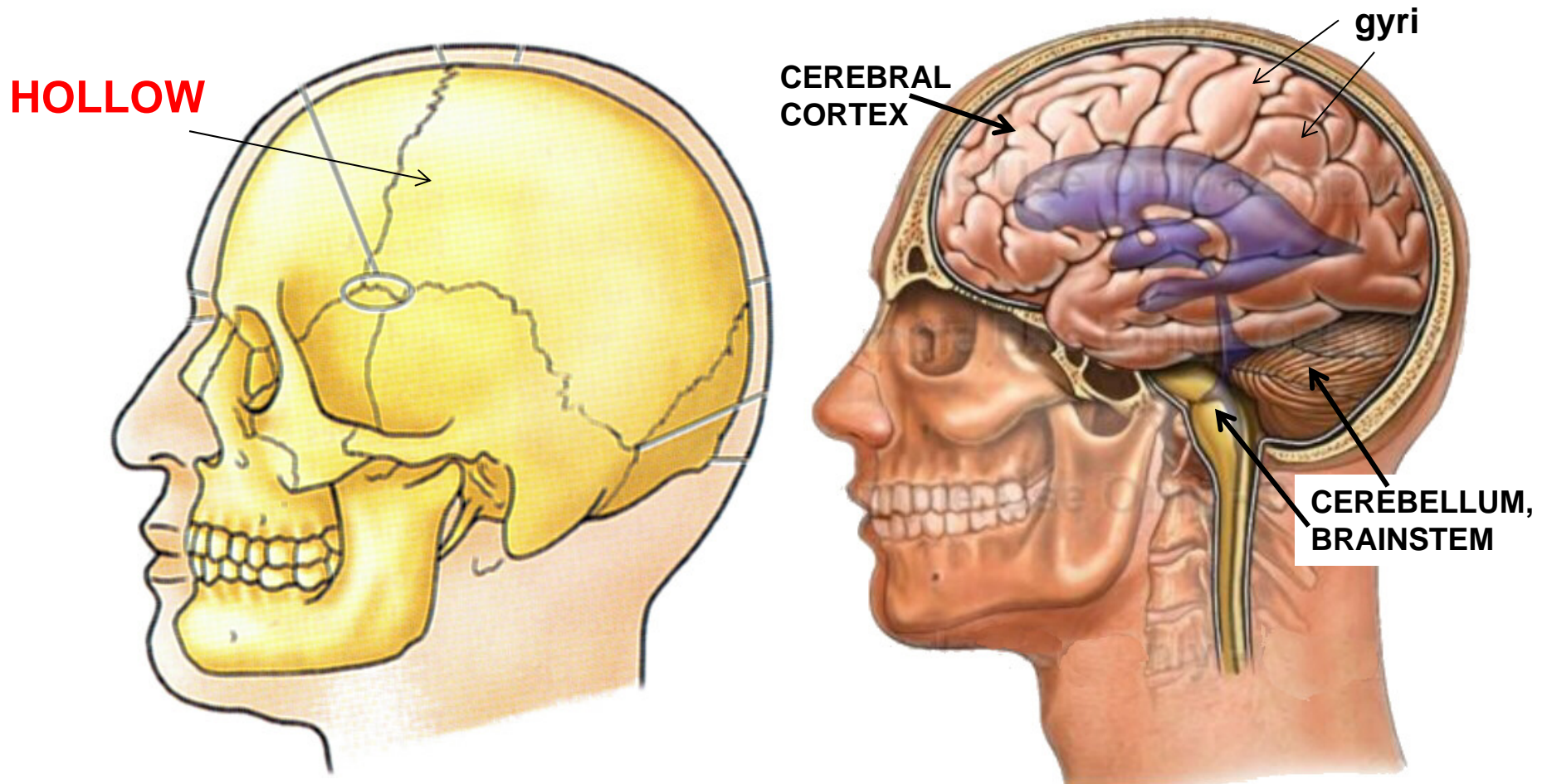


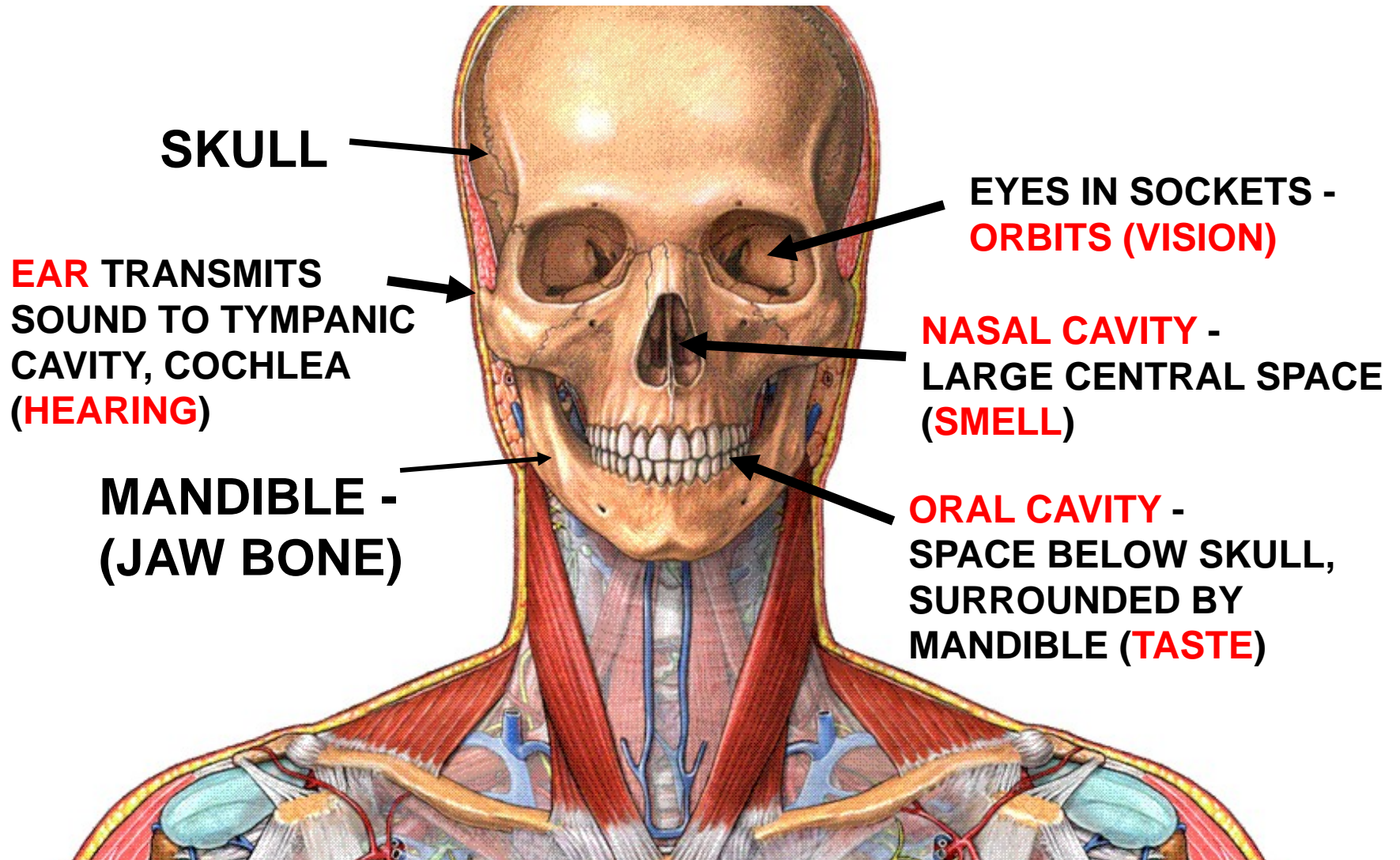
SKULL: HEAD IS SPECIALIZED TO HOUSE AND PROTECT THE BRAIN



ANATOMY OF SKULL IS COMPLEX; CLOSELY ASSOCIATED WITH AND CONTAINS BRAIN INSIDE CRANIAL CAVITY

note: Brain is in cranial cavity; cavity molded to brain like glove fitting hand; THERE IS NO OTHER ROOM INSIDE CRANIAL CAVITY

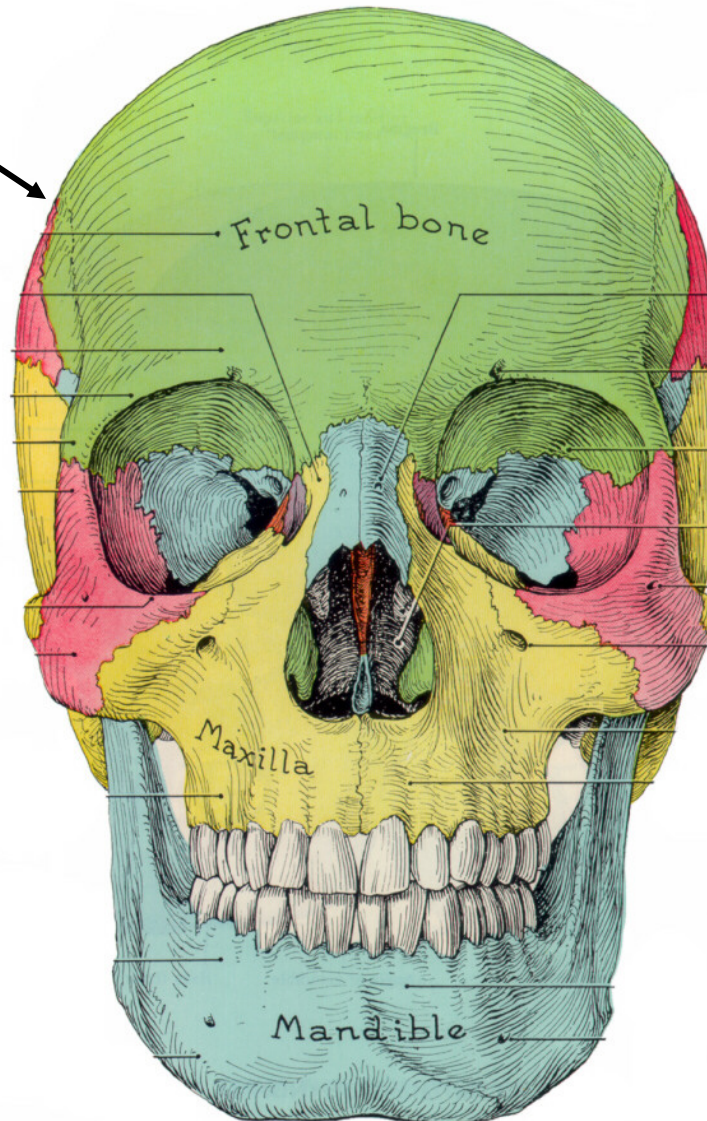
SKULL IS DESIGNED TO CONTAIN SPECIAL SENSES



HEAD AND NECK IS COMPLEX, IN PART, BECAUSE SPECIAL SENSES ARE LOCATED IN HEAD: **VISION, TASTE, SMELL, HEARING (EQUILIBRIUM)**; **THESE STRUCTURES ARE INNERVATE BY CRANIAL NERVES**

SKULL - bones rigidly connected by sutures to protect brain, attach move eyes

Sutures
Look like
Cracks
In
Bone



OUTLINE

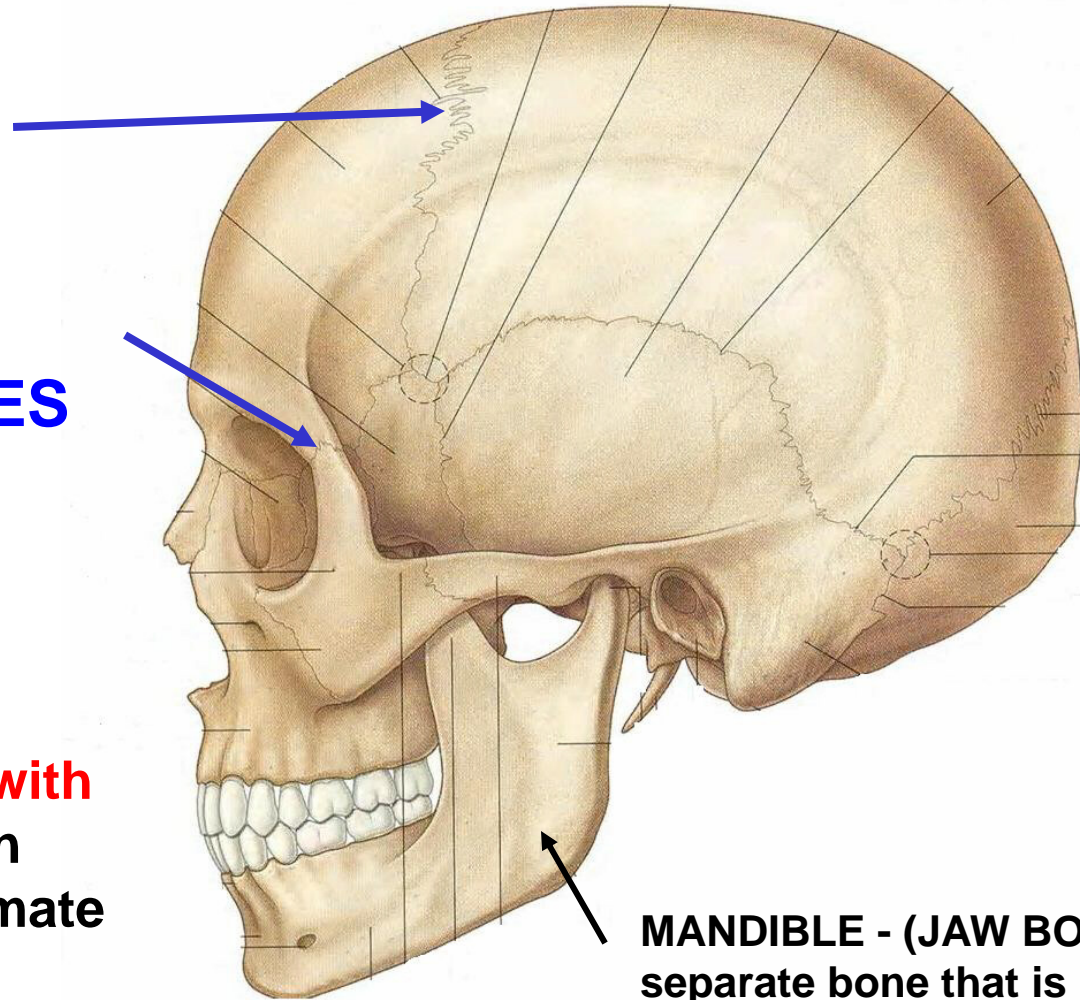
- I. CALVARIUM
- II. SCALP
- III. CRANIAL NERVES
- IV. LANDMARKS/ BONES OF SKULL
- V. CRANIAL CAVITY

Foramina covered in
Skull sessions

SKULL- bones rigidly connected by sutures to protect brain; also provides attachment to move eyes precisely

**SUTURES =
FIBROUS
CONNECTIVE
TISSUE JOINTS
BETWEEN BONES
(LOOK LIKE
CRACKS)**

Note: Sutures progressively fuse with age; extent of fusion can be used to estimate age of skull.

