

وسهلا

أهلا

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إذن المحرر واي اجراء  
يخالف ذلك يقع تحت  
طائلة المسؤولية القانونية



## الأستاذ الدكتور يوسف حسين

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# Skull

- The skull is formed of **22 bones**;

a- 1 movable; the mandible.

b- 21 immovable bones articulating together by **fibrous joints** which are classified into;

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## I- 8 Paired bones (right and left)

1- Parietal.

2- Temporal.

3- Zygomatic.

4- Maxillary.

5- Palatine.

6- Lacrimal.

7- Nasal.

8- Inferior concha.

## II- 5 single bones

1- Frontal.

2- Occipital.

3- Sphenoid.

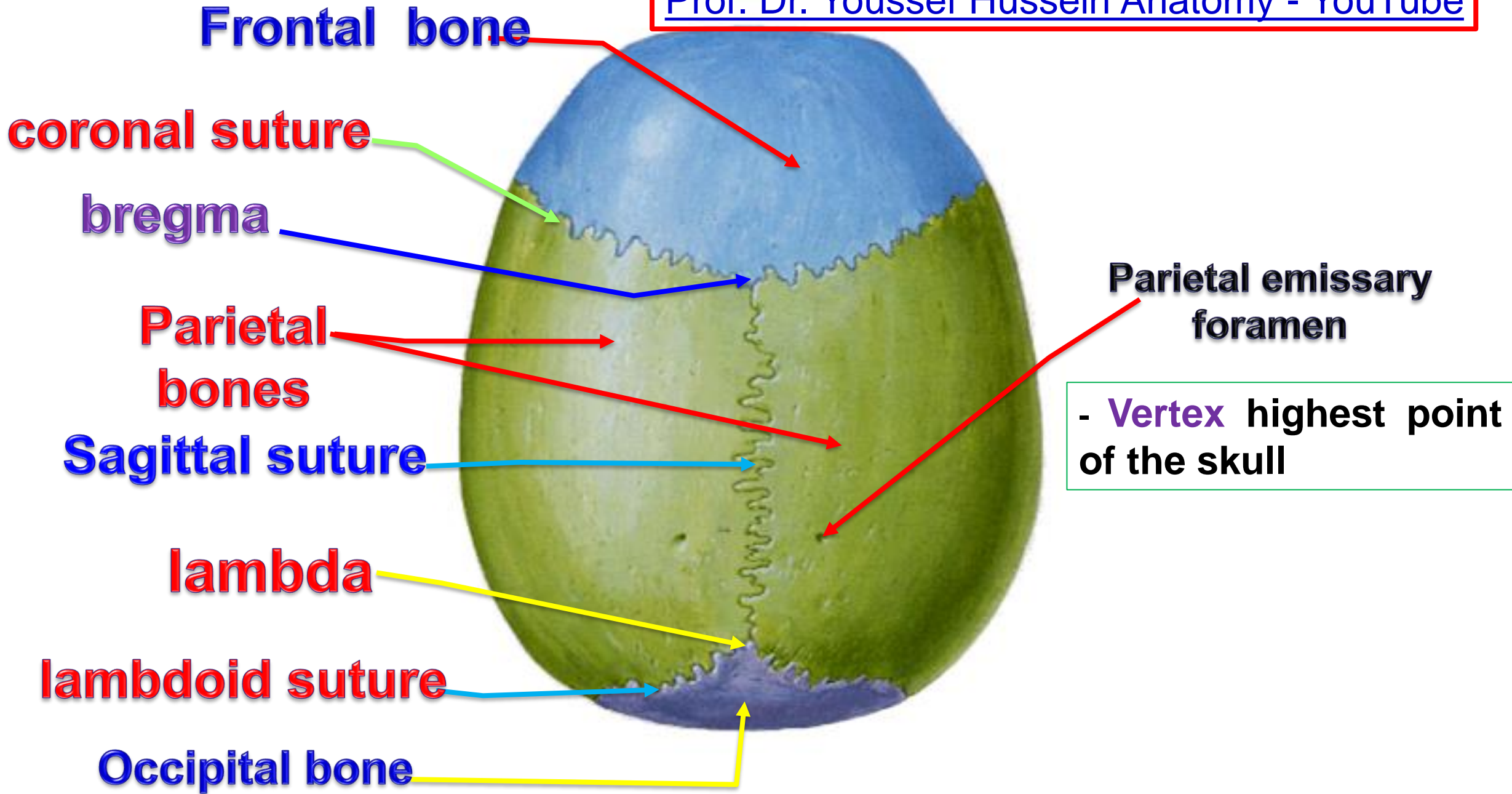
4- Ethmoid.

5- Vomer.

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# Norma verticalis

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**Frontal bone**

**coronal suture**

**bregma**

**Parietal bones**

**Sagittal suture**

**lambda**

**lambdoid suture**

**Occipital bone**

**Parietal emissary foramen**

- **Vertex** highest point of the skull

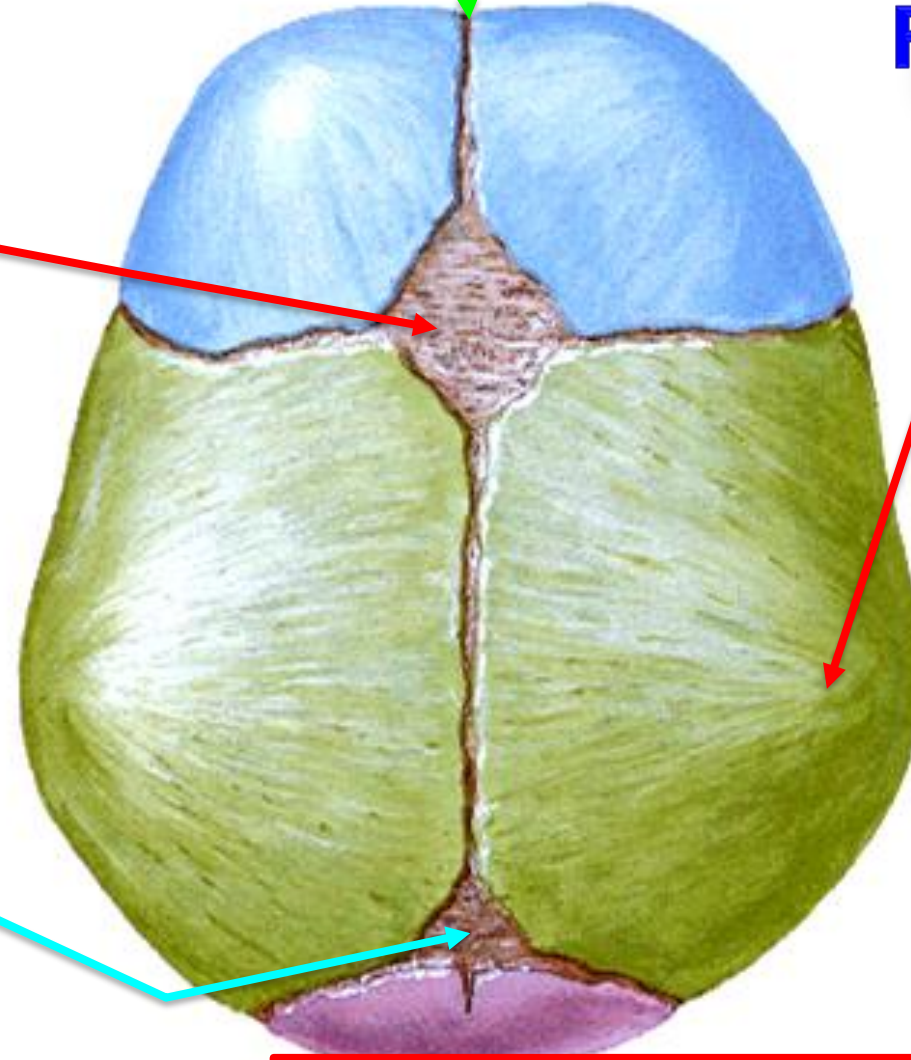
# Skull of new born

Fused at the end of (18 months)

Parietal eminence

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Metopic suture



Anterior fontanelle

close at 6<sup>th</sup> month

Posterior fontanelle

- Metopic suture: present in 9% of people.

## ❖ Norma verticalis

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

- It is formed of the following bones, 4 bones

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1) Anteriorly, Frontal bone.      2) On each side, two parietal bones.      3) Posteriorly, occipital bone.

### \*\* Sutures between the bones;

1- **Sagittal suture** runs in the median plane between the 2 parietal bones.

2- **Coronal suture** runs transversally between the frontal and 2 parietal bones.

3- **Lambdoid suture** runs between the occipital bone and 2 parietal bones.

### \*\* Special features,

1- **Bregma**, the meeting between the sagittal and coronal sutures.

– At birth, this area called the **anterior fontanelle**. The anteroposterior extent is about 3 fingers breadth. Normally, it is obliterated **at 18 months**.

2- **Lambda**; the meeting between the sagittal and lambdoid sutures.

- At birth, called **Posterior fontanelle**. It is closed at the **6 months**.

3- **Vertex** is the middle of the sagittal sutures (highest point of the skull).

4- **2 parietal eminences**, The most prominent parts of the parietal bones.

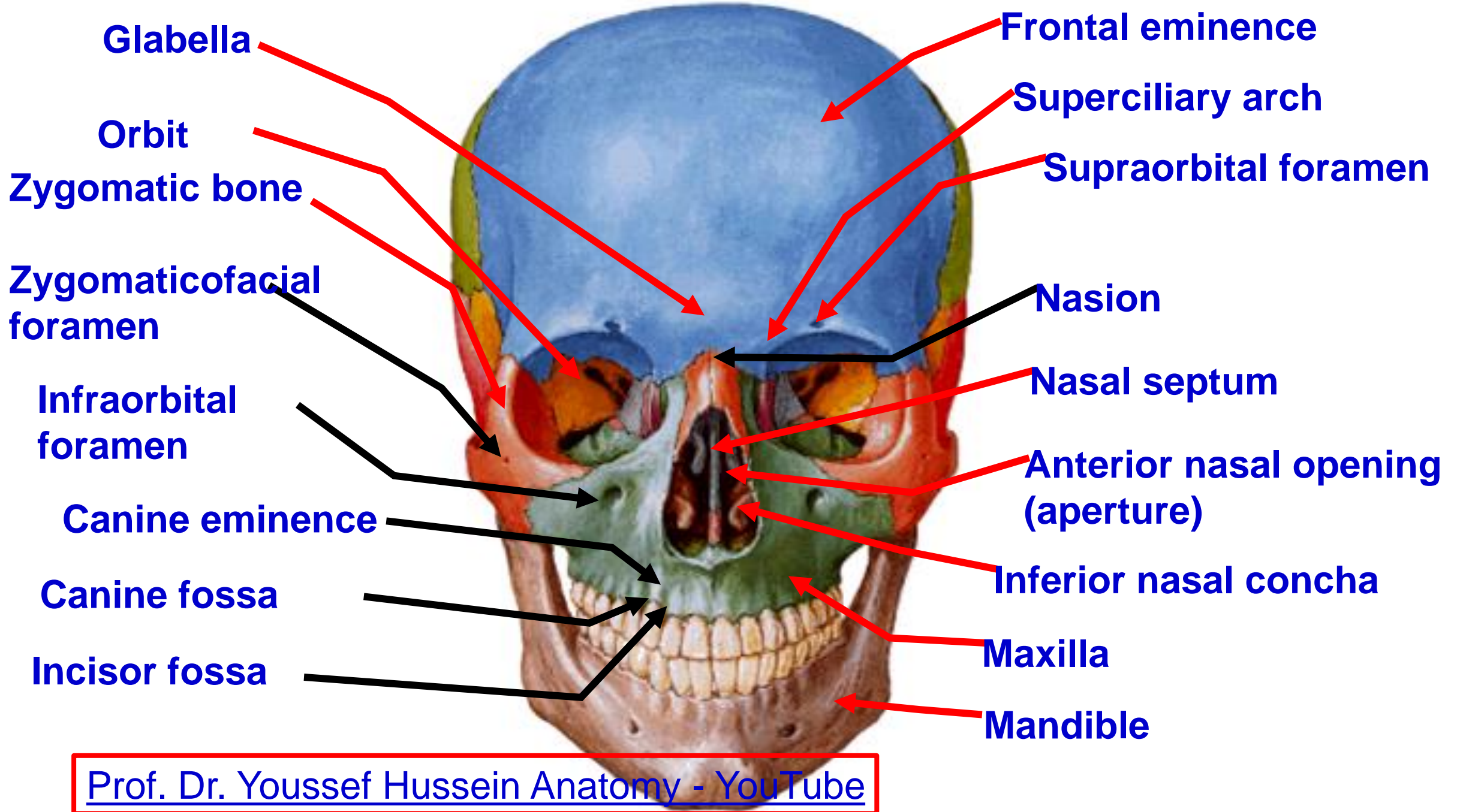
5- **Parietal emissary foramen**, one on each sides of the sagittal sutures, transmits an emissary veins connecting the scalp veins (outside skull) with the dural venous sinus (inside skull)

