

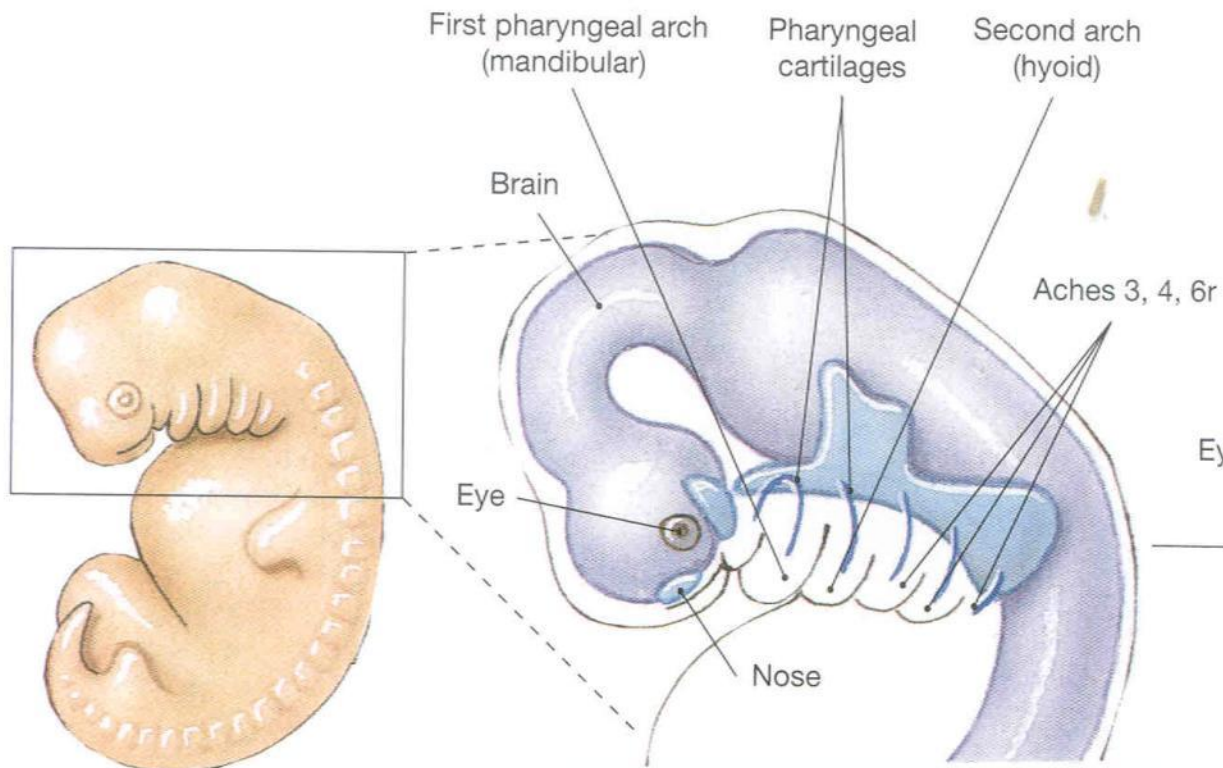
Biology 323

Human Anatomy for Biology Majors

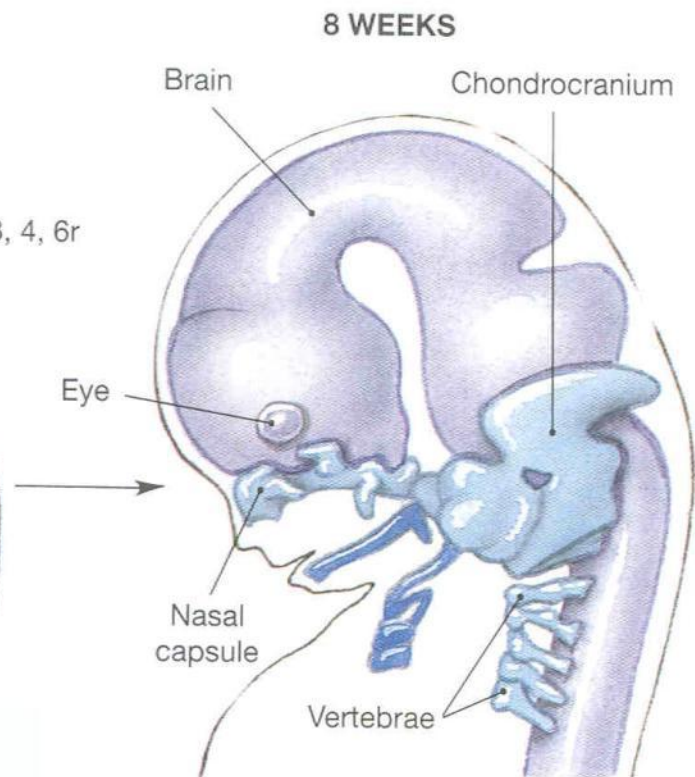
Lecture 16

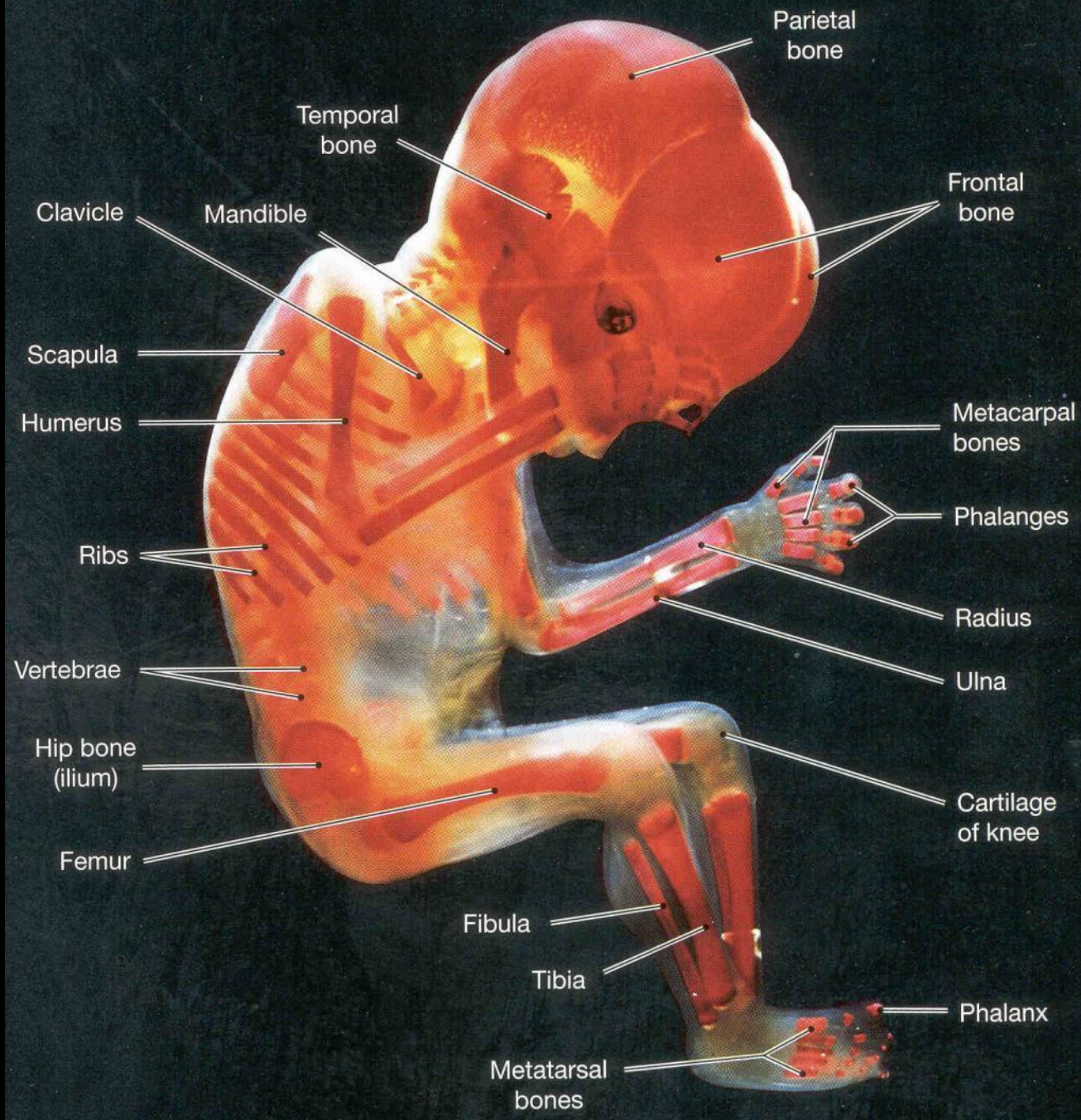
Dr. Stuart S. Sumida

Overview of Structure of the Adult Skull



5-WEEK EMBRYO





The developing skull has three component origins:

- **Condrocranium (base of skull / braincase)**
 - **Dermatocranium (flat bones of skull)**
- **Splanchnocranium (bones derived from gill arch elements)**

**Mode of
Formation**

**Germ Layer
Origin**

Condrocranium

Endochondral

Mesoderm

Dermatocranium

Dermal

Neural Crest

Splanchnocranium

Endochondral

Neural Crest

CHONDROCRANIUM: Bones of the base of the skull.

- Most major cranial nerves escape the skull through these.
- Endochondral
- Mostly Mesodermal
- Include: ethmoid, sphenoid (part), occipital (part) right and left temporal (parts).

02-FEB-01

09:42:09AM

4C1 - 8

H4.0 MHz 100mm

OB

SOFT

60dB -/+1/3/1

GAIN= 0dB $\Delta=1$

18:0 100%



5

02-FEB-01
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SOFT

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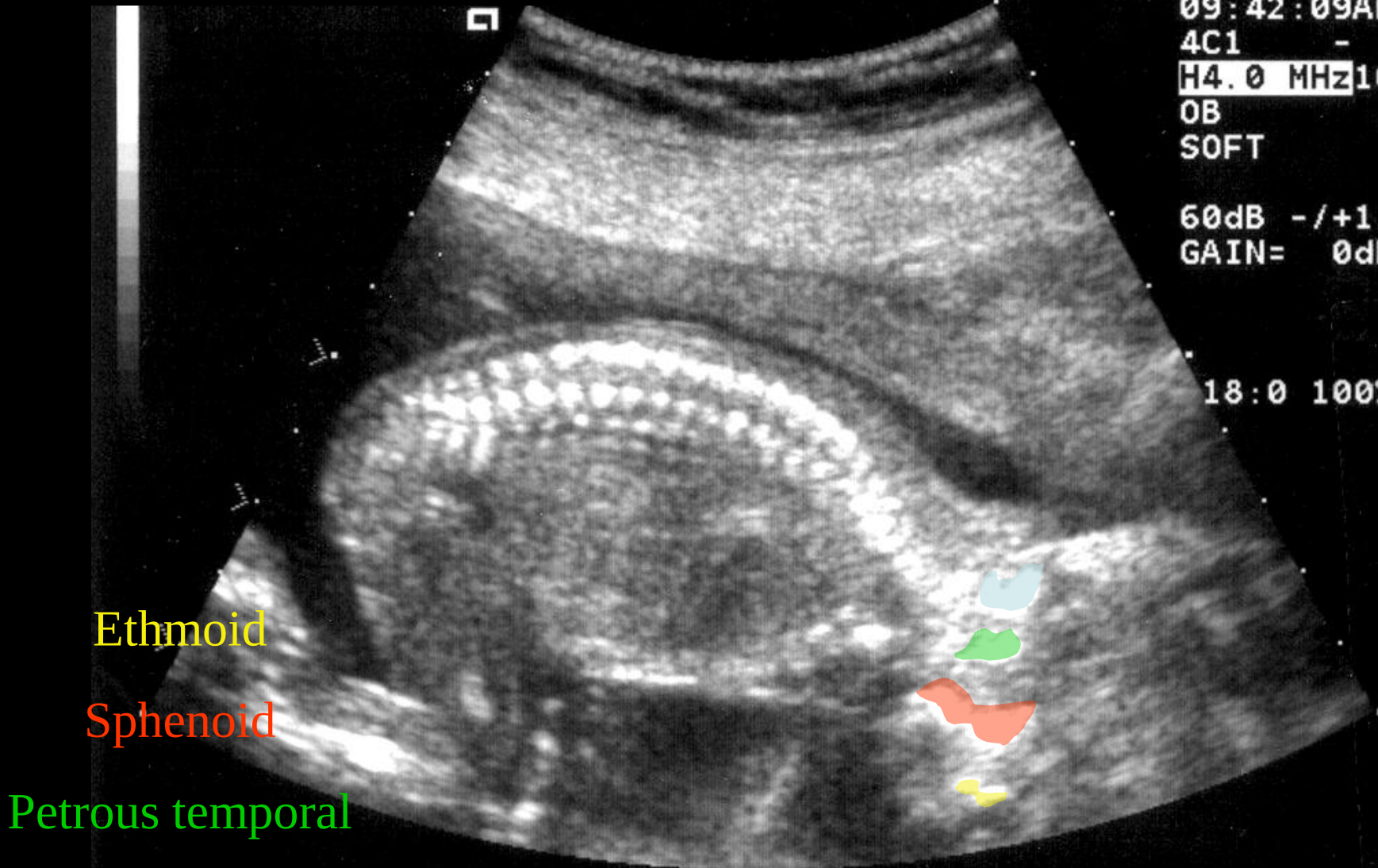
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Ethmoid

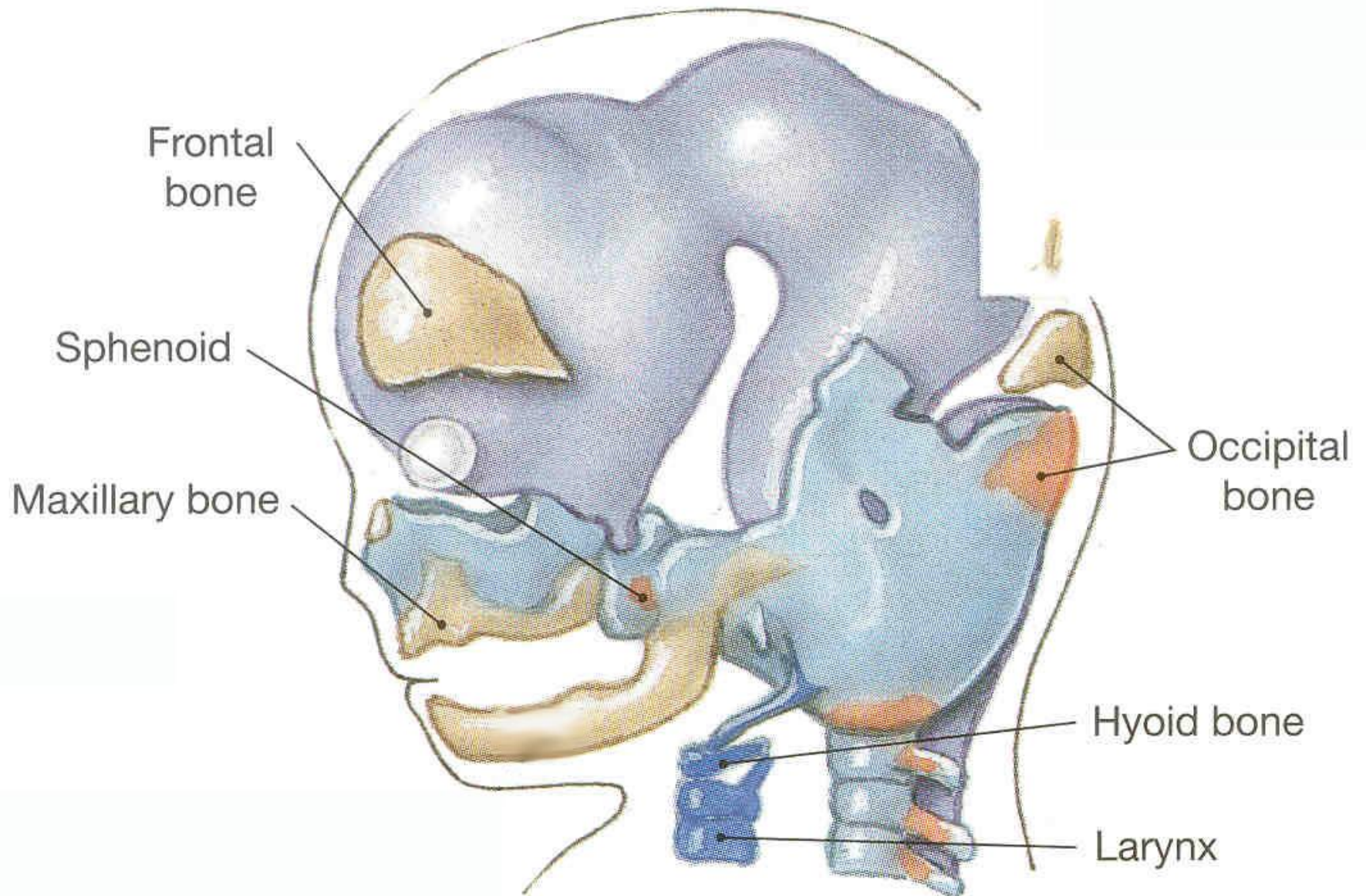
Sphenoid

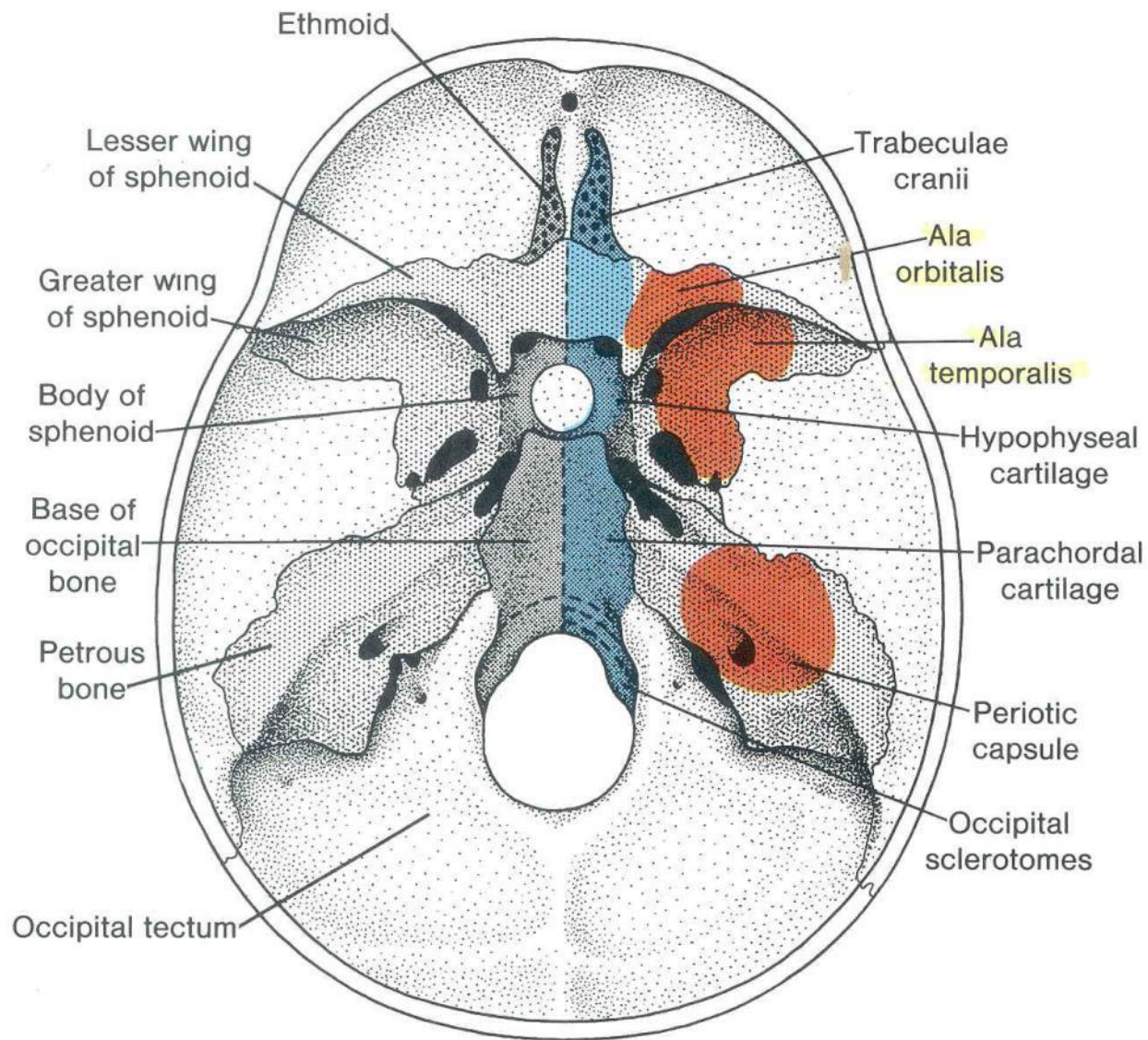
Petrous temporal

Basioccipital



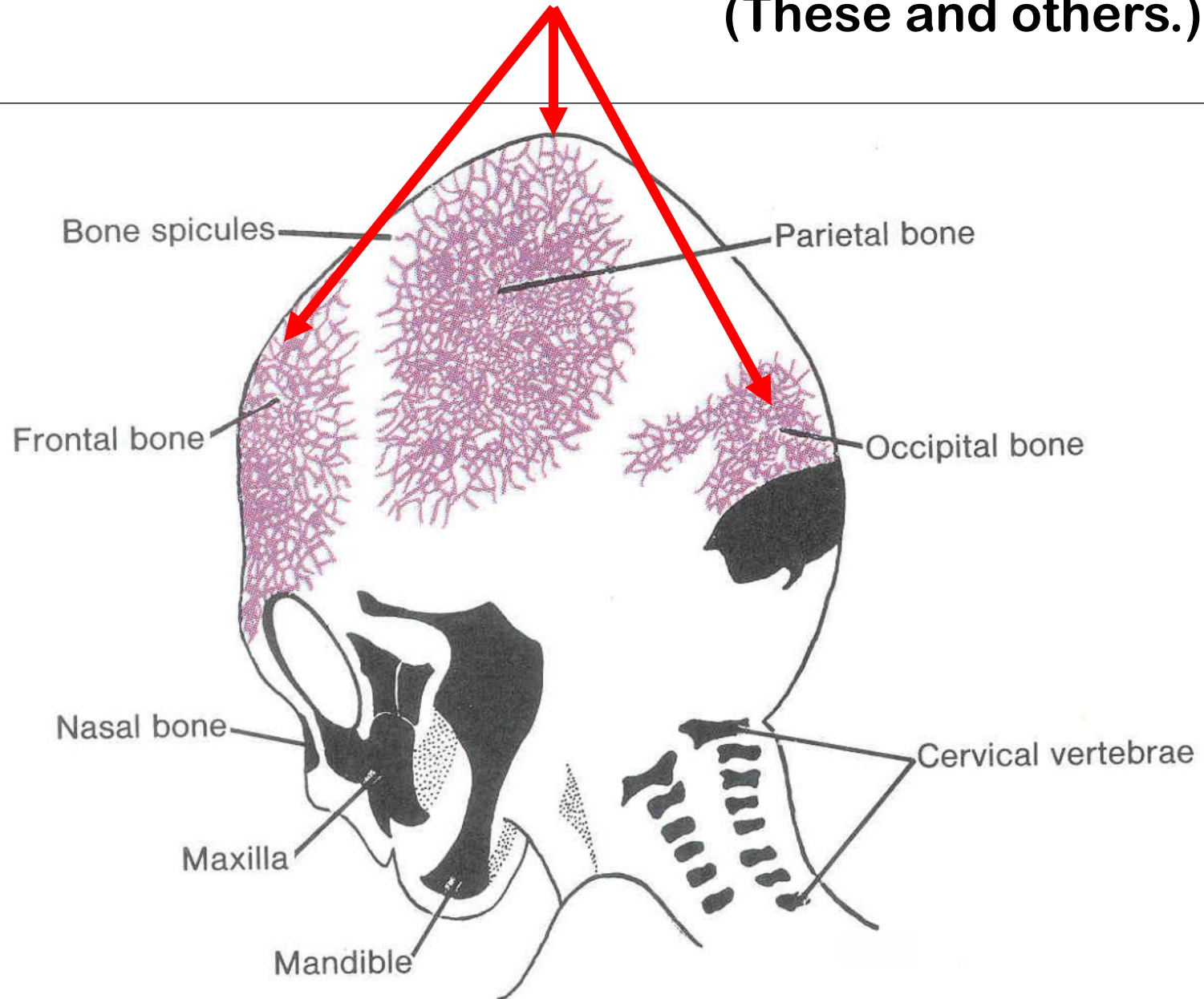
9 WEEKS

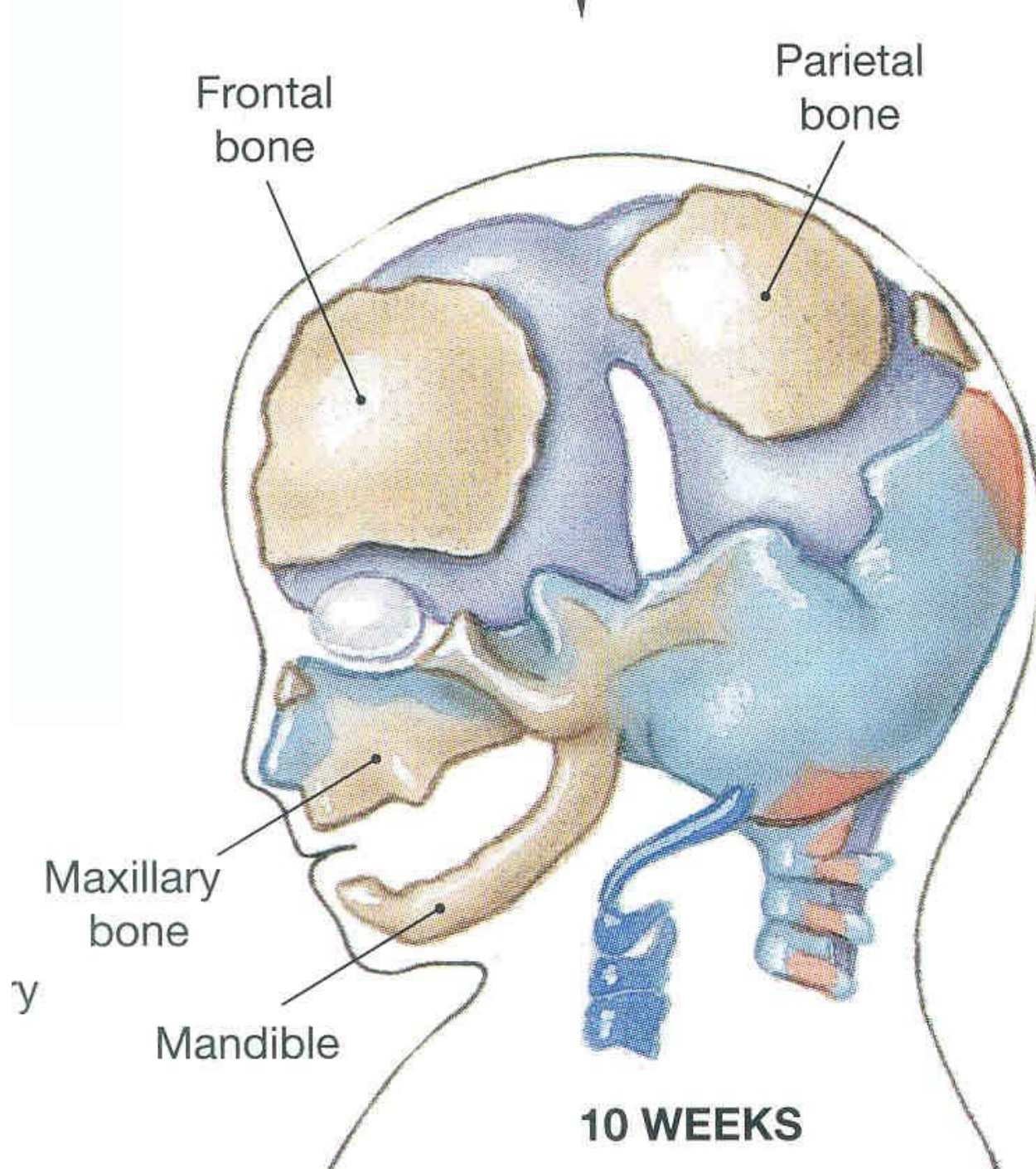


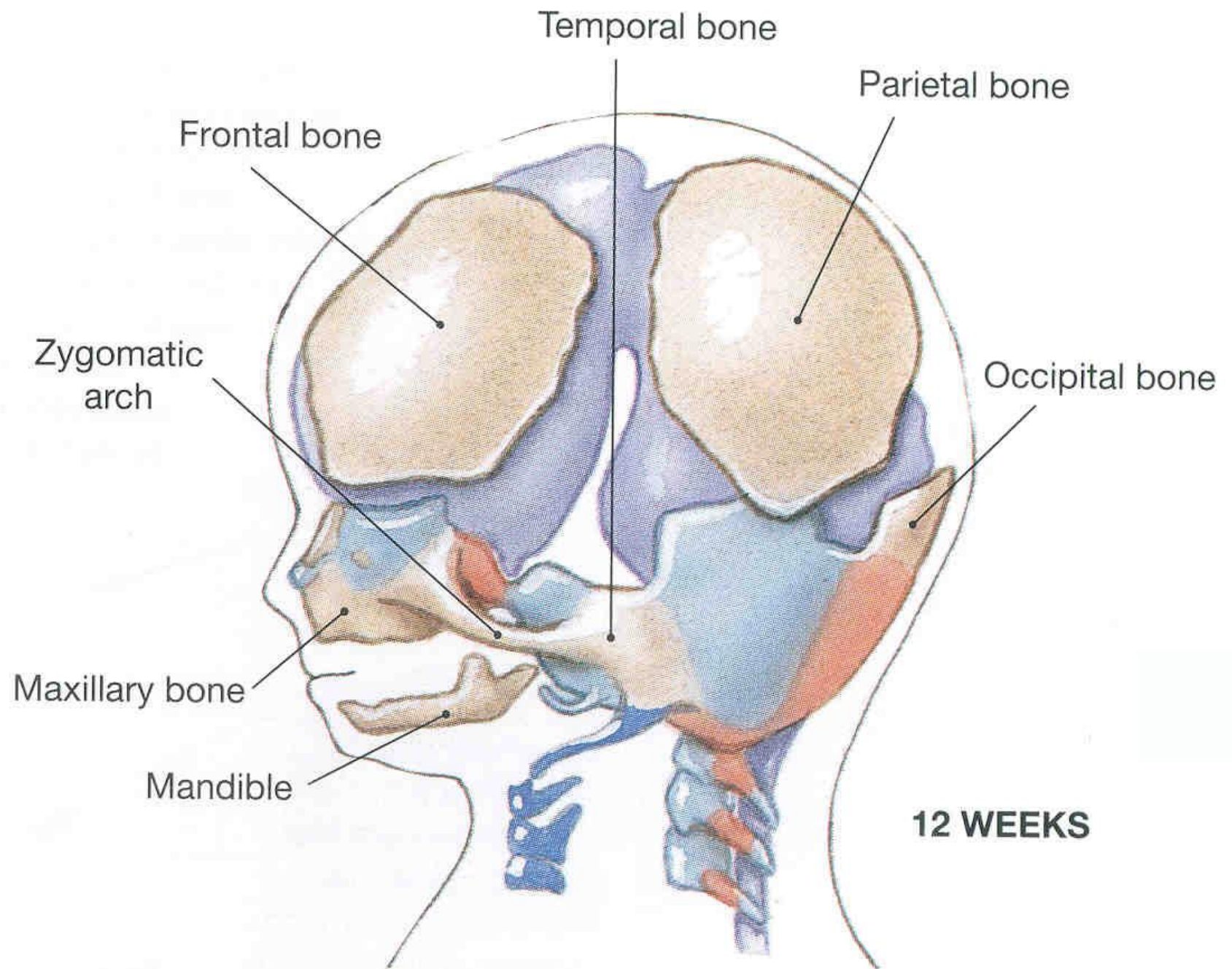


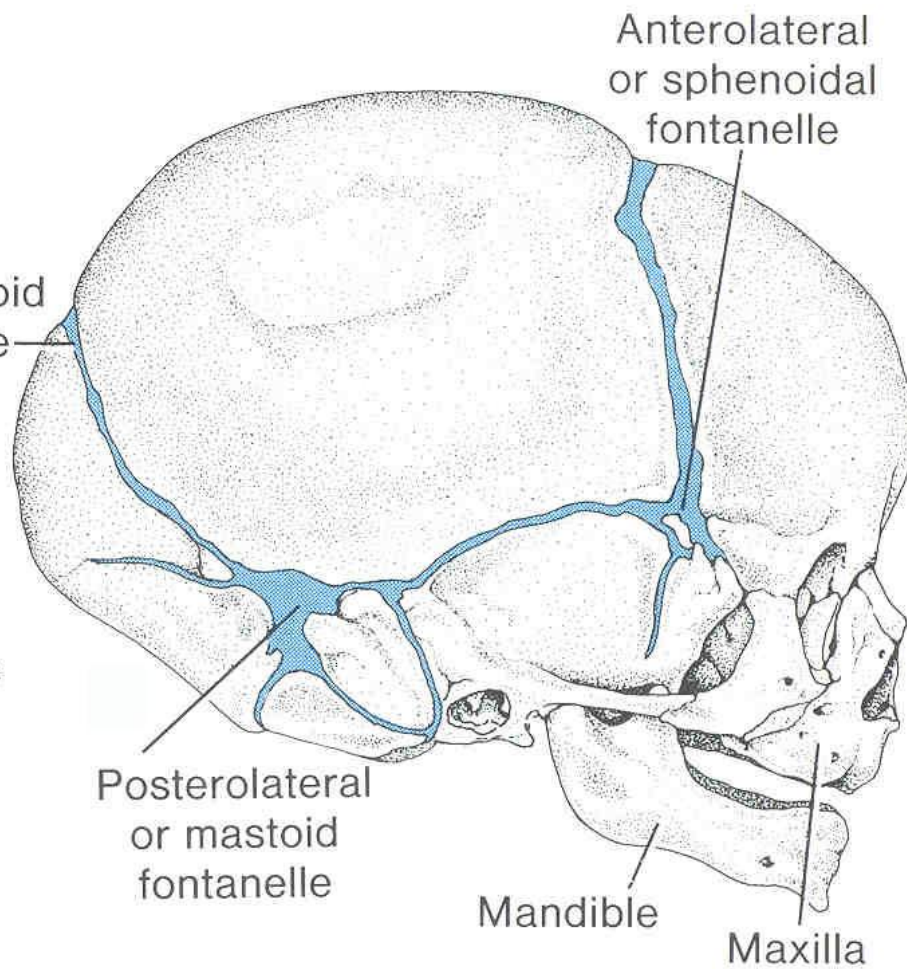
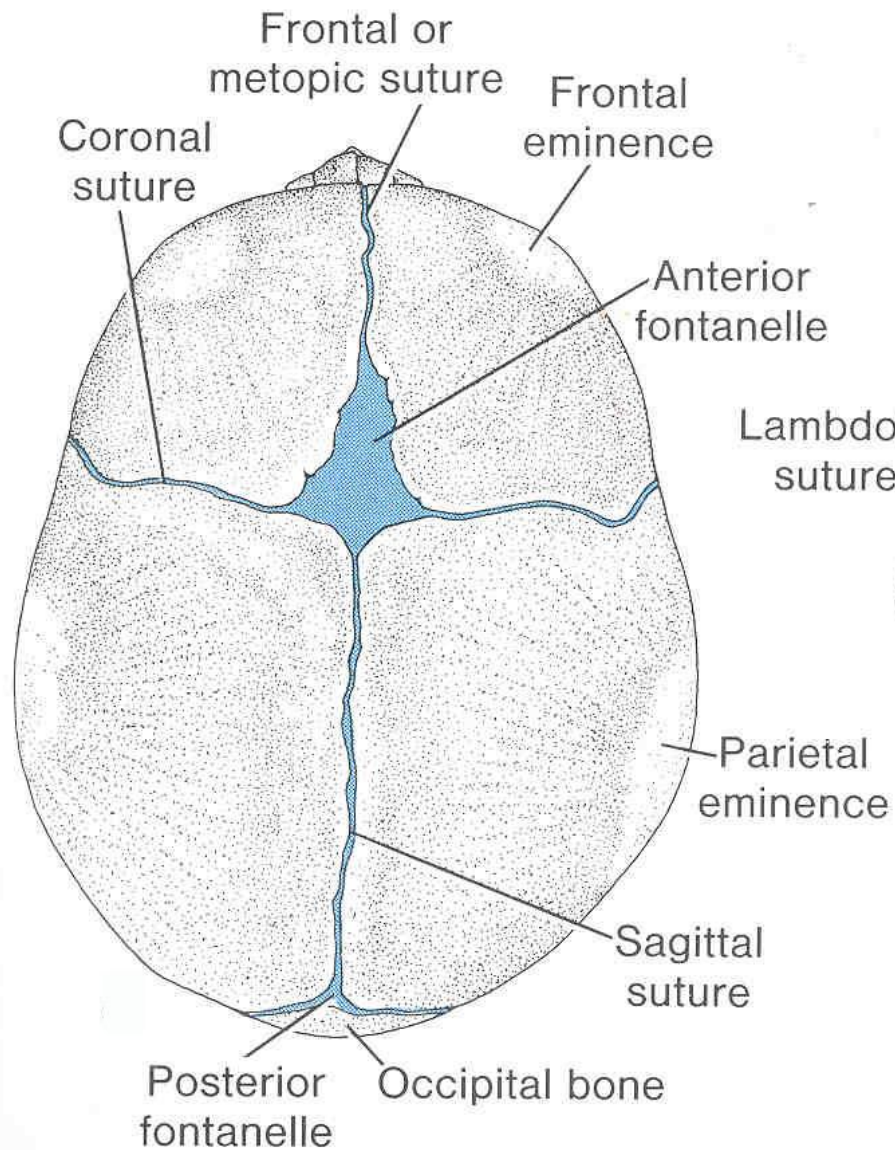
Schematized dorsal view of the chondrocranium or base of the skull in the adult. On the right are indicated in blue the various embryonic components participating in the formation of the median part of the chondrocranium; in red the components for the lateral part of the chondrocranium. On the left are indicated the names of the adult structures.

