

ANP 1106: Topic 3B

Anatomy of the Skeletal System



Throughout this section, refer to table 6.1: Bone Markings – *you are responsible for being able to define all of these bone markings*

THE SKELETON (Chapter 7)

- **206** bones in human skeleton - make up about 20% of body weight
- grouped into **axial** and **appendicular** skeletons
 - axial skeleton** = bones of skull, vertebral column, rib cage
 - appendicular skeleton** = bones of upper & lower limbs + pectoral/pelvic girdles (attach limbs to axial skeleton)

AXIAL SKELETON

80 bones

SKULL

most complex

2 sets of bones: **cranial** + **facial** = 22 bones

most skull bones are flat bones; (except mandible); united by **sutures**

facial bones form anterior part of skull & cranial bones form the rest

skull has eye orbits & paranasal sinuses, houses organs of hearing,
has 85 openings for nerves, blood vessels & spinal cord

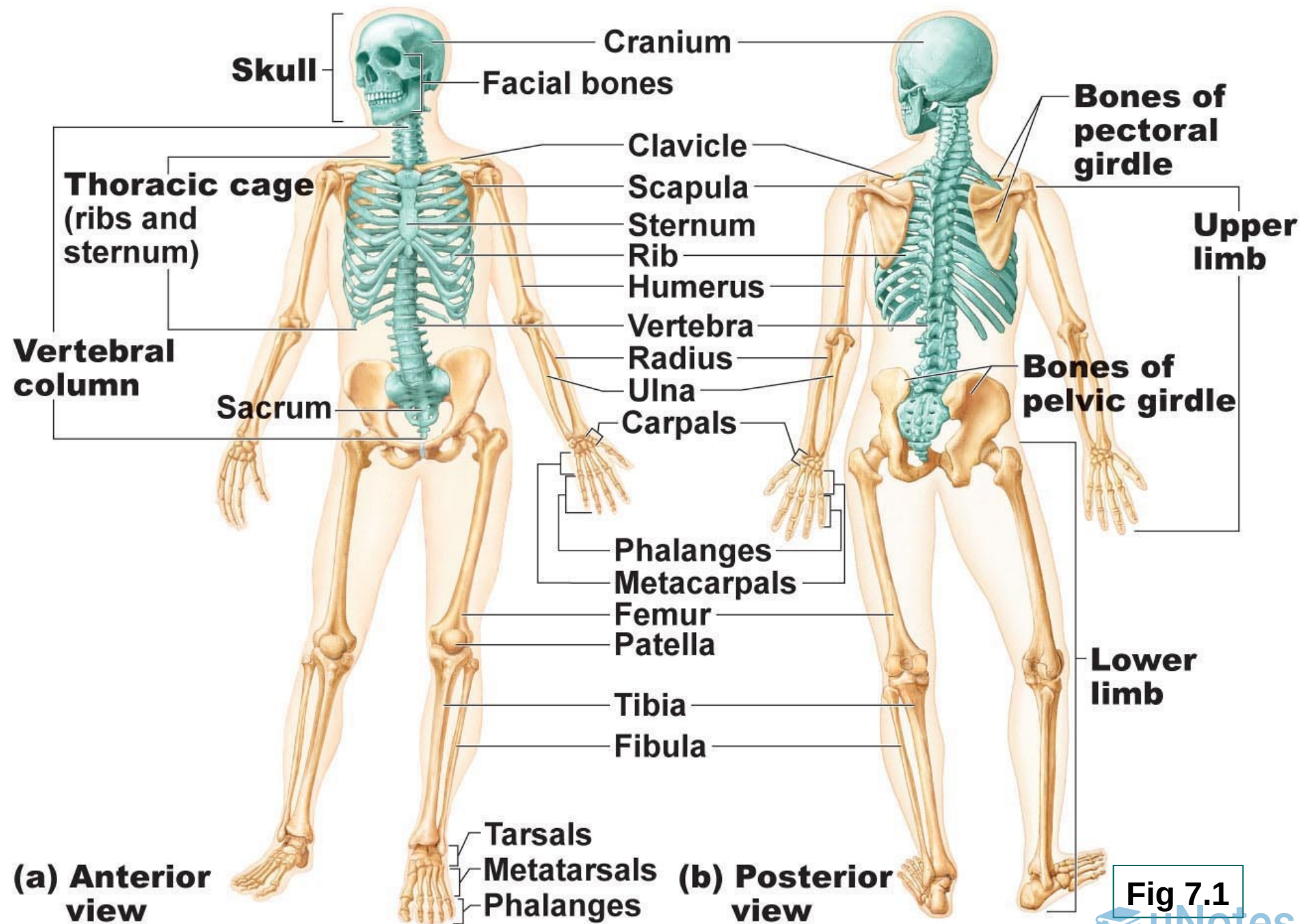
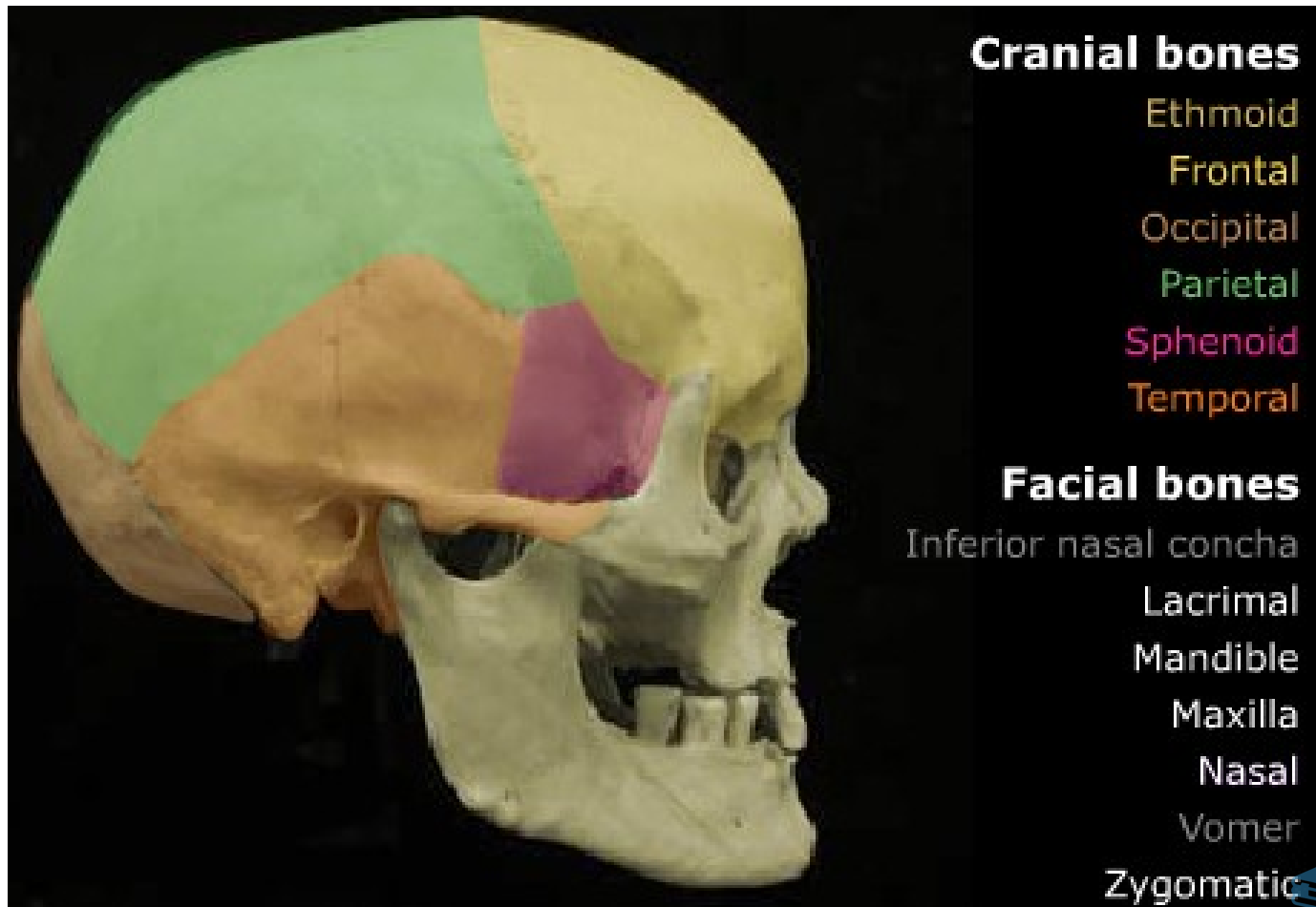


Fig 7.1

A) Cranium:

- cranium can be divided into a **vault** & a **base**
- **vault**: forms superior, lateral & posterior aspects of the skull + forehead
- **base**: inferior aspect of skull
- cranium surrounds & protects brain & organs of hearing & balance
- internally, 3 bony ridges divide the cranial base into 3 distinct areas: anterior (highest) fossa, middle fossa & posterior (lowest) fossa



B) Facial bones or Face:

form framework of the face

contain the cavities for the
sensory organs of sight, smell &
taste

provide openings for passage of
air & food

secure the teeth

anchor the facial muscles that
we use to show our feelings

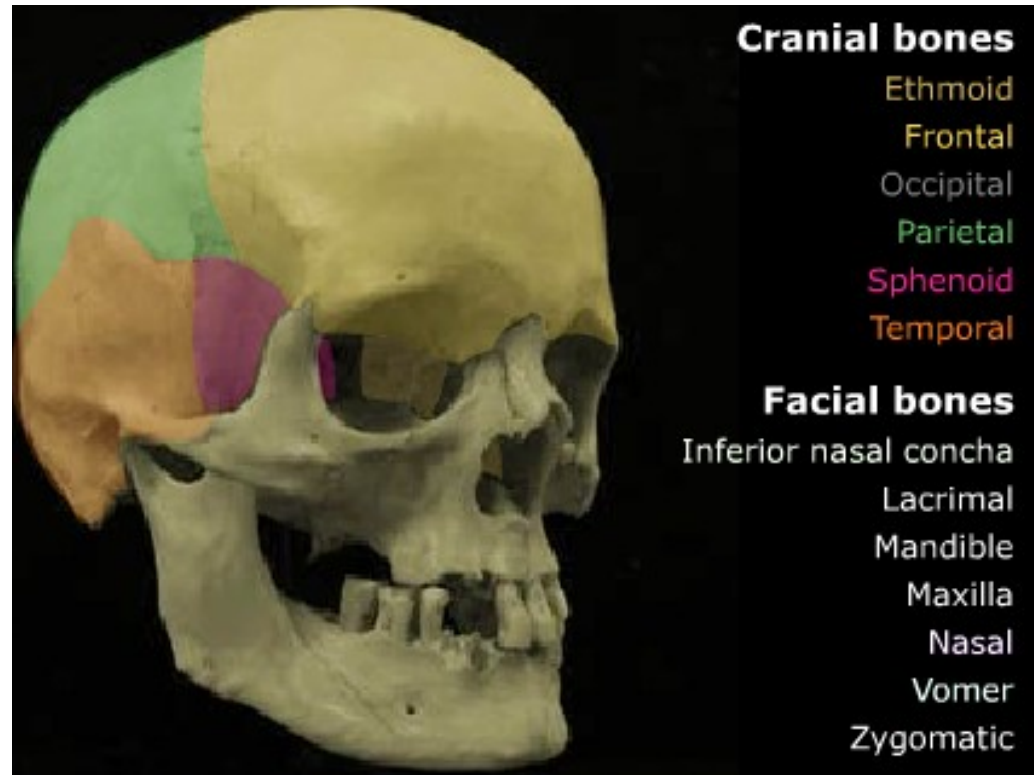
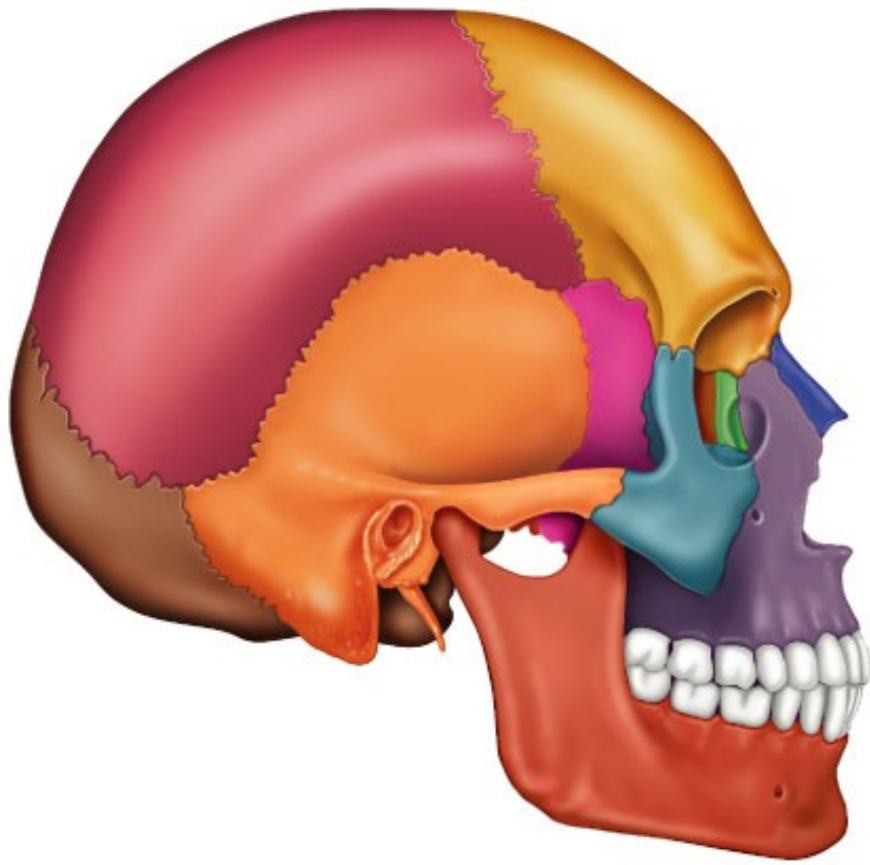


Fig. 7.4a

Cranium: 8 cranial bones are the **paired parietal** & **temporal** bones & the **unpaired frontal**, **occipital**, **sphenoid** & **ethmoid** bones

curvature allows them to be self-bracing; can be strong while being quite thin

Fig. 7.5a



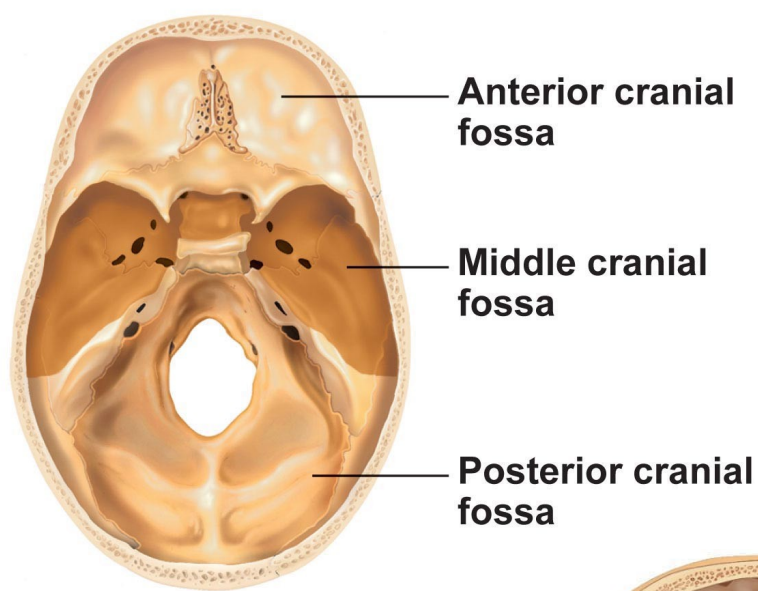


Fig. 7.2C

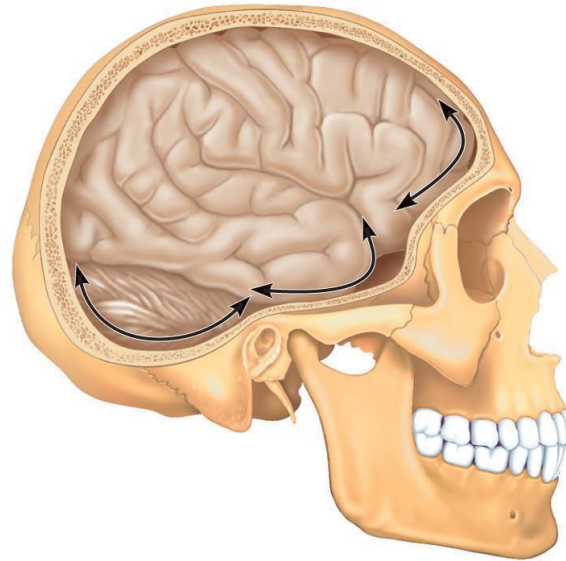


Fig. 7.4a

(i) Frontal Bone:

dome-shaped bone; also forms the roof of the orbits & anterior cranial fossa
 articulates with paired parietal bones posteriorly
 note supraorbital margin, supraorbital foramen, and glabella
 area lateral to glabella has left & right frontal sinus within bone

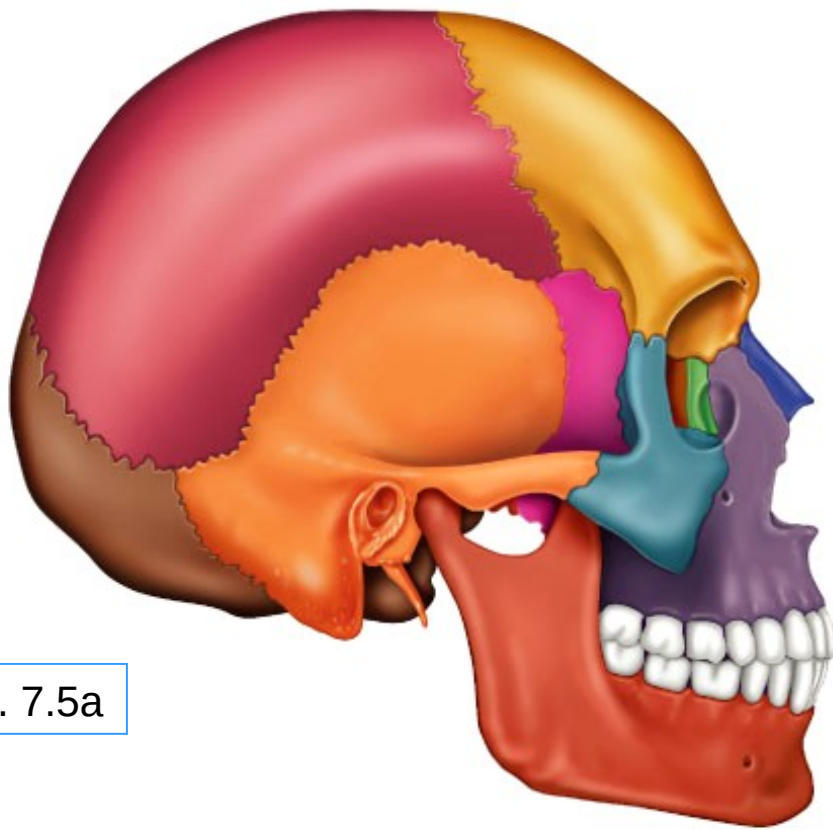


Fig. 7.5a

(iii) Occipital Bone:

single bone at base of skull; helps form post aspect of skull

also forms walls of the post cranial fossa

attaches anteriorly to the 2 parietals & 2 temporals & attaches to sphenoid

(ii) Parietal Bones

paired - form superior & lateral aspects of skull

therefore form bulk of **cranial vault**

Fig. 7.4b

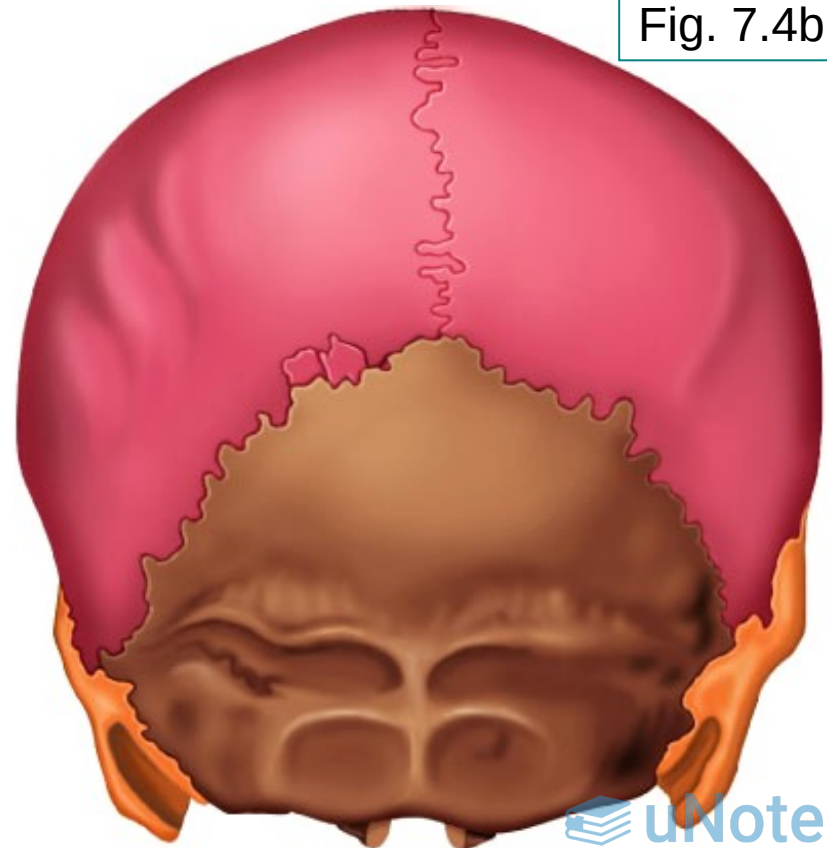


Fig. 7.6a



[Link to slide 19](#)

(iii) Occipital Bone (cont.)

large hole at base = **foramen magnum**
(passage for)

occipital condyles on each side of
foramen magnum = site of articulation
with first cervical vertebra