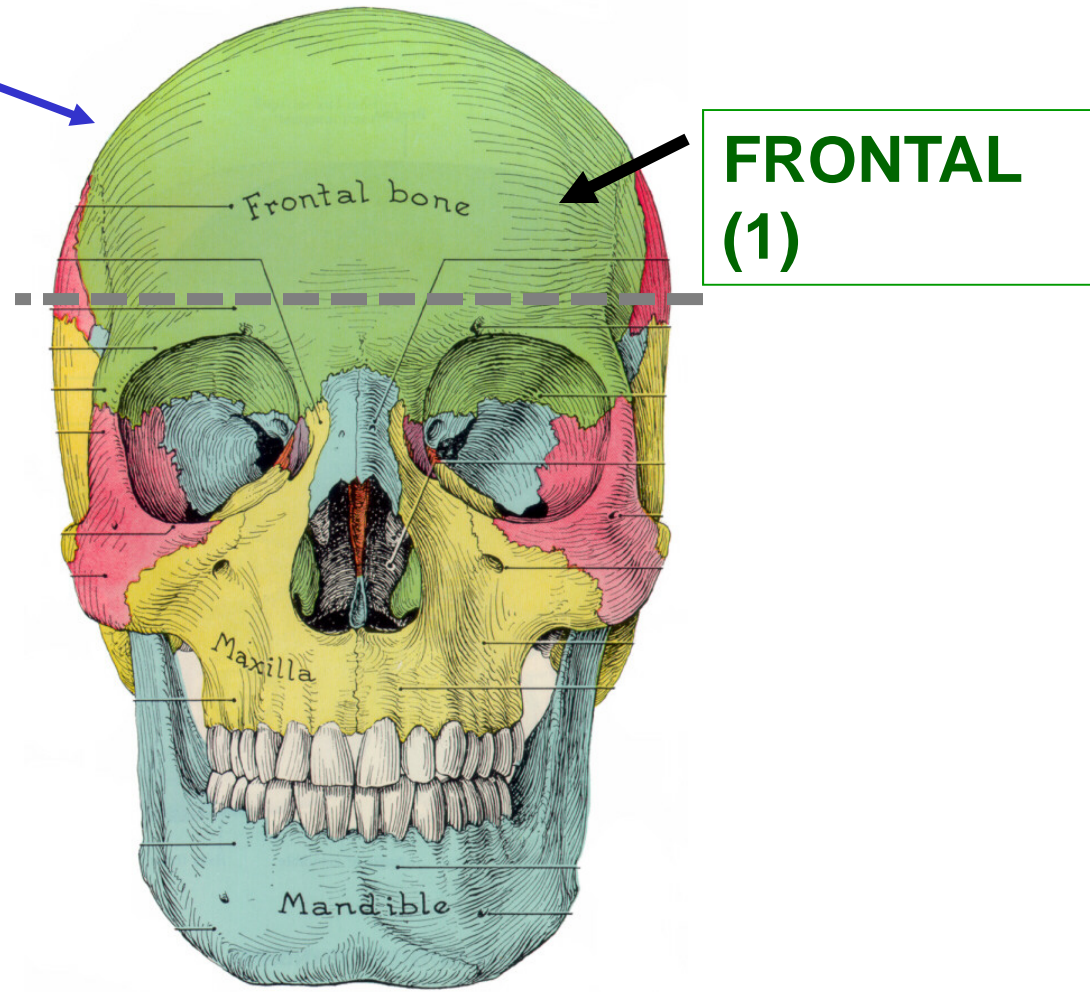


**MANDIBLE - (JAW BONE) -
separate bone that is
moveable**

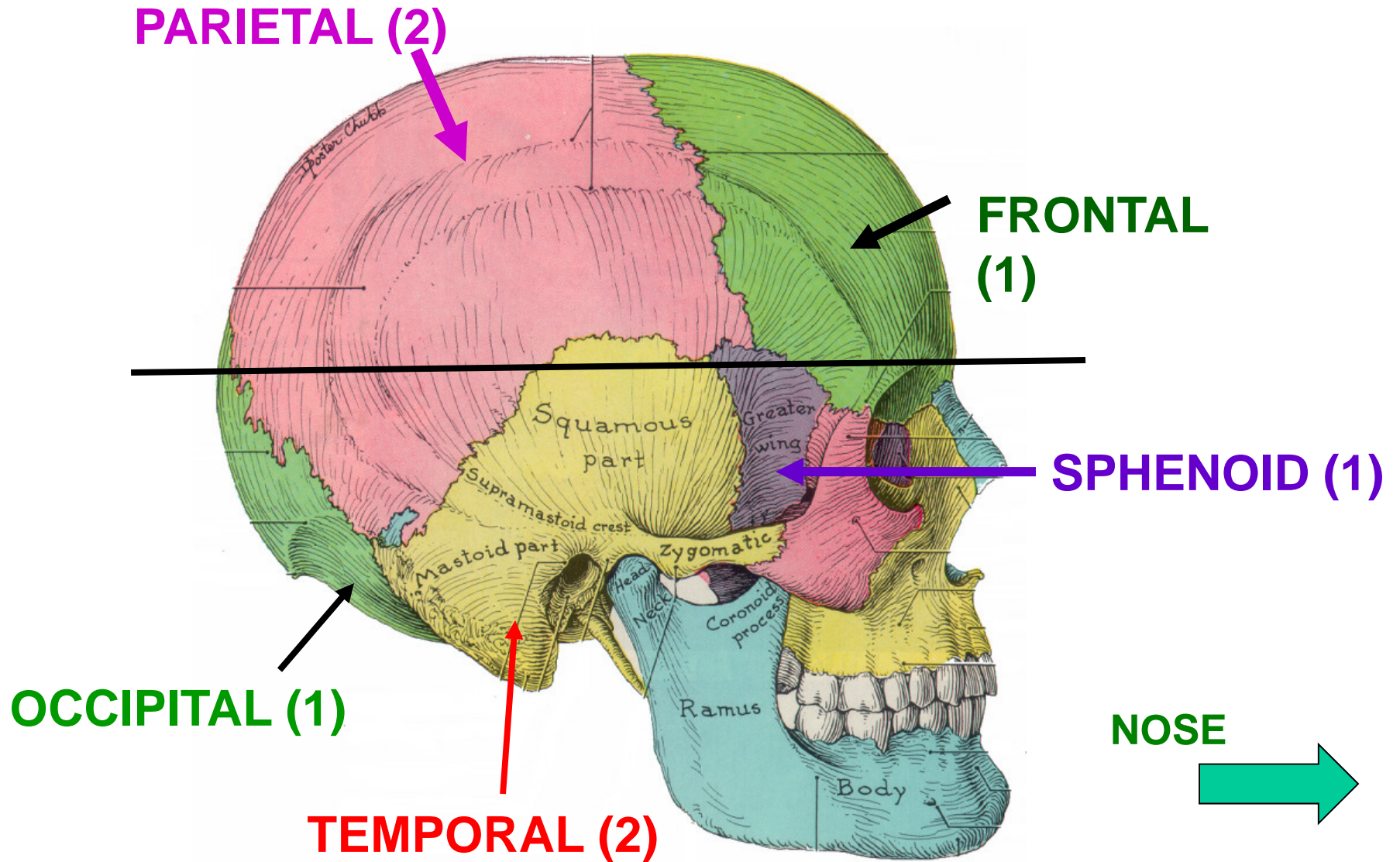
SKULL - bones rigidly connected by sutures to protect brain, attach move eyes

I. CALVARIUM = SKULL CAP -

Consists of
bones linked
by sutures



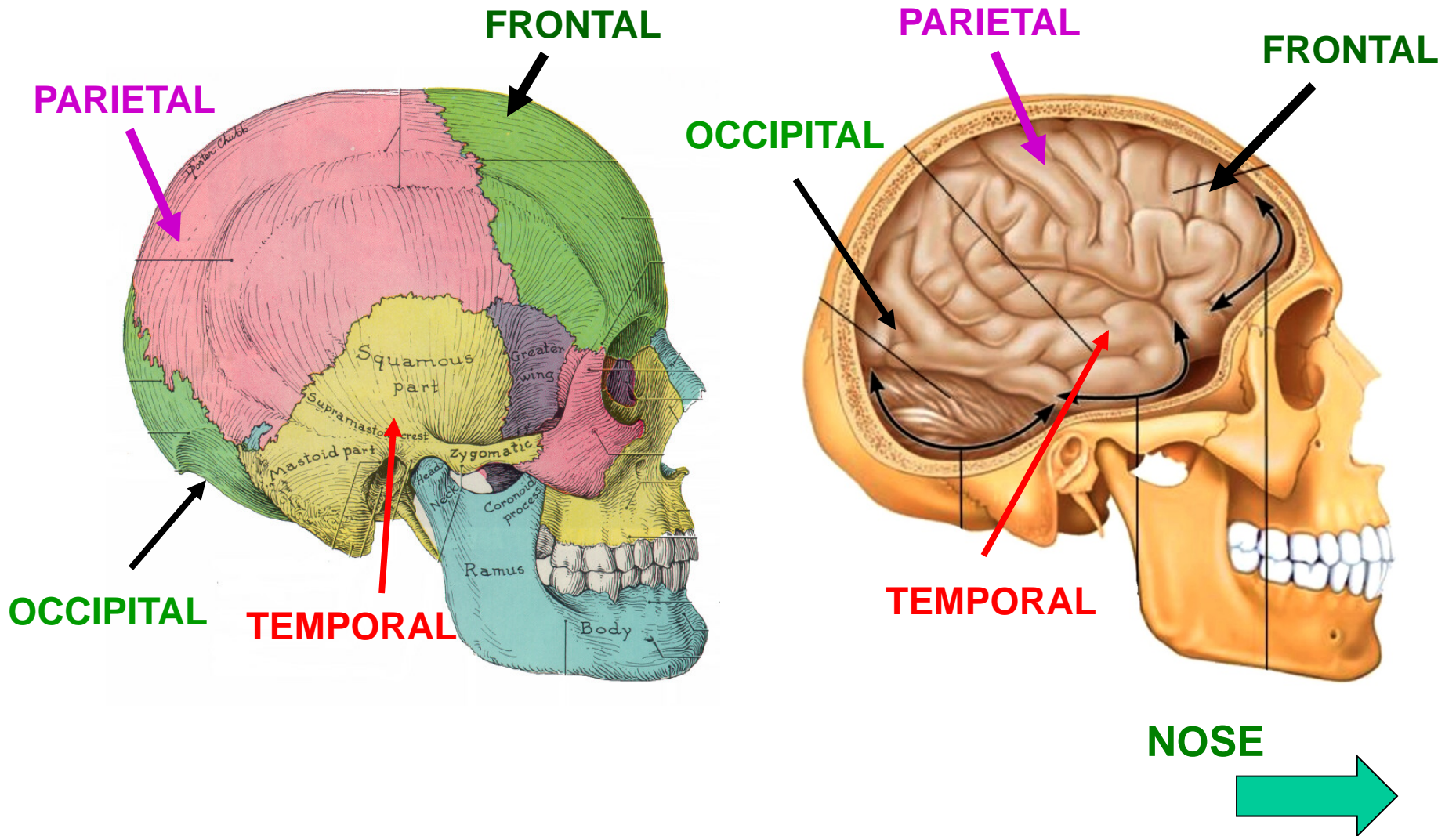
BONES OF CALVARIUM = SKULL CAP



NOSE →

SPHENOID (Gk) = wedge

LOBES OF CEREBRAL CORTEX OF BRAIN ARE NAMED FOR BONES OF SKULL

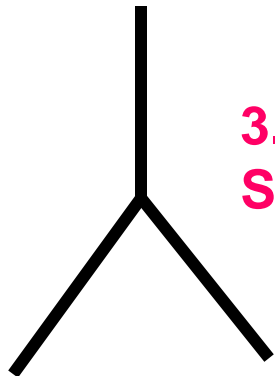


B. SUTURES

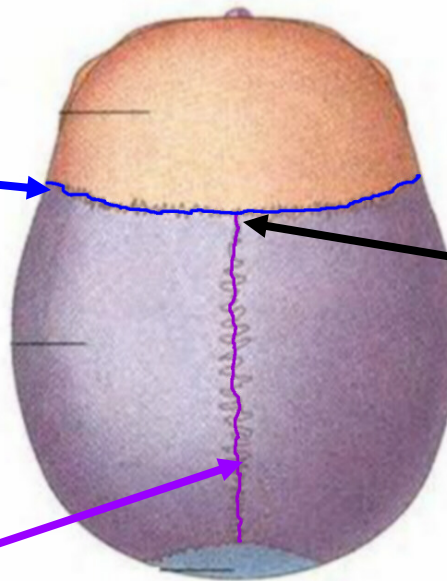
1. CORONAL SUTURE

2. SAGITTAL SUTURE

3. LAMBDOIDAL SUTURE



LAMBDA -
Greek letter



C. LANDMARKS

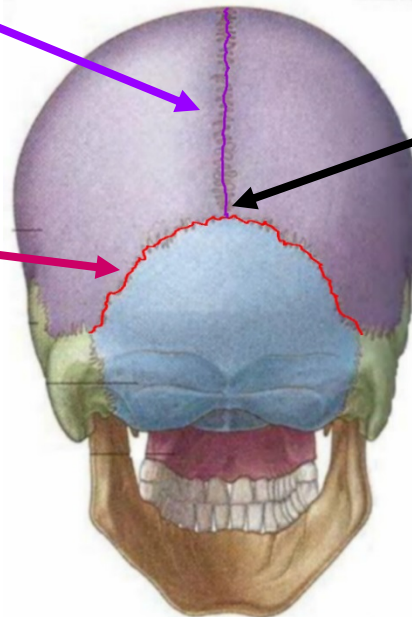
**

1. **BREGMA** - MID
POINT OF CORONAL
SUTURE

superior (top) view

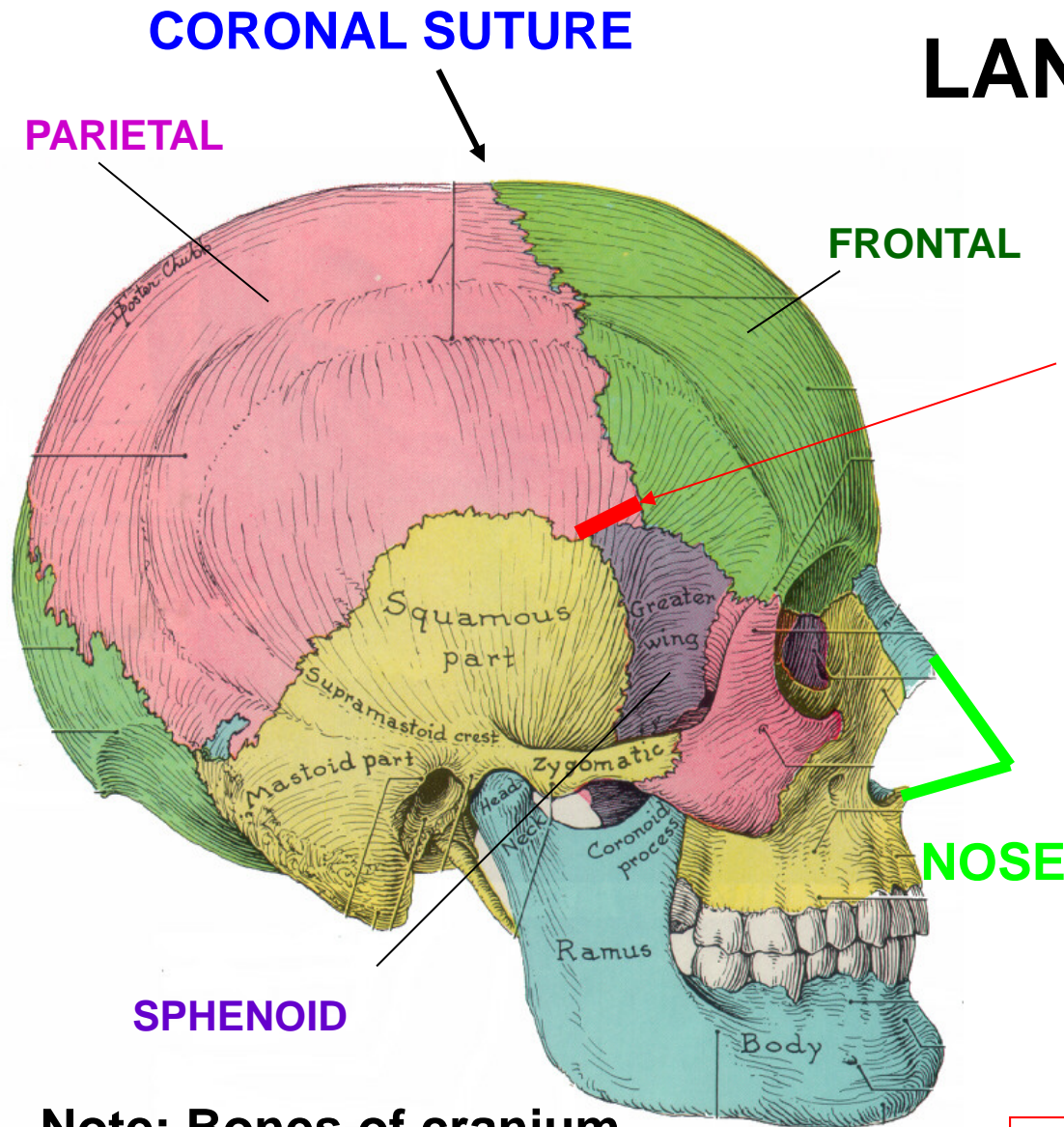
**

2. **LAMBDA** - MID
POINT OF
LAMBDOIDAL
SUTURE



posterior (back) view

LANDMARKS



3. PTERION **

- JUNCTION OF
TEMPORAL SPHENOID
PARIETAL AND FRONTAL
BONES

PIC THANKS TO DR. ALBERICO



Note: Bones of cranium
fuse (sutures disappear)
with age)