Flat bones of skull: DERMATOCRANIUM (These and others.)





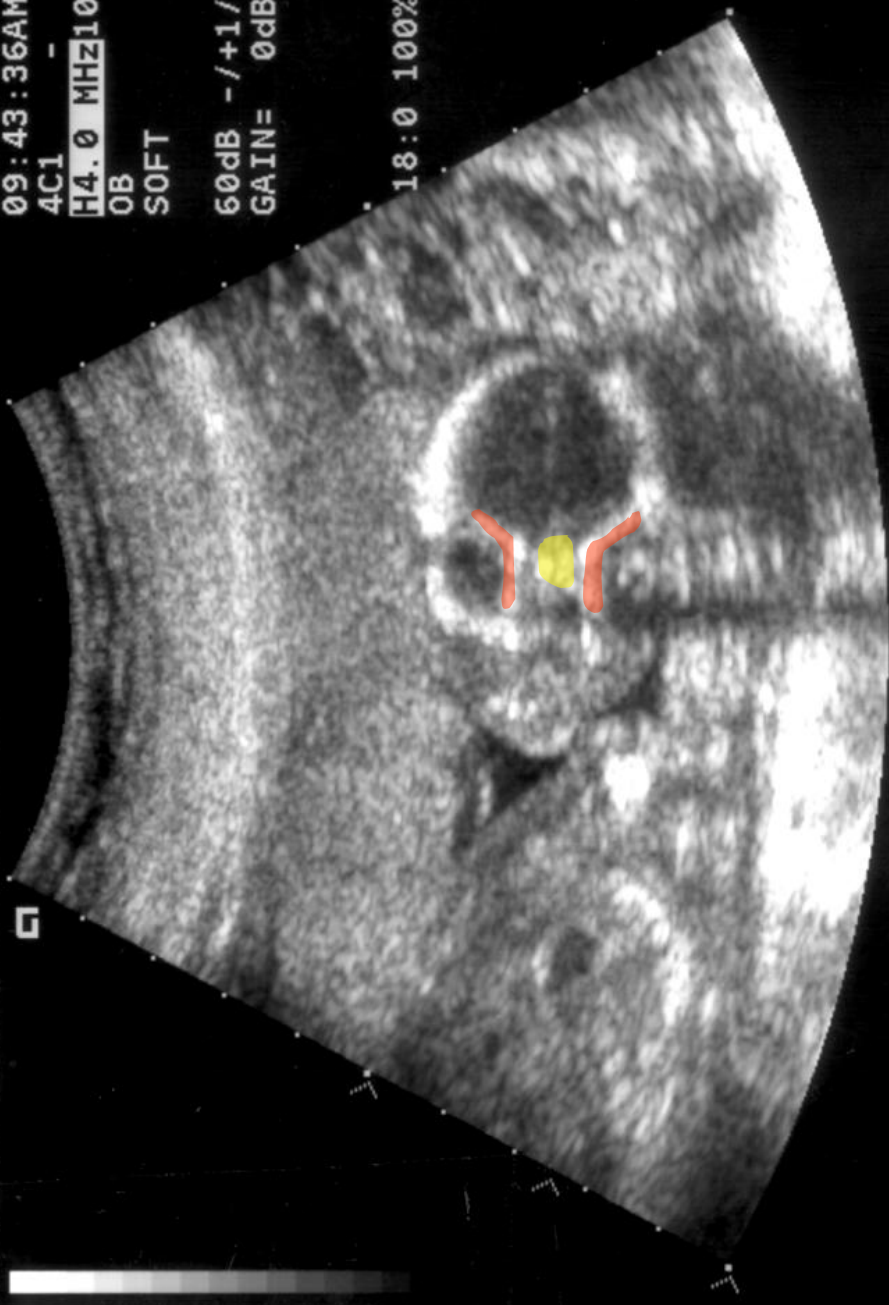




KAISER FONTANA
PT: REGA, ELIZABETH, 13056815

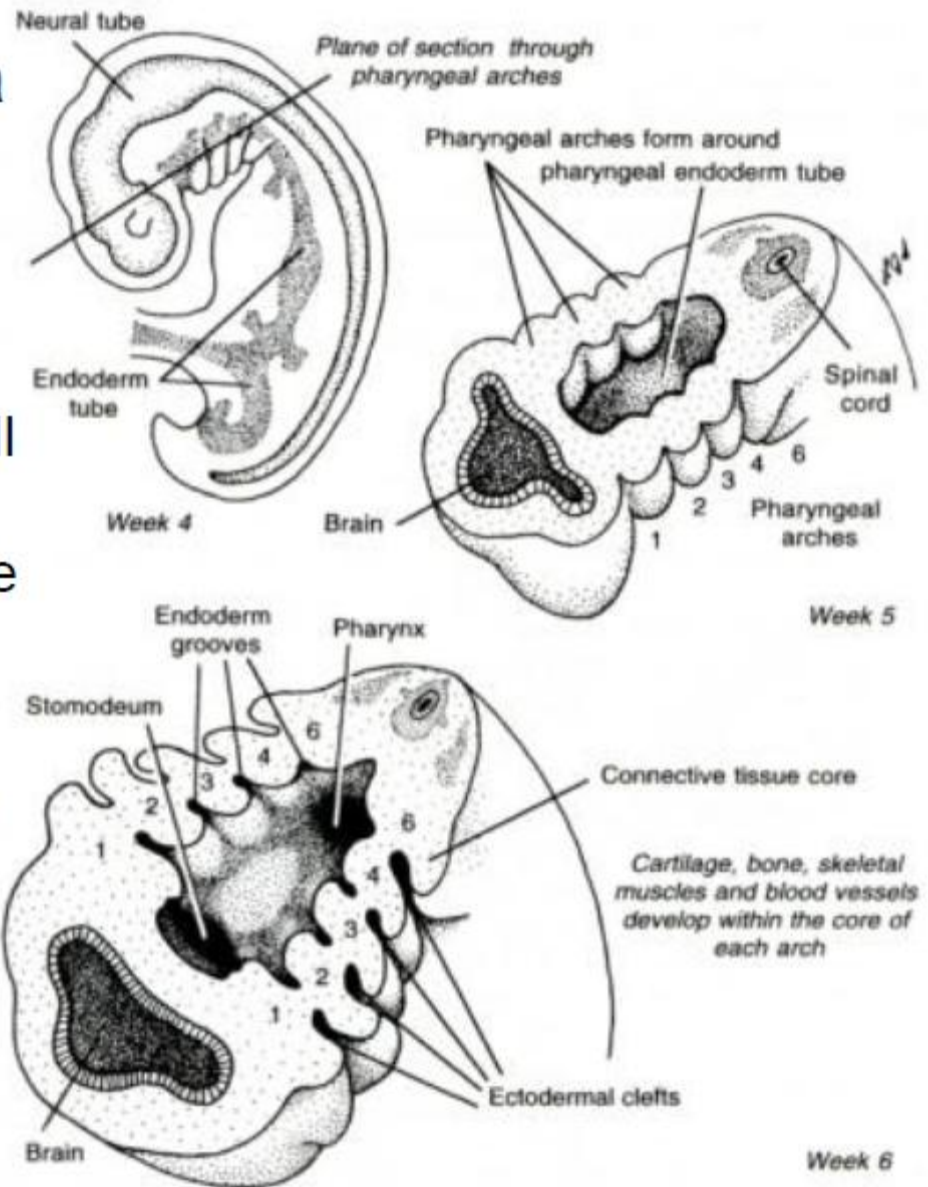
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18:0 100%

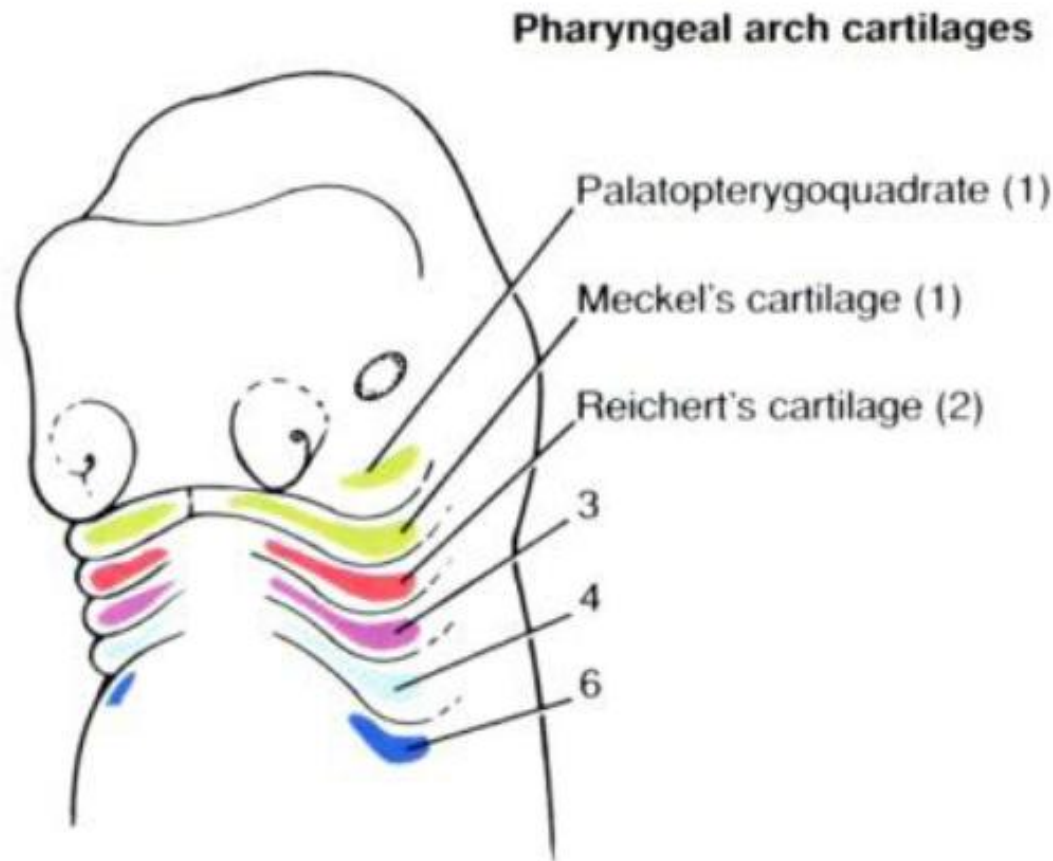


Branchial/Pharyngeal Arches

- Derived from neural crest
- Embryological homologues of the gill arches of fish
- Form structures of the throat and pharynx
- Each is associated with muscles, bones, and a cranial nerve

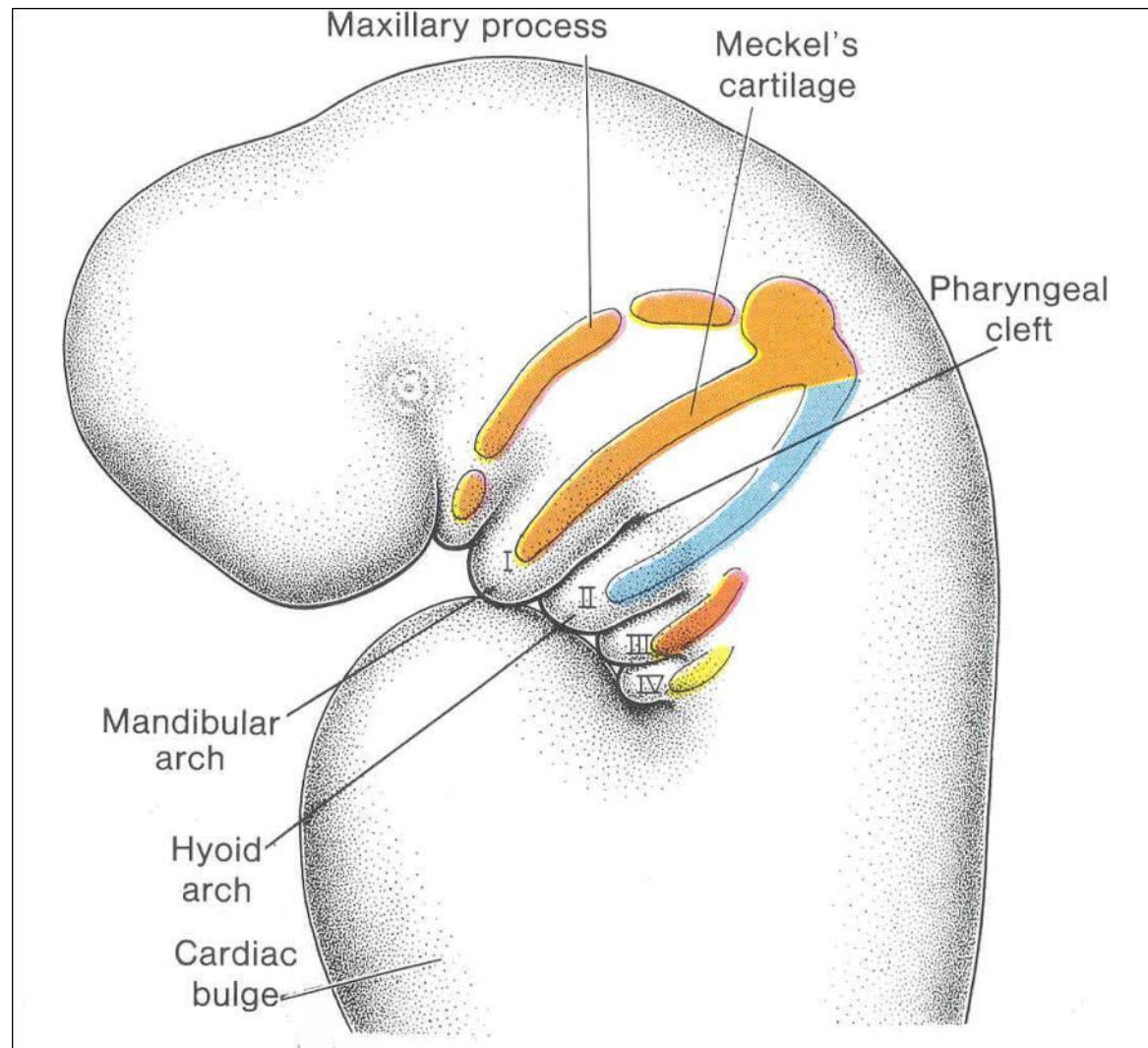


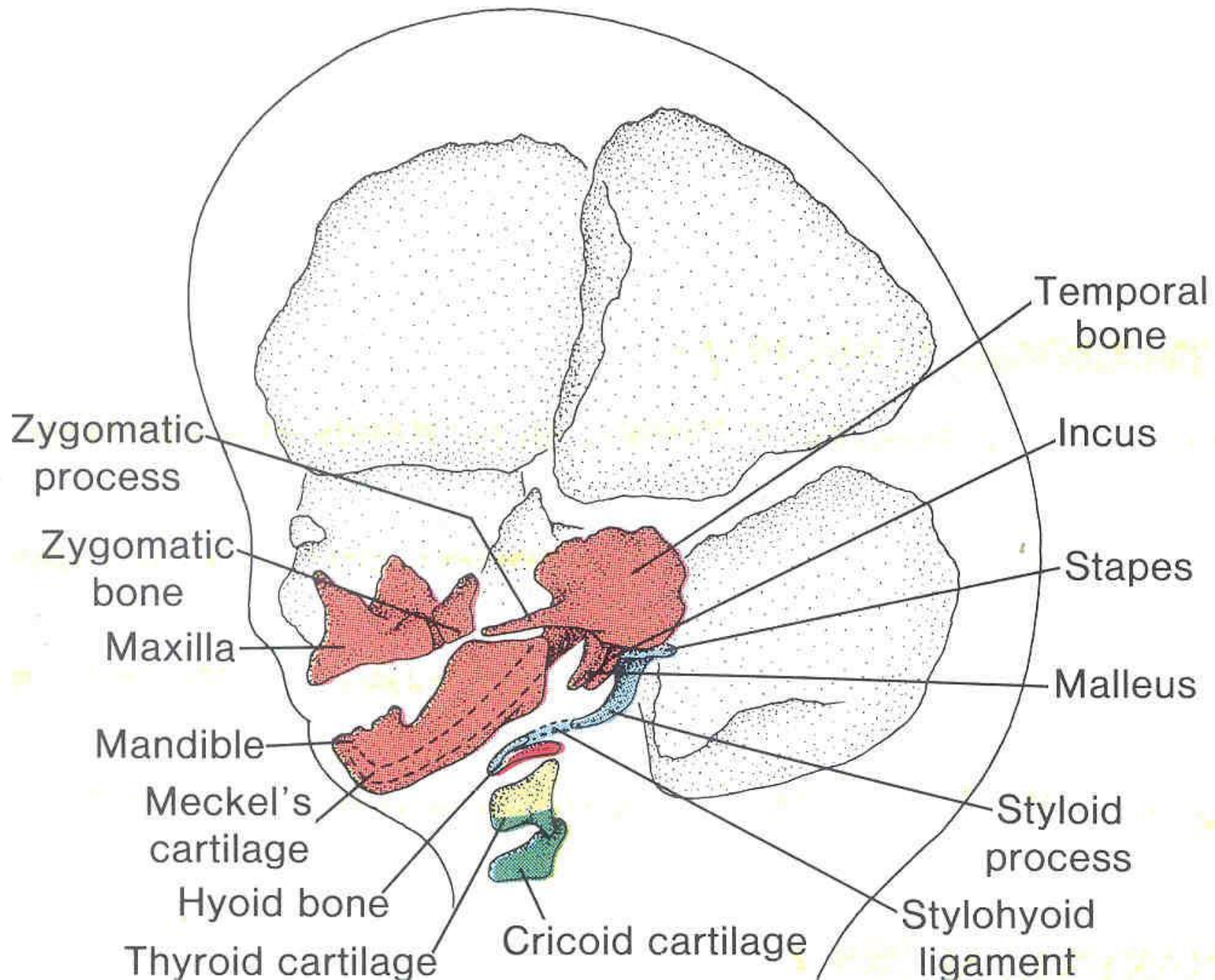
Each Arch has Associated Cartilages

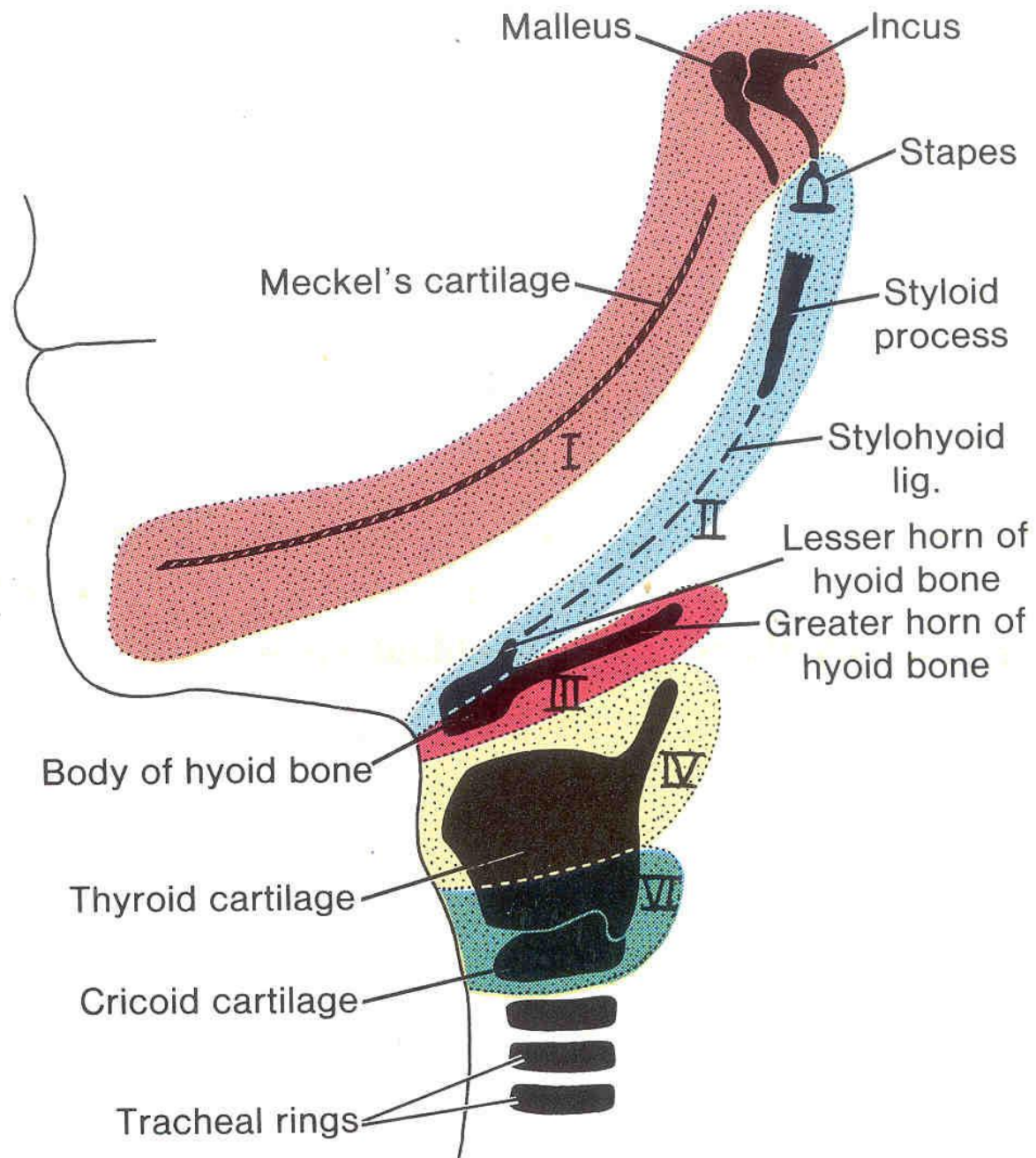


5 weeks

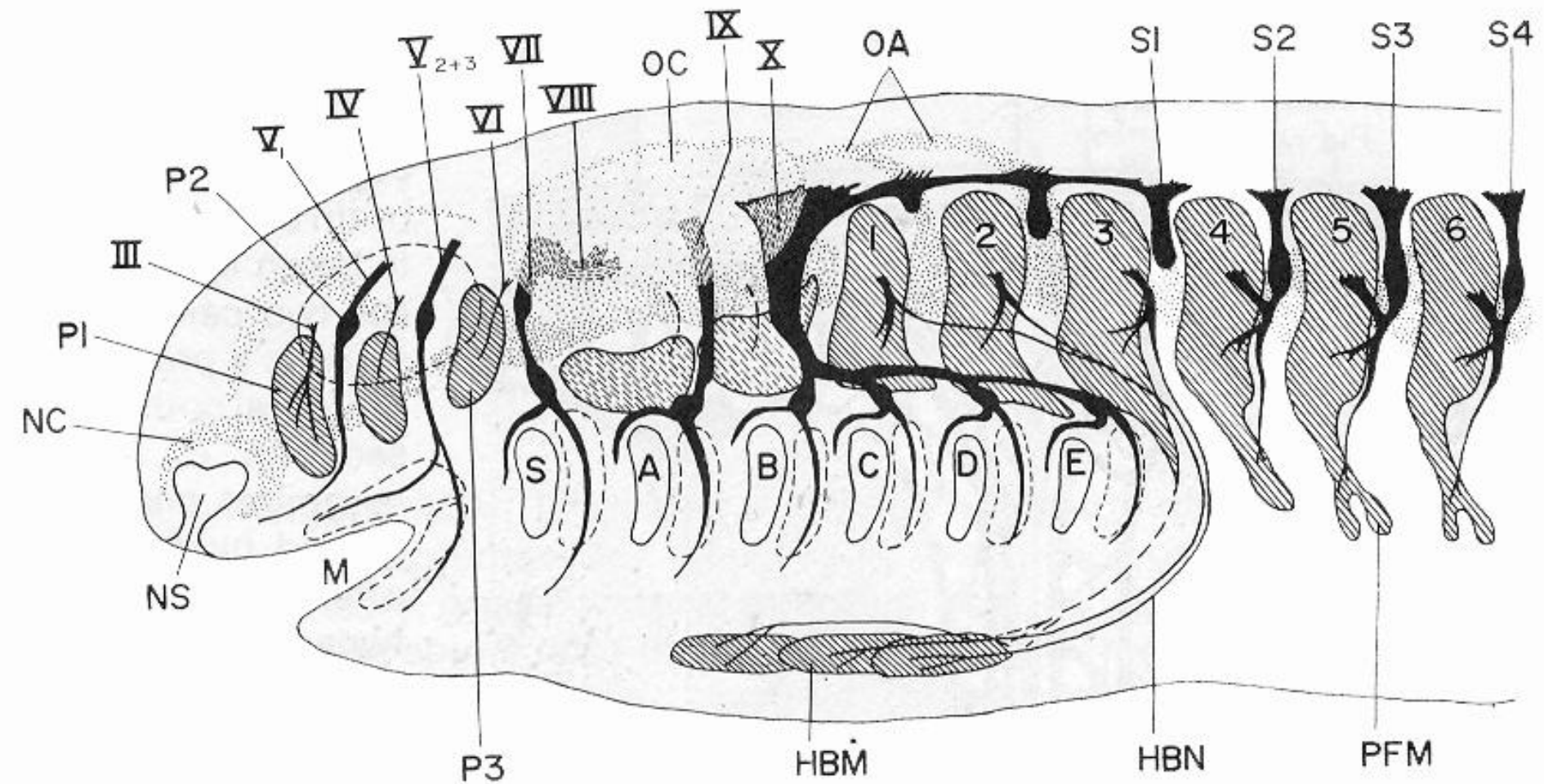
Gill Pouch Bones: become SPLANCHNOCRANIUM





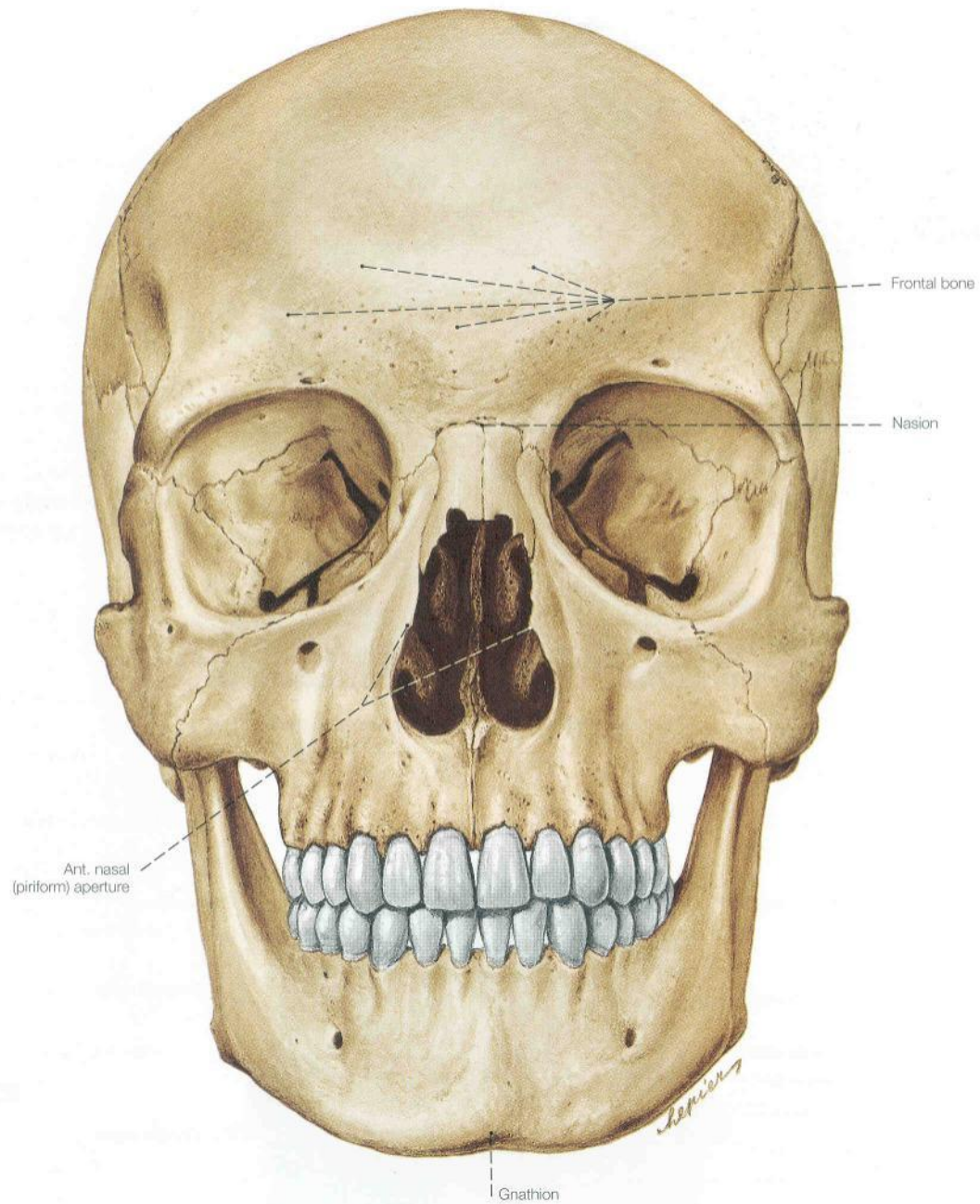


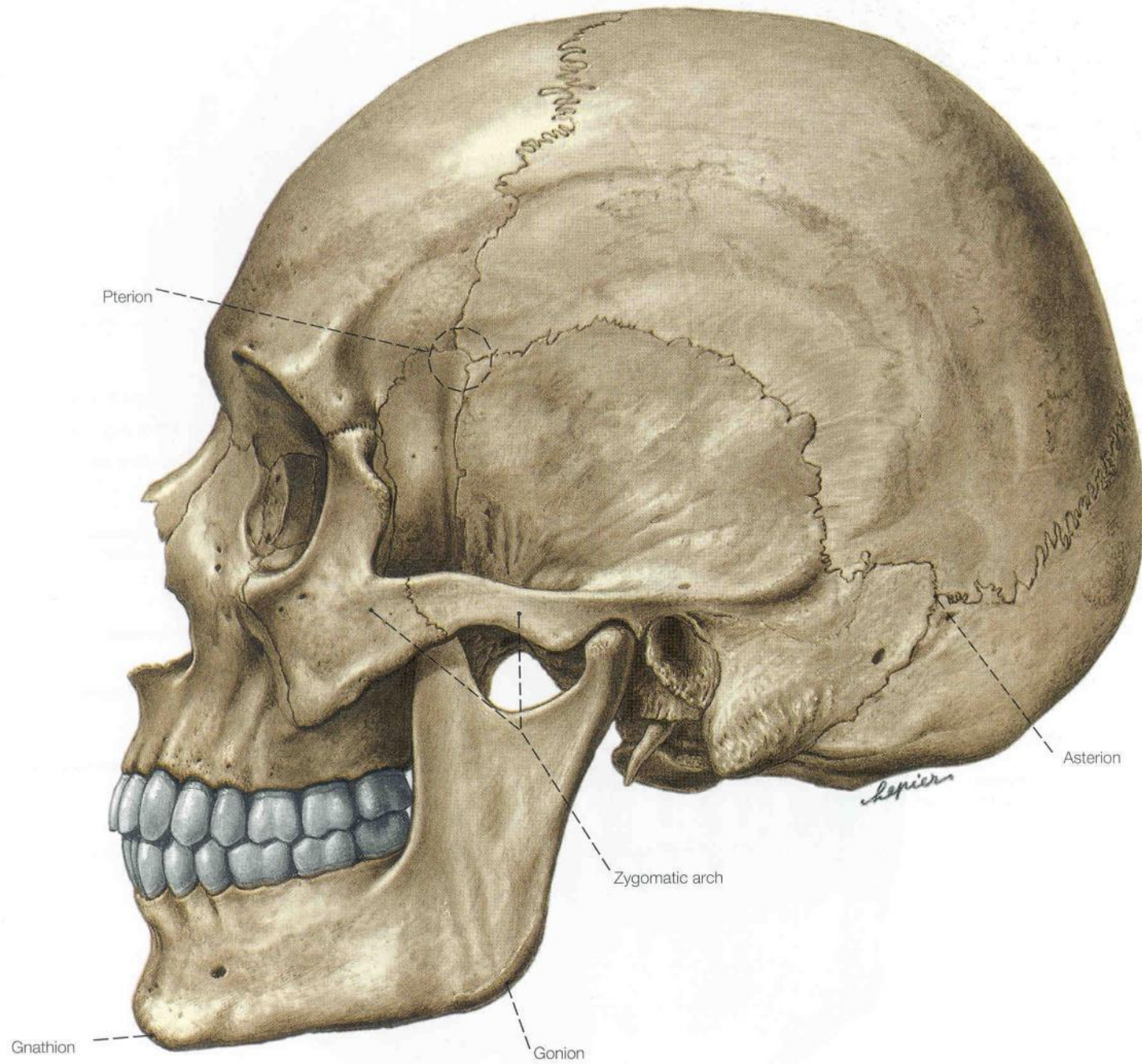
This lecture will revolve around the early embryology of the vertebrate skull. One of the landmark achievements in this was the summary of that topic – based initially on the developing embryonic shark head – by Edwin S. Goodrich. Thus it has come to be known as the “Goodrich Diagram”.

