

RU RMT 02

Lecture 09

Cranium

General features of skull

Skull forms the large cranial cavity as well as smaller cavities such as the nasal cavity and the orbits

Some bones of the skull contain cavities known as paranasal sinuses

The skull contains 3 tiny bones known as auditory ossicles that are located within the temporal bone

Other than the auditory ossicles, the mandible is the only moveable bone of the skull



Functions of skull

Inner surface of the bones attach to membranes (known as meninges) which stabilize the brain, blood vessels and nerves,

The outer surfaces of the bones act as muscle attachment sites

Facial bones provide the framework of the face

Bones of the skull protect the special sense organs (hearing, taste, smell, sight)

Contain numerous foramen which are the exit sites for nerves and blood vessels of cranium



Bones of Skull

Skull contains 22 bones that are grouped into 2 categories:

CRANIAL BONES

Cranial bones enclose and protect brain. There are a total of 8 bones. These include:

- 1. frontal**
- 2. ethmoid**
- 3. parietal (2)**
- 4. temporal (2)**
- 5. Occipital (1)**
- 6. Sphenoid (1)**

FACIAL BONES

Facial bones form the face.

There are a total of 14 bones.

These include:

- 1. nasal (2)**
- 2. maxilla (2)**
- 3. zygomatic (2)**
- 4. lacrimal (2)**
- 5. palatine (2)**
- 6. inferior nasal conchae (2)**
- 7. Vomer (1)**
- 8. Mandible (1)**

FRONTAL BONE

- **FEATURES/BONY LANDMARKS OF THE FRONTAL BONE**
 - Metopic Suture
 - Frontal Squama
 - Supraorbital margins
 - Supraorbital notch
 - Superciliary arch
 - Glabella
 - Frontal Sinus

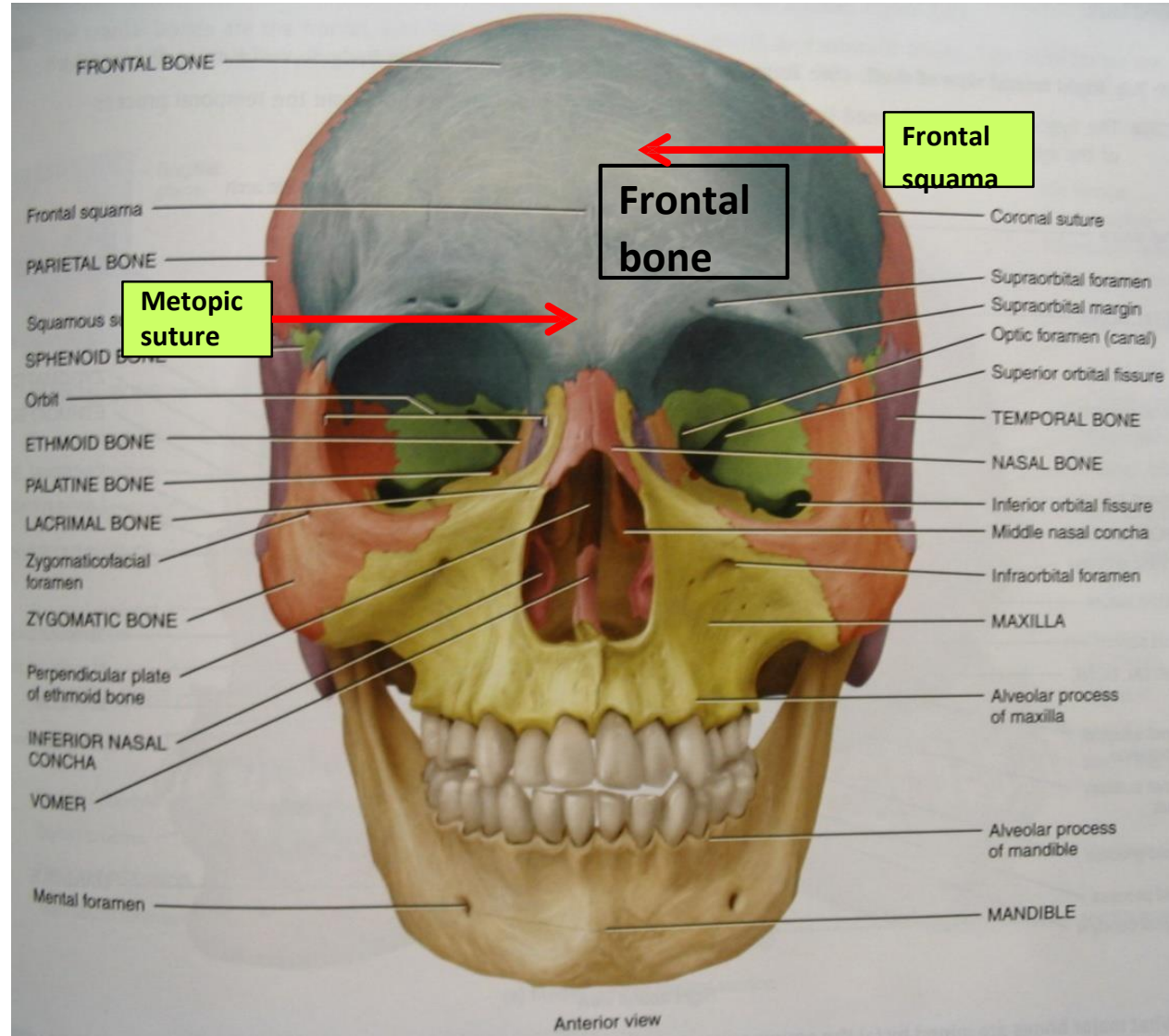
Frontal bone

Contributes to the
forehead,
roof of orbit,
anterior portion
of cranial floor

Metopic suture:

- Represent the division of right and left frontal bones that normally fuses shortly after birth
- ## Frontal squama:

- Plate of bone that forms the forehead & gradually slopes inferiorly and becomes almost vertical



Frontal bone

Supraorbital margins:

- Angular boundary between squama and orbits
- From this margin, bone extends posteriorly to form roof of orbit

Supraorbital notch/foramen:

- Located within the supraorbital margin, slightly medial to its midpoint
- Sometimes the foramen is incomplete and it then forms a notch
- Through it passes supraorbital nerve and artery

Frontal bone

Superciliary arch:

- Ridge located superior to the supraorbital margin
- Extends laterally on each side from the midline

Glabella:

- Smooth, slightly depressed area between superciliary arches

Frontal sinus:

- Lie deep to frontal squama and glabella
- Contains mucous membrane-lined cavities

Parietal bones

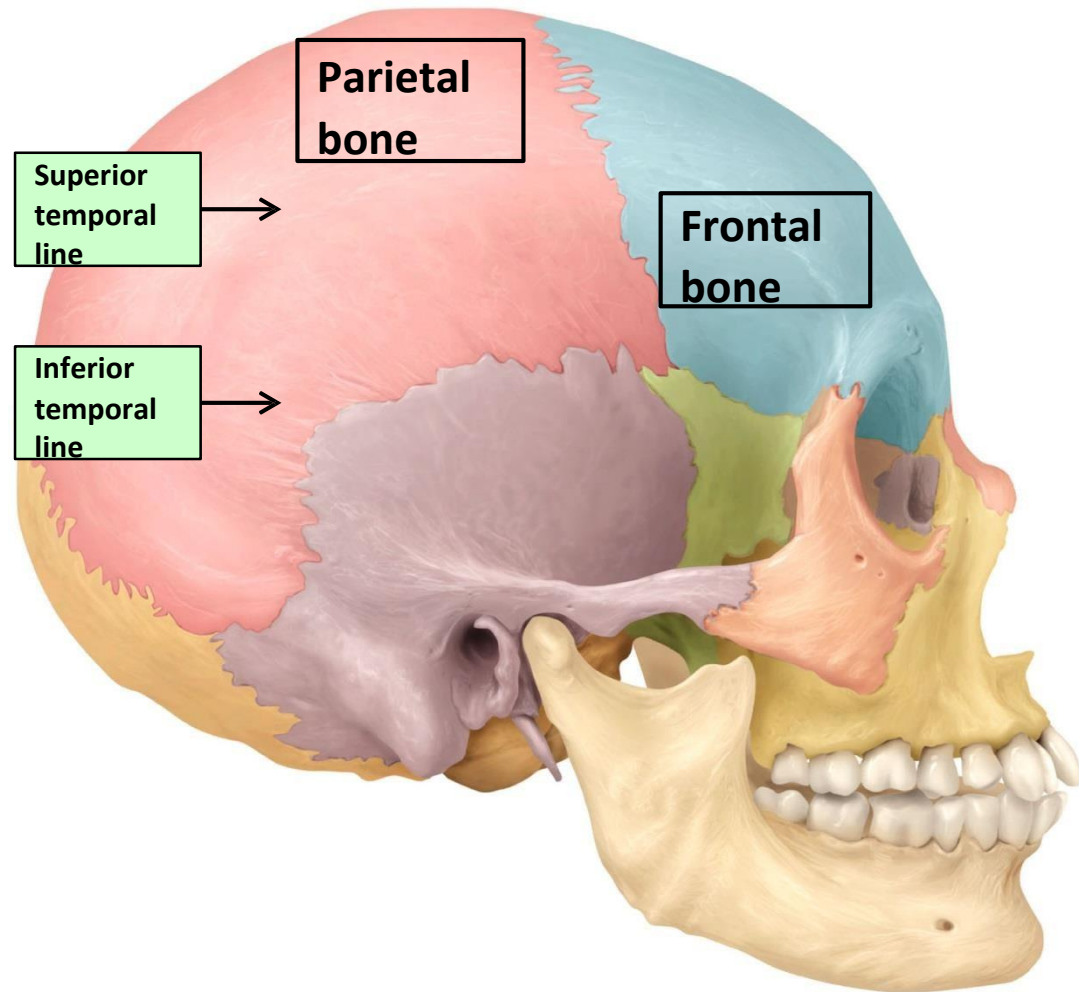
One on either side

Form large portion of sides and roof of cranial cavity

No foramina associated with parietal bone

Superior and inferior temporal lines:

- **Form superior and posterior boundary of temporal fossa, which houses the temporalis muscle**



TEMPORAL BONE

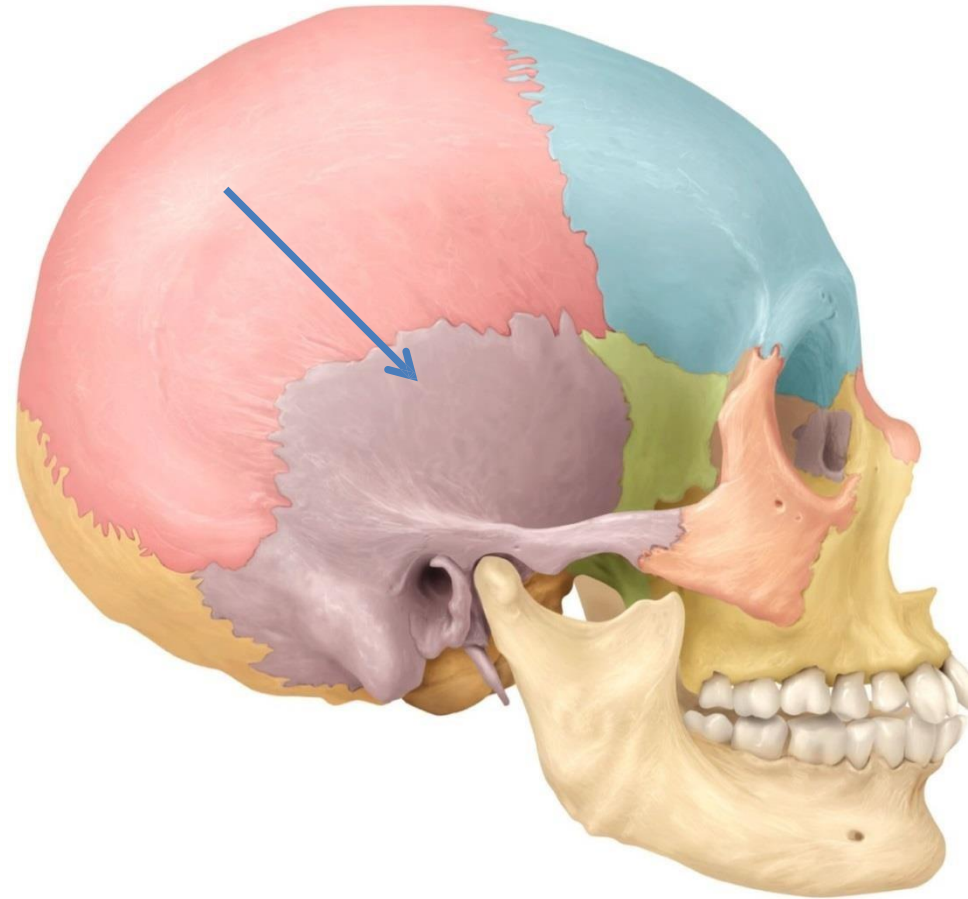
- **FEATURES/BONY LANDMARKS OF THE TEMPORAL BONE**
 - Temporal Squama
 - Petrous temporal bone
 - Processes
 - Mastoid
 - Styloid
 - Zygomatic
 - Foramen
 - External Auditory Meatus
 - Carotid canal
 - Jugular foramen

Temporal bone

Form inferolateral aspects of cranium, and part of the cranial floor

Temporal squama:

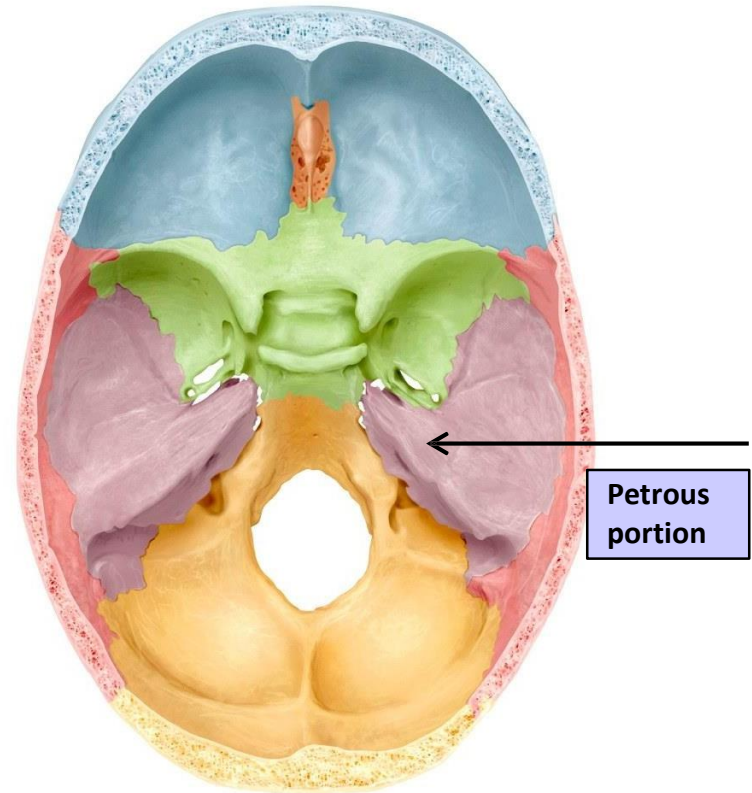
- Thin, flat part of temporal bone that forms anterior & superior part of temple



Temporal bone – Internal view

Petrous portion:

- Contributes to floor of cranial cavity
- It houses the internal and middle ears (contain structures related to hearing and equilibrium)



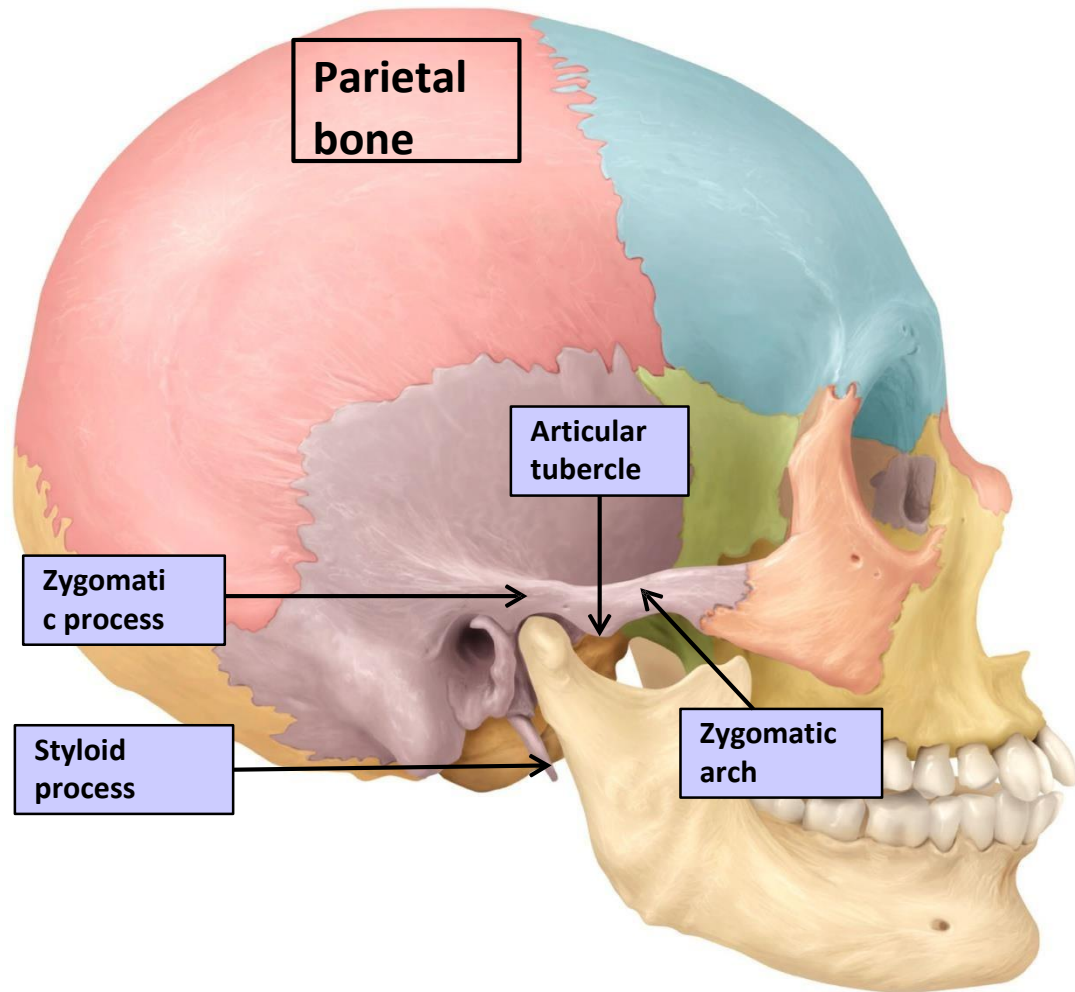
Temporal bone

Styloid process:

- Projects inferiorly from inferior surface of temporal bone
- It serves as a point of attachment for muscles and ligaments of the tongue and neck

External Auditory Meatus:

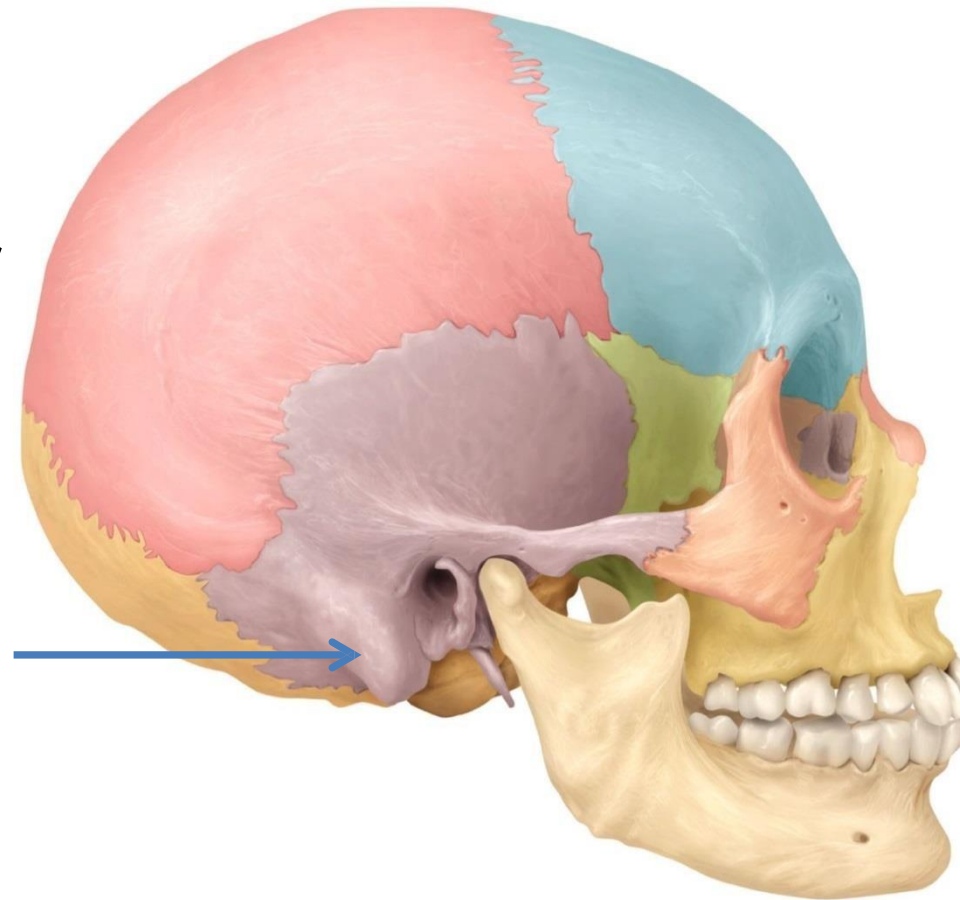
- Part of the external ear canal and a passageway to the internal cranium.



Temporal bone

Mastoid process:

- Located posterior & inferior to the external auditory meatus, or ear canal, which directs sound waves into the ear
- It is a point of attachment for neck muscles



Temporal bone

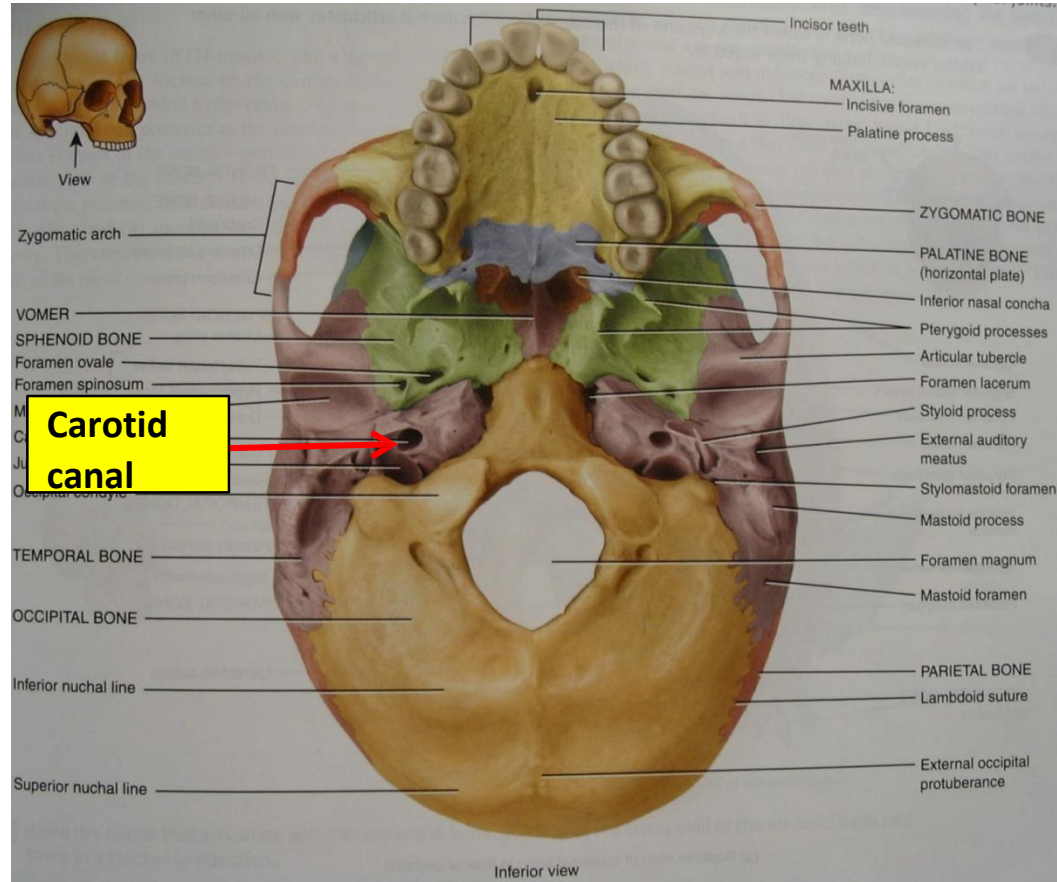
Zygomatic process:

- Projects from inferior surface of temporal squama
- It articulates with the temporal process of the **zygomatic bone**
- Together forms the zygomatic arch
- Each zygomatic process has a socket located on the posteroinferior surface called the **mandibular fossa**.
- Anterior to the mandibular fossa is a rounded elevation called the **articular tubercle**
- The mandibular fossa and the articular tubercle are two landmarks that articulate with the mandible to form the temporomandibular joint (TMJ)

Temporal bone

Foramina:

- **Carotid canal** - through which the internal carotid artery passes
- **Jugular foramen** – formed by articulation with the occipital bone, helps through which passes the internal jugular vein. This foramen is located posterior to carotid foramen and anterior to occipital bone



OCCIPITAL BONE

- **FEATURES/BONY LANDMARKS OF THE TEMPORAL BONE**
 - External Occipital protuberance/Inion
 - Superior and inferior Nuchal lines
 - Clivus
 - Occipital condyles
 - Foramen
 - Magnum
 - Hypoglossal canal

