

CRANIAL BONES

Bones of skull

- The bones of the skull are divided into cranial and facial groups.
- The two sets together form the orbits.
- Some of the bones are also forming sinuses and they are called as paranasal sinuses.

SKULL

- The cranial bones are frontal, parietal, interparietal, temporal occipital, sphenoid and ethmoid.
- The Facial bones are nasal, premaxilla, maxilla, palatine, pterygoid, lacrimal, malar, turbinates, vomer, mandible and hyoid.

The bones of the skull may be grouped as follows

S. no.	Cranial bones	
1	Occipital	Single
2	Sphenoid	Single
3	Ethmoid	Single
4	Interparietal	Paired
5	Parietal	Paired
6	Frontal	Paired
7	Temporal	Paired

S. no.	Facial bones	
1	Lacrimal	Paired
2	Malar	Paired
3	Maxilla	Paired
4	Pre-maxilla	Paired
5	Palatine	Paired
6	Nasal	Paired
7	Pterygoid	Paired
8	Turbinates	Paired
9	Vomer	Single
10	Mandible	Single
11	Hyoid	Single

- 9. Zygomatic arch
- 11. Coronoid process
- 12. Supraorbital process
- 13''. Paramastoid or styloid process
- 13'''. Occipital condyle
- 14. Parietal bone
- 15. Frontal bone
- 16. Squamous temporal bone
- 17. External auditory meatus
- 18. Temporal condyle
- 19. Orbital surface of lacrimal bone
- 20. Malar bone
- 21. Facial tuberosity
- 28'. Molar part of ramus of mandible
- 30. Broad vertical part of ramus
- 30'. Angle of jaw
- 31. Condyle of mandible
- 32. Atlas
- x. Wing of atlas

Skull and Atlas of Ox
Lateral View

Fig C

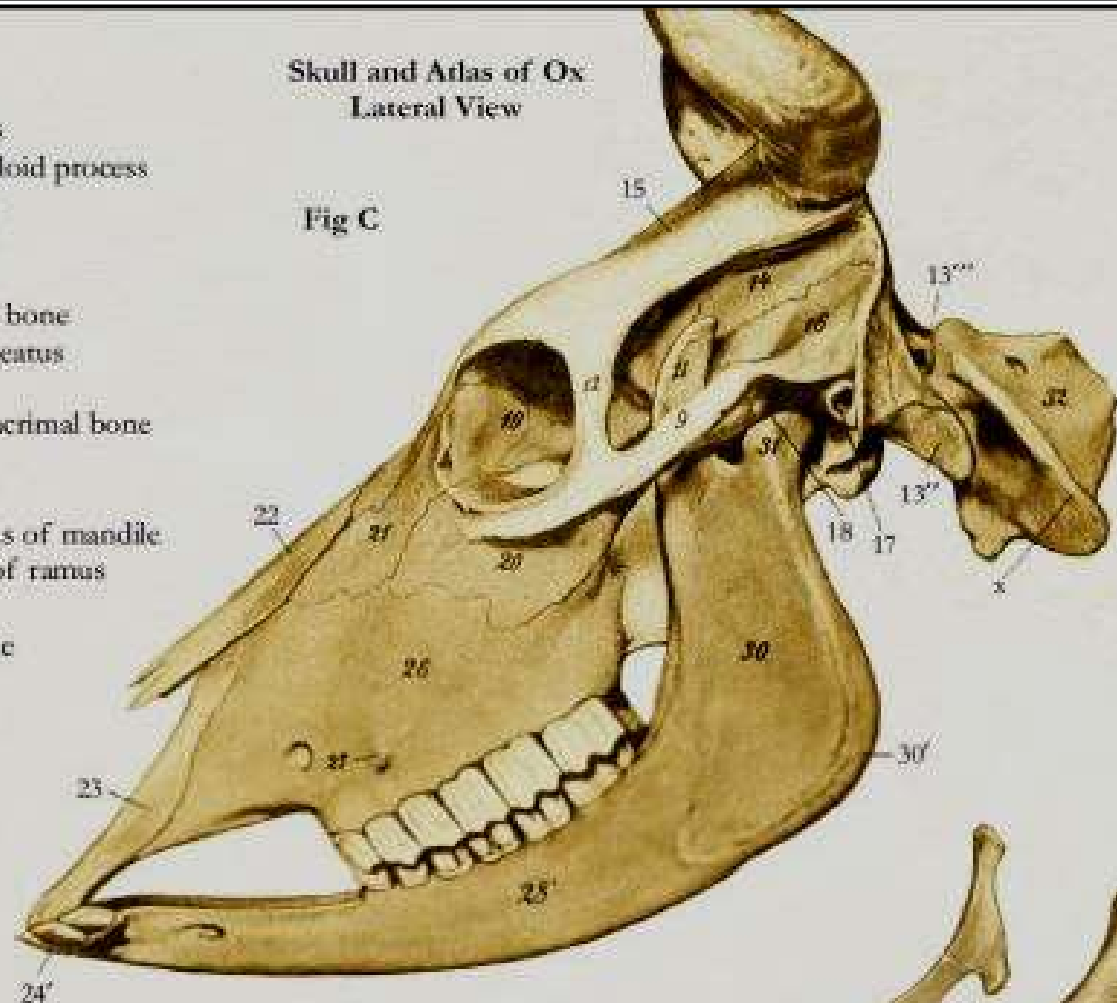


Fig H

- a. Body
- b. Lingual process
- c. Thyroid cornu and cartilage (c')
- d. Small cornu
- e. Middle cornu
- f. Great cornu
- g. Muscular angle of f



Hyoid Bone of Ox



Ox

OCCIPITAL BONE

- It is single bone situated on the lower part of the posterior surface of the skull.
- It consists of lateral (ex-occipital), squamous (supra-occipital) and basilar (basi-occipital) parts.
- Lateral part
 - Each consists of a condyle and a paramastoid process.
 - The condyles articulate with the atlas.
 - Paramastoid process are placed lateral to the condyle, which serves for muscular attachment.
 - The paramastoid process projects downward and backward and is curved medially.
 - Between the root of the paramastoid process and the condyle is the condyloid fossa, in which a large foramen the hypoglossal foramen is present for the XII cranial nerve.
 - Above this is another (often double)- condylar foramen which conducts a vein from the condyloid canal.

Basilar part

- It is a wide thick bar of bone which extends forward from the ventral margin of foramen magnum.
- Its ventral surface is rounded. It lodges the pons and medulla oblongata on its canal surface.
- The anterior end is fused to the body of post sphenoid. At its junction with the post-sphenoid it presents two tubercles (basilar tubercles) externally, which serve for muscular attachment.
- The lateral border form the medial margins of the foramen lacerum which is for the passage of IX, X and XI cranial nerves.

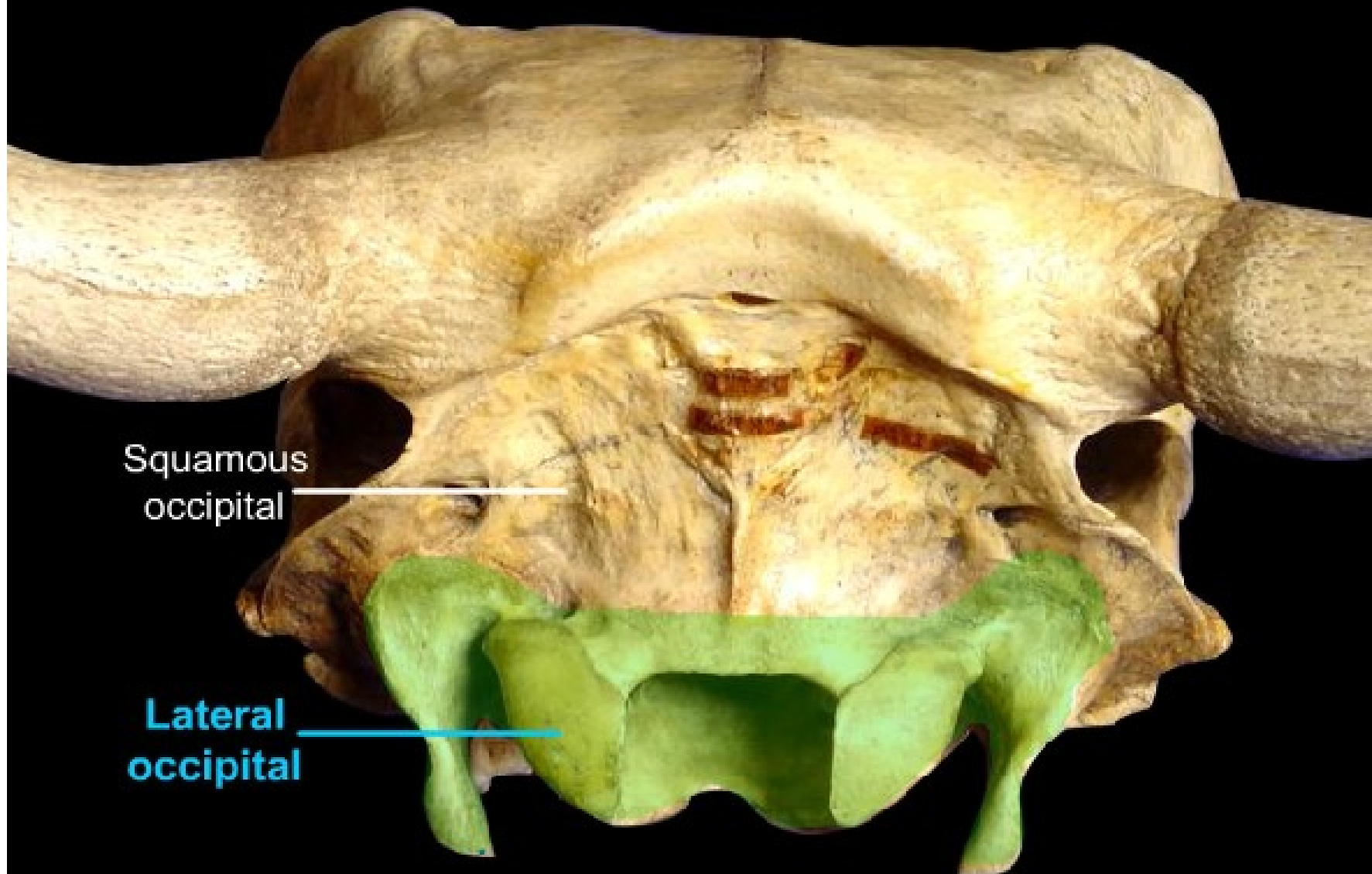
Supraorbital / Squamous part: It is **quadrilateral plate** of bone lying between the lateral parts below, squamous temporal laterally, the parietal and interparietal bones with which it fuse before birth.

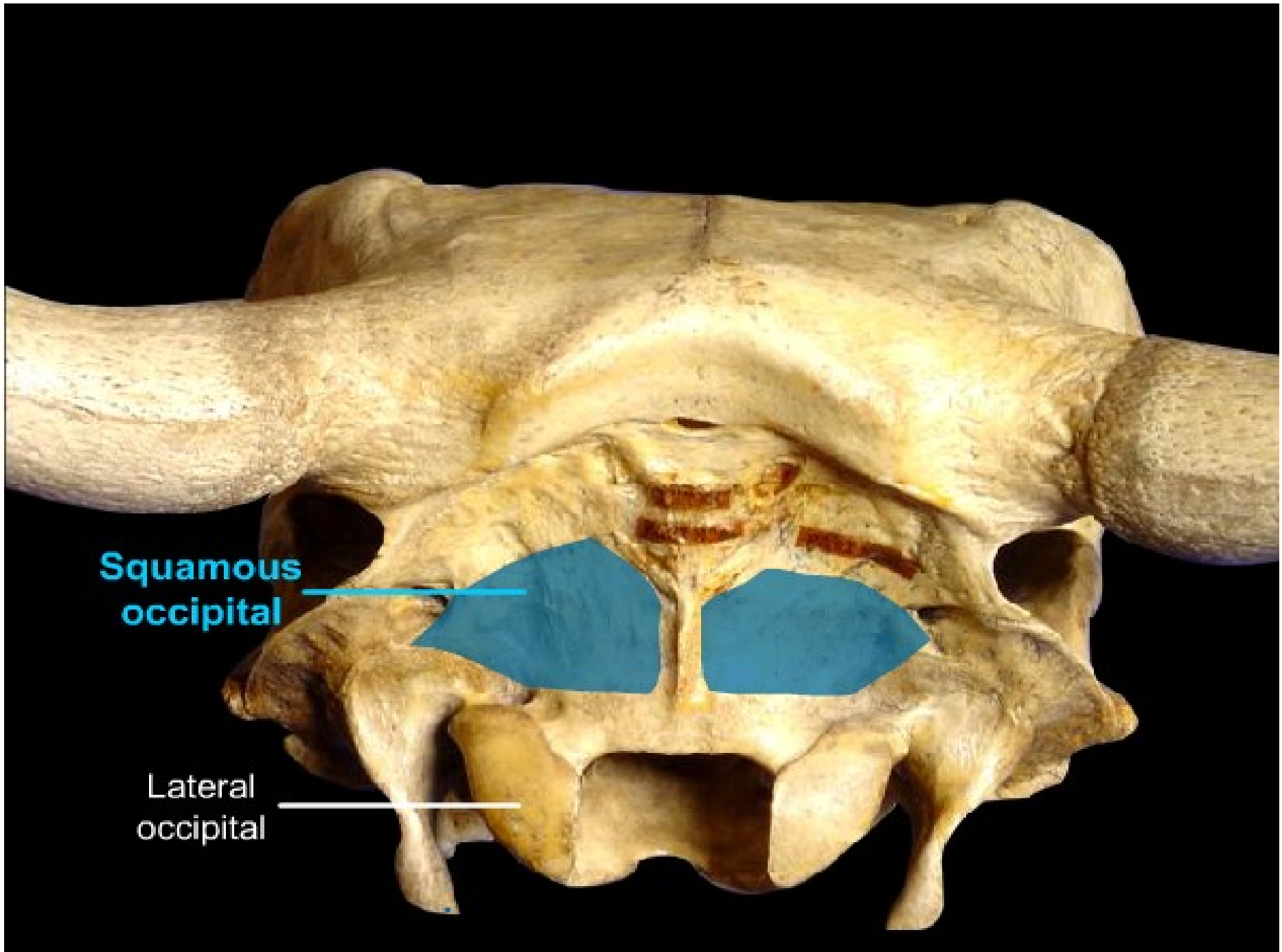
- It presents externally, a central **external occipital protuberance** near its **junction with the interparietal bone** for the **funicular part** of the **ligamentum nuchae**.
- The **mastoid foramen** is situated on each side, at the junction of the occipital and squamous temporal bones.
- It communicates with the **temporal and condyloid canals** at their junction.

