



General Anatomy

Lecture 1: Introduction to Human Anatomy

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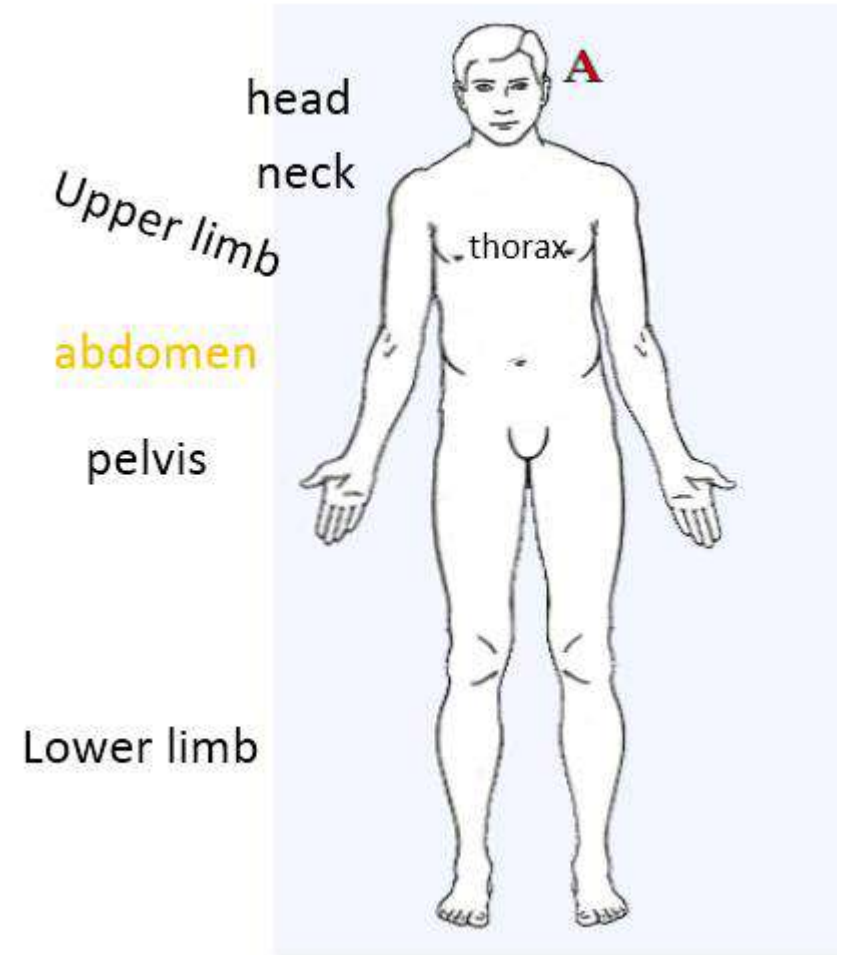
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Anatomy

- * **Definition:** anatome = up (ana) + cutting (tome).
- * **Descriptive anatomy:** **Regional or Systemic.**
 - * **Regional Anatomy** : parts of body e.g. head, neck, thorax, abdomen, upper limb & lower limb.
 - * **Systemic Anatomy**: e.g. cardiovascular system, respiratory system, urinary system, etc.
- * **Developmental Anatomy (Embryology).**
- * **Applied Anatomy (clinical).**
- * **Radiological Anatomy.**
- * **Surface Anatomy.**

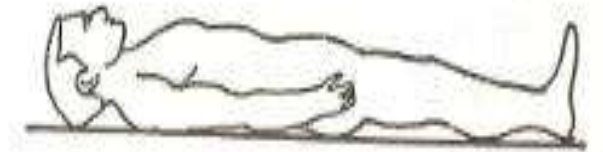
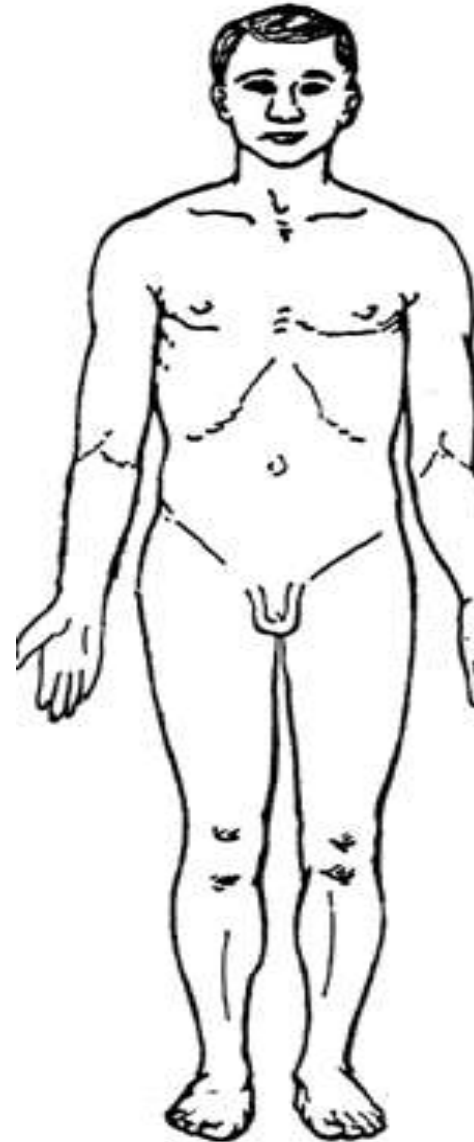
Body Regions

1. Head and Neck.
2. Abdomen & Pelvis.
3. Lower limb.
4. Upper limb.
5. Thorax.
6. Brain & spinal cord (Neuroanatomy).



Anatomical Position

- **Body erect (person standing).**
- **Face directed forward.**
- **Limbs at sides of body.**
- **Legs & feet close together.**
- **Palms directed forward.**



Supine

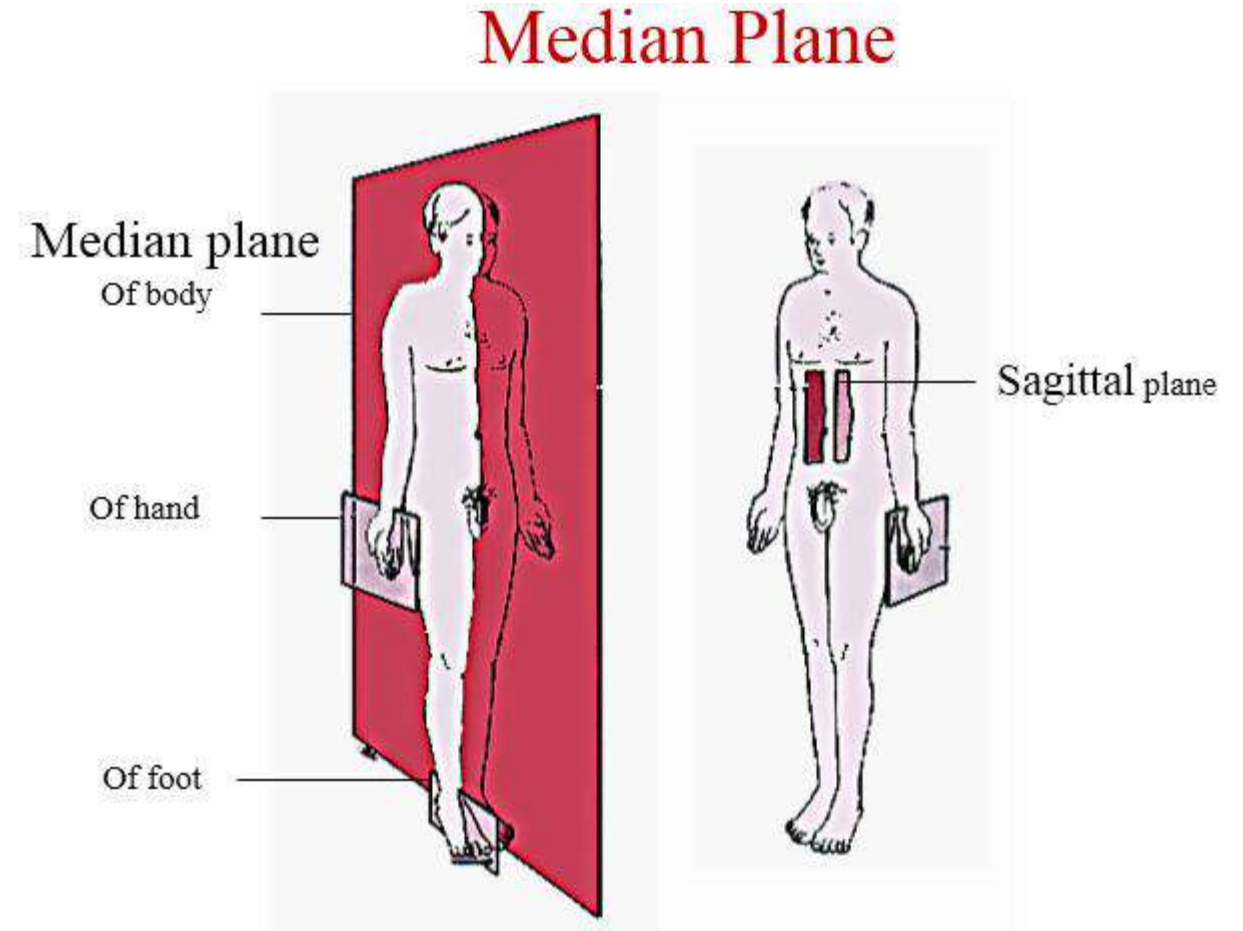


prone

Anatomical Planes

* Median (midsagittal) plane = vertical in midline, divides body into right & left equal parts.

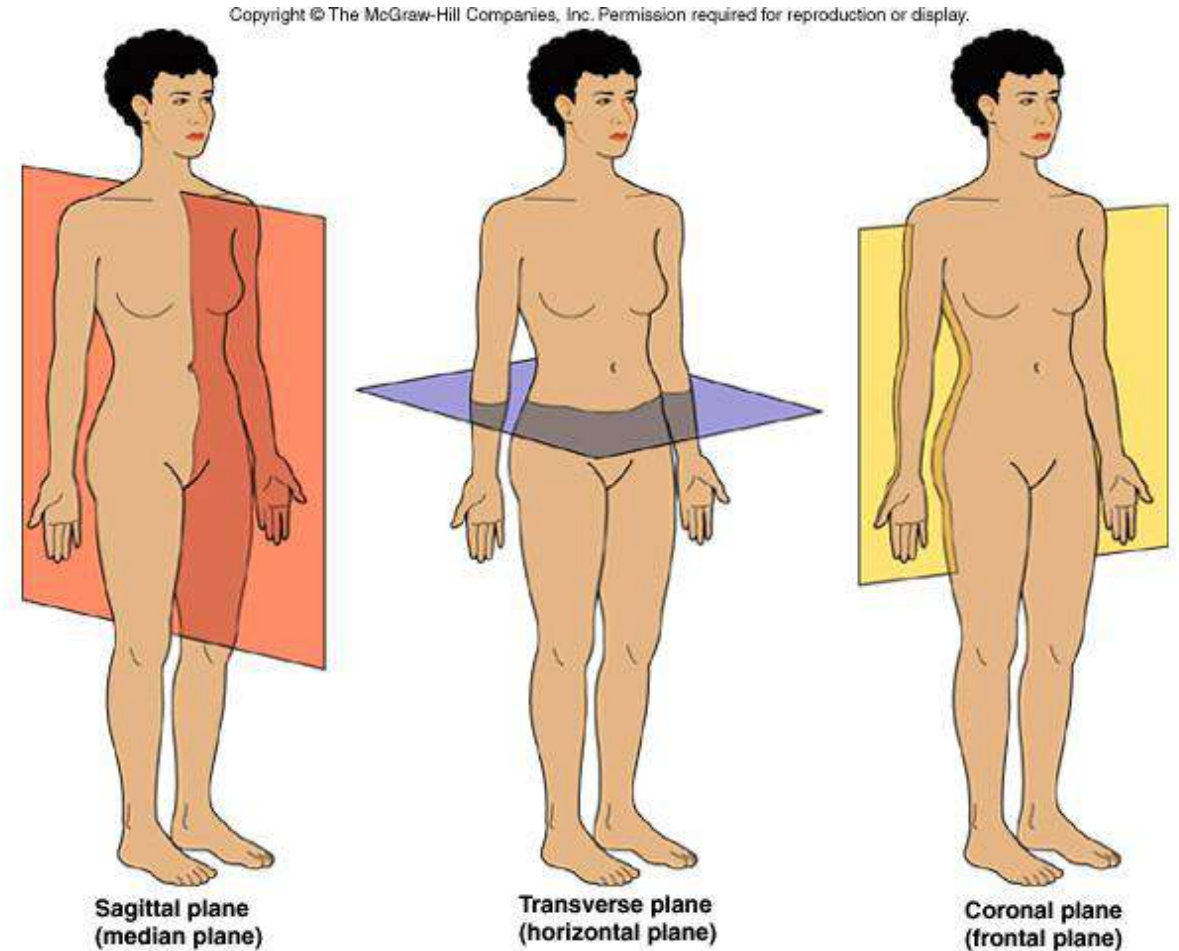
* * Parasagittal = vertical, parallel to median.



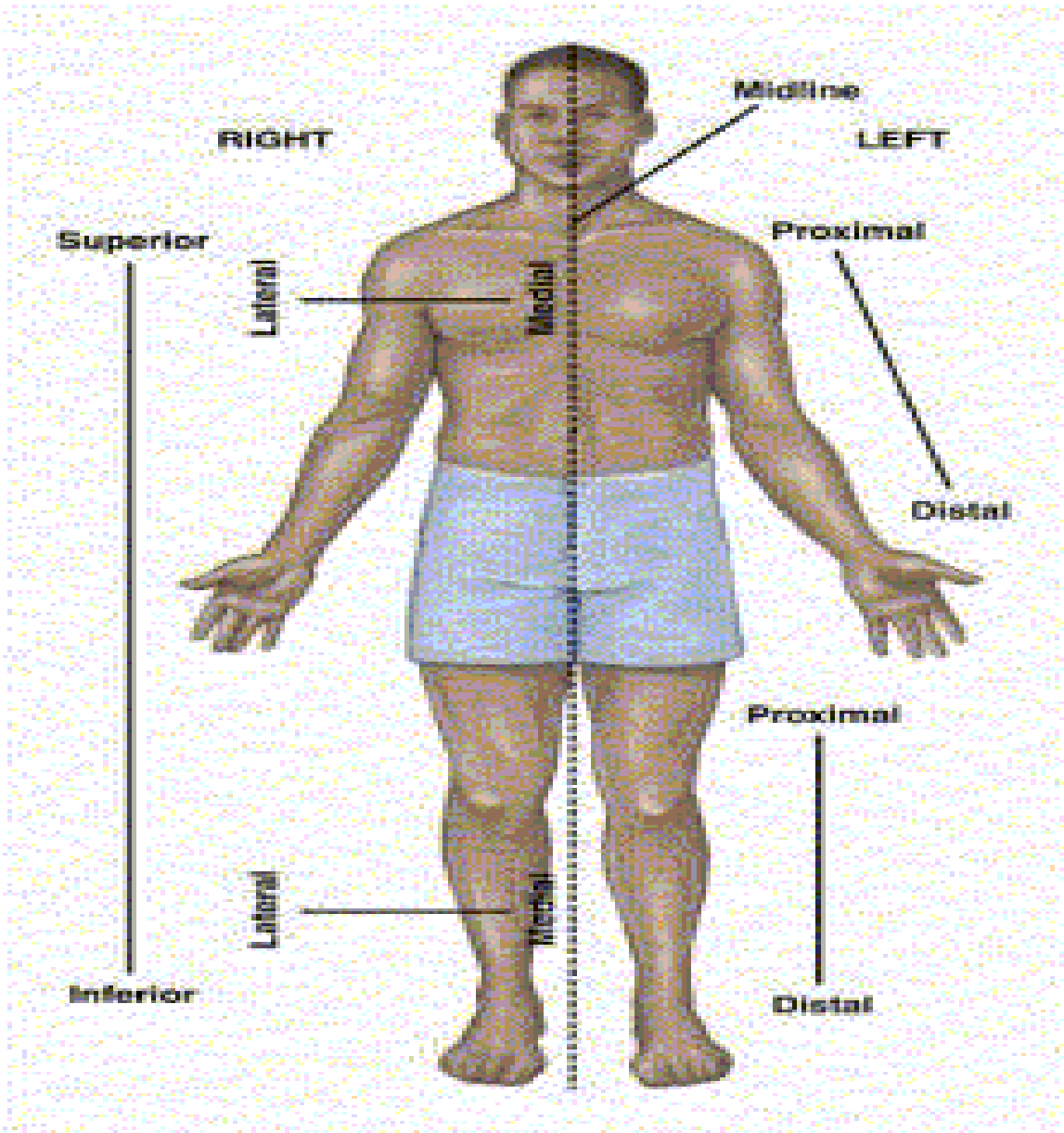
Anatomical Planes

* Coronal plane = vertical, perpendicular to median, divides body into anterior & posterior parts.

* Horizontal (transverse) = perpendicular to median & coronal planes divides body into upper & lower parts.

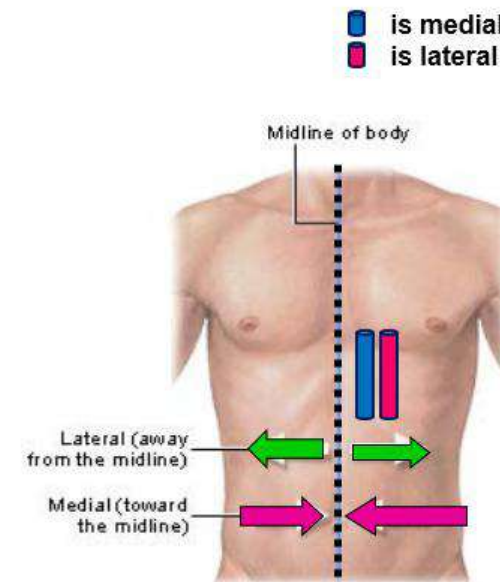


Anatomical Terms



1. Medial & Lateral:

- * Medial = closer to median plane.
- * Lateral = away from median plane.



2. Anterior & posterior:

- **Anterior or Ventral** → towards the front of the body
- **Posterior or dorsal** → towards the back of the body
- **Anterior surface of hand** → palmar surface
- **Posterior surface of hand** → dorsal surface
- **Upper surface of foot** → dorsal surface
- **Lower surface of foot** → plantar surface



3. Superior & inferior:

- * **Superior**
(**cephalic or cranial**) =
towards head.
- * **Inferior (caudal)**
= towards feet.



4. Proximal & Distal:

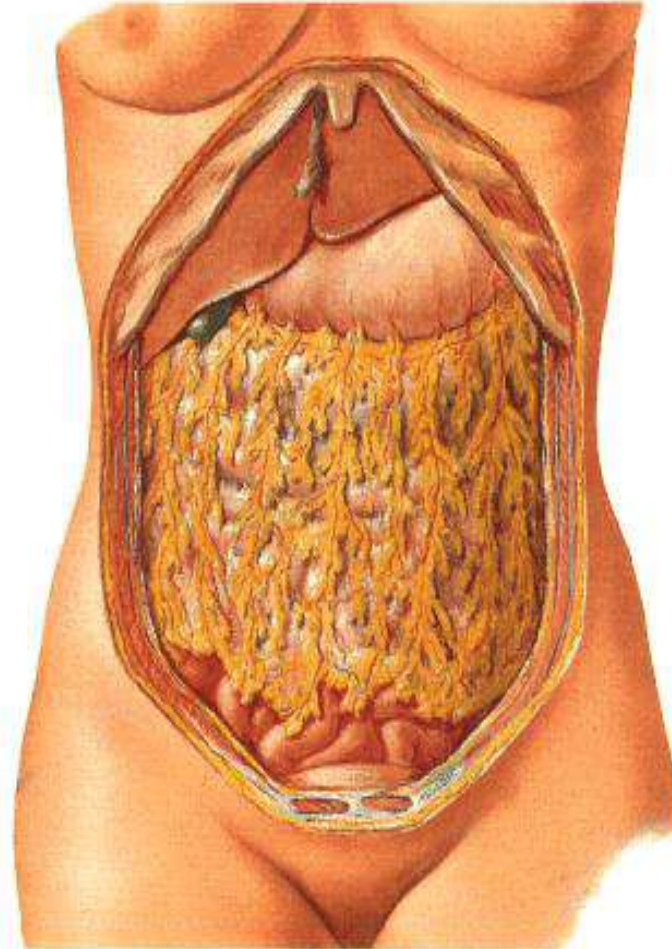
- * Proximal → closer to trunk.**
- * Distal → away from trunk.**



5. Superficial &

Deep:

- * Superficial → towards surface of body.**
- * Deep → away from surface of body.**



Anatomical Terms

- * **Medial** = closer to median plane.
- * **Lateral** = away from median plane.
- * **Anterior (ventral)** = towards front of body.
- * **Posterior (dorsal)** = towards back of body.
- * **Superior (cephalic or cranial)** = towards head
- * **Inferior (caudal)** = towards feet.
- * **Superficial** = towards surface of body.
- * **Deep** = towards center of body.
- * **Proximal** = nearer origin.
- * **Distal** = further from origin.

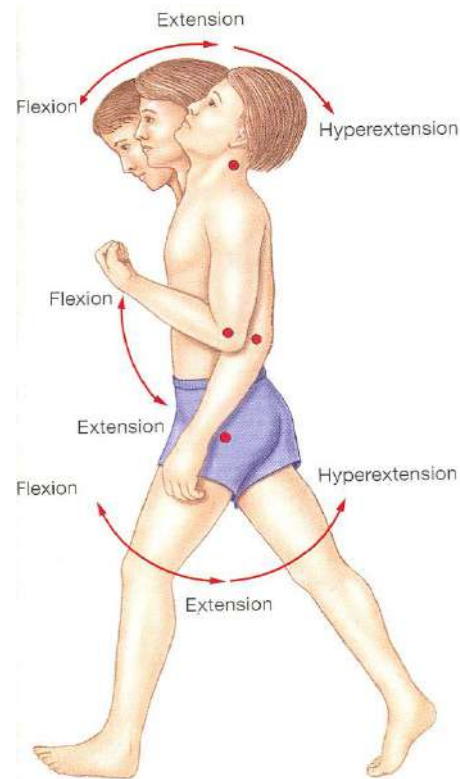
- * **External (outer):** means towards the surface and applies to the hollow-out structure.
- * **Internal (inner):** means towards the cavity of a hollow-out structure.
- * **Central:** means towards the center of the body.
- * **Peripheral:** means away from the center of the body.
- * **Ipsilateral:** means of the same side of the body.
- * **Contralateral :** means of the opposite side of the body.

Specific terms for the limbs :

- **In the forearm :** radial = lateral & ulnar = medial.
- **In the hand :** palmar = anterior & dorsal = posterior.
- **In the leg:** fibular = lateral & tibial = medial.
- **In the foot:** plantar = inferior & dorsal = superior.

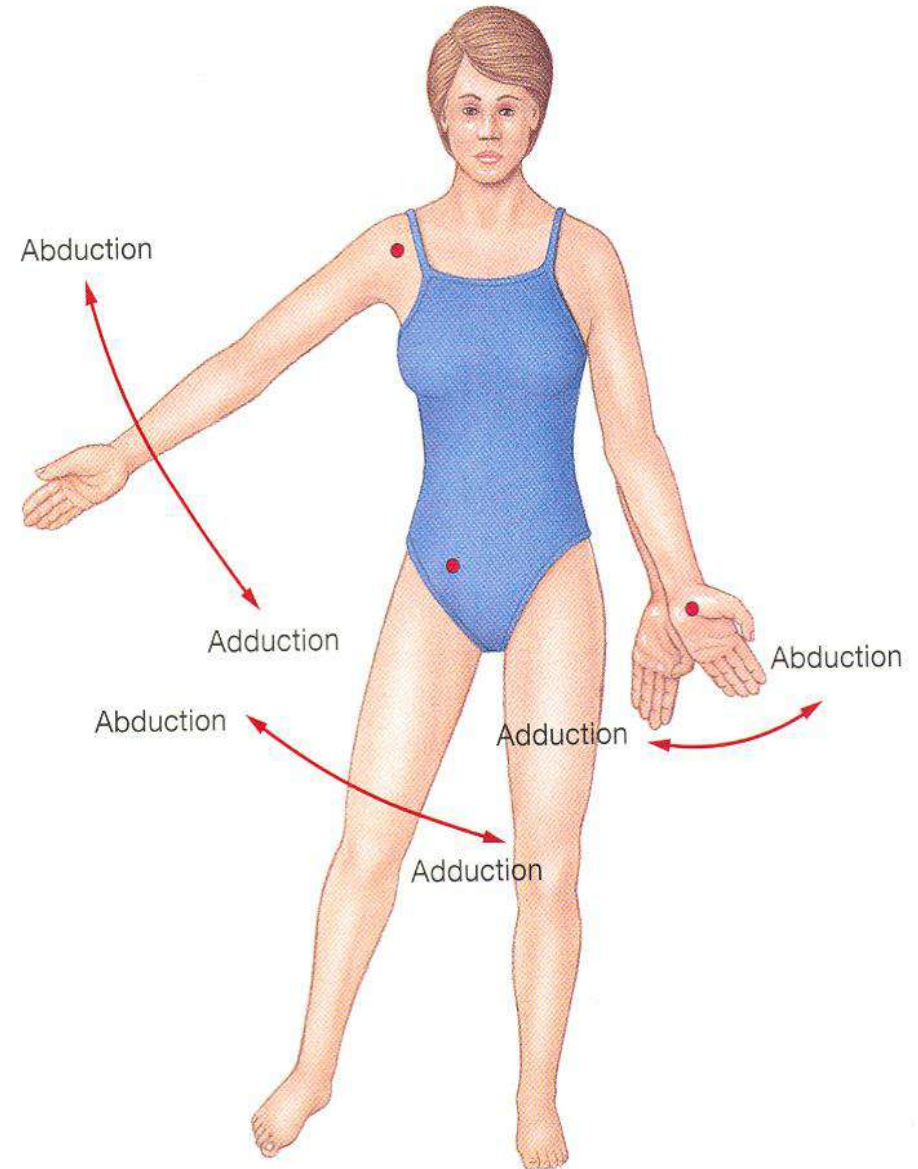
Anatomical Terms of Movements

- **Flexion** → to bend = angle = approximation of 2 ventral surfaces
- **Extension** → to stretch = straighten = approximation of 2 dorsal surfaces.

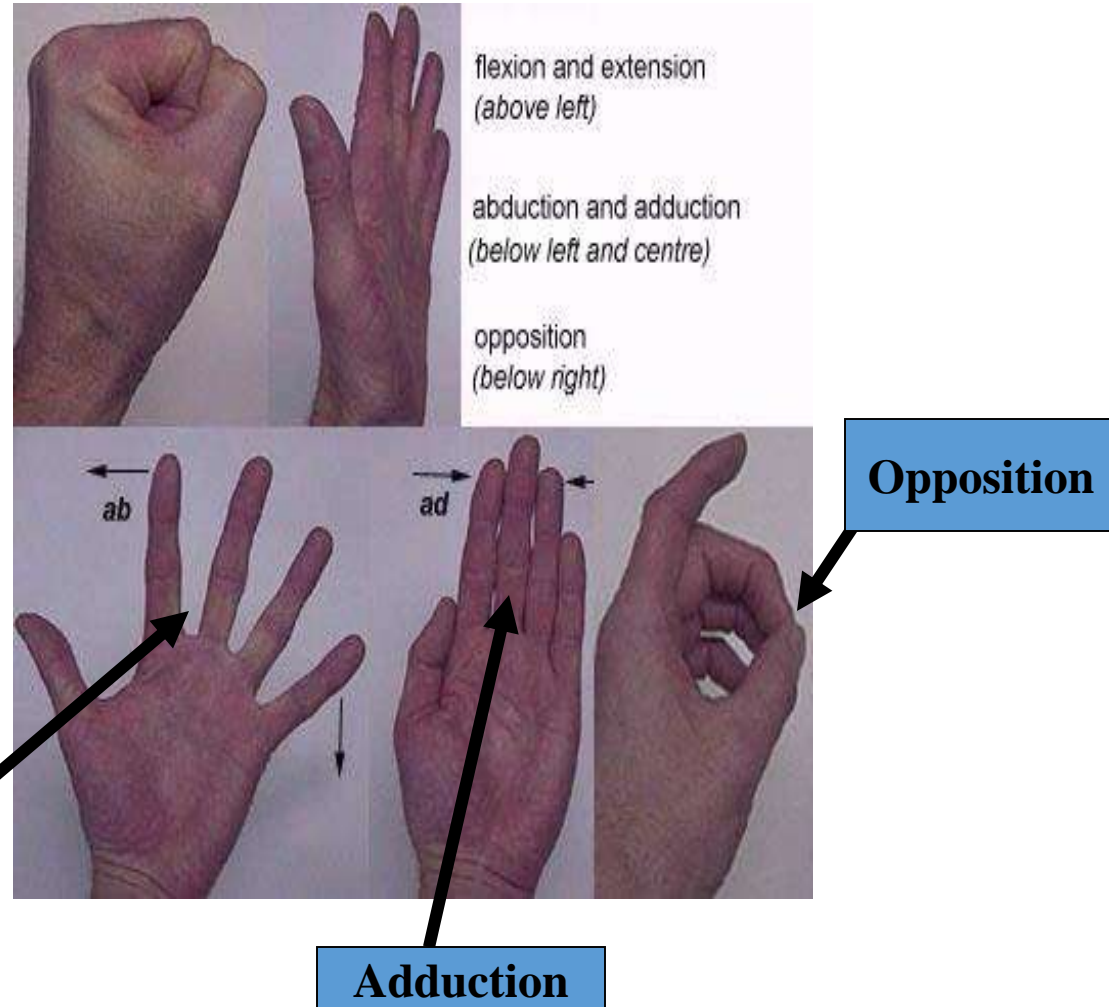


• **Abduction** →
moving a part
away from
midline.

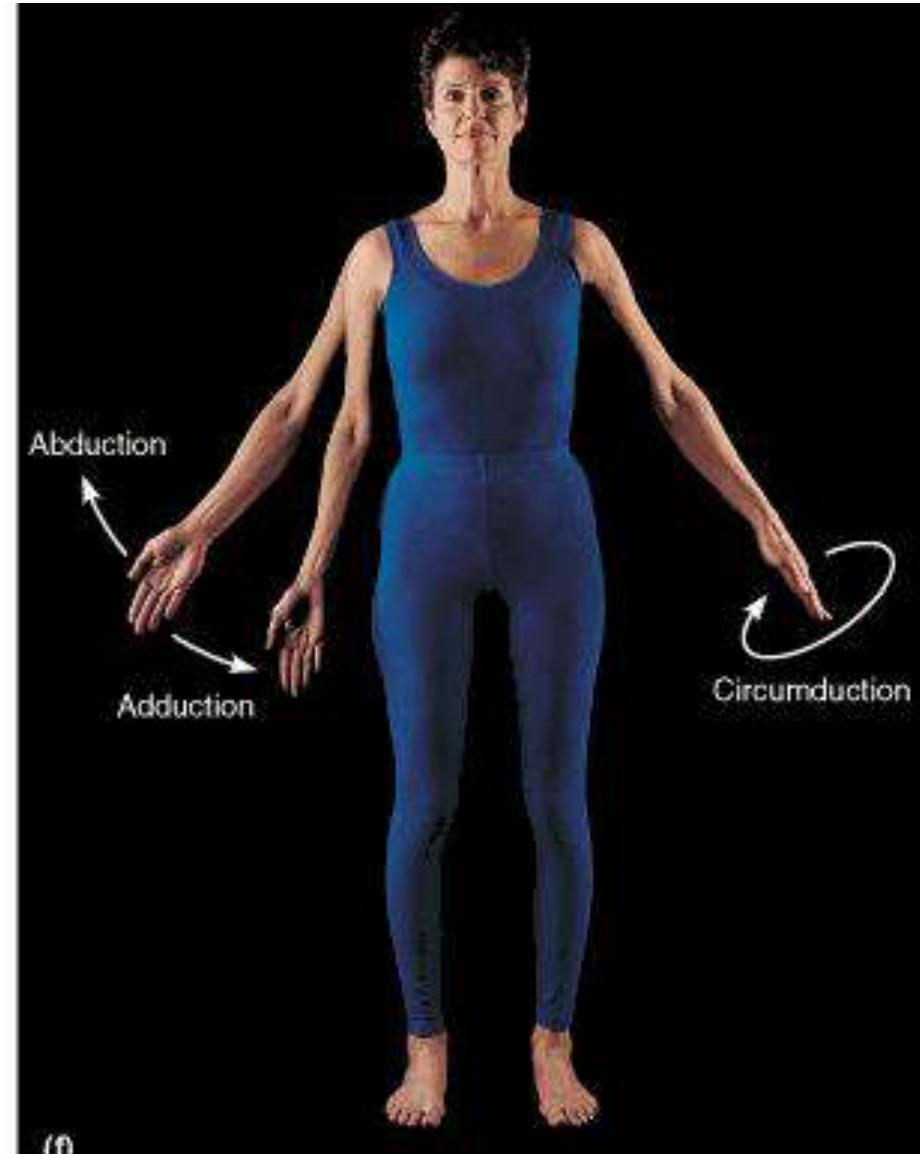
• **Adduction** →
moving a part
towards the
midline.



