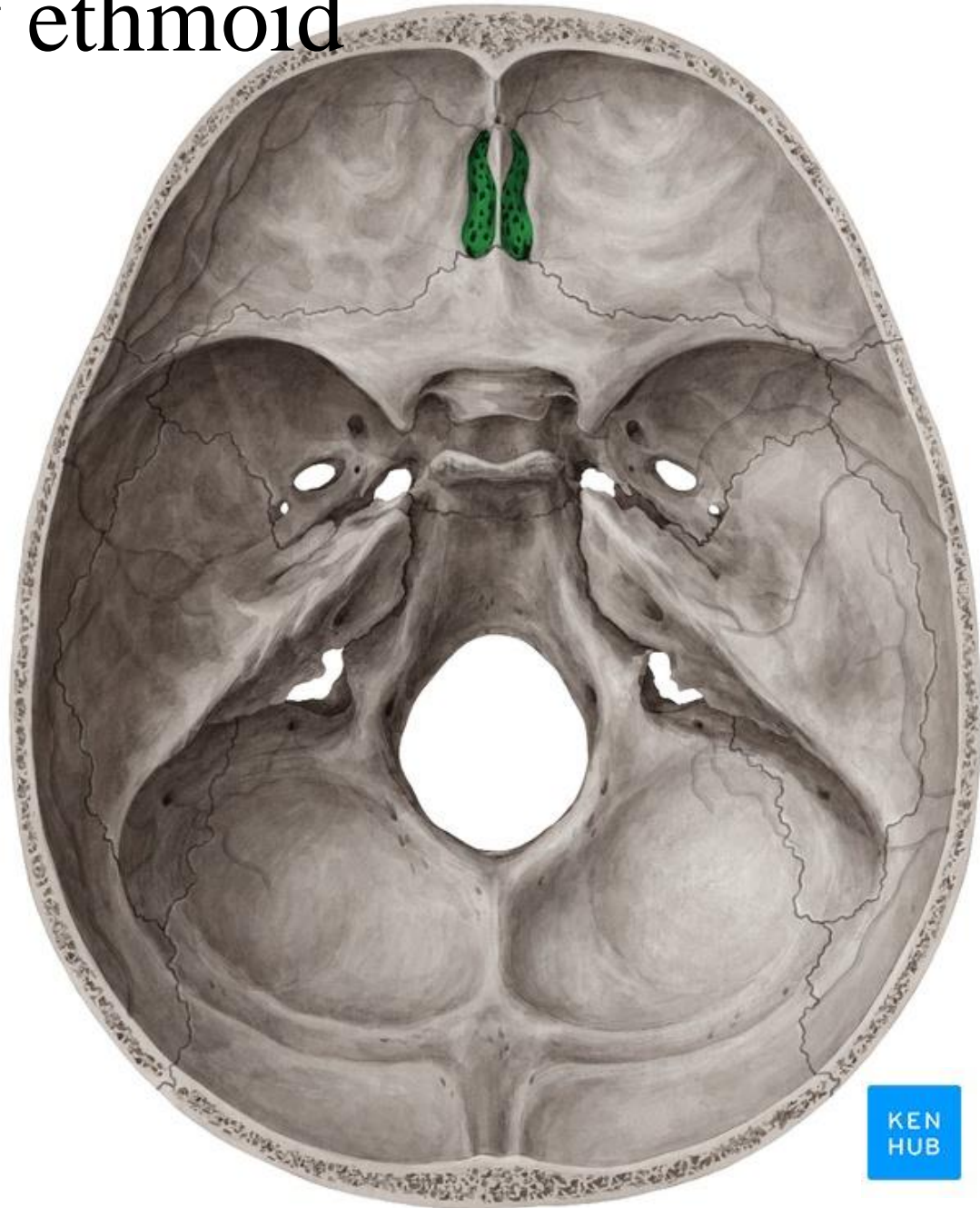
# Cribriform plate of ethmoid



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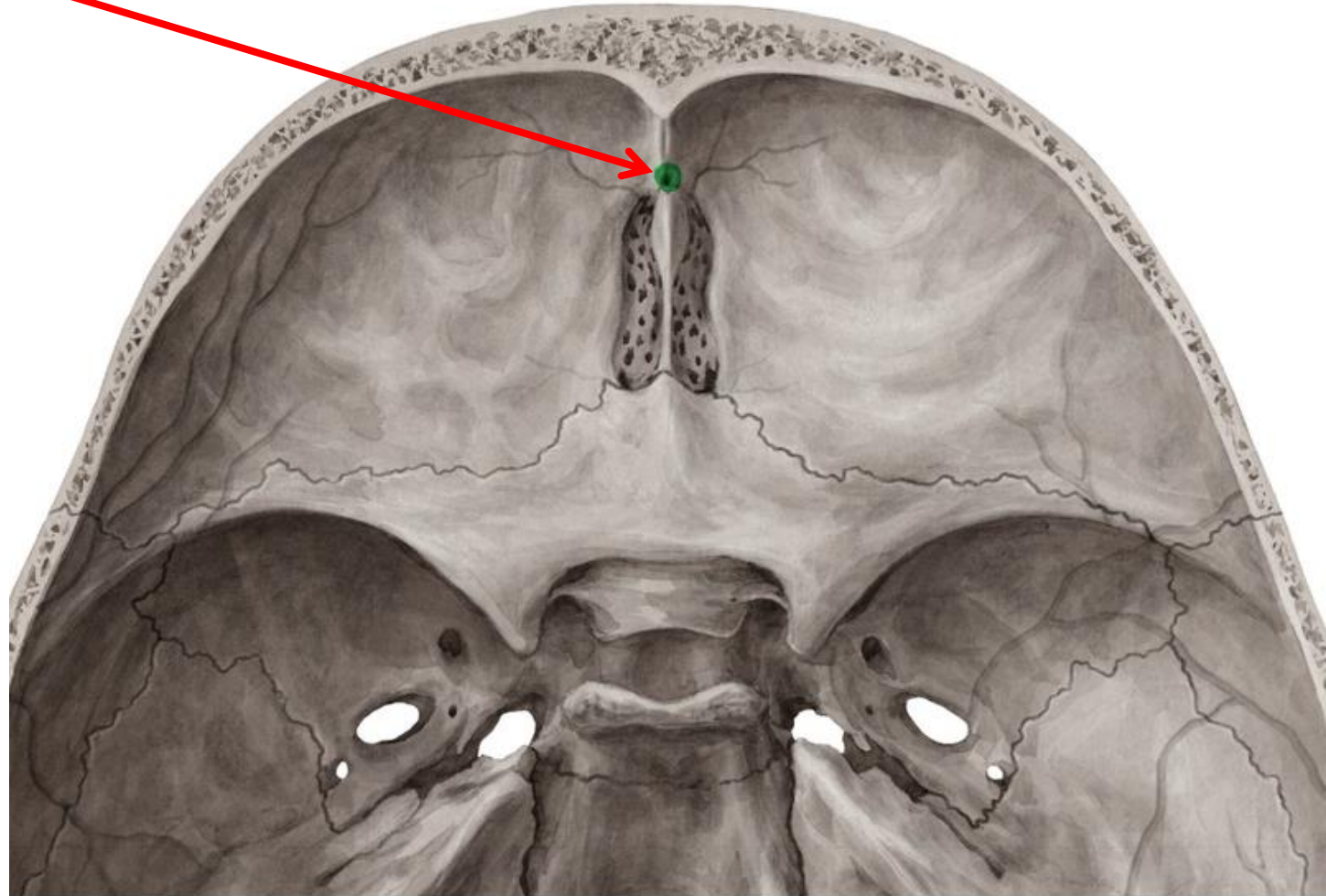
The small perforations in the cribriform plate are for the **olfactory nerves**.



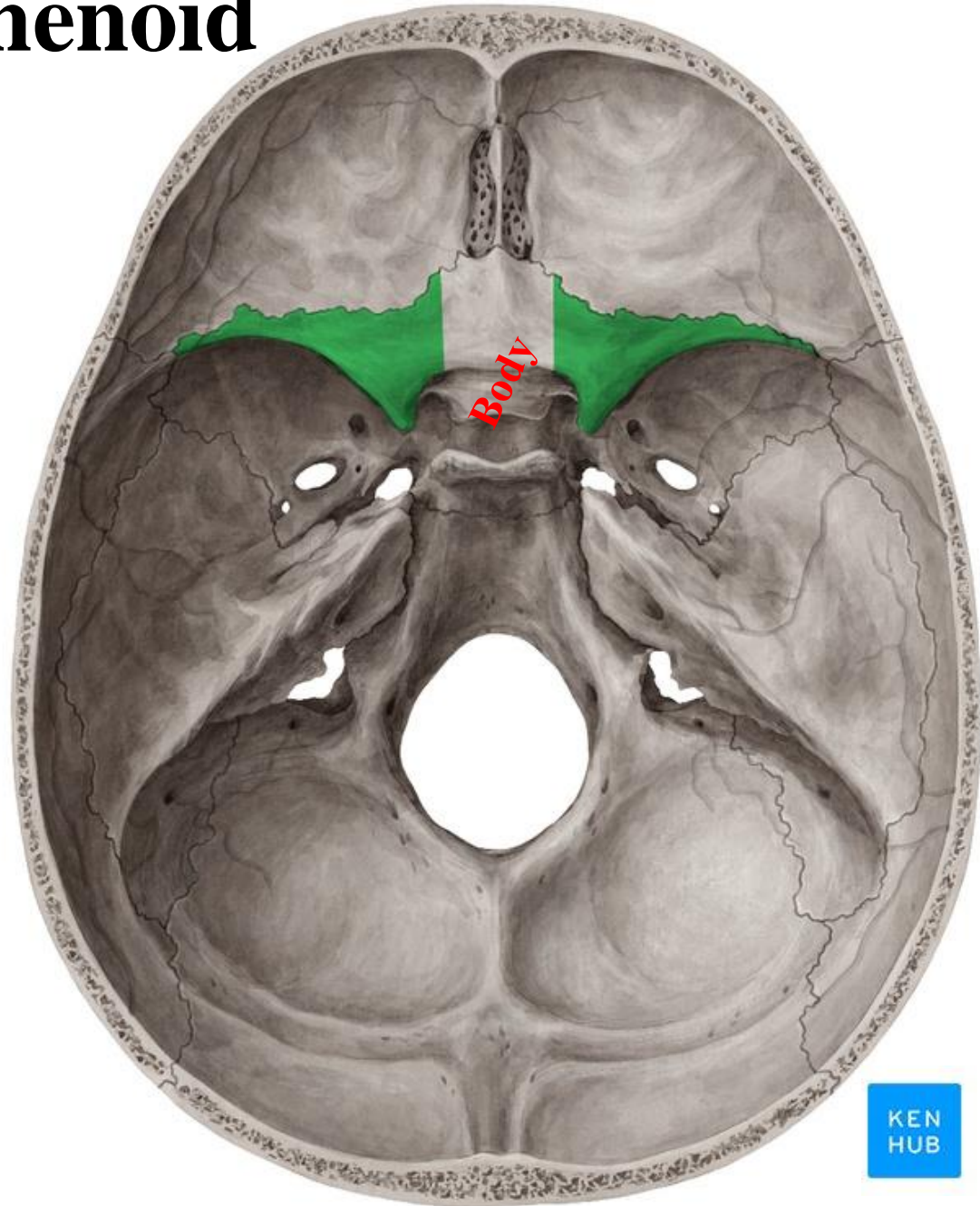
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**Foramen caecum**



# Lesser wing of sphenoid





# Anterior clinoid process

The medial ends of the lesser wing of the sphenoid form the **anterior clinoid processes**

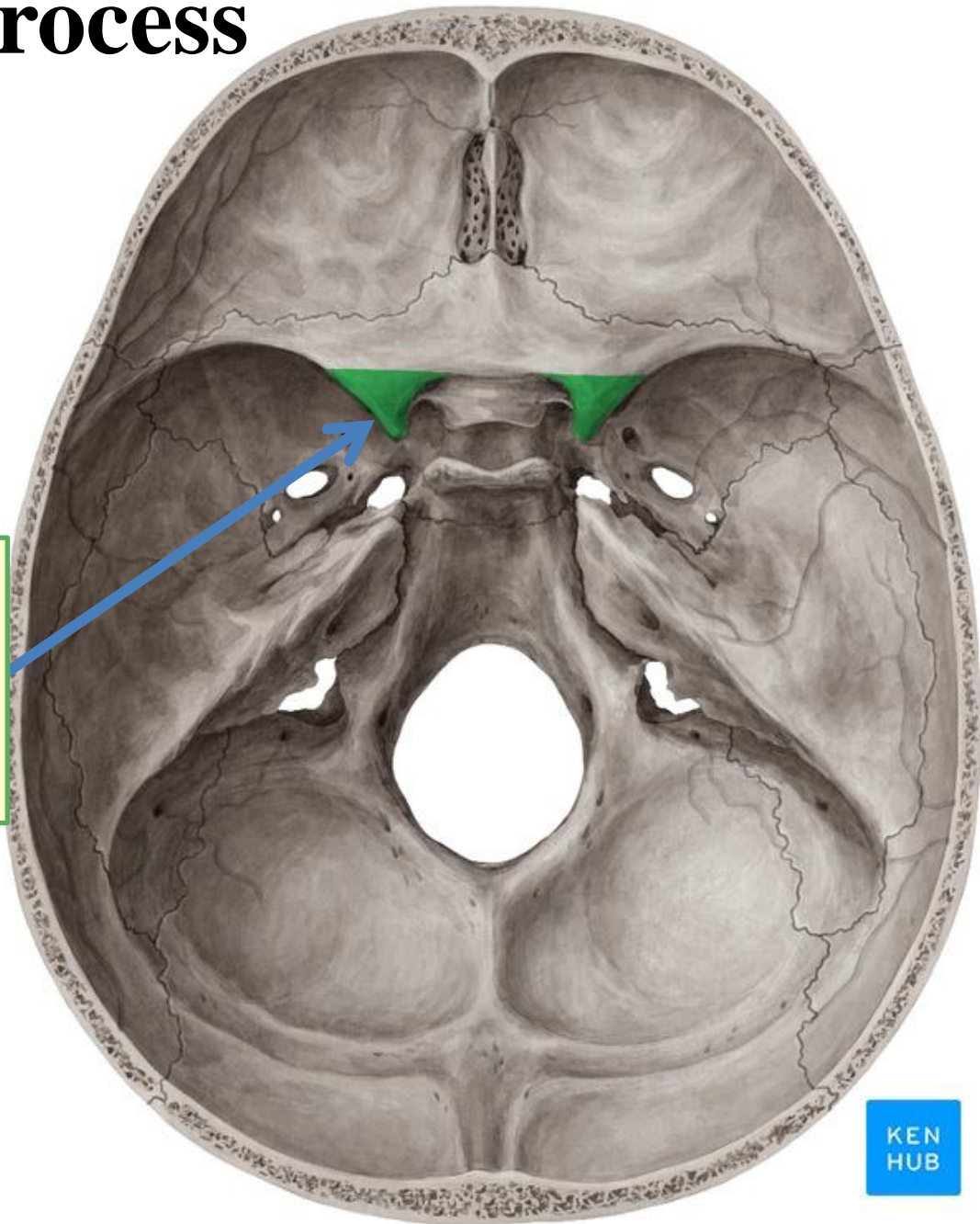
Note:

**Medial** to Anterior clinoid process:

**Optic canal**

**Lateral** to Anterior clinoid process:

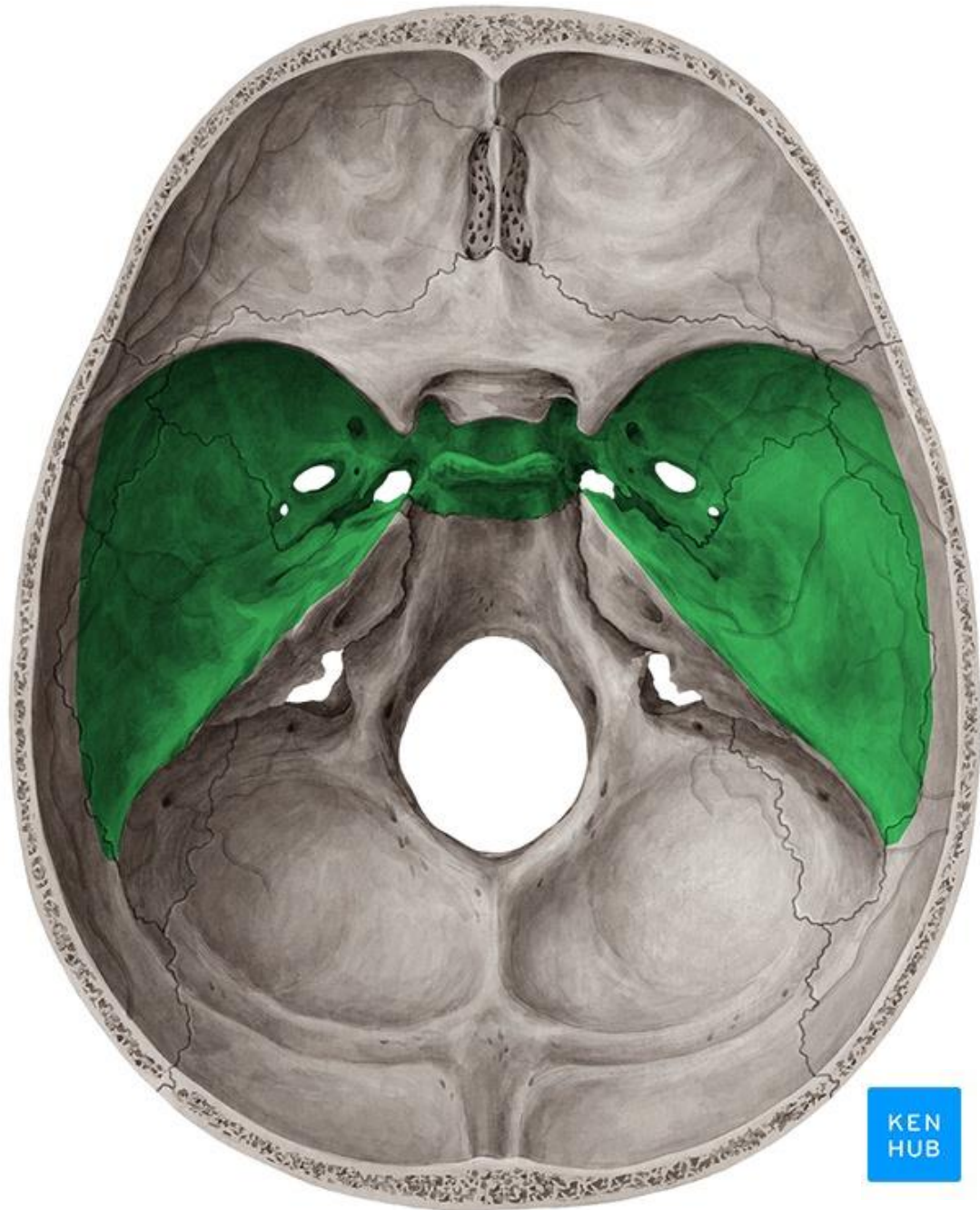
**Superior orbital fissure**



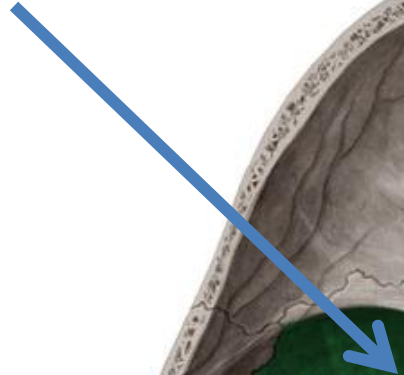
# Middle cranial fossa

Formed by:

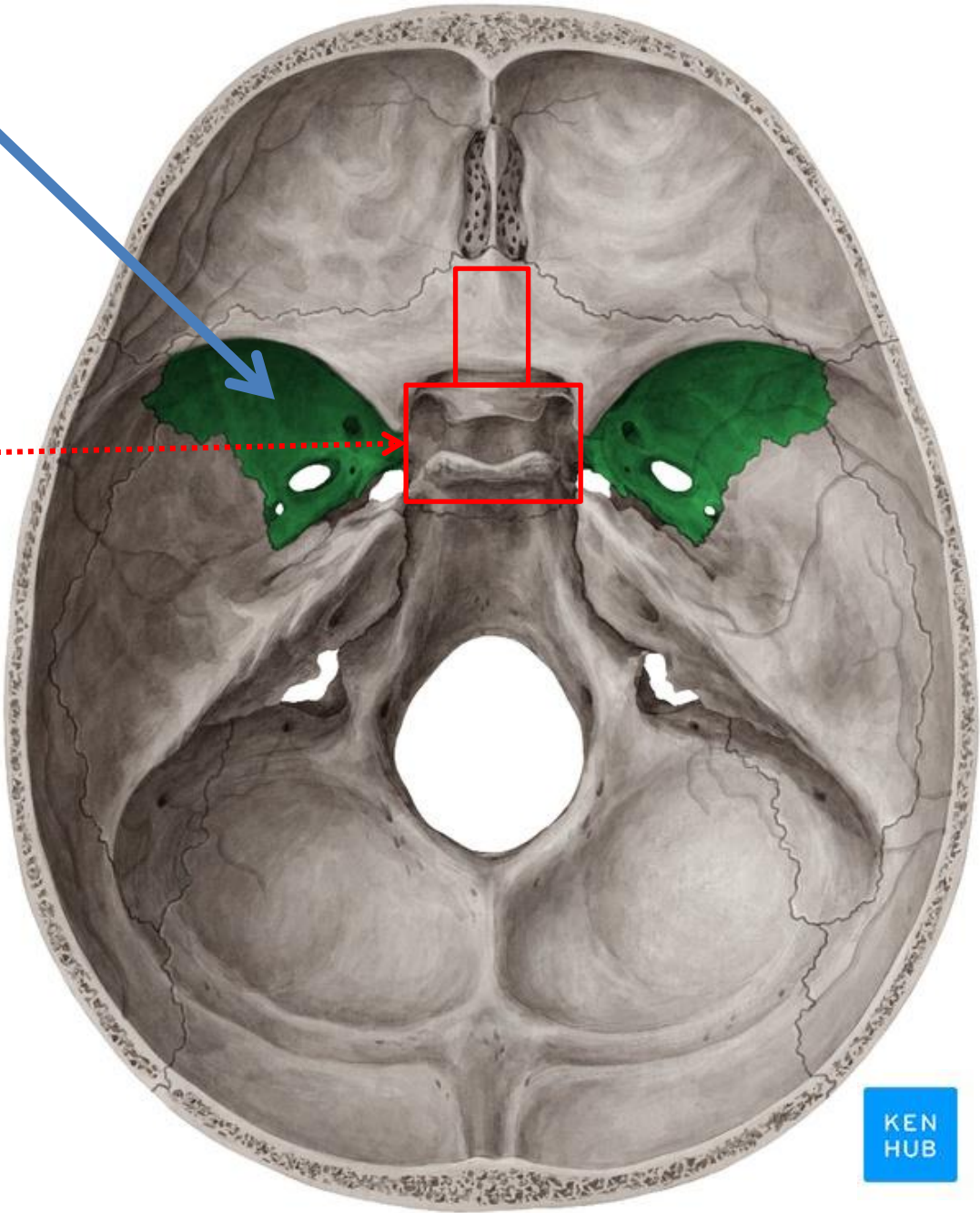
- Body of sphenoid
- Greater wing of the sphenoid
- Squamous and petrous parts of the temporal bone