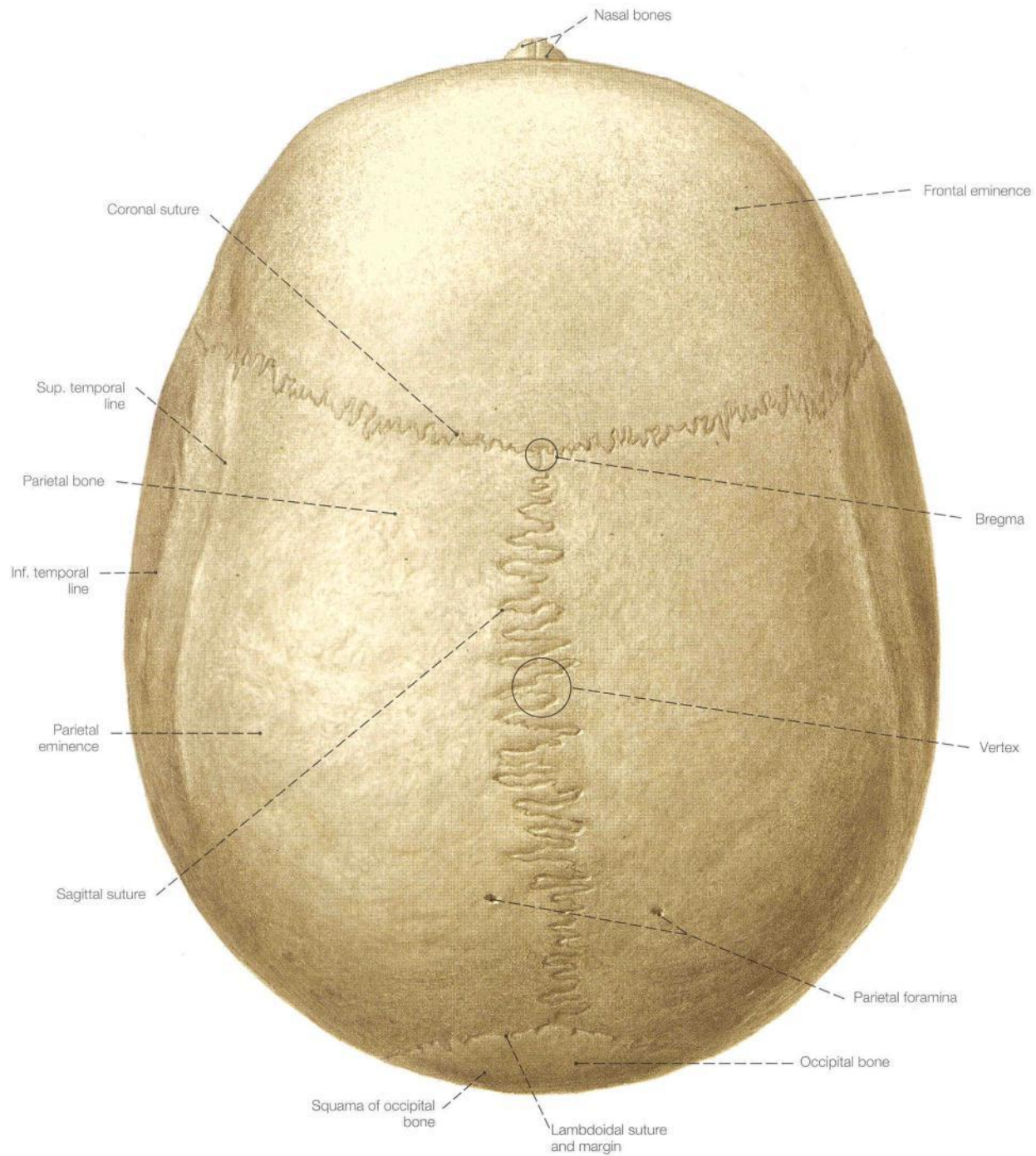


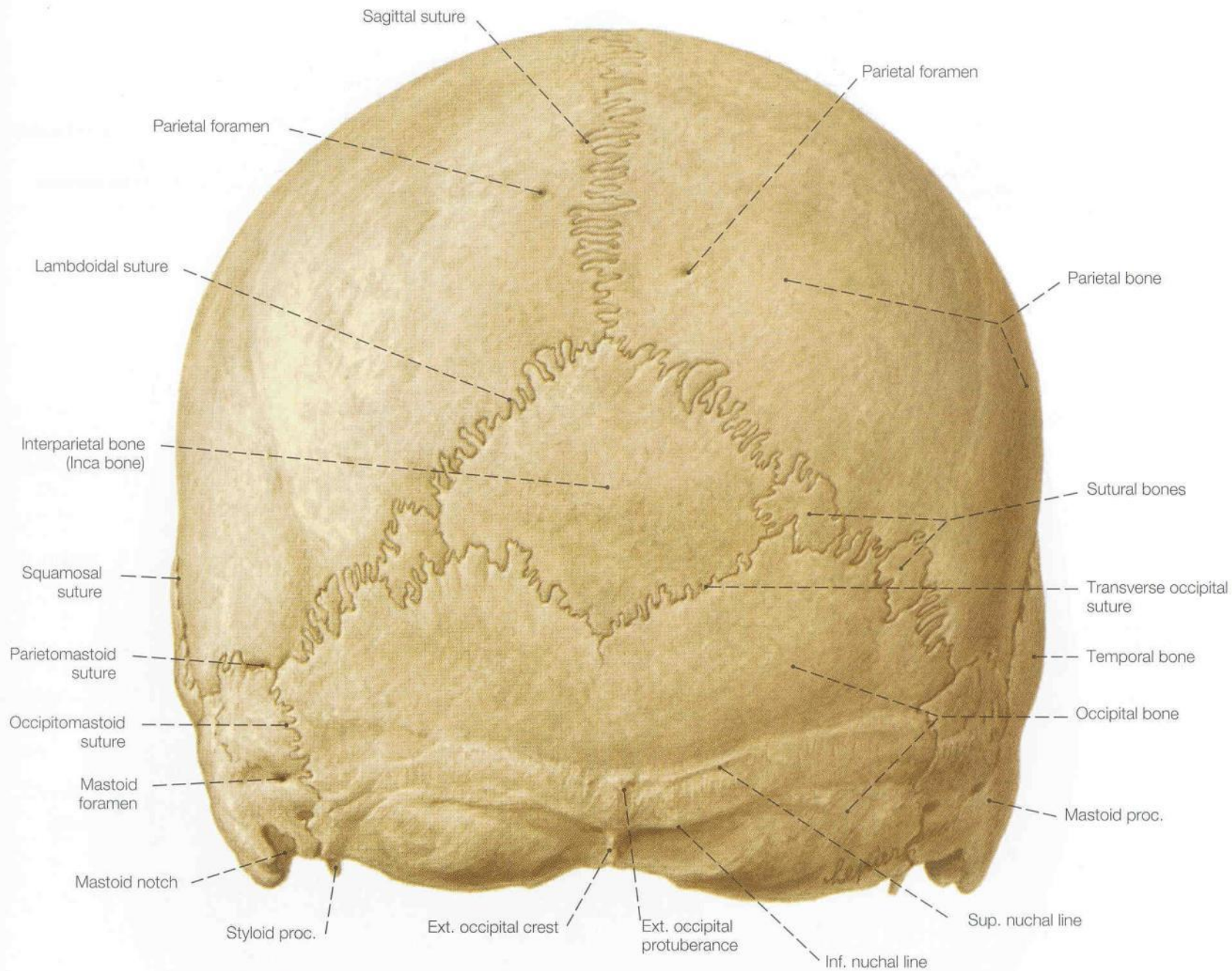
From Studies on the structure and development of vertebrates by Edwin S. Goodrich, 1958.

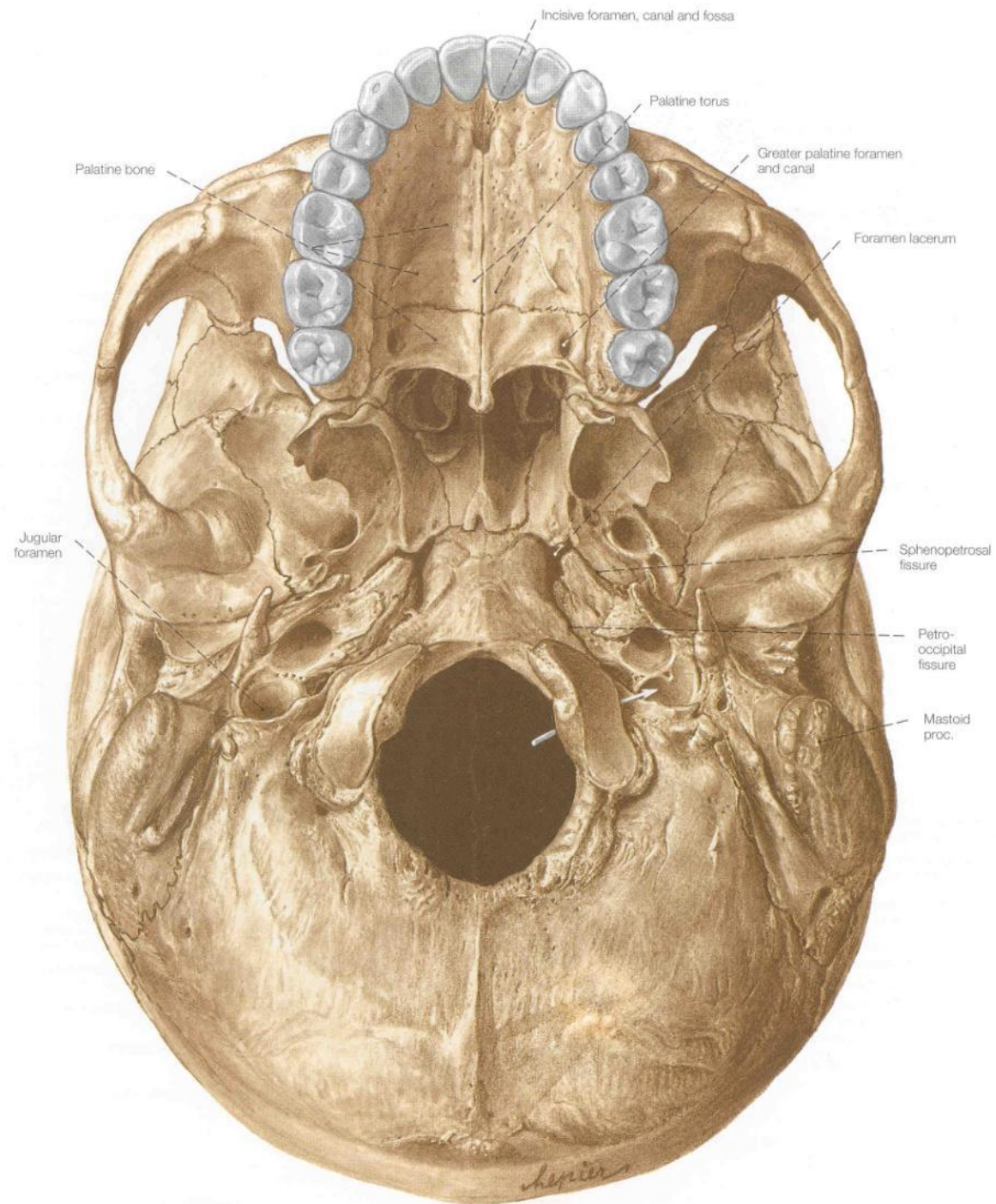
If you're working with the PowerPoint files, save space in your notes to draw here.



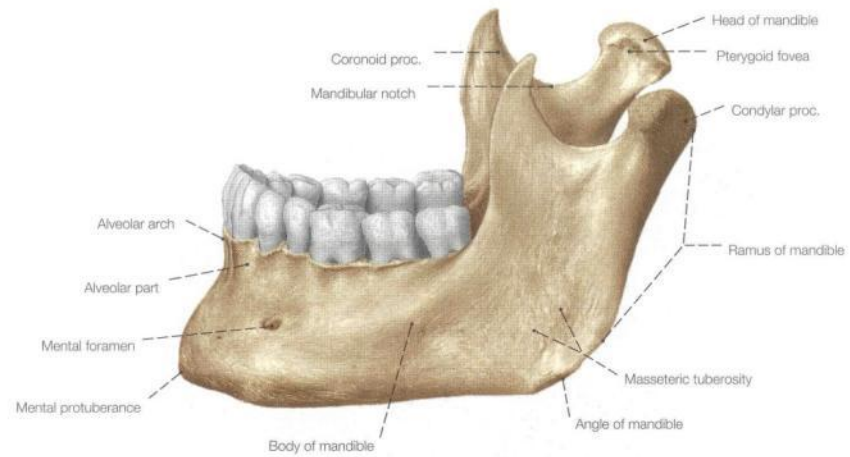




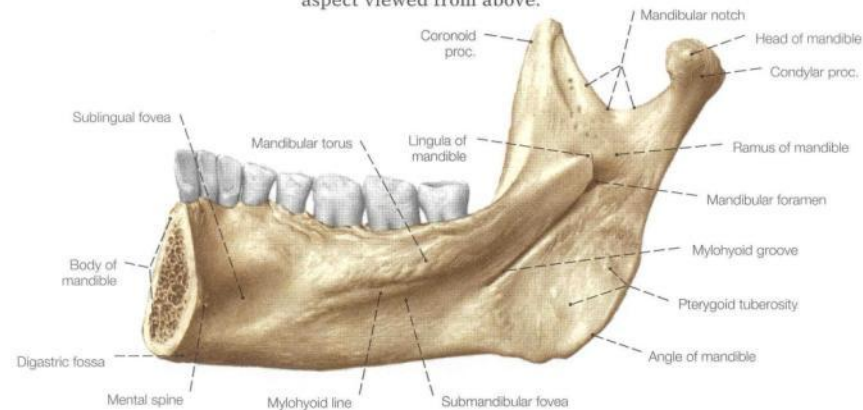




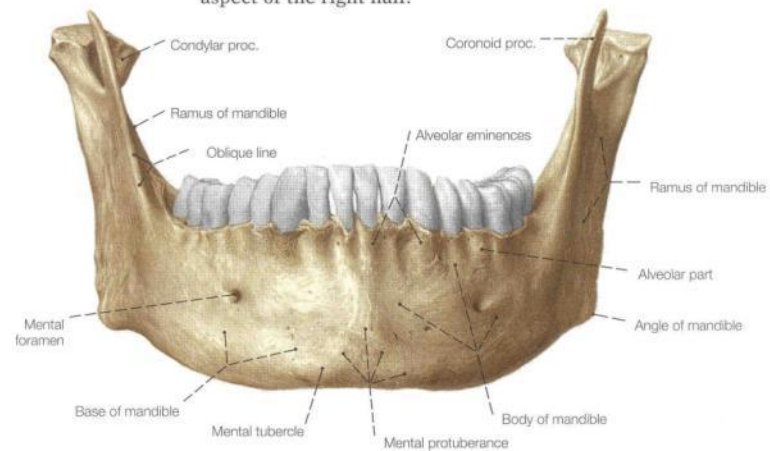
Mandible (Lower Jaw)



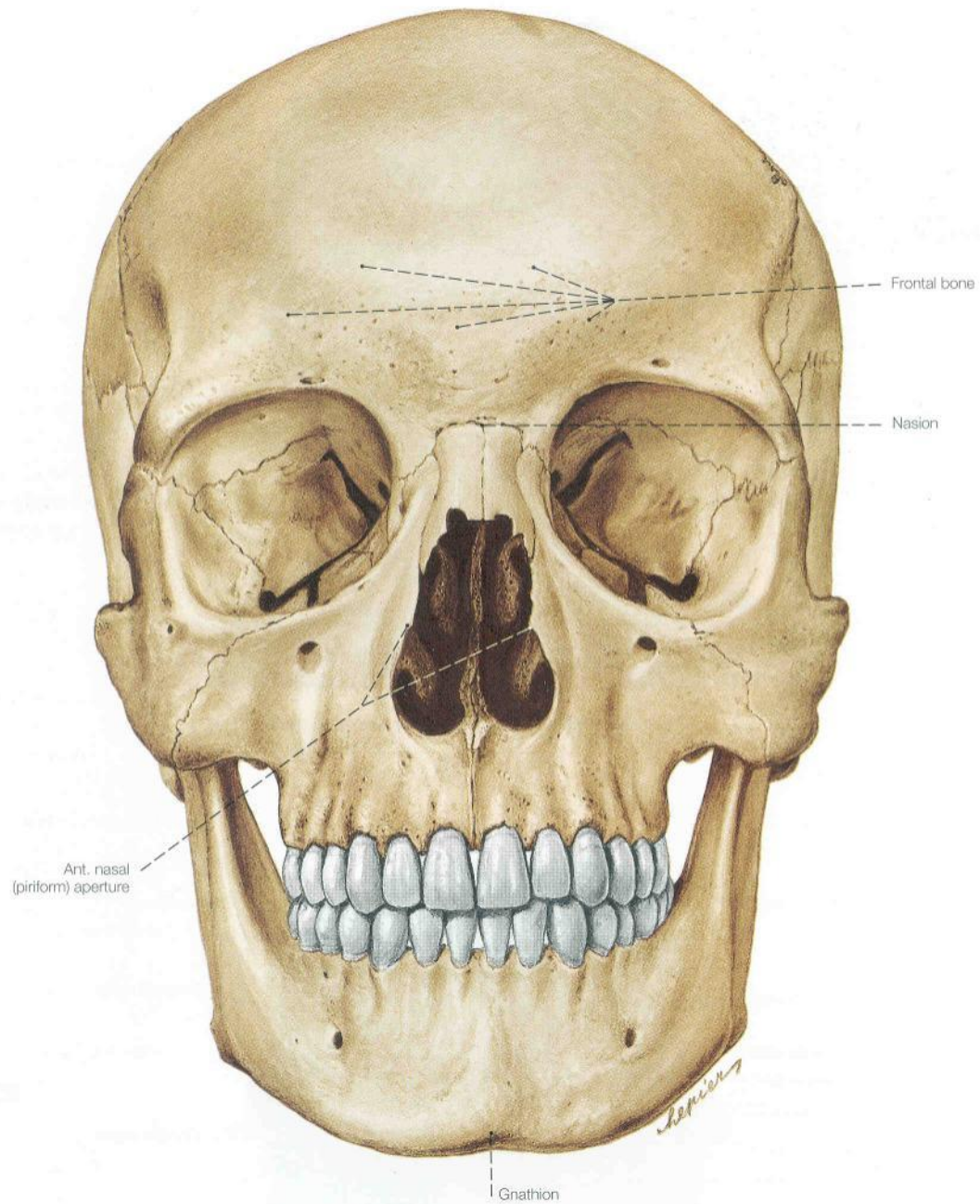
The mandible, lateral aspect viewed from above.

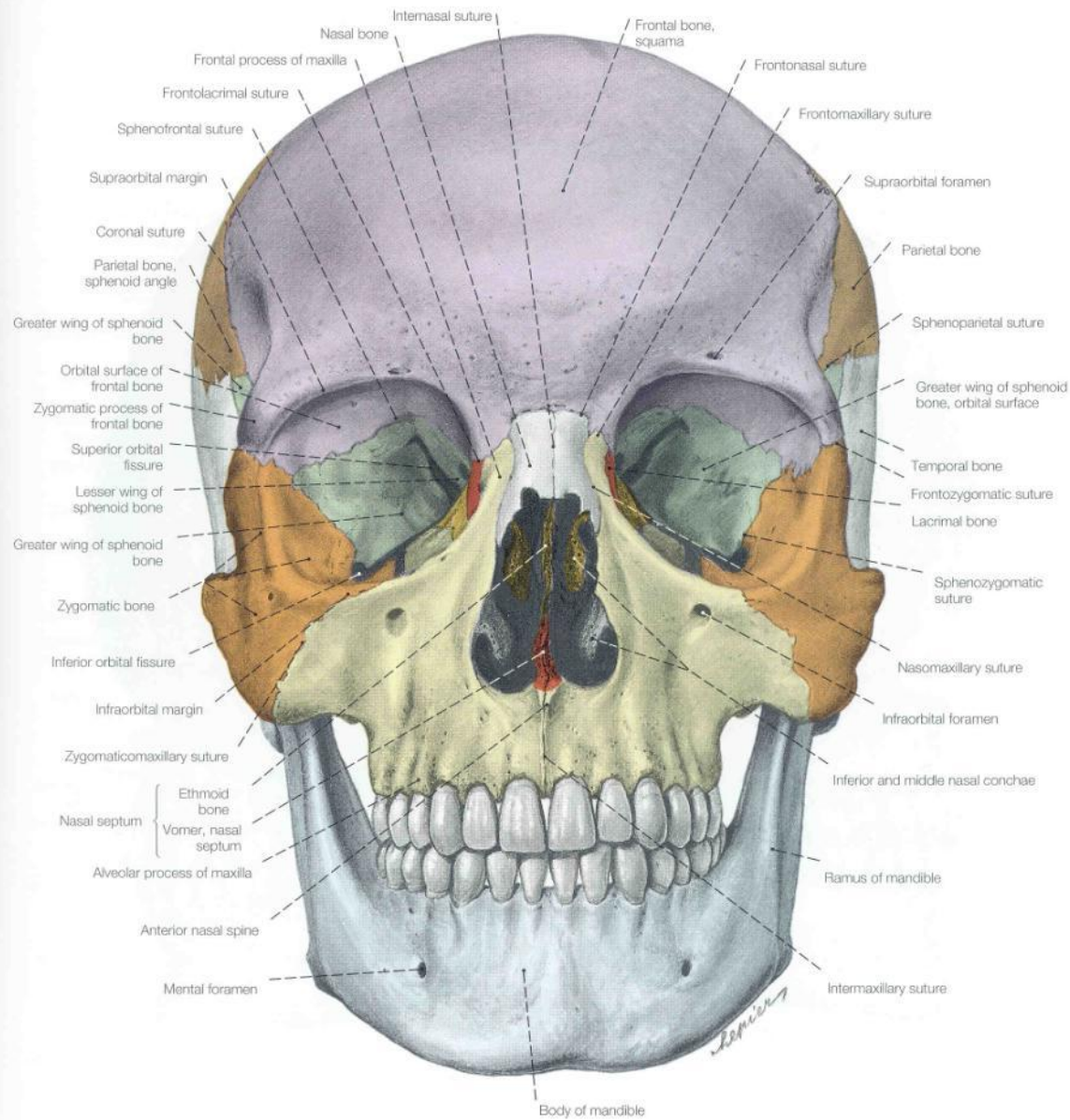


The mandible, medial aspect of the right half.



Skull – Anterior View



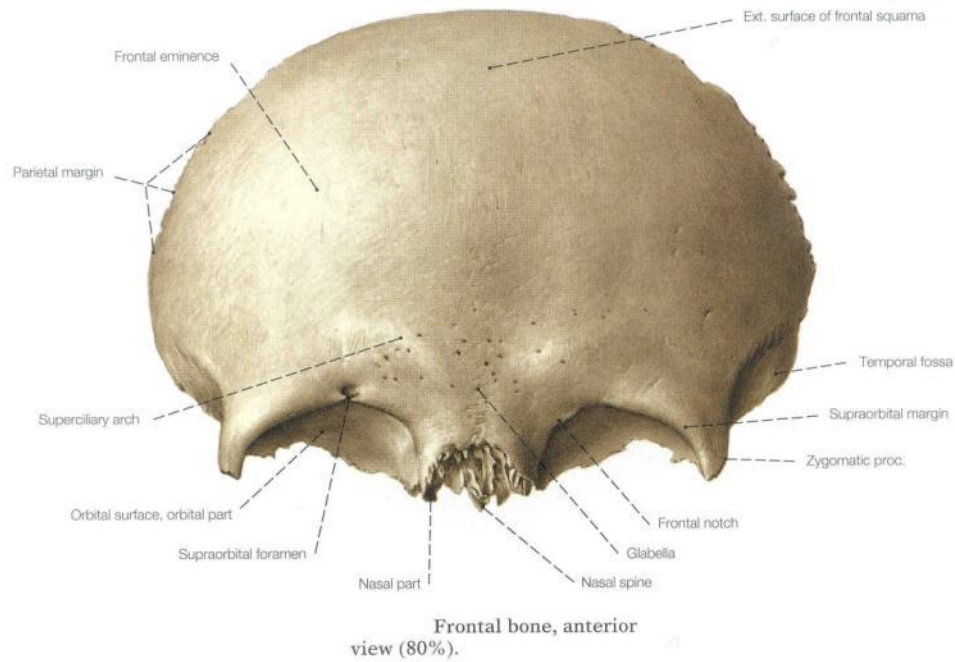


Frontal bone
Nasal bone
Maxilla
Zygomatic bone

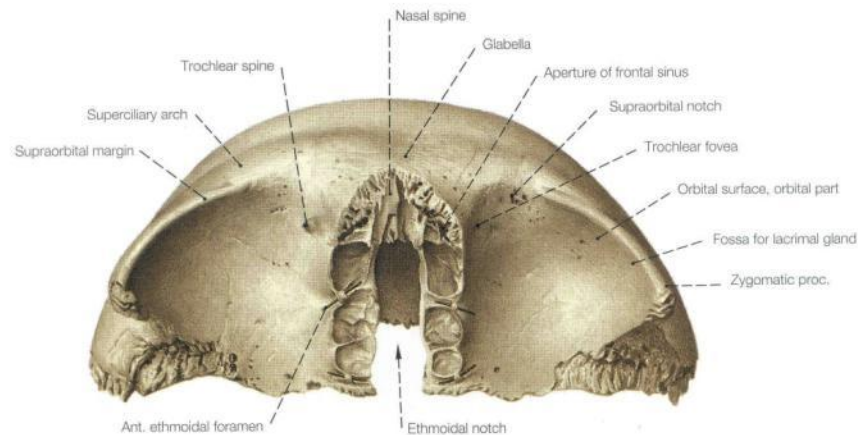
Temporal bone
Inferior nasal concha
Mandible
Lacrimal bone

Vomer
Ethmoid bone
Parietal bone
Sphenoid bone

Frontal

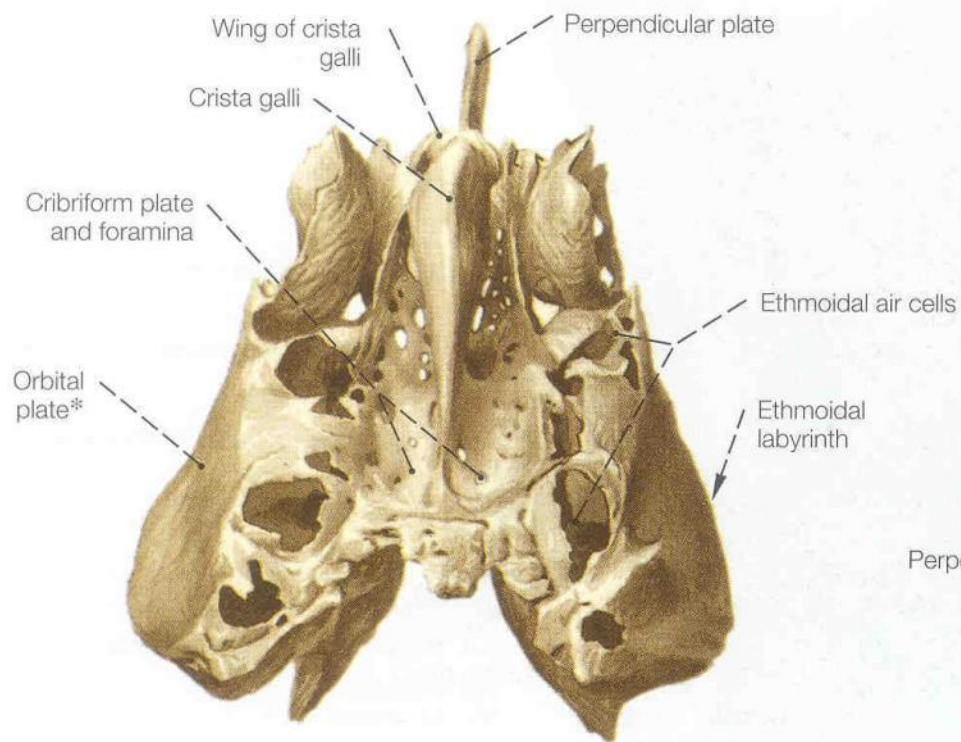


Anterior

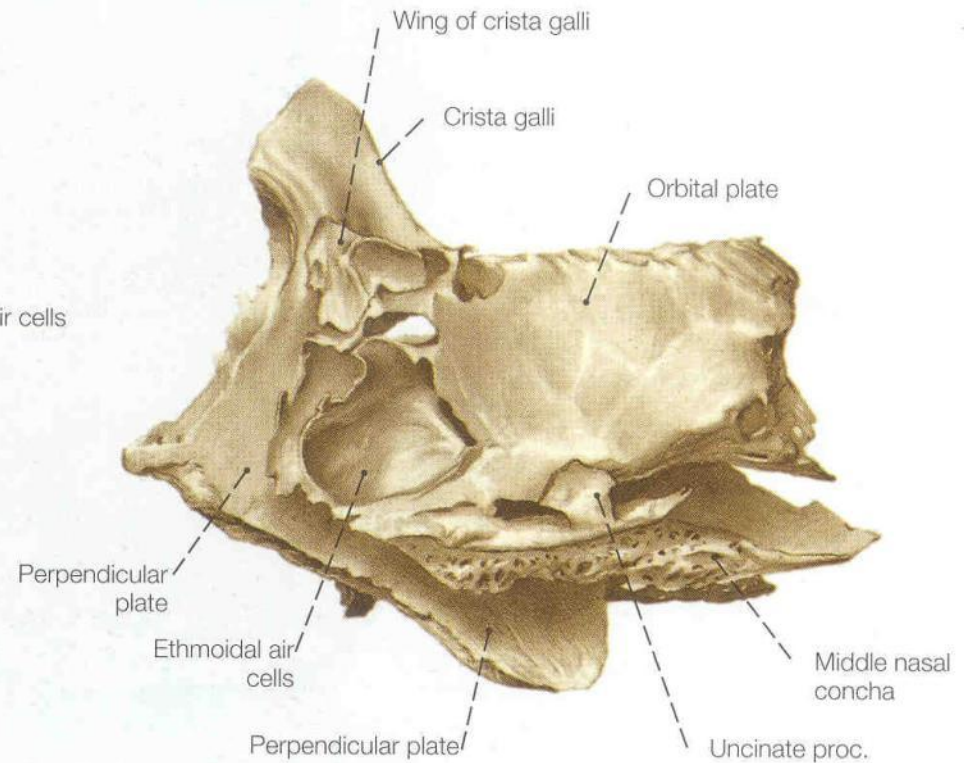


Inferior

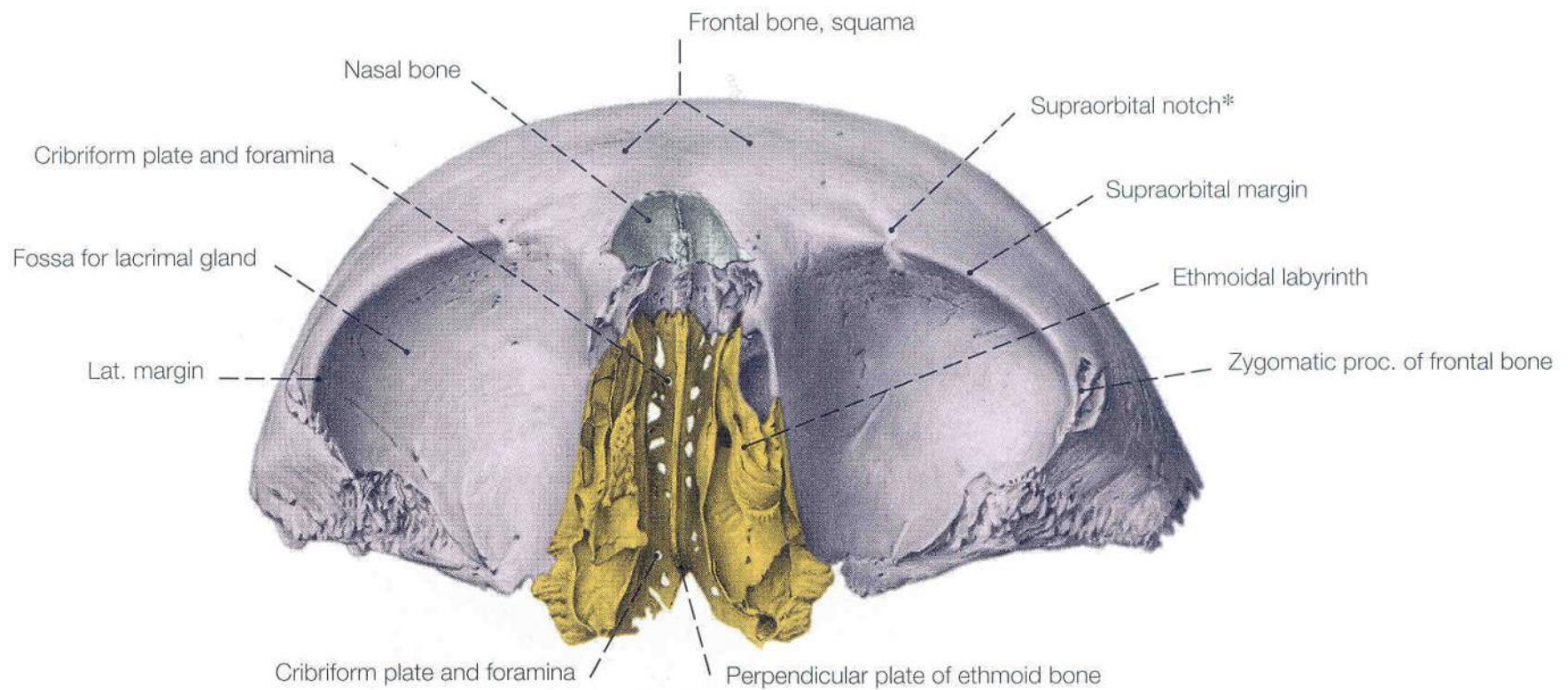
Ethmoid



superior



lateral



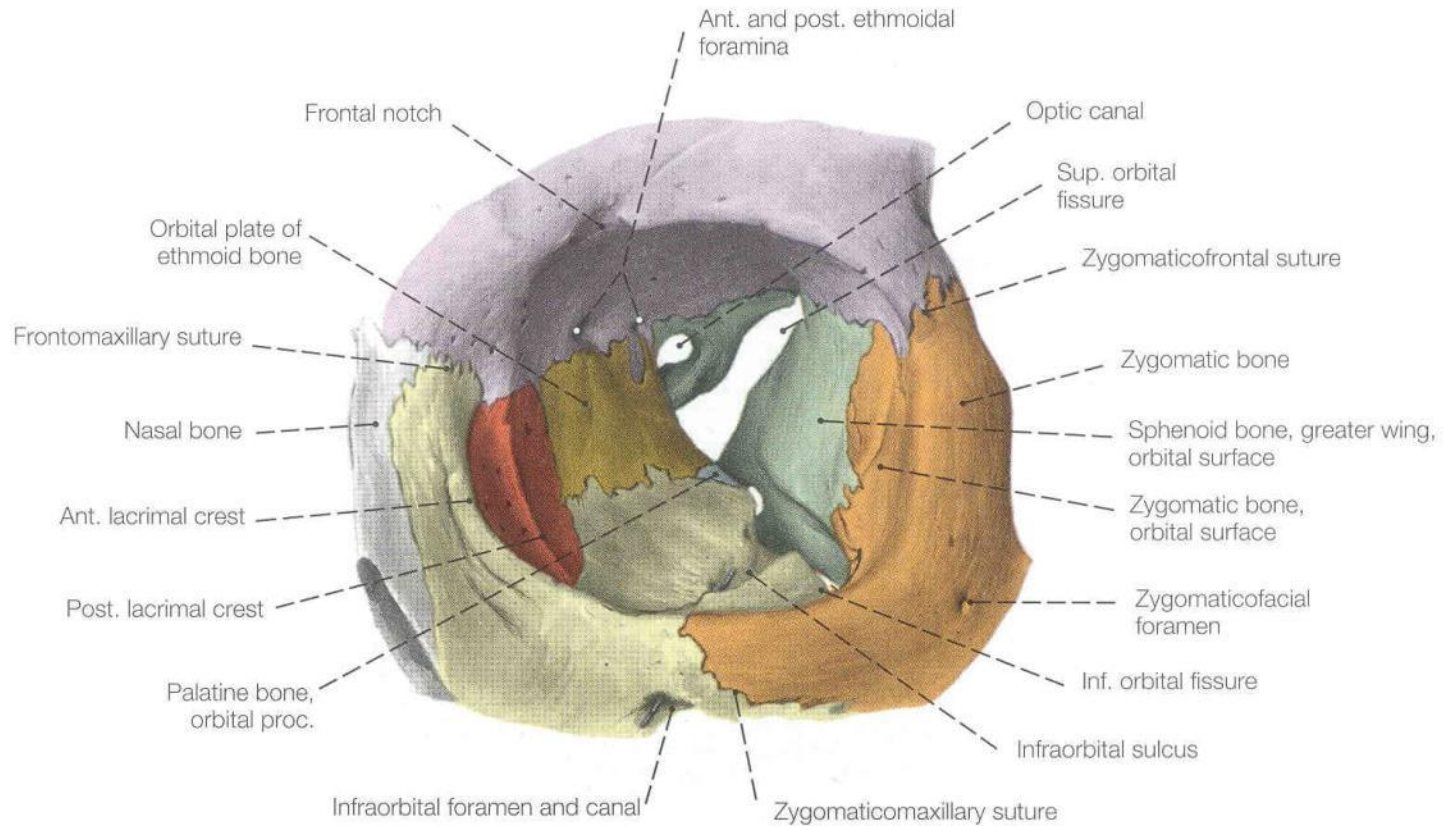
Frontal bone



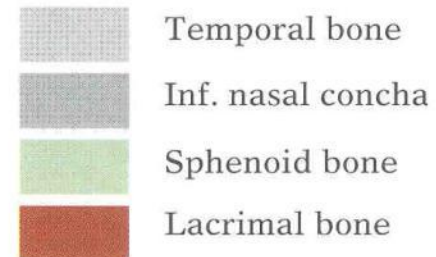
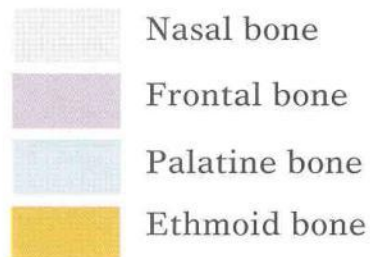
Ethmoid bone



