Beryl Arbuckle's Approach to the Head

or

A Curved Tensegrity Approach to Cranial

Cranial Osteopathy

- In the realm of cranial osteopathy, we learn that things can get restricted/stuck in the head.

- Trauma, chemical insult, physiological abnormalities, dental procedures, etc., can all cause or contribute to this restriction in the cranium.

- Traditionally, we are taught very gentle ways to diagnose and treat restrictions and strain patterns in the cranium using indirect methods on the fluids and membranes.

Cranial Osteopathy

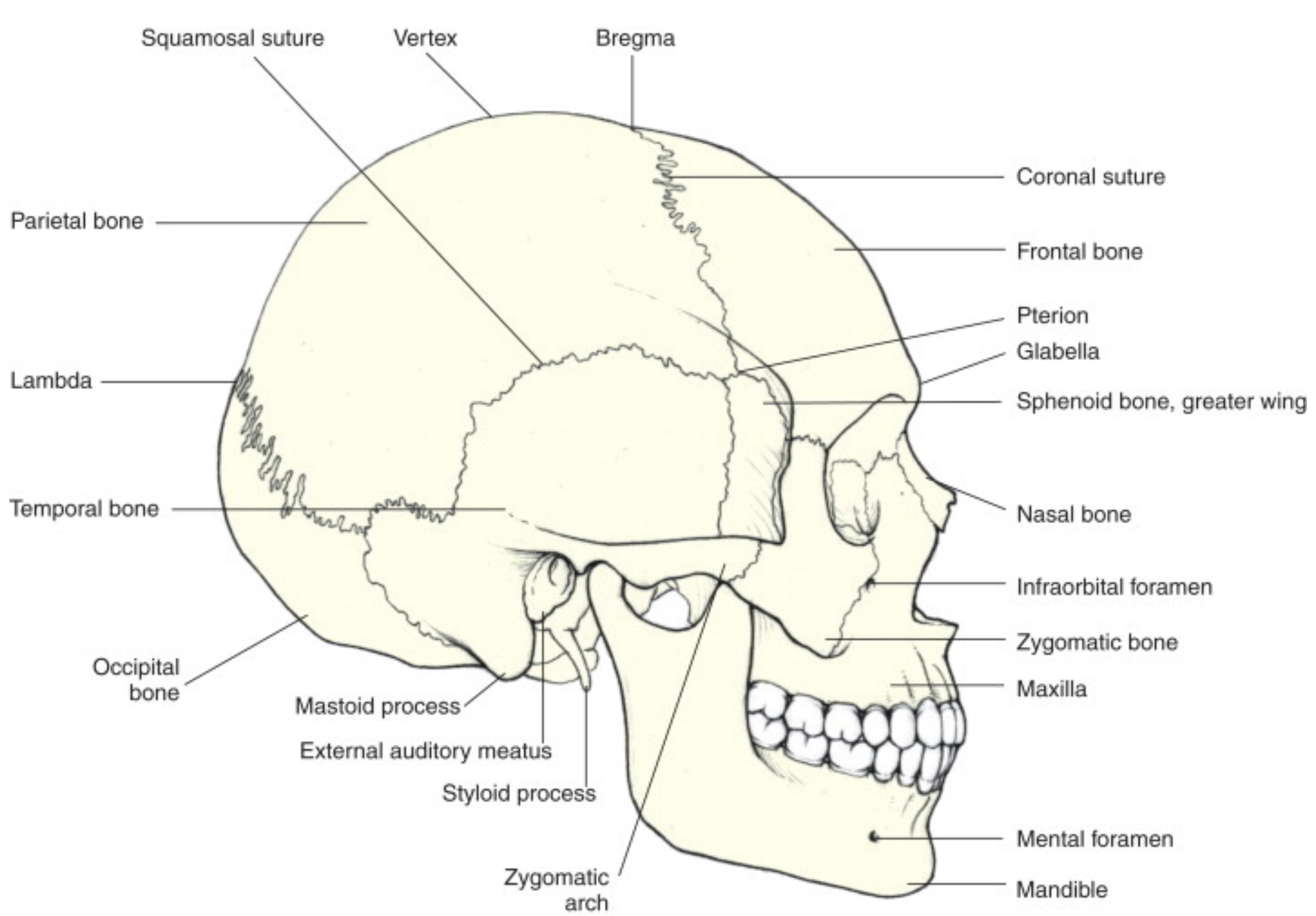
- Those methods work fairly well, but are they able to treat everything?

- Still said that if we were not getting the results that we were expecting then we did know our anatomy well enough….

Cranial Osteopathy

- Traditional cranial treatments leave out many of the sutures as a separately identifiable and treatable restriction.

- Thankfully, Sutherland taught a few students this approach and it has been passed down to a small number of osteopaths.


Squamosal suture
Vertex
Bregma
Coronal suture
Parietal bone
Frontal bone
Pterion
Glabella
Lambda
Sphenoid bone, greater wing
Temporal bone
Nasal bone
Infraorbital foramen
Zygomatic bone
Occipital bone
Maxilla
Mastoid process
External auditory meatus
Styloid process
Mental foramen
Zygomatic arch
Mandible

Cranial Osteopathy

- The sutural approach goes well beyond the V-spread.

- It is very powerful and can also address the membranes and fluids of the cranium in the hands of a skilled operator.

- But does it address enough of the things that can be restricted in the head (or is there more anatomy to treat)?

Cranial Osteopathy

- We typically learn that the body is symmetric and should move symmetrically unless a structure only grows on one side (the liver, for example).

- But is that true? (and most specifically, is it true in trauma?)

Can the method you currently know reliably locate and treat these restrictions?

Cranial Osteopathy

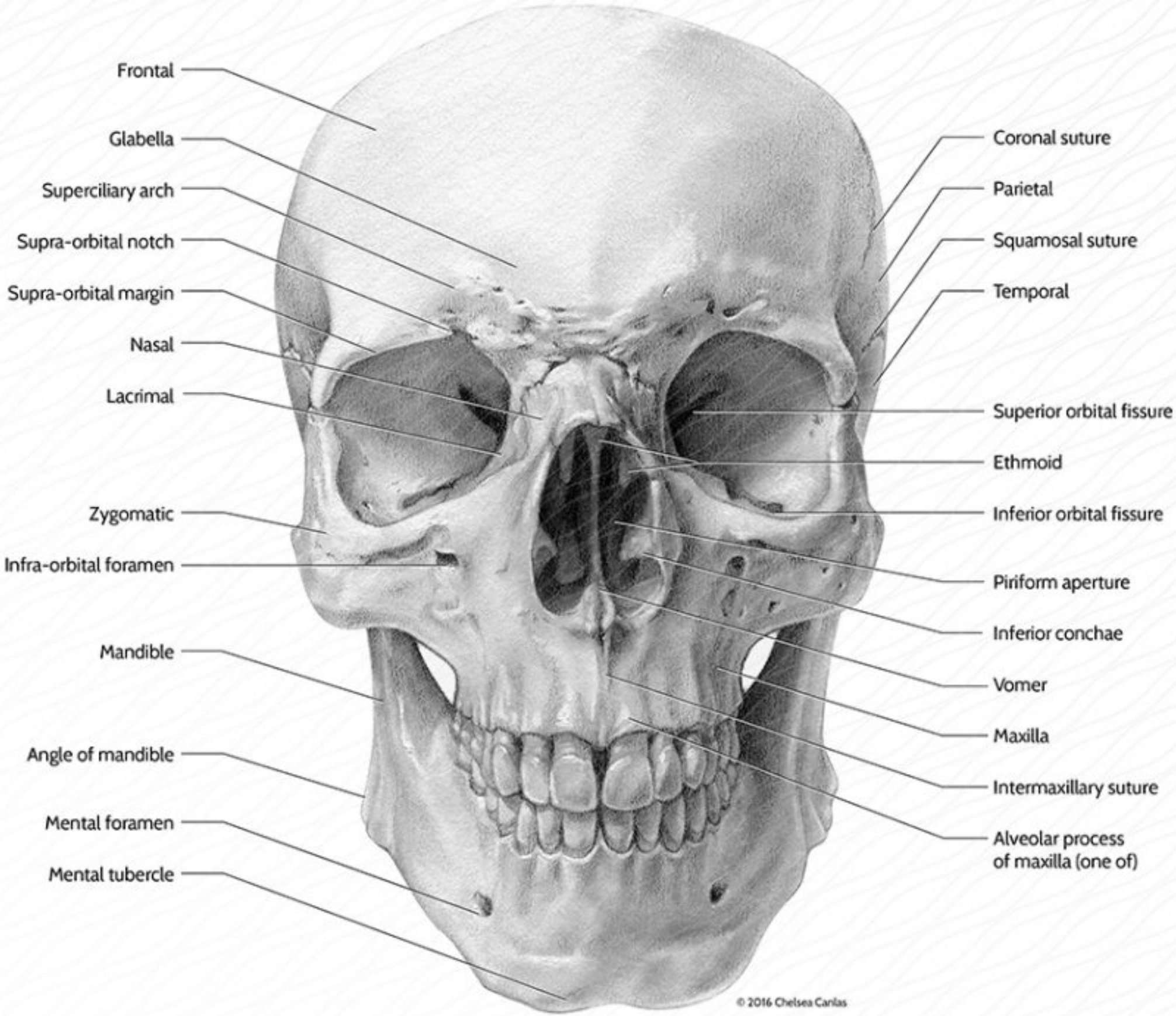
- Thanks to the work of one of Sutherland's first students, Beryl Arbuckle, we have at least one more layer of restrictions to look for and treat.

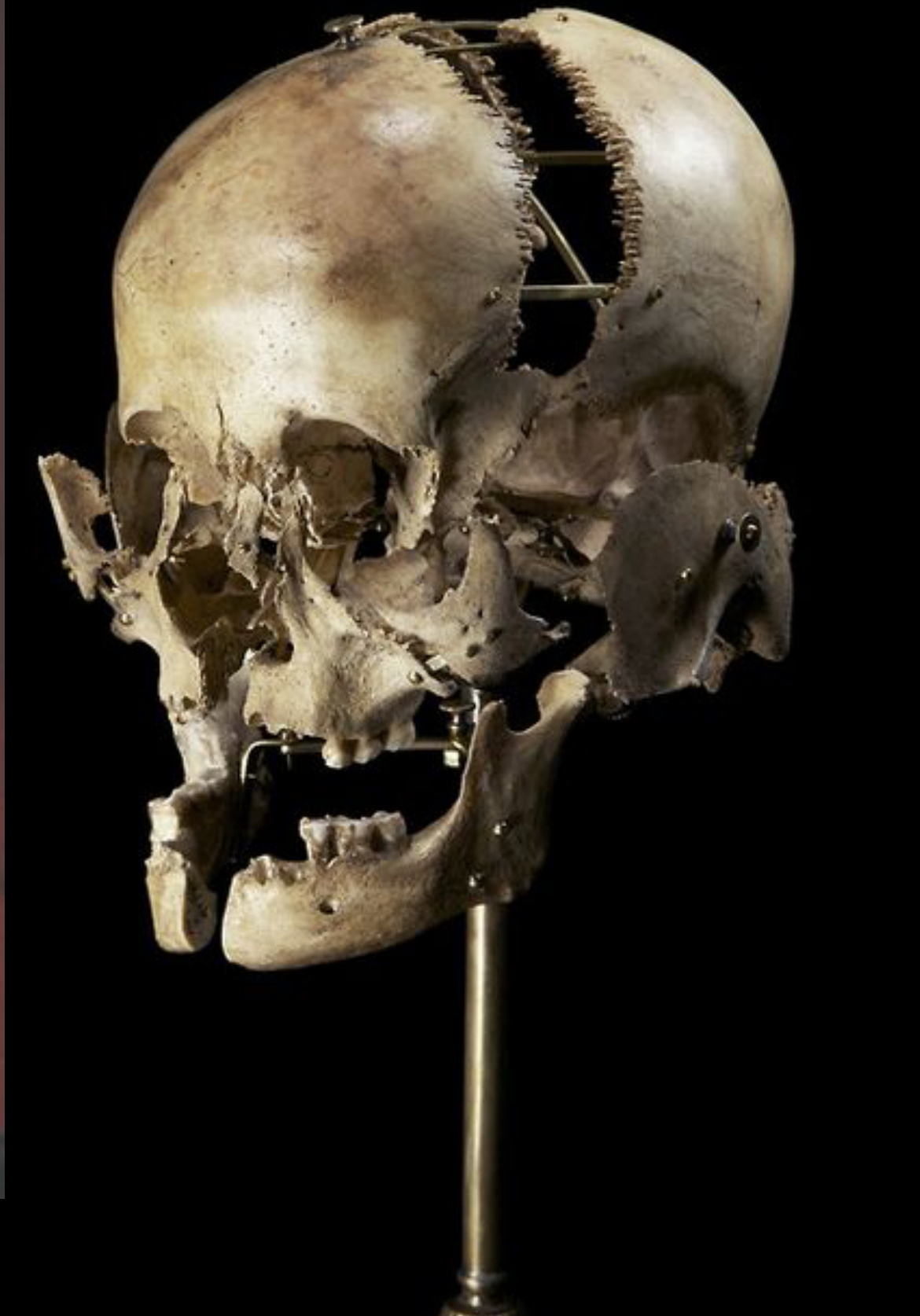
A Curved Tensegrity Approach to Cranial

“Osteopathy is a science built upon the principle that man is a machine - if a student is allowed to go to clinics before he masters anatomy, he gets cures mixed with an imperfect knowledge of the machine he tries to adjust.”

–Beryl Arbuckle

Anterior View of the Human Skull



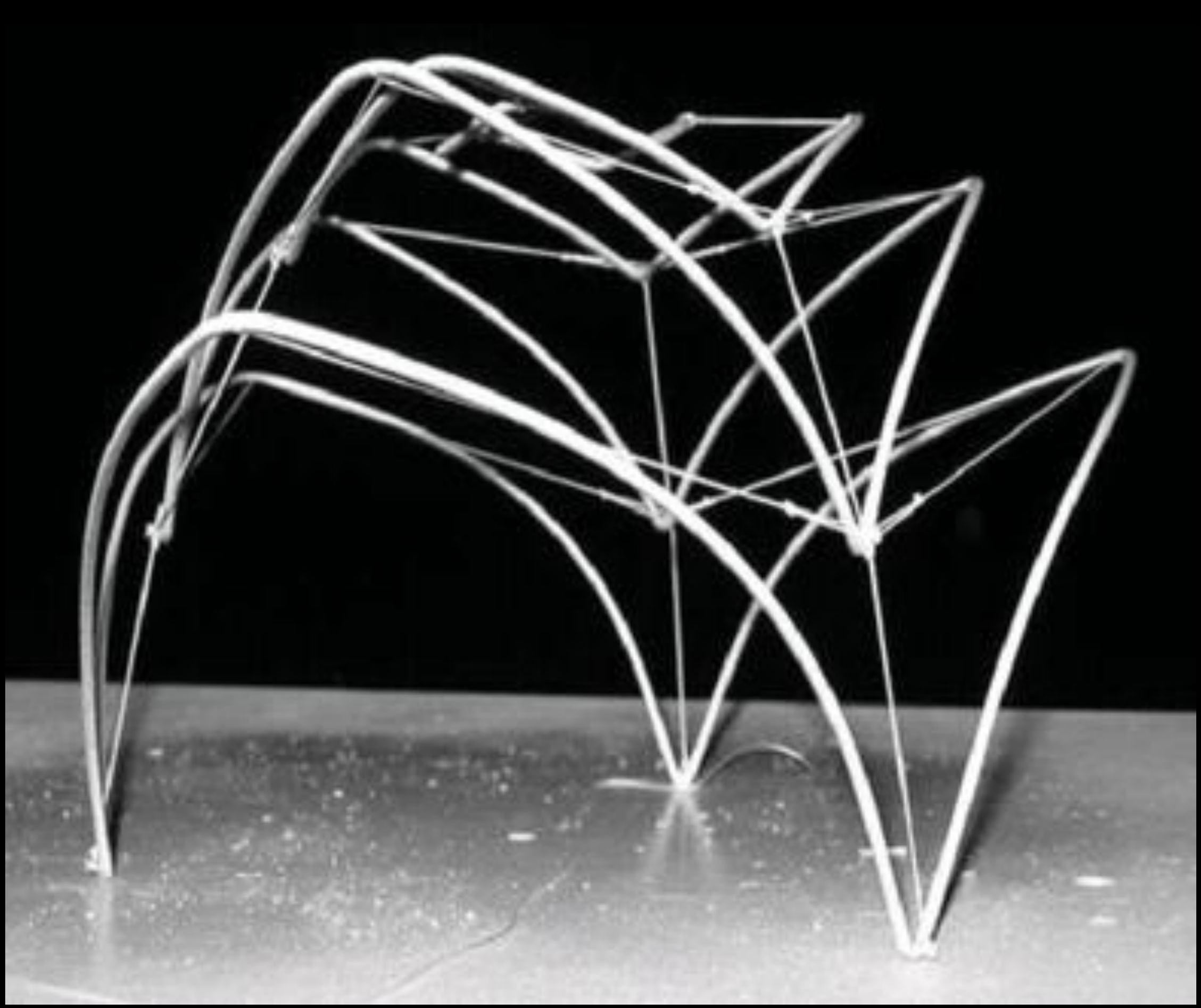


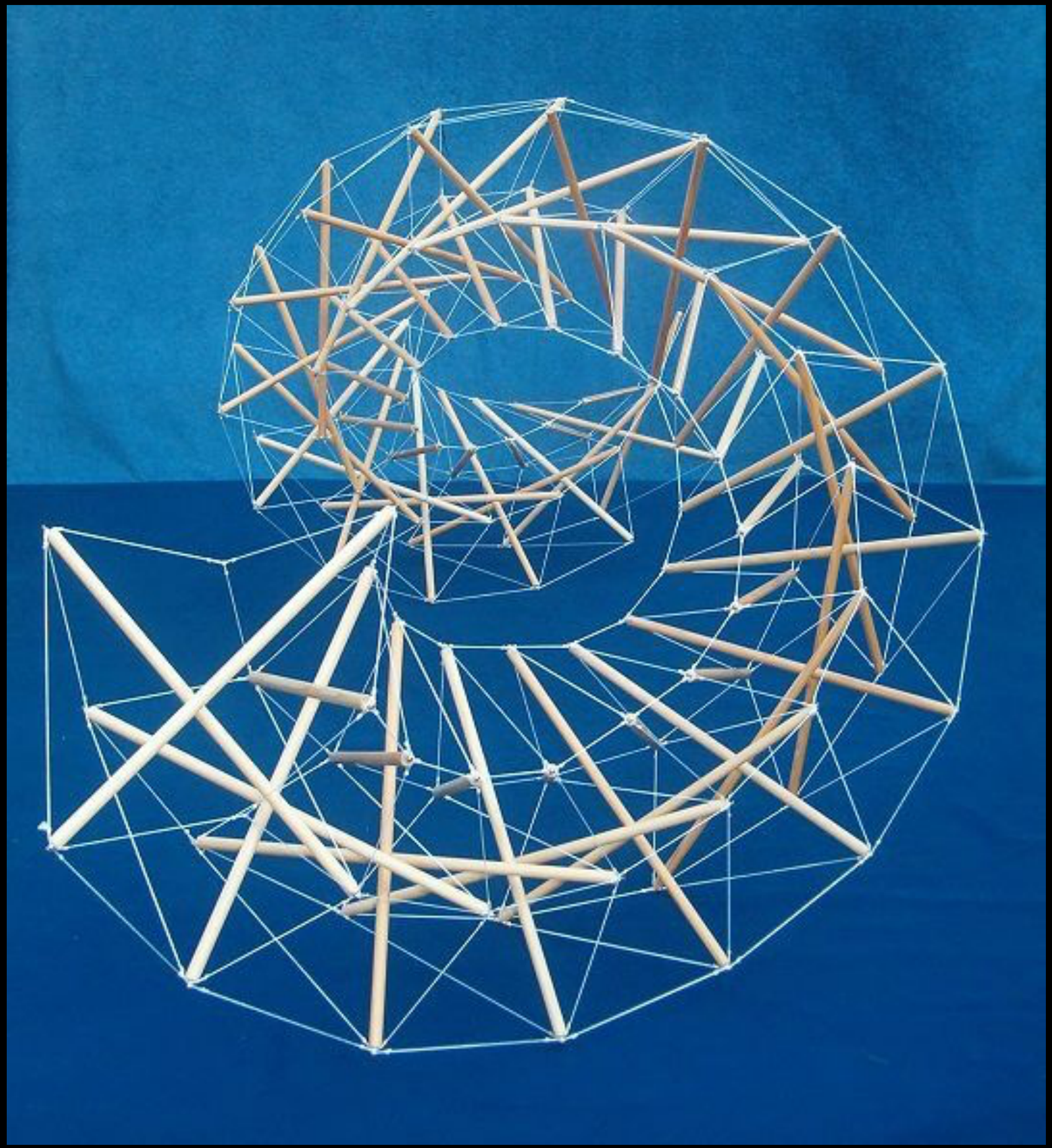
Curved Tensegrity Structures

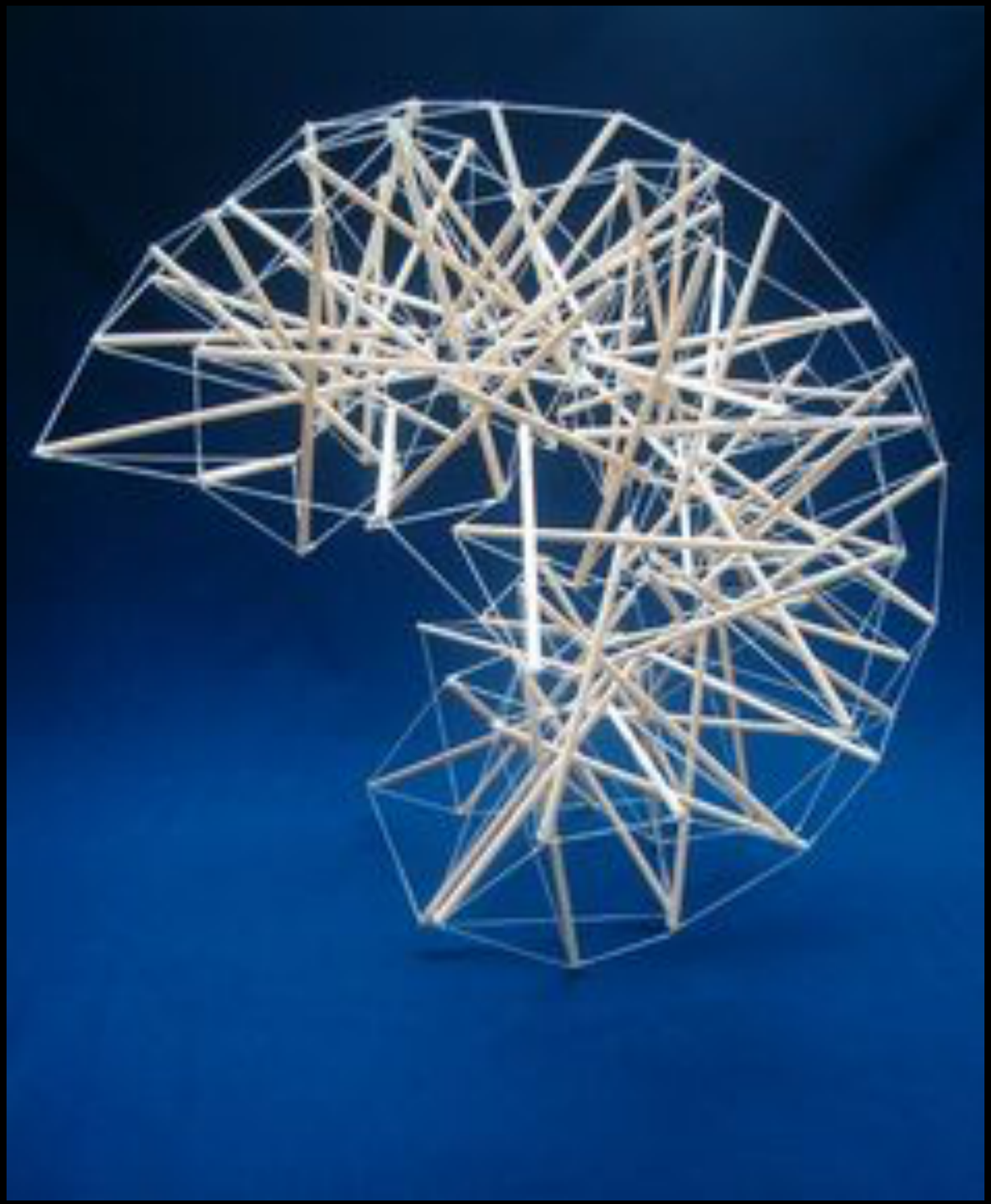
Curved Tensegrity Structures

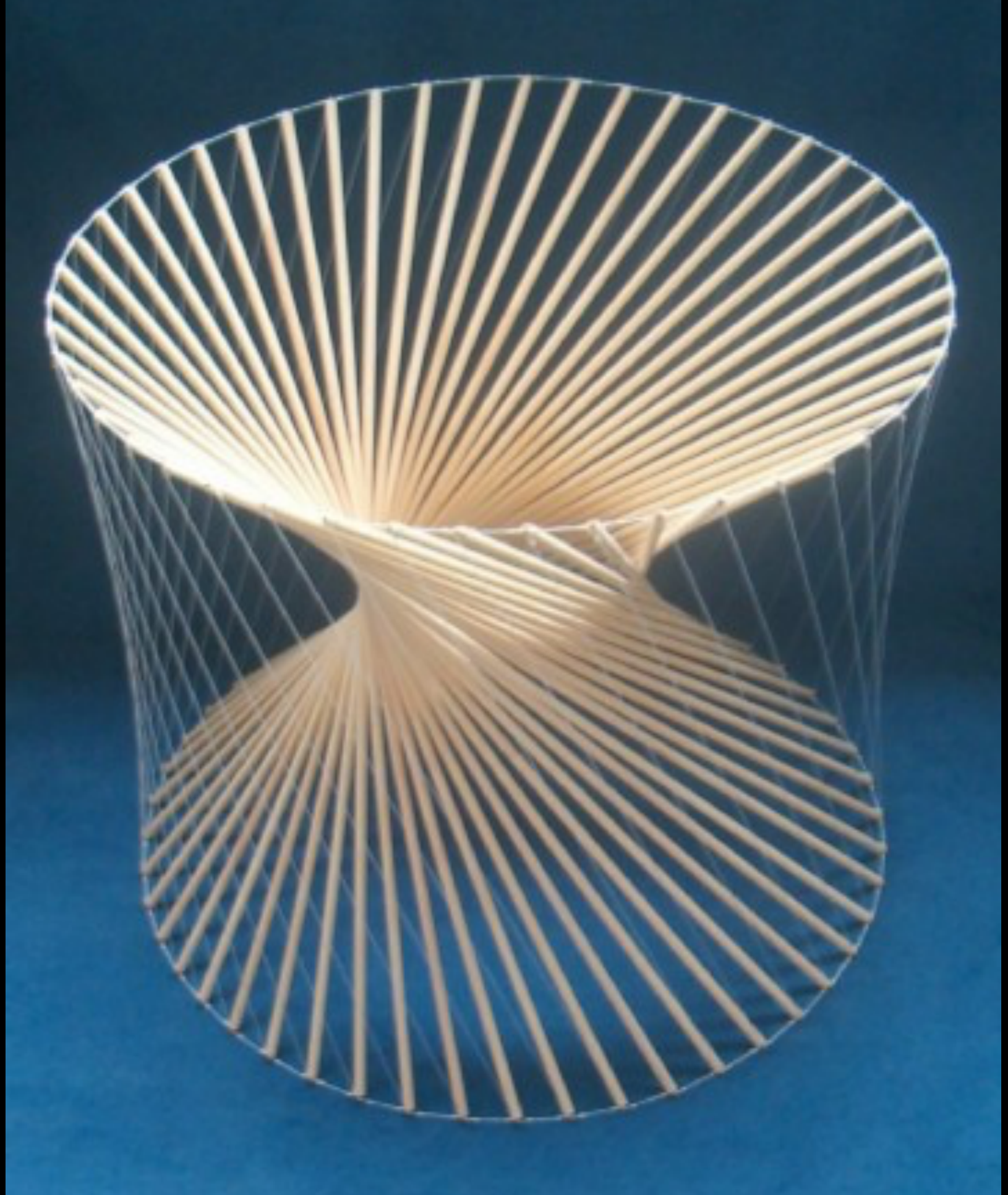
- In the following pictures of structures that demonstrate curved tensegrity, see if you can locate shapes and structures that are found in the body/head.

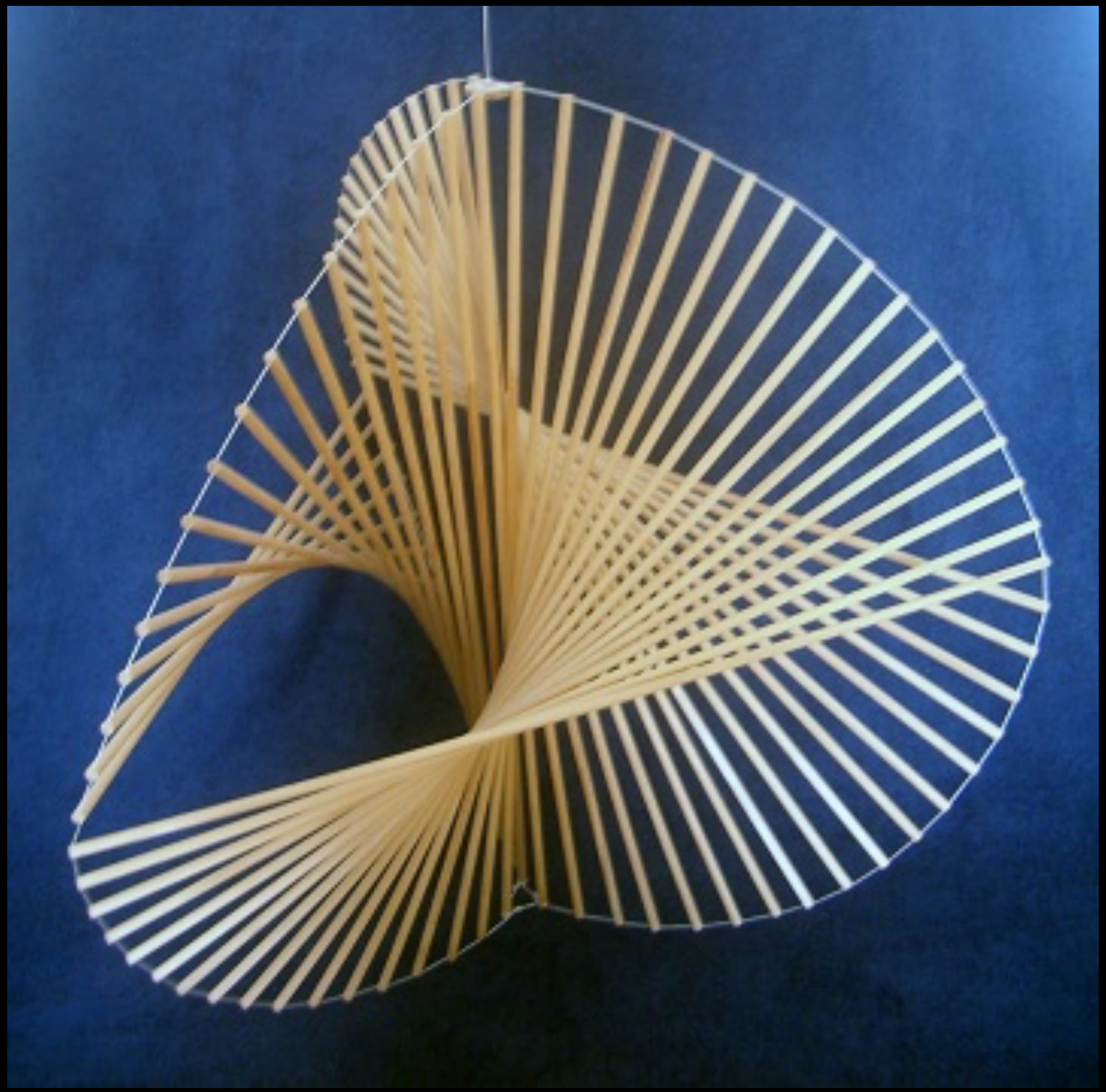
- We will palpate these shapes and structures and learn how they behave in the body later.