- **Abduction of fingers & toes** → spreading of fingers or toes apart.
- **Adduction of fingers & toes** → drawing or approximating fingers or toes together.

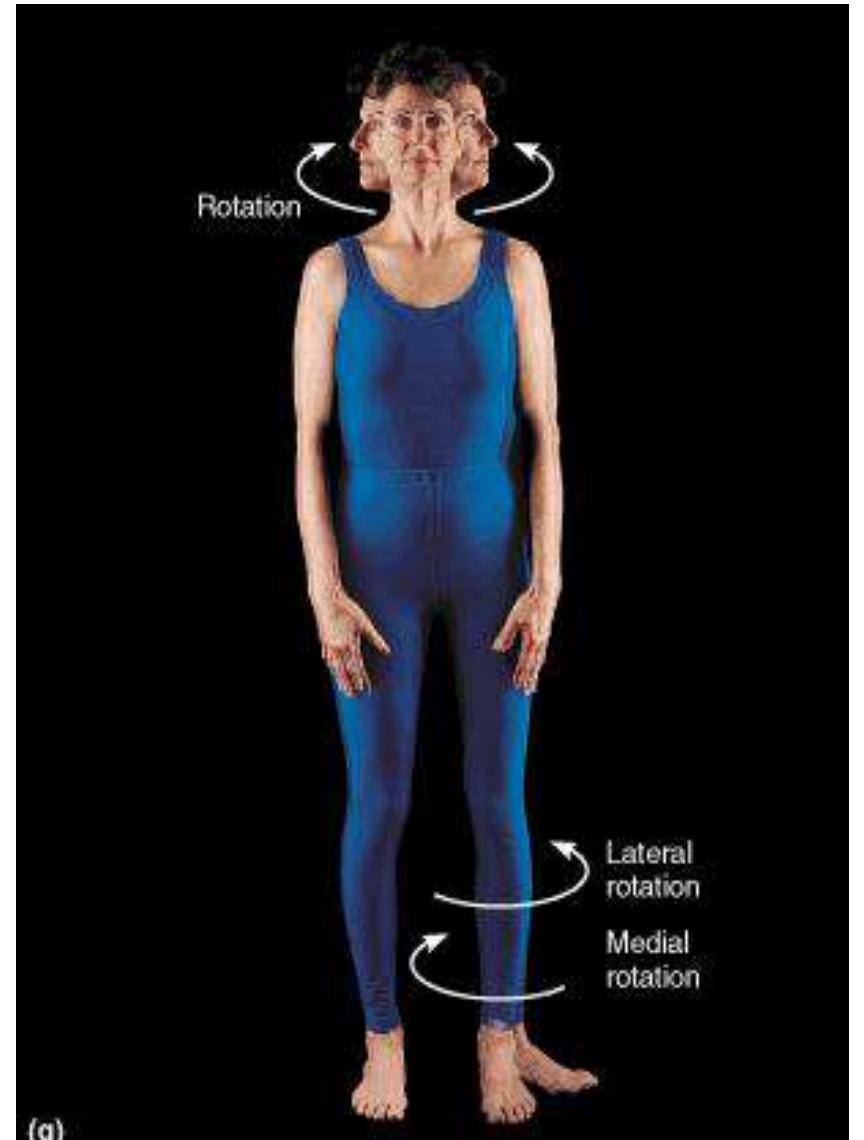


- **Opposition:**
- **Circumduction** →
the combination
in sequence of
movements of
flexion, abduction,
extension &
adduction.

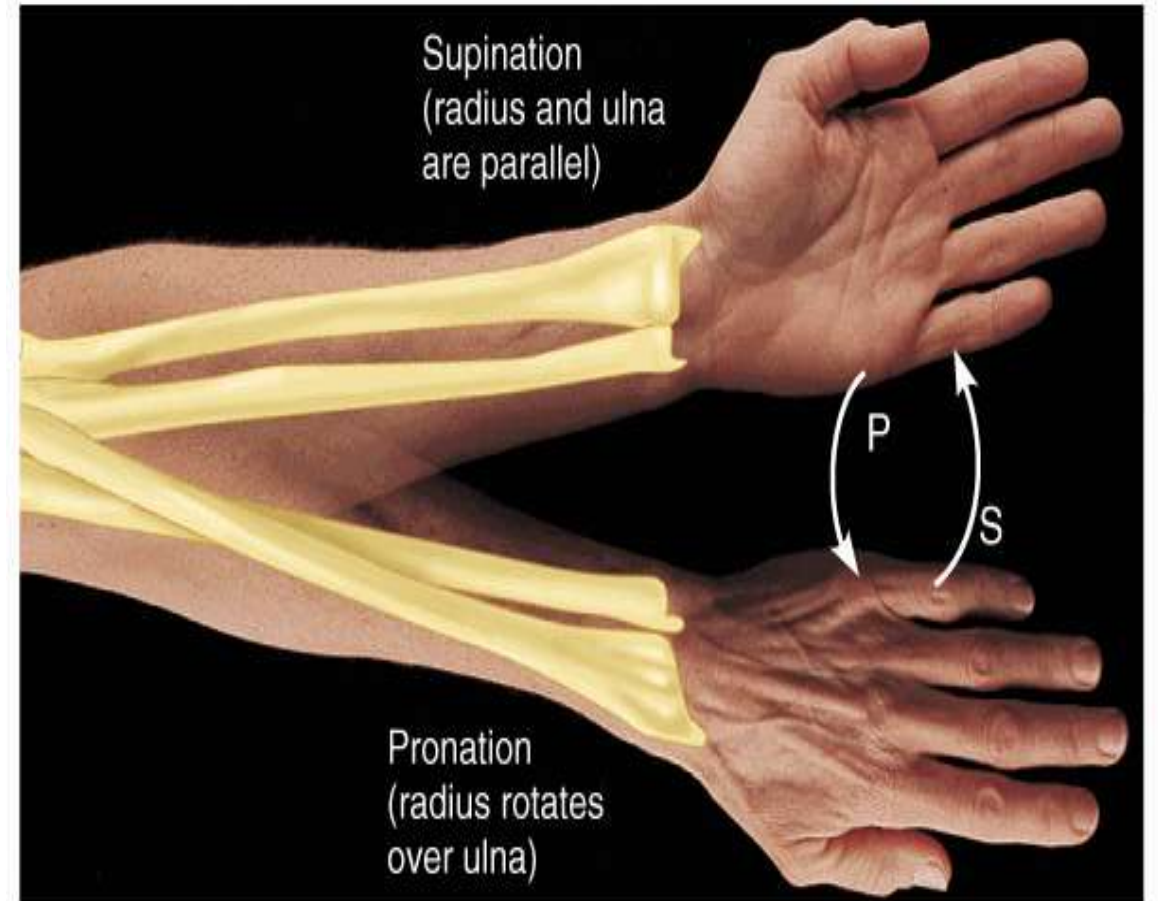


- **Medial rotation** → brings anterior surface to face medially

- **Lateral rotation** → brings anterior surface to face laterally

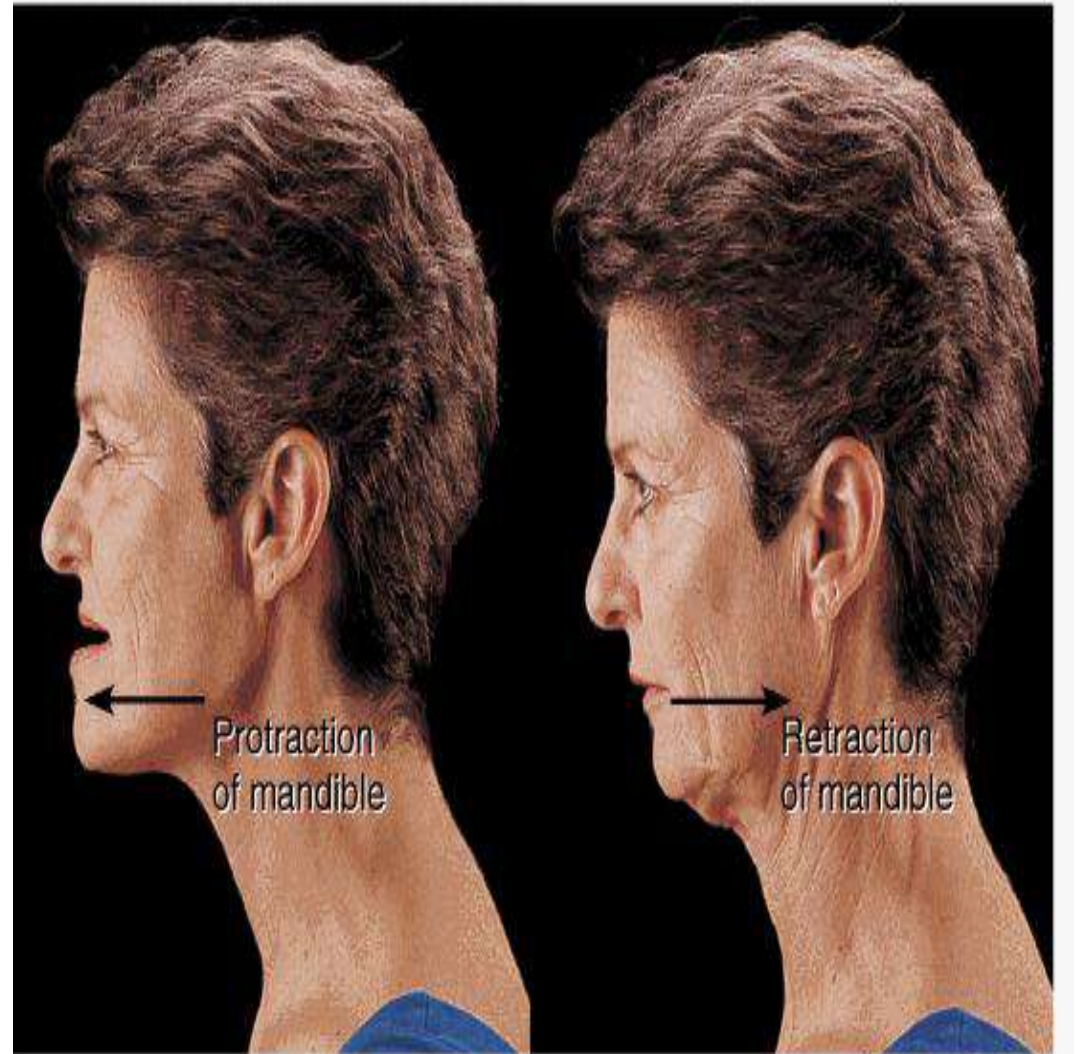


- **Pronation** → medial rotation of forearm which brings palm of hand to face posteriorly
- **Supination** → lateral rotation of forearm which brings palm of hand to face anteriorly



(a) Supination (S) and pronation (P)

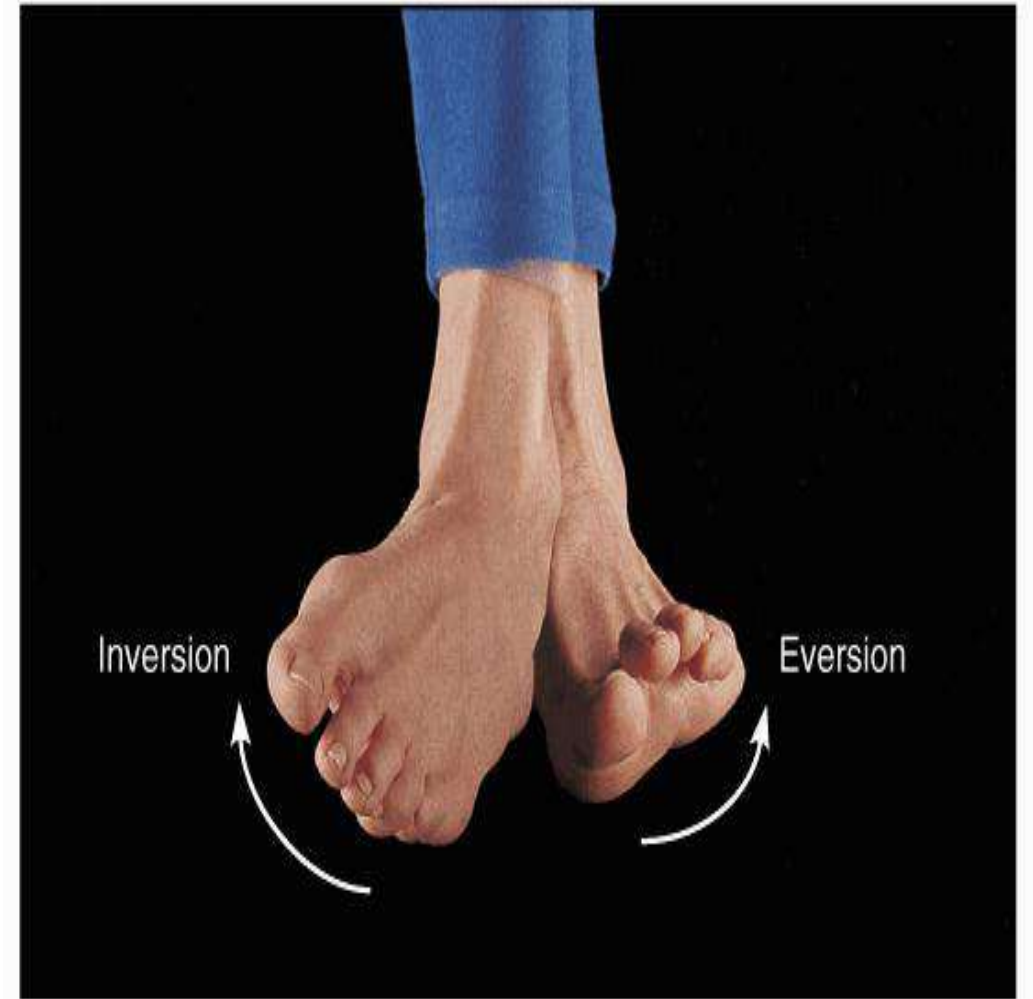
- **Protraction** → moving the jaw forwards.
- **Retraction** → moving the jaw backwards.
- **Protraction & retraction can also occur at the shoulders.**



(c) Protraction and retraction

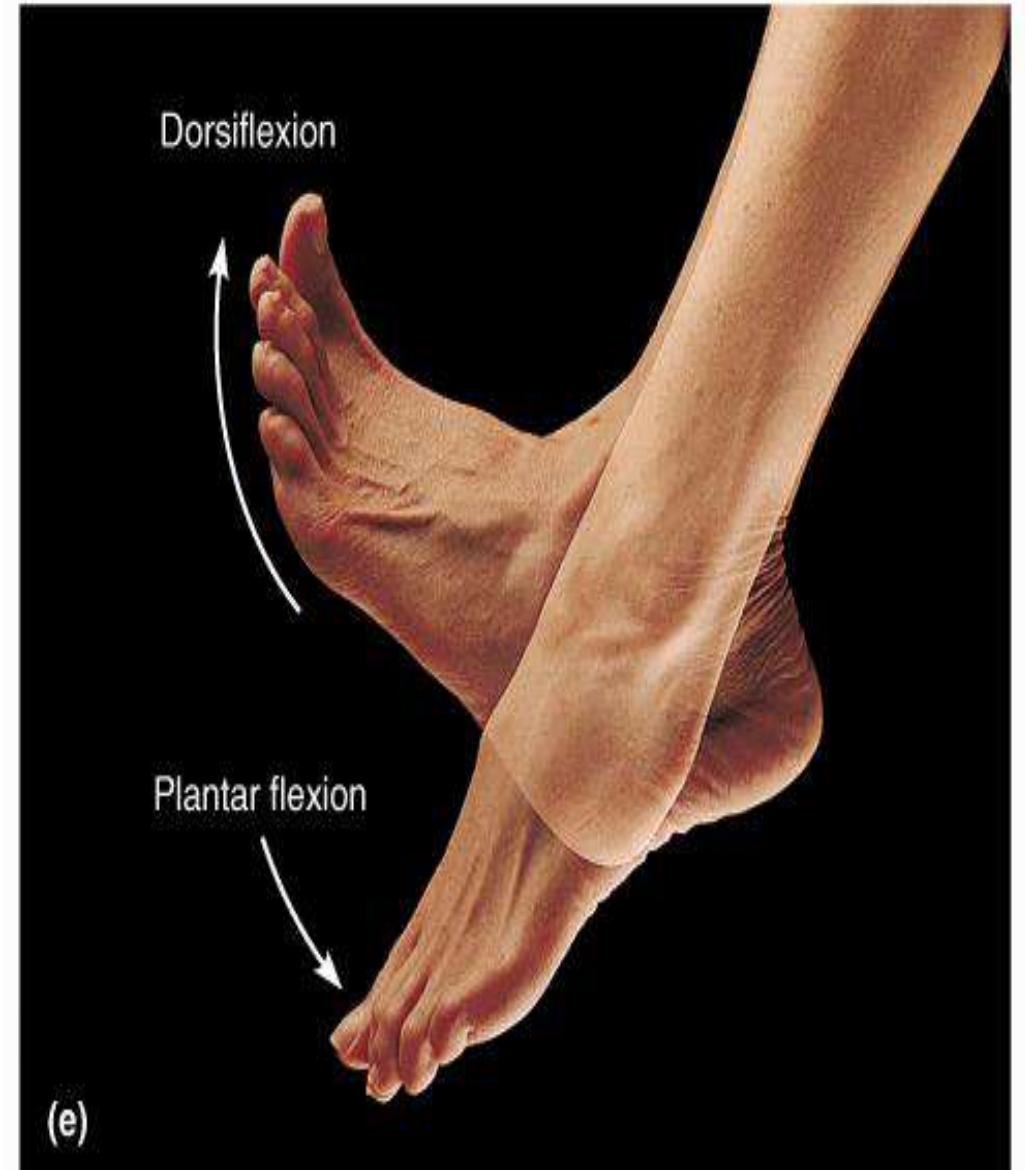
• **Inversion** → moving foot so that sole faces medially.

• **Eversion** → moving foot so that sole faces laterally.



(b) Inversion and eversion

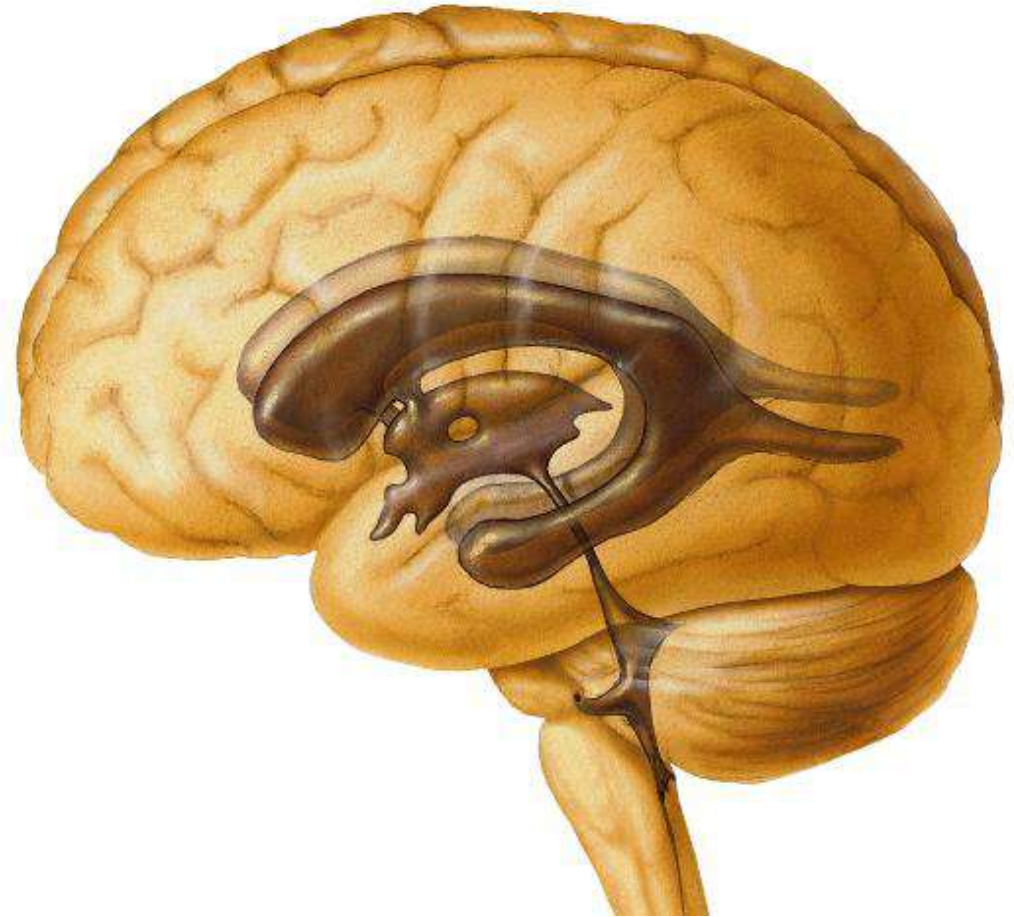
- **Dorsiflexion** → bending foot or ankle upwards.
- **Plantar flexion** → bending foot or ankle downwards.



Body Cavities

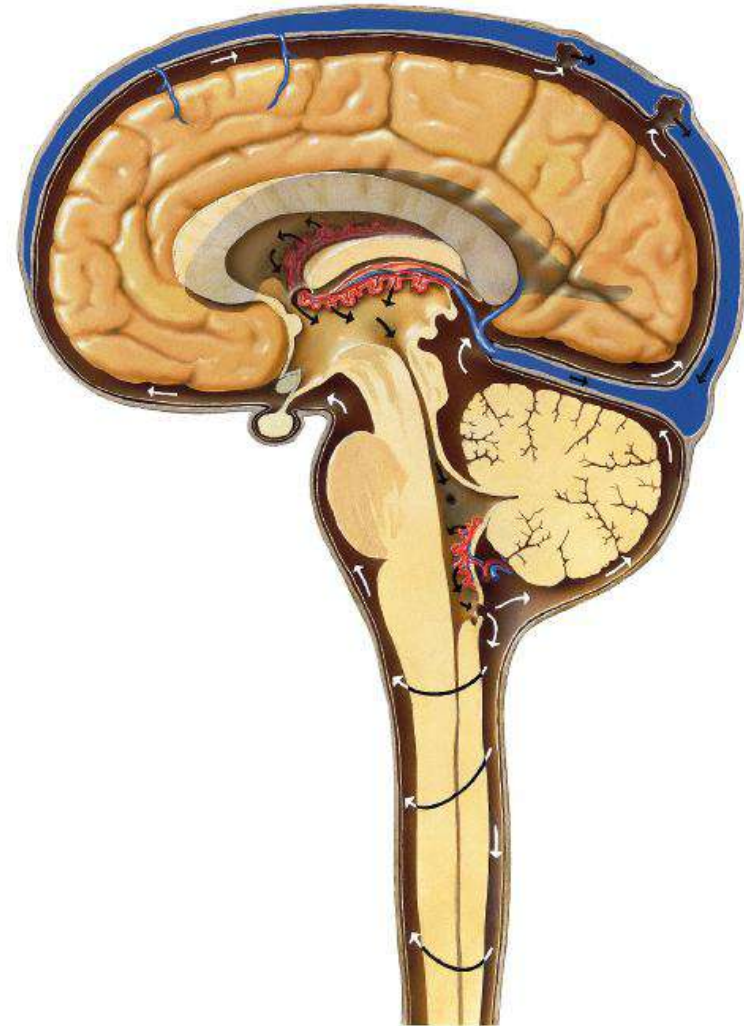
1. Cranial Cavity

- * The cavity inside the skull.
- * Contains the brain.



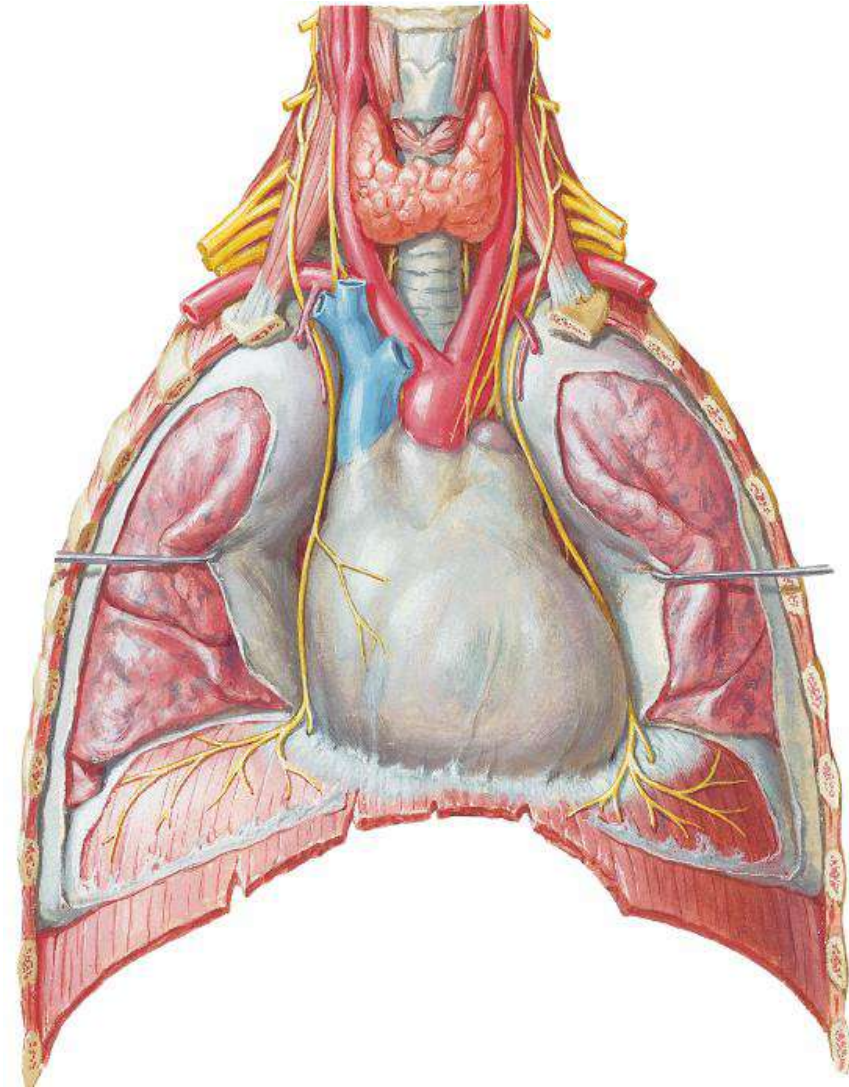
2. Vertebral Cavity

- * The cavity of the vertebral column.
- * Contains the spinal cord.



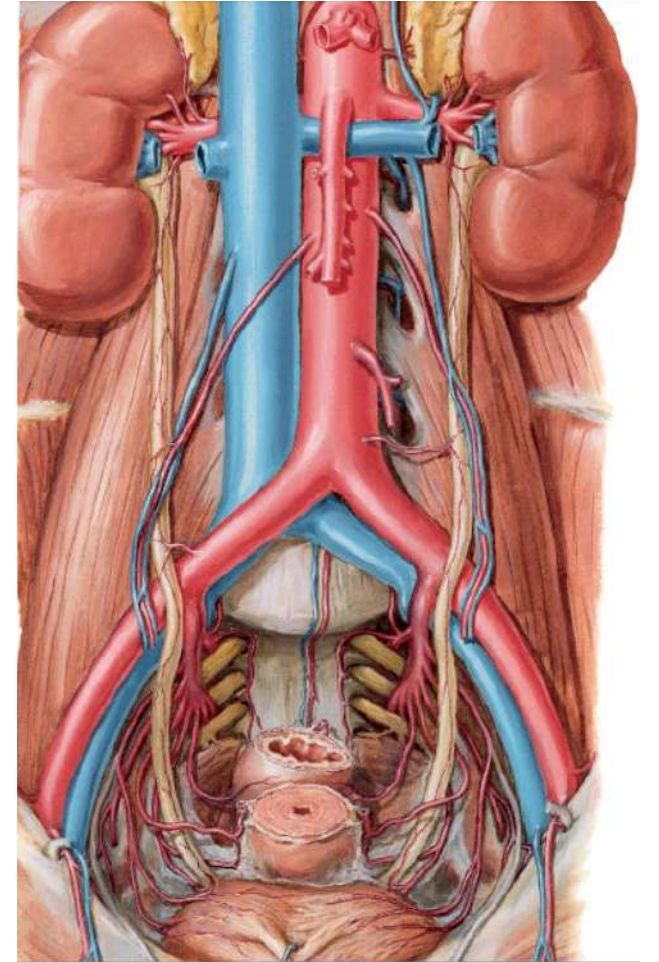
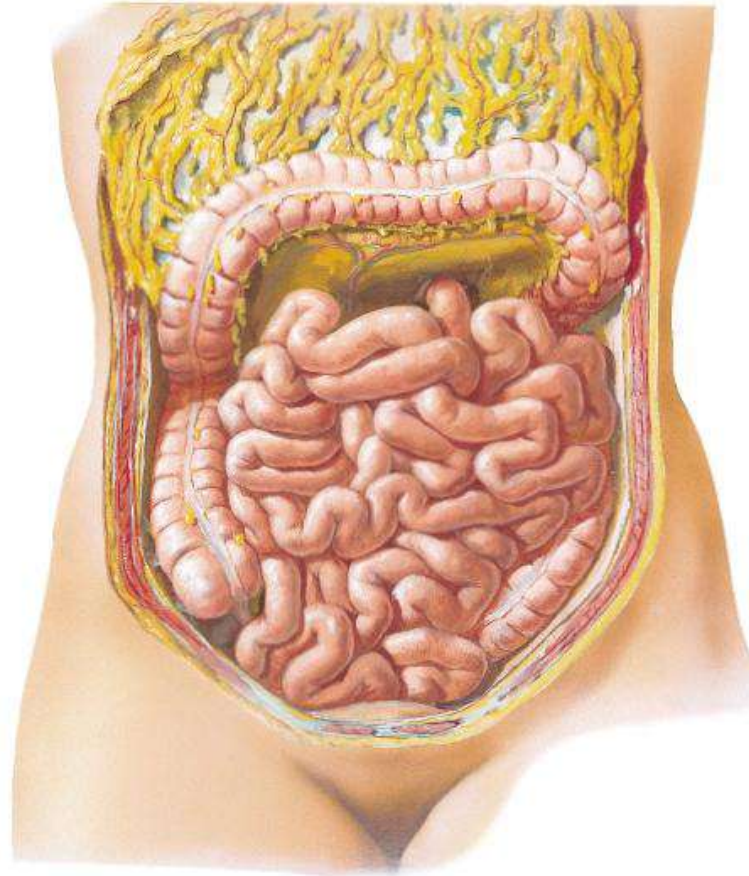
3. Thoracic Cavity

- * Contains the heart inside the pericardial cavity.
- * Contains the lungs inside the pleural cavities.