Occipital bone

Forms the posterior part and most of the base of the cranium

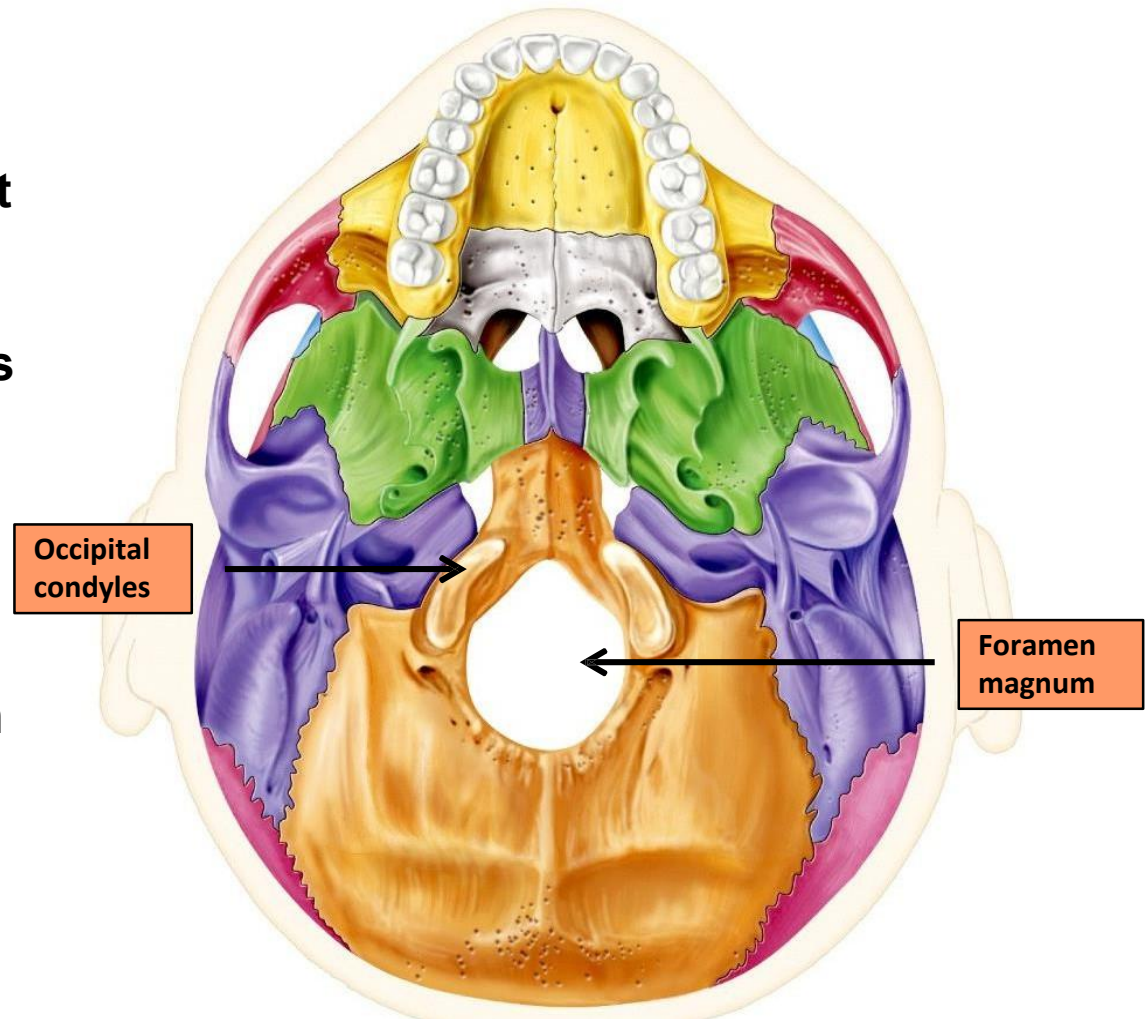
Occipital
bone

Foramen magnum:

- Situated in the inferior part of the bone
- Medulla of brain connects with spinal cord within this foramen
- Vertebral and spinal arteries pass through it

Occipital condyles:

- Convex oval processes on either side of foramen magnum
- Articulate with C1 to form the atlanto-occipital joint



Occipital bone

Hypoglossal foramen:

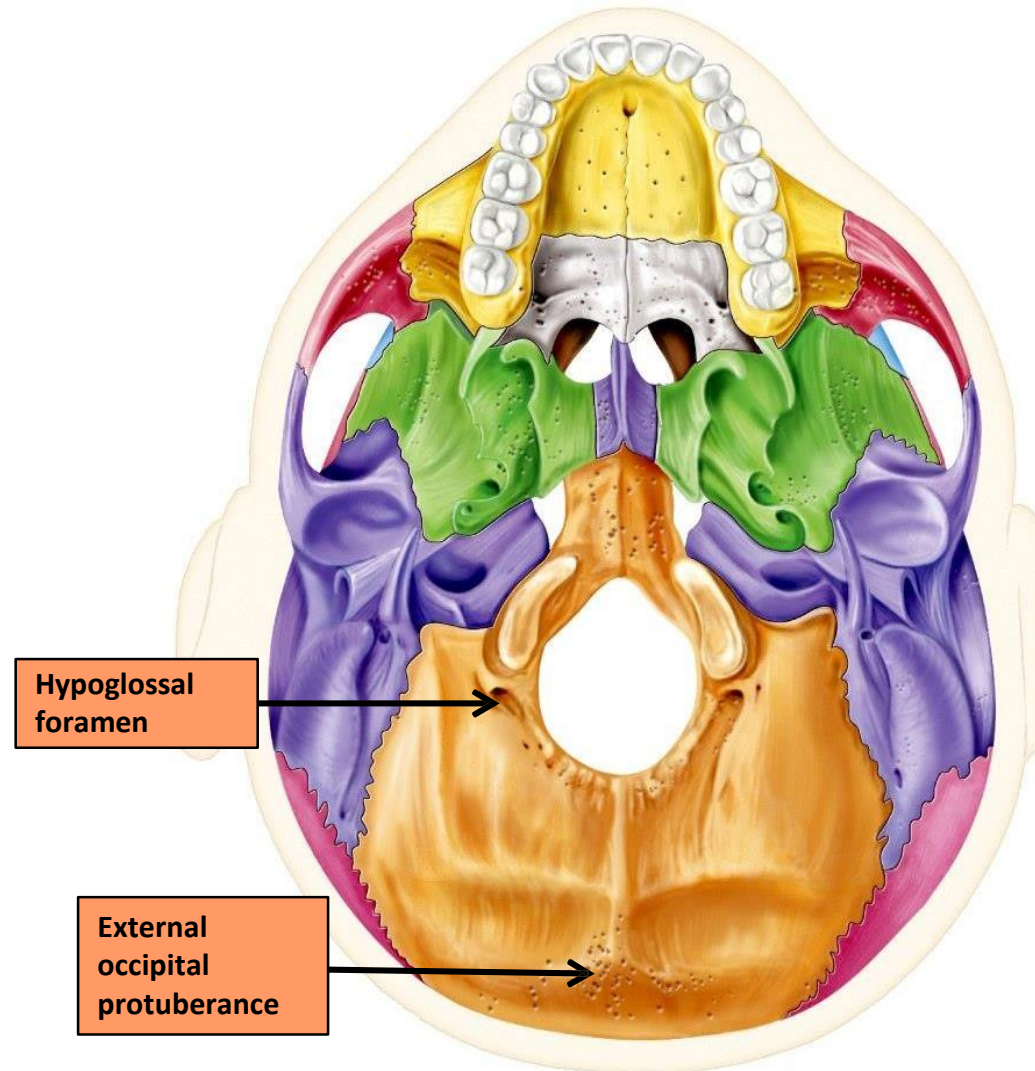
- Adjacent to each occipital condyle on inferior surface of skull
- Hypoglossal nerve (CN XII) passes through

External occipital protuberance:

- Most prominent midline projection on posterior surface of head.
- Palpated as a bump at the back of the head, just above the neck

Clivus:

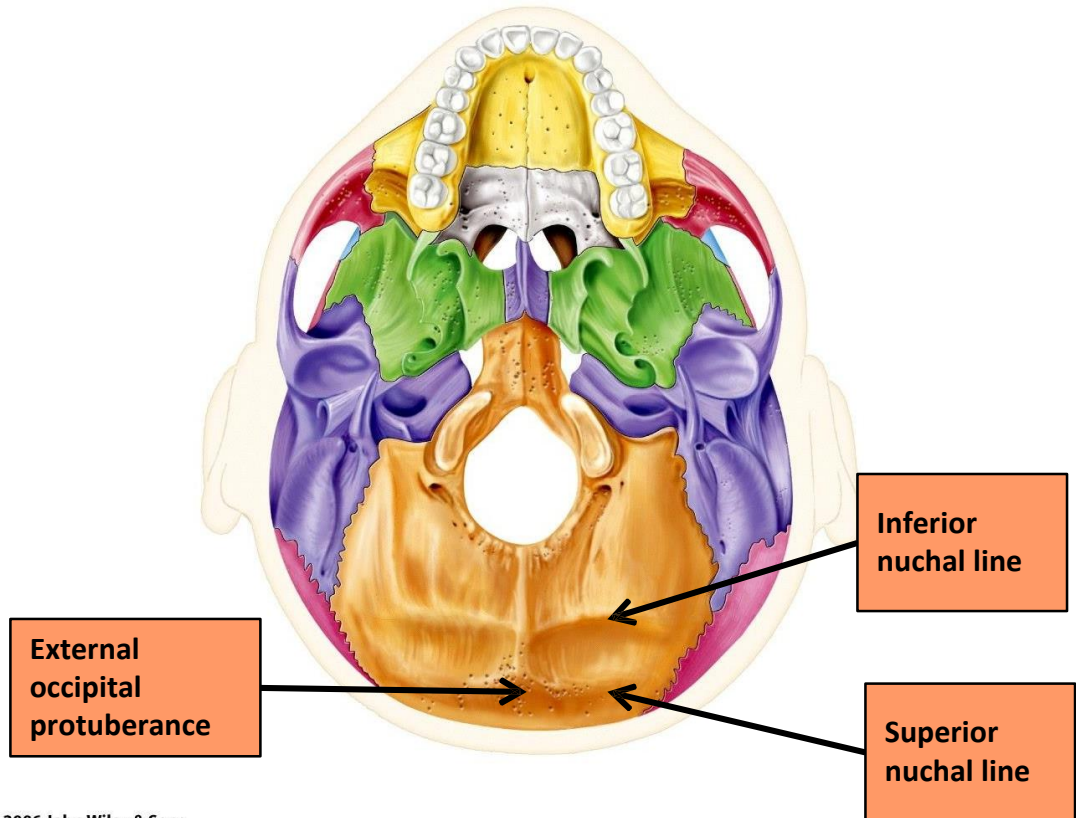
- Basilar part of occipital bone and articulates anteriorly with the sphenoid bone.