Occipital bone

Squamous occipital

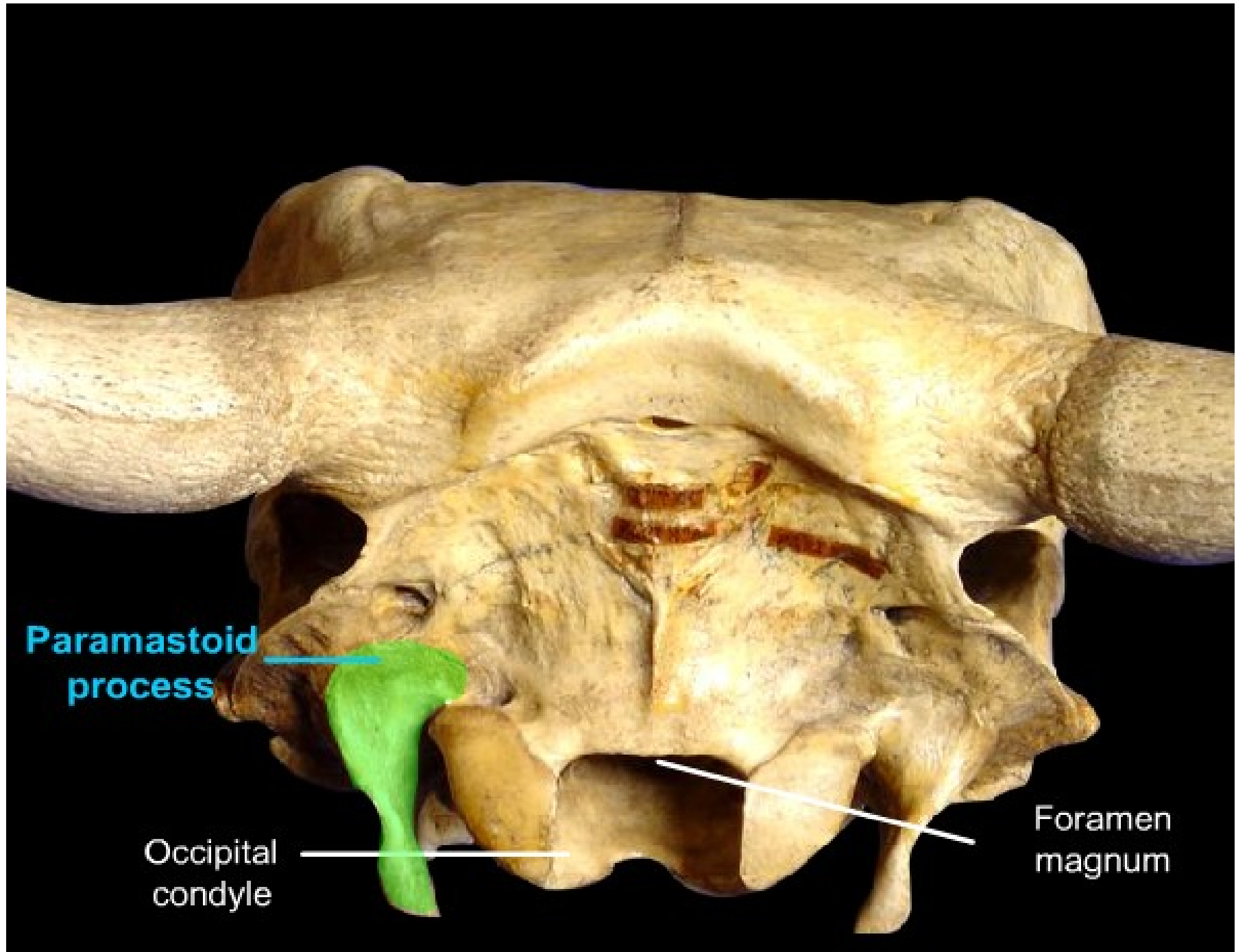
Lateral occipital





Squamous
occipital

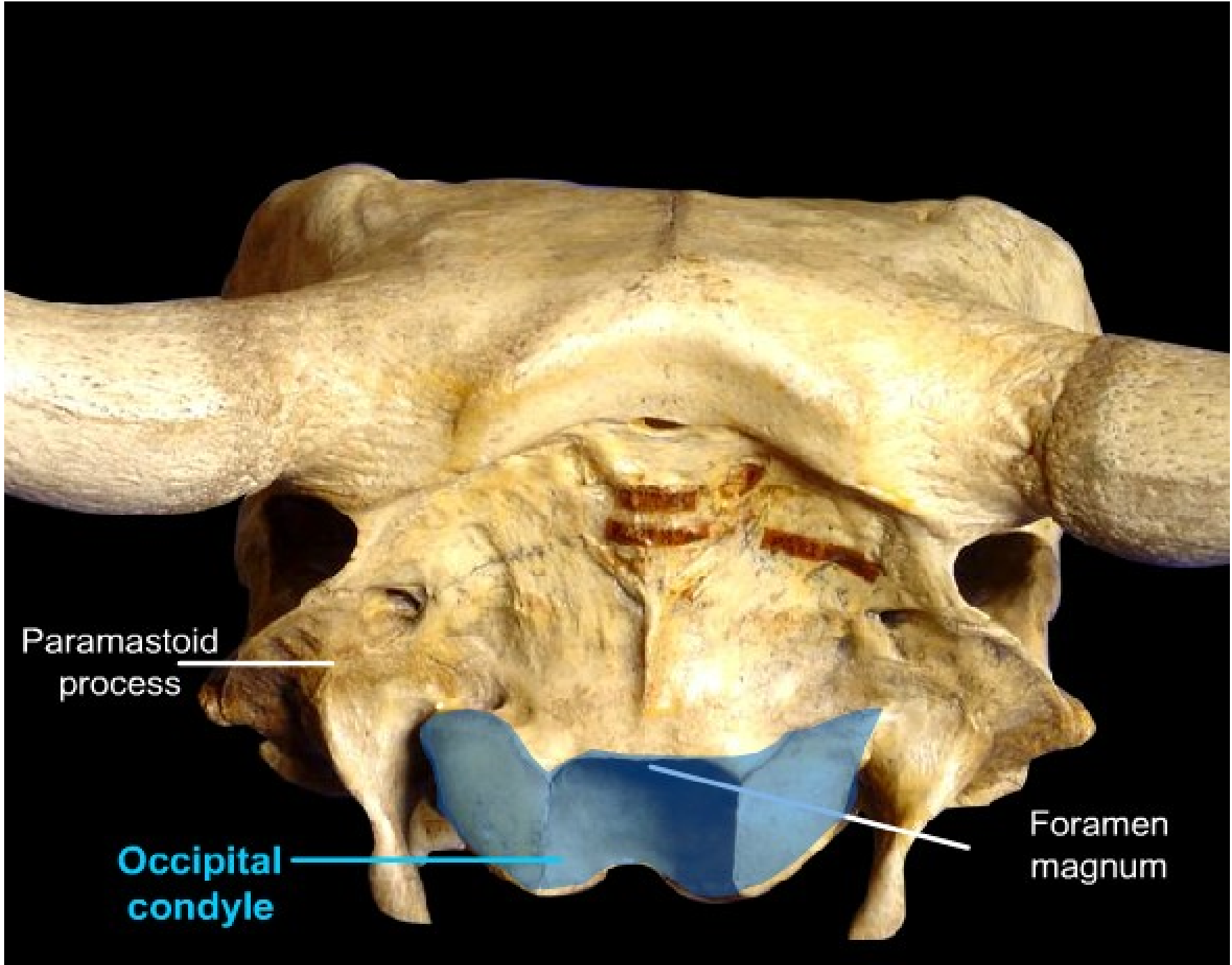
Lateral
occipital



Paramastoid process

Occipital condyle

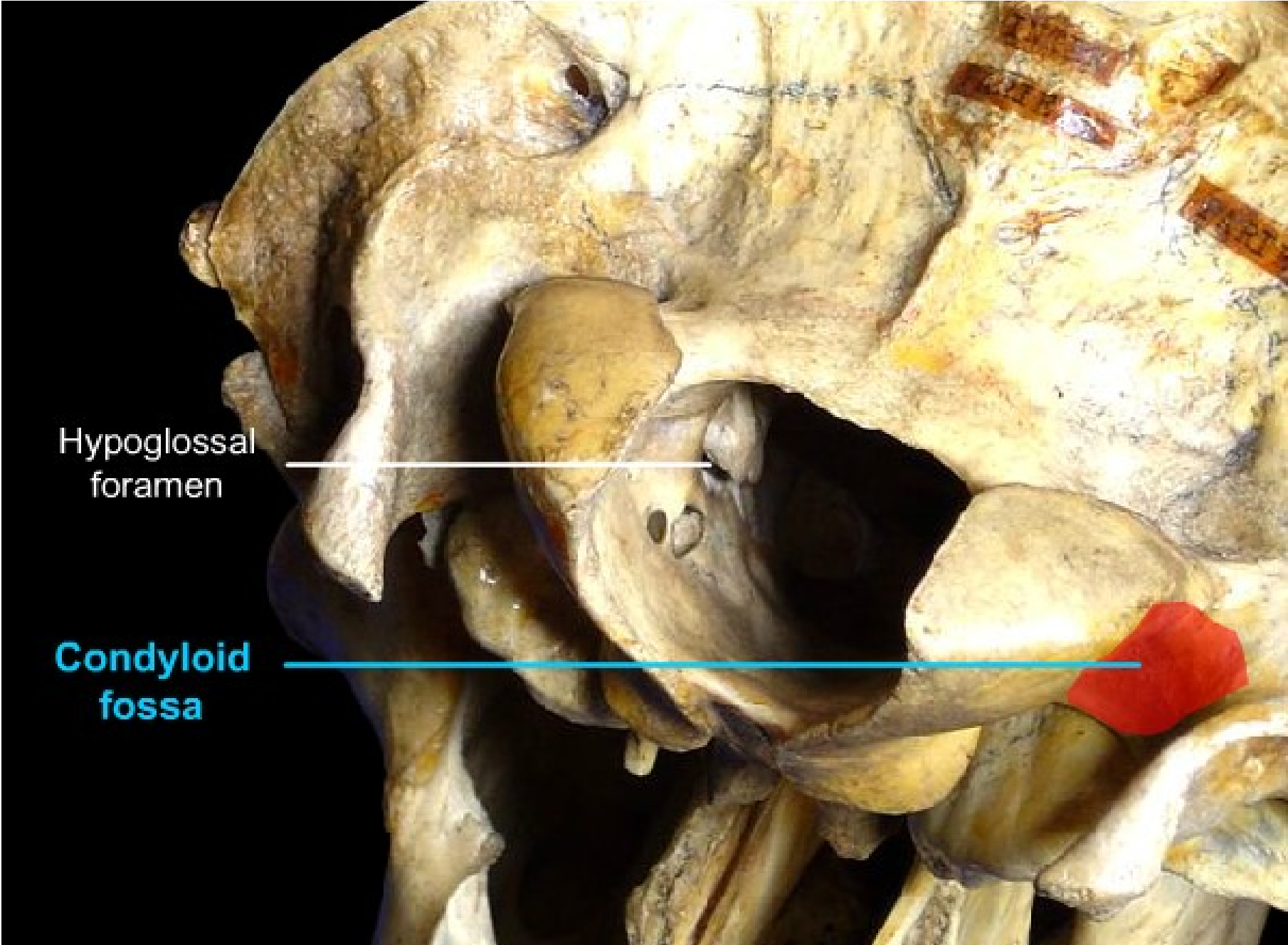
Foramen magnum



Paramastoid
process

Occipital
condyle

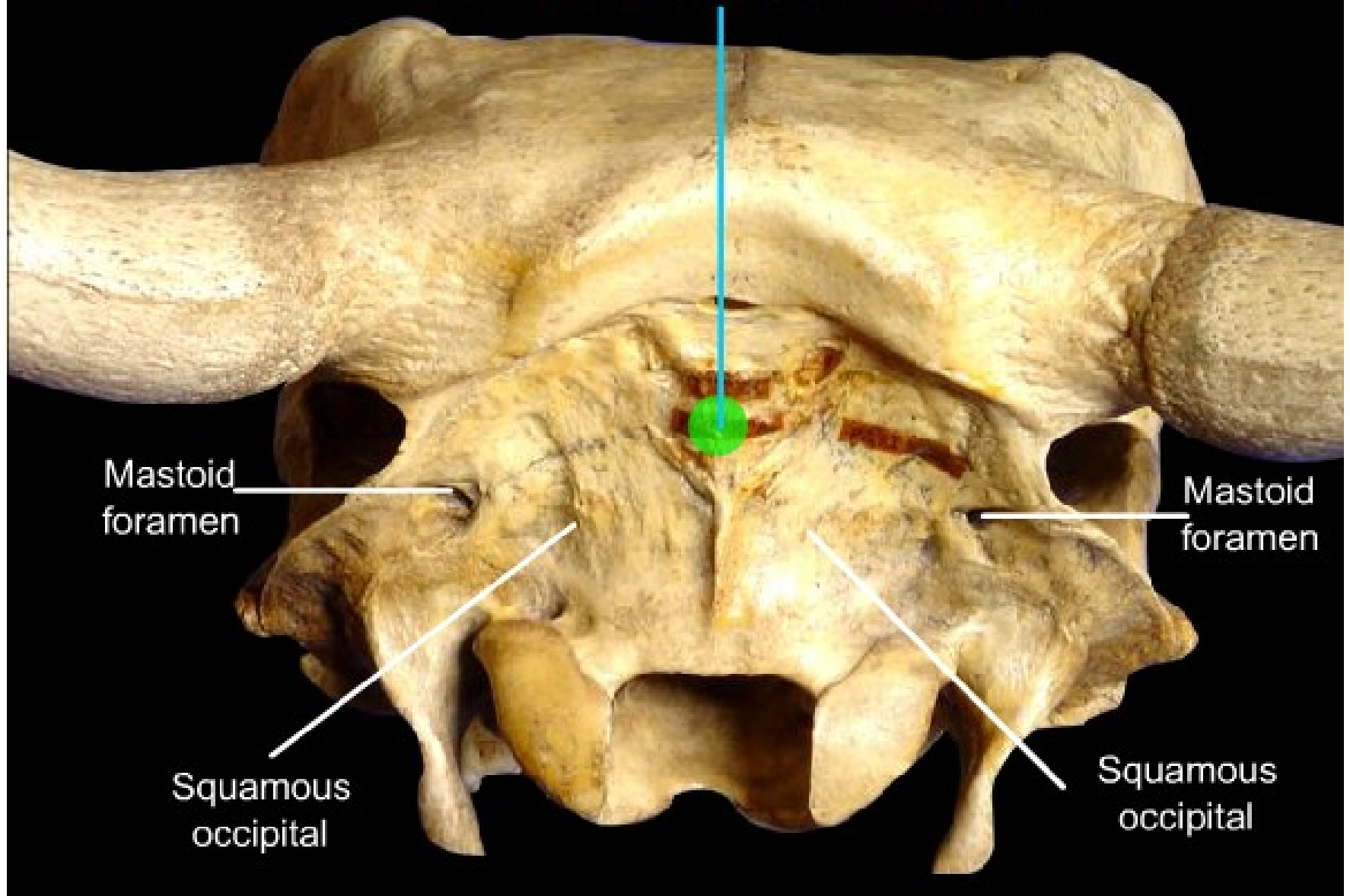
Foramen
magnum



Hypoglossal
foramen

Condylloid
fossa

External occipital protuberance



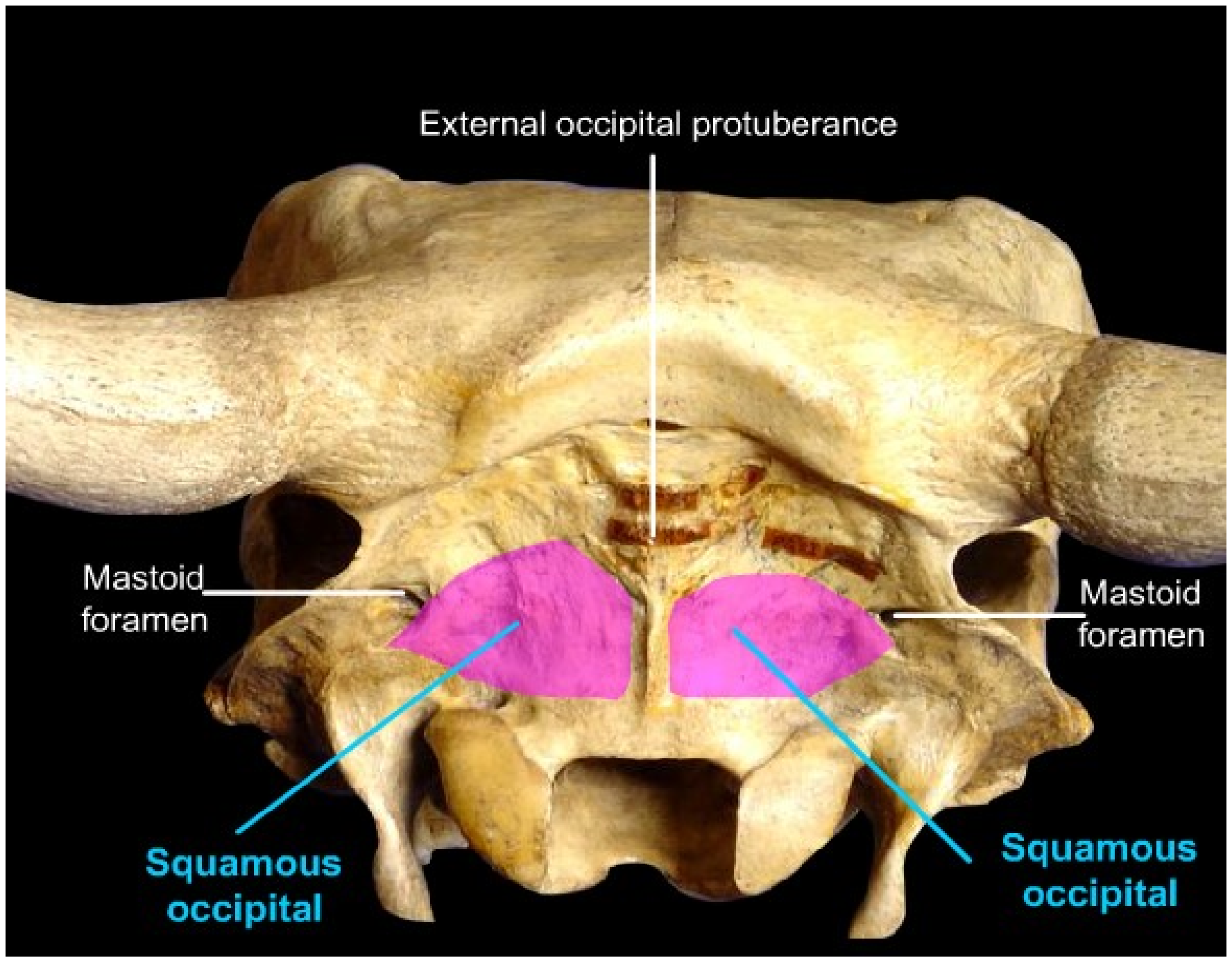
External occipital protuberance

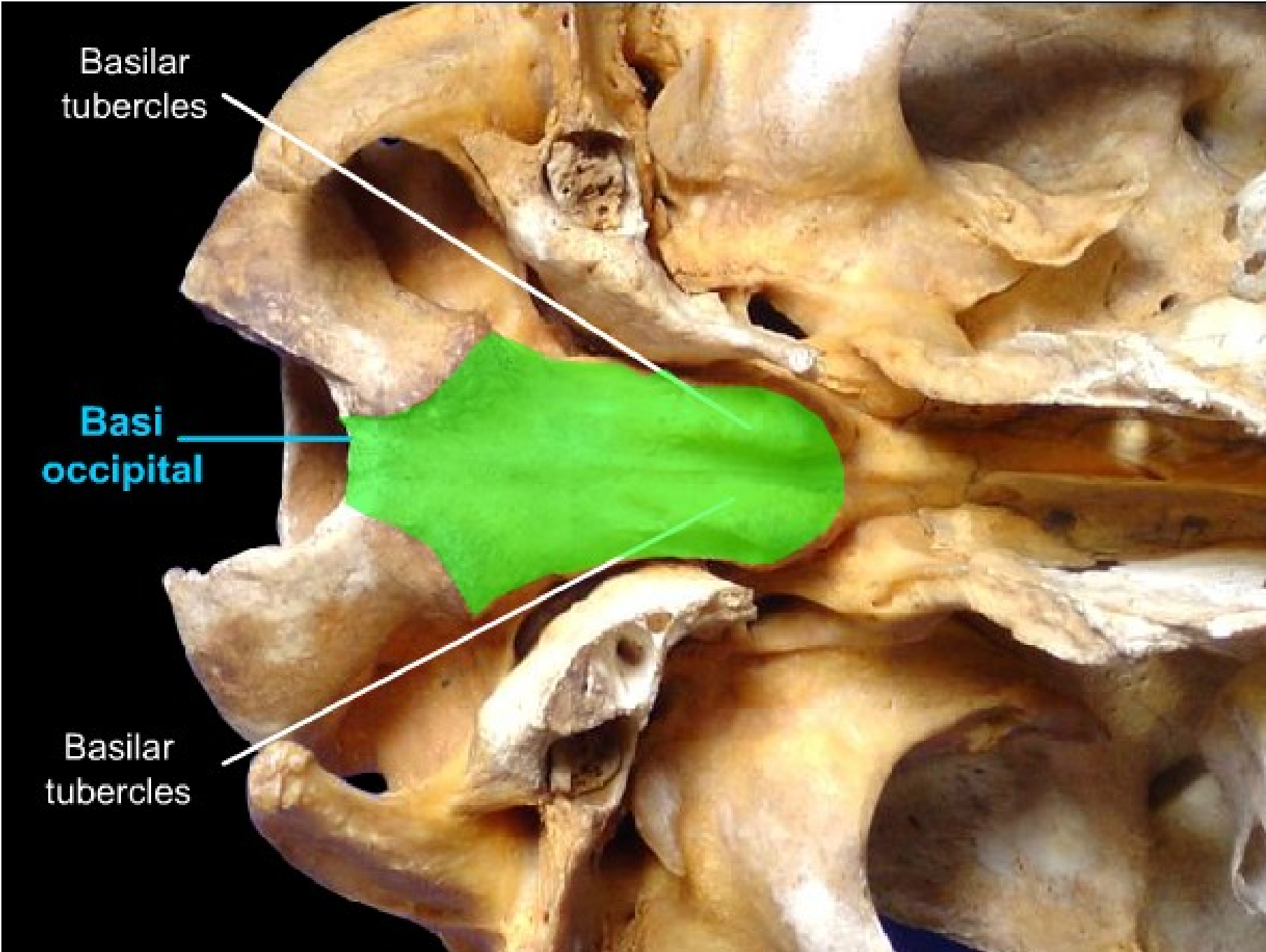
Mastoid foramen

Mastoid foramen

Squamous occipital

Squamous occipital

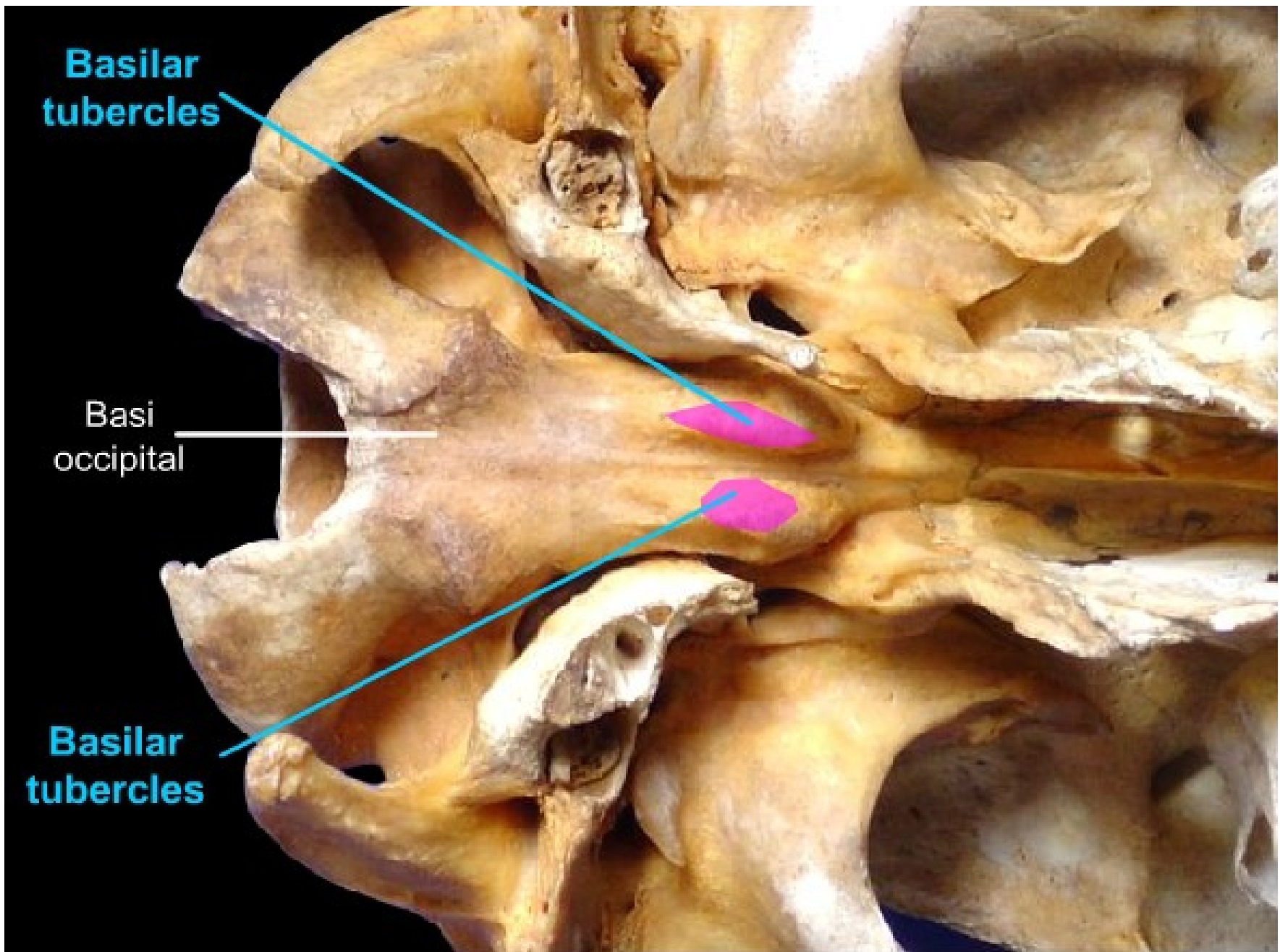




Basilar tubercles

Basi occipital

Basilar tubercles



PARIETAL BONE

Ox

- They are placed on the **posterior** and **lateral** aspects of the cranium.