**Greater wing of the sphenoid**



**Body of sphenoid**

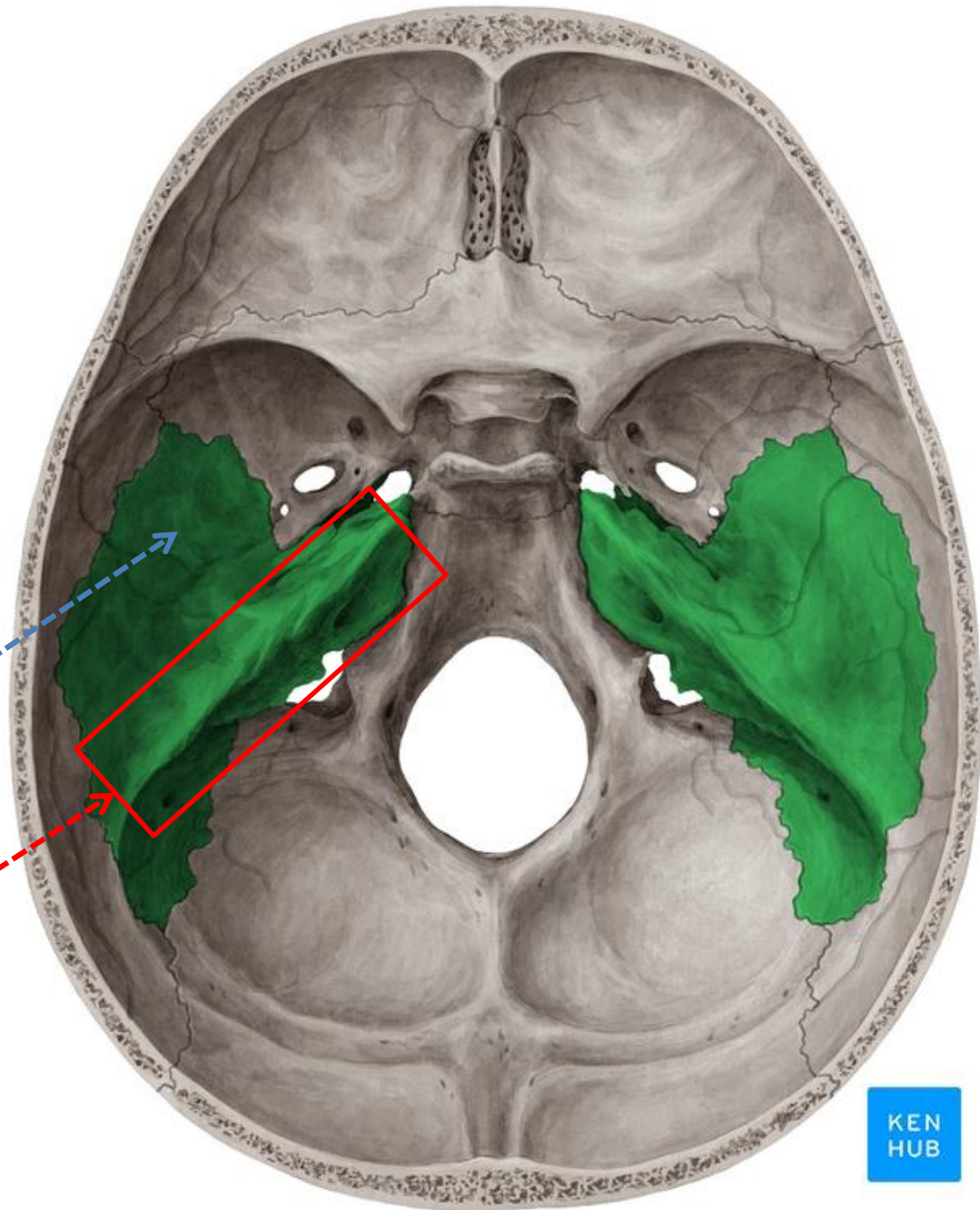




# Squamous and petrous parts of the temporal bone

Squamous part

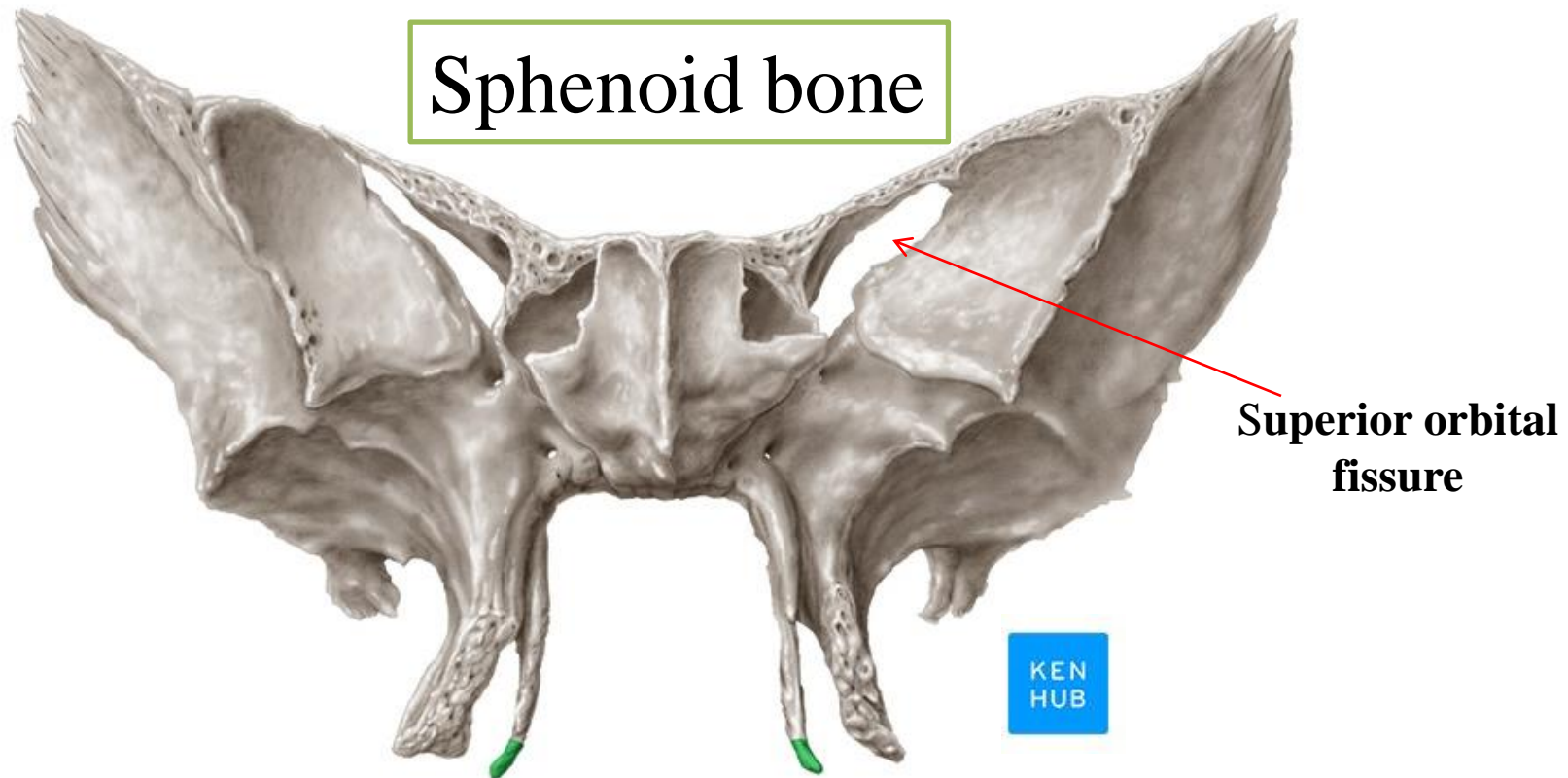
Petrous part

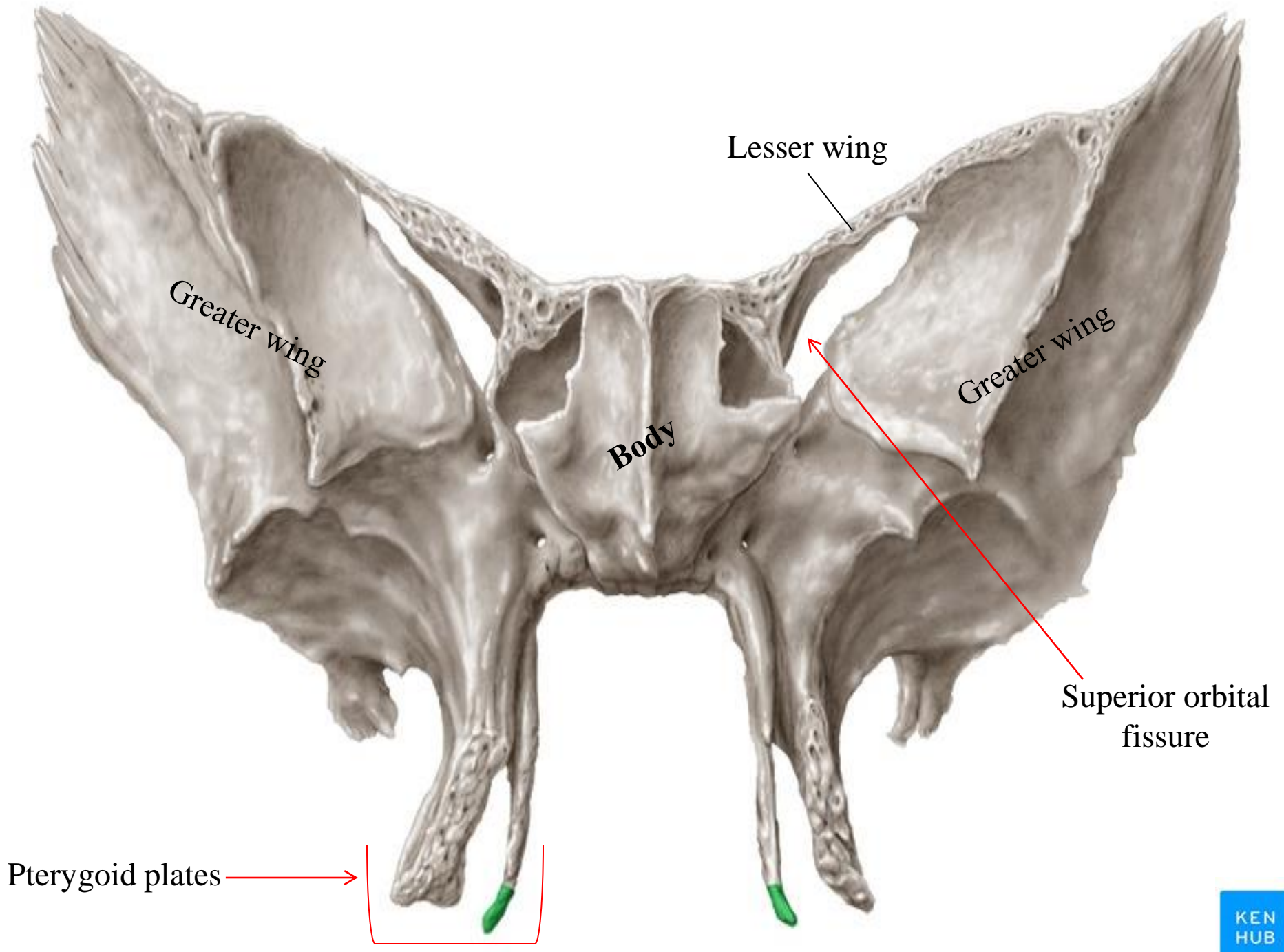


Resembles a bat having a centrally placed body with greater and lesser wings that are outstretched on each side

The **superior orbital fissure** is a slitlike opening between the lesser and greater wings of the sphenoid

The body of the sphenoid: contains the **sphenoid air sinuses**





Greater wing

Lesser wing

Body

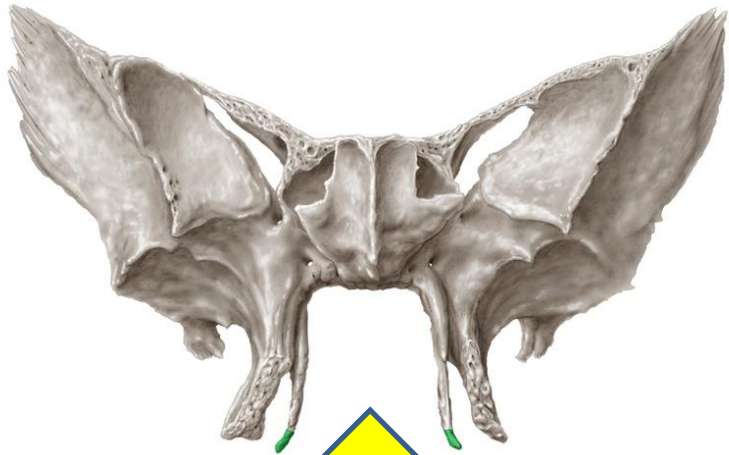
Greater wing

Superior orbital  
fissure

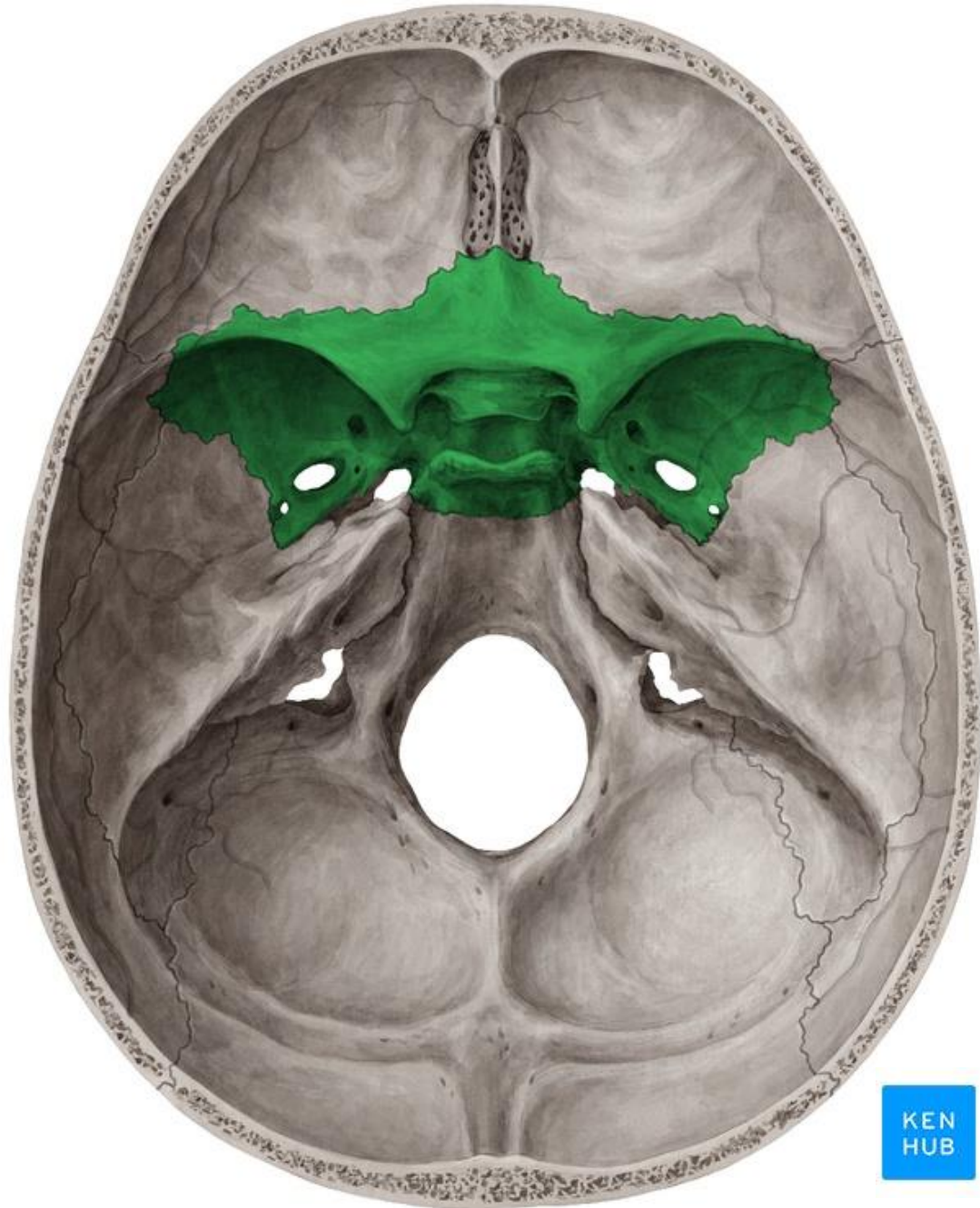
Pterygoid plates



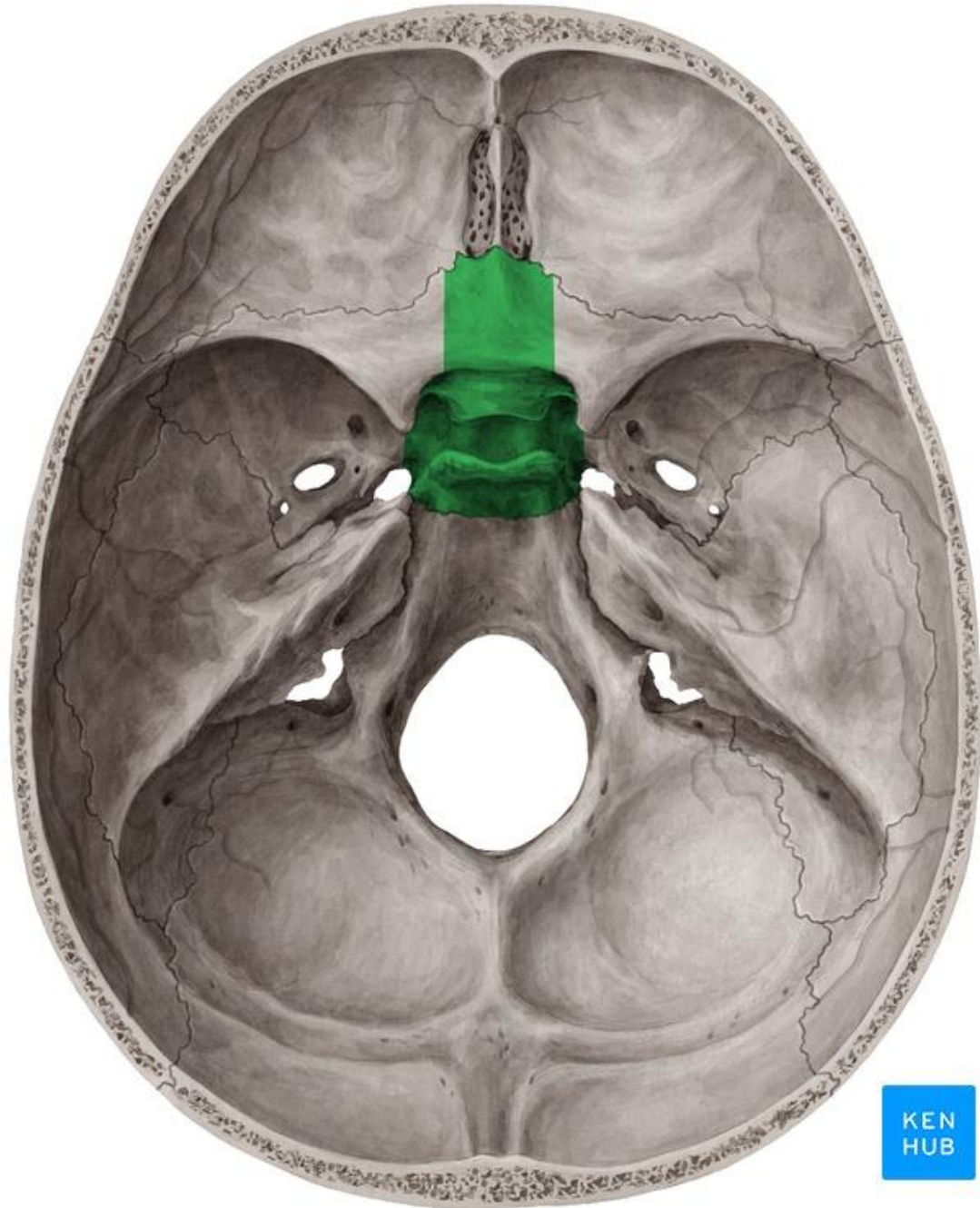
# Sphenoid bone



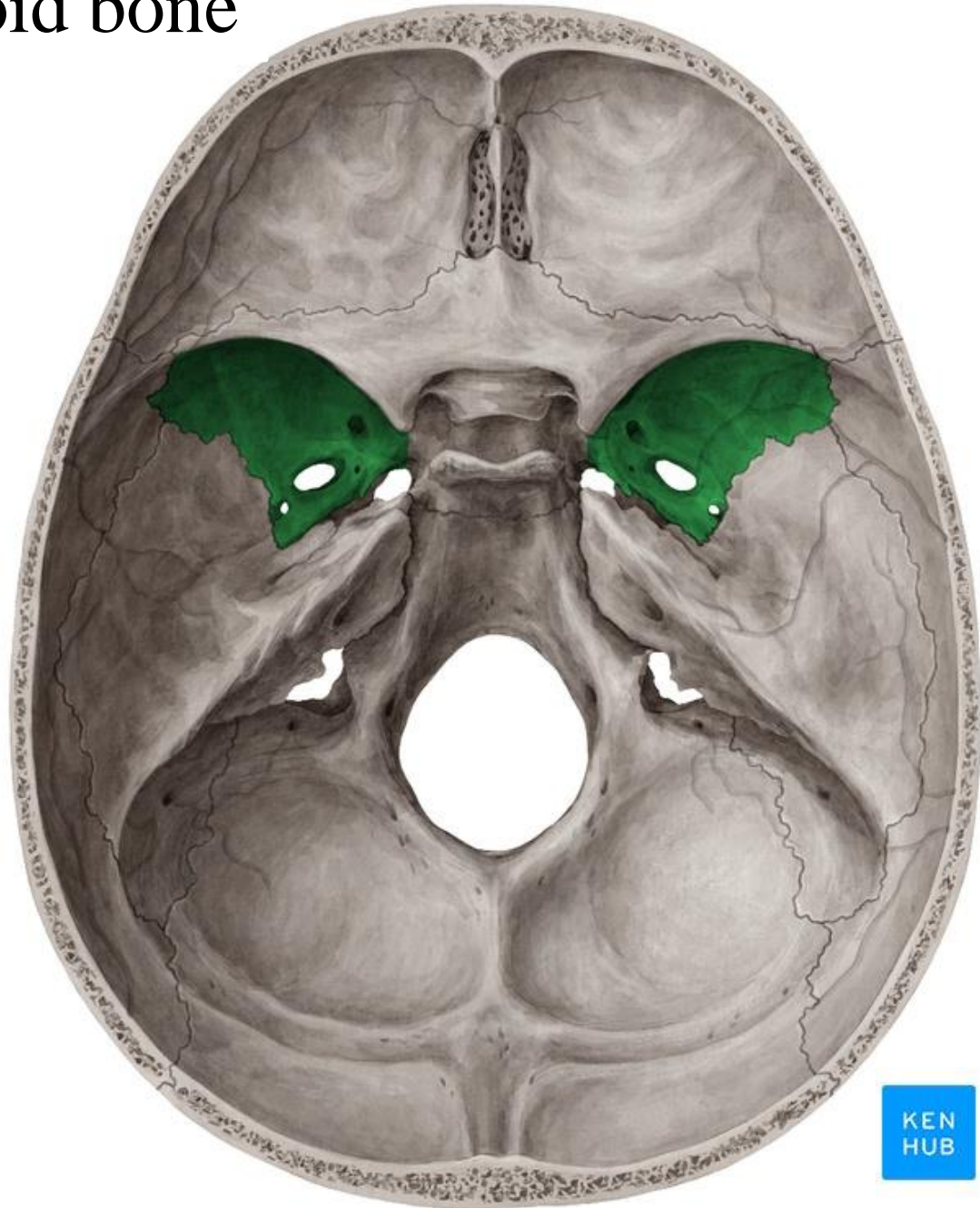
Anterior  
view



# Body of Sphenoid bone

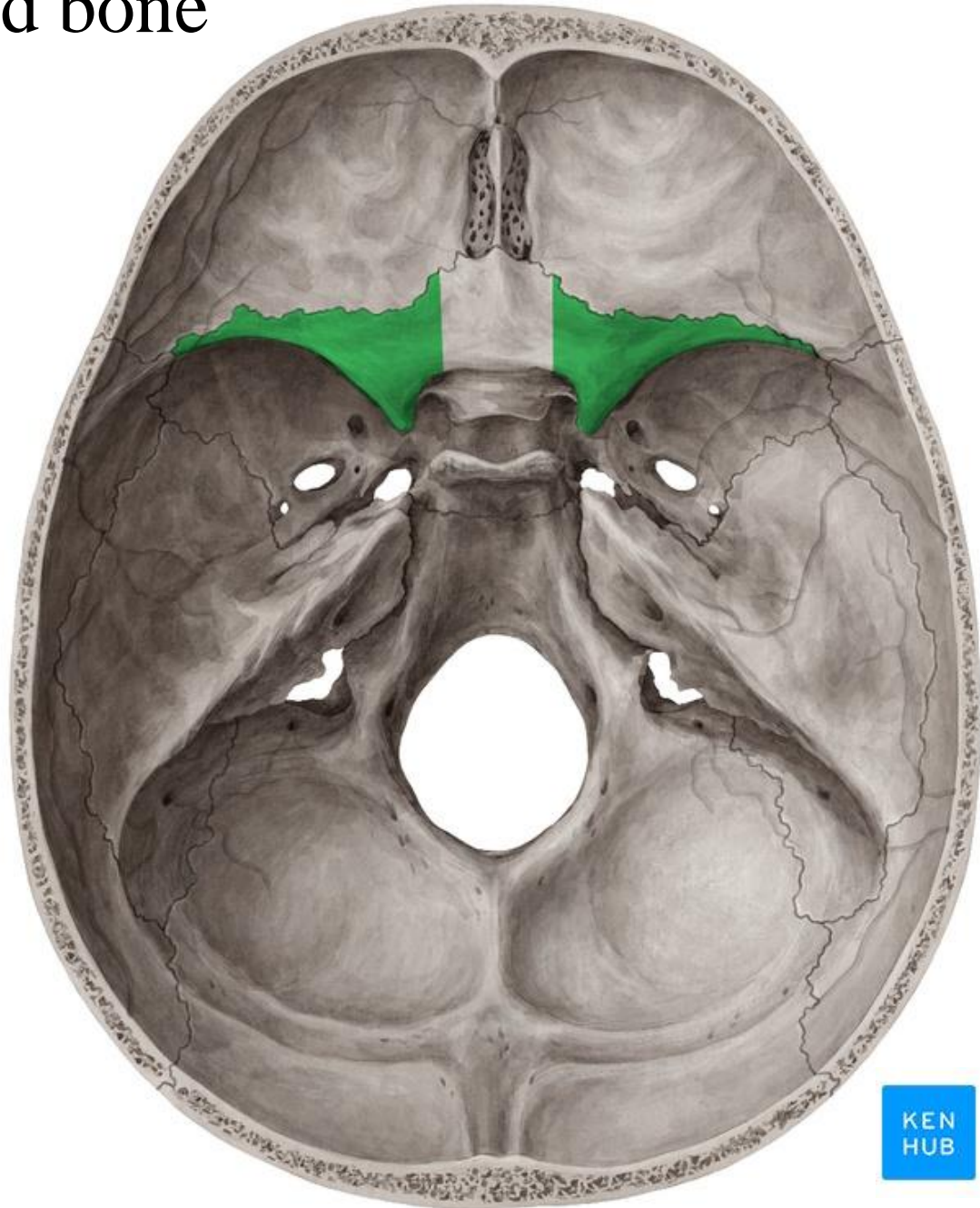


# Greater wing of Sphenoid bone





# Lesser wing of Sphenoid bone



## Pterygoid plates



**Foramen rotundum:** situated behind the medial end of the superior orbital fissure. Transmits the maxillary nerve

**Foramen ovale:** lies posterolateral to the foramen rotundum transmits the mandibular nerve

**Foramen spinosum** (small) lies posterolateral to the foramen ovale. Transmits the middle meningeal artery

**Carotid canal:** Transmits the internal carotid artery

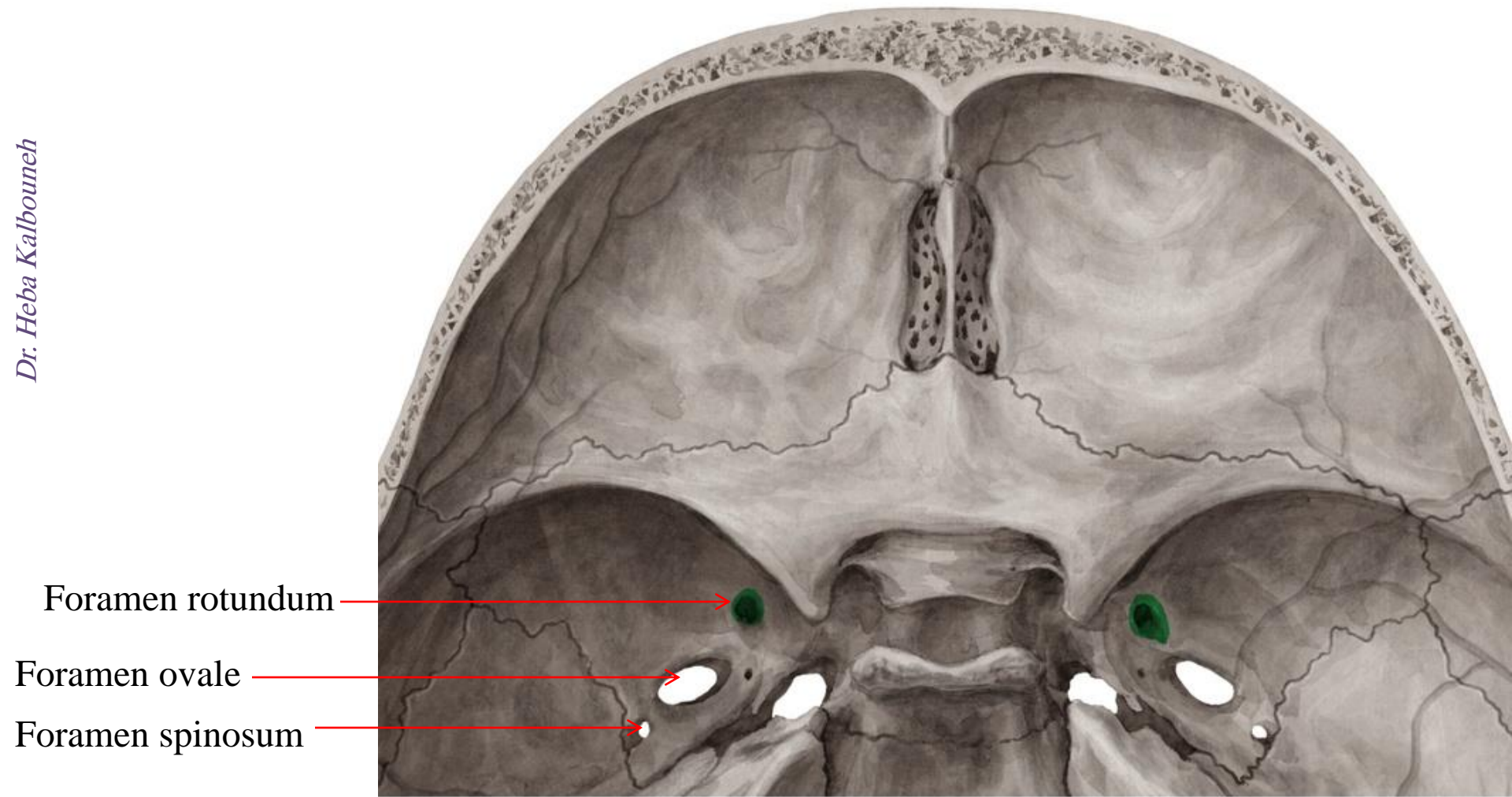
**Foramen lacerum** lies at the apex of the petrous part of the temporal bone . In life is filled by cartilage and fibrous tissue, and only small blood vessels pass through this tissue