Occipital bone

Superior and inferior nuchal lines:

1. Two curved ridges, the superior nuchal lines, and below these inferior nuchal lines that extend from the external occipital protuberance are.
2. Both these lines are areas of muscle attachment

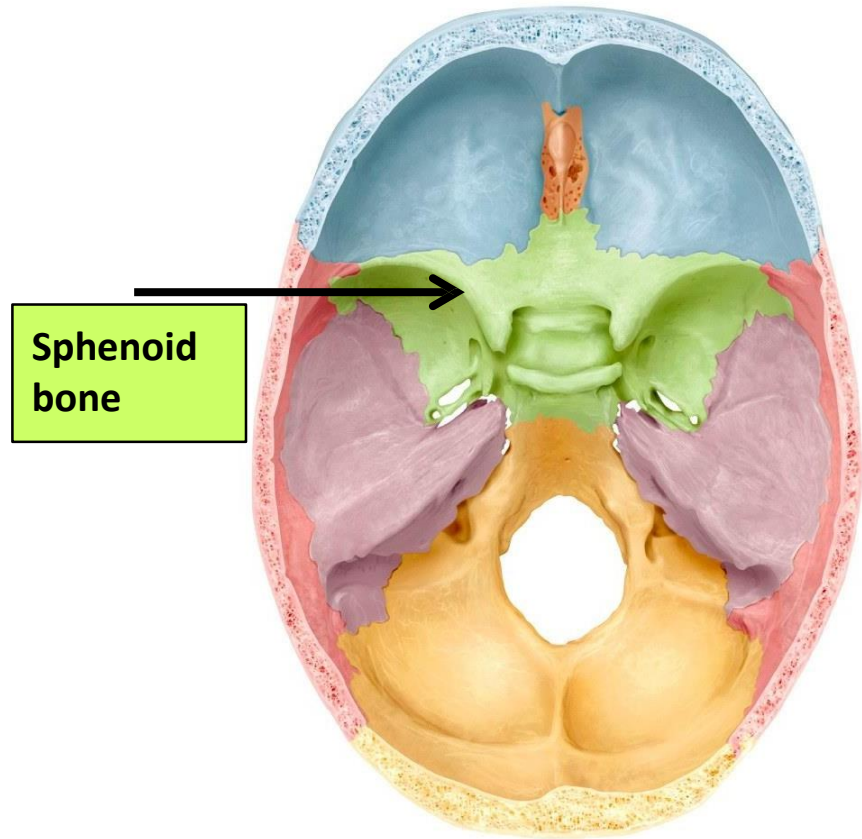


Sphenoid bone

Lies at the middle part of the base of the skull and resembles a butterfly with outstretched wings

Very important bone of the cranial floor because articulates with all other cranial bones and holds them together

KEYSTONE OF THE CRANIUM



SPHENOID BONE

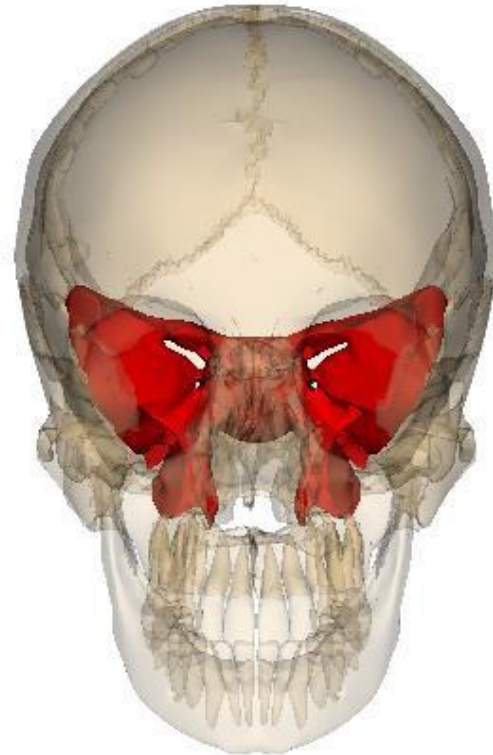
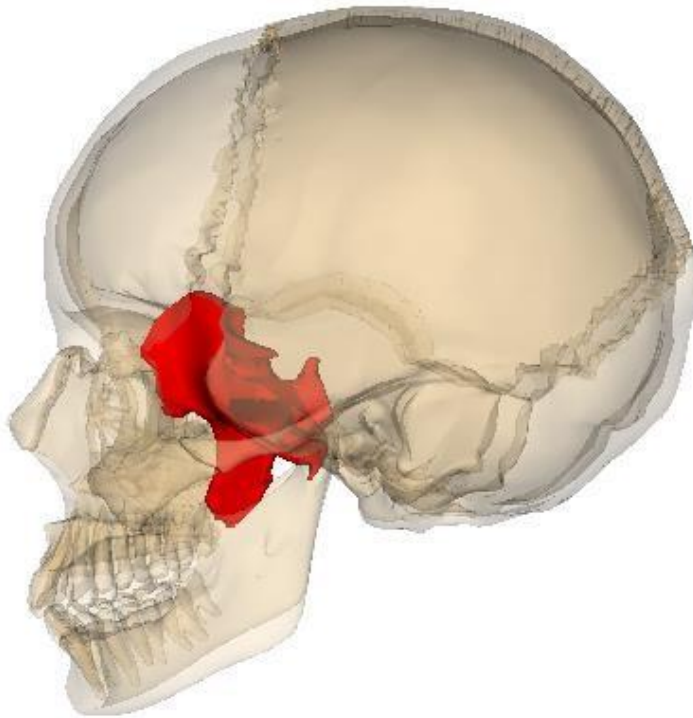
- BONEY FEATURES OF THE SPHENOID

- Sella Turcica
 - Hypophyseal fossa
 - Tuberculum sellae
 - Dorsum Sella
- Greater wings
- Lesser wings
- Optic foramen
- Superior orbital fissure
- Inferior orbital fissure
- Pterygoid processes
- Sphenoid sinuses
- Foramen Ovale
- Foramen Lacerum

Sphenoid bone

Body:

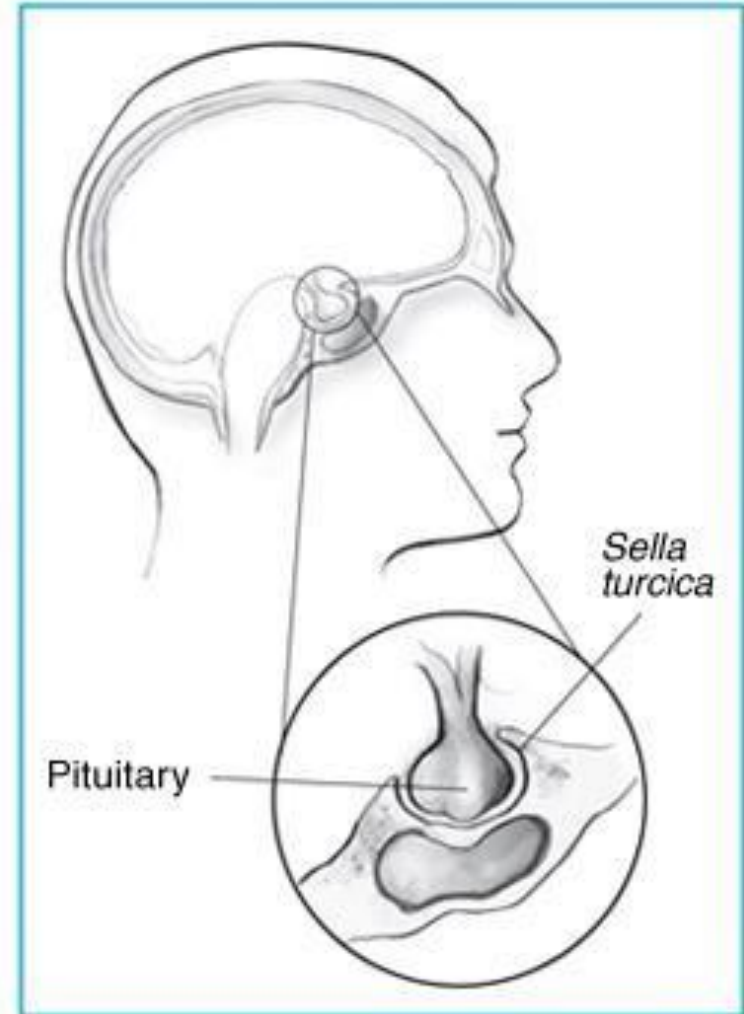
- Hollowed and cube-like
- Situated between the ethmoid and occipital bones
- The space inside body is known as the sphenoidal sinus, which drains into the nasal cavity



Sphenoid bone

Sella turcica:

- Bony saddle-shaped structure on superior surface of body
- Contains a depression known as hypophyseal fossa, which contains the pituitary gland
- The anterior part of the hypophyseal fossa contains a ridge known as the tuberculum sellae, while the ridge on the posterior part is called dorsum sellae



Sphenoid bone

Greater wings:

- Project laterally from body and form anterolateral floor of cranium
- Also form part of lateral wall of skull just anterior to the temporal bone

Lesser wings:

- Smaller than greater wings
- Form a ridge of bone anterior and superior to greater wings
- Form part of floor of cranium, and posterior part of the orbit of the eye



Sphenoid bone

Optic Foramen: (1)

- Situated between the body and lesser wing just anterior to sella turcica
- Optic nerve (CN II) and ophthalmic artery pass through this foramen into the orbit