# Norma Frontalis

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## ❖ NORMA FRONTALIS

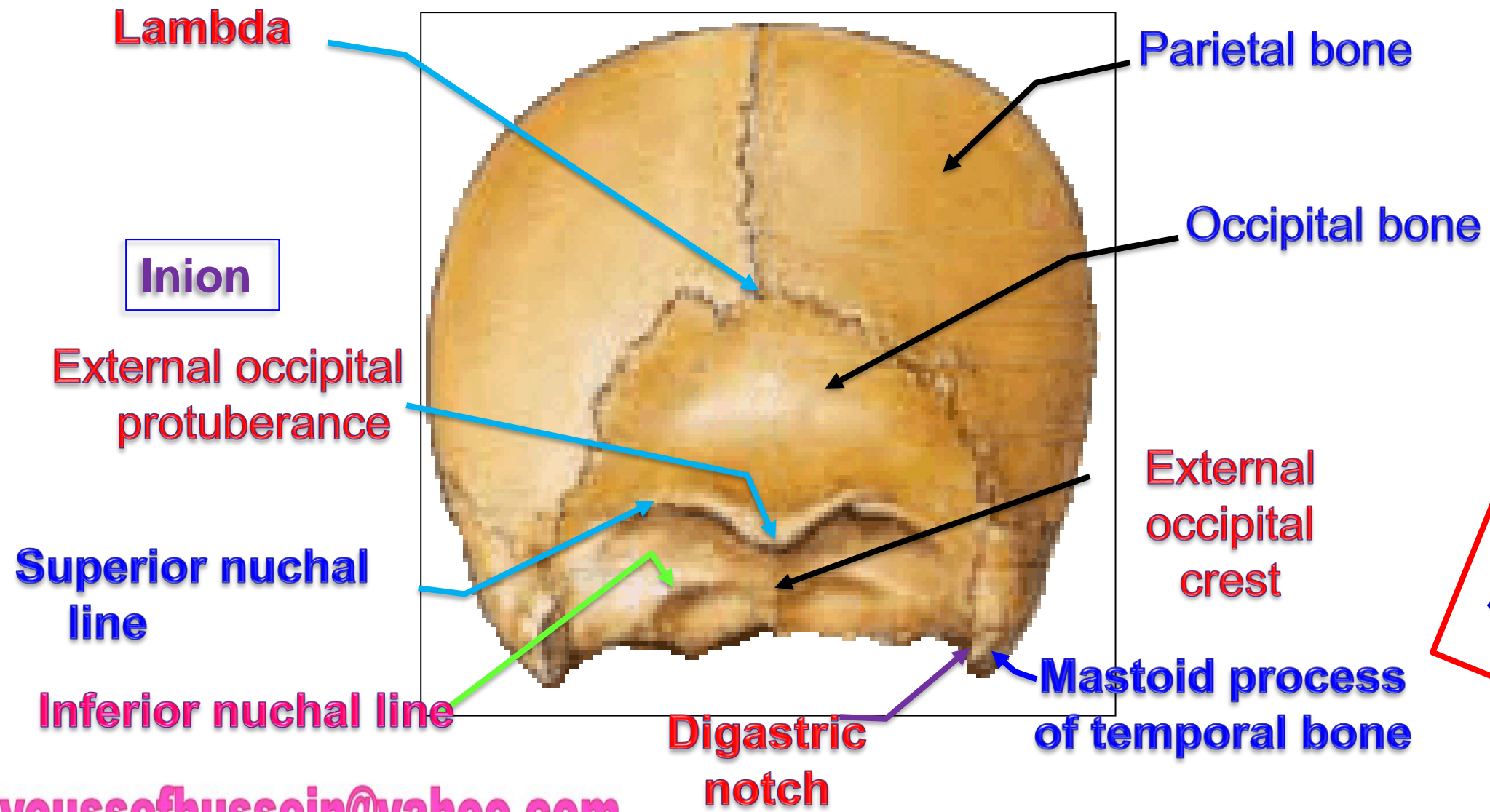
1. **Frontal eminences** : the most prominent areas on either side of the forehead
2. **Superciliary arches**: elevated arched ridges **above the medial parts** of the superior orbital margins. They are more prominent in **males**.
3. **Supraorbital notch (or foramen)**: transmits supraorbital nerve & vessels.
4. **Glabella**: a median elevation between the 2 superciliary arches above the root of nose.
5. **Nasion**: the point of meeting of frontonasal and internasal sutures.
6. Nasal septum between two nasal cavities
7. **Inferior nasal concha** is a separate bone
8. **Zygomaticofacial foramen**: close to the inferolateral angle of the orbit, transmits zygomaticofacial nerve and vessels.
9. **Maxilla**:
  - A- **Infraorbital foramen in maxilla**: transmits infraorbital nerve & vessels.
  - B- **Canine eminence**: a projection produced by the root of canine tooth **النااب**.
  - C- **Canine fossa**: a shallow depression **lateral** to the canine eminence.
  - D- **Incisor fossa**: a shallow depression **medial** to the canine eminence (above incisor **الققاطع**).

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## ❖ Norma Occipitalis

- It is the posterior aspect of the skull.

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\* **Bones forming it,**

- Squamous part of the occipital bone    - Two parietal bone    - Two Mastoid part of temporal bone

- \* **General features;**

**1- External occipital protuberance:** - A median elevation on the lower part of the occipital bone.

- The most prominent point on the protuberance is called **inion**.

- Its upper part gives origin to **trapezius muscle**.

**2- External occipital crest;** extends from external occipital protuberance to posterior border of foramen magnum.

**3- Superior nuchal line:** a line connecting external occipital protuberance with mastoid process.

- Its **medial** 1/3 gives **origin** to the **trapezius** muscle.

- Its **lateral** 1/3 gives **insertion** to the **sternocleidomastoid** muscle.

**4- Inferior nuchal line,** it extends from middle of external occipital crest and passed parallel and below to the superior nuchal line.

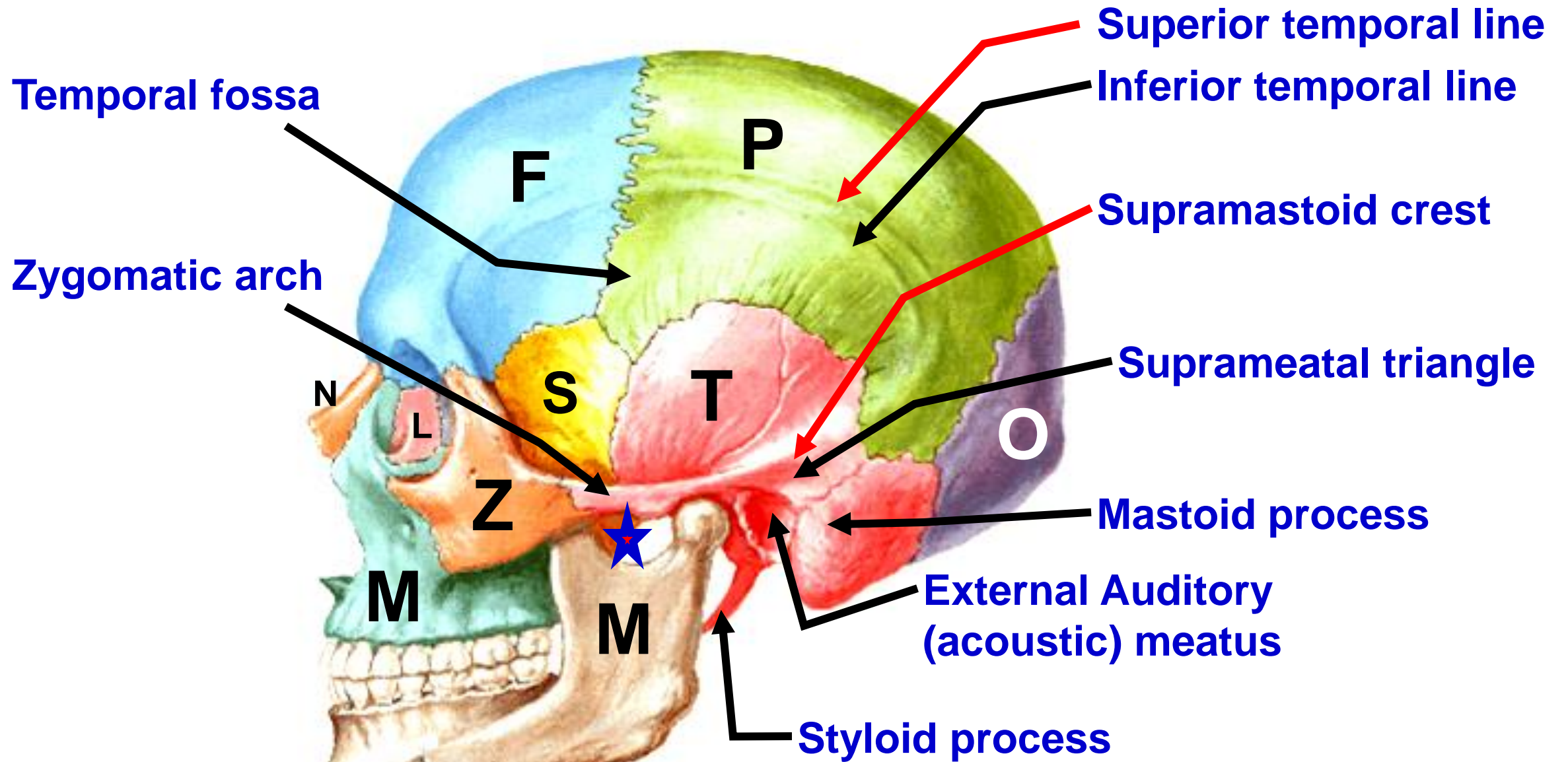
**5- Highest nuchal line:** an ill-defined line arching upwards and laterally 1 cm above the superior nuchal line on each side.

- Its lateral part gives **origin** to the **occipital belly of the occitipofrontalis muscle**.

# Norma Lateralis

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- **Norma lateralis**

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- **Temporal line:**

(a) Superior temporal line → a) Epicranial aponeurosis. b) Temporal fascia.

(b) Inferior temporal line → origin to **temporalis muscle**.

- **Zygomatic arch** it is a boney bridge formed of temporal process of zygomatic bone and zygomatic process of the temporal bone.

- Its lower border and inner surface give origin to the **masseter muscle**.

- **Supramastoid crest:** continuation of the posterior end of the zygomatic process of temporal bones, above the mastoid process, to the superior temporal line

- **Temporal fossa:** space above zygomatic arch, below superior temporal line, gives origin of **temporalis muscle**.

- **Infratemporal fossa** below the zygomatic arch

- **Mastoid process**, a nipple-like process felt subcutaneously deep to lobule of ear

- **Styloid process:** thin long projection anteromedial to mastoid process.

- **External auditory (acoustic) meatus** just below posterior root of the zygomatic process of temporal bone

- **Suprameatal triangle:** triangular area just **above and behind** external auditory meatus



## ❖ **Supra-meatal triangle:**

### \*\* **Surgical importance:**

- 1) It forms the lateral wall of the mastoid (tympanic) antrum.
- 2) A drill hole above the suprimeatal triangle will enter the middle cranial fossa.

## ❖ **Mastoid process:**

- Its **inner surface** (digastric notch) gives **origin** to the **posterior belly of digastric muscle**
- Its **outer surface** gives **insertion to 3 muscles:**

**(a) Sternocleidomastoid muscle.**

**(b) Splenius capitis muscle.**

**(c) Longissimus capitis muscle.**

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## ❖ **Styloid process:**

- It gives attachment to **2 ligaments and 3 muscles;**

(1) Stylomandibular ligament

(2) Stylohyoid ligament

(3) Stylohyoid muscle

(4) Styloglossus muscle

(5) Stylopharyngeus muscle

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### ❖ Pterion

- It is the area of meeting of **4 bones** connected by H- shaped suture:

- 1) Frontal bone.
- 2) Parietal bone.
- 3) Squamous part of temporal bone.
- 4) Greater wing of sphenoid.

- **At birth**, called **Sphenoidal fontanelle** which ossifies at 3 months.

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\*\* **Surface anatomy:** the center of the pterion lies about 1.5 inch behind the frontozygomatic suture and 1.5 inch above the midpoint of the zygomatic arch.

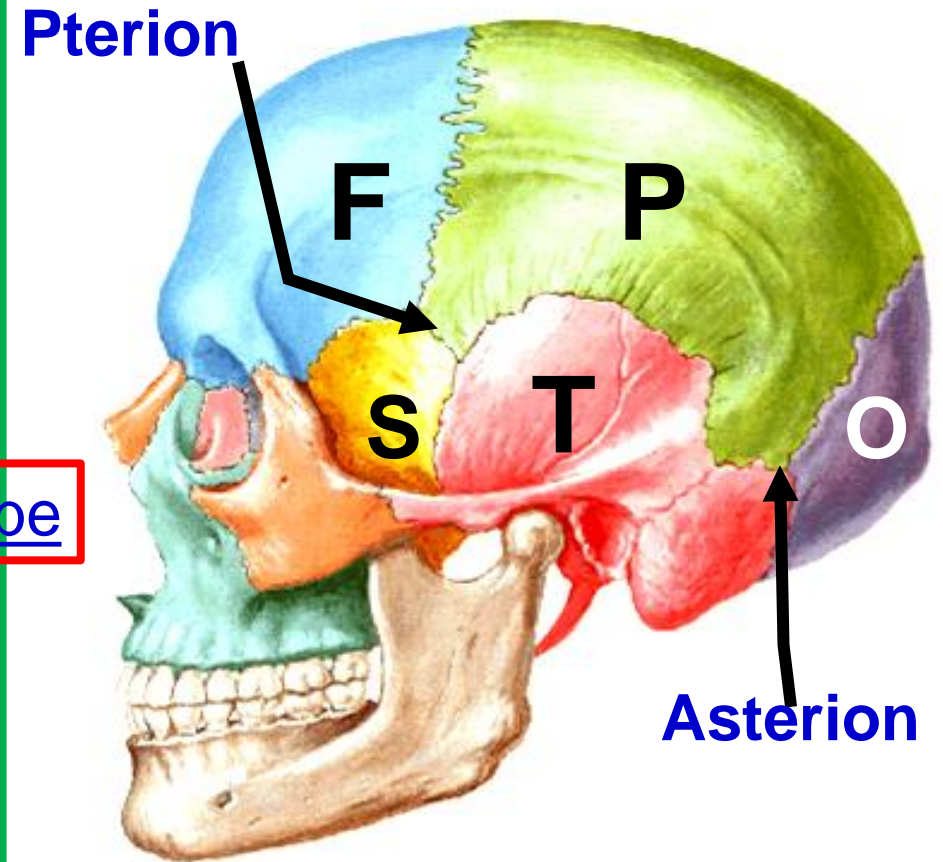
\*\* **Importance:** the center is related internally to anterior branch of the middle meningeal artery.

### ❖ Asterion

- It is the point of meeting of **3 bones** 1) Parietal bone. 2) Occipital bone. 3) Mastoid part of temporal bone.