**Meckel's cave:** impression on the apex of the petrous part of the temporal bone for the trigeminal ganglion



*Dr. Heba Kalbouneh*

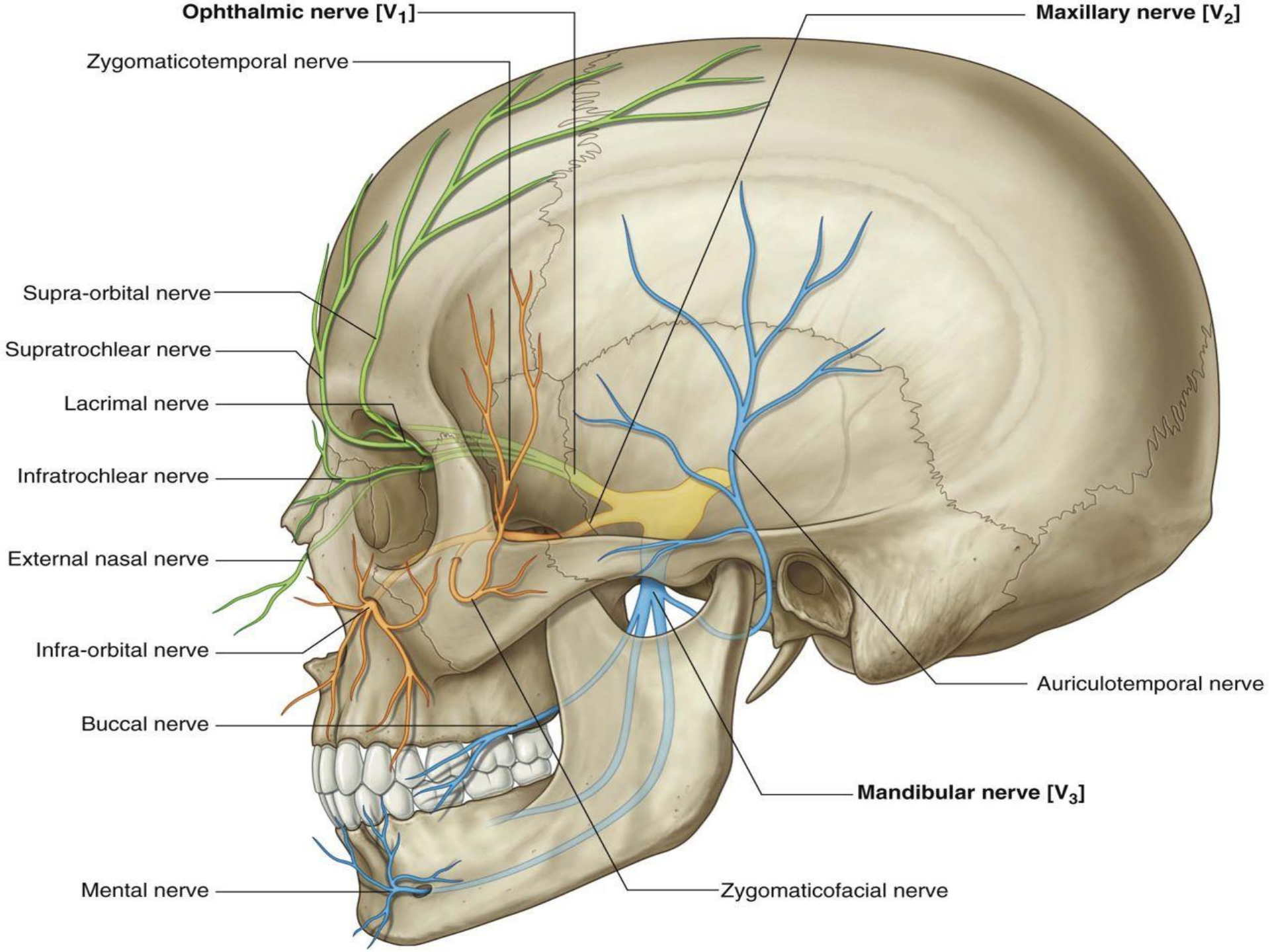


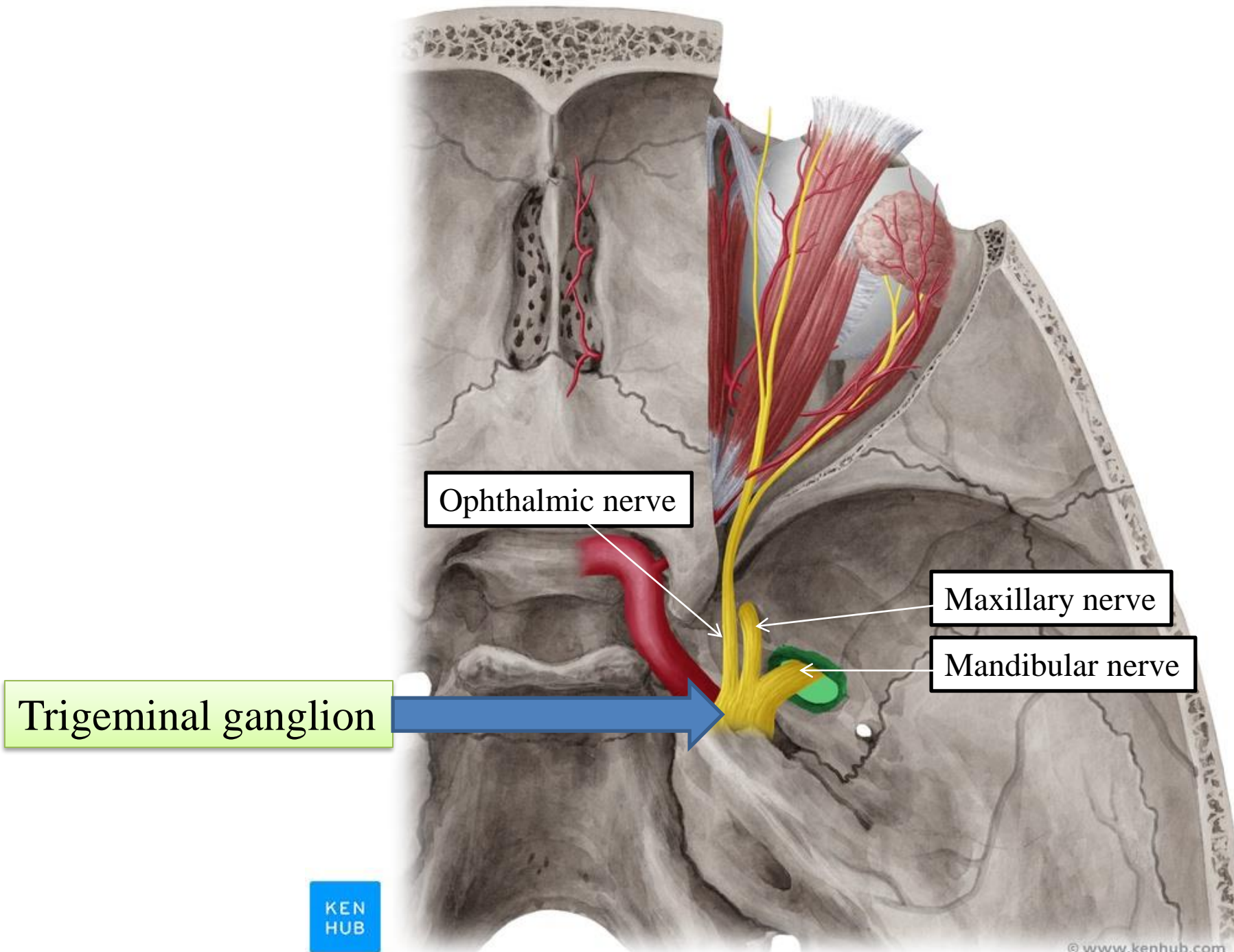


Foramen rotundum

Foramen ovale

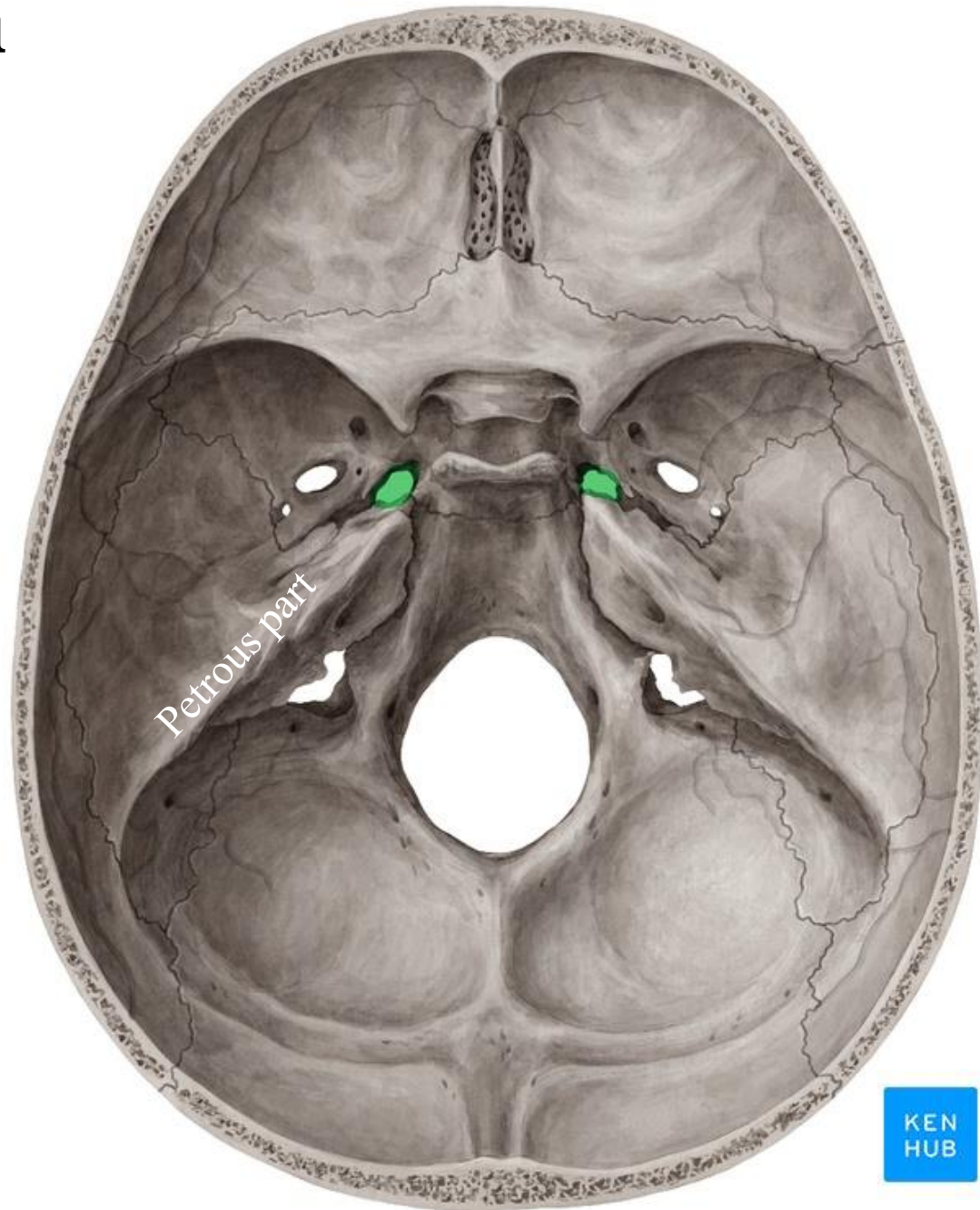
Foramen spinosum



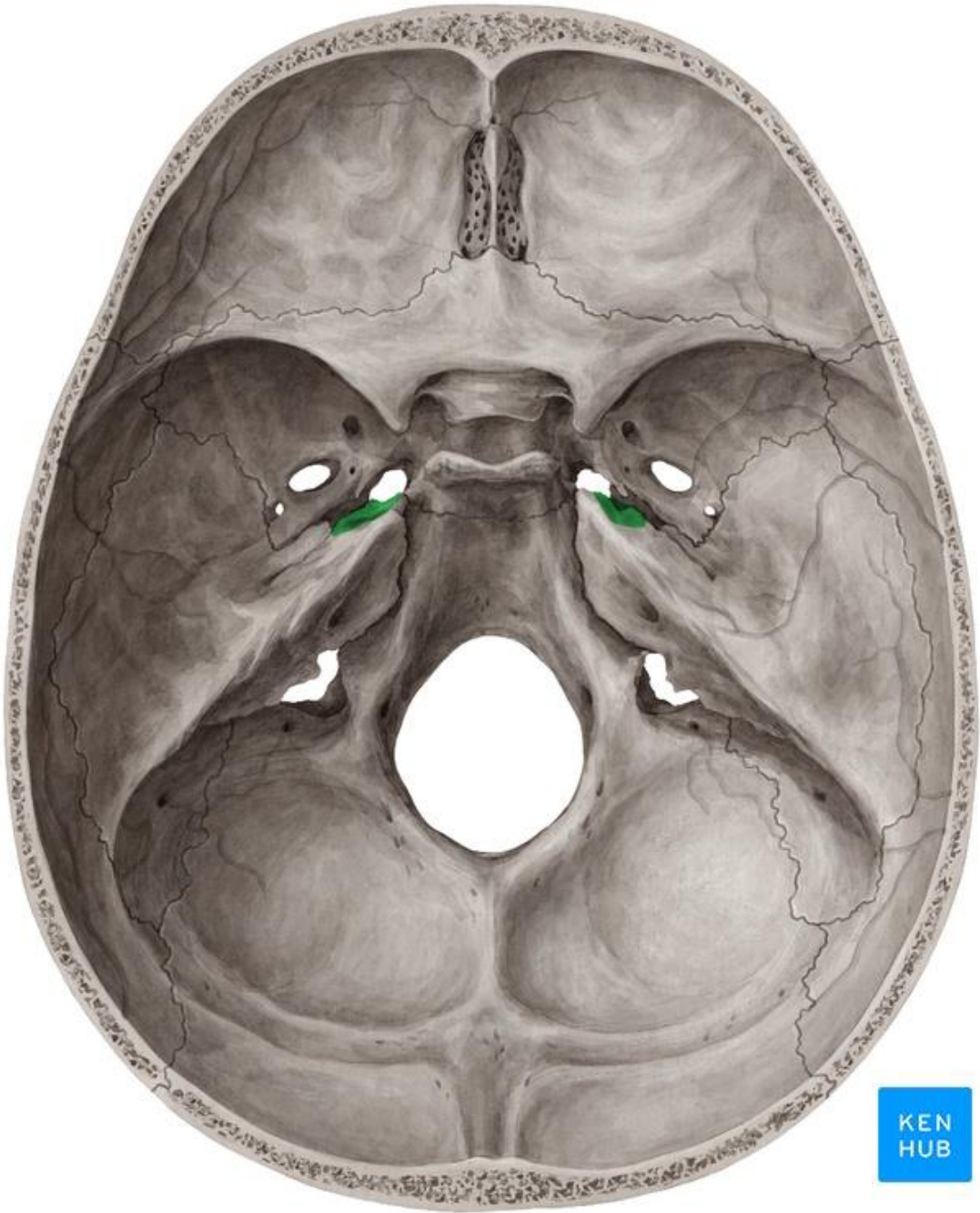




# Foramen lacerum



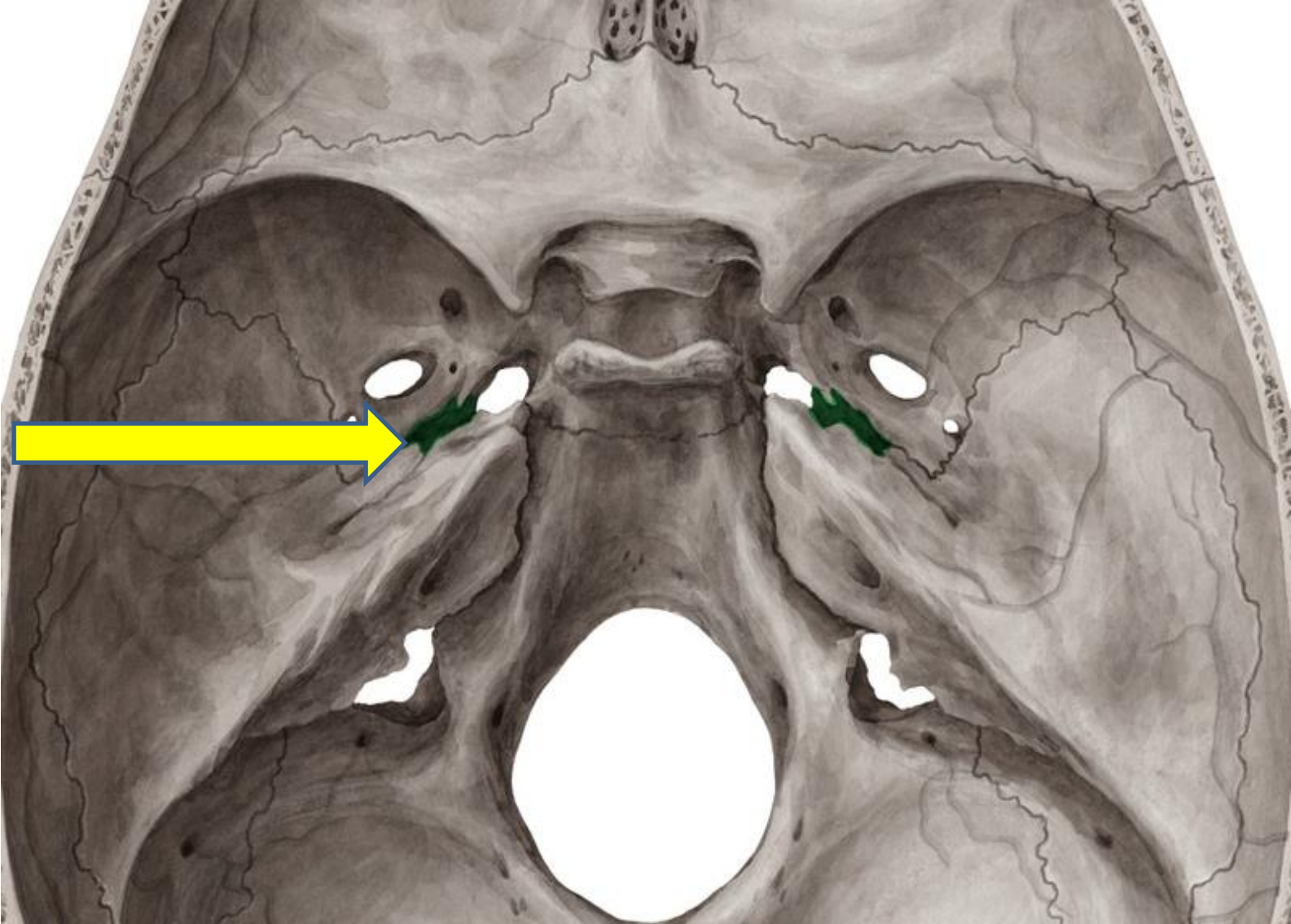
# Meckl's cave (Trigeminal impression)



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# Carotid canal





The median part of the middle cranial fossa is formed by the **body of the sphenoid**

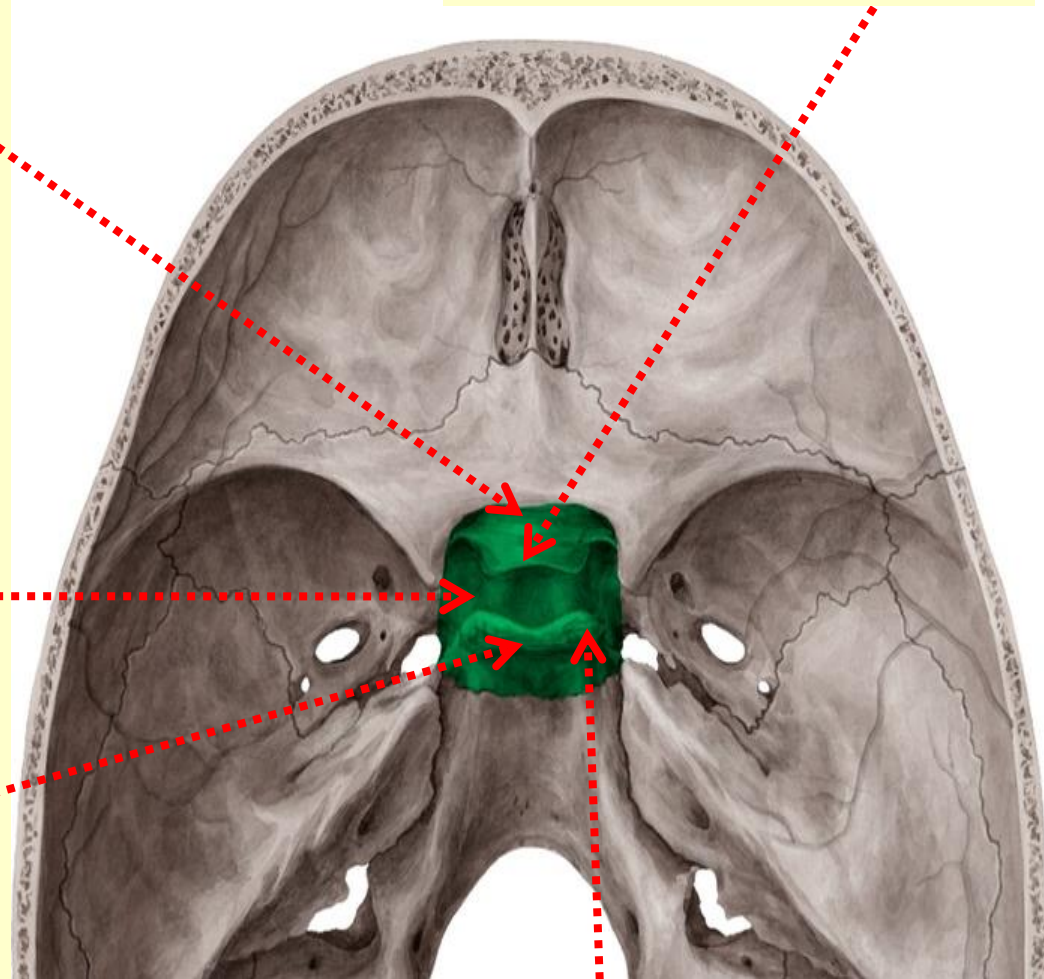
**Sulcus chiasmaticus (chiasmatic groove)** is related to the optic chiasma and leads laterally to the **Optic canal**

On the superior aspect of the body is a depression called the **Sella turcica** which contains the pituitary gland (**hypophyseal fossa**)

Posterior to the hypophyseal fossa is the **Dorsum sellae**

The superior angles of the dorsum sellae have two tubercles called the **Posterior clinoid processes**

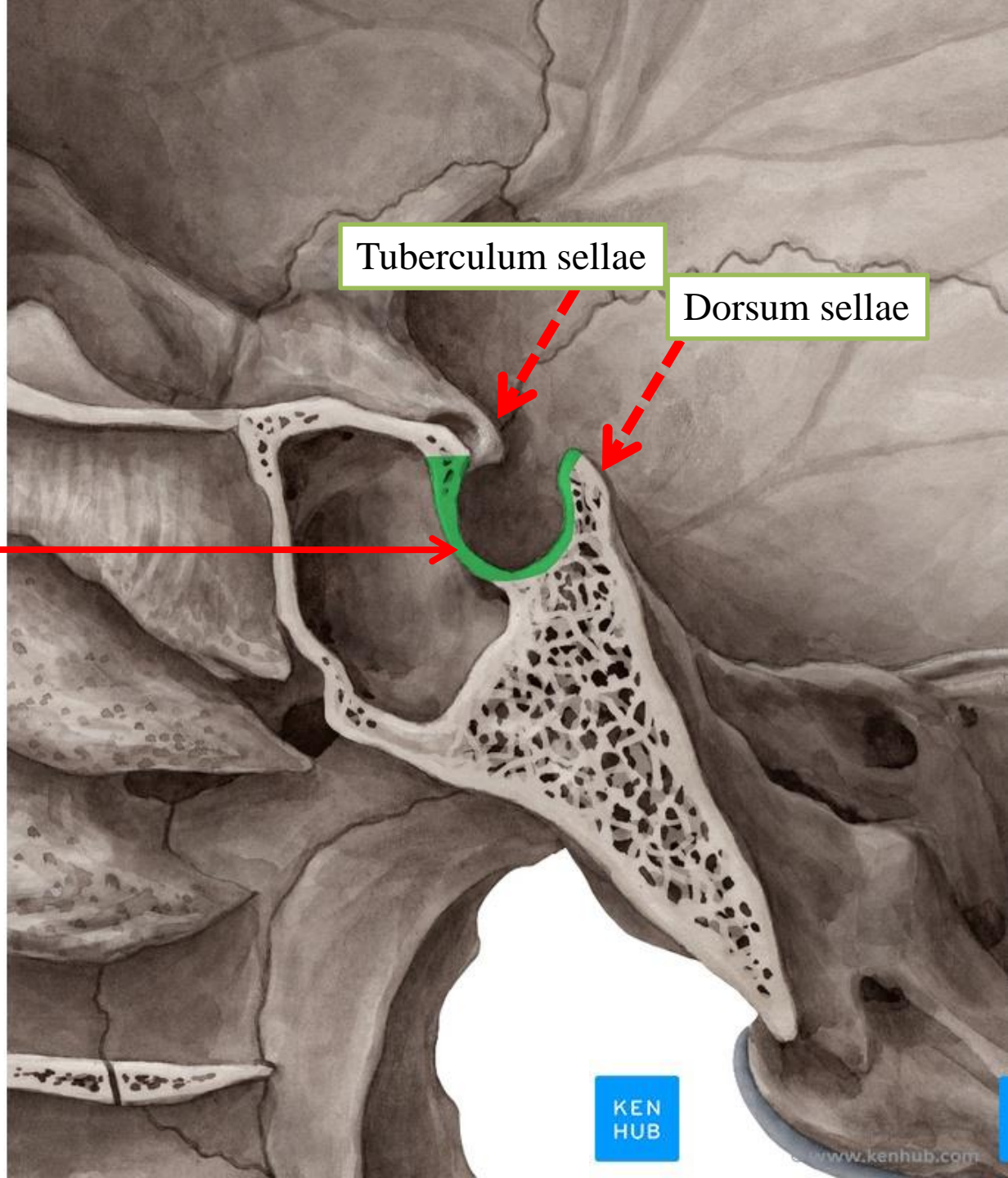
In front of the hypophyseal fossa is the **Tuberculum sellae**