- They are **fused** to each other and with the **inter-parietal** and **squamous part** of **occipital** before birth.
- Each is made up of a posterior part and a lateral part.
- The posterior parts of the two sides form the posterior wall of the **temporal fossa**.
- The junction of the two parts is marked by a **prominent parietal crest** which is continuous with the **temporal crest** below and with the **frontal crest** anteriorly.
- The frontal sinus extends into the parietals.



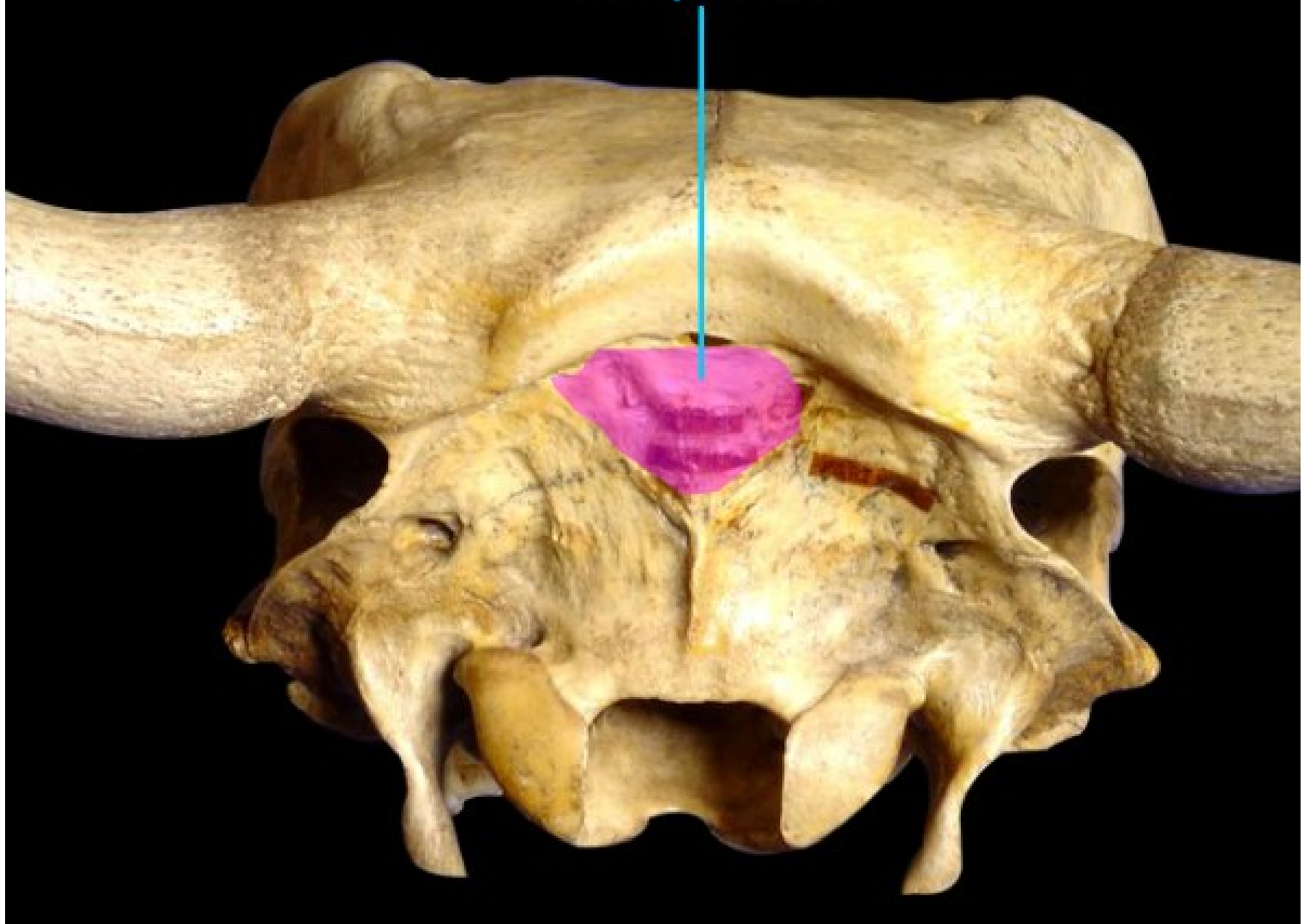
PARIETAL

Temporal Bone

INTERPARIETAL BONE

- It is single bone located in the **postero-superior** part of the cranium.
- It is **paired** in the foetus; wedged in between the **parietals** above and the **supra-occipital** below and is fused with these bones before or shortly after birth.
- The frontal sinus is prolonged into it in the adult.