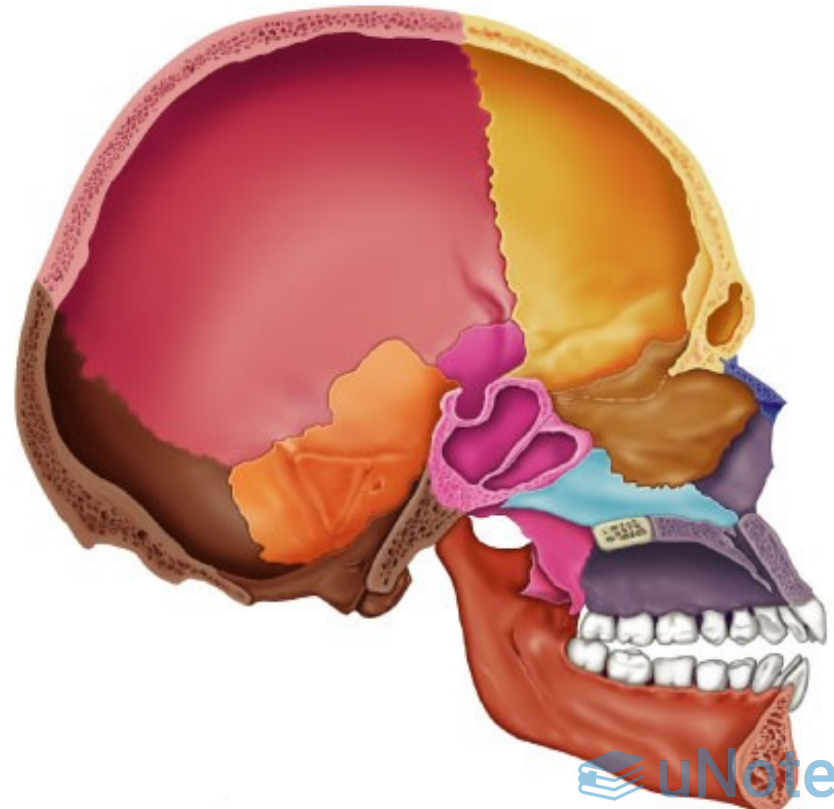
external occipital protuberance =
projection at back of skull - more
prominent in males

(iv) Temporal Bones

paired; form inferior & lateral
aspects of skull and parts of the
cranial floor

located just below the 2 parietal
bones; have 3 very different
areas or regions

Fig. 7.5b



1) **Squamous region:** flattened zygomatic process to cheekbone (**zygomatic bone**)

mandibular fossa receives condyle of mandible

2) **Tympanic region:** surrounds external acoustic meatus

3) **Petrous region** is on internal aspect of temporal bone

contributes to cranial base; houses middle and inner ear cavities

mastoid process is attachment site for some neck muscles

styloid process is attachment area for muscles of the tongue

several important foramina associated with this part of the temporal bone: jugular foramen, carotid canal, internal acoustic meatus

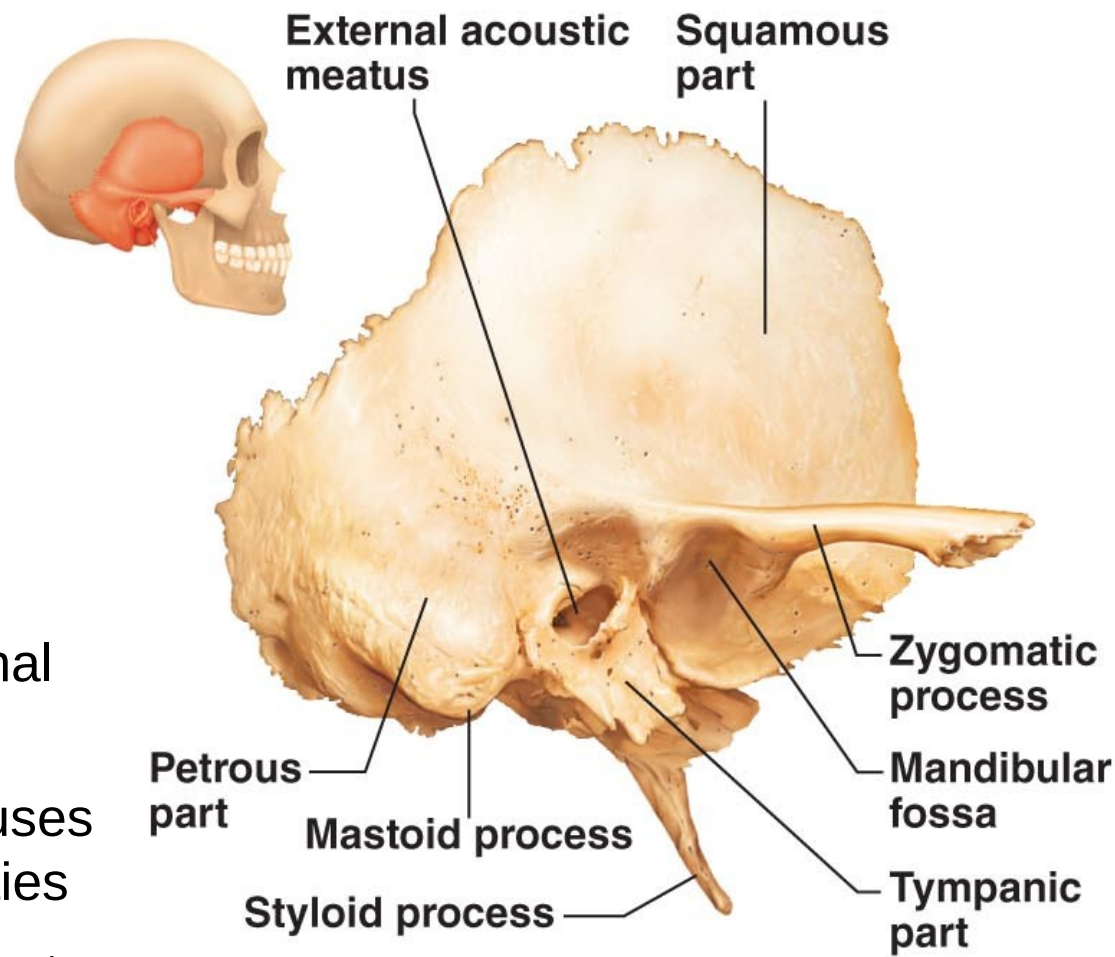


Fig. 7.8: Temporal Bone

(v) Sphenoid Bone:

complex bone; difficult to visualize; articulates with all other cranial bones
forms base of middle cranial fossa; contributes to base of anterior cranial fossa

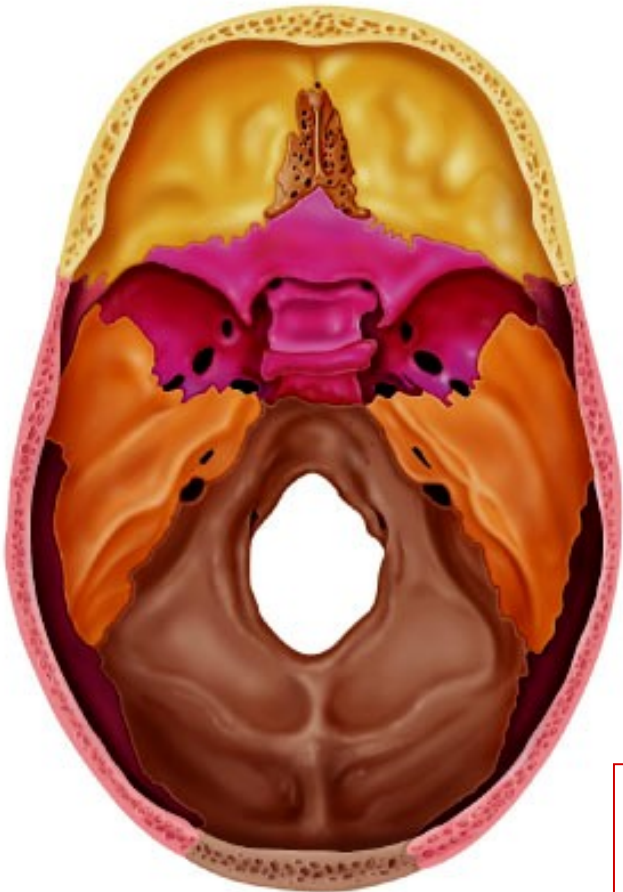


Fig 7.7a: Superior view of floor of cranial cavity

Fig. 7.9



central body which contains
sphenoid sinuses

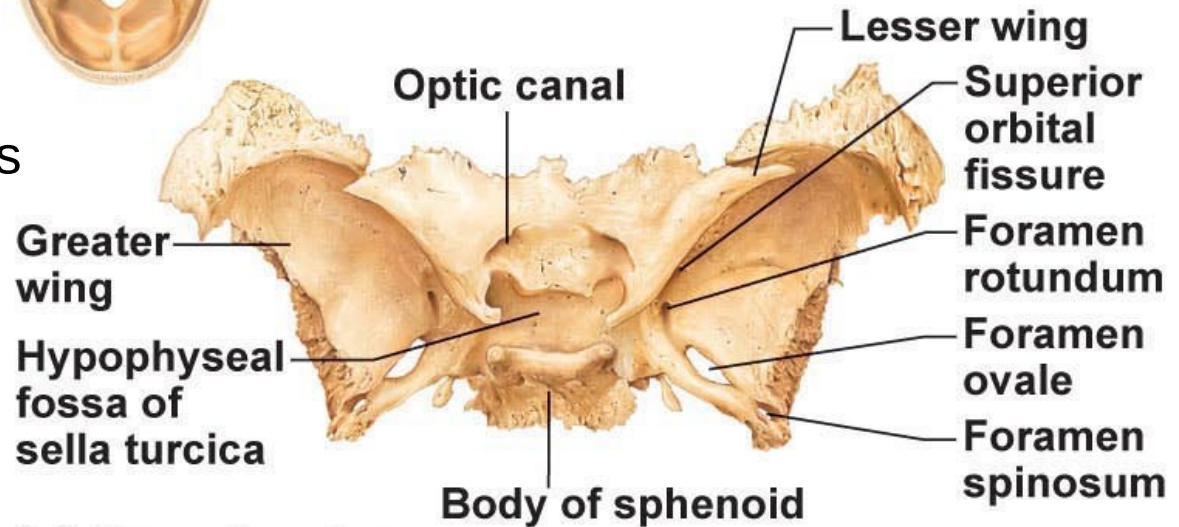
3 projections:

greater & lesser wings
(orbits, MCF & ACF)

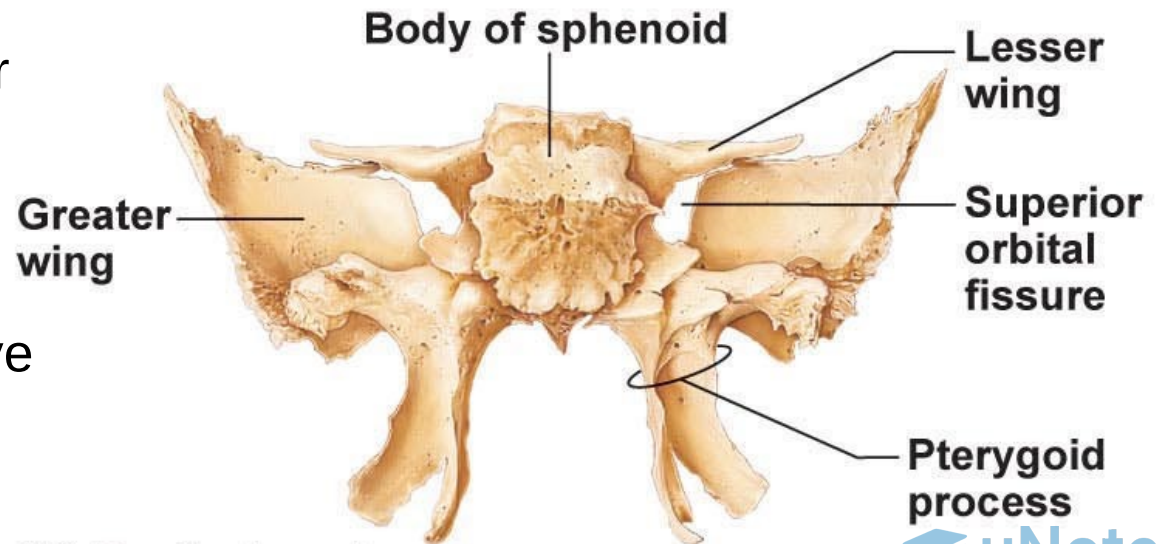
pterygoid processes
(muscles for ?)