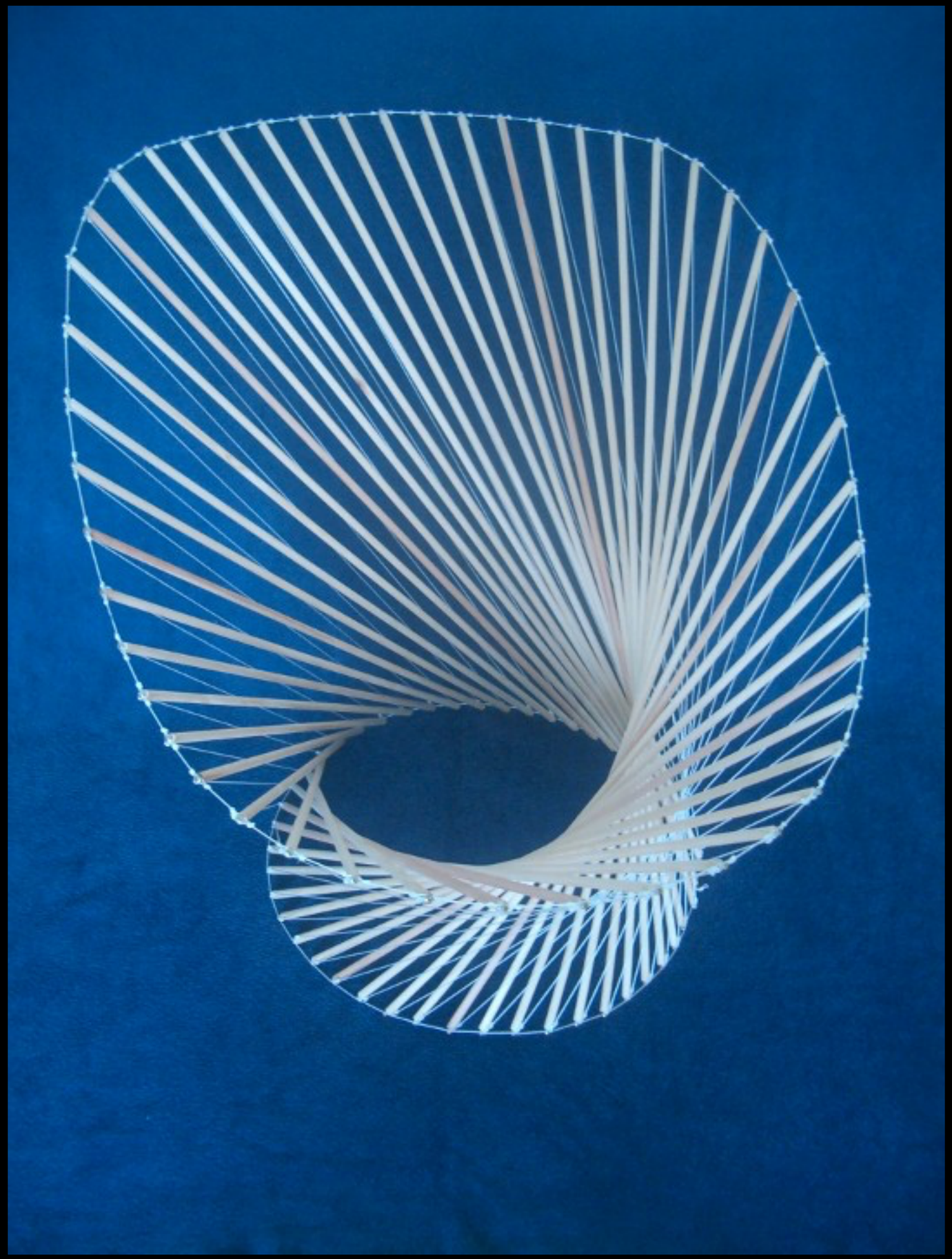


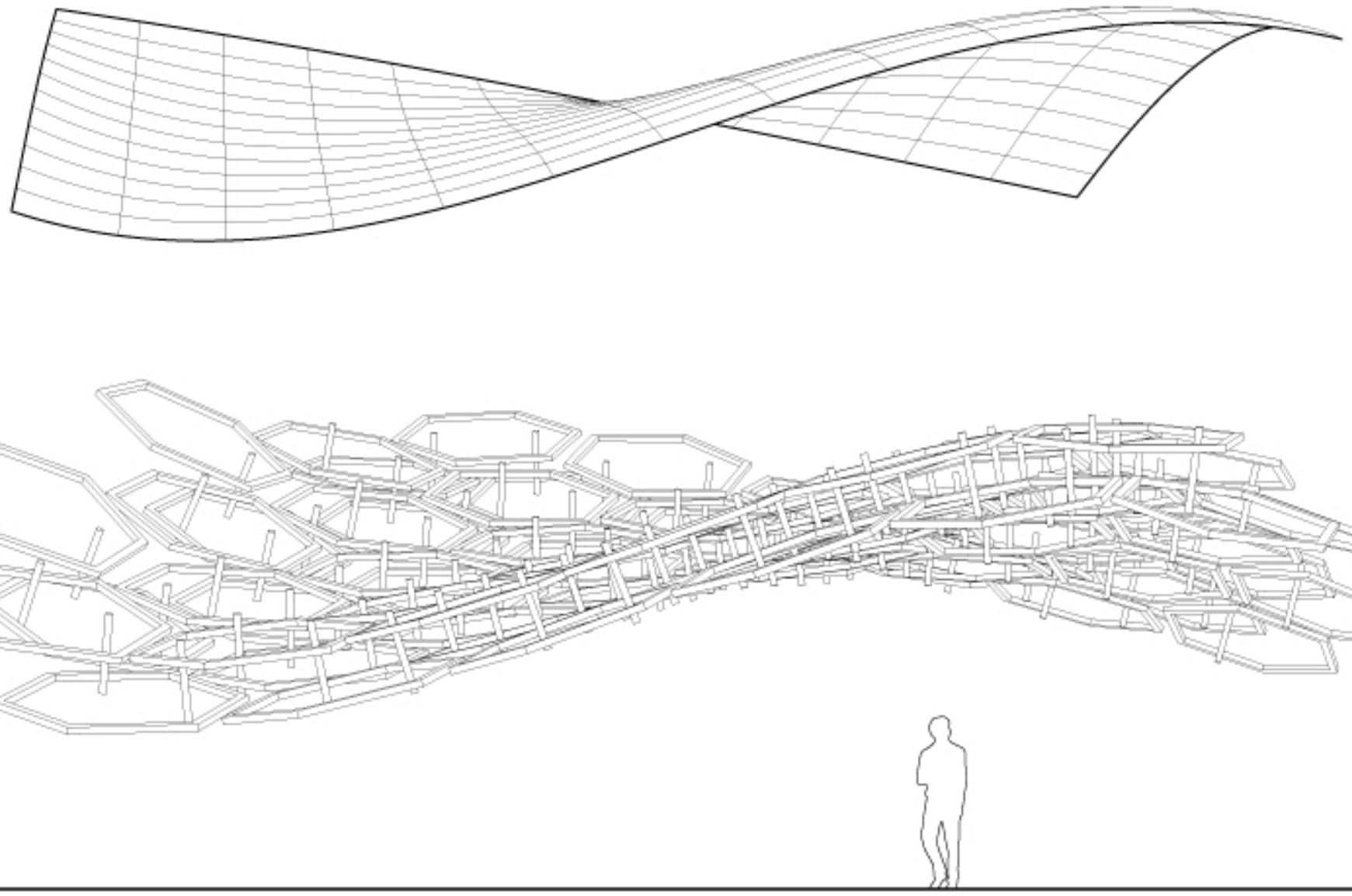


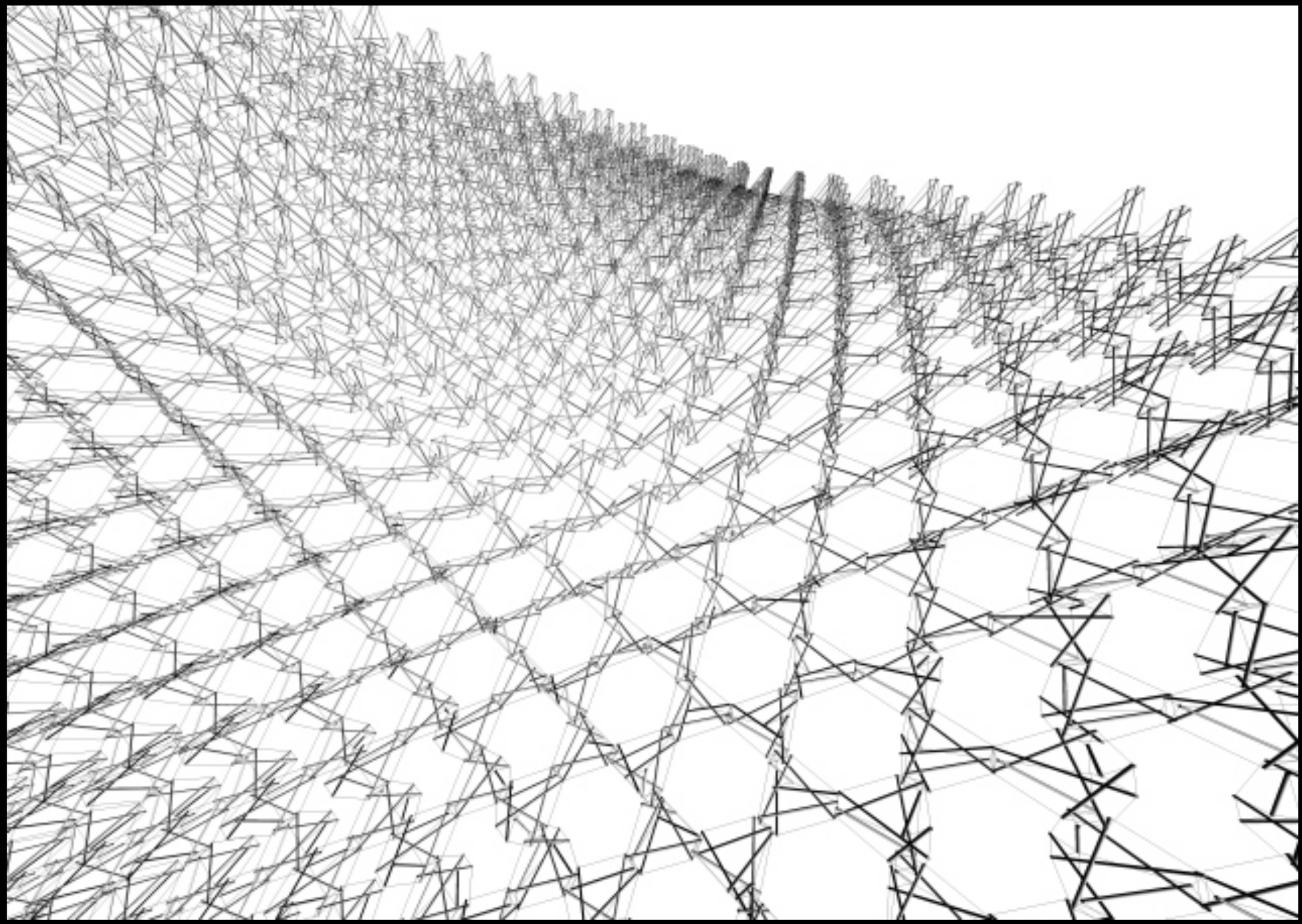


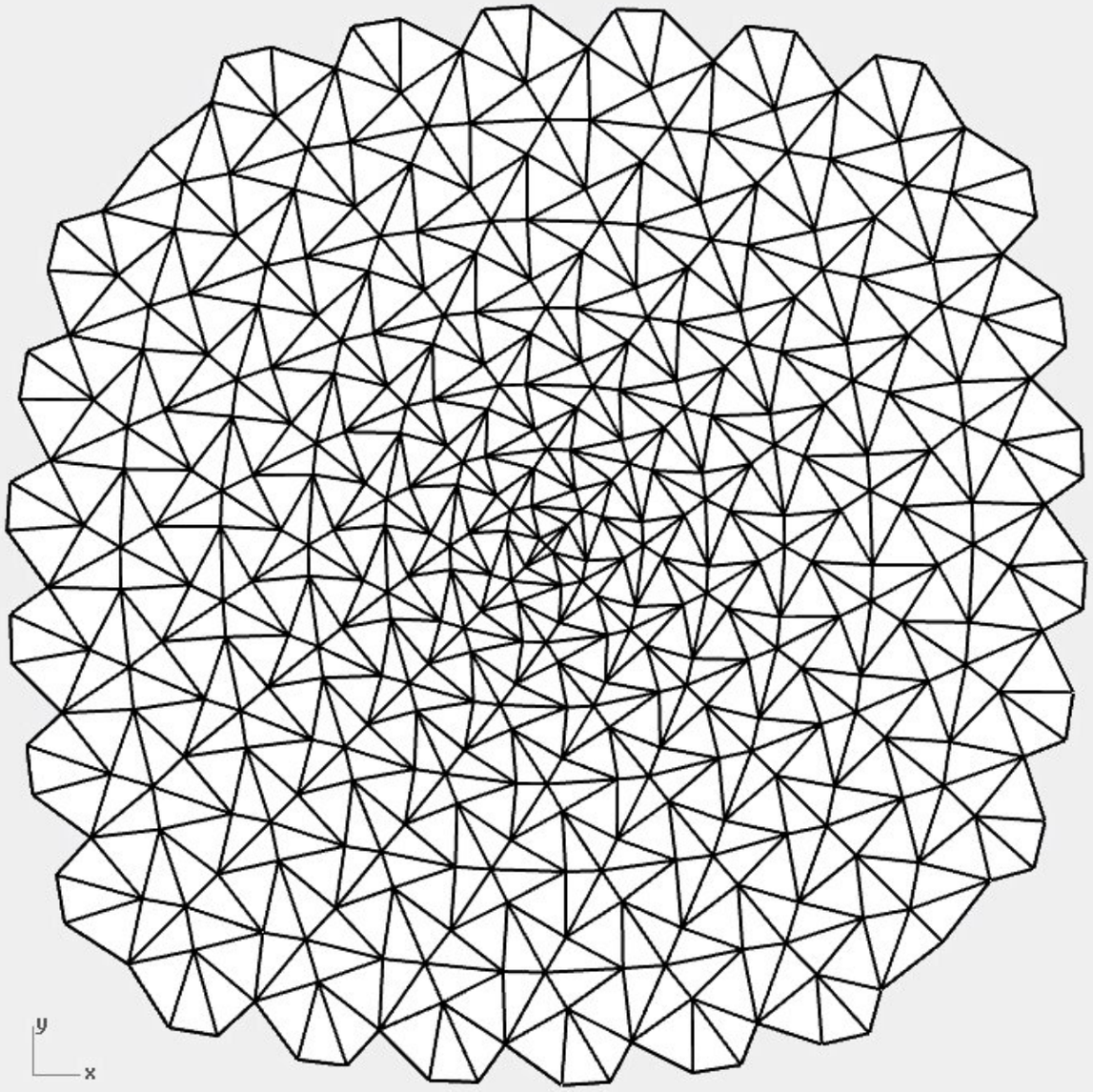


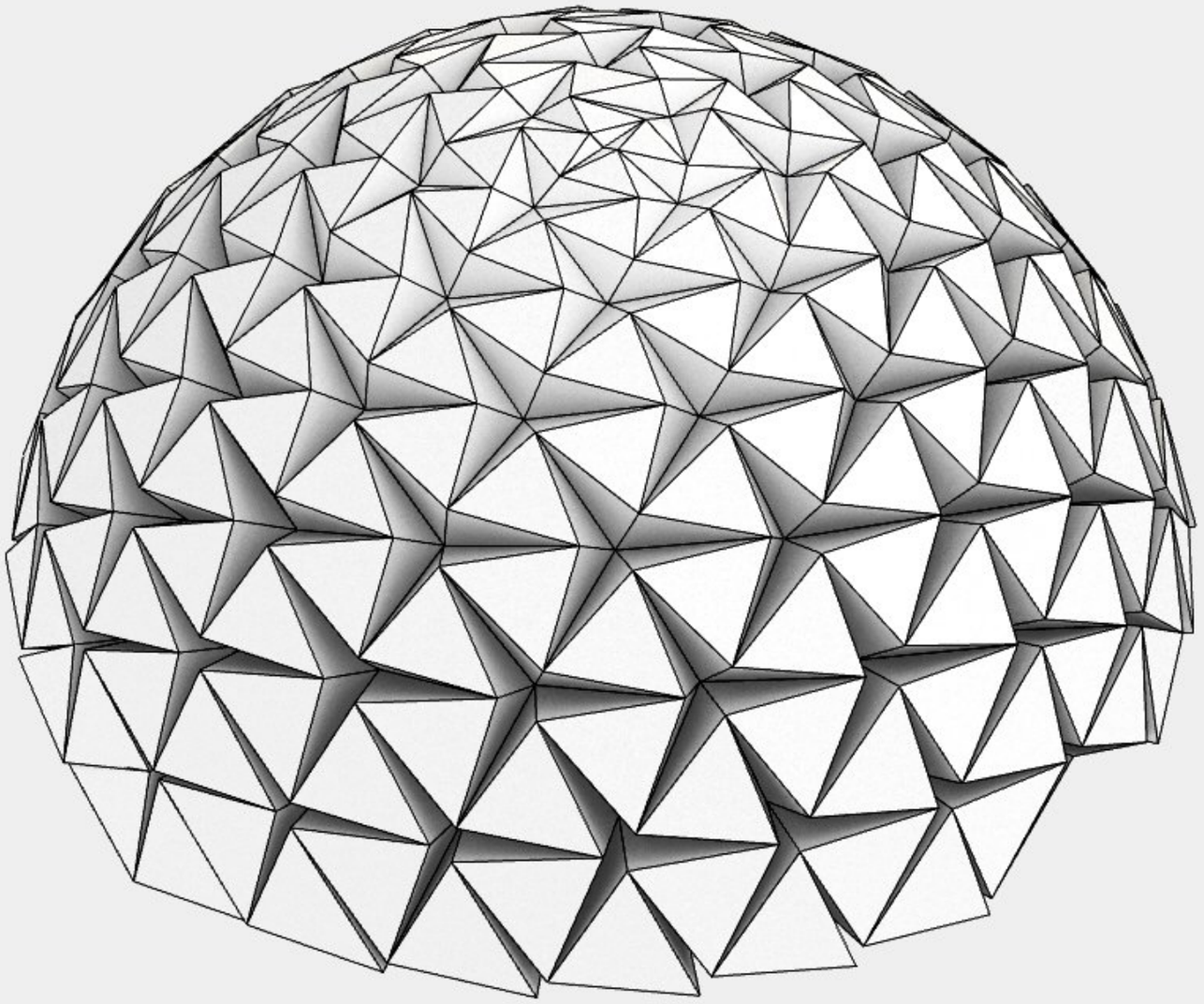








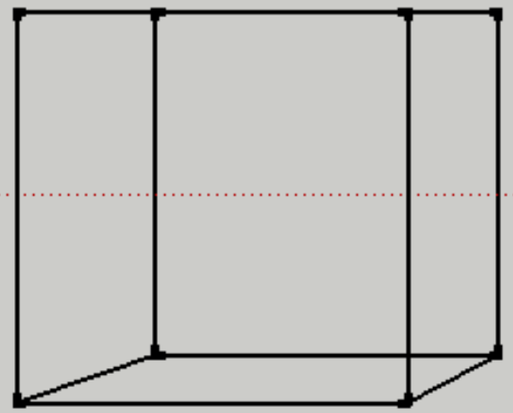

y
x

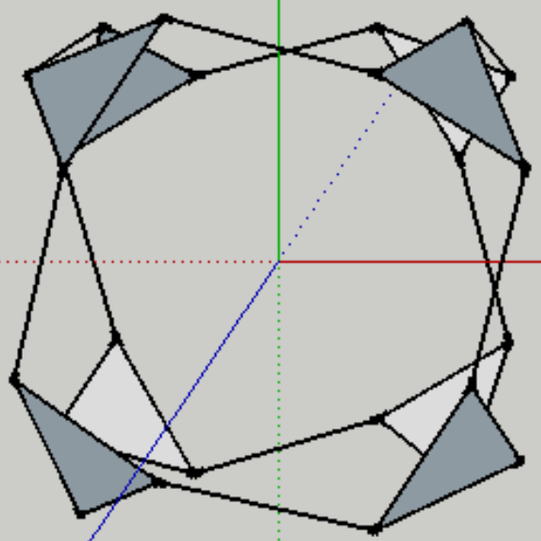


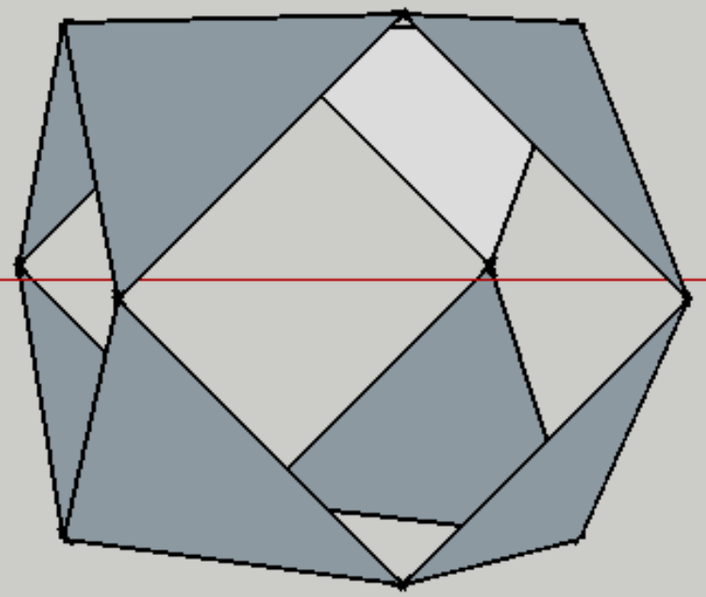
Cube

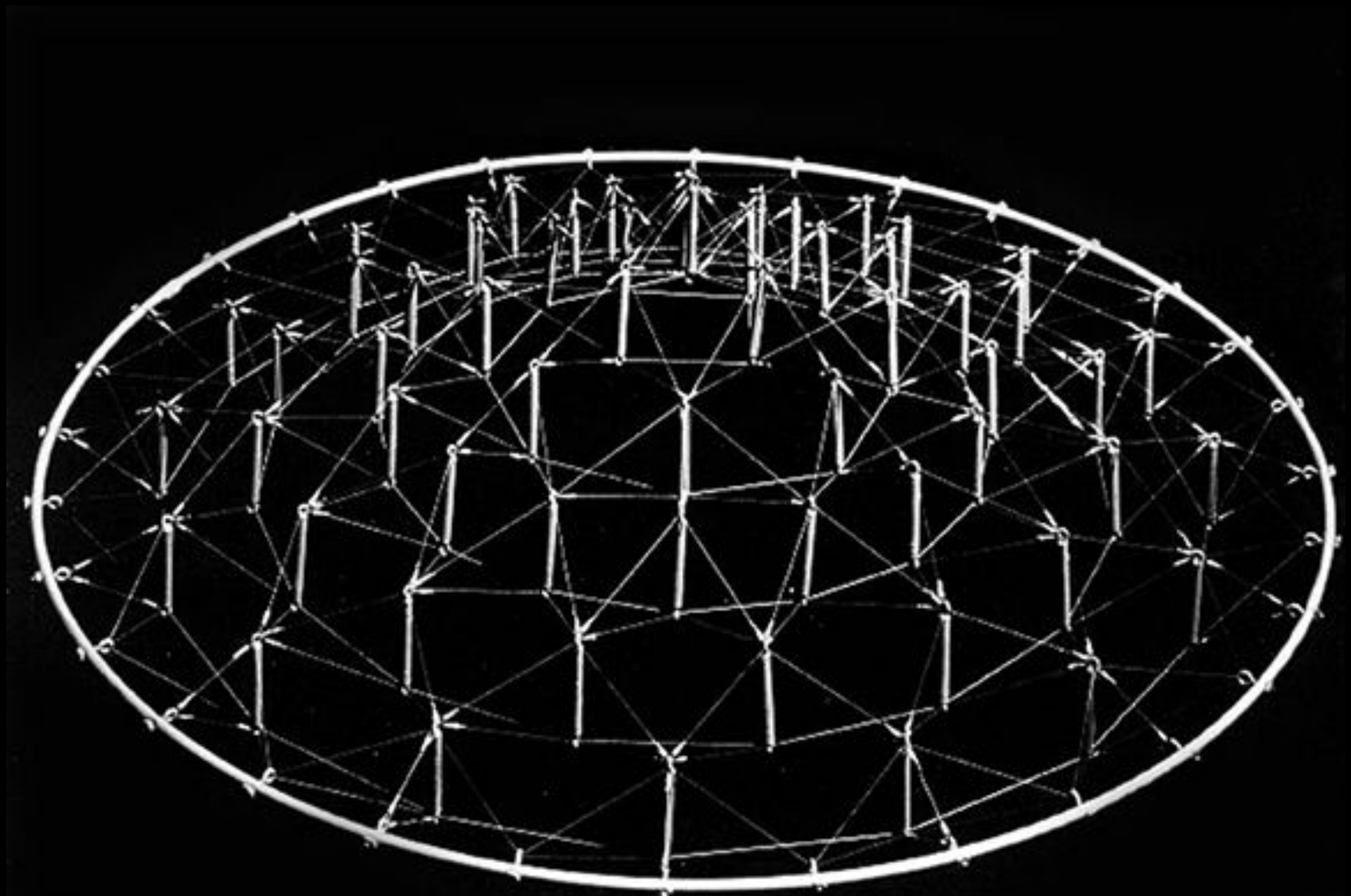
QbaII

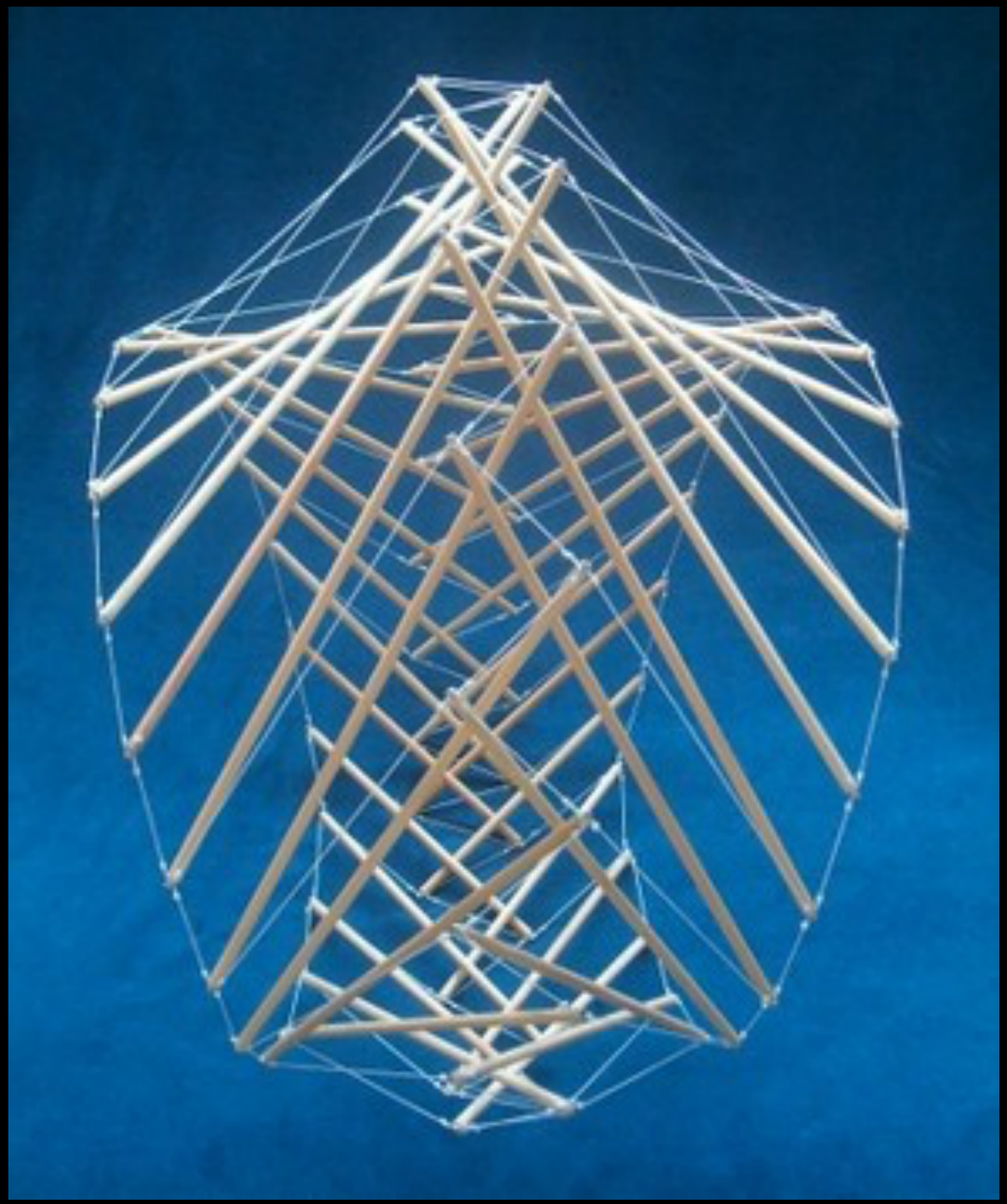
Cuboctahedron

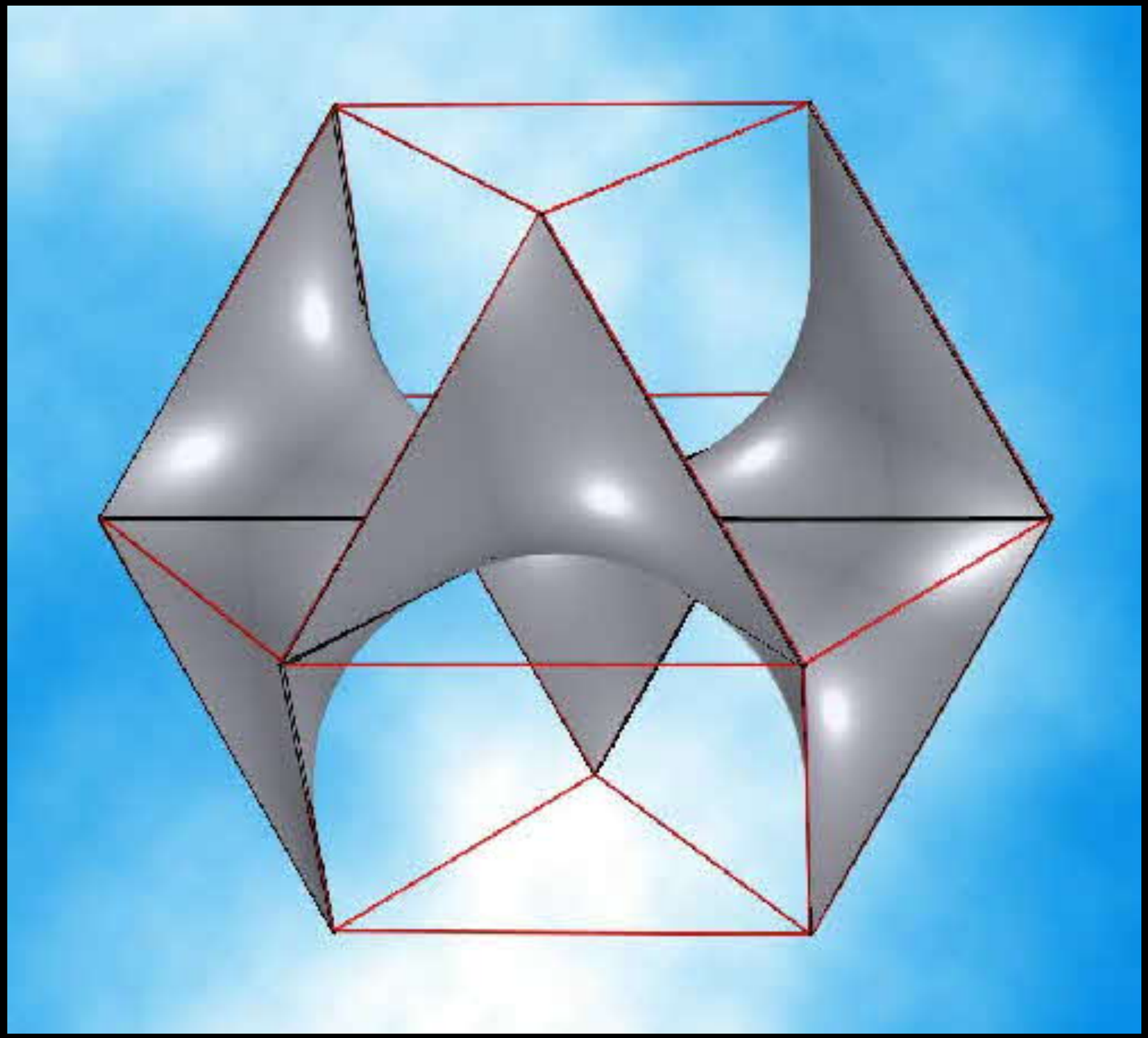


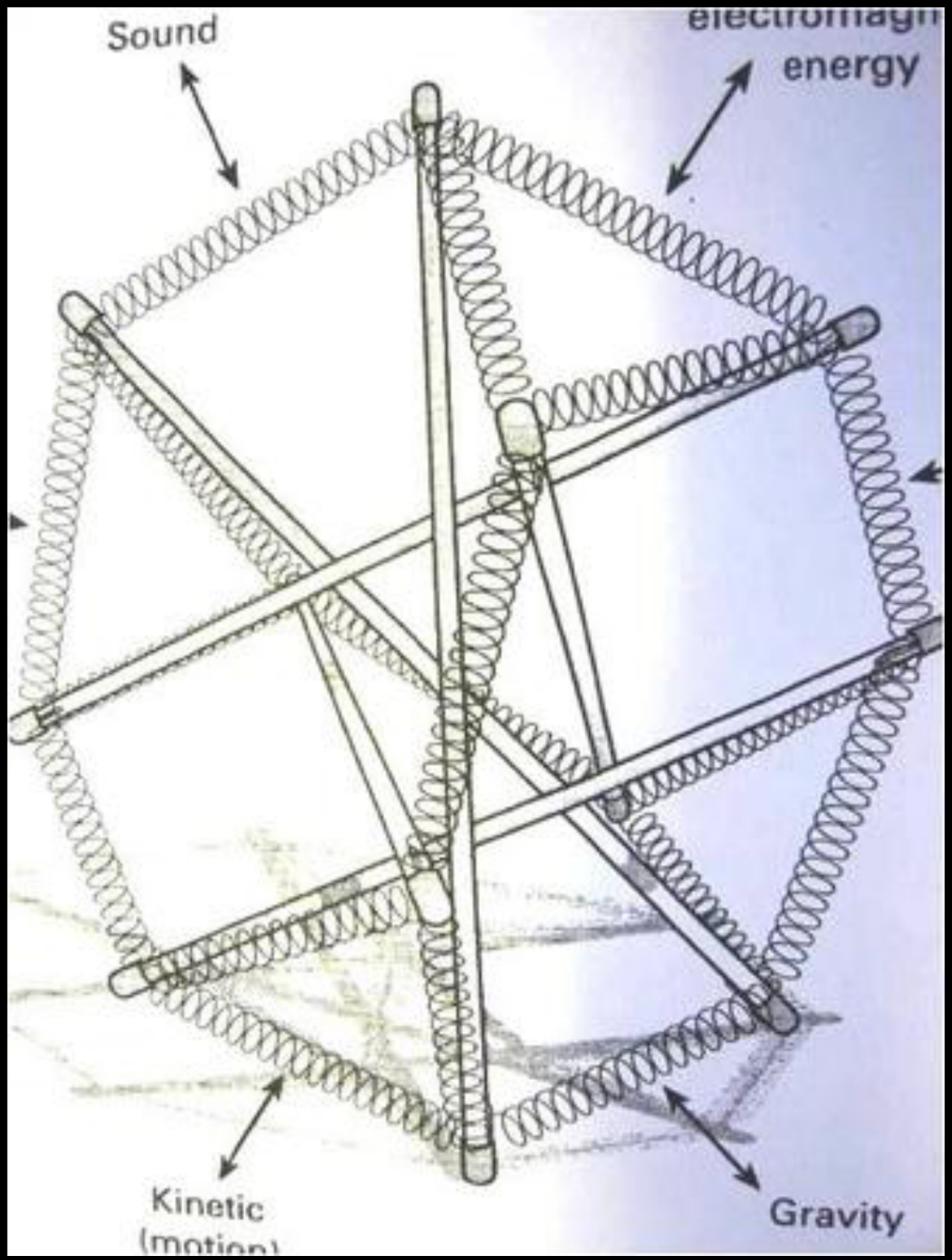


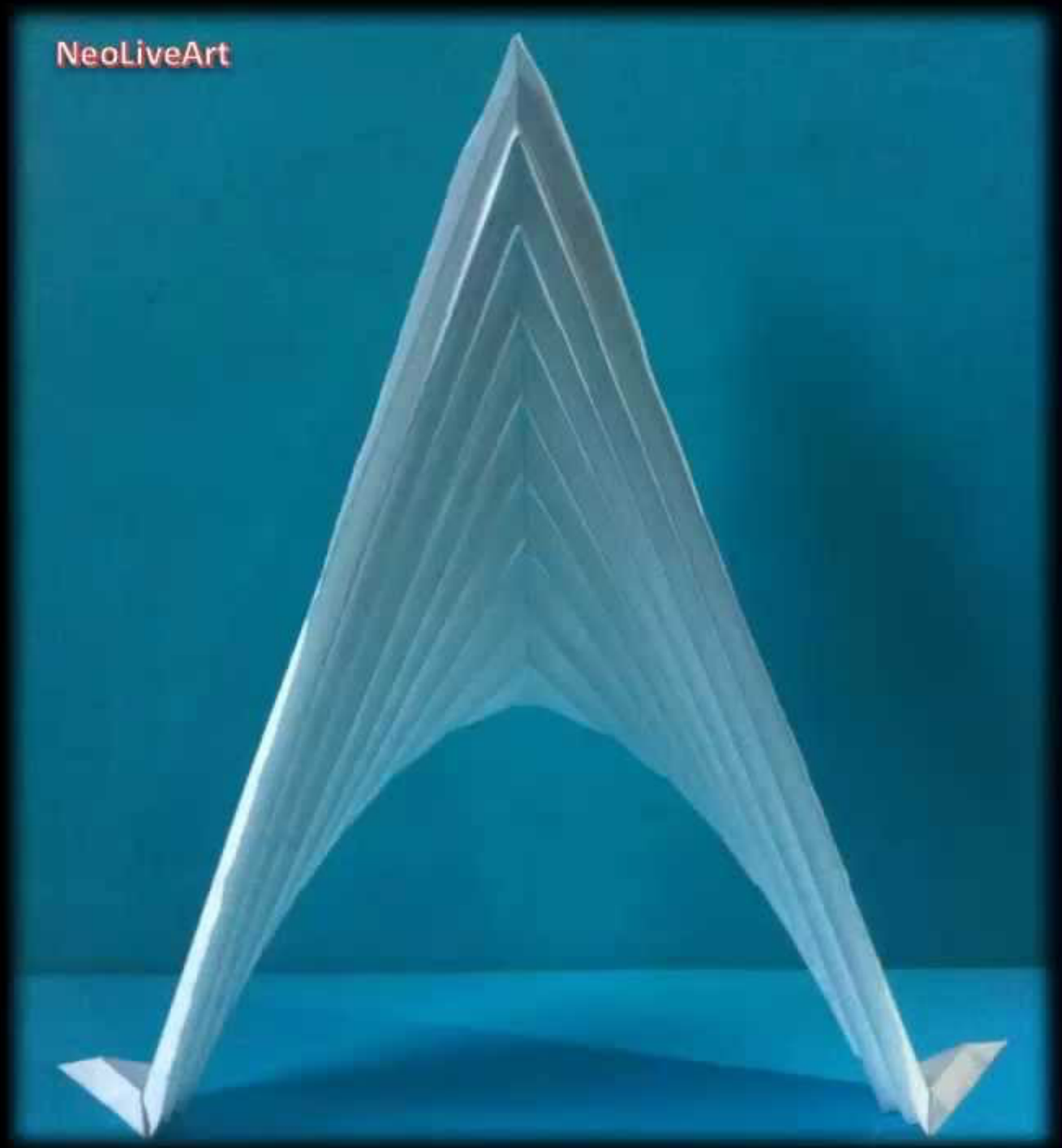




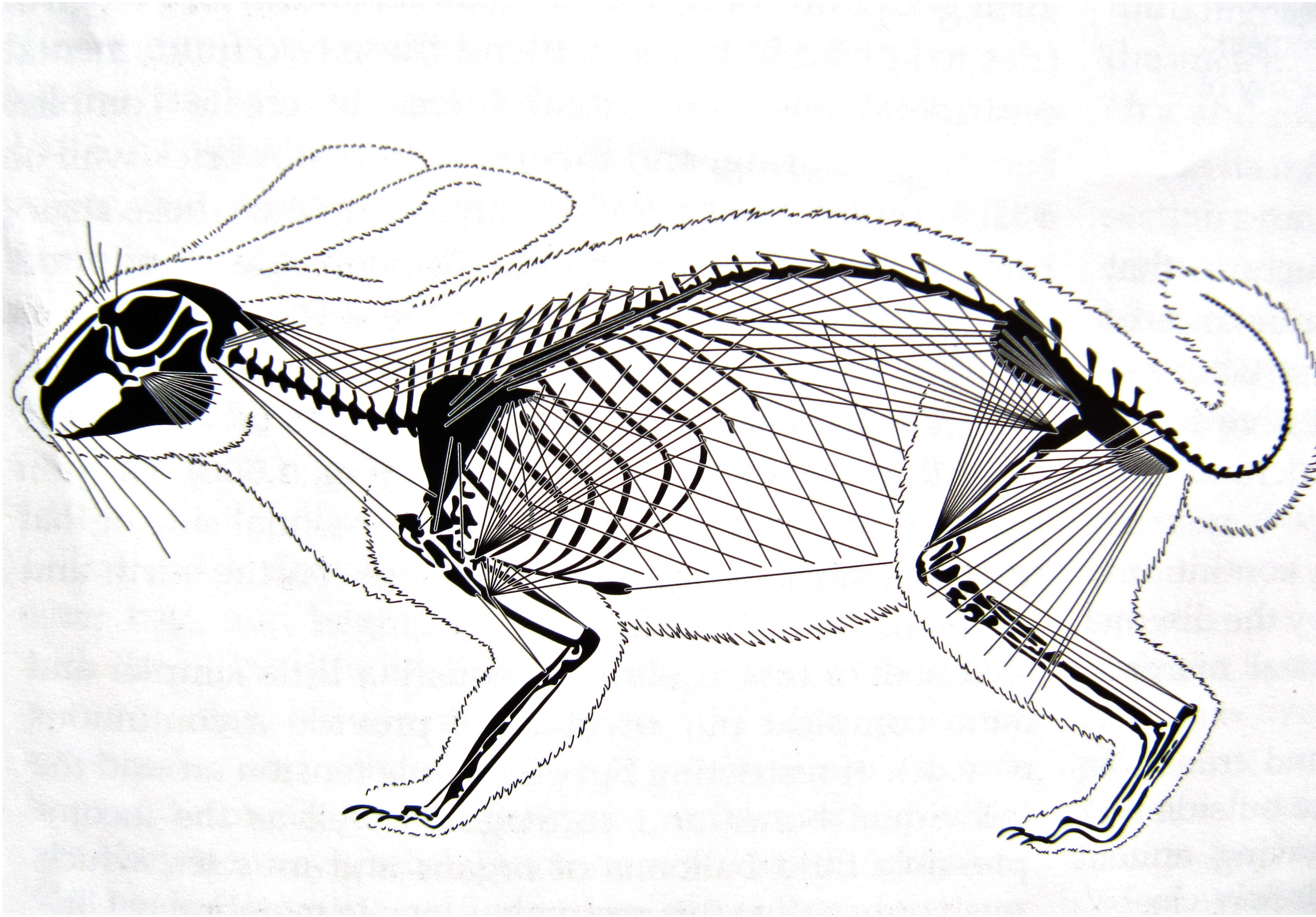


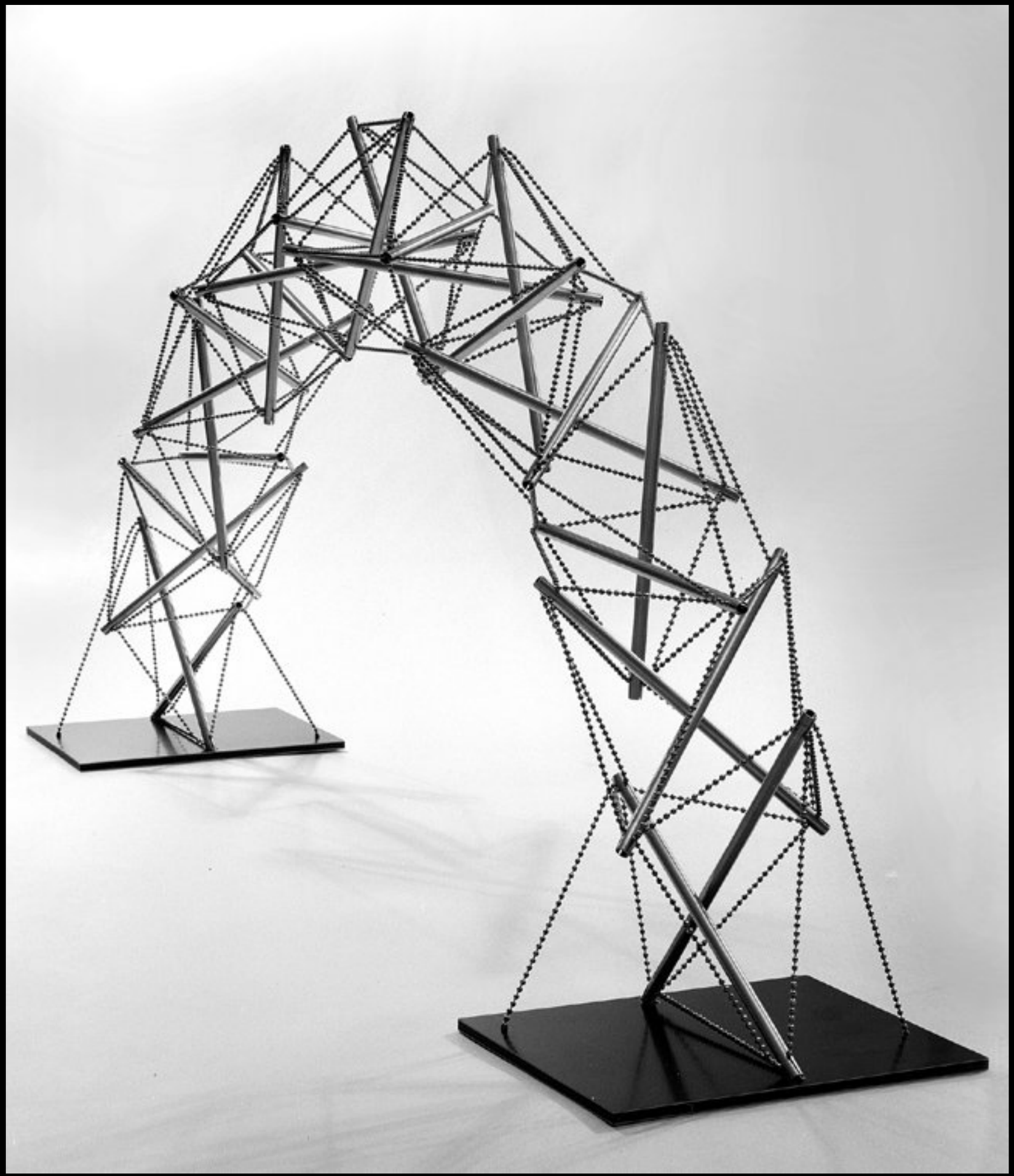


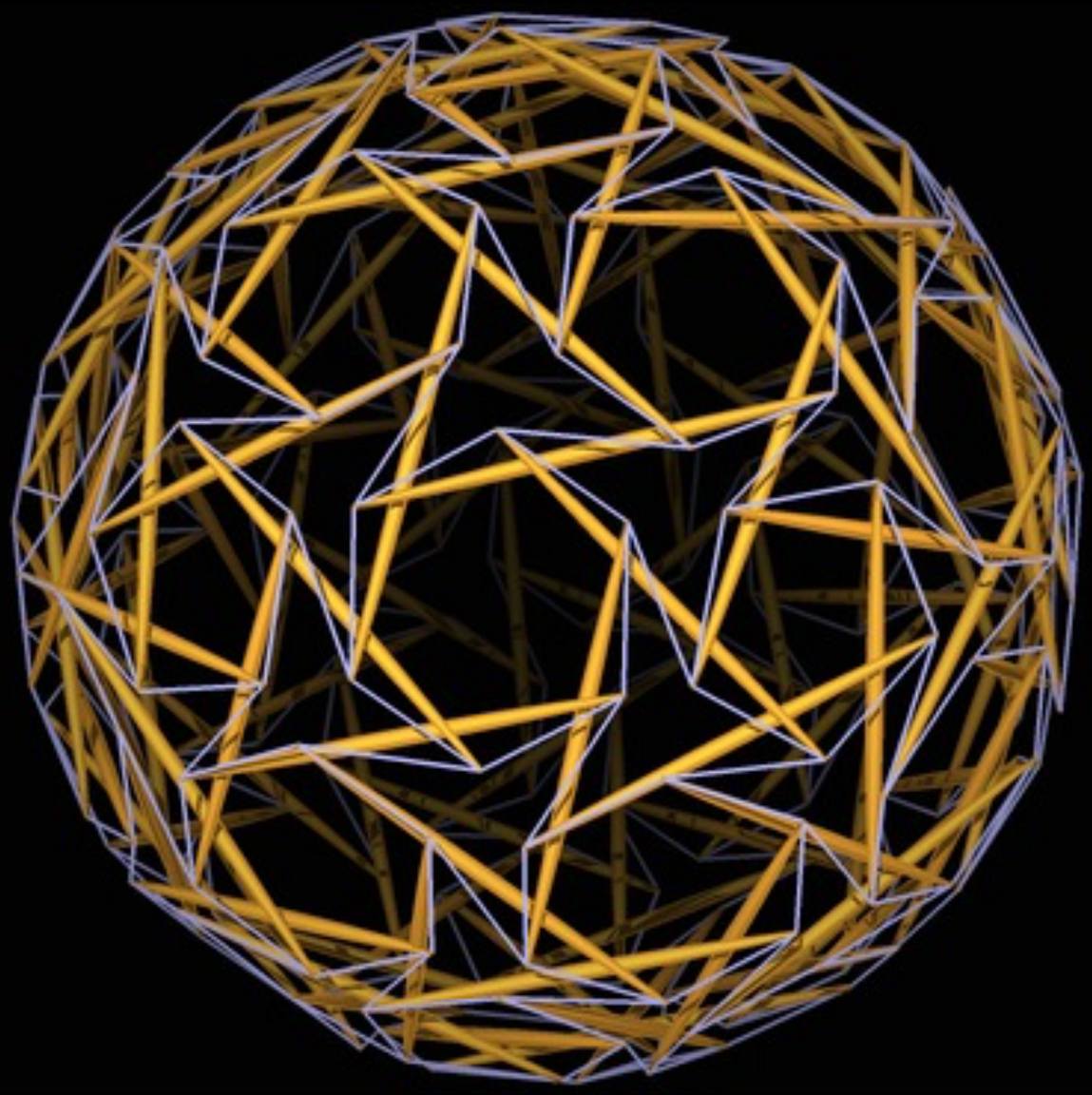

Sound
energy
Kinetic
(motion)
Gravity


NeoLiveArt


NeoSpica







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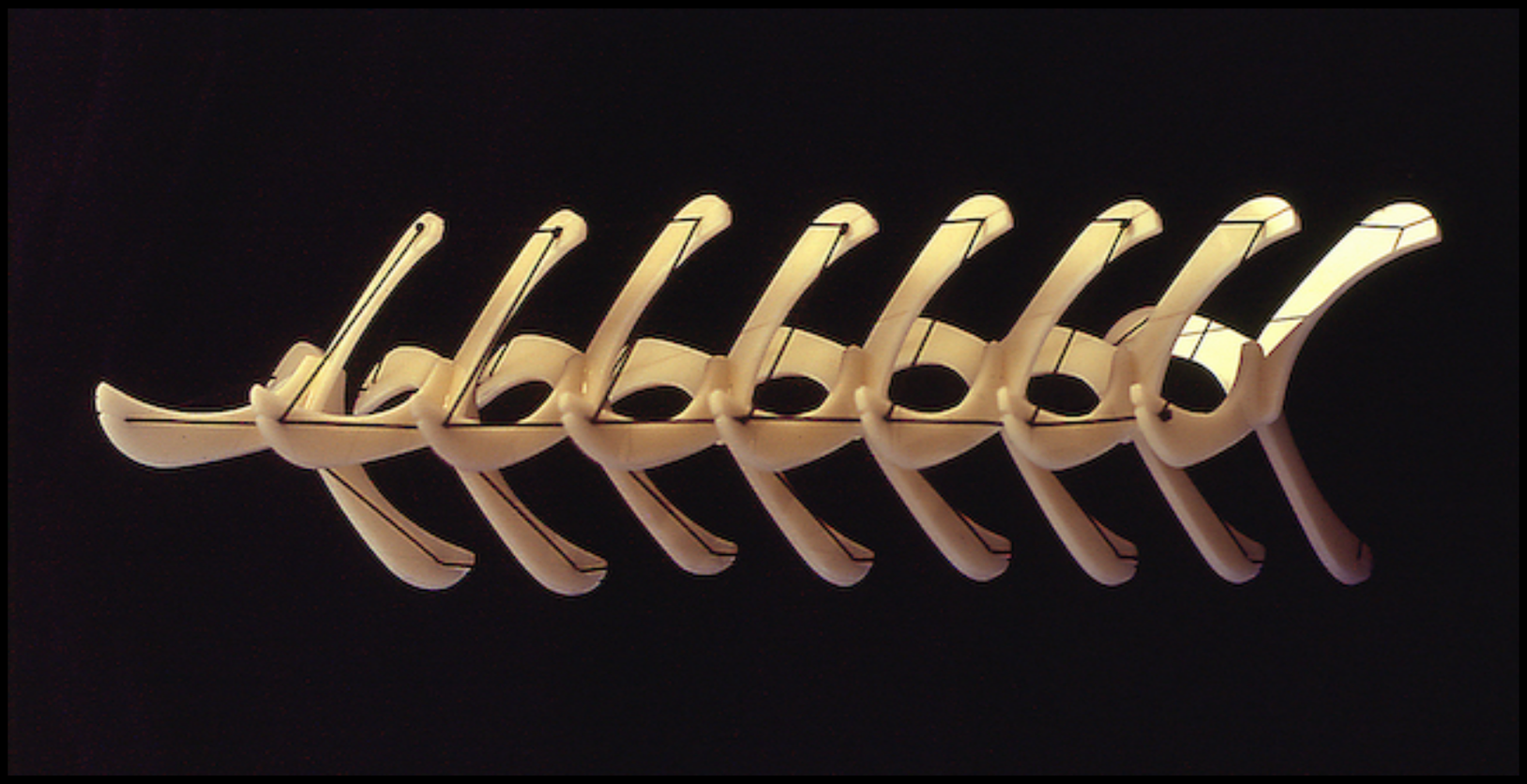

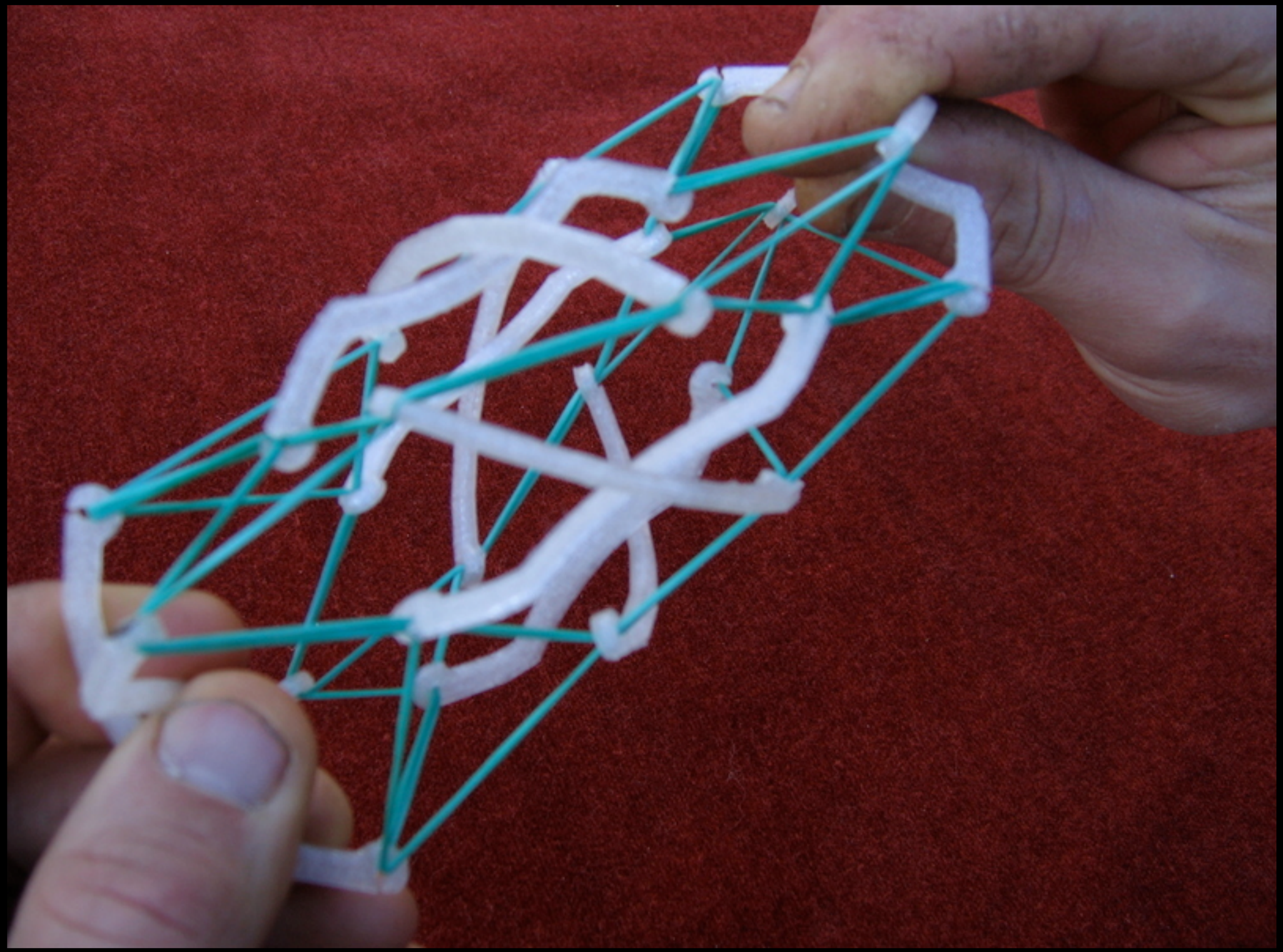

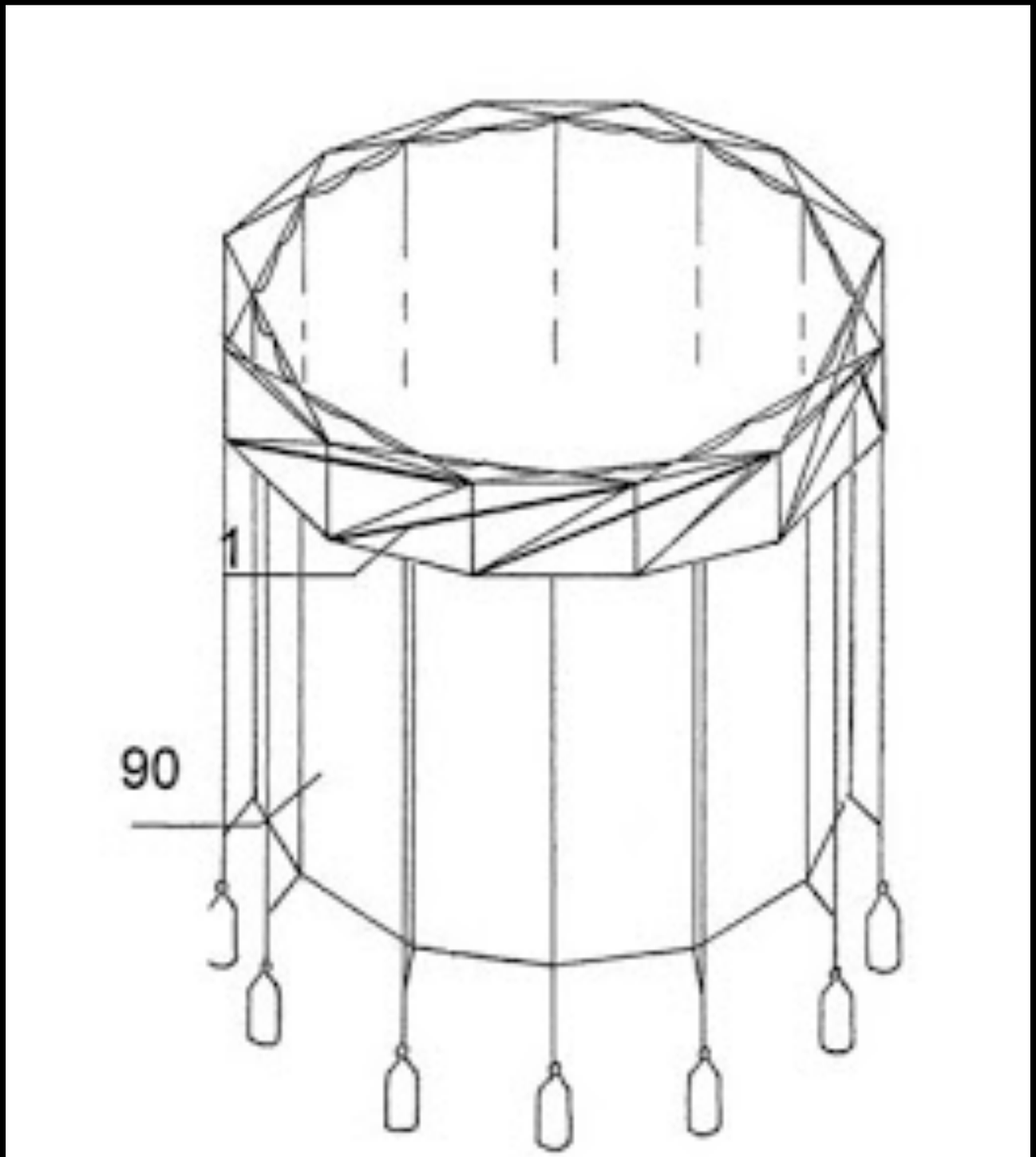
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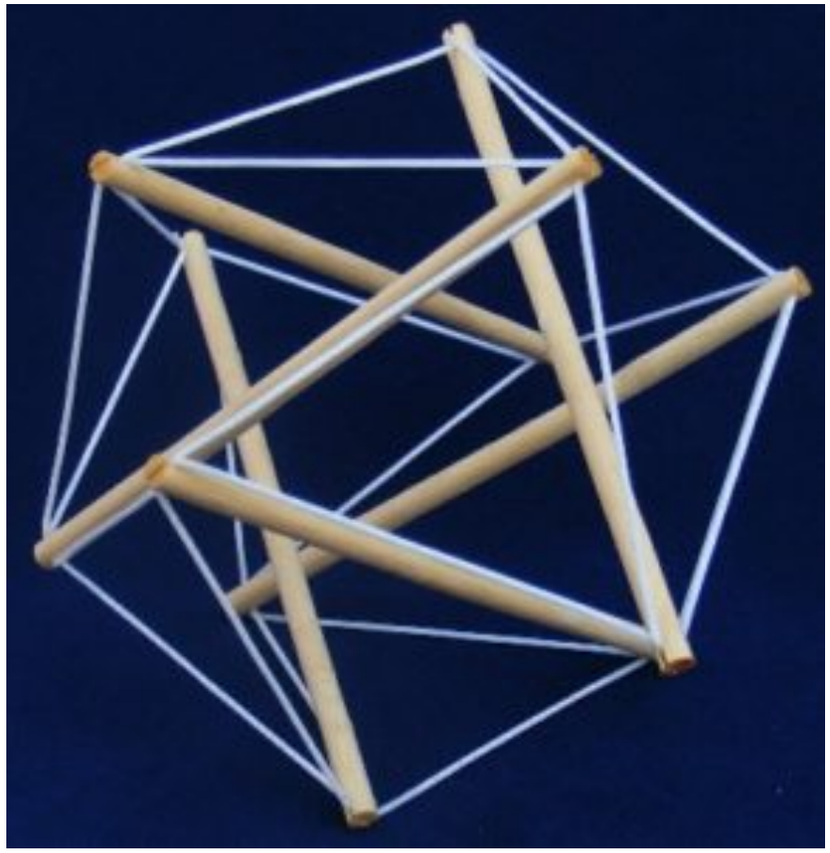
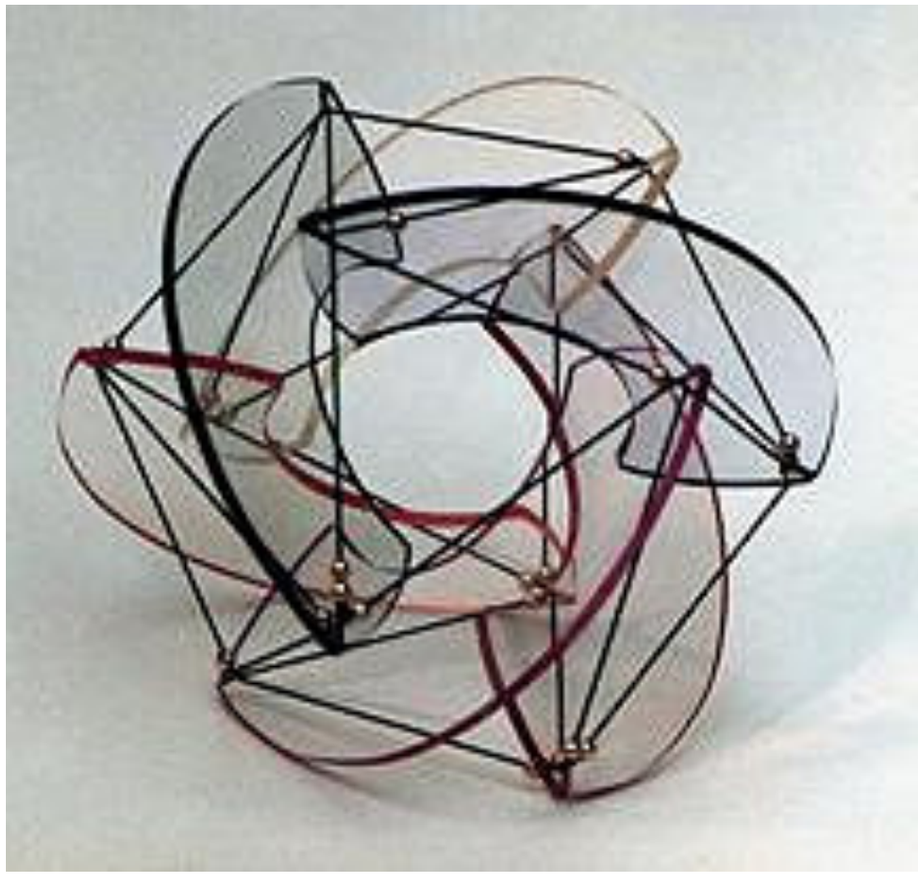
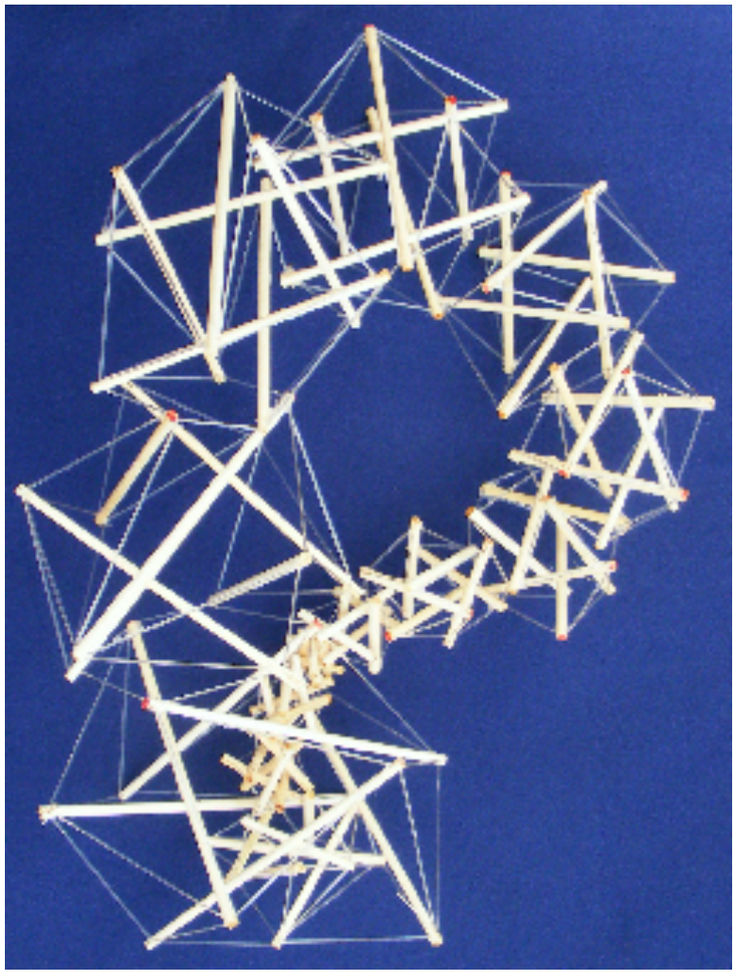
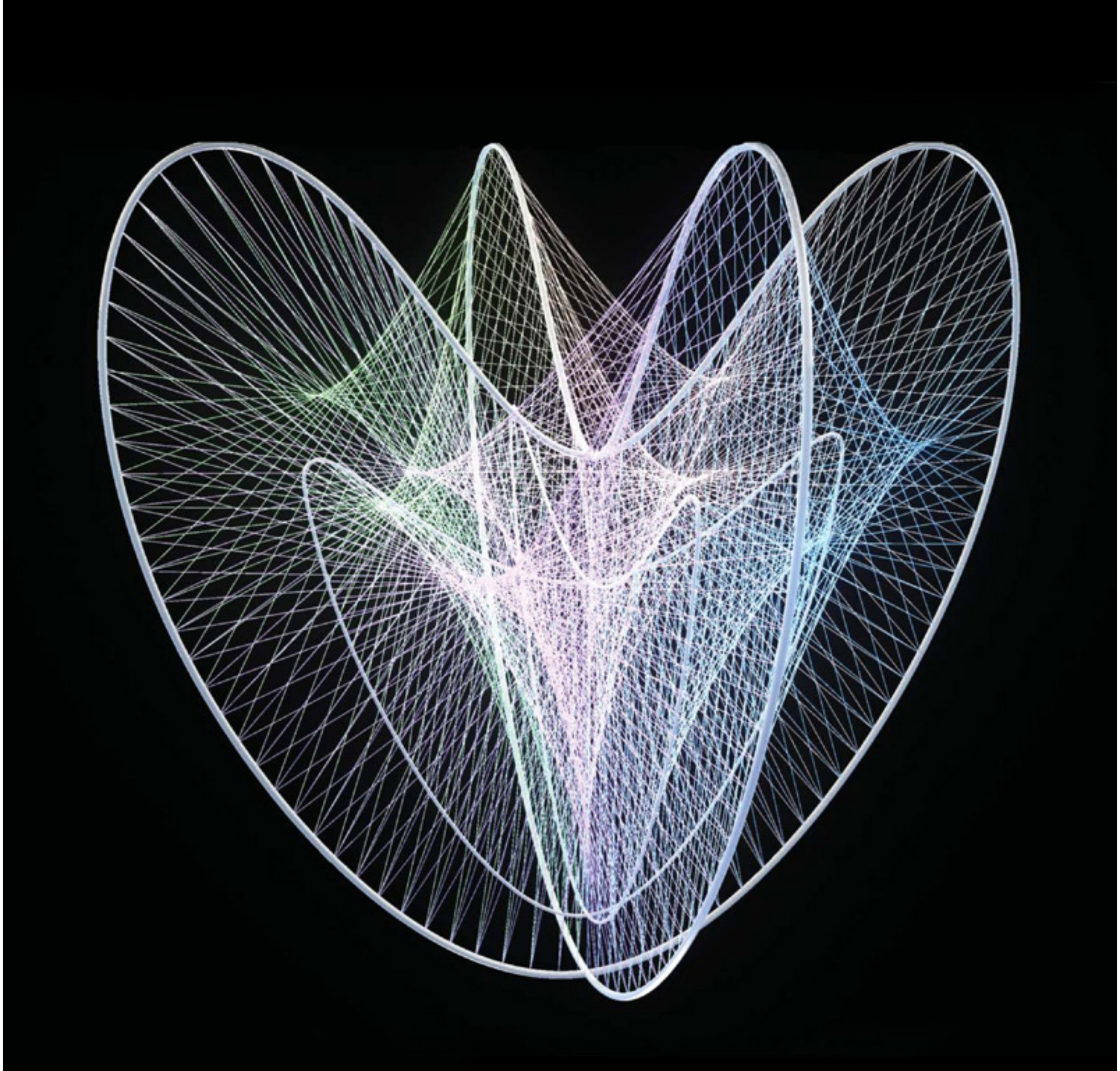
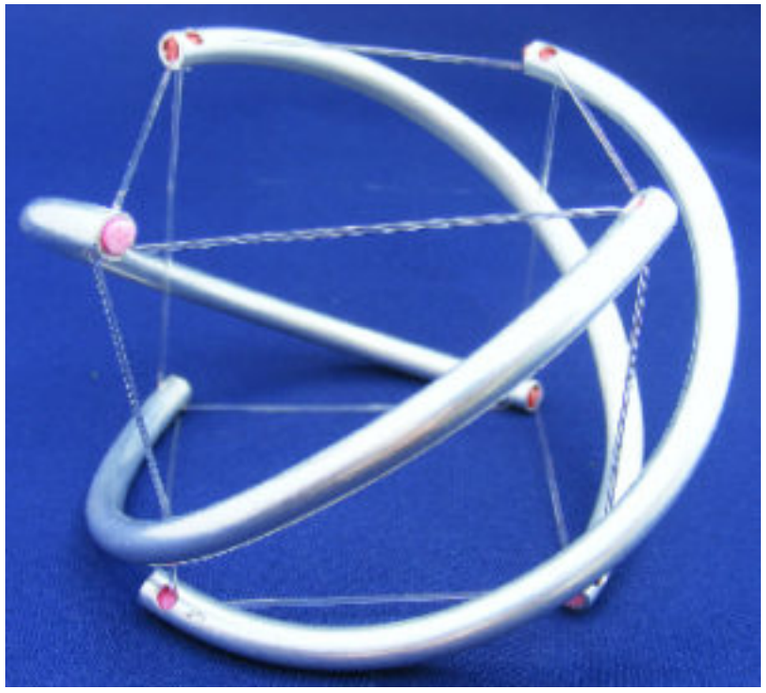
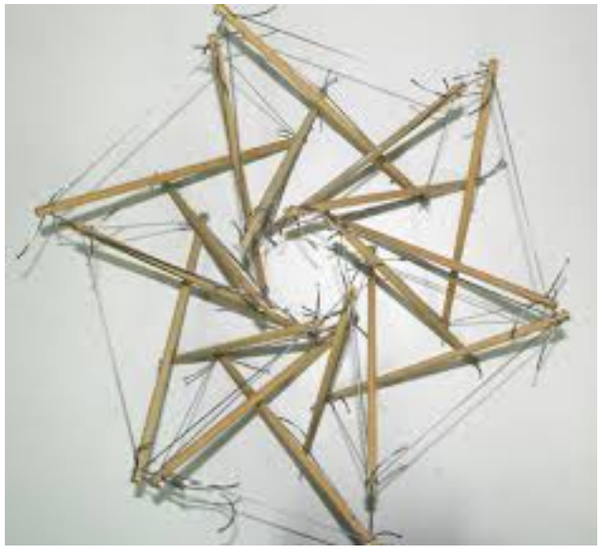