Turkish saddle

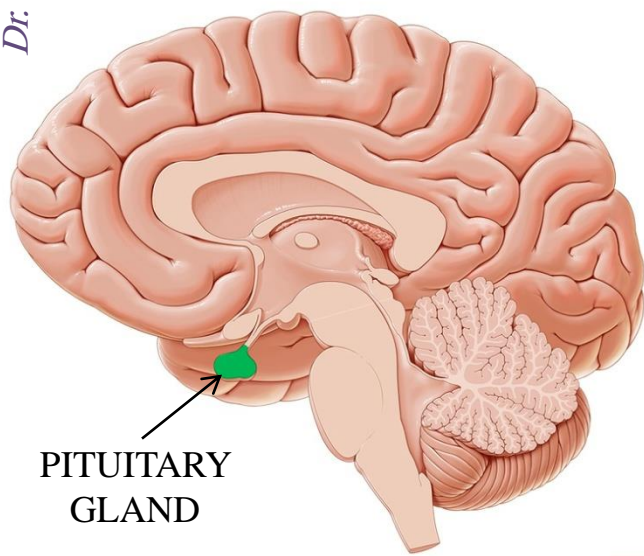


The **sella turcica**  
(hypophyseal fossa) which  
**CONTAINS THE**  
**PITUITARY GLAND**



Tuberculum sellae

Dorsum sellae

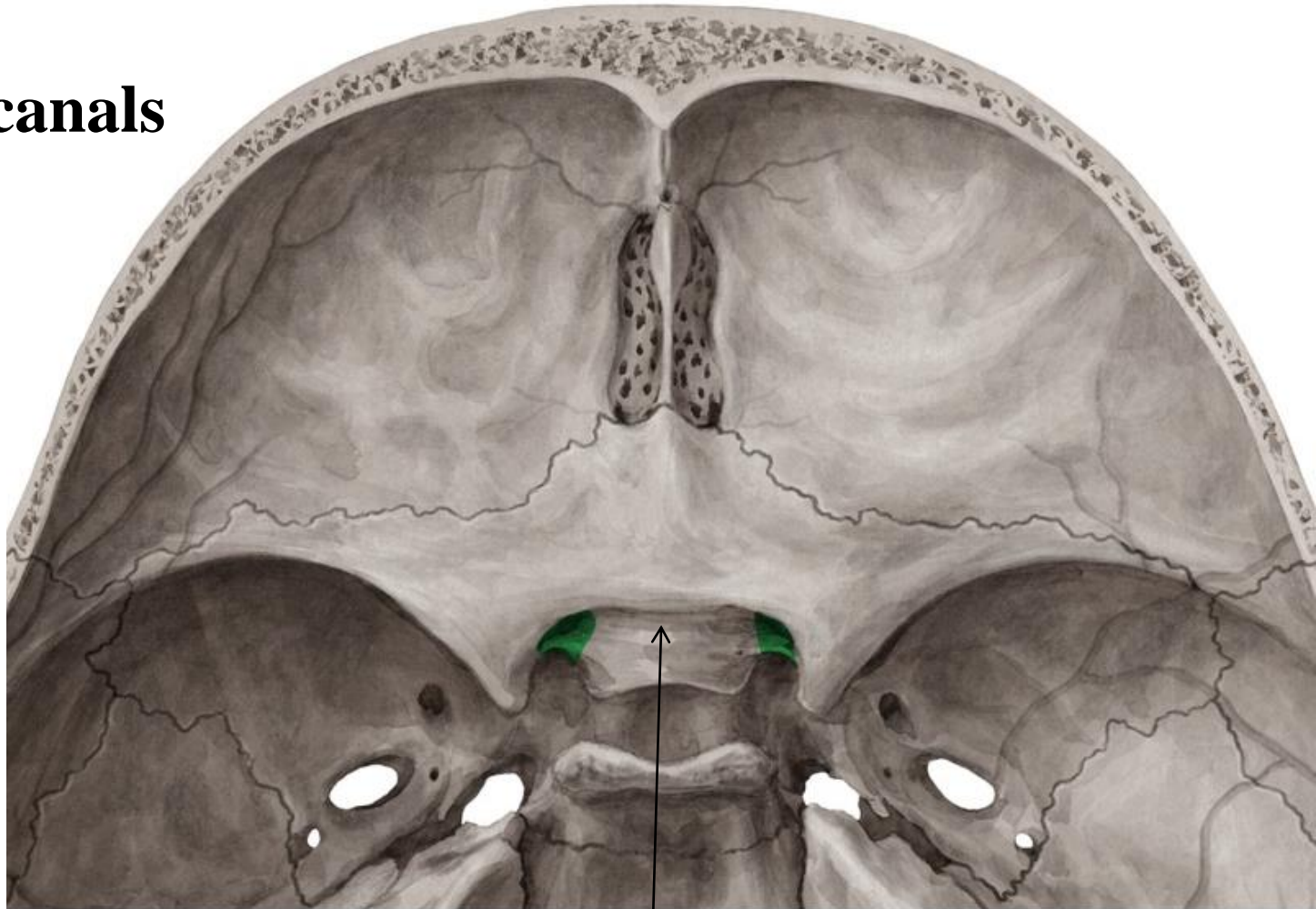


PITUITARY  
GLAND

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# Optic canals



**Sulcus chiasmaticus  
(chiasmatic groove)**

Is the groove between the optic canals

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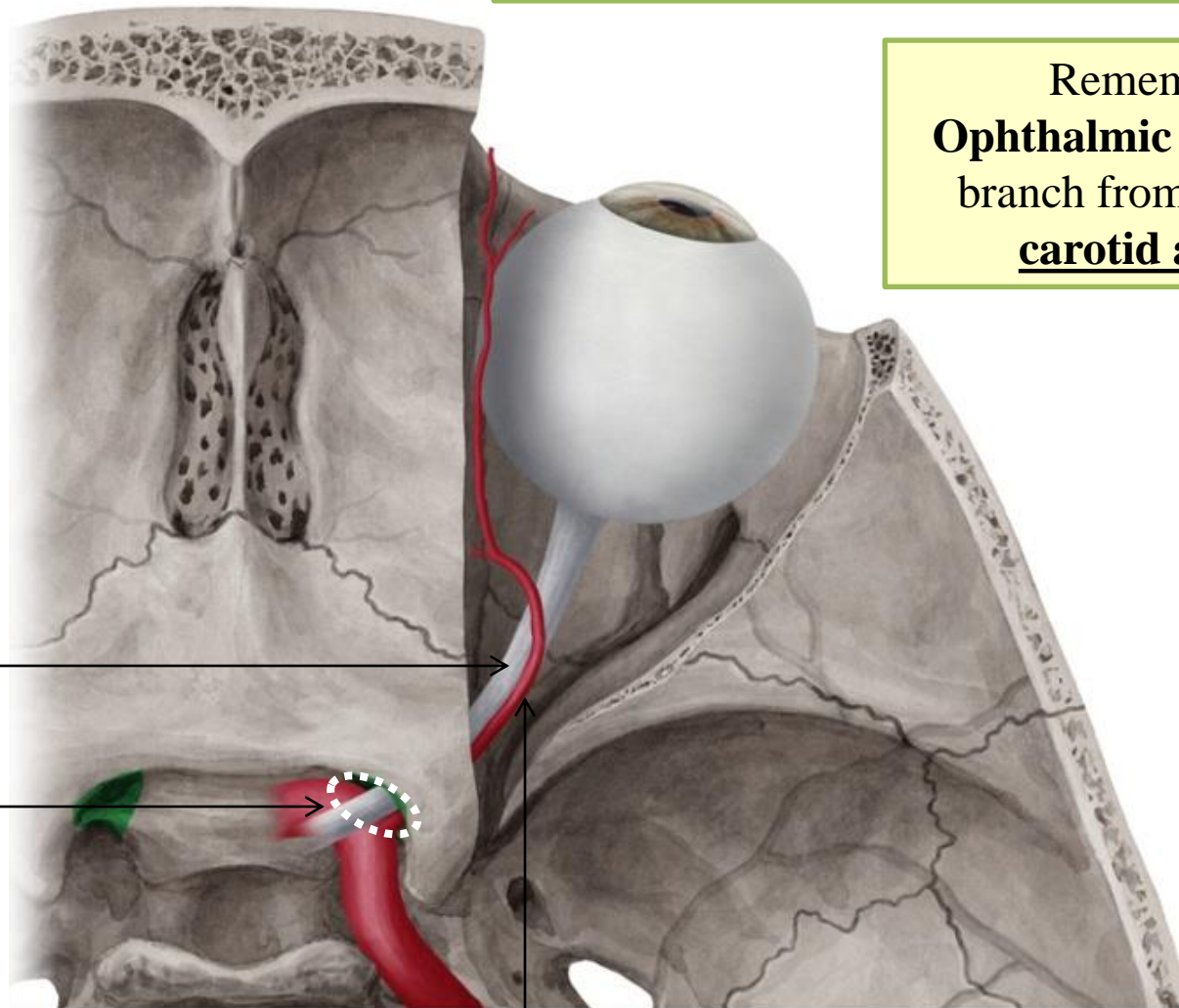
**Optic canal** transmits the optic nerve and the ophthalmic artery

Remember:  
**Ophthalmic artery** is a branch from internal carotid artery

Optic nerve

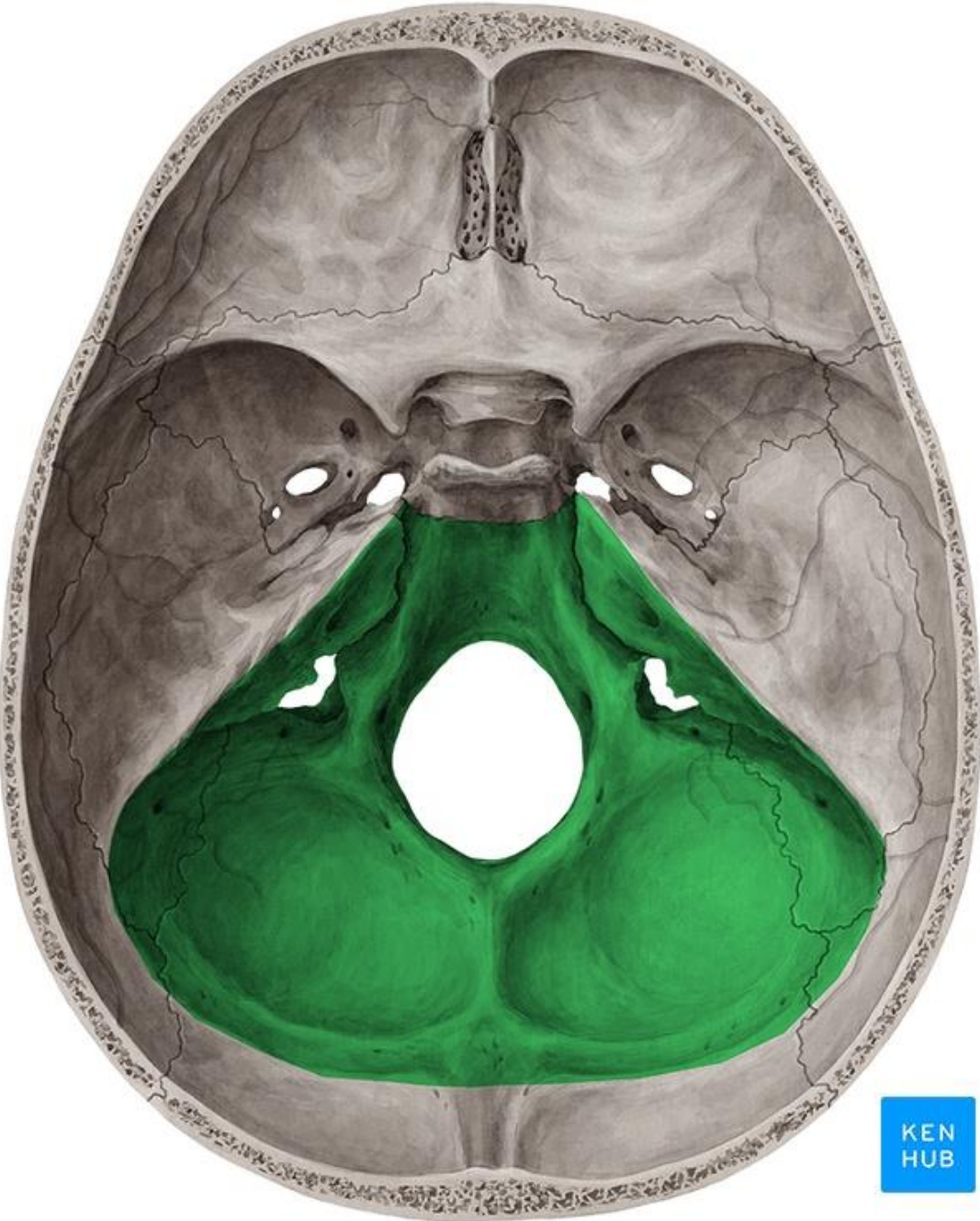
**Optic canal**

Ophthalmic artery



# Posterior cranial fossa

Formed mostly by parts of temporal and occipital bones

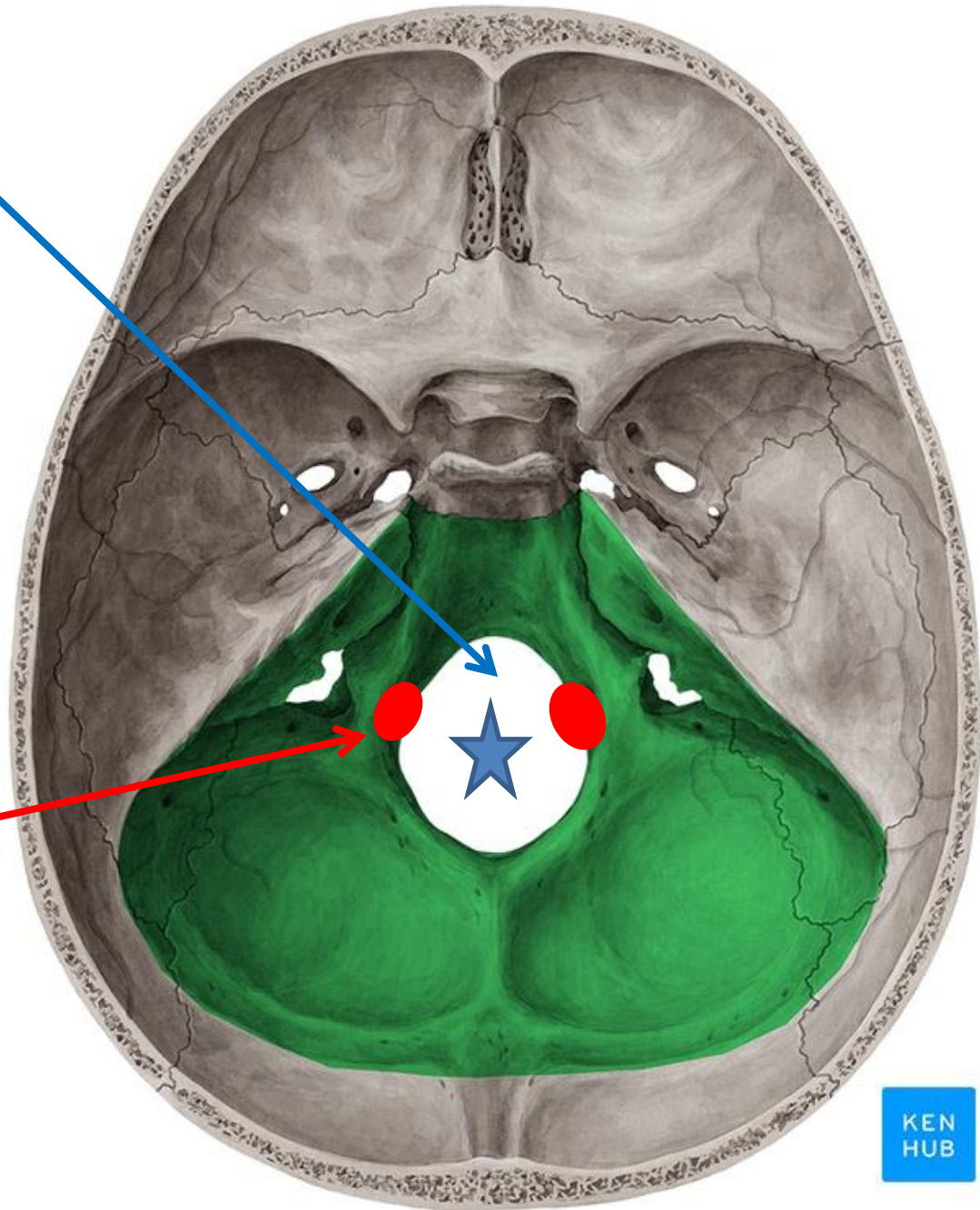


★ **The foramen magnum**

transmits

- 1- Medulla oblongata and its surrounding meninges
- 2- Spinal roots of the accessory nerves
- 3- Two vertebral arteries.

- The **hypoglossal canal** is situated above the anterolateral boundary of the foramen magnum and transmits the **hypoglossal nerve**



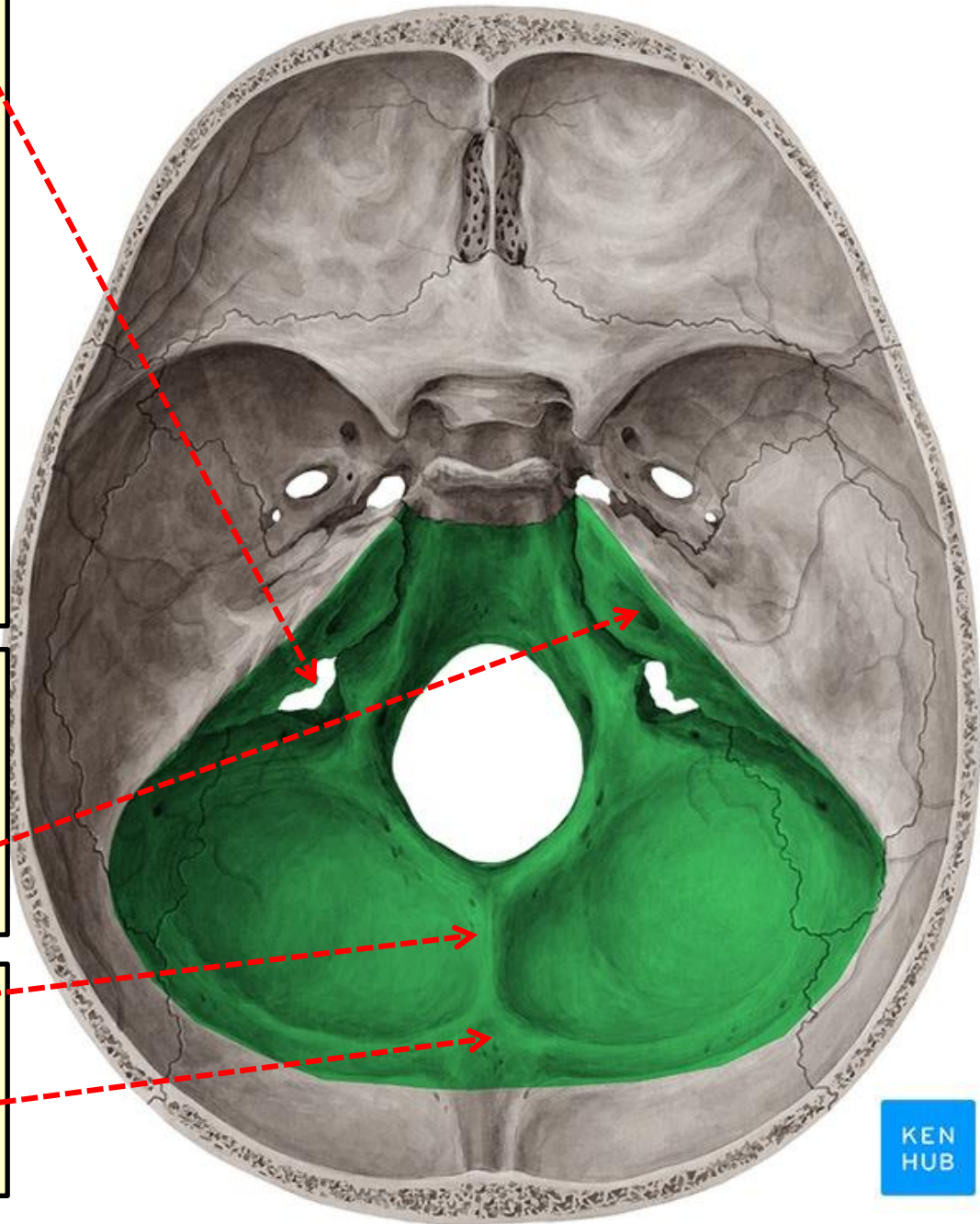


The **jugular foramen** lies between the petrous part of the temporal bone and the occipital bone.

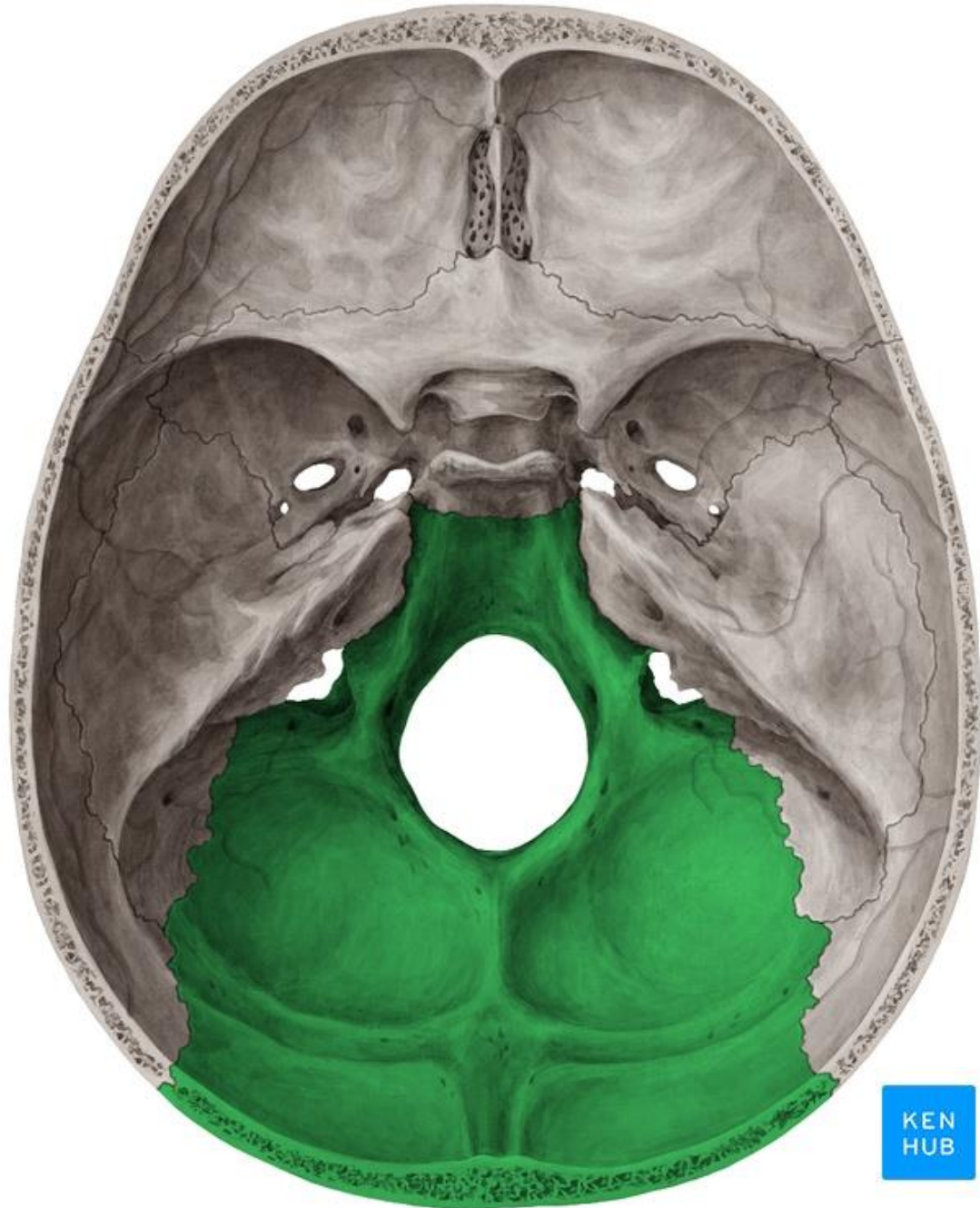
It transmits the following structures  
**Anterior part:** the inferior petrosal sinus  
**Middle part:** the 9th, 10th, and 11th cranial nerves  
**Posterior part:** the large sigmoid sinus.  
The sigmoid sinus turns down through the foramen to become the internal jugular vein.