Nasal bone

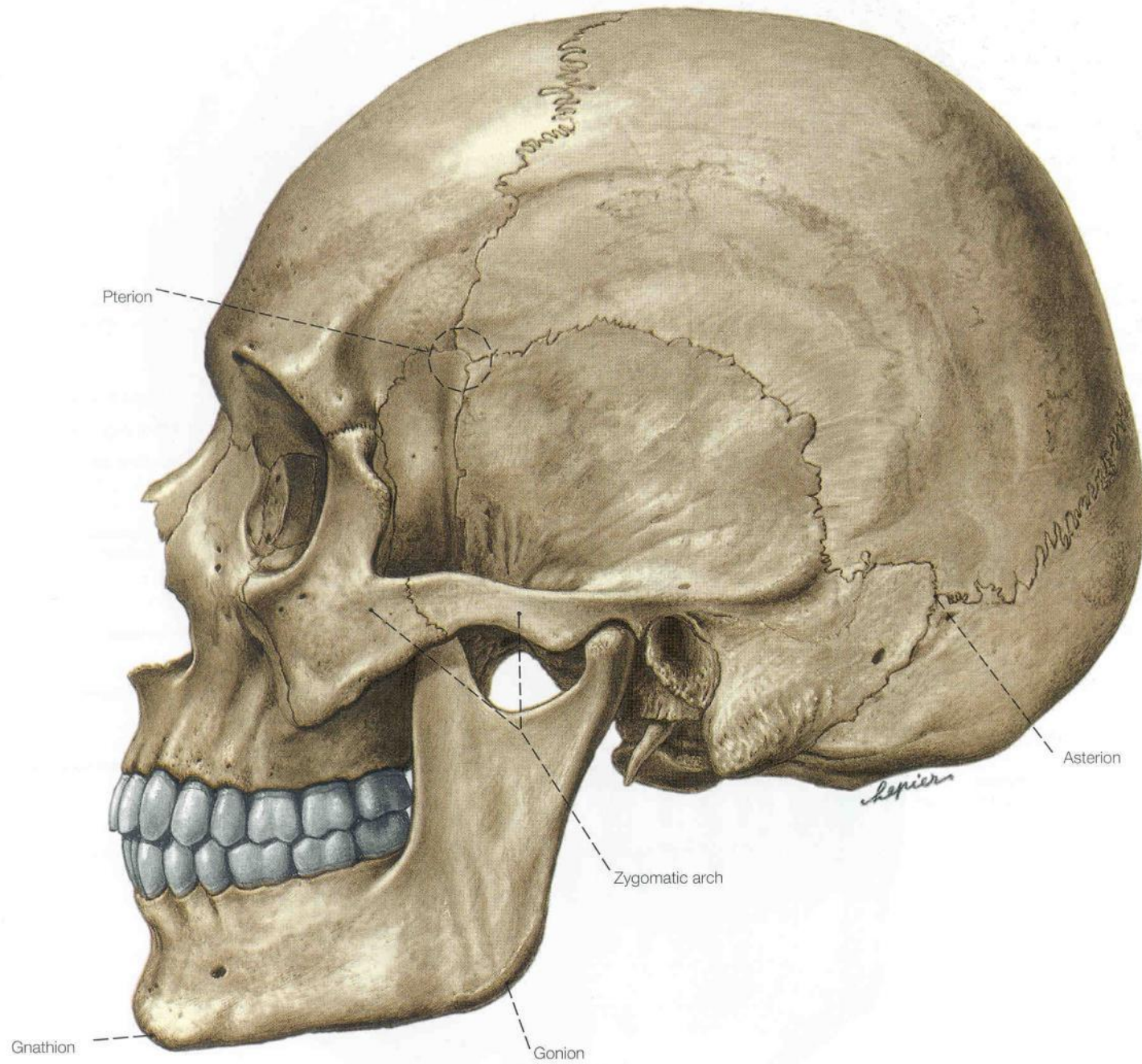


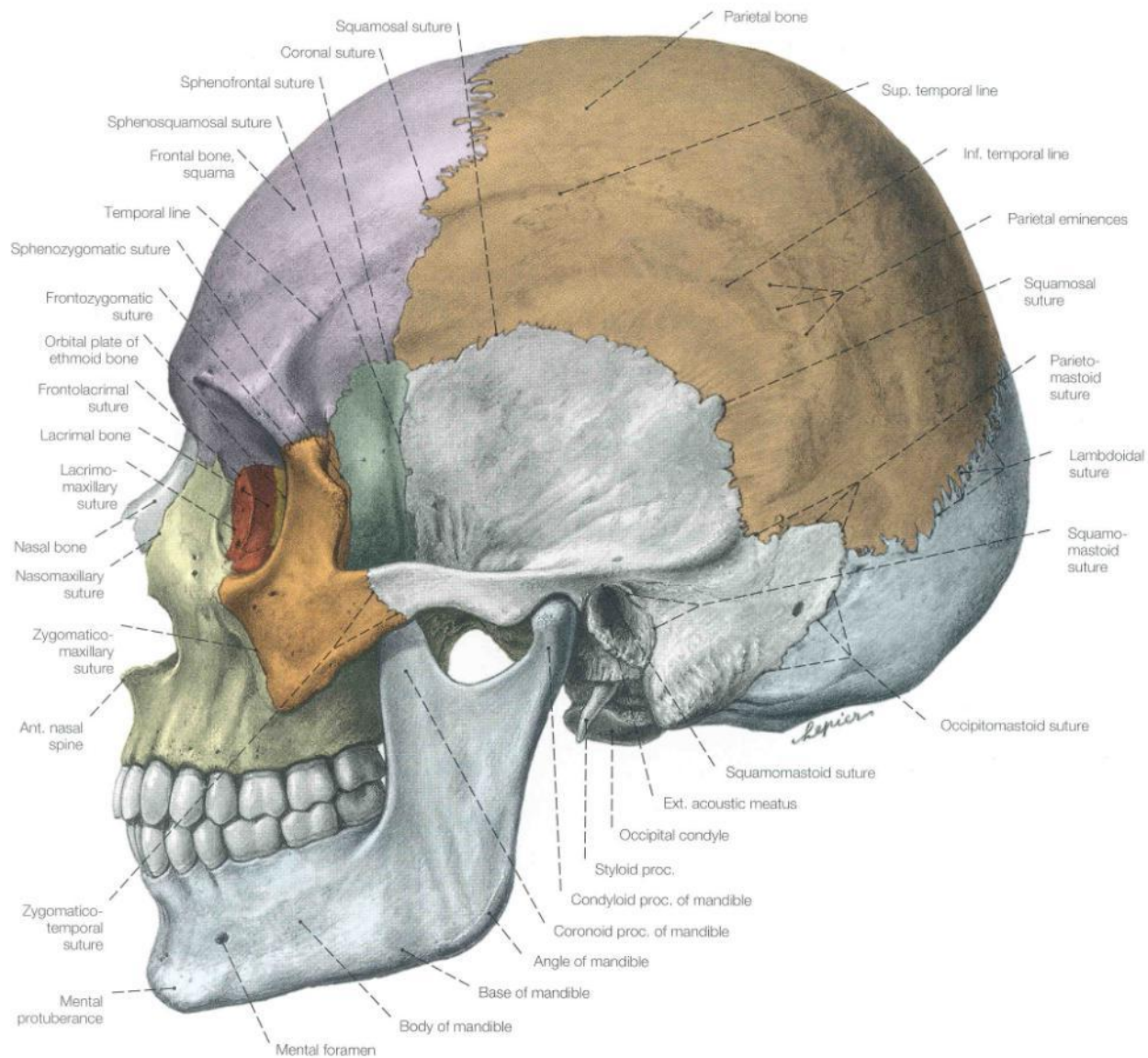
The left orbit,
anterolateral view (110%). The
probe is in the infraorbital
canal.



Bones of the Orbit

Skull – Lateral View





Frontal bone

Parietal bone

Occipital bone

Nasal bone

Lacrimal bone

Zygomatic bone

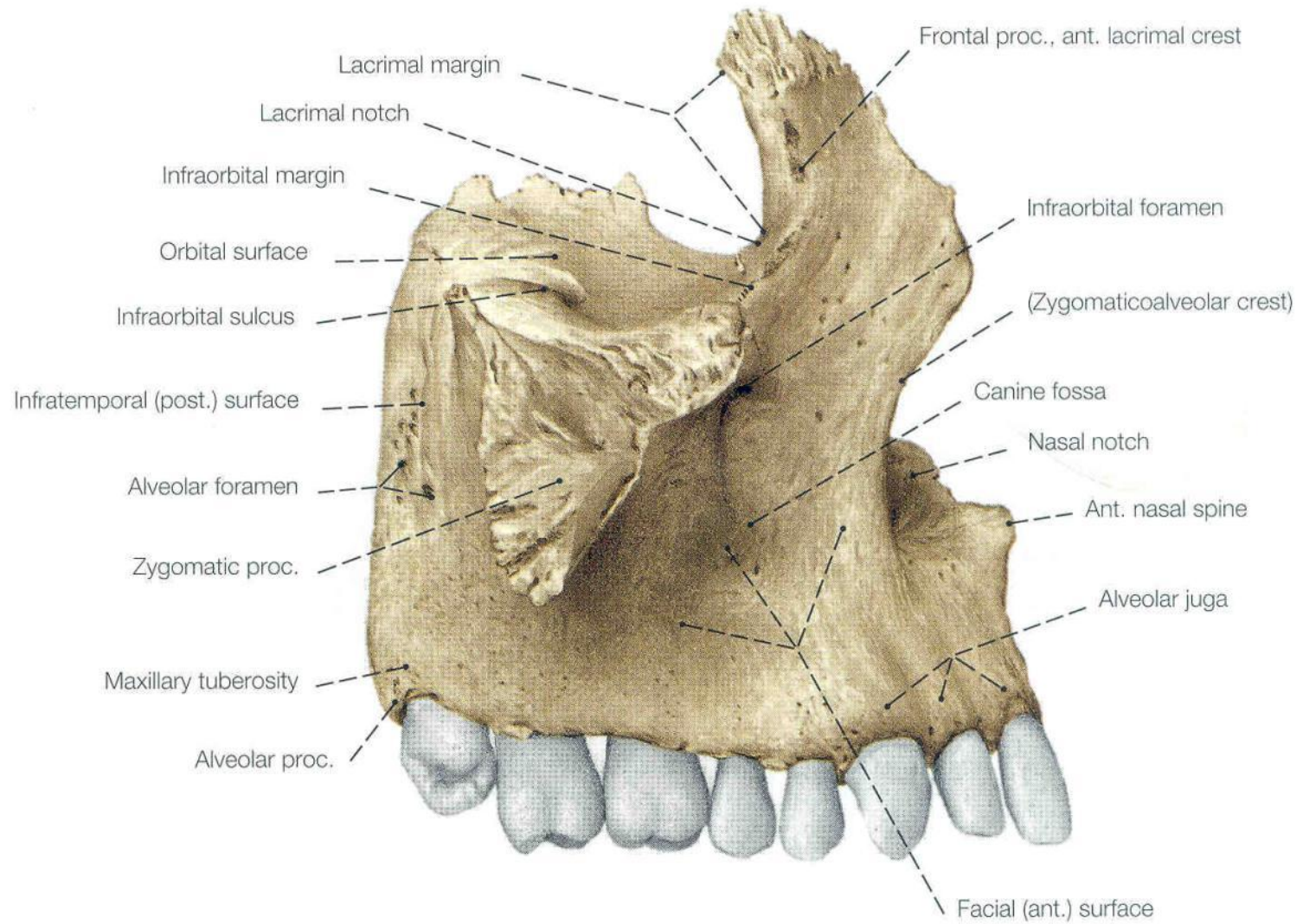
Sphenoid bone

Ethmoid bone

Temporal bone

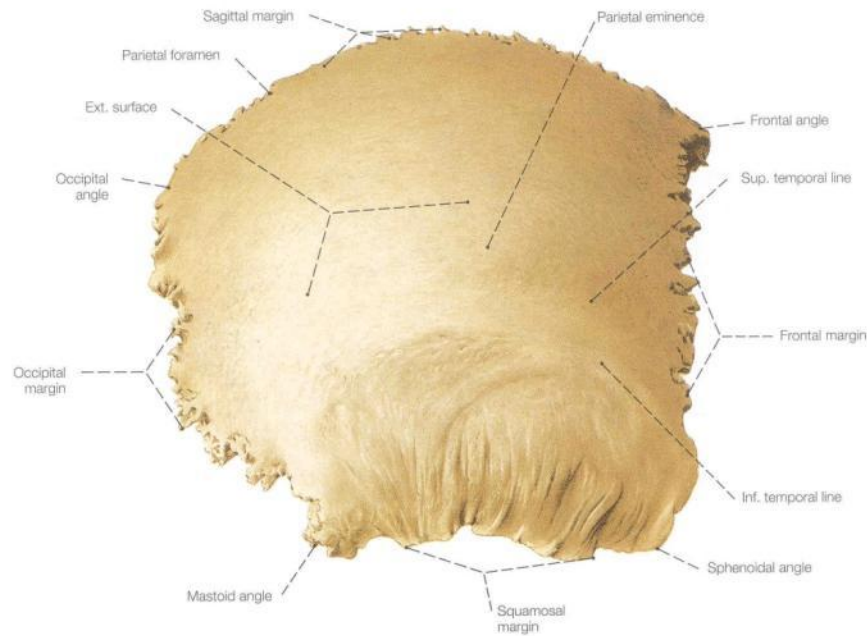
Maxilla

Mandible



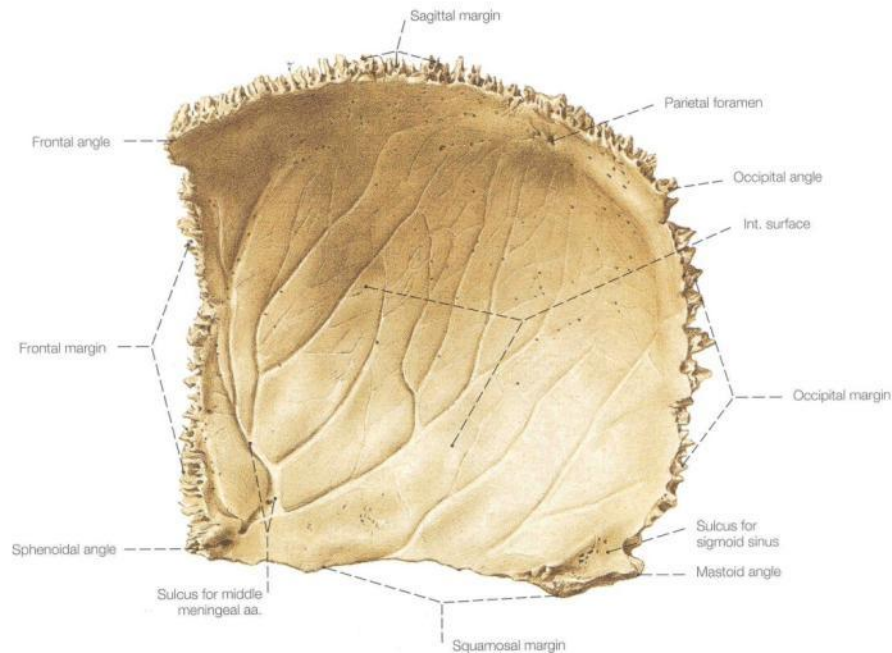
Maxilla: Lateral View

Parietal



External

The right parietal bone,
lateral aspect

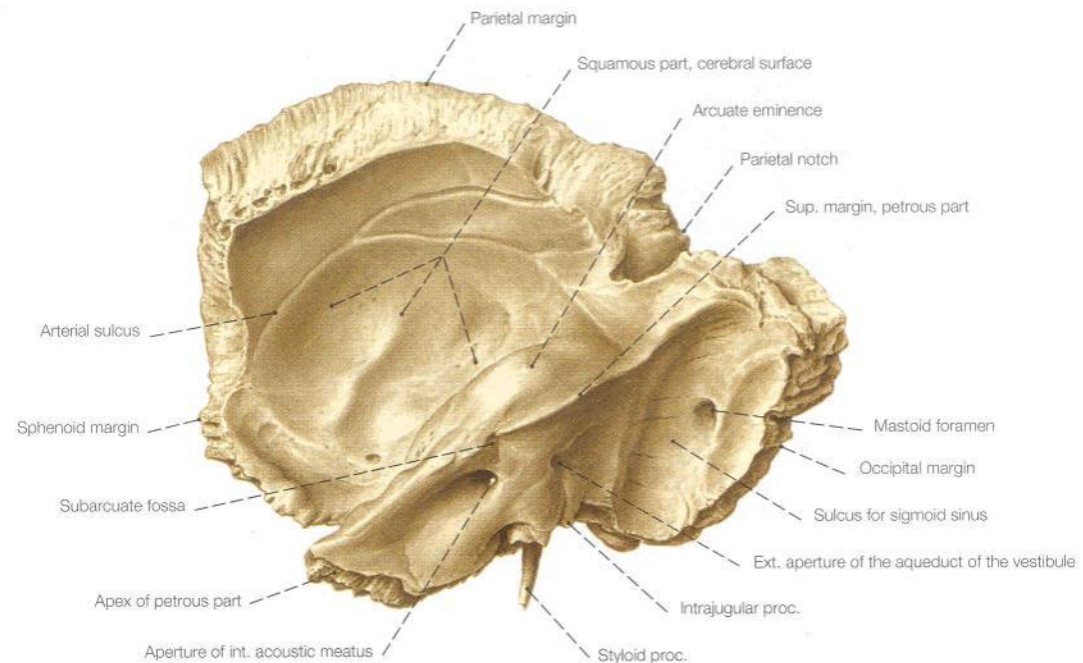
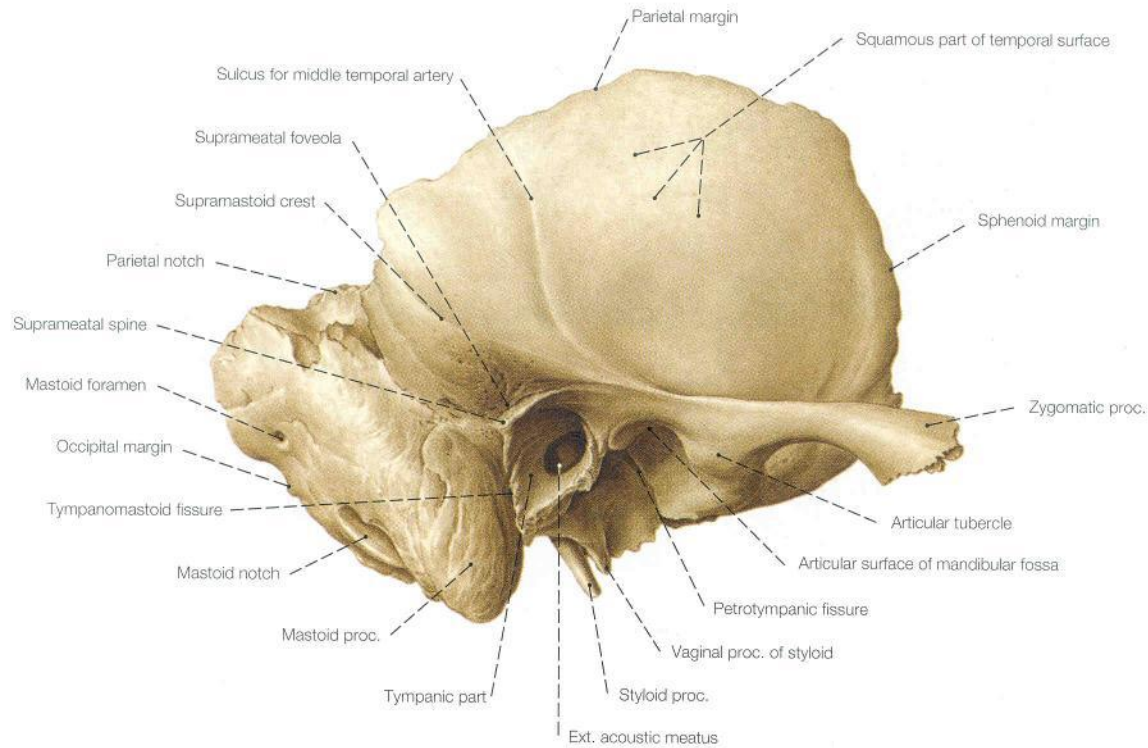