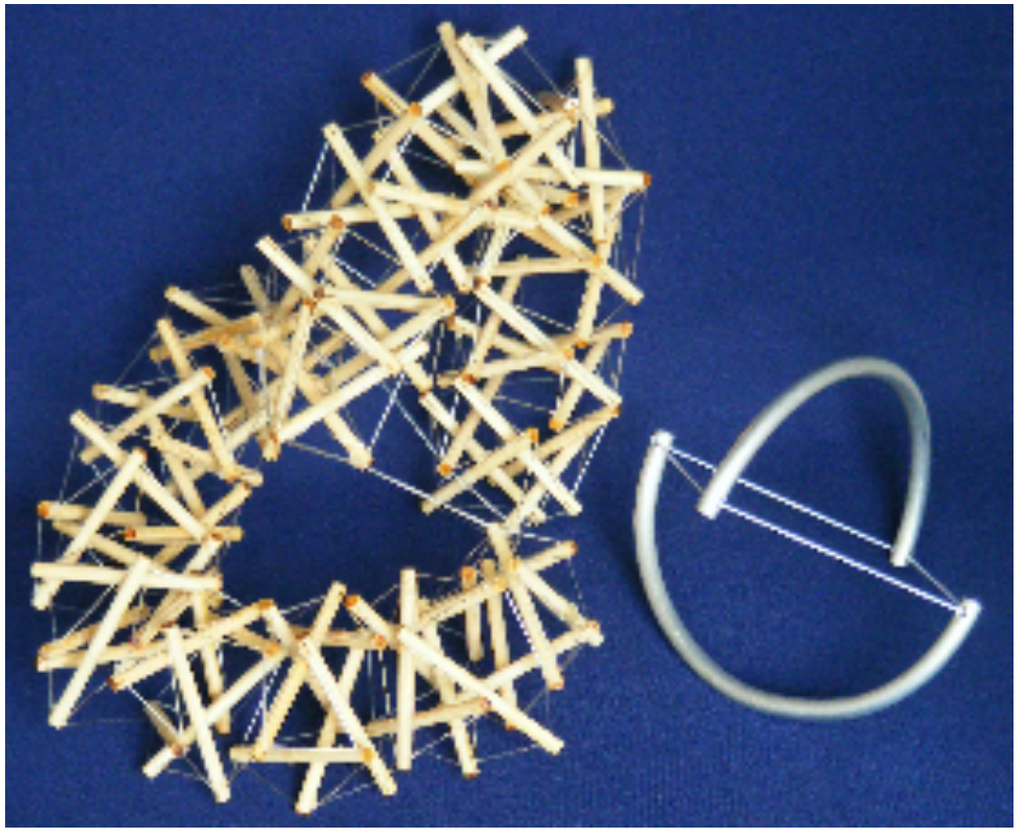


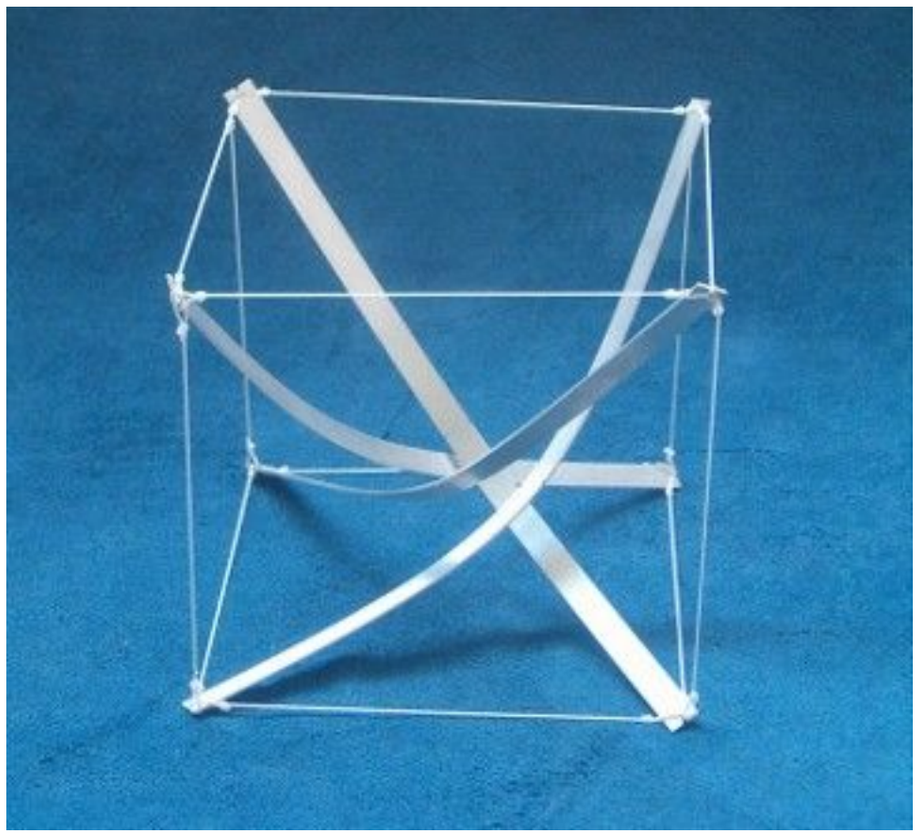


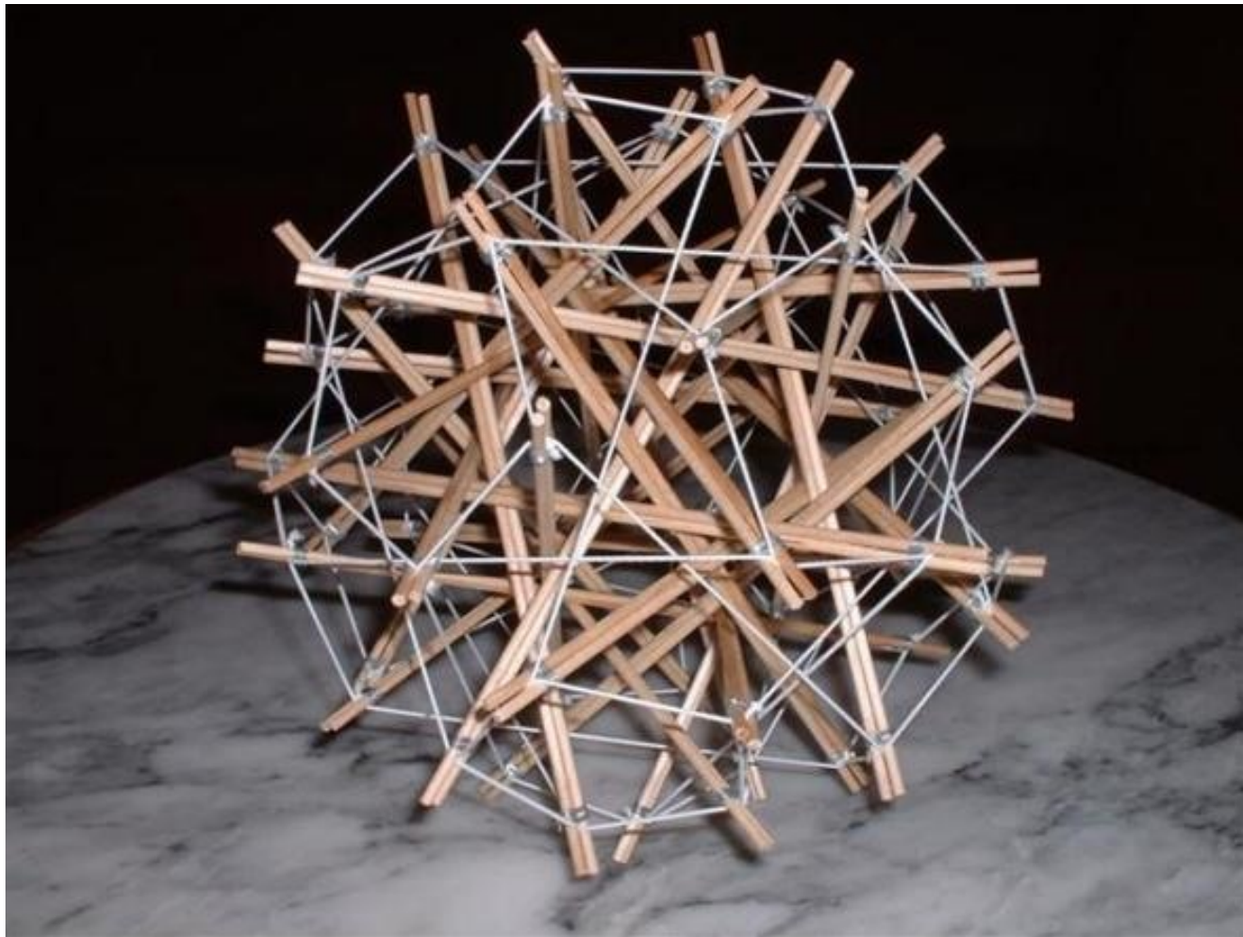


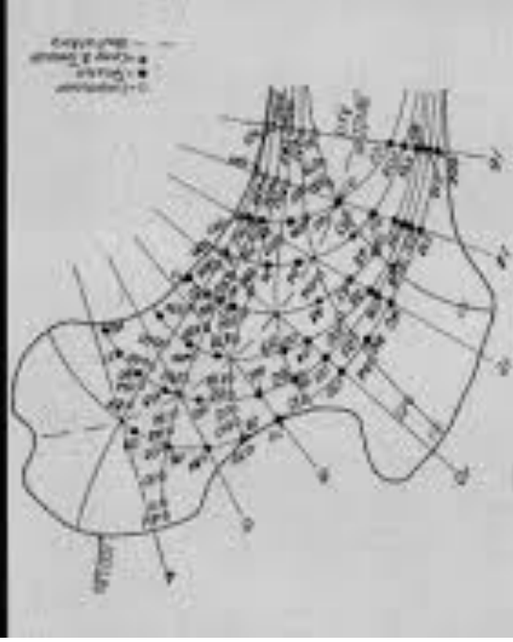


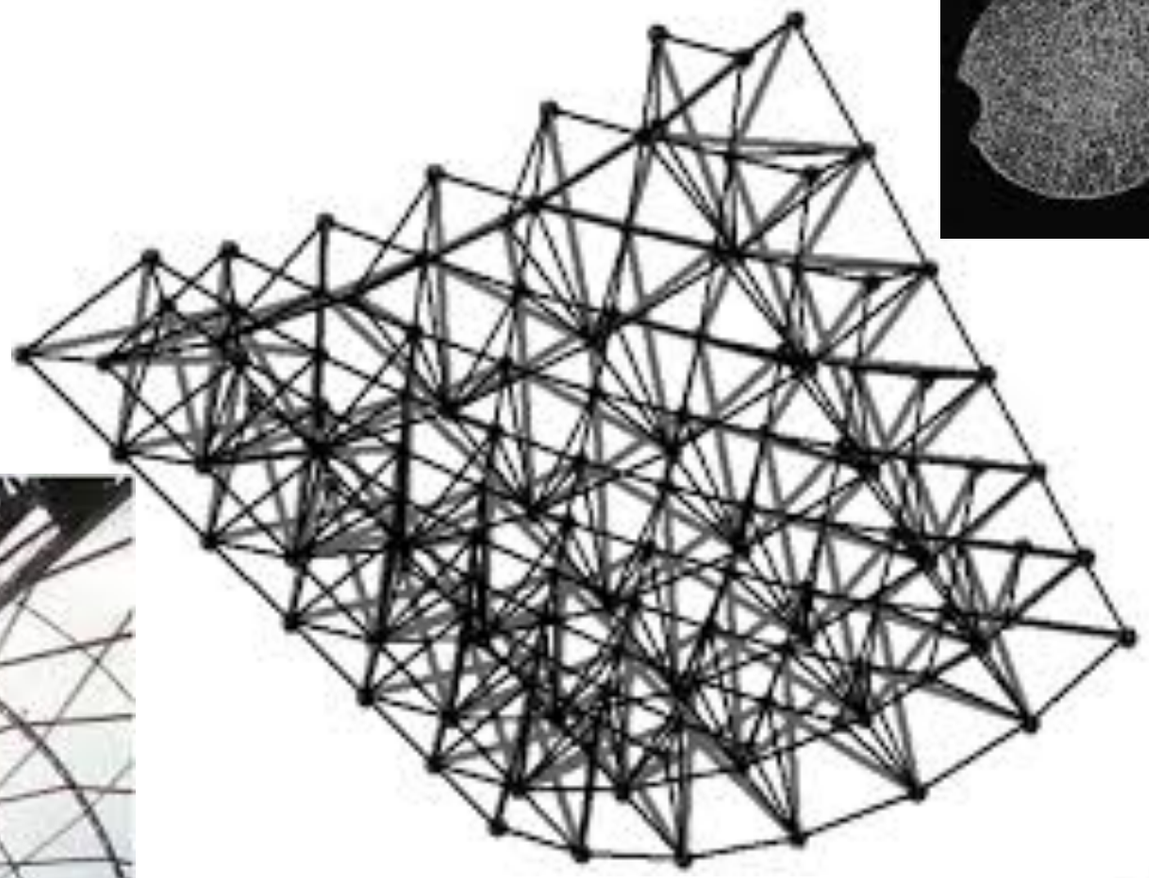


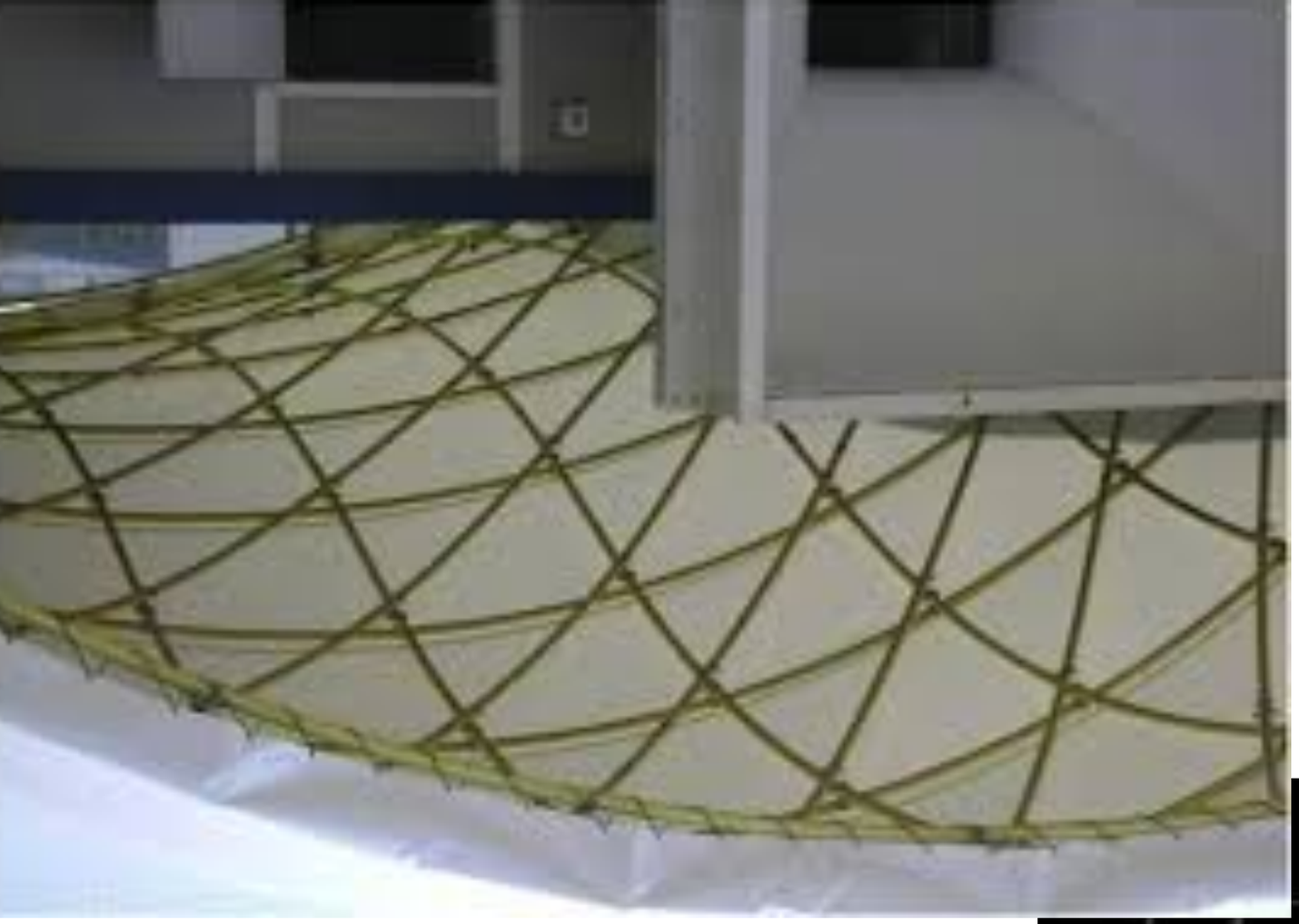


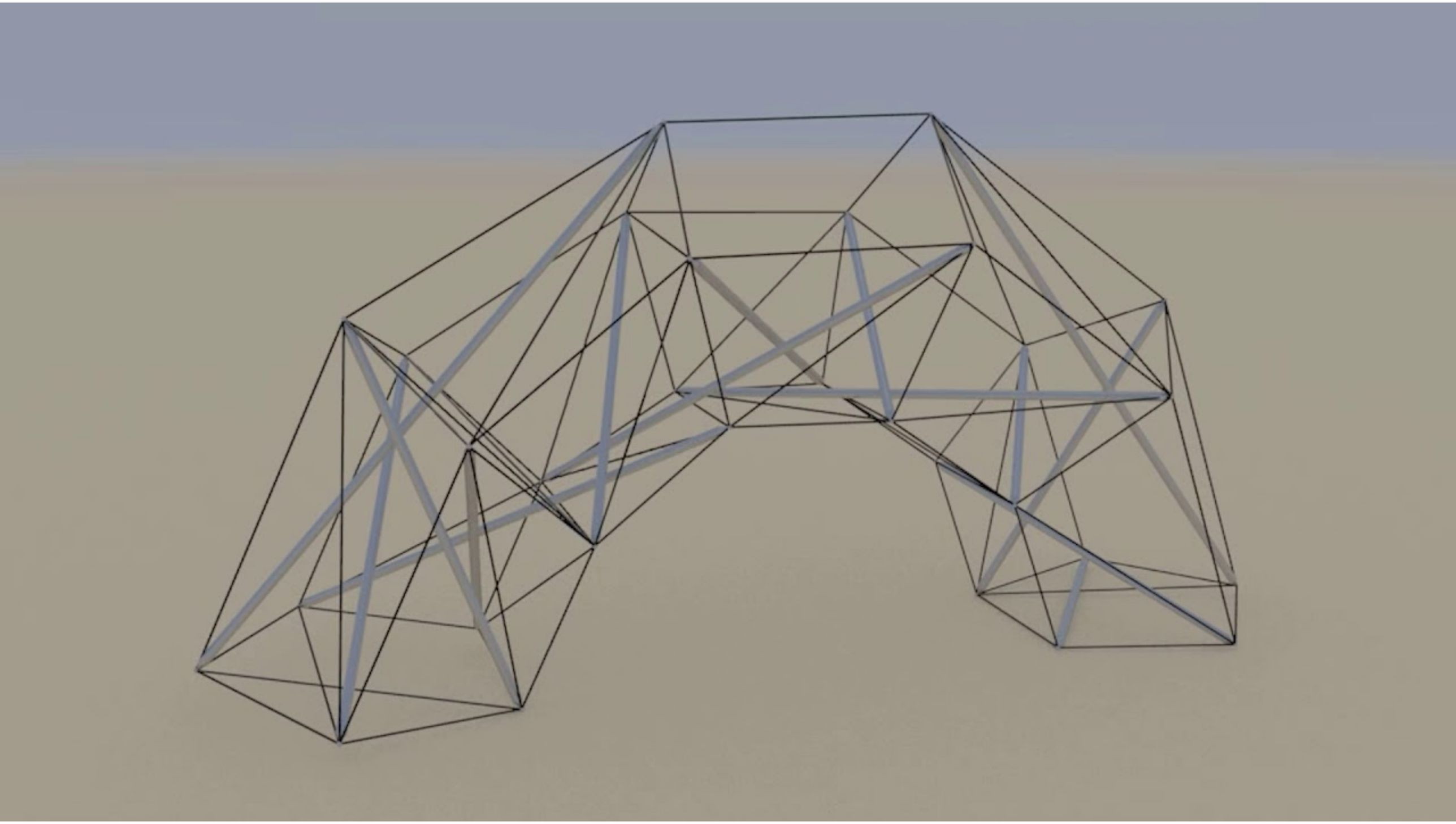












Reciprocal Tension Membrane

Reciprocal Tension Membrane

- We learn about this structure in our training. Yet, we don’t focus on the bilaminar composition (two layers) of the membrane. Without that focus, we can’t learn to feel how it is supposed to move…and we can’t locate some of Arbuckle’s restrictions.

Reciprocal Tension Membrane

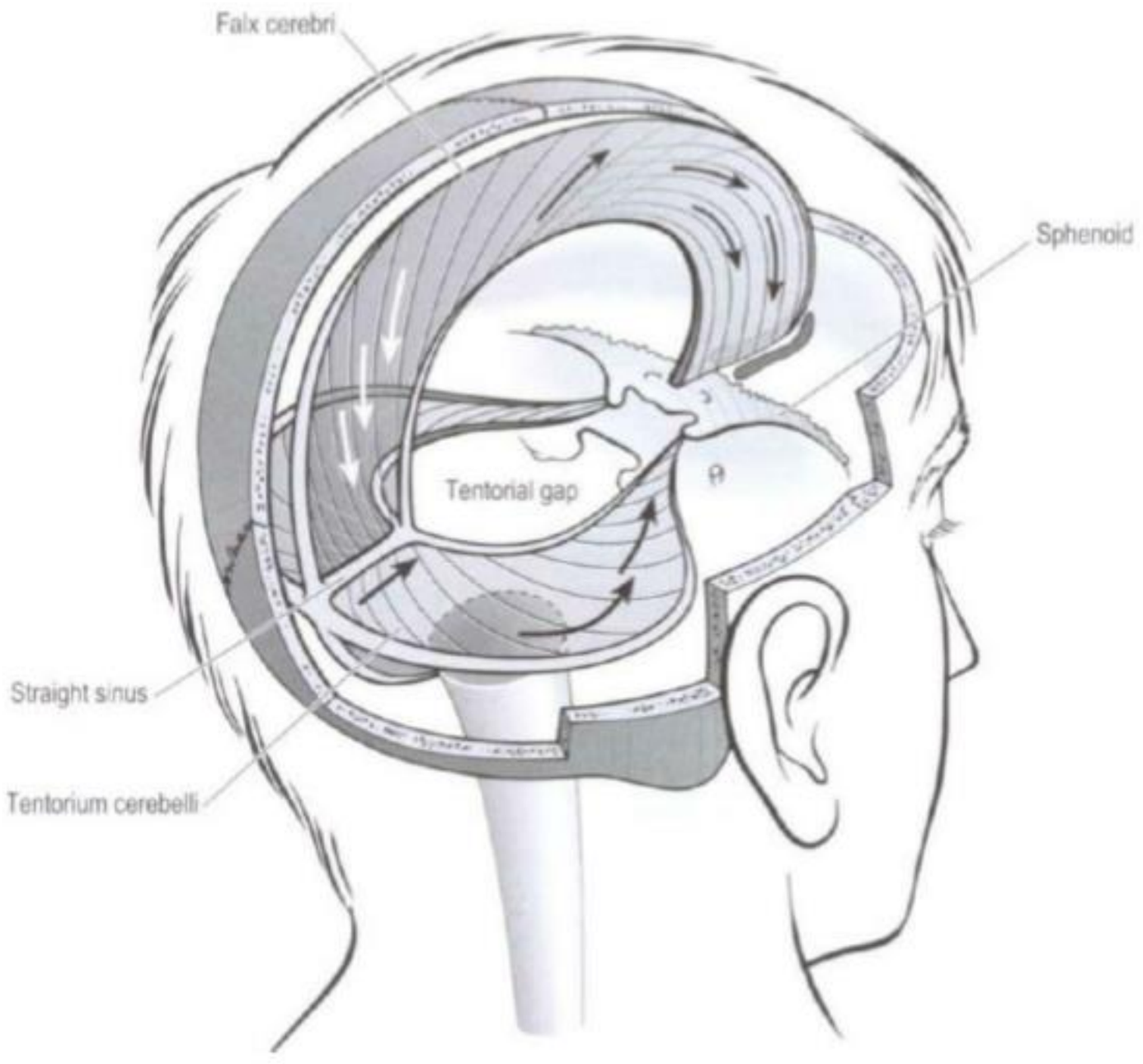
- Notice as you look at the pictures that the artists drew in lines to reflect the fibers that make up the membrane. Much like any other piece of anatomy, those fibers can become restricted.

- It resembles fiberglass or carbon fiber construction.

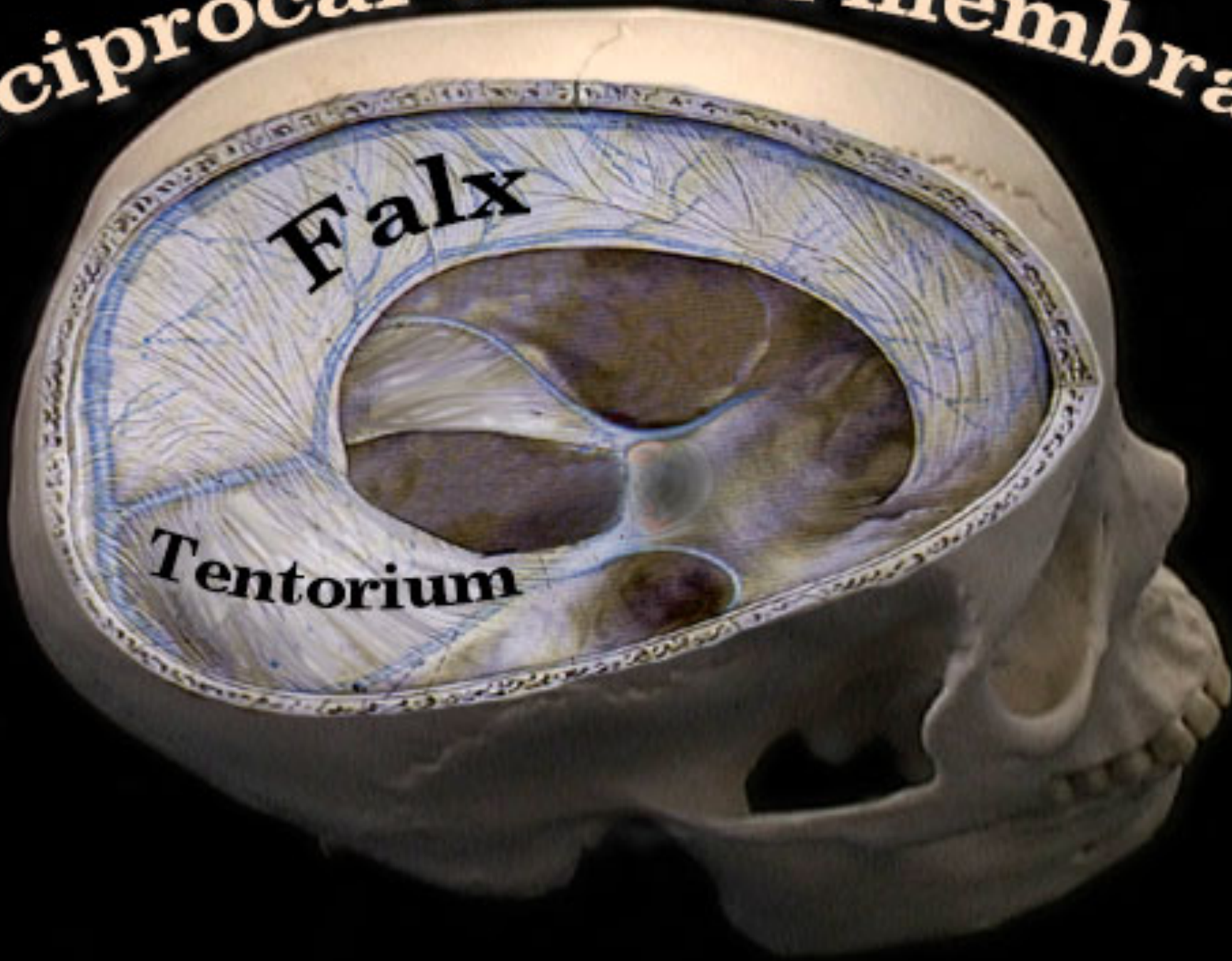
- Those restricted fibers can be palpated and treated.

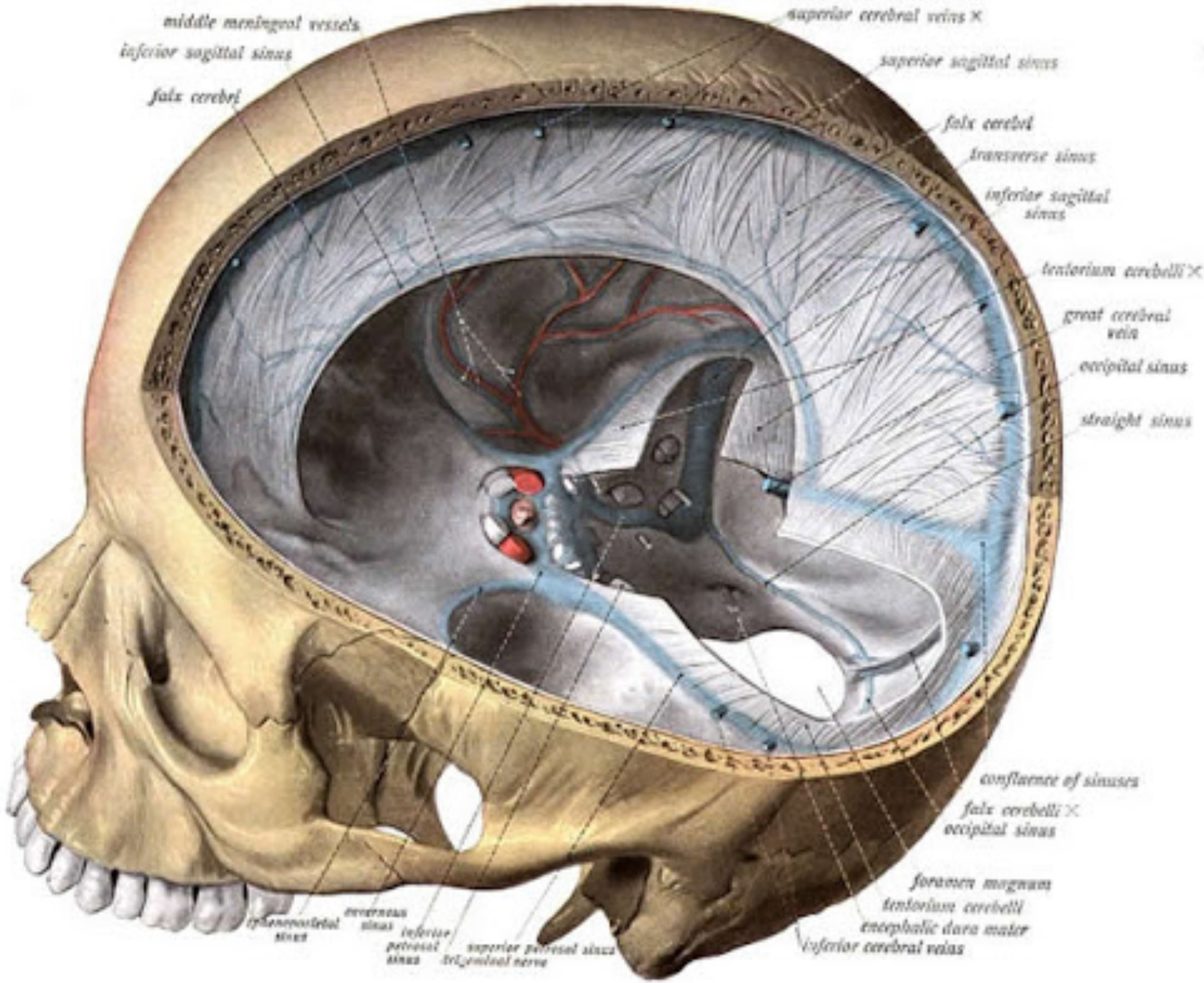
Reciprocal tension membranes

- The cranial term for the dural membranes
- They are the:
  - Falx cerebri
  - Falx cerebelli
  - Tentorium cerebelli
  - Diaphragma sellae
- They are continusuly under dynamic tension so that change in one requires adaptive change in another (Chaitow, 2005, p.4)

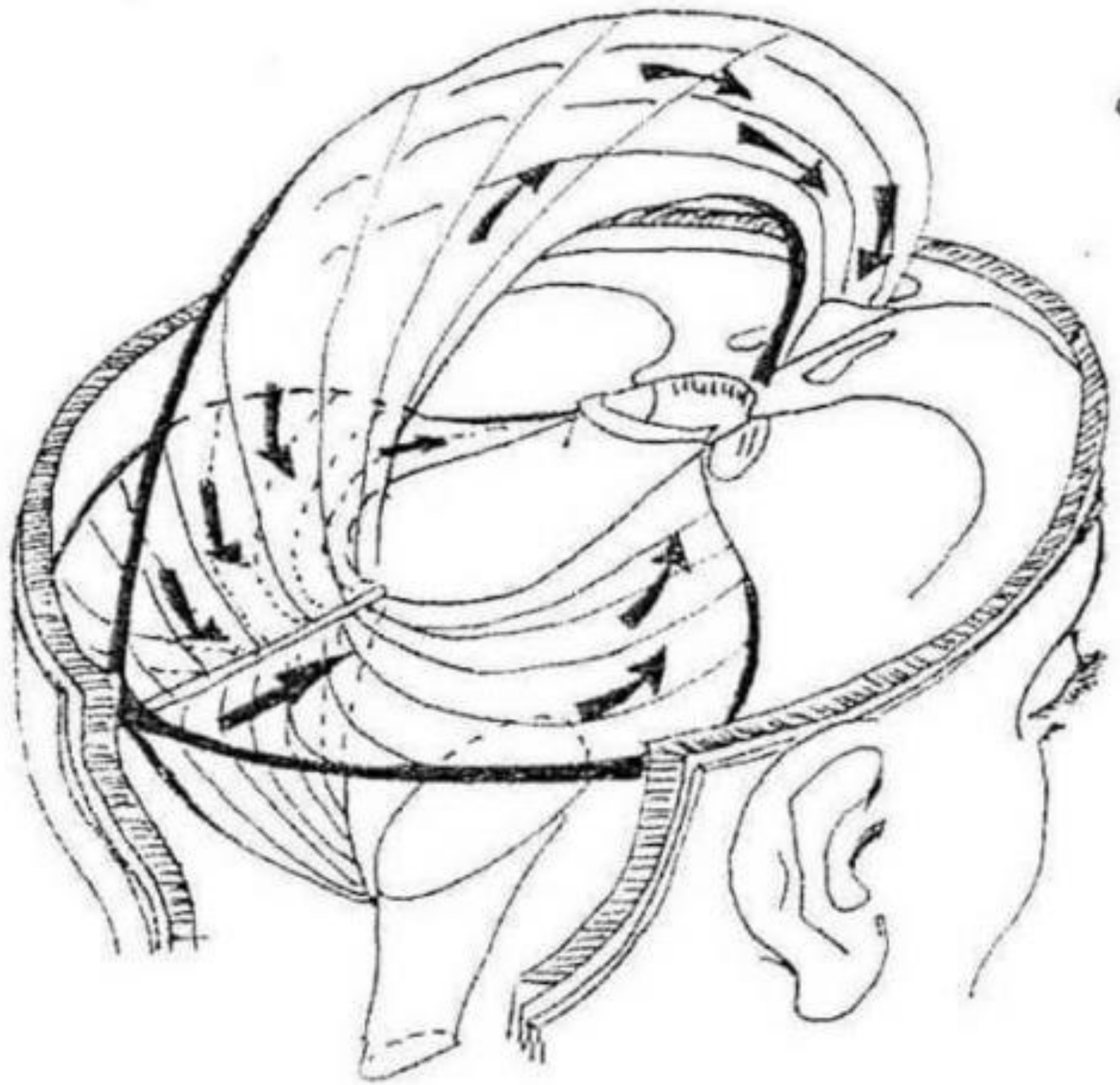


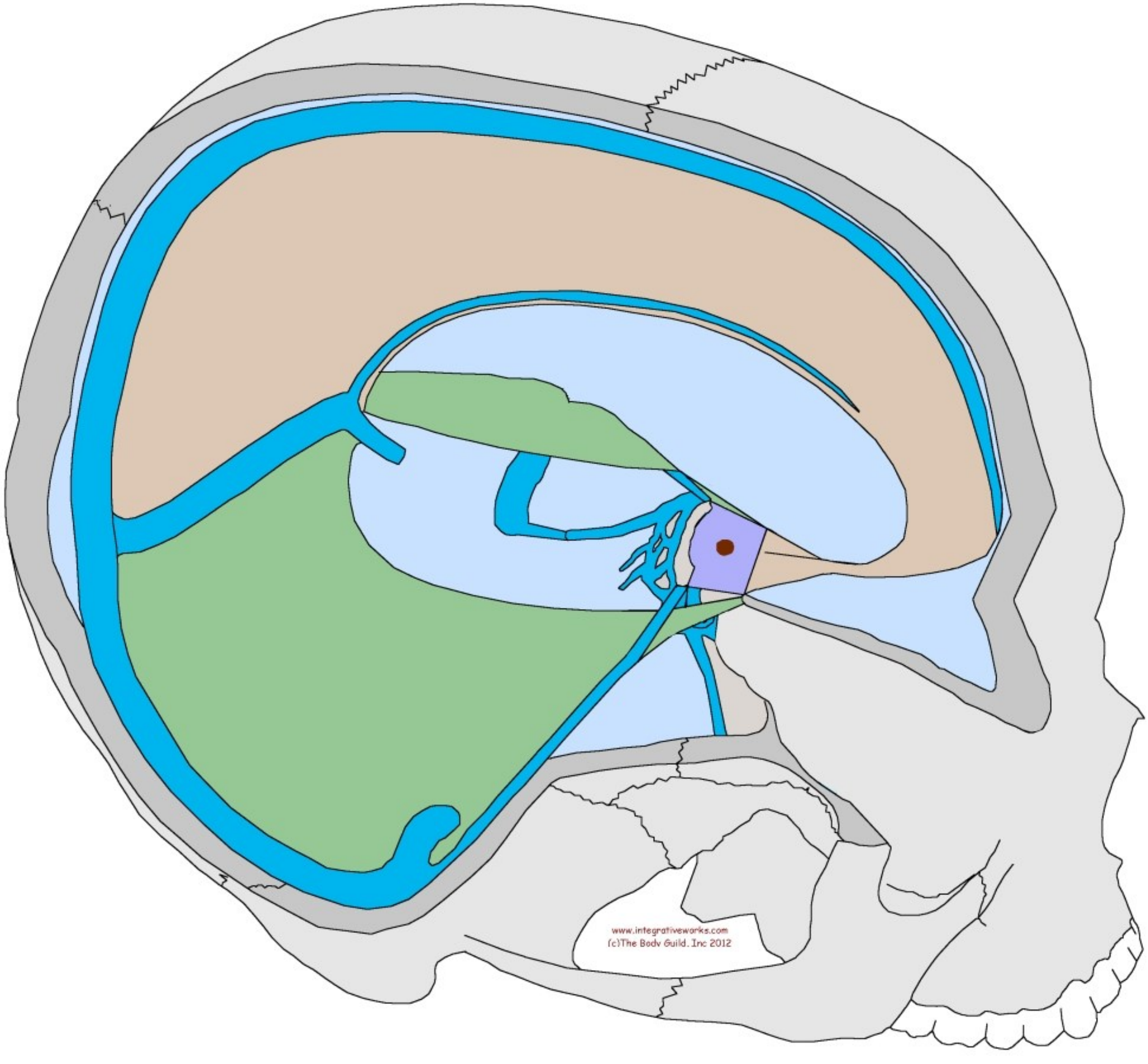
Reciprocal tension membrane

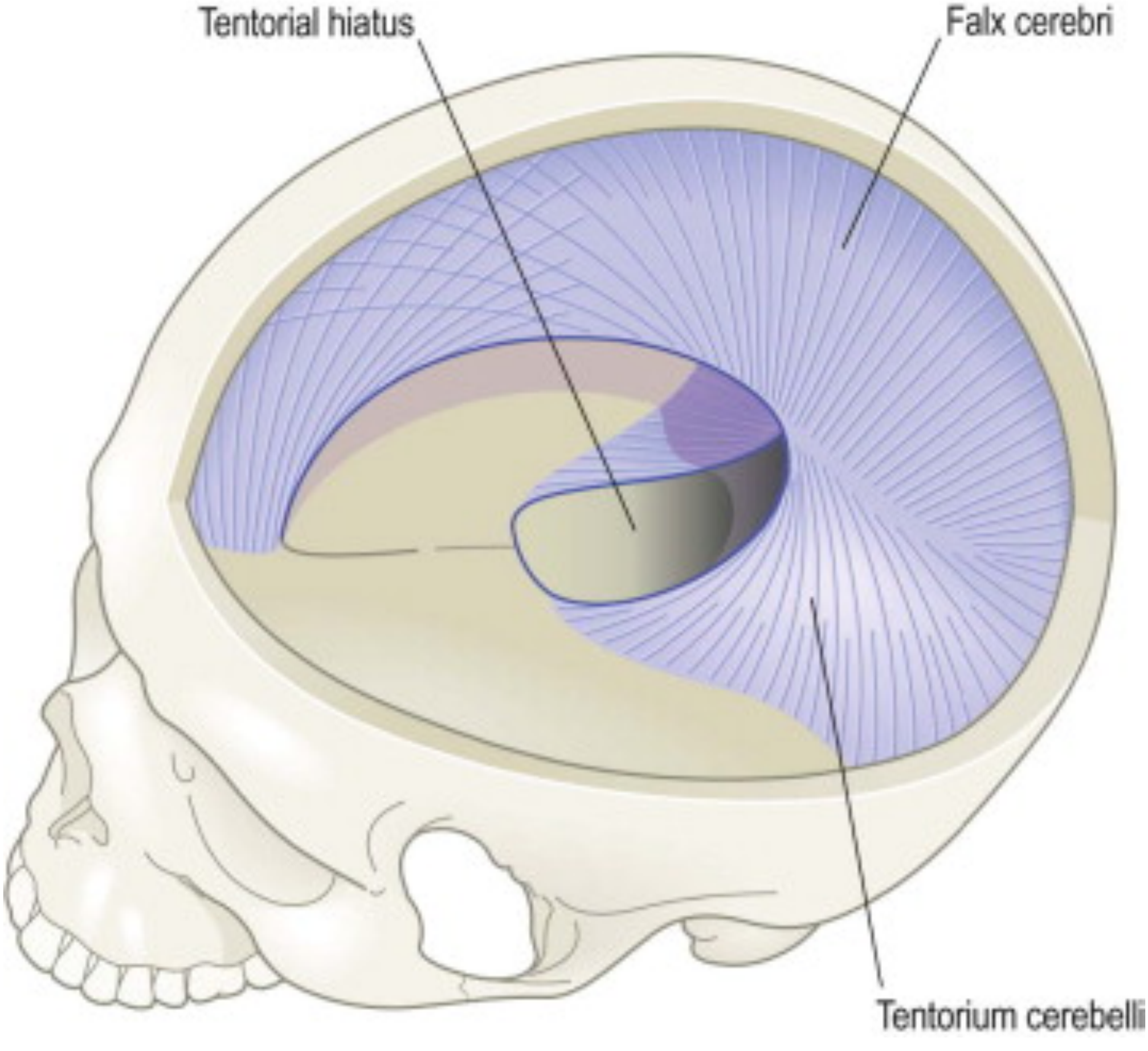


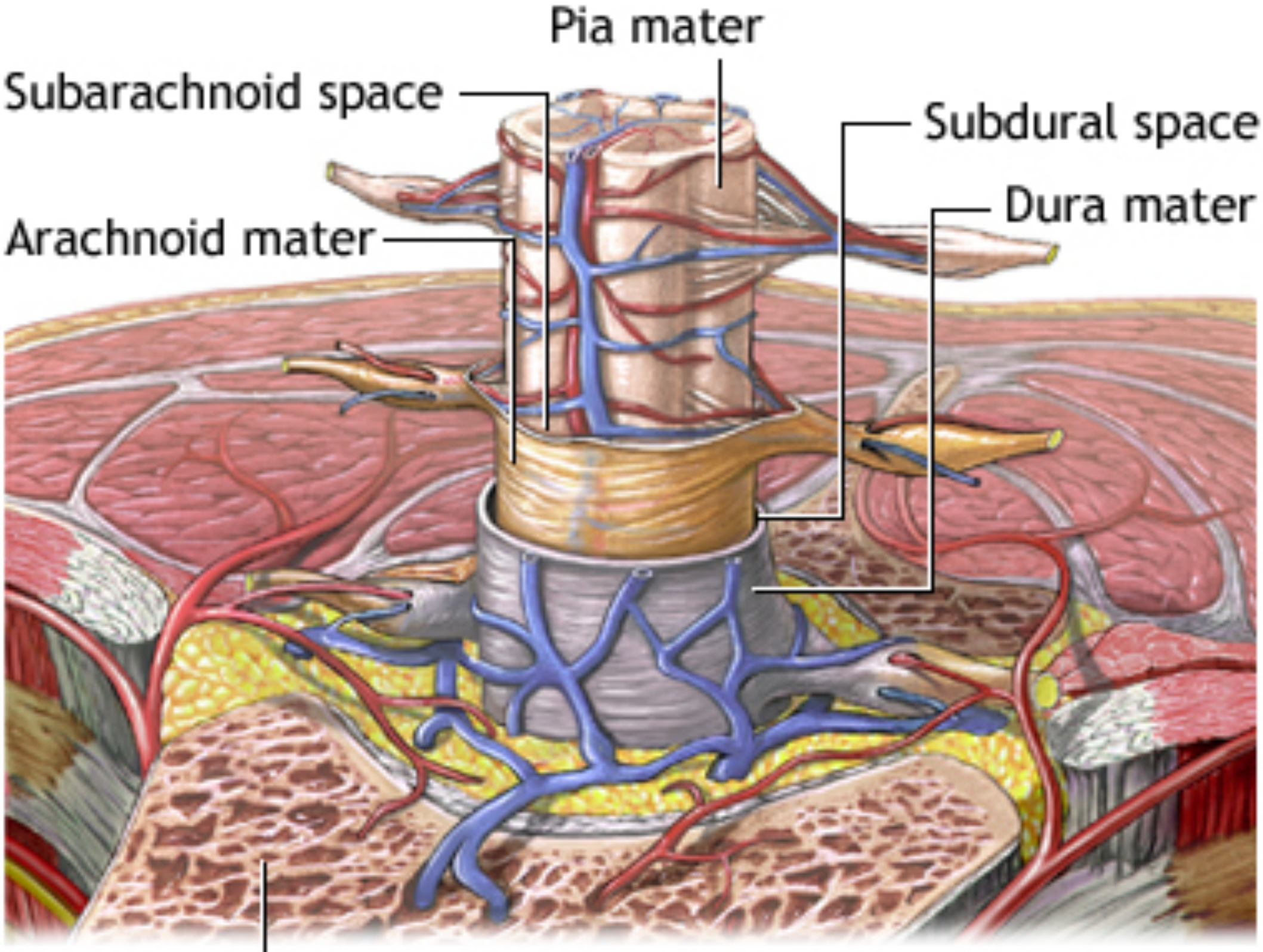

middle meningeal vessels
inferior sagittal sinus
falx cerebri
superior cerebral veins ×
superior sagittal sinus
falx cerebri
transverse sinus
inferior sagittal sinus
tentorium cerebelli ×
great cerebral vein
occipital sinus
straight sinus
confluence of sinuses
falx cerebelli ×
occipital sinus
foramen magnum
tentorium cerebelli
encephalic dura mater
inferior cerebral veins
cavernous sinus
inferior petrosal sinus
superior petrosal sinus
trigeminal nerve

Флексия

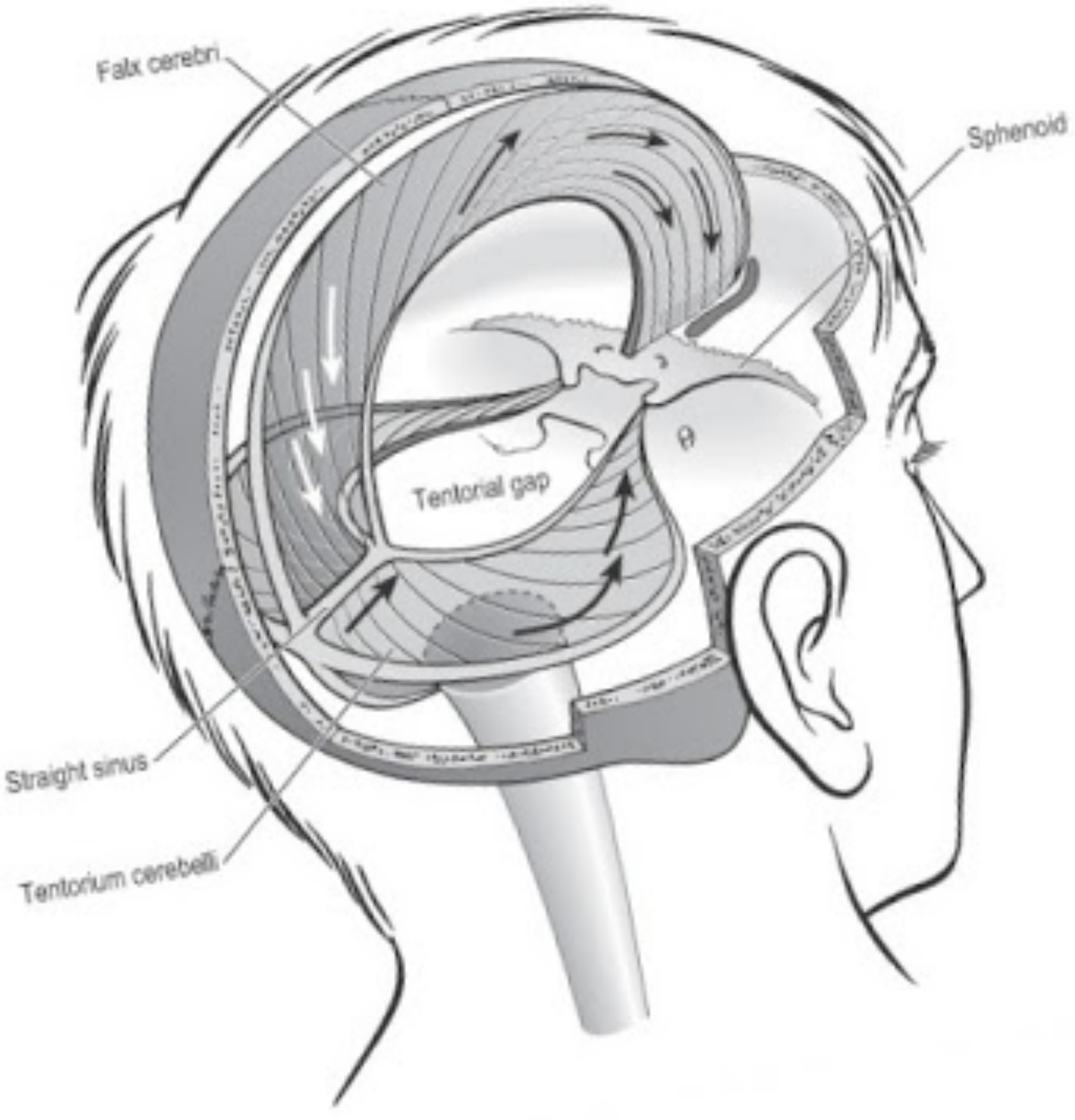


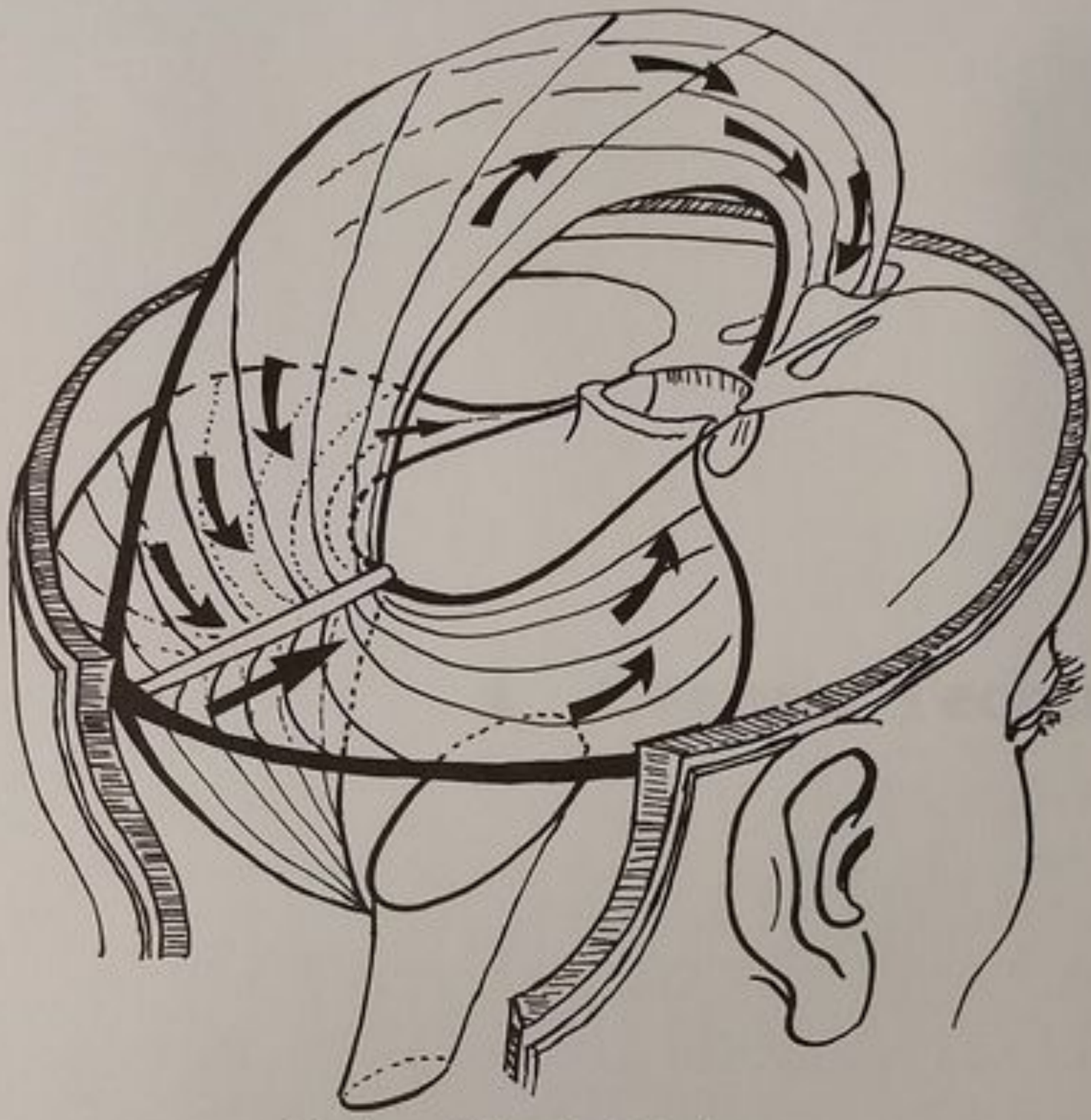

www.integrativeworks.com
(c)The Body Guild. Inc 2012


Tentorial hiatus
Falx cerebri
Tentorium cerebelli

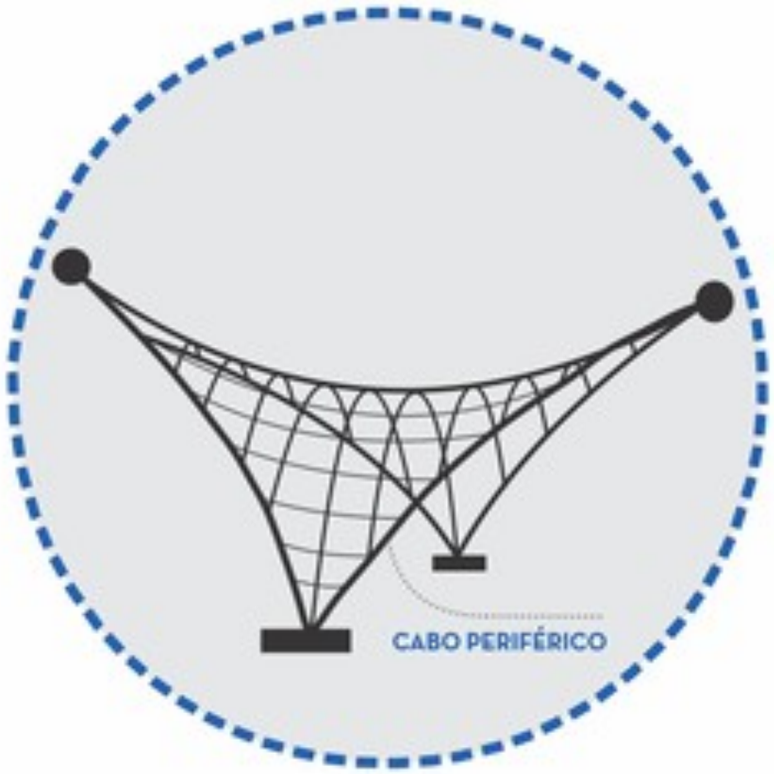

Pia mater
Subarachnoid space
Subdural space
Dura mater
Arachnoid mater
Cut vertebra

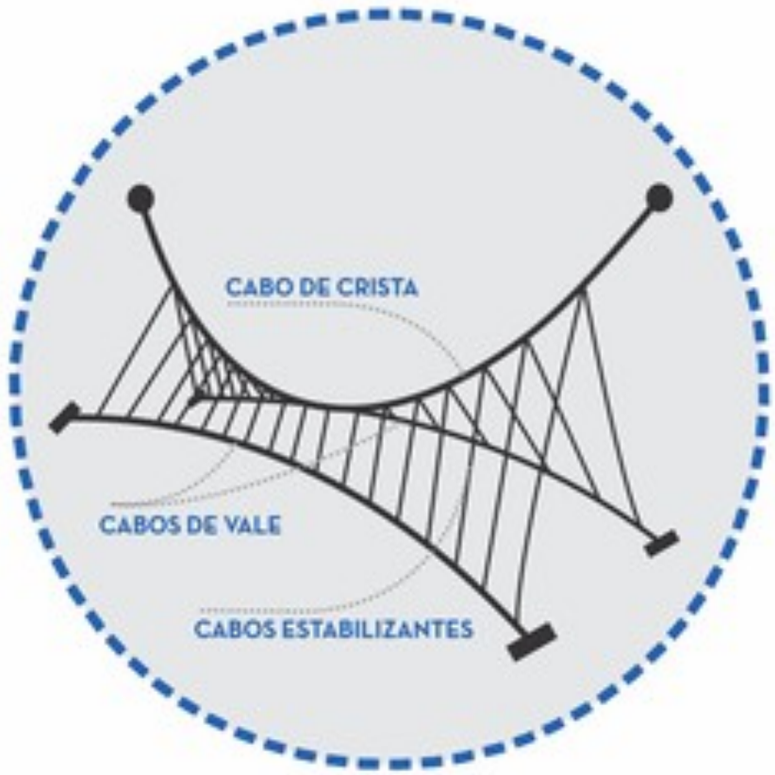
A.D.A.M.