The **internal acoustic meatus** (on the posterior surface of the petrous part of the temporal bone): transmits the vestibulocochlear nerve and the facial nerve (7<sup>th</sup> and 8<sup>th</sup> cranial nerves)

The **internal occipital crest** runs upward in the midline posteriorly from the foramen magnum to the **internal occipital protuberance**



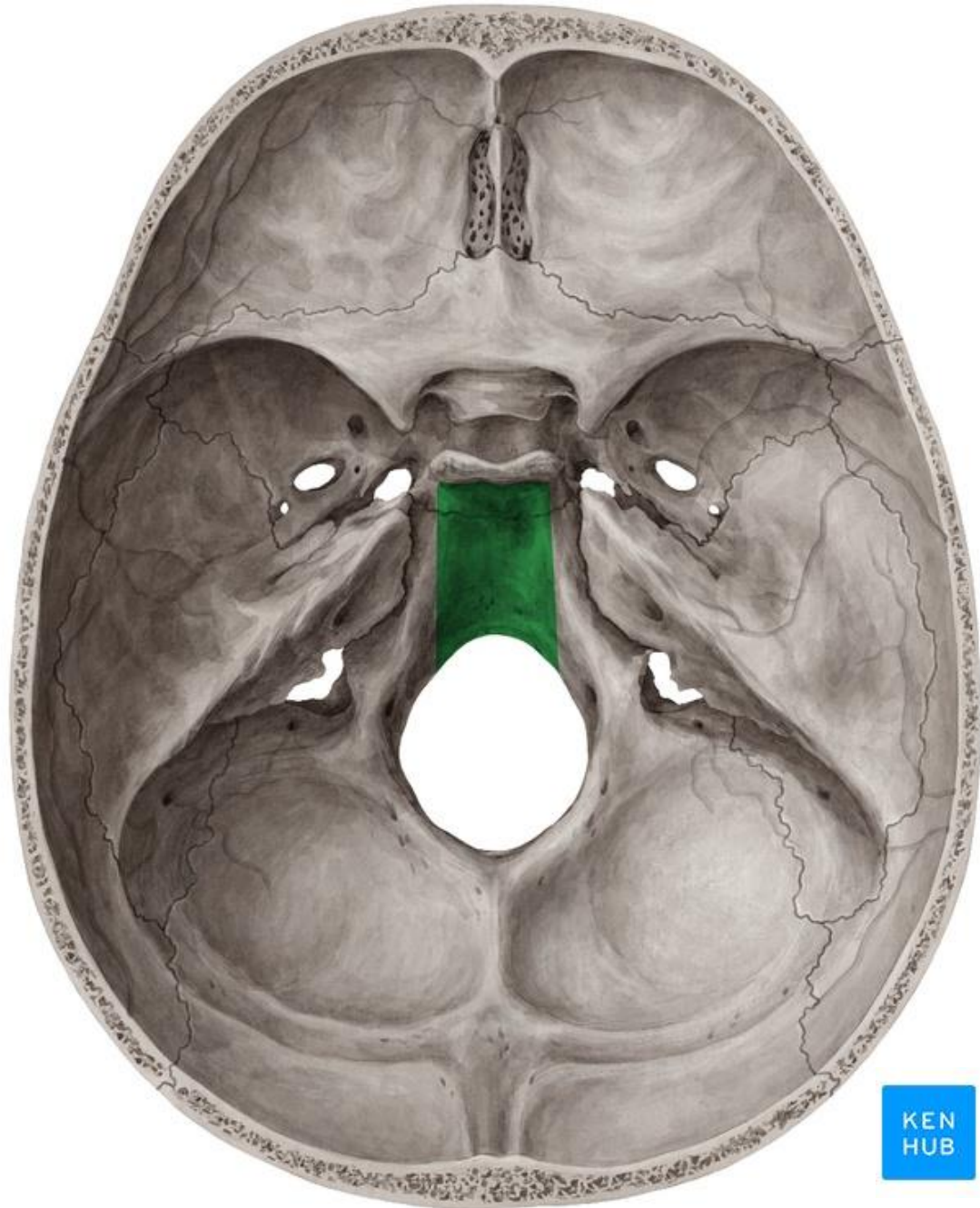
# Occipital bone



# Clivus

is the sloping midline surface of the occipital bone anterior to the foramen magnum

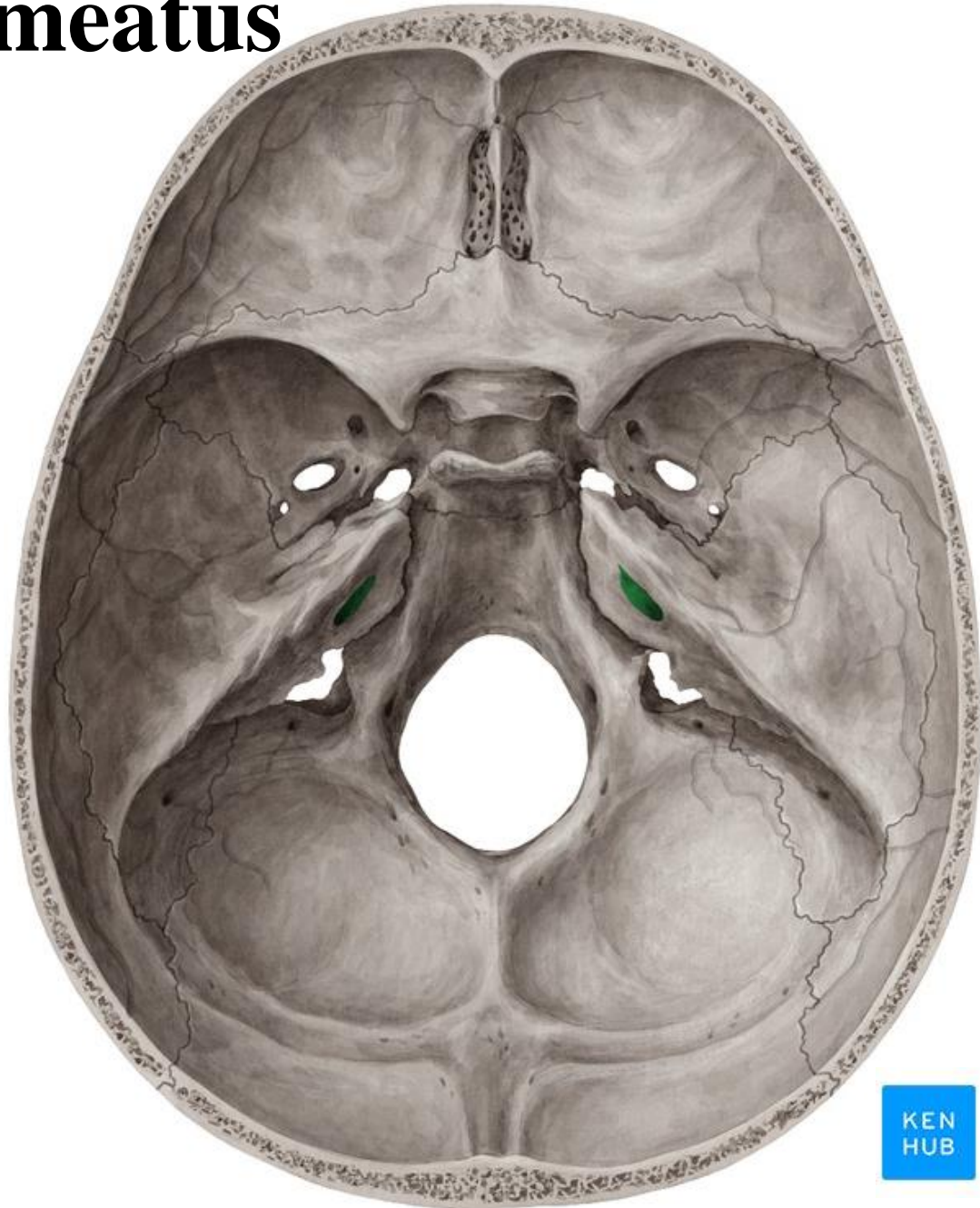
**Clivus: Slope**



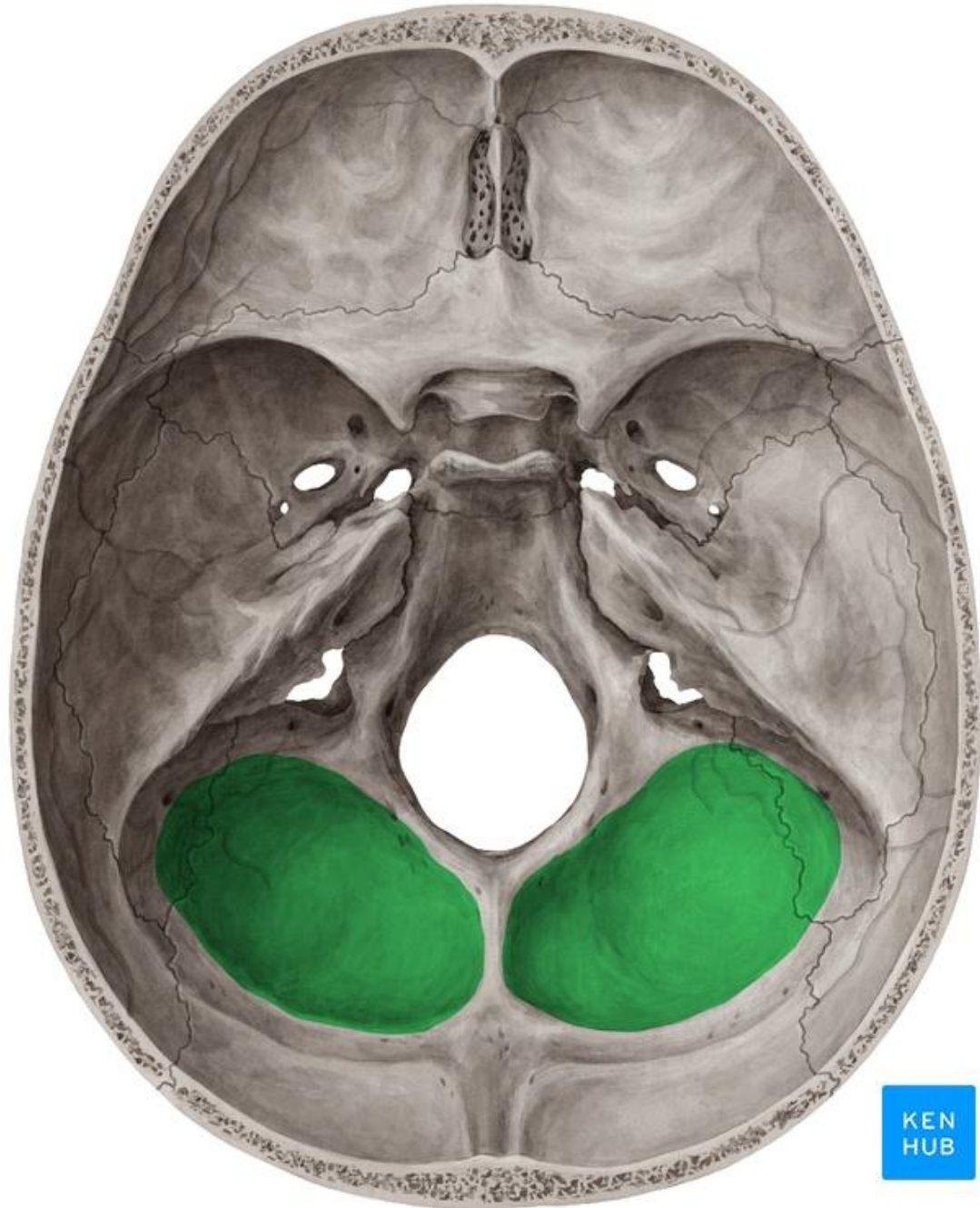


# Internal acoustic meatus

Transmits the  
vestibulocochlear nerve and  
the facial nerve  
(7<sup>th</sup> and 8<sup>th</sup> cranial nerves)



# Cerebellar fossa



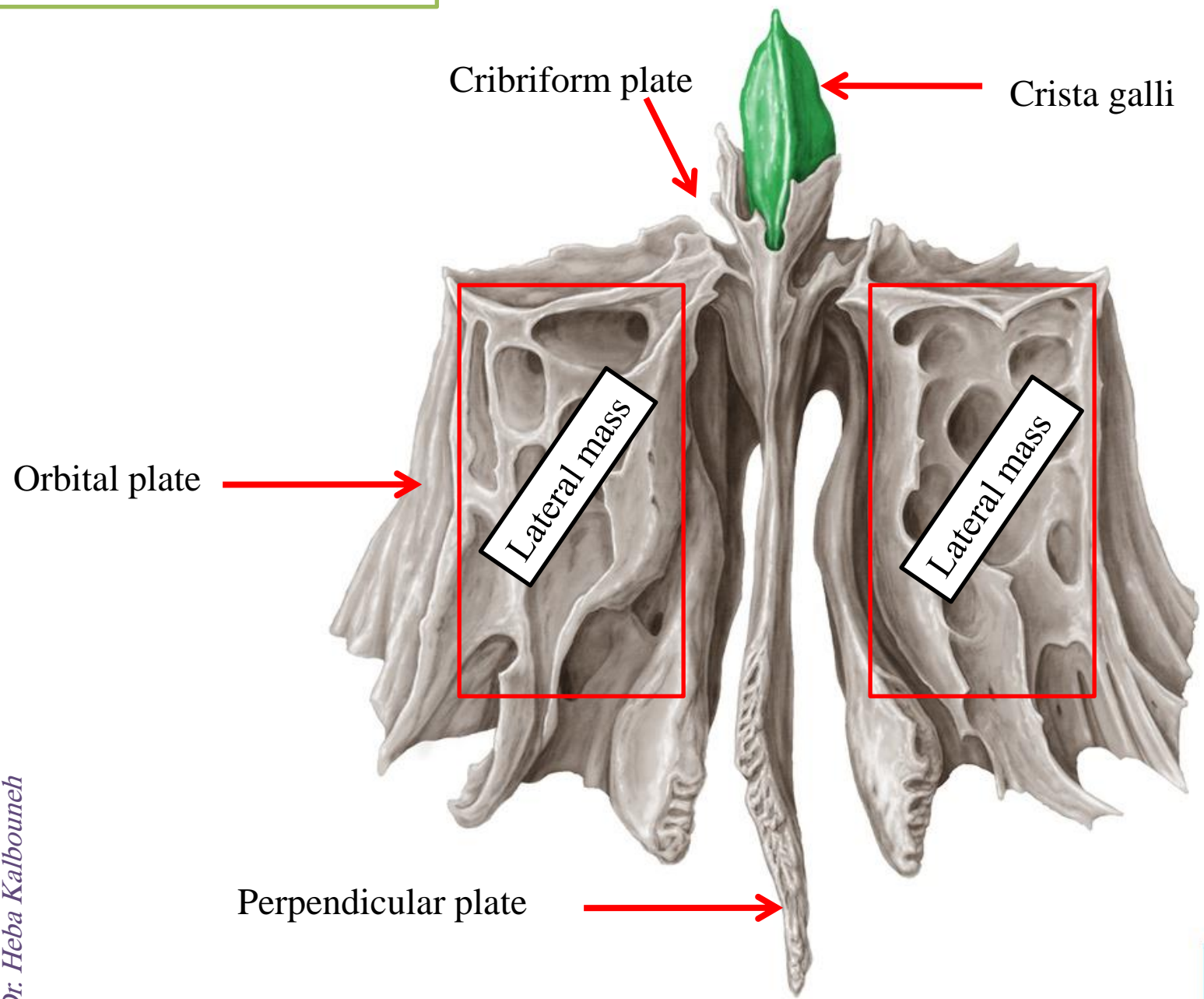
# Ethmoid bone

Delicate bone located between the two orbits





# Ethmoid bone



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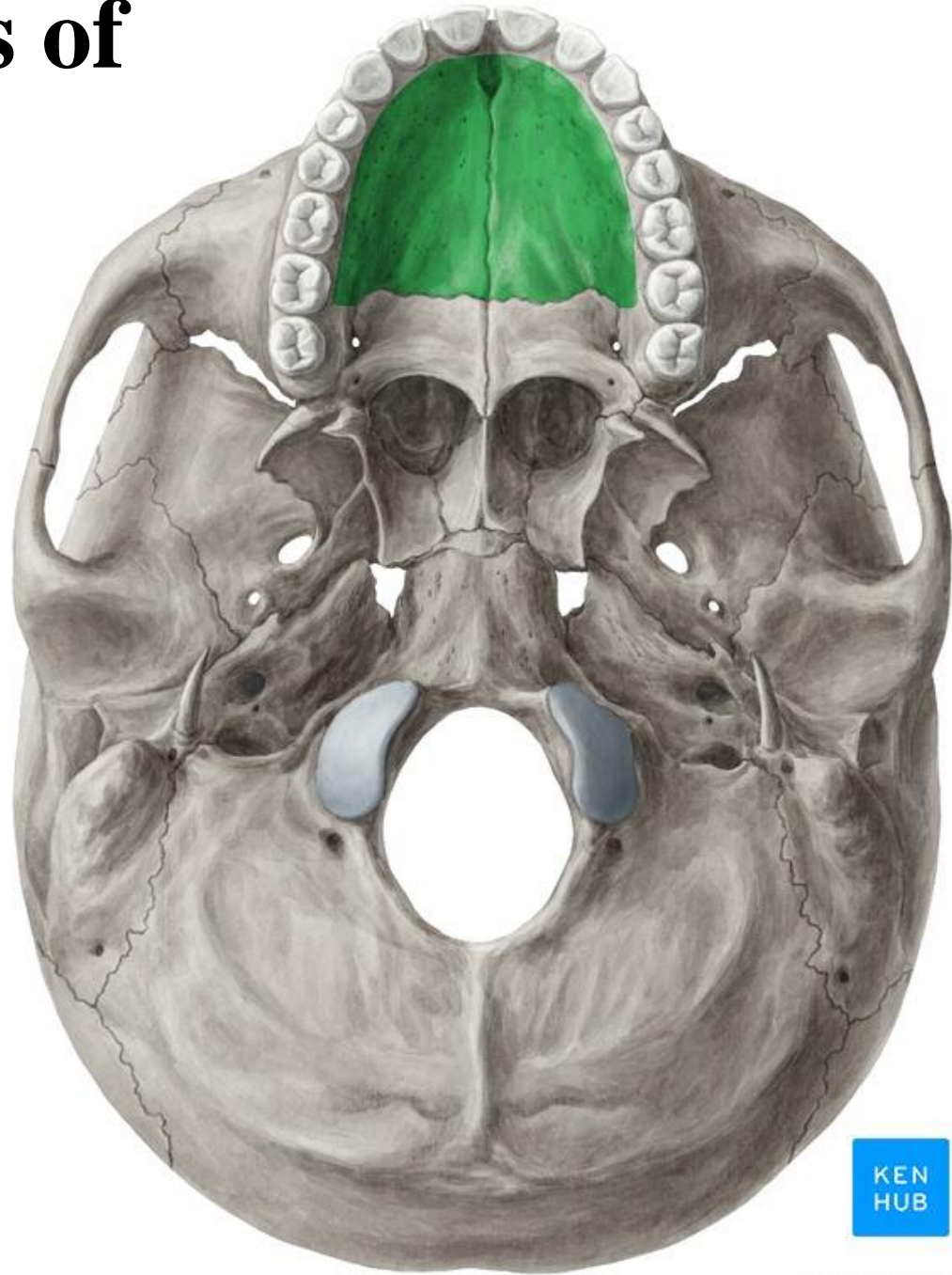
# Norma Basalis Externa

# Maxilla



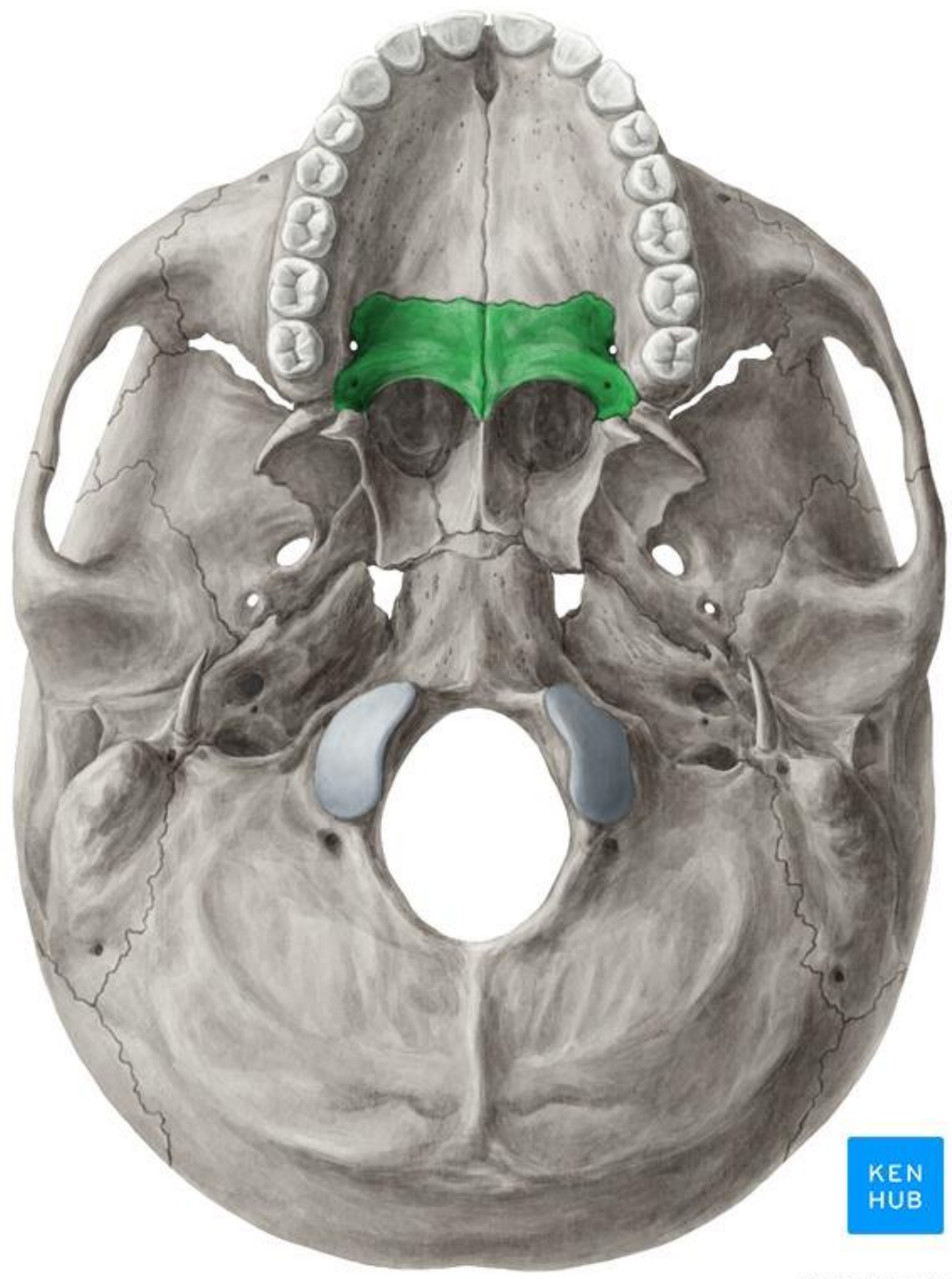
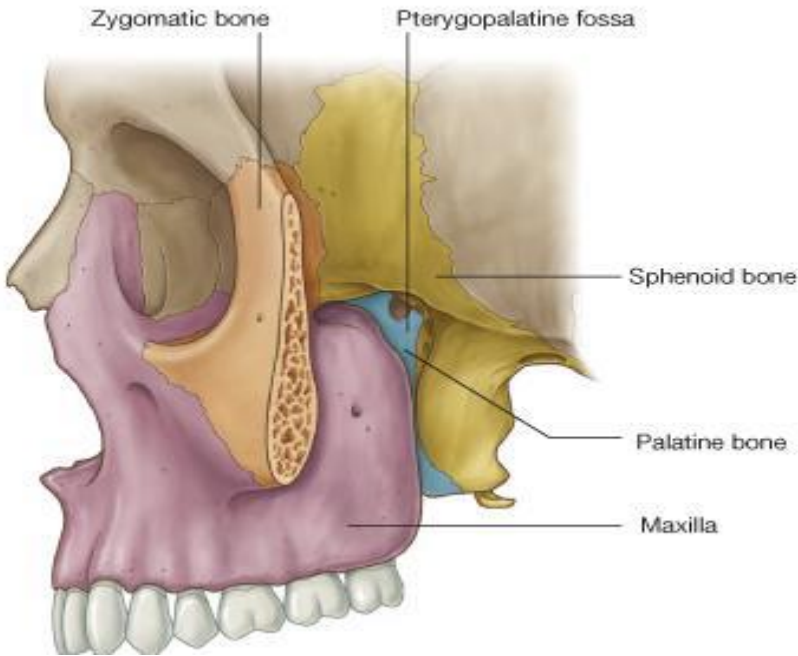


# Palatine process of maxilla



# Palatine bone (horizontal plate)

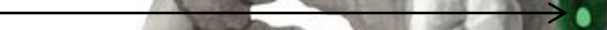
*Dr. Heba Kalbouneh*  
For respiratory system



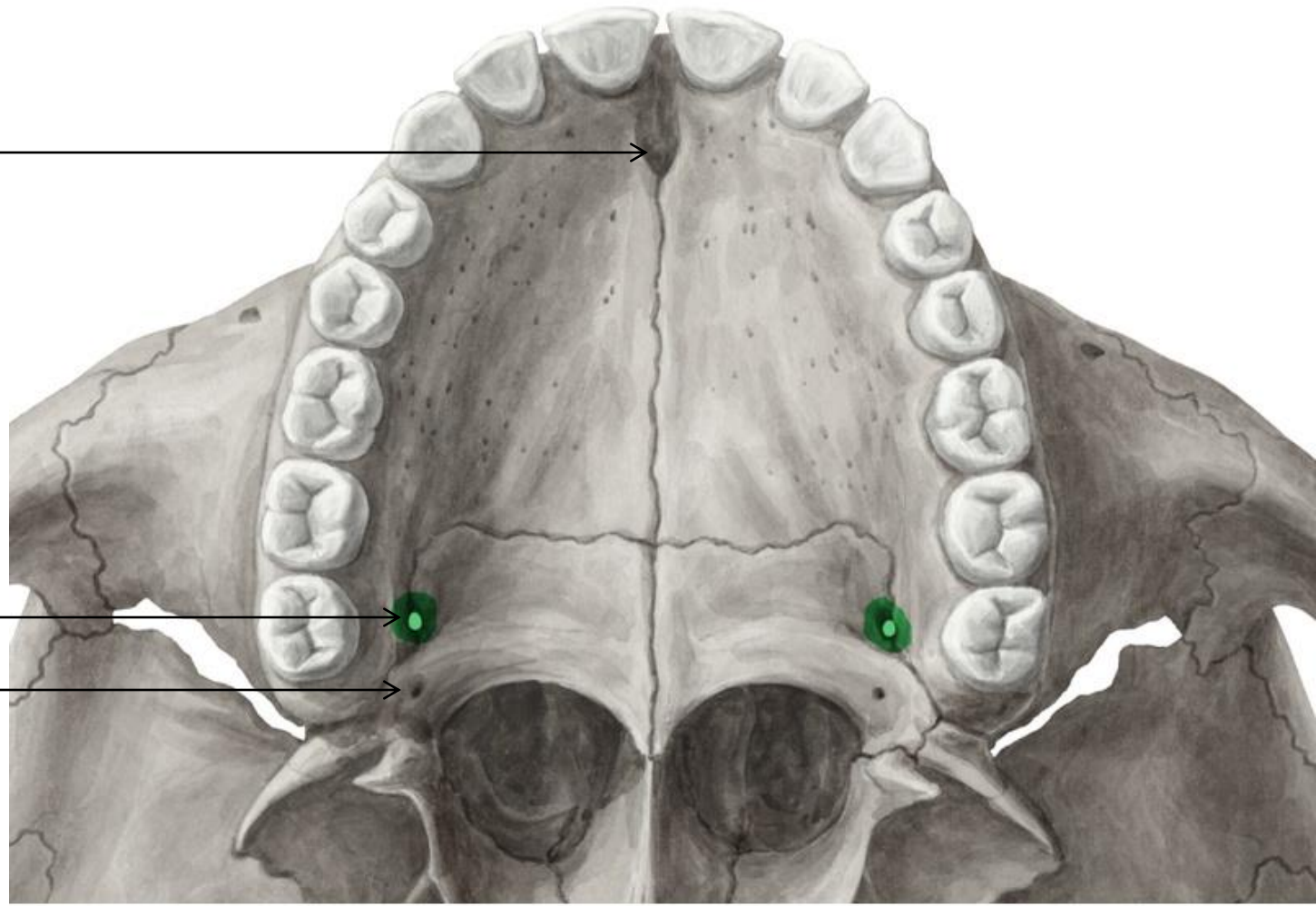
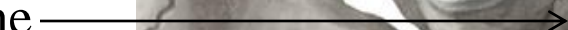
Incisive foramen