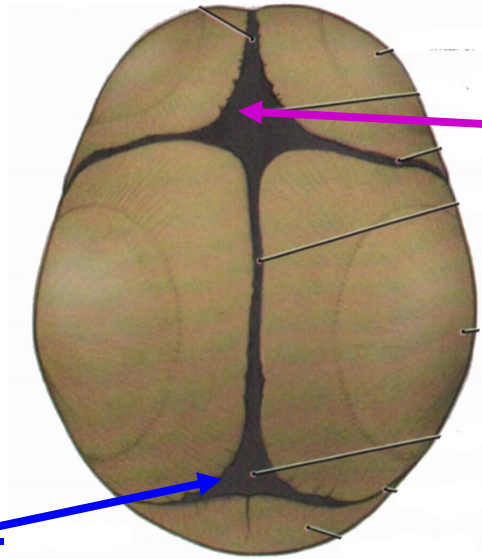
**

Note: Skull fractures in region
of pterion clinically important
(Epidural Hematoma)

D. FONTANELLES - Membranes that link bones at birth

- FONTANELLES ('soft spots') PERMIT CRANIAL COMPRESSION AT BIRTH - CRANIAL GROWTH

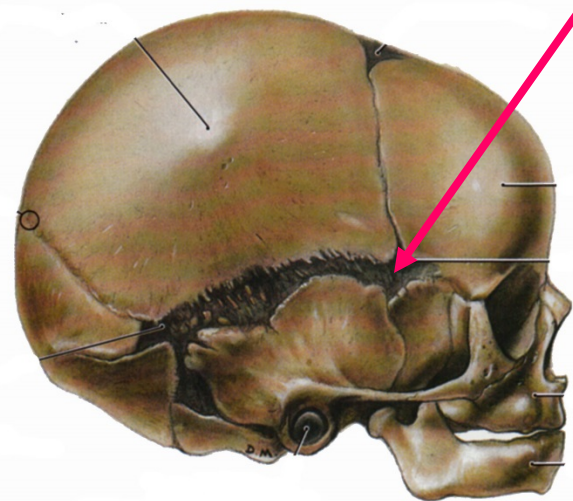
2. POSTERIOR FONTANELLE - AT LAMBDA



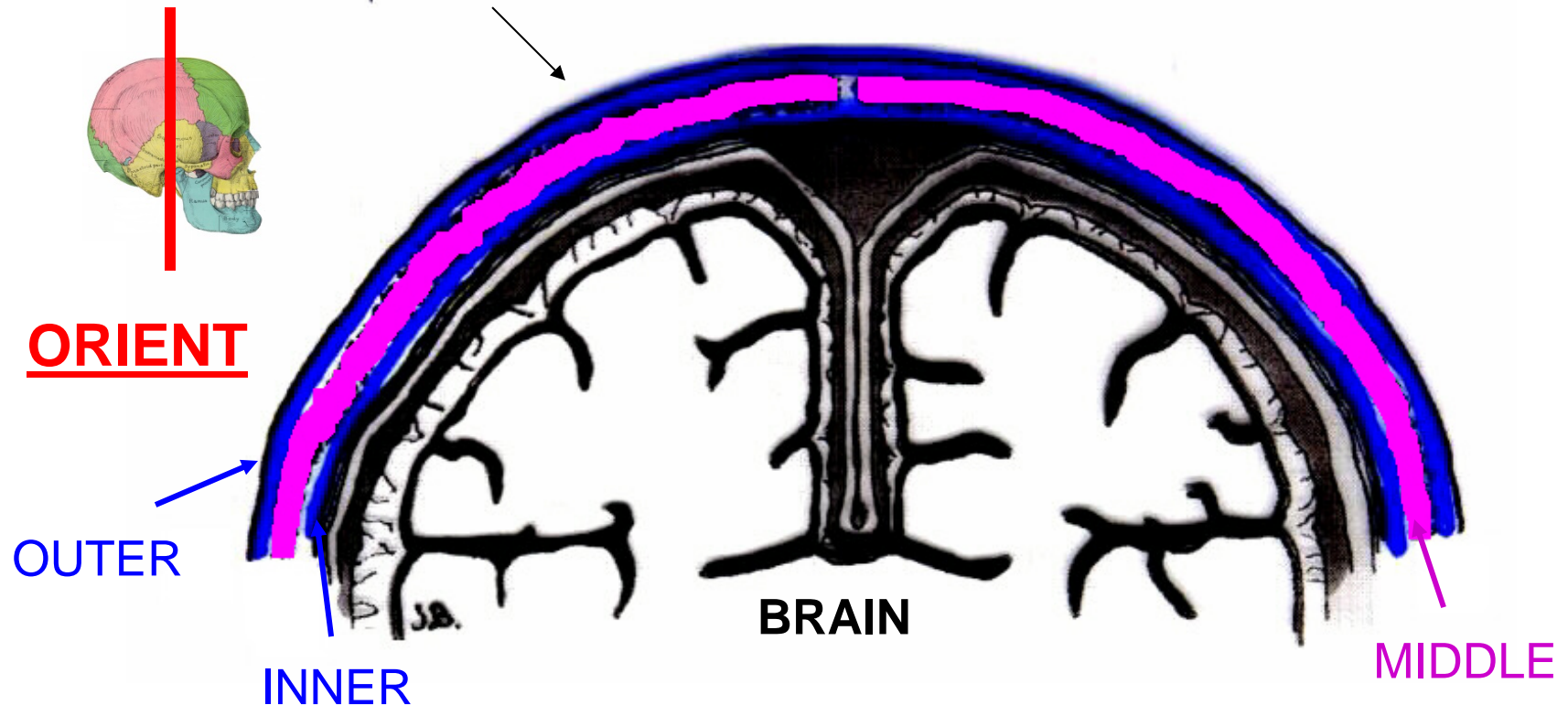
1. ANTERIOR FONTANELLE AT BREGMA

3. LATERAL FONTANELLE AT PTERION

Note: Anterior Fontanelle can be used to access Superior Sagittal venous sinus in neonates



E. INTERNAL STRUCTURE OF CALVARIUM



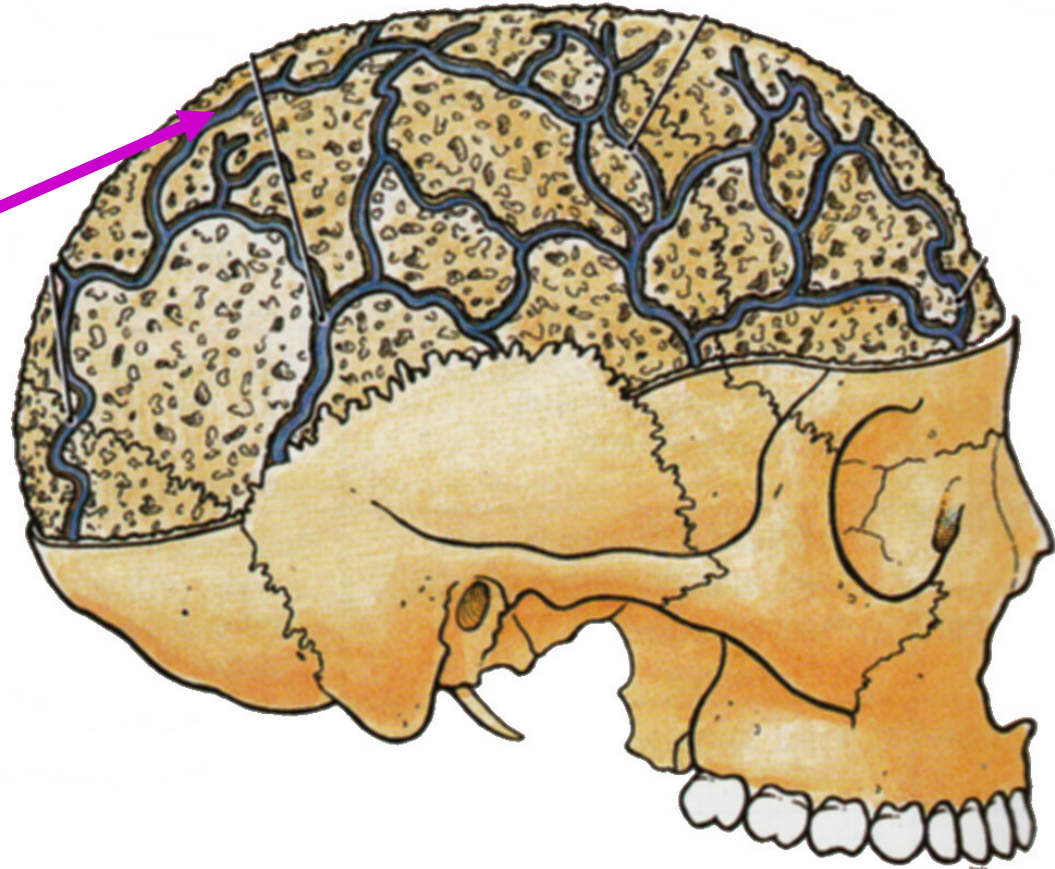
1. INNER AND OUTER TABLES - HARD CORTICAL BONE

MIDDLE LAYER - SOFT SPONGY BONE CALLED DIPLOE (= DOUBLE IN GREEK)