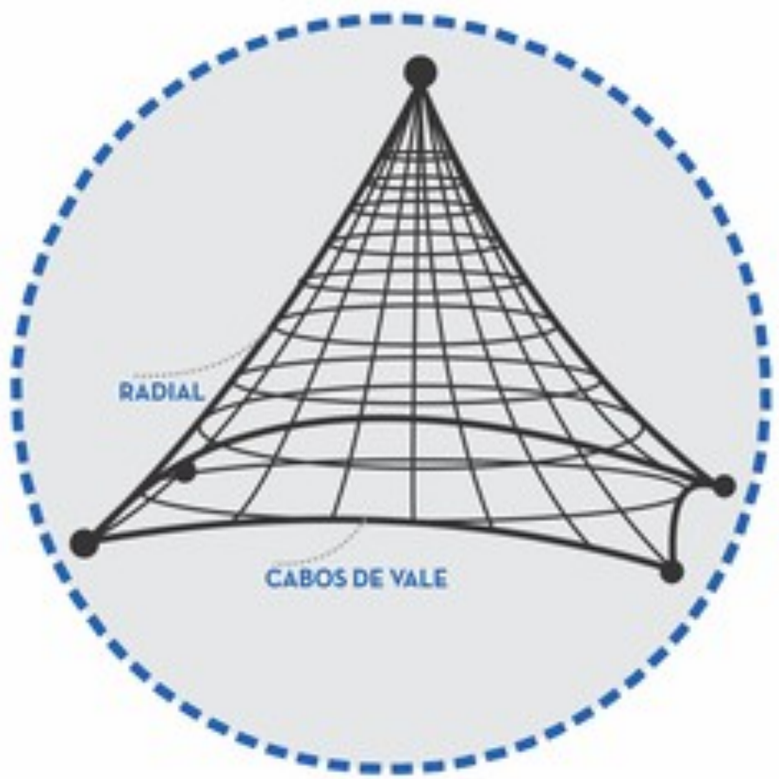

Falx cerebri
Sphenoid
Tentorial gap
Straight sinus
Tentorium cerebelli



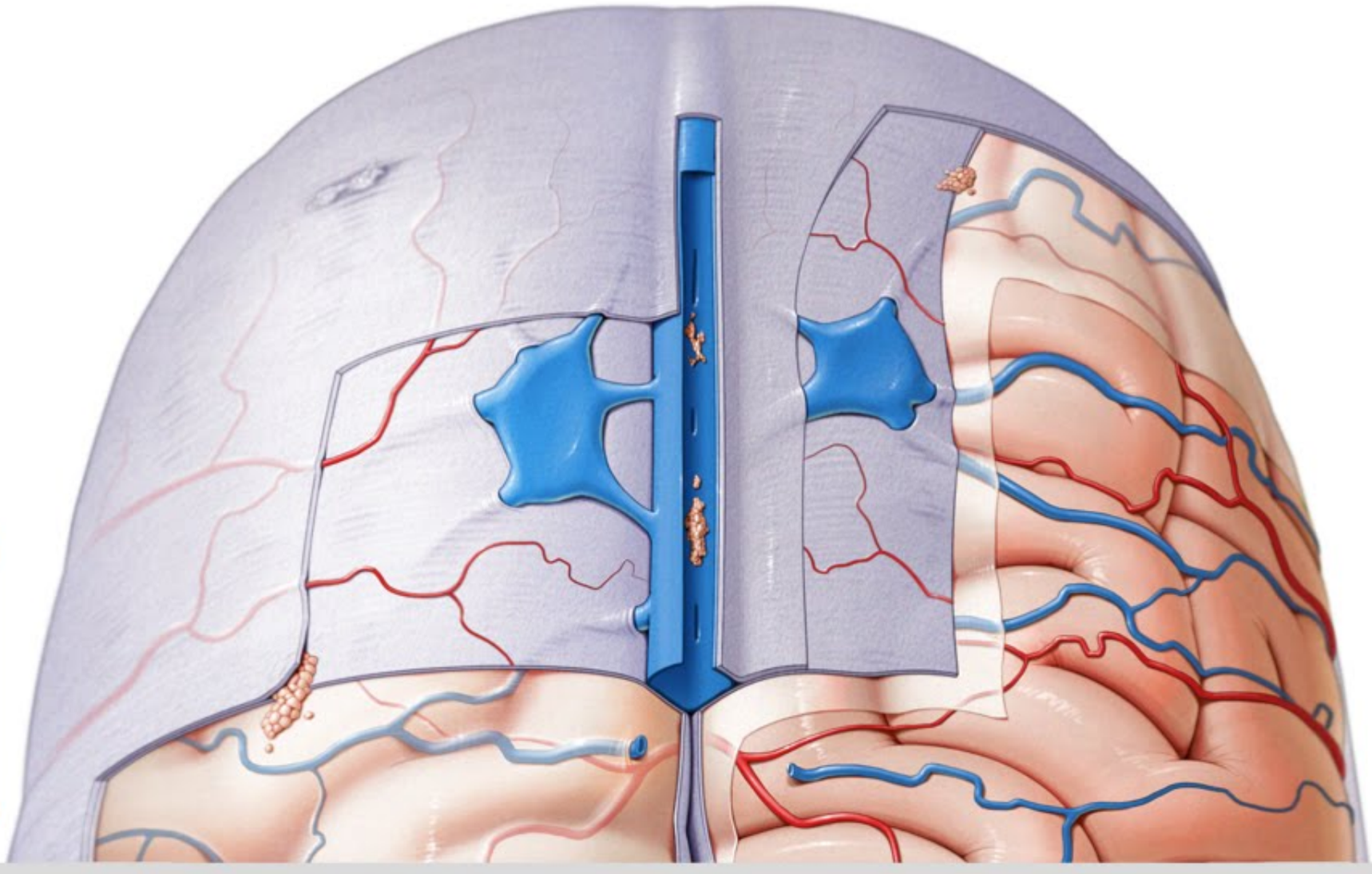
Reciprocal Tension Membrane


CABO PERIFÉRICO

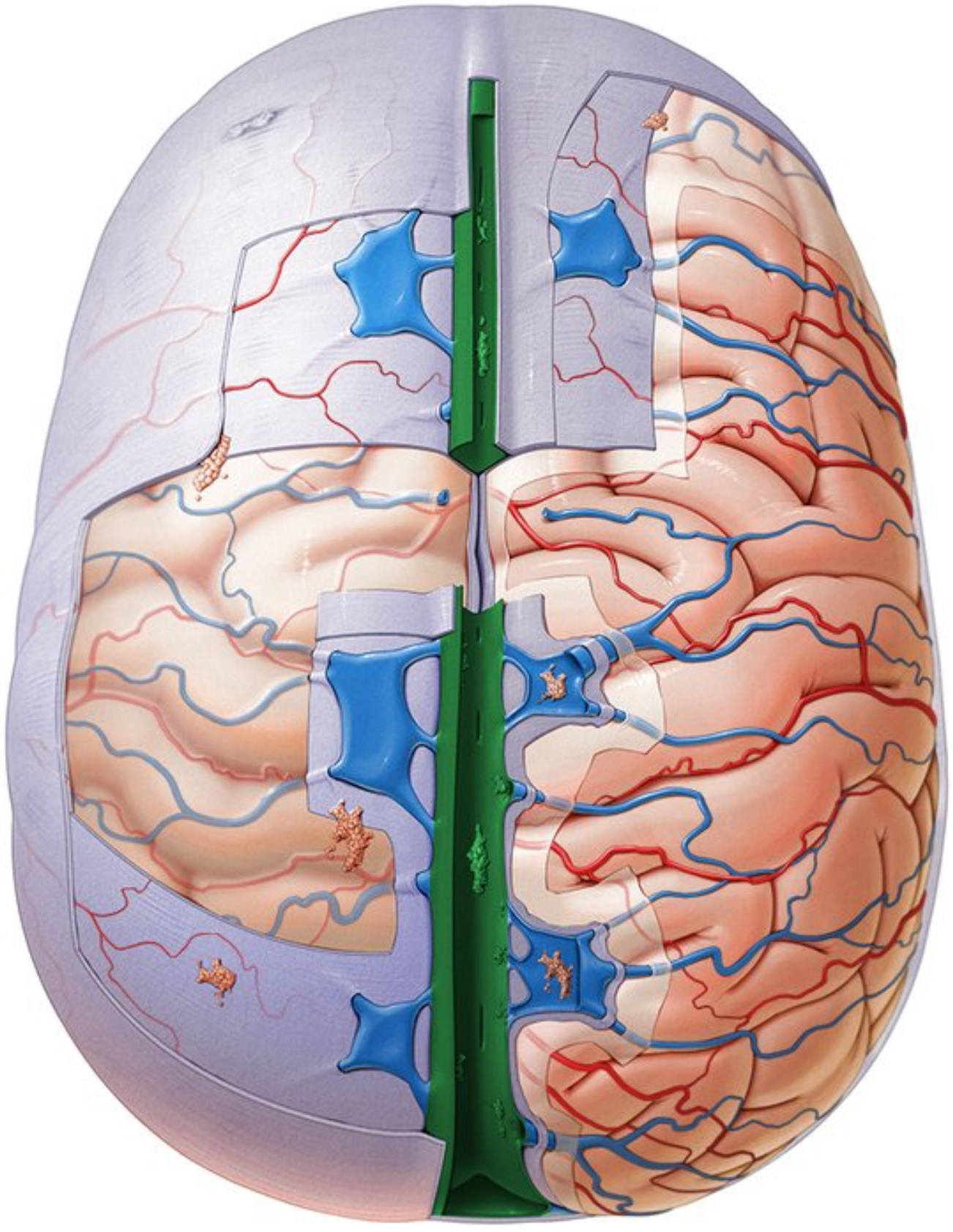

CABO DE CRISTA
CABOS DE VALE
CABOS ESTABILIZANTES


RADIAL
CABOS DE VALE

Dura mater



K



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Buttresses

Definition

- a projecting structure of masonry or wood for supporting or giving stability to a wall or building.

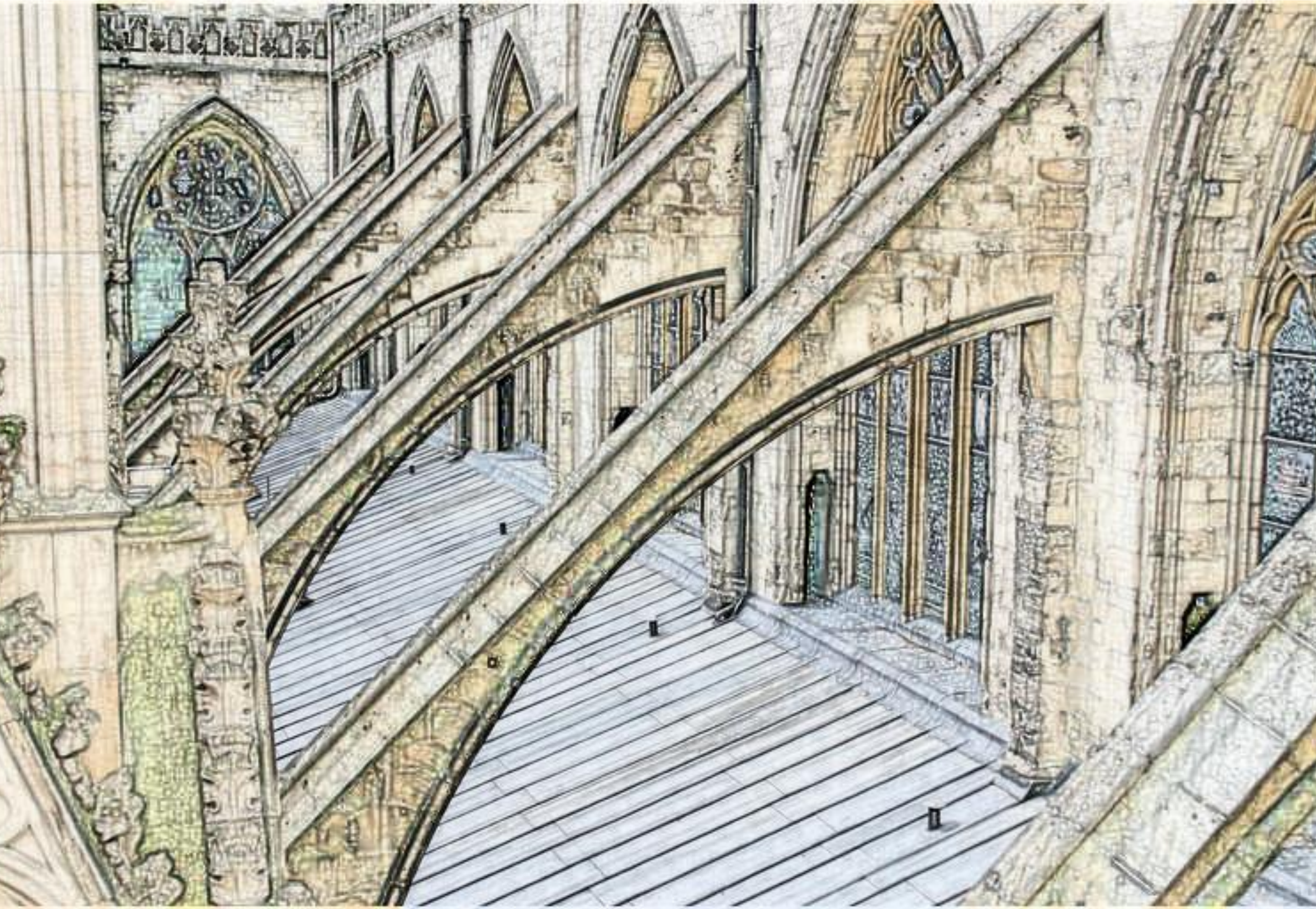
- something that supports or strengthens.

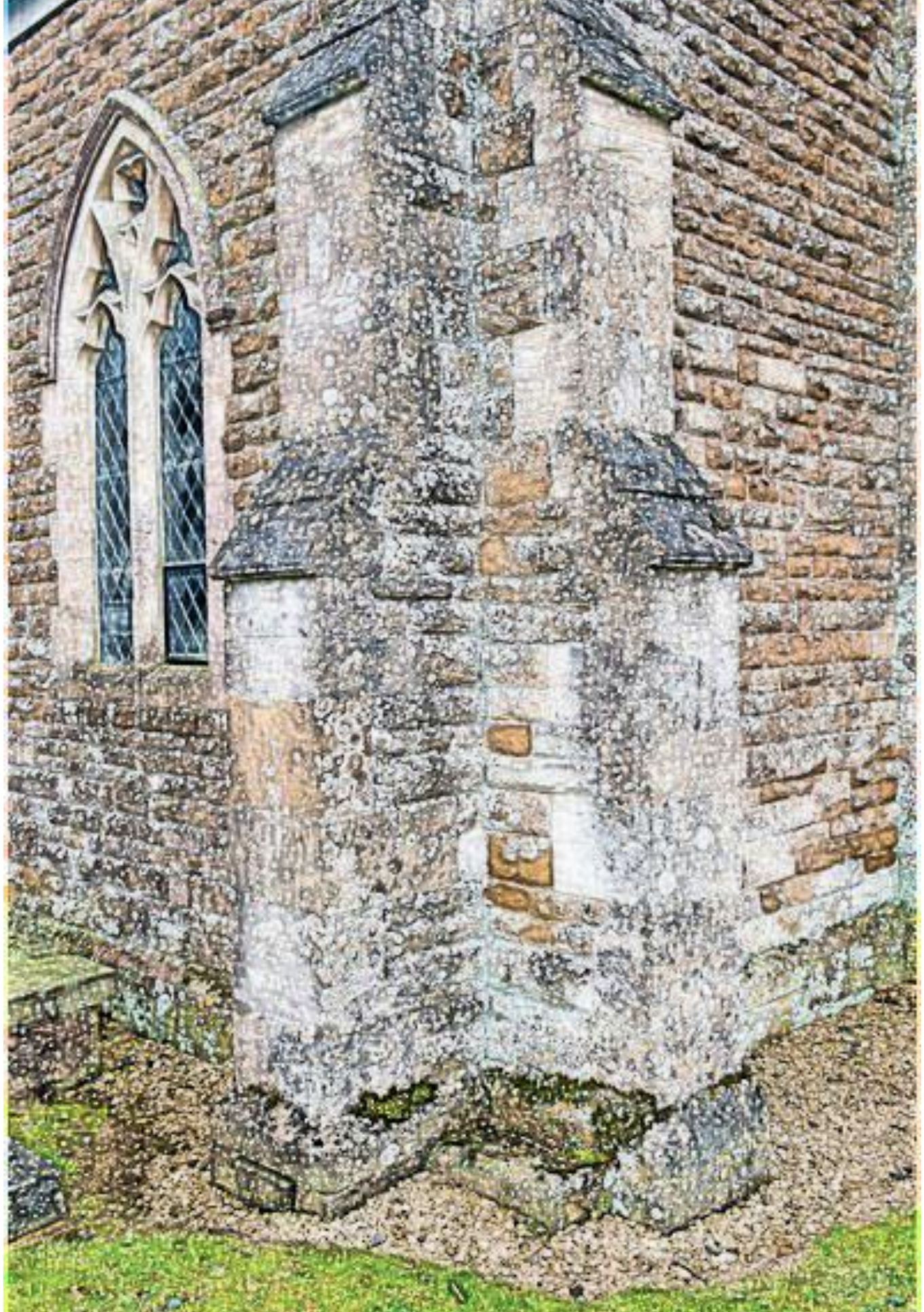
Cranial Buttresses

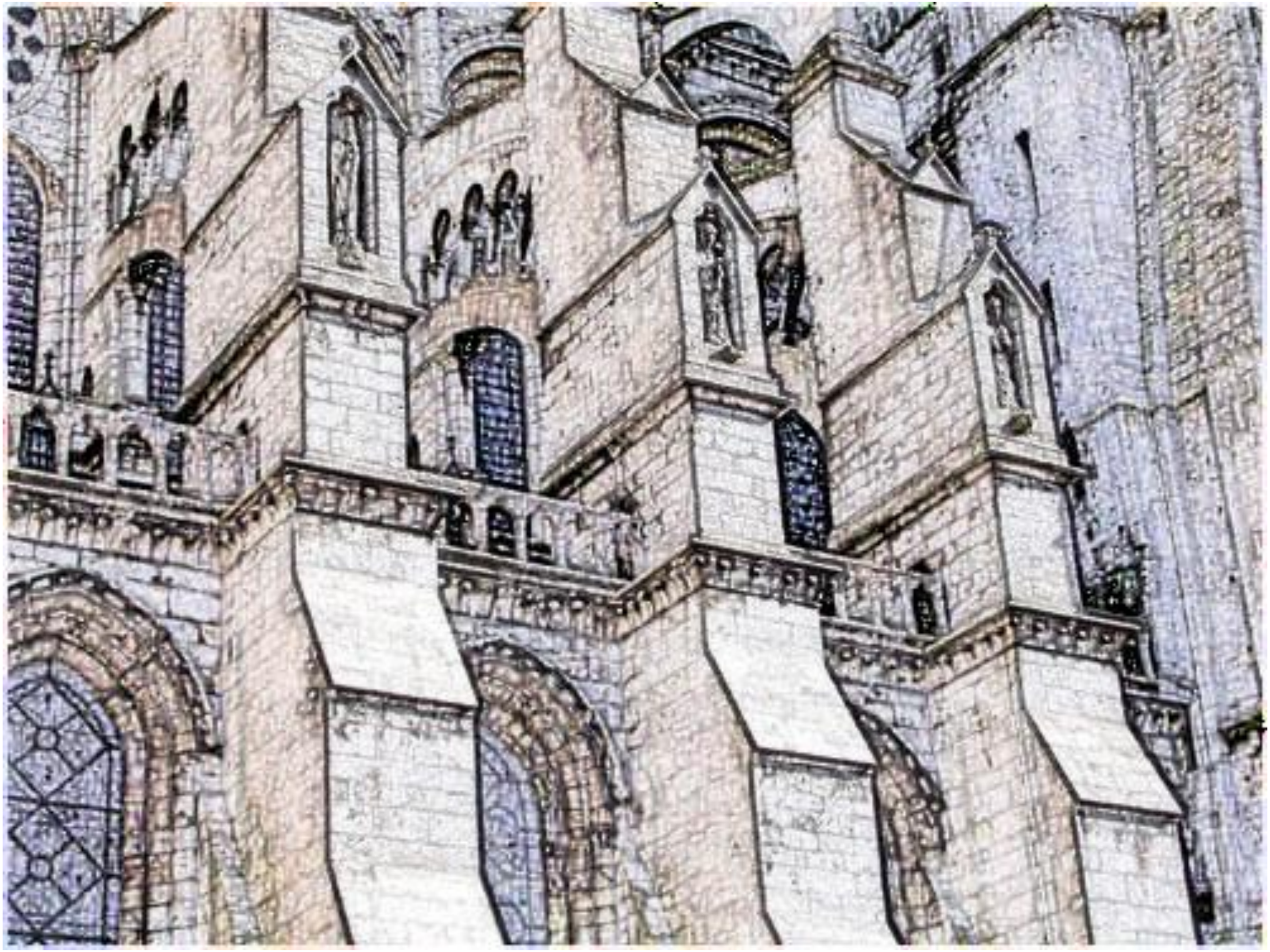
- In the cranium, any thickening of the bone (such as the sutures) or any angle of the bone (such as the bend of the frontal at the eyebrows) creates a buttress. It strengthens the bone.

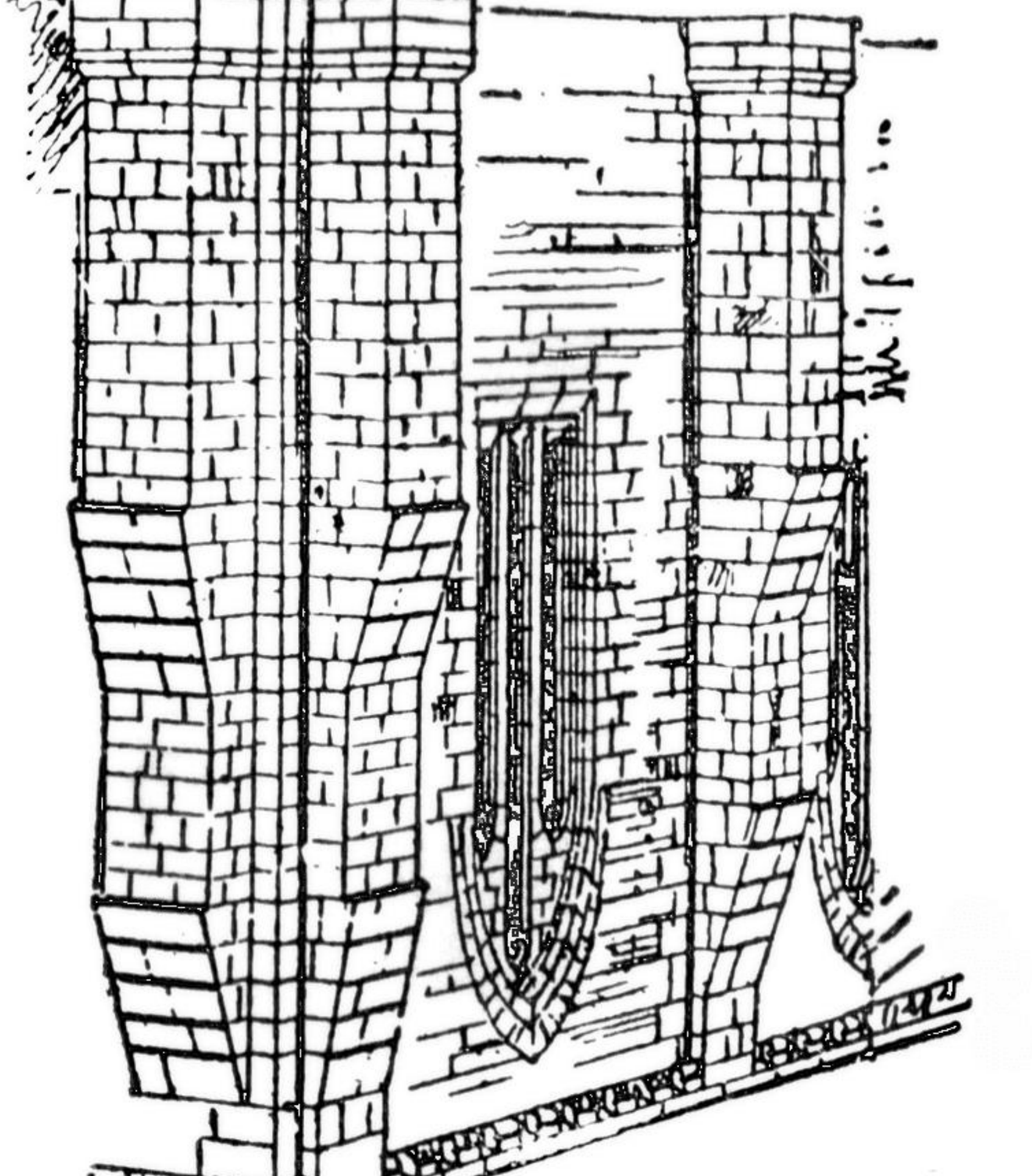
- These buttresses can become restricted and can be palpated and treated.