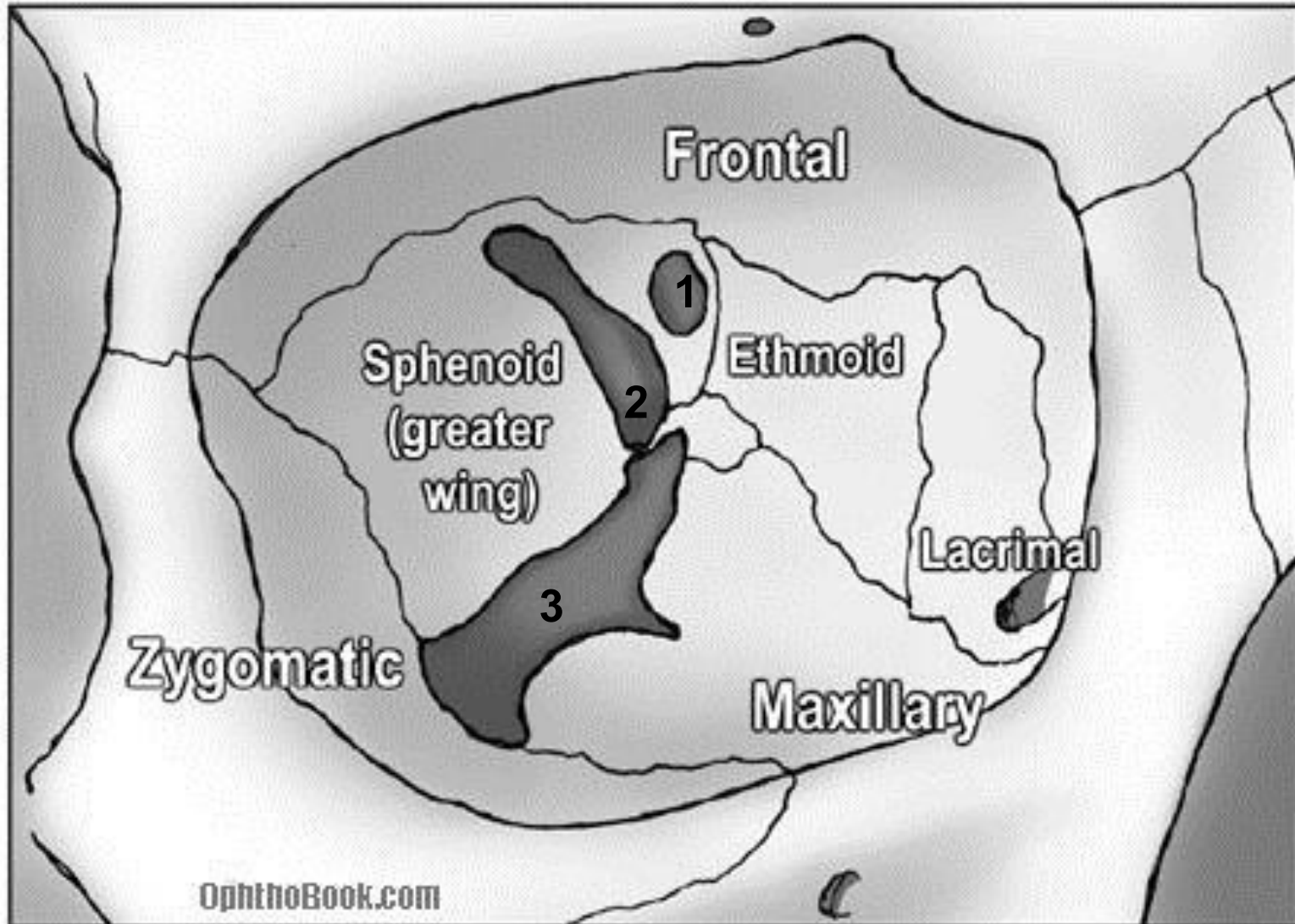
Superior Orbital Fissure: (2)

- Triangular opening lateral to sphenoid body between greater and lesser wings
- Blood vessels and nerves pass through it to the orbit

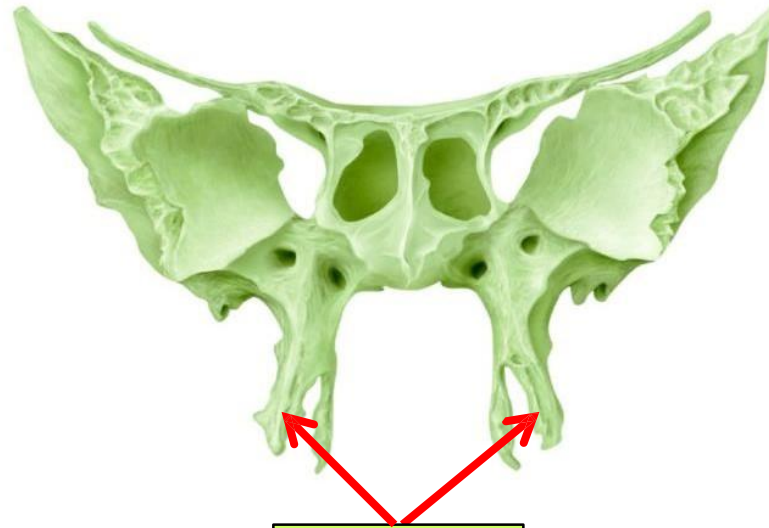
Inferior Orbital Fissure: (3)

- located between greater wing of sphenoid and maxilla

Sphenoid bone



Sphenoid bone



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**Pterygoid
processes**

Pterygoid processes:

- **Consist of medial and lateral pterygoid plates**
- **Project inferiorly from where body and greater wings of sphenoid unite**
- **Form posterolateral region of nasal cavity**
- **Some muscles which move the mandible originate here**

Sphenoid bone

Foramen Rotundum:

- Located at junction of anterior aspect of the greater wing of the sphenoid bone

Foramen Ovale:

- Located at the base of the greater wing

Foramen Lacerum:

- Bounded anteriorly and medially by sphenoid bone, medially and posteriorly by occipital bones and laterally by the temporal bone.
- Most of it is covered by layer of fibrocartilage

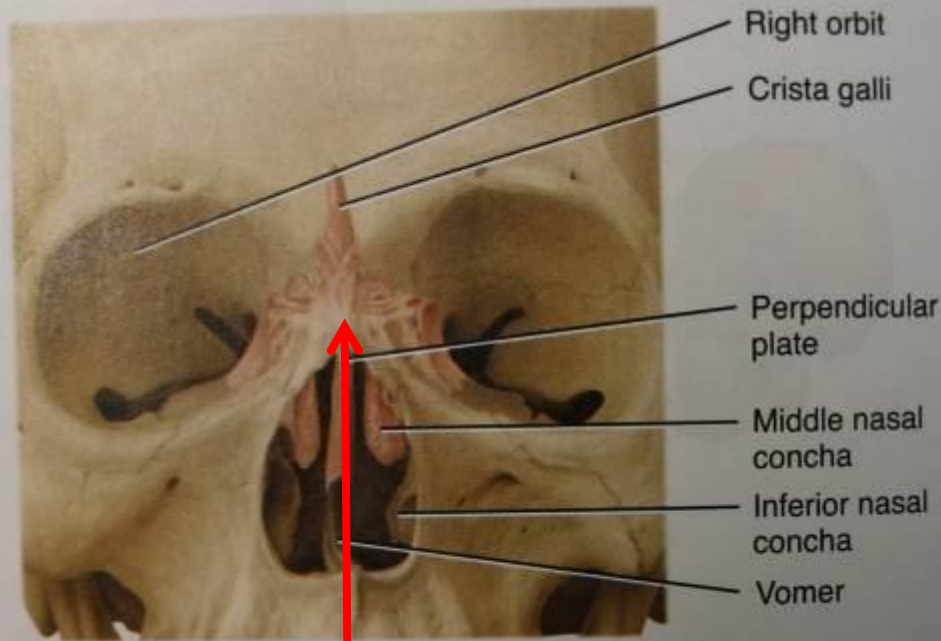
Foramen Spinosum:

- Located in the base of the greater wing of the sphenoid and lateral to foramen ovale.

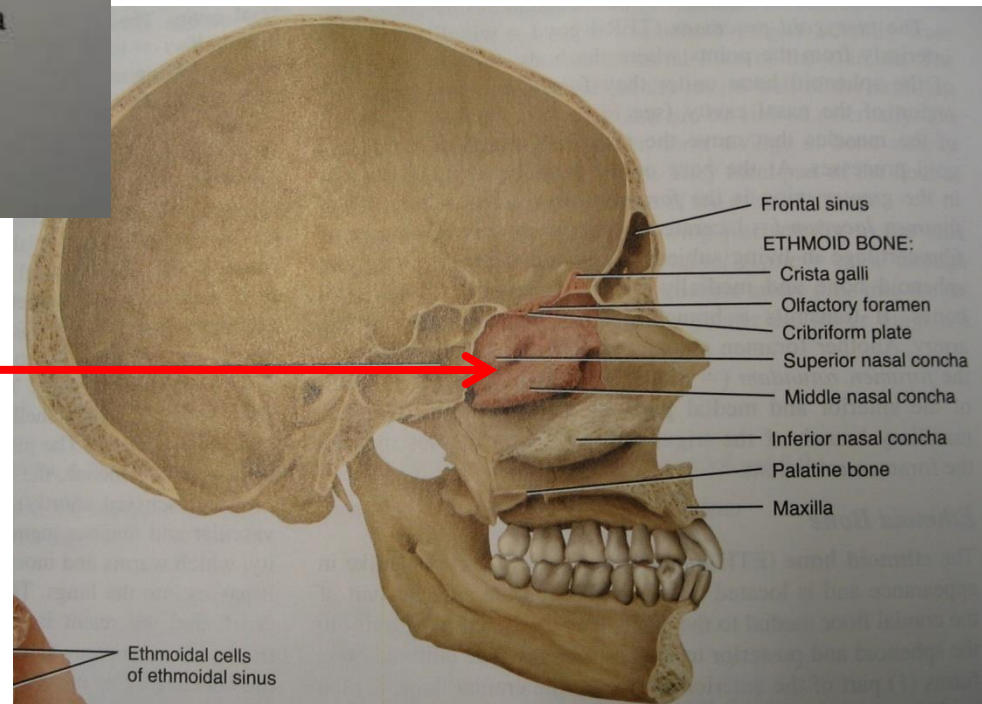
Ethmoid bone

**Sponge-like in appearance;
located anterior to sphenoid
and posterior to nasal bones**

**It is the major superior
supporting structure of
nasal cavity**



**Ethmoid
bone**



ETHMOID BONE

- BONY FEATURES OF THE ETHMOID BONE
 - Cribriform plate
 - Crista galli
 - Perpendicular Plate
 - Lateral masses
 - Ethmoidal Sinuses
 - Nasal Concha