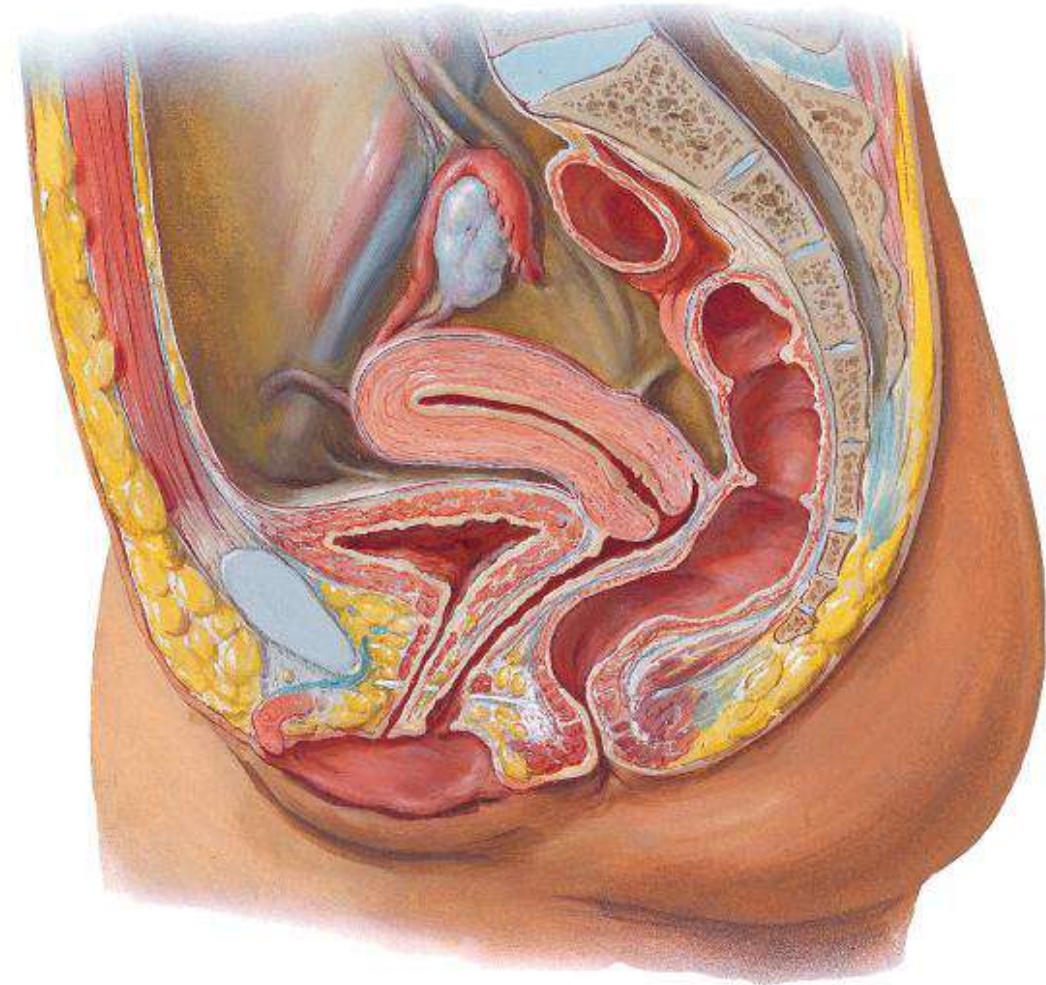
4. Abdominal Cavity

*** Contains abdominal organs such as organs of gastro-intestinal tract & kidneys.**



5. Pelvic Cavity

*** Contains pelvic organs such as urinary bladder, rectum & uterus & ovaries (in females).**





Thank You
Thank You
Thank You!!!!



General Anatomy

Lecture 2: Axial Skeleton: The Skull

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THE SKELETON

- * It comprises cartilages, bones, ligaments & joints.**
- * The bones are rigid and heavier than cartilages.**
- * Cartilages are more flexible and lighter.**
- * The younger the age, the greater is the contribution of cartilage to the skeleton.**

*** Divisions of the skeleton:**

1. Exoskeleton: rudimentary in man.

It is represented by: nails & enamel of teeth .

2. Endoskeleton: about 206 bones & is formed of:

a. The axial skeleton.

b. The appendicular skeleton.

Regional classification of bones

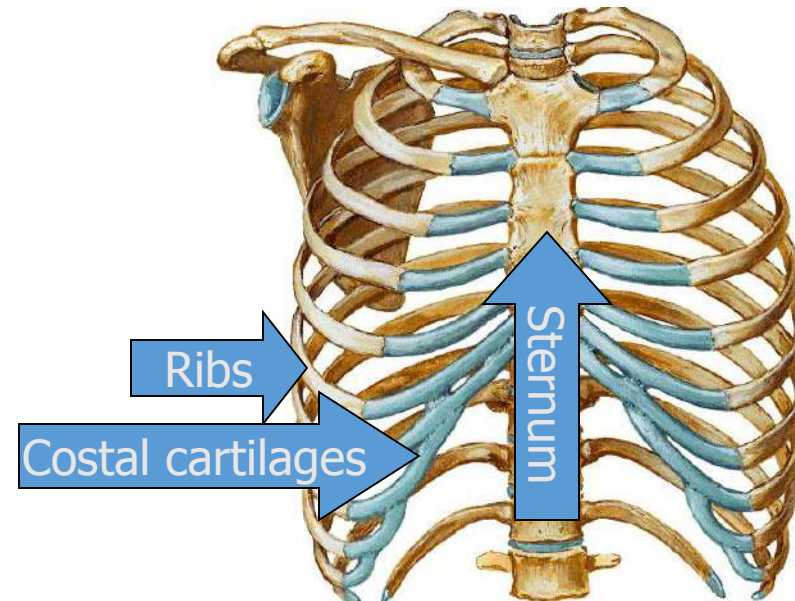
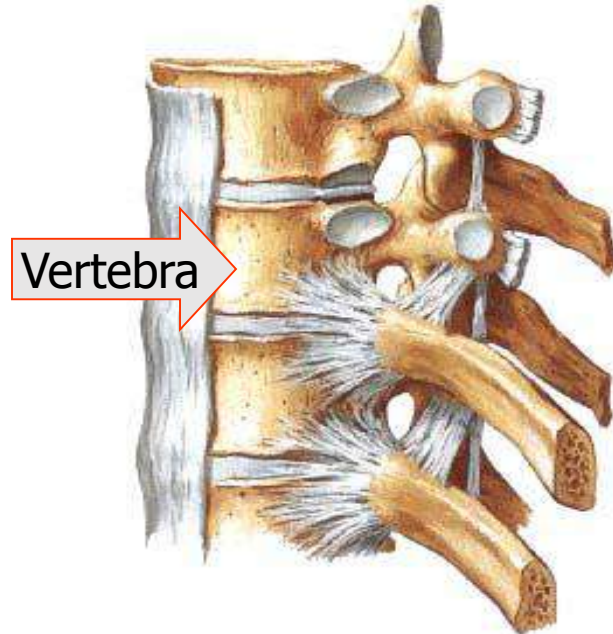
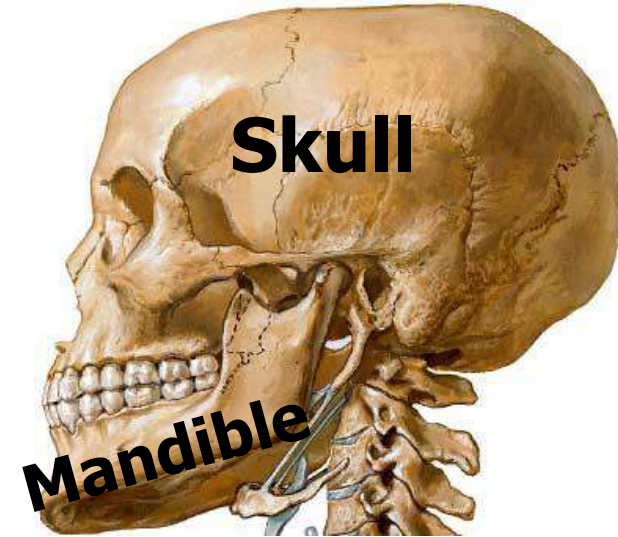
* The human skeleton is divided into:

1. Axial skeleton: which includes skull, vertebral column, ribs & sternum.

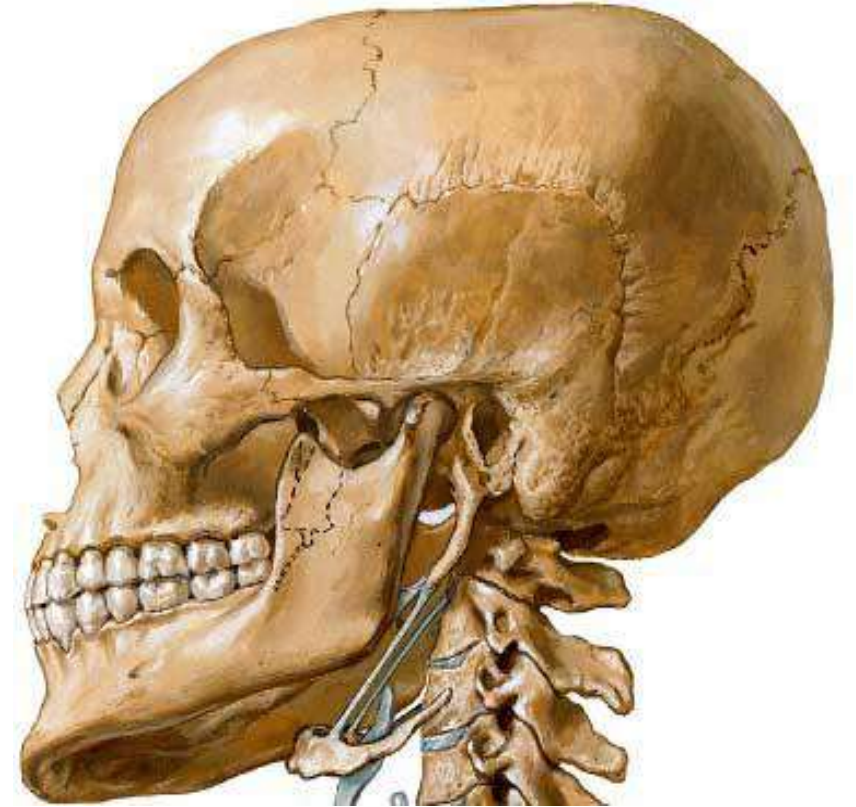
2. Appendicular skeleton: which includes the bones of the appendages (upper & lower limbs) & their girdles (shoulder & pelvic).

Axial skeleton

1. Skull & mandible.
2. Ribs.
3. Sternum.
4. Vertebral column.



*** The skull (cranium)**
(which contains the
brain + its meninges)
+ the mandible (part
of facial bones) →
form the skeleton of
the head.



The skull

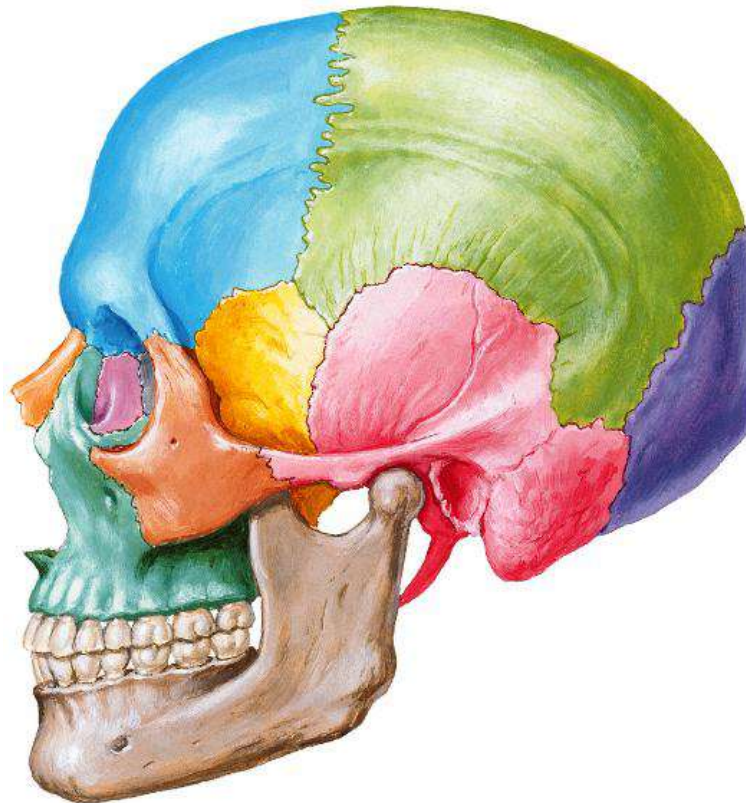
Is formed of 22 separate bones

One movable bone

The mandible

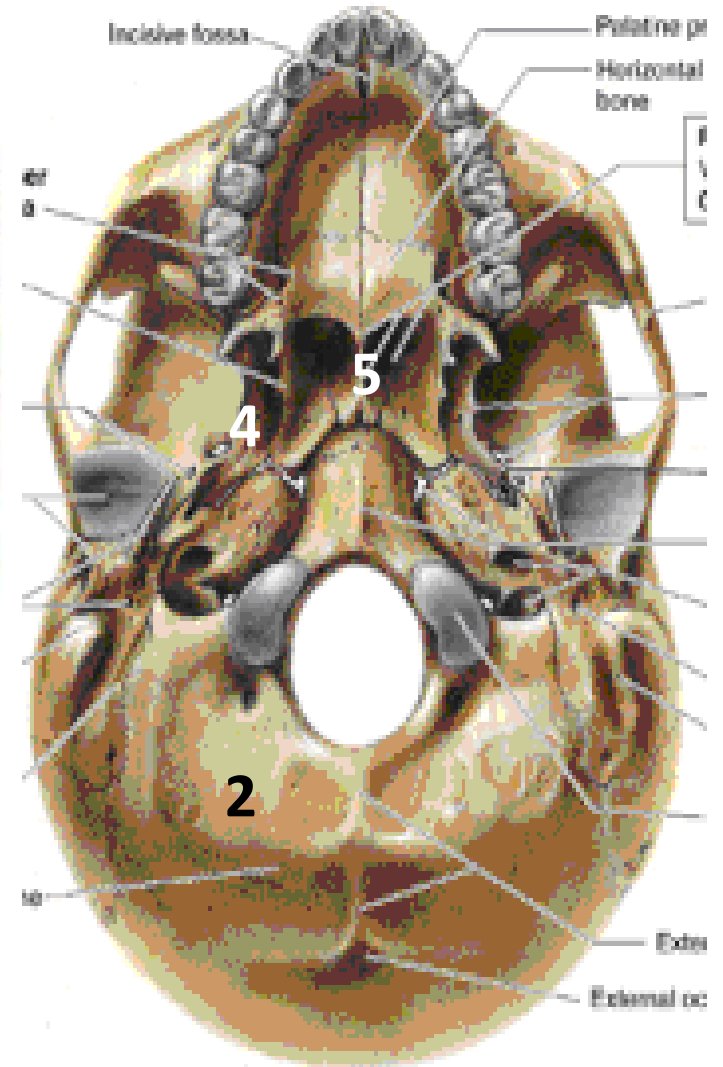
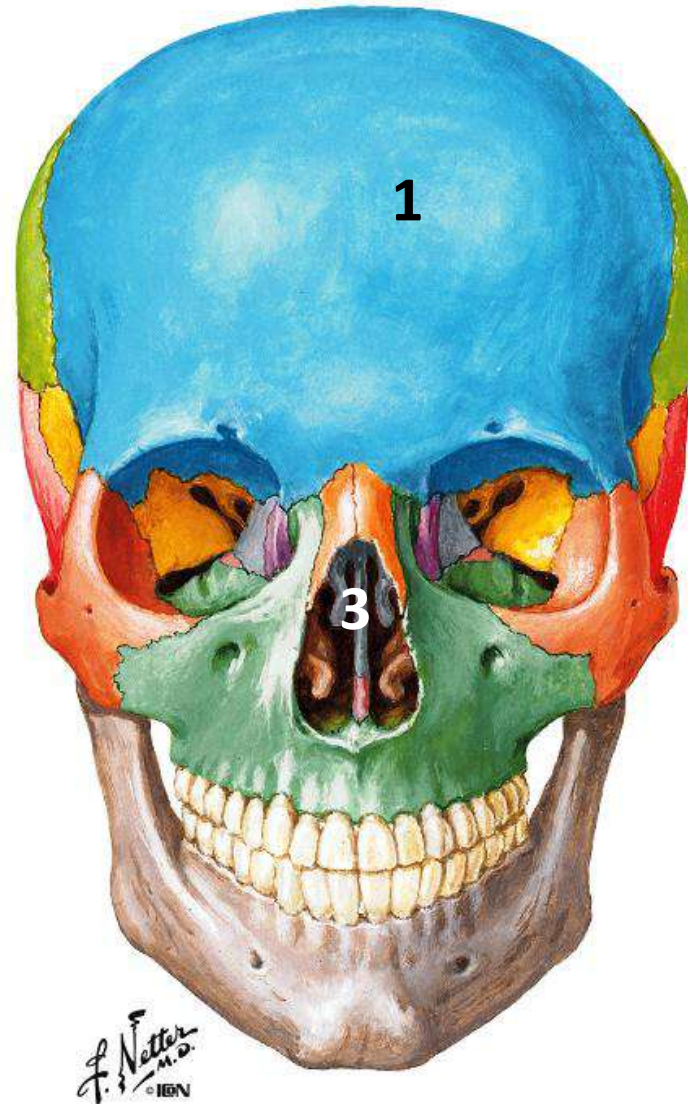
21 immovable bones

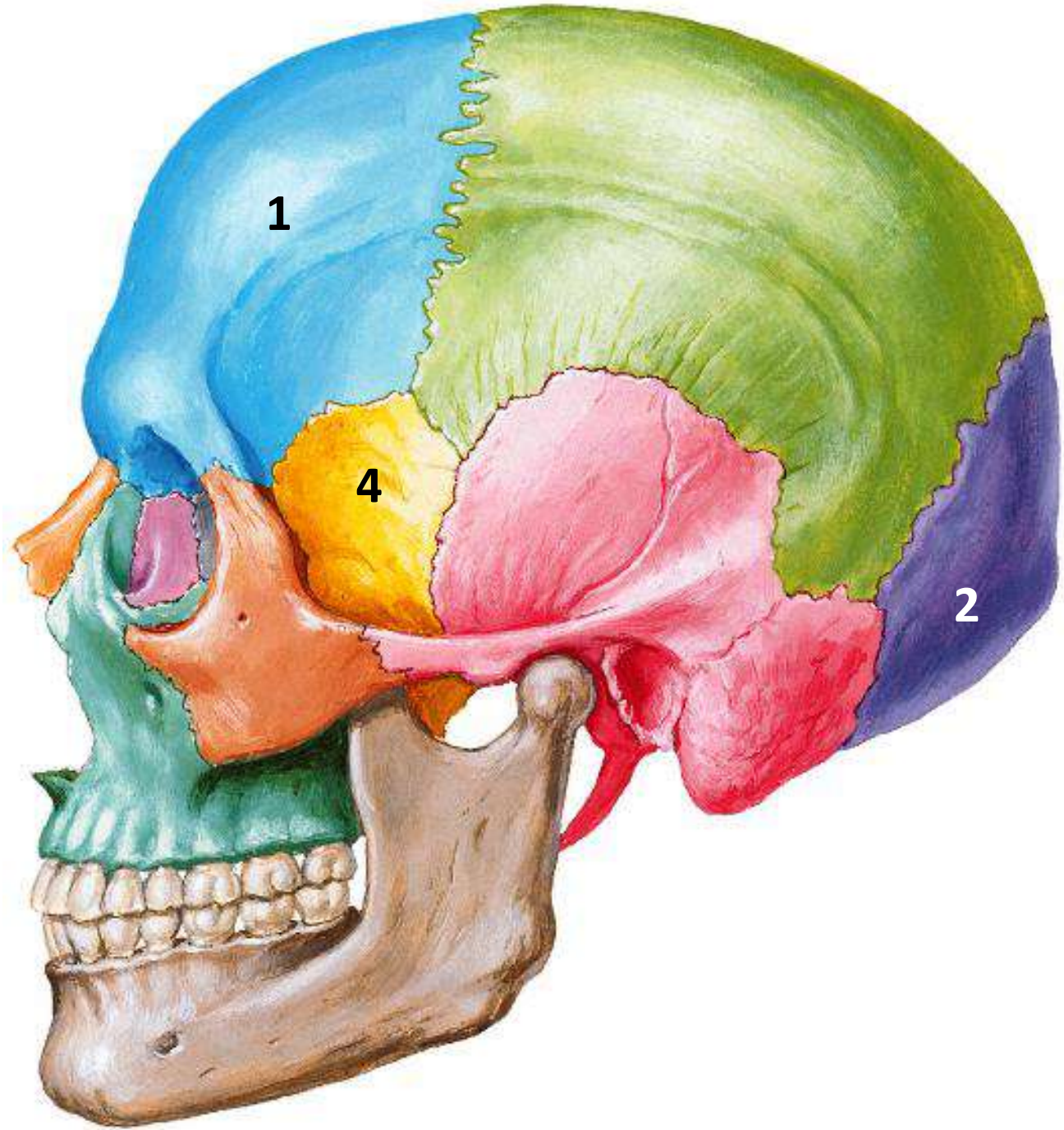
Articulating together by **sutures**
(which are fibrous joints)

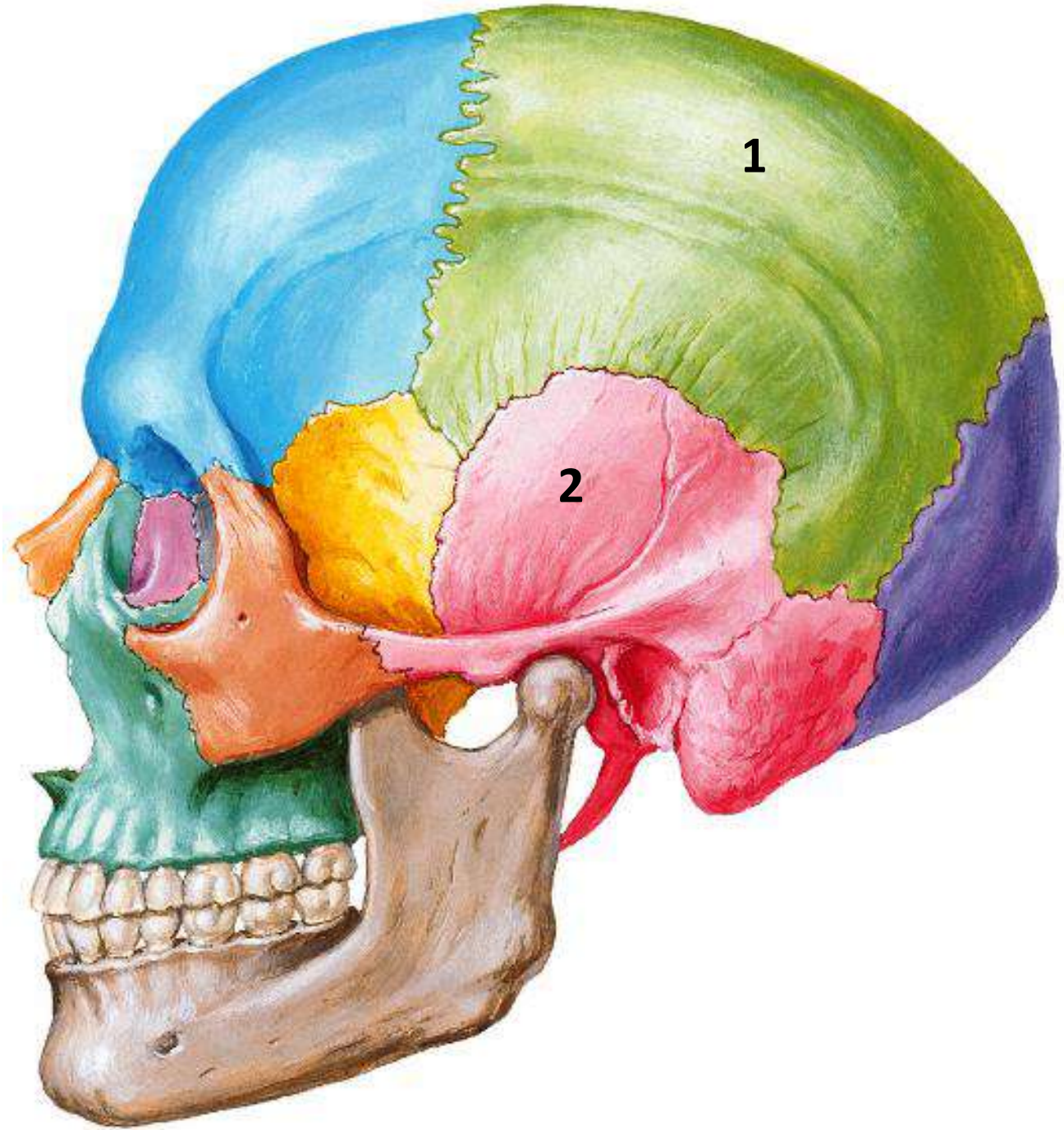


5 Unpaired bones

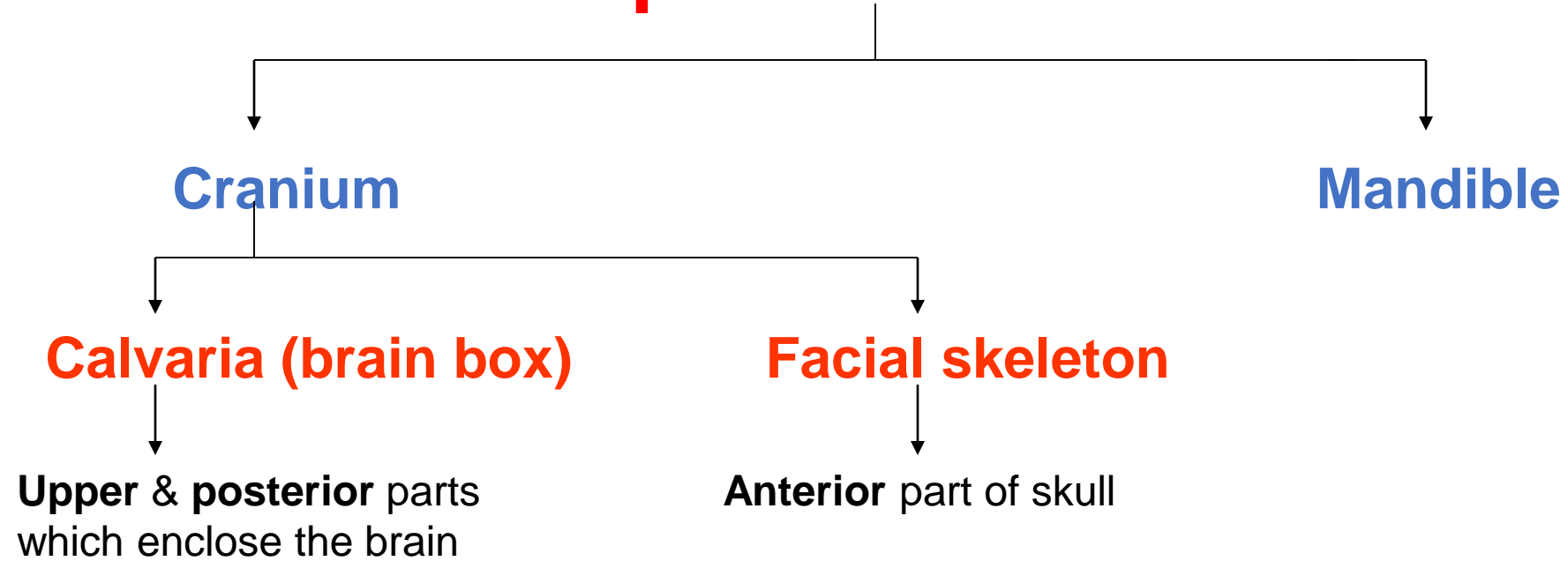
1. Frontal
2. Occipital
3. Ethmoid
4. Sphenoid
5. Vomer







The parts of the skull

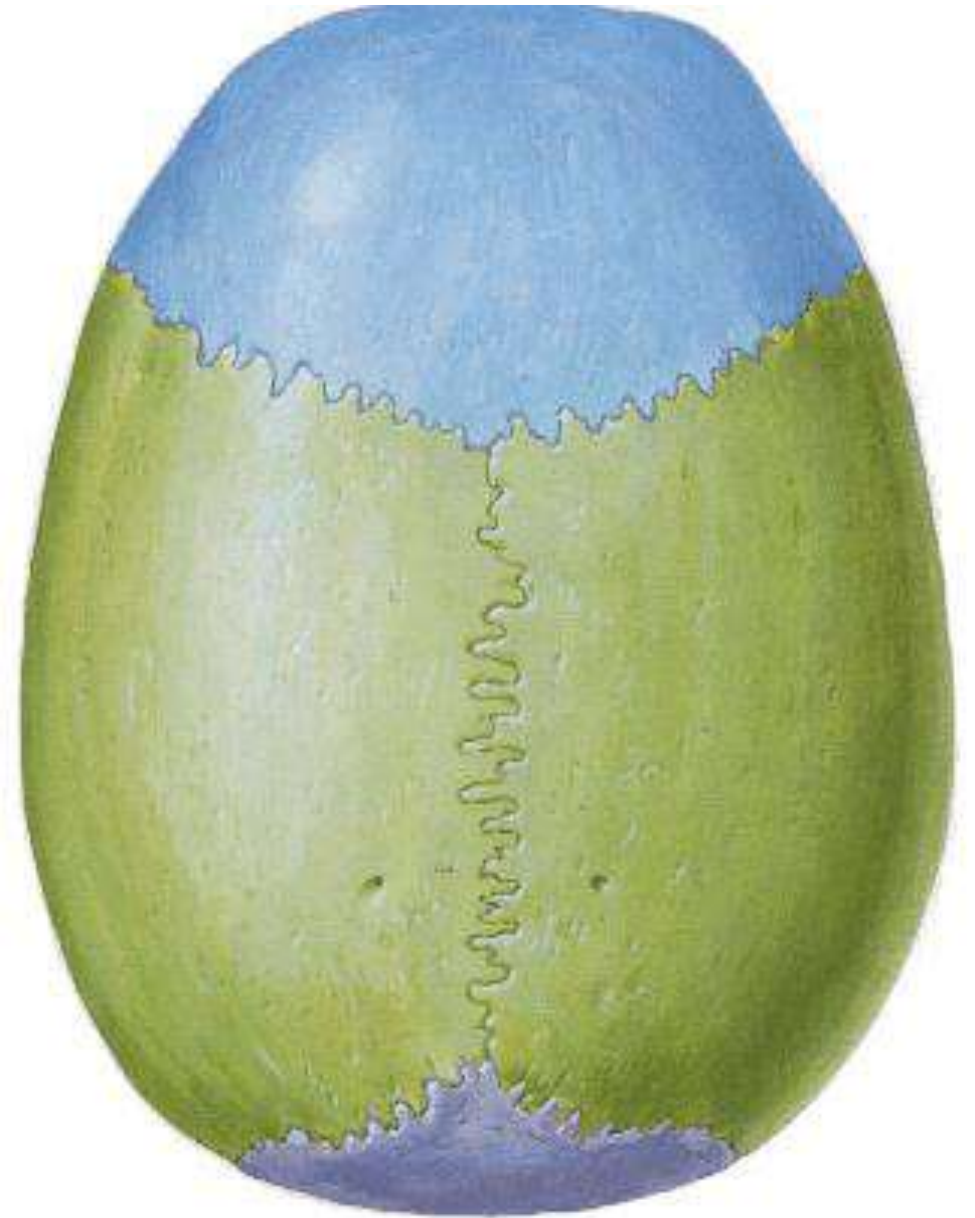


Norma verticalis

* It is the **upper** aspect (**vault**) of the skull.

* It presents 4 bones:

1. The **frontal bone** in its anterior part.
2. The **2 parietal bones** behind the frontal bones.
3. The **occipital bone** in its posterior part.