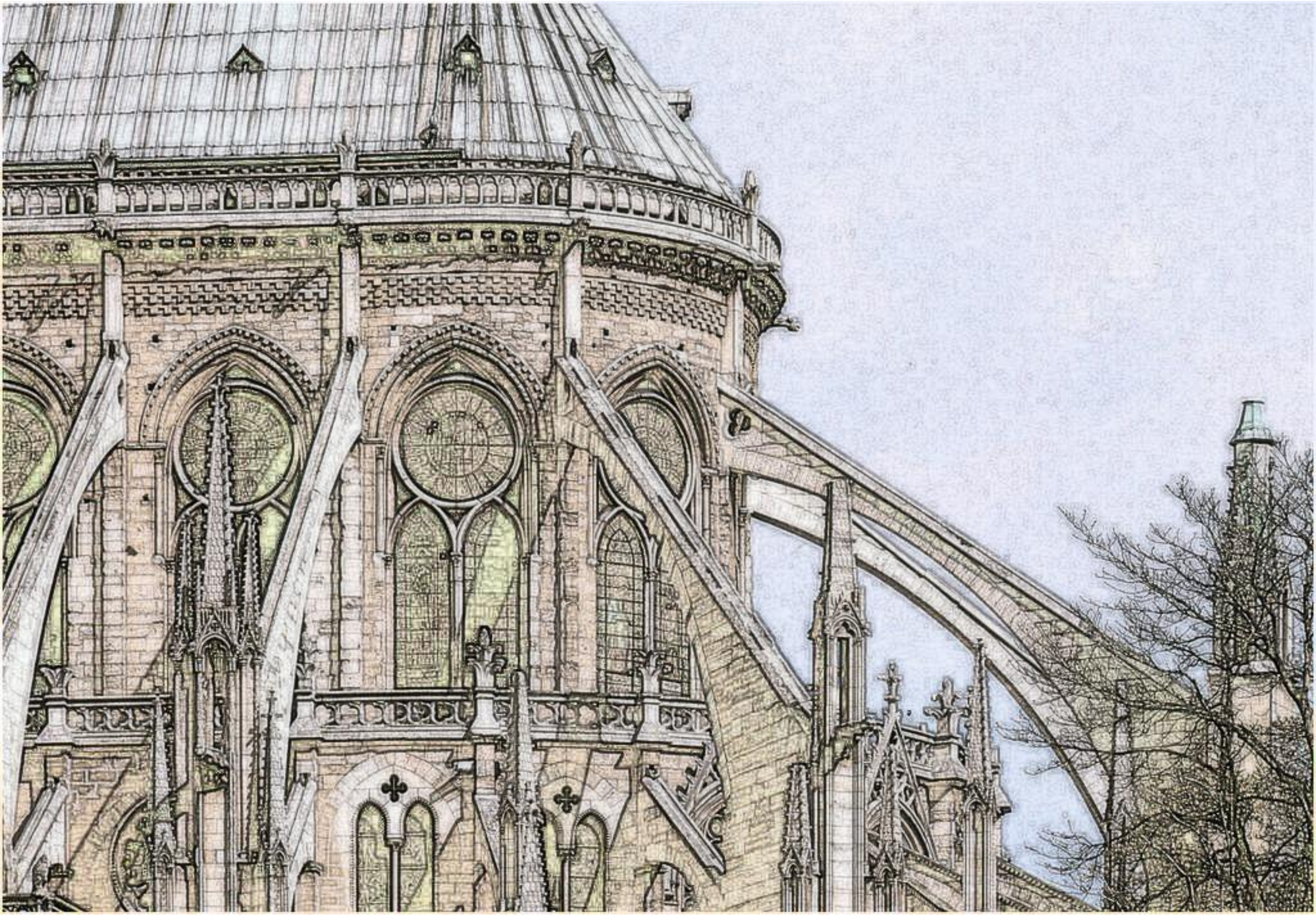
Architectural Examples

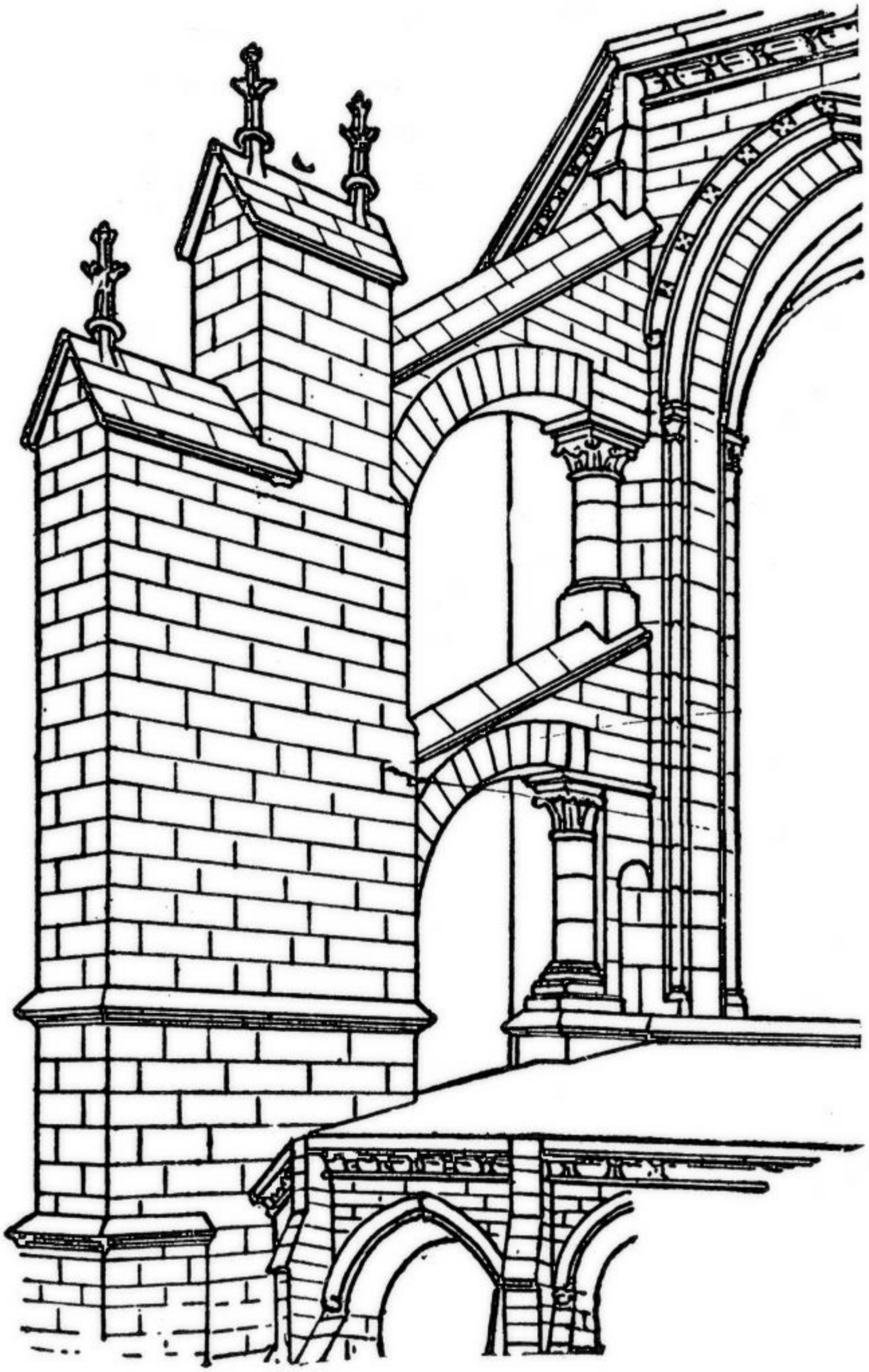


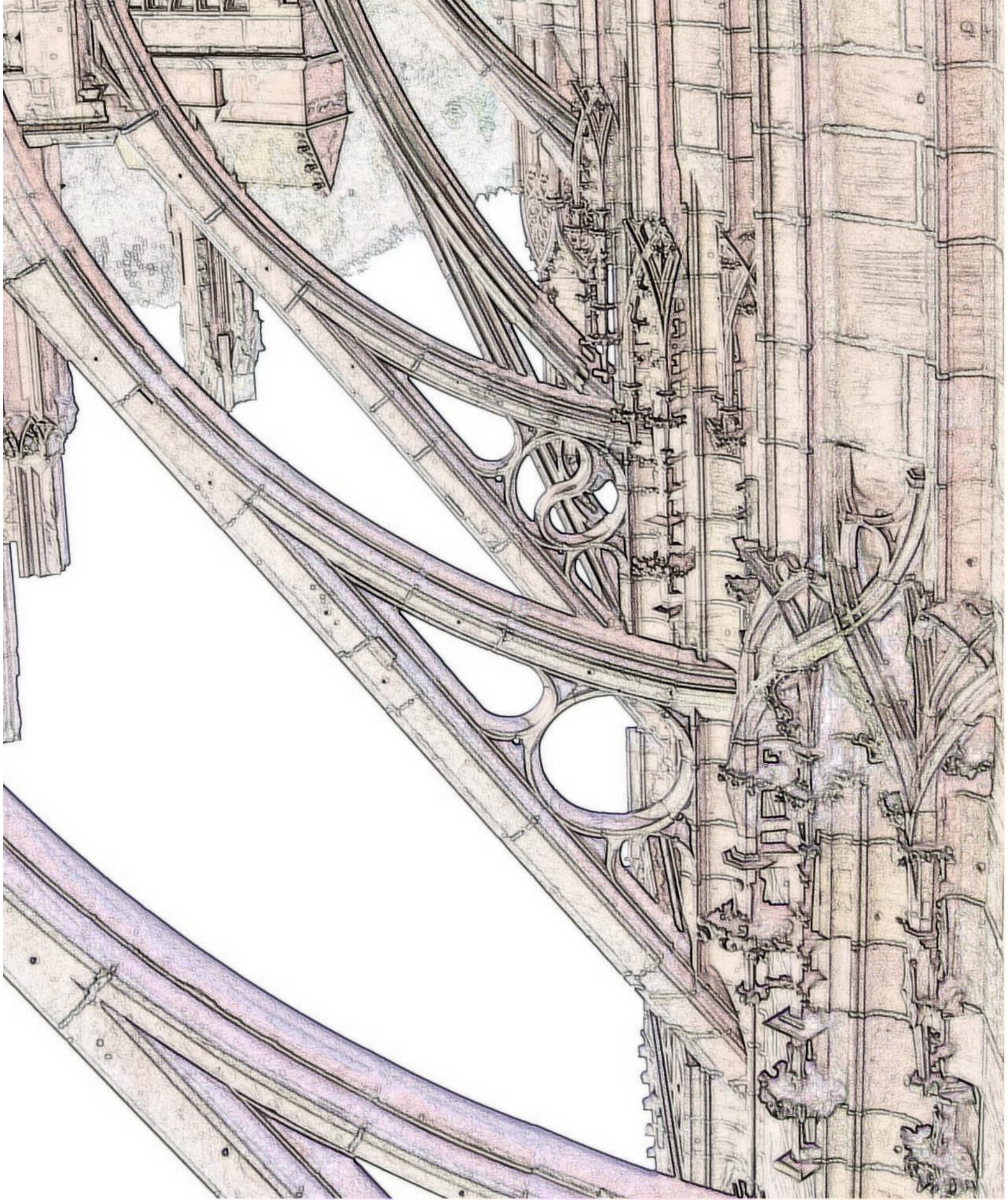




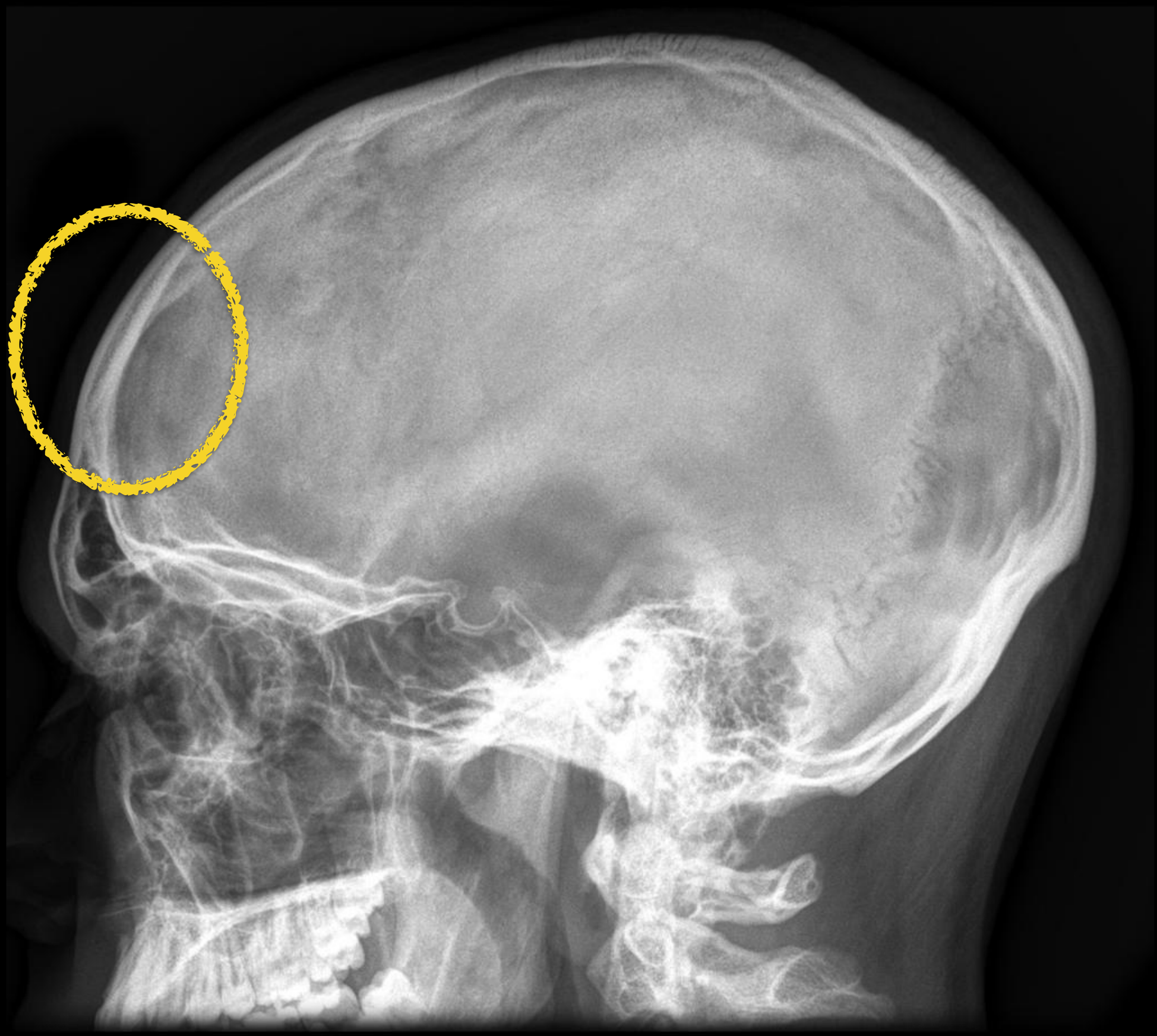


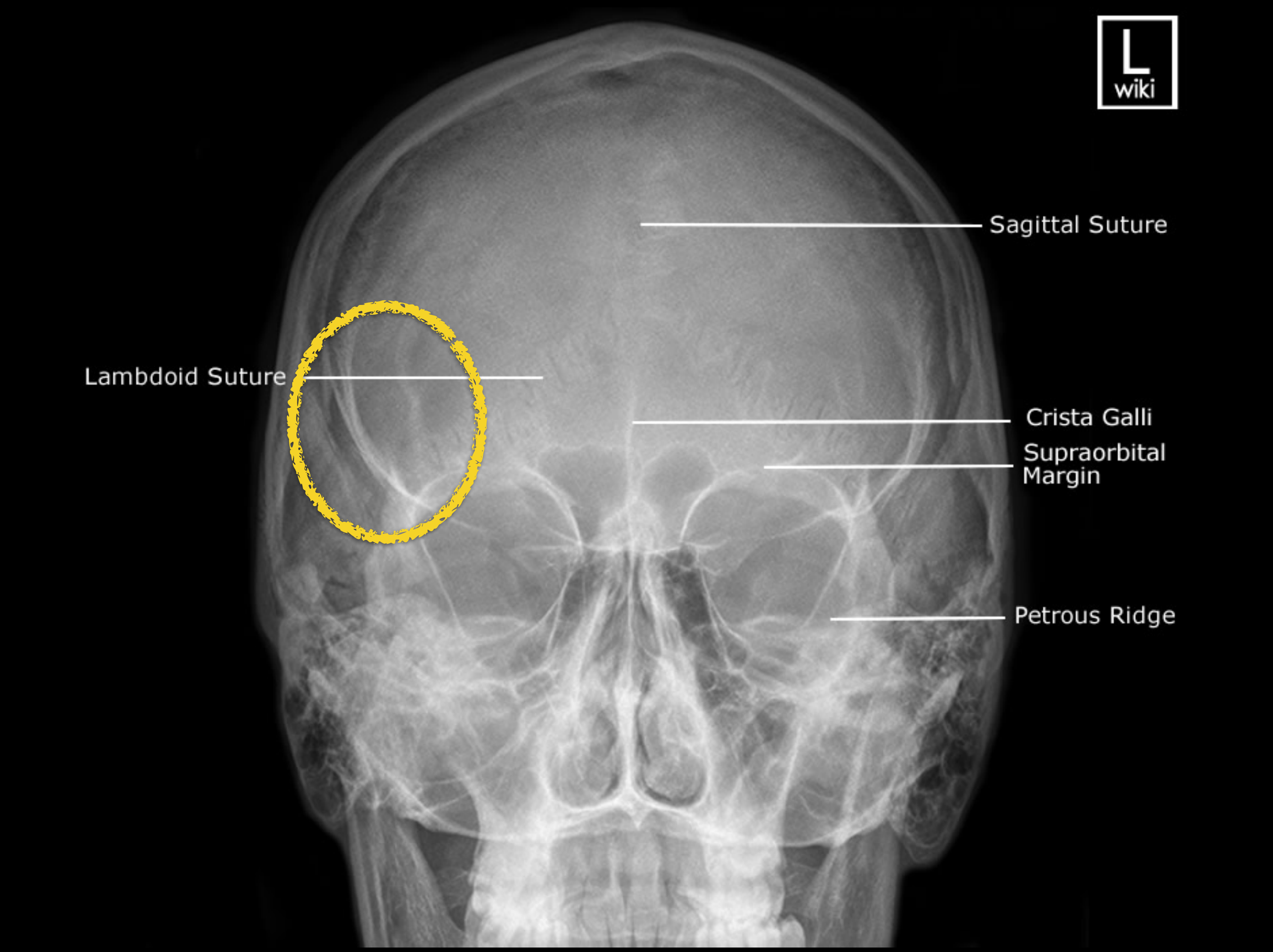


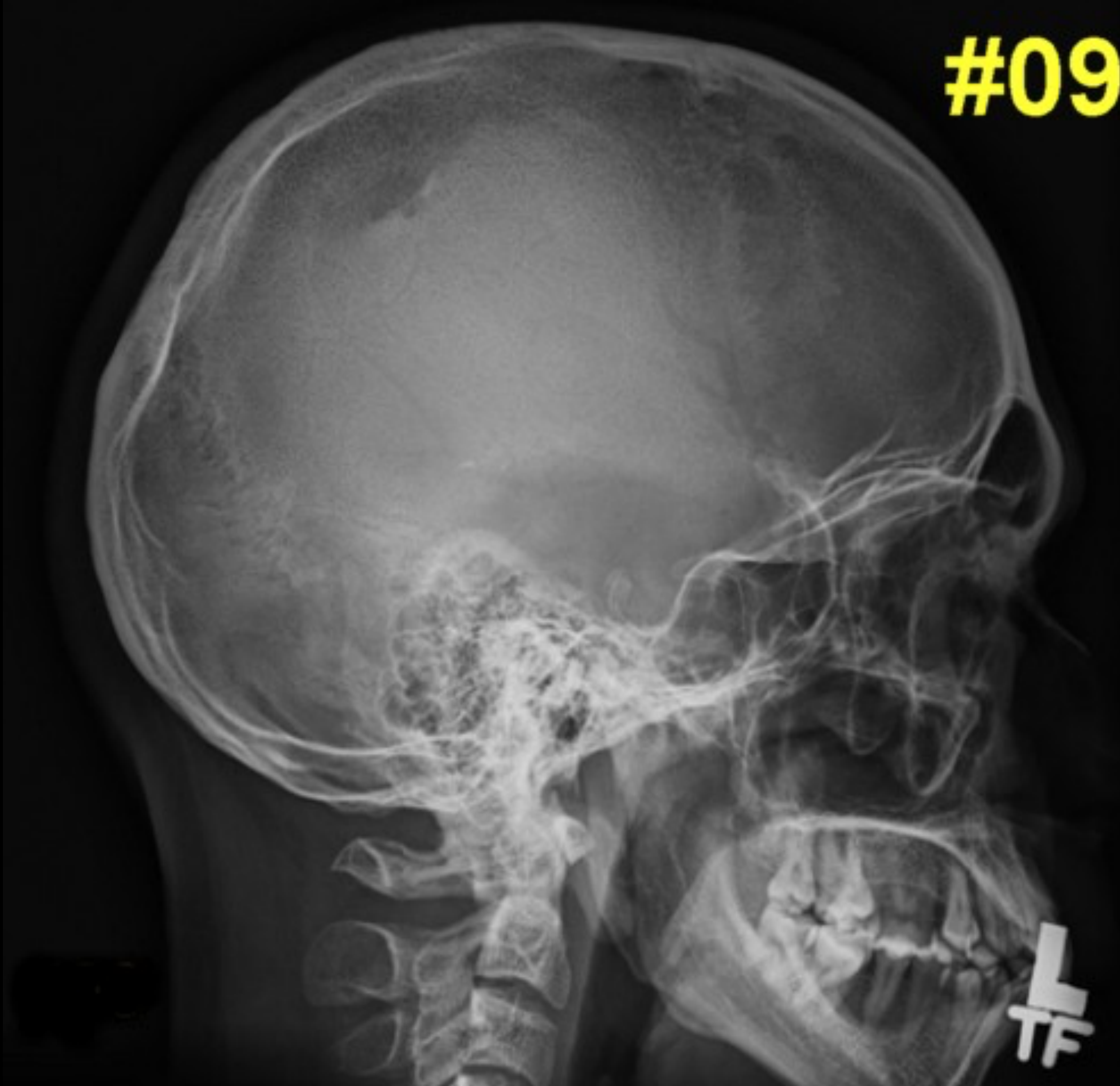




X-Rays of Buttresses

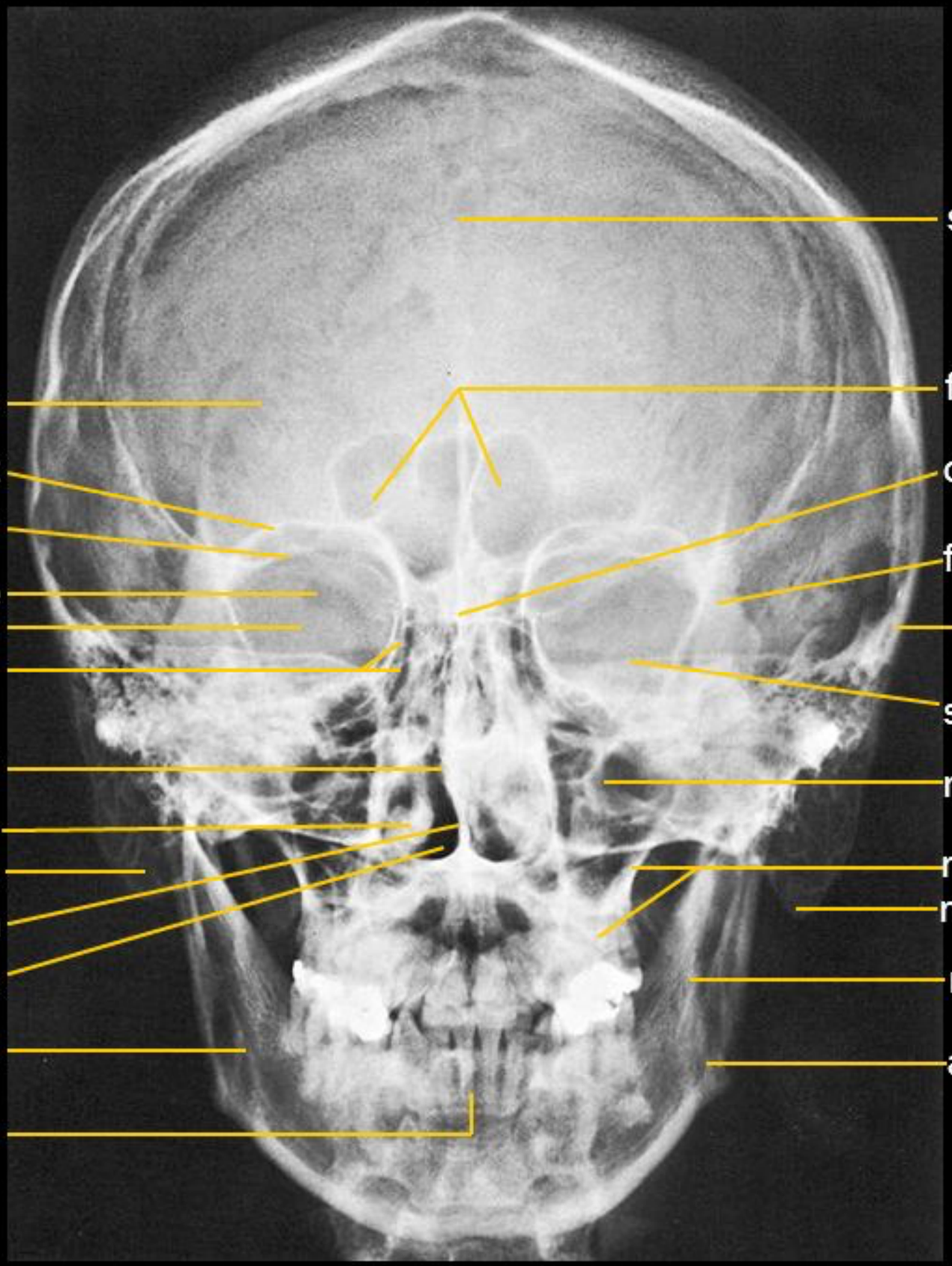


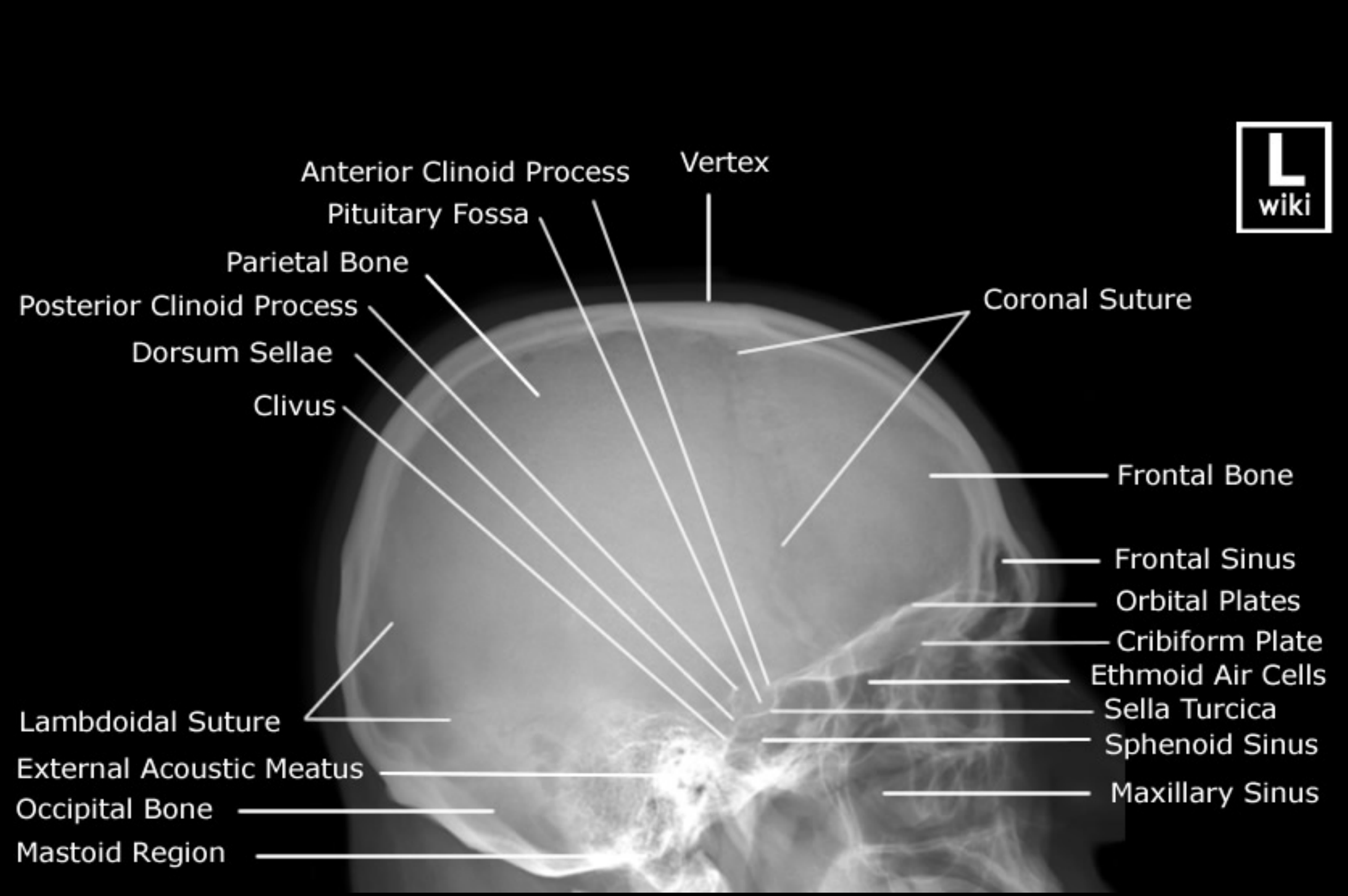

Sagittal Suture
Lambdoid Suture
Crista Galli
Supraorbital Margin
Petrous Ridge


#09

Head

axial projection




Anterior Clinoid Process
Pituitary Fossa
Vertex
Parietal Bone
Posterior Clinoid Process
Coronal Suture
Dorsum Sellae
Clivus
Frontal Bone
Frontal Sinus
Orbital Plates
Cribiform Plate
Ethmoid Air Cells
Lambdoidal Suture
Sella Turcica
Sphenoid Sinus
External Acoustic Meatus
Maxillary Sinus
Occipital Bone
Mastoid Region

Buttresses

Buttress

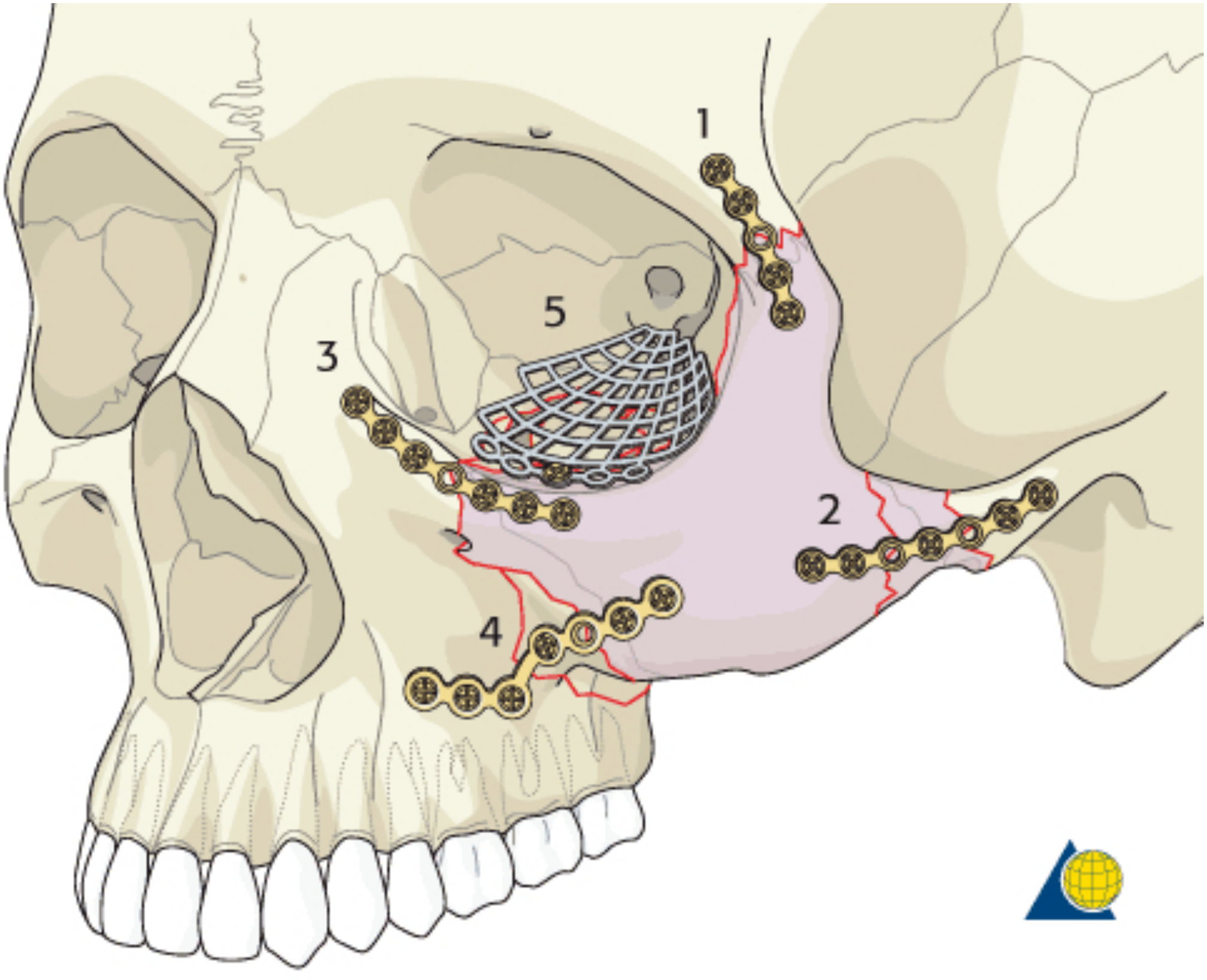
- **Architecture** - A buttress is an exterior support projecting from a wall that is used to resist the sideways force, also called thrust, created by the load on an arch or roof. Its name was first adopted into English as "butres" in the 14th century. It came to us from the Anglo-French *(arche) boteraz,* meaning "thrusting (arch)," and ultimately derives from the verb "buter," "to thrust." "Buter" is also the source of our verb *butt,* meaning "to thrust, push, or strike with the head or horns." Relatively soon, "buttress" came to be used figuratively for anything that supports or strengthens something else. In addition, it was also in the 14th century that "buttress" was first used as a verb meaning "to support or strengthen," literally and figuratively.

Cranial Buttresses

- For our purposes in osteopathy, we will think of a buttress as:
  - something that supports or strengthens
  - a thickening of a bone - this can occur at a suture or at an angle

Cranial Buttresses

- We learn very little about these in our training. But the oromaxillaryfacial surgeons can teach us a great deal about them. It is in these strengthened parts that they place their screws during surgery…


1
2
3
4
5

Cranial Buttresses

- The buttresses are designed to give our face strength in different areas and the ability to resist minor traumas.

- If a buttress gets stuck, it often spans more than one bone or joint…so it can cause dysfunction in more than one place.

Cranial Buttresses

- In the next few slides, we will show the photos from Dr. Arbuckle's book and some of the structures that they demonstrate.

- We will be covering these and many more…

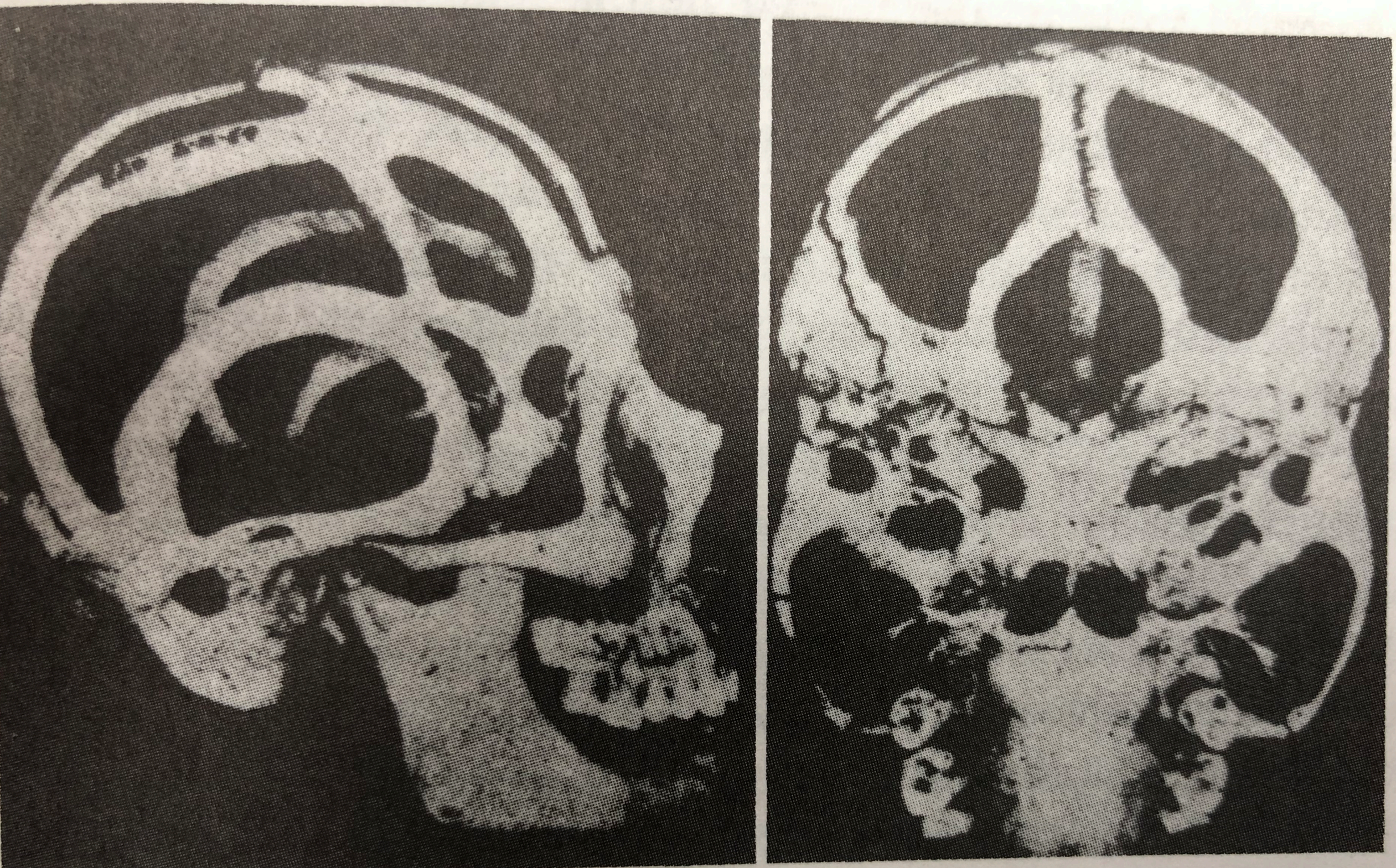


FIG. 2 — CRANIAL BUTTRESSES

TemporoParietal Suture

FIG. 2 — CRANIAL BUTTRESSES

Coronal Suture

FIG. 2 — CRANIAL BUTTRESSES

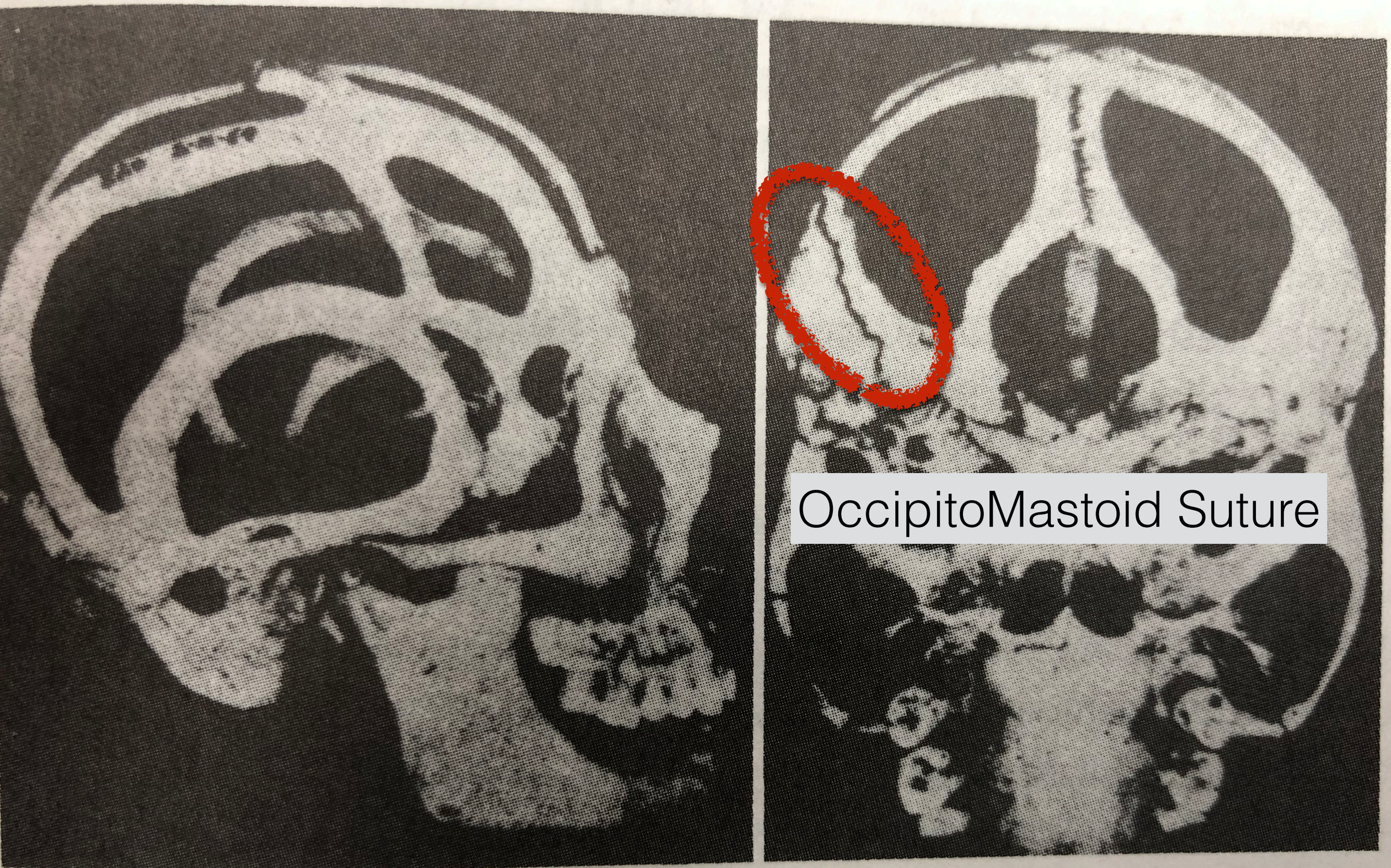
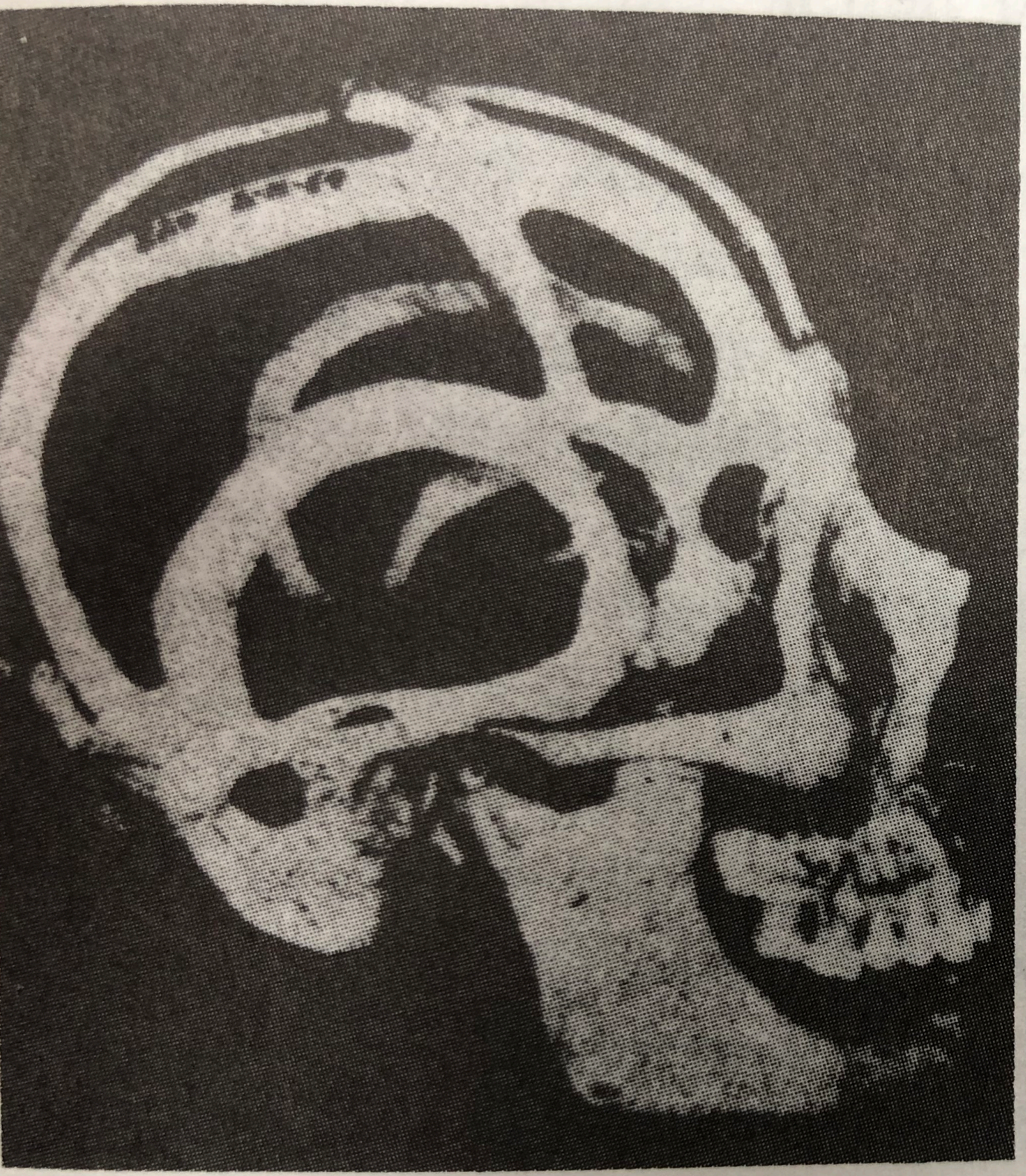


FIG. 2 — CRANIAL BUTTRESSES



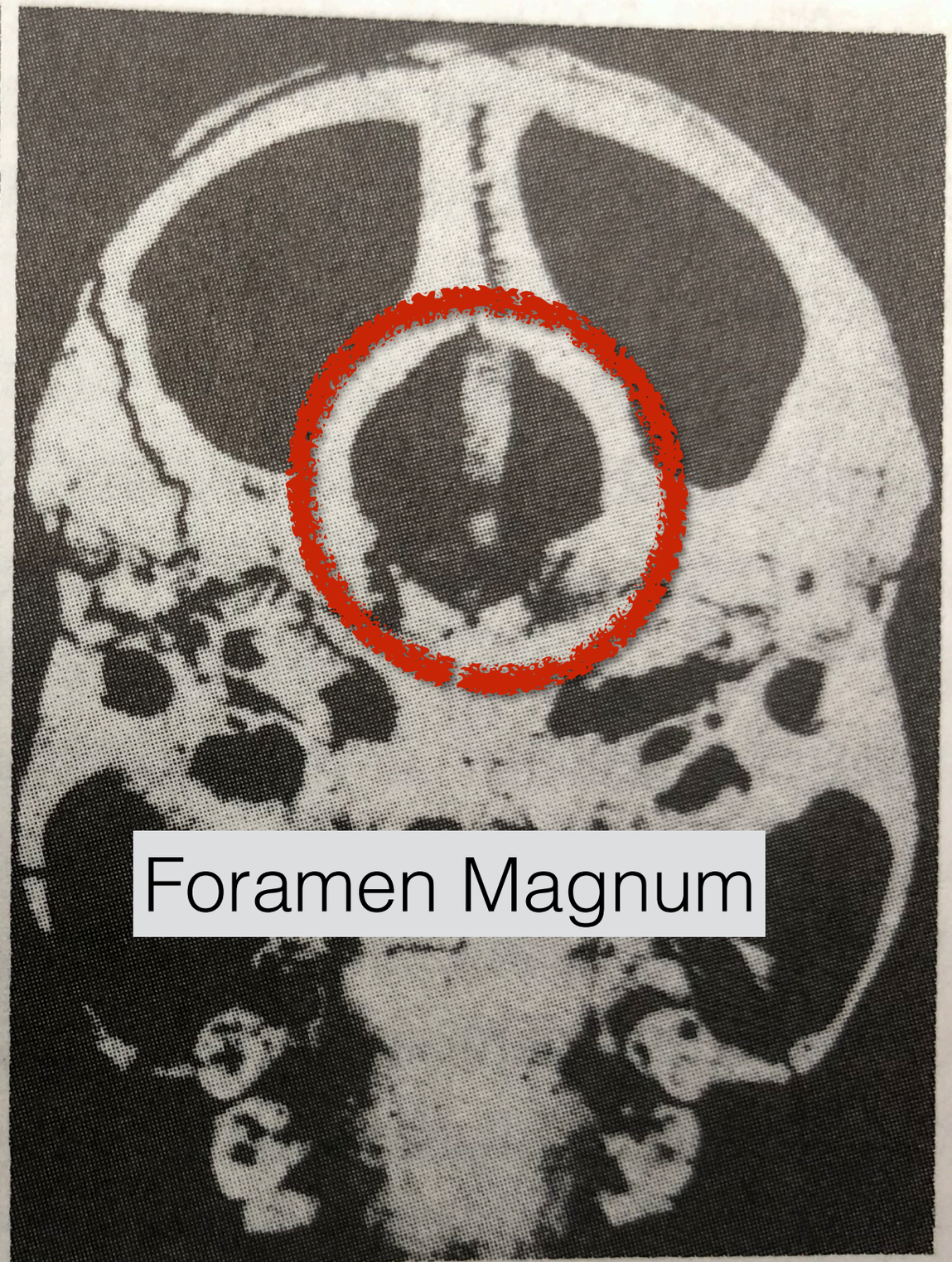


FIG. 2 — CRANIAL BUTTRESSES

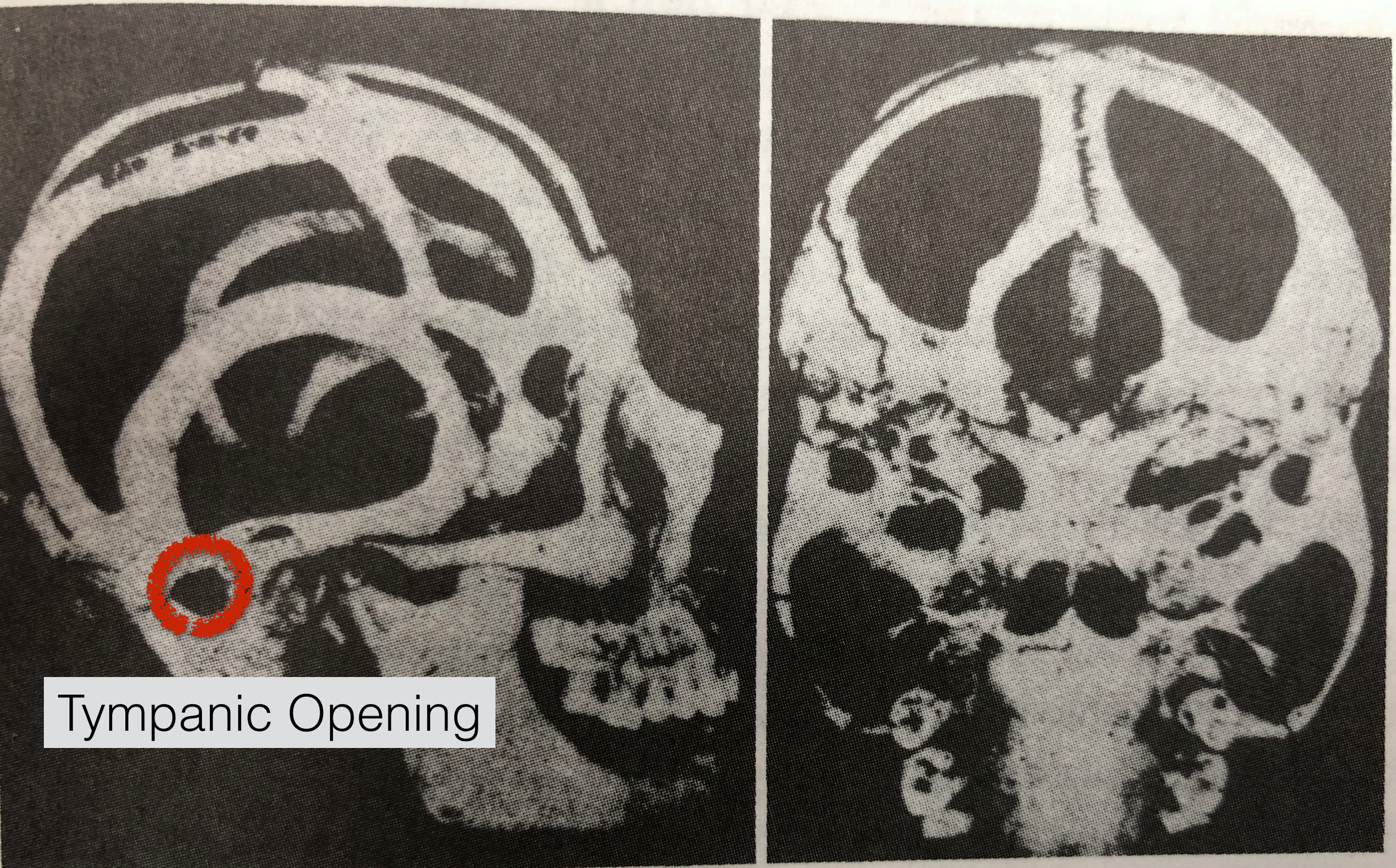


FIG. 2 — CRANIAL BUTTRESSES

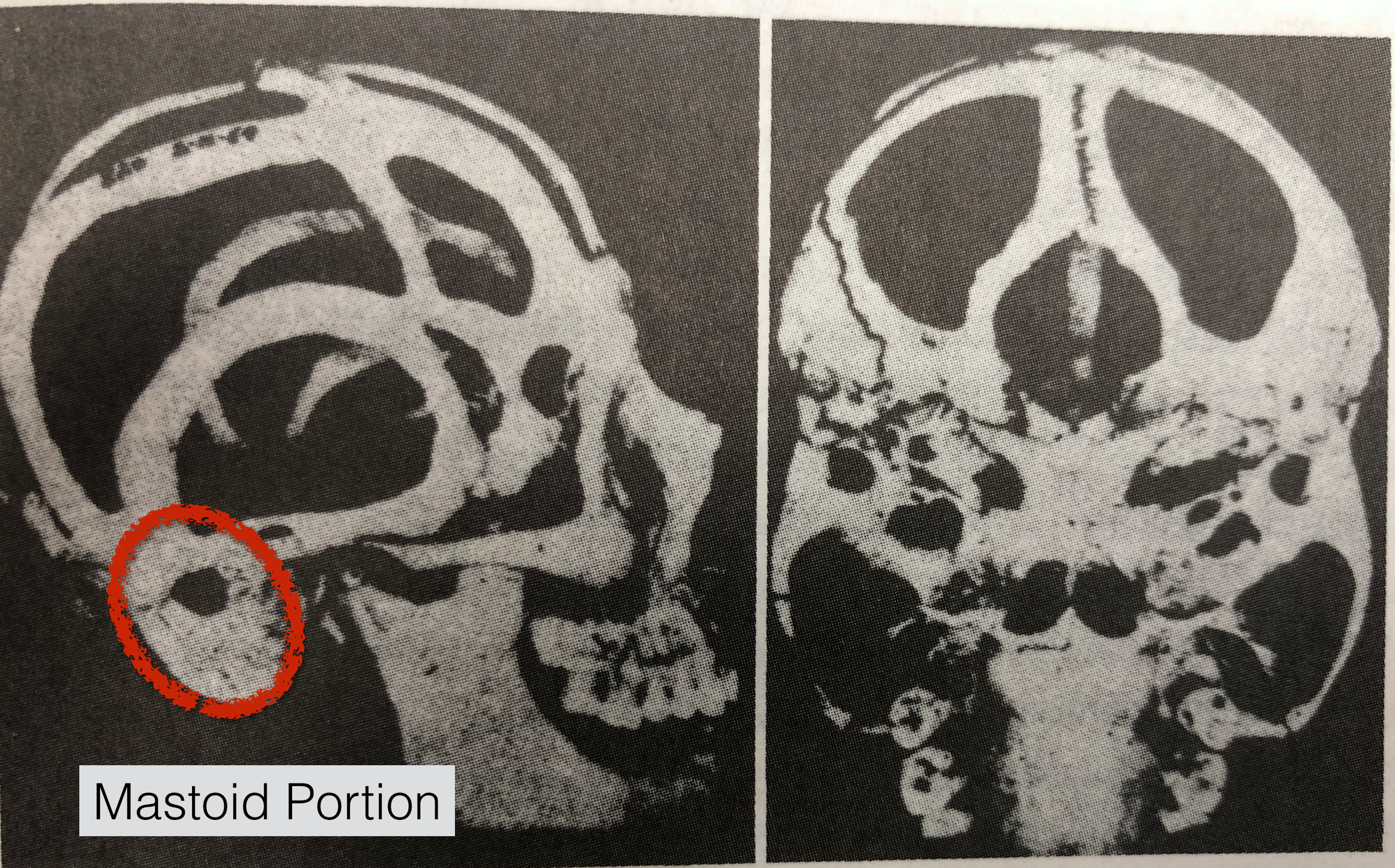


FIG. 2 — CRANIAL BUTTRESSES

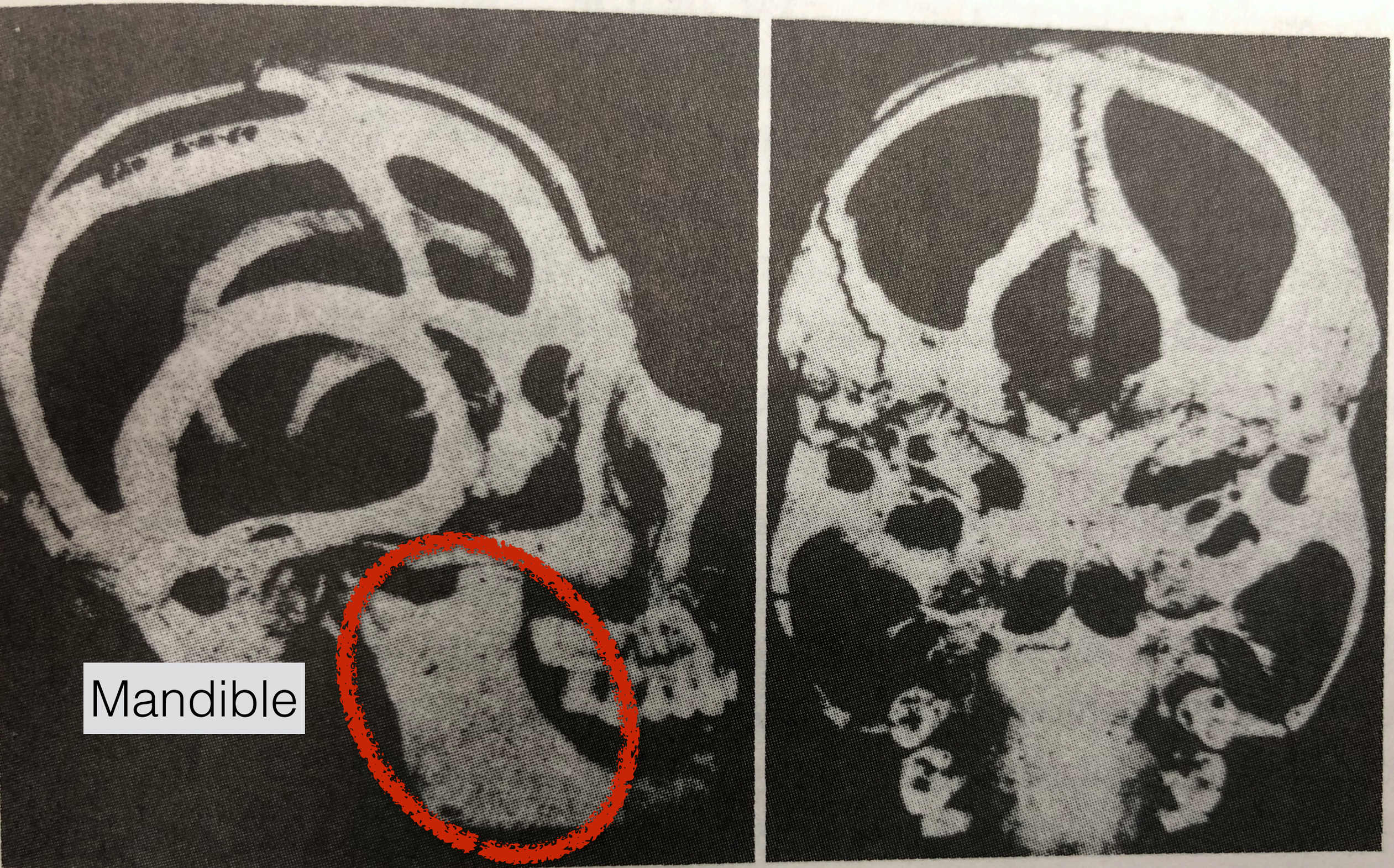
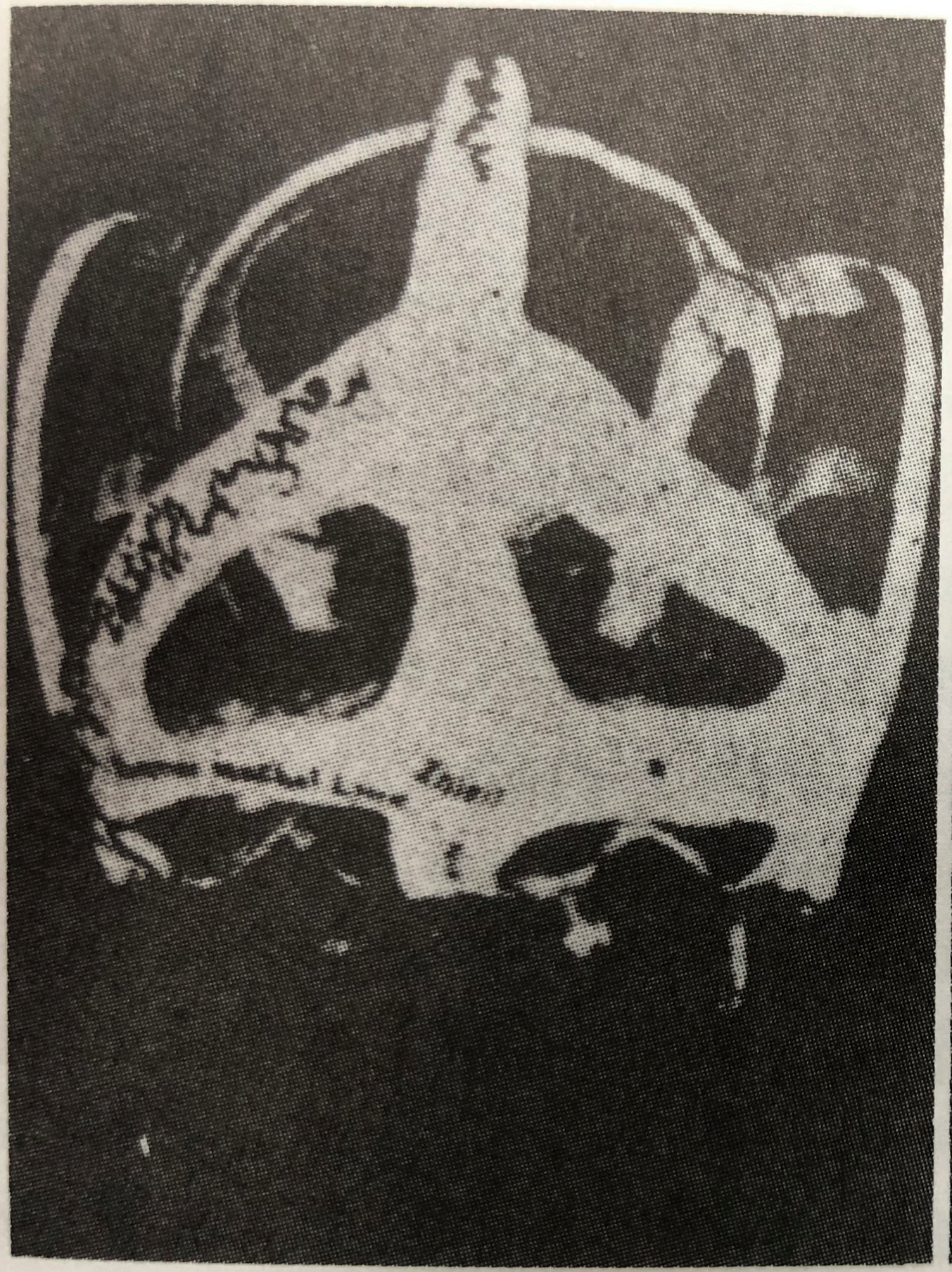
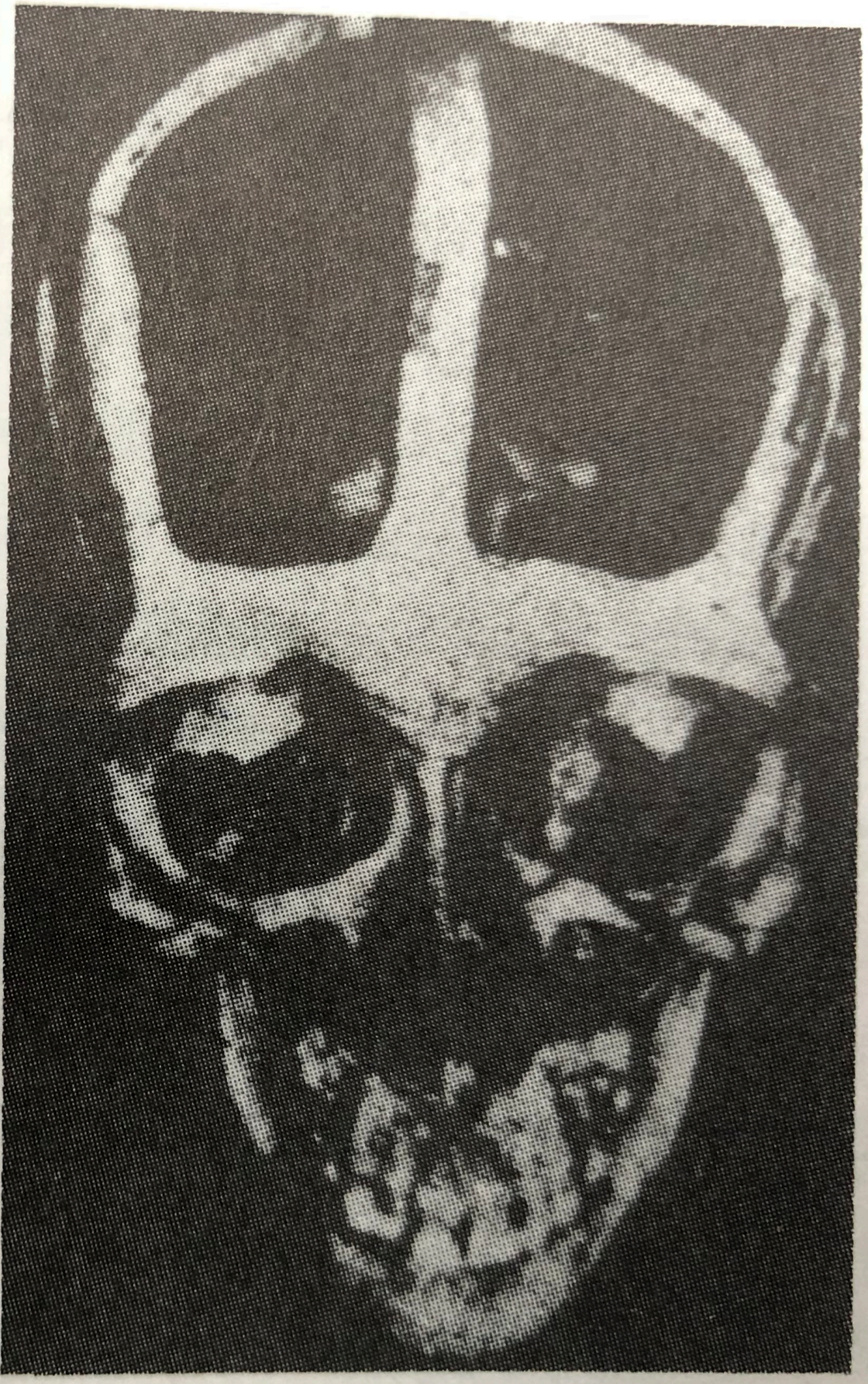