optic foramina (canals): for
optic nerves

superior orbital fissure
between greater & lesser
wings (cranial nerves for eye
movement)



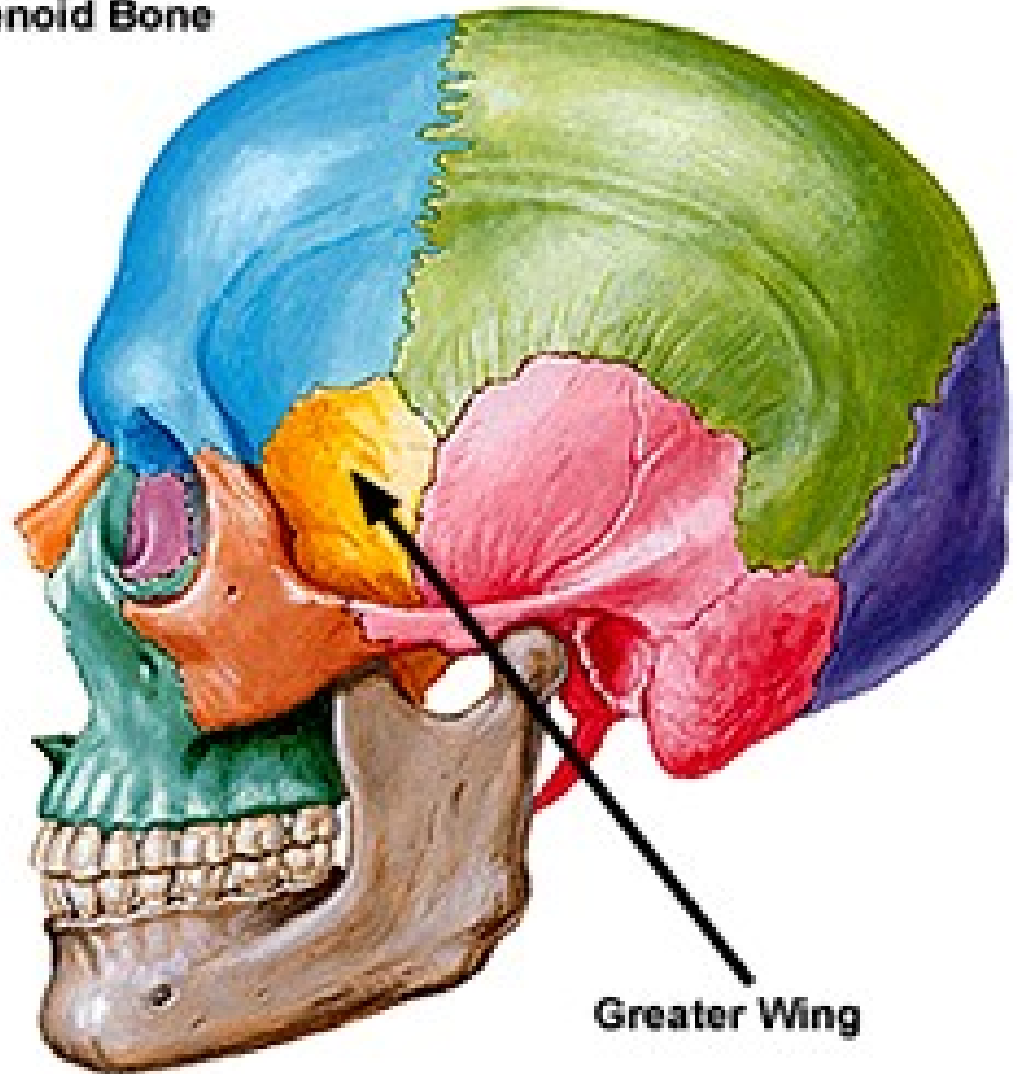
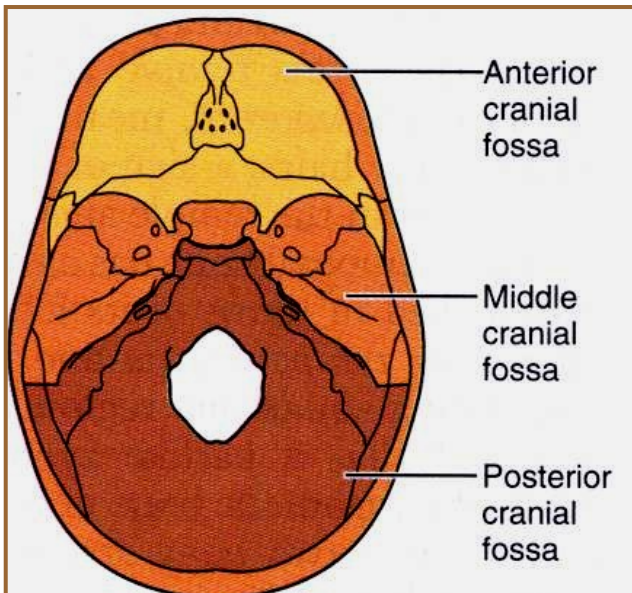
(a) Superior view



(b) Posterior view

Sphenoid Bone

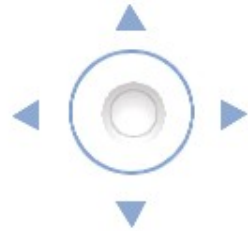
Cranial cavity
floor showing
major fossae



www.upstate.edu/cdb/grossanat/imgs/sklatsb1.jpg

From Visible Body:

Skeletal System > Axial > Skull > Cranium (neurocranium, braincase) > Sphenoid >



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Show

Fade

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Deselect All

Fade Others

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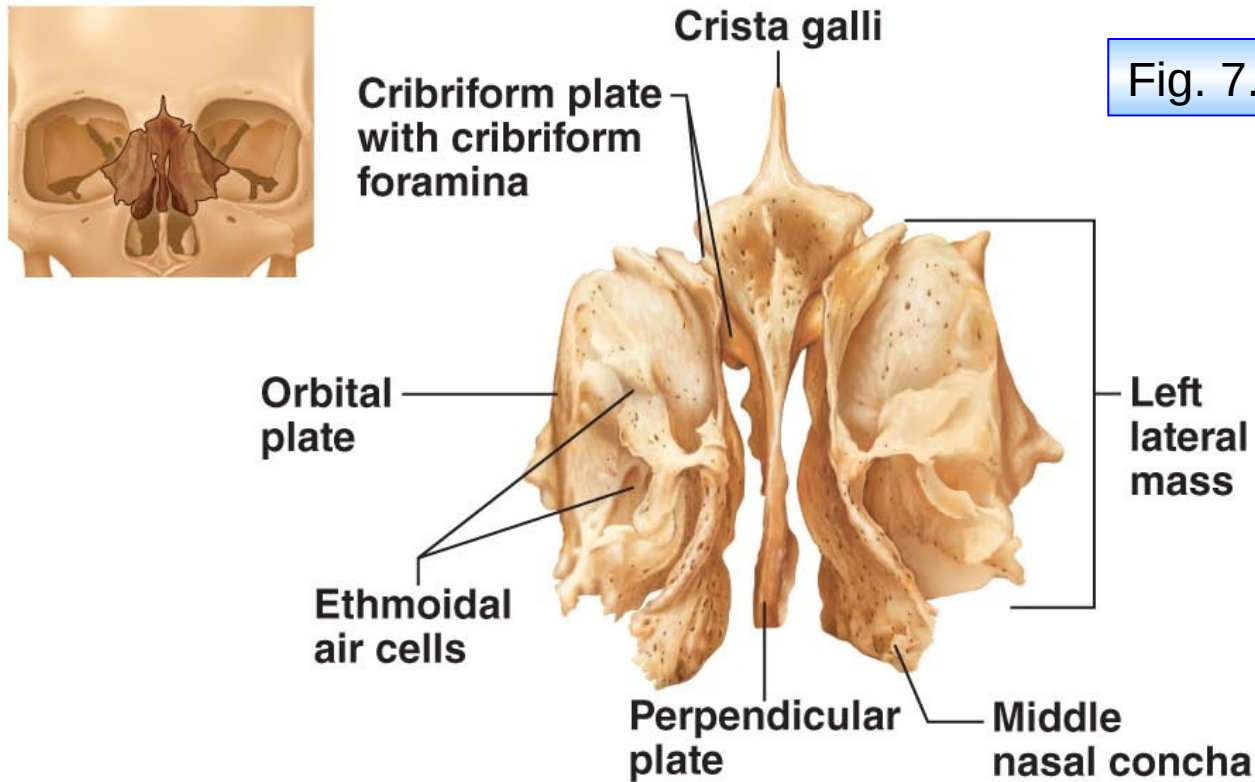


(vi) Ethmoid bone: approximates a cube that lies deep between orbits & nasal cavities

cribriform plate forms roof of nasal cavity & floor of anterior cranial fossa; tiny holes (**olfactory foramina**) transmit olfactory nerves