- **At birth**, **mastoid) fontanelle** which ossifies at 3 months.

- **It** is related internally to the highest point of transverse sinus.

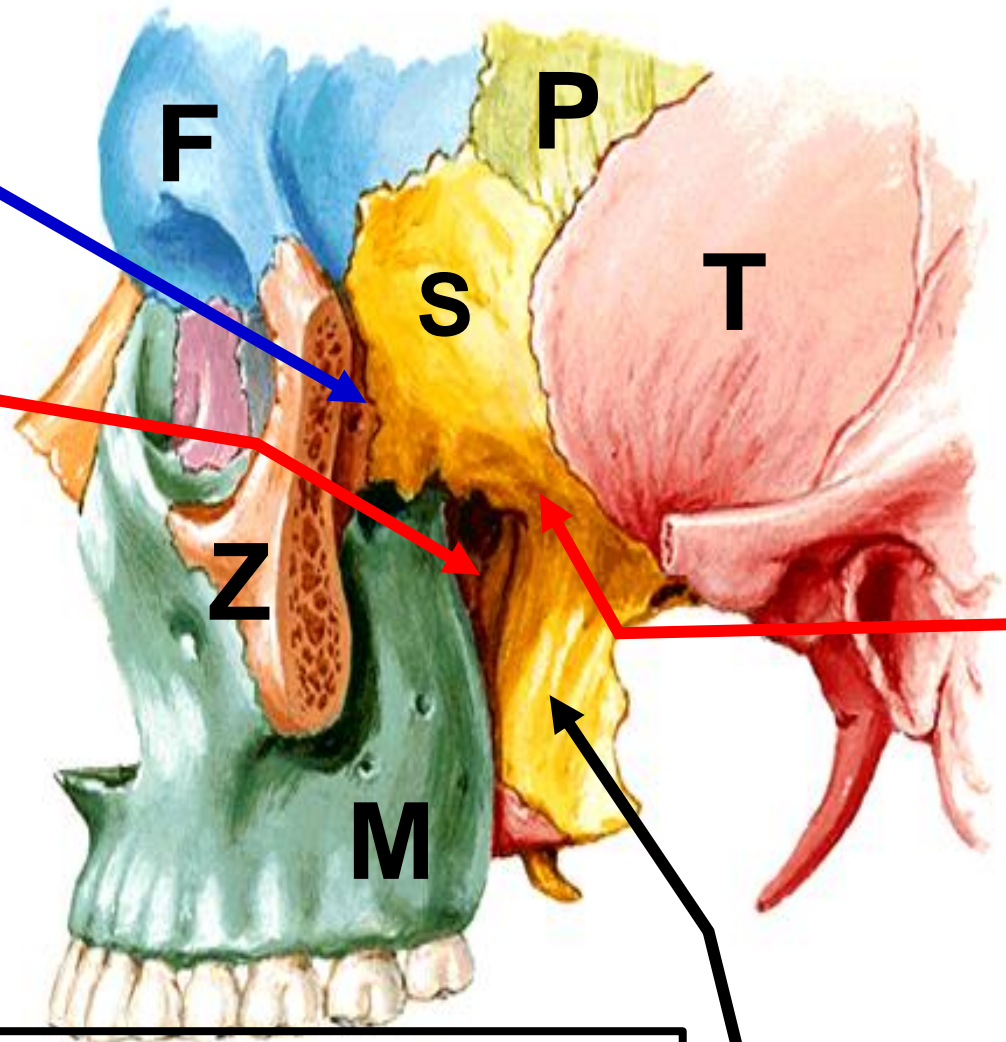


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**Inferior orbital fissure**

**Pterygomaxillary fissure is door of pterygopalatine fossa**

- **Infratemporal fossa** is exposed by removal of zygomatic arch and mandible
- **Pterygopalatine fossa:** medial to pterygomaxillary fissure and behind the apex of orbit.



**Infratemporal surface of greater wing of sphenoid (roof)**

**Lateral pterygoid plate (medial wall)**

**\*\* Communications of infratemporal fossa: it communicates with:**

- 1- **Temporal fossa** through the gap deep to the zygomatic arch.
- 2- **Orbit** through the **inferior orbital fissure**.
- 3- **Pterygopalatine fossa** through the **pterygomaxillary fissure**.
- 4- **Middle cranial fossa** through **foramen ovale and foramen spinosum**.

# Norma Basalis externa

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Alveolar arch

Hard palate  
(Palatine process  
of maxilla)

Hard palate  
(Horizontal  
palate of palatine  
bone)

Maxillary  
tuberosity  
origin to **superficial**  
**head of medial**  
**pterygoid** muscle.

Posterior free border  
of hard palate

Posterior nasal spine origin to **musculus**  
uvulae

Incisive fossa

Greater palatine foramen

Lesser palatine foramen

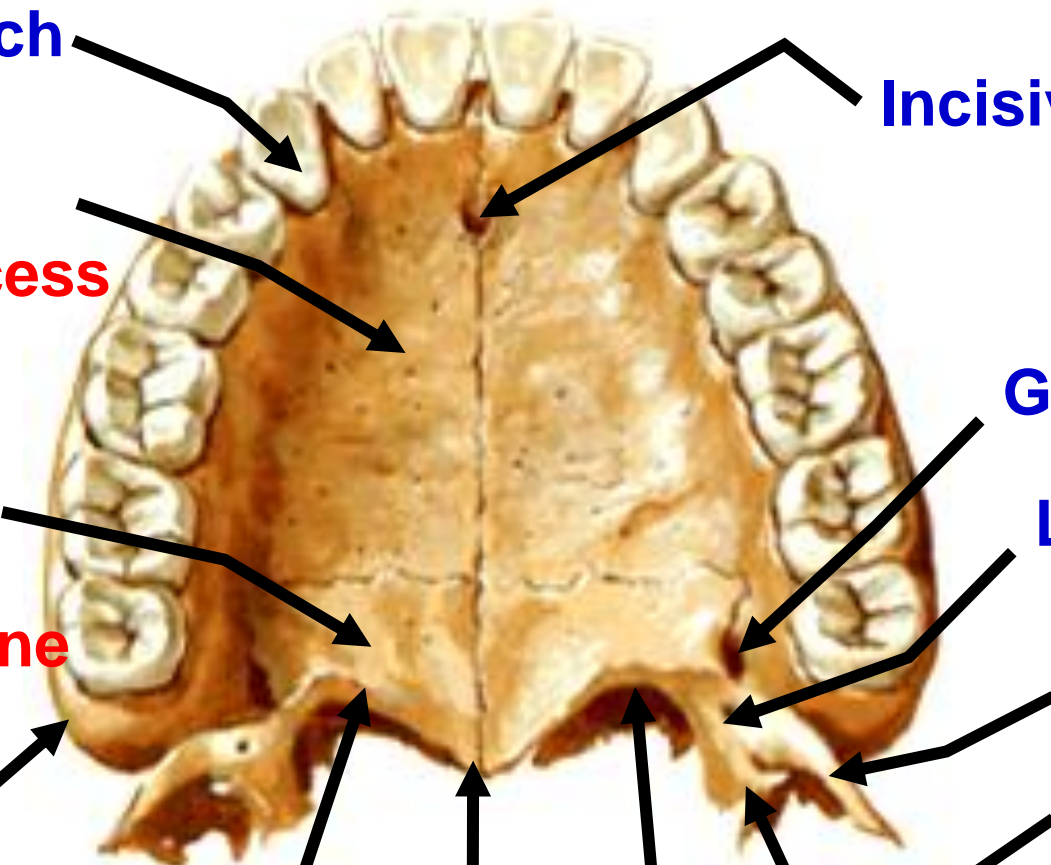
Lateral pterygoid plate

Medial pterygoid plate

Posterior nasal opening

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## ❖ Anterior part of norma basalis

- **Alveolar arch**: carries the sockets for the upper 16 teeth.
- **Maxillary tuberosity**: **posterior end of the alveolar arch** → origin to the **superficial head of the medial pterygoid muscle**.
- **Posterior free border of hard palate**: → palatine aponeurosis of soft palate.
- **Posterior nasal spine**: → origin to **musculus uvulae**.
- **Incisive fossa** : behind the incisors for the passage of greater palatine nerve and vessels and long sphenopalatine nerves
- **Greater palatine foramen**: lies medial to the last molar socket, → greater palatine nerve and vessels.
- **Lesser palatine foramina** behind the greater → lesser palatine nerve and vessels.

**Pterygoid hamulus**

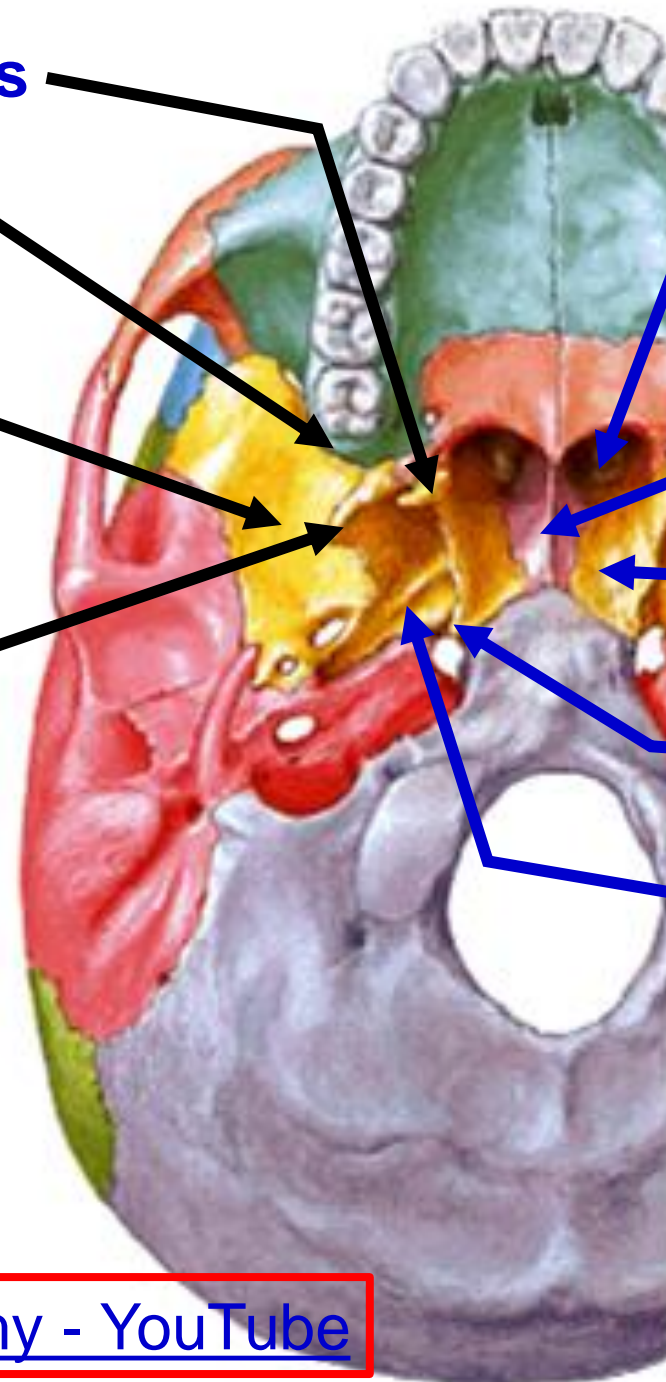
**Maxillary tuberosity** origin to **superficial head of medial pterygoid muscle.**

**Infratemporal surface of greater wing of sphenoid** gives origin to the **upper head of lateral pterygoid muscle**

**Lateral pterygoid plate**

- Its **lateral surface** gives origin to **lower head of lateral pterygoid muscle.**

- Its **medial surface** gives origin to **deep head of medial pterygoid muscle**



**Posterior nasal opening**

**Vomer**

**Medial pterygoid plate**

**Pterygoid tubercle**

**Scaphoid fossa**

- **Posterior nasal opening:** separated from each other by **vomer**

- **Lateral pterygoid plate**

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- **Medial pterygoid plate**

- **Pterygoid fossa** between lateral and medial pterygoid plates

- **Medial pterygoid plate :**

- **The upper end of the posterior border** divides into

- 1) Laterally **Scaphoid fossa**, it gives origin to **tensor palate muscle**.

- 2) Medially **Pterygoid tubercle**. It lies in front of foramen lacerum.

- Above the tubercle lies the posterior end of **pterygoid canal**.