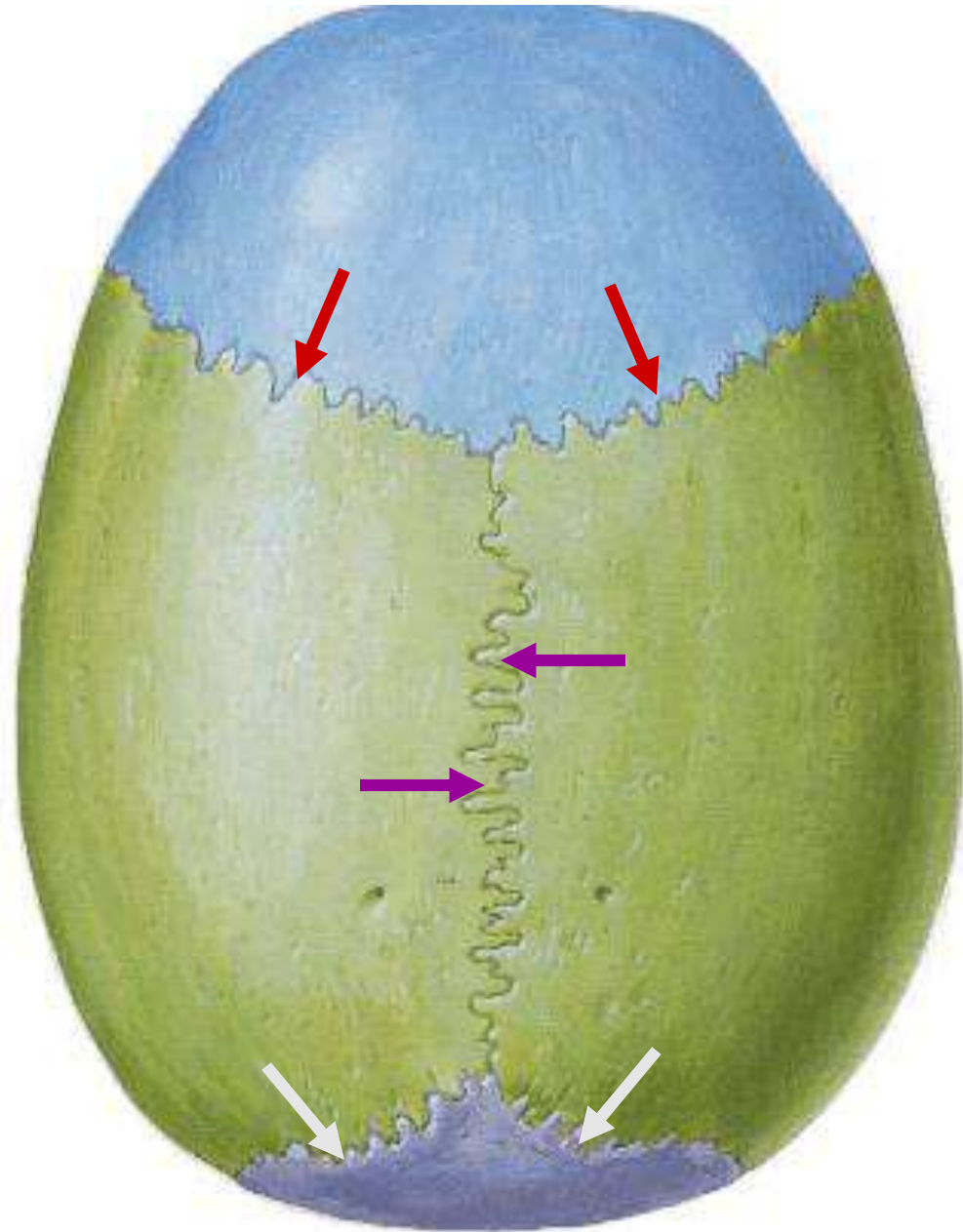


*** It presents 3 sutures:**

1. The coronal suture:
between the frontal bone
and the 2 parietal bones.

2. The sagittal suture:
between the 2 parietal
bones.

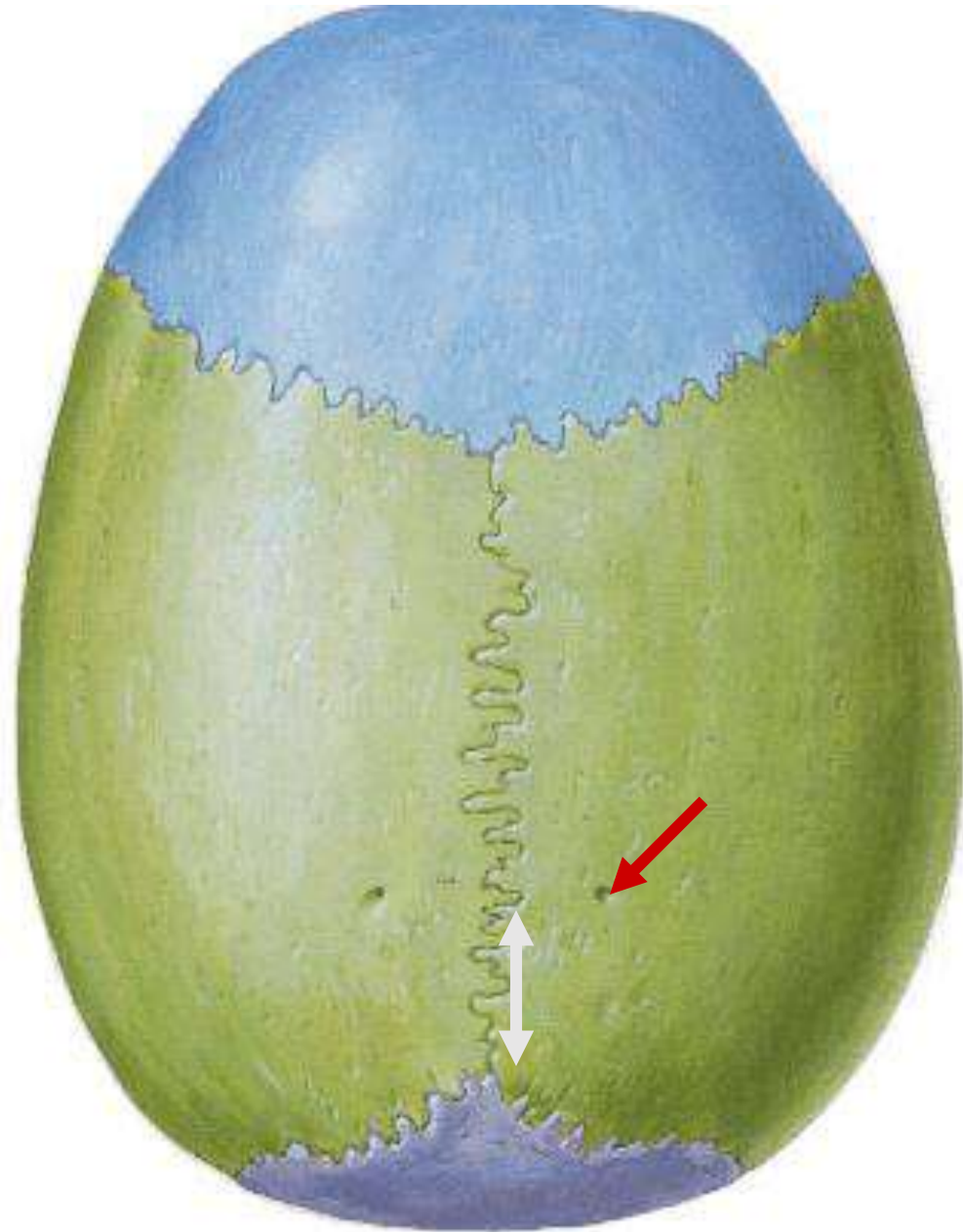
3. The lambdoid suture:
between the occipital bone
and the 2 parietal bones.



* It presents 2
parietal emissary
foramina:

* One on each side of
the sagittal suture, **4**
cm anterior to the
lambda.

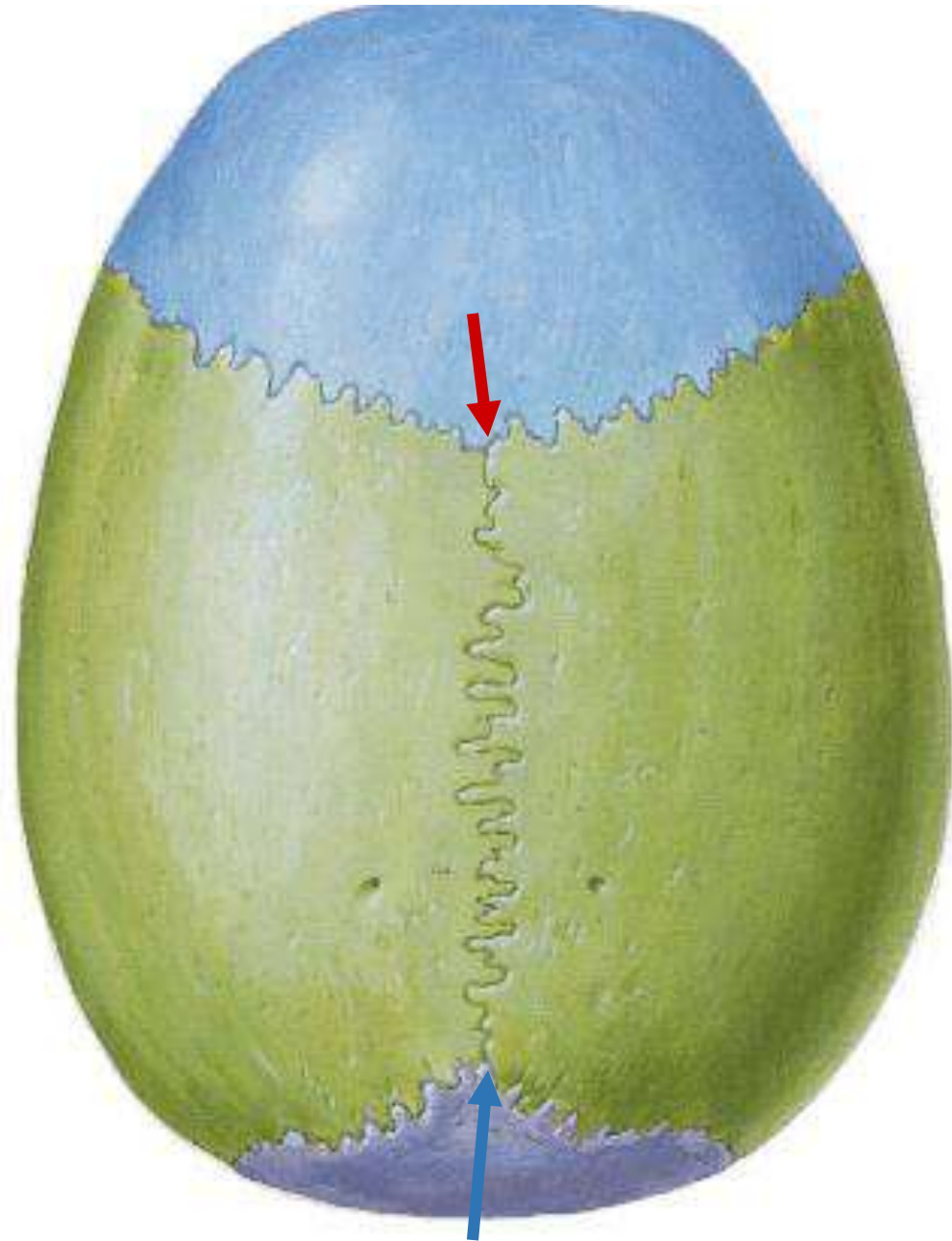
* It transmits an
emissary vein.



*** It presents 2 meeting points:**

1. The bregma: is the meeting of coronal and sagittal sutures.

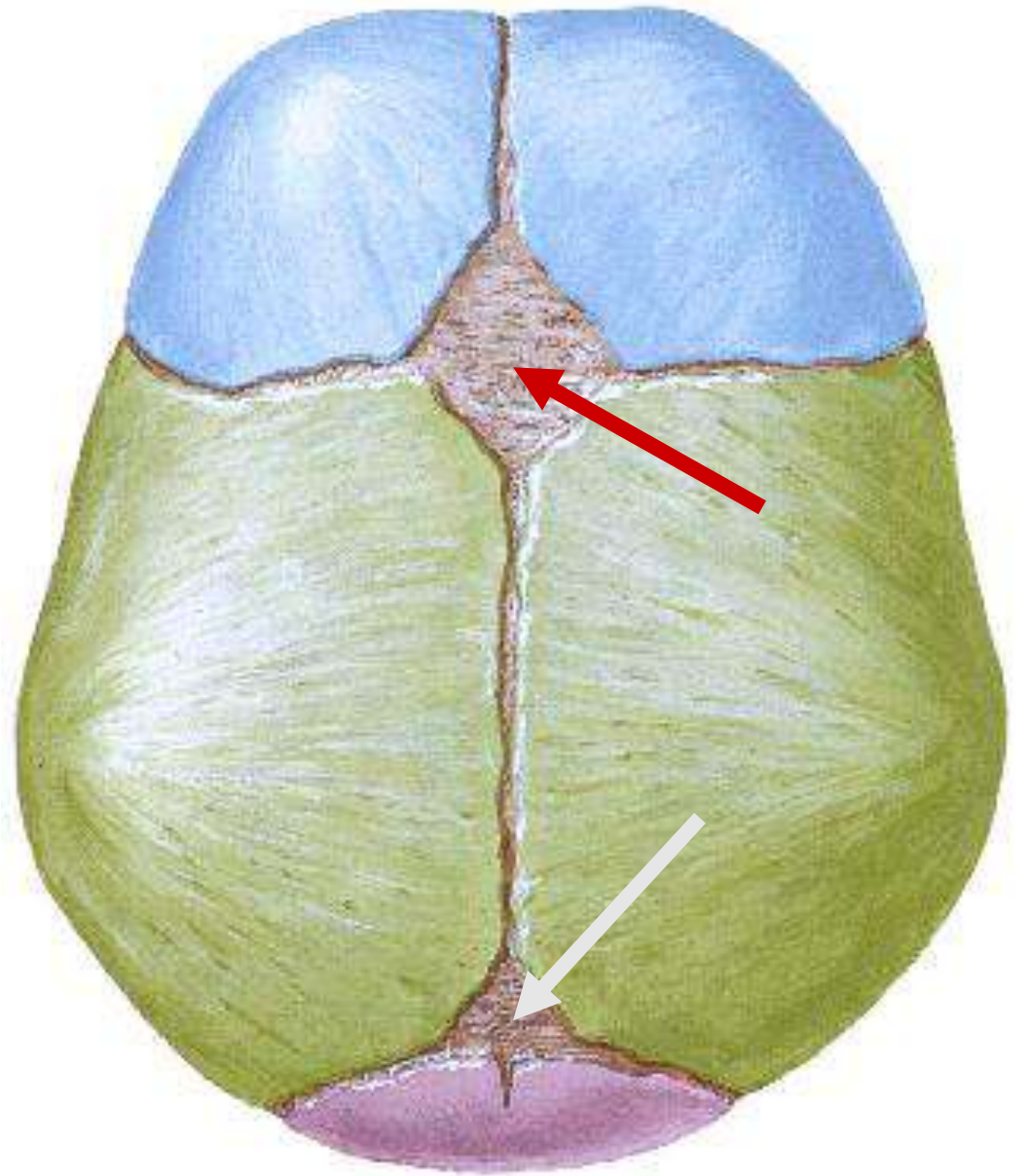
2. The lambda: is the meeting of the lambdoid and sagittal sutures.



* During foetal life:

1. **The bregma** is the site of membrane – filled **rhomboidal area** called **anterior fontanelle**. It usually closes **1.5 – 2 years** after birth.

2. **The lambda** is the site of a membrane – filled **triangular area**, called the **posterior fontanelle**. It usually closes **6 months** after birth.



* Clinical importance of fontanelles:

1. They are present at birth to allow overlap of skull bones during delivery.

2. They give an idea about the intra cranial pressure:

- If the pressure \uparrow it bulges.
- If the pressure \downarrow it sinks (dehydration).

3. They help in diagnosis of some diseases:

- Premature closure causes craniostenosis \rightarrow microcephaly.
- Delayed closure diagnoses rickets.

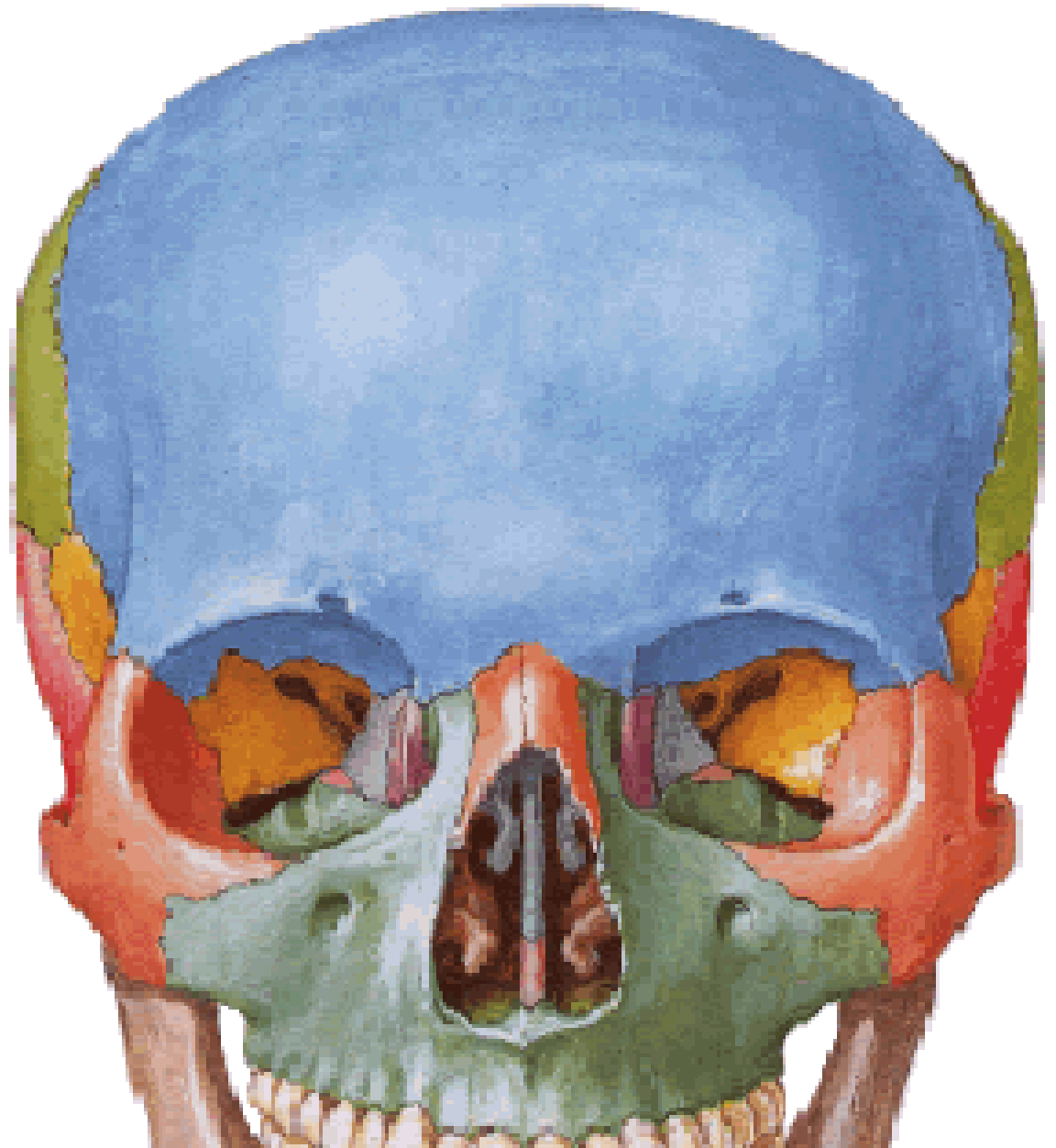
4. They can be used as a site for IV injection (superior Sagittal sinus).

Norma Frontalis

* It presents:

* 4 bones.

* 3 apertures
(surrounding 3
cavities; 2 orbital
& 1 nasal).



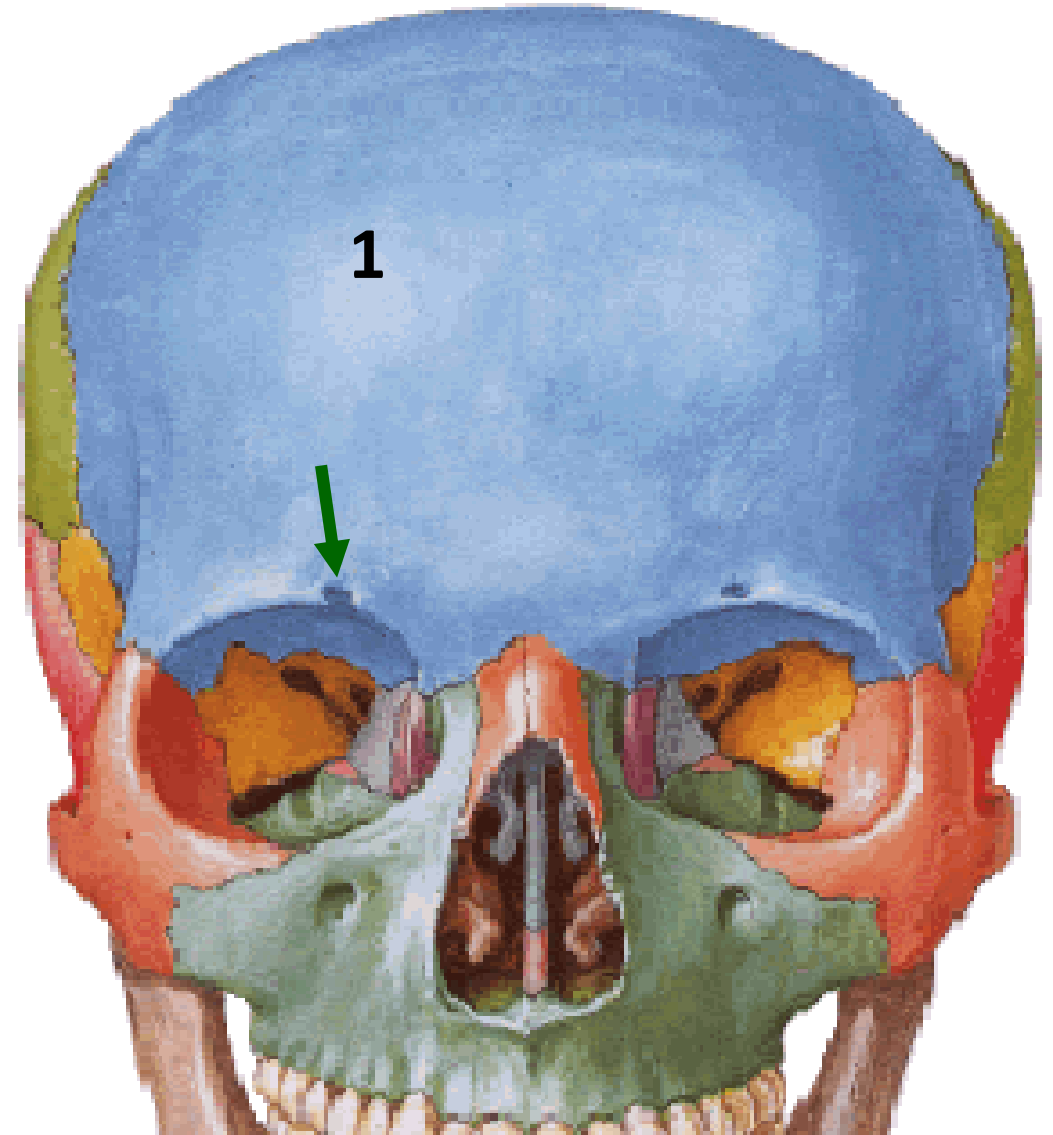
1. The frontal bone:

* Before the age of 8 years, the frontal bone is formed of two halves separated by

metopic suture which is completely ossified by 8 years.

* It persists in black race & in 8% of population.

* It is pierced by the **supraorbital foramen** (which gives passage to supraorbital nerve & vessels).

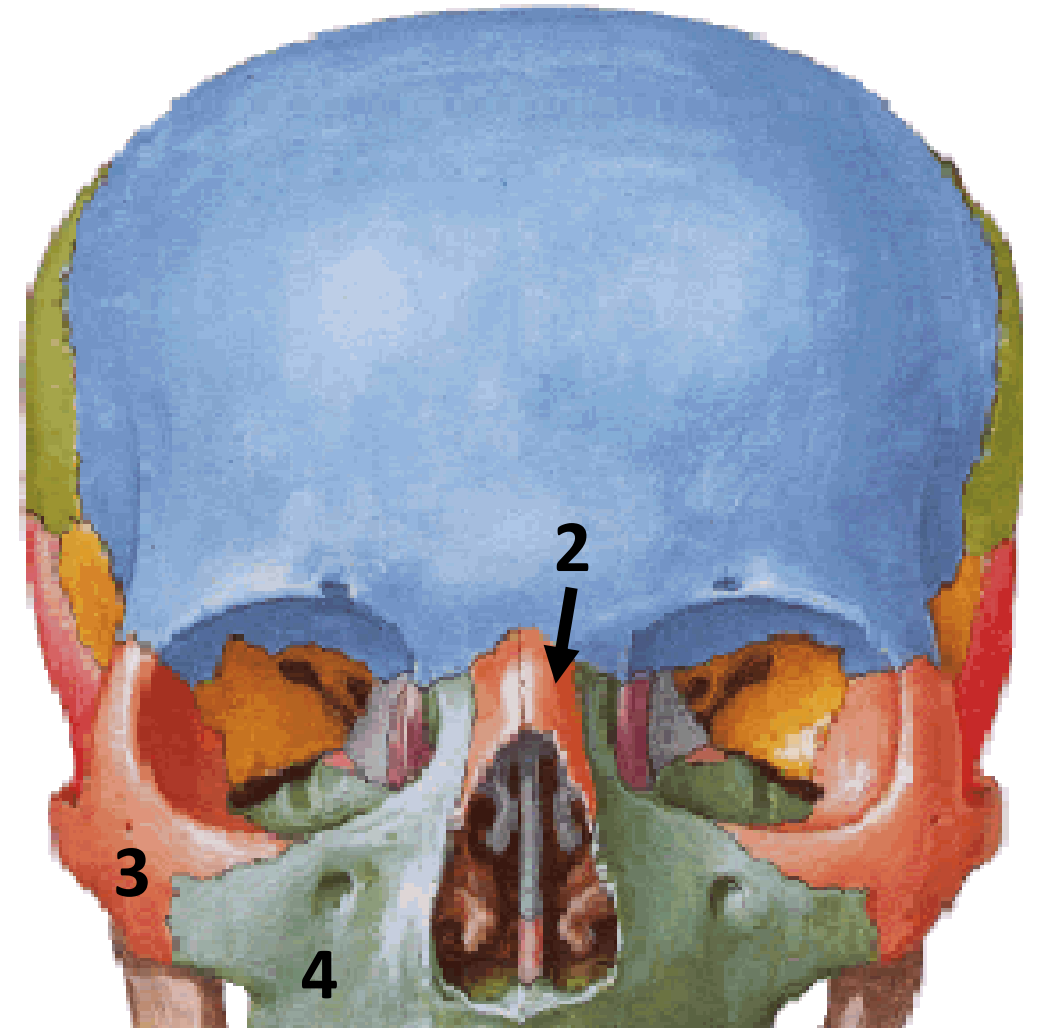


2. The 2 nasal bones: form the bridge of the nose.

3. Zygomatic bone:

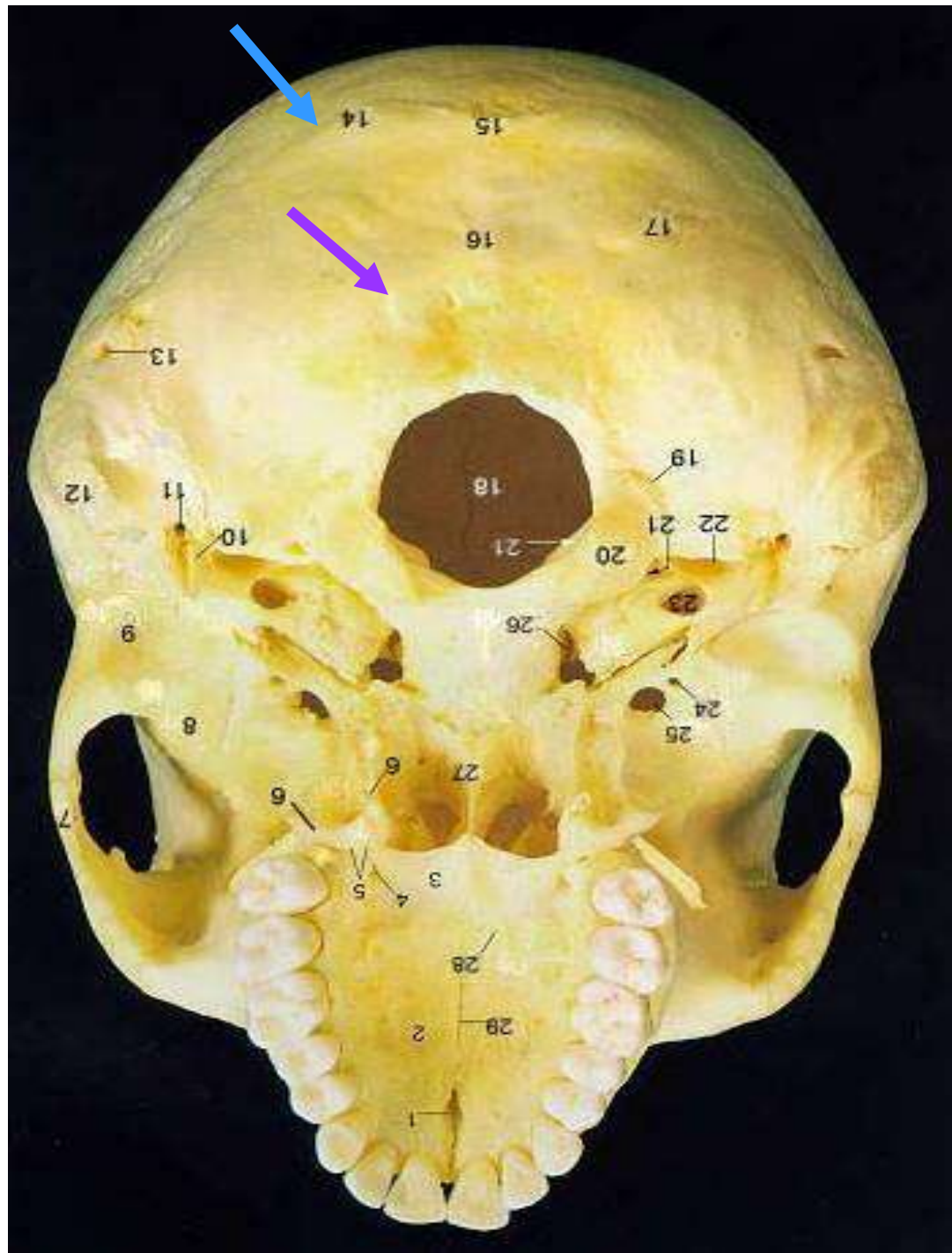
4. The maxillary bone:

- It has a **body** which contains the maxillary air sinus.
- It is pierced by the **infra-orbital foramen** (which gives passage to infra-orbital nerve & vessels).