2. DIPLOIC VEINS

view when outer table of bone is partially removed

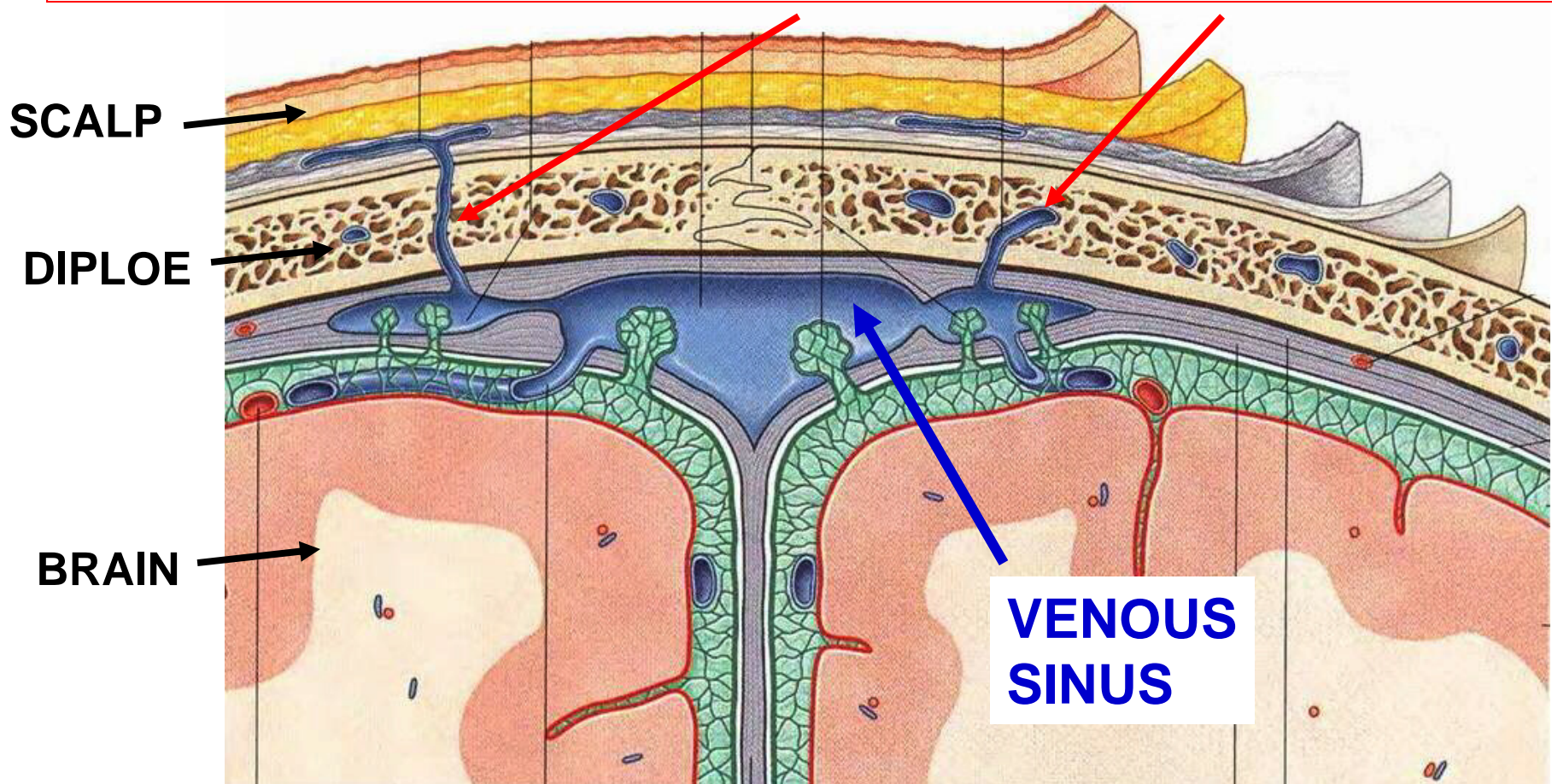
**COURSE IN
DIPLOE -
CONNECT BOTH
TO CRANIAL
CAVITY AND
SURFACE OF
SKULL**



**- CAN TRANSMIT INFECTION FROM SCALP TO
BRAIN VIA EMISSARY VEINS**

EMISSARY VEINS

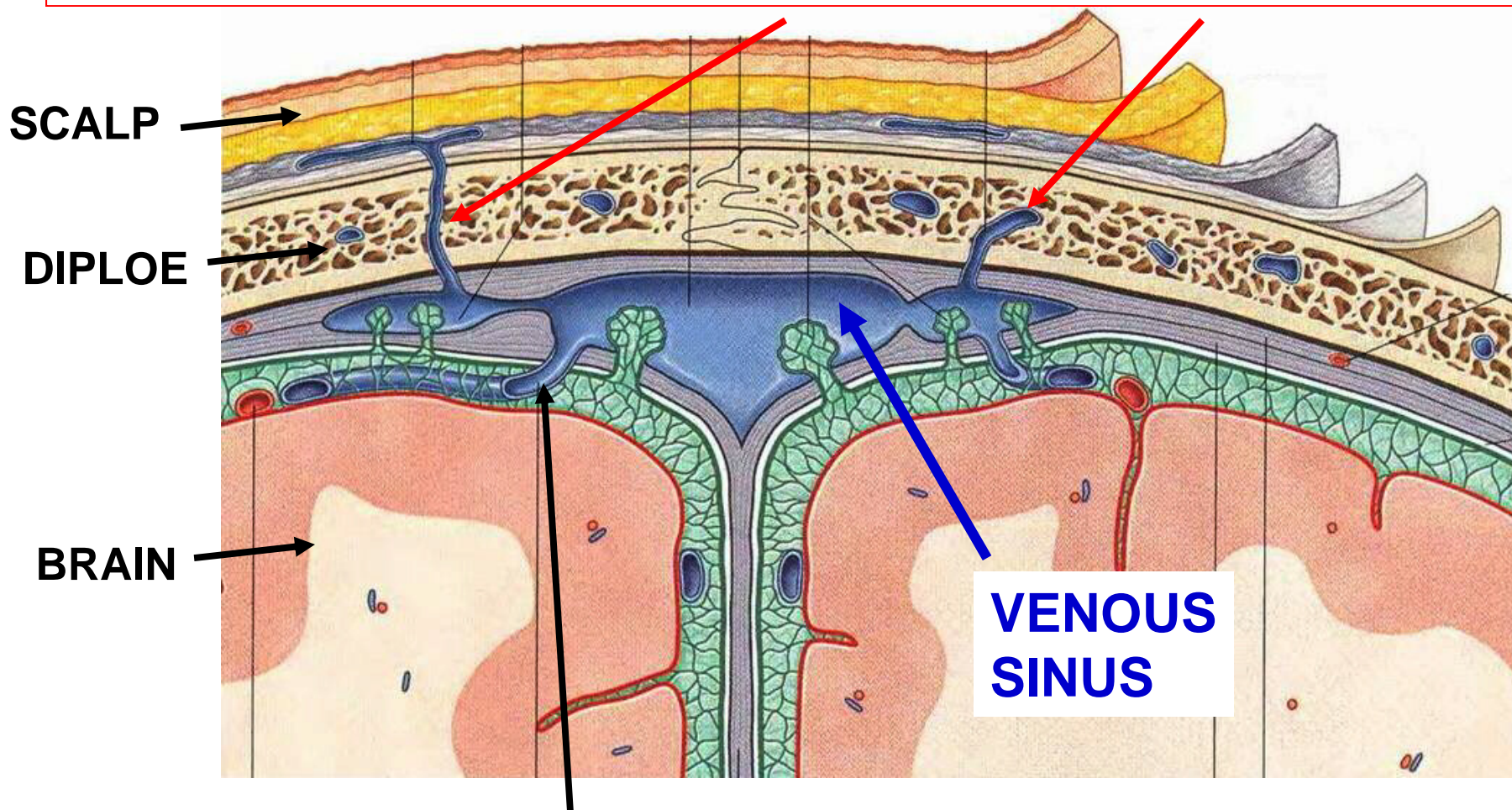
EMISSARY VEIN - SCALP TO DIPLOE, SCALP TO SINUS, DIPLOE TO SINUS



note: Emissary vein – connect 'outside' to venous sinus

EMISSARY VEINS VS BRIDGING VEINS

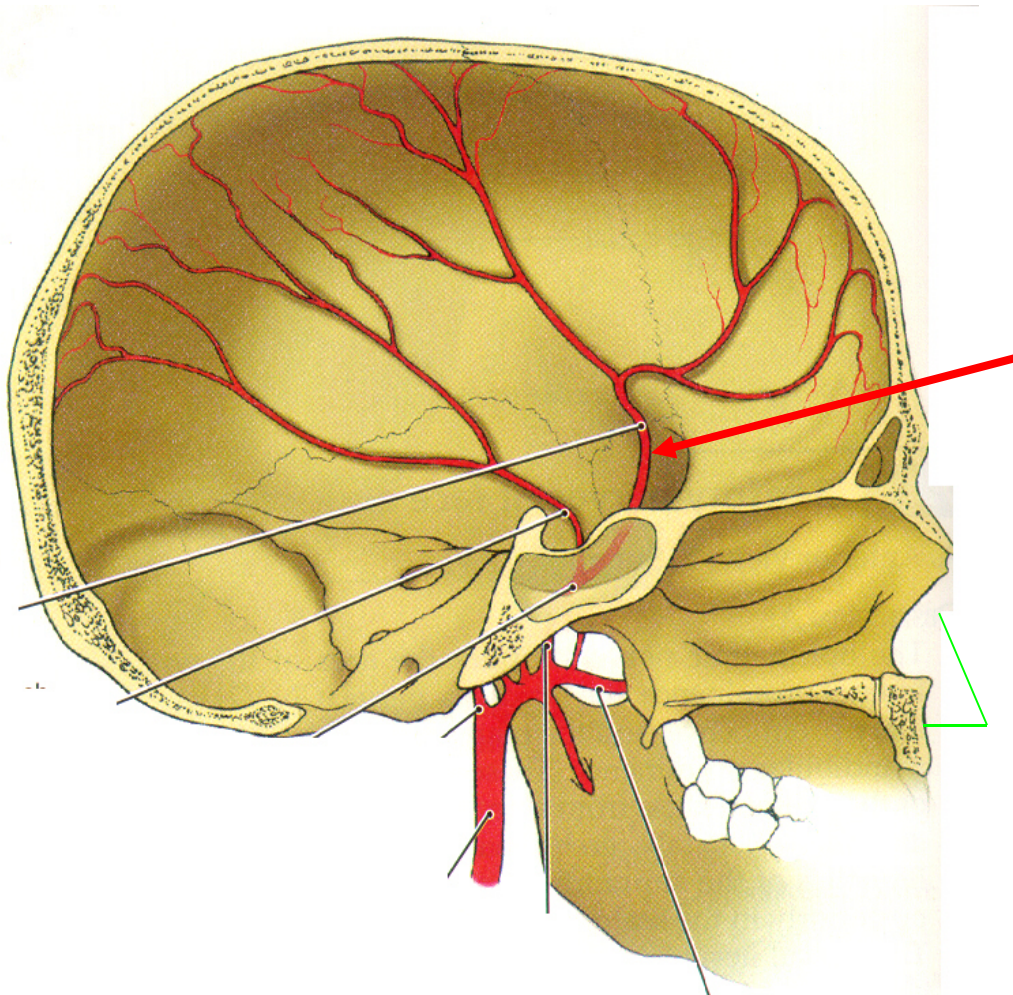
EMISSARY VEIN - SCALP TO DIPLOE, SCALP TO SINUS, DIPLOE TO SINUS



BRIDGING VEIN - SURFACE OF BRAIN (CEREBRAL VEIN) TO VENOUS SINUS

note: Emissary vein - 'outside' to sinus; Bridging vein - brain (inside) to sinus

F. BLOOD SUPPLY TO CALVARIUM



1) OUTER SURFACE –
ARTERIES TO SCALP

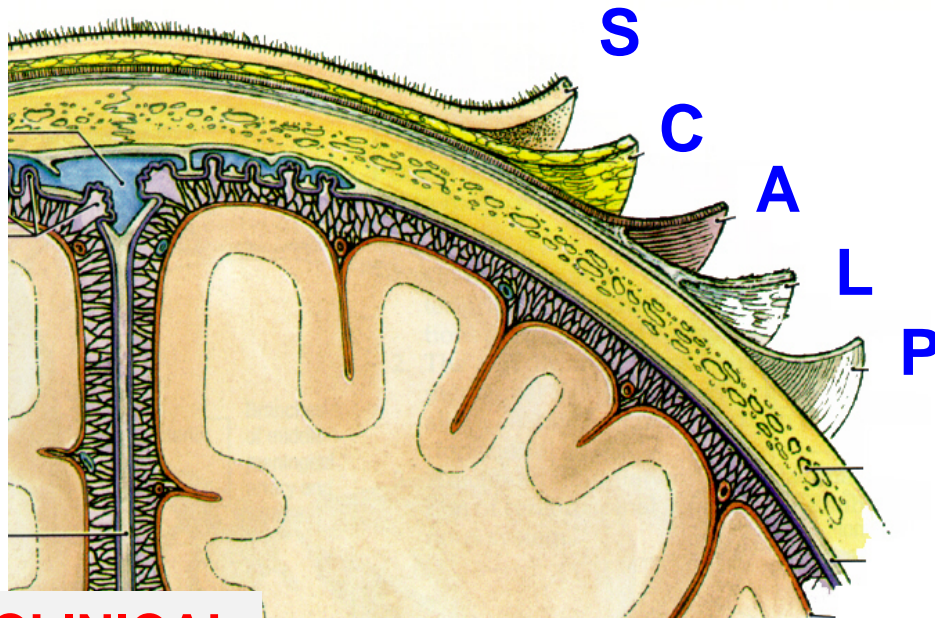
2) INNER SURFACE-
MENINGEAL ARTERIES

COURSE NEXT TO BONE;
MISNAMED - SOUND
LIKE SUPPLY MENINGES
- MOST BLOOD TO
BONES

Note: Skull fracture can cause bleeding of Meningeal arteries – EPIDURAL HEMATOMA

II. SCALP A. LAYERS

mnemonic - layers spell SCALP



CLINICAL

Clinical note: Infections can readily spread through loose areolar layer deep to epicranial aponeurosis. **

1. S **SKIN** – HAIR, SWEAT AND SEBACEOUS GLANDS

2. C **CONNECTIVE TISSUE** – SURROUND ARTERIES, VEINS (ORIGIN OF EMISSARY VEINS)

3. A **EPICRANIAL APONEUROSIS** – TENDINOUS SHEET, ATTACHES TO SCALP MUSCLES; MOVEABLE ANTERIOR AND POSTERIOR; LATERAL ATTACHES TO TEMPORALIS FASCIA

4. L **LOOSE AREOLAR TISSUE**- LOOSELY CONNECTS APONEUROSIS AND PERIOSTEUM CROSSED BY EMISSARY VIENS

5. P **PERIOSTEUM (PERICRANIUM)** CT LAYER ON OUTER SIDE OF CALVARIUM

SCALPING SOMEONE: REMOVE SCALP BETWEEN 3

(EPICRANIAL APONEUROSIS) AND 4 (LOOSE AREOLAR TISSUE);

Note: SAVING SCALP AS SOUVENIR - not done in civilized societies (including medical students)

B. NERVES OF SCALP- BRANCHES OF TRIGEMINAL (V) AND CERVICAL SPINAL NERVES

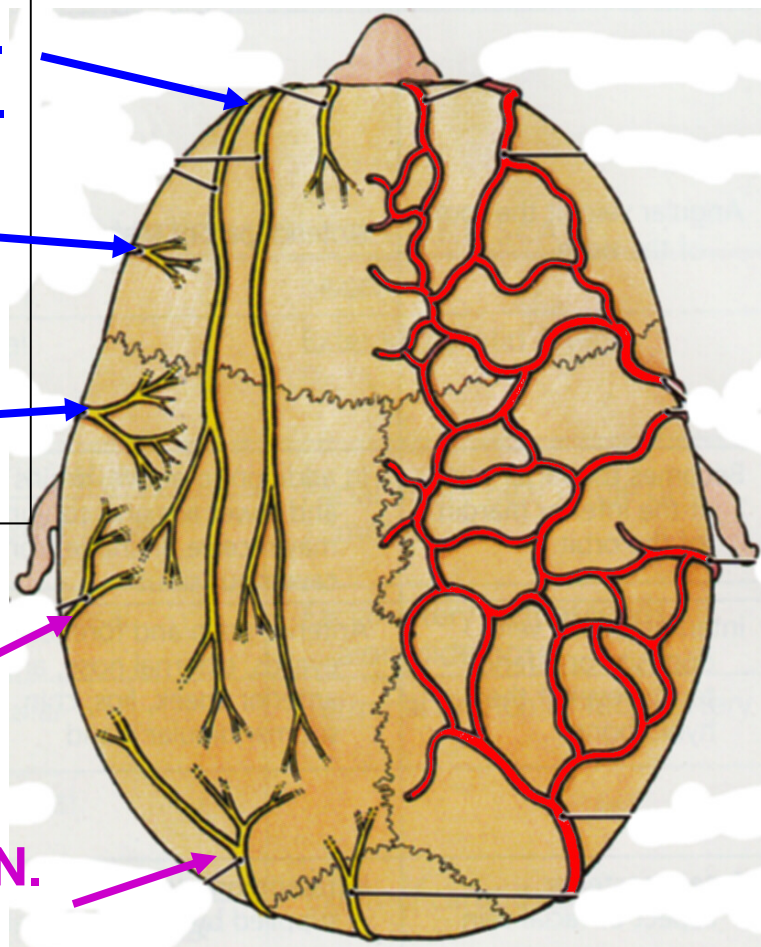
TRIGEMINAL

- V1- SUPRAORBITAL N.
SUPRATROCHLEAR N.
- V2 – ZYGOMATICO-
TEMPORAL N.
- V3 – AURICULO-
TEMPORAL N.