Interparietal



SPHENOID BONE

Ox: The bone is placed at the **base of the skull**. In the calf at birth and some months after it consists of two pieces.

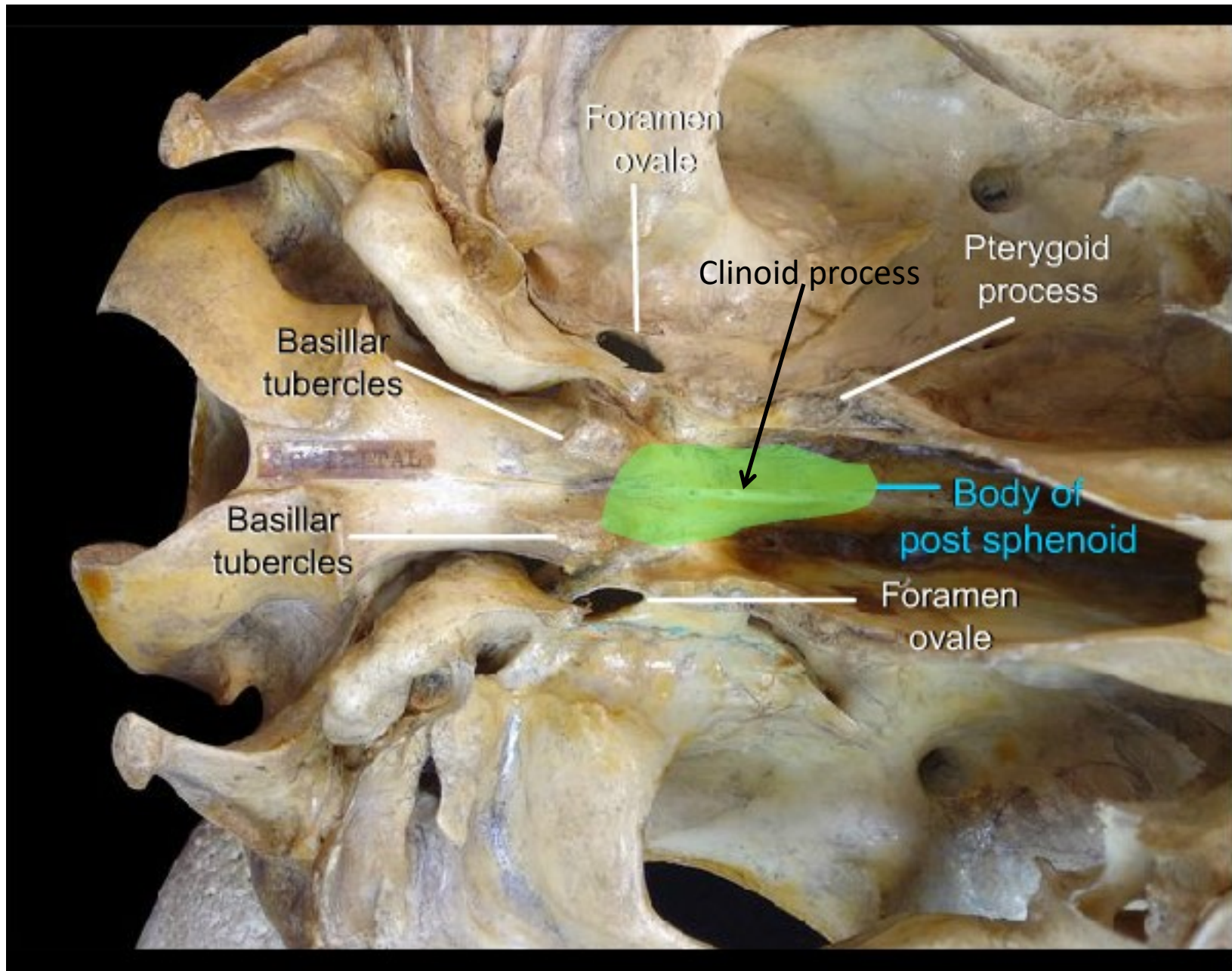
- The **posterior part** lies next to the **basilar part of the occipital**, being termed **post-sphenoid** and the anterior part **pre-sphenoid**.
- Though the two parts fuse later in life it is convenient to describe them separately.

Post-sphenoid: The post-sphenoid has a body, **two temporal wings** and **two pterygoid (sub-sphenoidal) processes**.

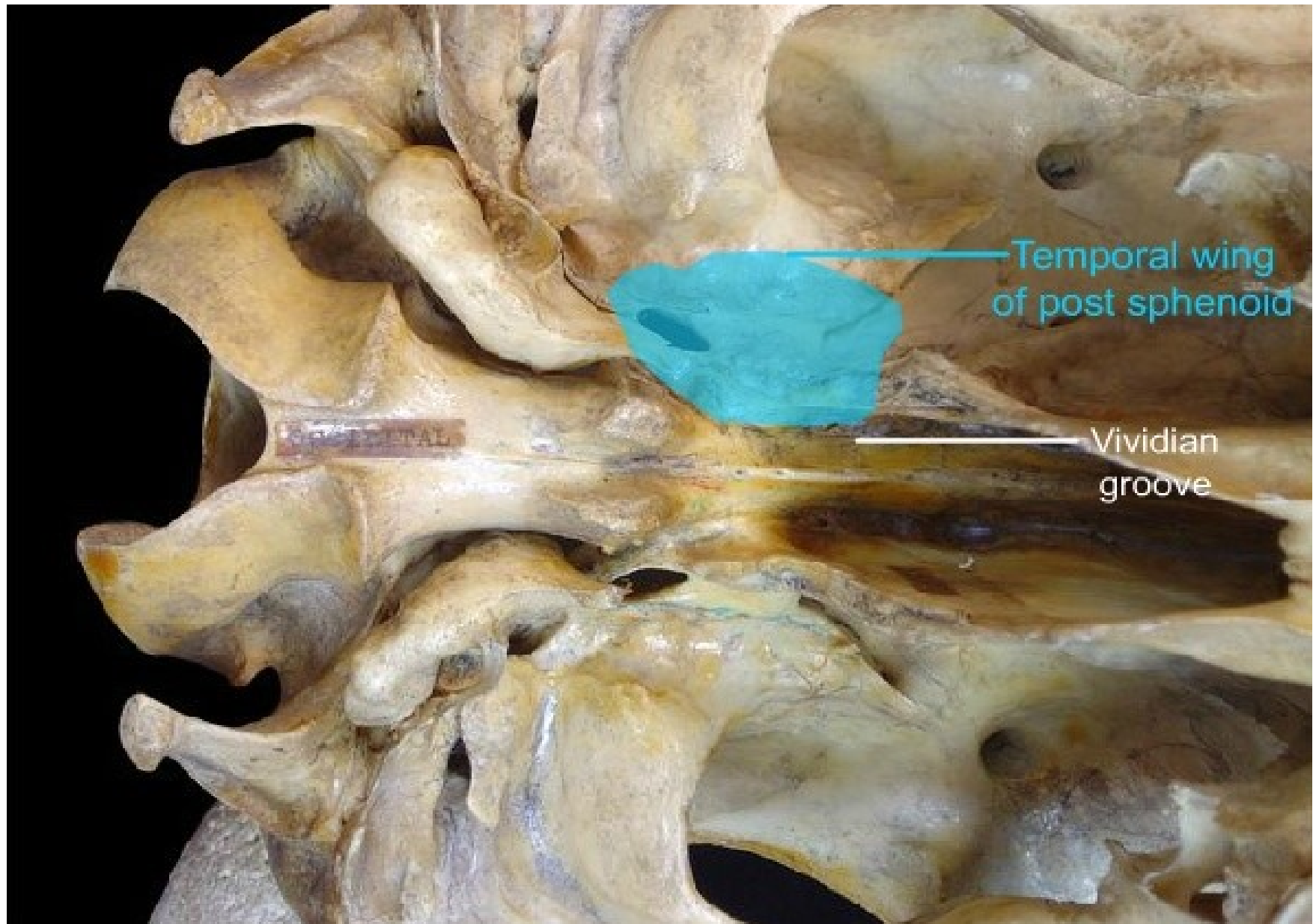
The external face of the body presents close to its junction with the **pterygoid** a **vidian groove** for the nerve of the **pterygoid canal (vidian nerve)**.

- The internal surface presents the **hypophyseal** or **pituitary fossa (sella tursica)** for the pituitary gland.
- The **dorsum sellae** is a transverse projection at the posterior end of the body and bears posterior **clinoid processes**.
- The wings diverge outward from the body.
- Each is perforated about its middle by **foramen ovale** for the mandibular nerve and middle meningeal artery.
- The internal surface presents a longitudinal groove leading to **foramen orbito rotundum**.