3. The superior nuchal lines: extends laterally from the protuberance.

4. The inferior nuchal lines: extends laterally from the crest & run parallel to and below the superior nuchal lines.

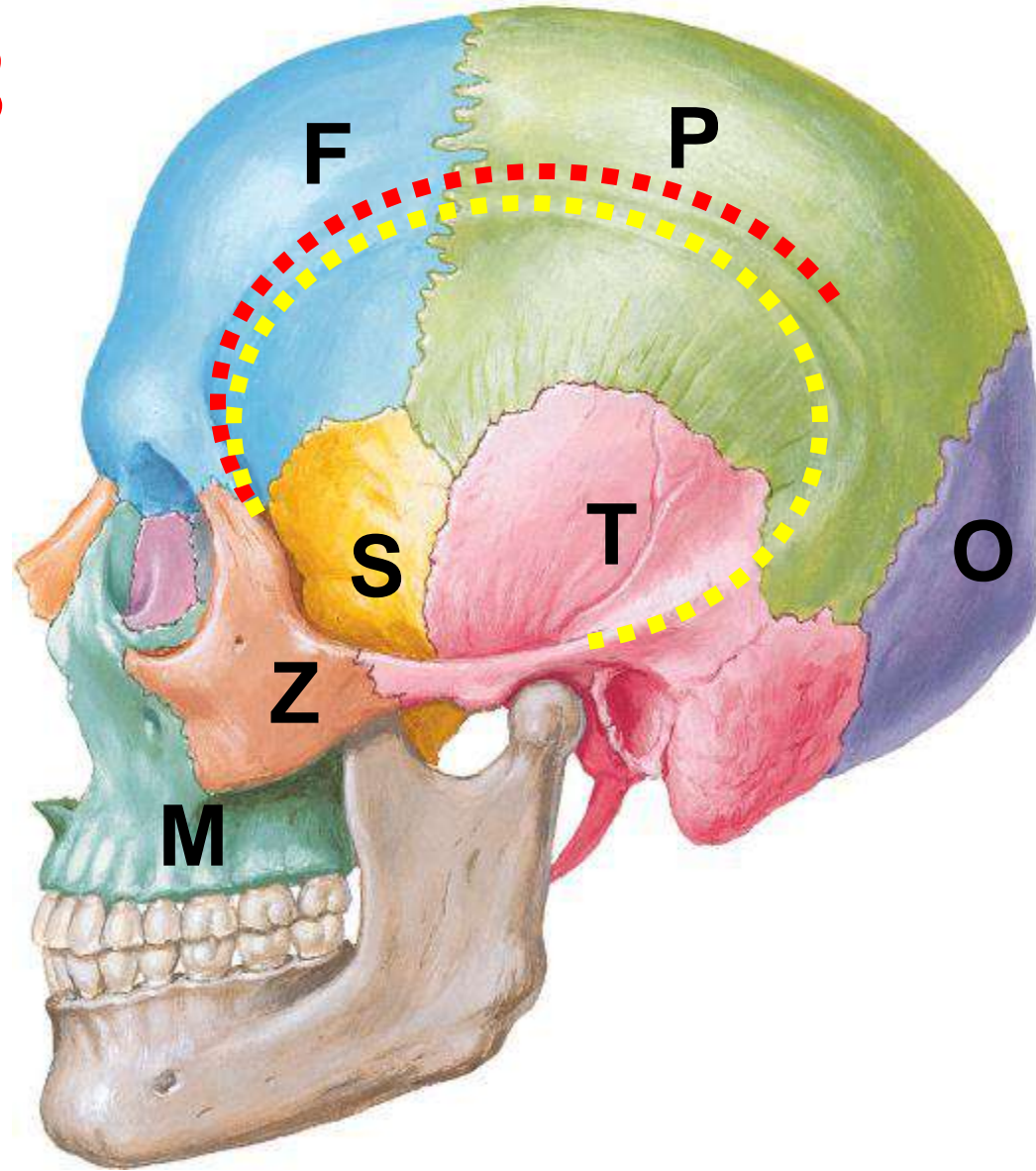


Norma Lateralis

*It is formed of: frontal, parietal, occipital, temporal, greater wing of sphenoid bone, maxilla and zygomatic bones.

***The superior temporal line:**
extends from zygomatic bone and passes backwards.

***The inferior temporal line:**
with **the temporal fossa** lies below it.

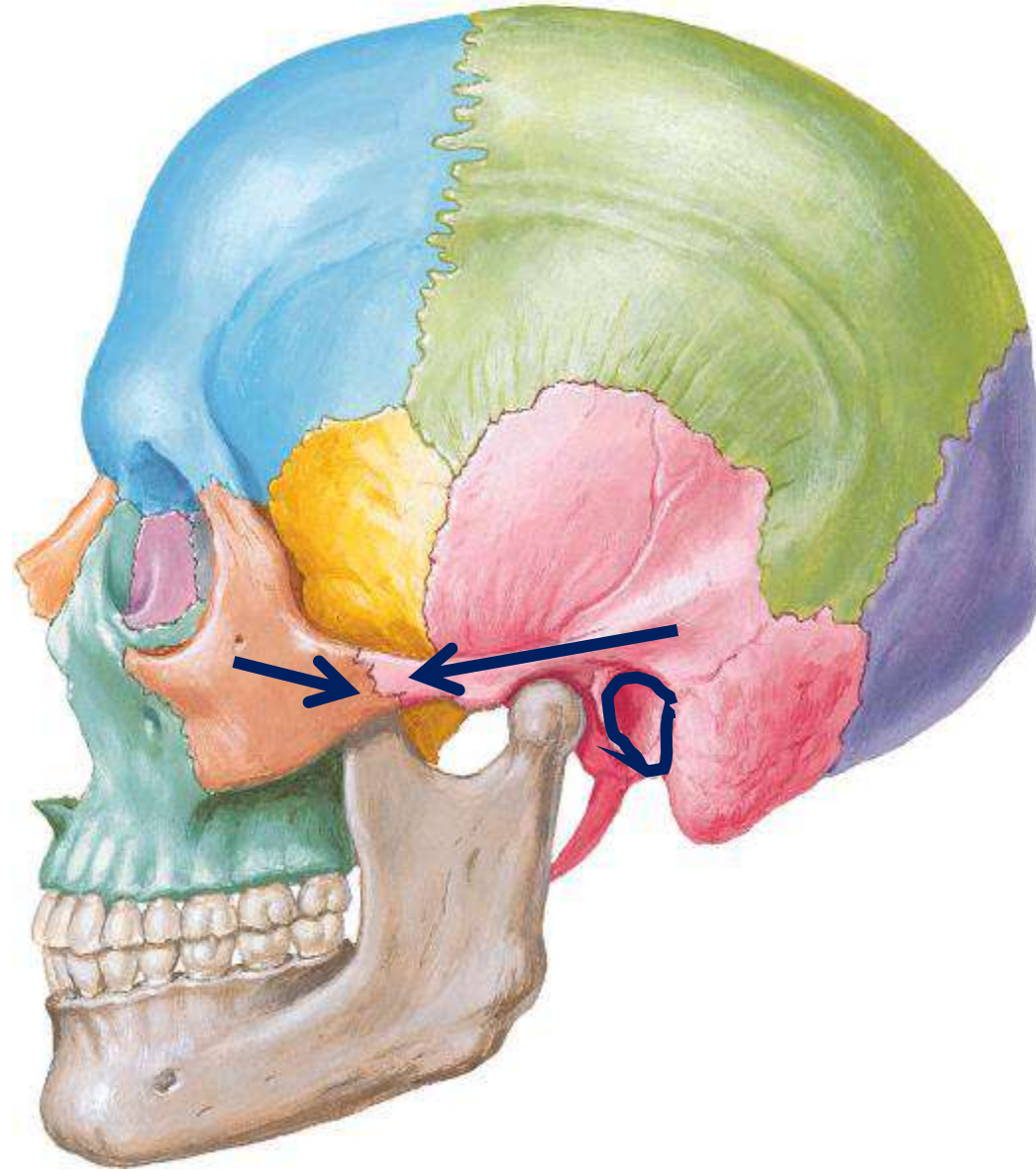


* **The zygomatic arch:**

* Is formed by the temporal process of zygomatic bone and zygomatic process of temporal bone.

* **The external auditory meatus:**

* lies below the posterior part of the zygomatic process of the temporal bone.



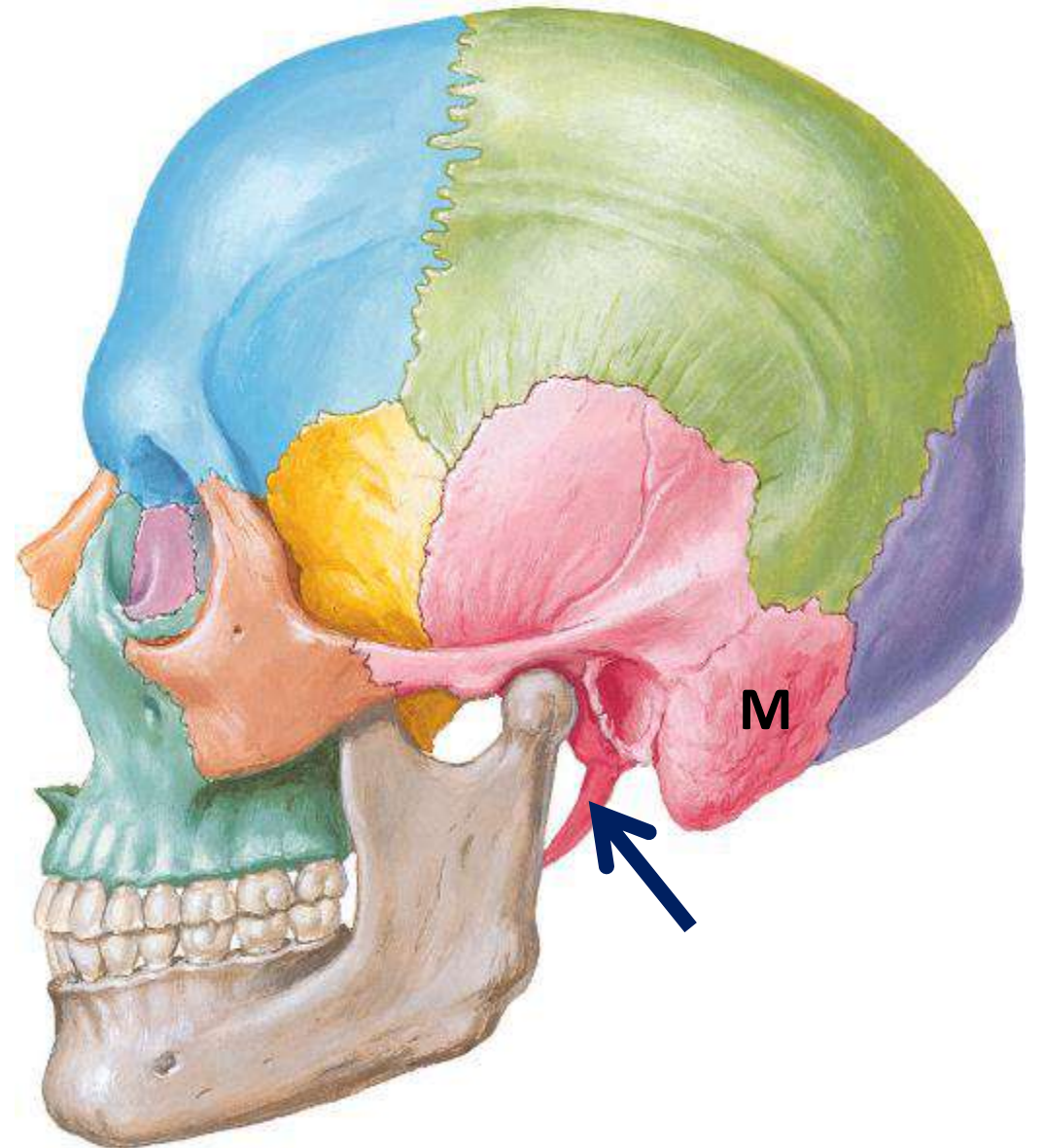
*** The mastoid process (M):**

* It is a part of the temporal bone.

* It lies behind the external auditory meatus.

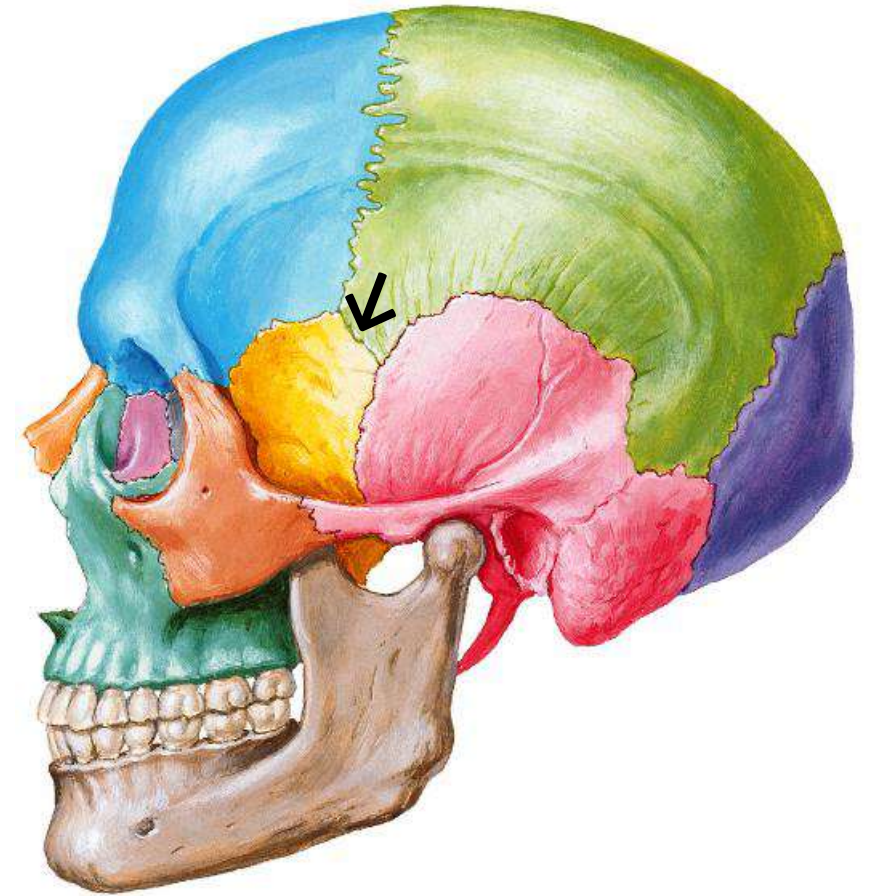
*** The Styloid process (↑):**

* It is a slender projection of the temporal bone.



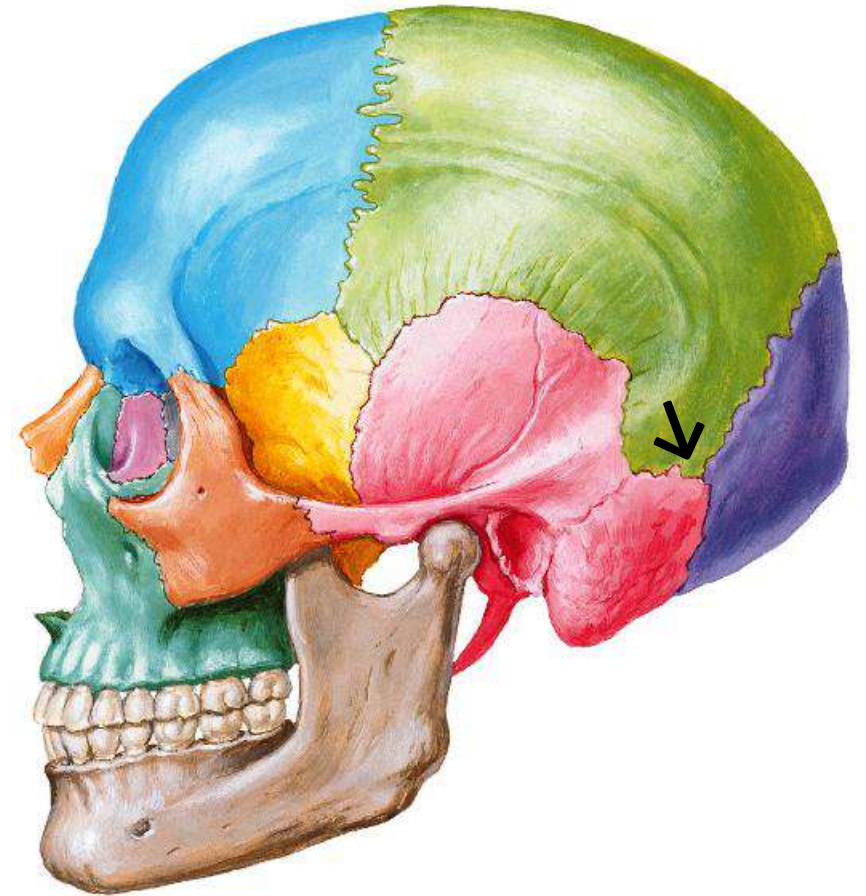
* **Pterion (↓):**

- * It is the meeting point of 4 bones, the frontal, parietal, temporal and greater wing of sphenoid.
- * It is an H-shaped suture.
- * It is the ossified anterolateral fontanelle at the age of 3 months.
- * The center of the pterion lies 4 cm above the mid-point of the zygomatic arch & 3.5 cm behind frontozygomatic suture.
- * It is related to the middle meningeal A.
- * Since it is very thin, the pterion is the most frequently fractured part of skull in car accidents leading to hemorrhage (extradural hematoma) which compresses the motor area of the brain.



* **Asterion (↓):**

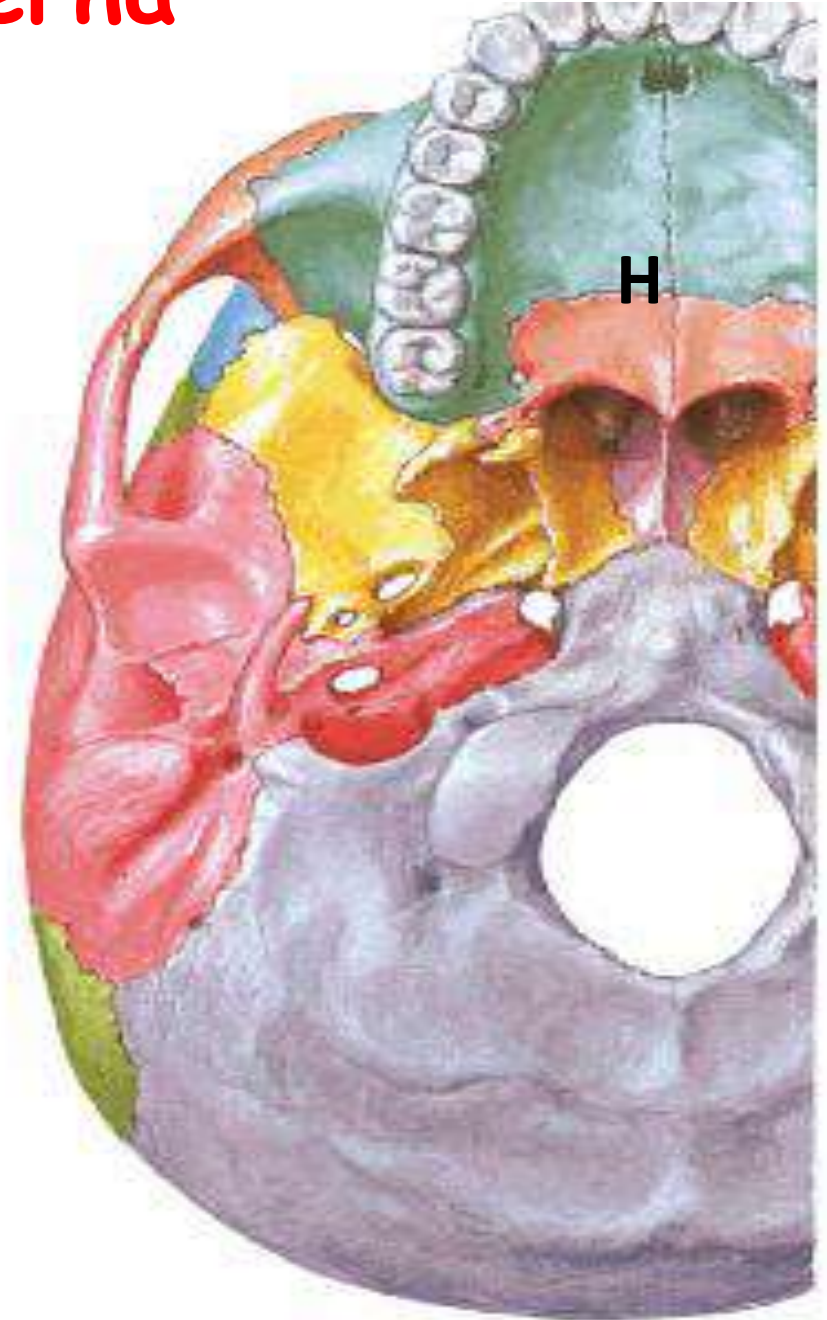
- * It is the meeting point of the parietal, occipital & mastoid part of temporal bones.
- * It is the site of posterolateral fontanelle which ossifies at the age of 3 months.



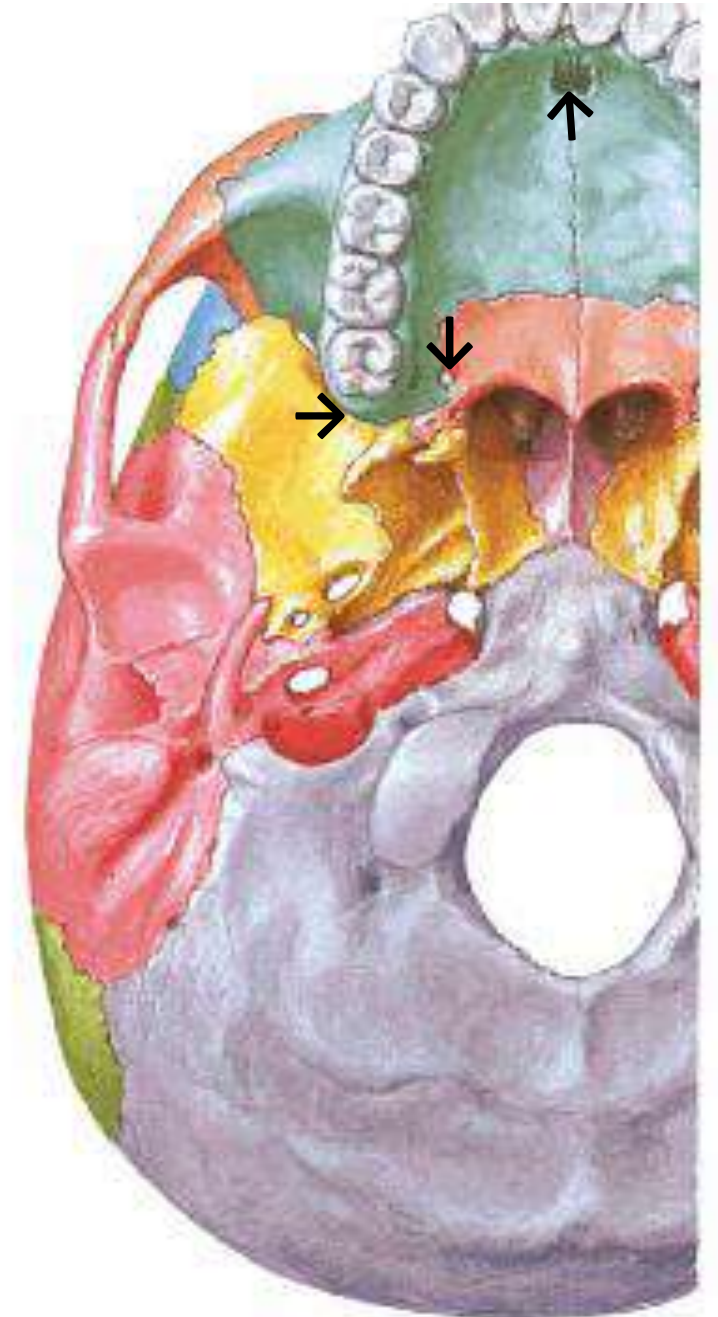
Norma Basalis Externa

A. Anterior part:

- * It is formed by the **hard palate (H)**.
- * The hard palate is bounded anteriorly by the **alveolar arch**, which has 16 sockets for the roots of the upper teeth.



- * **The greater palatine foramen (↓)** lies in the posterior part of the hard palate. It gives passage to greater palatine nerve & vessels.
- * **The lesser palatine foramina,** usually two, lie behind the greater palatine foramen. They give passage to lesser palatine nerve & vessels.
- * **The maxillary tuberosity (→)** is present at the posterior end of the alveolar arch.
- * **The incisive fossa (↑)** lies posterior to the central incisor teeth. It contains foramina which serve as a connection between palate & nose.



B. Middle part:

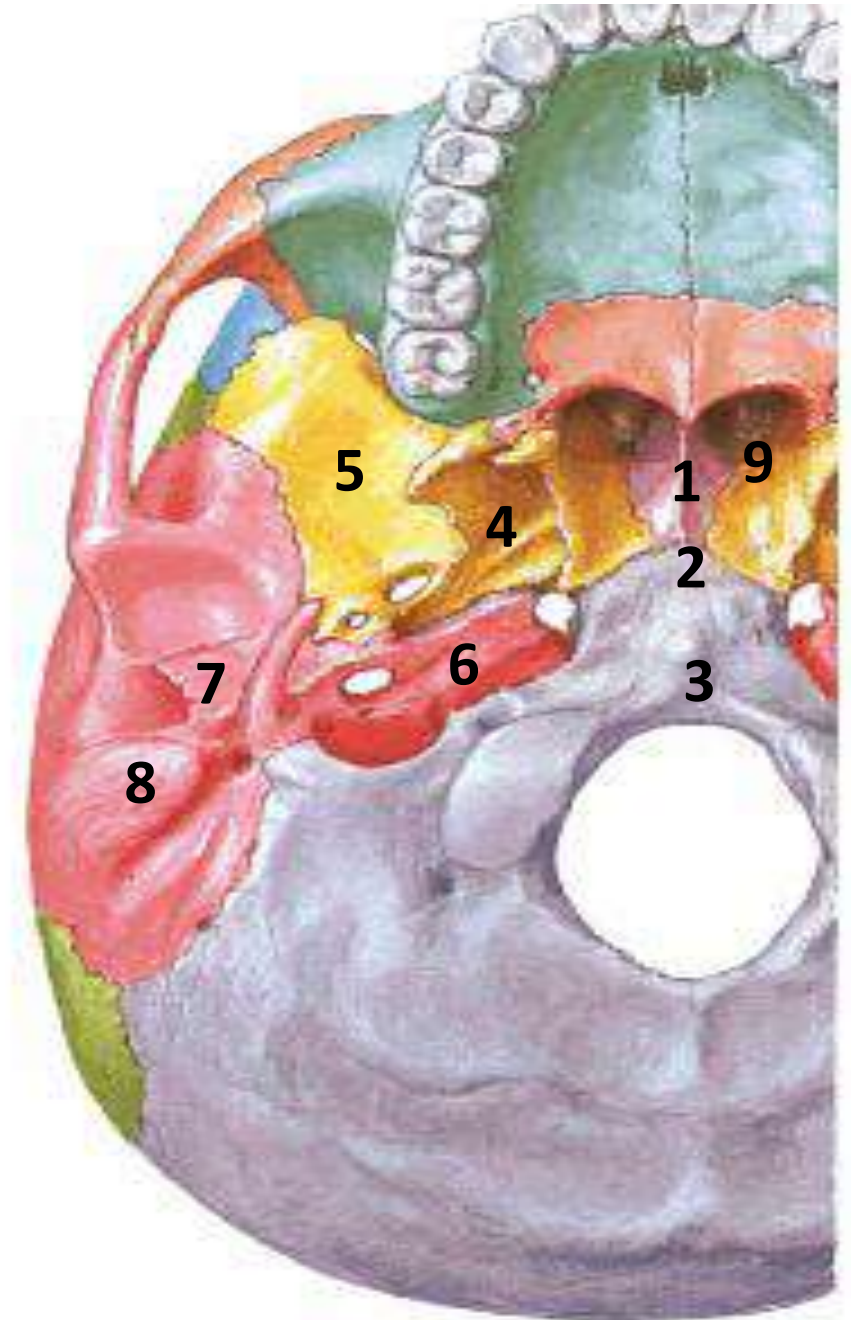
*** In the middle, it shows:**

- 1. Vomer.**
- 2. Body of sphenoid.**
- 3. Basilar part of occipital bone.**

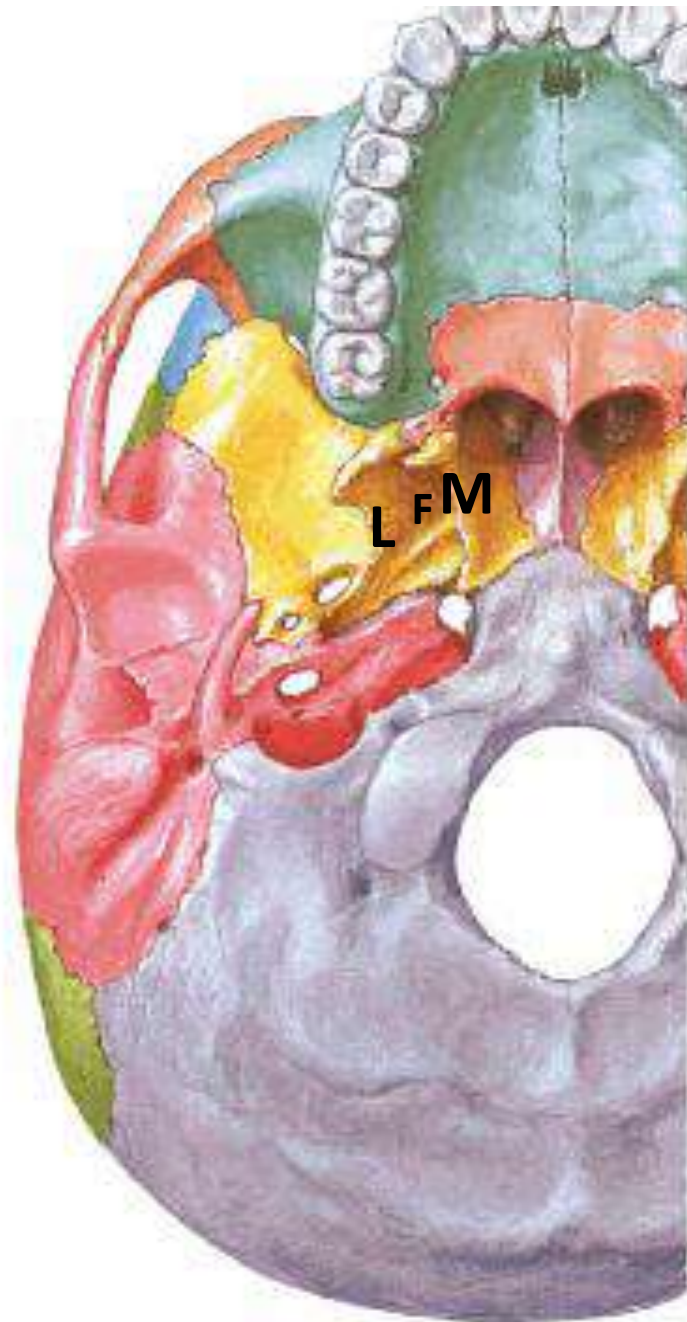
*** Laterally, it shows:**

- 4. Pterygoid process.**
- 5. Greater wing of sphenoid.**
- 6. Petrous part of temporal bone.**
- 7. tympanic parts of temporal bone.**
- 8. Mastoid process.**

*** It contains: Posterior nasal openings (9) (choanae) which are separated by vomer (part of nasal septum).**



- ** The pterygoid process of the sphenoid bone:**
- * It is formed of lateral pterygoid plate (L) and medial pterygoid plate (M) with the pterygoid fossa (F) in between.**