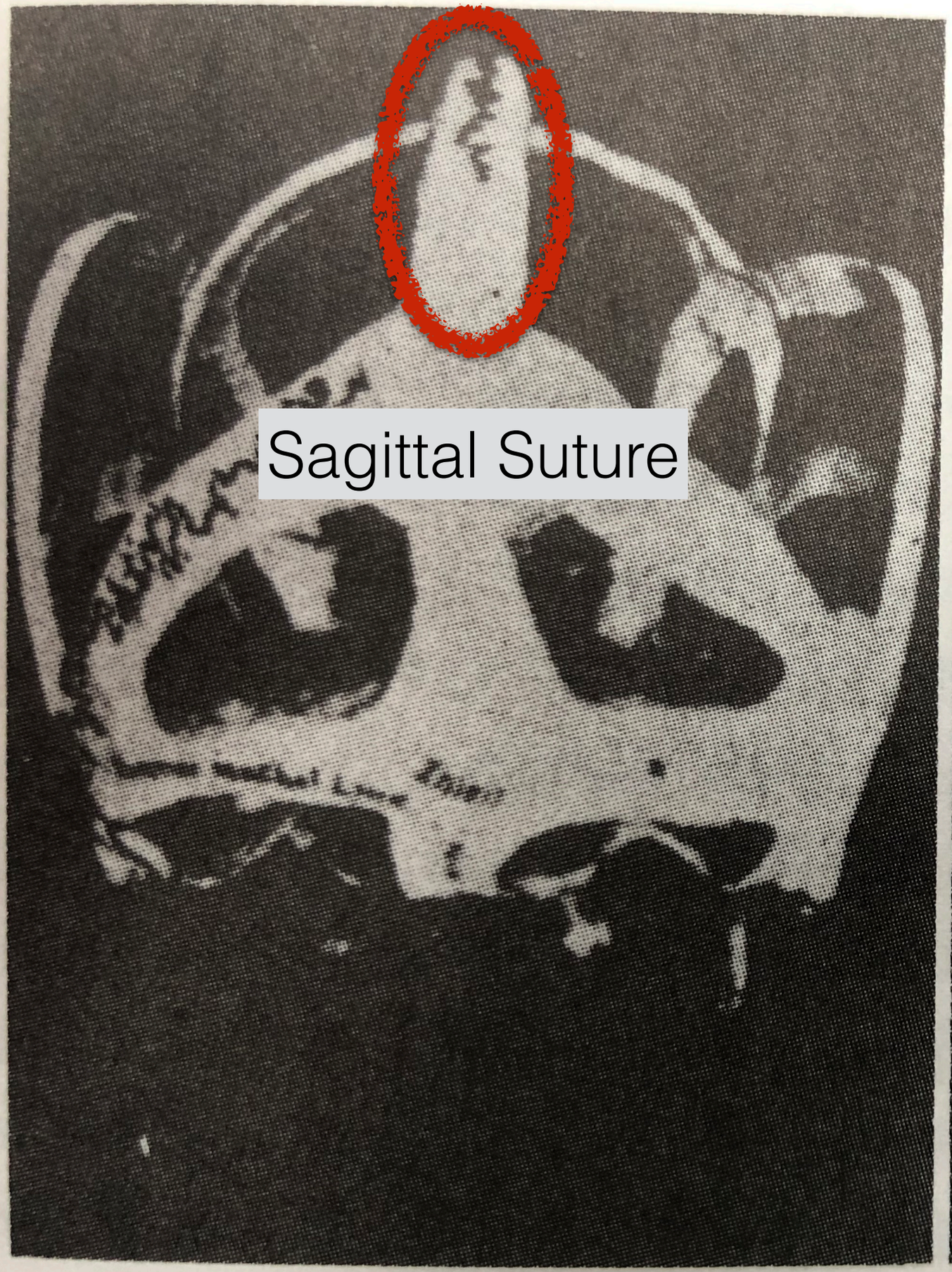
FIG. 2 — CRANIAL BUTTRESSES

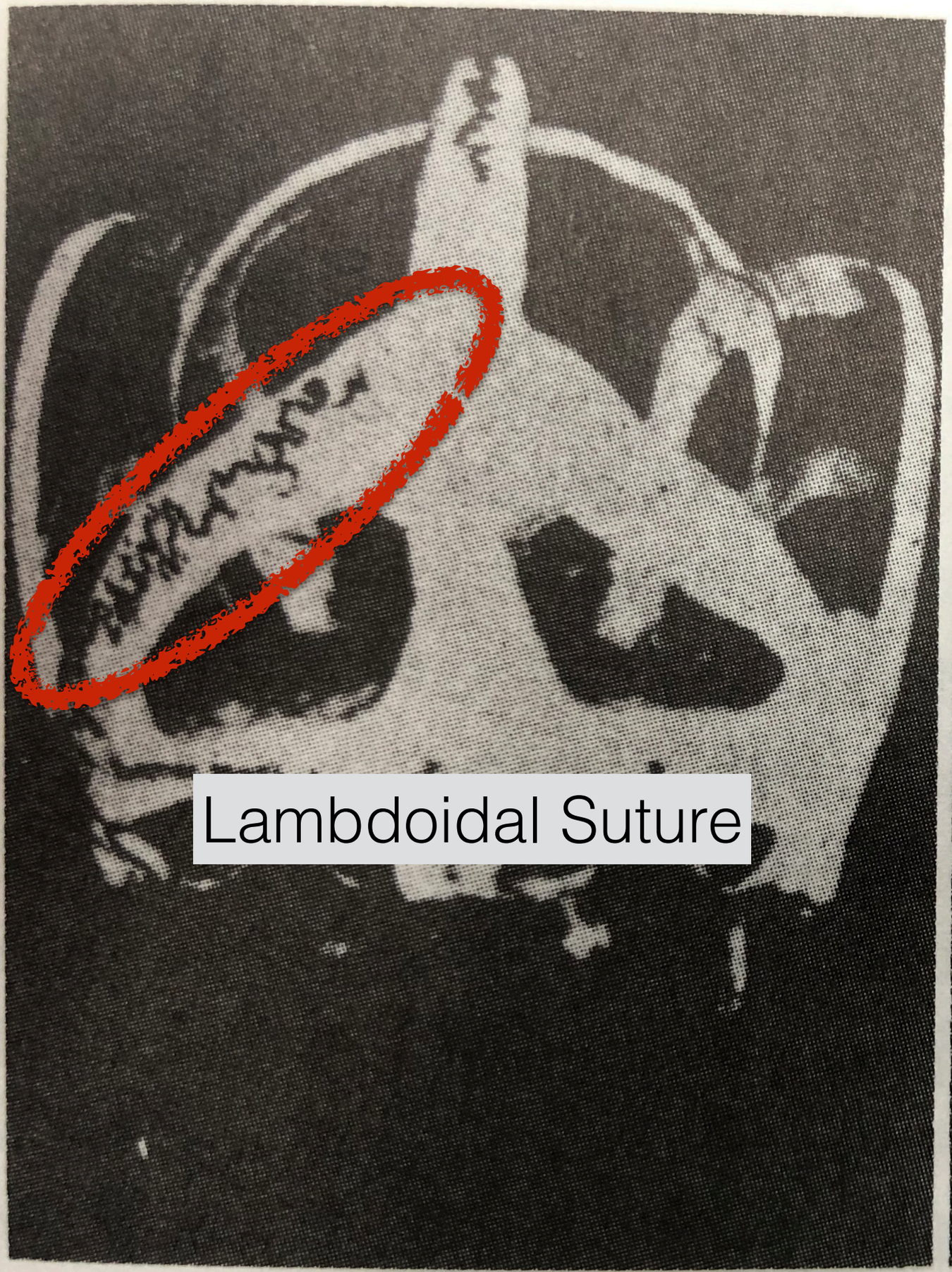
Zygomatic Arch

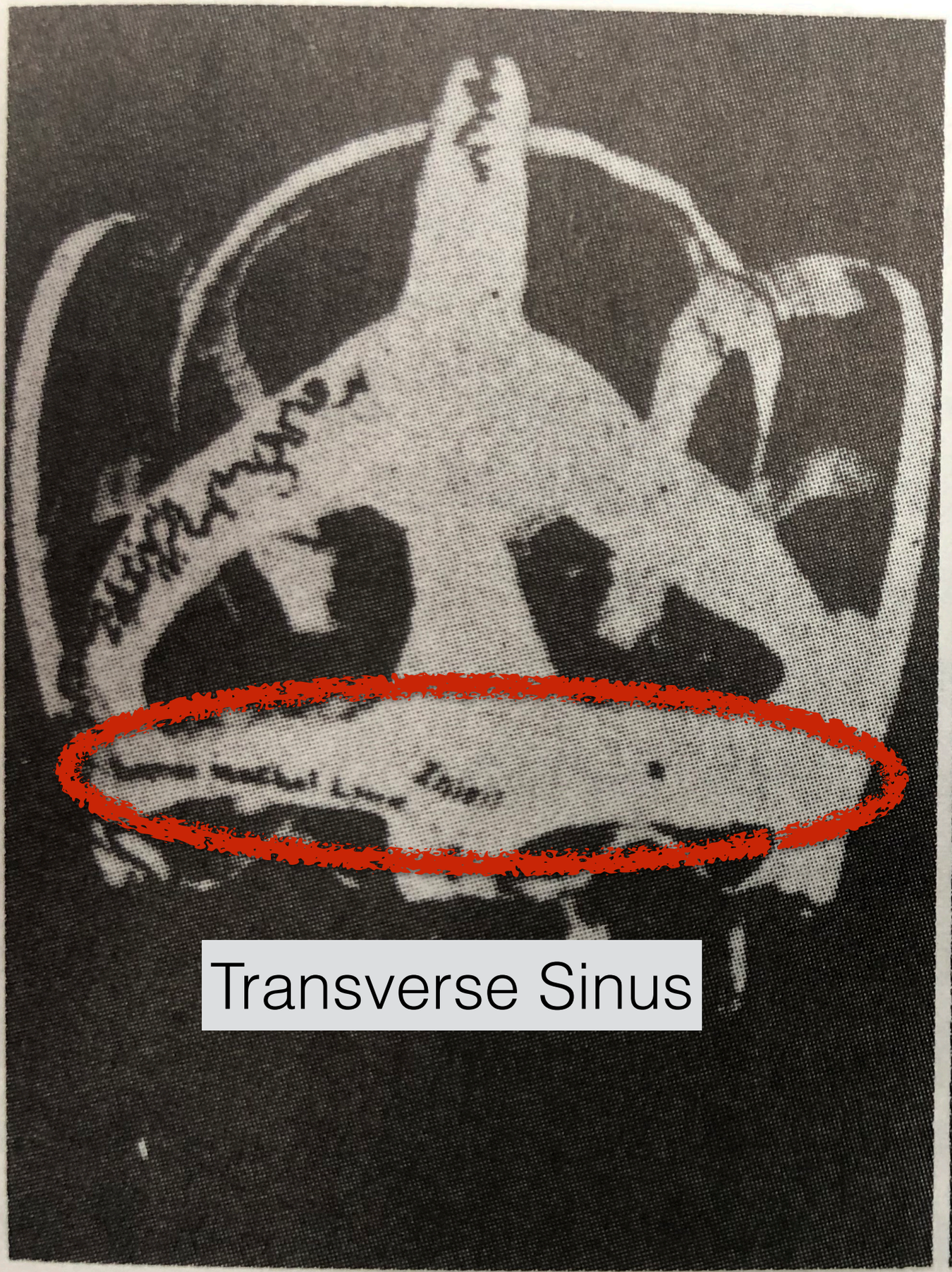
FIG. 2 — CRANIAL BUTTRESSES

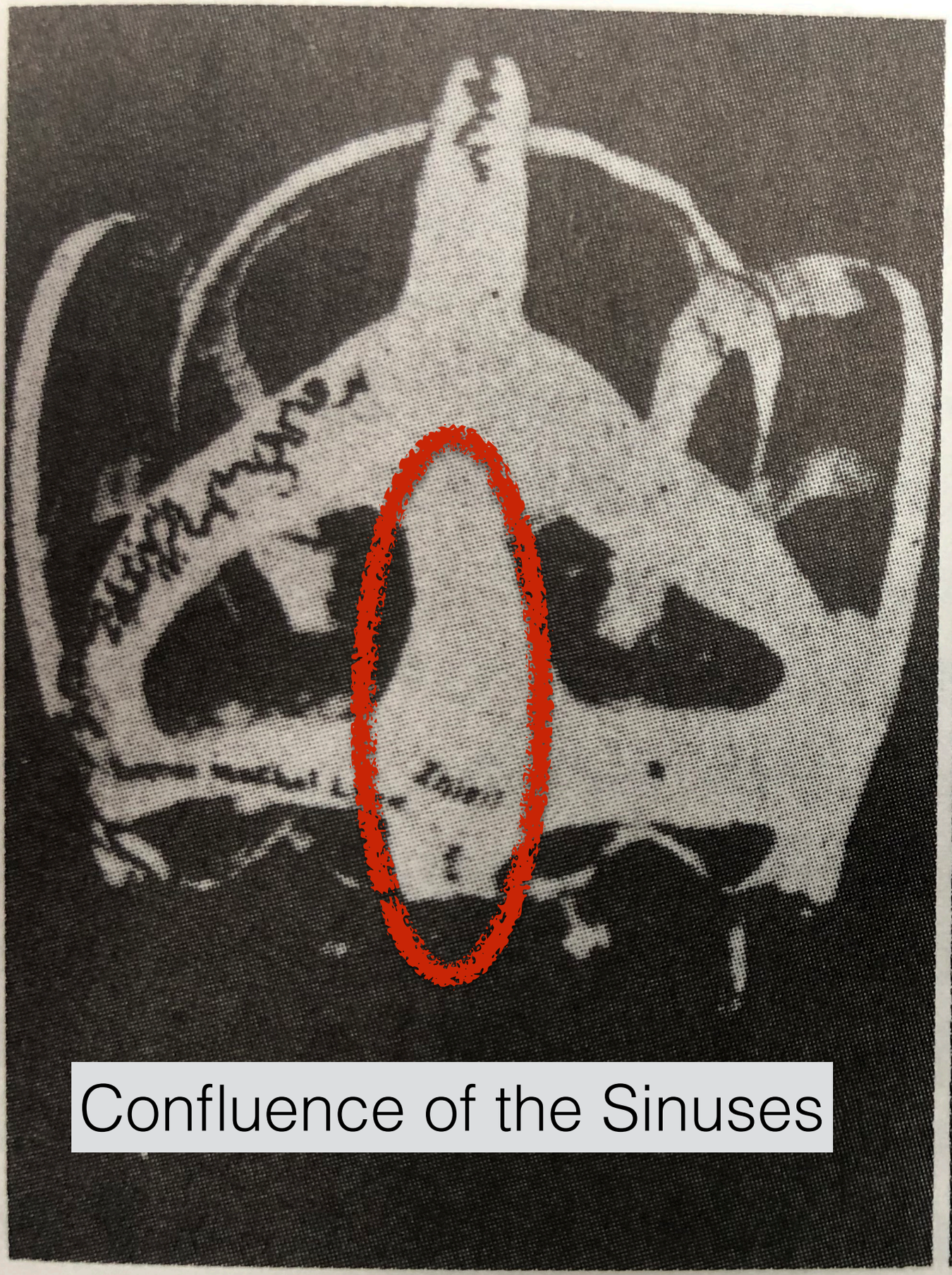




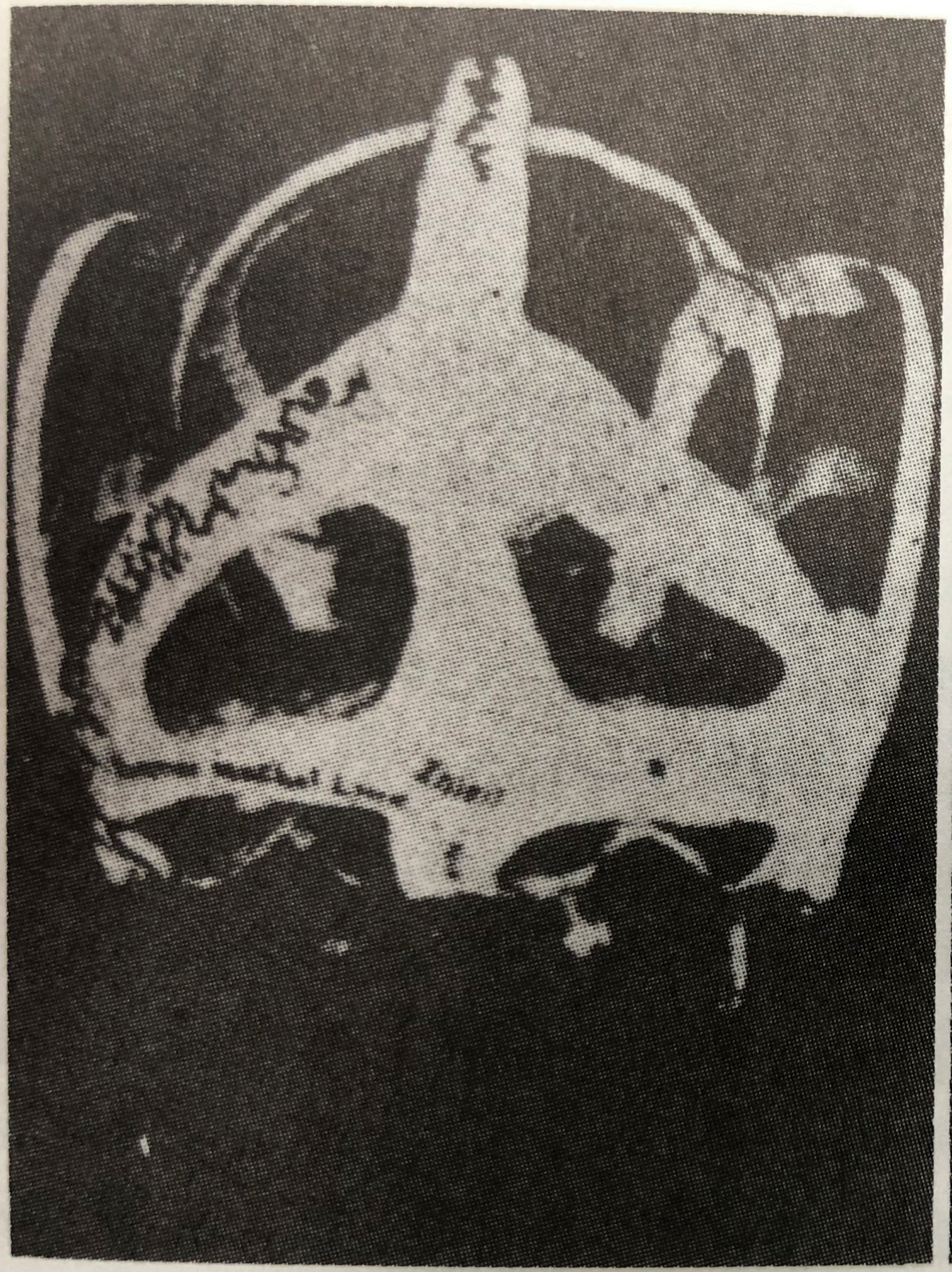

Sagittal Suture

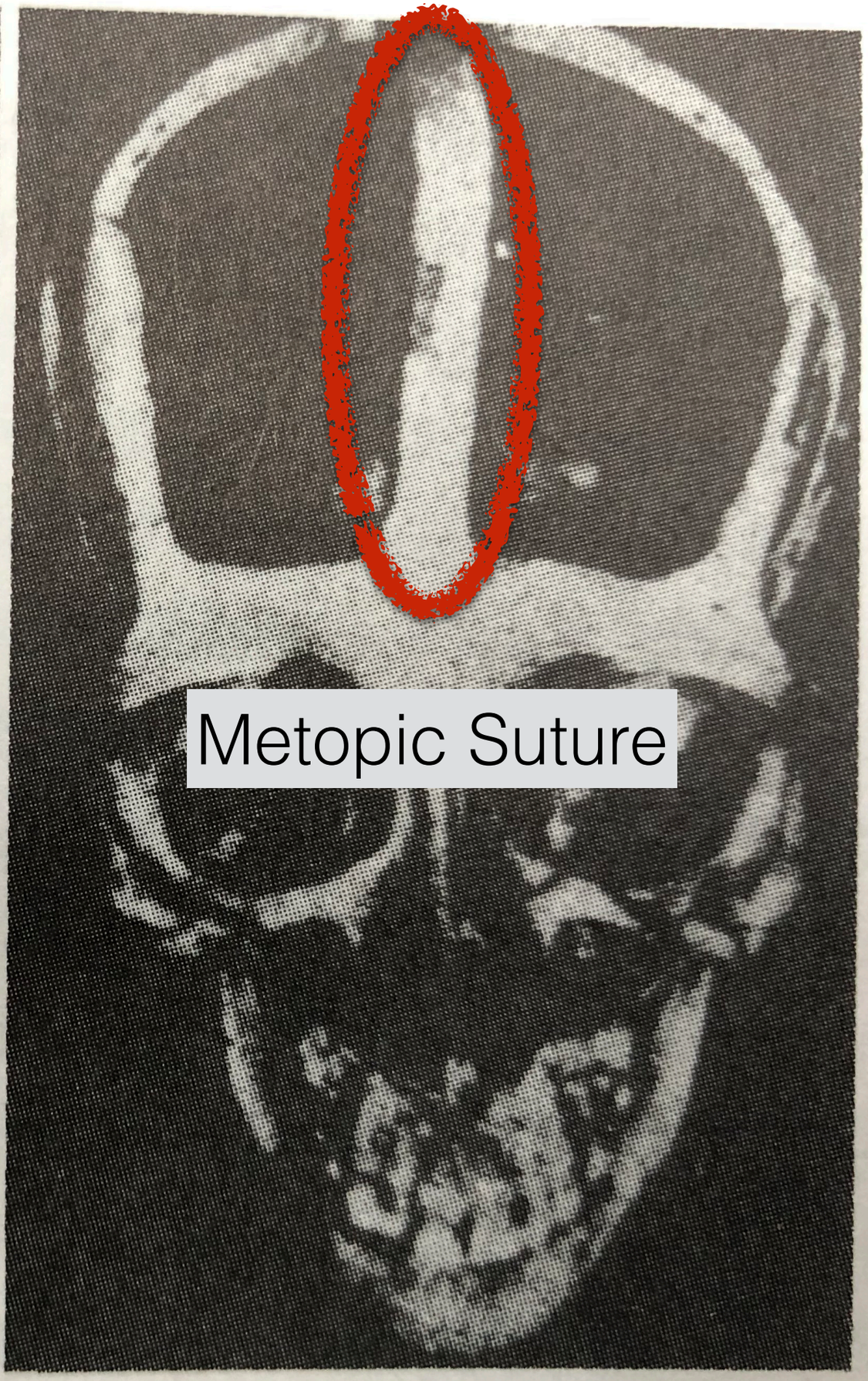

Lambdoidal Suture


Transverse Sinus

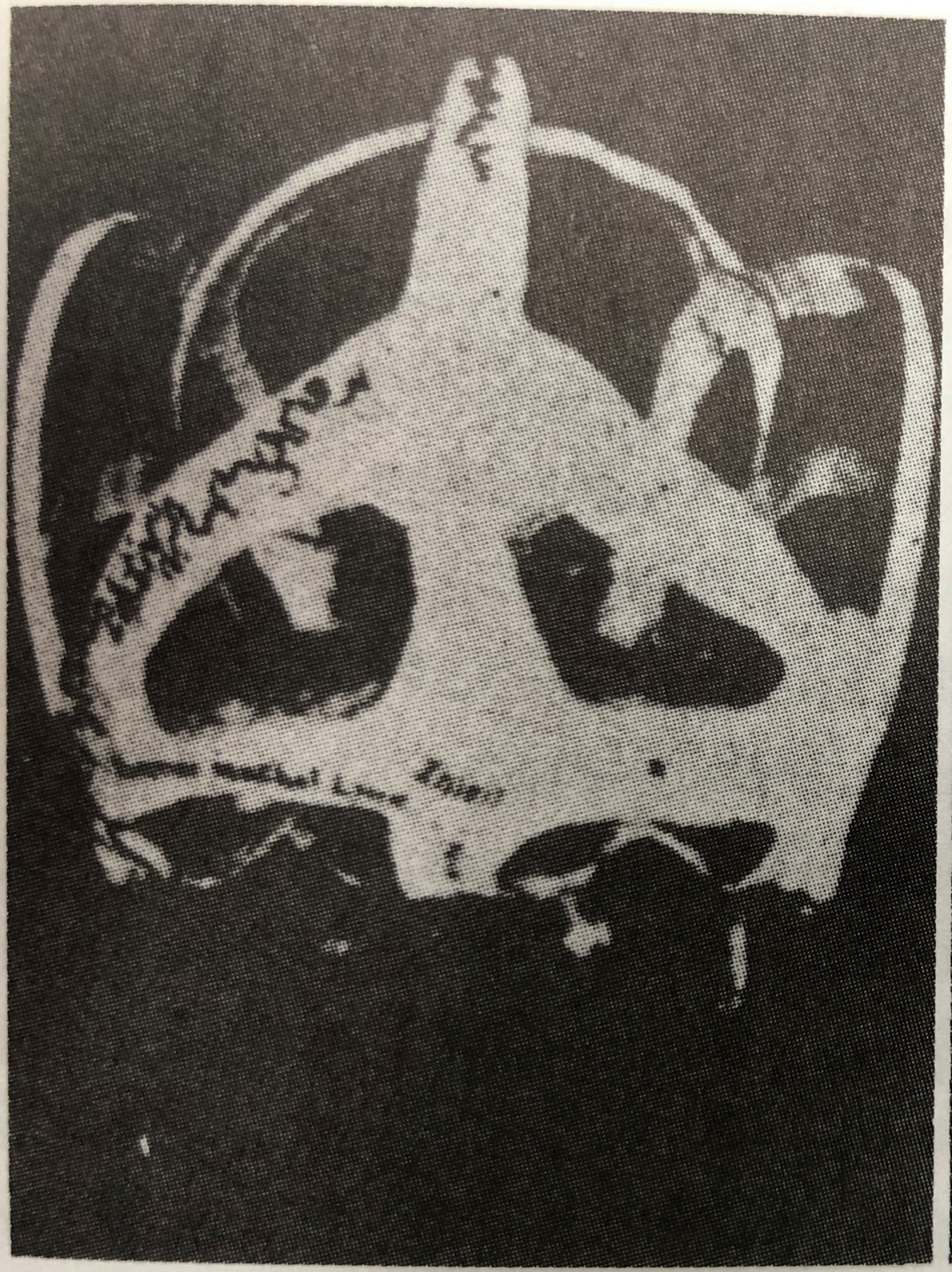


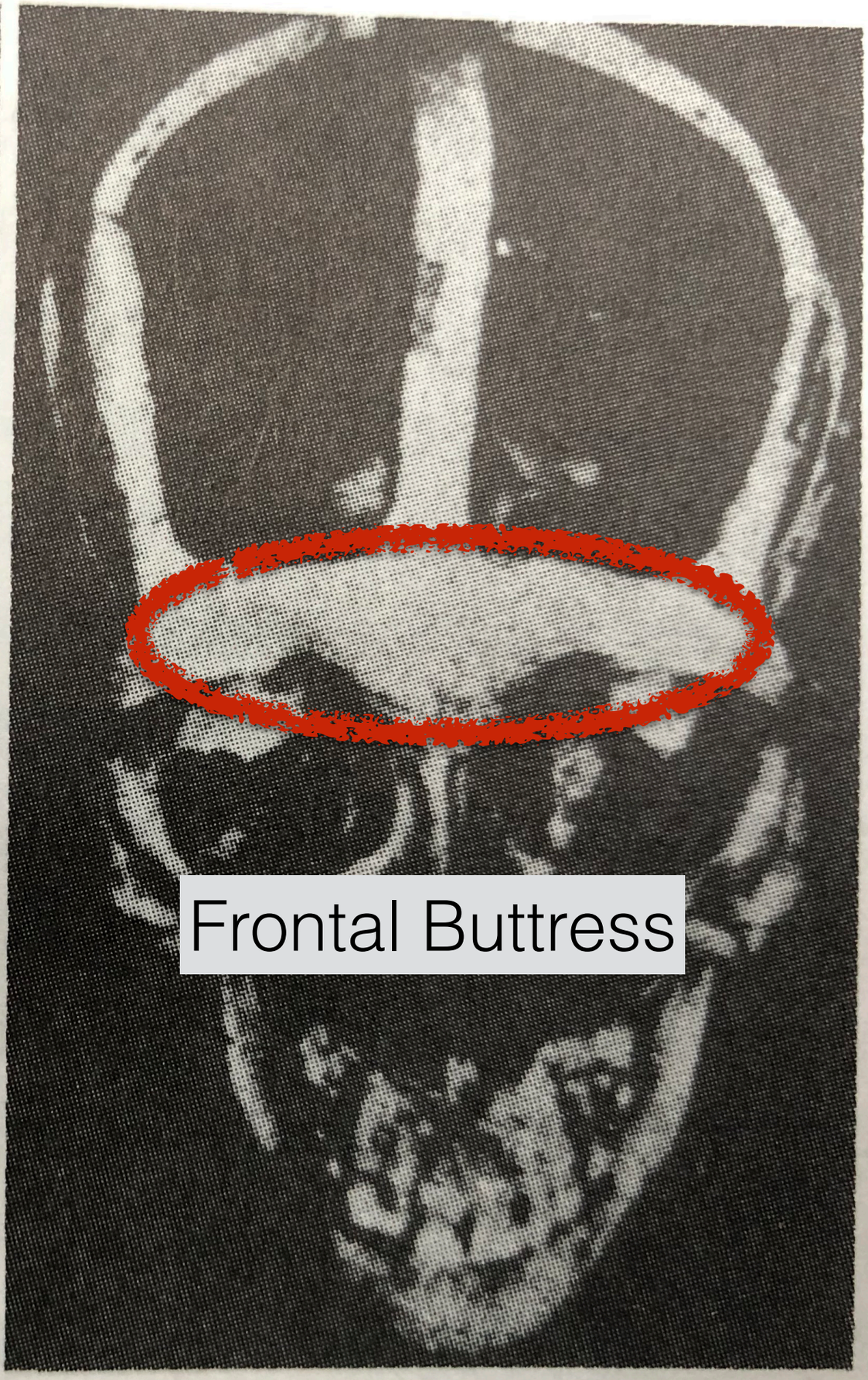
Confluence of the Sinuses





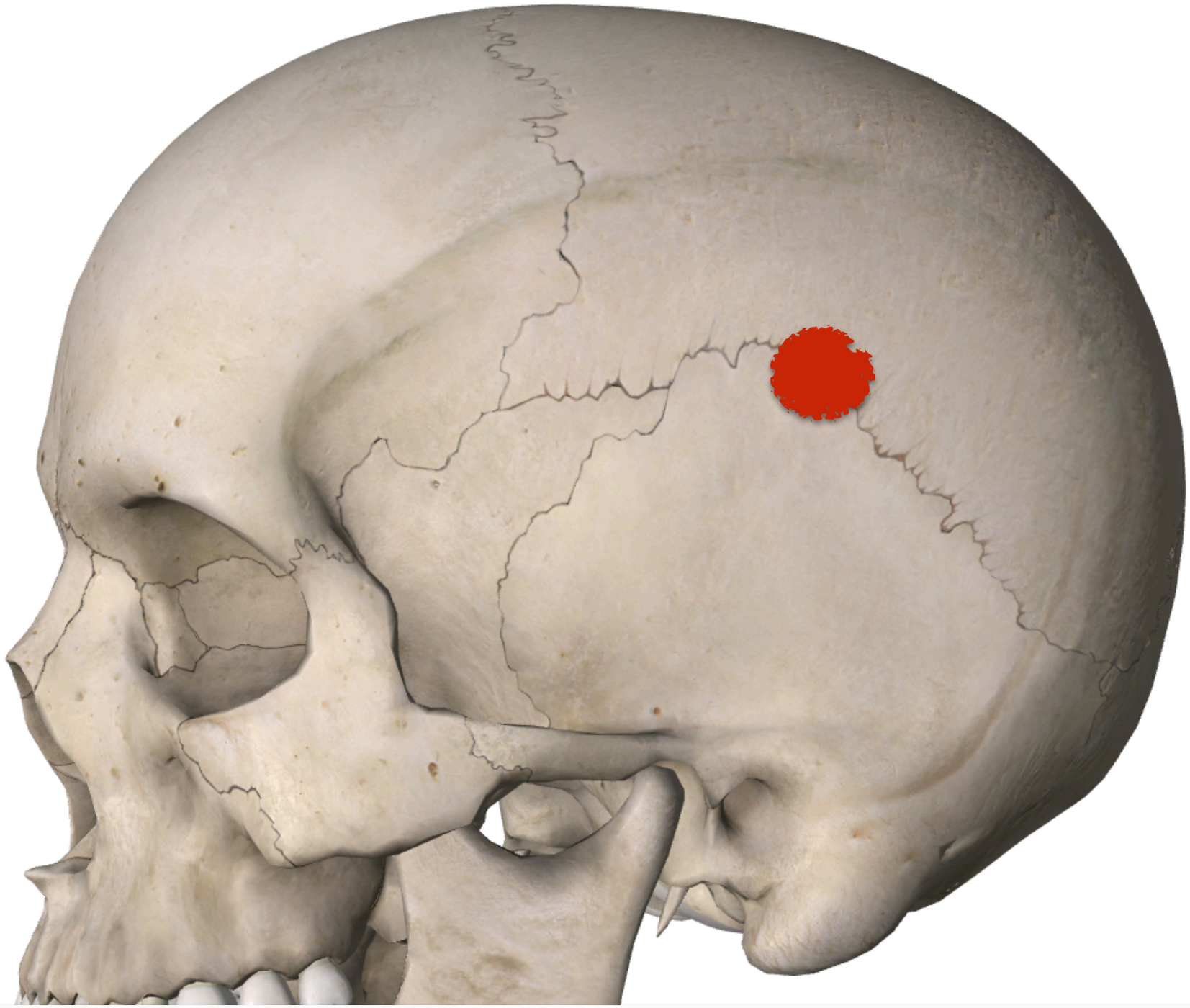
Metopic Suture




Frontal Buttress

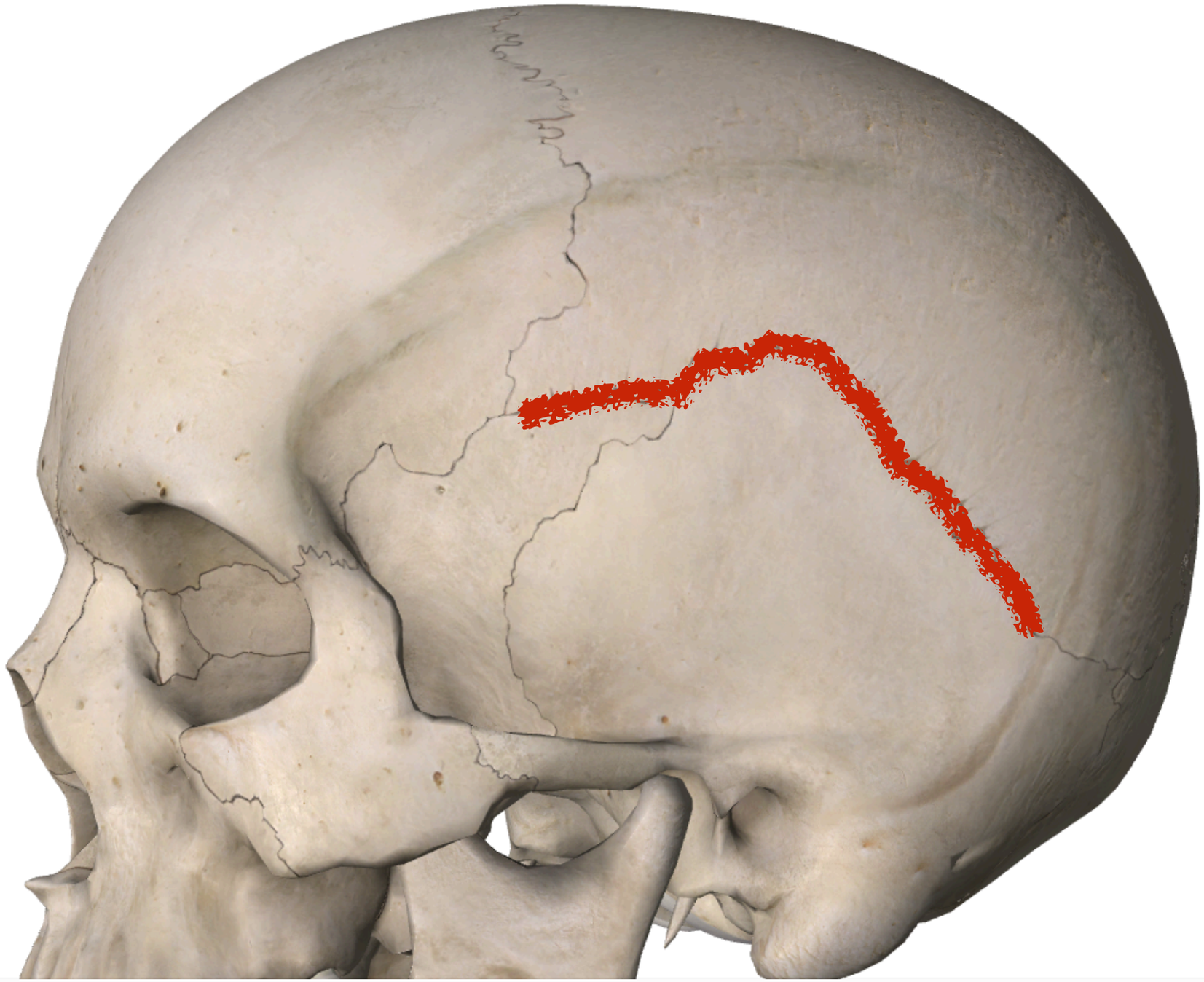
Sutures vs Buttresses

- If sutures and buttresses both are located in the same structures, what makes them different?



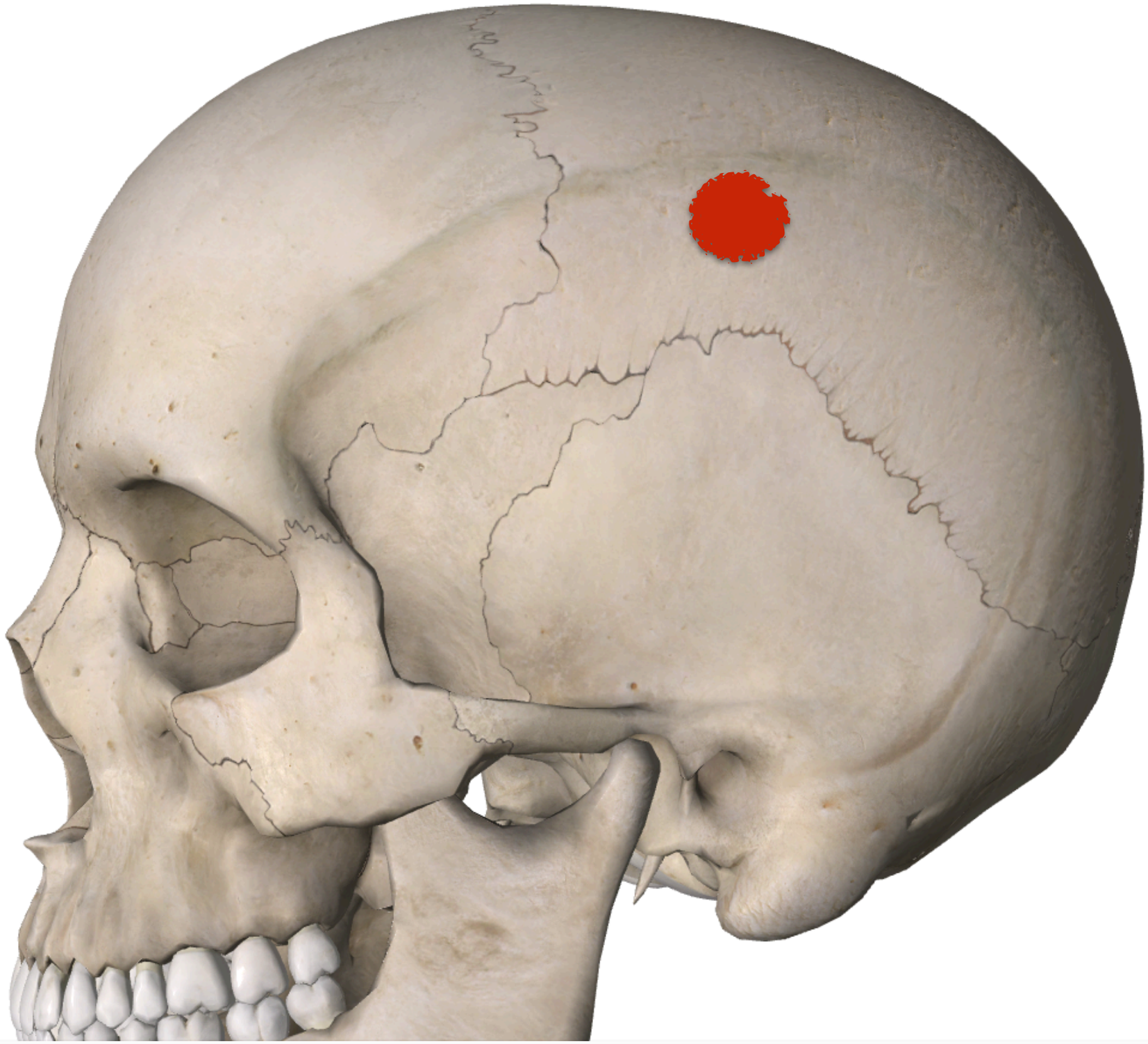
A sutural restriction affects both bones that make up the suture and has a focal point of restriction.

This is the place to treat to free the restricted sutures.



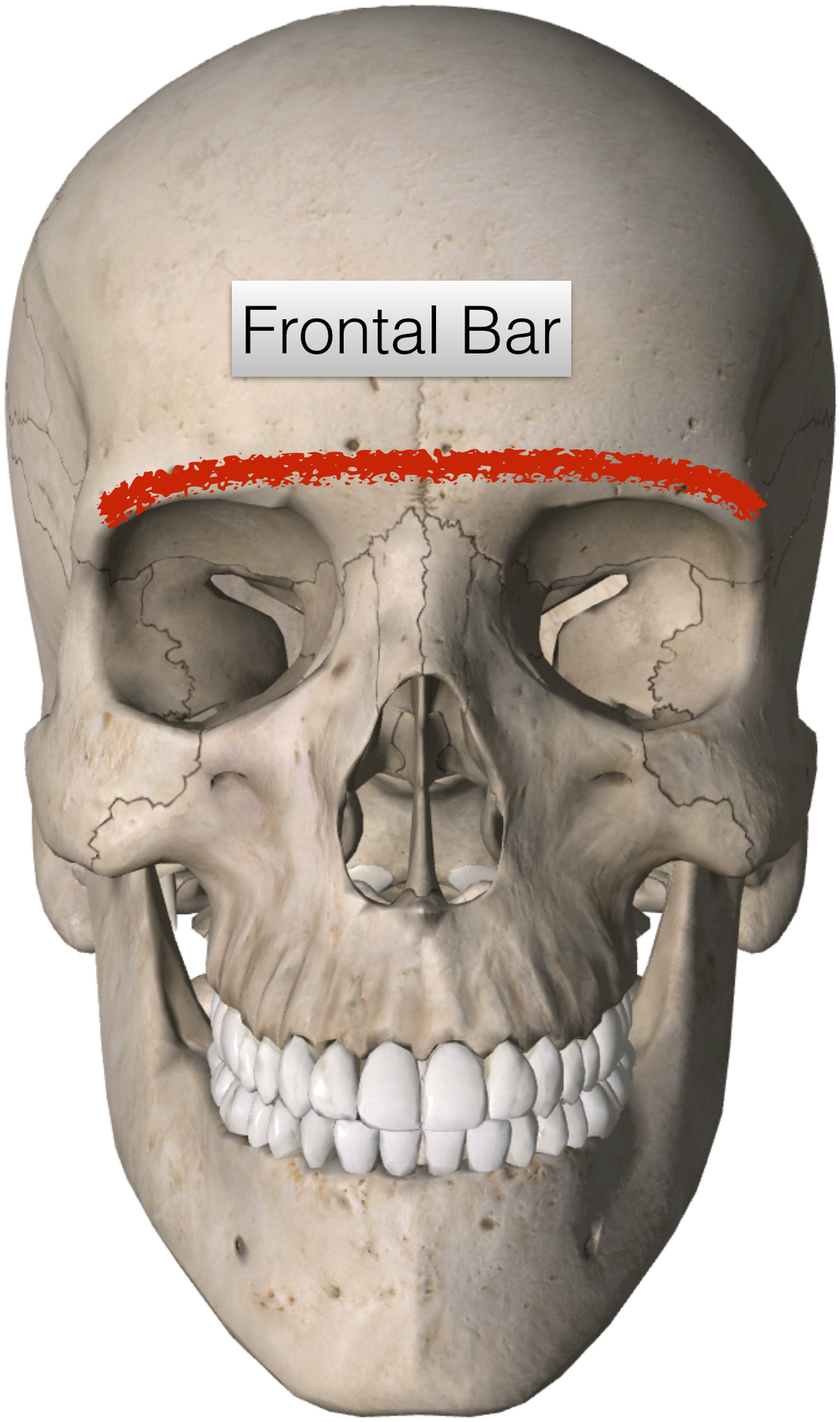
A buttress restriction affects both bones that make up the suture and has NO focal point of restriction - a larger area is restricted.

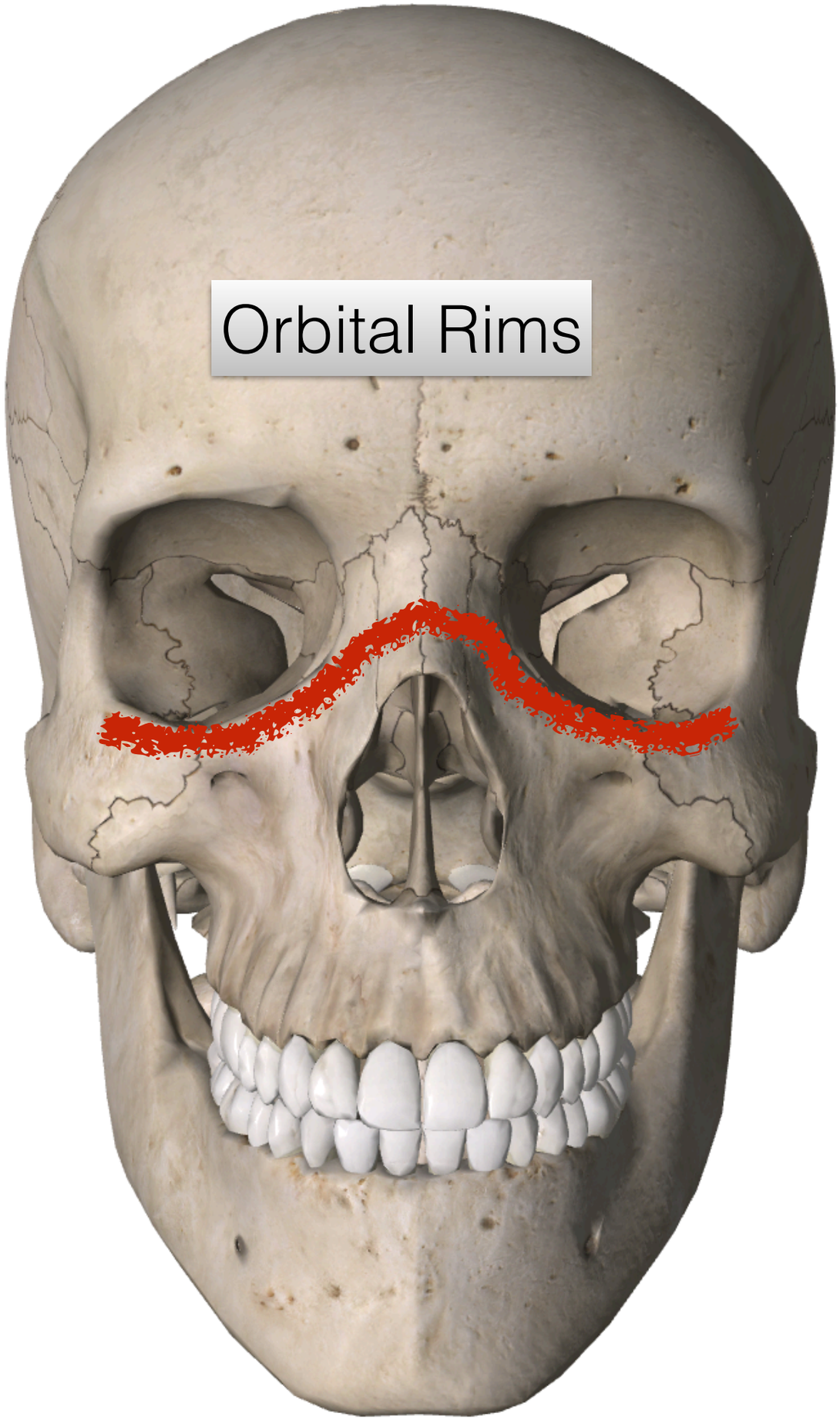
No focal restriction is noted and the entire buttress feels hard and does not spring.

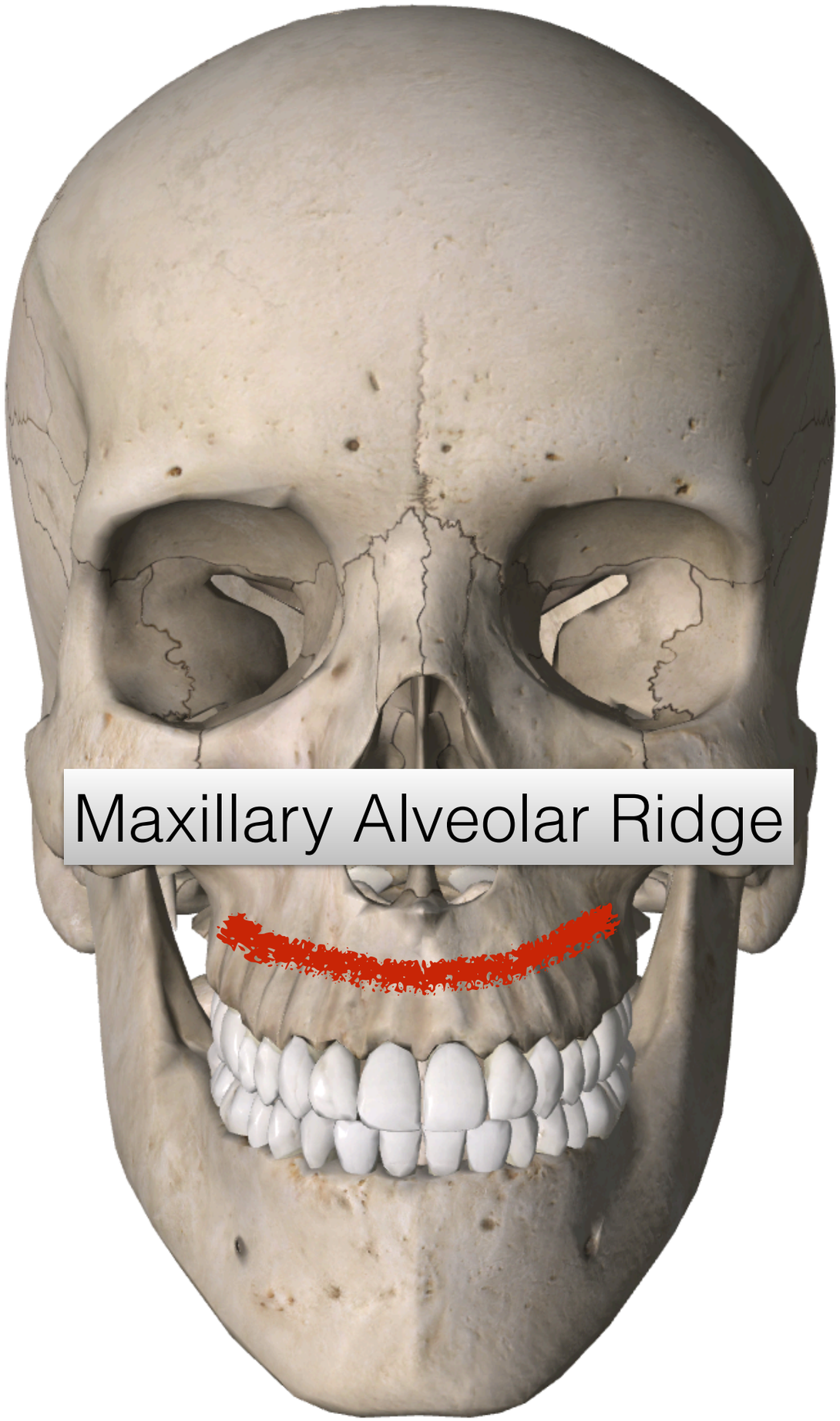


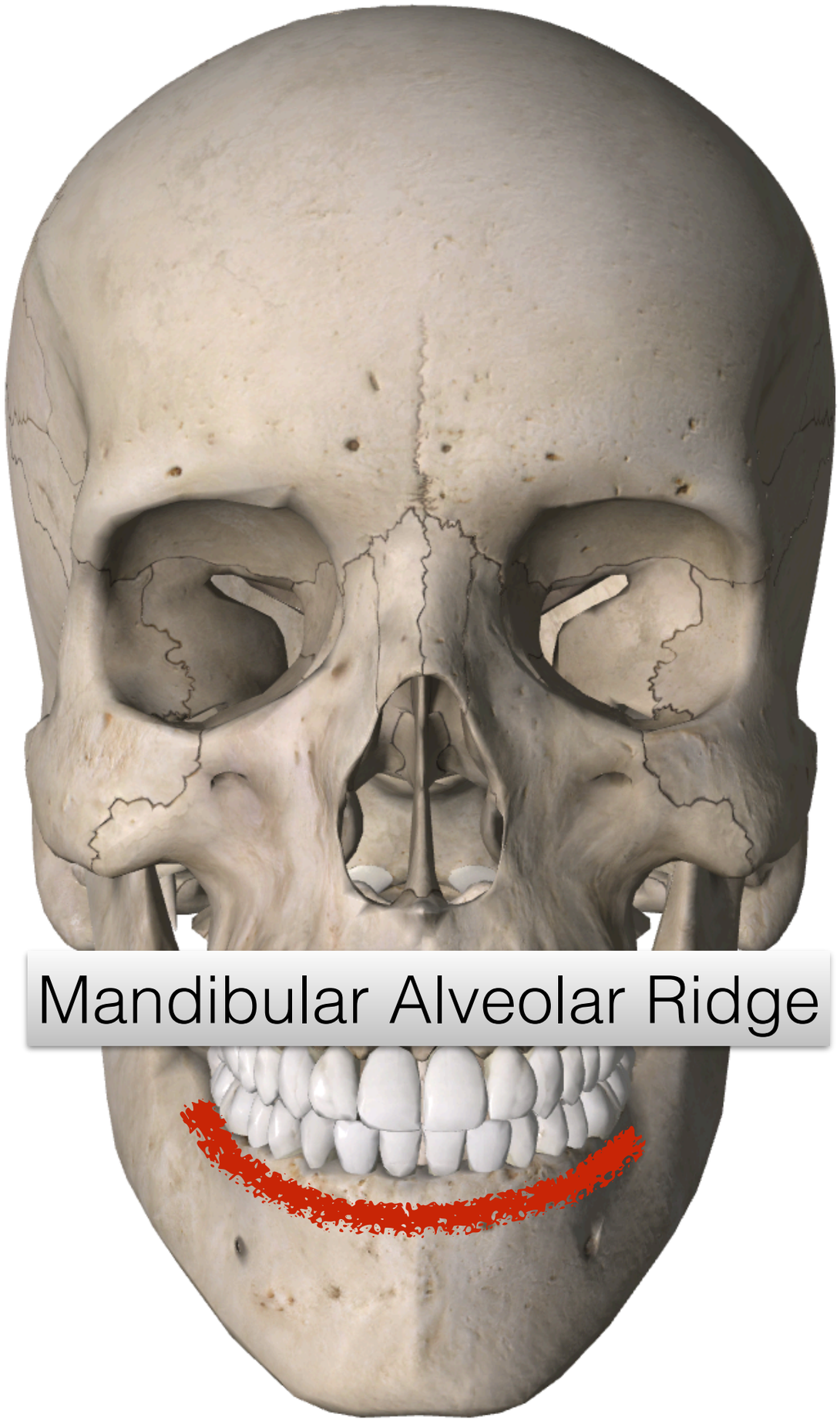
And, just to be clear with semantics, a hard spot in the center of a bone - not on a suture - would be called an intraosseous strain.