LESSER OCCIPITAL
N. - C2 VENTRAL
RAMUS

GREATER OCCIPITAL N.
- C2 DORSAL RAMUS

NOSE



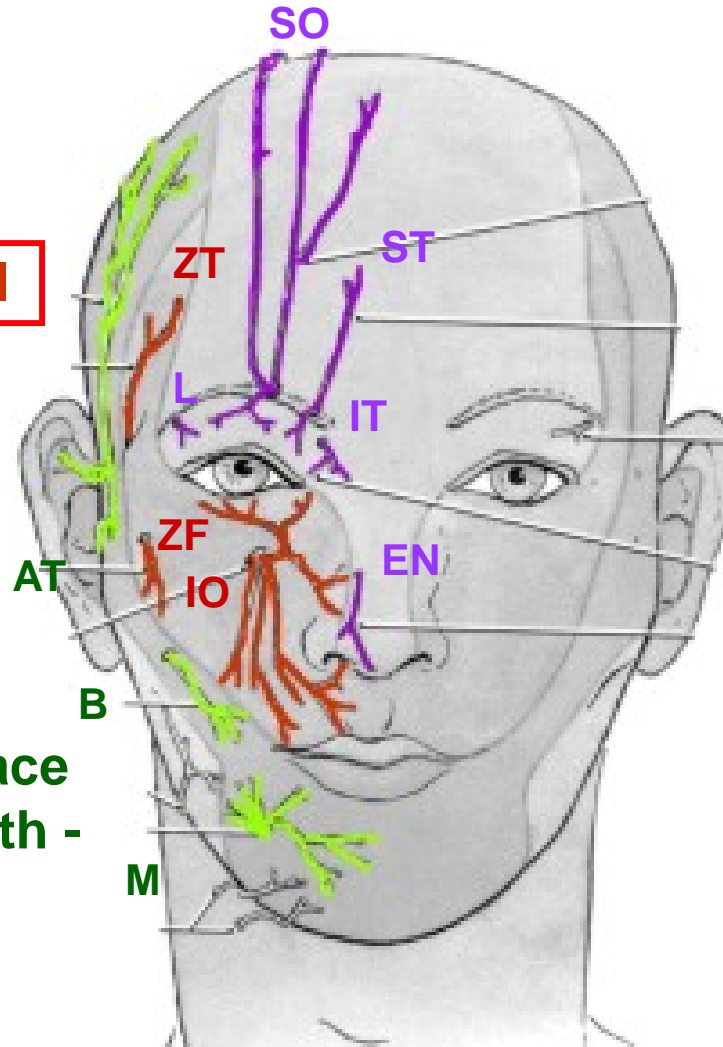
FACE LECTURE: SENSORY SUPPLY - BRANCHES OF TRIGEMINAL NERVE TO FACE

V2 – MAXILLARY -
to skin of cheek
below orbit -

Zygomatotemporal
Zygomatofacial
Infraorbital

V3- MANDIBULAR -
to skin of jaw and face
below angle of mouth -

Auriculotemporal
Buccal
Mental



NOTE: These are branches of V to face, not ALL branches of V

V1 – OPHTHALMIC -
to skin above orbit -
Lacrimal

Supraorbital
Supratrochlear
Infratrochlear
External Nasal Nerve

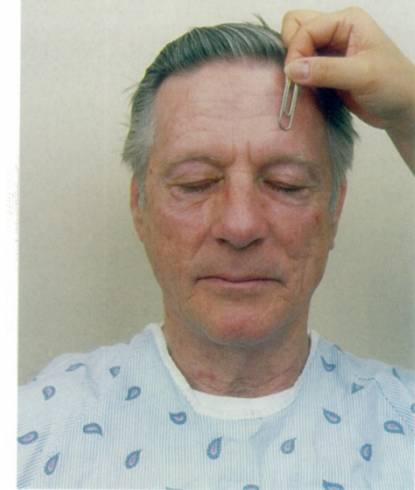
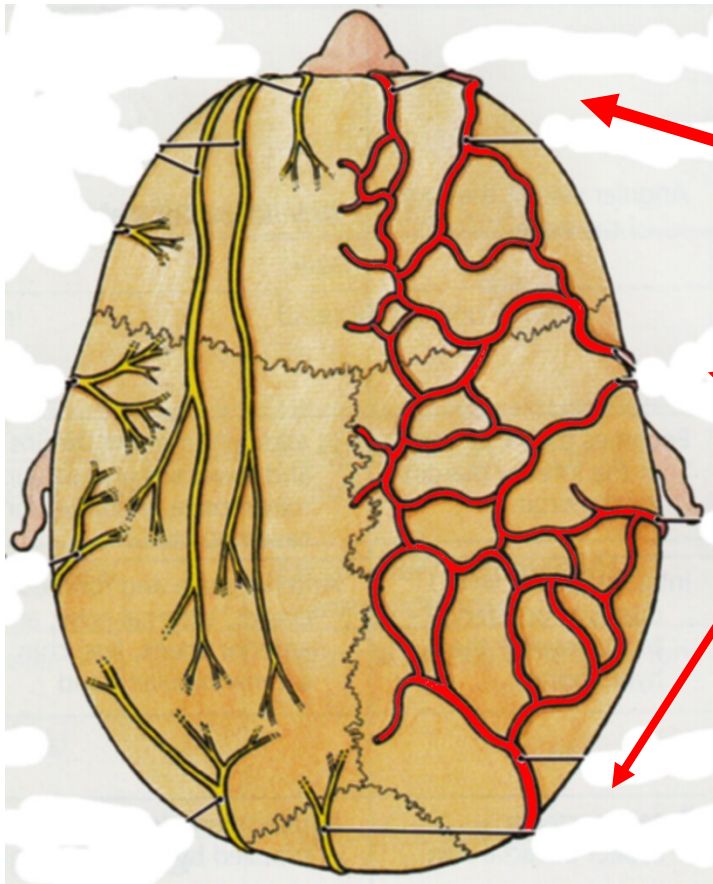


FIGURE 21-13
Examination of the trigeminal cranial nerve

**CLINICAL TEST OF V:
SUPRAORBITAL N.**

C. ARTERIES OF SCALP

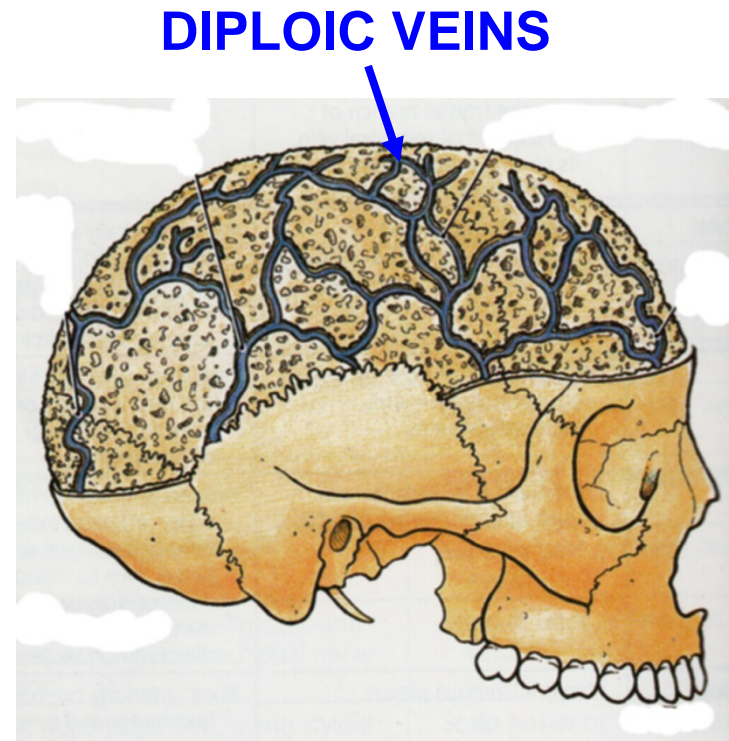
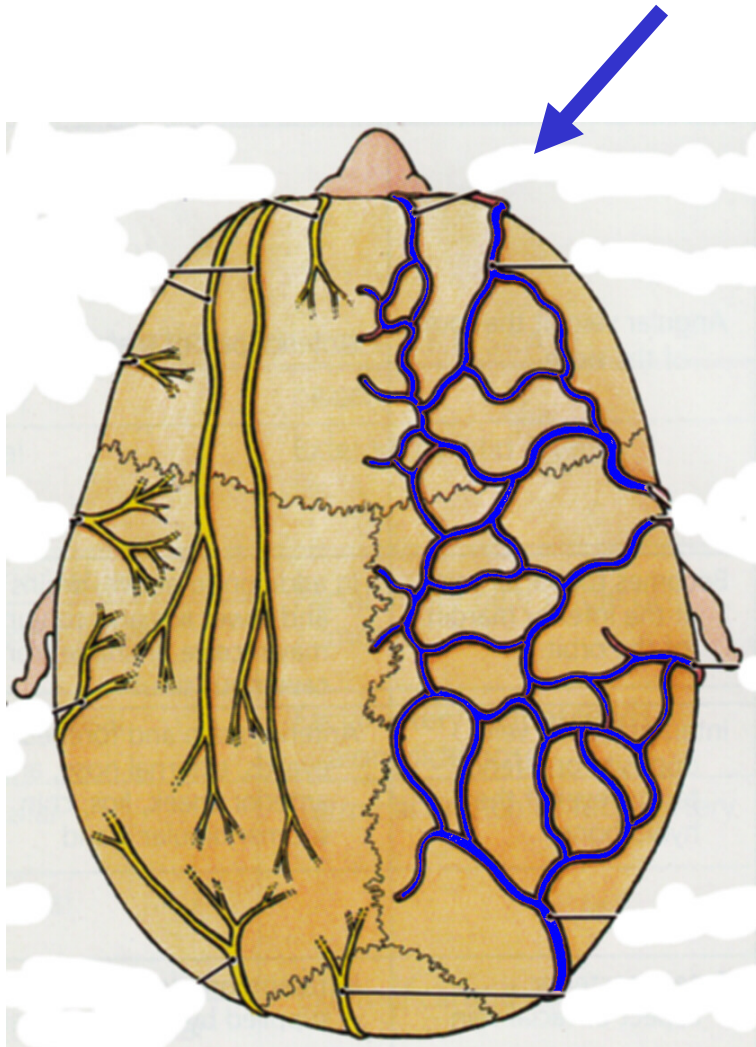
- RICH SUPPLY FROM BRANCHES OF INTERNAL AND EXTERNAL CAROTID; EXTENSIVE ANASTOMOSES - SCALP WOUND BLEEDS PROFUSELY FROM BOTH SIDES OF CUT



1. br. of OPHTHALMIC:
SUPRAORBITAL A.,
SUPRATROCHLEAR A

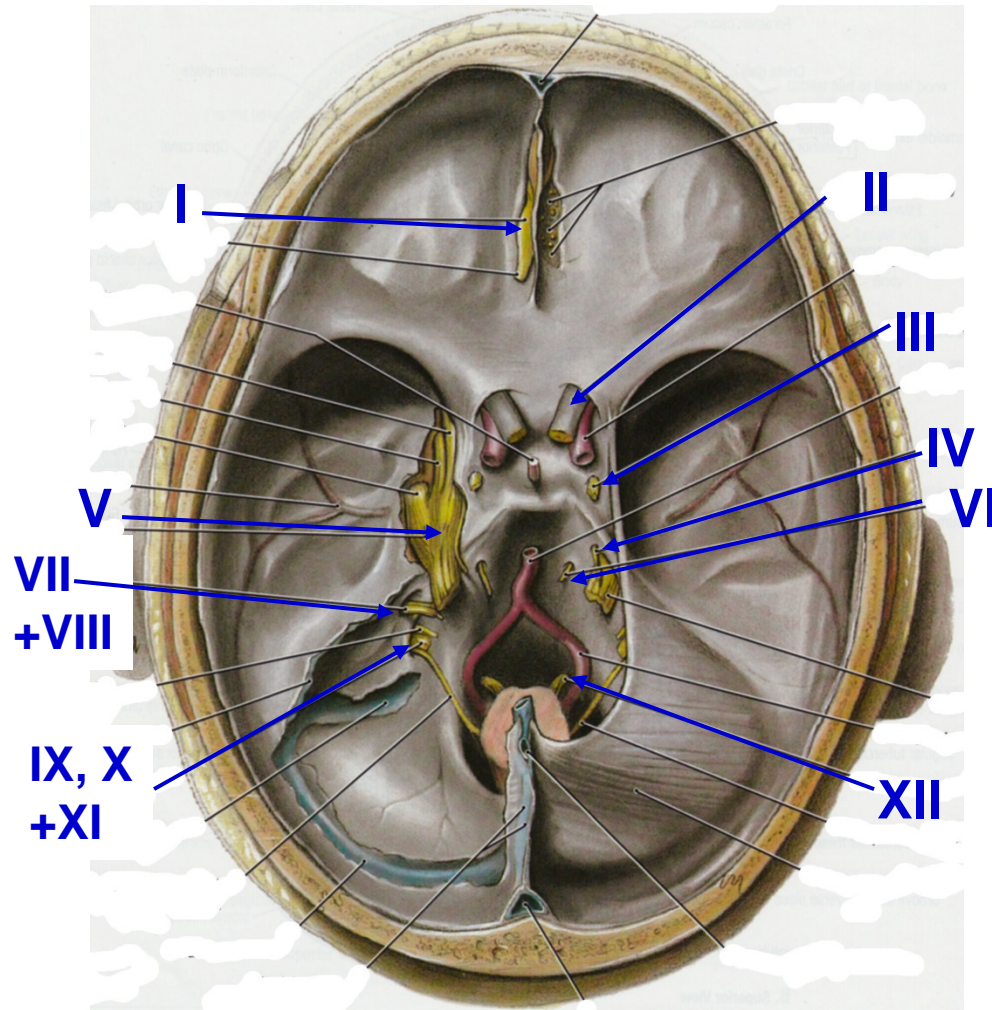
2. br. of EXTERNAL CAROTID:
SUPERFICIAL TEMPORAL A.,
POSTERIOR AURICULAR A.,
OCCIPITAL A.

D. VEINS OF SCALP – SAME NAMES AS ARTERIES



**ALSO EMISSARY
VEINS drain to
DIPLOIC VEINS IN
DIPLOE**

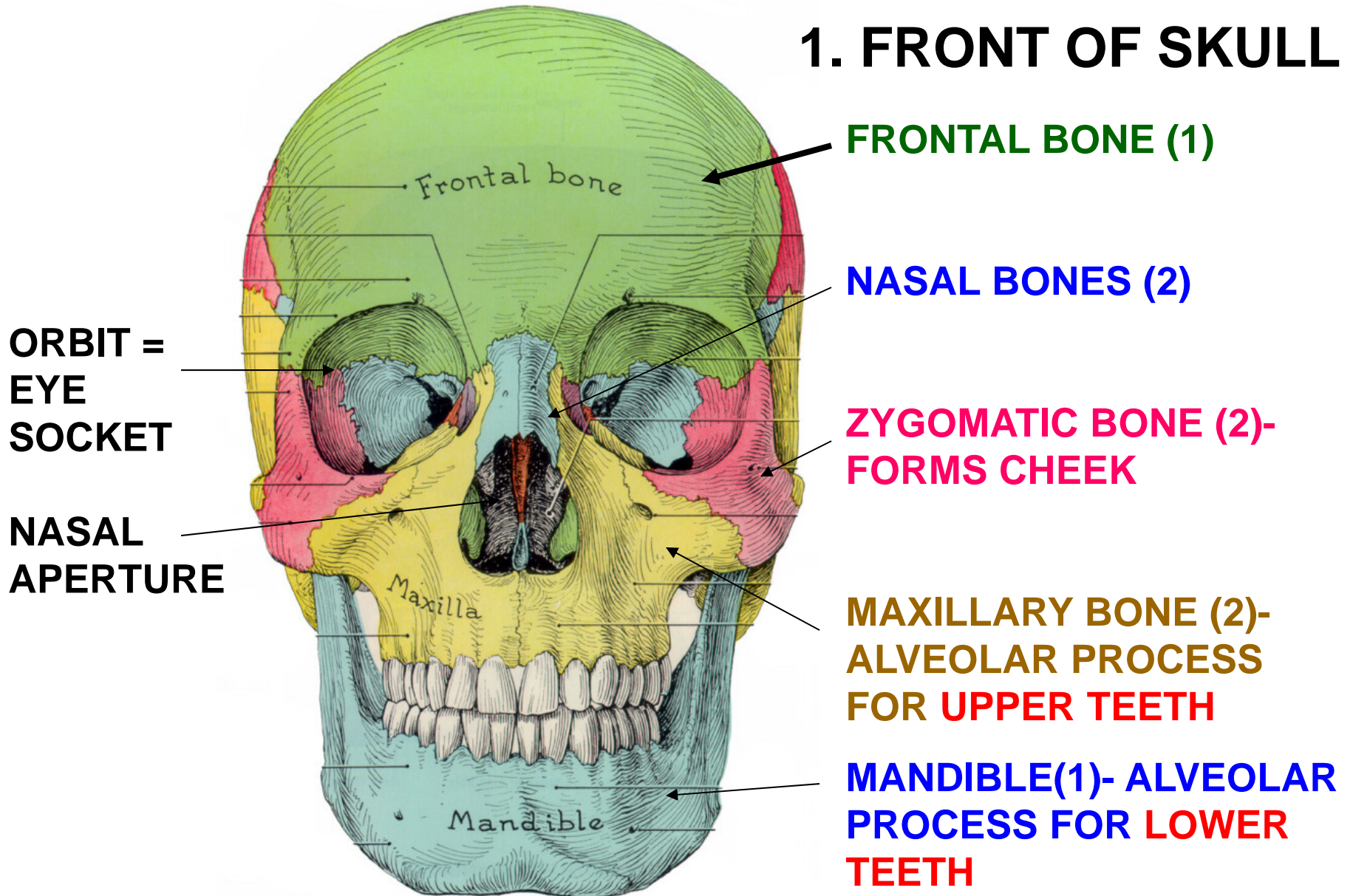
CRANIAL NERVES



- I. OLFACTORY - sense of smell
- II. OPTIC - vision
- III. OCULOMOTOR - eye movement
- IV. TROCHLEAR - eye movement
- V. TRIGEMINAL - touch, general sensation to skin, oral cavity, nasal cavity + more
- VI. ABDUCENS - eye movement
- VII. FACIAL - muscles of facial expression + lots more
- VIII. VESTIBULO-COCHLEAR - hearing and balance
- IX. GLOSSOPHARYNGEAL - sensory to pharynx + more
- X. VAGUS - larynx, pharynx + rest of body
- XI. ACCESSORY - sternocleidomastoid, trapezius
- XII. HYPOGLOSSAL - muscles of tongue