Internal

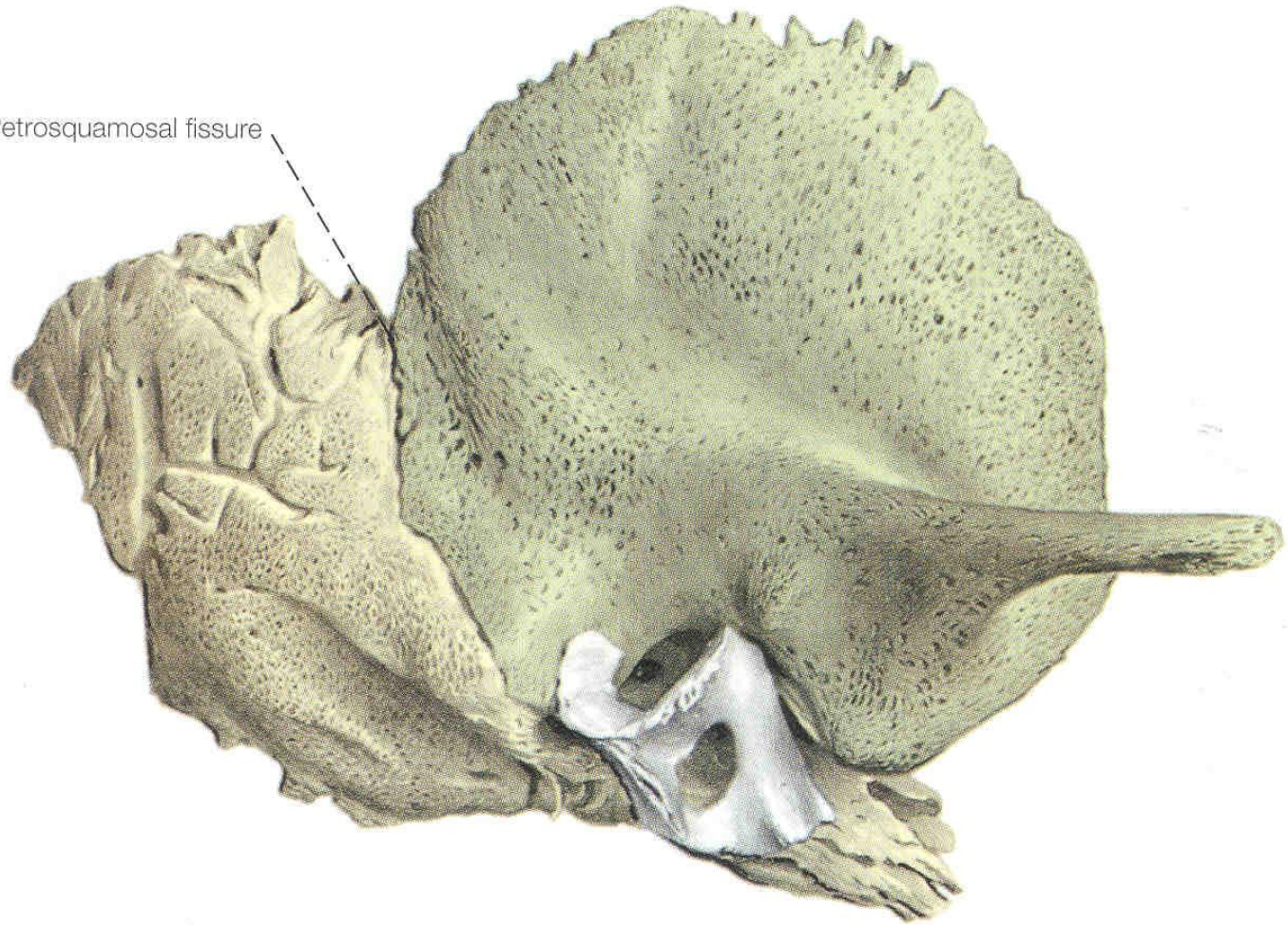
Temporal

Internal

External



Petrosquamosal fissure



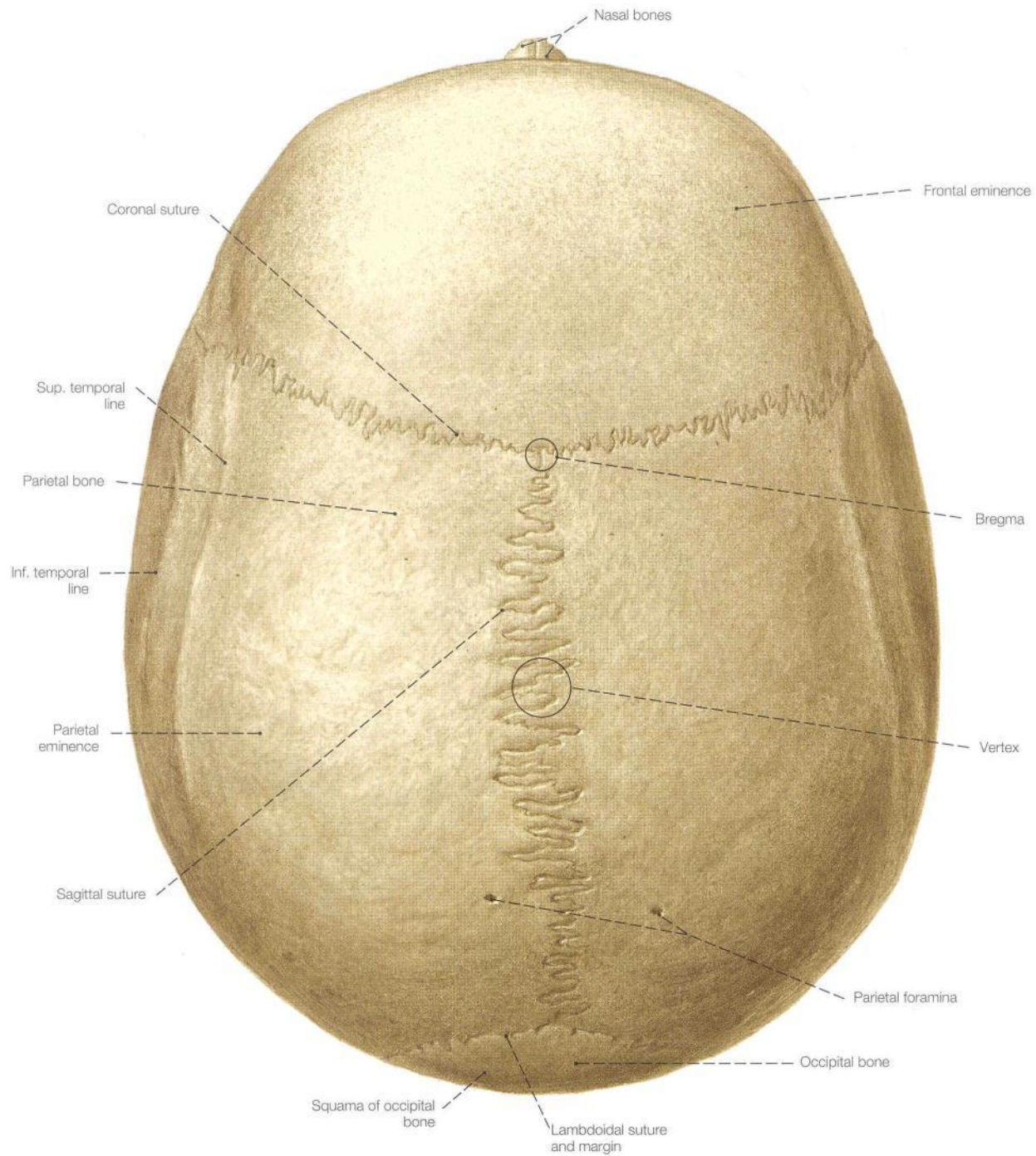
Squamous part

Tympanic part

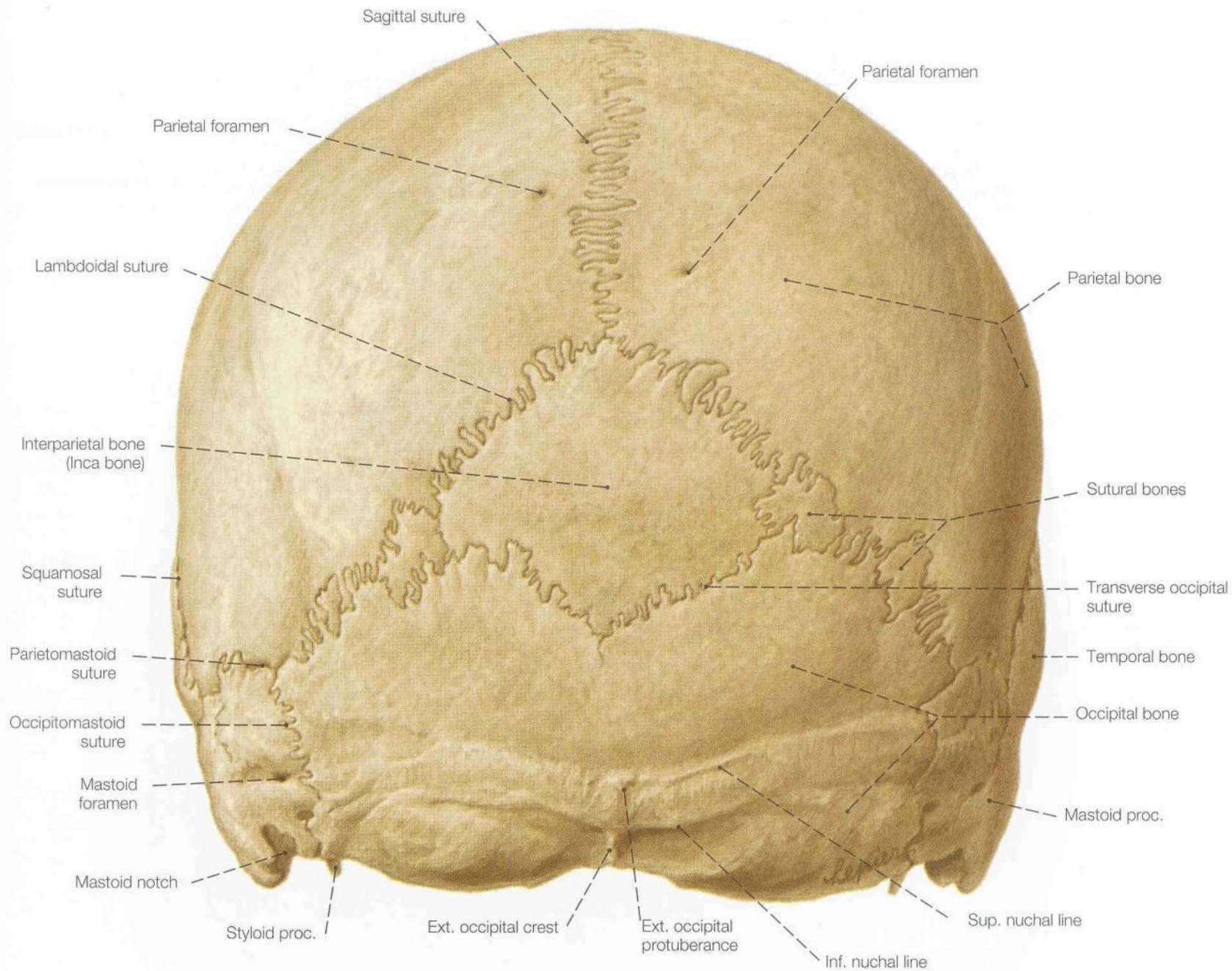
Petrous part

Neonatal Temporal Bone

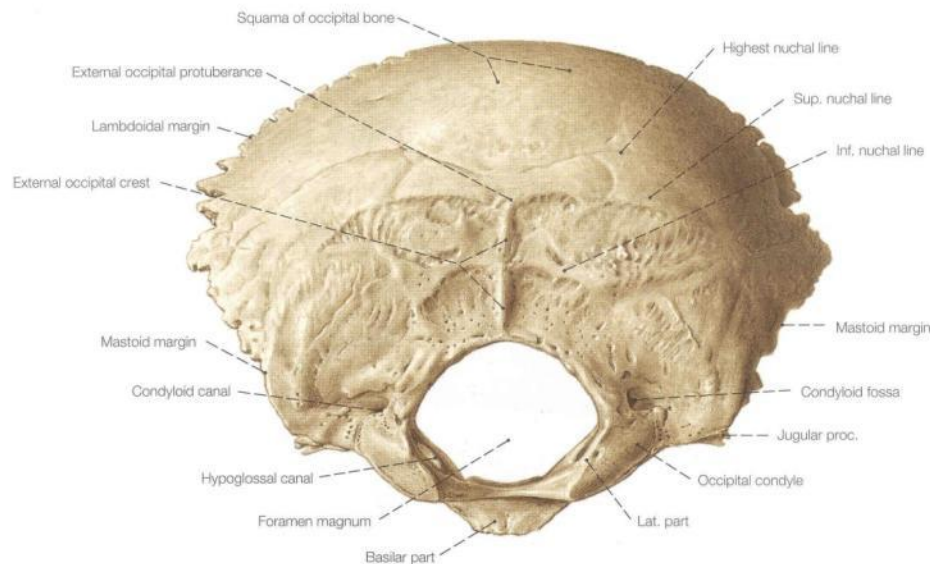
Skull – Superior View



Skull – Posterior View

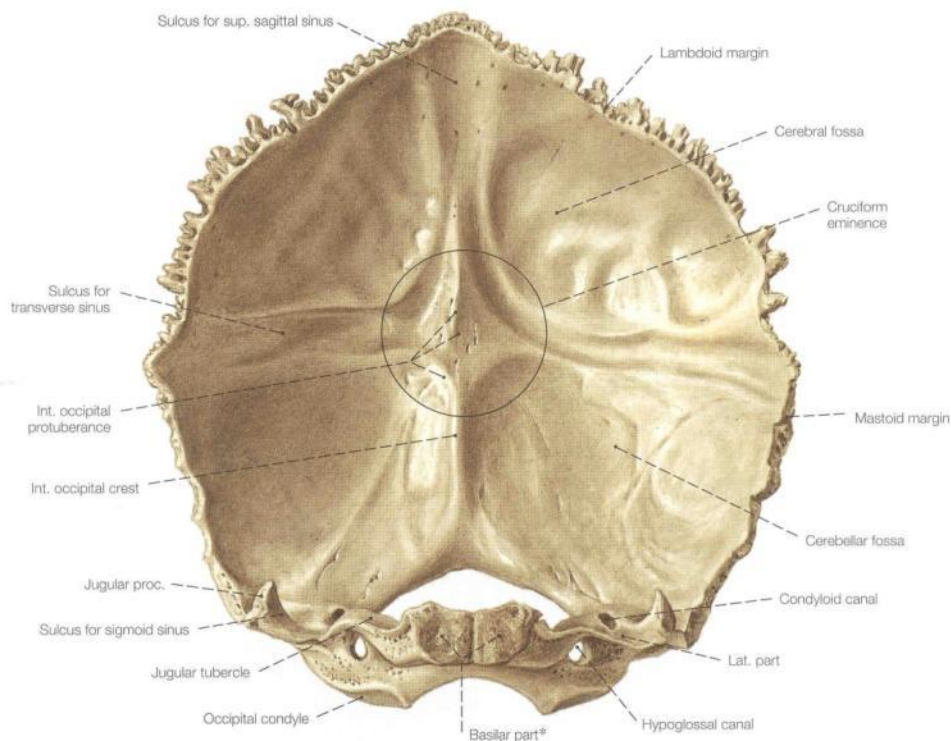


Occipital



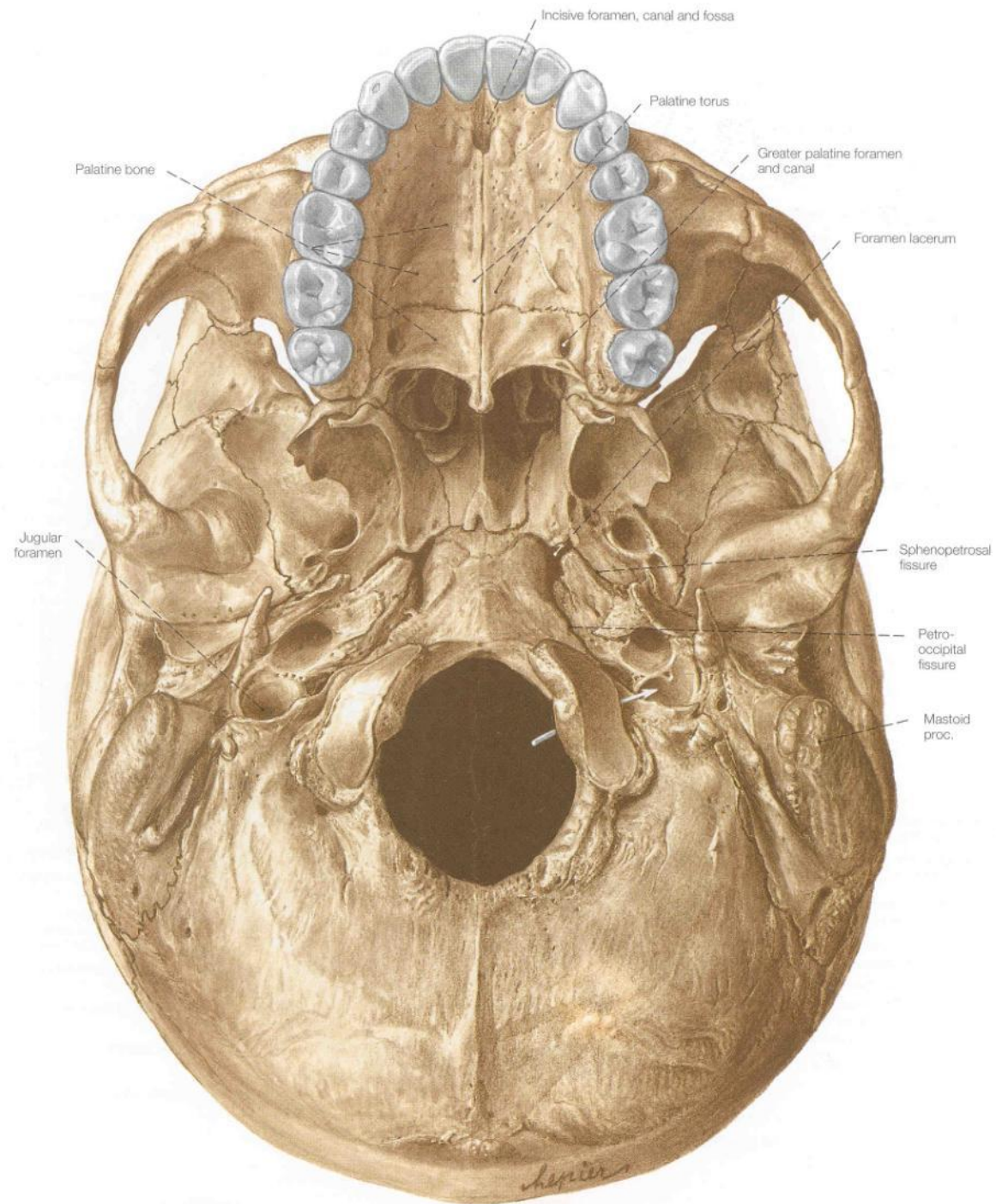
Occipital bone, external surface viewed from below.

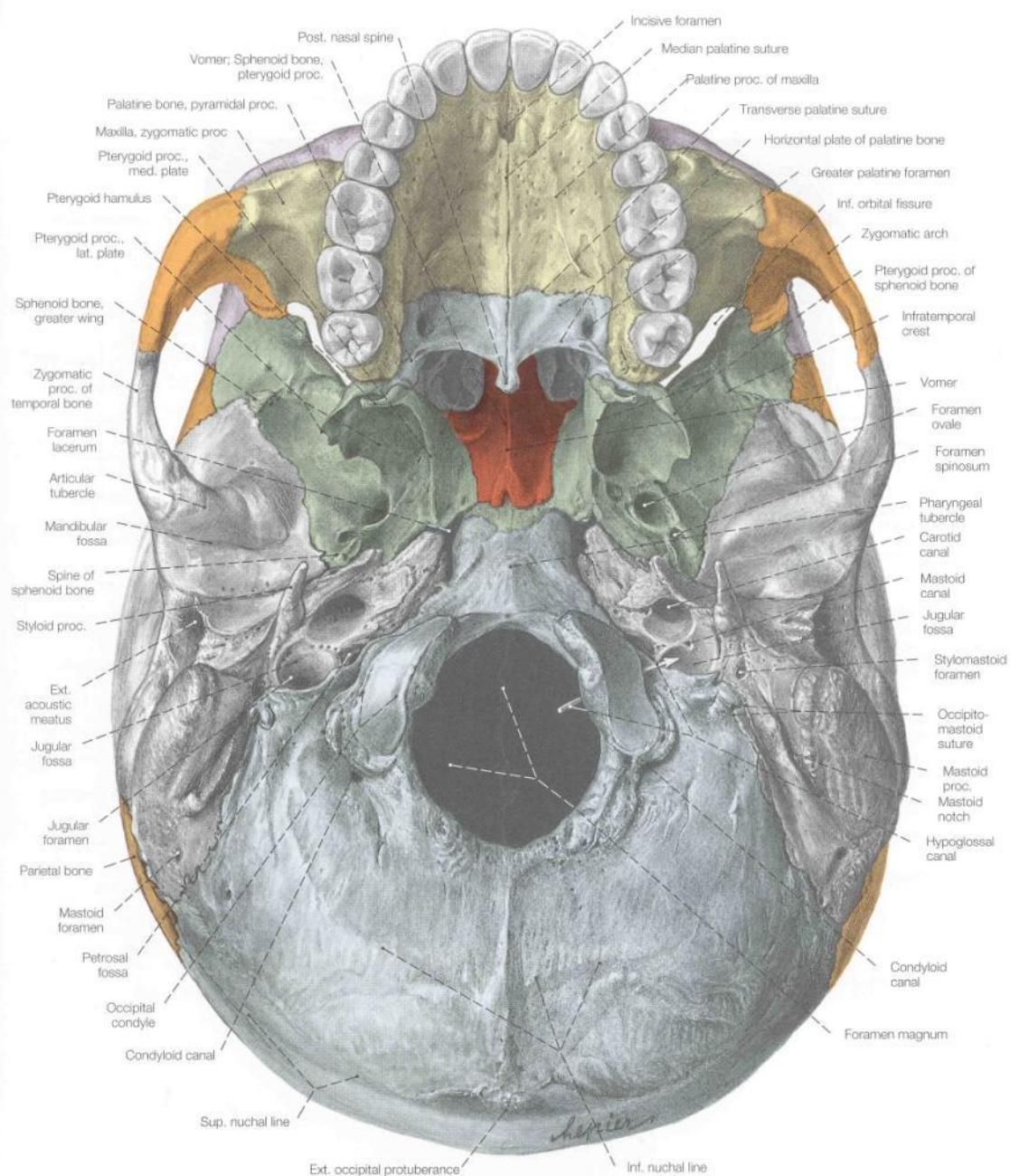
Inferior



Internal

Skull – Inferior View





Maxilla
 Frontal bone
 Parietal bone

Palatine bone
 Vomer
 Zygomatic bone

Sphenoid bone
 Temporal bone
 Occipital bone



Maxilla



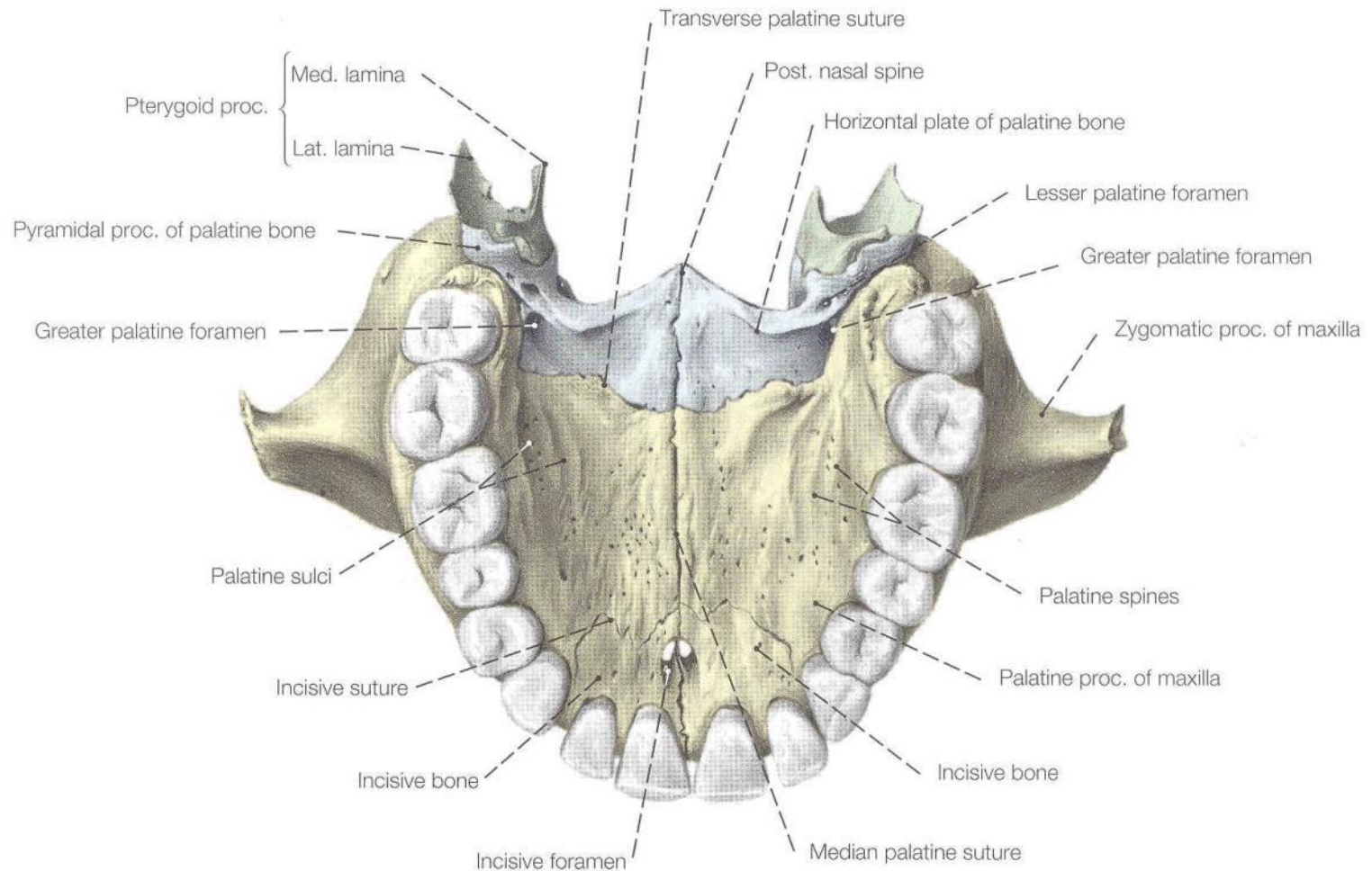
Palatine bone



Sphenoid bone

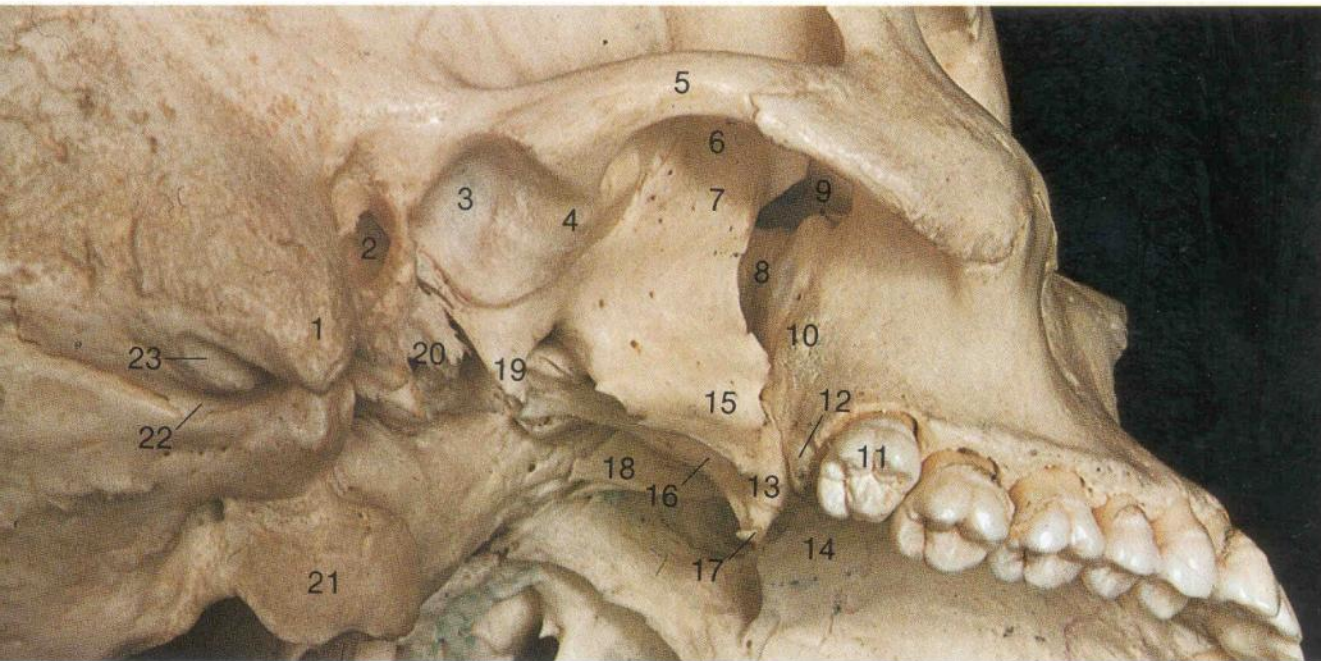


Inferior nasal concha



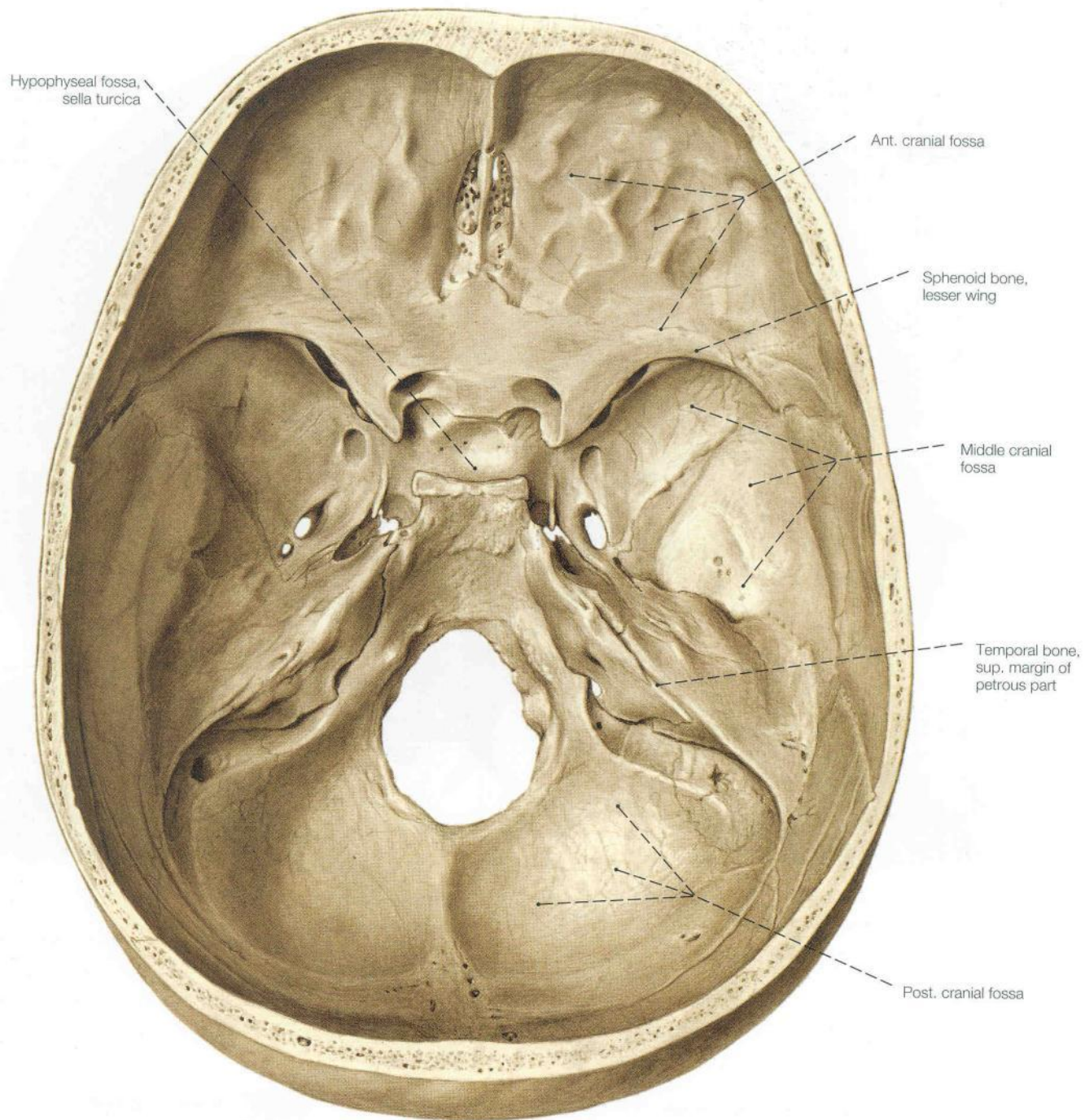
Hard Palate

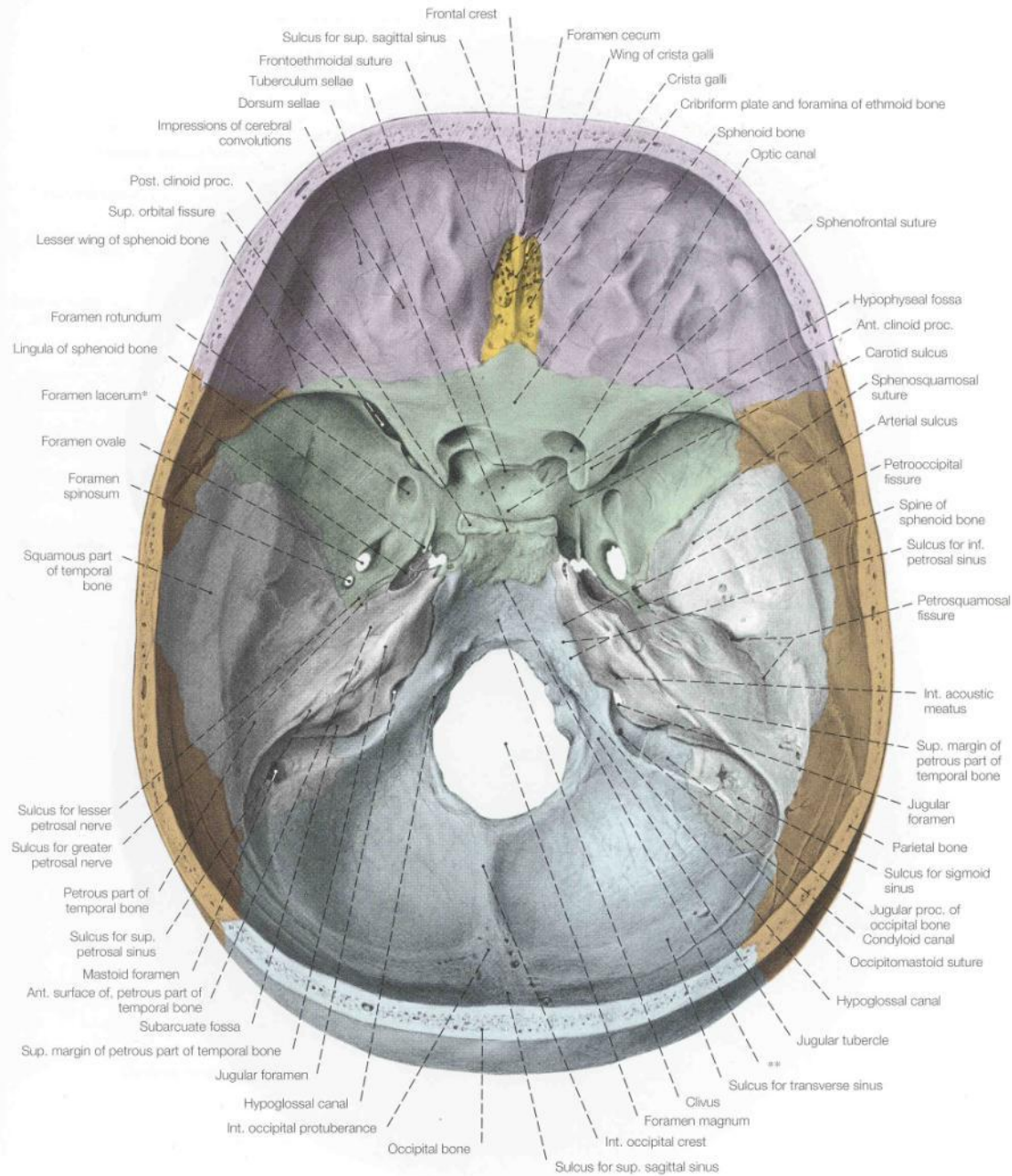
Infratemporal Region



- 1 Mastoid process
 - 2 External acoustic meatus
 - 3 Mandibular fossa
 - 4 Articular tubercle
 - 5 Zygomatic arch
 - 6 Infratemporal crest
 - 7 Infratemporal surface of greater wing of sphenoid bone
 - 8 Pterygomaxillary fissure and pterygopalatine fossa
 - 9 Inferior orbital fissure
 - 10 Infratemporal (posterior) surface of maxilla
 - 11 Third molar tooth
 - 12 Tuberosity of maxilla
 - 13 Pyramidal process
 - 14 Horizontal plate
 - 15 Lateral
 - 16 Medial
 - 17 Pterygoid hamulus
 - 18 Vomer
 - 19 Spine of sphenoid bone
 - 20 Styloid process and sheath
 - 21 Occipital condyle
 - 22 Occipital groove
 - 23 Mastoid notch
- of palatine bone
- pterygoid plate