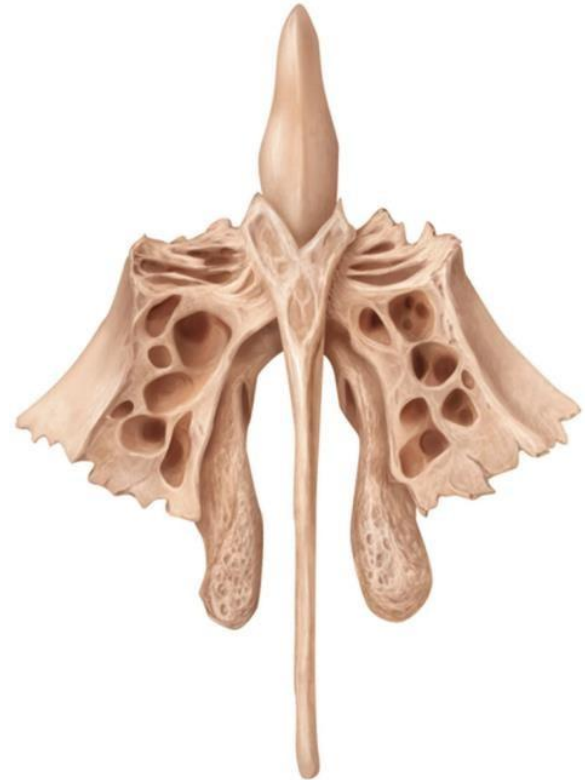
Ethmoid bone

Forms part of:

- Anterior portion of cranial floor
- Medial wall of the orbits
- Superior part of the nasal septum (partition that divides nasal cavity into right and left sides)
- Superior side walls of the nasal cavity

Cribiform plate:

- Horizontally situated
- Lies in anterior floor of cranium
- Forms roof of nasal cavity
- Contains the olfactory foramina



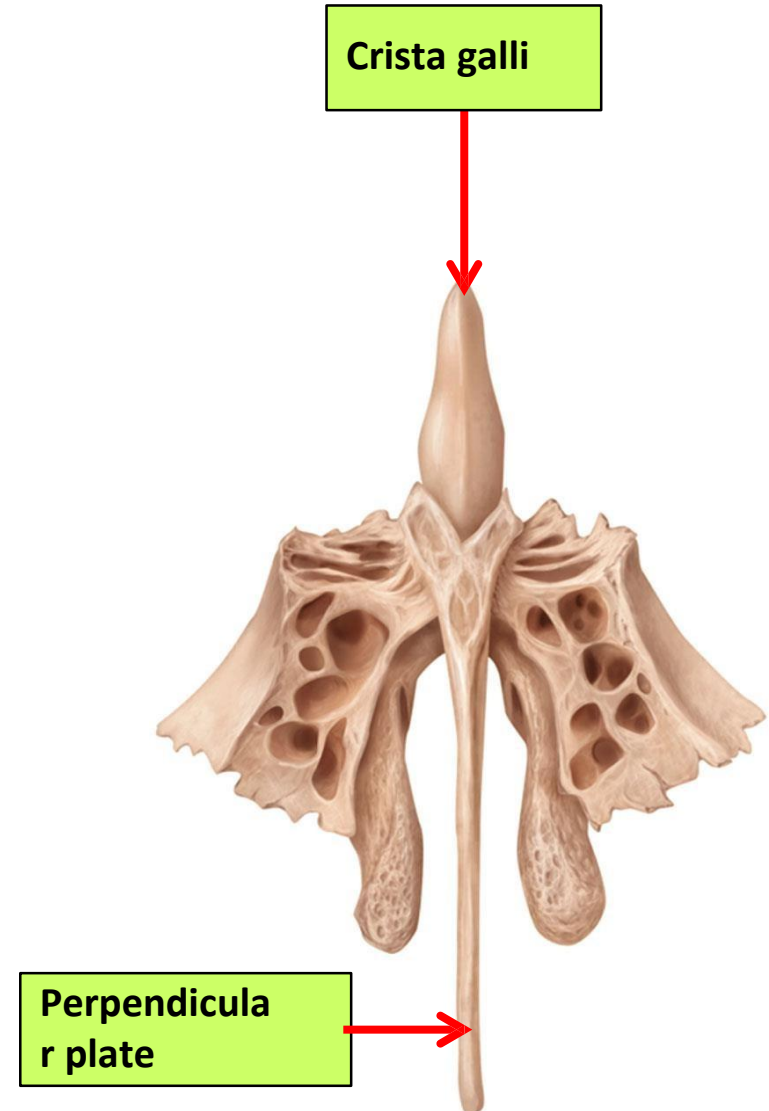
Ethmoid bone

Crista galli:

- Triangular process projecting superiorly
- Point of attachment for a membrane (falx cerebri) that separates the 2 sides of the brain

Perpendicular plate:

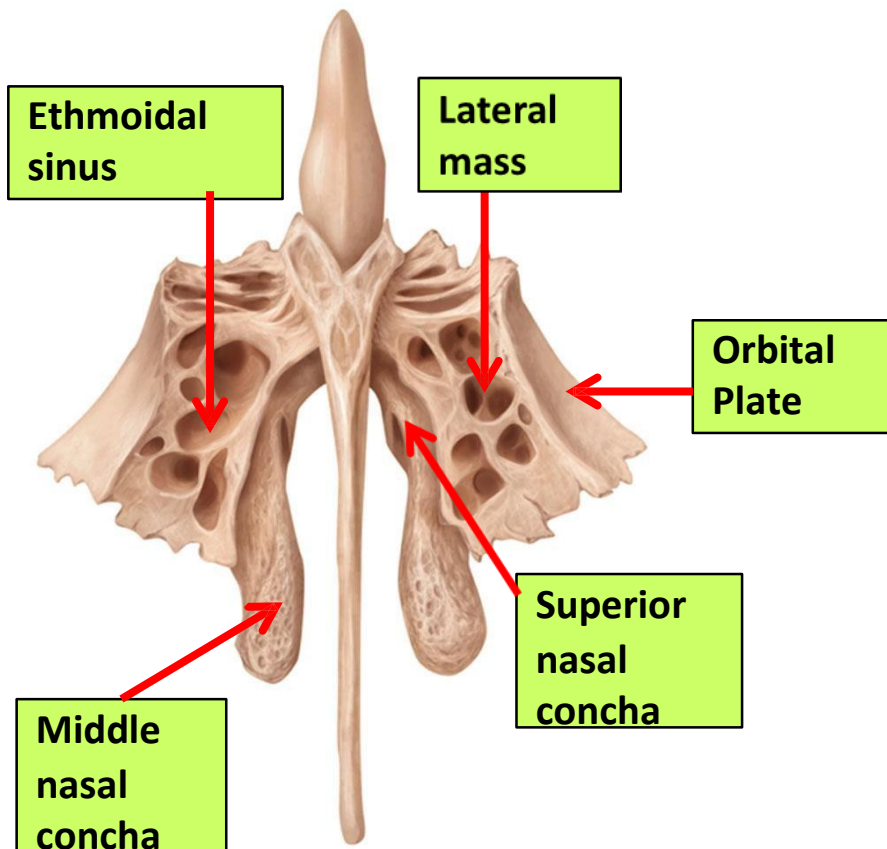
- Vertically situated
- Projects inferiorly from cribriform plate
- Forms superior portion of nasal septum



Ethmoid bone

Lateral masses:

- Form most of wall between nasal cavity and orbits
- Contain air spaces called ethmoidal sinuses



Superior and middle nasal conchae

- Two projections form the ethmoid bone that increase the vascular and mucous membrane surface area in the nasal cavity, thus warming and moistening inhaled air before it passes into lungs