II. LANDMARKS AND BONES

1. FRONT OF SKULL



2. LATERAL VIEW OF SKULL



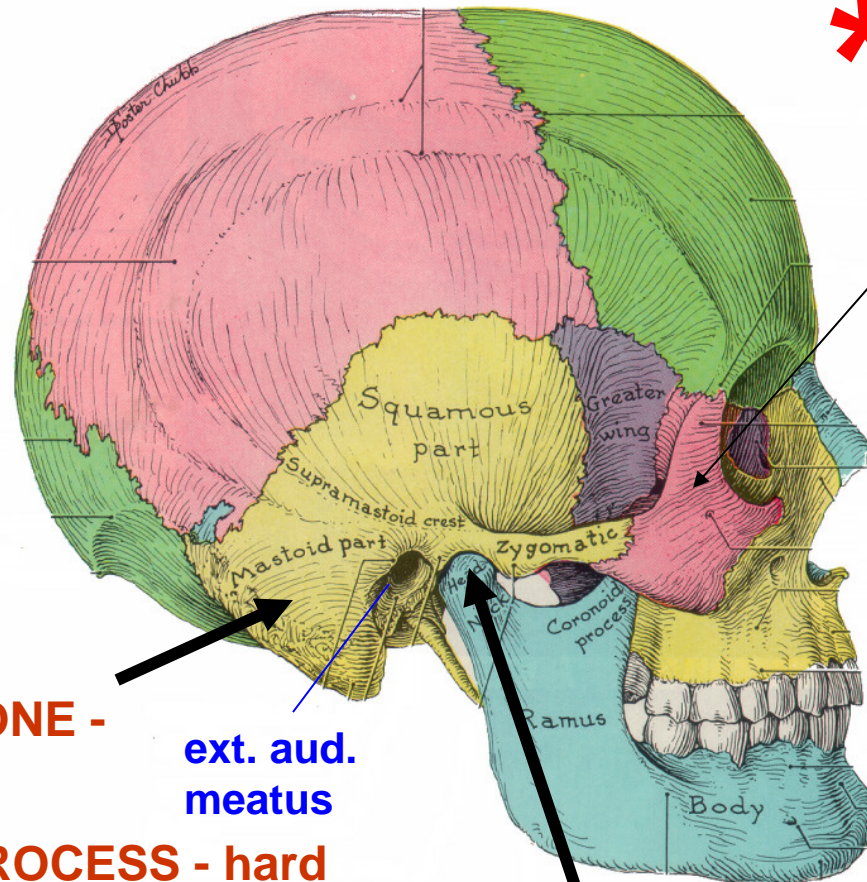
CLINICAL - fractures

ZYGOMATIC ARCH-

1) ZYGOMATIC BONE

**2) MAXILLARY BONE-
ZYGOMATIC PROCESS**

**3) TEMPORAL BONE-
ZYGOMATIC PROCESS**



TEMPORAL BONE -

PARTS

1) MASTOID PROCESS - hard

2) SQUAMOUS PART- flat

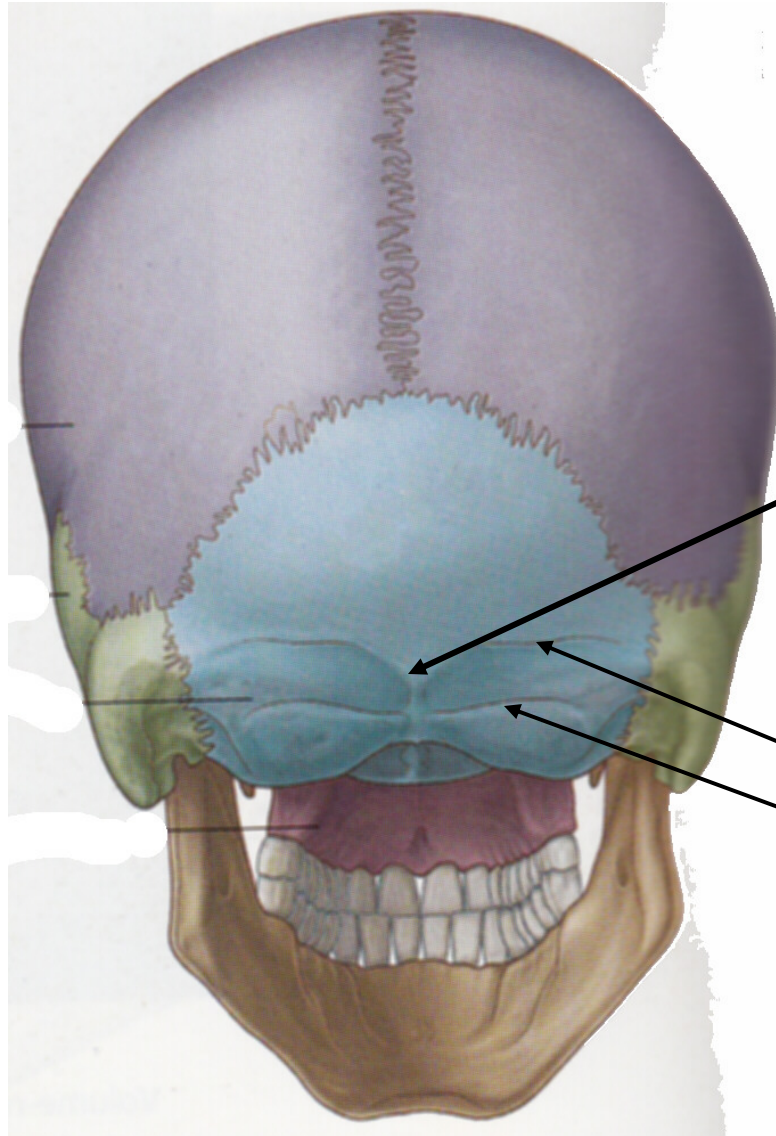
**3) TYMPANIC PART - ANT. TO
EXTERNAL AUDITORY
MEATUS**

**4) PETROUS PART – inside
skull**

**ext. aud.
meatus**

**TEMPORO-MANDIBULAR JOINT-
FROM RAMUS OF MANDIBLE**

3. POSTERIOR VIEW OF SKULL

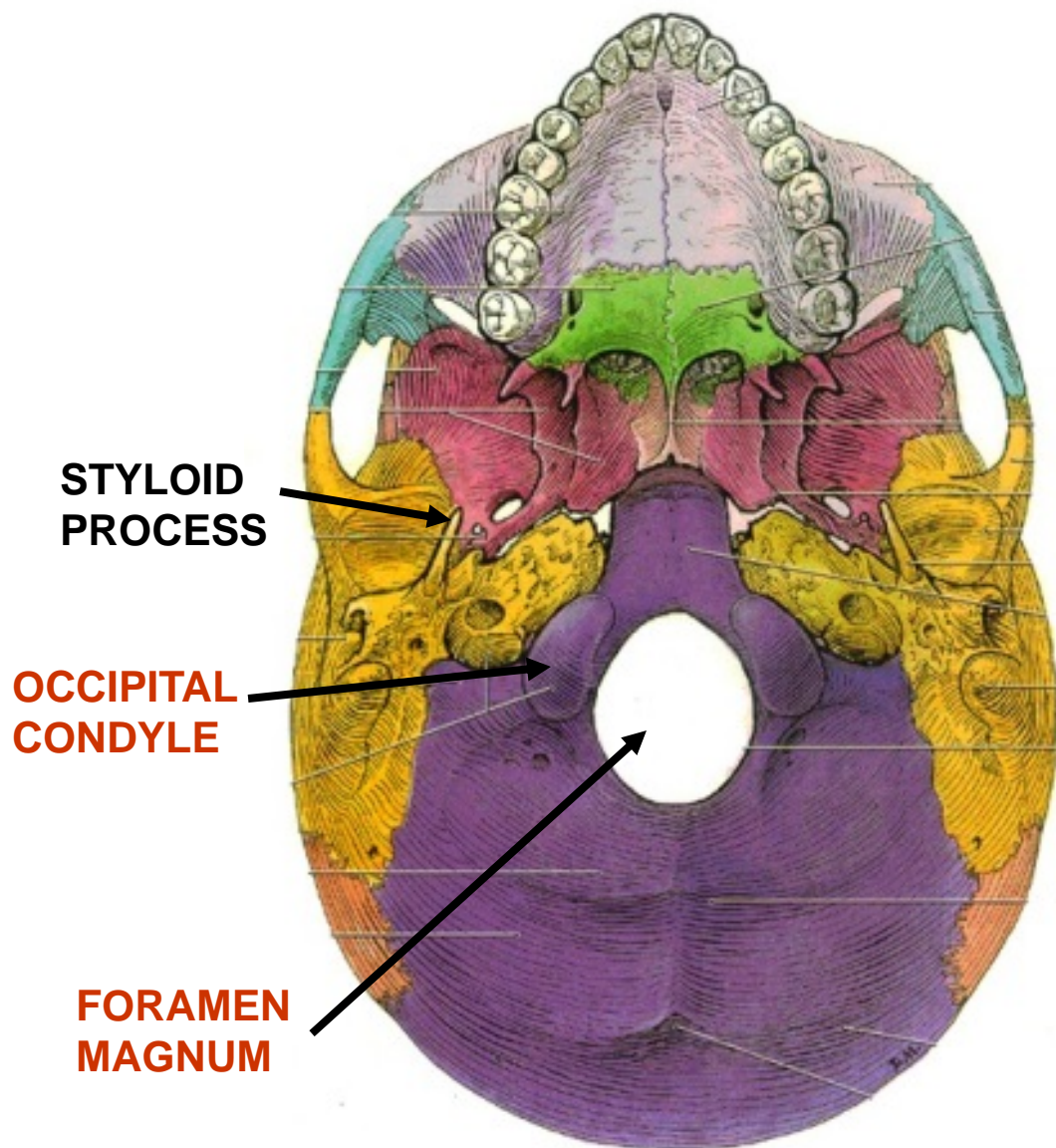


OCCIPITAL BONE

**EXTERNAL OCCIPITAL
PROTUBERANCE**

**SUPERIOR AND
INFERIOR
NUCHAL LINES**

4. BASE OF SKULL - COMPLEX



C) HARD PALATE-
PALATINE BONES AND
PALATINE PROCESS OF
MAXILLARY BONES

A) TEMPORAL BONE-
HAS STYLOID
PROCESS- MUSCLE
ATTACH

B) OCCIPITAL BONE-
HAS FORAMEN
MAGNUM - SPINAL
CORD; OCCIPITAL
CONDYLES- FOR C1-
ATLAS

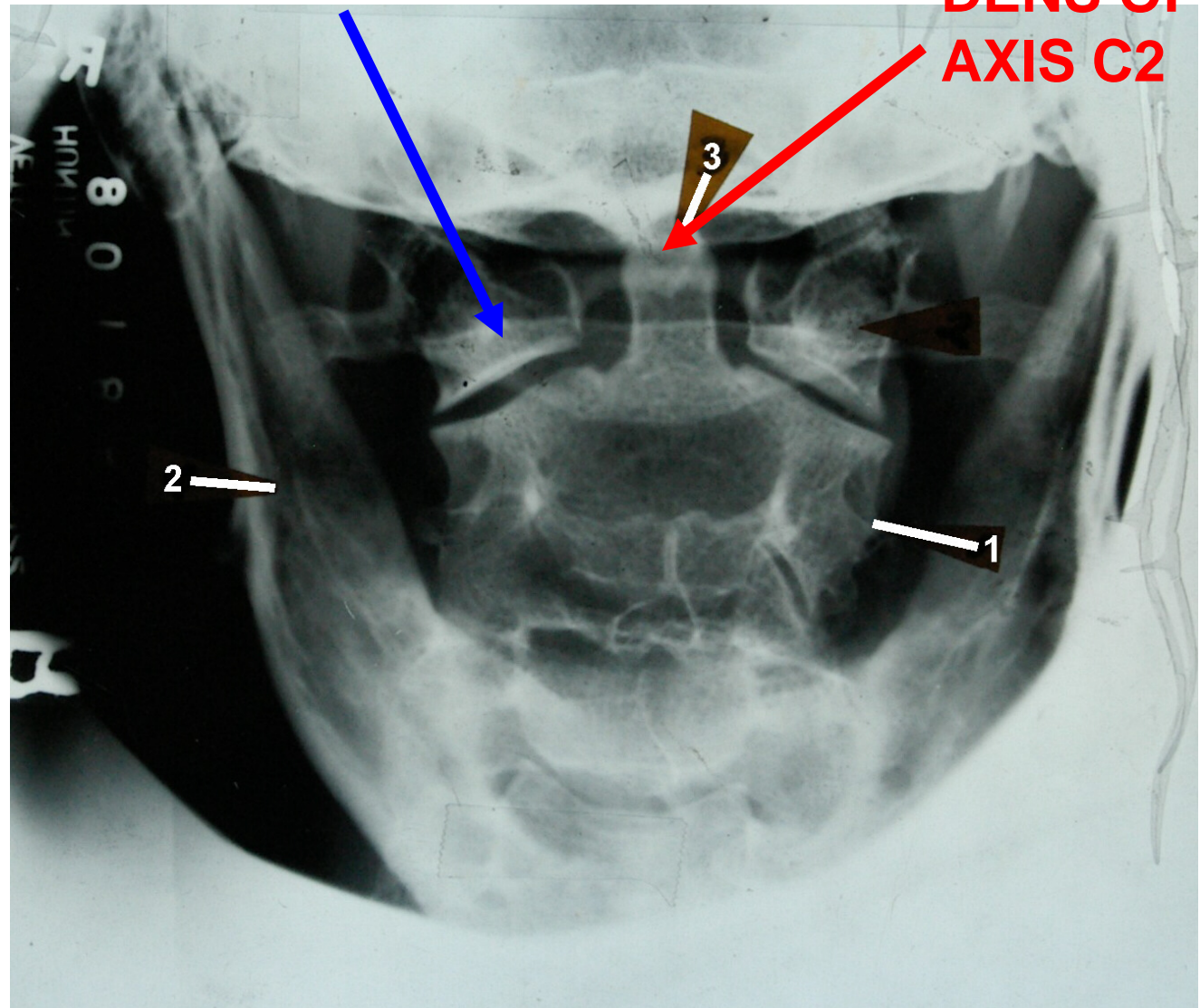
AP view

ATLAS C1

DENS OF
AXIS C2

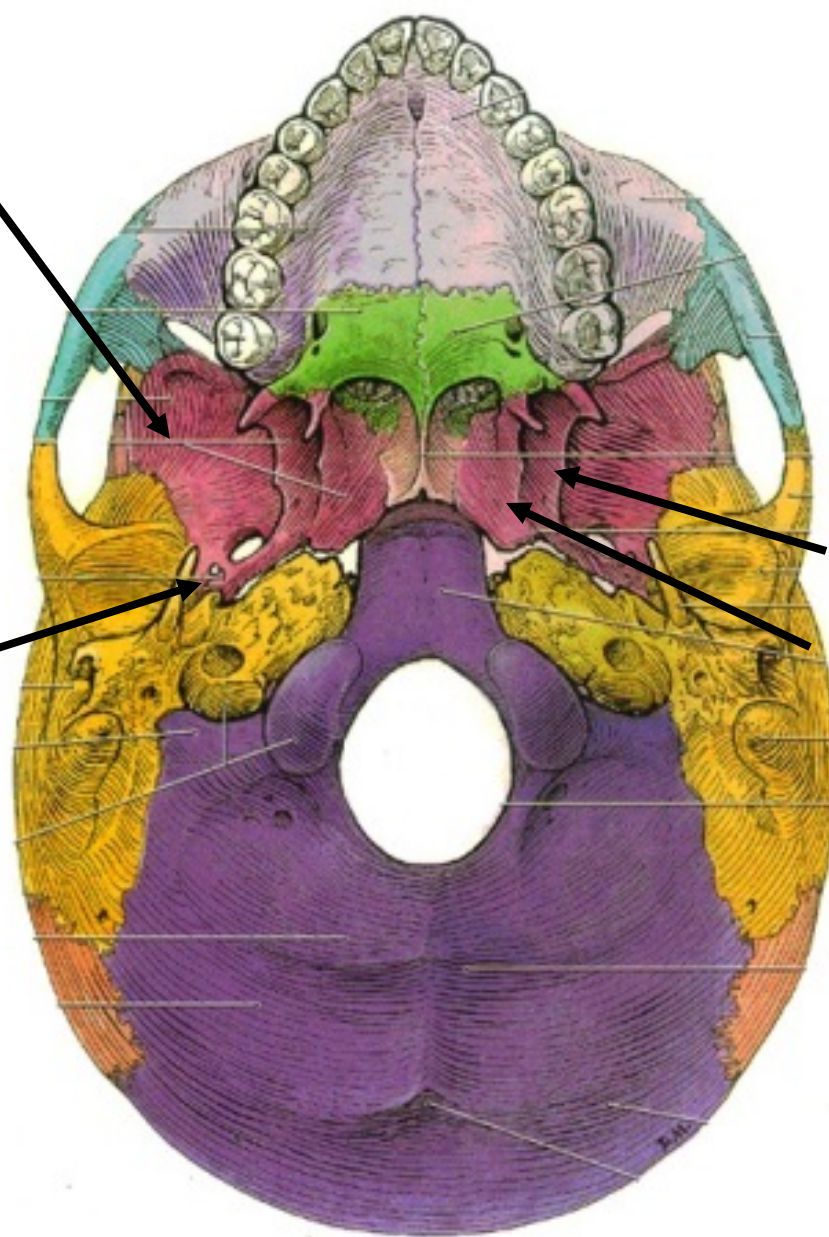
Antero-
posterior film
of with mouth
open