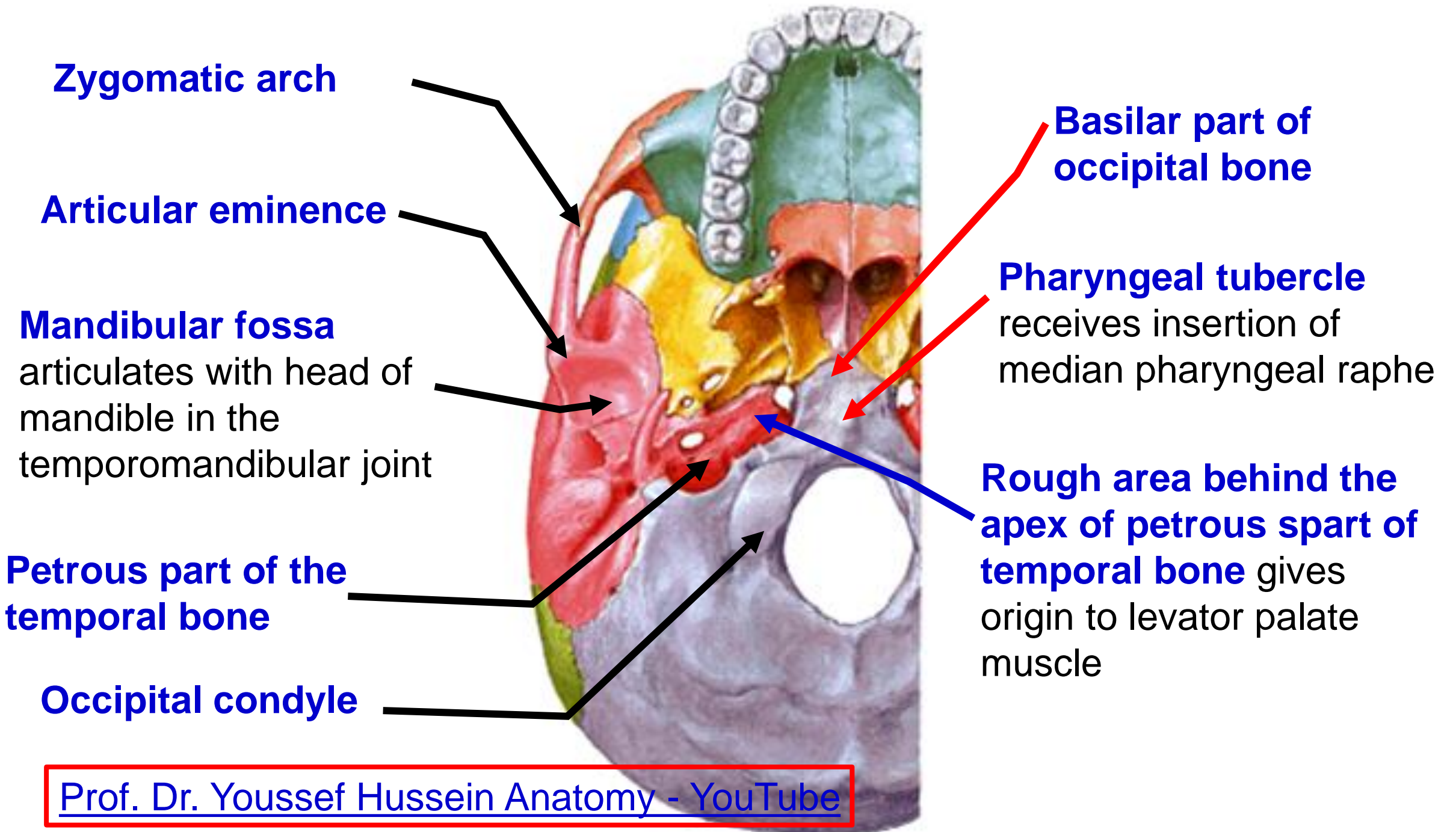
- **The lower end of the posterior border** end in **pterygoid hamulus** (hook) which is related to the tendon of tensor palati muscle.

- The **pterygoid hamulus** gives attached to:

1. Upper end of **pterygomandibular ligament**.

2. Origin of upper fibers of **superior constrictor muscle of pharynx**.





**Zygomatic arch**

**Articular eminence**

**Mandibular fossa**

articulates with head of mandible in the temporomandibular joint

**Petrous part of the temporal bone**

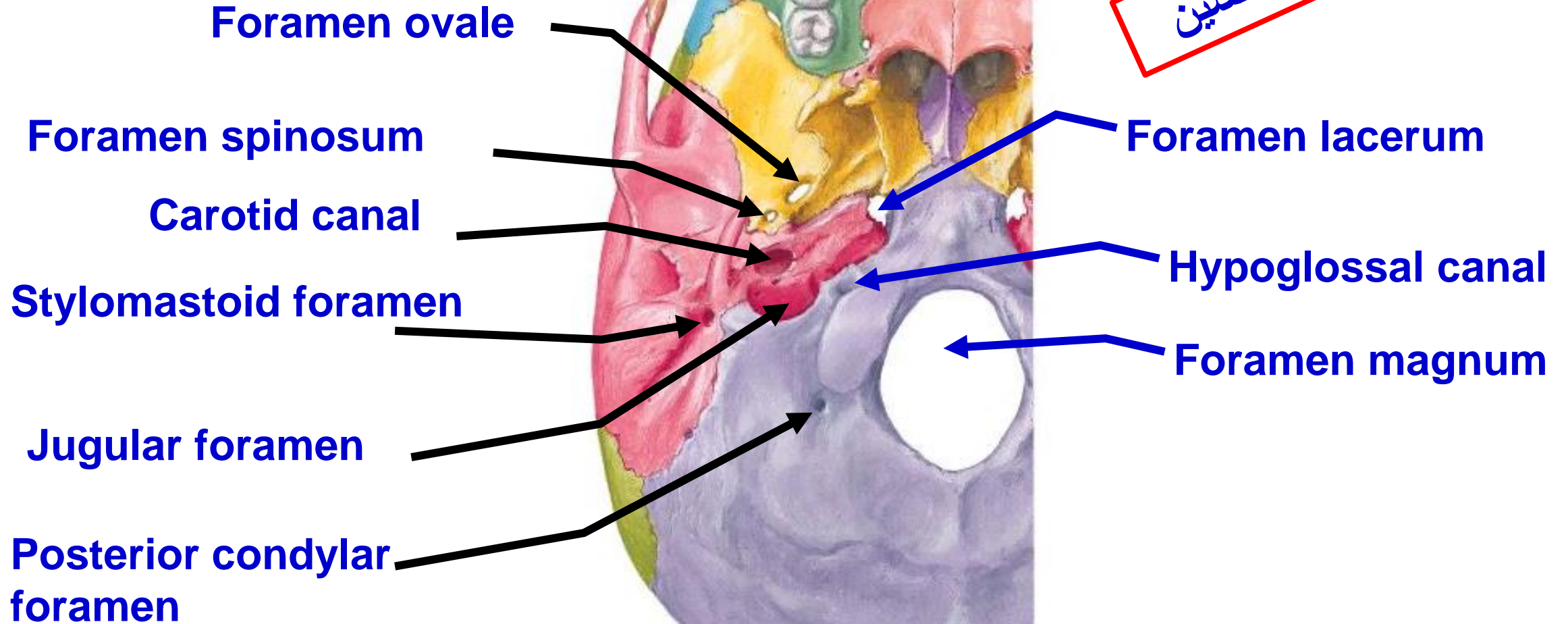
**Occipital condyle**

**Basilar part of occipital bone**

**Pharyngeal tubercle**  
receives insertion of median pharyngeal raphe

**Rough area behind the apex of petrous part of temporal bone** gives origin to levator palatini muscle

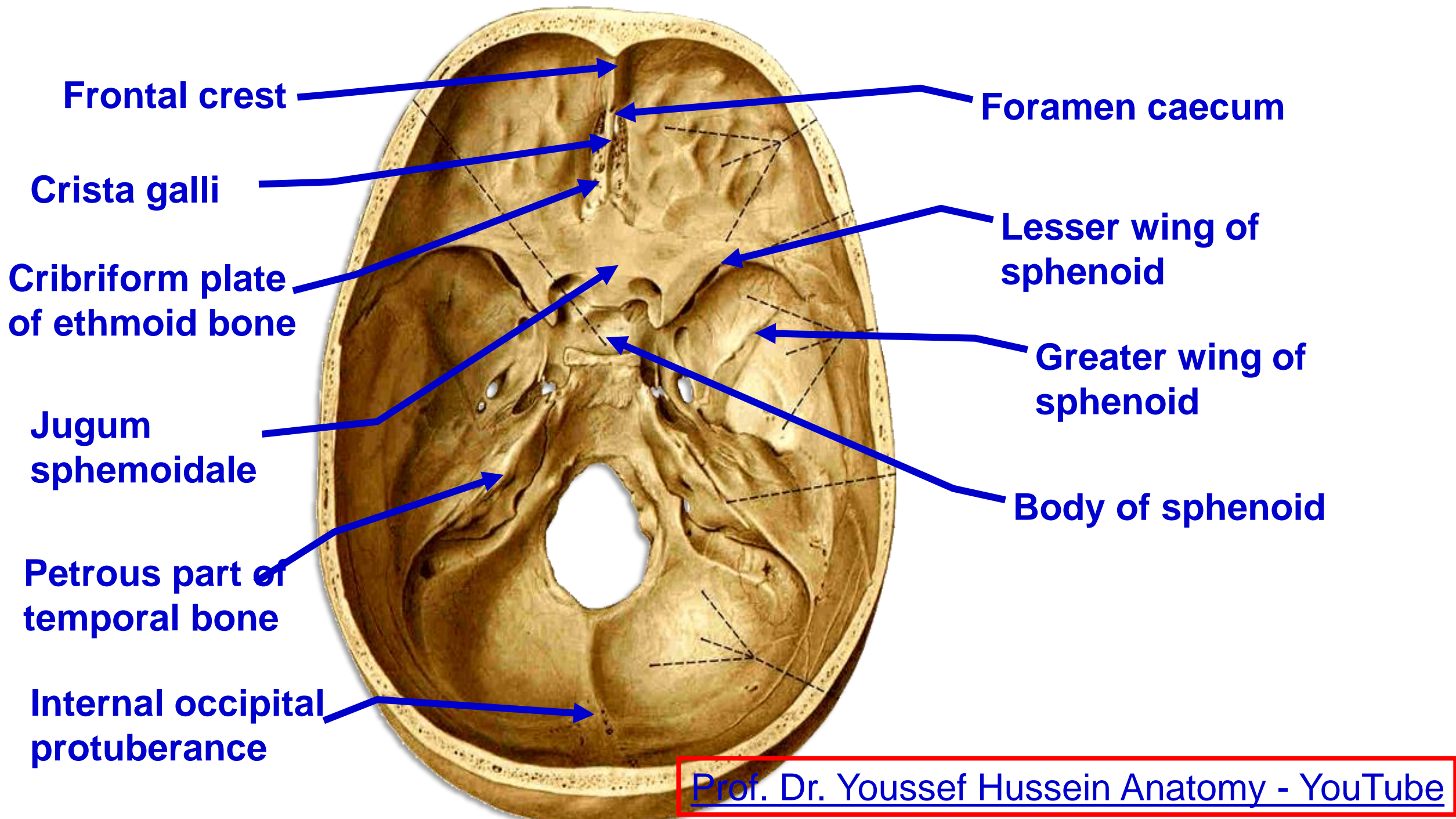
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# Norma Basalis interna

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**Frontal crest**

**Crista galli**

**Cribriform plate  
of ethmoid bone**

**Jugum  
sphenoidale**

**Petrous part of  
temporal bone**

**Internal occipital  
protuberance**

**Foramen caecum**

**Lesser wing of  
sphenoid**

**Greater wing of  
sphenoid**

**Body of sphenoid**

- **Anterior cranial fossa**

**(1) Frontal crest:** a median bony projection.

**(2) Cribriform plate of ethmoid passage of** Olfactory nerves

**(3) Crista galli:** a median bony projection from cribriform plate of ethmoid

**(4) Jugum sphenoidal:** is the anterior part of the body of sphenoid behind the cribriform plate of ethmoid.

**(5) Lesser wing of sphenoid:** extends laterally from the jugum sphenoidal. Its posterior free margin is grooved by the **sphenoparietal sinus**.

**(6) Anterior clinoid process** medial end of the lesser wing.

# Middle cranial fossa

Sulcus chiasmaticus  
(Optic groove)

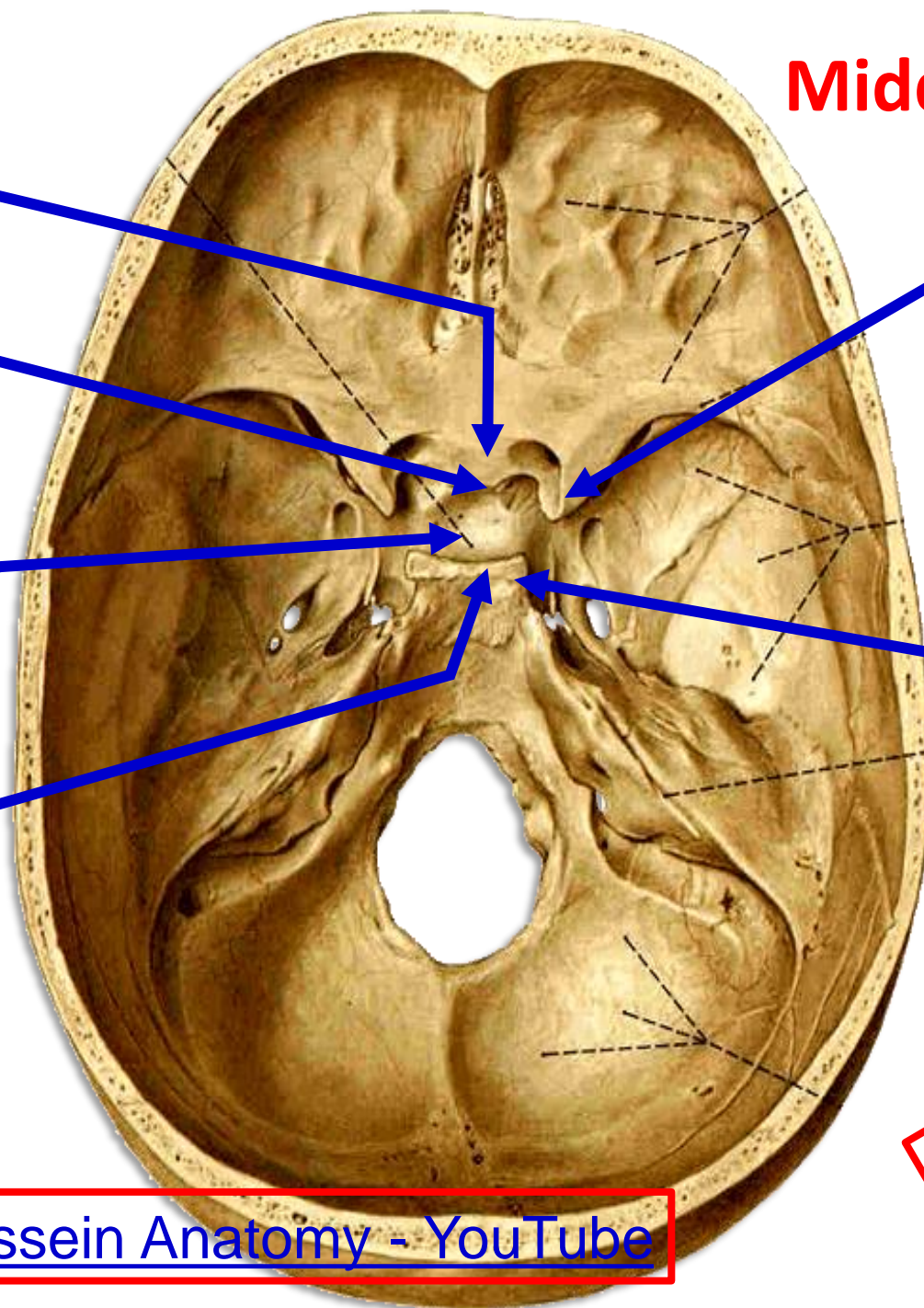
Tuberculum selle

Hypophyseal fossa  
Sella turcica  
(pituitary gland)