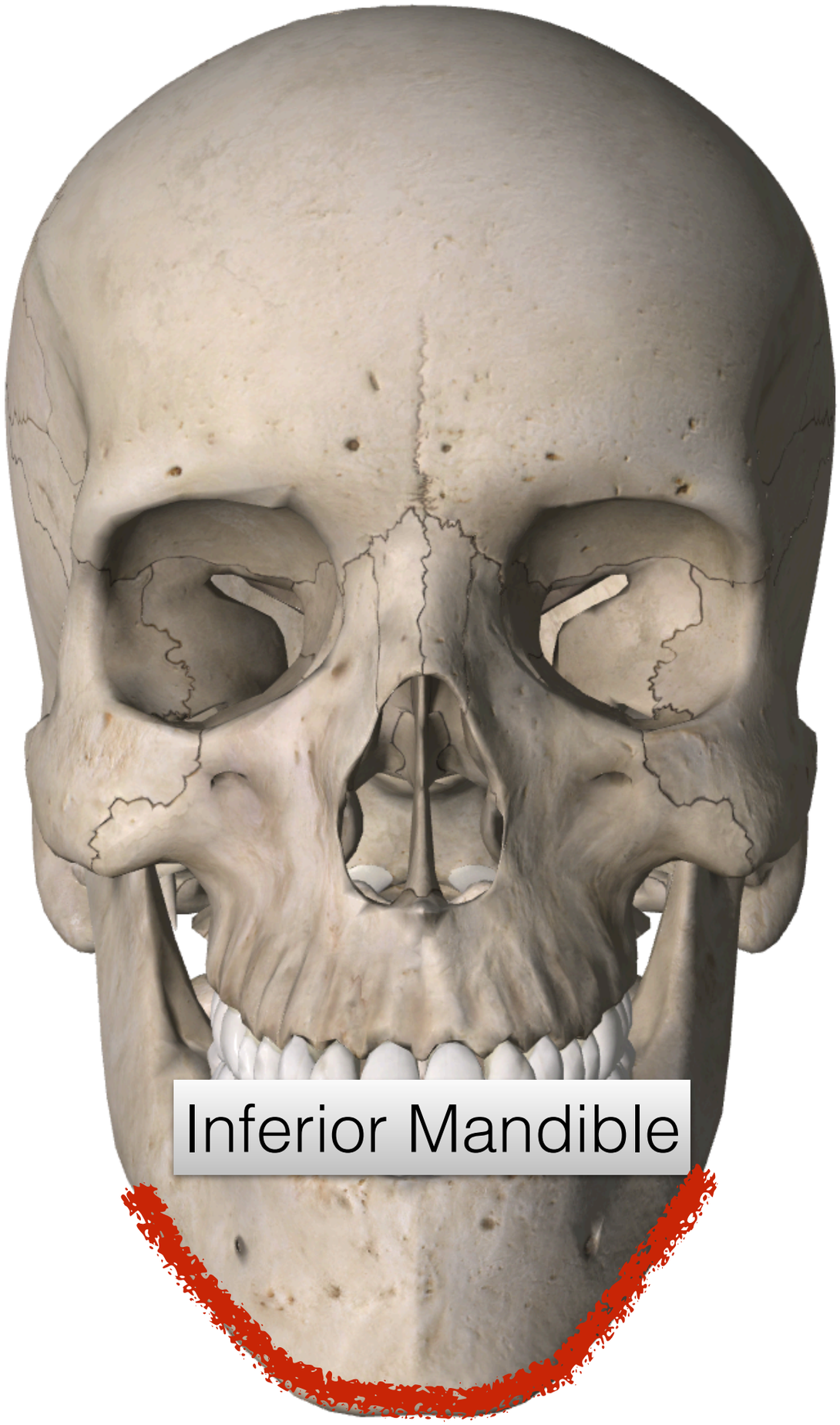
Possible Buttress Restrictions

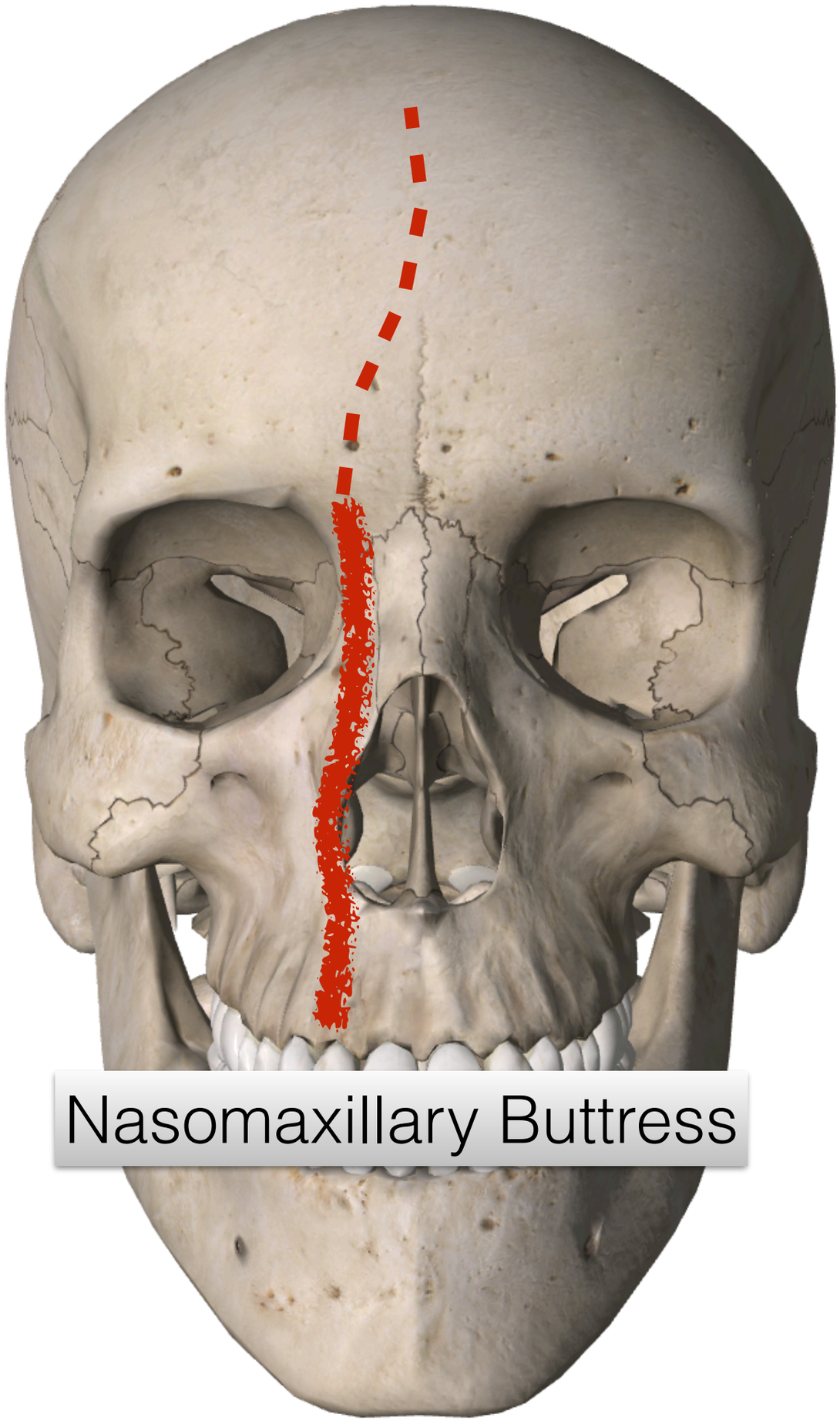

Frontal Bar

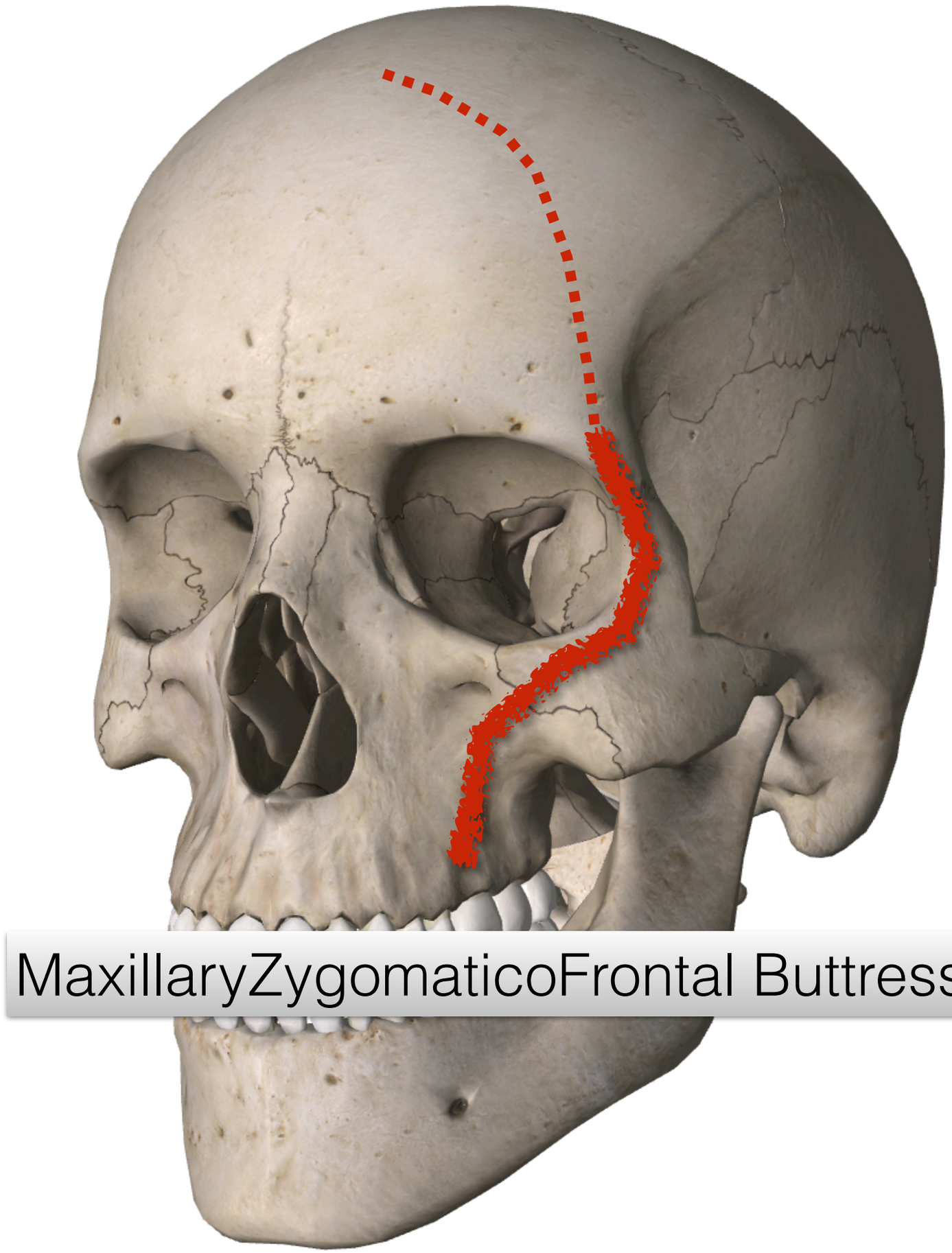

Orbital Rims


Maxillary Alveolar Ridge

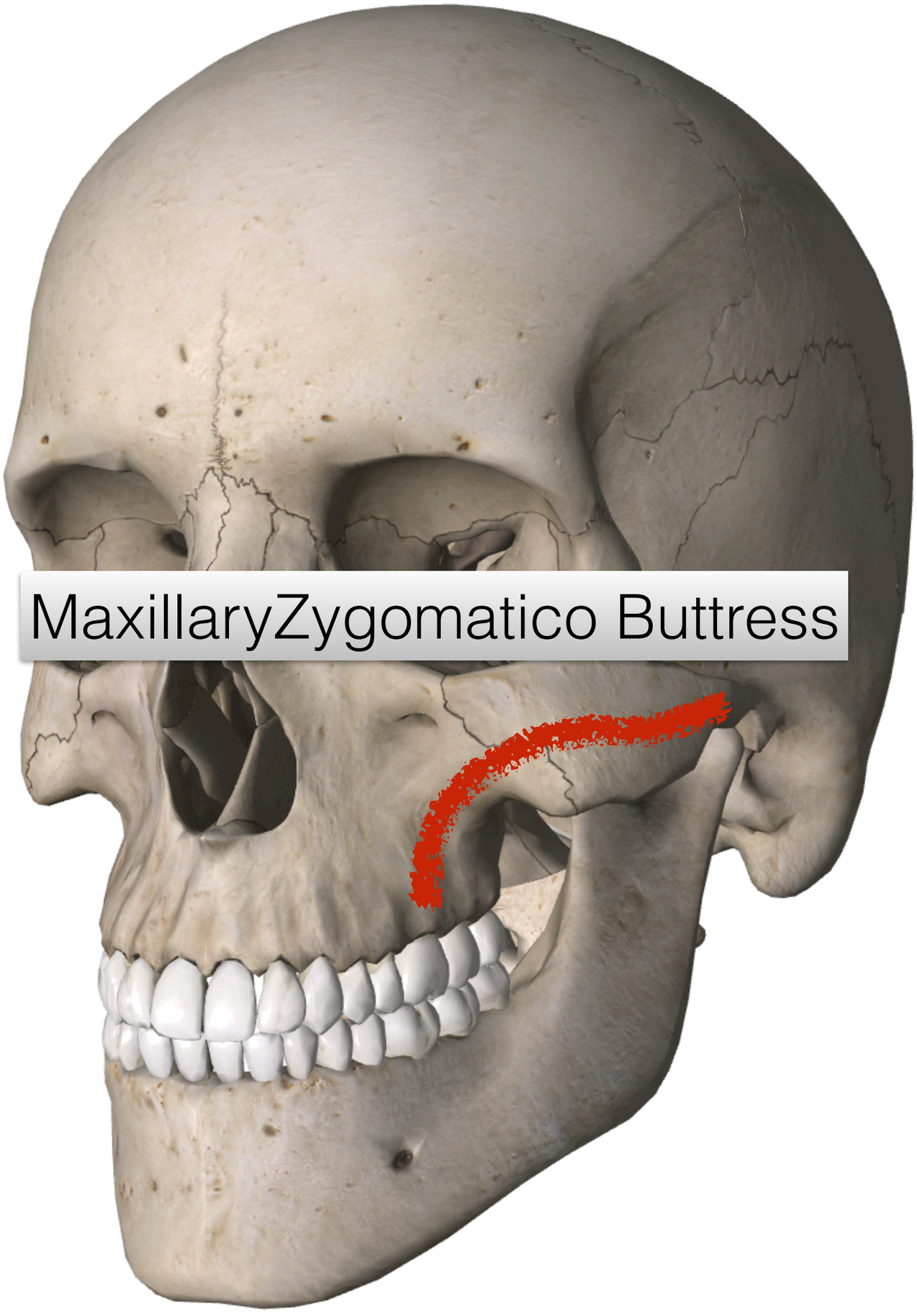

Mandibular Alveolar Ridge

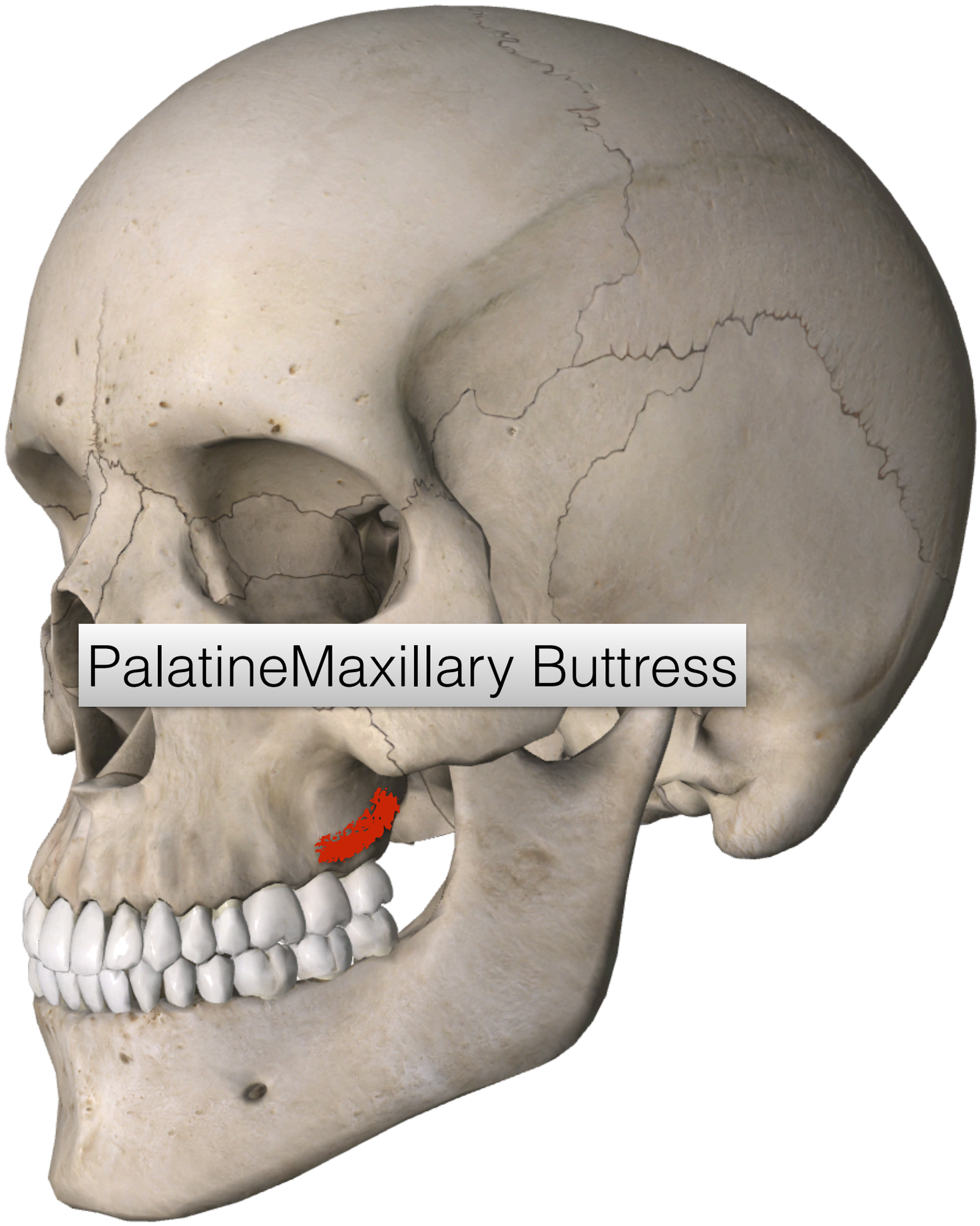

Inferior Mandible

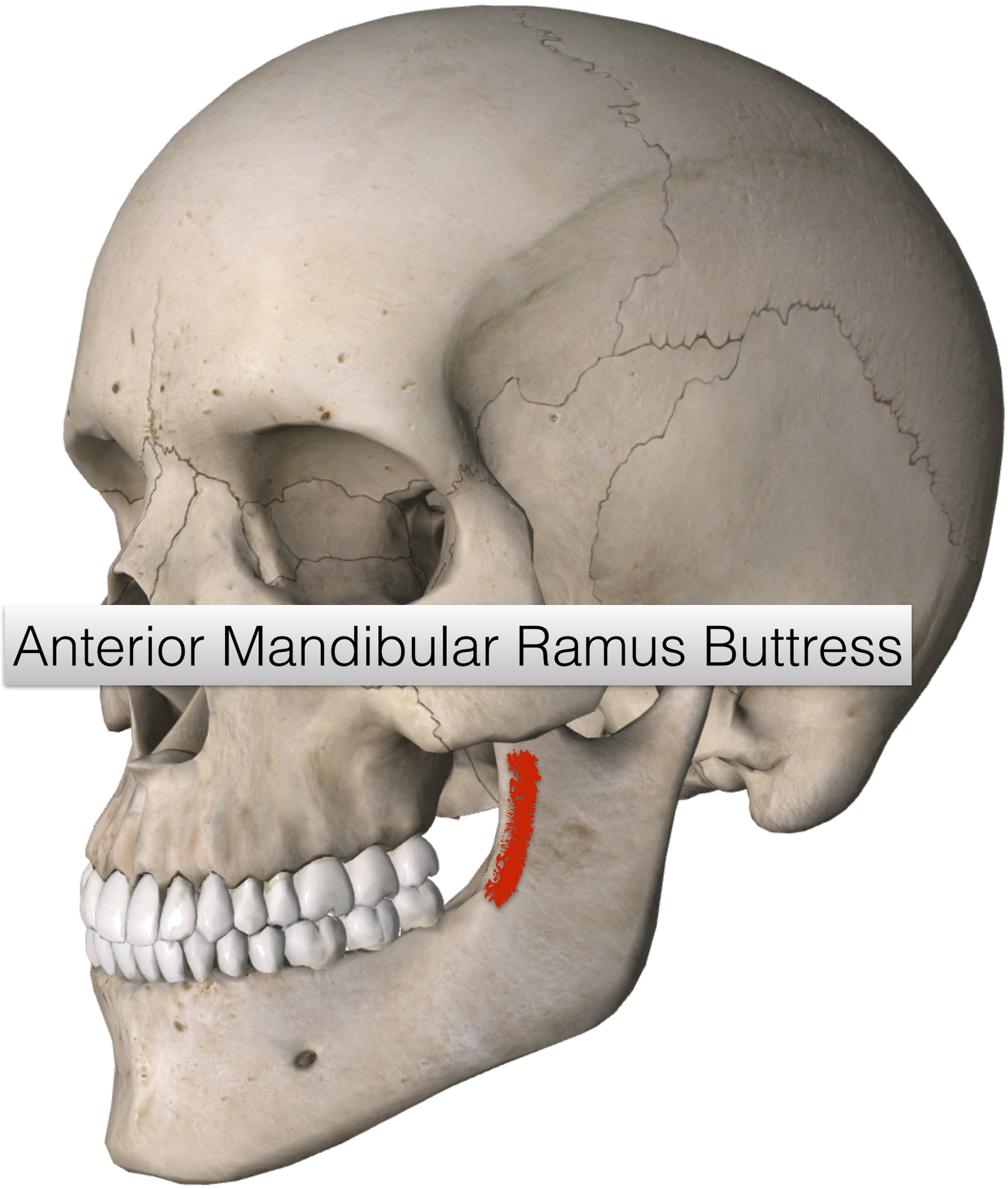

Nasomaxillary Buttress

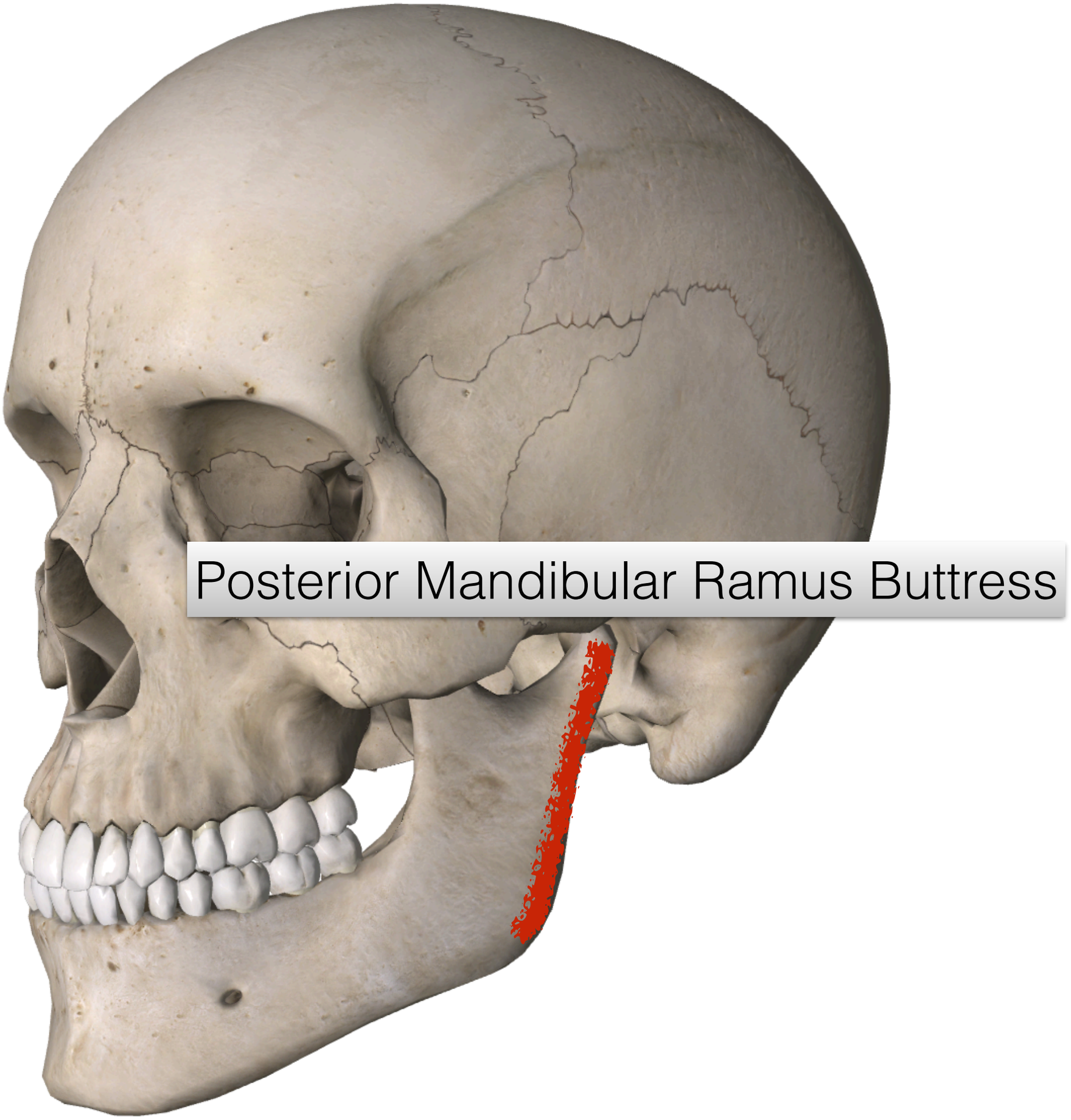


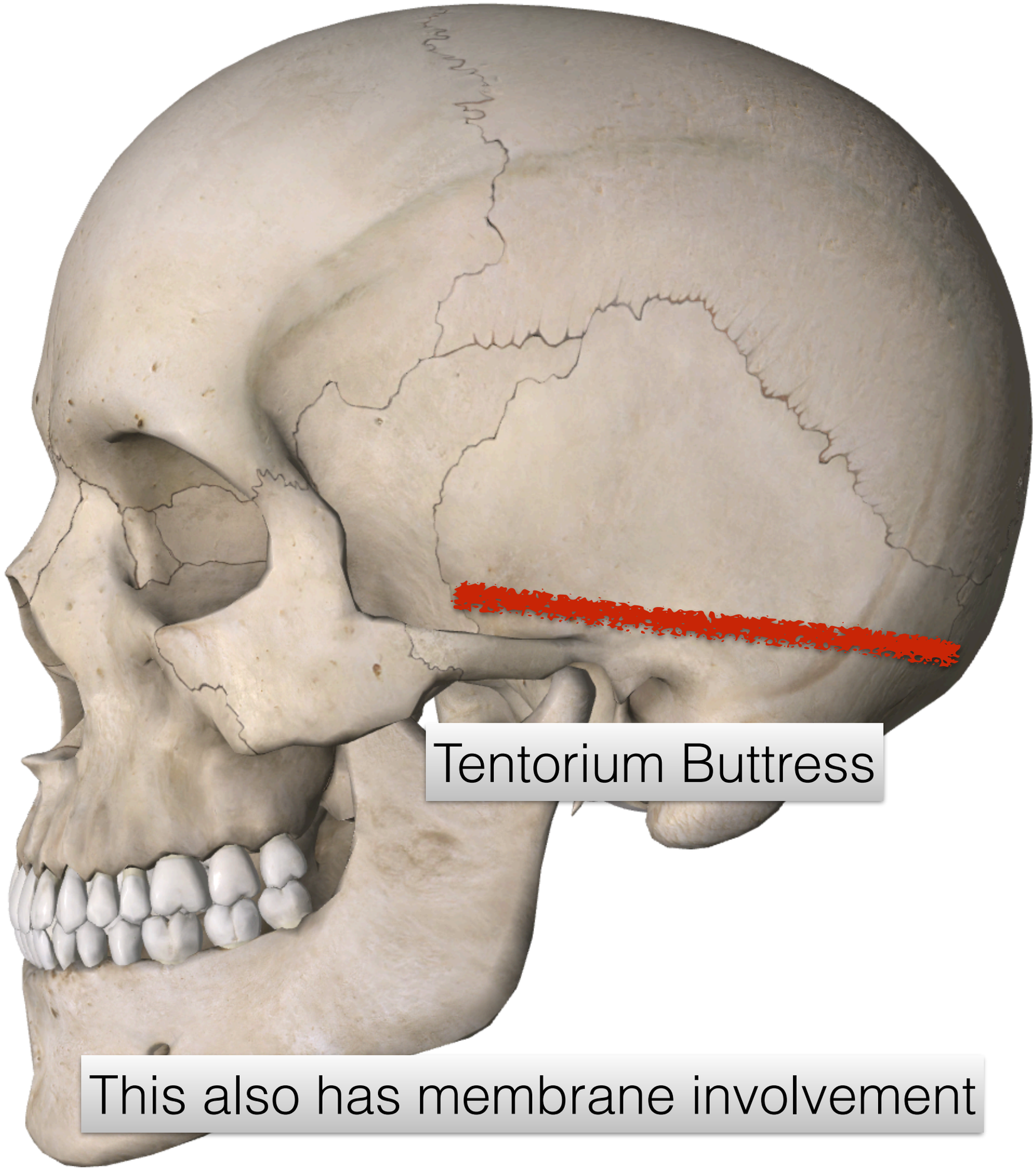
MaxillaryZygomaticoFrontal Buttress


MaxillaryZygomatico Buttress


PalatineMaxillary Buttress

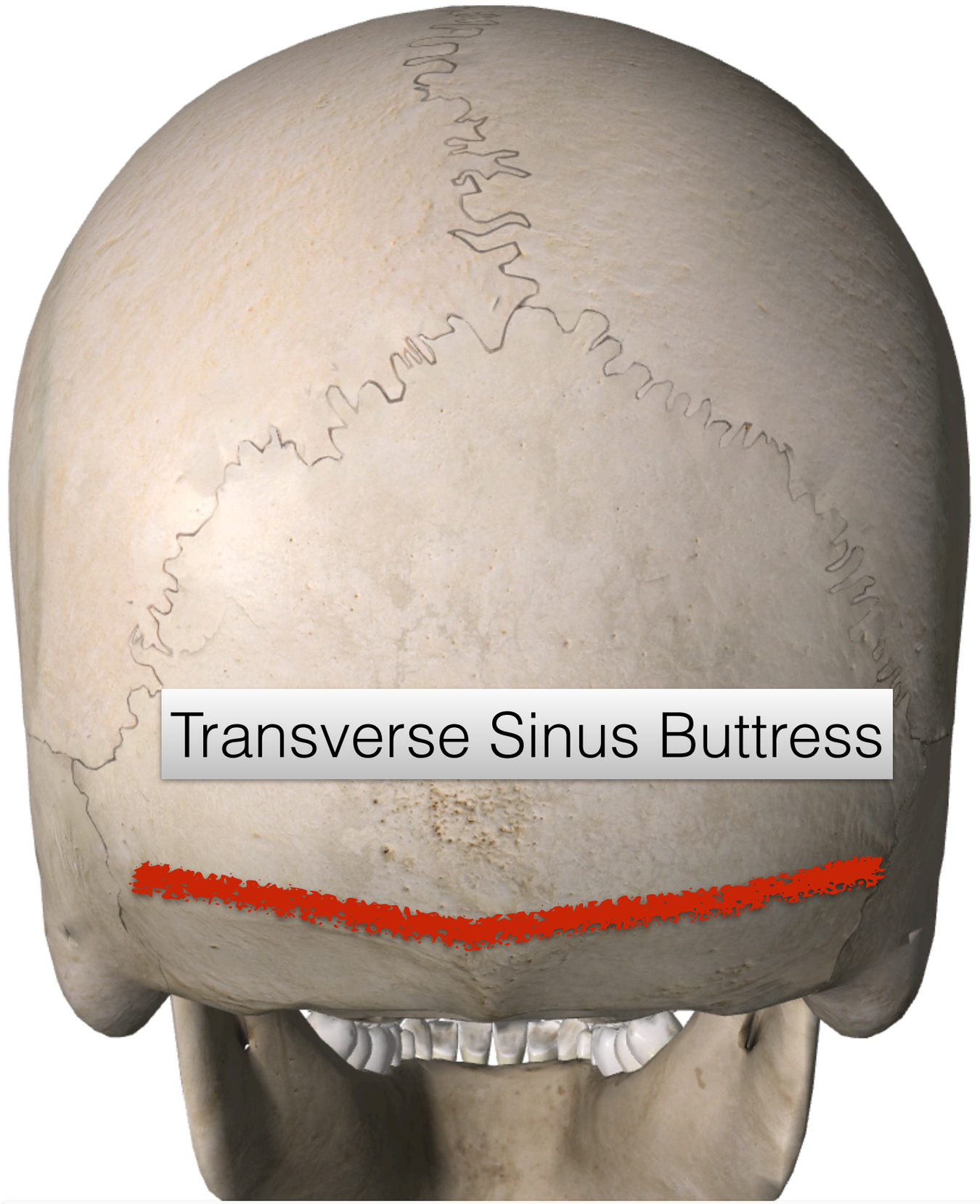

Anterior Mandibular Ramus Buttress


Posterior Mandibular Ramus Buttress

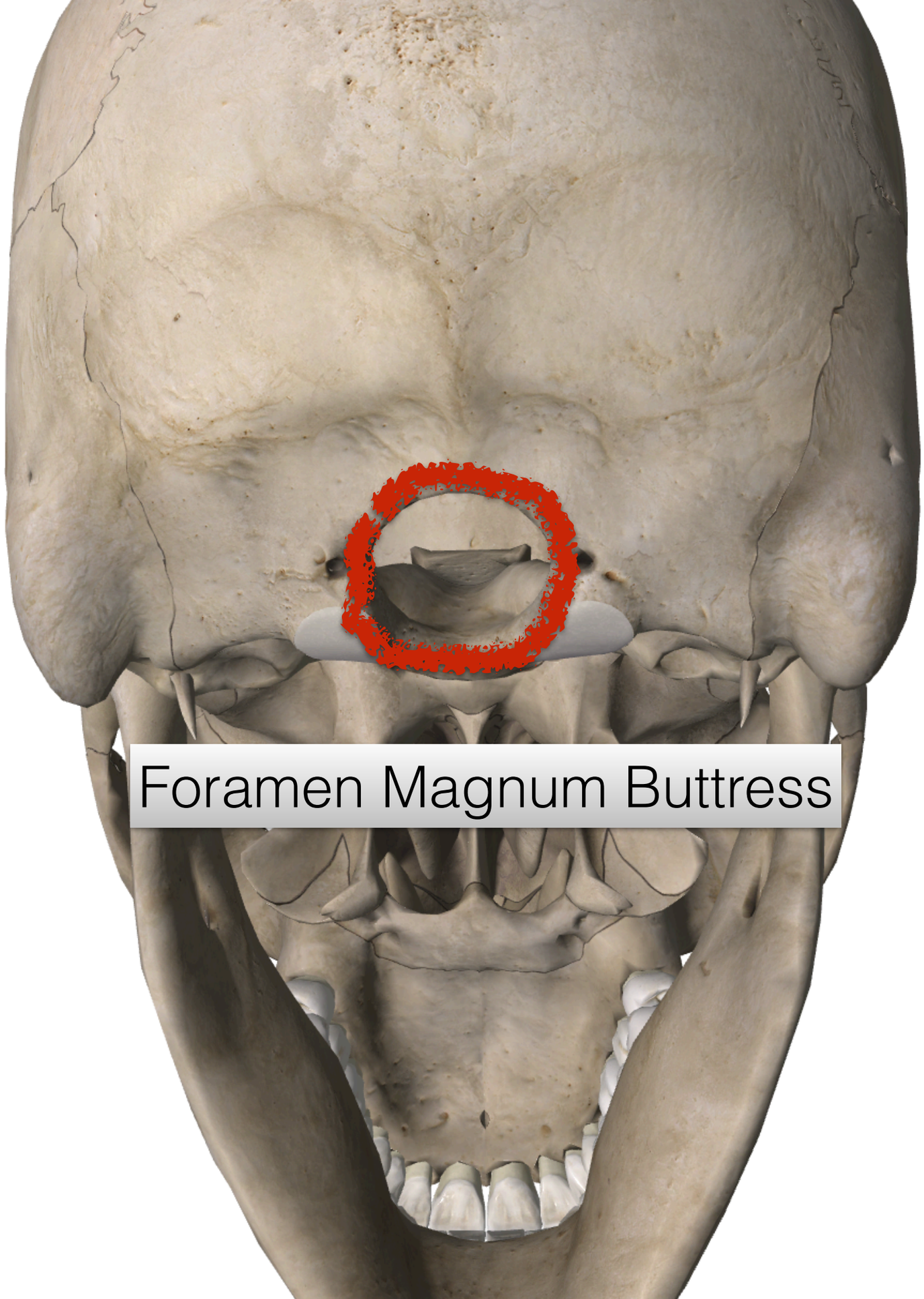


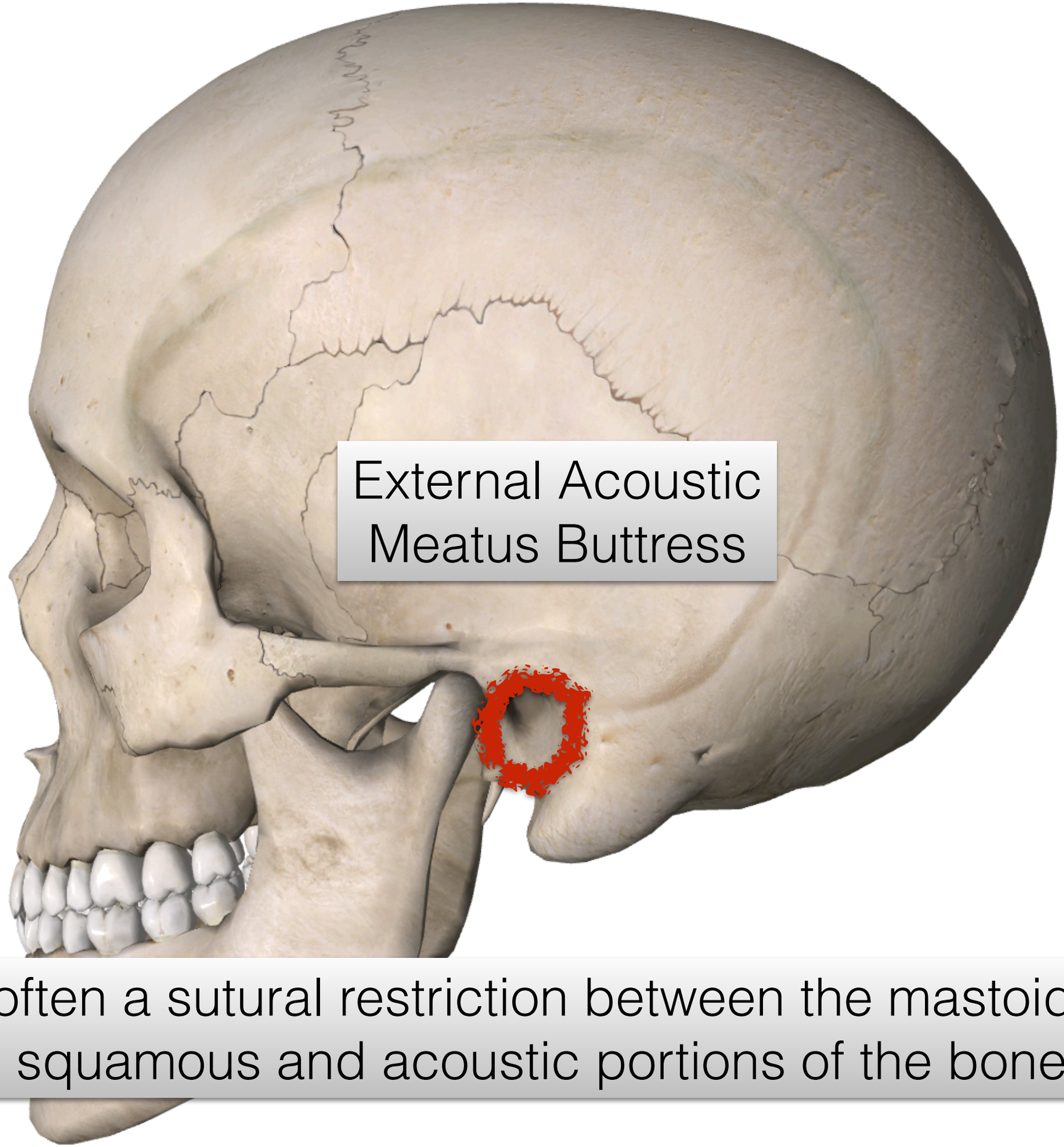
Tentorium Buttress

This also has membrane involvement

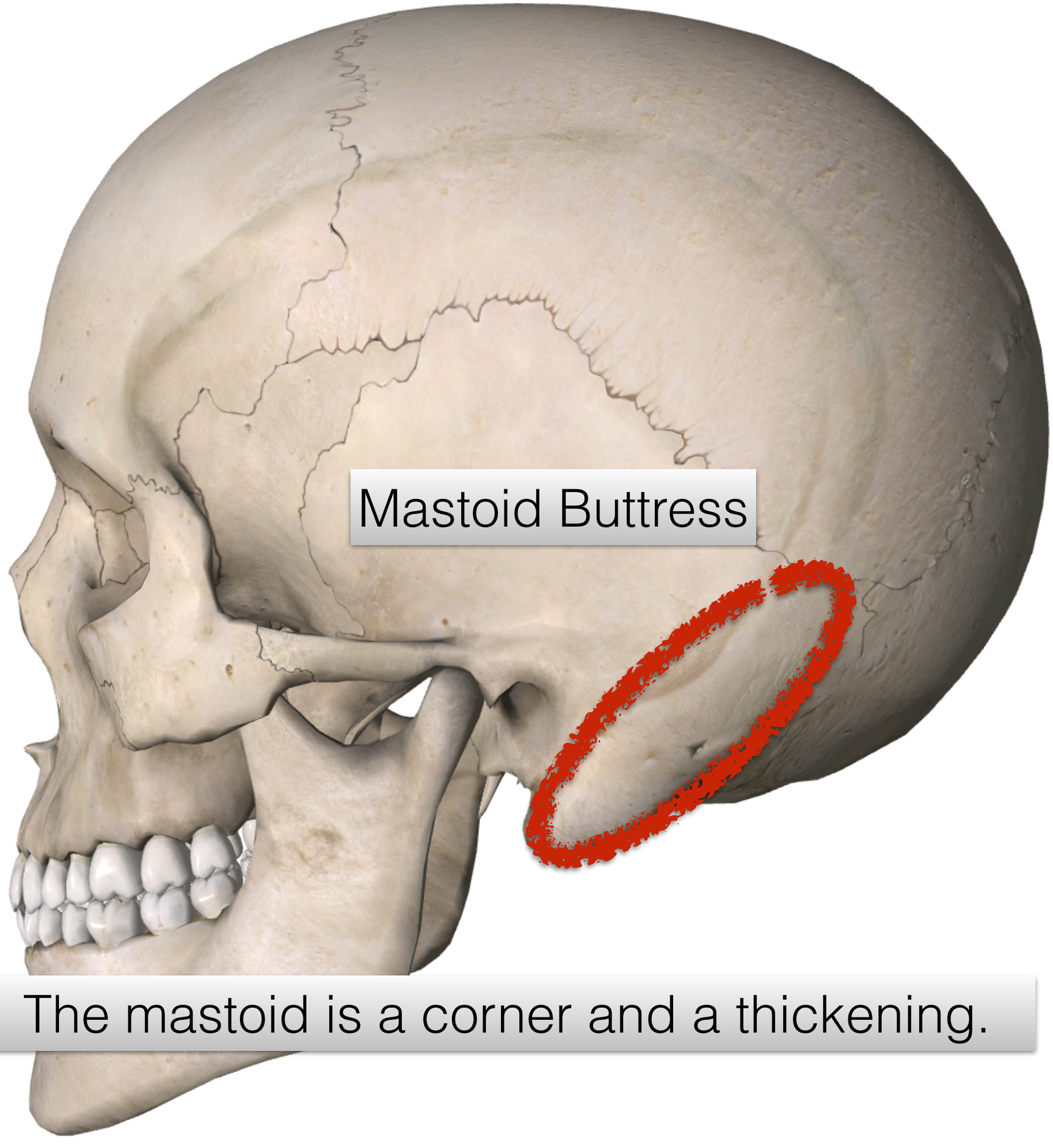


This also has membrane involvement


Foramen Magnum Buttress



This is often a sutural restriction between the mastoid and/or squamous and acoustic portions of the bone



The mastoid is a corner and a thickening.

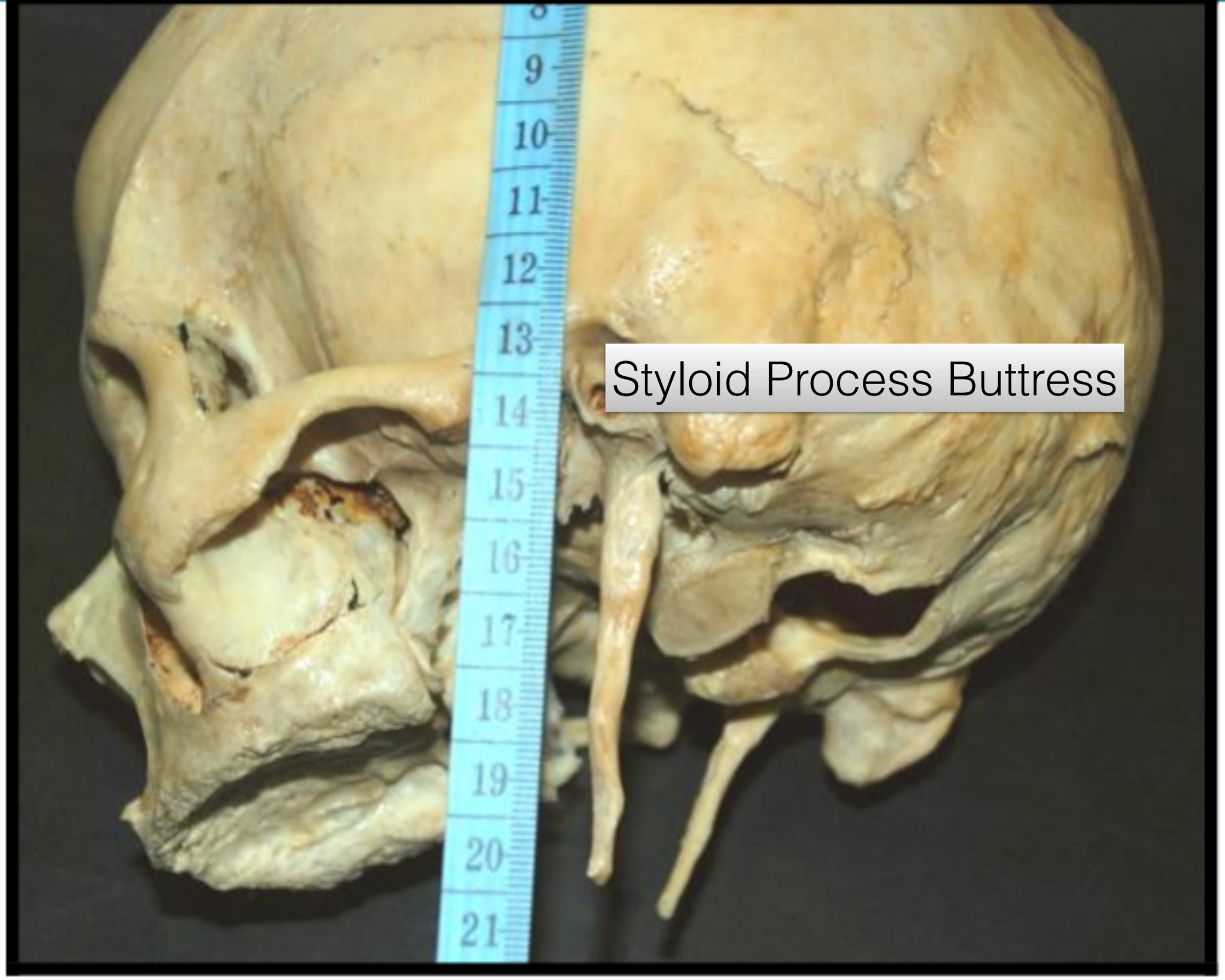
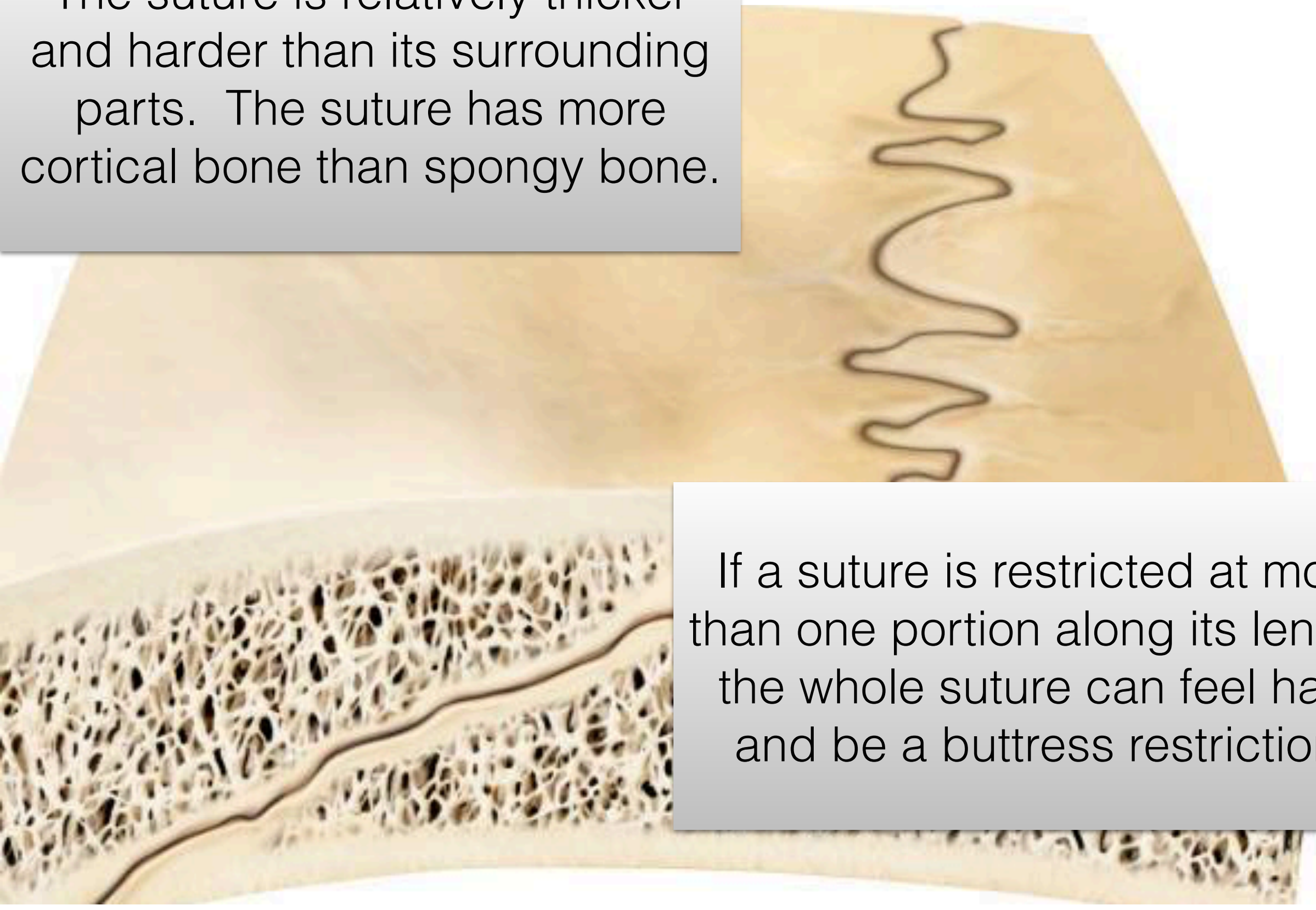


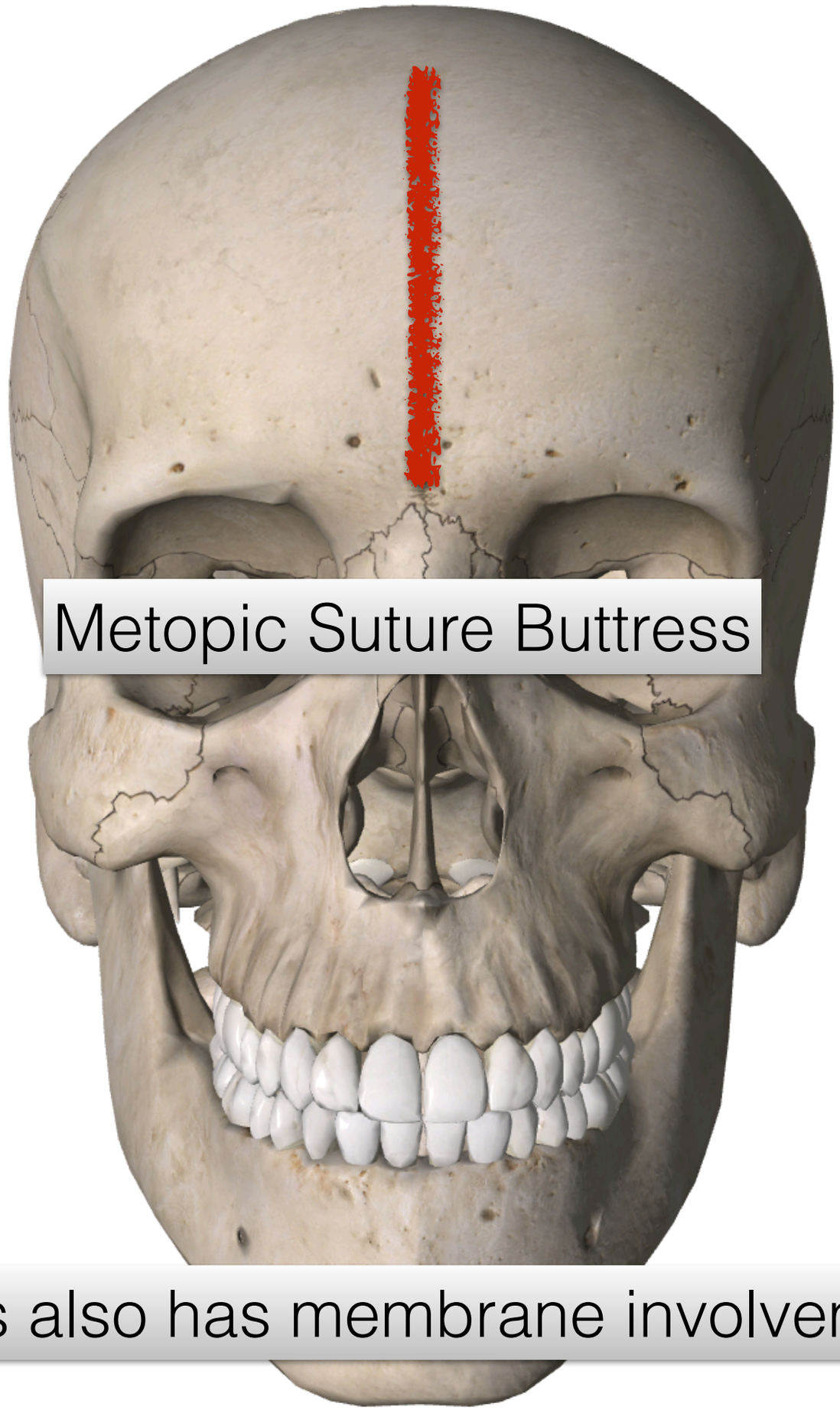
Figure 1: Showing elongated Styloid process on both sides

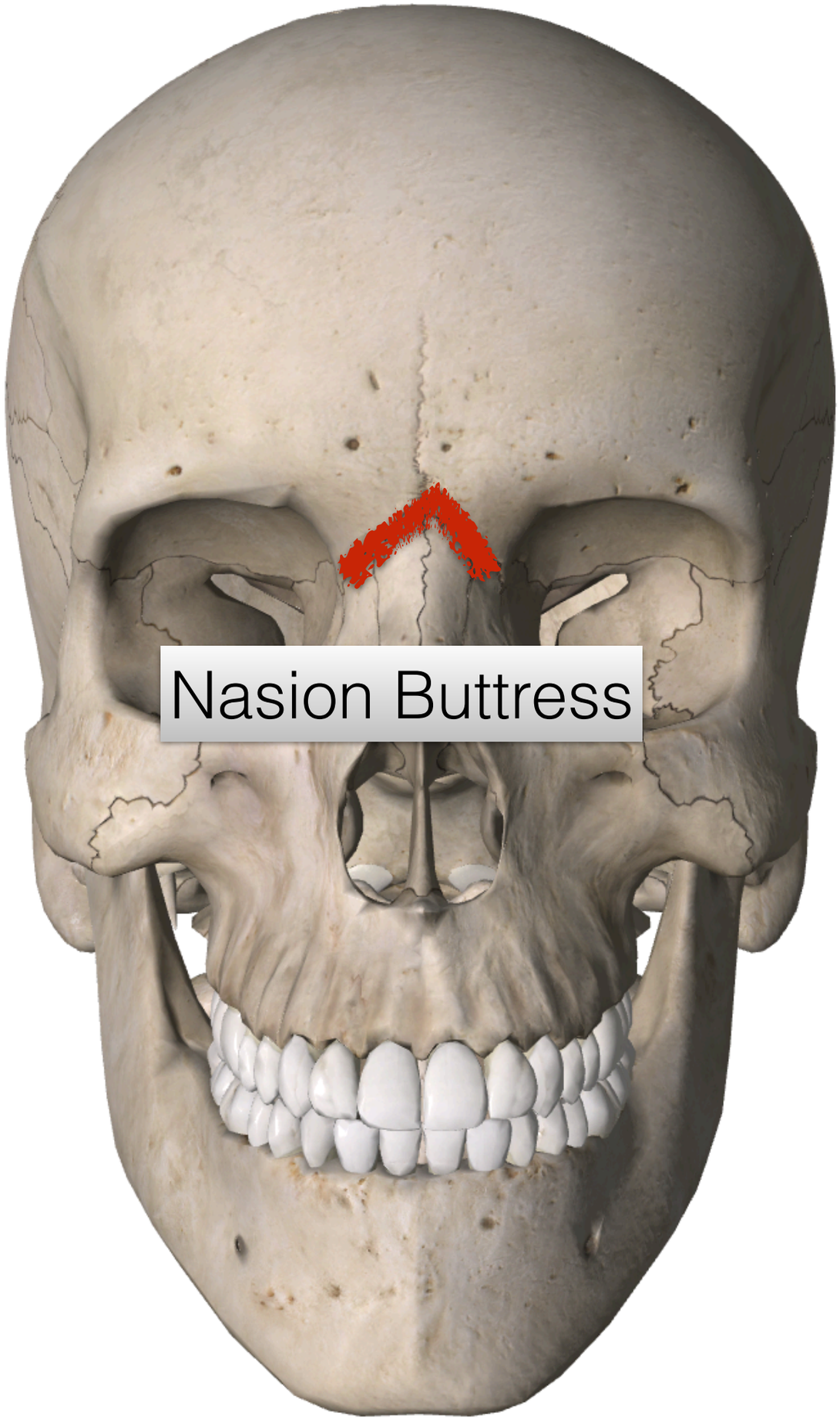
Don’t forget the Sutural Buttresses

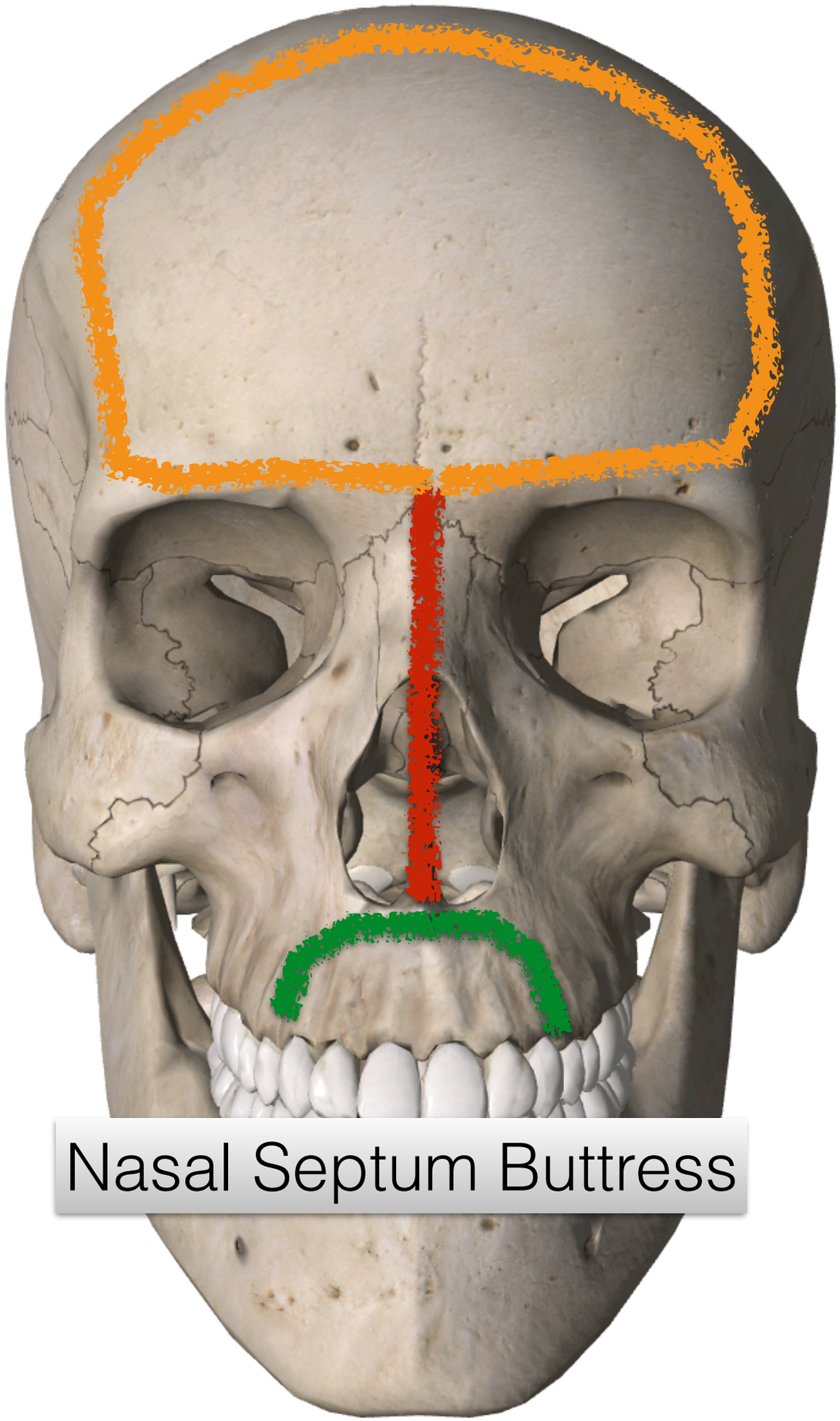
The suture is relatively thicker and harder than its surrounding parts. The suture has more cortical bone than spongy bone.