1. Transverse process of C2
2. Ramus of mandible
3. Odontoid process (dens) of C2



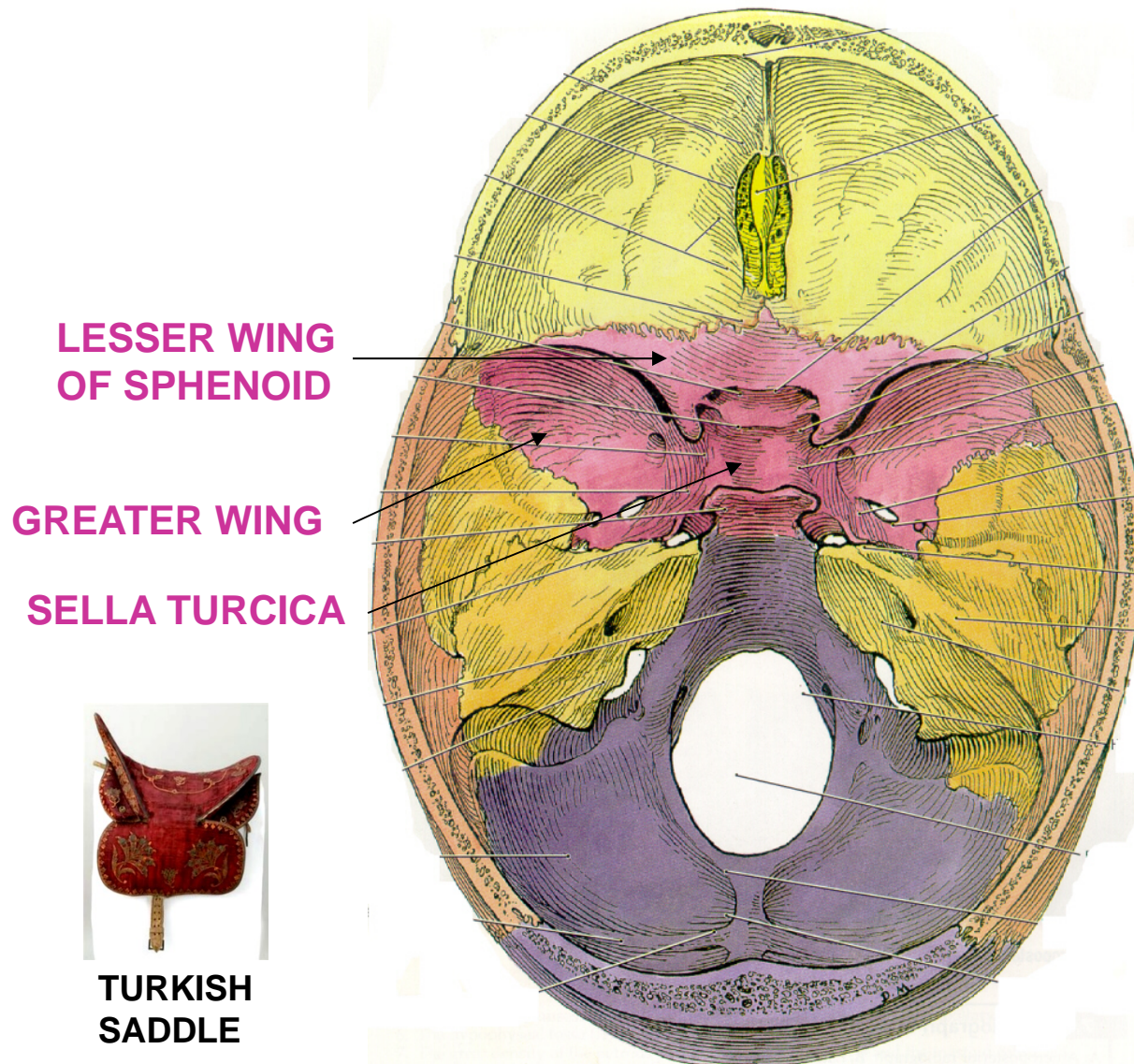
1. SPHENOID BONE – ‘CORE’ OF SKULL

2) SPINE OF SPHENOID -
INFERIOR SIDE
ATTACH LIGAMENT



LATERAL AND
MEDIAL
PTERYGOID
PLATES -
MUSCLE
ATTACHMENT

SPHENOID BONE - INSIDE SKULL



TURKISH SADDLE

- Sphenoid bone forms parts of all cranial fossae; has:

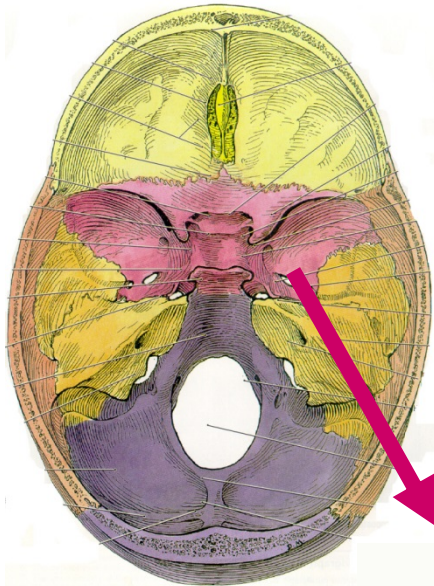
i) Lesser Wing above Superior Orbital Fissure;

ii) Greater Wing - Below Superior Orbital Fissure extends laterally;

iii) Sella Turcica - (turkish saddle) depression above main part (body)

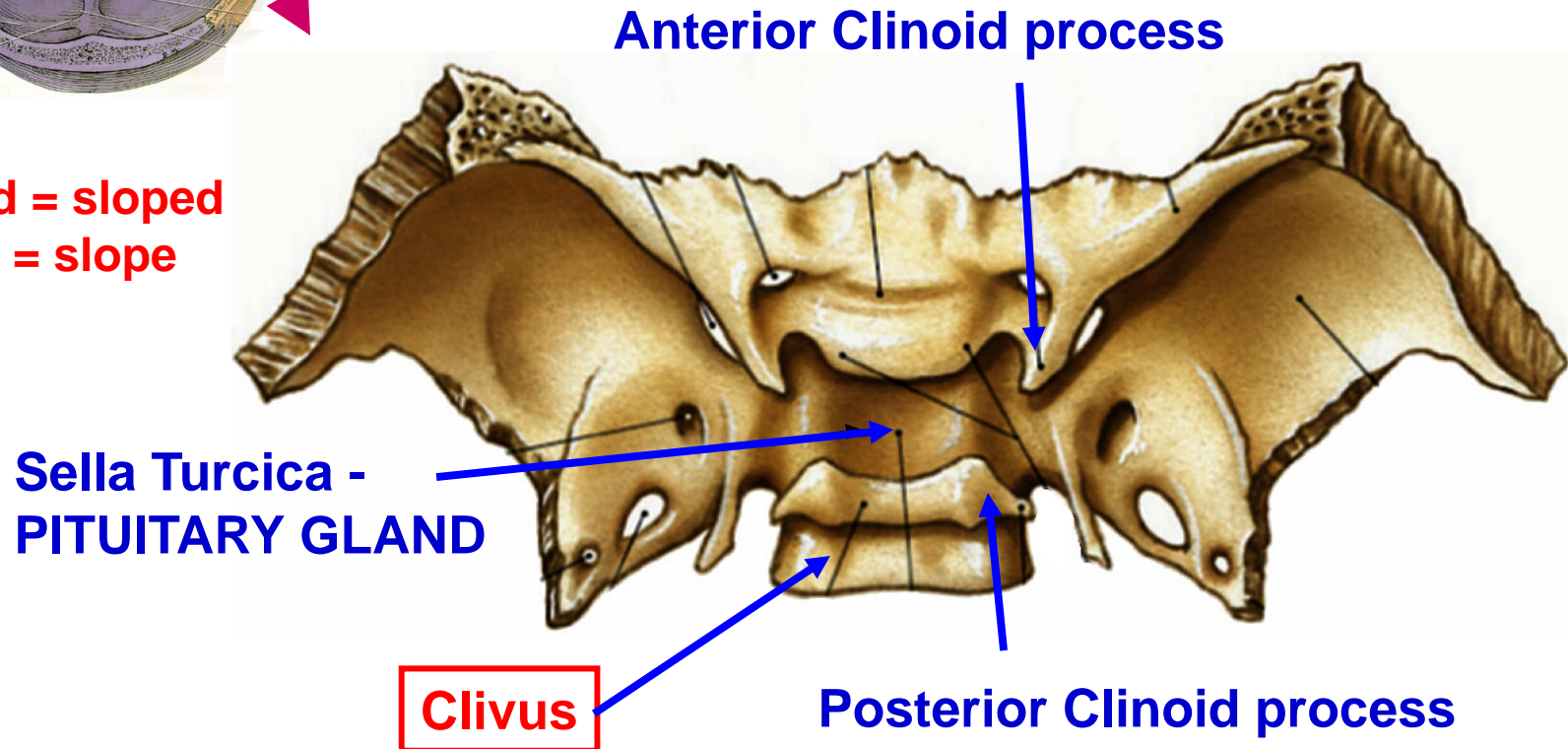
LOCATION OF PITUITARY GLAND

SPHENOID BONE - INSIDE SKULL



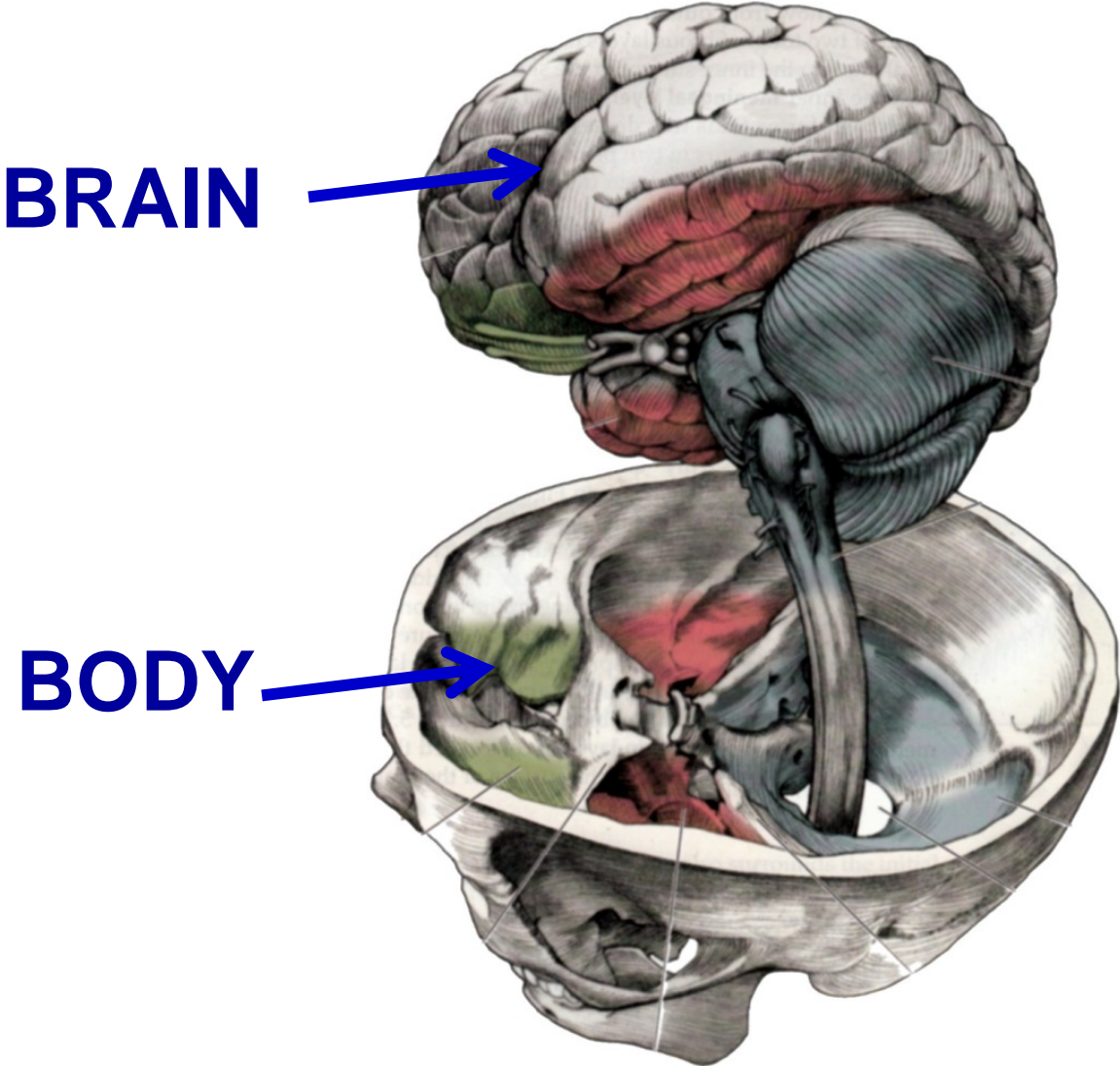
Sella Turcica - (turkish saddle) depression above body; location of PITUITARY GLAND

**Clinoid = sloped
Clivus = slope**



Note: parts of Sphenoid bone are important landmarks in Neurology

**GROSS BRAINSTEM DISSECTION: HOW THE BRAIN
FITS IN THE BODY**



SKULL LECTURE HANDOUT: CHECKLIST OF FEATURES

CHECKLIST OF FEATURES AND BONES OF SKULL TO IDENTIFY

Coronal suture - between Frontal and Parietal bones

Sagittal suture - between Parietal bones

Lambdoidal suture - between Parietal and Occipital bones

Bregma - midpoint of Coronal Suture

Lambda - midpoint of Lambdoidal suture

Pterion - junction of Sphenoid, Temporal, Parietal and Frontal bones (fracture - **Epidural Hematoma**)

Anterior Fontanelle - located at Bregma

Posterior Fontanelle - located at Lambda

Lateral Fontanelle - located at Pterion

Diploe - spongy bone in calvarium between hard inner and outer tables

Zygomatic arch - zygomatic bones and zygomatic processes of maxillary and temporal bones

Temporomandibular joint - joint between head of mandible and mandibular fossa of temporal bone

Mastoid process - inferior part of temporal bone posterior to external auditory meatus

Squamous part of Temporal bone - lateral part, contributes to calvarium

Tympanic part of Temporal bone - anterior to external auditory meatus

Petrous part of Temporal bone - hard, inside cranial cavity (contains cochlea, semicircular canals)

Superior and Inferior nuchal lines - raised ridges on posterior surface of Occipital bone