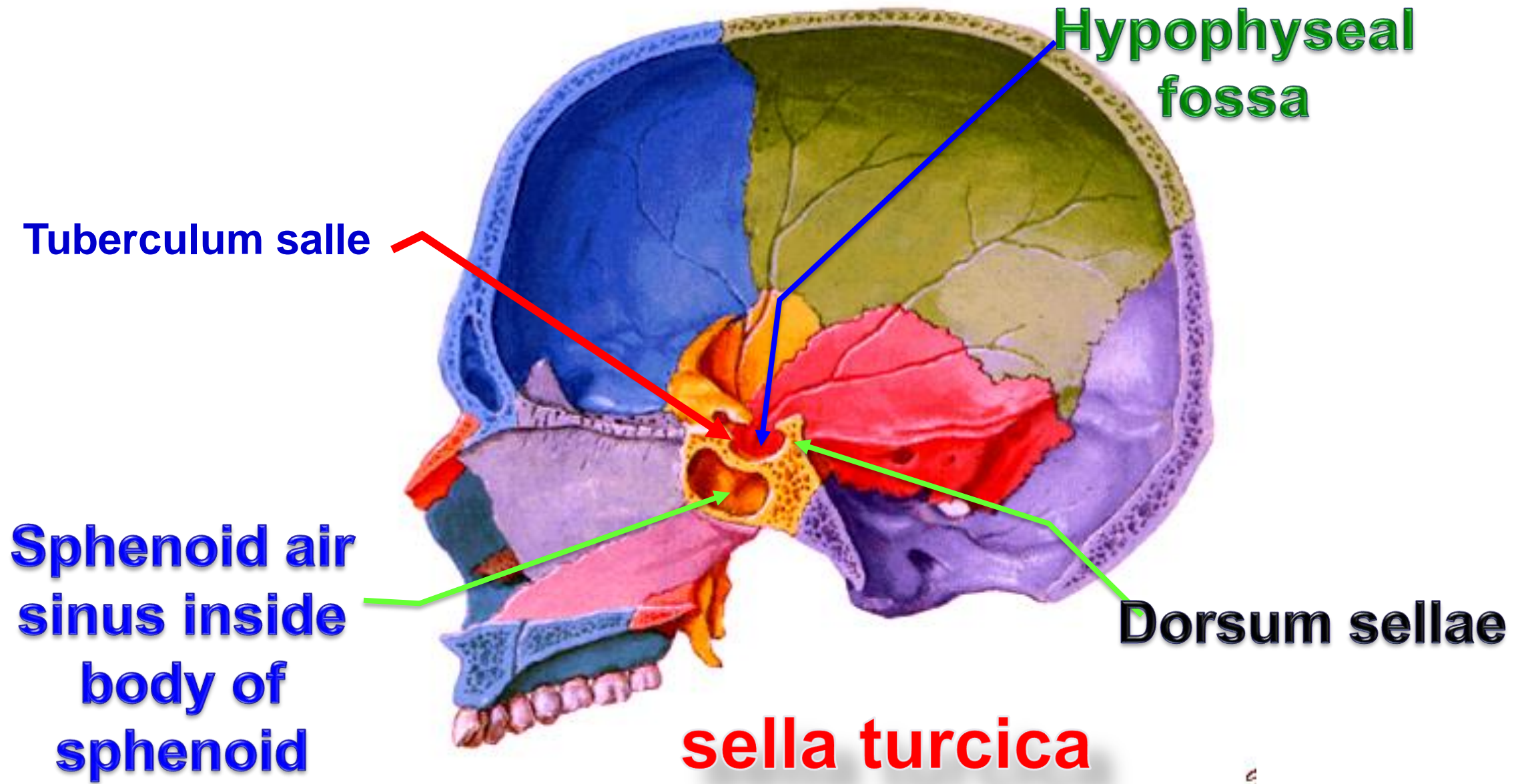
Dorsum selle

Anterior clinoid  
process

Posterior clinoid  
process



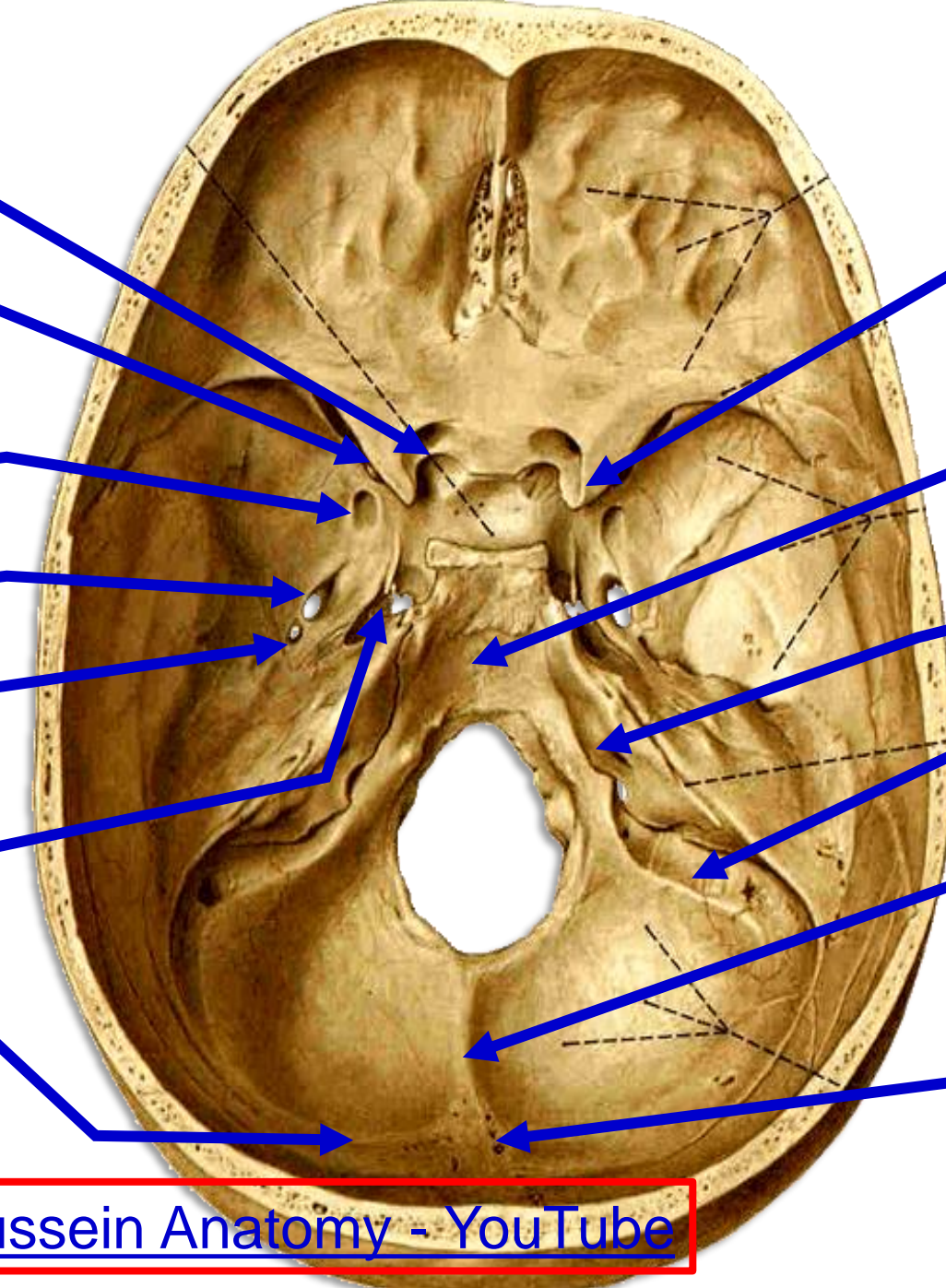
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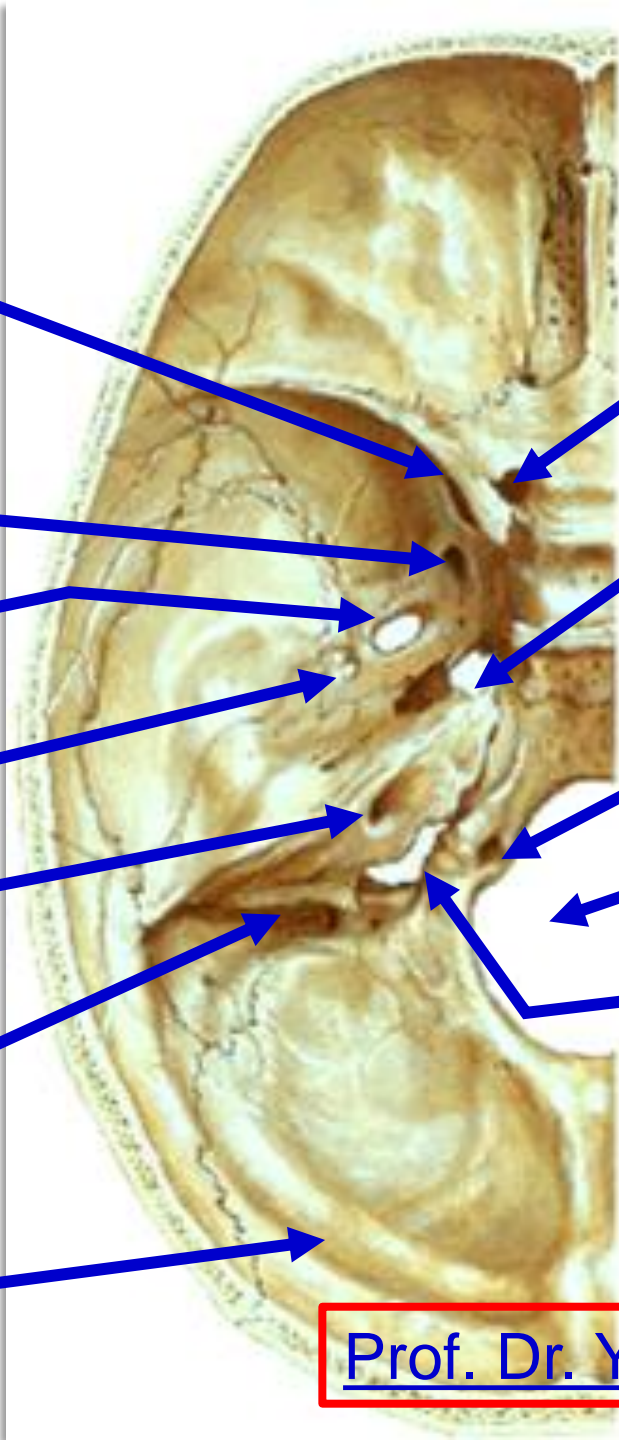
**Foramen of the skull**

- Optic canal
- Superior orbital fissure
- Foramen rotundum
- Foramen ovale
- Foramen spinosum
- Foramen lacerum
- Groove for Transverse sinus

- Anterior clinoid process
- Clivus
- Jugular foramen
- Groove for Sigmoid sinus
- Internal occipital crest
- Internal occipital protuberance







**Superior orbital  
fissure**

**Foramen rotundum**

**Foramen ovale**

**Foramen spinosum**

**Internal auditory  
meatus**

**Groove for sigmoid  
sinus**

**Groove for T. sinus**

**Optic canal**

**Foramen lacerum**

**Hypoglossal canal**

**Foramen magnum**

**Jugular foramen**

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Groove for superior petrosal sinus

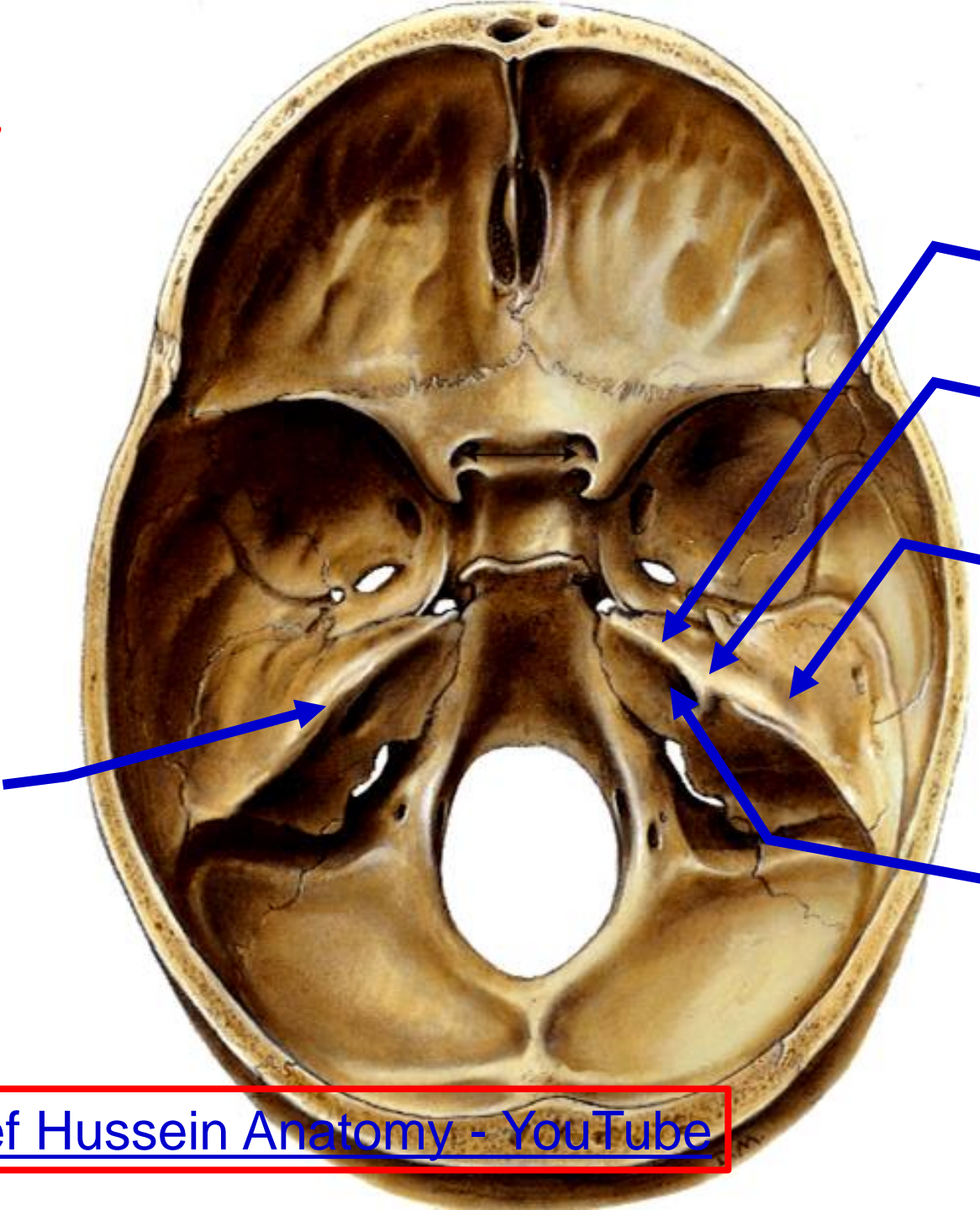
Trigeminal impression

Arcuate eminence

Tegmen tympani

Internal auditory meatus and facial canal

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- **Petrous part of temporal bone (its anterior surface):** shows the following features