perpendicular plate projects inferiorly to contribute to nasal septum

crista galli projects superiorly to attach to dura mater of brain

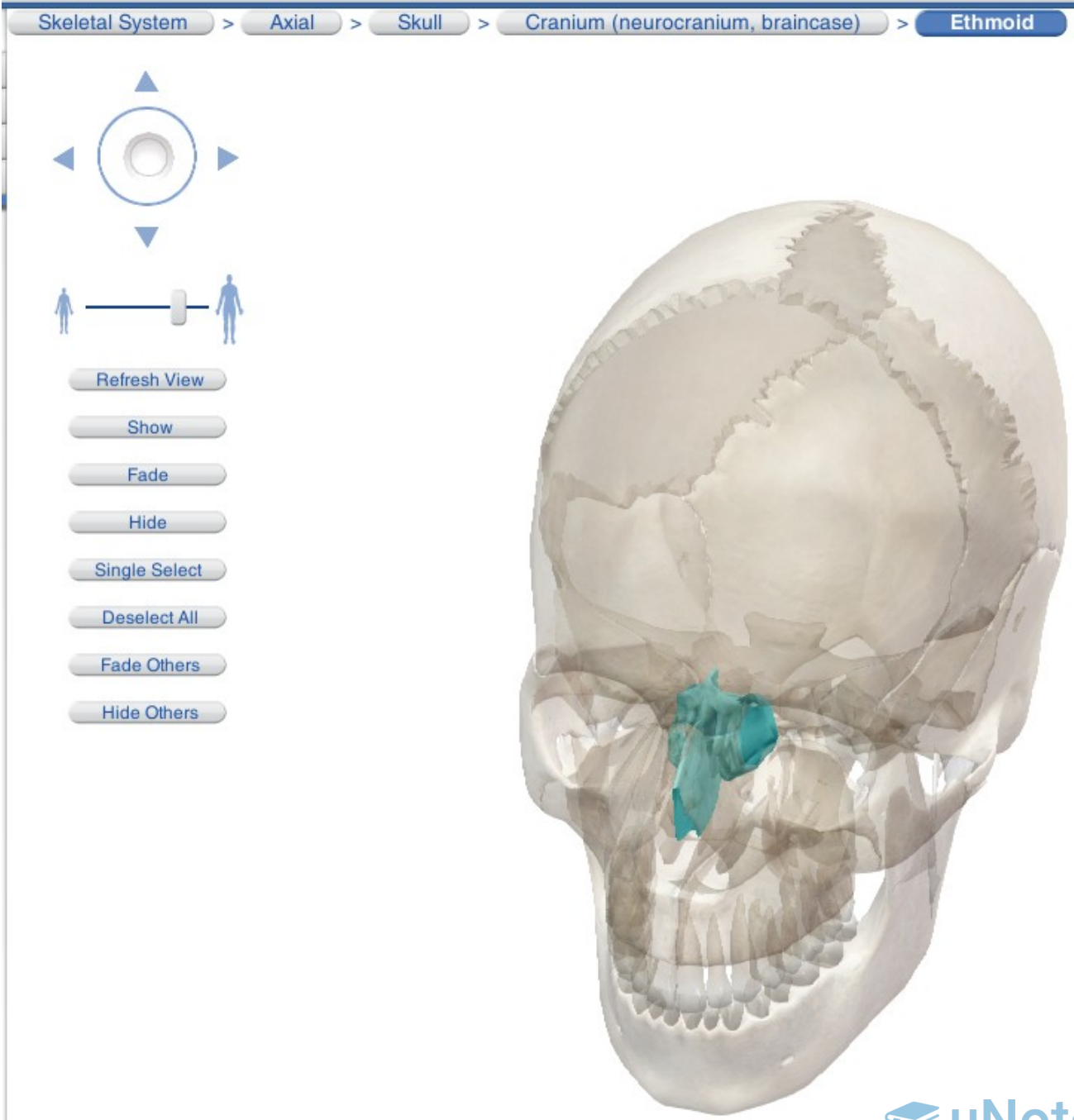


lateral masses contain **ethmoid sinuses**

medially are superior & middle **nasal conchae**

laterally are **orbital plates** - contribute to medial walls of orbits

From Visible Body:



Major Cranial Sutures:

- bones of the adult skull are firmly united by **sutures**
 - 4 main sutures that connect the cranial bones
- (1) **Coronal suture:** frontal bone & 2 parietal bones
 - (2) **Squamous suture:** parietal bone & temporal bone
 - (3) **Lambdoid suture:** occipital bone & 2 parietal bones

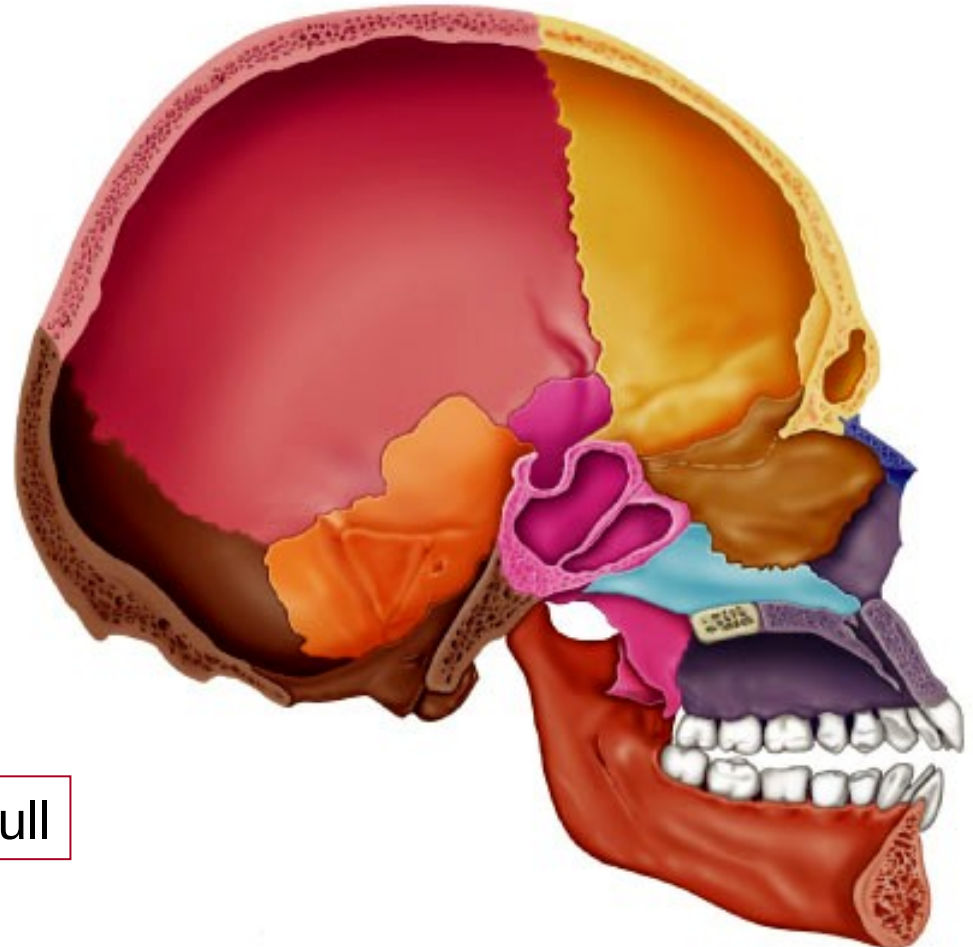
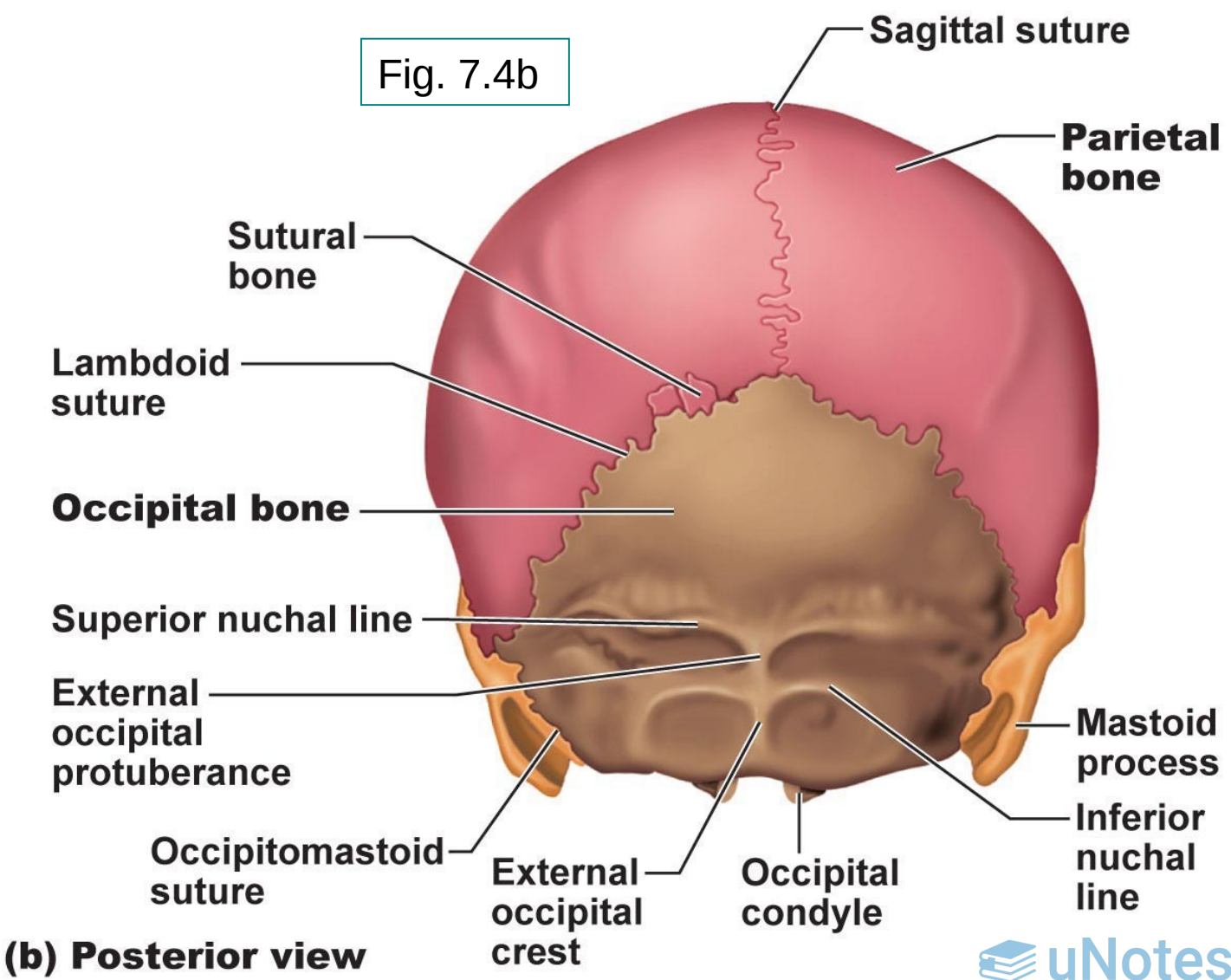