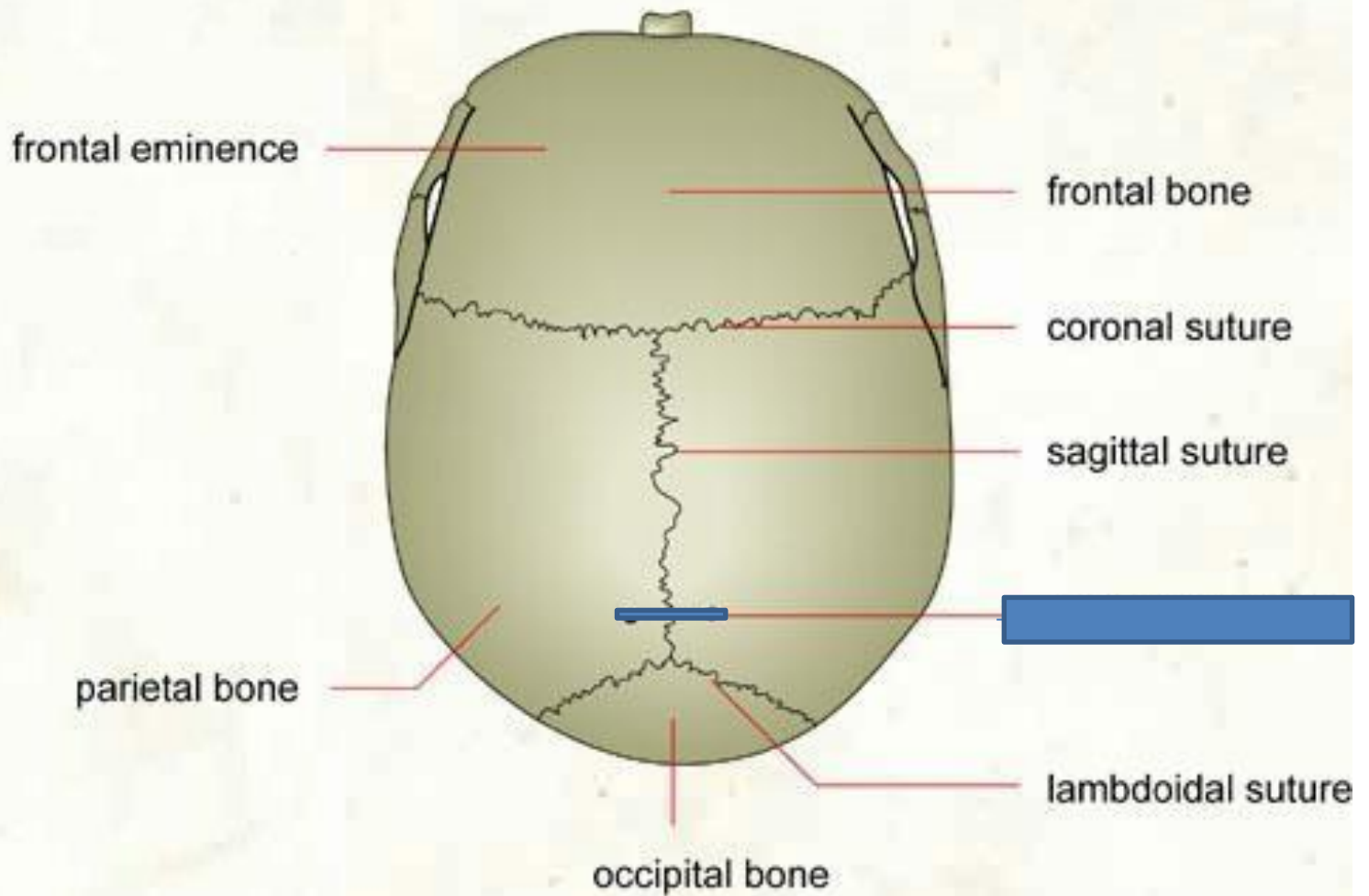
Sutures of the Skull

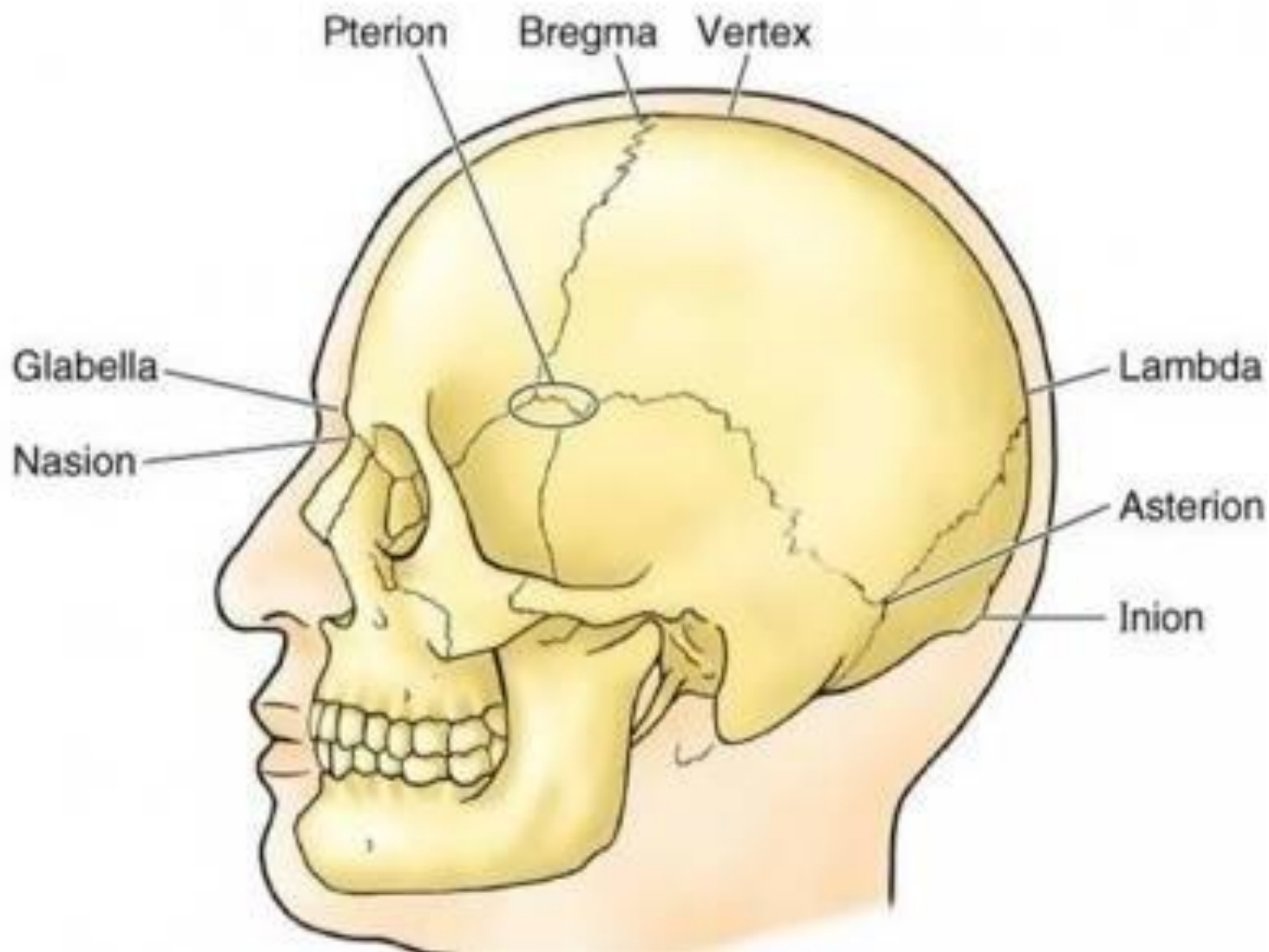
- Sagittal suture connects.....
- Lambdoid suture connects.....
- Coronal suture connects.....
- Squamosal suture connects....

Suture Junctions

- (a) Bregma (formally the anterior fontanelle)
- (b) Lambda (formally the posterior fontanelle)
- (c) Pterion is the connection between...

SKULL (upper view)

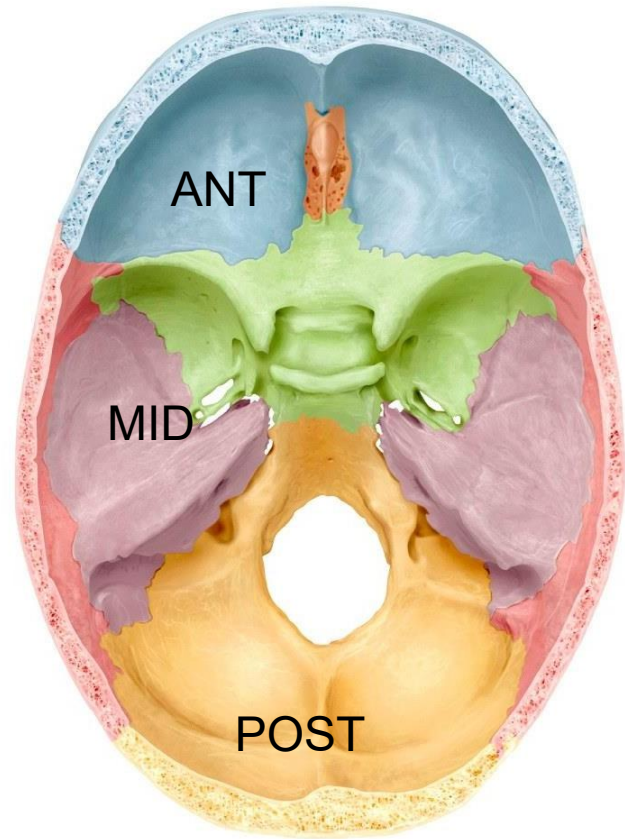




Cranial

Fossae

- The bones of the cranium form three deep fossae on the internal surface of the cranium that house important lobes of the brain



Cranial Fossa

- Anterior
 - Formed by Frontal, Ethmoid and Sphenoid bones
 - Highest (most anterior/superior) and shallowest
- Middle
 - Formed by Sphenoid and Temporal bones
 - Contains most foramen and the pituitary gland
- Posterior
 - Formed by Occipital and Temporal bones
 - Sits most posterior/inferior in cranium and is the deepest