Post-sphenoid



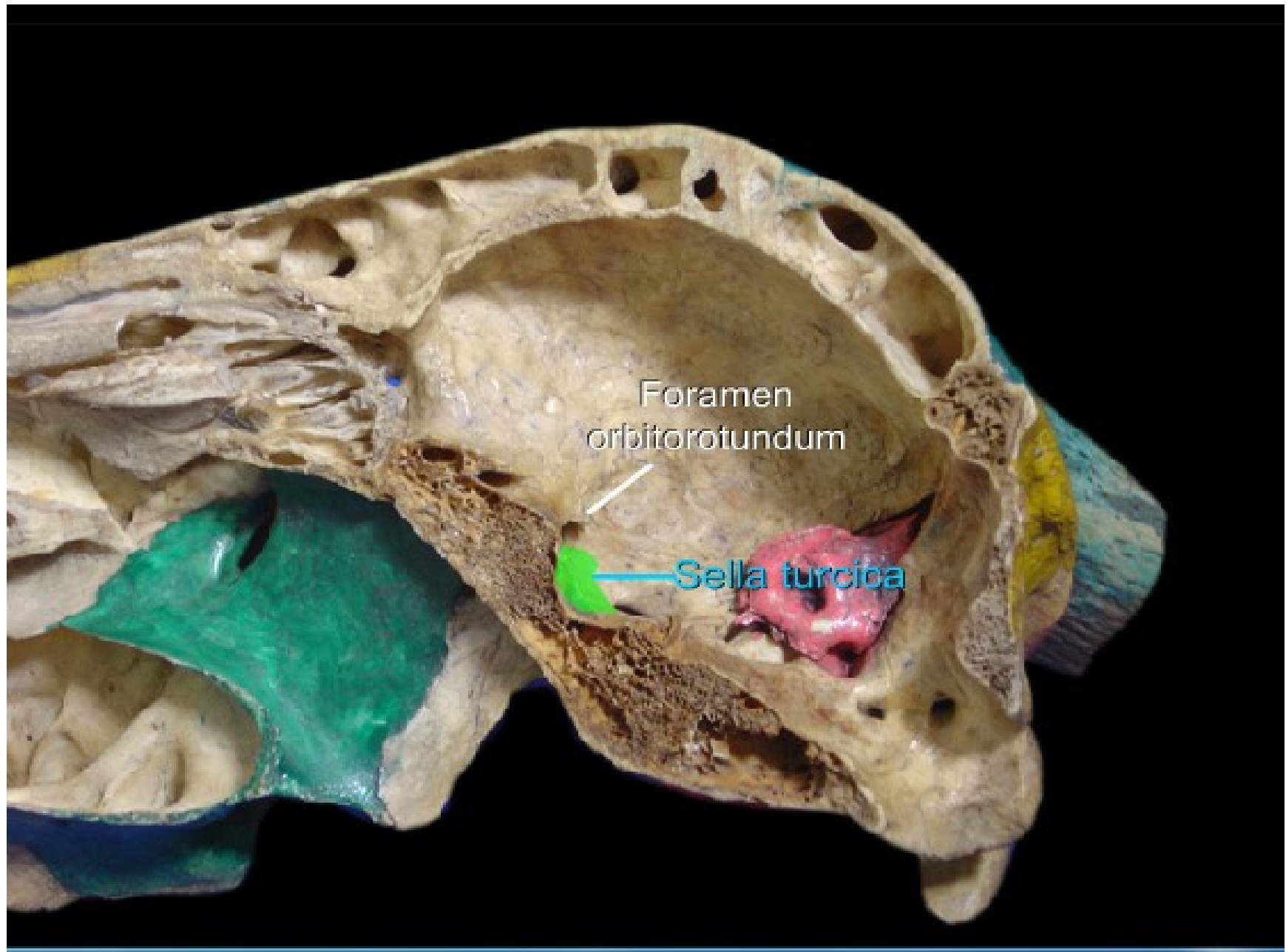
Post-sphenoid



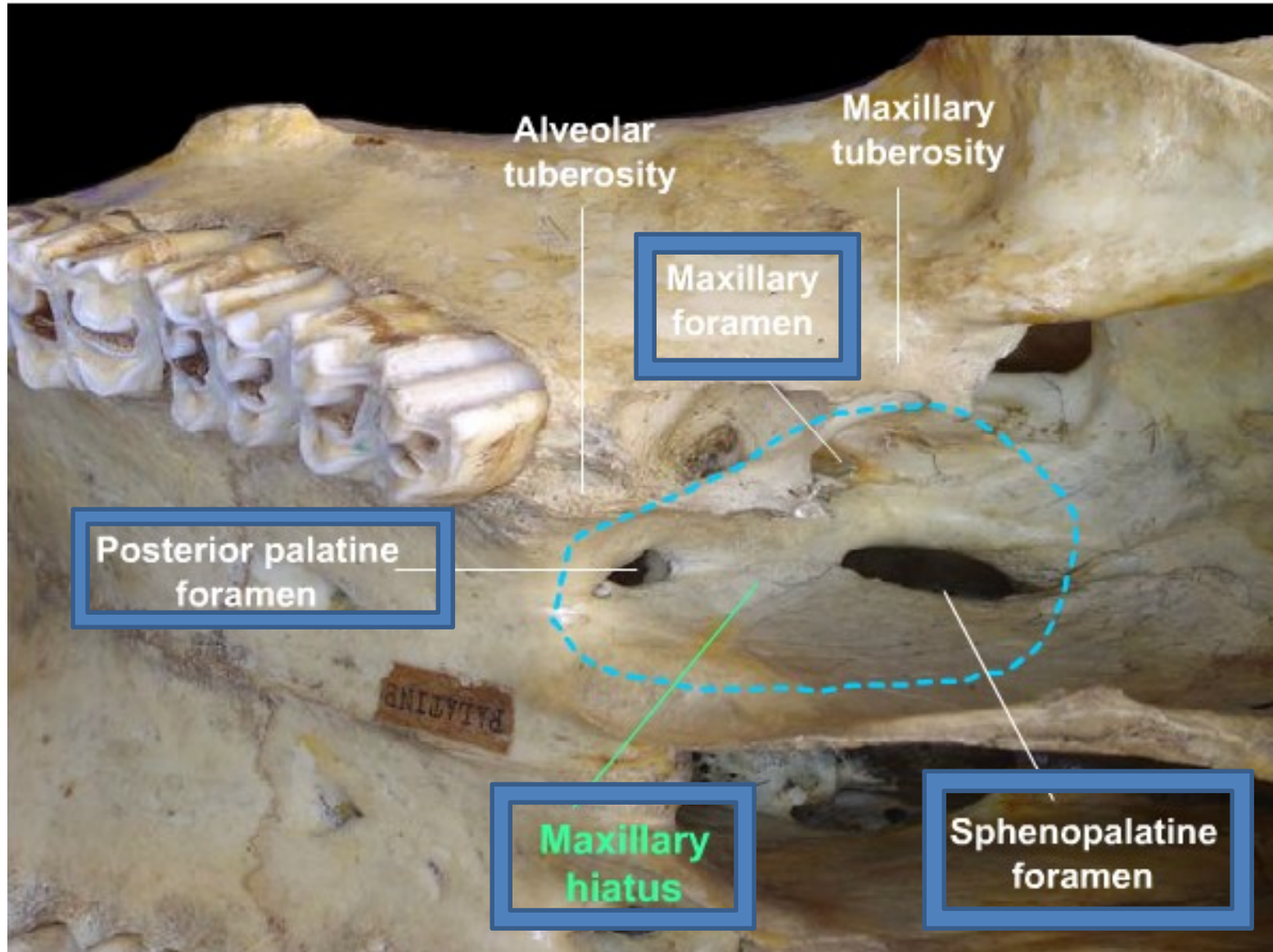
Pre-sphenoid

- The **pre-sphenoid** lies at a higher level, has a **body** and **two orbital wings**.
- The anterior part of the external face of the body is concealed mostly by the **vomer** and laterally by the **pterygoid bones**.
- The **vidian groove** is continued by a vidian canal at the junction of the wing with the body and opens into the **pterygo-palatine fossa**.
- The cranial surface of the body presents anteriorly a median **ethmoid spine**, which joins the **crista galli** of the **ethmoid**.
- Posteriorly and at a lower level is the optic groove which supports the **optic commissure** in life and the groove on either side leads to the **optic foramen**.
- The anterior one of these joins the ethmoid and perpendicular part of palatine at the **spheno-palatine foramen**.
- At its junction with the body it is pierced by the **optic foramen**.
- The posterior border forms with the wings of post-sphenoid, the **foramen orbito-rotundum**.

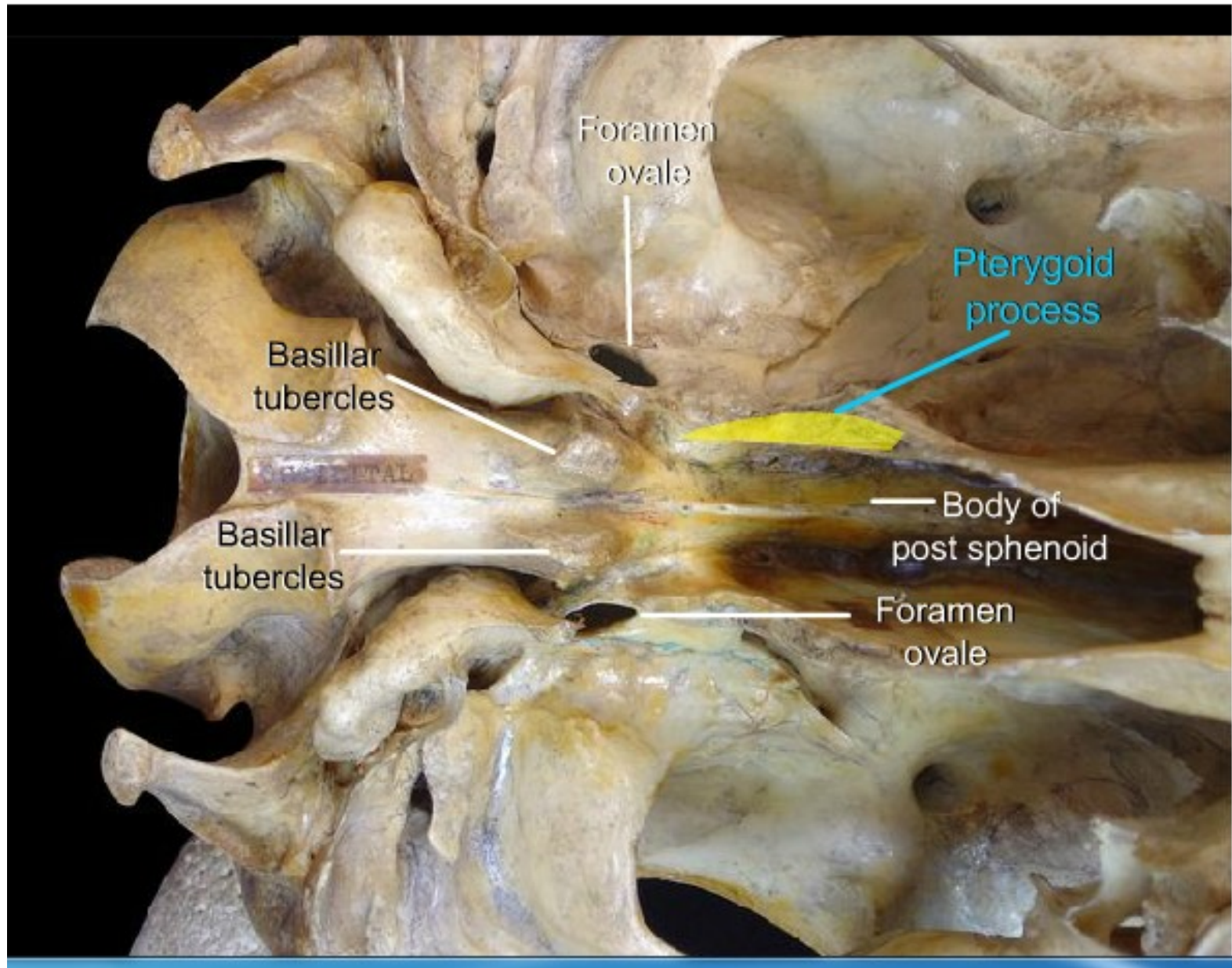
Post-sphenoid



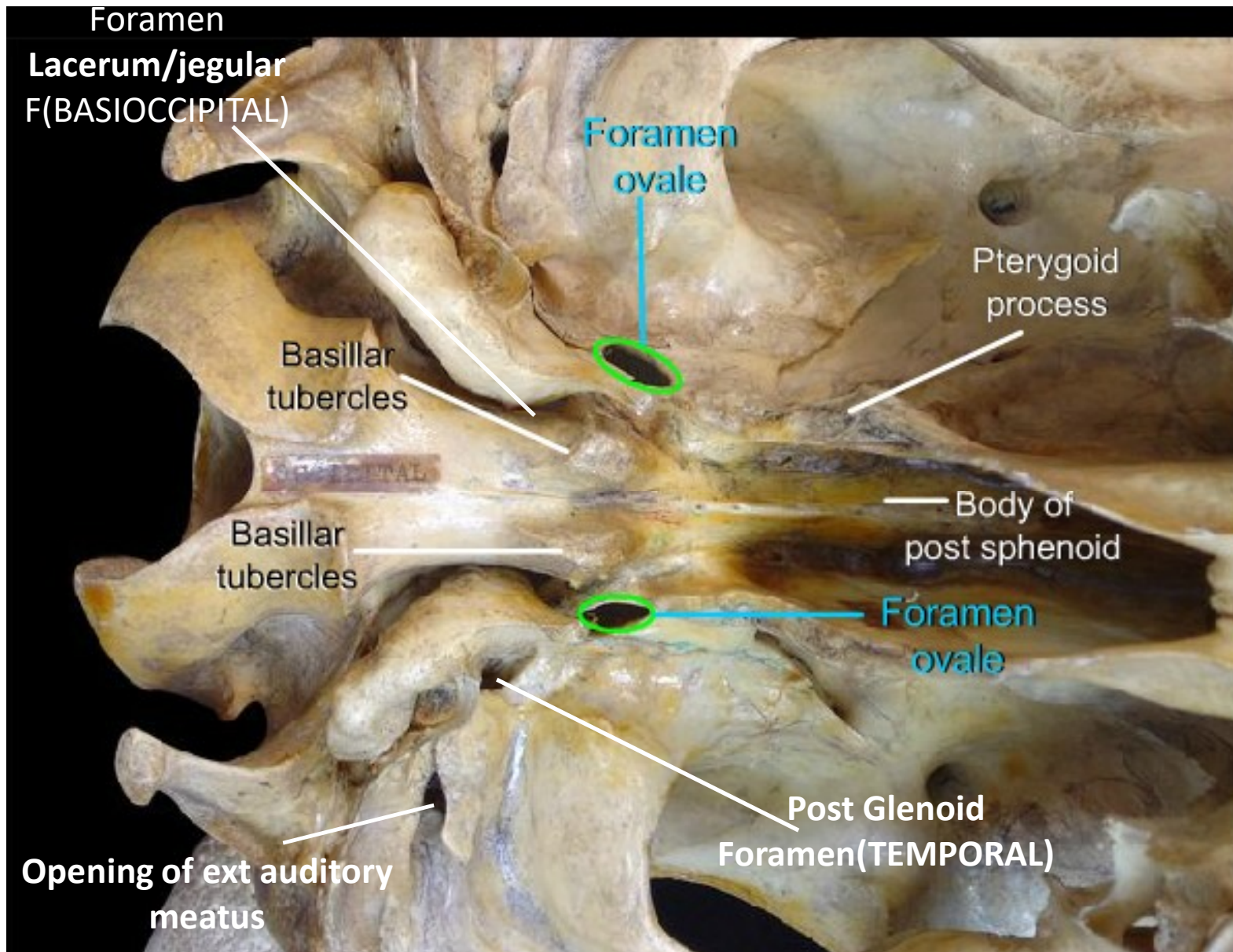
Maxilla



Post-sphenoid



Post-sphenoid



Ox

ETHMOID BONE

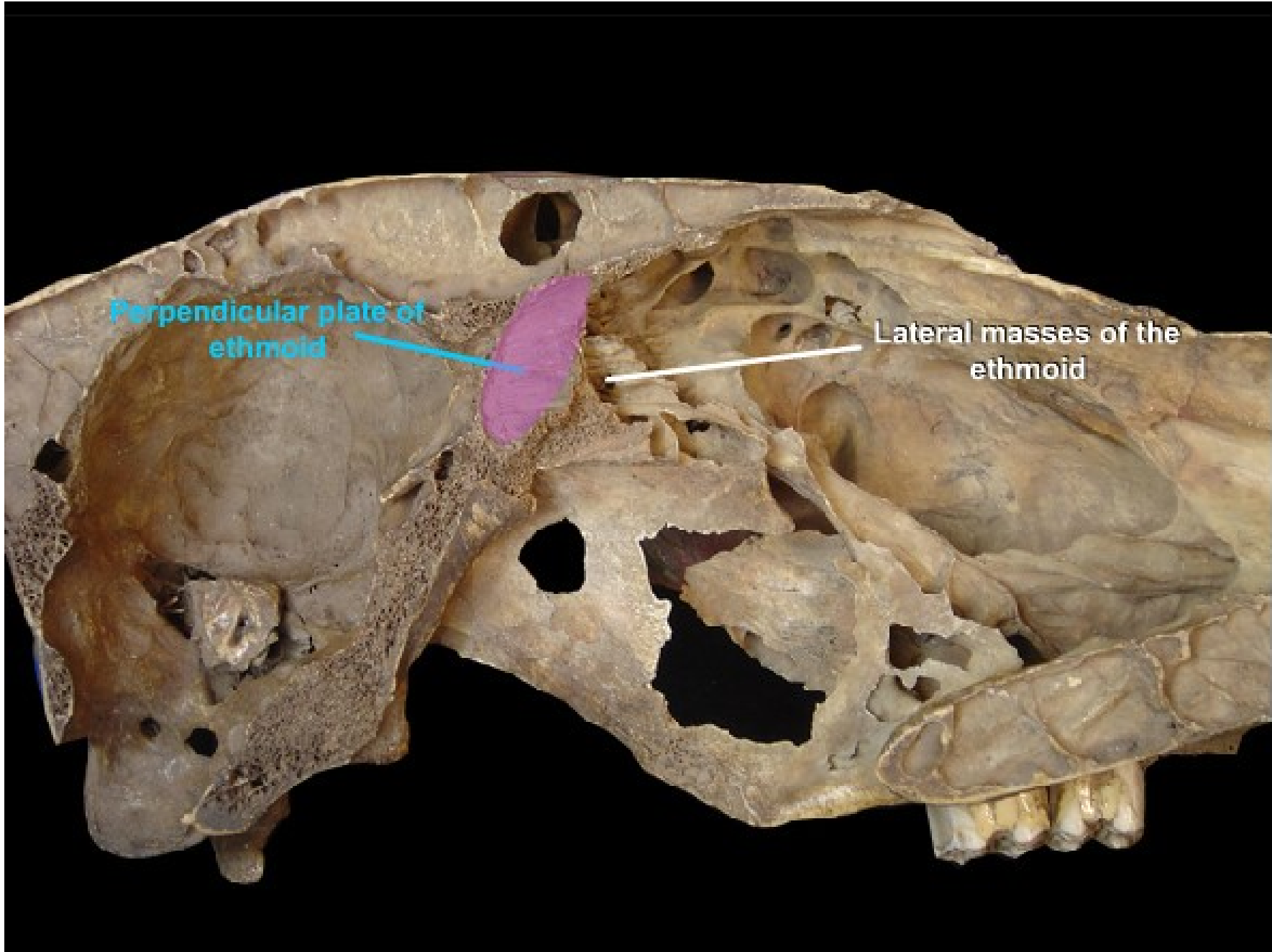
- It is a **single bone** situated in front of the **presphenoid** and has a **cribriform plate**, a **perpendicular part** and **two lateral masses**.
- **Cribriform plate**:
 - It is a **sieve-like** partition between the **cranial** and the **nasal cavities**.
 - Its cranial surface is divided by the **ethmoidal crest (crista galli)** into two halves.
 - Each half forms the deep **ethmoidal fossa** for the olfactory bulb. The plate is perforated by **numerous small foramen** for the passage of the olfactory nerve filaments and on either side of the **ethmoidal foramen** for the **ethmoidal artery** and **nerve**.
 - The **convex nasal surface** has the lateral masses attached to it.