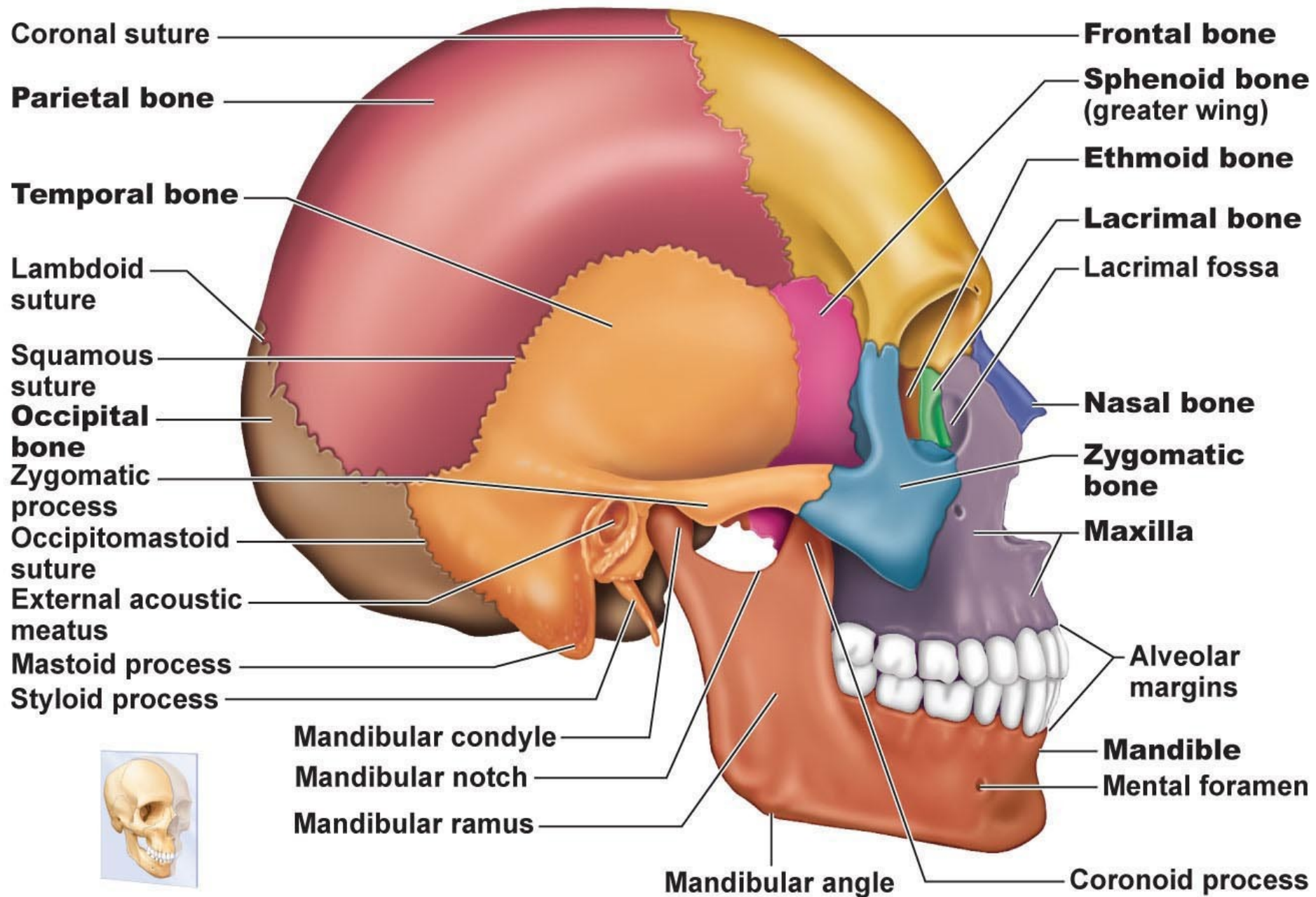
Fig. 7.5c: Midsagittal view of skull

(4) Sagittal suture: 2 parietal bones

Sutural bones: tiny irregular bones; can occur within cranial suture

additional ossification centres that appeared rapidly during fetal development





(a) External anatomy of the right side of the skull

Facial Bones: 14 bones of which **mandible** & **vomer** are **unpaired**
paired bones are: **maxillae, zygomatic, nasal, lacrimal, palatine & inferior conchae**

(i) Mandible: lower jaw bone - strongest & largest bone of the face

- body is horizontal part & contains chin; left & right rami join body at mandibular angle

note: **mandibular notch**, **coronoid process** (insertion of temporalis muscle), **mandibular condyle**, **alveolar margin** (contains tooth sockets), **mandibular foramina** (nerves to teeth in lower jaw) & **mental foramina** (blood vessels & nerves to chin & lower lip)

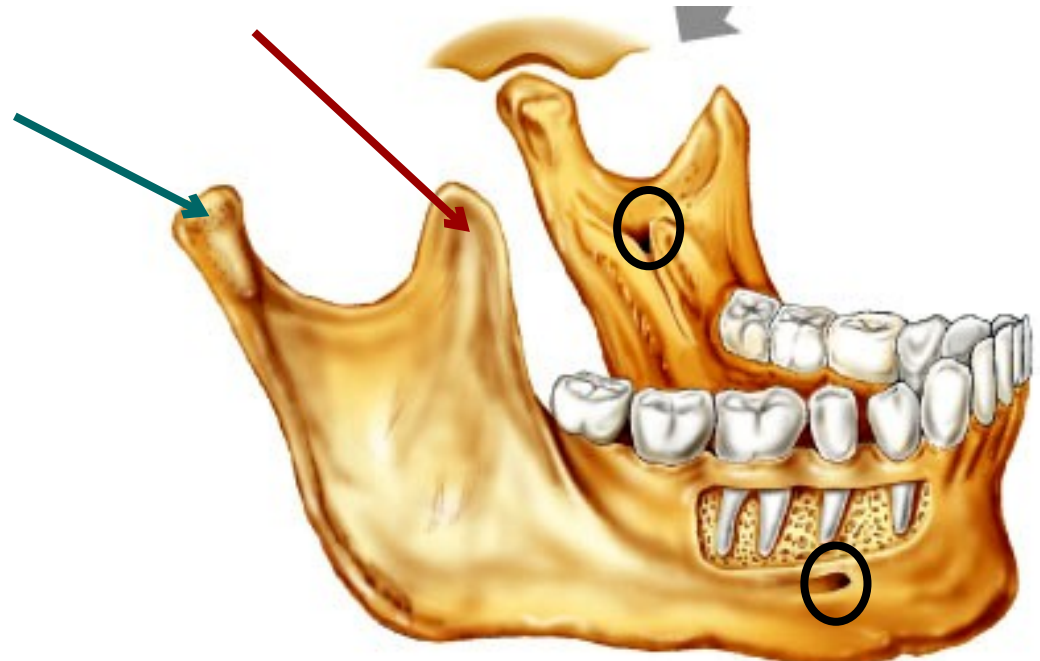
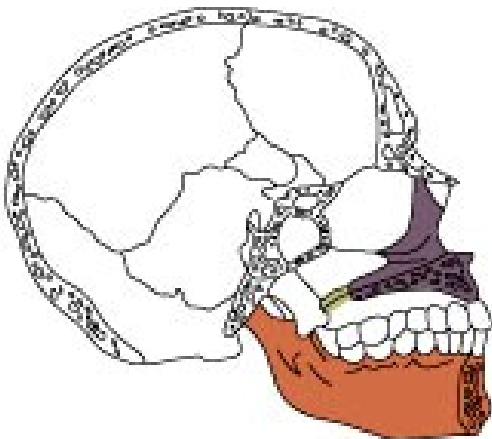
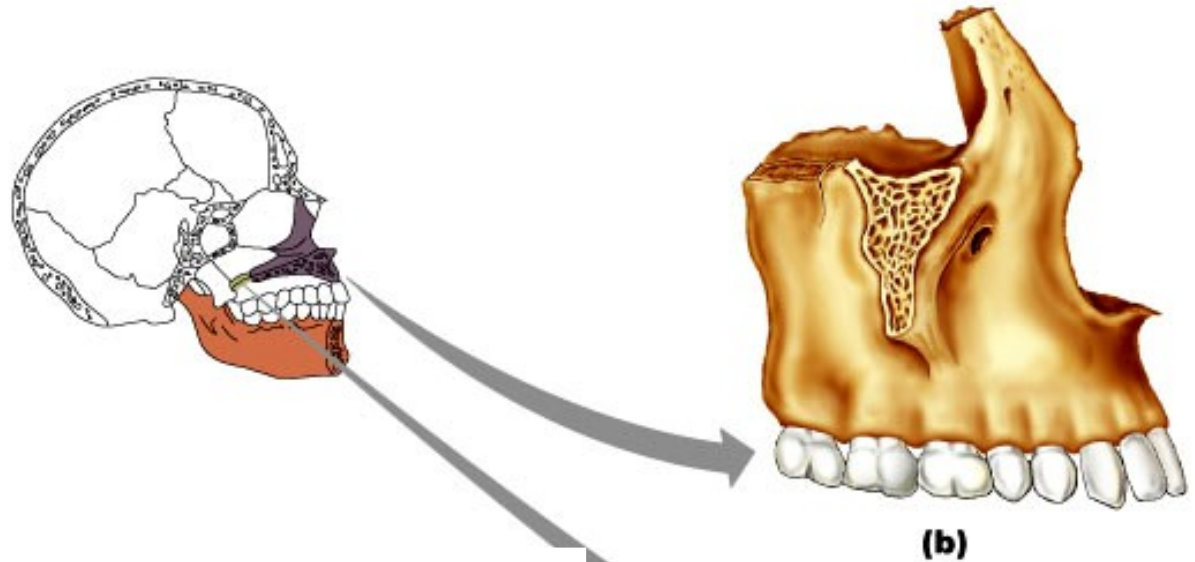


Fig. 7.8



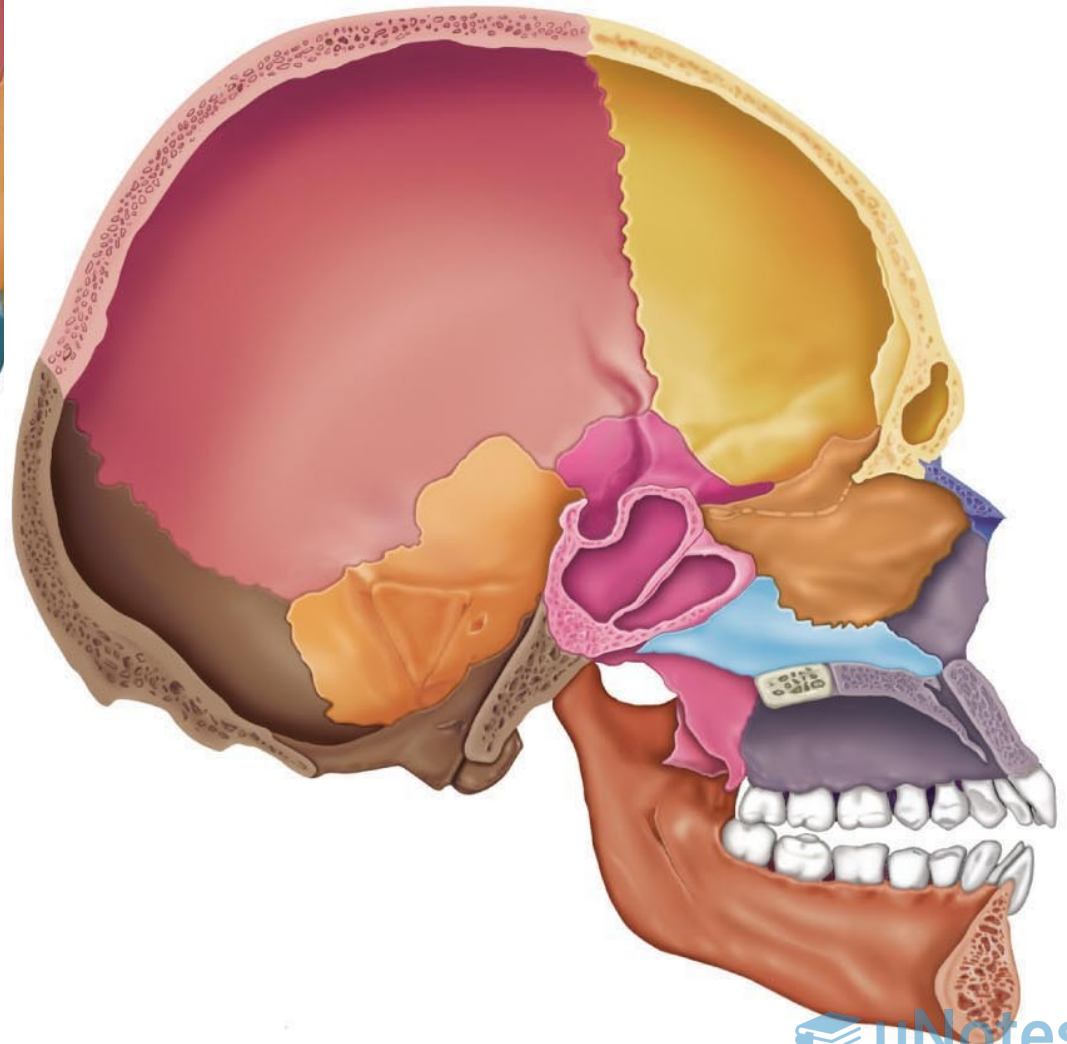
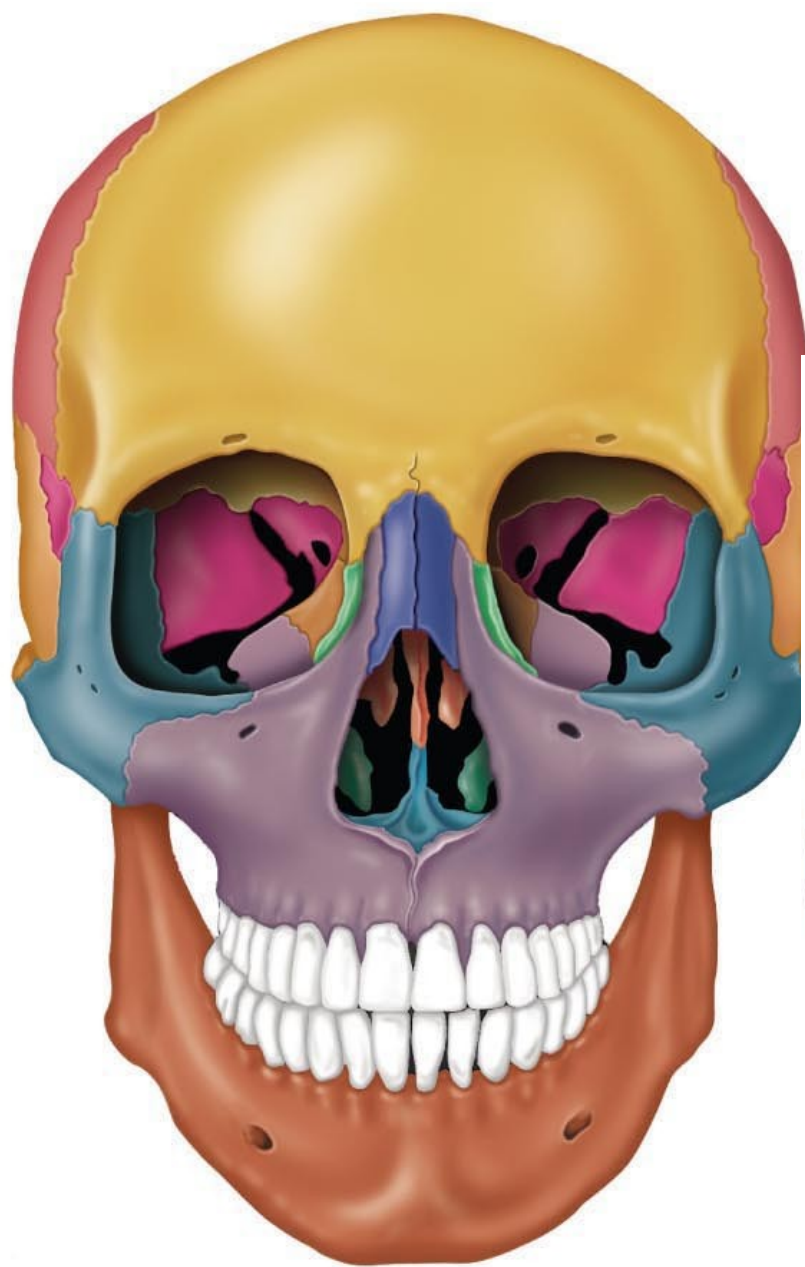
(ii) Maxillary bones:

- fused medially
- alveolar margins hold teeth of upper jaw
- palatine processes project posteriorly forming anterior 2/3 of hard palate

note: (incisive fossa) (passage of blood vessels & nerves), frontal processes & zygomatic processes

main portion of bone on each side has maxillary sinus - these are the sinuses that get infected





(iii) Zygomatic bones: = cheekbones

- articulate with **zygomatic processes** of maxilla, frontal & temporal bones
- contribute to inferolateral margins of orbit

(iv) Nasal bones:

- 2 tiny, rectangular bones that fuse medially to form bridge of nose
- articulate with **frontal** bone superiorly & **maxillary** bones laterally

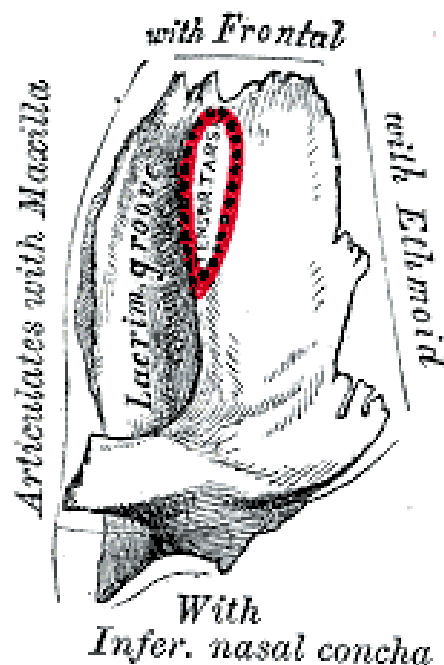
(v) Lacrimal bones:

- 2 fingernail-shaped bones in anterior, medial portion of orbit –

articulate with:

frontal bone
ethmoid bone
maxillae

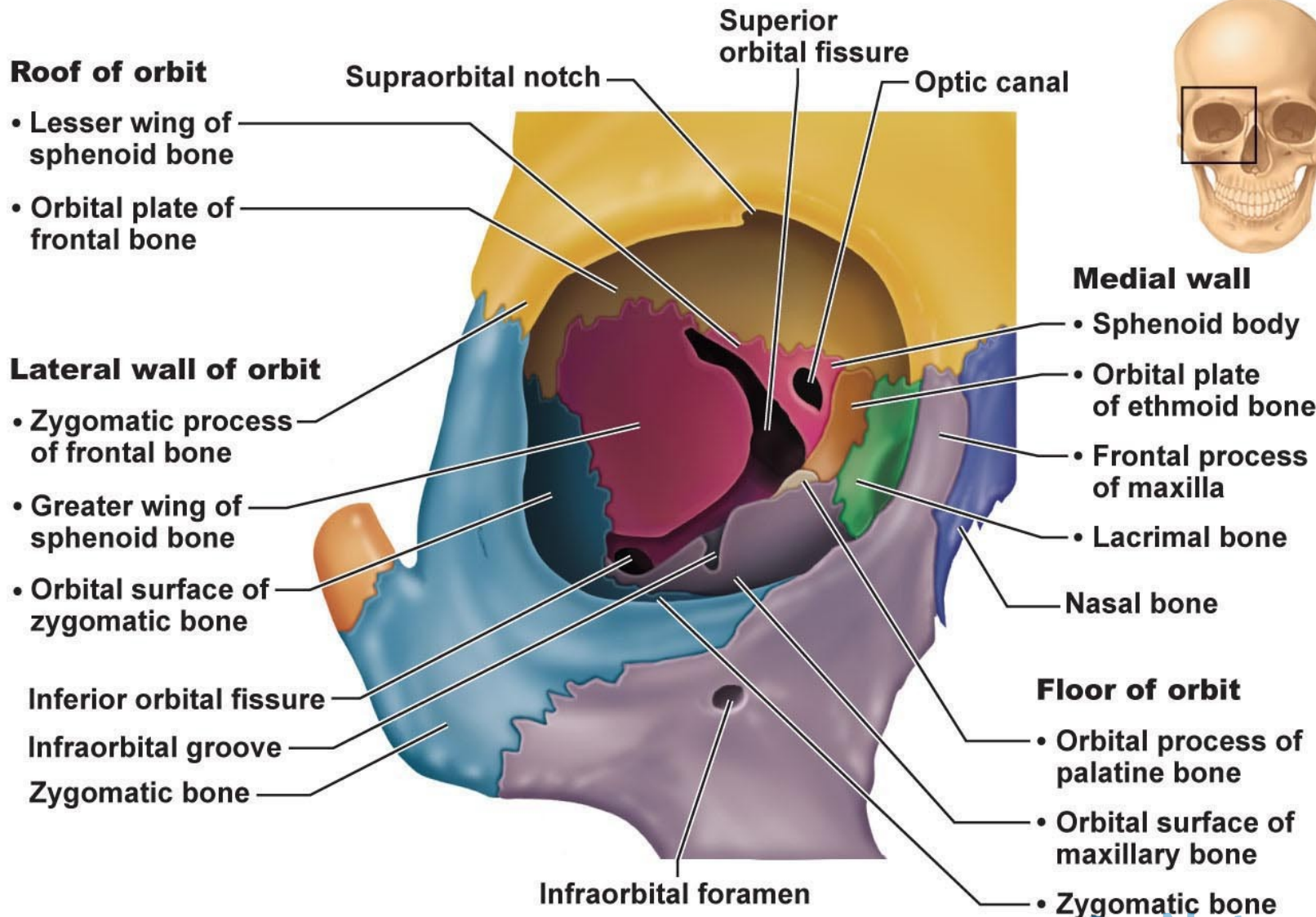
each has a
depression
(**lacrimal fossa**)
for *lacrimal sac*



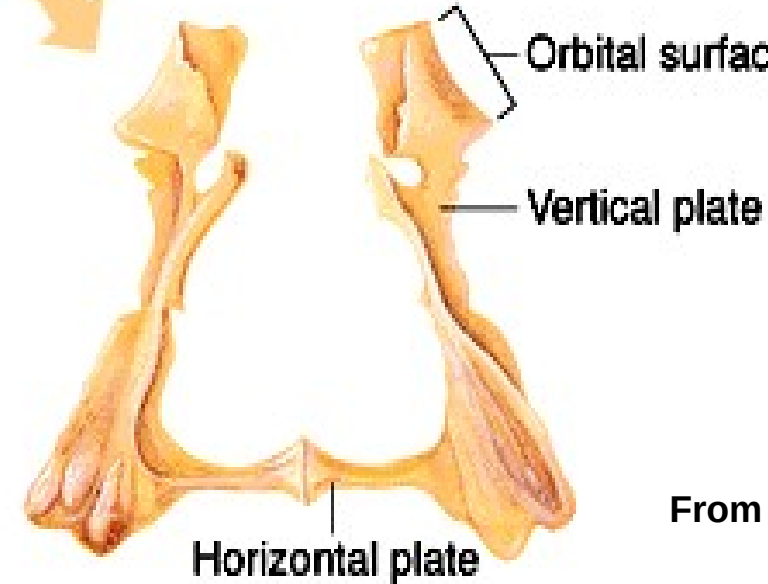
Orbits:

zygomatic
frontal
maxilla
ethmoid
lacrimal
sphenoid
palatine
(orbital
process)

Fig. 7.13



(b) Contribution of each of the seven bones forming the right orbit



(c) Palatine bones (posterior aspect)

From Fig. 7.8

(vi) Palatine bones:

2 L-shaped bones

horizontal plates form part of **hard palate**

vertical plates - nasal cavity & orbit

(vii) Vomer:

single thin bone forms nasal septum

(see **Fig. 7.4a**)

(viii) Inferior nasal conchae:

[superior and middle nasal conchae from ethmoid bone]

thin, curved bones - project medially

largest of 3 pairs of conchae



Fig.7.6a

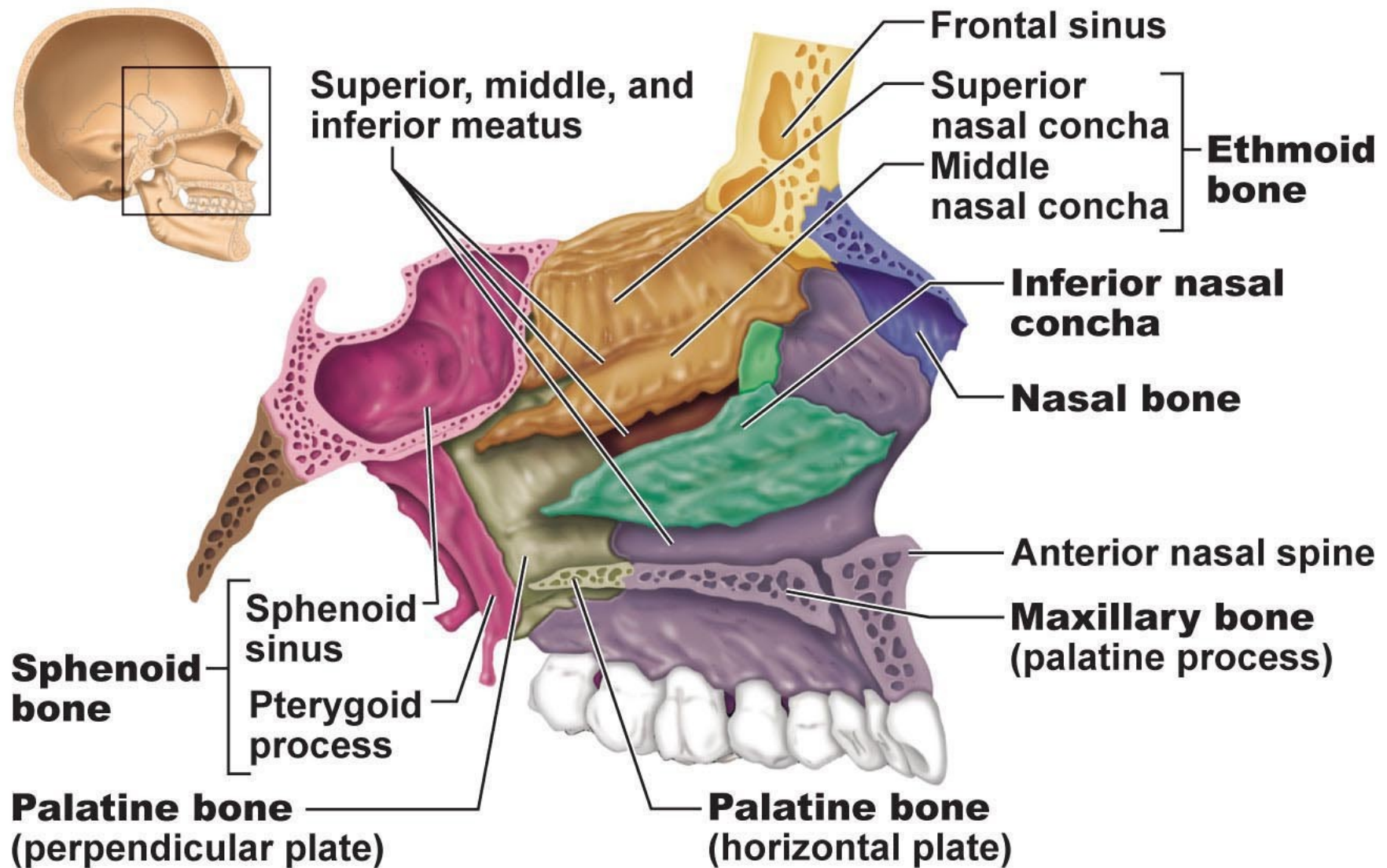
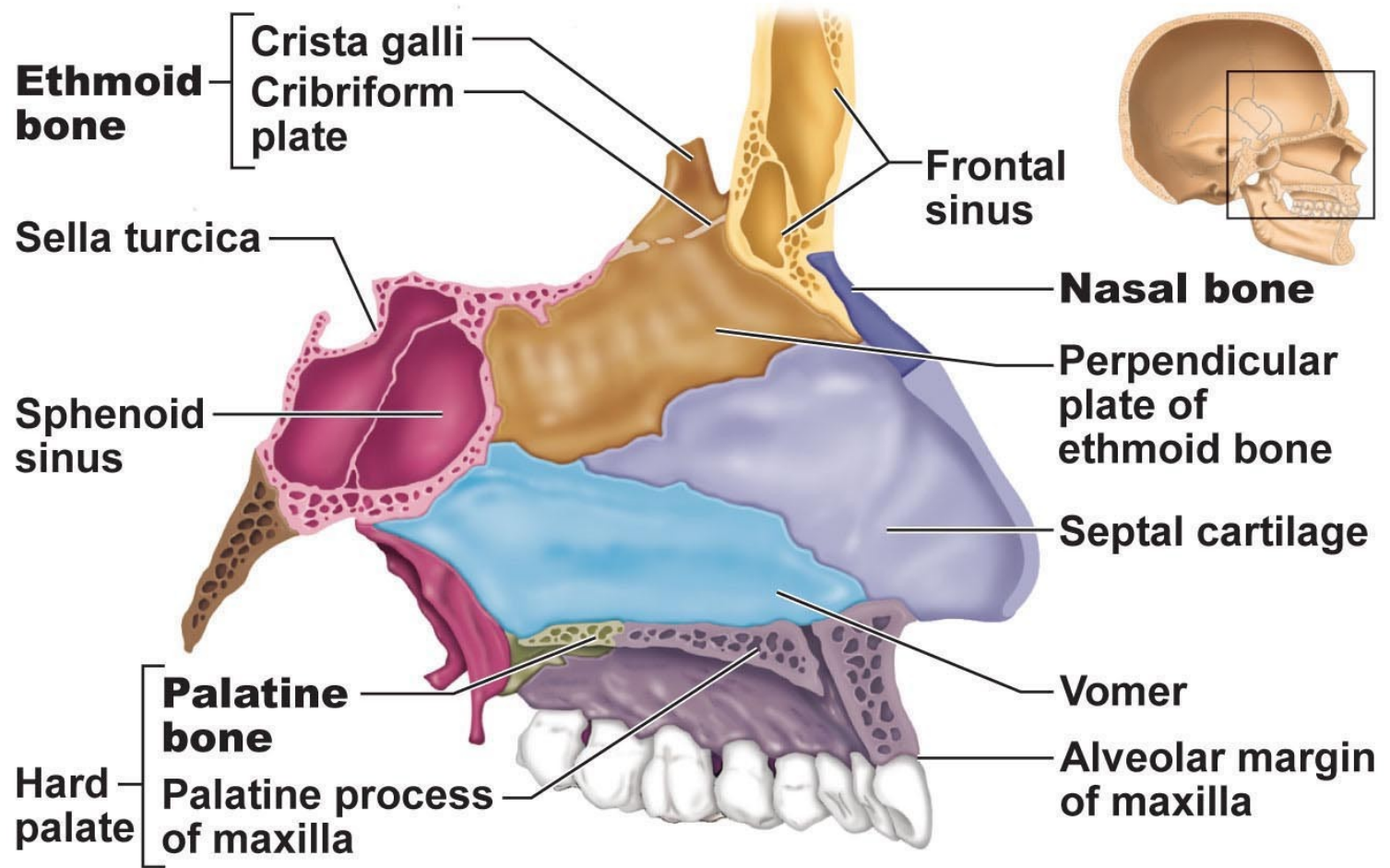


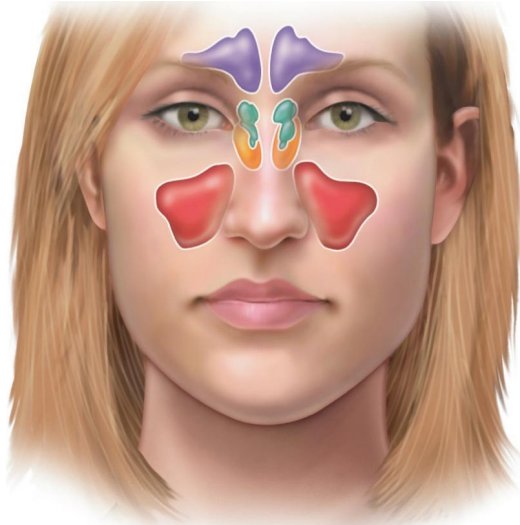
Fig. 7.14a: Bones forming the *left lateral* wall of the nasal cavity:



(b) Nasal cavity with septum in place showing the contributions of the ethmoid bone, the vomer, and septal cartilage

Fig. 7.14b: Contributions of ethmoid & vomer bones & cartilage to nasal septum:

Fig. 7.15



Paranasal Sinuses:

frontal
maxillary
sphenoid
ethmoid

mucosa-lined, air-filled

lighten skull and enhance
resonance of voice; connect to
nasal cavity so also help to
warm & humidify incoming air

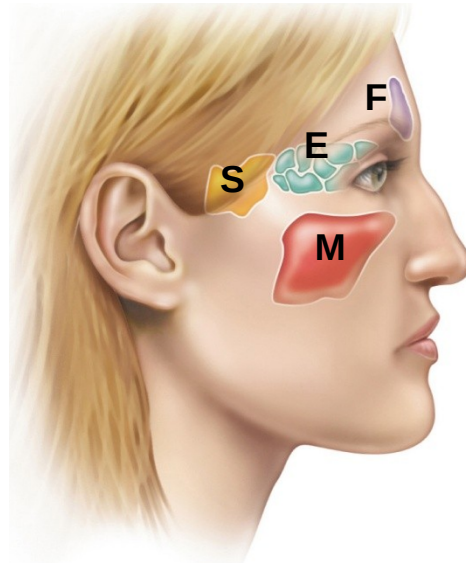
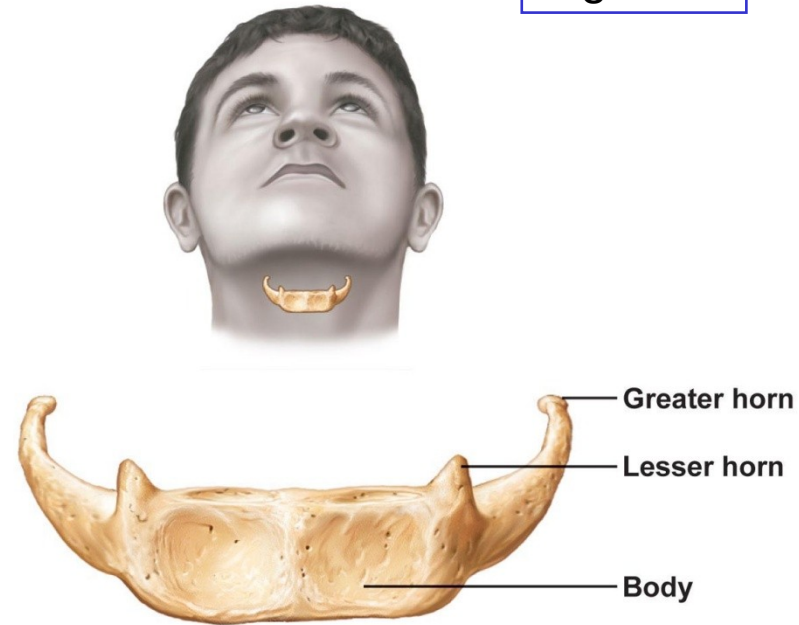


Fig. 7.12



Hyoid:

- only bone of the body that does not articulate with any other bone
- supports tongue & gives attachment to muscles for swallowing & speech
- horseshoe-shaped with a body + 2 pairs of horns