Greater palatine foramen

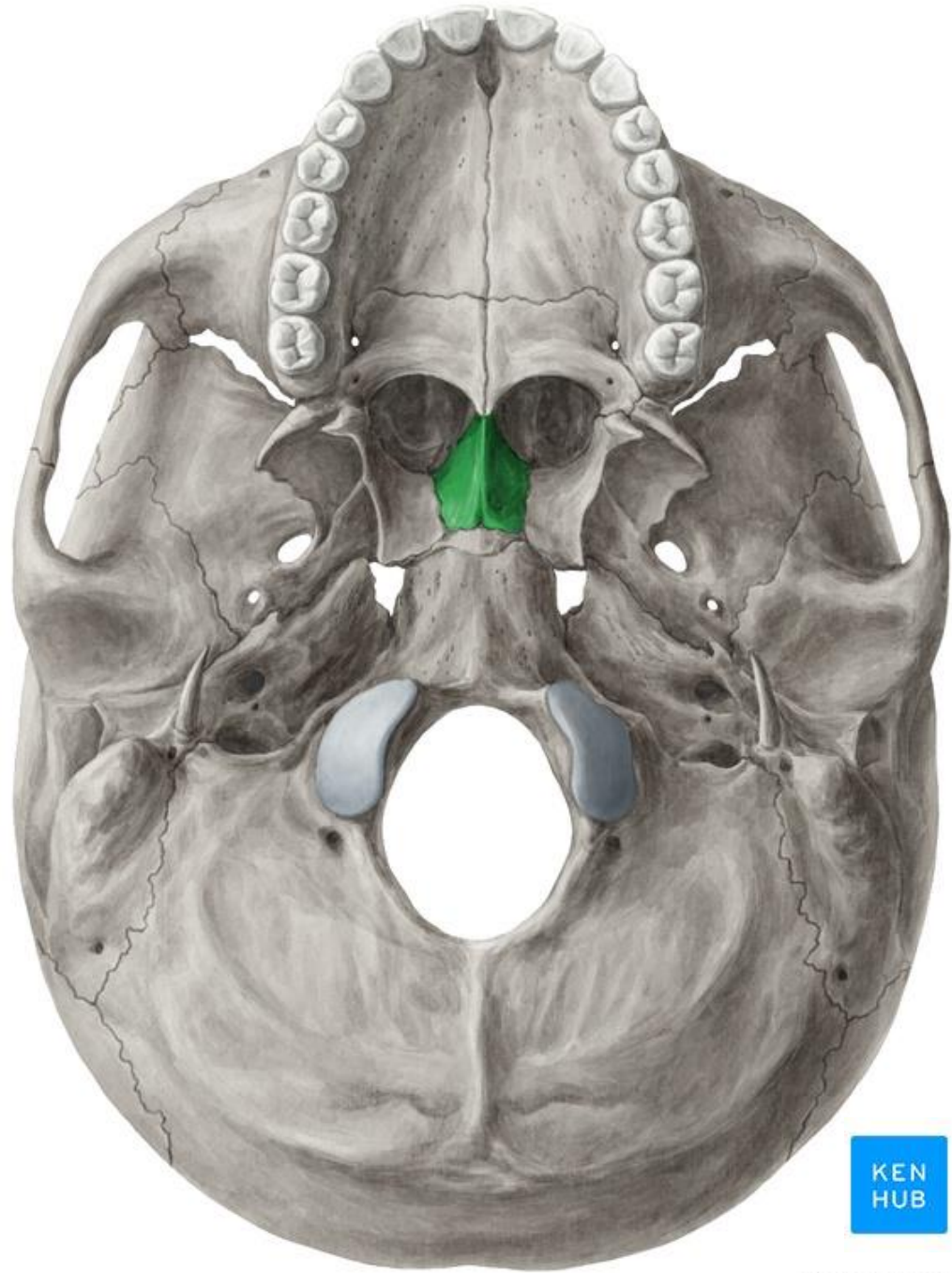


Lesser palatine foramen



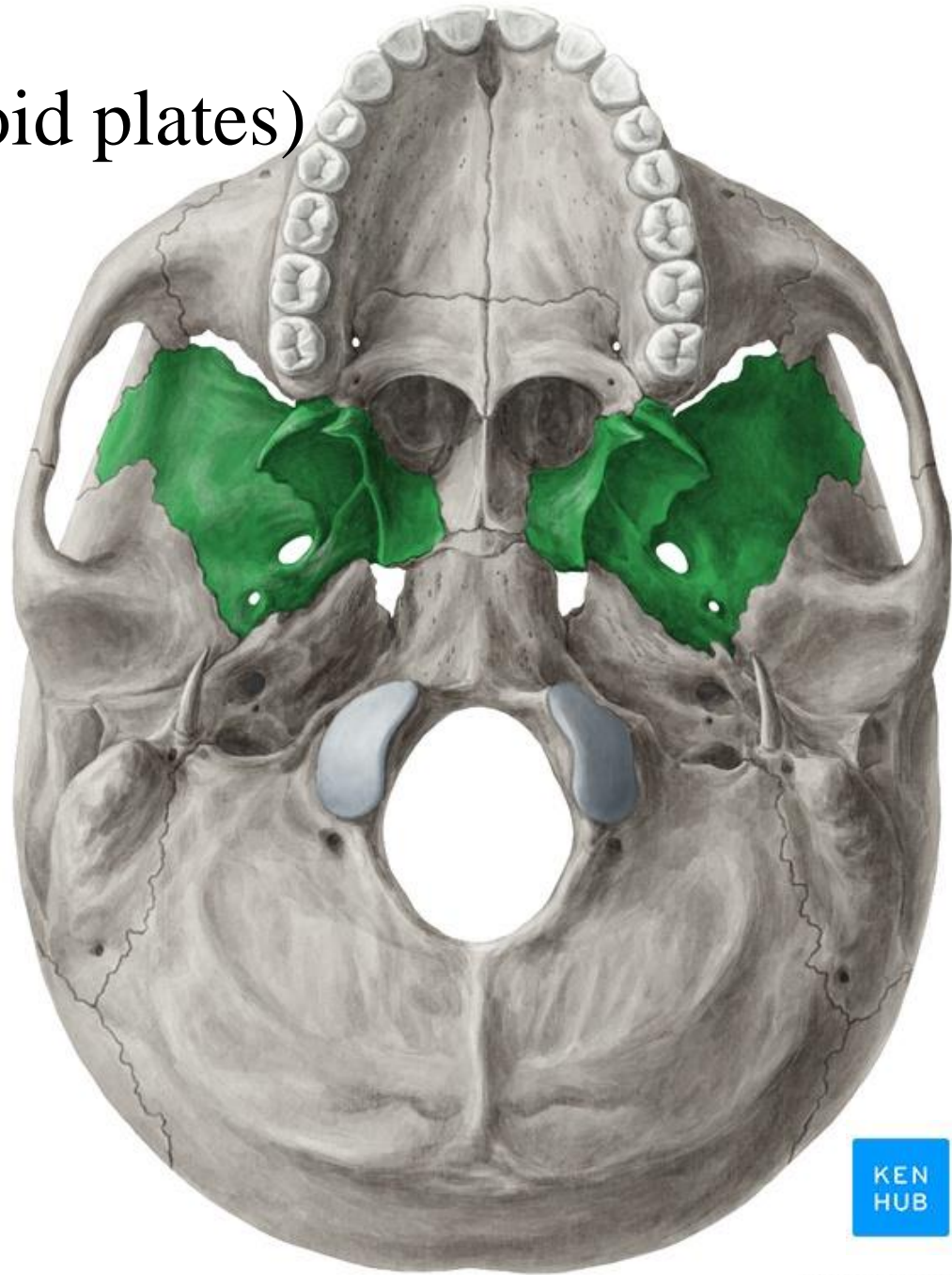


# The vomer

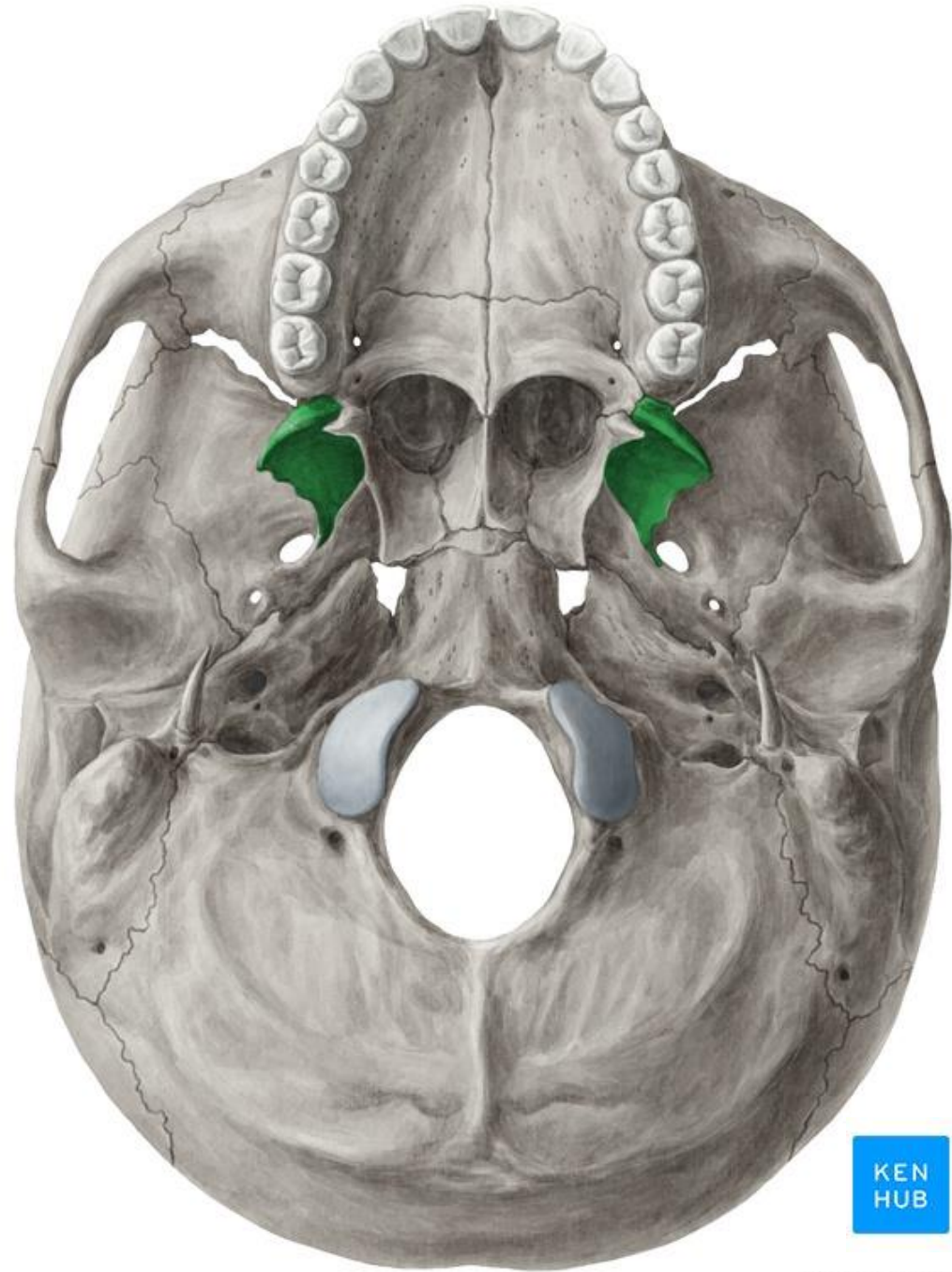


# Sphenoid bone

(greater wing and pterygoid plates)



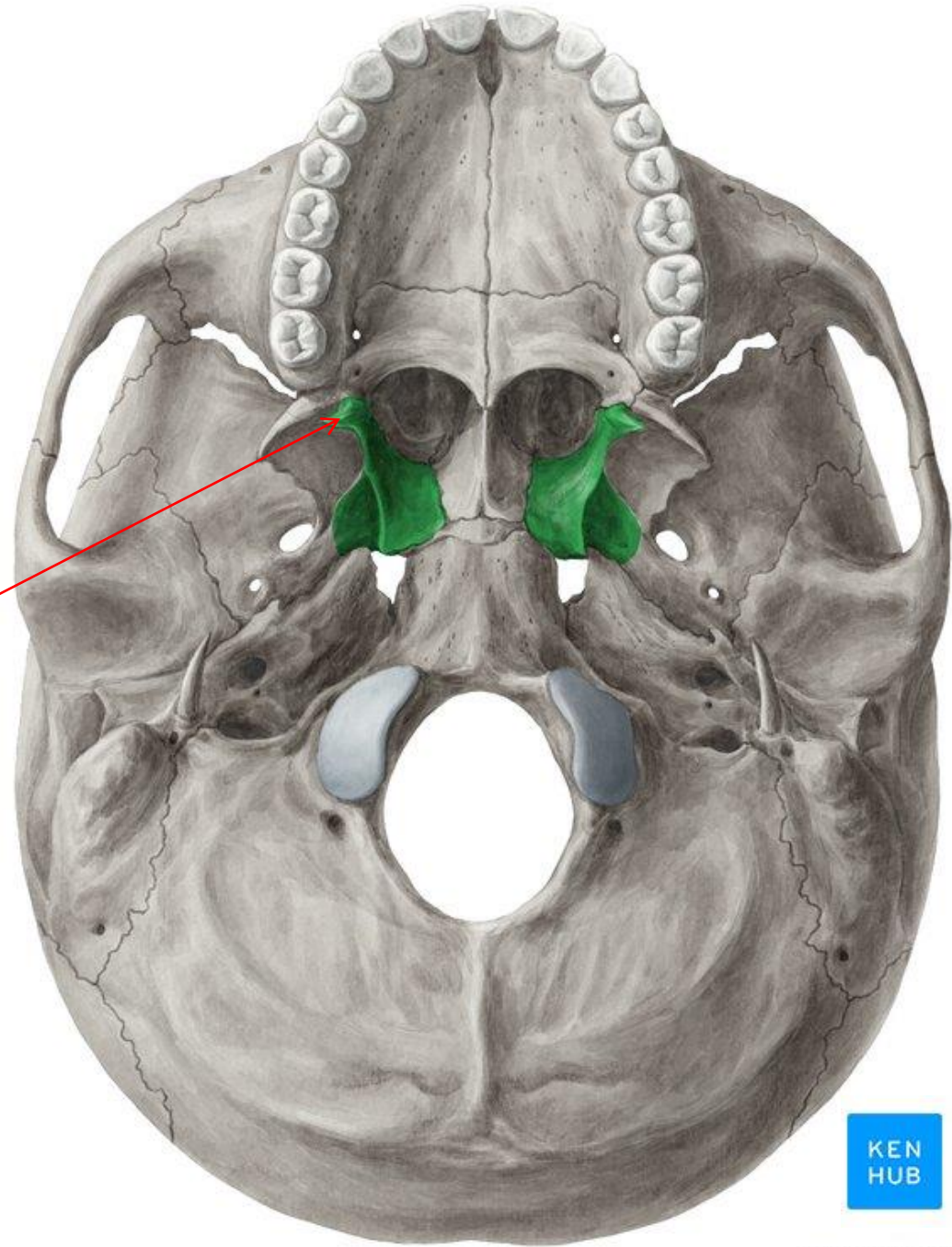
# Lateral pterygoid plates of sphenoid





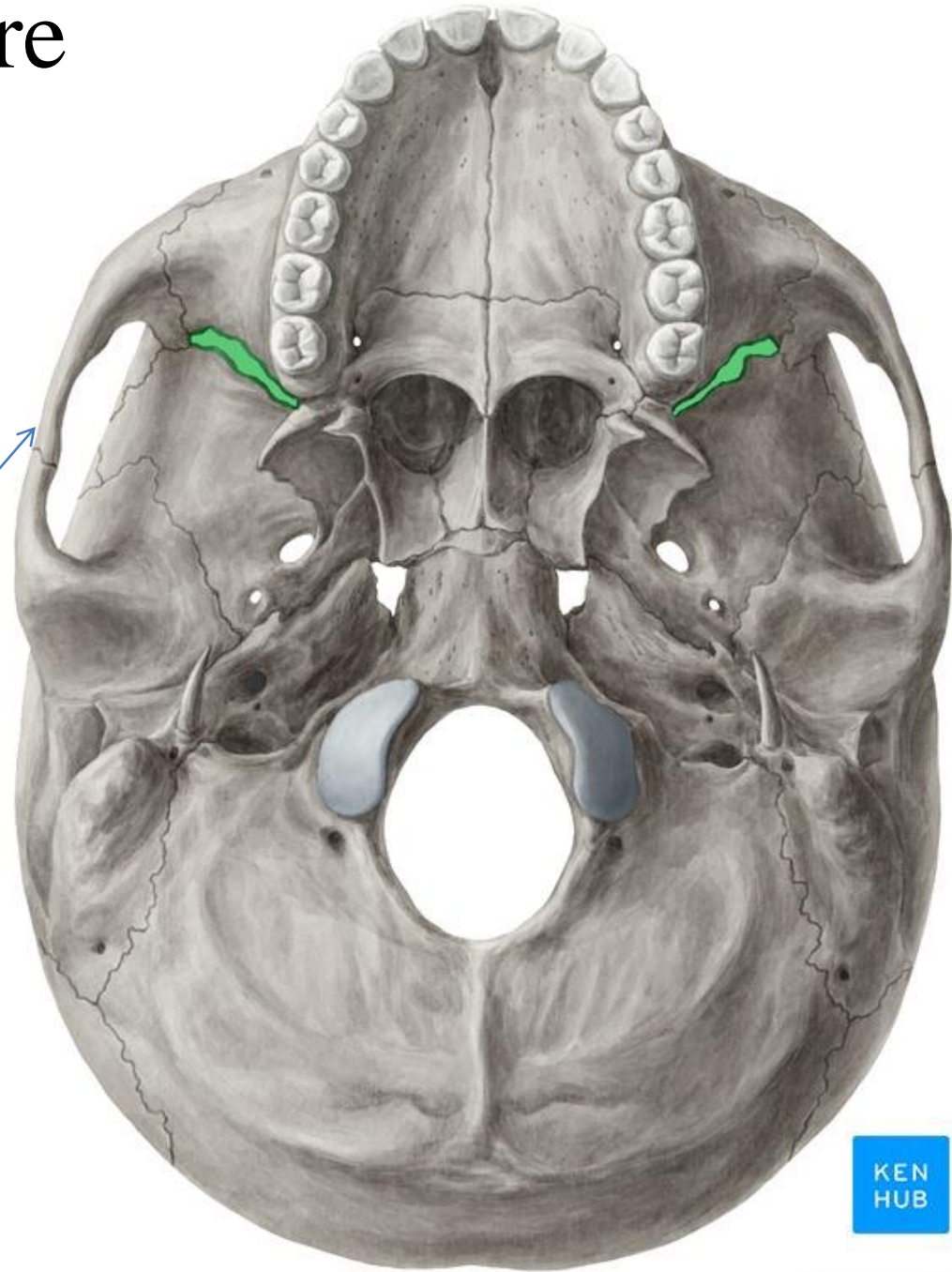
# Medial pterygoid plates of sphenoid

**Hamulus** of  
Medial pterygoid  
plate of sphenoid



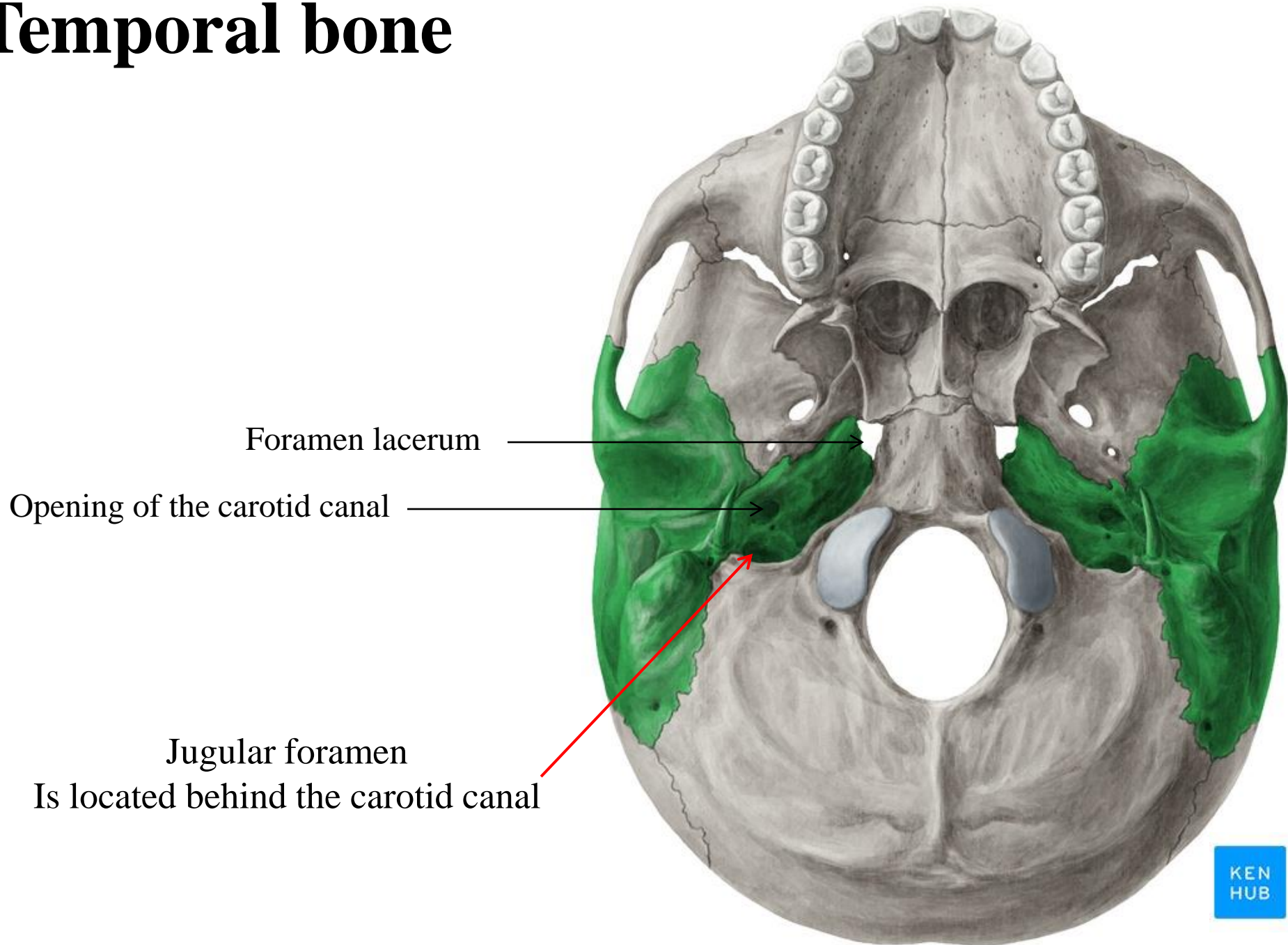
# Inferior orbital fissure

It is formed between the greater wing of sphenoid bone and maxilla



**Zygomatic arch**

# Temporal bone



Foramen lacerum

Opening of the carotid canal

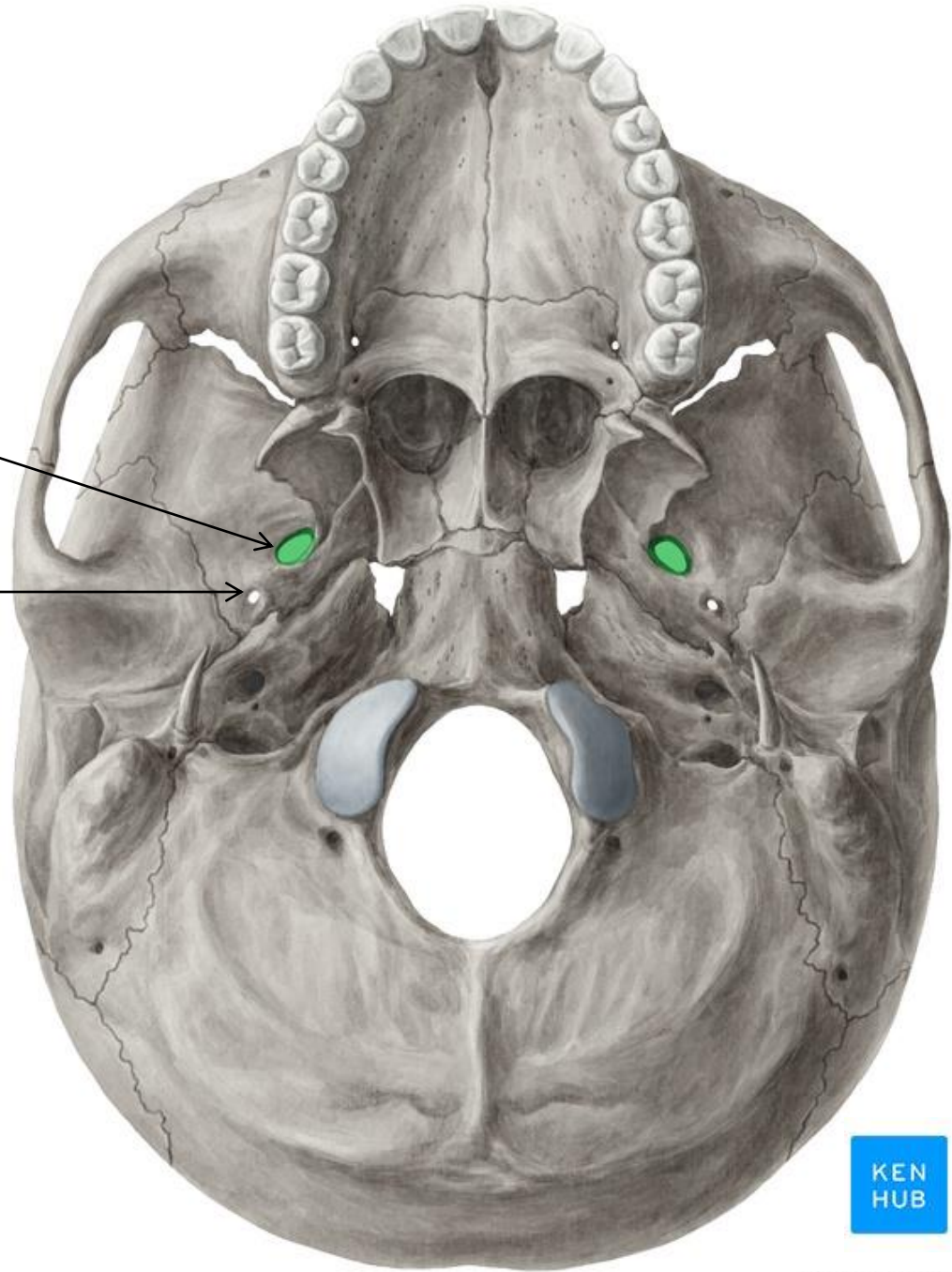
Jugular foramen

Is located behind the carotid canal



Foramen ovale

Foramen spinosum

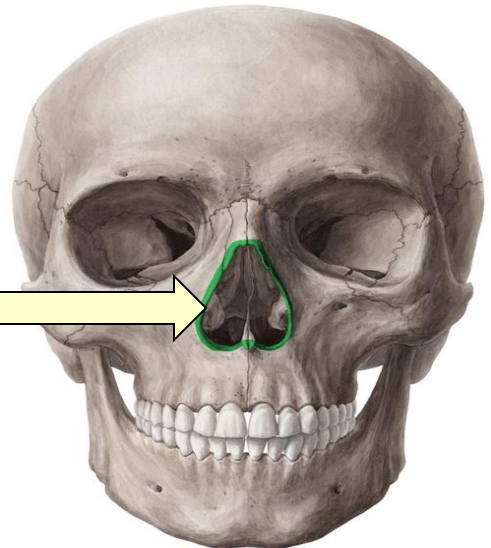
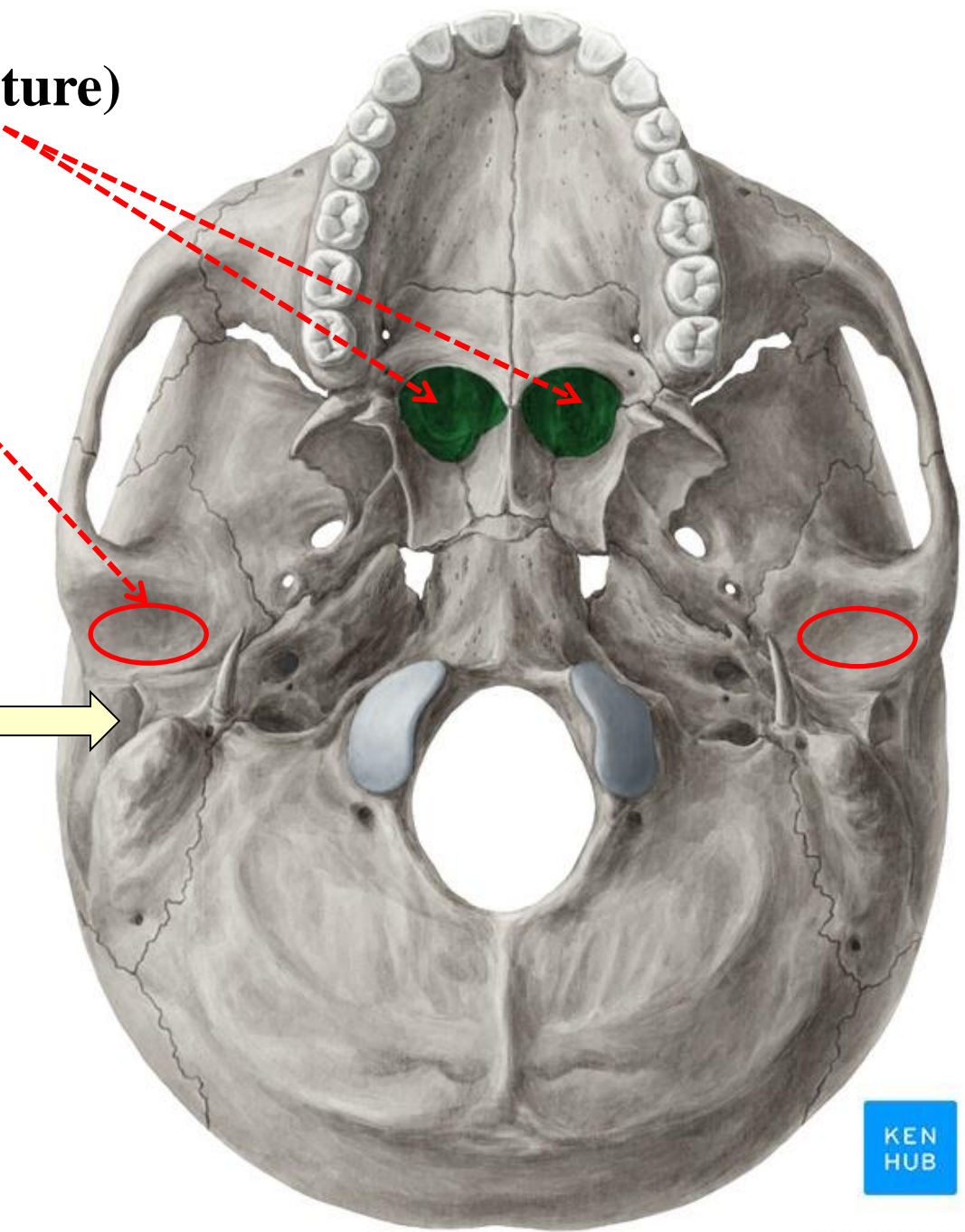


# Choanae (posterior nasal aperture)

The **mandibular fossa** of the temporal bone and the articular tubercle form the upper articular surfaces for the temporomandibular joint.