Skull – Internal View

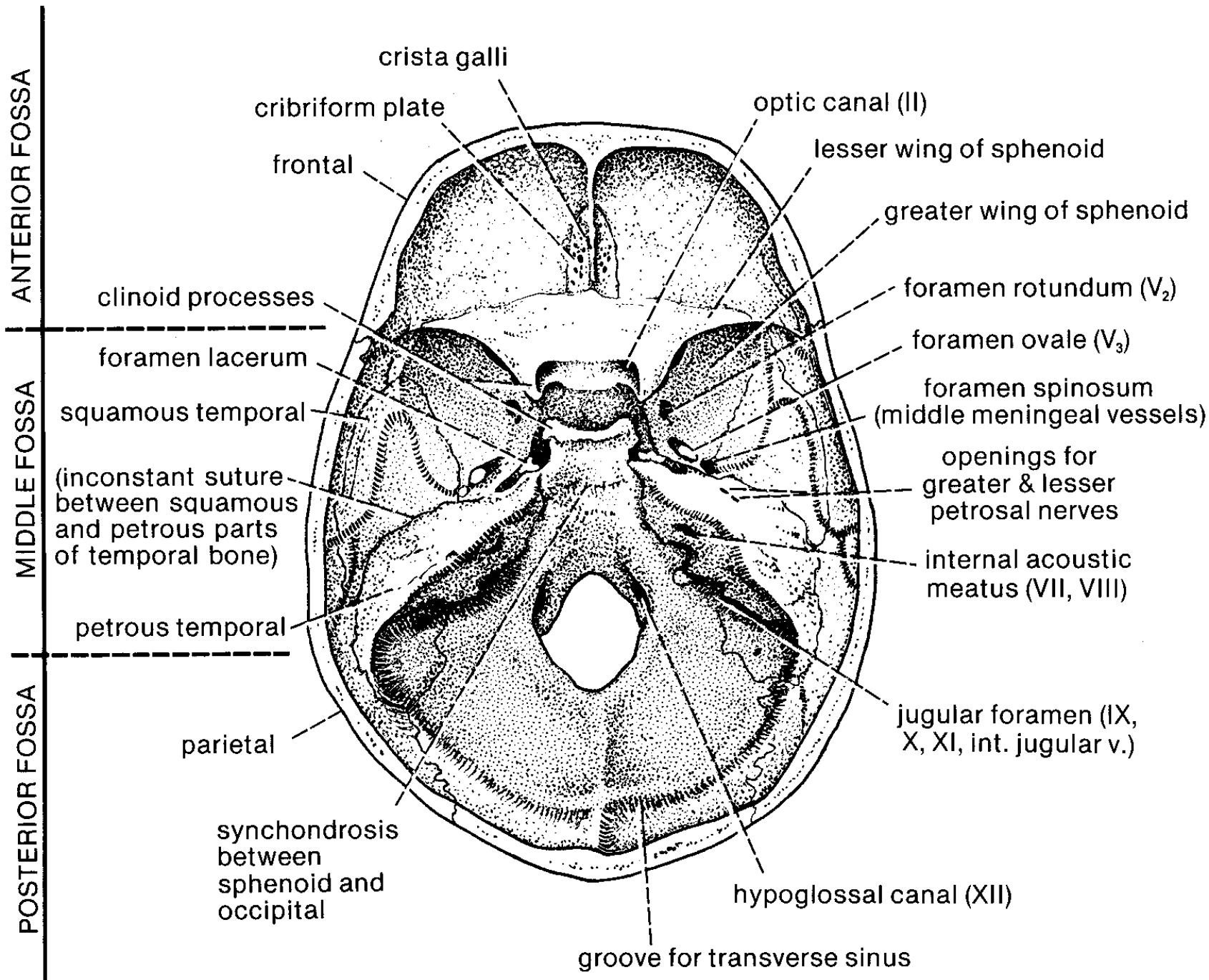


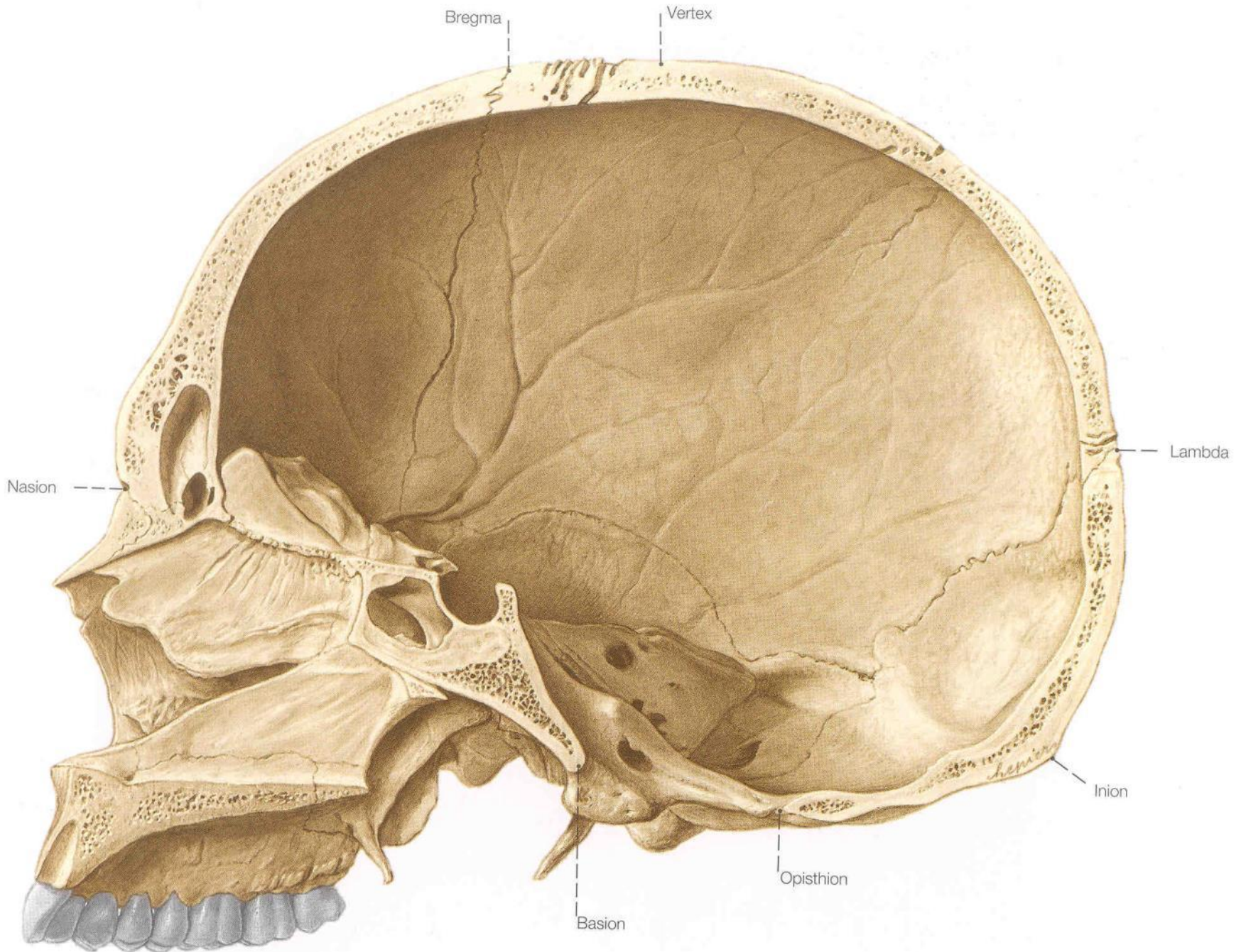


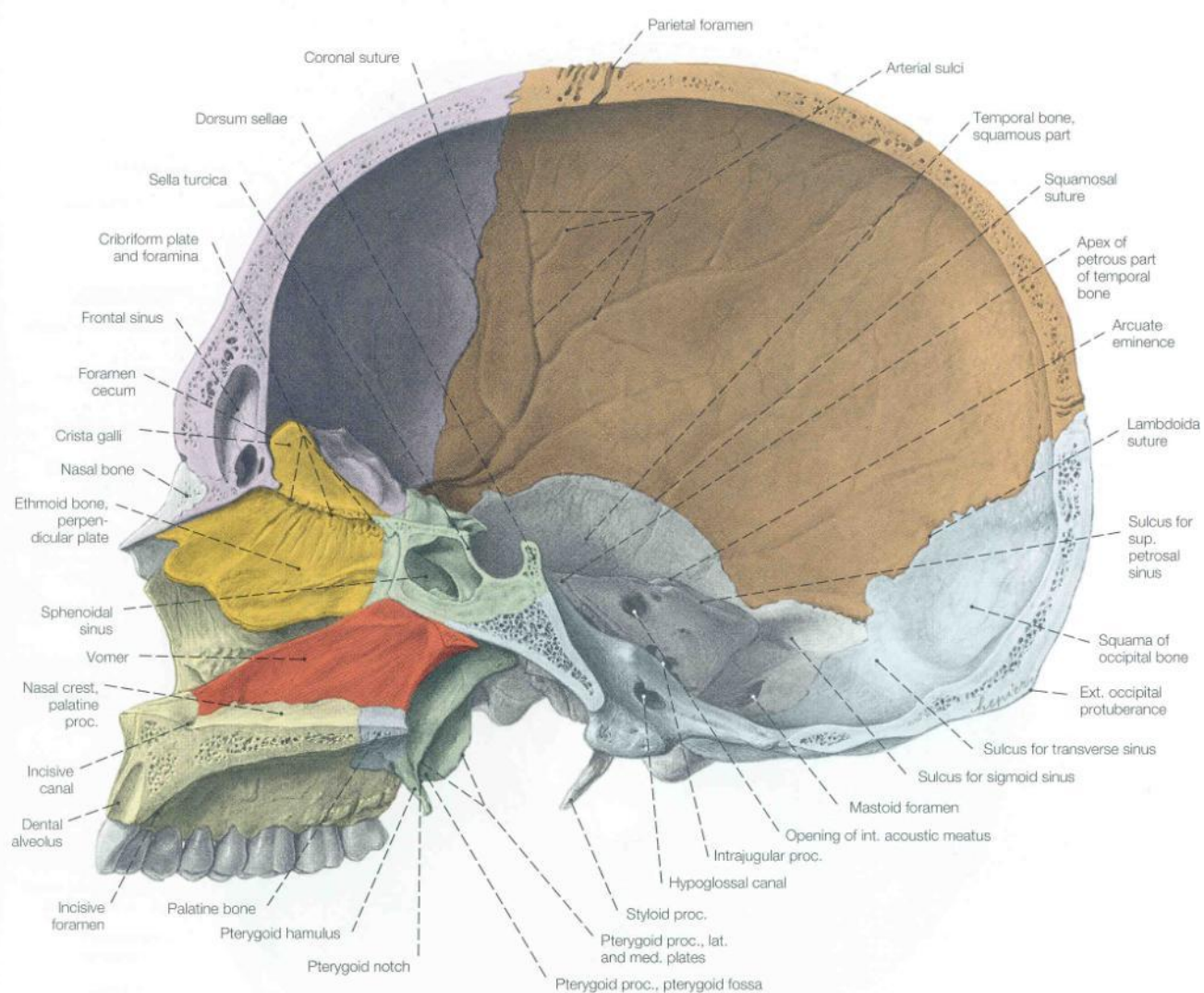
Frontal bone
 Parietal bone

Ethmoid bone
 Sphenoid bone

Temporal bone
 Occipital bone



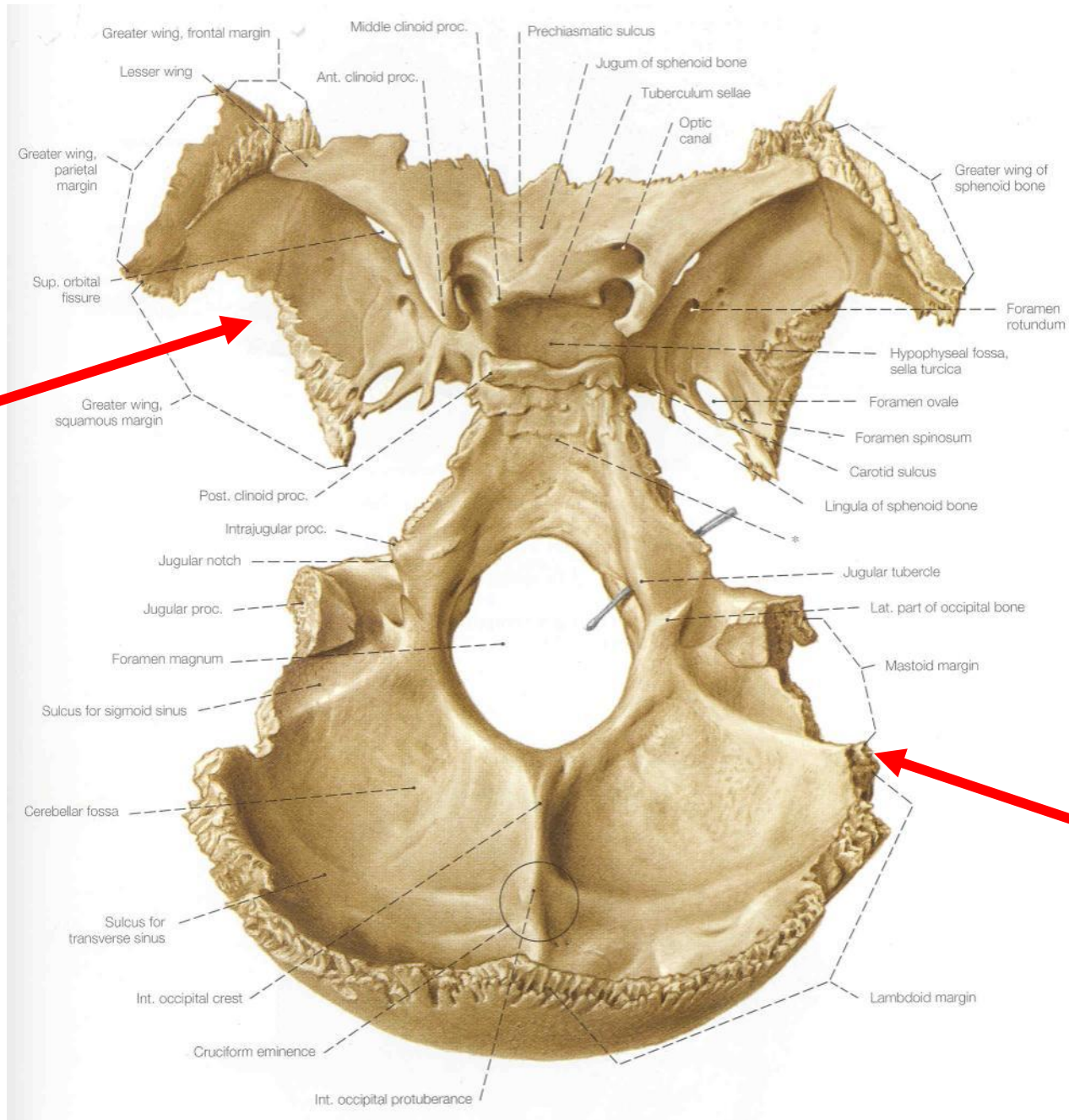




Frontal bone
Parietal bone
Occipital bone
Nasal bone
Ethmoid bone

Sphenoid bone
Temporal bone
Maxilla
Vomer
Palatine bone

Sphenoid

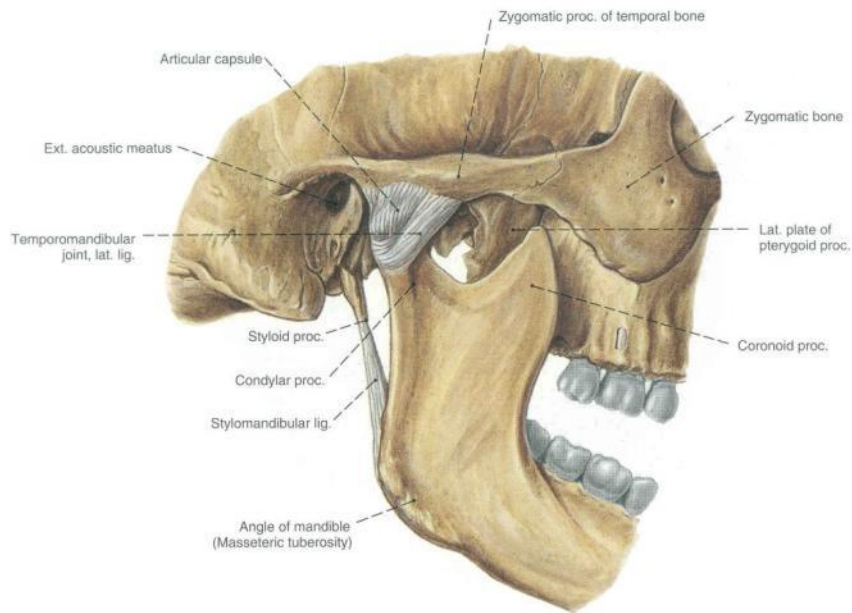


Occipital

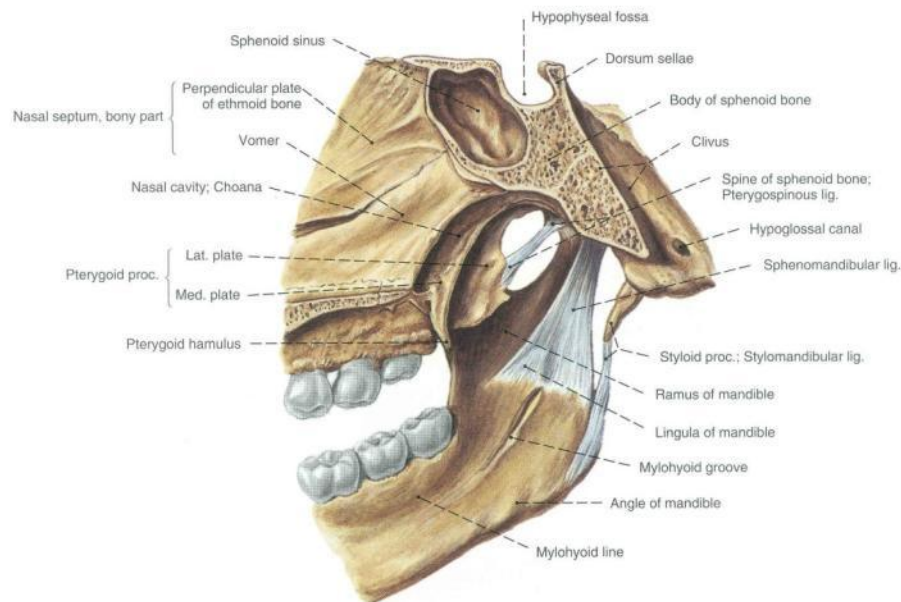
Major Ligaments Near Jaw Joint

Major Ligaments Near Jaw Joint:

Stylomandibular

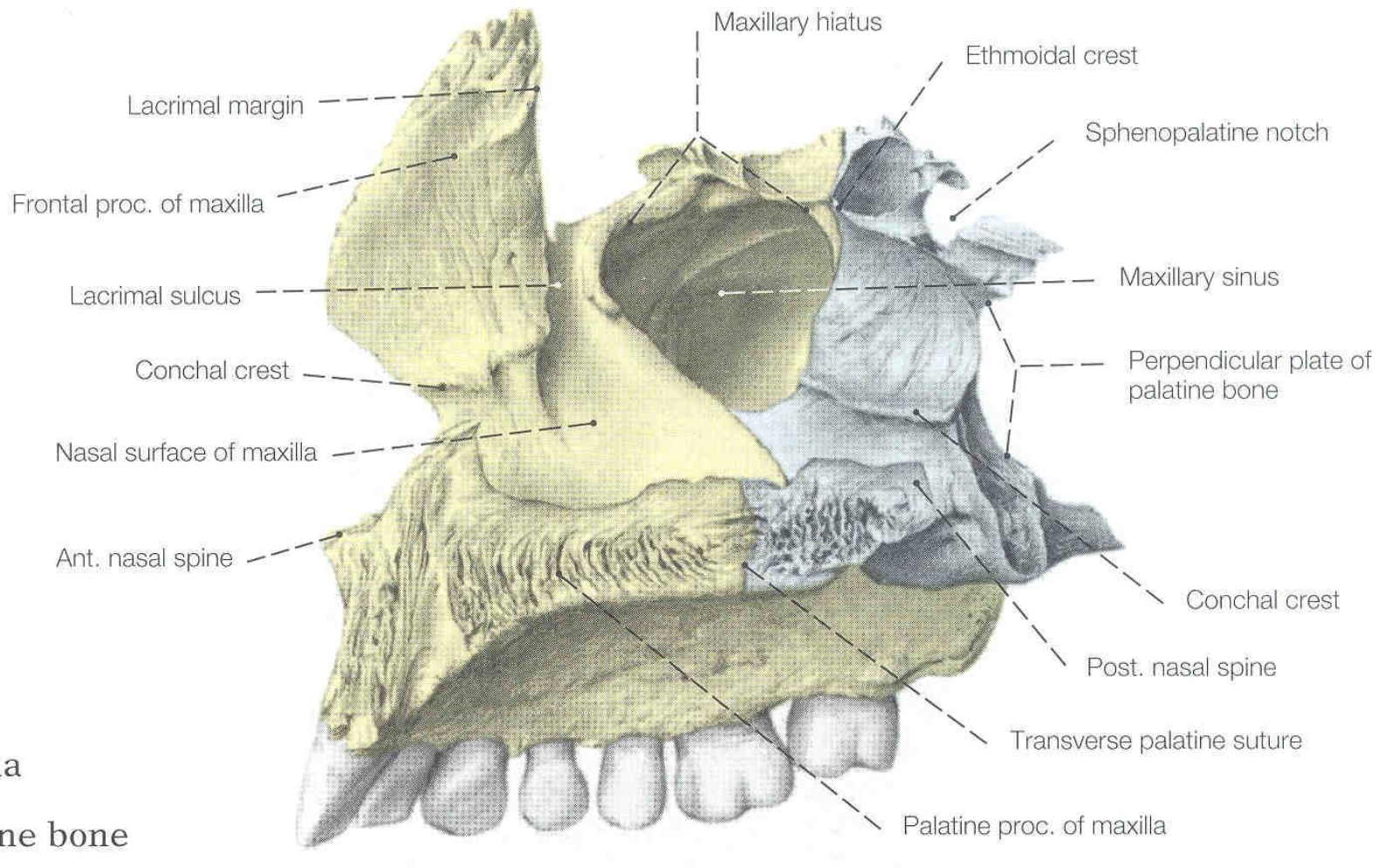


The temporomandibular joint,
lateral aspect.



The pterygospinous and sphenomandibular
ligaments. A paramedian section, medial aspect.

Sphenomandibular



Bones of the Basicranium

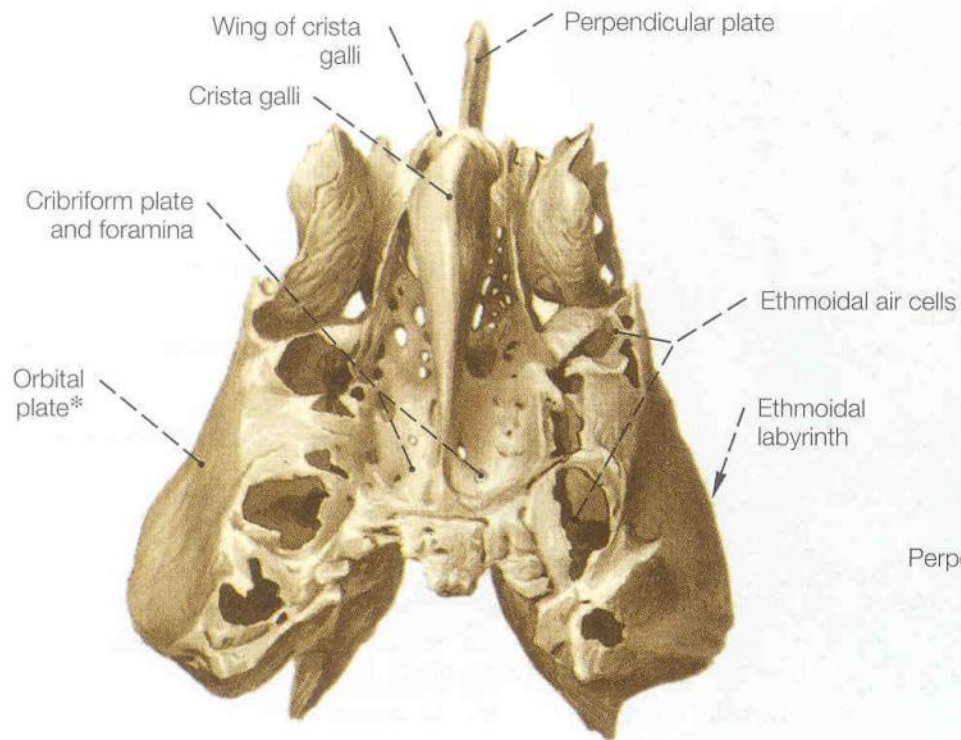
Ethmoid

Sphenoid

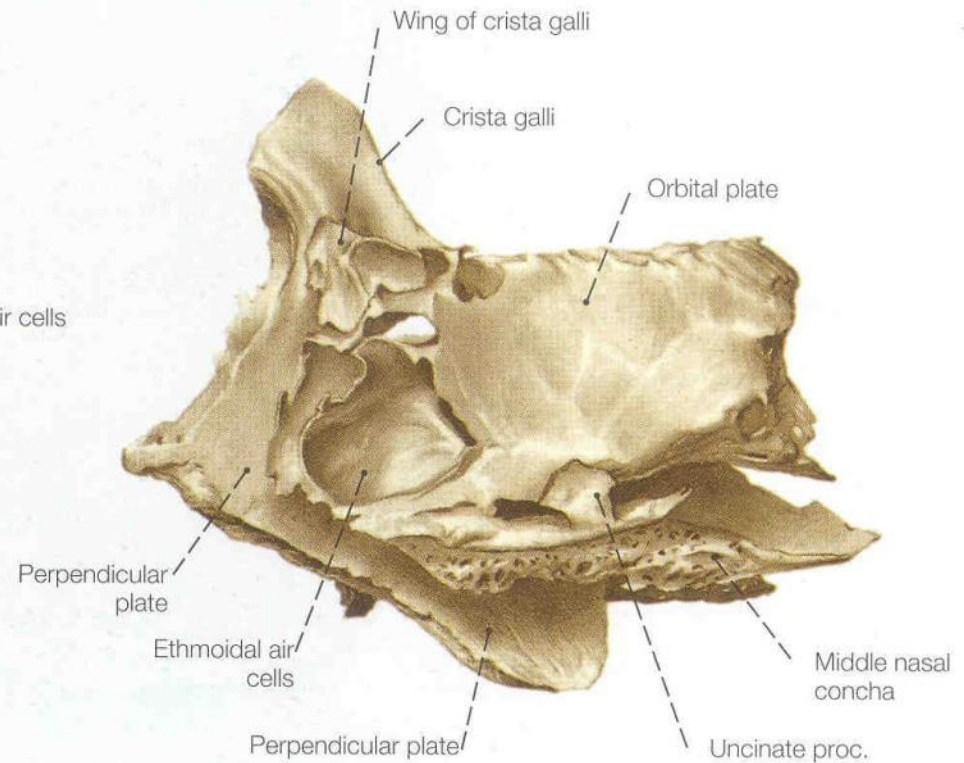
Temporal

Occipital

Ethmoid

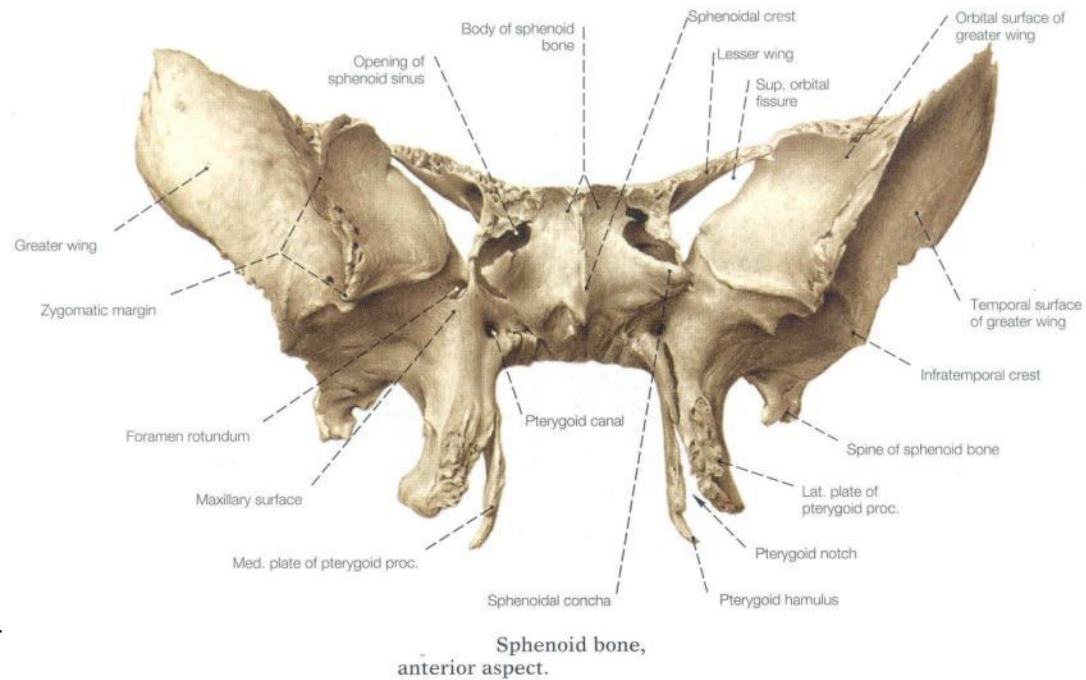


superior

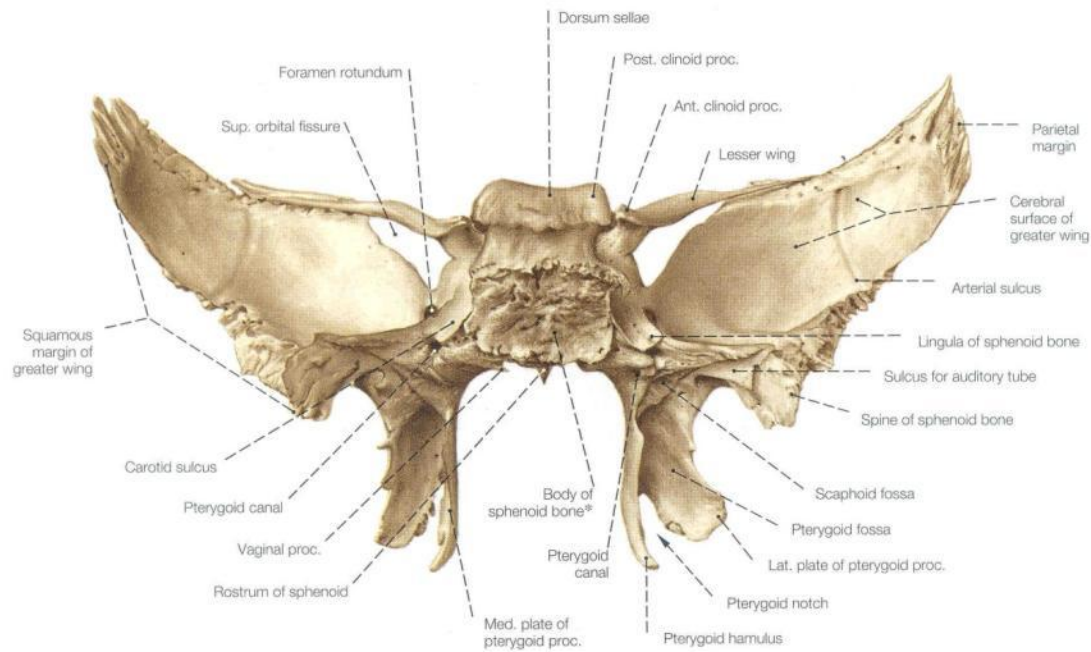


lateral

Sphenoid



Anterior

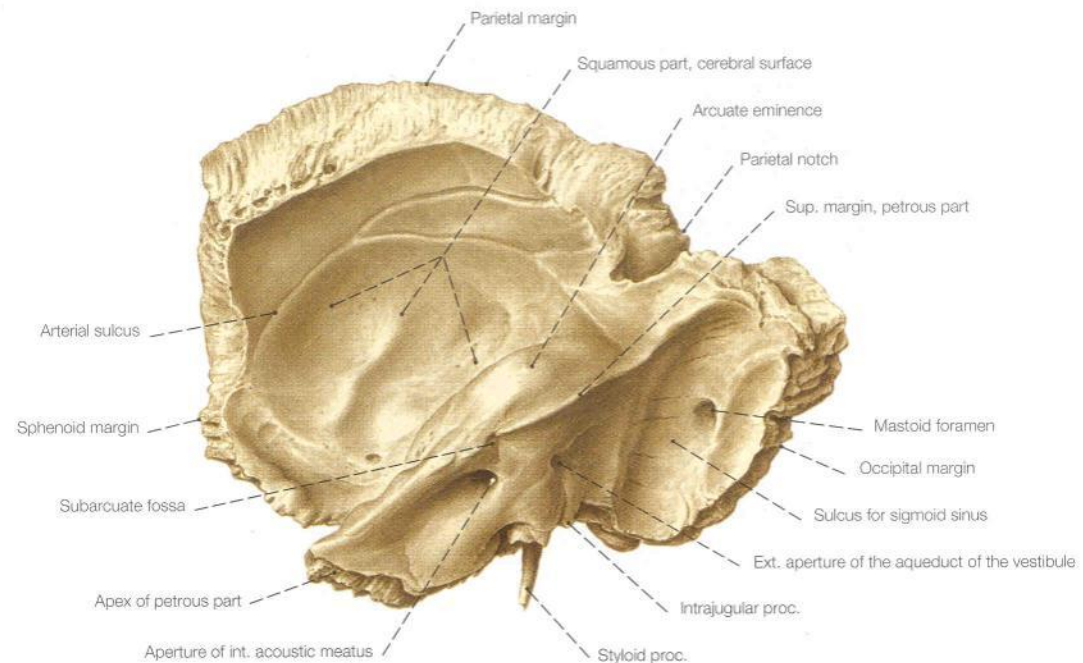
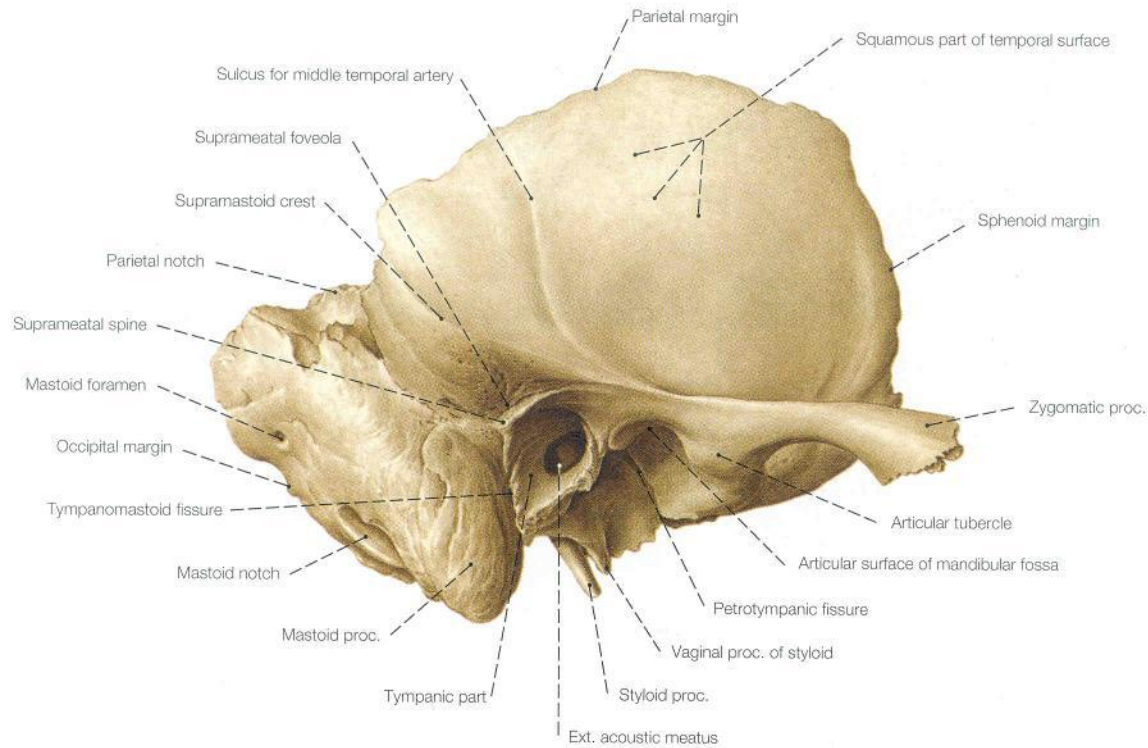