**** The greater wing of sphenoid bone shows:**

1. Foramen ovale (↓):

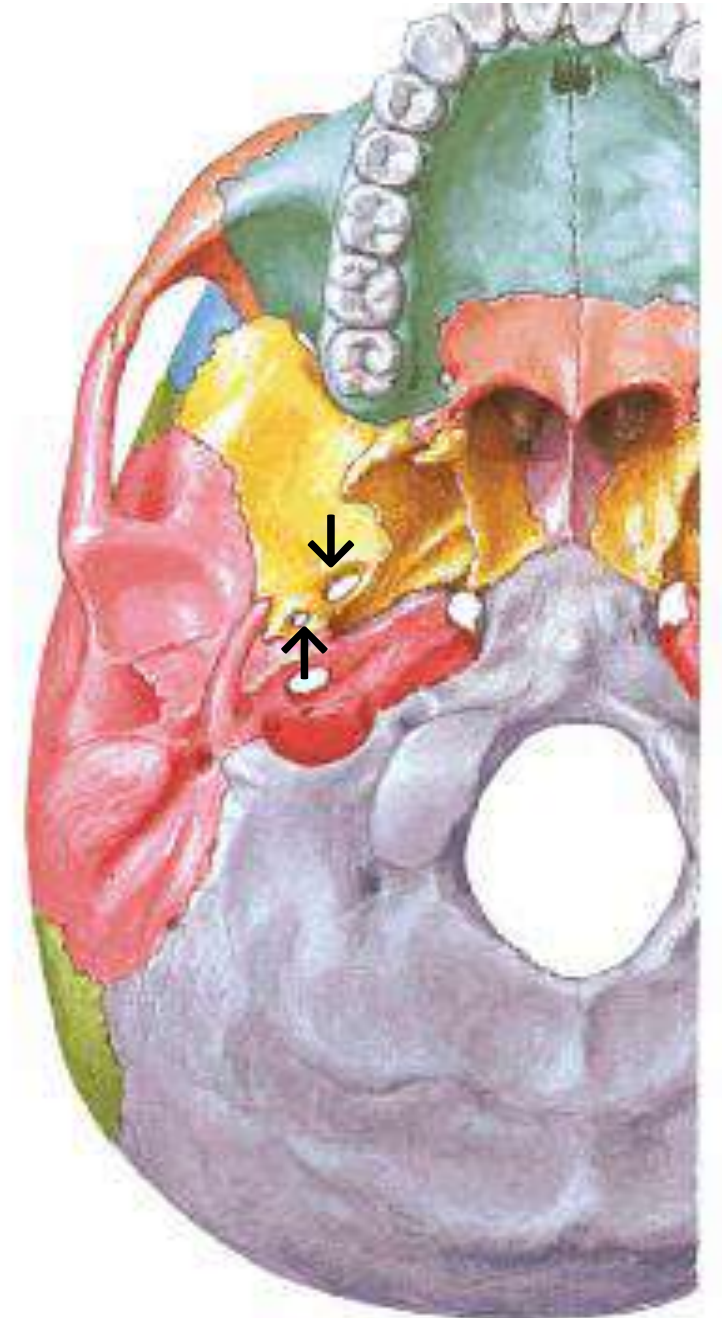
*** Gives passage to:**

- a. Mandibular nerve.**
- b. Lesser petrosal nerve.**
- c. Accessory meningeal artery.**

2. Foramen spinosum (↑):

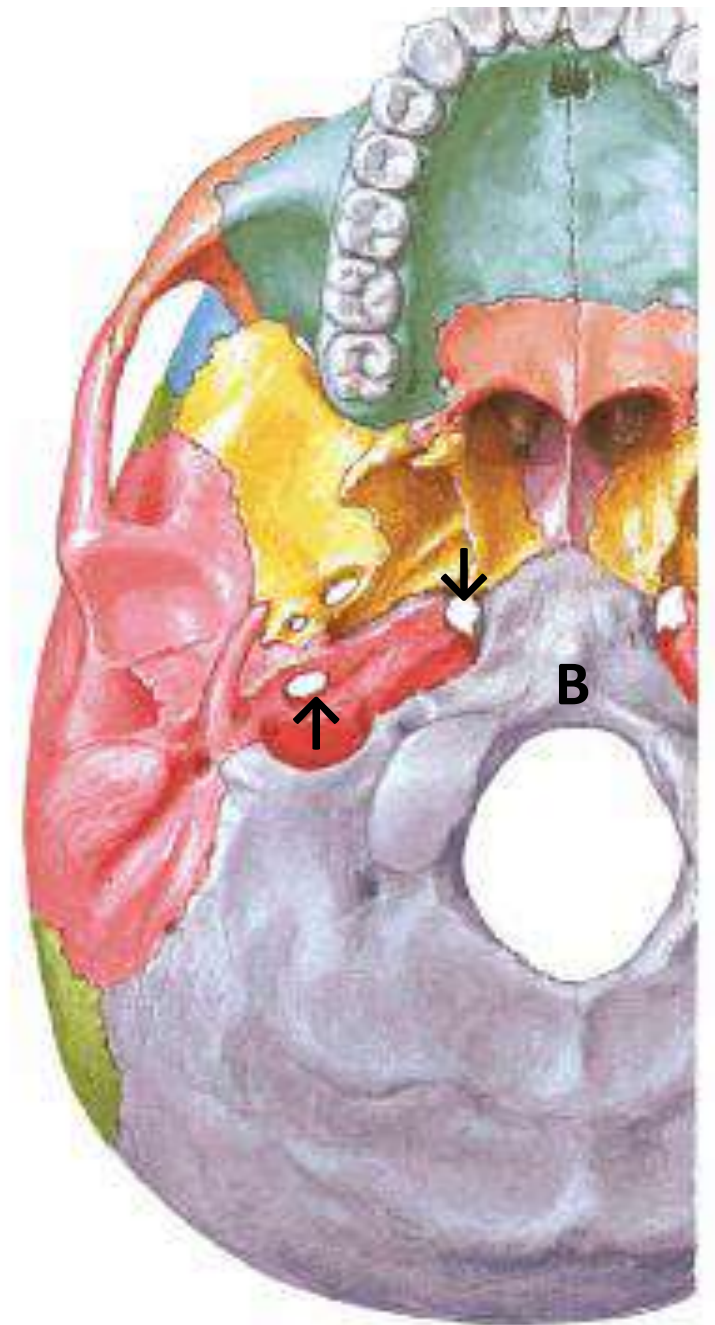
*** Gives passage to:**

- a. Nervus spinosus.**
- b. Middle meningeal artery.**



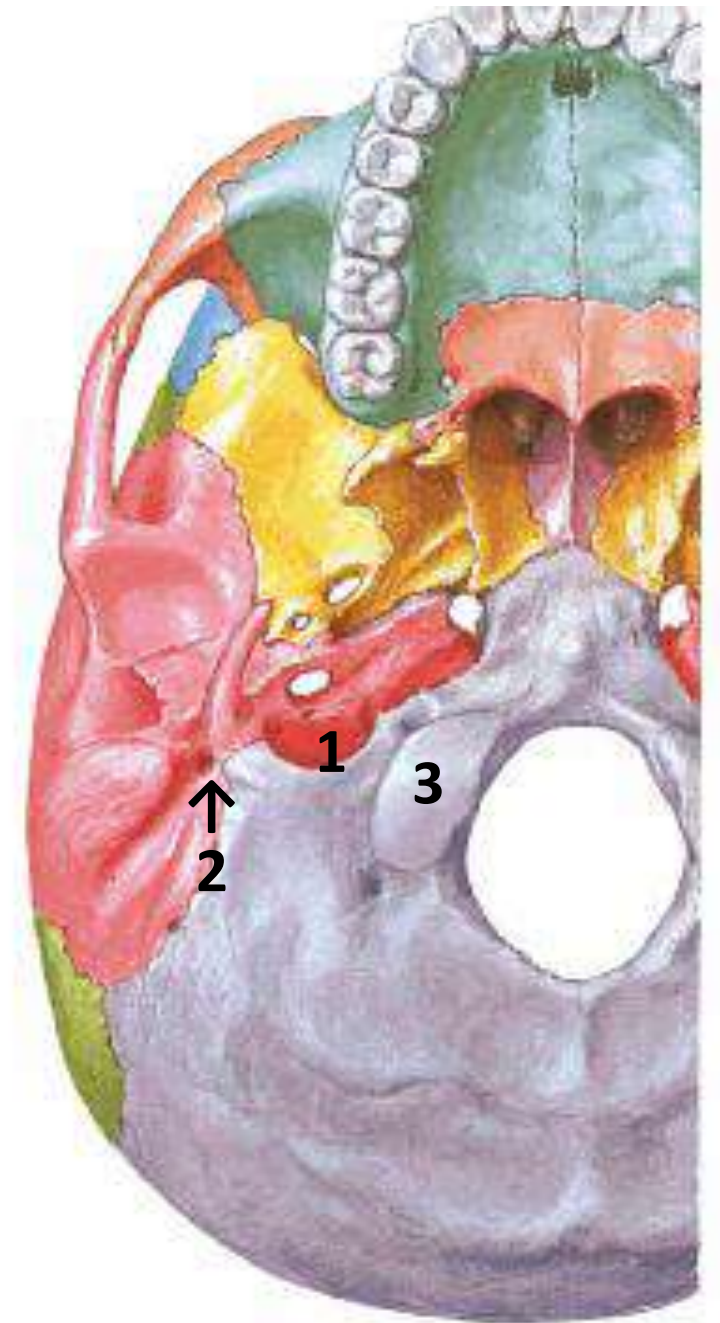
C. Posterior part:

- ** The basilar part of occipital bone (B)** articulates anteriorly with the body of the sphenoid bone.
- ** Foramen lacerum (↓)** lies between petrous part of temporal bone, basilar part of occipital and the pterygoid process. In life it is closed by cartilage plate.
- ** The carotid canal (↑):** lies posterolateral to foramen lacerum. Gives passage to internal carotid artery.



**** Notice the following:**

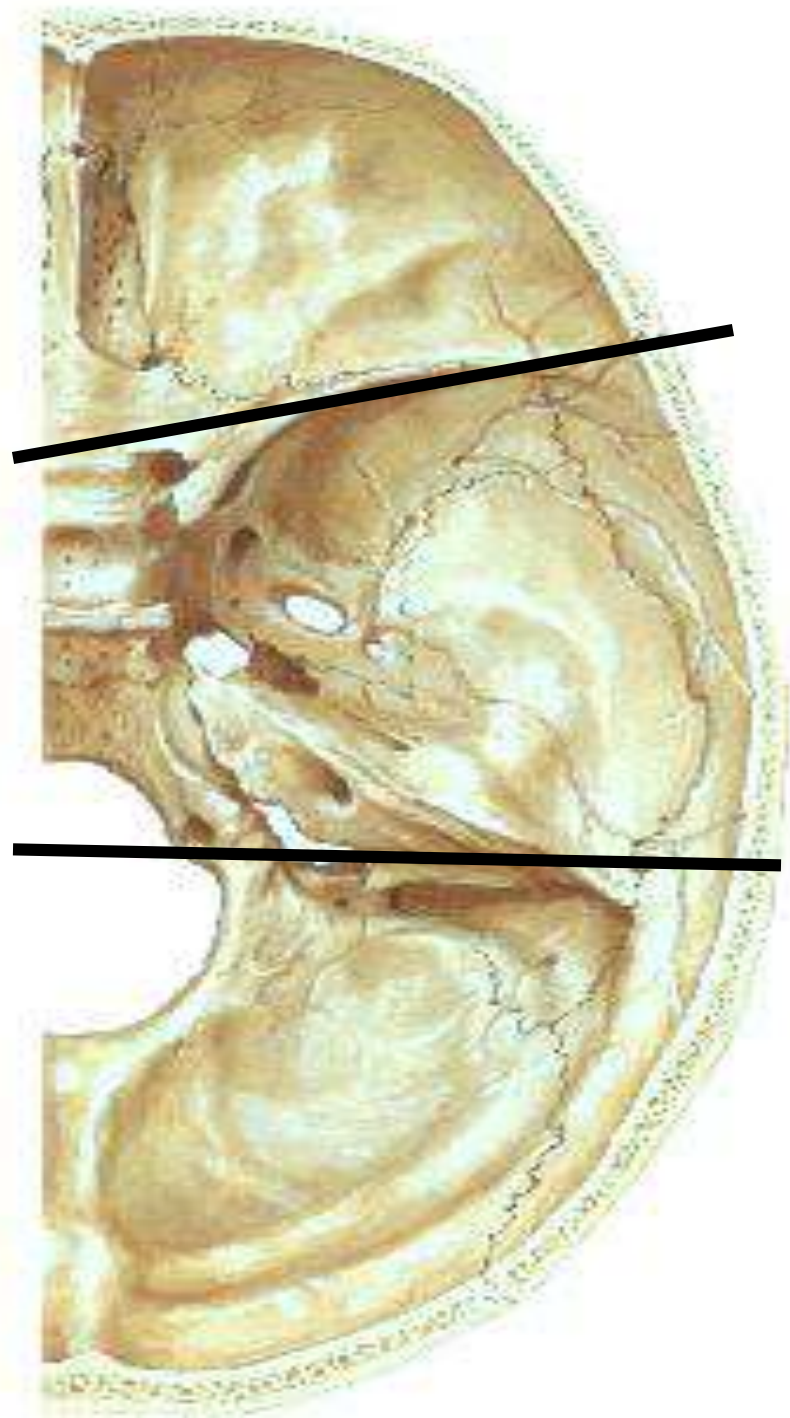
- 1. The jugular foramen:** lies lateral to the occipital condyle. Gives passage to internal jugular vein.
- 2. The stylomastoid foramen:** lies between styloid and mastoid processes. Gives passage to facial nerve.
- 3. The occipital condyles:** articulate with the atlas to form atlanto-occipital joint.
- 4. The anterior condylar (hypoglossal) foramen.** Gives passage to hypoglossal nerve.
- 5. The posterior condylar foramen.**
- 6. The foramen magnum:** communicates the cranial cavity with the vertebral canal. Gives passage to brain stem which continues as spinal cord.



Cranial Cavity

* It is divided into:

1. Anterior cranial fossa.
2. Middle cranial fossa.
3. Posterior cranial fossa.



Ant. Cranial Fossa

* It is formed by the following bones:

* In the midline:

1- Frontal bone.

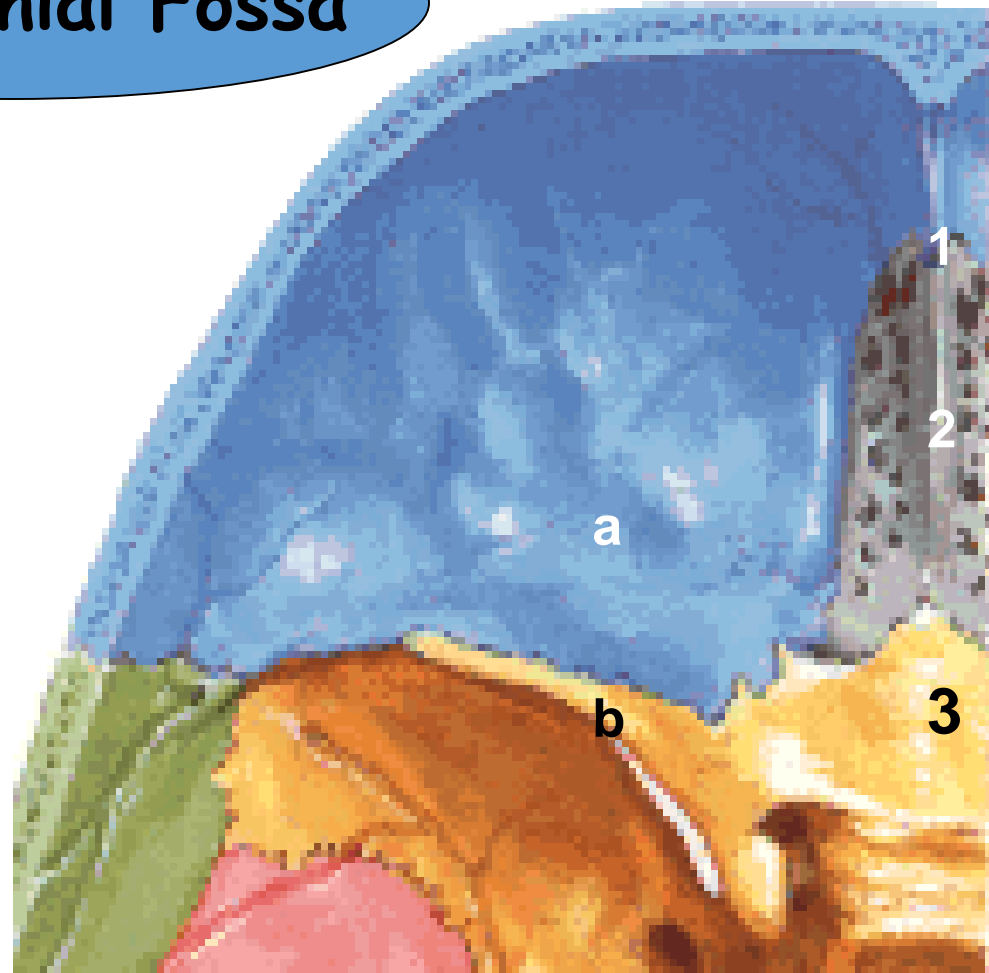
2- Ethmoid.

3- Sphenoid.

* On each side:

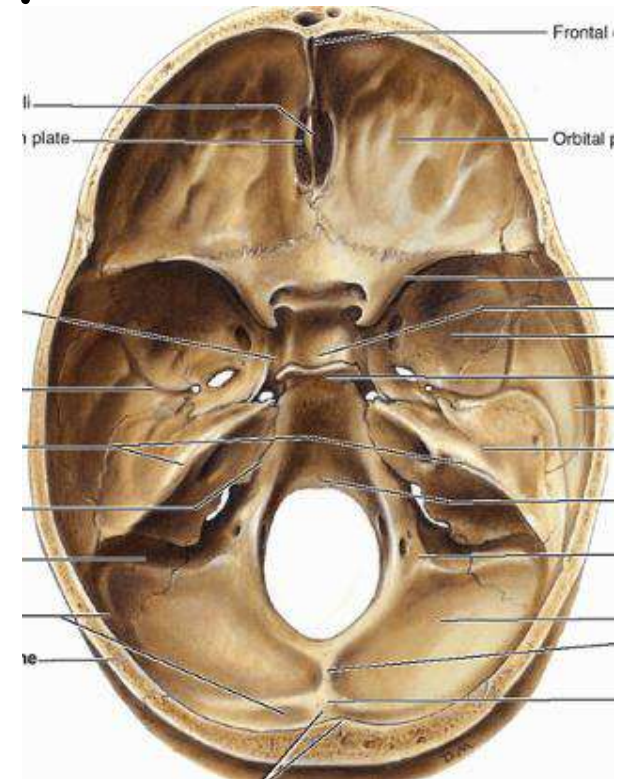
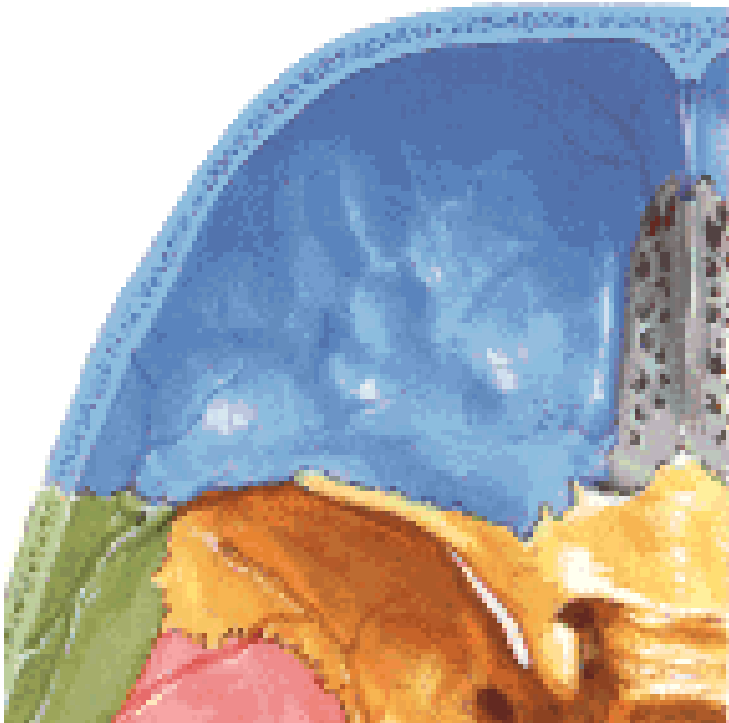
a. Frontal bone.

b. Sphenoid (lesser wing).



* Midline structures of the anterior cranial fossa:

1. Frontal crest.
2. Foramen caecum.
3. Crista galli.
4. Cribriform plate of ethmoid (gives passage to olfactory nerve).



Middle Cranial Fossa

* Formed by the following bones:

* In the midline:

Sphenoid (body).

* On each side:

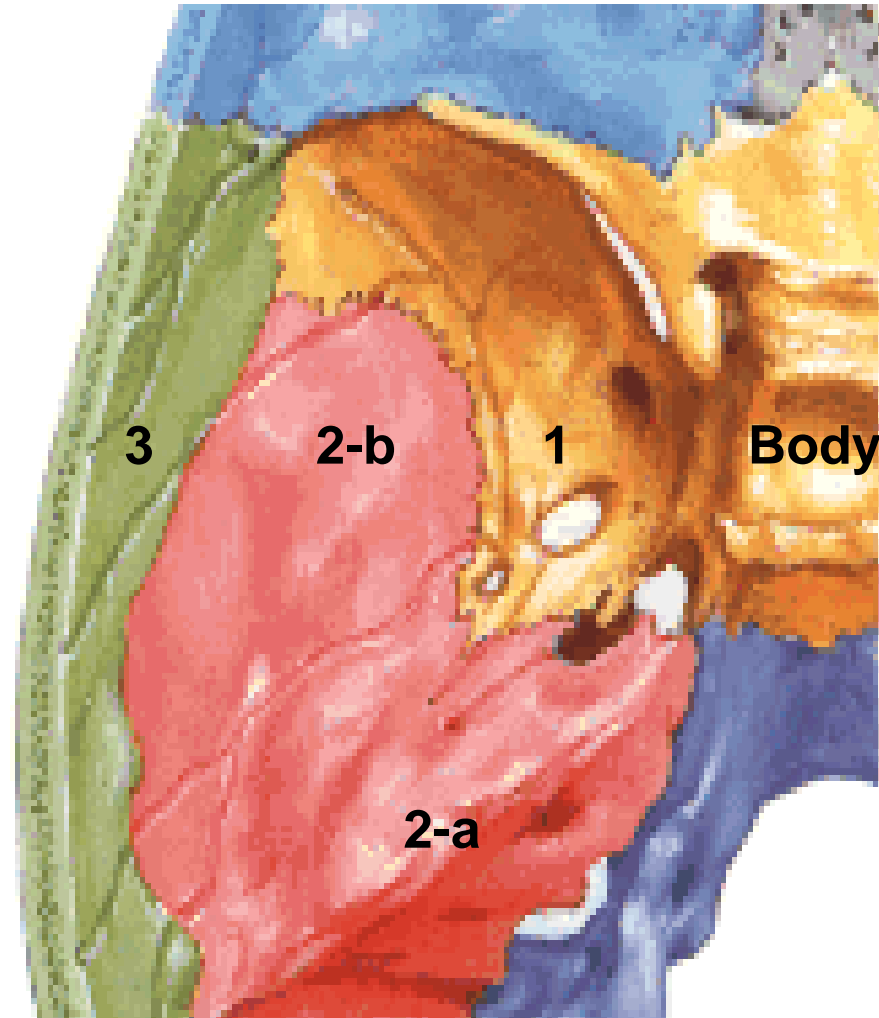
1- Sphenoid (greater wing).

2- Temporal bone:

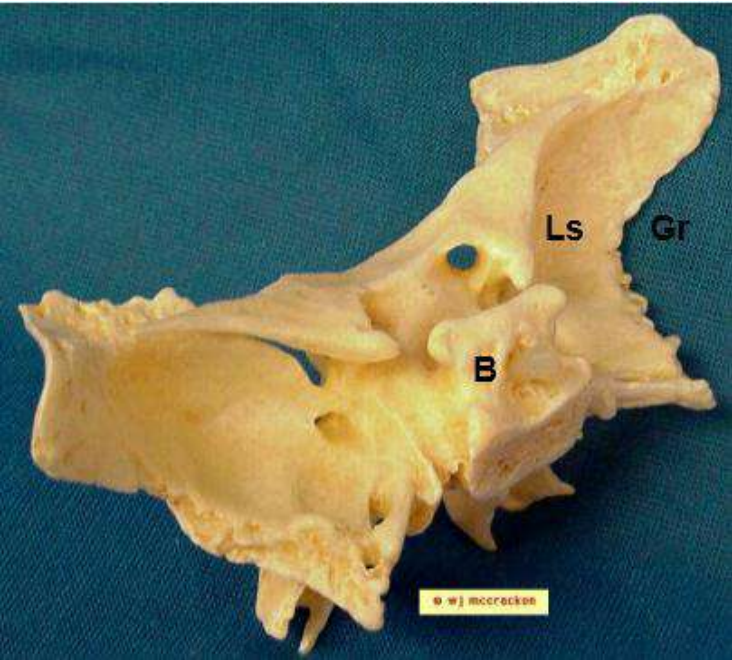
a. Petrous part.

b. Squamous part.

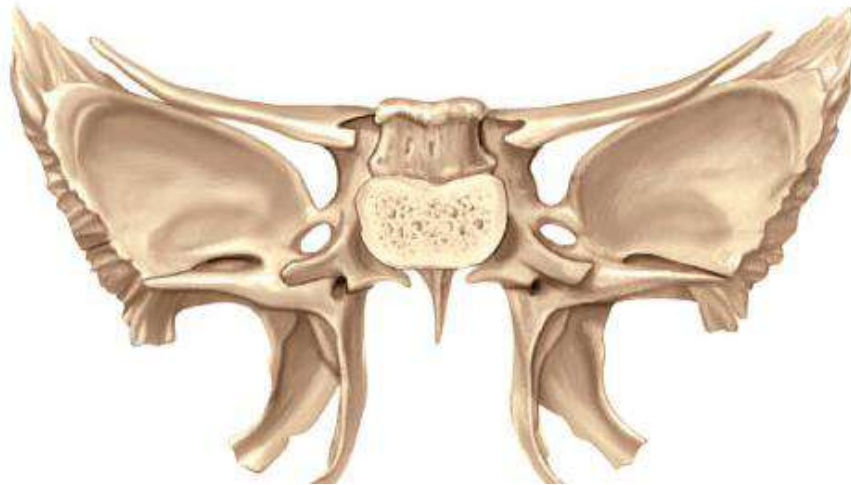
3- Parietal bone.



sphenoid bone is like a butterfly



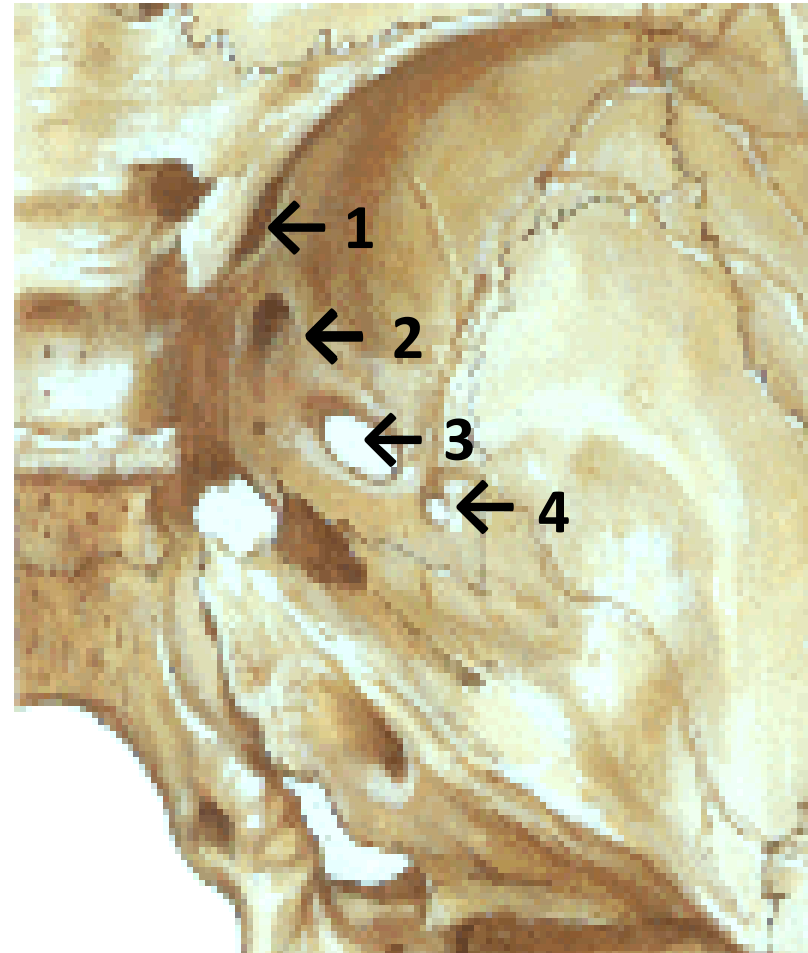
(a) Superior view



* Middle cranial fossa shows:

Greater wing of sphenoid which contains:

1. **Sup. Orbital Fissure** → gives passage to nerves & vessels of orbit.
2. F. **R**otundum → gives passage to maxillary nerve
3. F. **O**vale.
4. F. **S**pinosum.



Post. Cranial Fossa

* Formed by the following bones:

* In the midline:

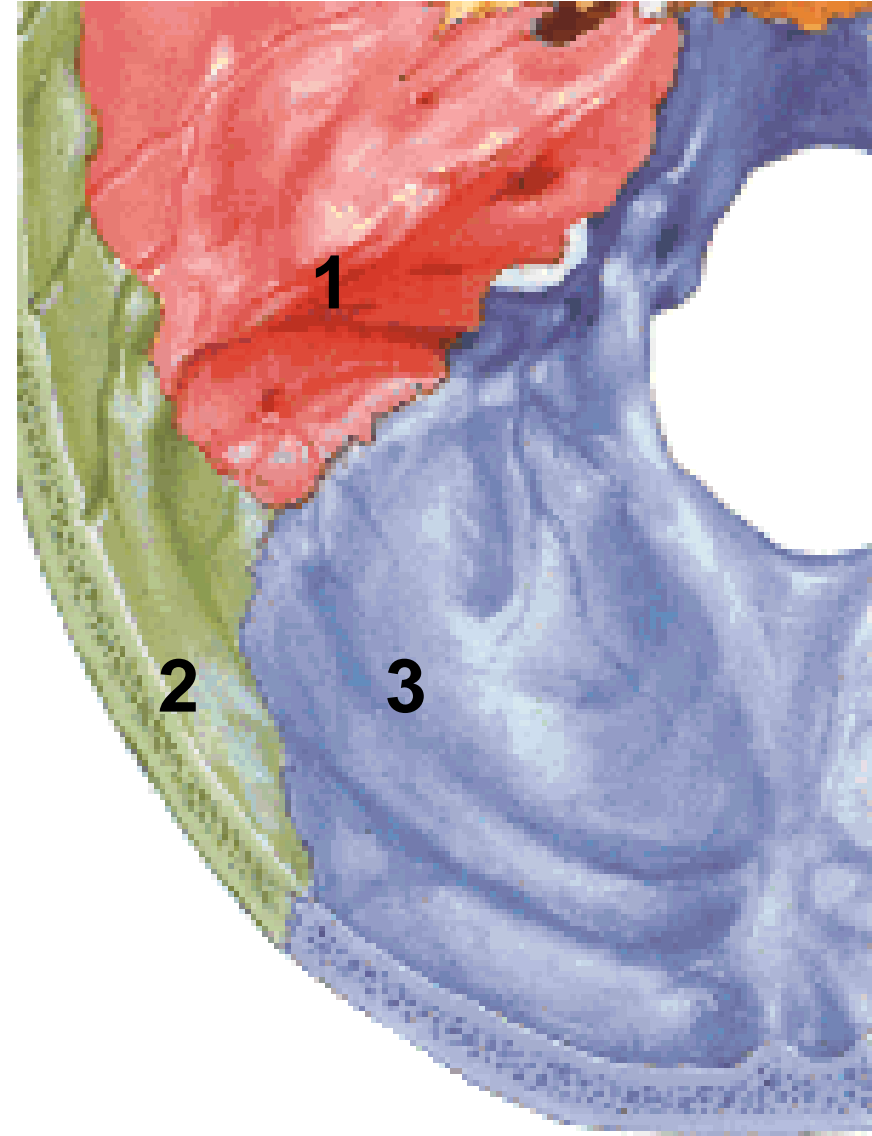
Occipital bone.

* Laterally-placed:

1- Petrous part of temporal bone.