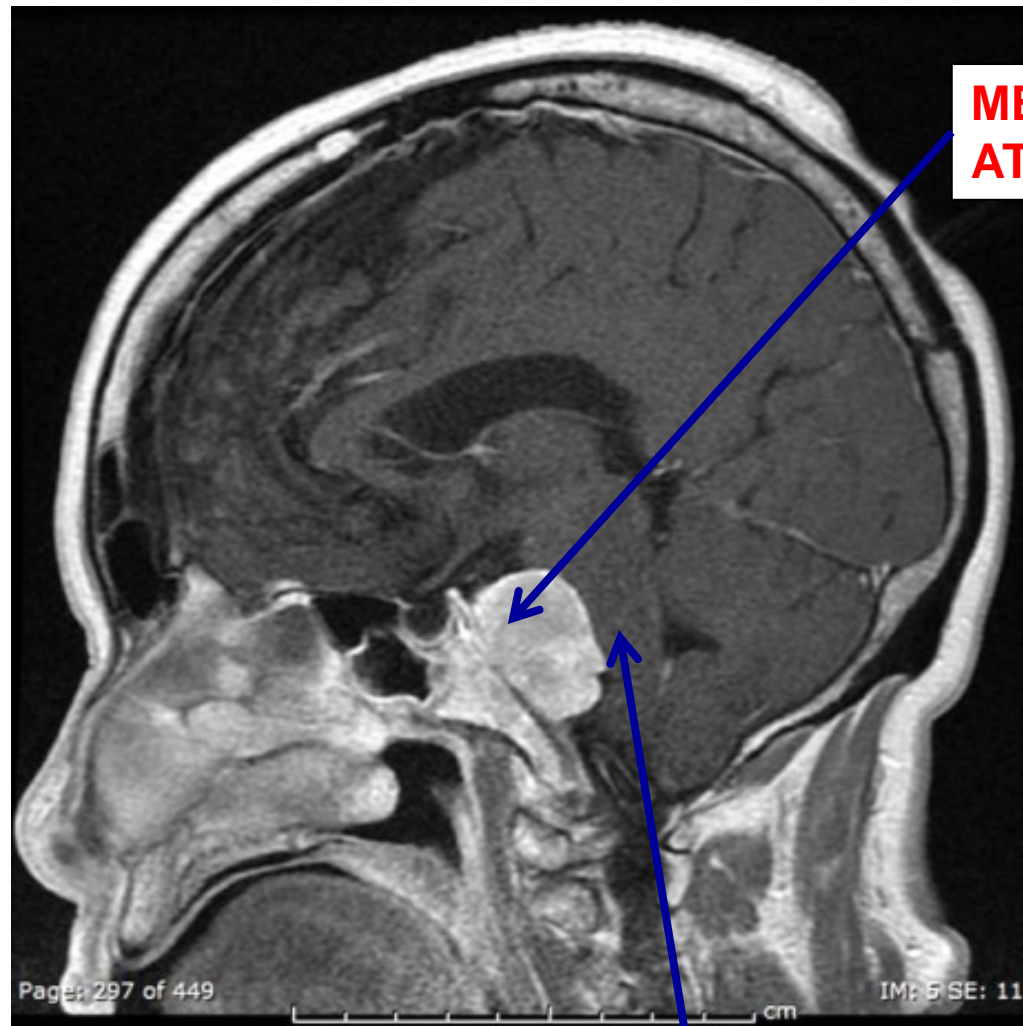
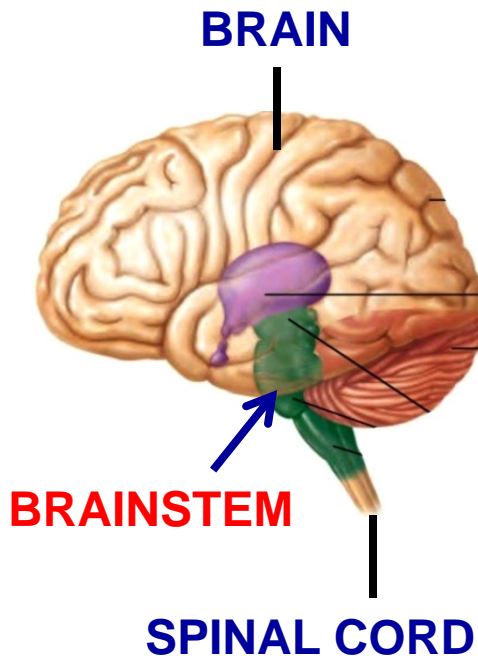
External Occipital protuberance - raised midline bump in Superior Nuchal line

Bony palate - palatine bones, palatine process of maxillary bones

Medial Pterygoid plates- inferior projection of Sphenoid bone for muscle attachment (has hamulus (hook) for Tensor Palati muscle)

Lateral Pterygoid plates - inferior projection of Sphenoid bone for muscle attachment (Pterygoid muscles)

TERMINOLOGY: MENINGIOMA AT THE CLIVUS

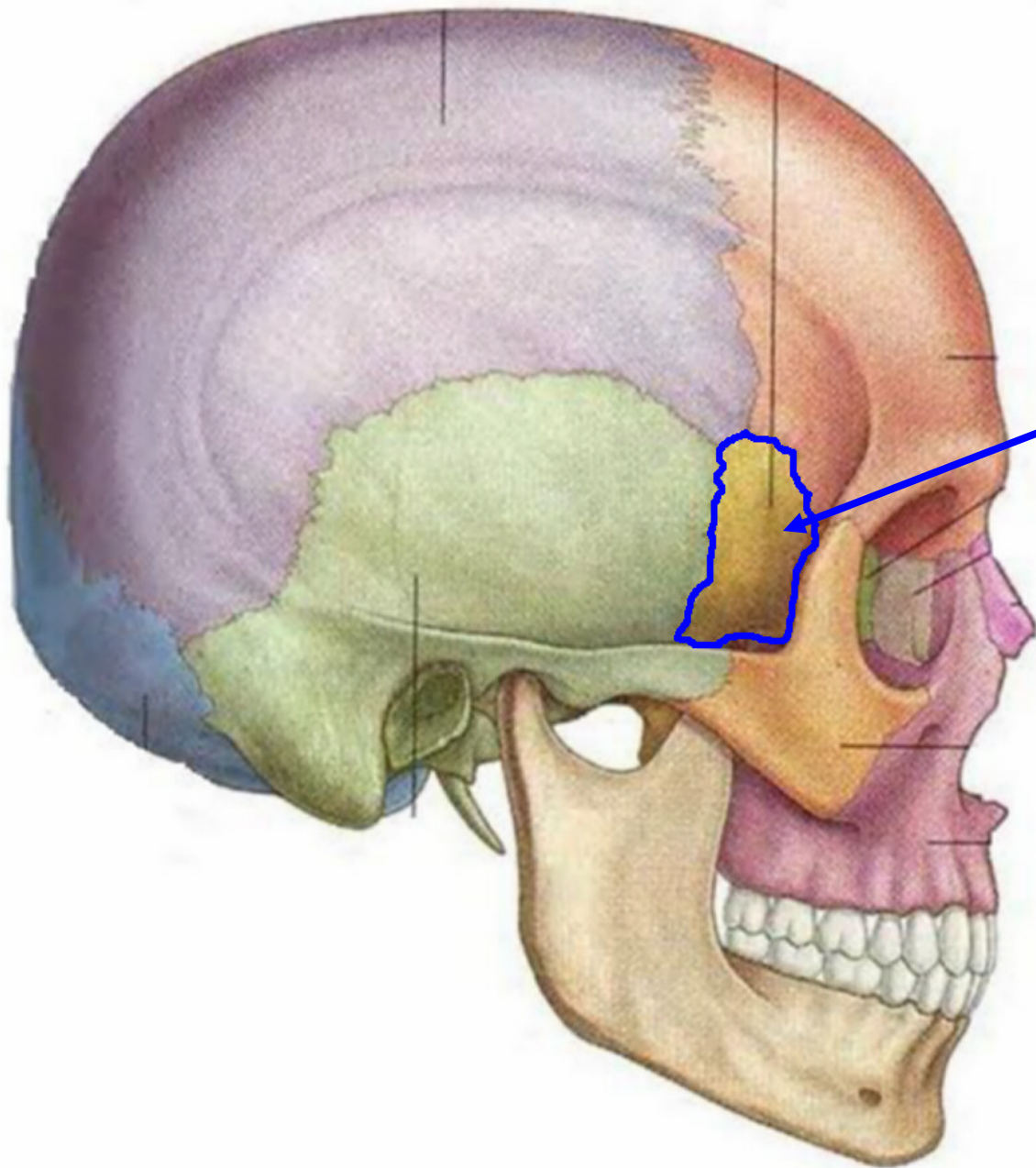


NOSE ←

BRAINSTEM

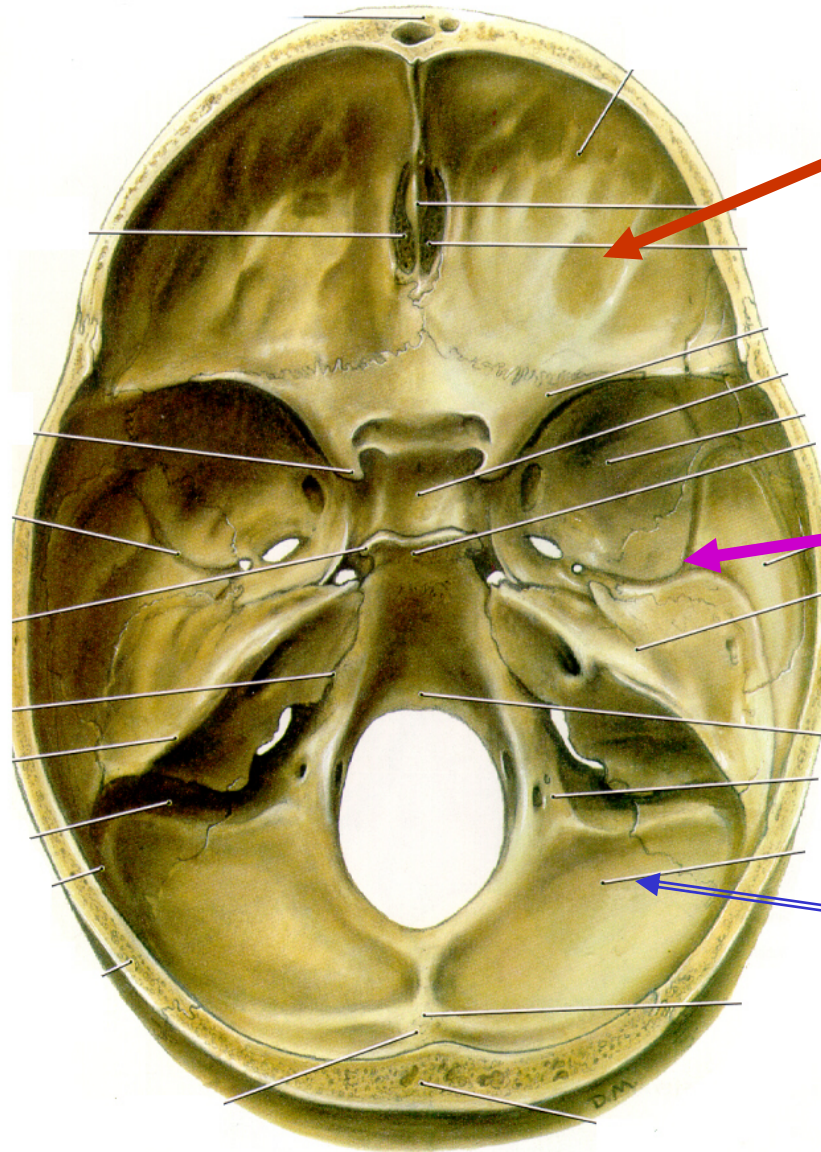
FYI (not memorize):
Symptoms (MANY) can include:

- Coordination problems (ataxia)
- Blurry vision
- Difficulty swallowing (dysphagia)
- Difficulty walking
- Headaches
- Hearing loss
- Nausea
- Optical disc swelling (papilledema)
- Sensory problems
- Vertigo (loss of balance)
- Vision problems
- Vomiting
- Weakness



**GREATER
WING OF
SPHENOID-
LATERAL
SIDE OF
SKULL**

V. CRANIAL CAVITY- DIVIDED INTO DEPRESSIONS (FOSSAE)



ANTERIOR CRANIAL FOSSA (ROOF OF NASAL CAVITY, ORBIT)

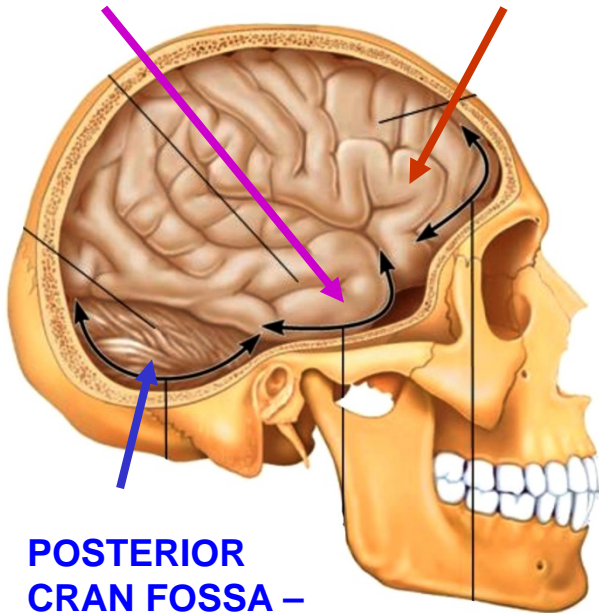
MIDDLE CRANIAL FOSSA (ORBIT, NASAL CAVITY, FACE)

POSTERIOR CRANIAL FOSSA (FACE, ORAL CAVITY, NECK)

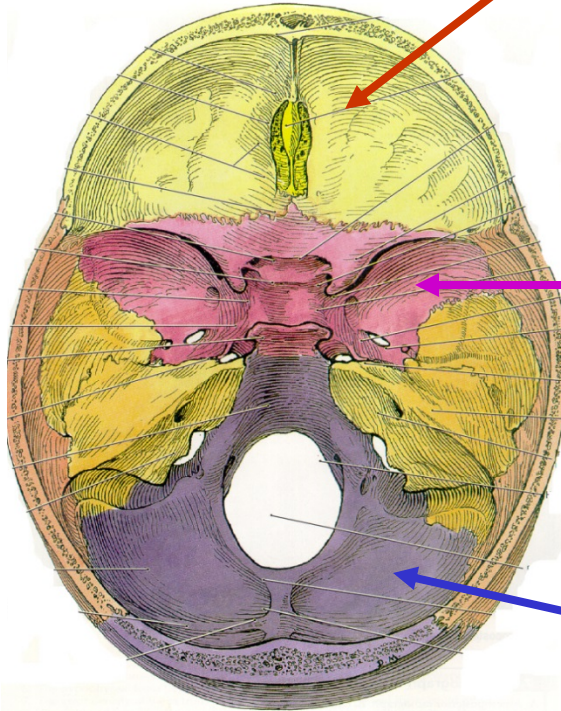
CONTENTS OF CRANIAL FOSSAE

MIDDLE CRANIAL FOSSA – TEMPORAL LOBE

ANTERIOR CRANIAL FOSSA – FRONTAL LOBES



POSTERIOR CRAN FOSSA – CEREBELLUM, BRAINSTEM



ANTERIOR CRANIAL FOSSA –
BONES: FRONTAL, ETHMOID, SPHENOID;
CONTAINS: CN I (CRIBRIFORM PLATE), FRONTAL LOBES, OLFACTORY BULB

MIDDLE CRANIAL FOSSA - BONES: SPHENOID, TEMPORAL, PARIETAL
CONTAINS: CN II-VI - TEMPORAL LOBES - PITUITARY, BRAIN STEM

POSTERIOR CRANIAL FOSSA - BONES: SPHENOID, TEMPORAL, OCCIPITAL, PARIETAL
CONTAINS - CN VII-XII - CEREBELLUM, BRAINSTEM -FORAMEN MAGNUM TRANSMITS SPINAL CORD, VERTEBRAL ARTERIES