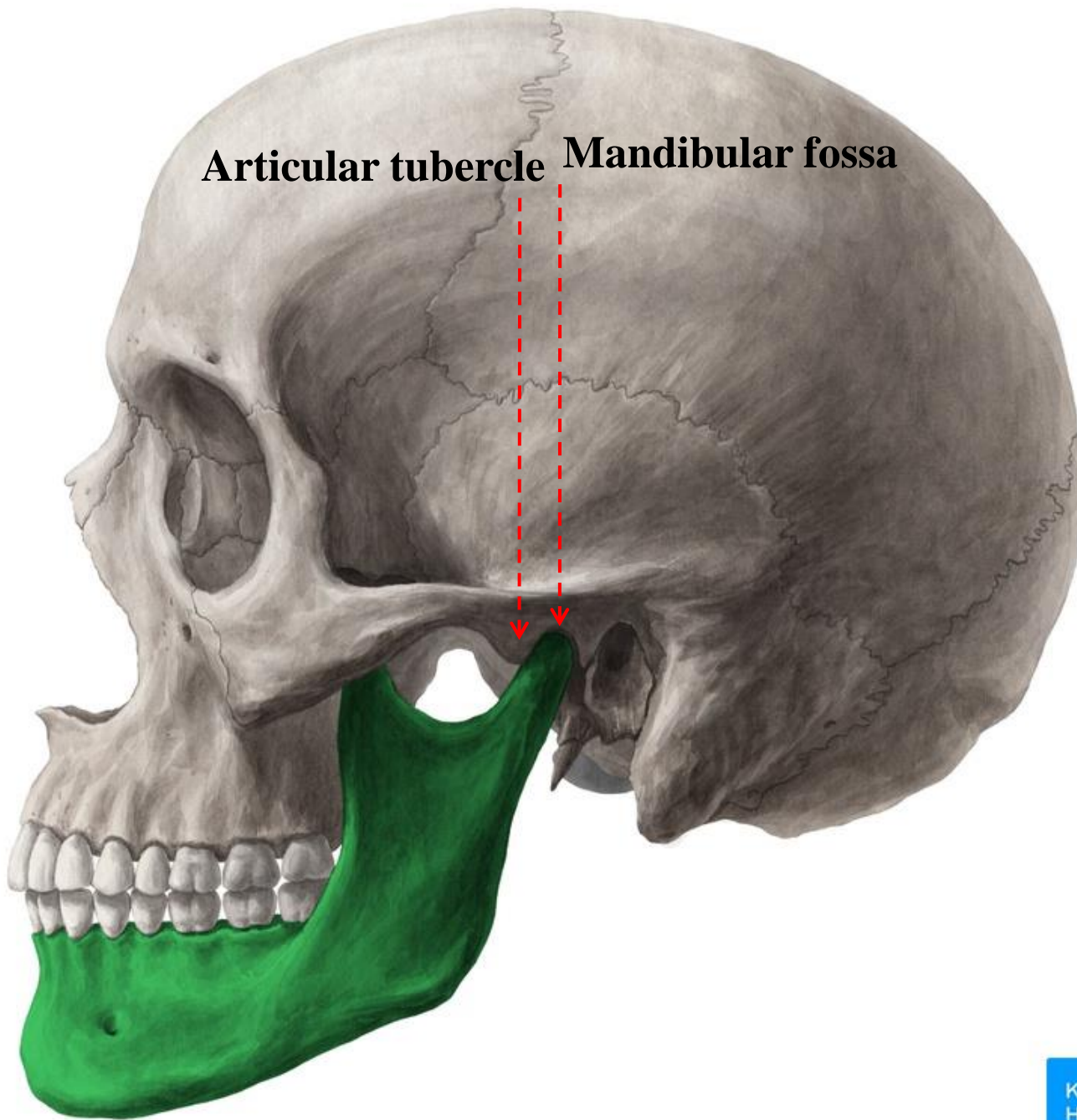
External auditory meatus →

Anterior nasal aperture →



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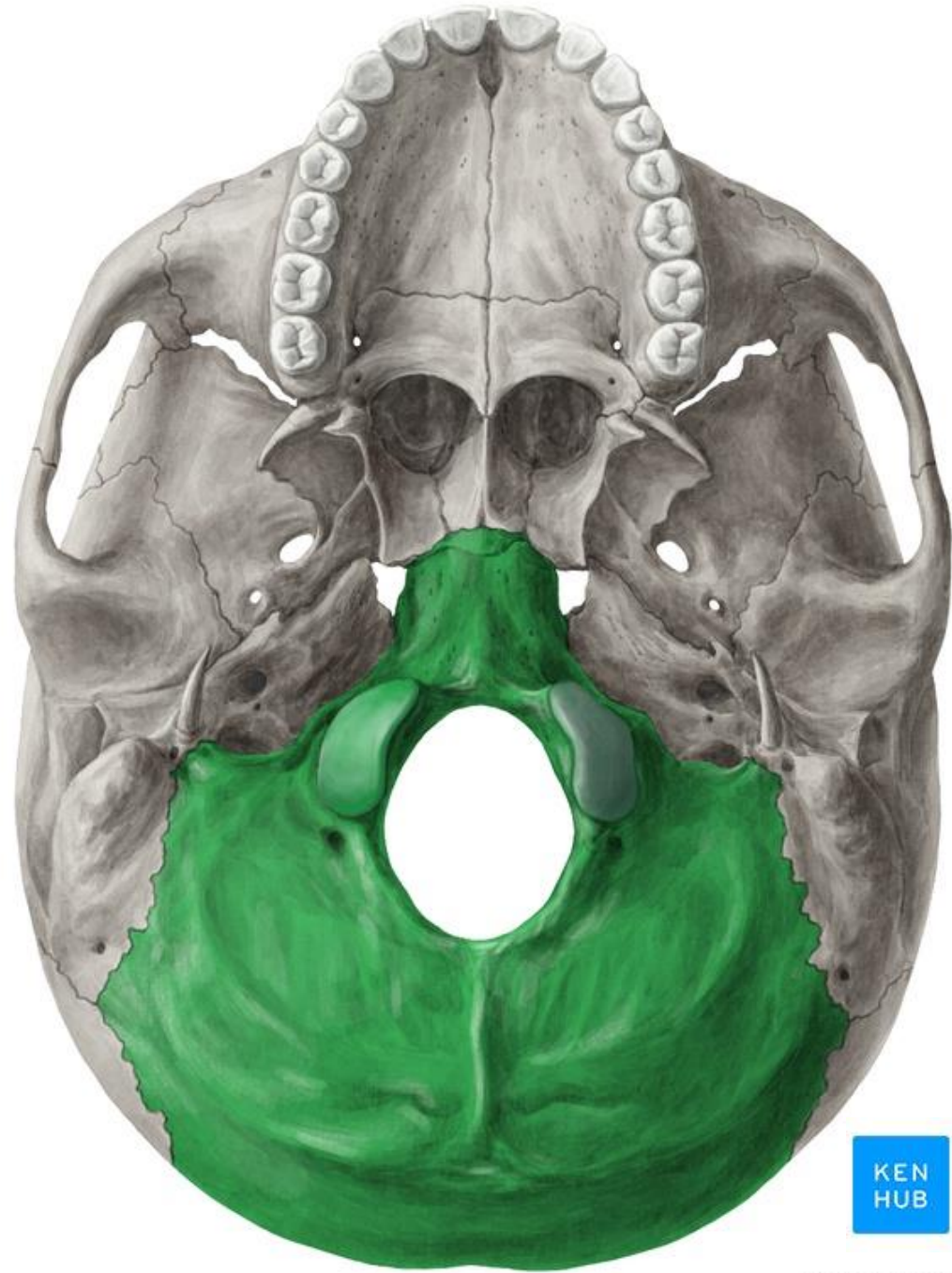




**Articular tubercle**   **Mandibular fossa**

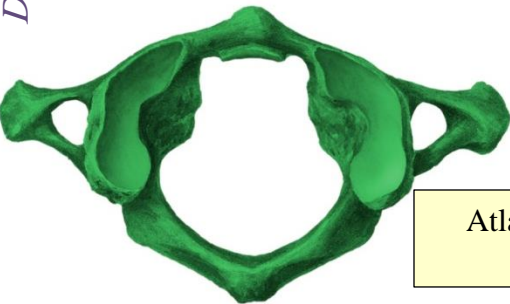


# Occipital bone

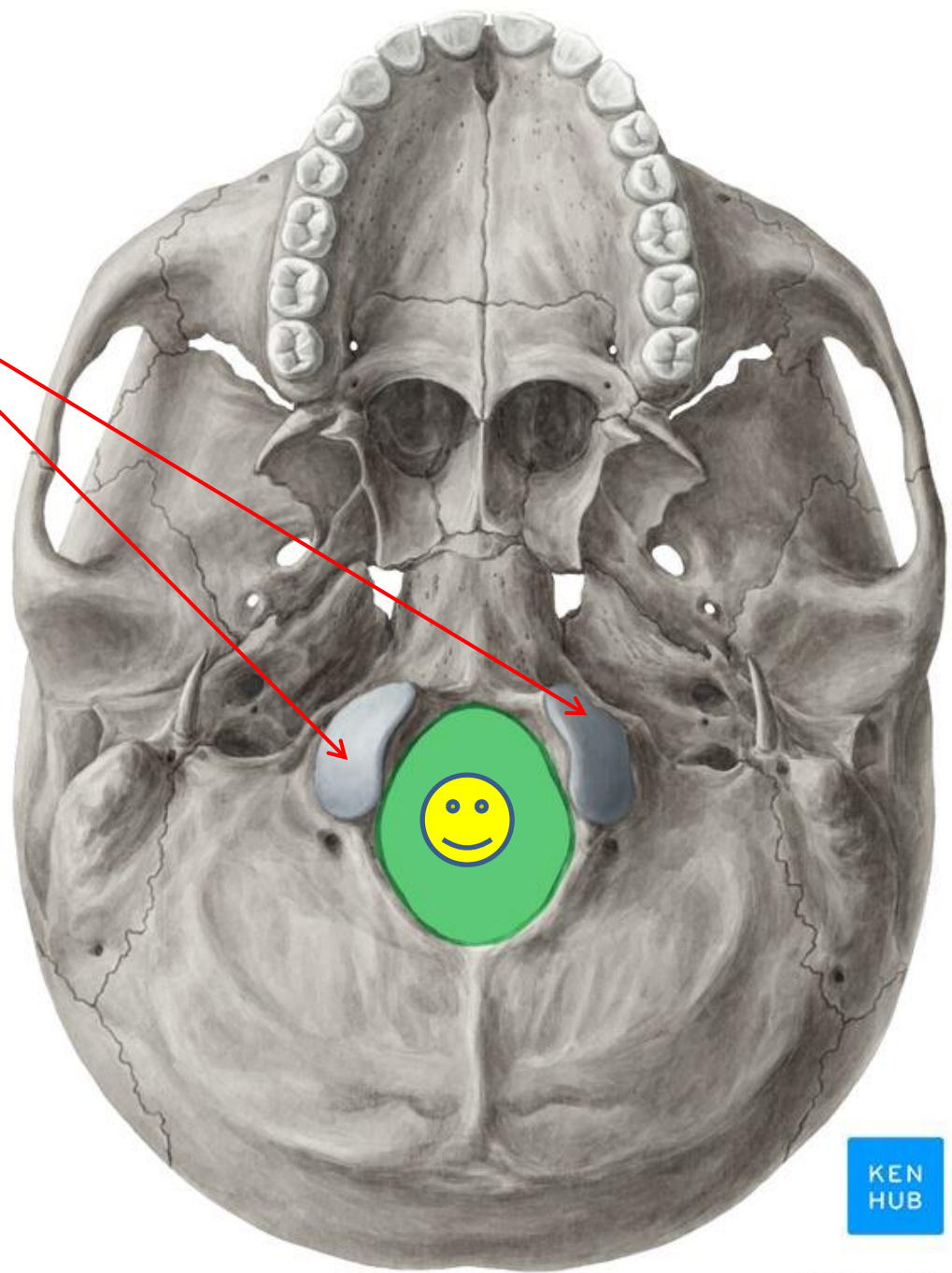
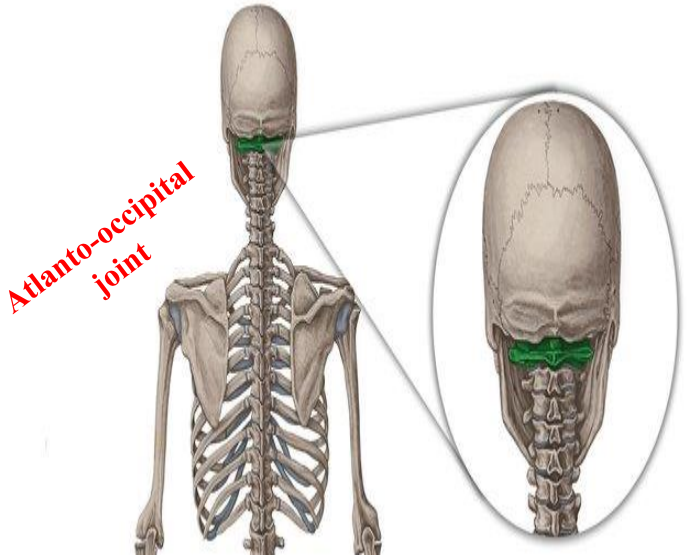


# Foramen magnum 😊

**Chondyles of occipital bone**  
(articulate with C1 vertebra)

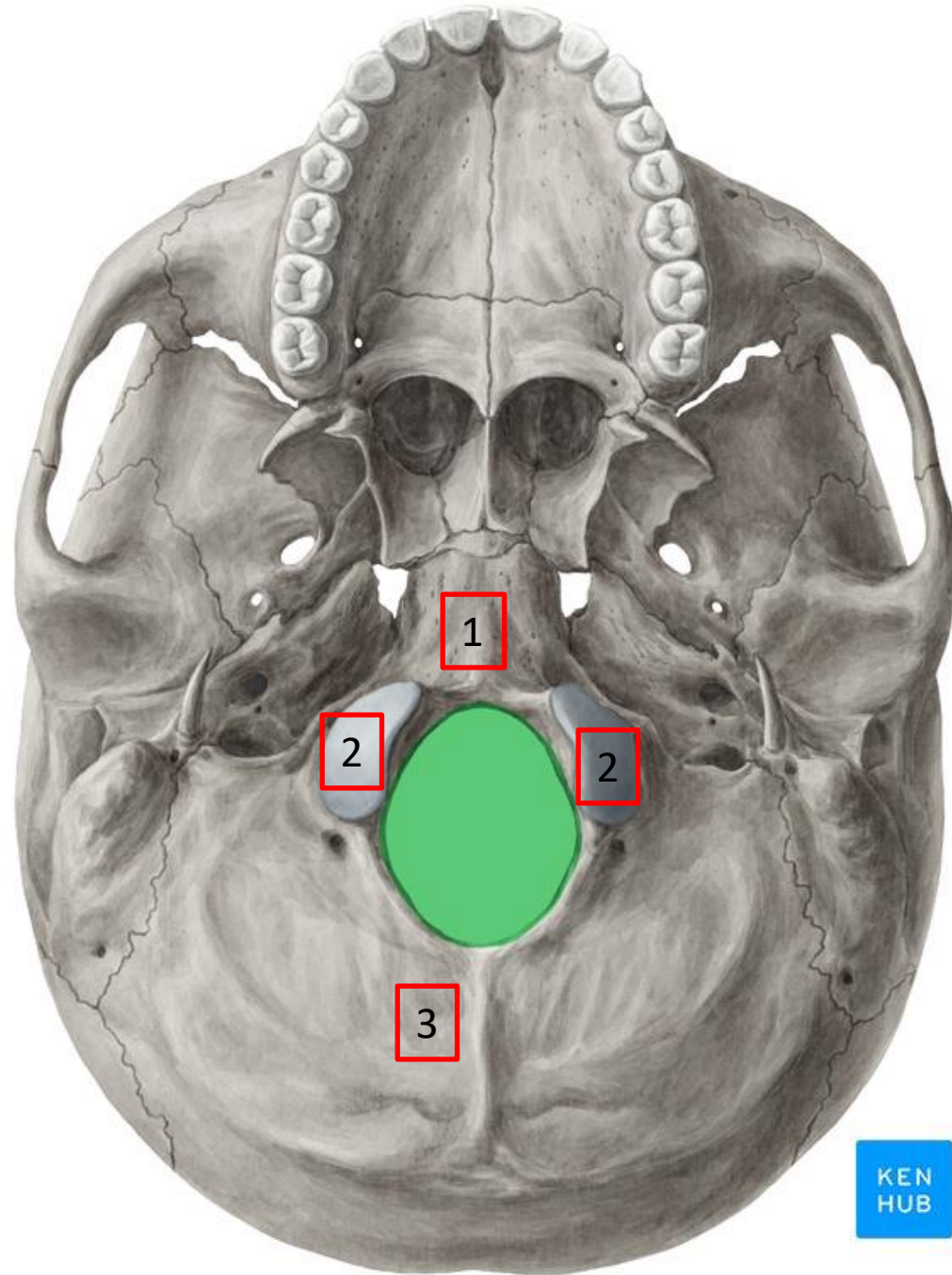


Atlas (1<sup>st</sup> cervical vertebra)



Parts of occipital bone:

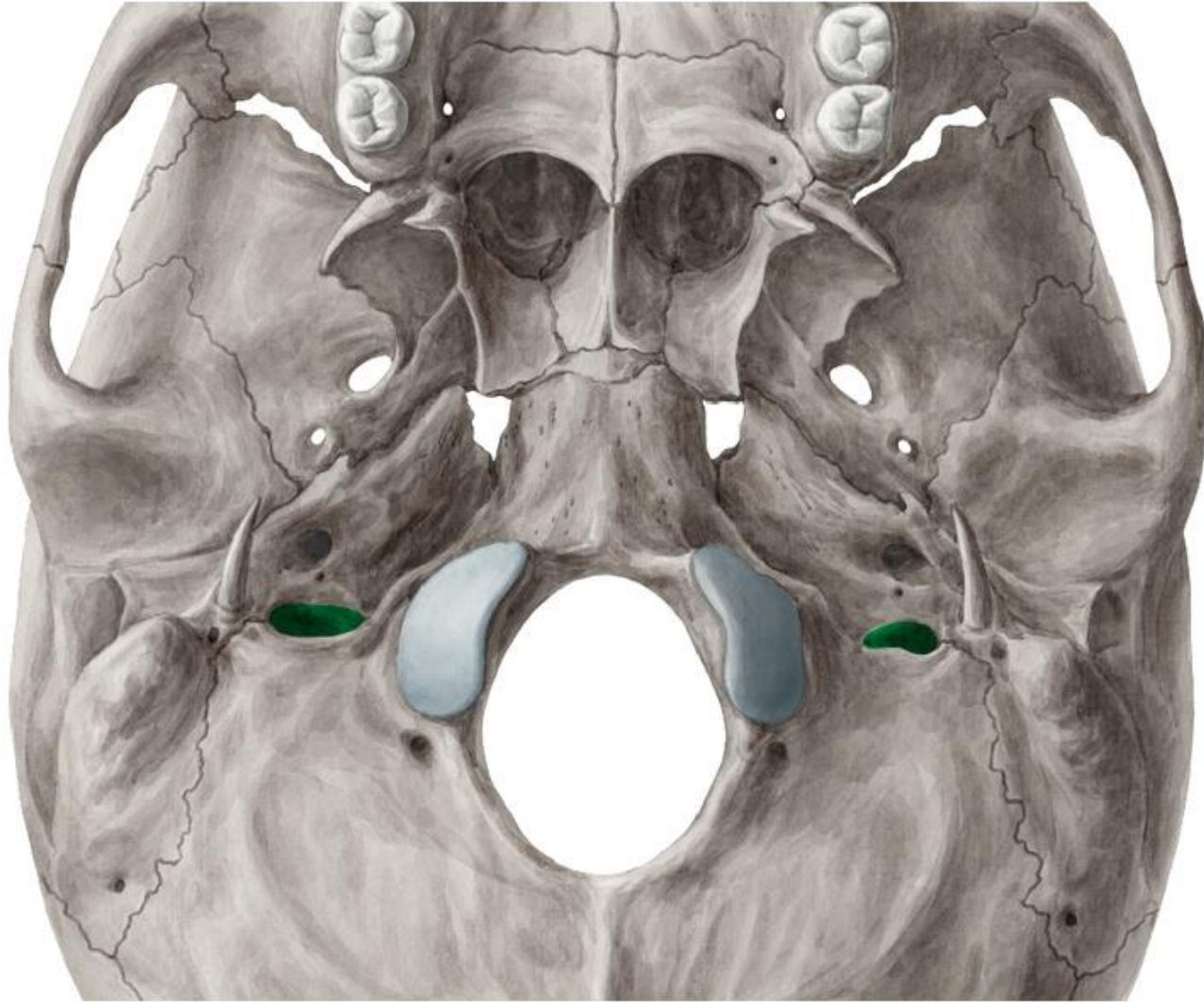
- 1: Basilar part (in front the foramen magnum)
- 2: Occipital condyles (sides of foramen magnum)
- 3: Squamous part (behind the foramen magnum)