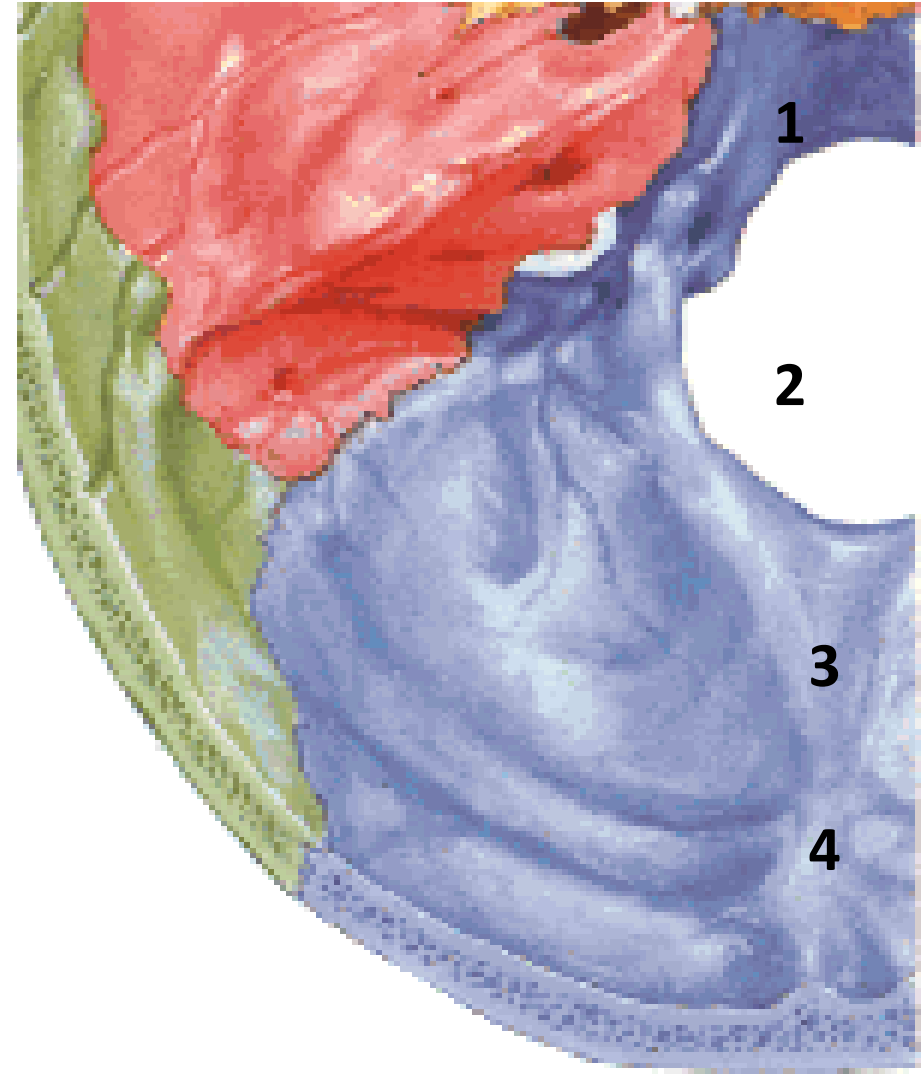
2- Parietal bone.

3- Occipital bone.



*** Midline structures in the posterior cranial fossa :**

- 1. Clivus (formed by: body of sphenoid + basilar part of occipital bone).**
- 2. Foramen magnum.**
- 3. Internal occipital crest.**
- 4. Internal occipital protuberance.**



* Laterally-placed structures in the post. cranial fossa:

* Two sulci & 3 foramina:

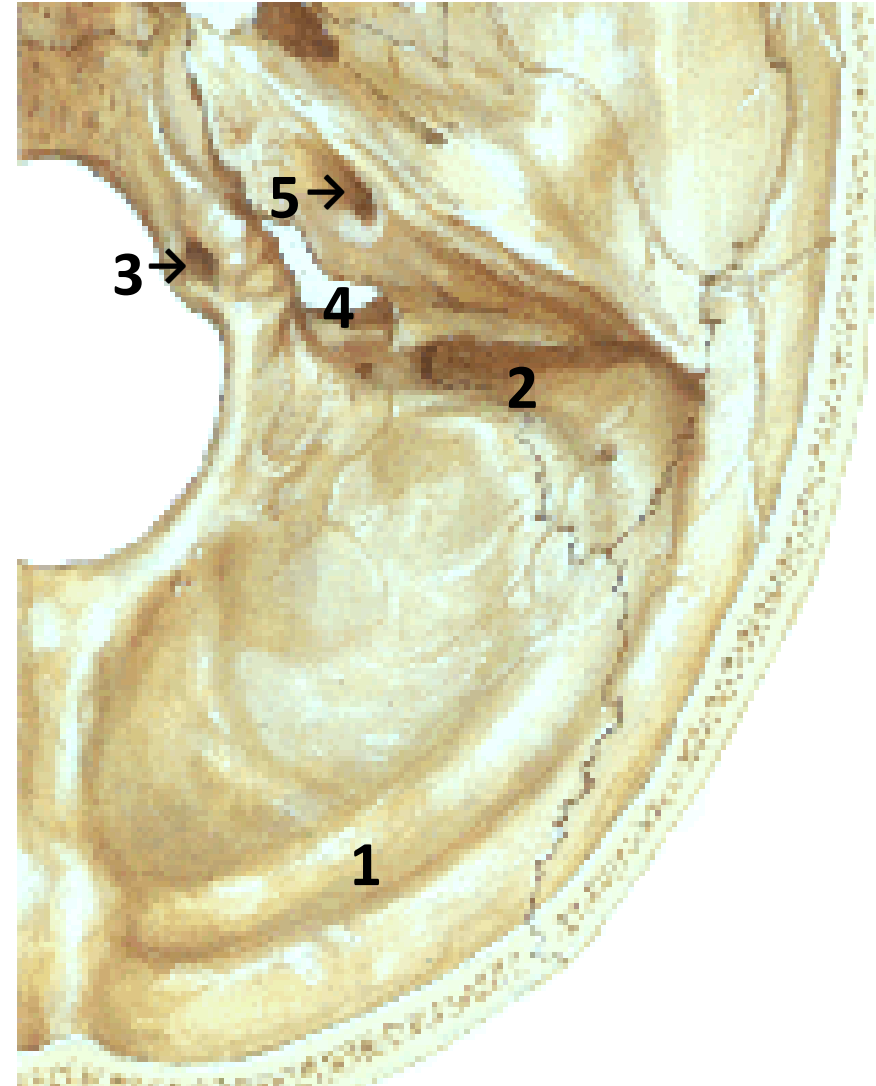
1. Transverse sulcus (contains transverse sinus).

2. Sigmoid sulcus (contains sigmoid sinus).

3. Hypoglossal canal (gives passage to hypoglossal nerve).

4. Jugular foramen (gives passage to internal jugular vein).

5. internal auditory meatus → gives passage to 7th & 8th cranial nerves).





Thank You
Thank You
Thank You!!!!

SHAY



General Anatomy

Lecture 3: Mandible & Vertebral Column

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Mandible

** Is formed of two bones, (right and left) which unite at the **symphysis menti** after the first year.

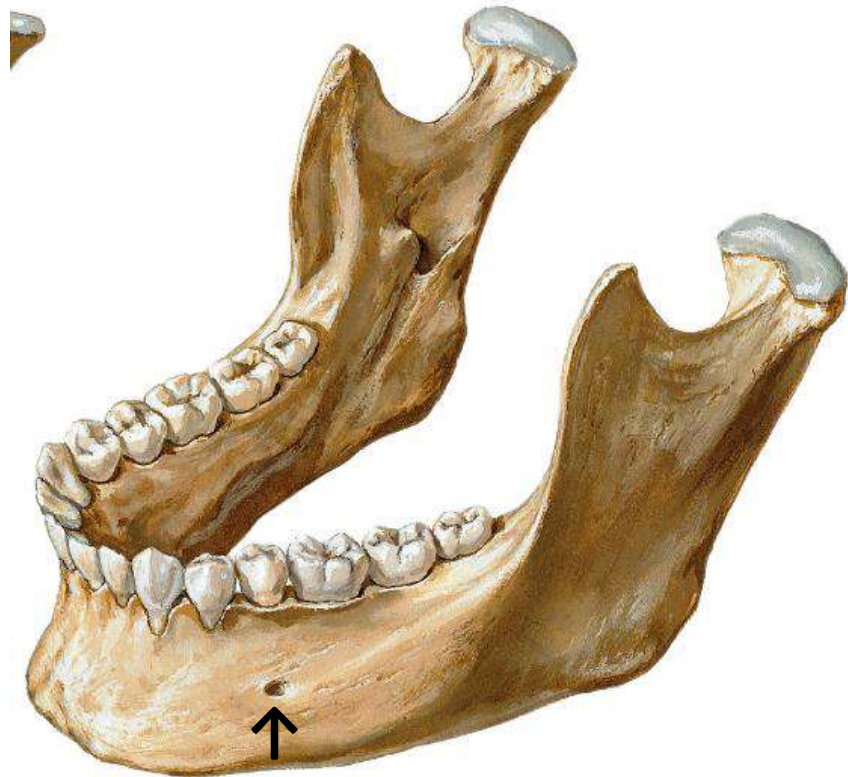
** The mandible is formed of **a body** and **two rami**.



A. The body

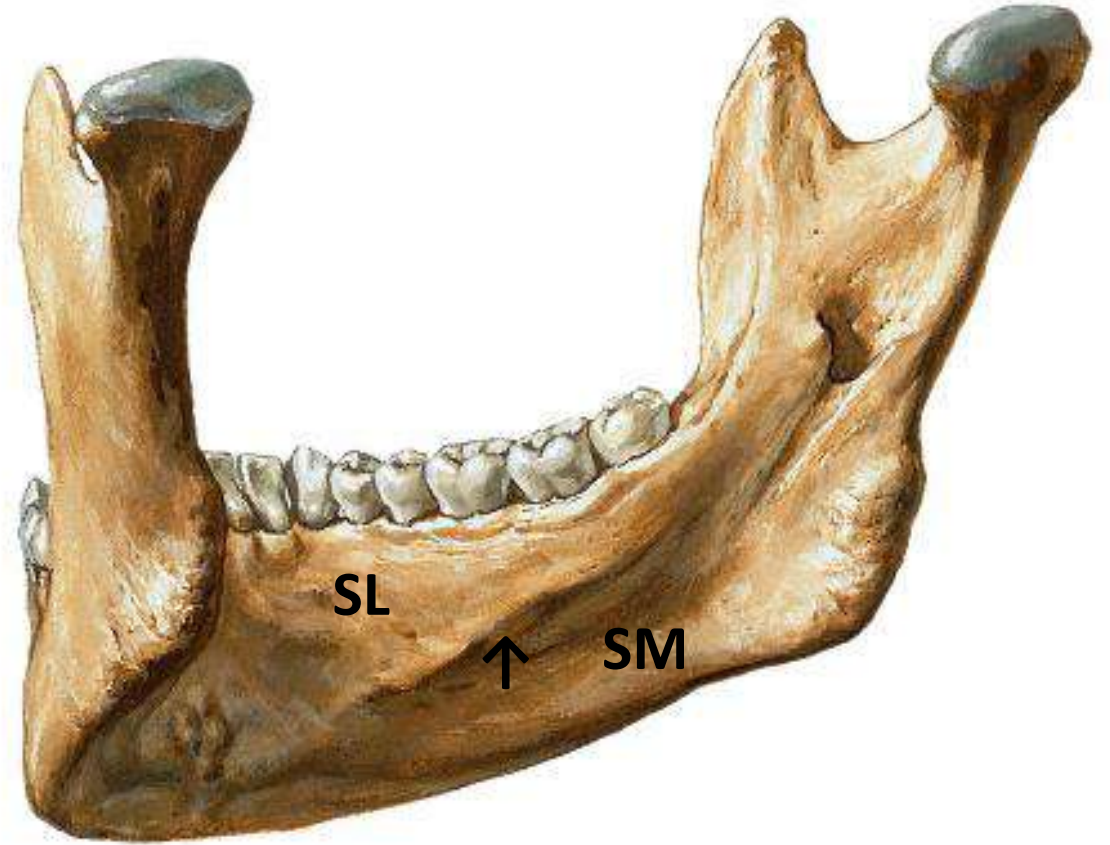
* External surface:

* The mental foramen lies midway between upper & lower borders, below 2nd premolar tooth.



* Internal surface :

- It shows the **mylohyoid line** (↑).
- Below this line is the **submandibular fossa (SM)**, while above this line is the **sublingual fossa (SL)**.



B. Ramus of mandible

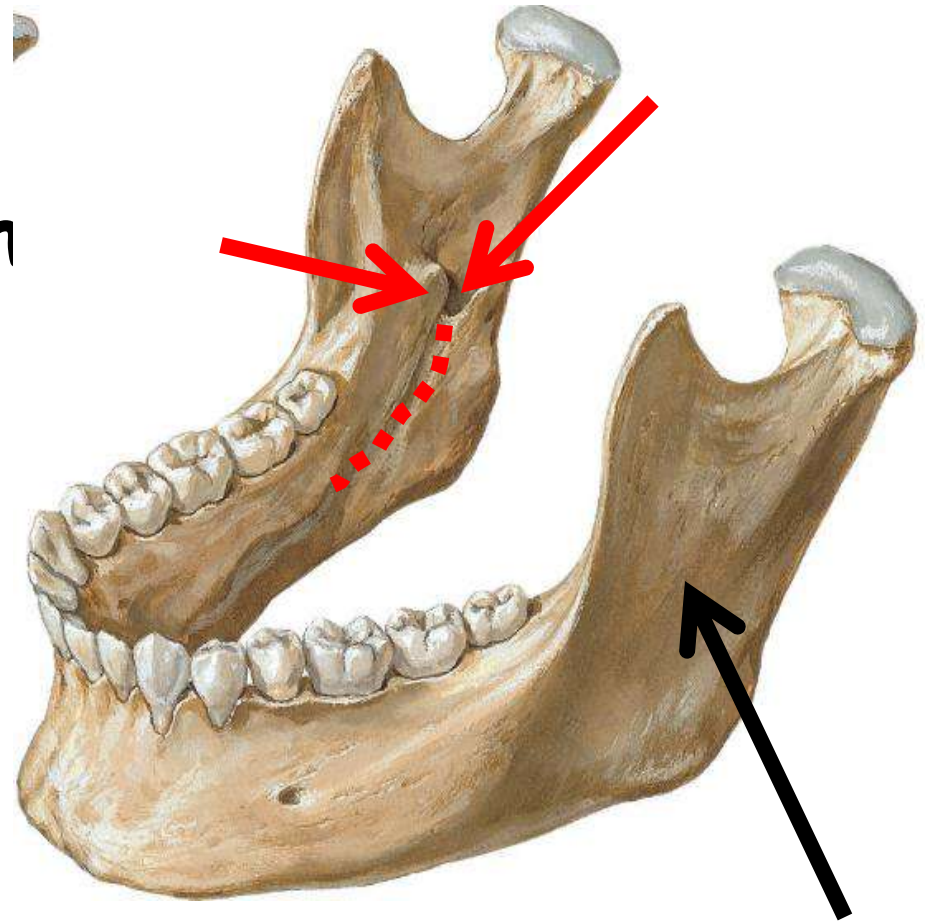
* It has two surfaces.

1. The medial surface: shows the **mandibular foramen** which leads to **mandibular canal**.

• Projecting over the foramen is the **lingula**.

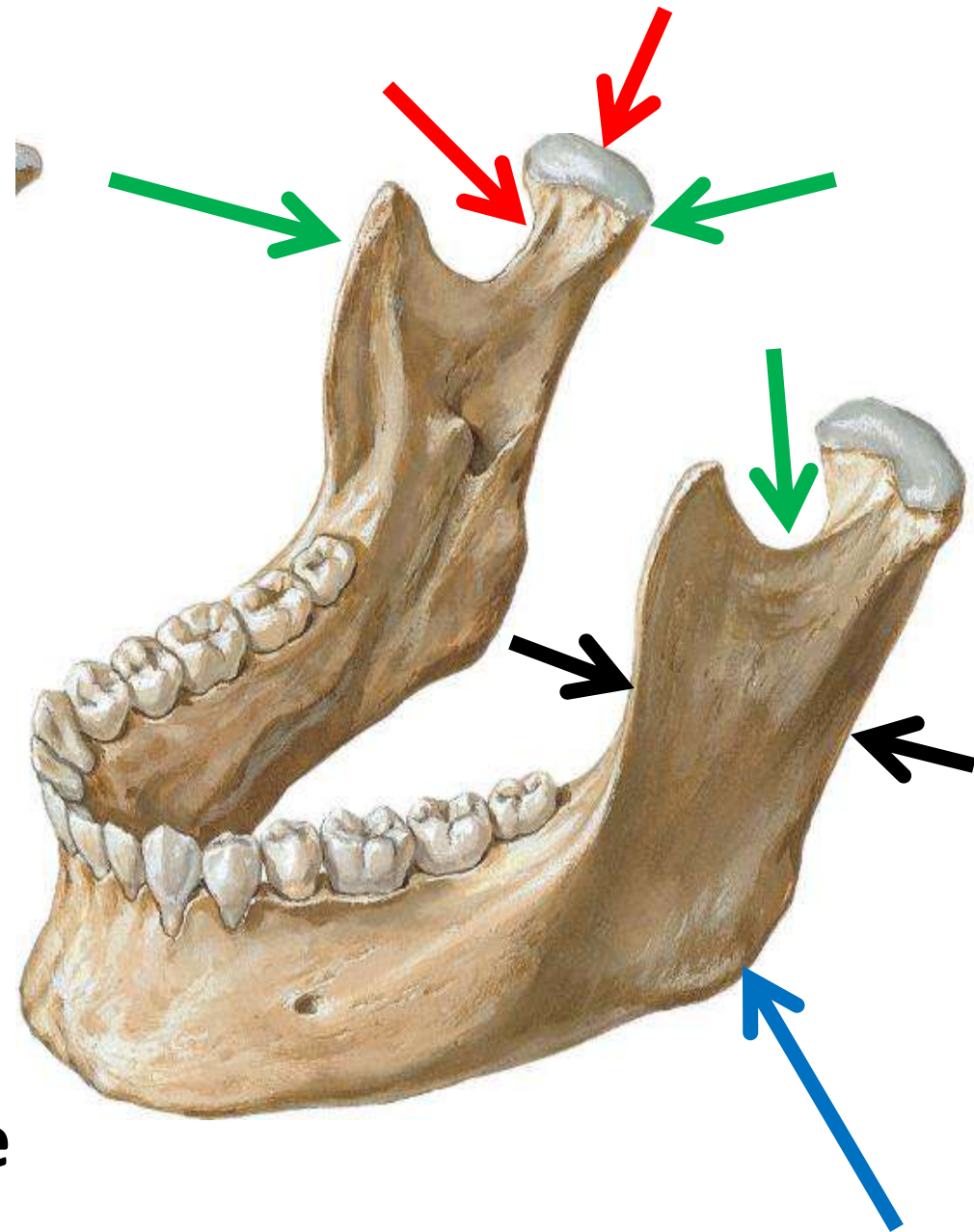
• The **mylohyoid groove** starts at the lower border of the foramen.

2. The lateral surface: is flat

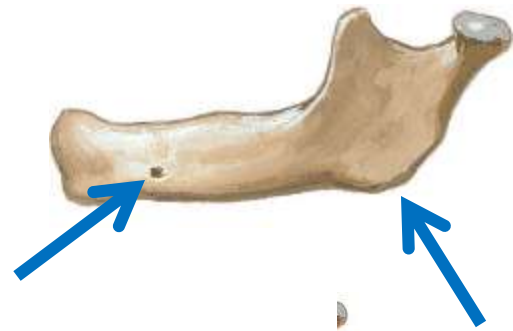


** Upper border:

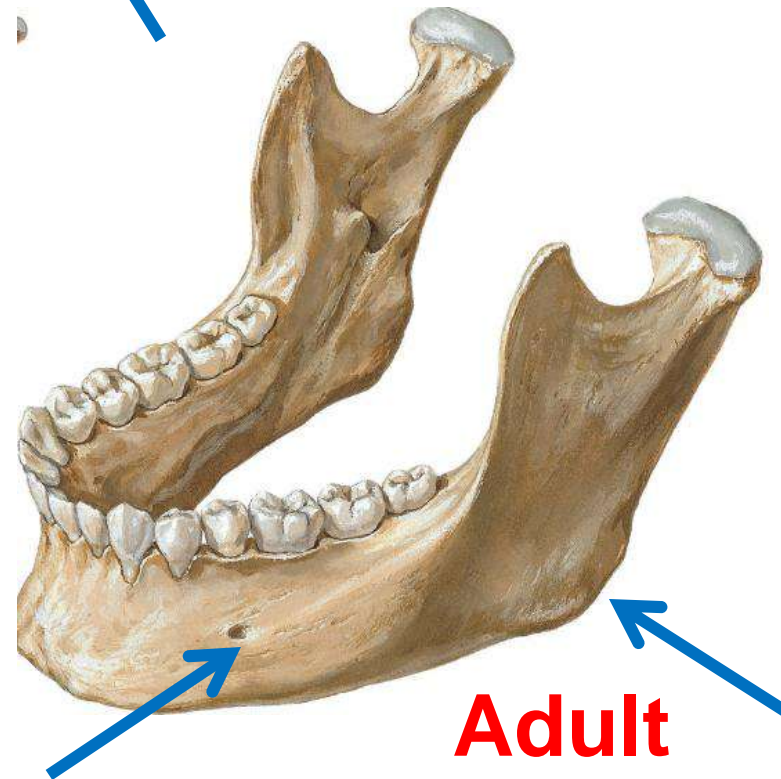
- Shows two process **coronoid** anteriorly and **condylar** process posteriorly and in between **the mandibular notch**.
- The condylar process is expanded to form the **head** of the mandible.
- The constricted area below the head is the **neck**.
- **Angle** of the mandible is the area of meeting of body and the ramus .



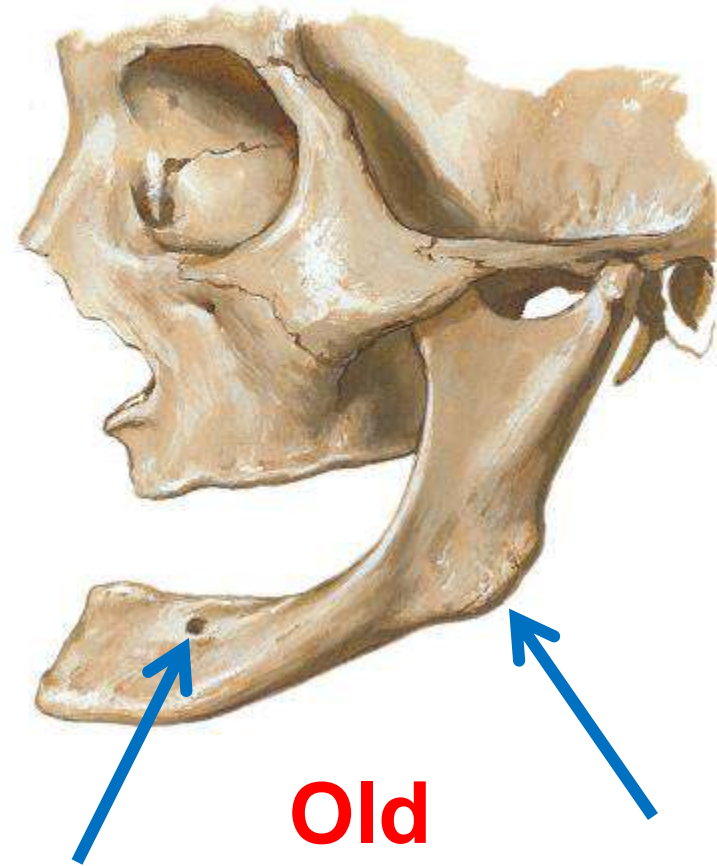
Age changes of the mandible



Infant

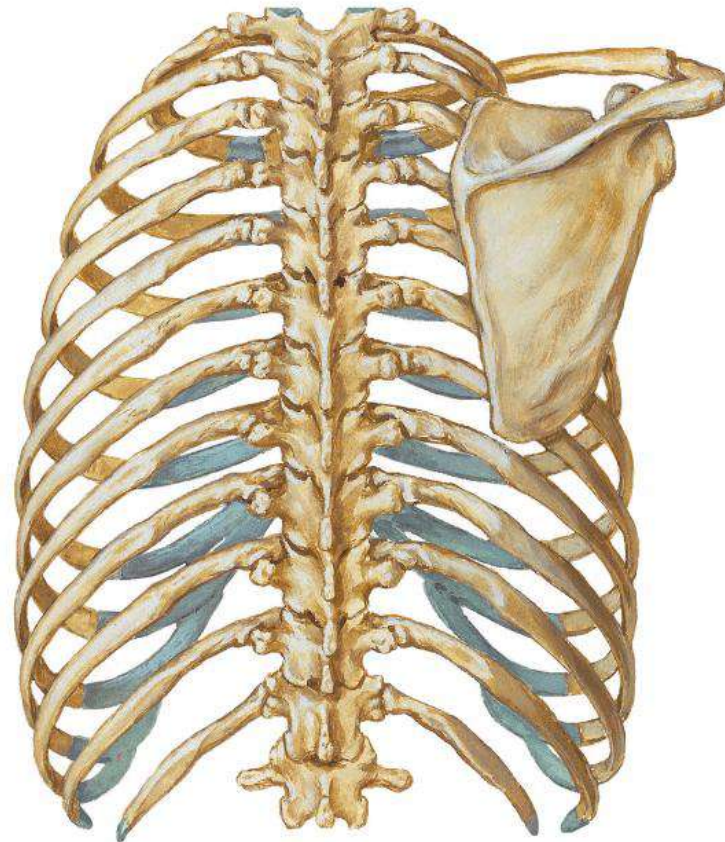
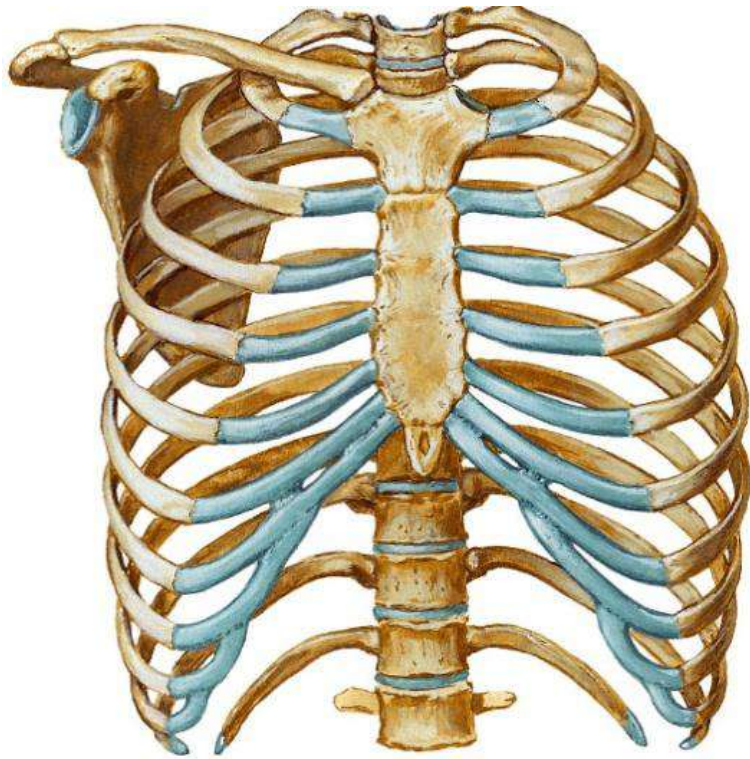


Adult



Old

- * **The vertebral column:** is formed of a series of bones called vertebrae (which are 33 vertebrae).
- * The vertebrae articulate together by cartilagenous intervertebral discs.

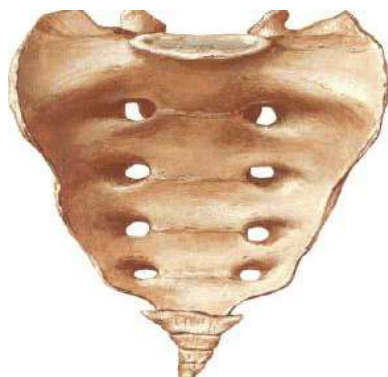
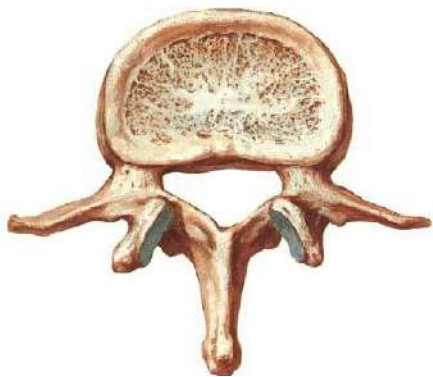


* The column is divided into 5 regions:

7 cervical - 12 thoracic - 5 lumbar - 5 sacral
(fused to form the sacrum) - 4 coccygeal
(fused to form the coccyx).

* The vertebral column:

1. Forms the axial skeleton of the body.
2. Supports the weight of the body.
3. Protects & surrounds the spinal cord.



**** Curves of vertebral column:**

* **Primary curve:** The vertebral column is concave anteriorly at birth.

* **Secondary curves:**

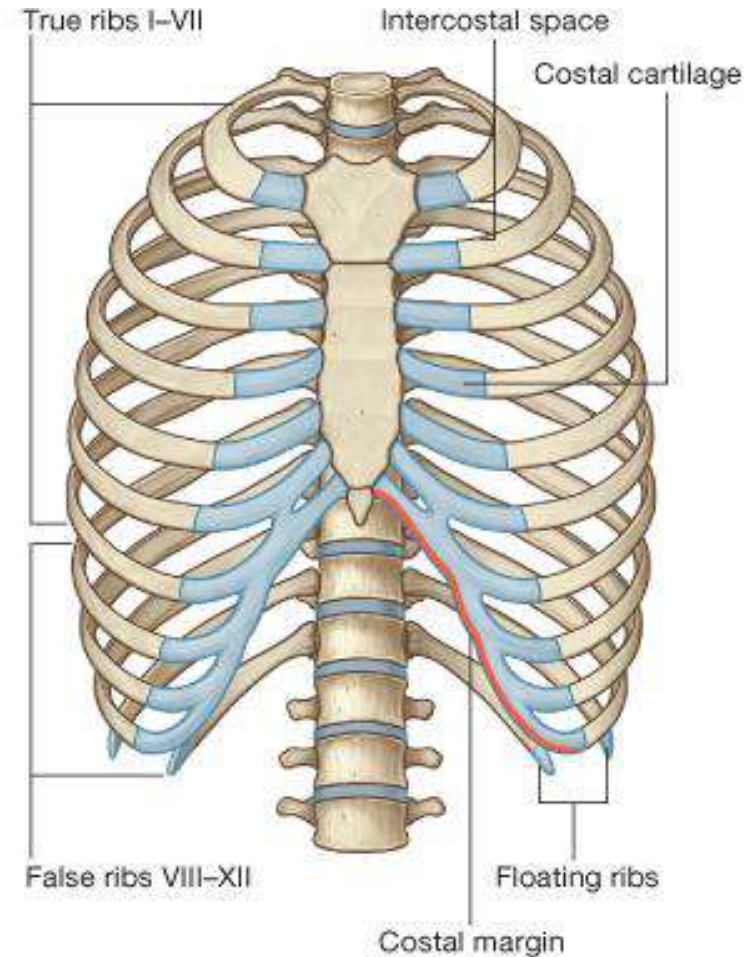
(a) The cervical curve: becomes convex anteriorly when the child extends his head at the 3rd - 4th month.

(b) The lumbar curve: becomes convex anteriorly when the child begins to walk between 12-18 months due to strengthening of the muscles of the back.