Perpendicular plate

- It forms the **postero-dorsal** part of the **septum nasi** and is covered by a **mucous membrane**.
- Its **ventral border** is received into the groove of the **vomer**.

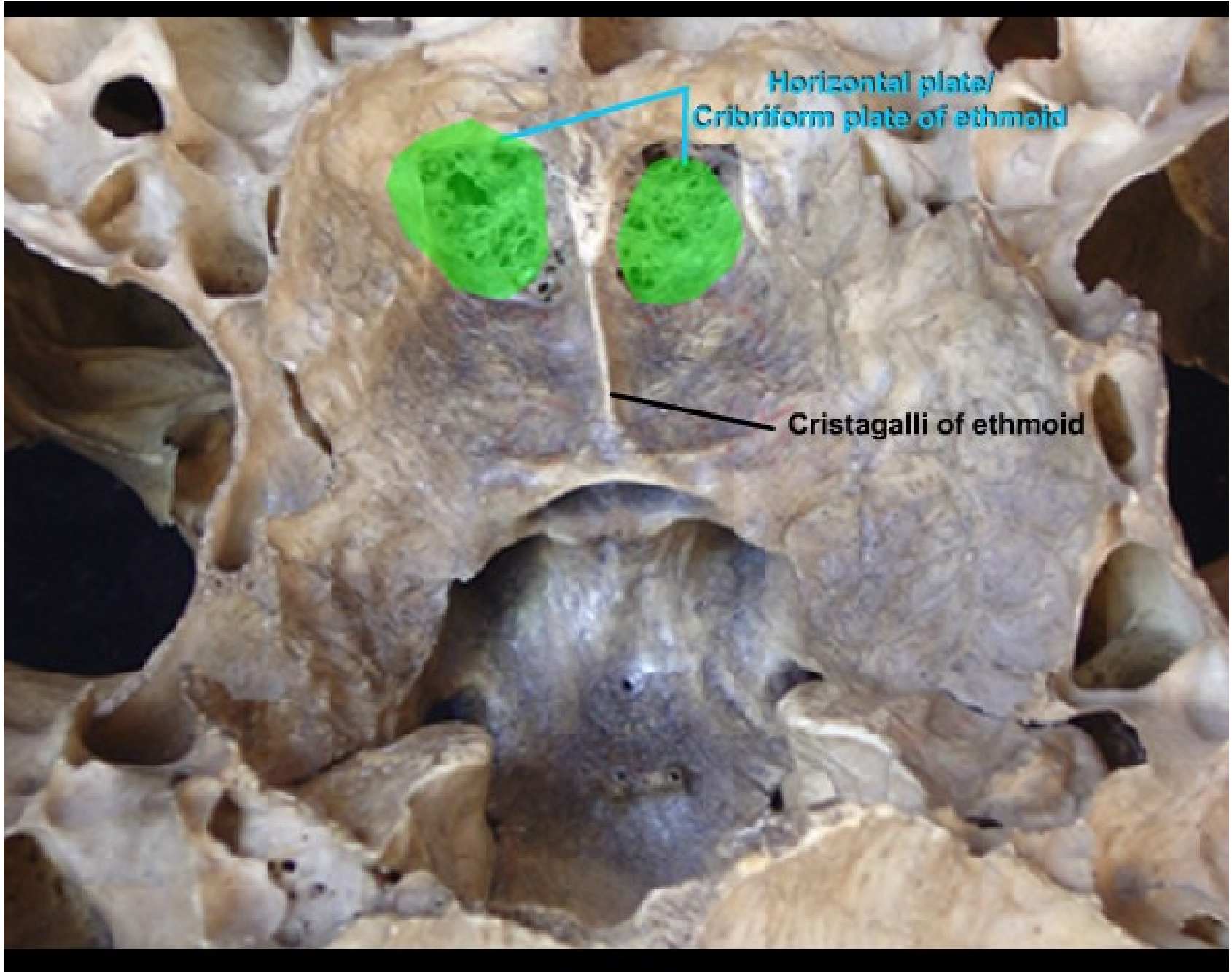
Lateral mass

- Each **lateral mass** is the posterior part of the nasal cavity above and behind the posterior nares.
- Each has the shape of cone with the base attached to the nasal surface of the cribriform plates.



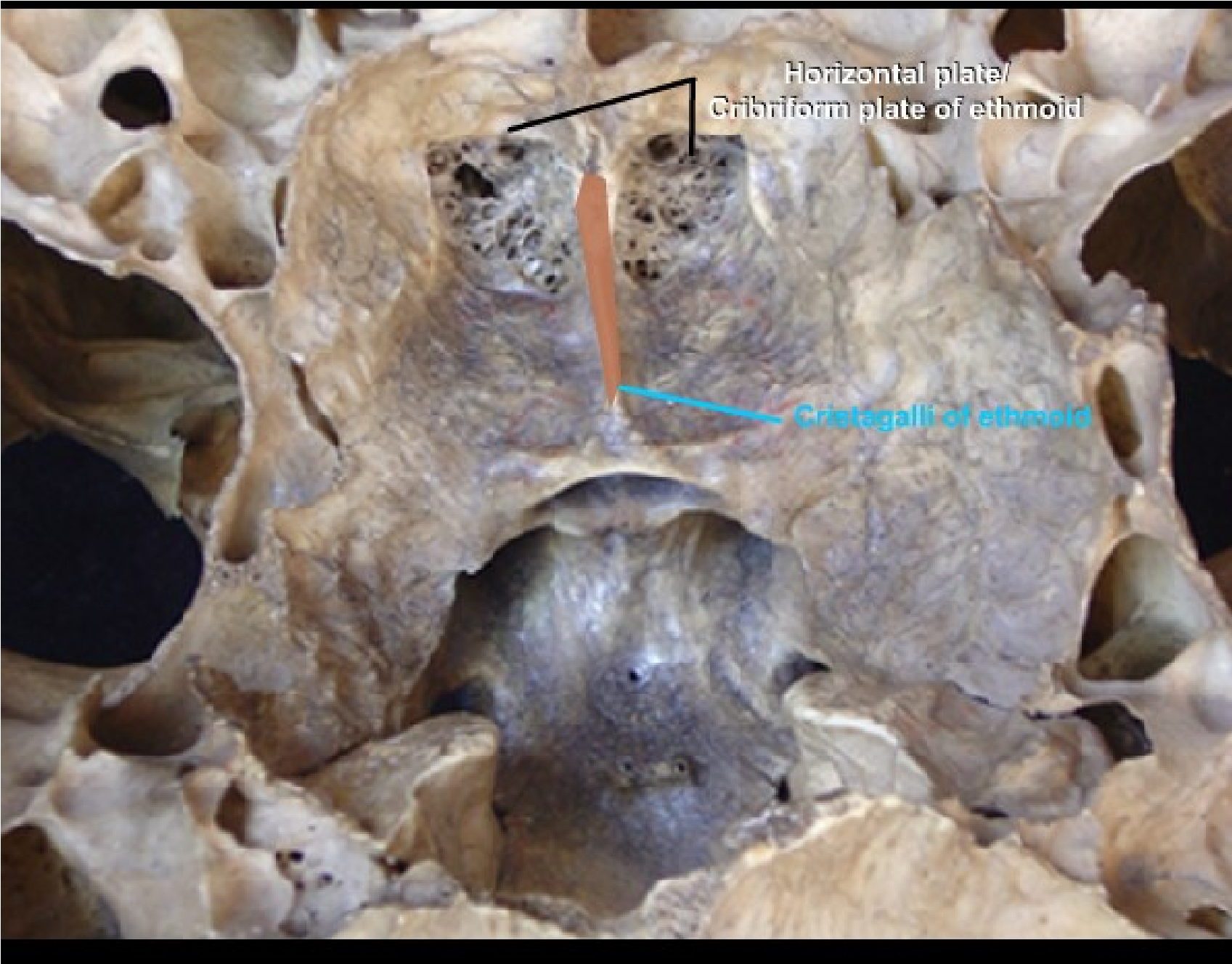
Perpendicular plate of ethmoid

Lateral masses of the ethmoid



Horizontal plate/
Cribriform plate of ethmoid

Crista galli of ethmoid



Horizontal plate/
Cribriform plate of ethmoid

Cristagalli of ethmoid

FRONTAL BONE

- The frontal bones are situated on the **dorsal aspect** of the skull and form the **entire roof** of the cranium. They are the **largest of cranial** bones.
- The characteristic appearance of the skull is largely due to the shape and size of the frontal bones. Each has a body or **frontal part**, an **orbital plate** and **supra orbital processes**.

Body

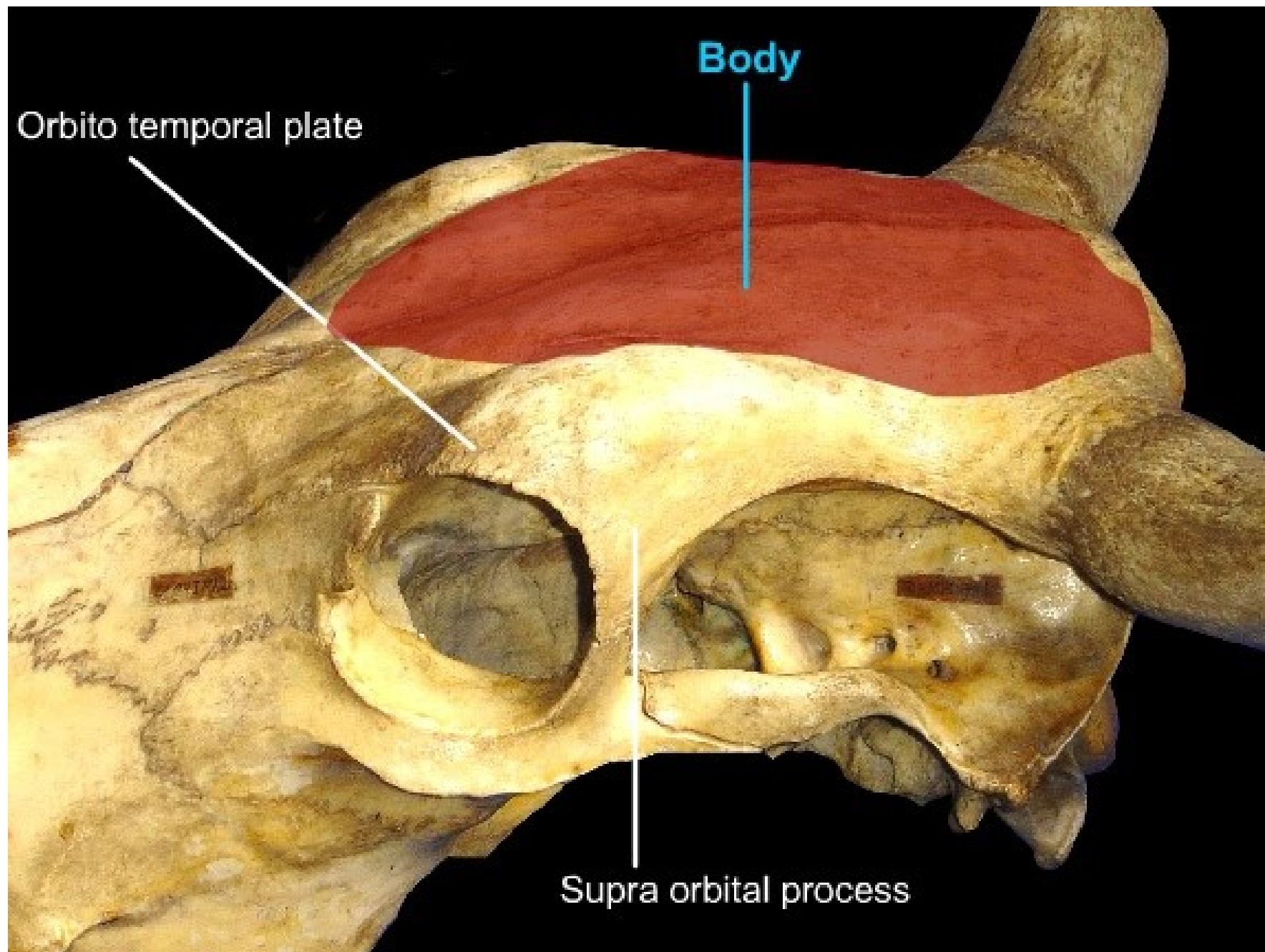
- The **external surface** of the body presents the **supra-orbital groove** about the middle of which is **supra orbital foramen**- the upper opening of the **supra orbital canal**.
- The **supra orbital groove** marks the course of **frontal vein**.
- It meets the parietal and at the junction, forms a central prominence- the **frontal eminence (torus frontalis)**.
- At its **postero-lateral angle** is a large conical process.
- The **horn core (flint or cornual process)** is excavated to form part of the frontal sinus.
- The anterior end with its fellow form notch to receive the **two nasal bones**.