**(a) Trigeminal impression:** a depression at the apex of the petrous temporal. It lodges the trigeminal ganglion.

**(b) Arcuate eminence:** an elevation posterolateral to the trigeminal impression. *It produced by superior semicircular canal of internal ear.*

**(c) Tegmen tympani:** is the thin bone anterolateral to the arcuate eminence. *It forms the roof of the tympanic cavity.*

**(d) Hiatus and groove for greater petrosal nerve:** lateral to the trigeminal impression and ends at the **foramen lacerum**. (branch of facial nerve)

**(e) Hiatus and groove for lesser petrosal nerve:** lateral to those of greater petrosal nerve, parallel to them.

<b>Foramen</b>	<b>Position</b>	<b>structures passing</b>
<b>Optic canal</b>	at the apex of the orbit	(1) optic nerve (2) Ophthalmic artery.
<b>Superior orbital fissure</b>	Between the roof and the lateral wall of the orbit.	( <b>Live Free To See No Insult At All</b> ); (1) <b>Lacrimal</b> nerve (2) <b>Frontal</b> nerve (3) <b>Trochlear</b> (4) <b>Superior</b> division of oculomotor (5) <b>Nasociliary</b> nerve (6) <b>Inferior</b> division of oculomotor (7) <b>Abducent</b> nerve (6 <sup>th</sup> cranial nerve).
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<b>Inferior orbital fissure</b>	Between the lateral Wall and the floor of the orbit.	(1) Infraorbital nerve. (2) Infraorbital artery. (3) Zygomatic nerve.

- **Foramen ovale:** The following structures passing through it;
  - 1) **M**andibular nerve.
  - 2) **L**esser superficial petrosal nerve.
  - 3) **A**ccessory meningeal artery.

- **Foramen spinosum:**

- 1) Middle meingeal artery and
- 2) Nervus spinosus.

- **Stylomastoid foramen:** between the styloid & mastoid processes.

- 1) Facial nerve.
- 2) Stylomastoid artery (branch of posterior auricular artery)

- **Carotid canal:**

- (1) Internal carotid artery.
- (2) Sympathetic plexus around the artery
- (3) Emissary vein

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- **Foramen lacerum** : at the apex of petrous part of temporal bone.

- (1) Internal carotid artery.
- (2) Sympathetic plexus around the artery.
- (3) Emissary vein.

- **Jugular foramen:**

- 1) Internal Jugular vein

- 2) The 9<sup>th</sup>, 10<sup>th</sup> and 11<sup>th</sup> cranial nerves

- **Anterior condylar foramen (hypoglossal canal);**

- 1) Hypoglossal nerve (12<sup>th</sup> cranial nerve).

- 2) Meningeal branch of ascending pharyngeal artery.

- **Posterior condylar foramen** emissary vein.

- **Foramen magnum** : The following structures passing through it

- 1) Lower end of the medulla oblongata.

- 2) Meninges.

- 3) Spinal roots of accessory nerve

- 4) Spinal arteries

- 5) Vertebral arteries

- 6) Vertebral plexus of veins.

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**Internal auditory meatus**, on the posterior surface of the petrous temporal bone.

It transmits 1) Facial nerve (the 7<sup>th</sup> cranial nerve), 2) Vestibulo-cochlear nerve (the 8<sup>th</sup> cranial nerve), and (3) Internal auditory vessels.

- **Hidden foramina of the base:**

- 1) **Palatovaginal canal;** midway between the vomer and vaginal process of medial pterygoid plate.

- - It transmits the pharyngeal branch of the sphenopalatine ganglion.

- 2) **Pterygoid canal:** opens into the aspect of foramen lacerum above the pterygoid tubercle. It transmits the nerve of pterygoid canal (**Vidian nerve**)

- 3) **Bony opening of Eustachian tube** **at posterior end of scaphoid fossa and medial to spine of sphenoid** contains cartilaginous part of the tube.

- 4) **Squamotympanic fissure**, between the tympanic plate of temporal bone and floor of the mandibular fossa, for the passage of .

- **Chorda tympani** nerve (branch of facial nerve)

- **Anterior tympanic artery** (branch of maxillary artery)

- **Pterygo-palatine fossa**

\* **Site**; It lies medial to the pterygomaxillary fissure and behind the apex of orbit.

\* **Content of the pterygopalatine fossa:**

(1) Terminal part of maxillary artery.

(2) Maxillary nerve.

(3) Sphenopalatine ganglion suspended from the nerve.

\* **Foramina and fissures opening in the pterygopalatine fossa :**

(1) **Foramen rotundum** to middle cranial fossa: transmitting maxillary nerve from cranial cavity to fossa.

(2) **Pterygoid canal** (above pterygoid tubercle): transmitting the nerve and artery of the pterygoid canal.

(3) **Palatovaginal canal** (between the vaginal process of the medial pterygoid plate and ala of the vomer) transmitting the pharyngeal branch of the sphenopalatine ganglion to the pharynx.

(4) **Sphenopalatine foramen** to the nasal cavity: transmitting the short and long sphenopalatine nerves of the ganglion to the pharynx.

(5) **The inferior orbital fissure**: connecting the fossa with the orbit.

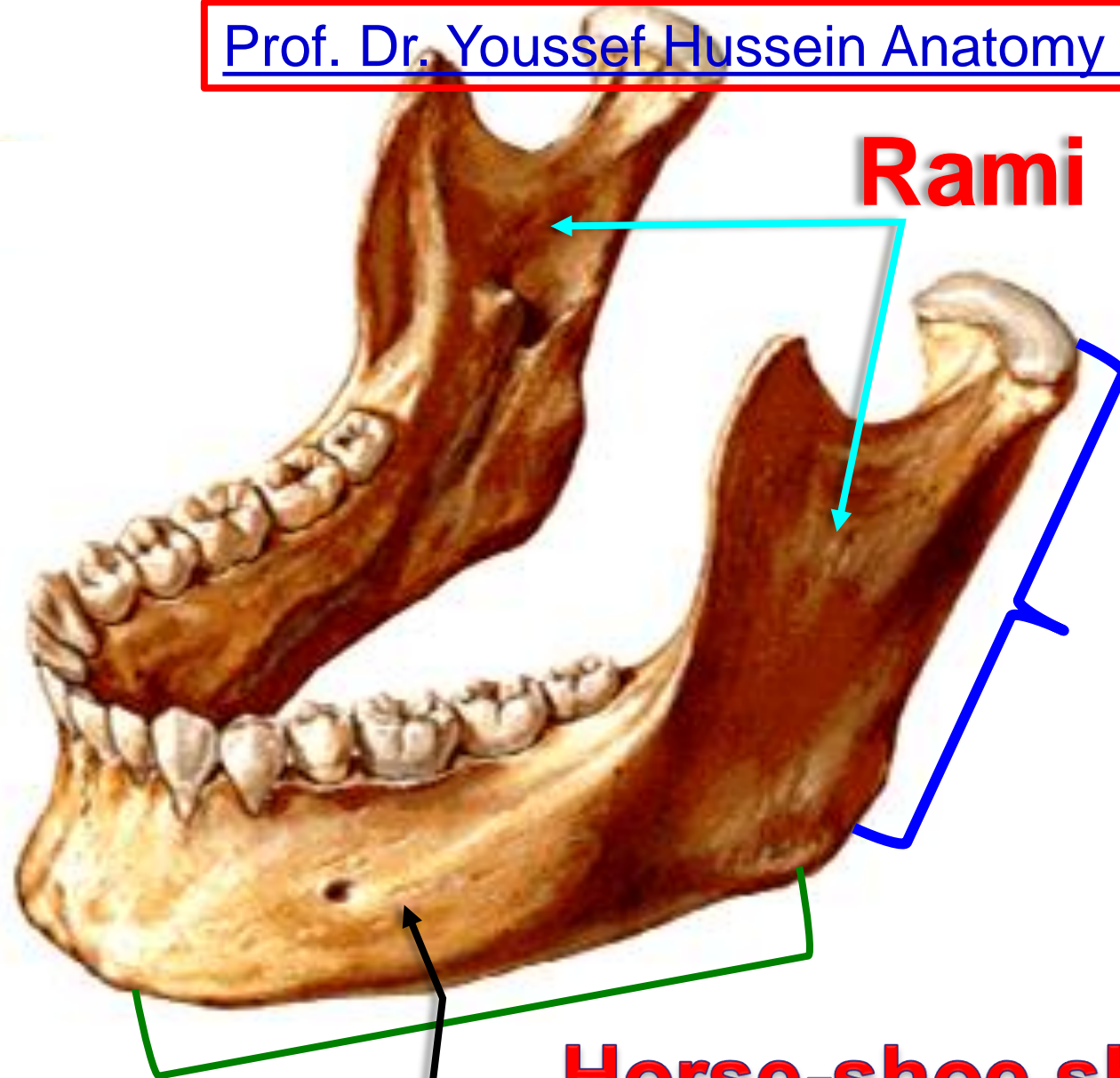
(6) **Greater palatine and lesser palatine canals**: transmitting the greater and lesser palatine nerve and vessels to the palate.

(7) **Pterygomaxillary fissure**: connecting the pterygopalatine fossa to the infratemporal fossa and transmitting maxillary nerve and artery,



# Mandible

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**Rami**

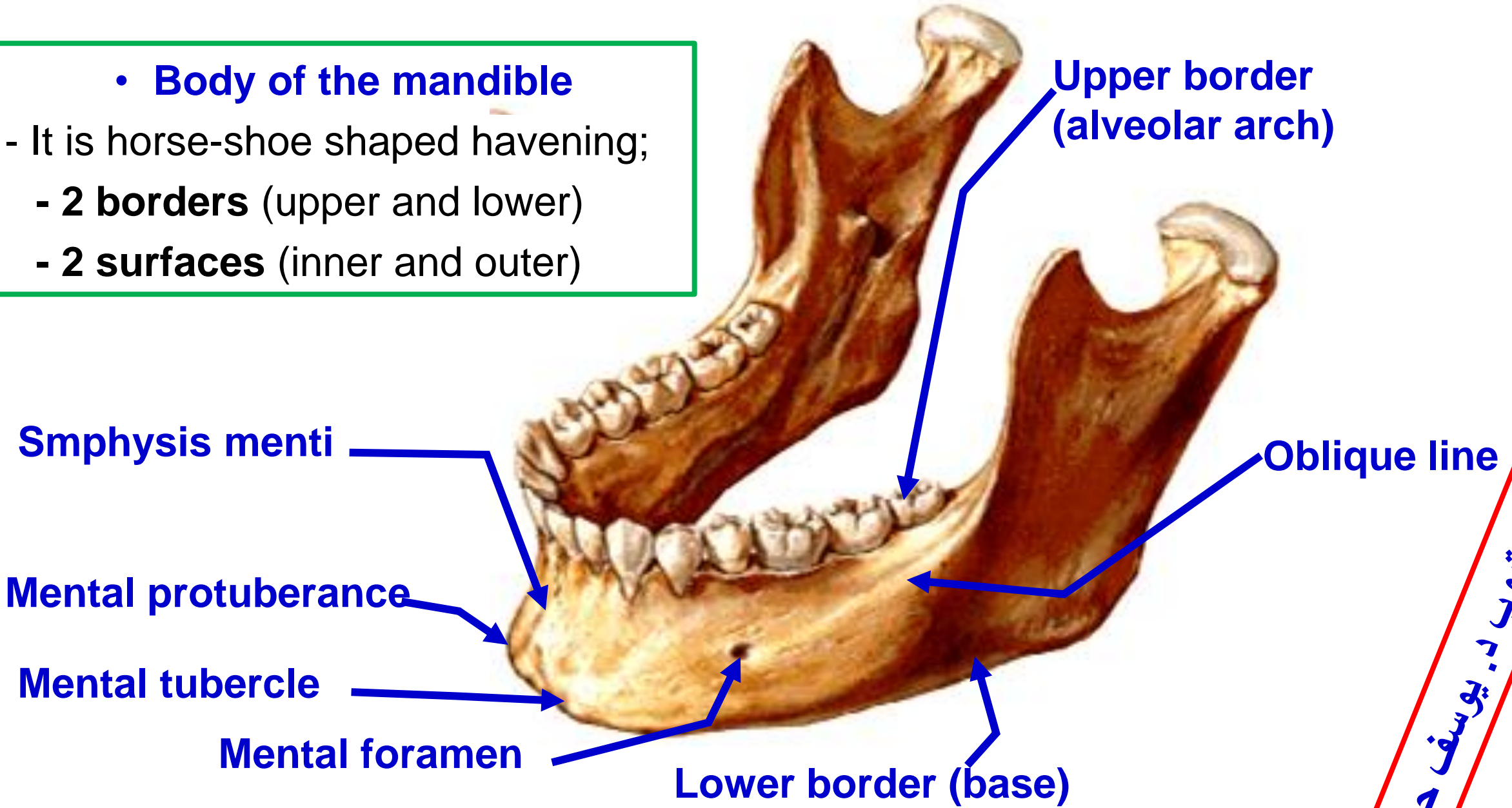
**Body**

**Horse-shoe shaped body**

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- **Body of the mandible**

- It is horse-shoe shaped having;
- **2 borders** (upper and lower)
- **2 surfaces** (inner and outer)