Posterior

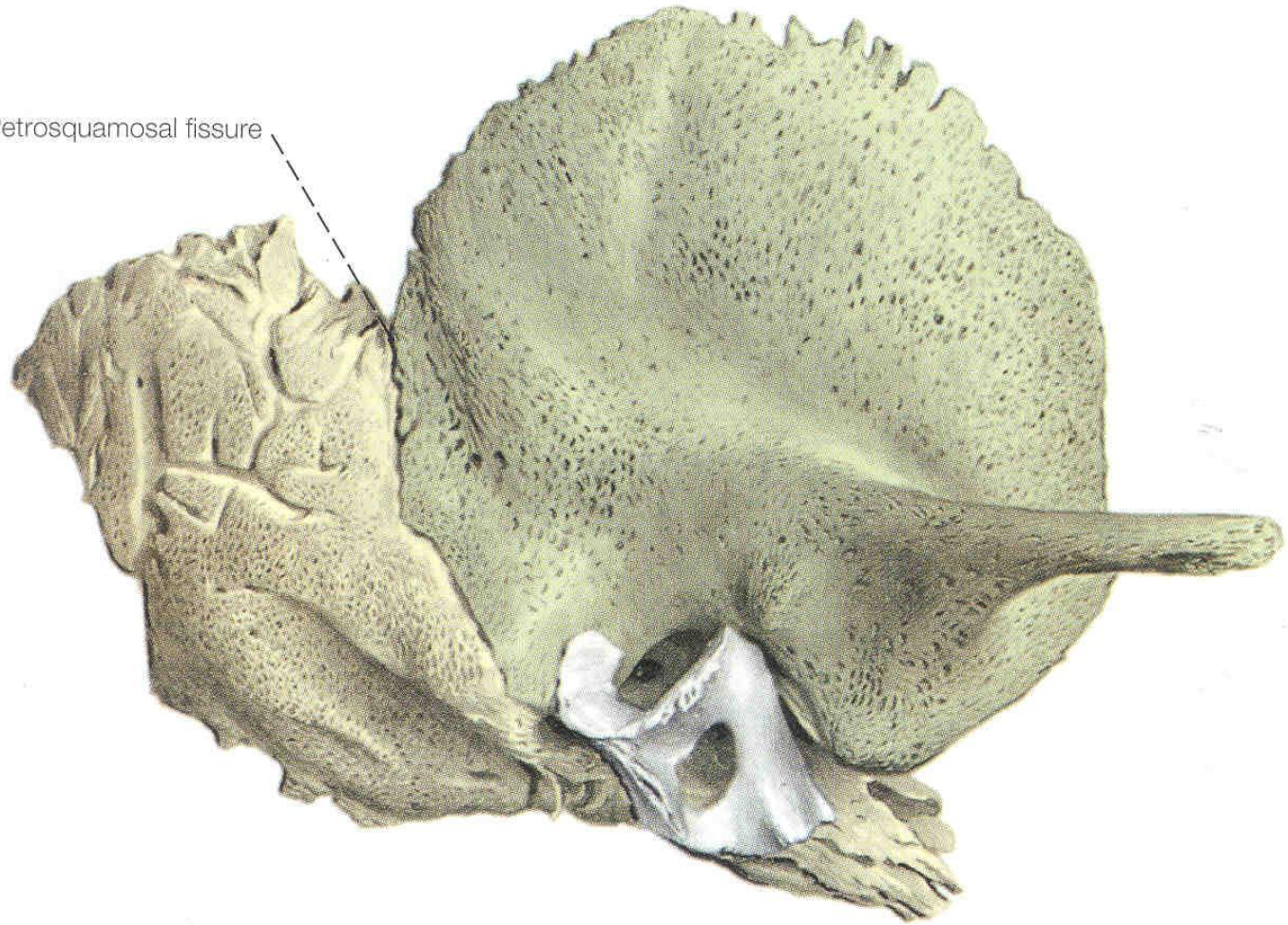
Temporal

Internal

External



Petrosquamosal fissure



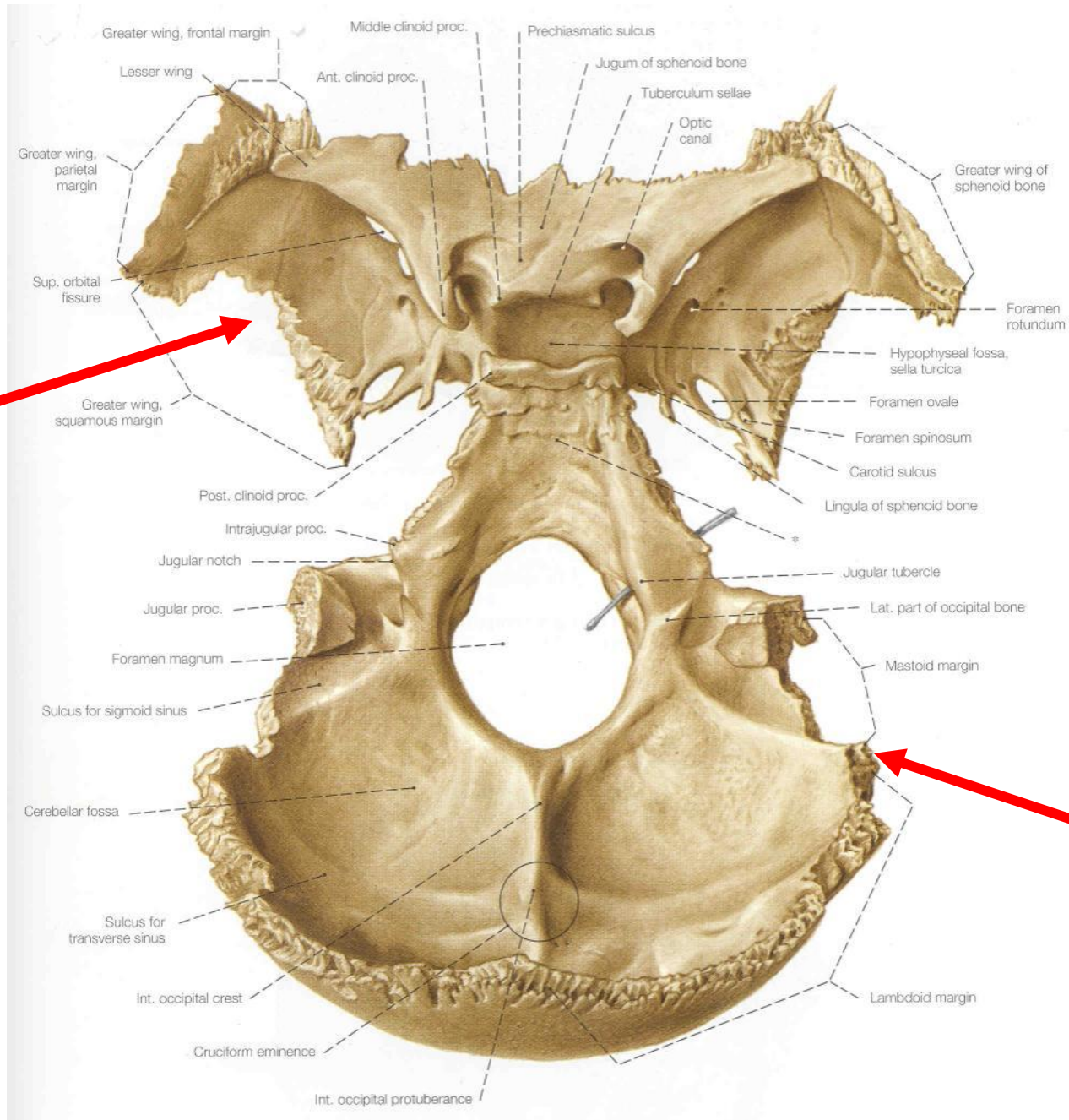
Squamous part

Tympanic part

Petrous part

Neonatal Temporal Bone

Sphenoid



Occipital

02-FEB-01

09:42:09AM

4C1 - 8

H4.0 MHz 100mm

OB

SOFT

60dB -/+1/3/1

GAIN= 0dB $\Delta=1$

18:0 100%

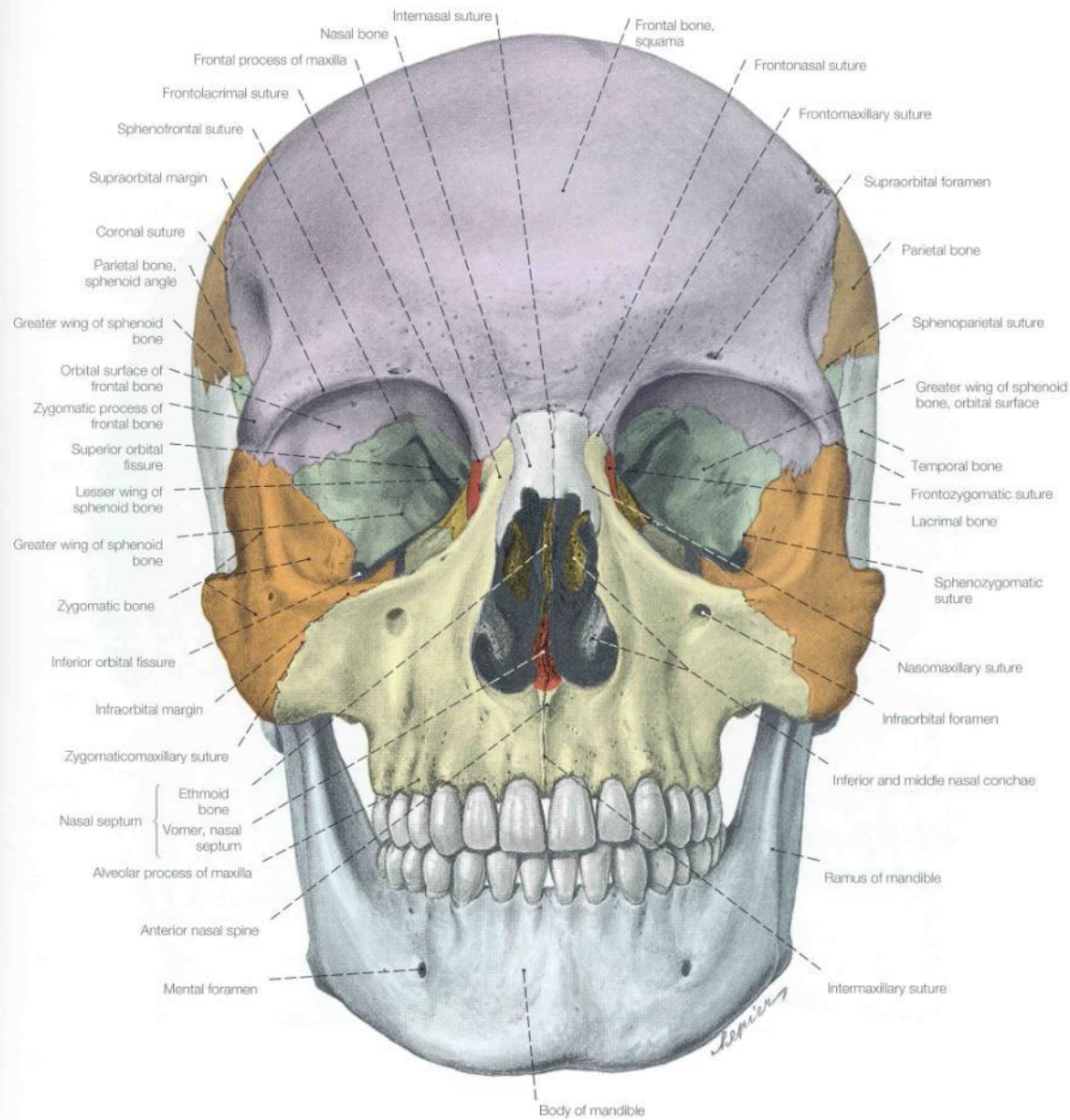


Dermal Roofing Bones

Nasals

Frontal

Parietals

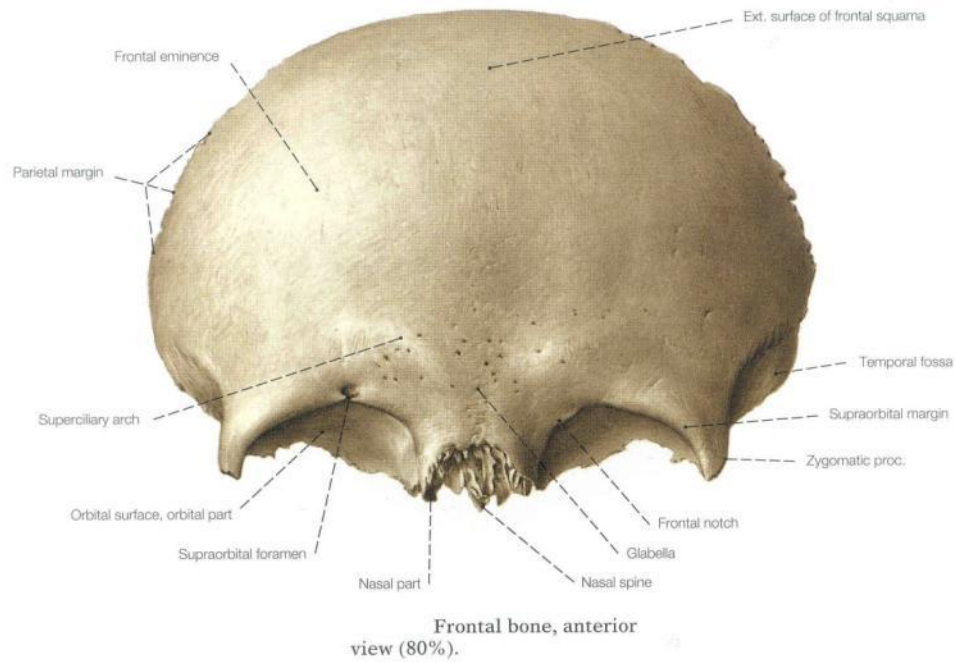


Frontal bone
Nasal bone
Maxilla
Zygomatic bone

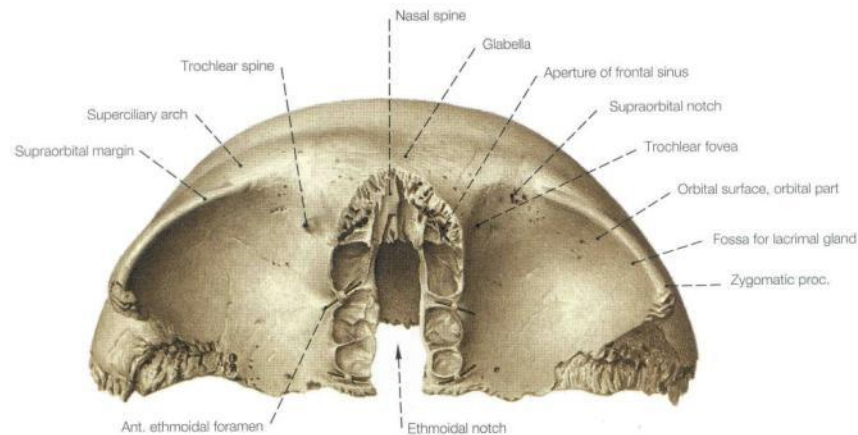
Temporal bone
Inferior nasal concha
Mandible
Lacrimal bone

Vomer
Ethmoid bone
Parietal bone
Sphenoid bone

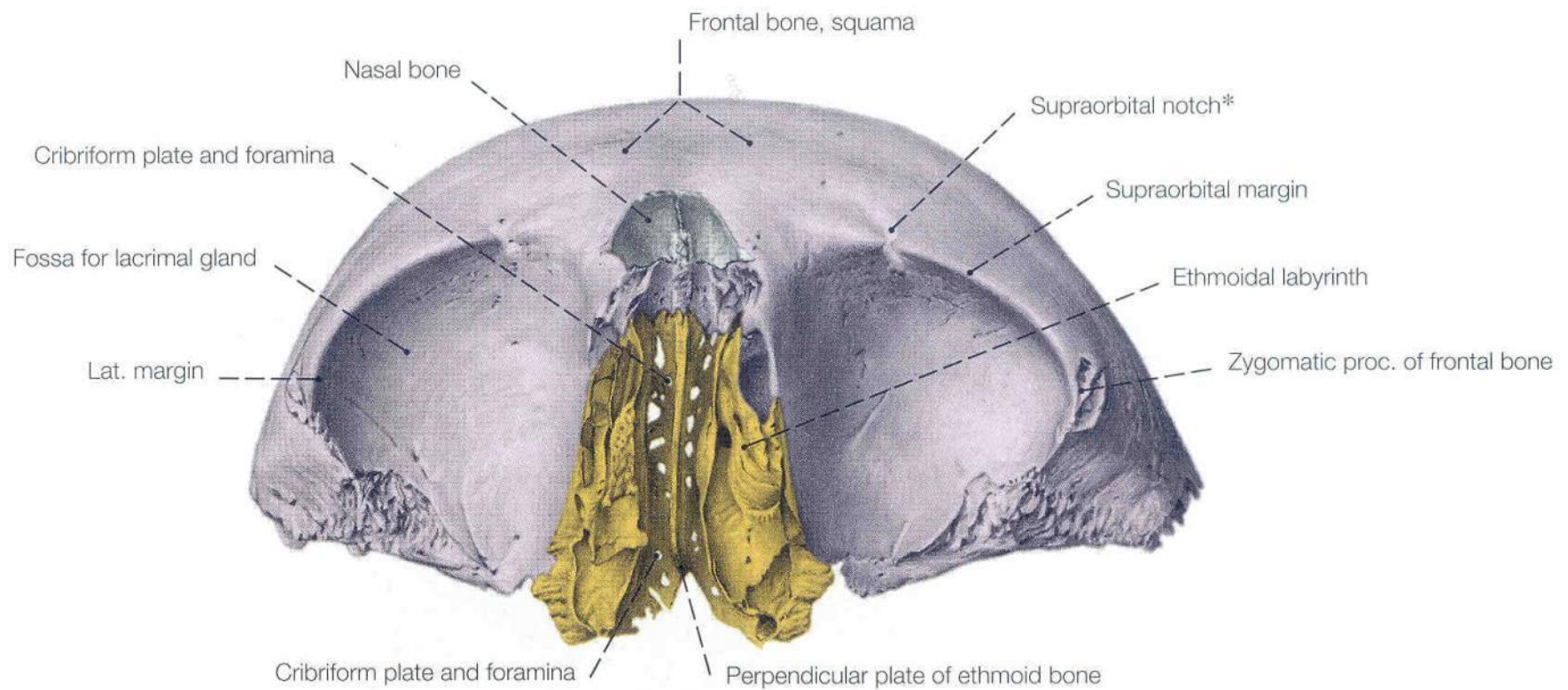
Frontal



Anterior



Inferior



Frontal bone

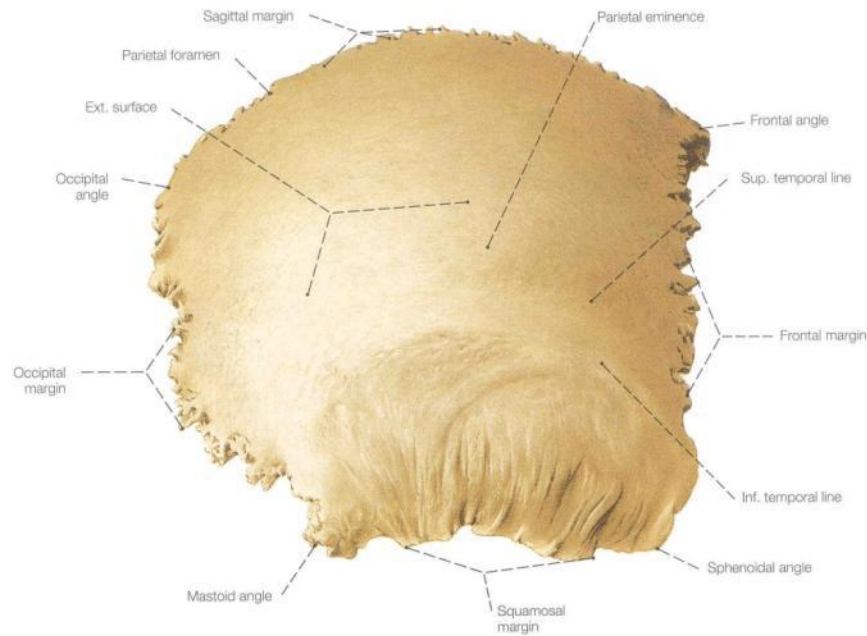


Ethmoid bone



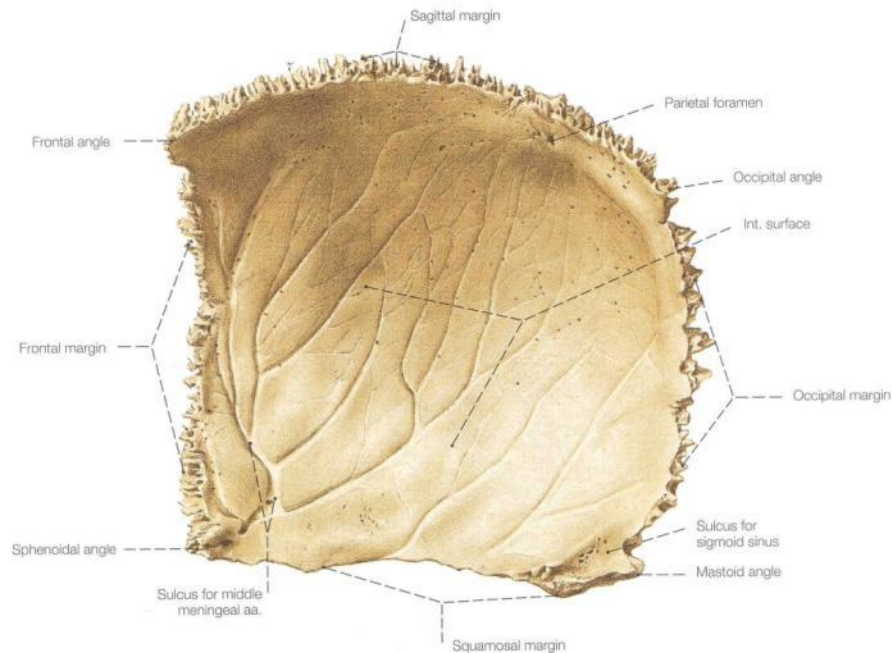
Nasal bone

Parietal



External

The right parietal bone,
lateral aspect



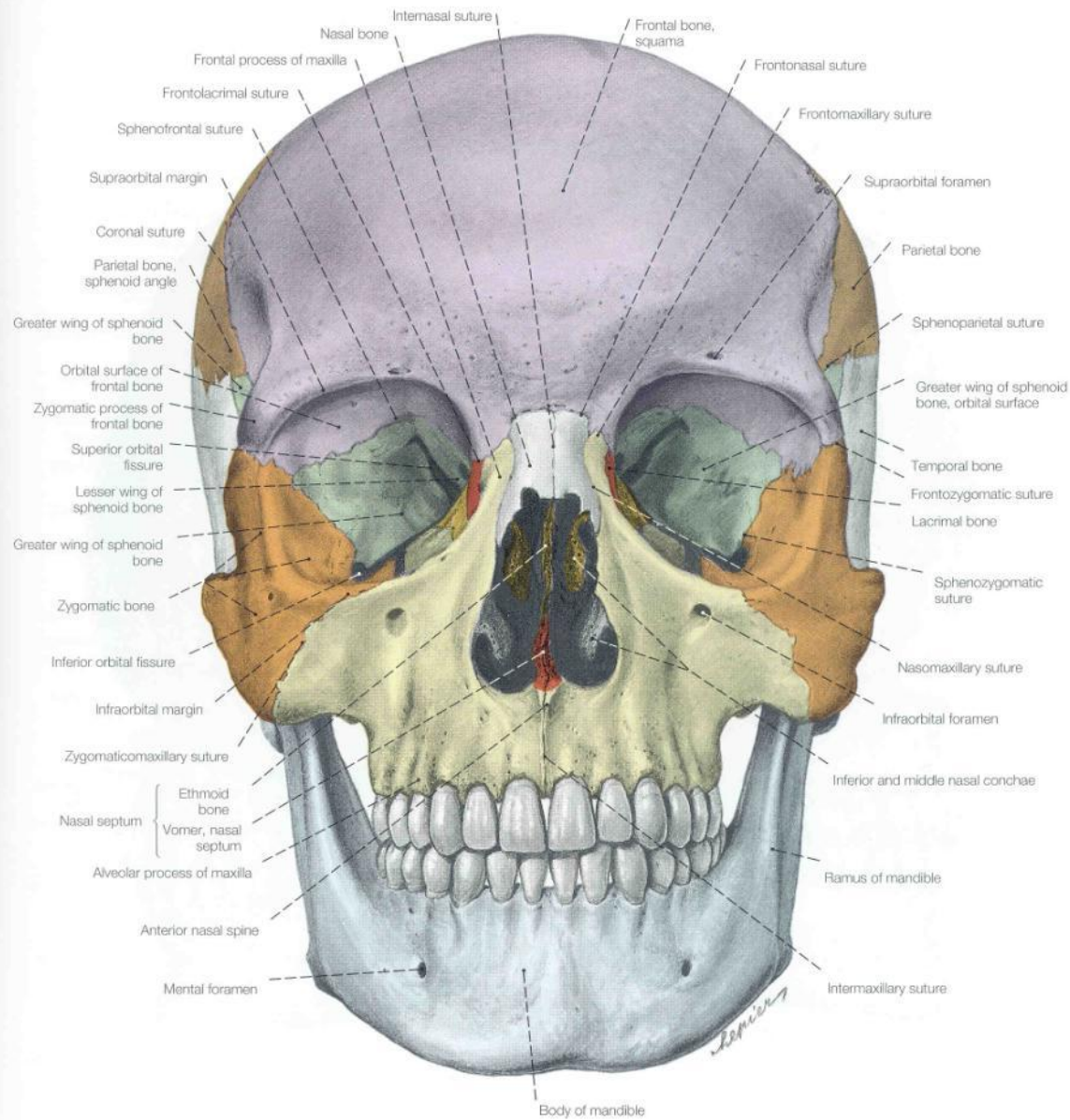
Internal

Dermal Facial Bones

Maxilla

Zygomatic

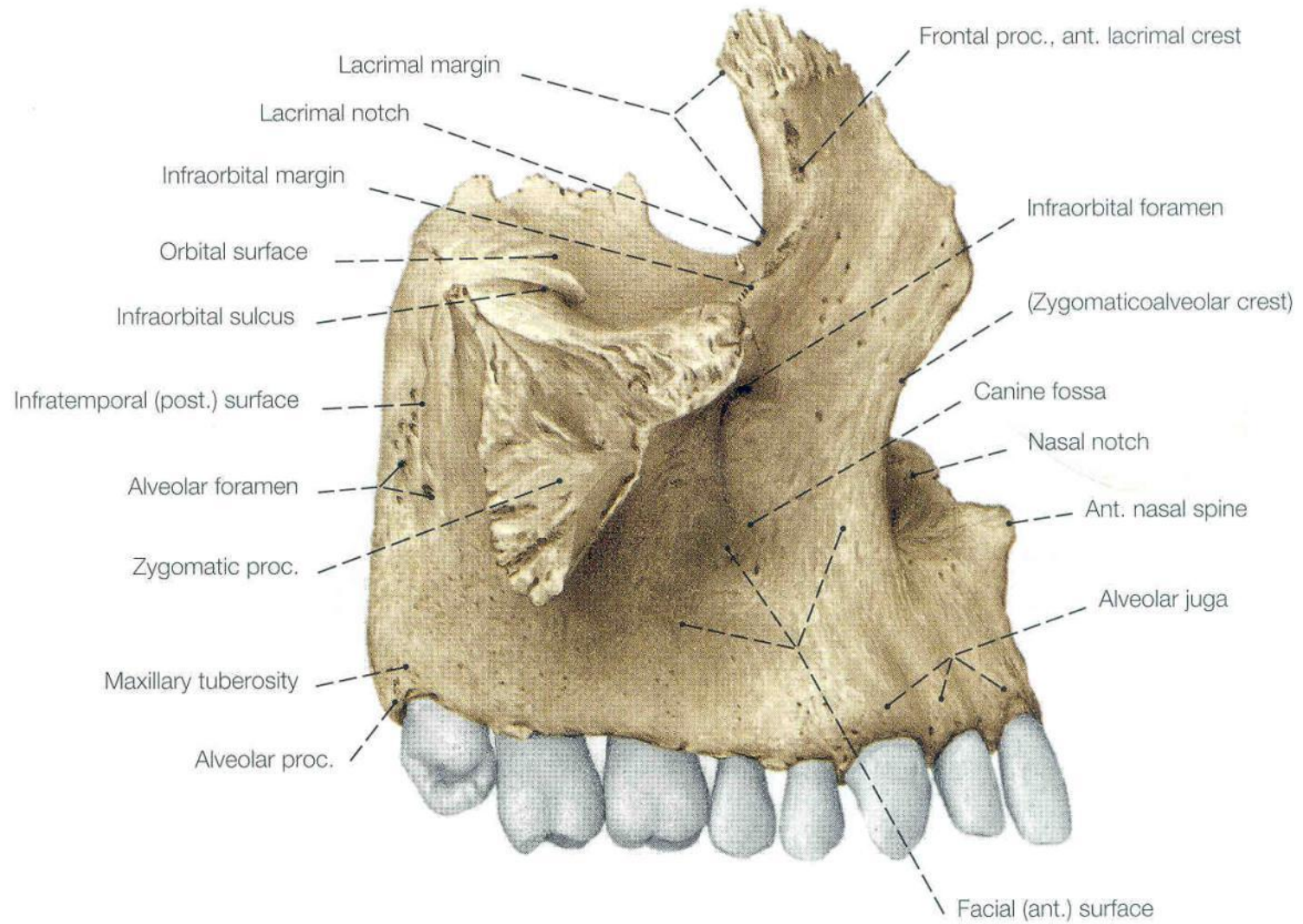
Lacrimal



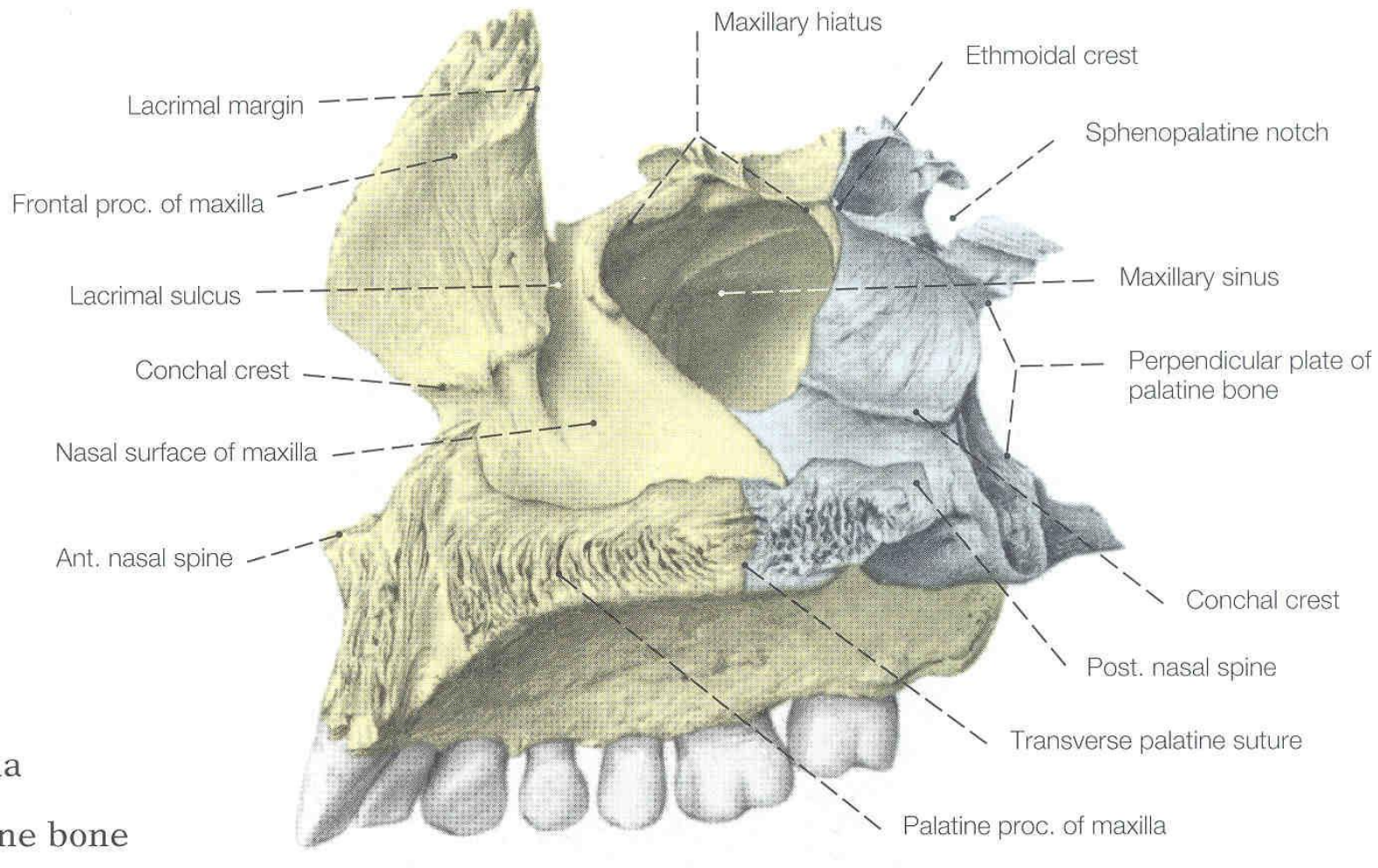
Frontal bone
Nasal bone
Maxilla
Zygomatic bone

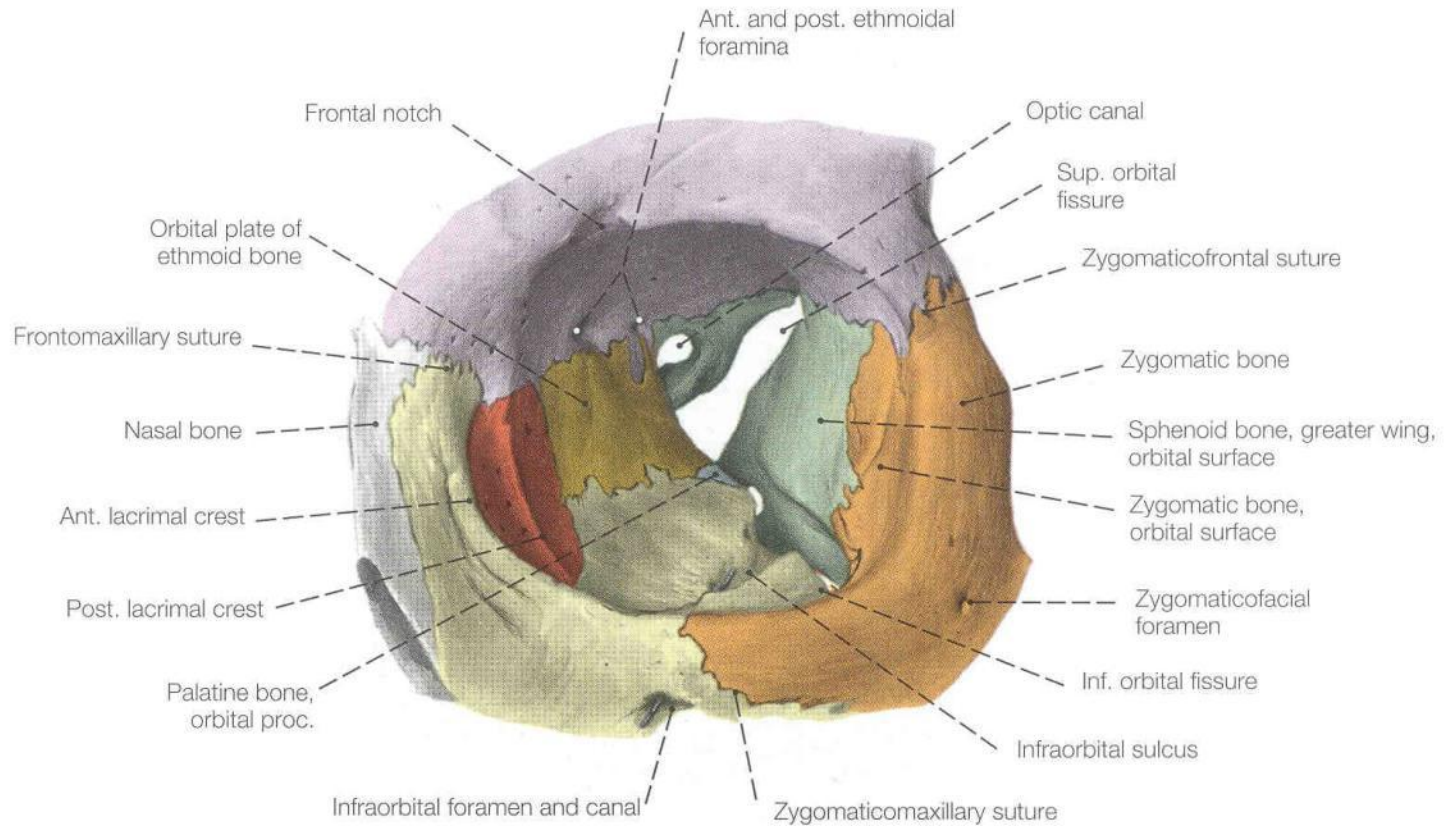
Temporal bone
Inferior nasal concha
Mandible
Lacrimal bone

Vomer
Ethmoid bone
Parietal bone
Sphenoid bone

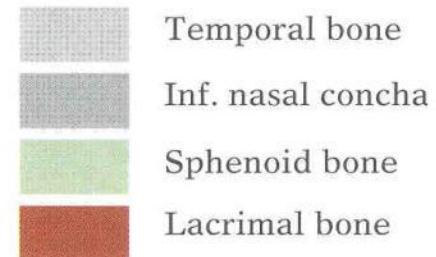
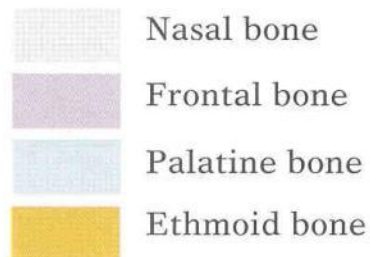


Maxilla: Lateral View





The left orbit, anterolateral view (110%). The probe is in the infraorbital canal.