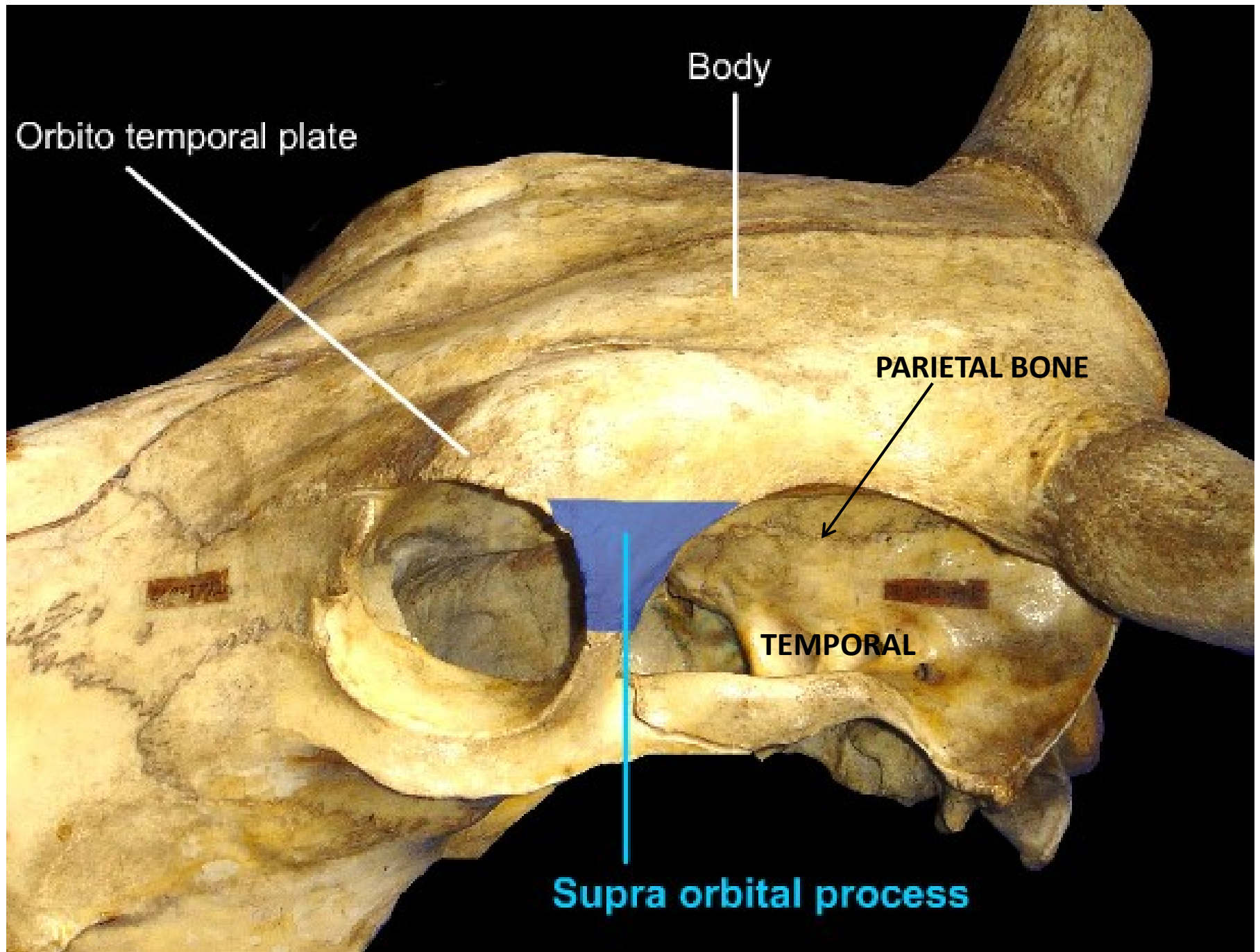
Orbital plate

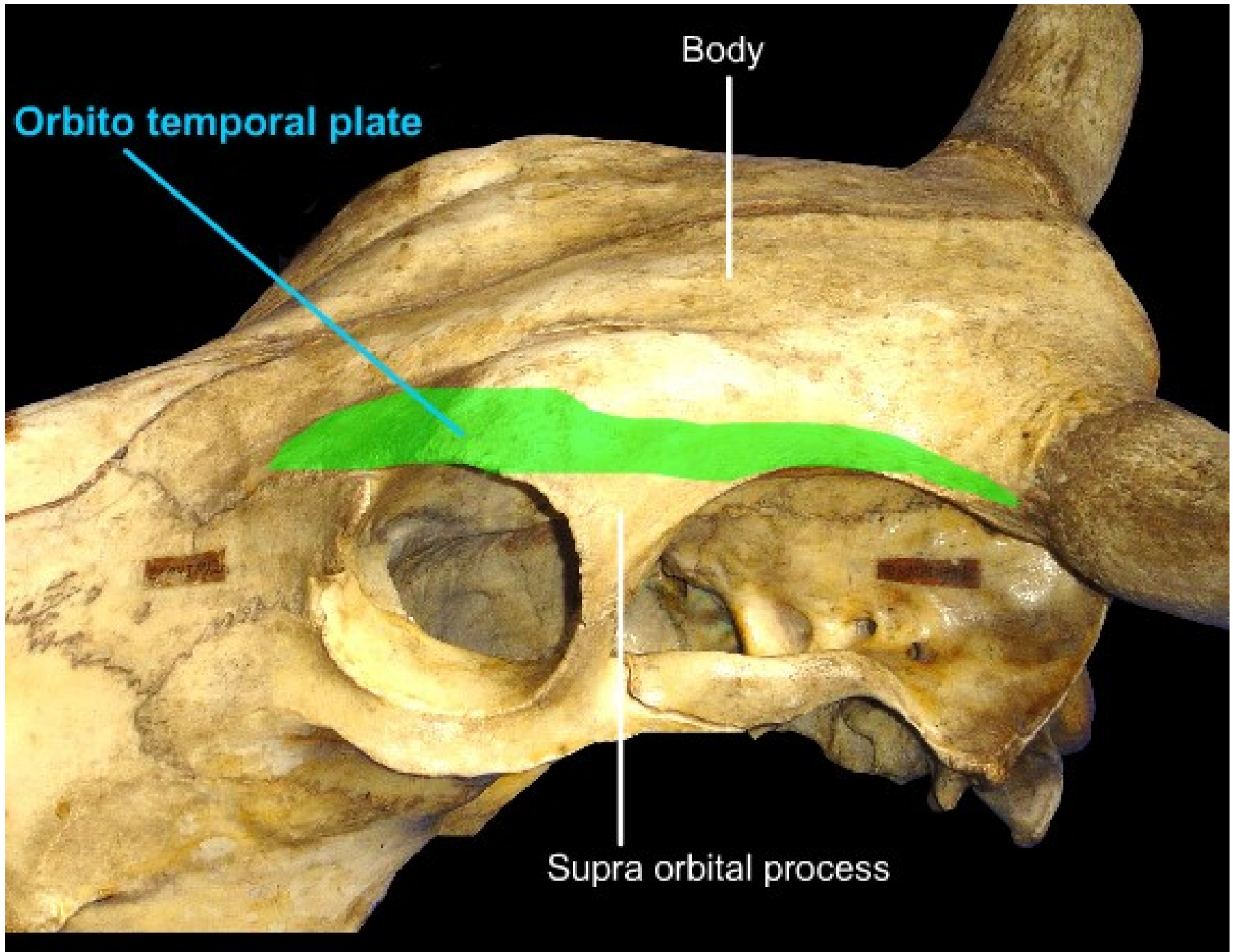
- It forms the medial wall of the orbit.
- It presents the orbital opening of the supra-orbital canal. Close to the posterior edge is the ethmoidal foramen.
- The medial surface meets the sphenoid and ethmoid.

Supra-orbital process

- It forms a part of the posterior rim of the orbit.
- Its medial face is related to the lacrimal gland.
- It meets below the frontal process of the malar.