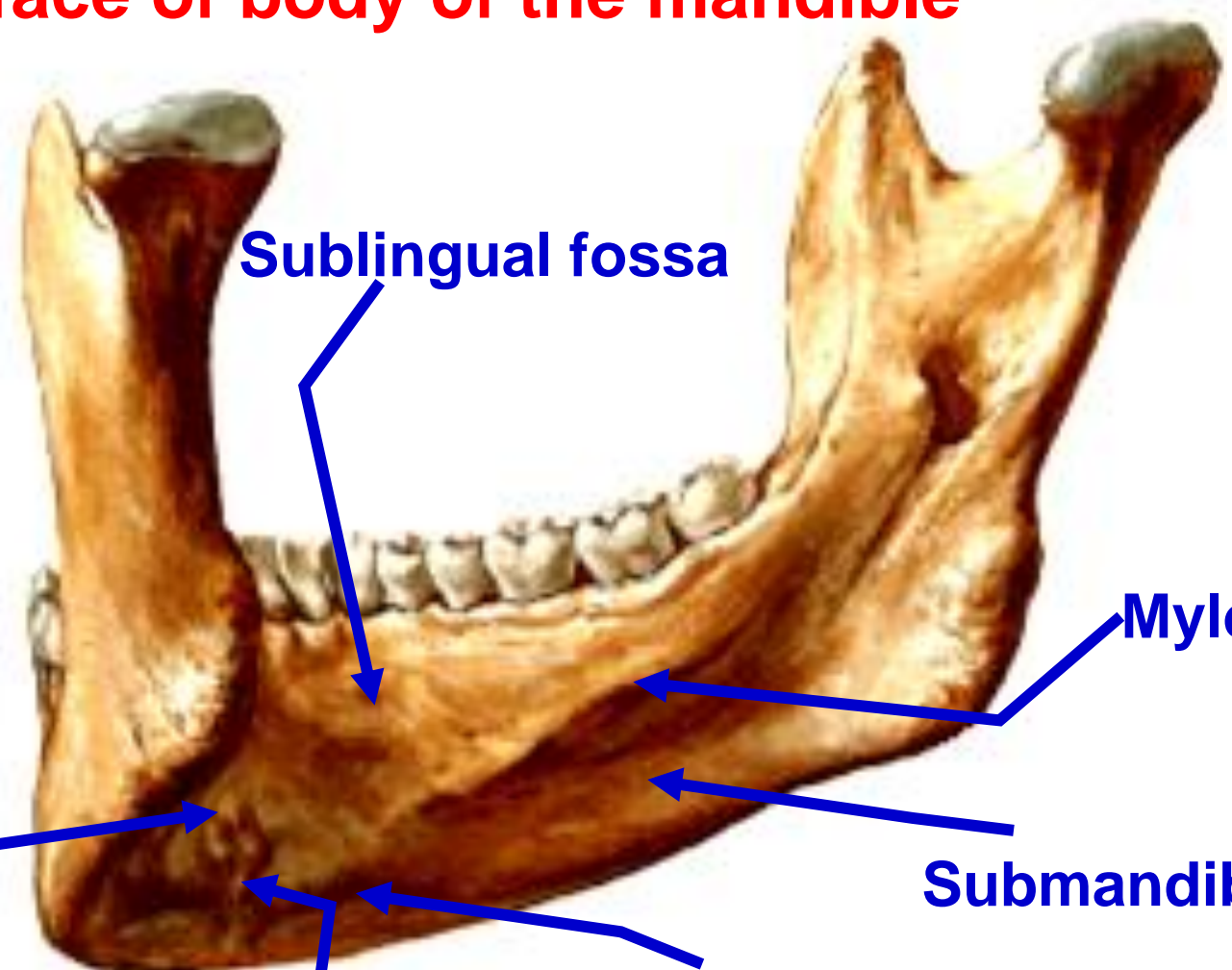


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## ❖ Inner surface of body of the mandible

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Sublingual fossa

Mylohyoid line

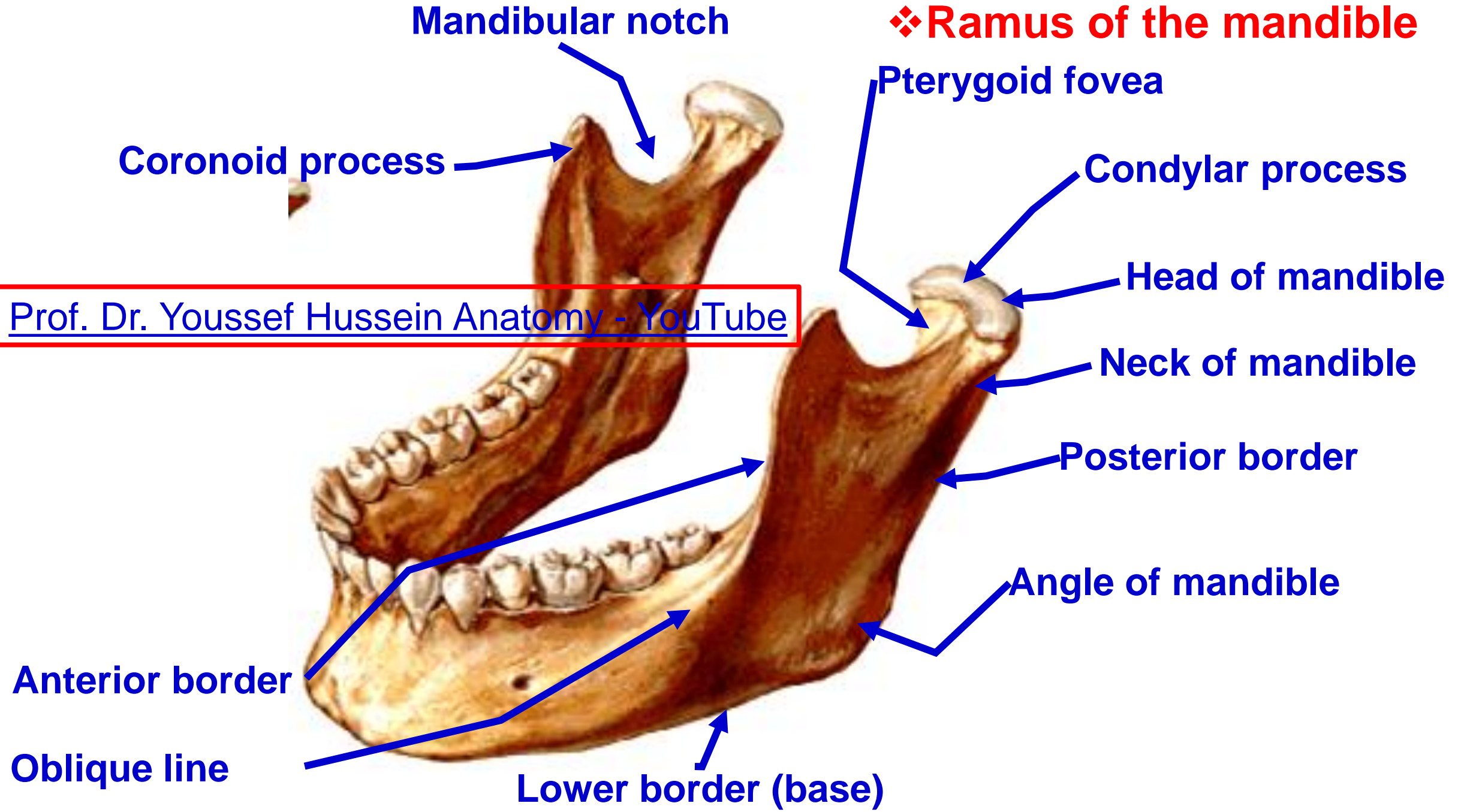
Submandibular fossa

Digastric fossa

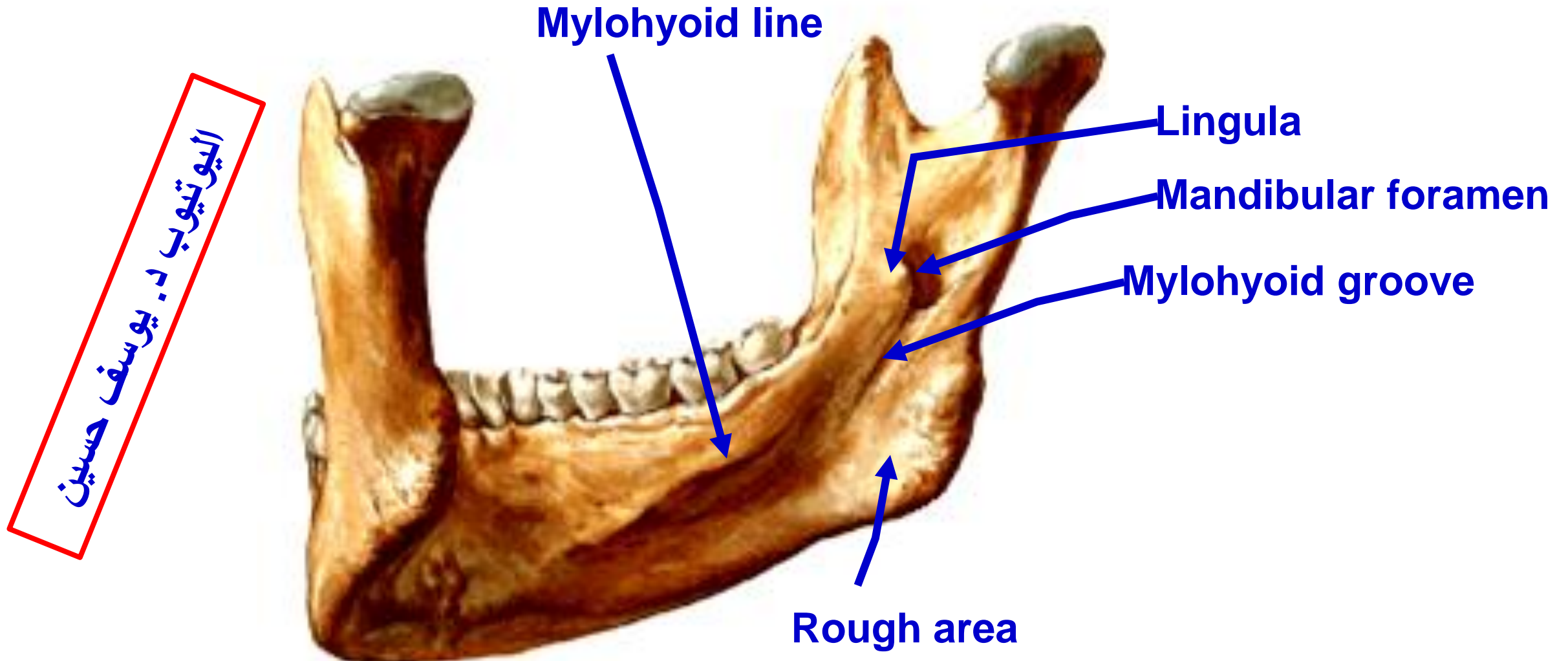
Superior genial tubercle

Inferior genial tubercle

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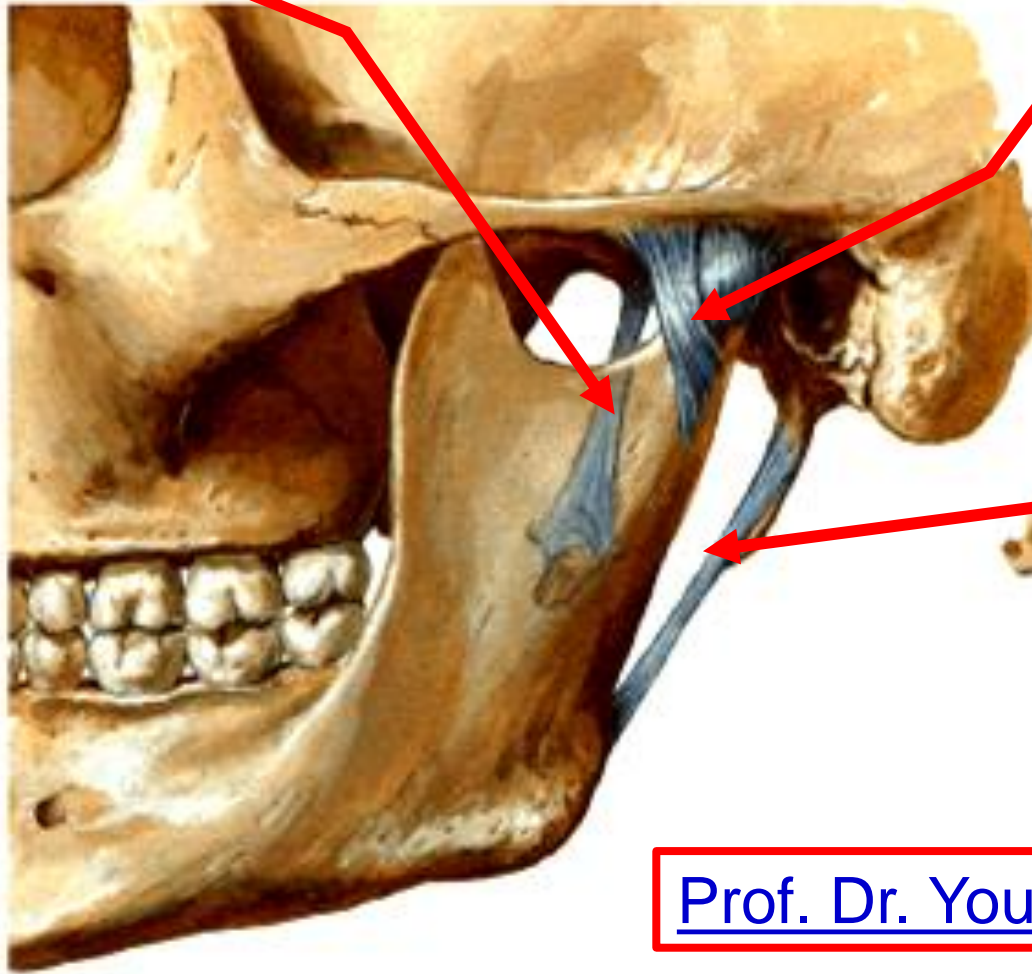