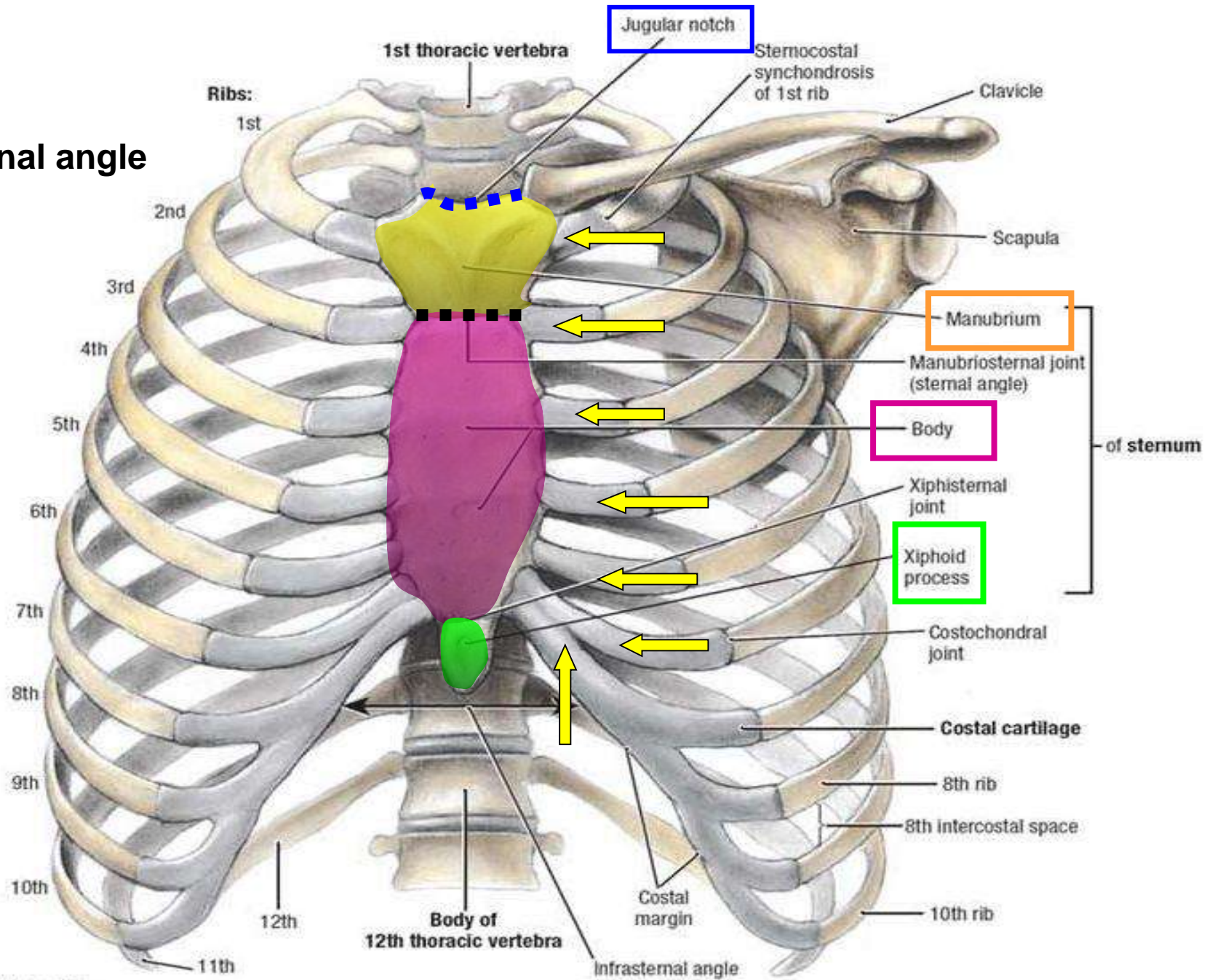


Thoracic cage

- **Formed of:**
- **Anteriorly** → sternum (manubrium, body & xiphoid process). It is joined to the upper 7 costal cartilages.
- **On each side** → 12 pairs of ribs separated by **intercostal spaces**.
- **Posteriorly** → 12 thoracic vertebrae.



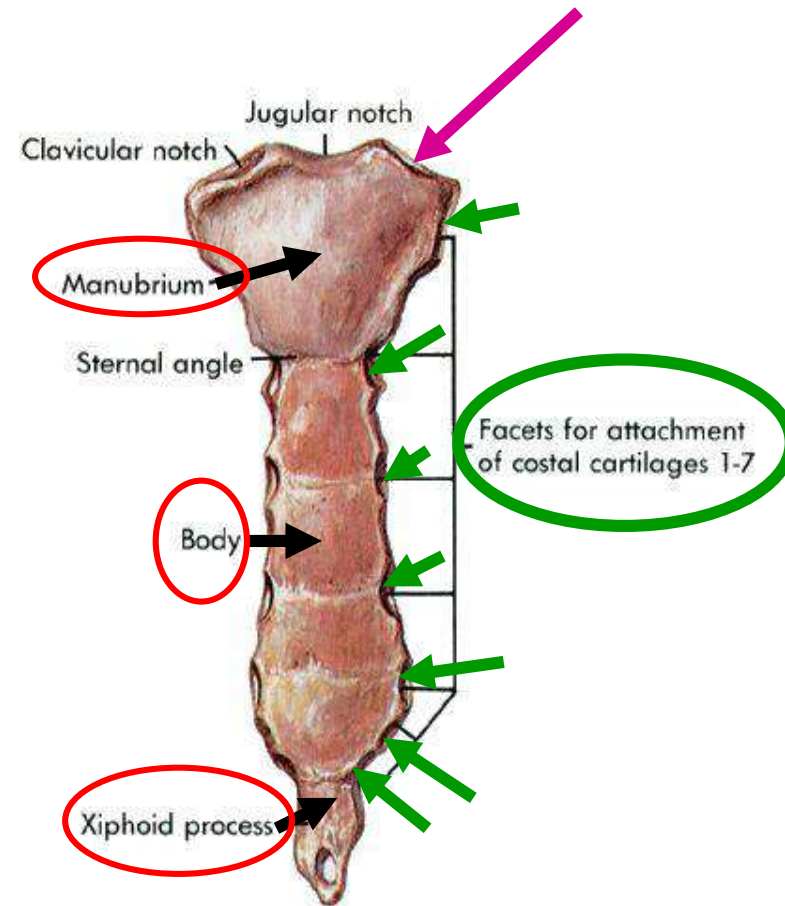
Sternal angle



A. Anterior View

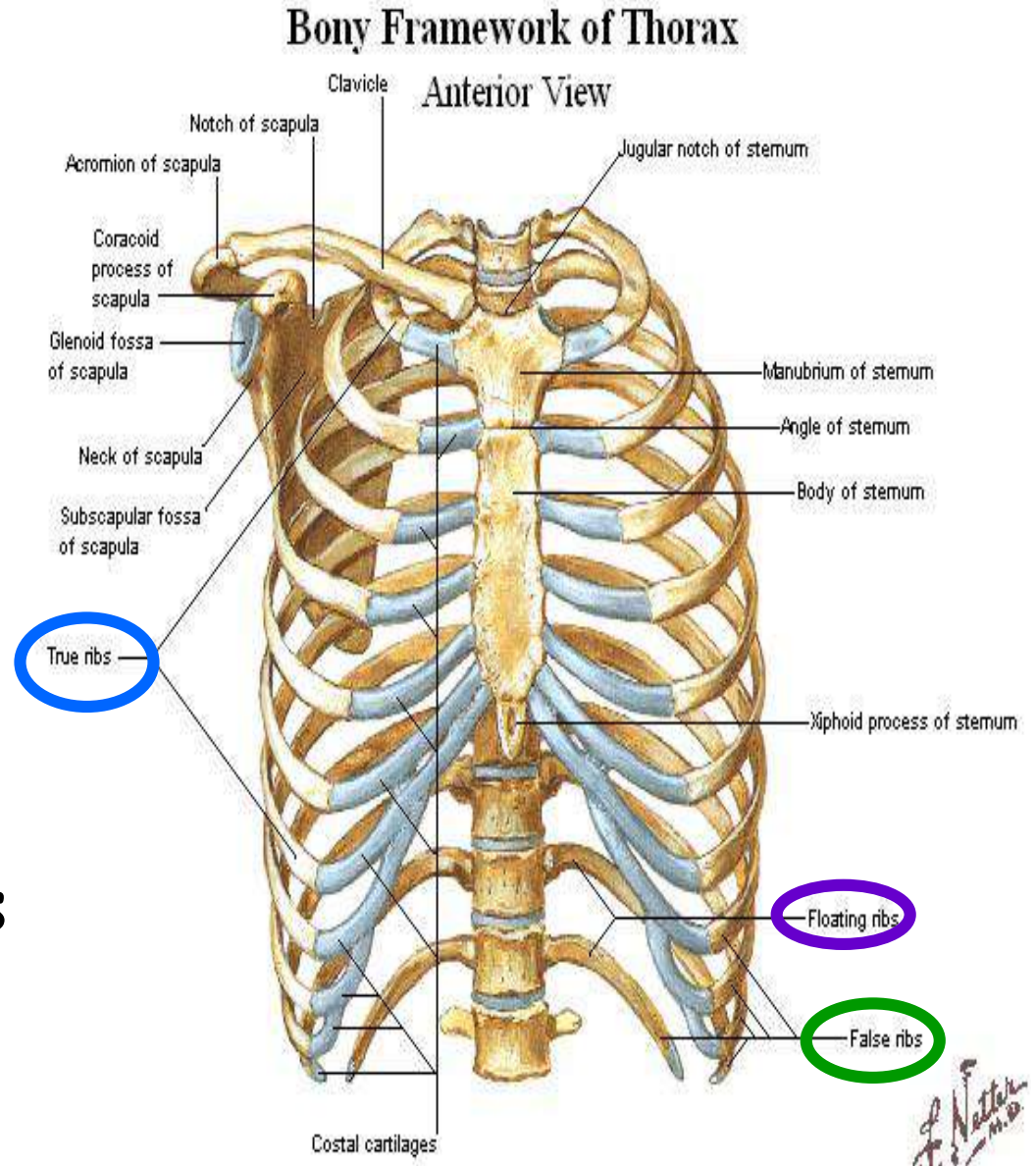
The Sternum

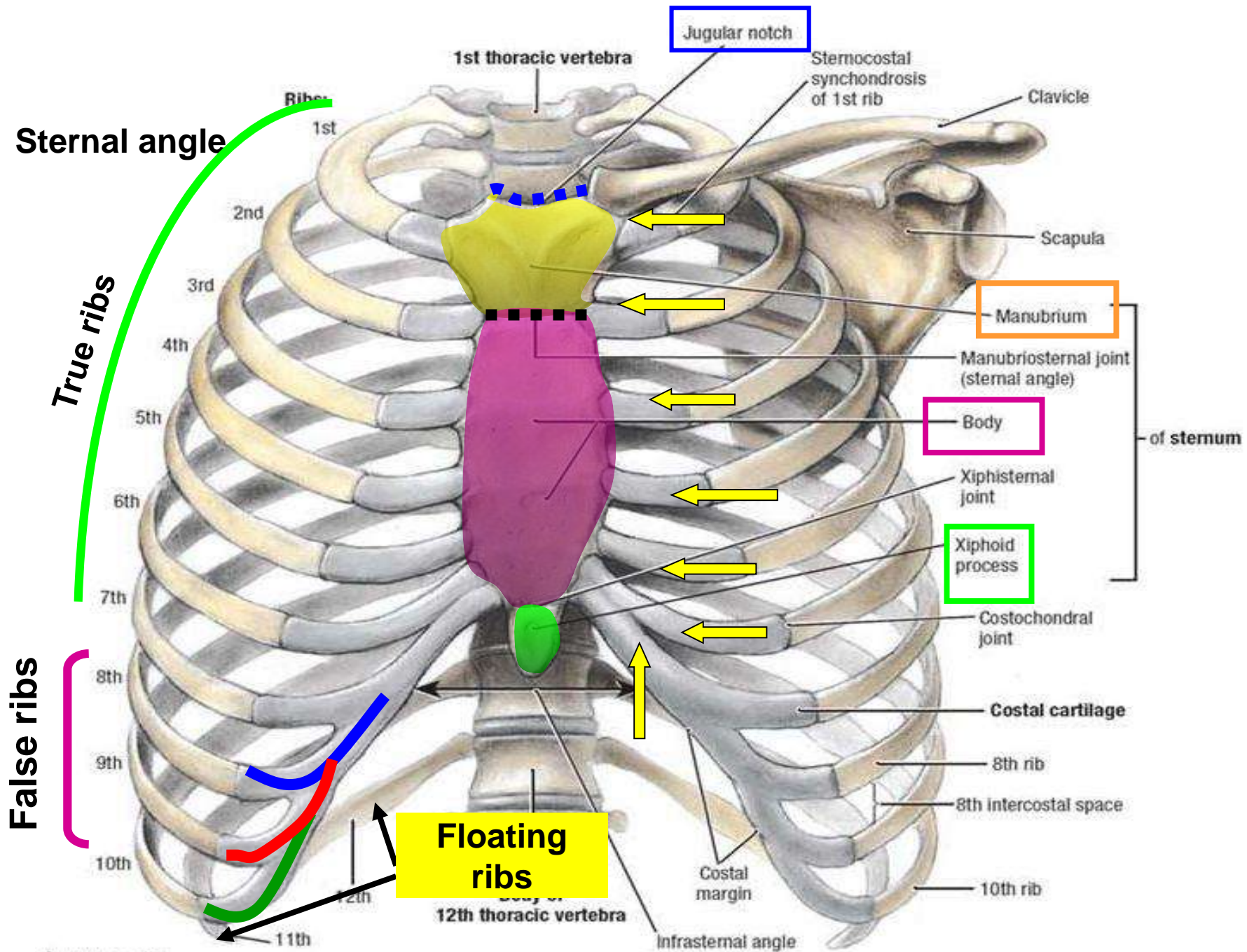
- **Formed of 3 parts**
→ manubrium,
body & xiphoid
process.
- **Articulates with** →
clavicles & upper 7
costal cartilages.



The Ribs

- **12 pairs** of ribs articulate with the thoracic vertebrae.
- **Upper seven** are **true ribs** as each articulates by its costal cartilage to the sternum.
- **Lower five** are **false ribs** as their costal cartilages fail to reach the sternum.
- **Last two** are called **floating ribs** as their costal cartilages are free.

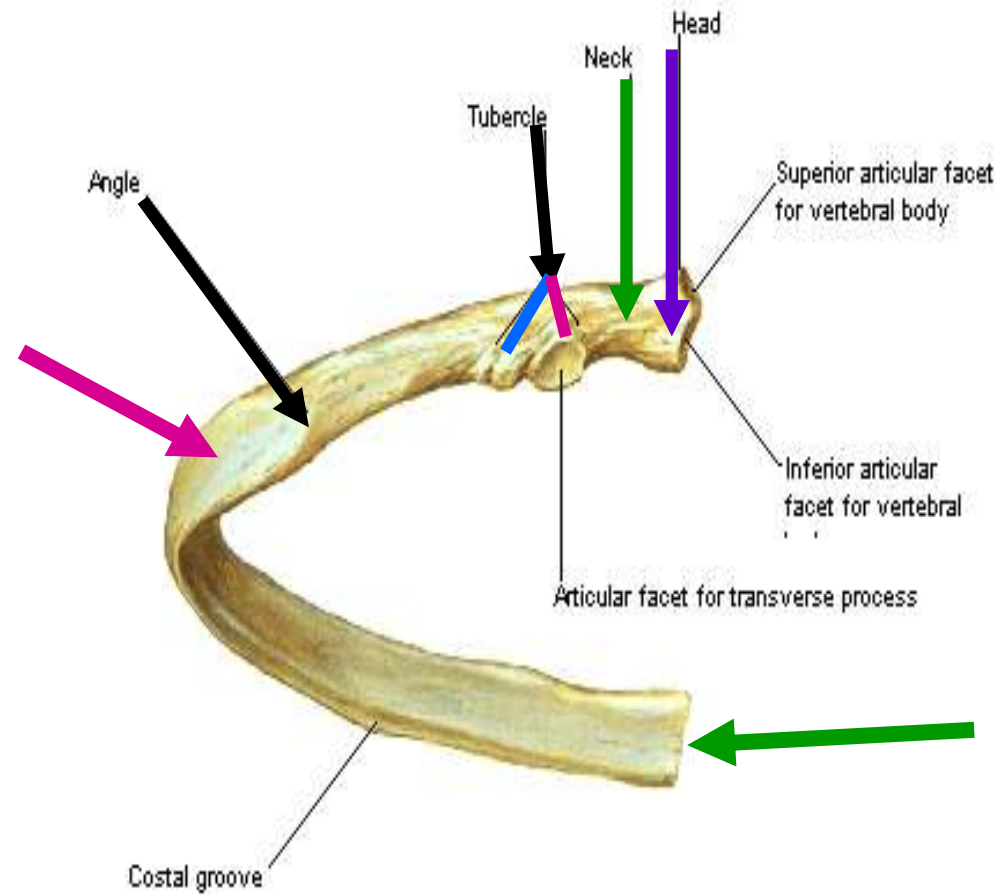




A. Anterior View

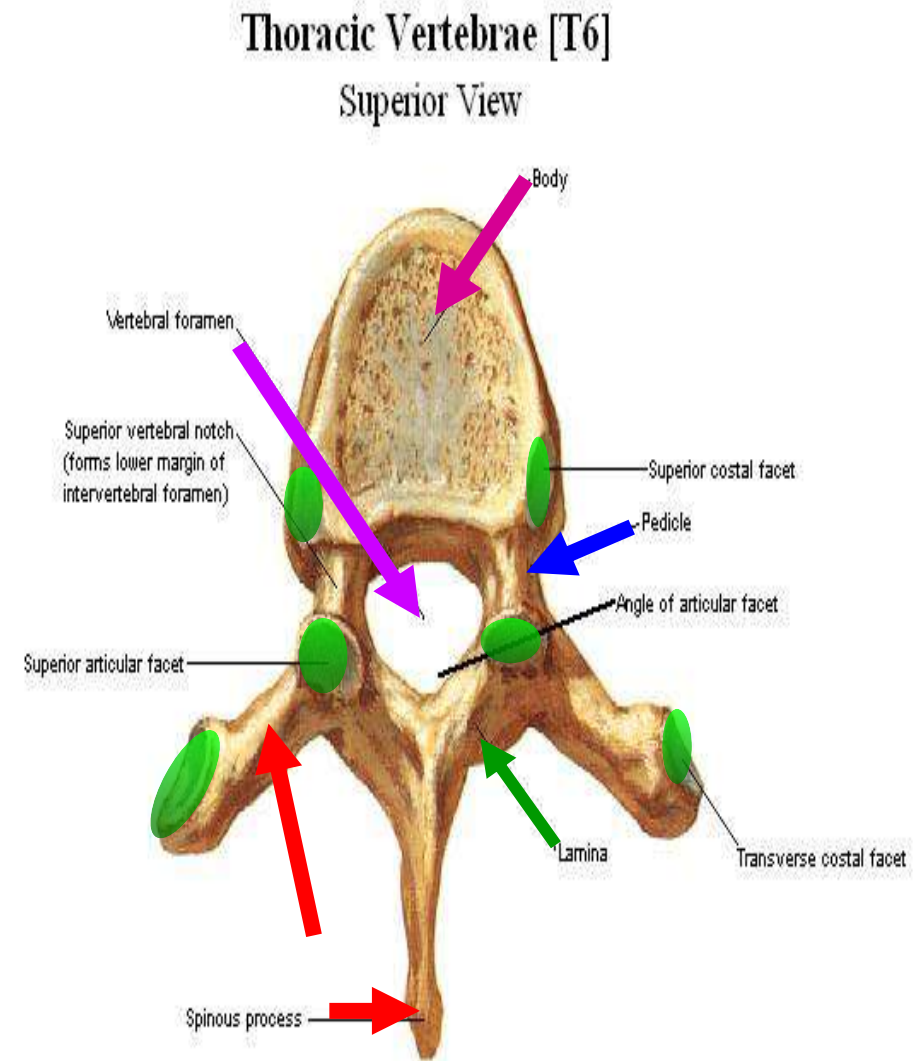
Parts of a typical rib

- **Vertebral end** → head, neck & tubercle
- **Shaft**
- **Sternal end** → groove for attachment of costal cartilage.



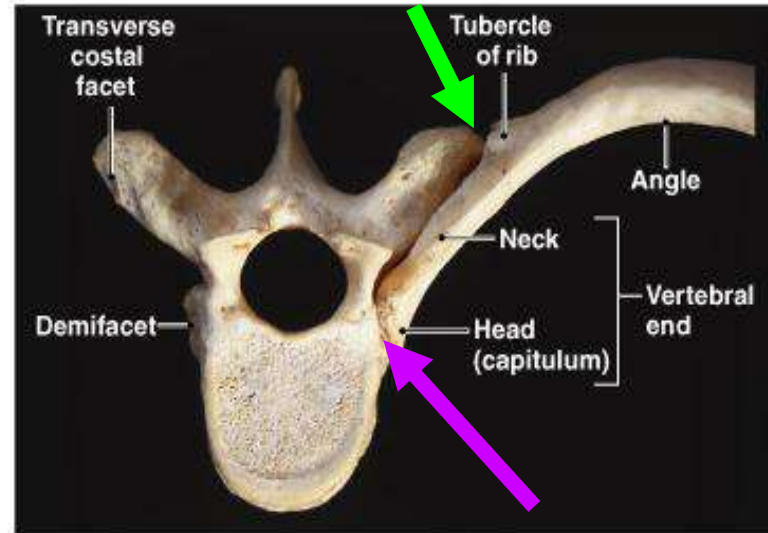
The Thoracic Vertebrae

- * 12 in number
- * Each is formed of :
 - Body
 - Pedicle
 - Transverse process
 - Lamina
 - Spine
 - Vertebral foramen
 - Articular facets

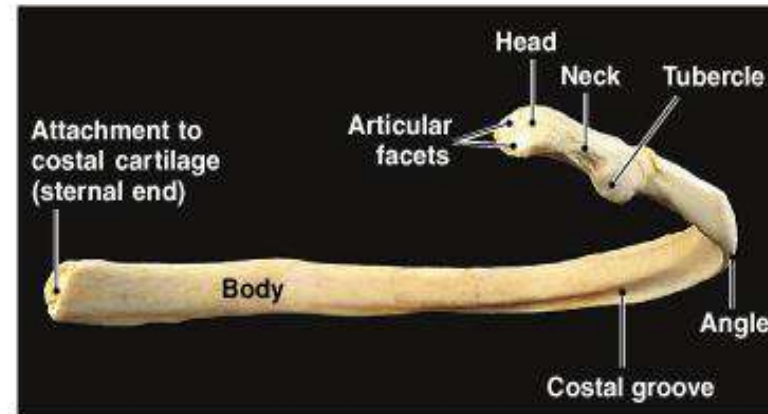


Articulation of vertebra to rib

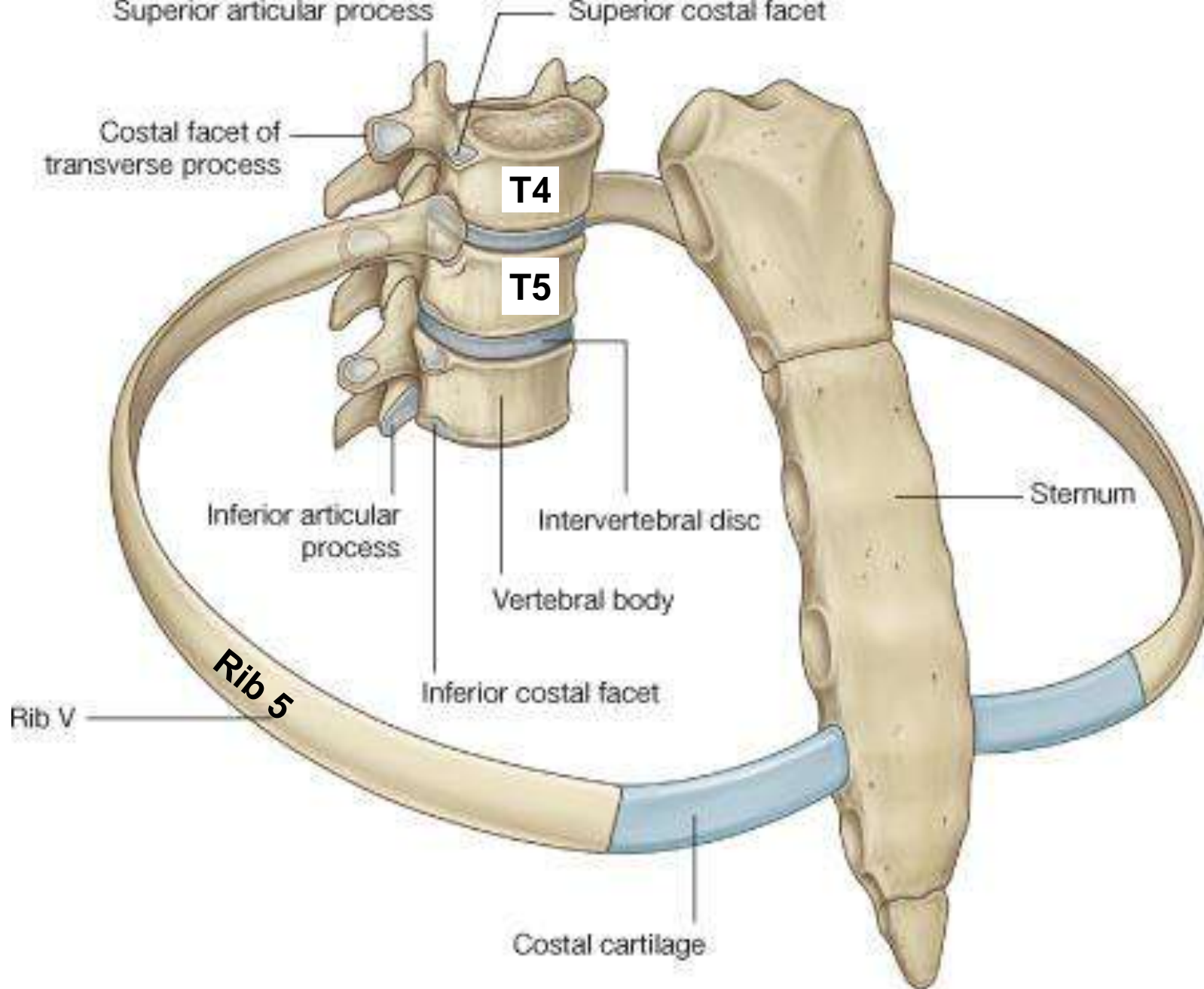
- **Head** of rib articulates with **Body** of vertebra
- **Tubercle** of rib articulates with **Transverse process** of vertebra



(a) Superior view



(b) Posterior view



Cervical Vertebrae

Atlas = 1st Cervical Vertebra

- * Articulates with skull above & axis below.
- * Formed of 2 lateral masses connected by anterior & posterior arches.
- * Its transverse process shows a foramen transversarium.



Axis = 2nd Cervical Vertebra

- * Articulates with atlas above & 3rd cervical vertebra below.
- * It has a well-defined process called dens.
- * Its transverse process shows a foramen transversarium.



Typical Cervical Vertebra (3-6)

- * Its spine is bifid.
- * Its transverse process shows a foramen transversarium.

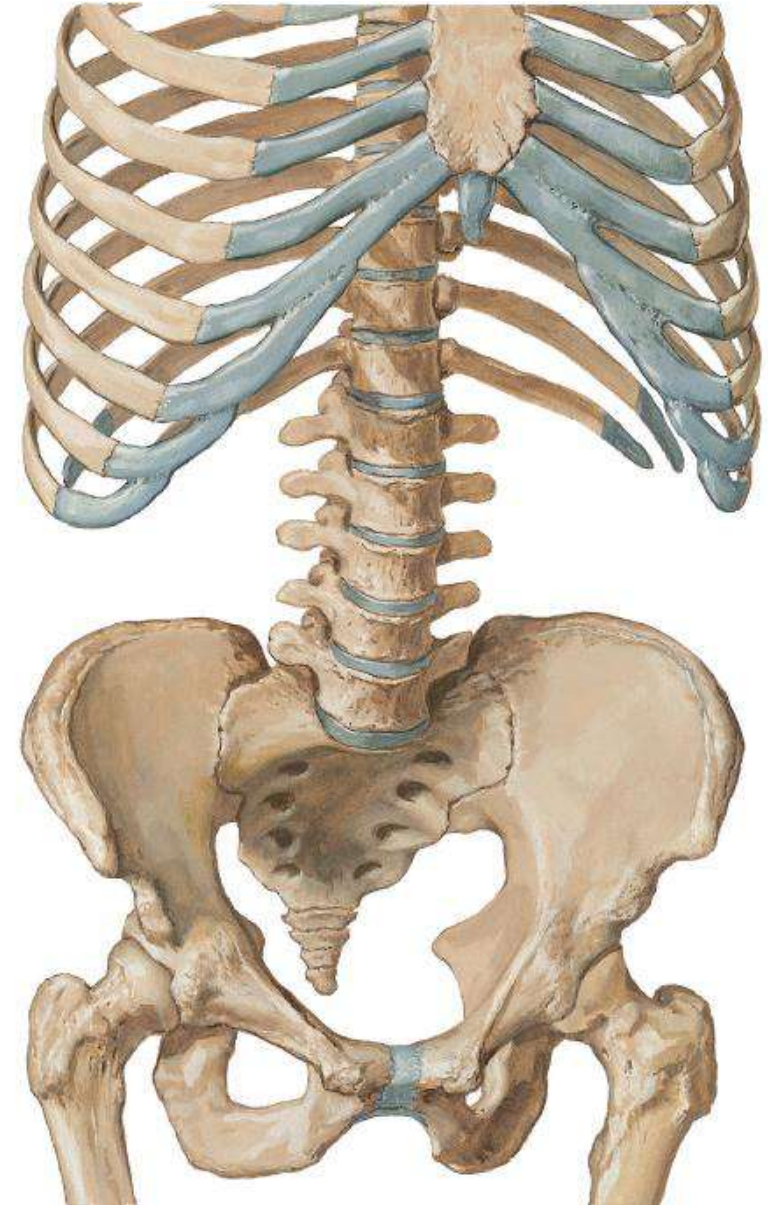


7th Cervical Vertebra

- * Its spine is long & not bifid.
- * Its transverse process shows a foramen transversarium.



- **The lumbar vertebrae** are the largest vertebrae in the body.
- No foramina transversaria in transverse processes & no bifid spines.
- **The sacrum** is a single triangular bone that is formed by fused 5 sacral vertebrae.
- The sacrum articulates with the 5th lumbar vertebra above & with the hip bones on each side.



Intervertebral Disc



* Each 2 vertebrae are separated from each other by an intervertebral (IV) disc.

* The IV disc is considered as a 2ry cartilaginous joint.

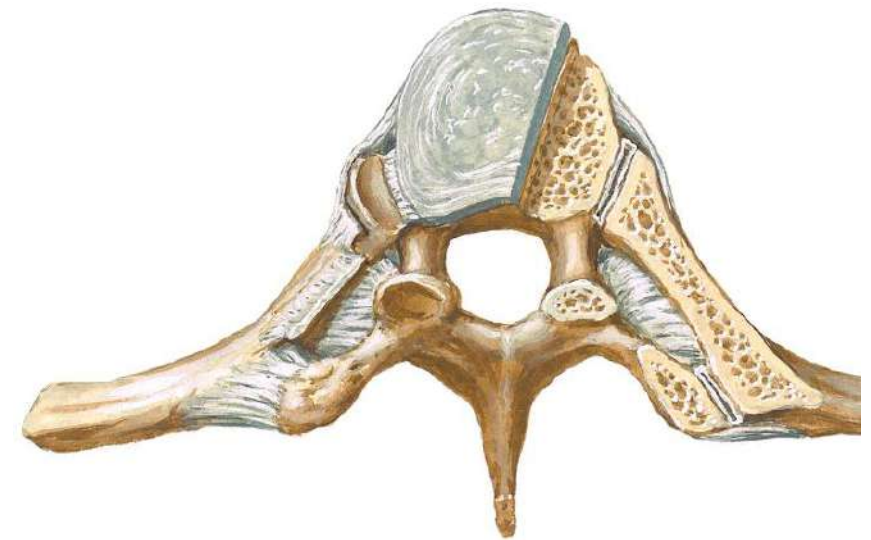
* It is formed of white fibrocartilage (which is the hardest type of cartilage).

* It is formed of 2 parts:

a. An inner part called nucleus pulposus.

b. An outer peripheral part called annulus fibrosus.

* Its dislocation (called disc prolapse) causes a compression of one of the adjacent spinal nerves leading to severe pain.





Thank You
Thank You
Thank You!!!!