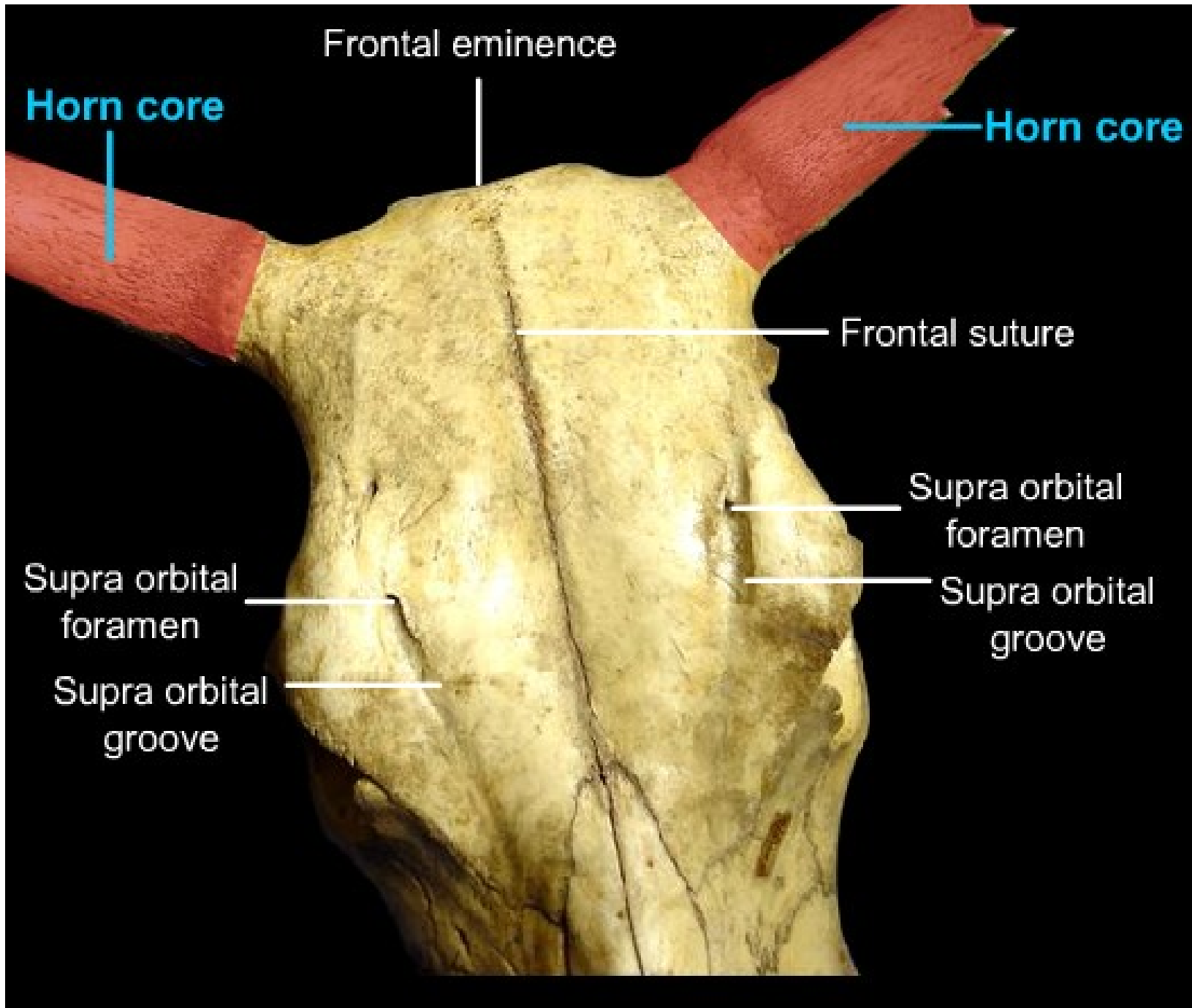


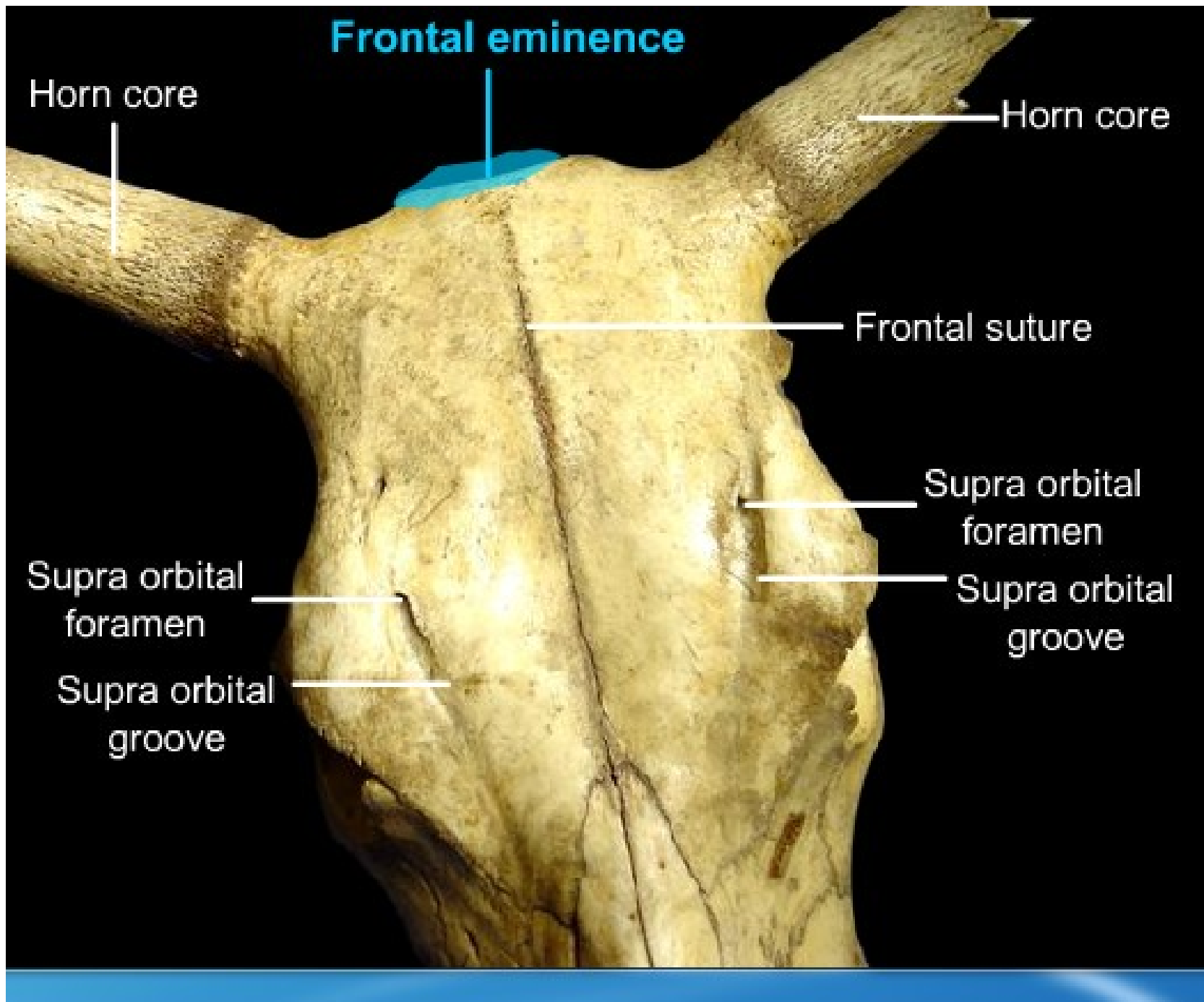


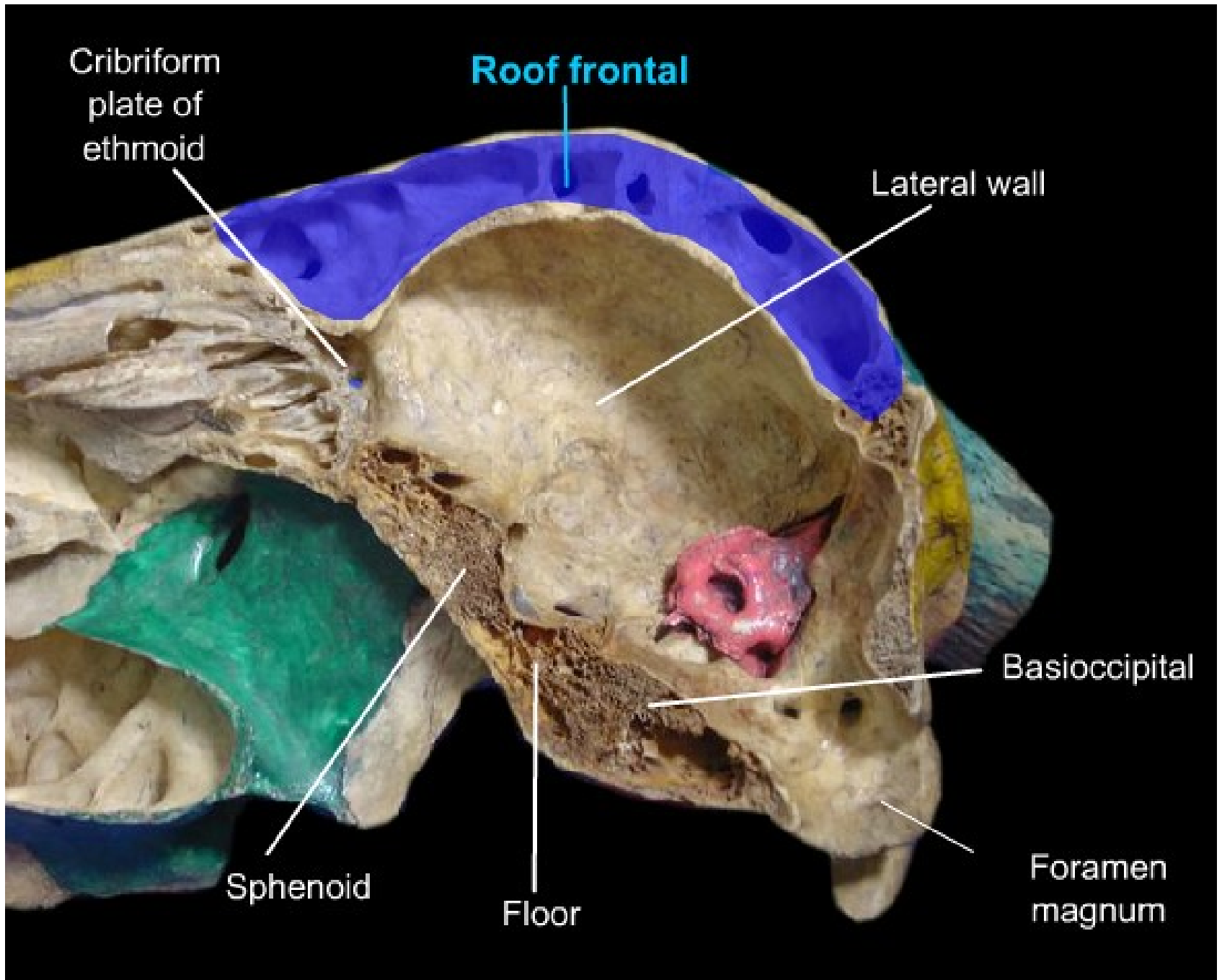
Orbito temporal plate

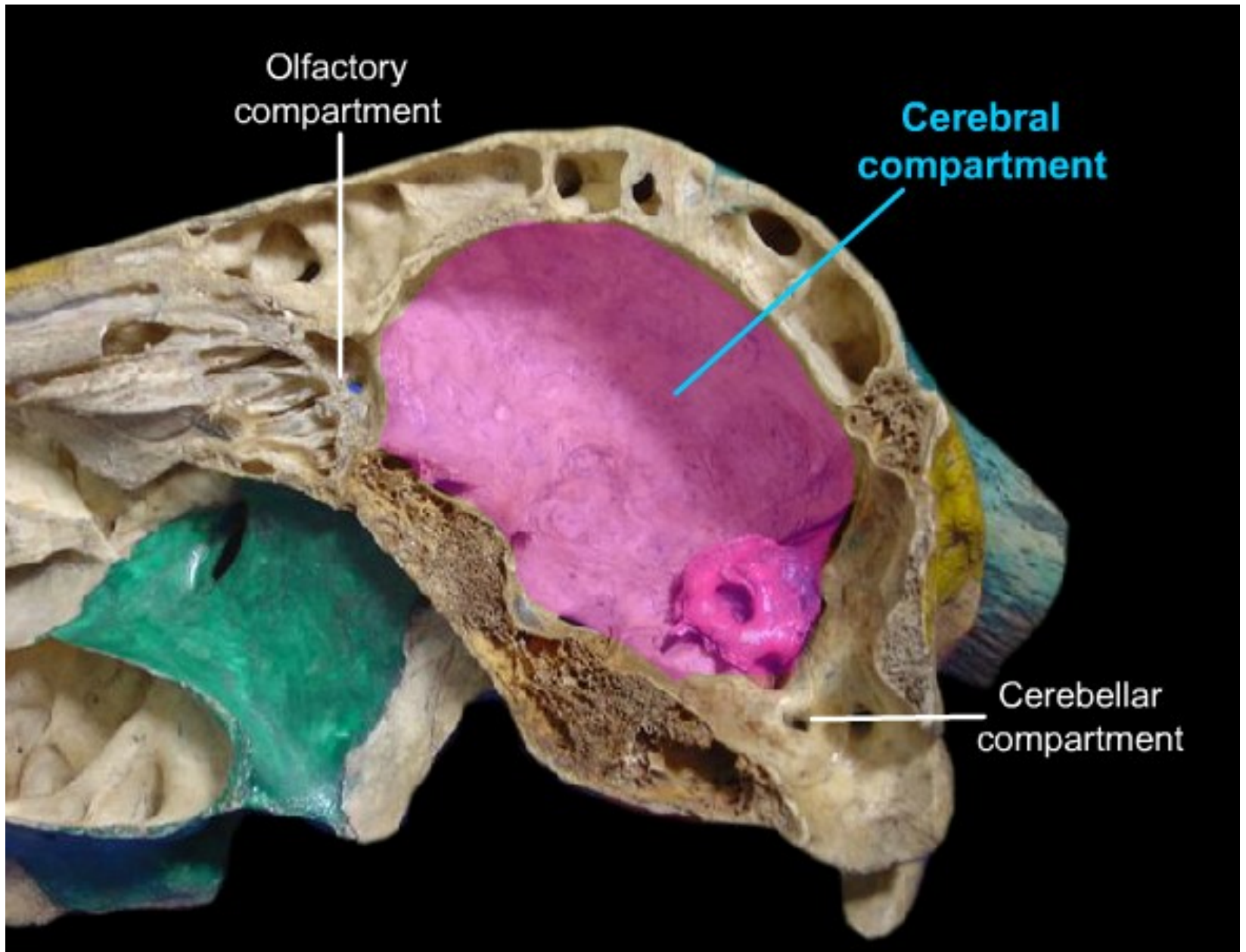
Body

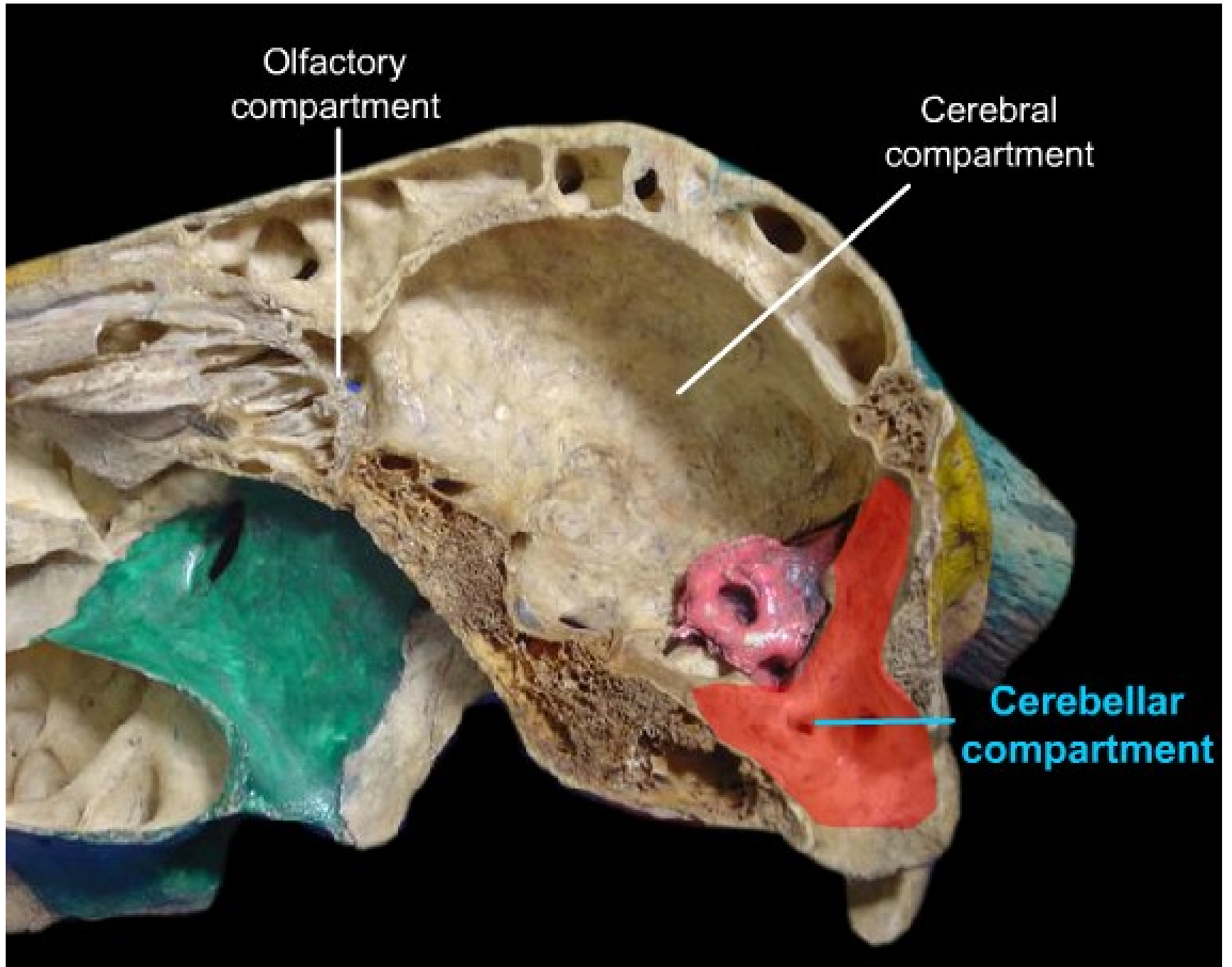
Supra orbital process











Olfactory
compartment

Cerebral
compartment

Cerebellar
compartment

Ox

TEMPORAL BONE

- They form part of the **lateral walls** of the **cranium**. They are situated between the **occipital** and the **parietal** behind, and the **frontal** dorsally and **sphenoid** ventrally and medially.
- Each consists of **squamous** and **petrous parts**, which are fused completely at birth.
- **Squamous temporal**
- It has a **body and zygomatic process**. The external surface of the body is divided by the temporal crest into two parts. The crest is continuous with the parietal crest above, turns forward below ending in a tubercle, above the external acoustic meatus.

- **Petrous temporal**

- The **petrous temporal** is situated between the **occipital** behind and the **squamous temporal** in front.

- It consists of **petrous** and **tympanic parts**.

- **Petrous part**

- The **petrous part** contains internal ear.

- The medial face is smooth and forms the lateral wall of the **cerebellar compartment** of the cranial cavity.

- It presents the **internal acoustic (auditory) meatus** for the VII and VIII cranial nerves.

- In the superior one is the origin of the facial canal, which curves through the bone and opens externally at the **stylomastoid foramen**, it transmits the XII cranial nerve.

- The **inferior fossa** presents small foramina for the passage of the fibres of the VIII cranial nerve.

Tympanic part

- The **tympanic part** is external and presents the following:
- The **external auditory** process-a curved plate of bone projecting through a notch in the squamous temporal and encloses the external **acoustic meatus**.
- Between the hyoid and the **paramastoid** processes is the **stylomastoid foramen**- the external opening of the facial canal.
- The **bulla tympanica** (auditory bulla) whose cavity forms part of the **middle ear**.
- The **muscular (styloid)** process of the petrous temporal springs from below the bulla for muscular attachment.
- Lateral to the root of this process is the **petro-tympanic (Glaserian)** tissue for the chorda tympani nerve and medially is a groove or **semicanal**- the osseous **eustachian tube (auditory tube)**.

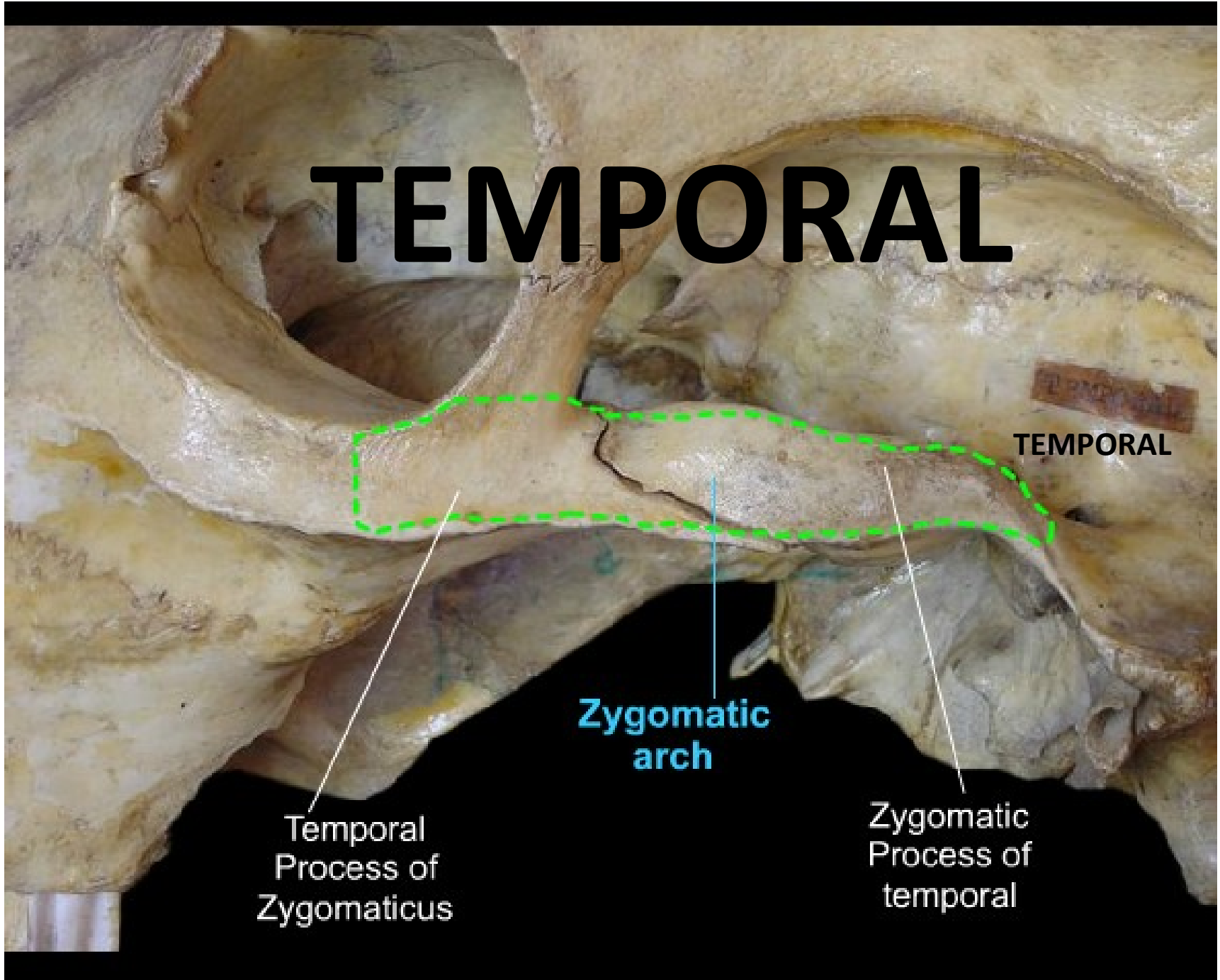
TEMPORAL

TEMPORAL

Zygomatic
arch

Temporal
Process of
Zygomaticus

Zygomatic
Process of
temporal



THANK YOU