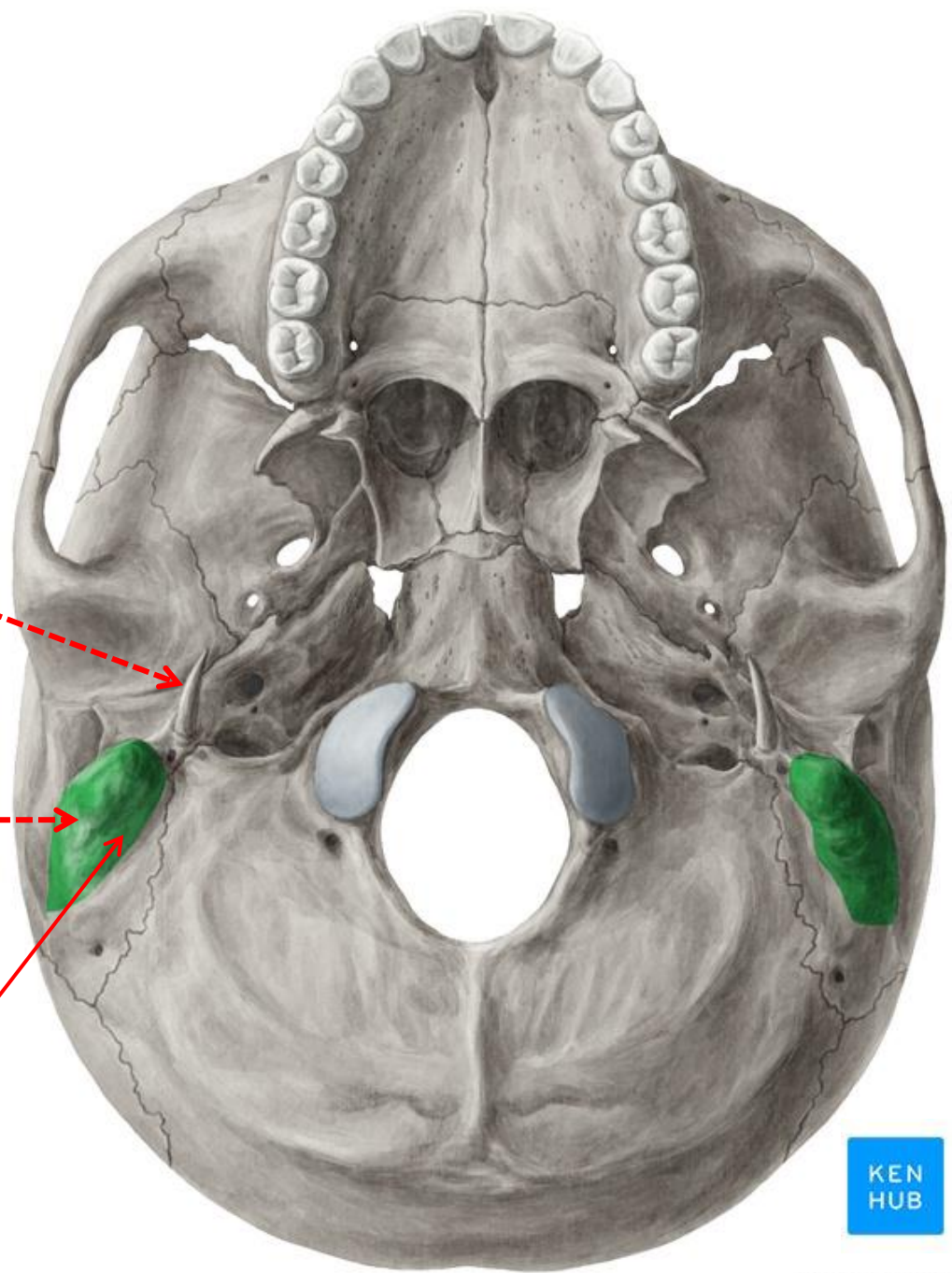
# Jugular foramen



Styloid process of the temporal bone

Mastoid process

Mastoid notch

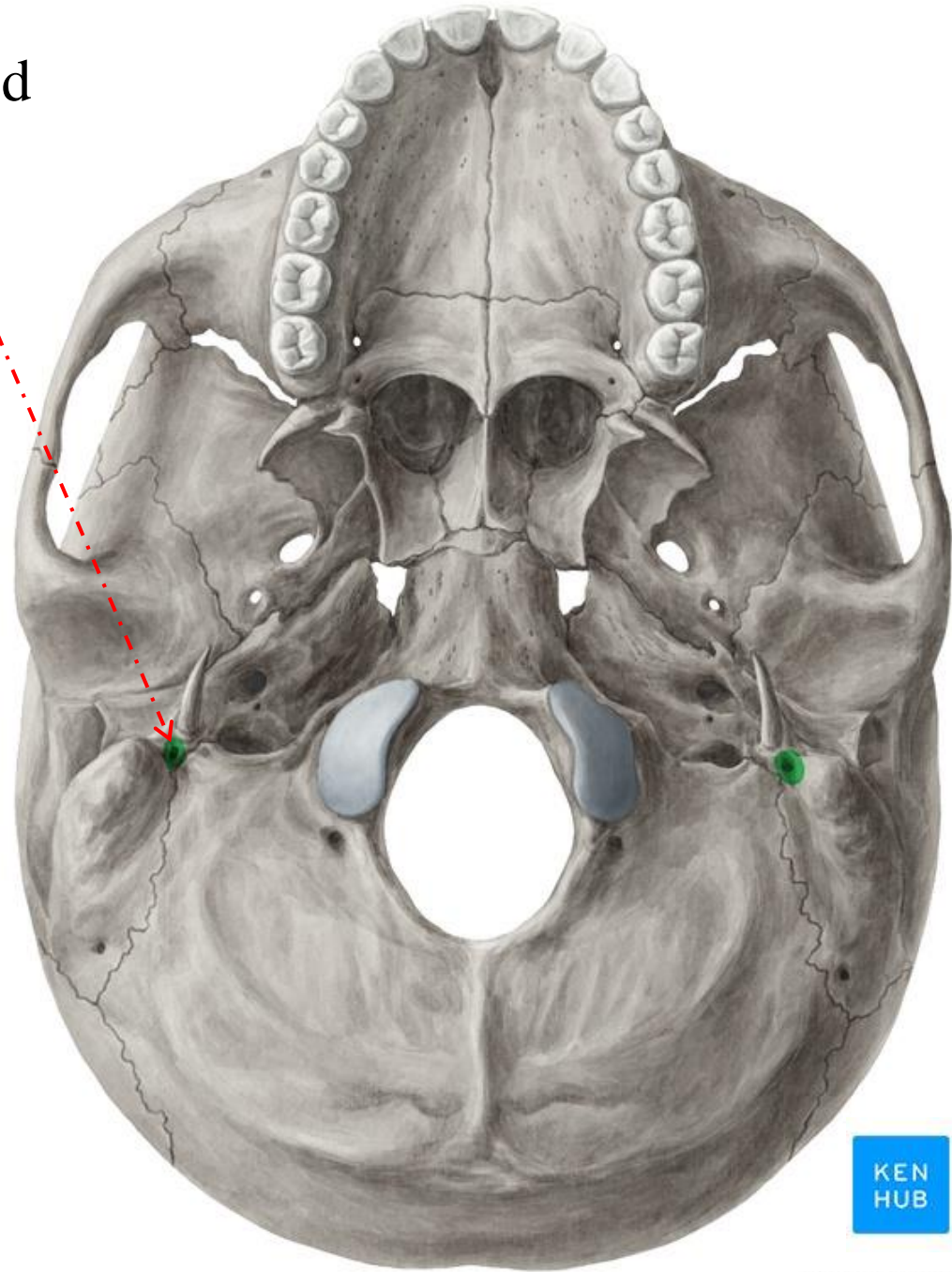




# The stylomastoid foramen

In the interval between the styloid  
and mastoid processes

Transmits the facial nerve



# Infra temporal fossa

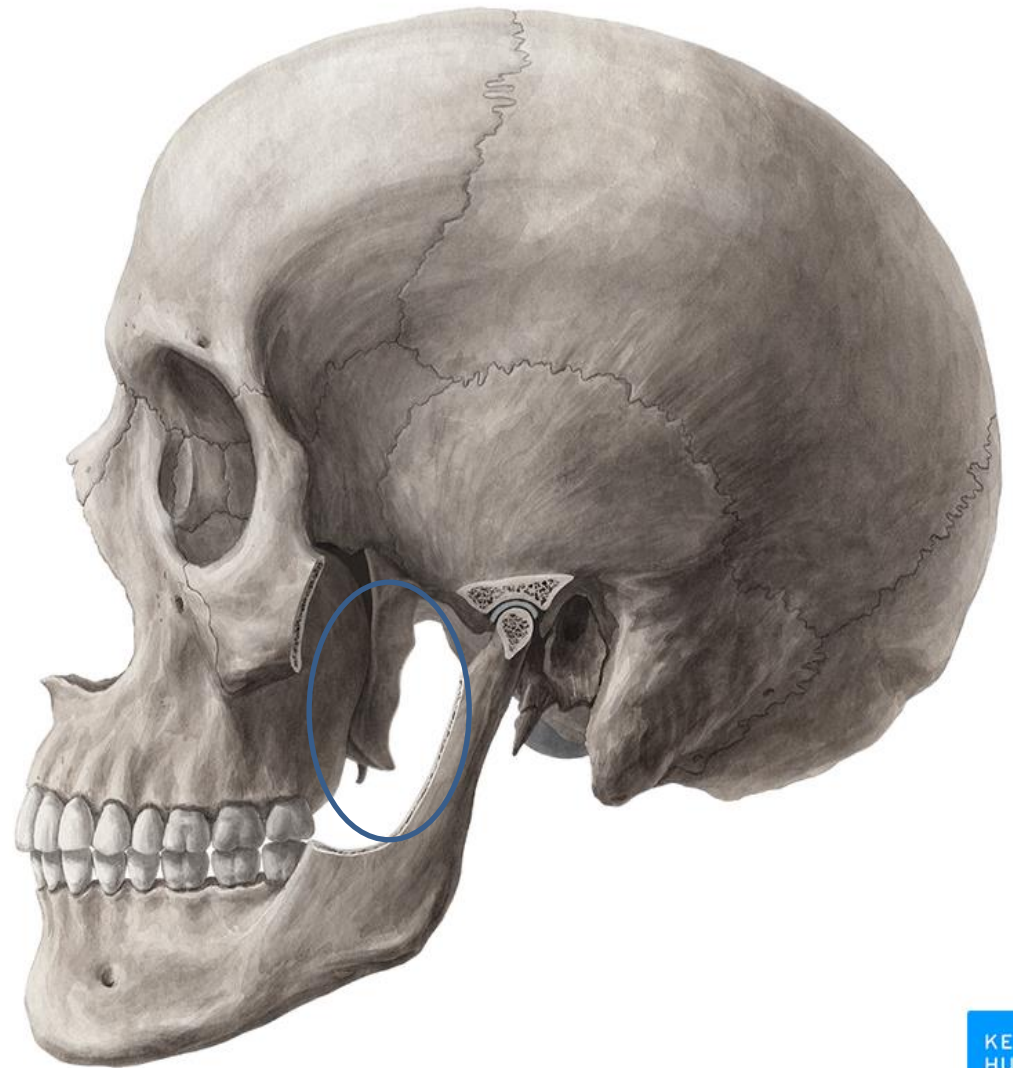
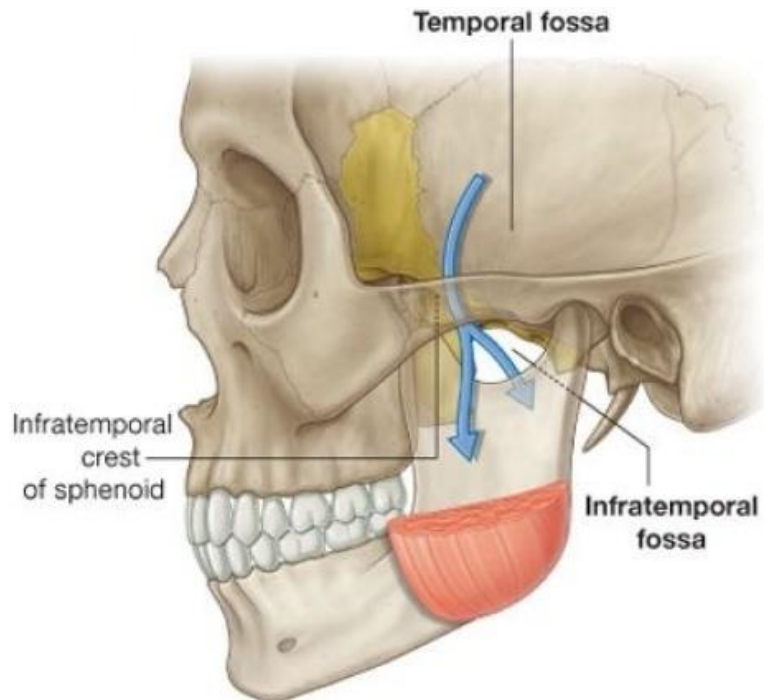
## Boundaries

Anterior wall: back of the maxilla

Medial wall: lateral pterygoid plate

Roof: greater wing of sphenoid bone

Lateral wall: ramus of mandible



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## Communications

Temporal fossa: through the gap deep to the zygomatic arch

Orbit: through the inferior orbital fissure

Pterygo-palatine fossa: through the pterygo-maxillary fissure

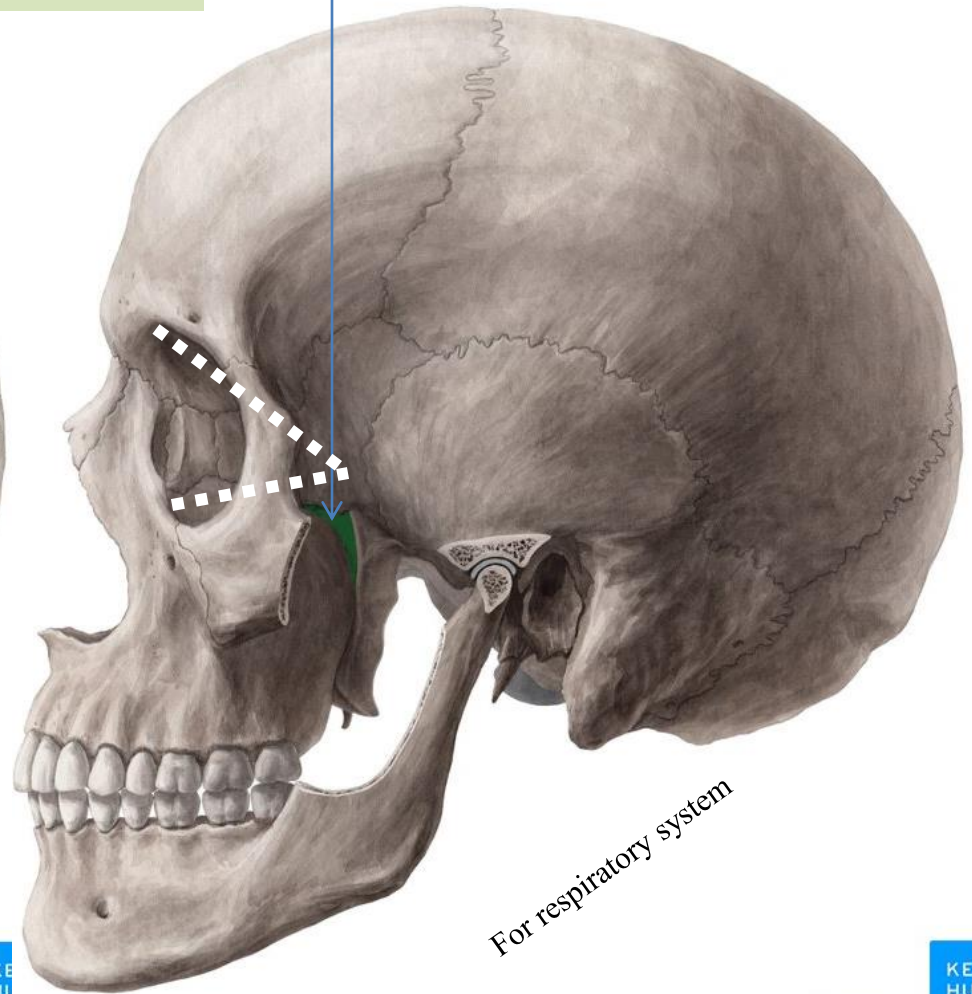
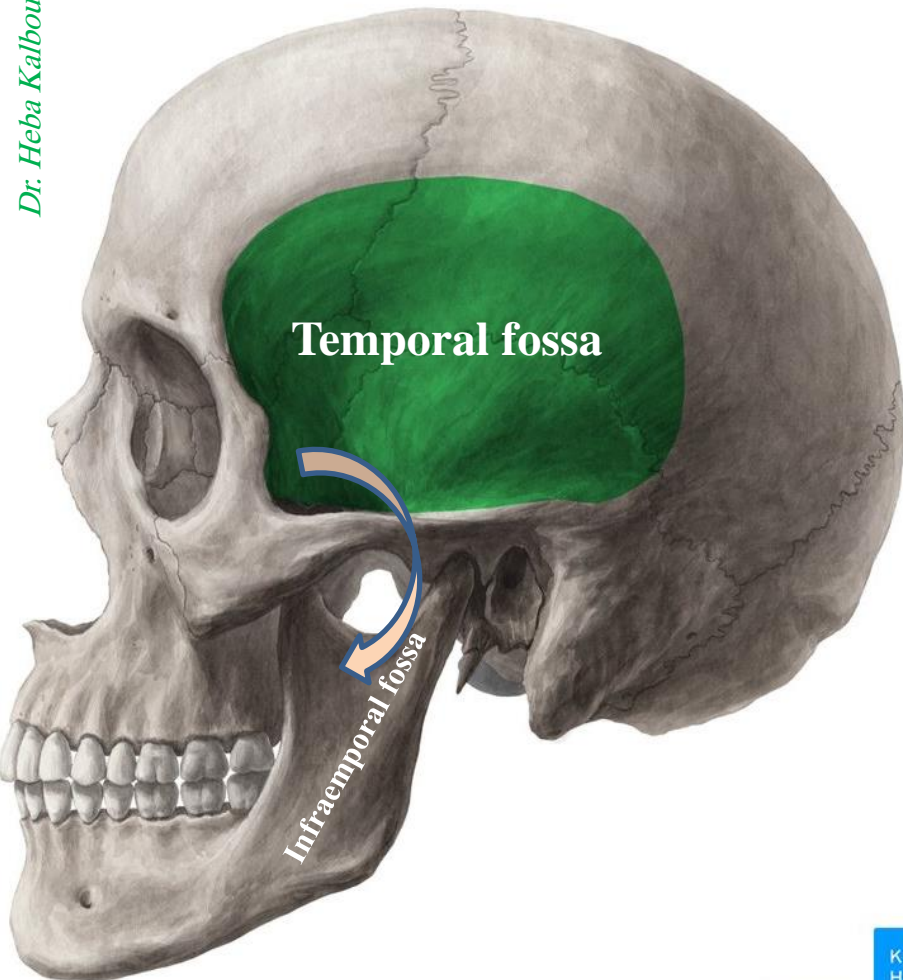
Middle cranial fossa: through foramen ovale and spinosum

Temporal and infratemporal fossae are interconnected spaces on the lateral side of the head

Temporal fossa is superior to the infratemporal fossa above the zygomatic arch

**Pterygo-palatine fossa**  
Lies below the apex of the orbit

*Dr. Heba Kalbouneh*

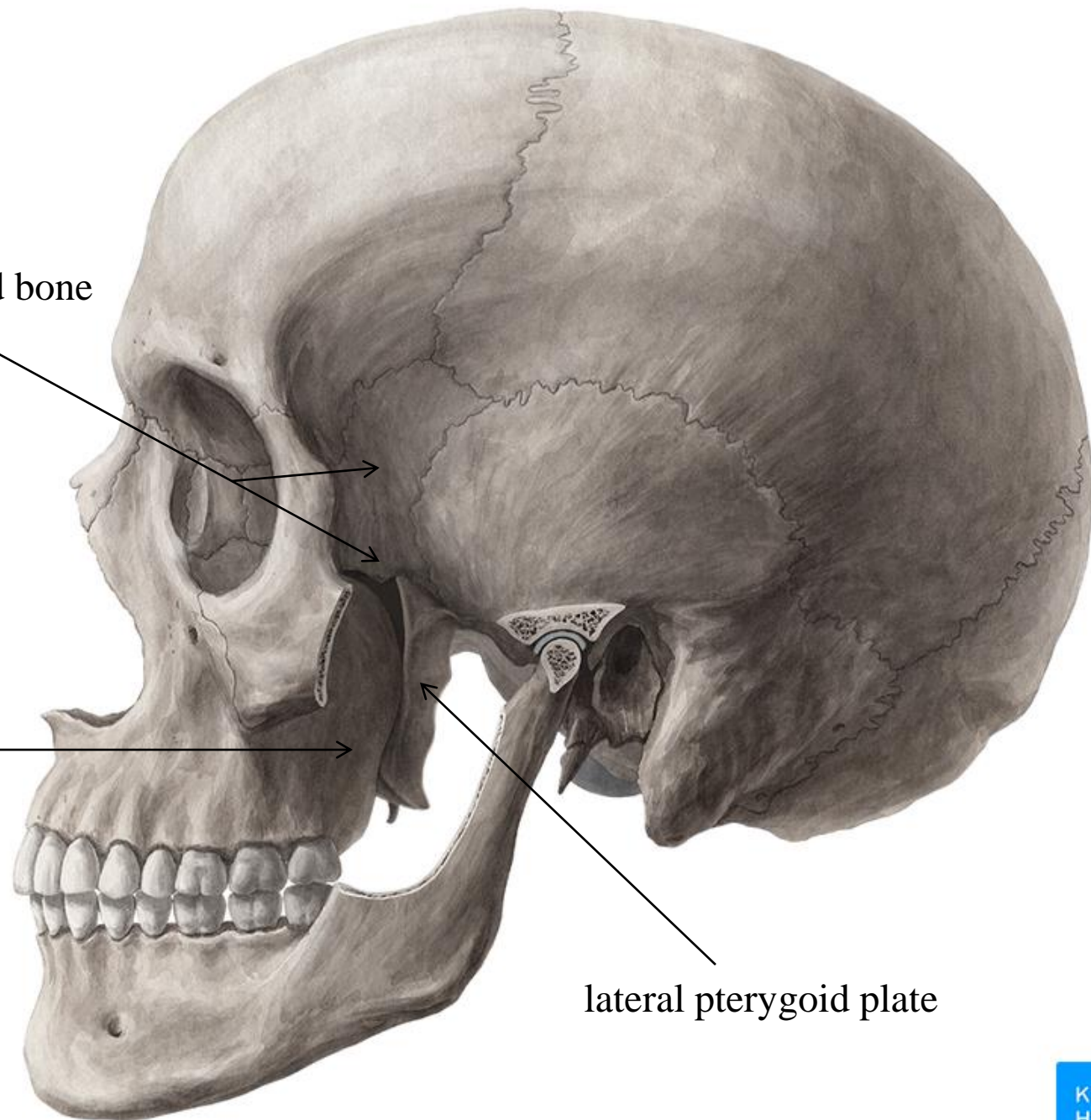




greater wing of sphenoid bone

Back of the maxilla

lateral pterygoid plate



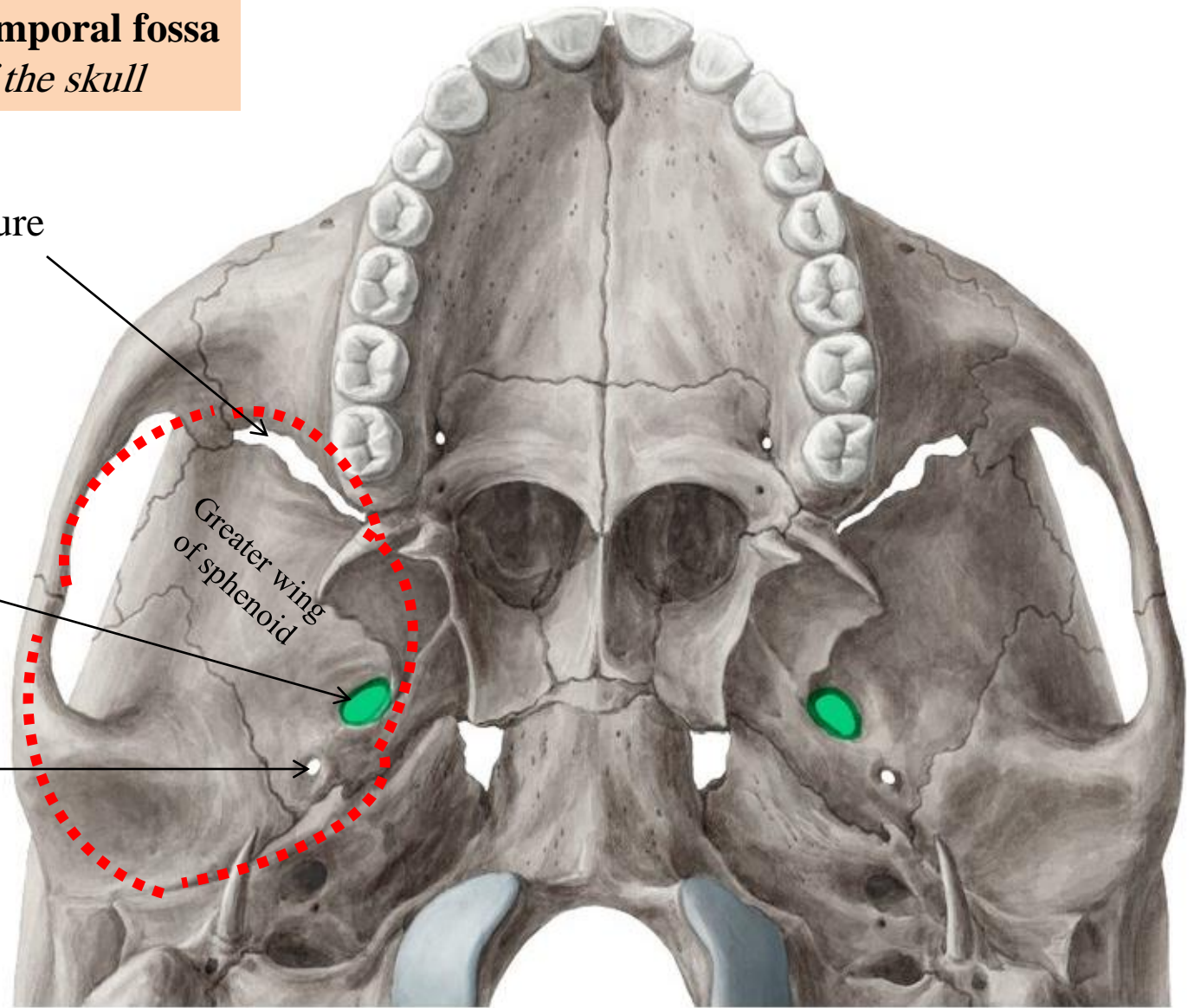
# The roof of Infratemporal fossa

*Inferior view of the skull*

Inferior orbital fissure

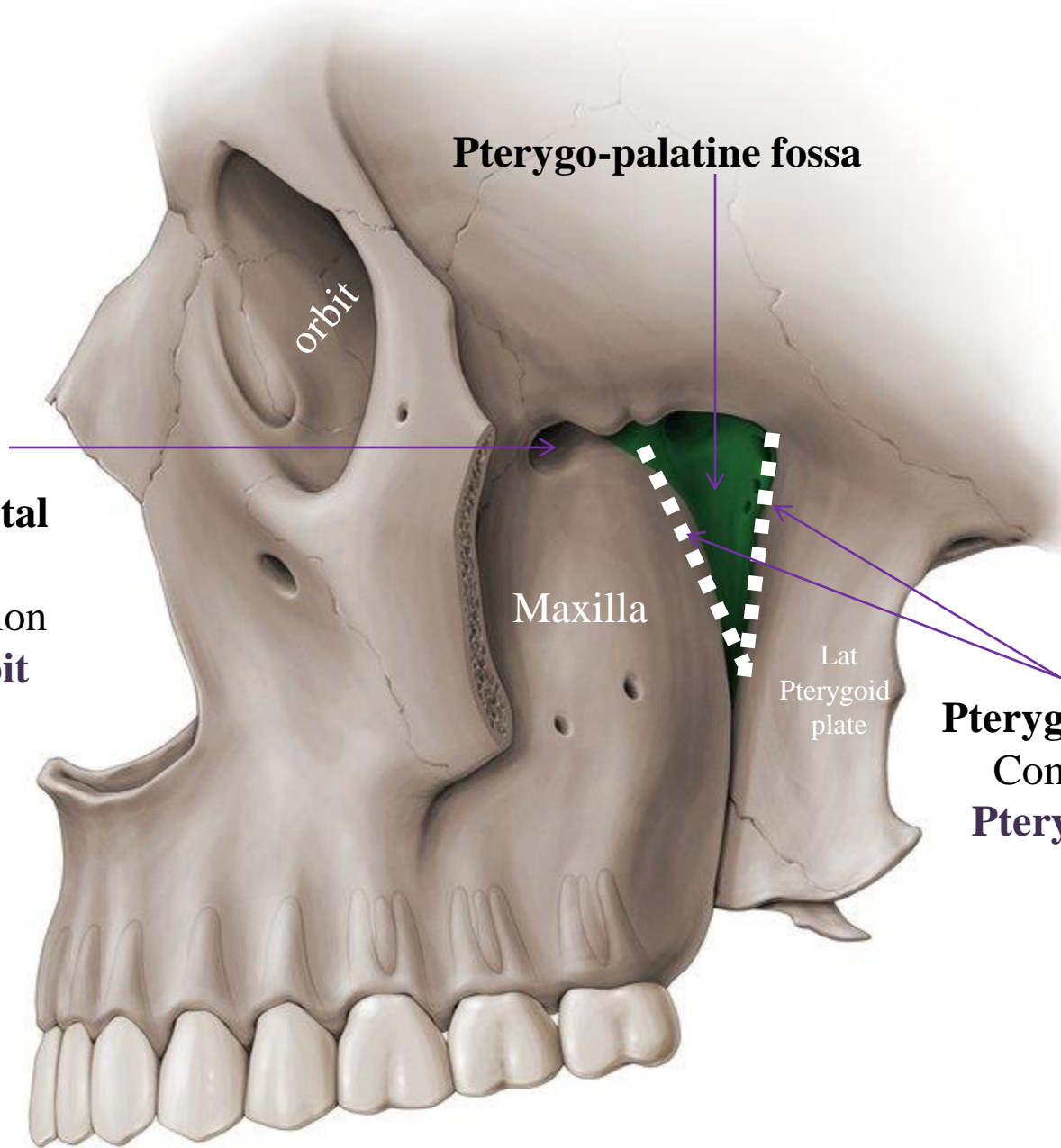
Foramen ovale  
(mandibular nerve)

Foramen spinosum  
(Middle meningeal artery)



Note:

The foramen ovale and foramen spinosum open on its roof



**Inferior orbital fissure**  
Communication with the **orbit**

**Pterygo-palatine fossa**

Maxilla

Lat  
Pterygoid  
plate

**Pterygomaxillary fissure** is a vertical fissure between the pterygoid plate and back of the maxilla. It leads medially into the pterygopalatine fossa

**Pterygo-maxillary fissure**  
Communication with **Pterygo-palatine fossa**

**The medial and anterior walls of Infratemporal fossa**



# Norma basalis externa

Base of the skull- inferior view

The **hard palate** which is made of:

A-The palatal processes of the maxillae

B-The horizontal plates of the palatine bones

The **choanae** (posterior nasal apertures)

The **vomer**

**Medial and lateral pterygoid plates of the sphenoid bone**

**Occipital condyles**

**External occipital crest**

**External occipital protuberance**

**Superior nuchal line**