## ❖ Inner surface of Ramus of the mandible



**Sphenomandibular ligament from spine of sphenoid to lingula**

**Tempromandibular ligament from articular eminence to lateral side of neck**



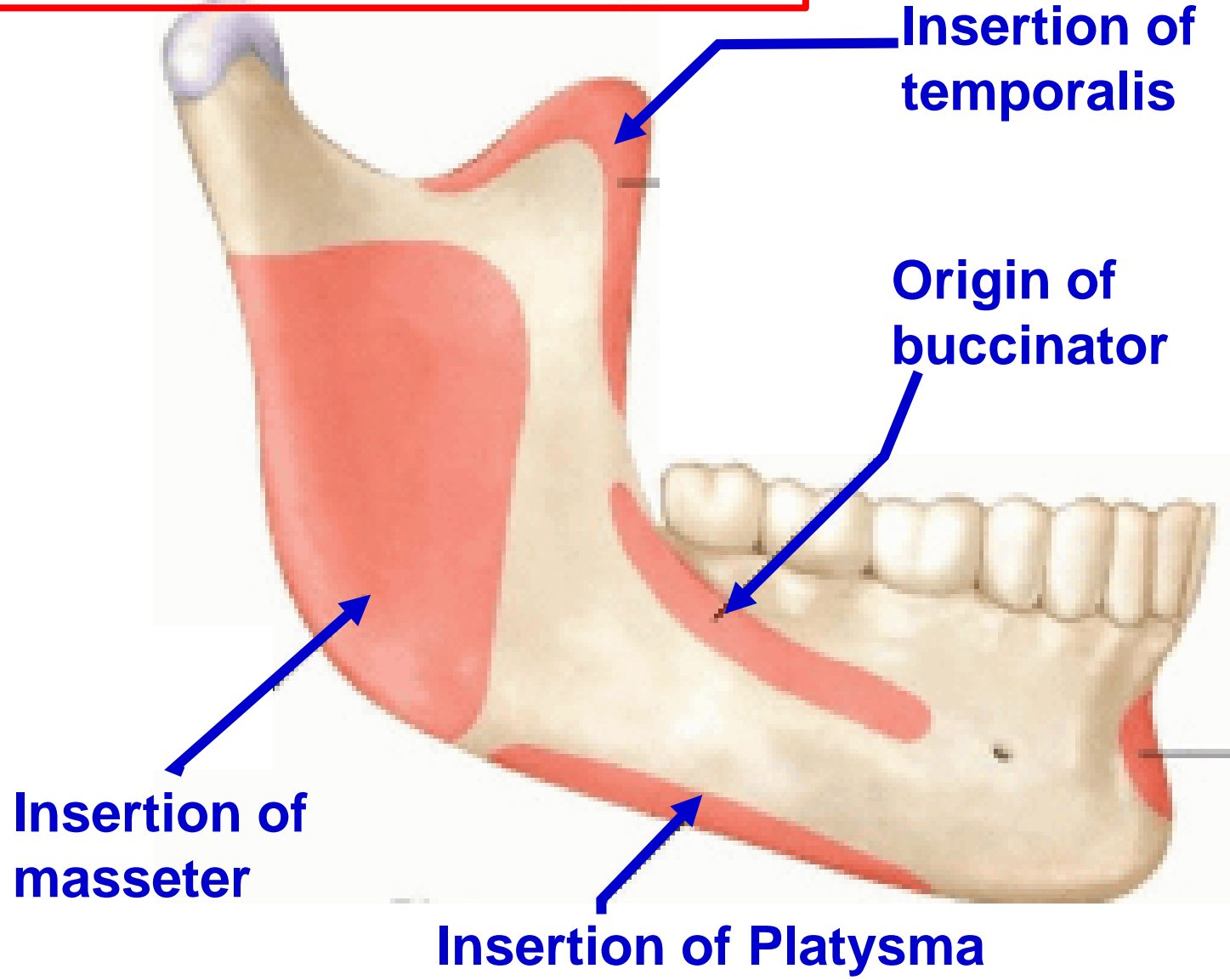
**Stylomandibular ligament from styloid process to angle**

**Pterygomandibular ligament; from pterygoid Hamulus to posterior end of mylohyoid line**

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**Ligaments related to mandible**

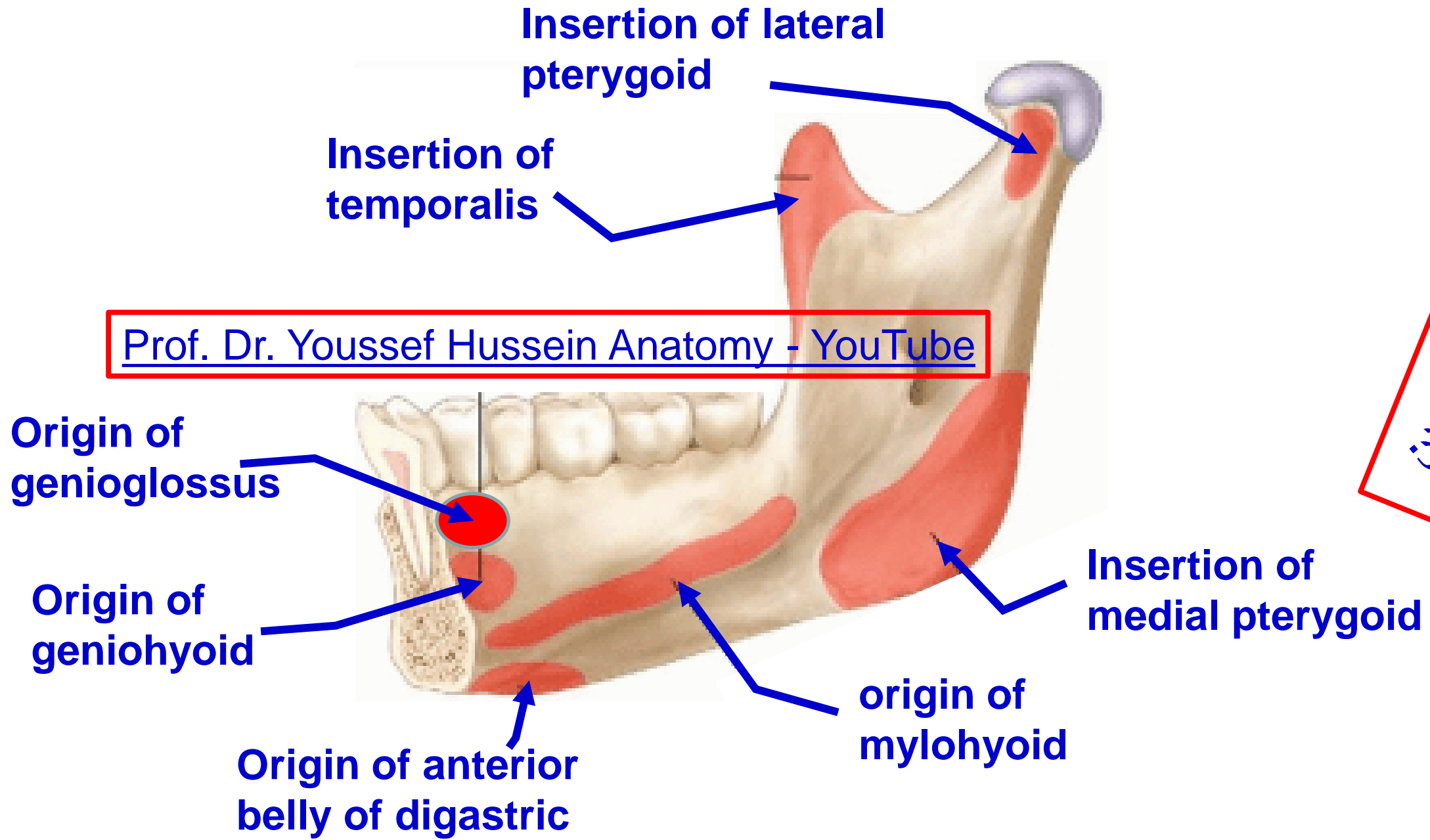
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**Muscles attached to mandible (outer)**





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**Muscles attached to mandible (inner)**

## **\*\* Nerves related to the mandible**

### **A- 2 Nerves related to the foramina;**

1. Inferior alveolar nerve enters the mandibular foramen.
2. Mental nerve emerges from the mental foramen.

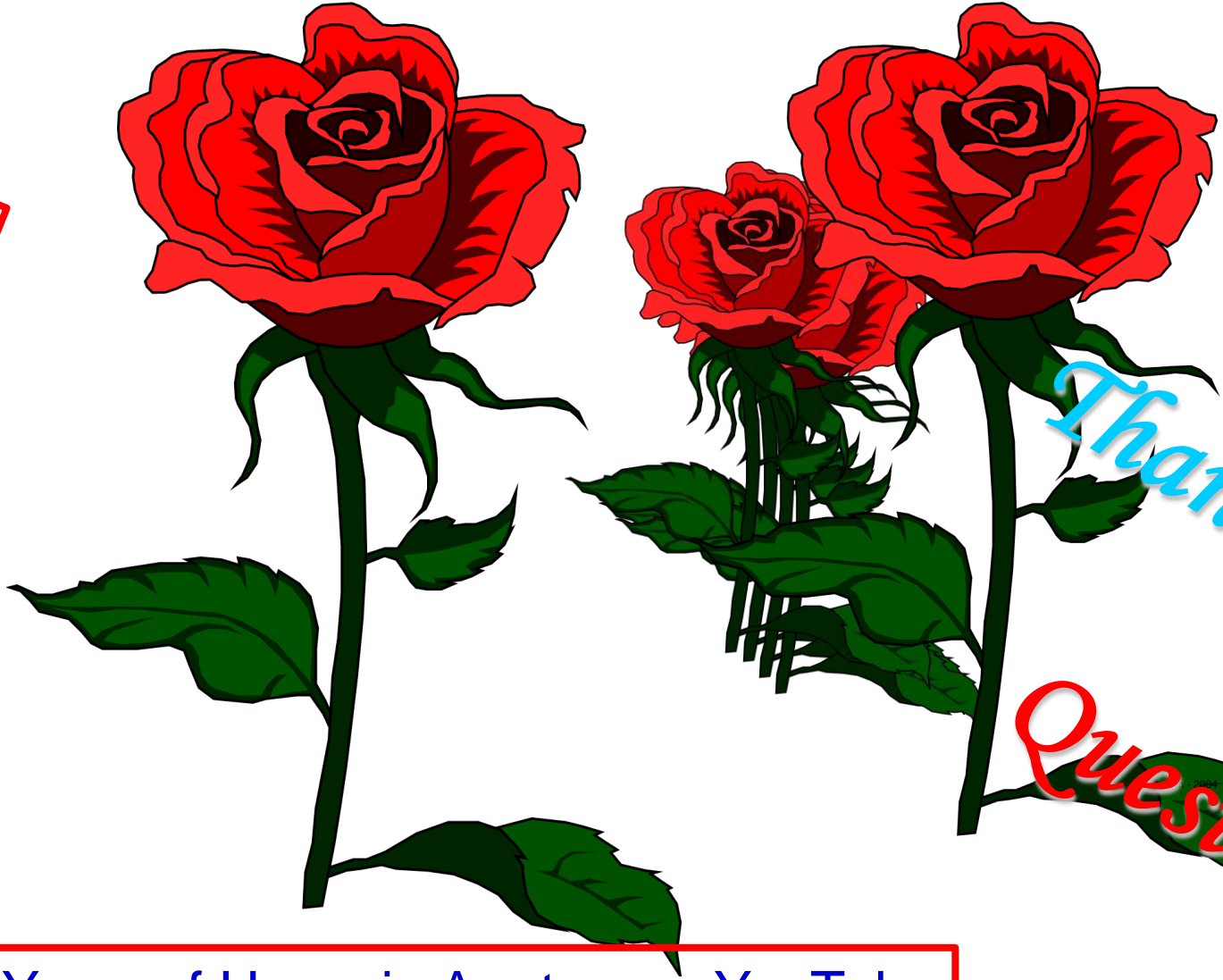
### **B- 2 Nerves related to the grooves,**

- 1- Nerve to mylohyoid, in the mylohyoid groove.
- 2- Lingual nerve runs forwards along groove on the medial aspect of the last molar tooth.

## **\*\* Glands related to mandible,**

- 1. Submandibular salivary gland**, related to the submandibular fossa.
- 2. Sublingual salivary gland**, related to the sublingual fossa.
- 3. Parotid gland** related to the posterior border of the ramus.

[https://www.youtube.com/channel/UCVSNqbibj9UWYaJdd\\_cn0PQ](https://www.youtube.com/channel/UCVSNqbibj9UWYaJdd_cn0PQ)



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يُمنع أخذ السلايدات بدون  
إذن المحرر واي اجراء  
يخالف ذلك يقع تحت  
طائلة المسؤولية القانونية

Thank You

Questions

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