Bones of the Orbit

Dermal Palatal Bones

Maxilla

Palatine

Vomer



Maxilla



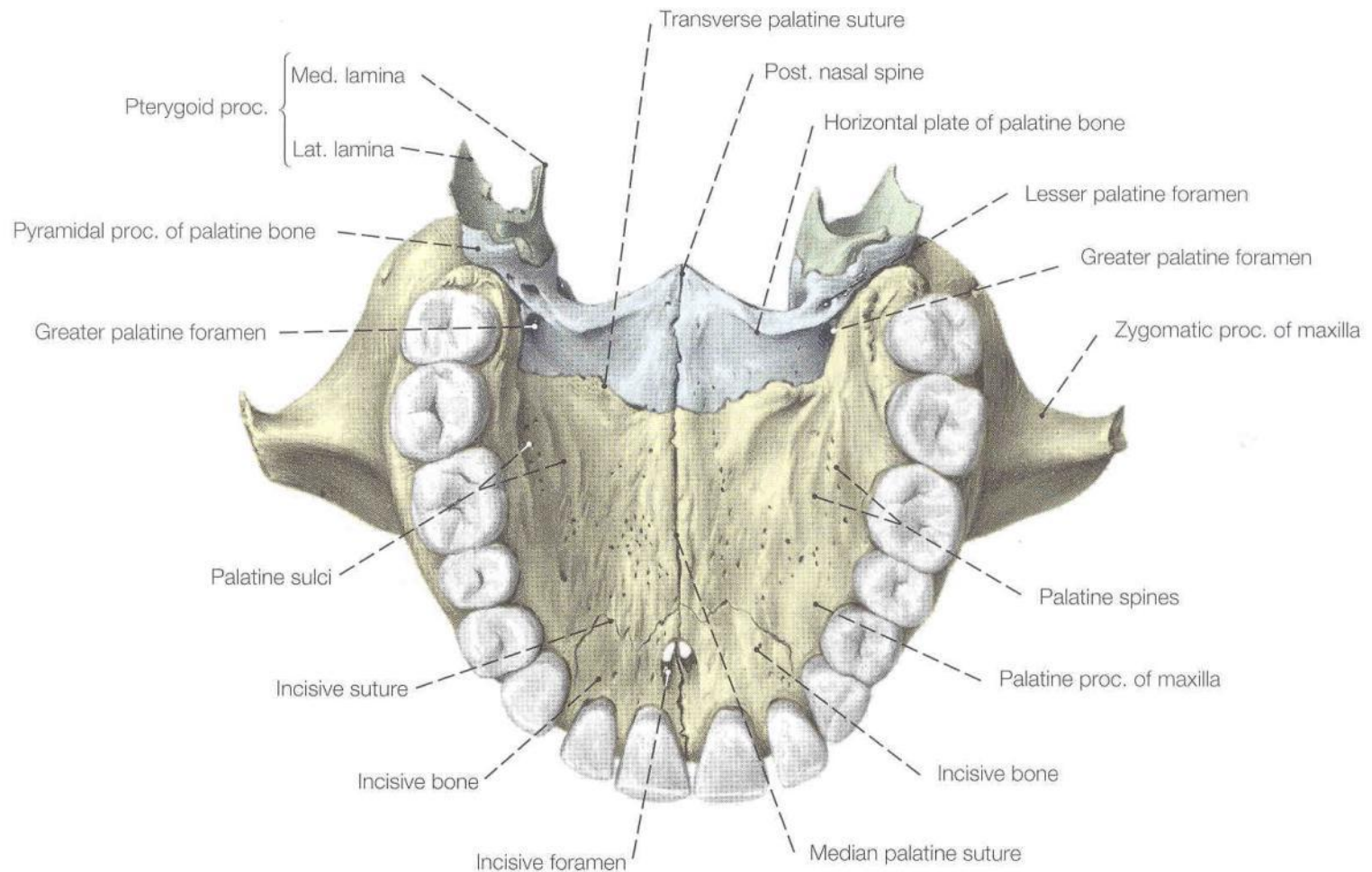
Palatine bone



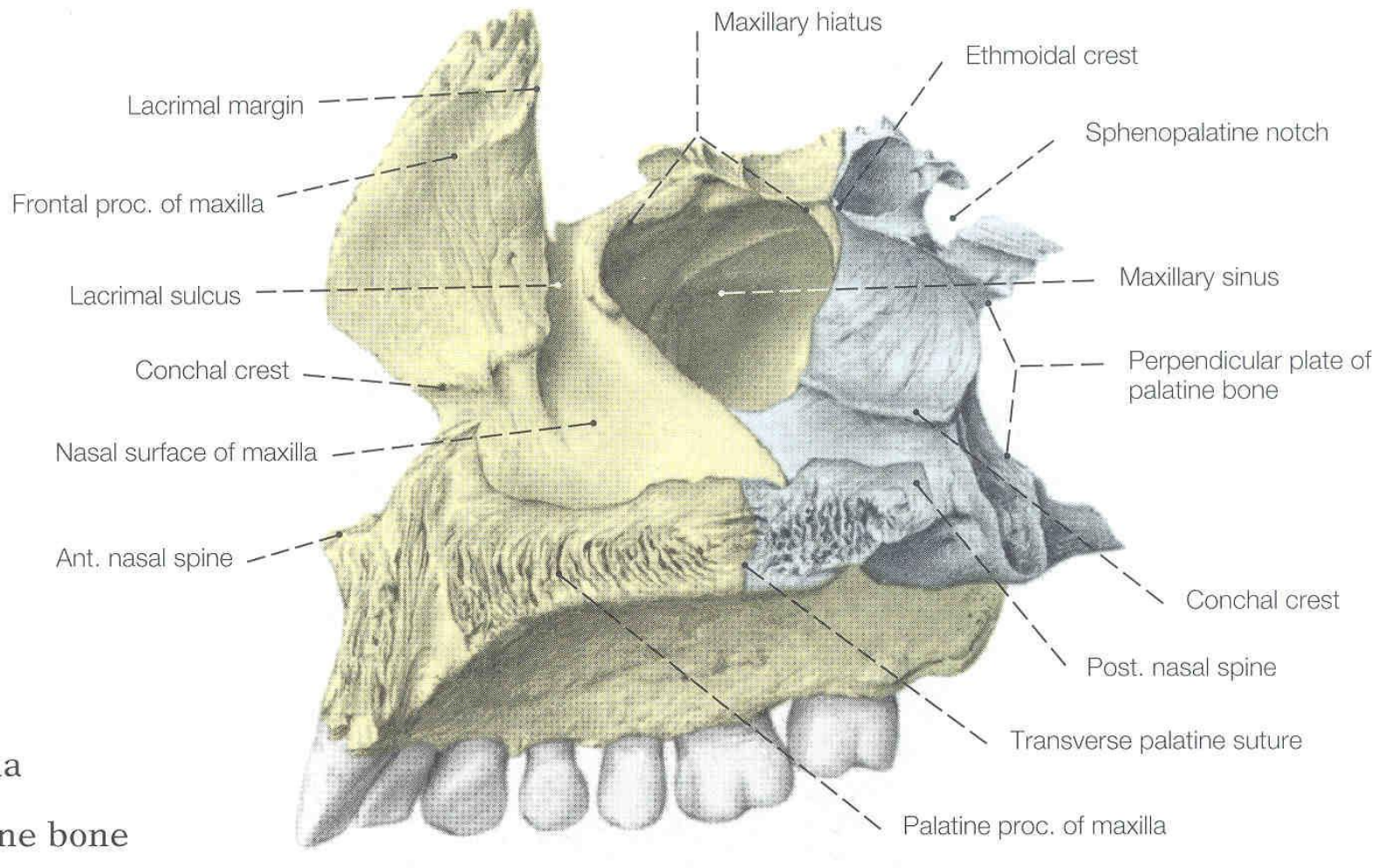
Sphenoid bone



Inferior nasal concha



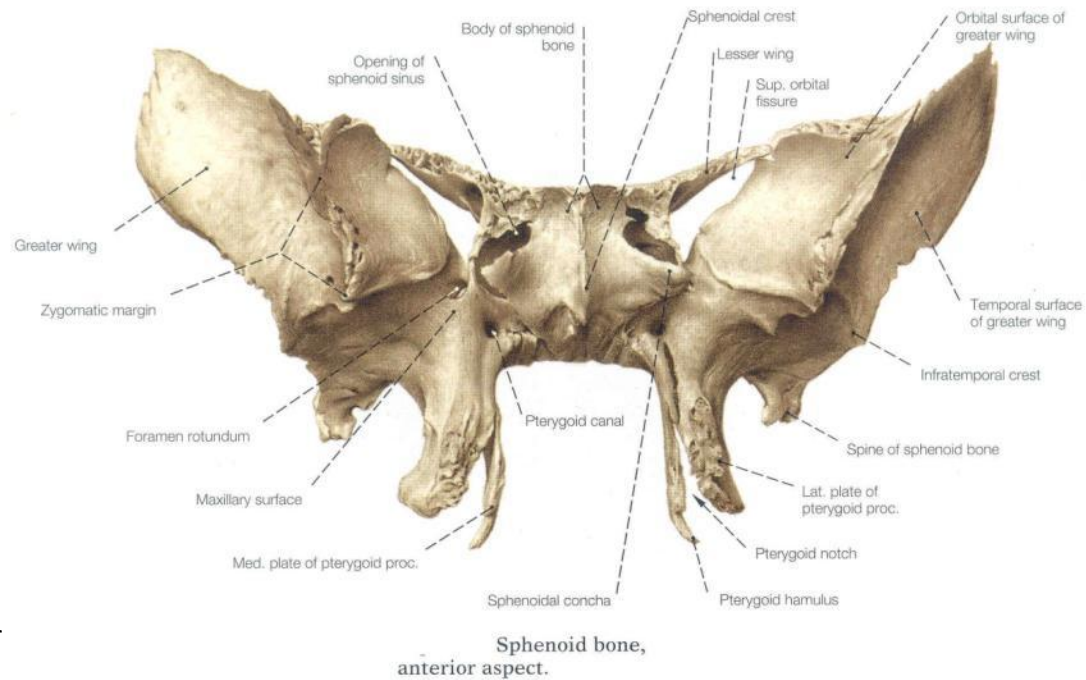
Hard Palate



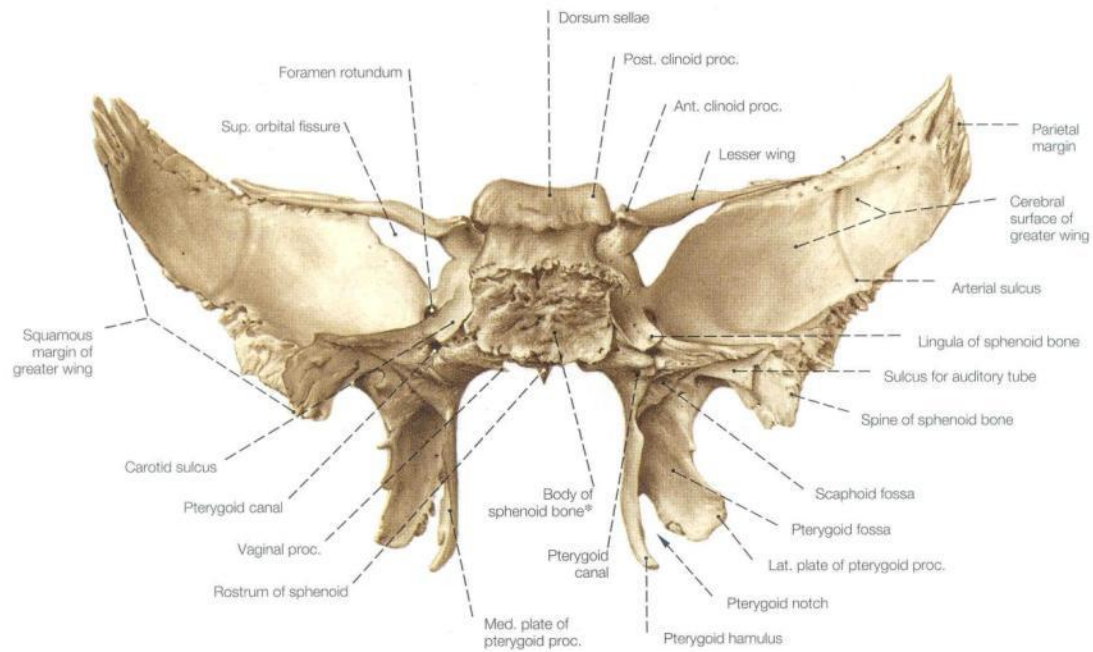
Bones of Splanchnopleure

Sphenoid Greater Wing
Temporal Styloid Process
Middle Ear Ossicles

Sphenoid

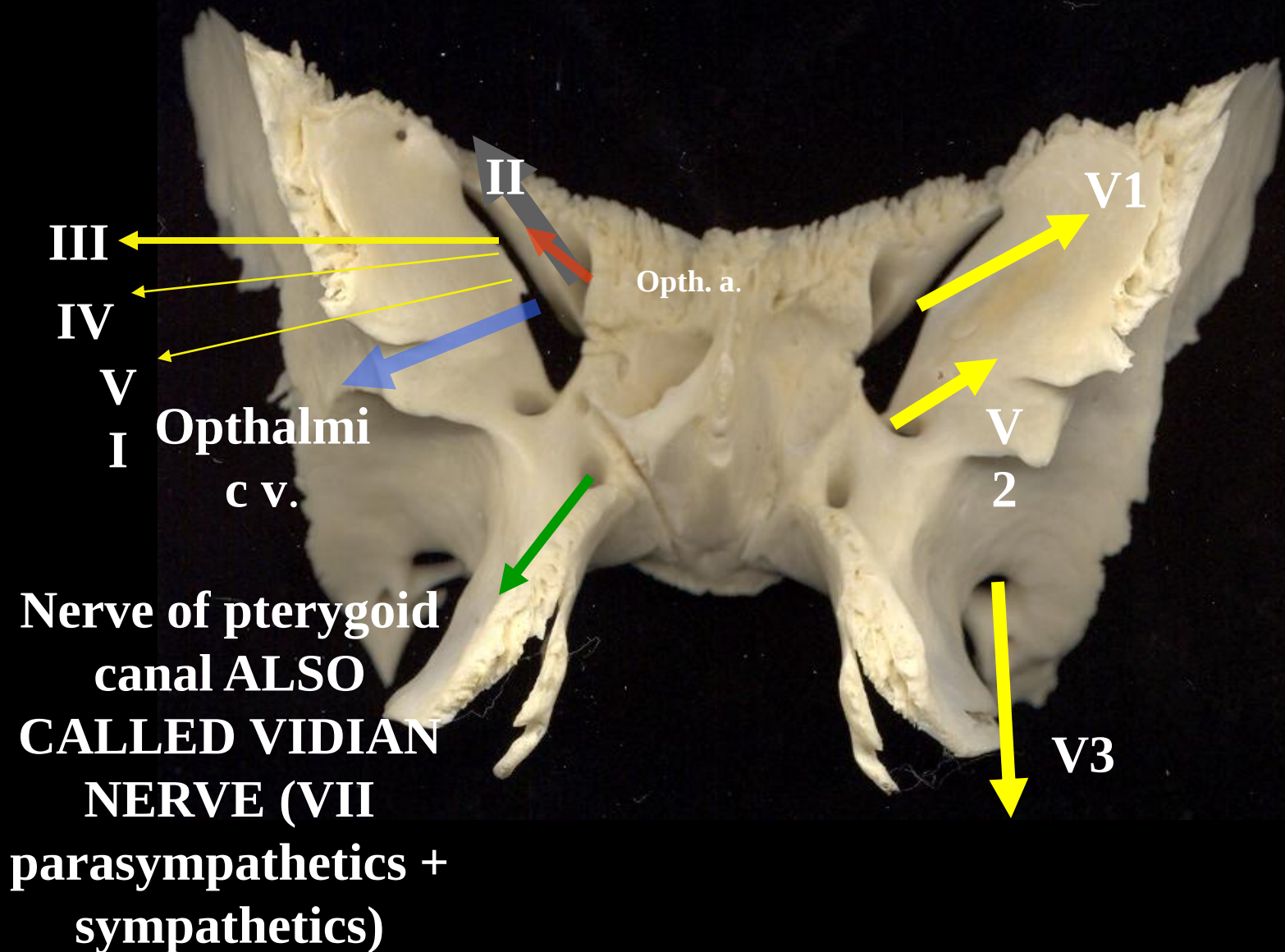


Anterior

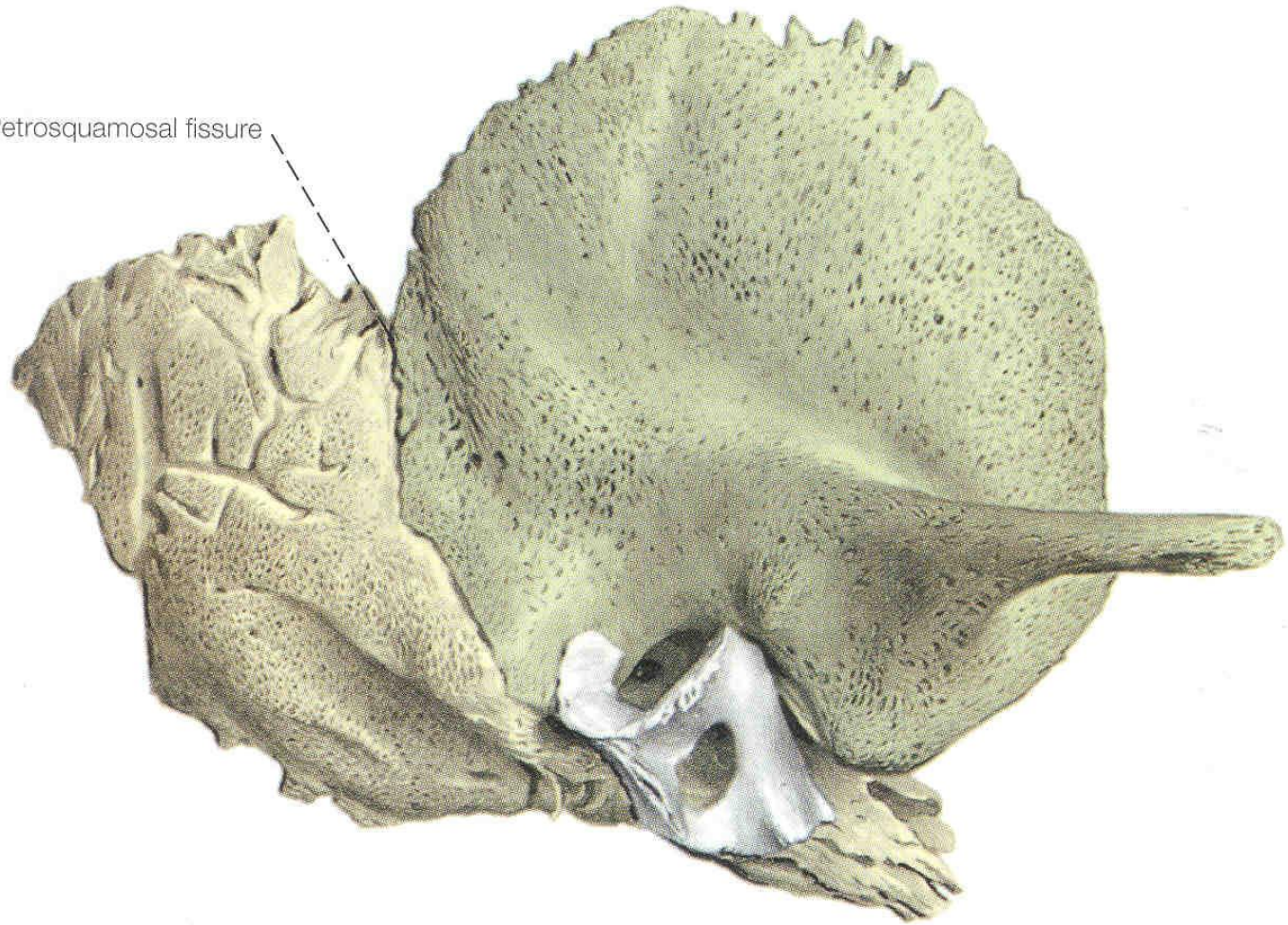


Posterior

Sphenoid/ anterior view of orbital surface and foramina with associated cranial nerves indicated



Petrosquamosal fissure



Squamous part

Tympanic part

Petrous part

Neonatal Temporal Bone

Middle Ear Ossicles

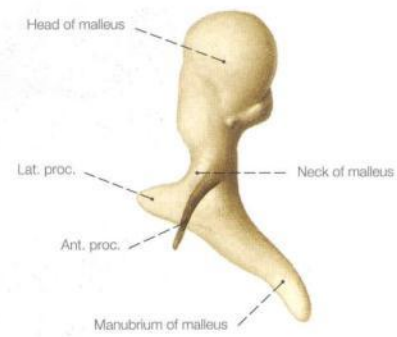
Malleus

Incus

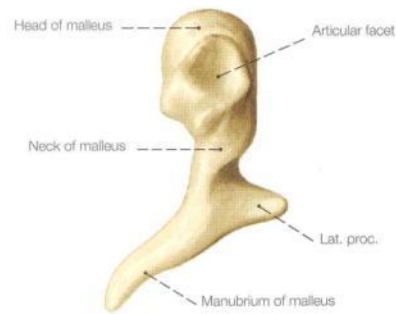
Stapes



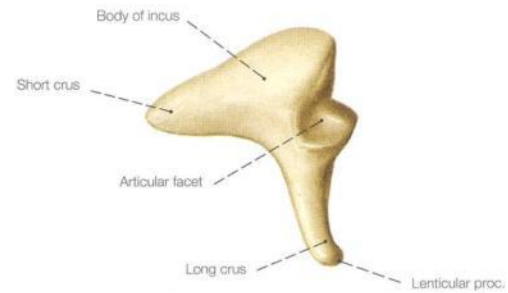
The right malleus,
lateral view



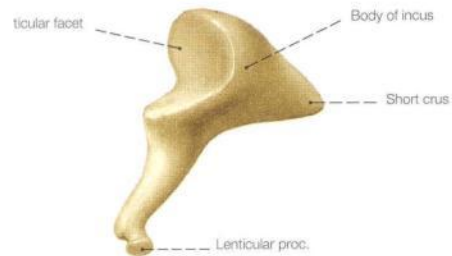
The right malleus,
anterior view



The right malleus,
posterior view



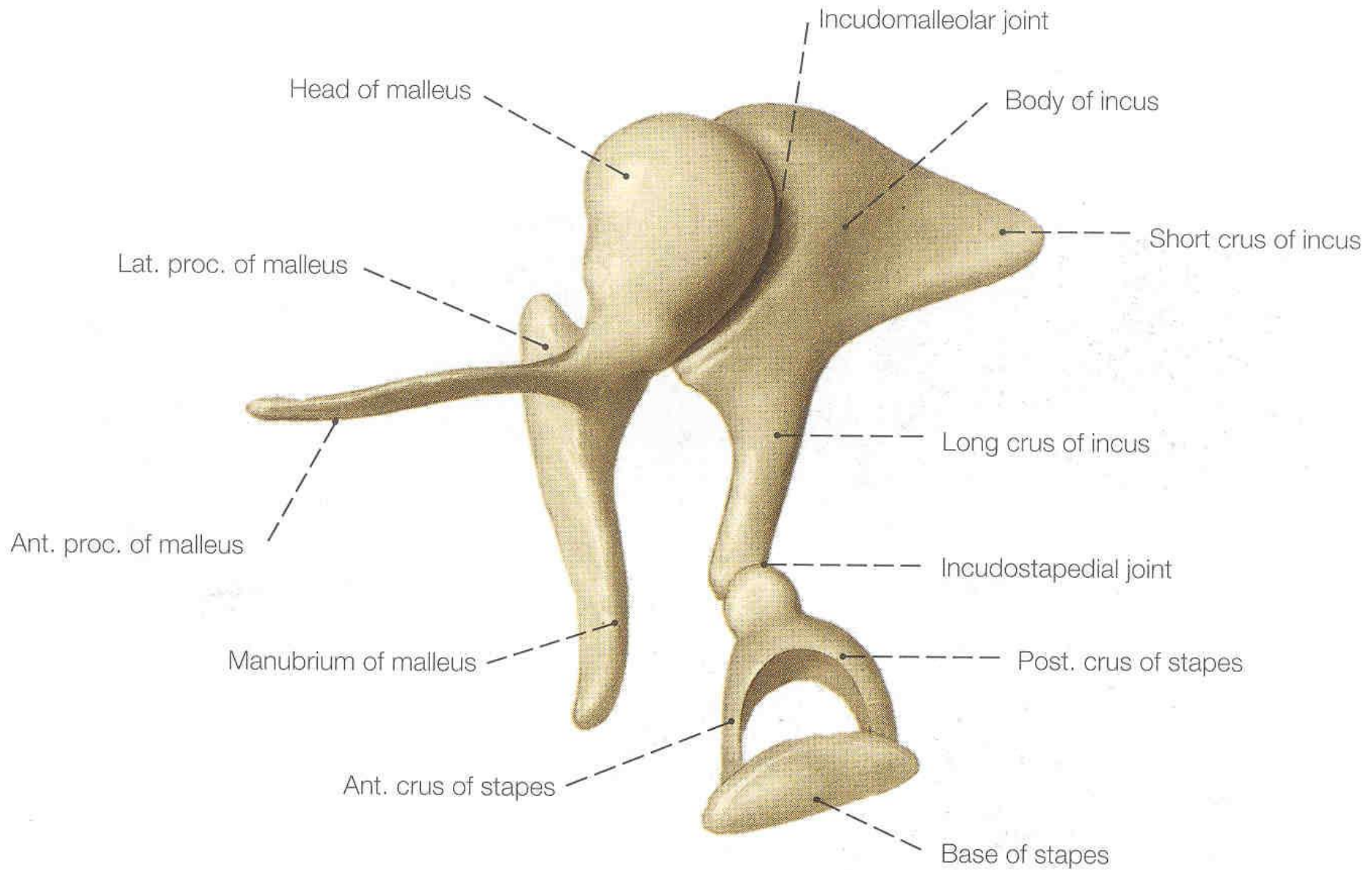
The right incus,
lateral view

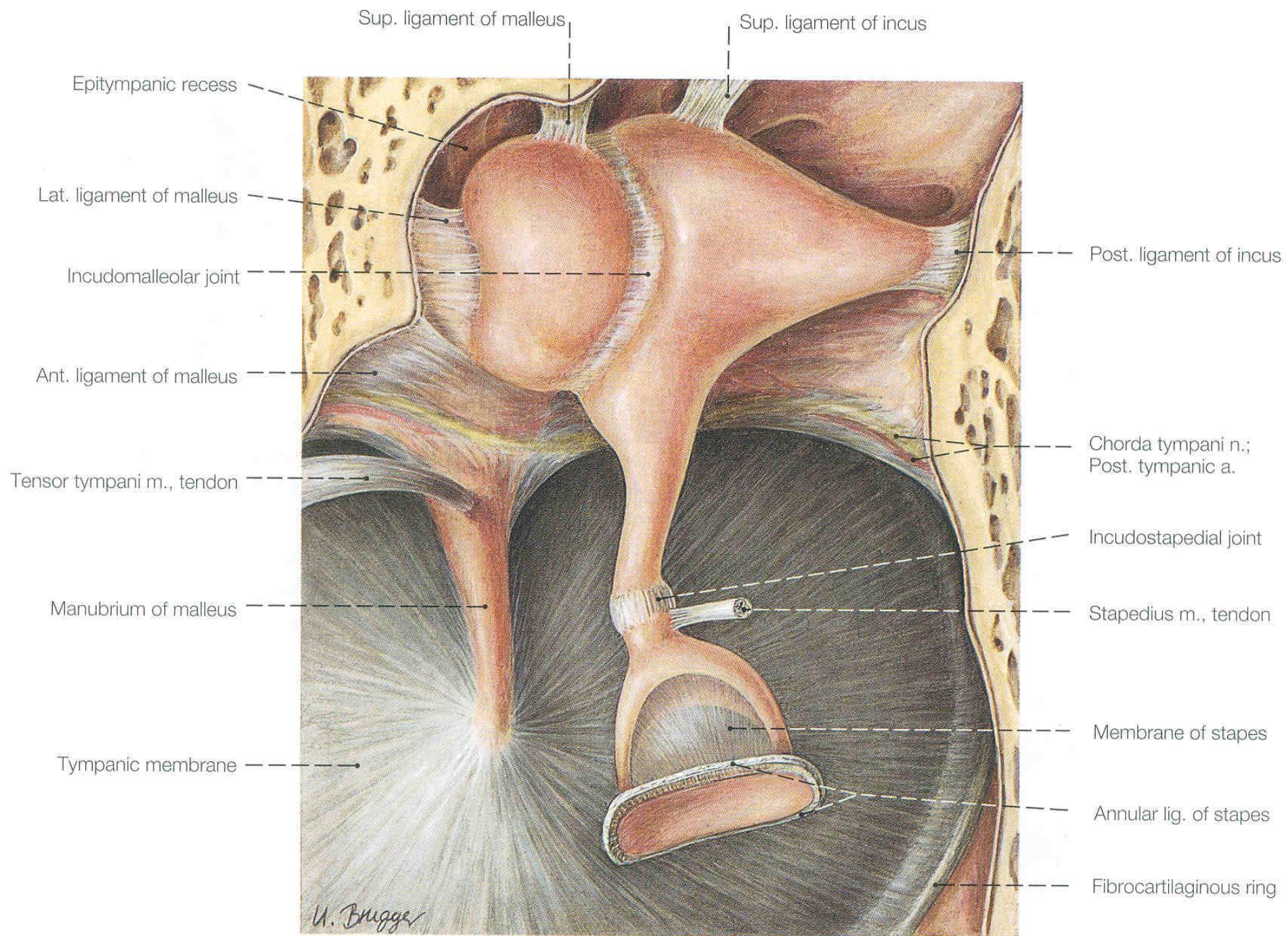


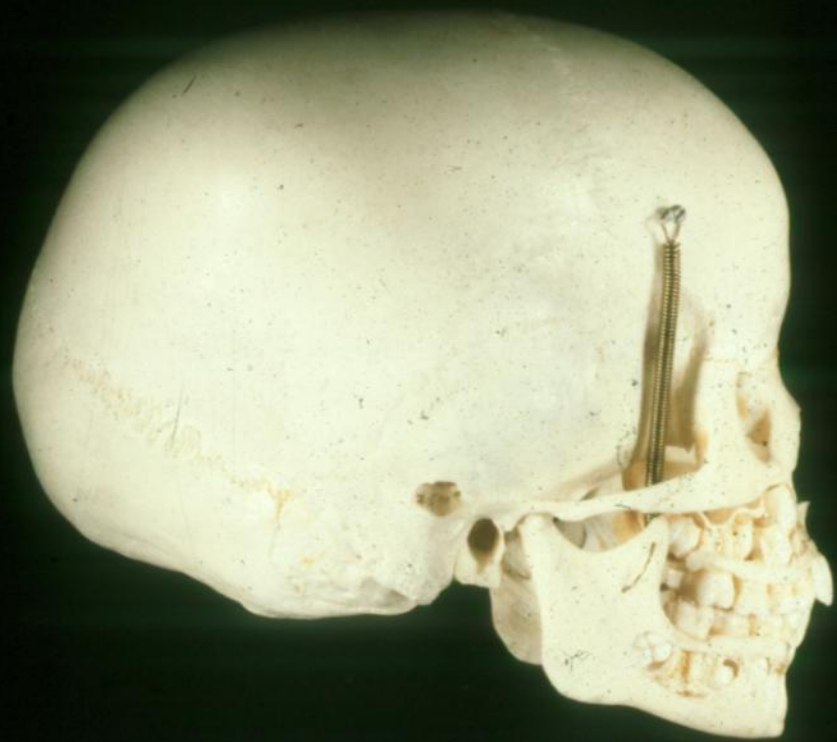
The right incus,
medial view



The right stapes,
viewed from above

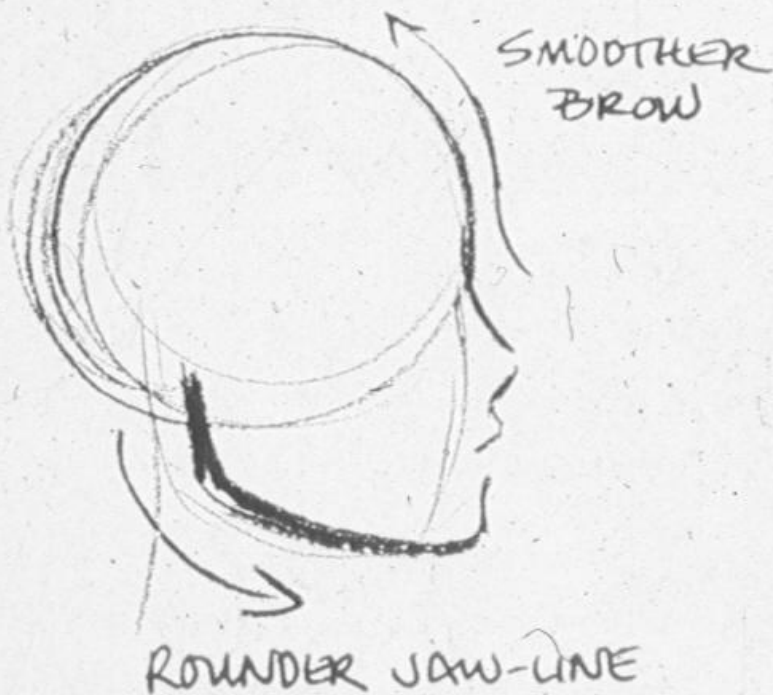






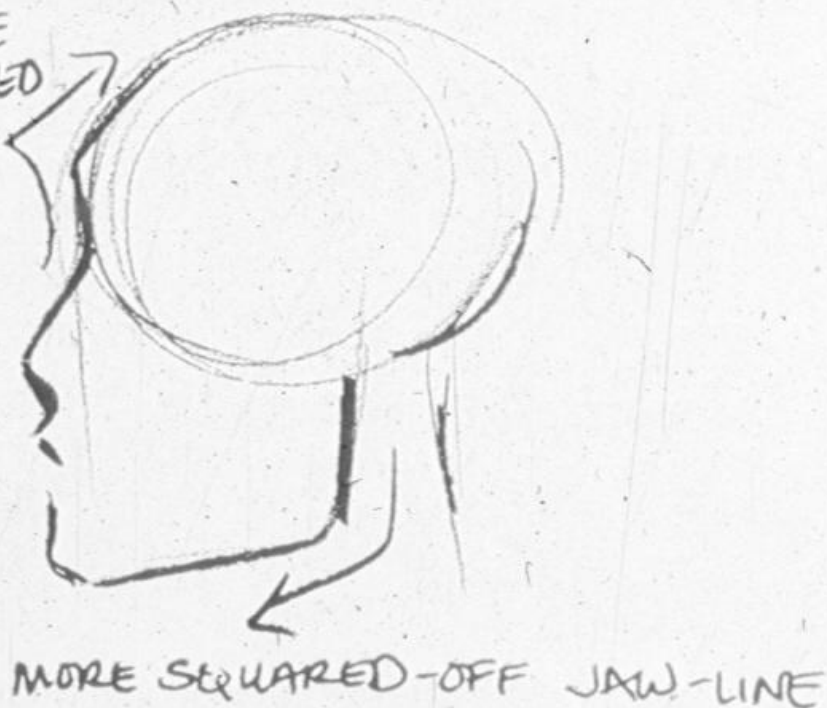


FEMALE



MALE

MORE
DEFINED
BROW



→ WOMEN MATURE EARLIER (TO HAVE BABIES)

SINCE → MORE BONE DEPOSITS, THE LATER ONE MATURES,
IT IS LOGICAL THAT MALES WOULD HAVE "HEAVIER"
BROW + JAW BONE.