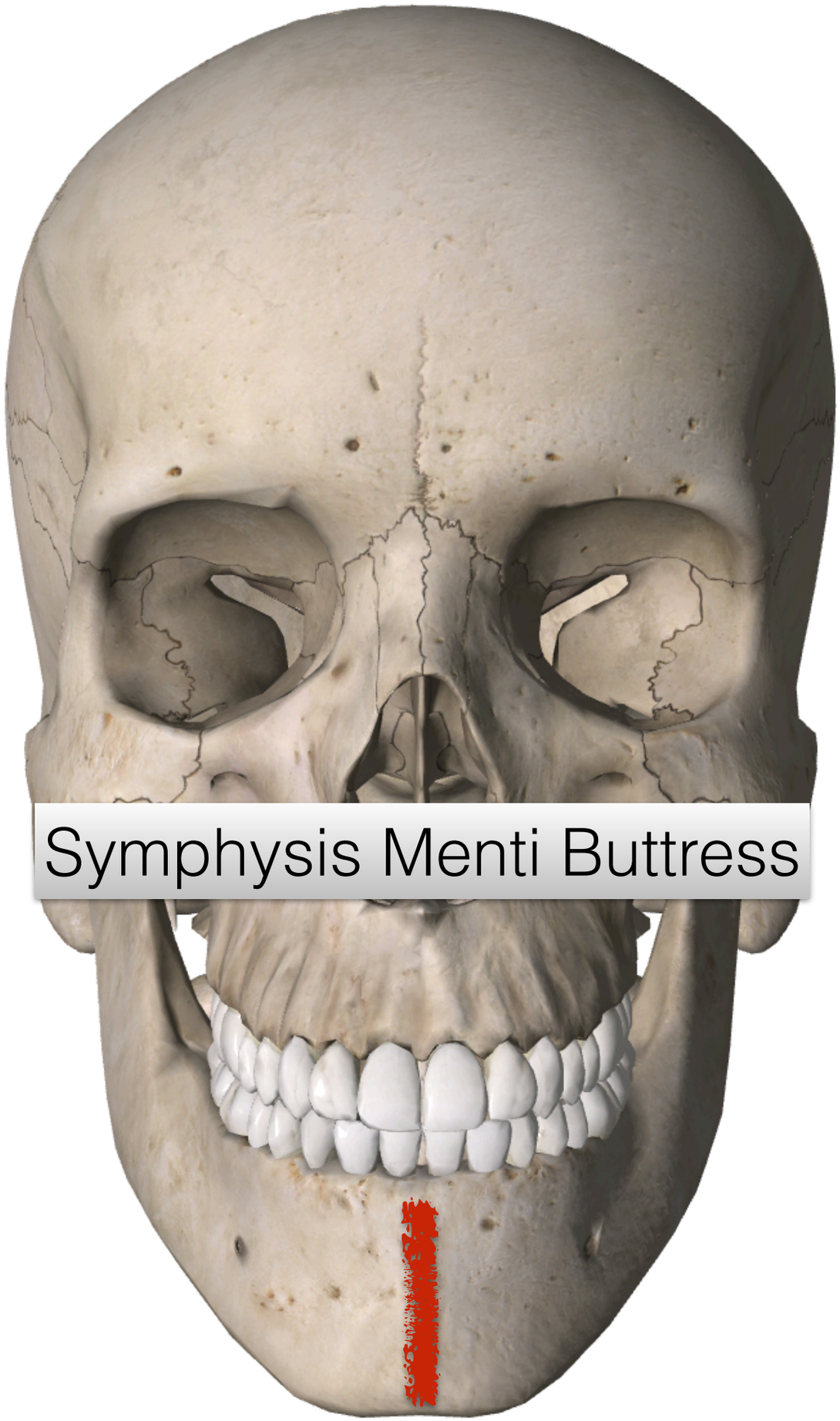
If a suture is restricted at more than one portion along its length, the whole suture can feel hard and be a buttress restriction.

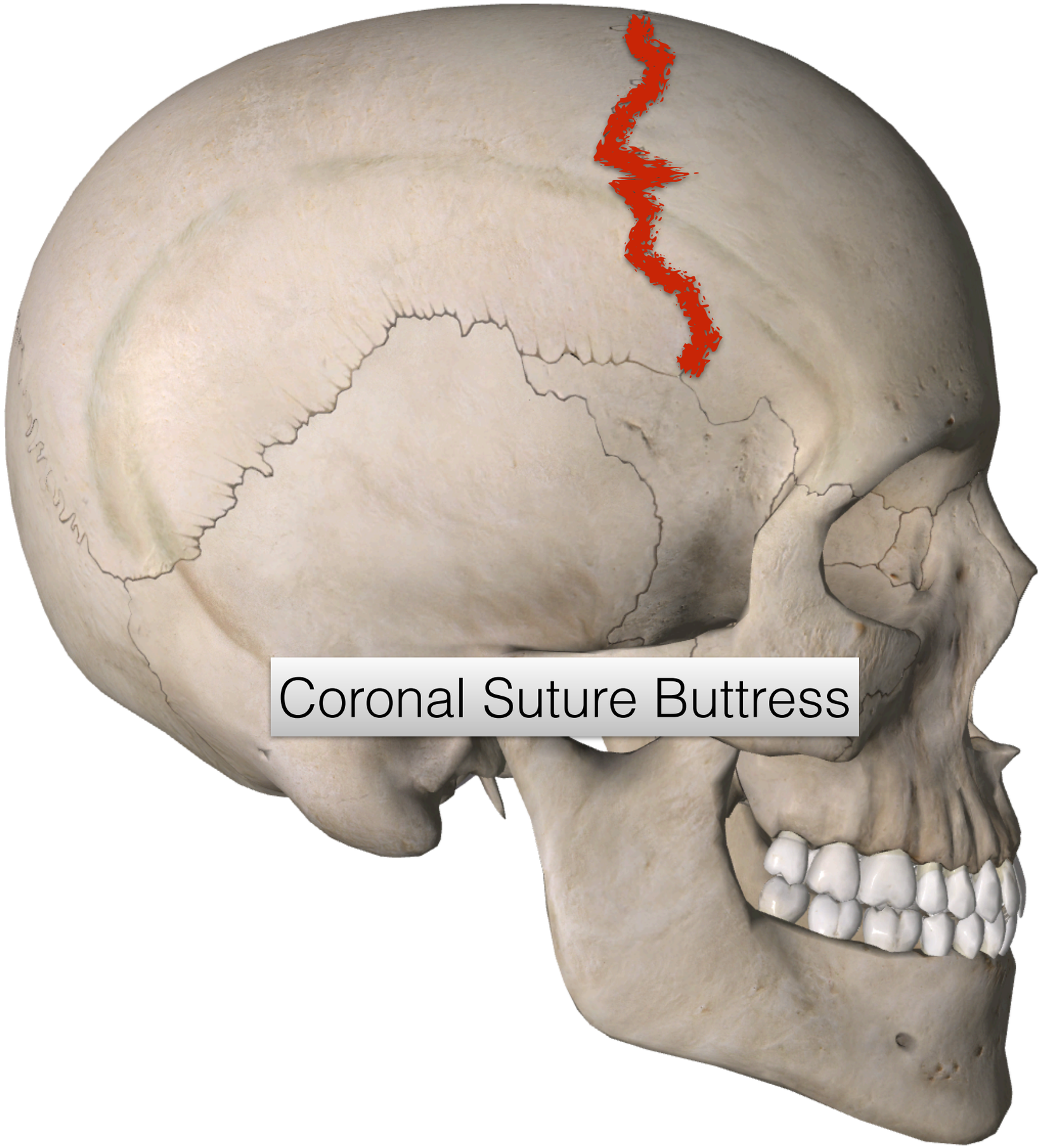

Metopic Suture Buttress
This also has membrane involvement

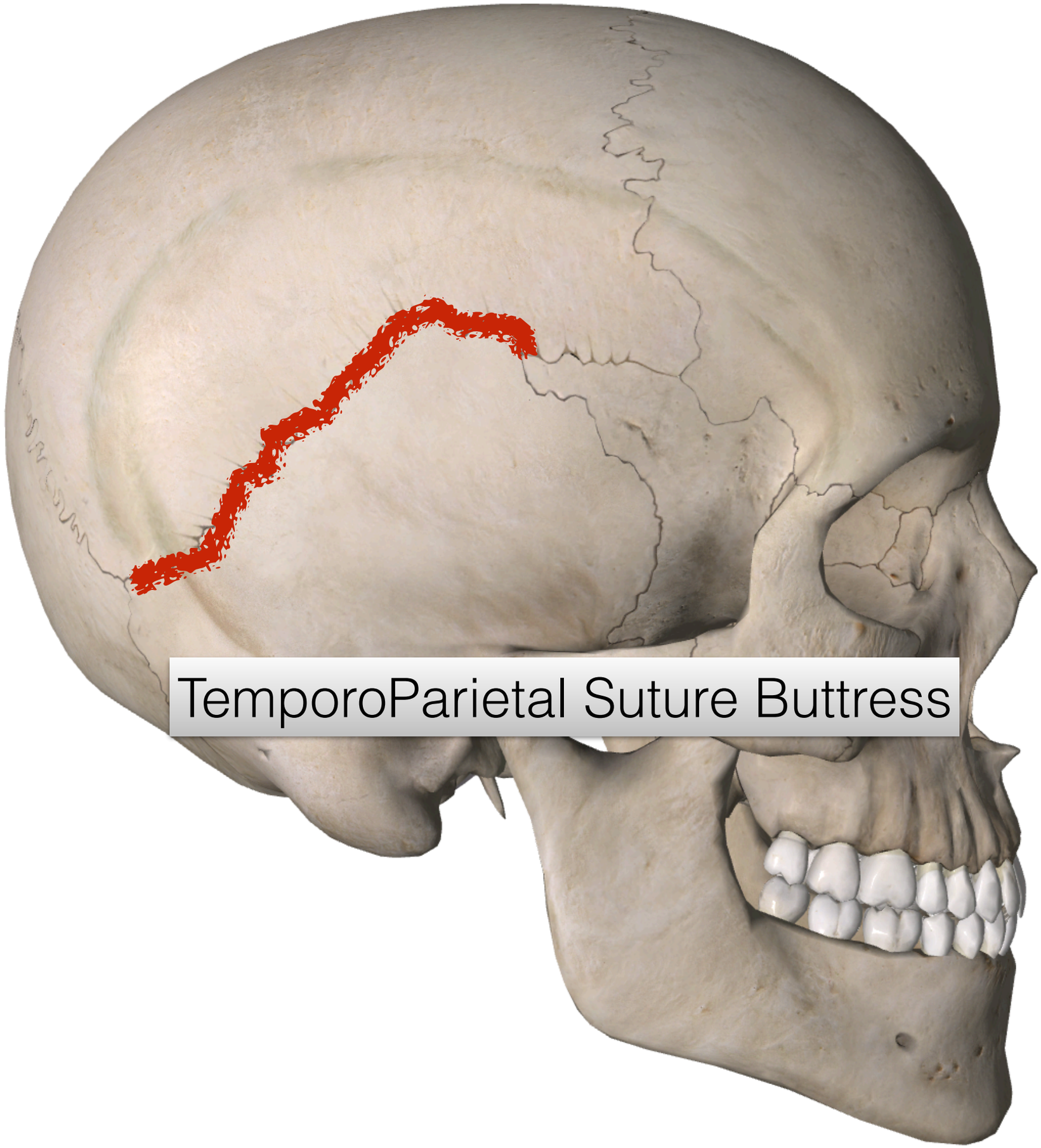

Nasion Buttress

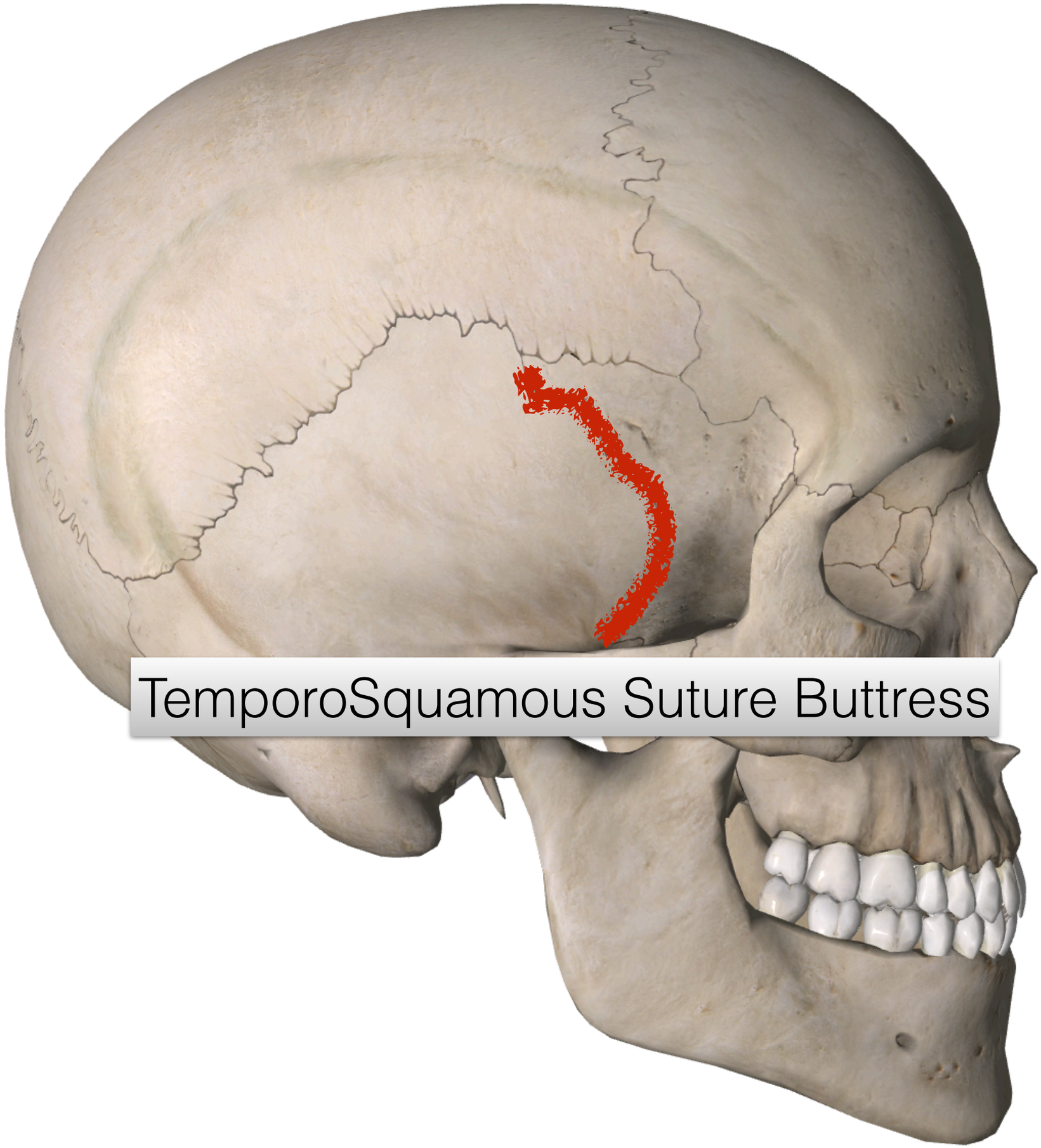


Nasal Septum Buttress

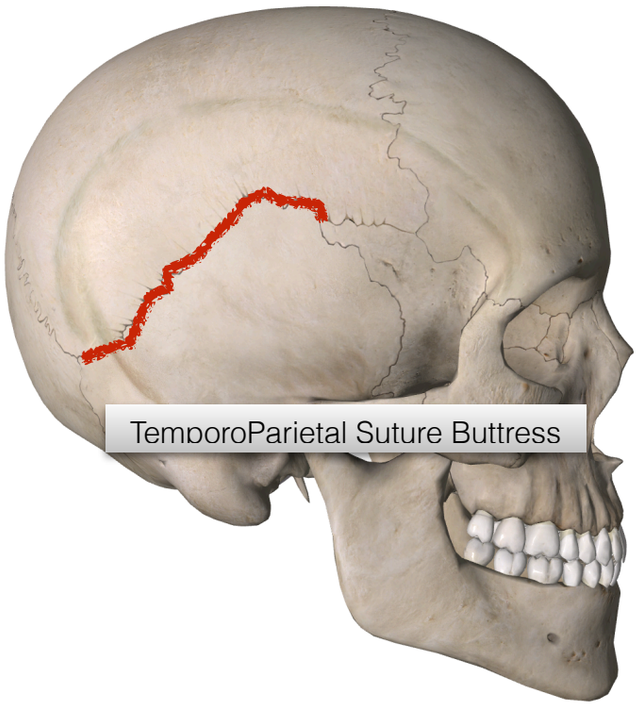

Symphysis Menti Buttress


Coronal Suture Buttress

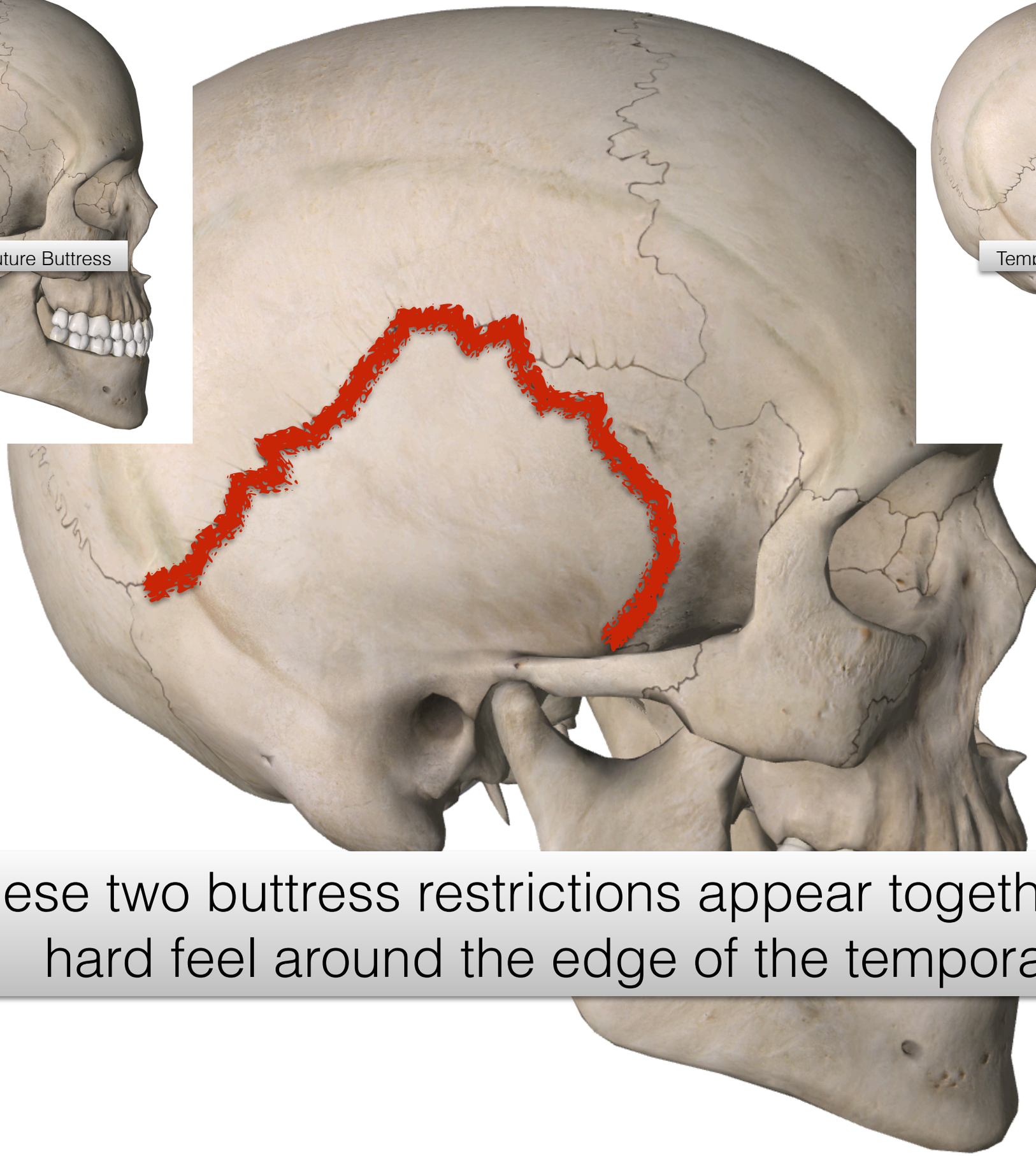

TemporoParietal Suture Buttress

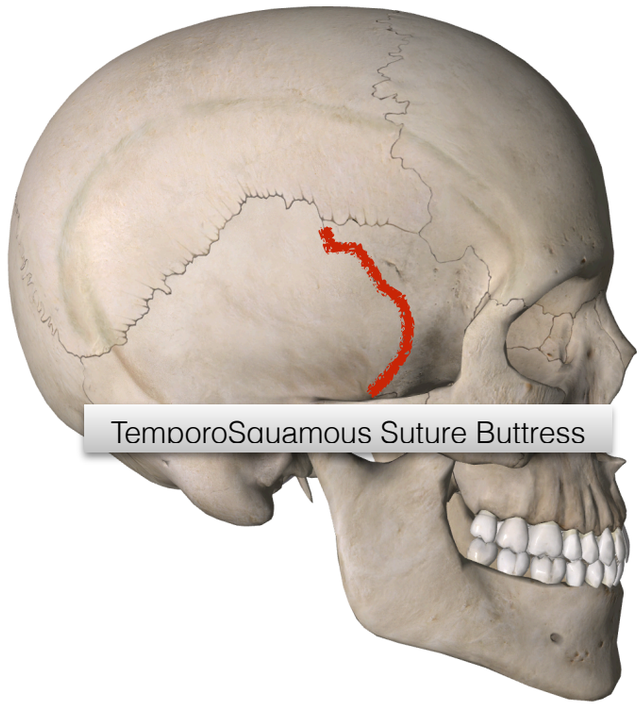


TemporoSquamous Suture Buttress



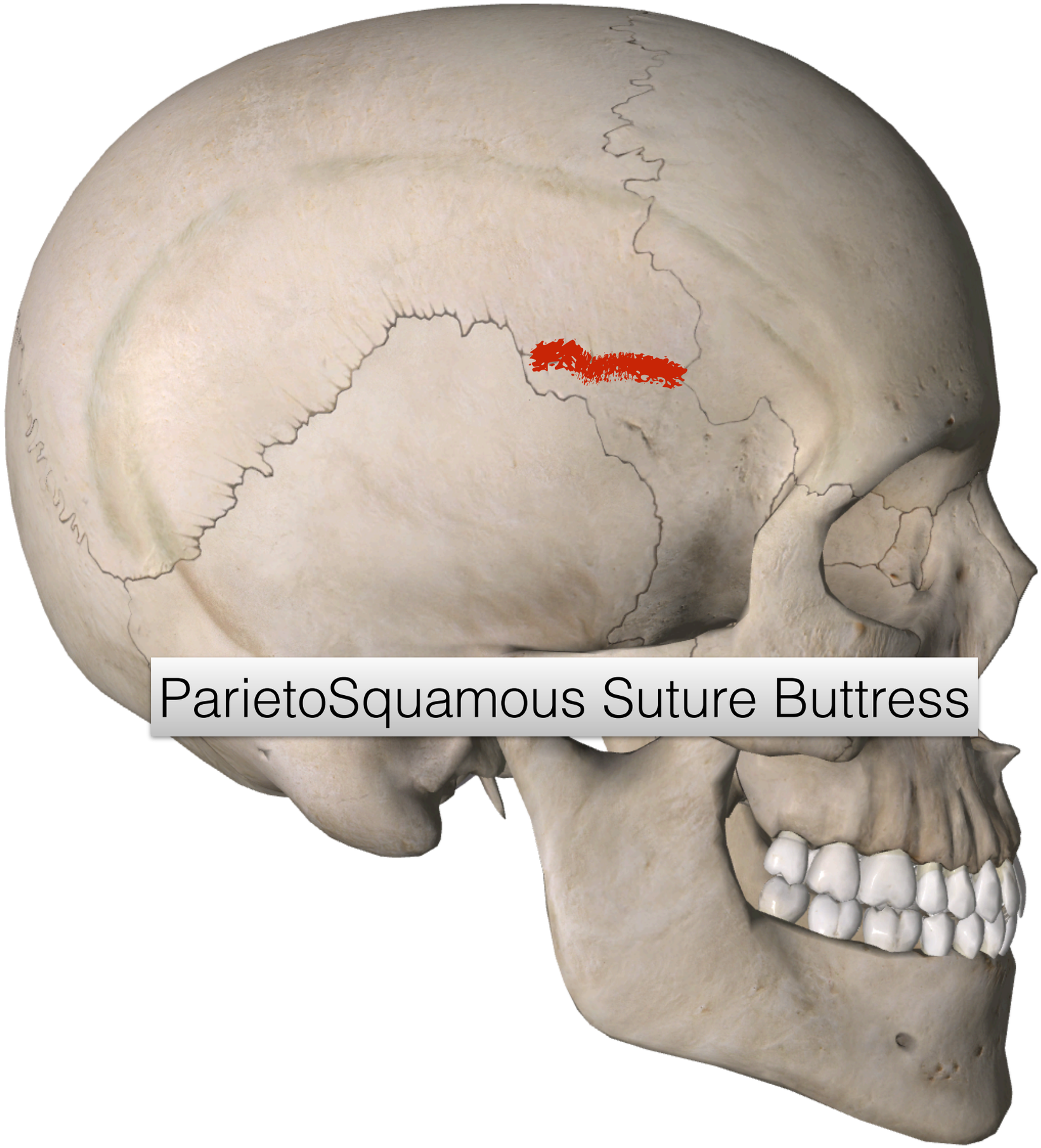
TemporoParietal Suture Buttress

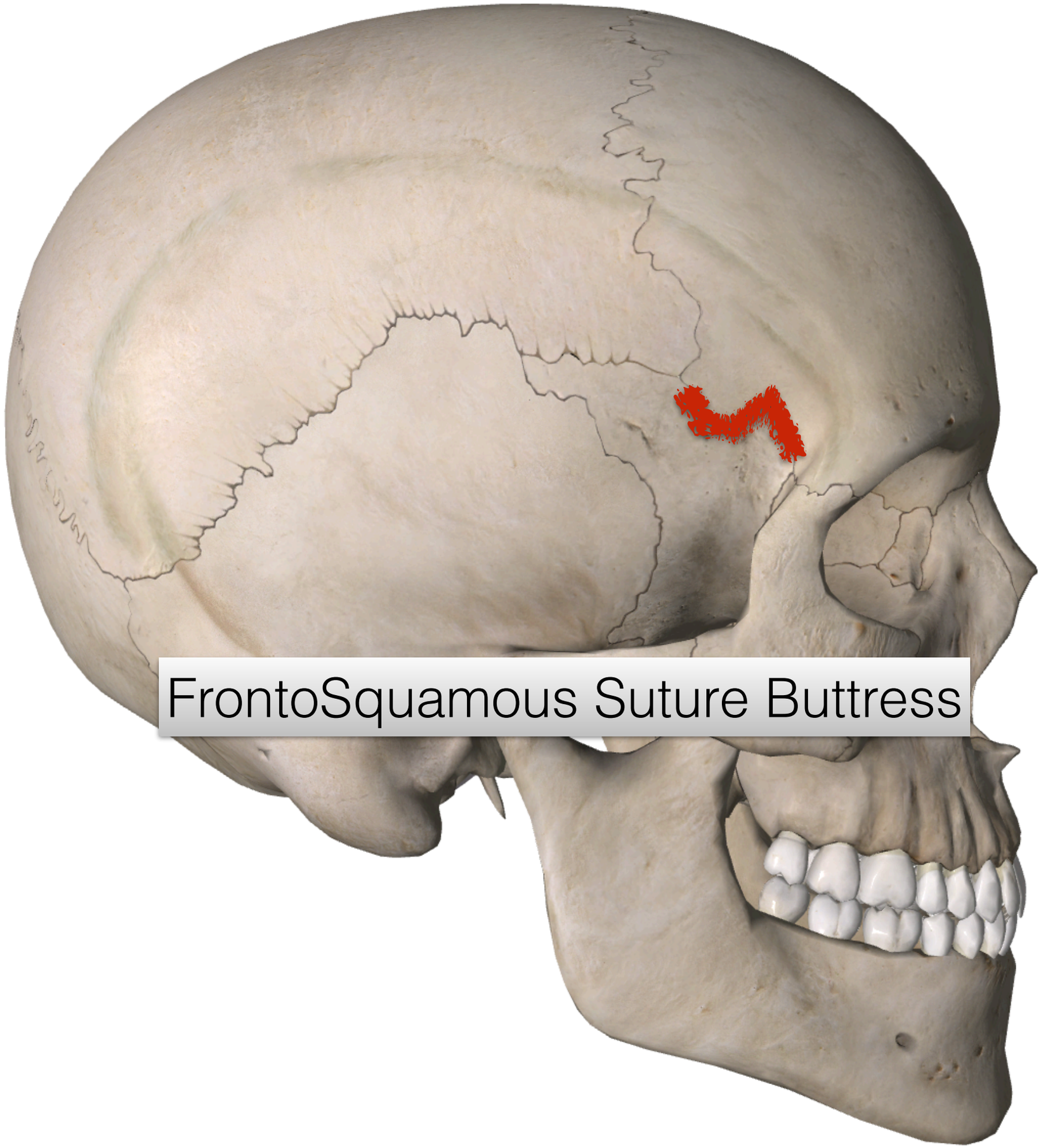


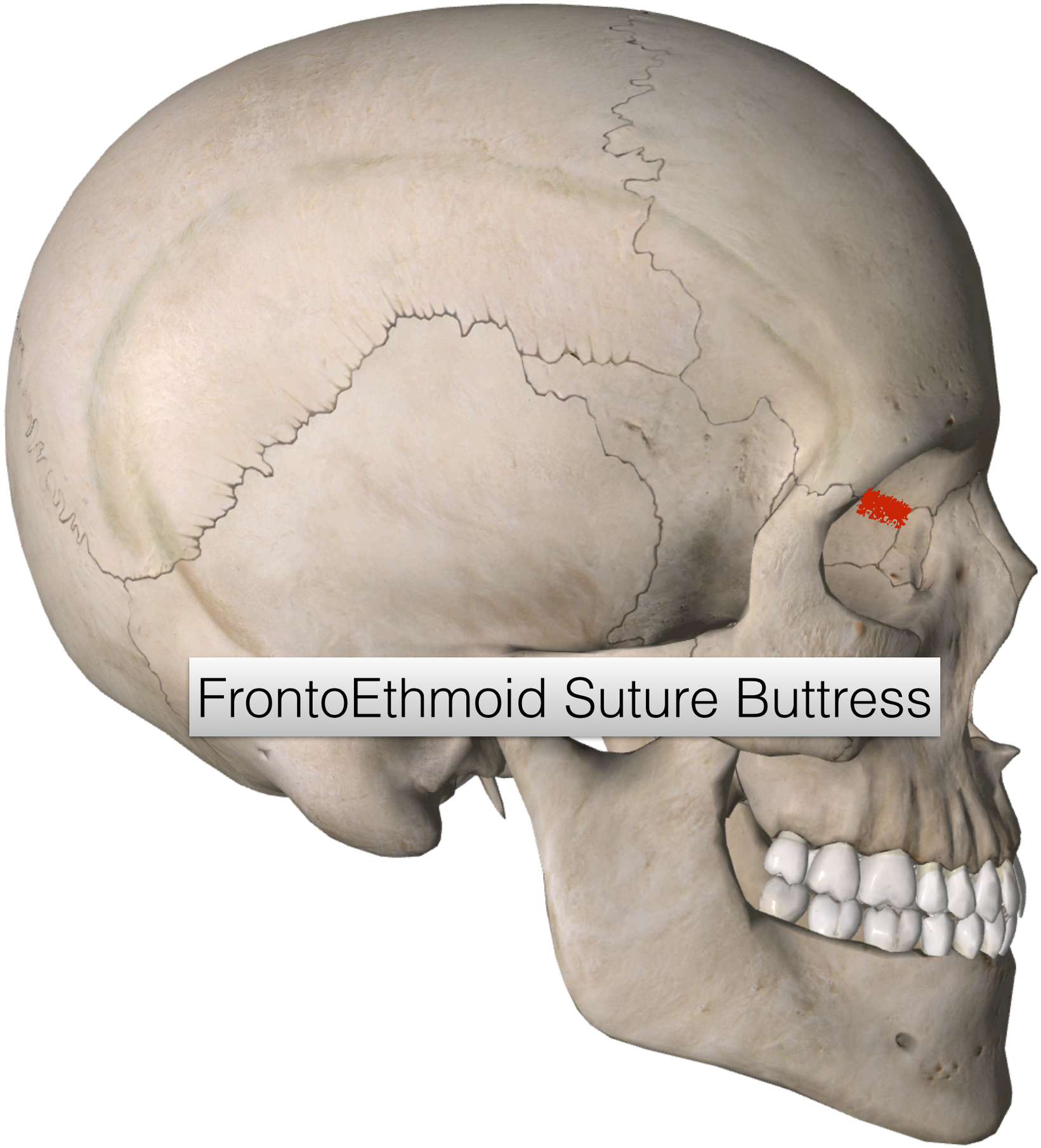


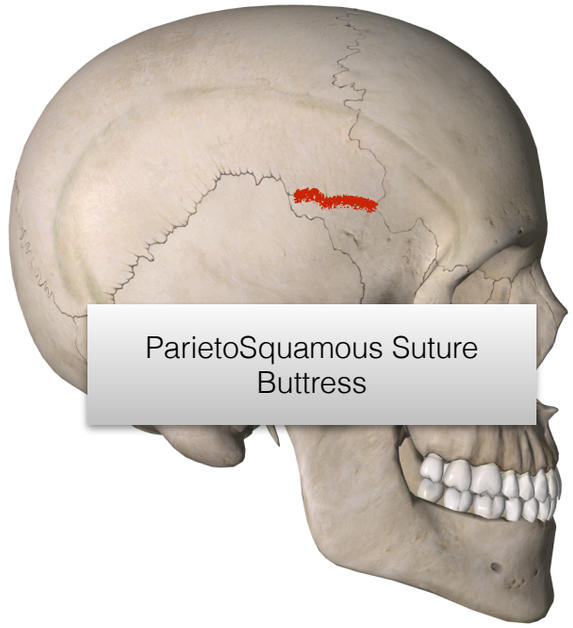
TemporoSquamous Suture Buttress

Often, these two buttress restrictions appear together, giving a hard feel around the edge of the temporal

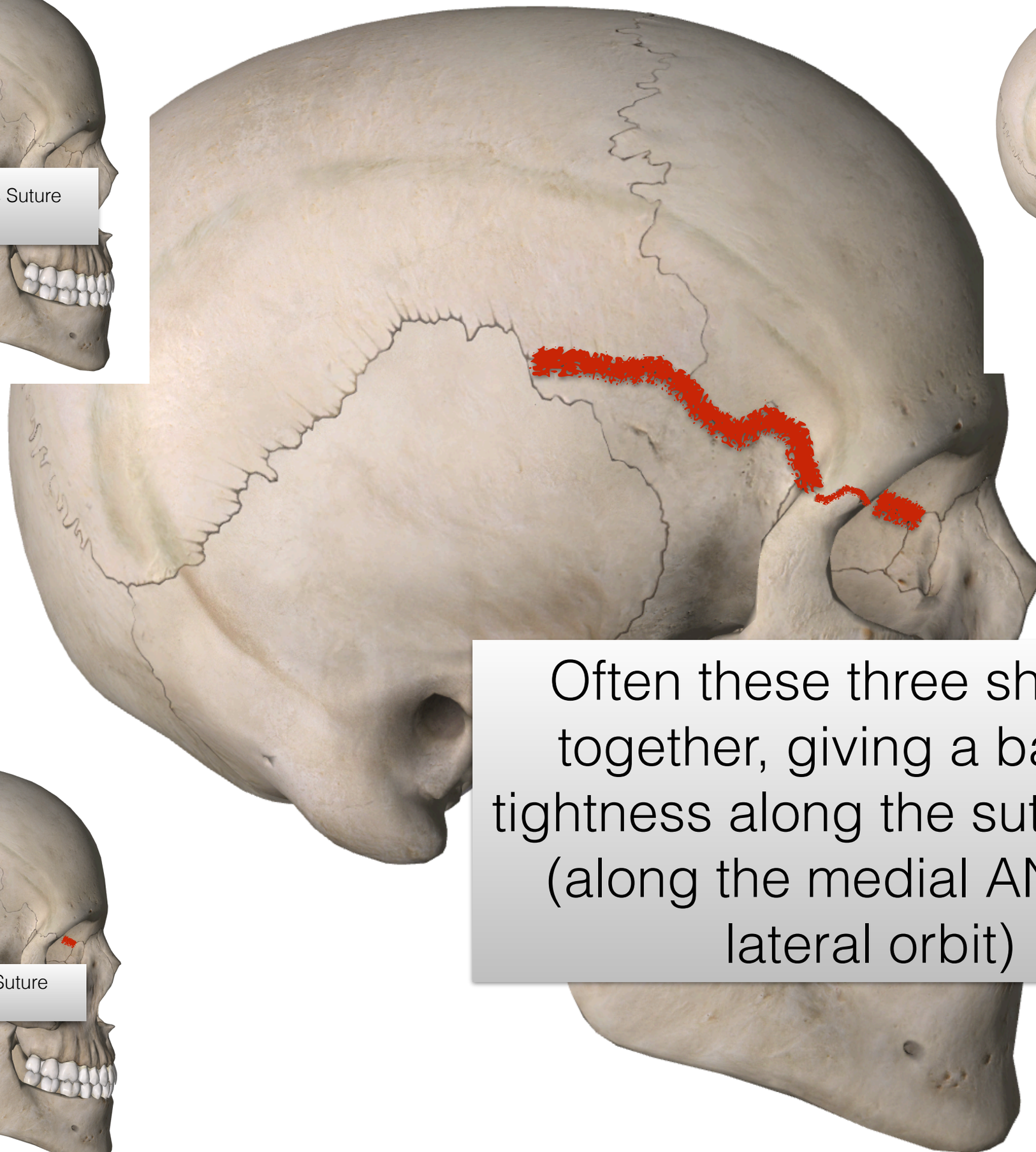

ParietoSquamous Suture Buttress

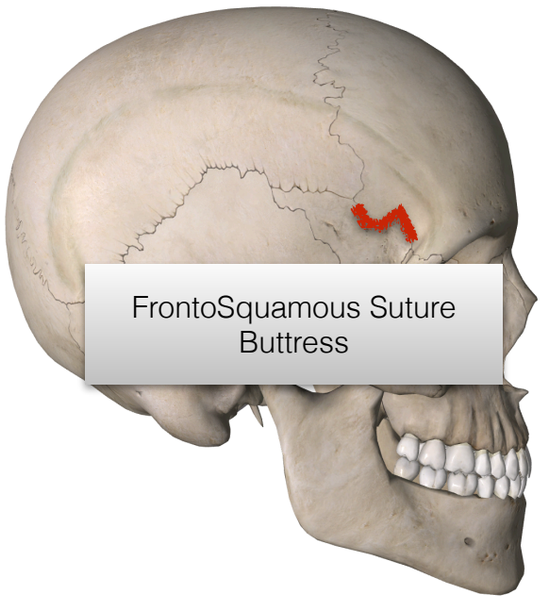

FrontoSquamous Suture Buttress


FrontoEthmoid Suture Buttress

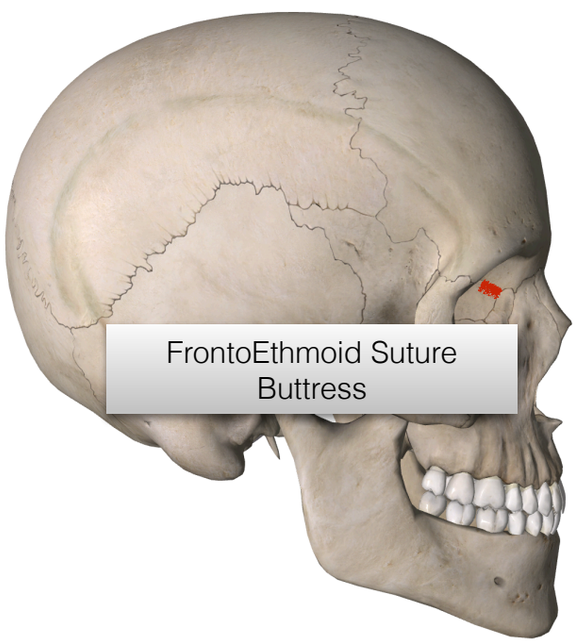


ParietoSquamous Suture Buttress



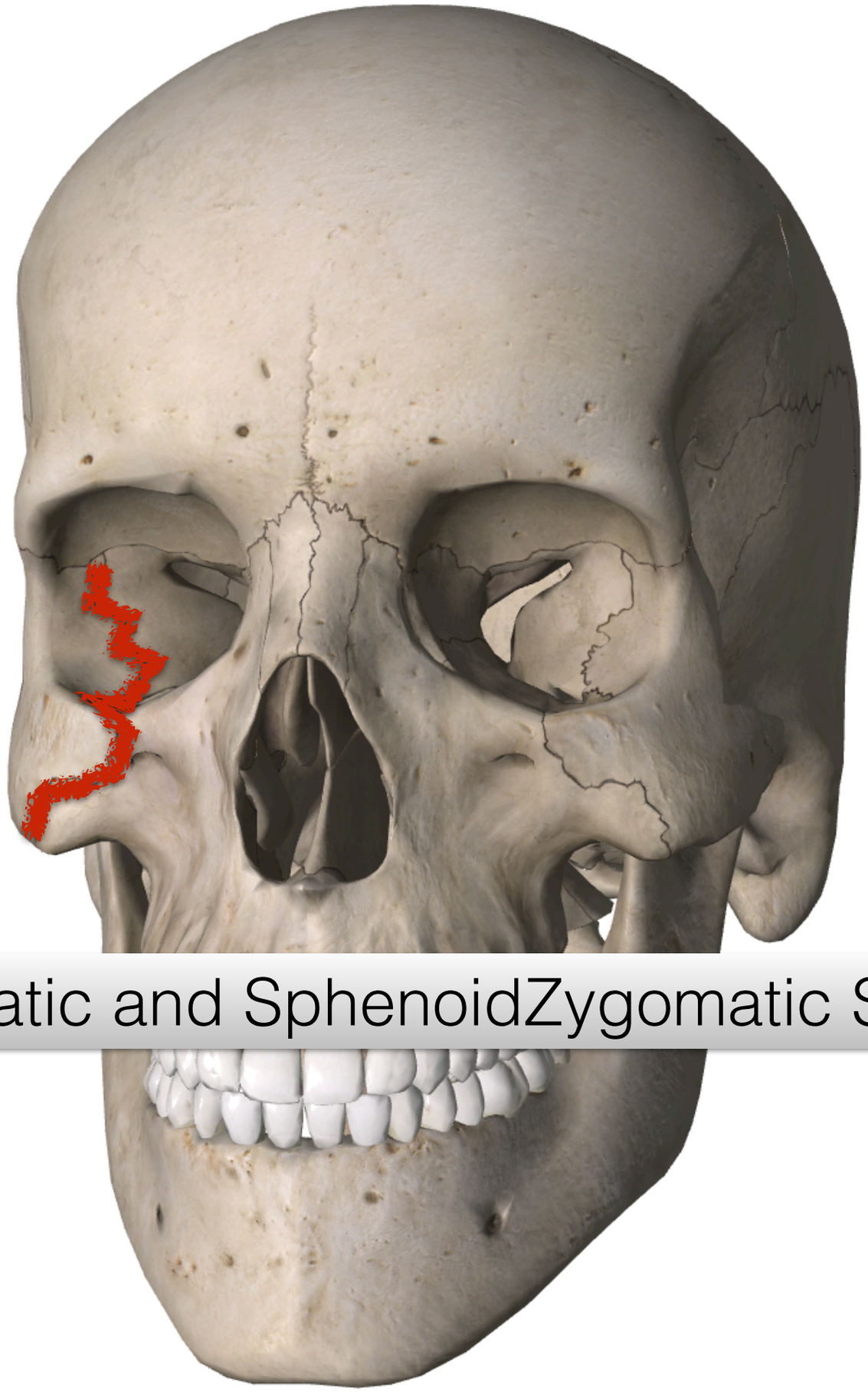


FrontoSquamous Suture Buttress

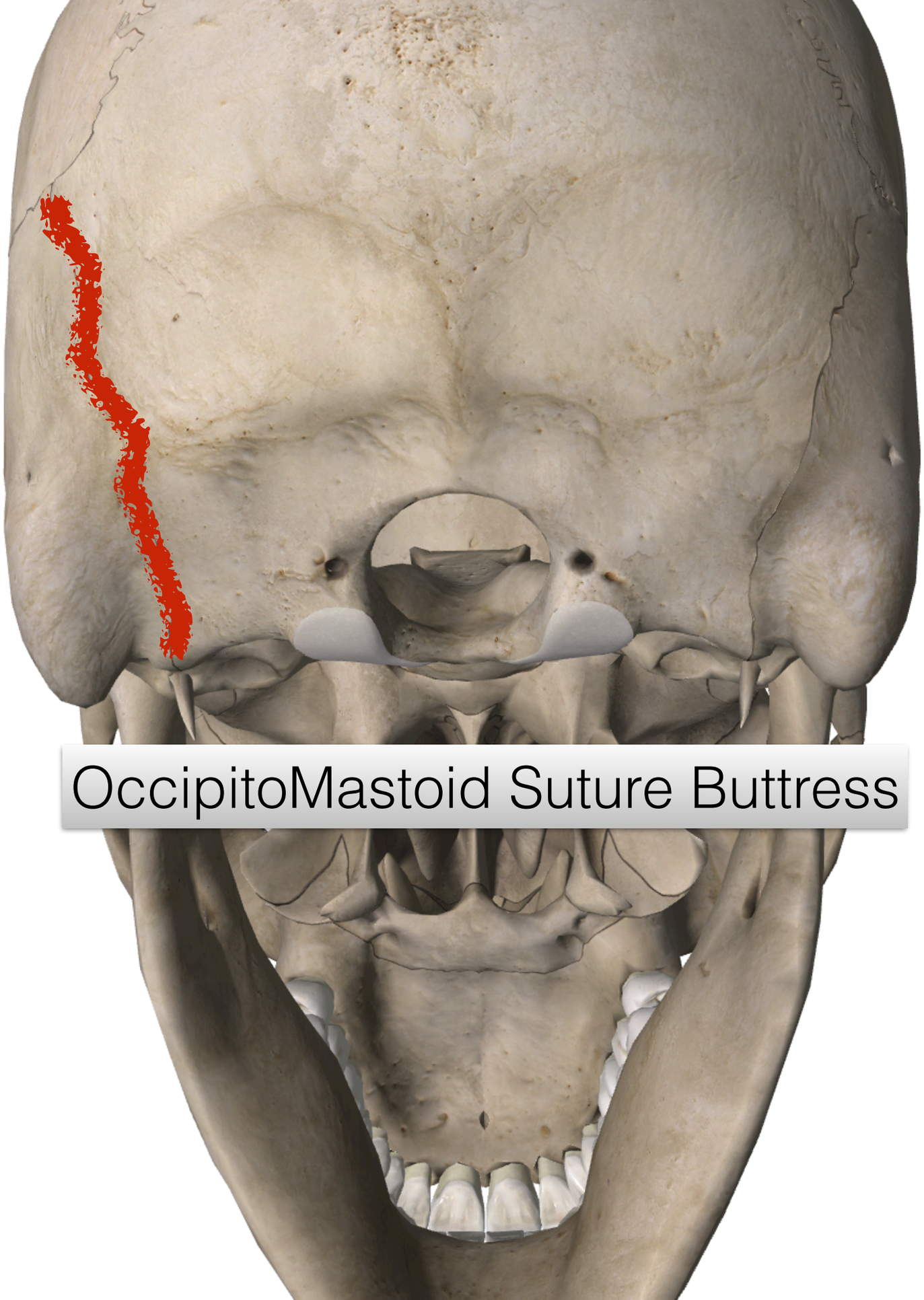


FrontoEthmoid Suture Buttress

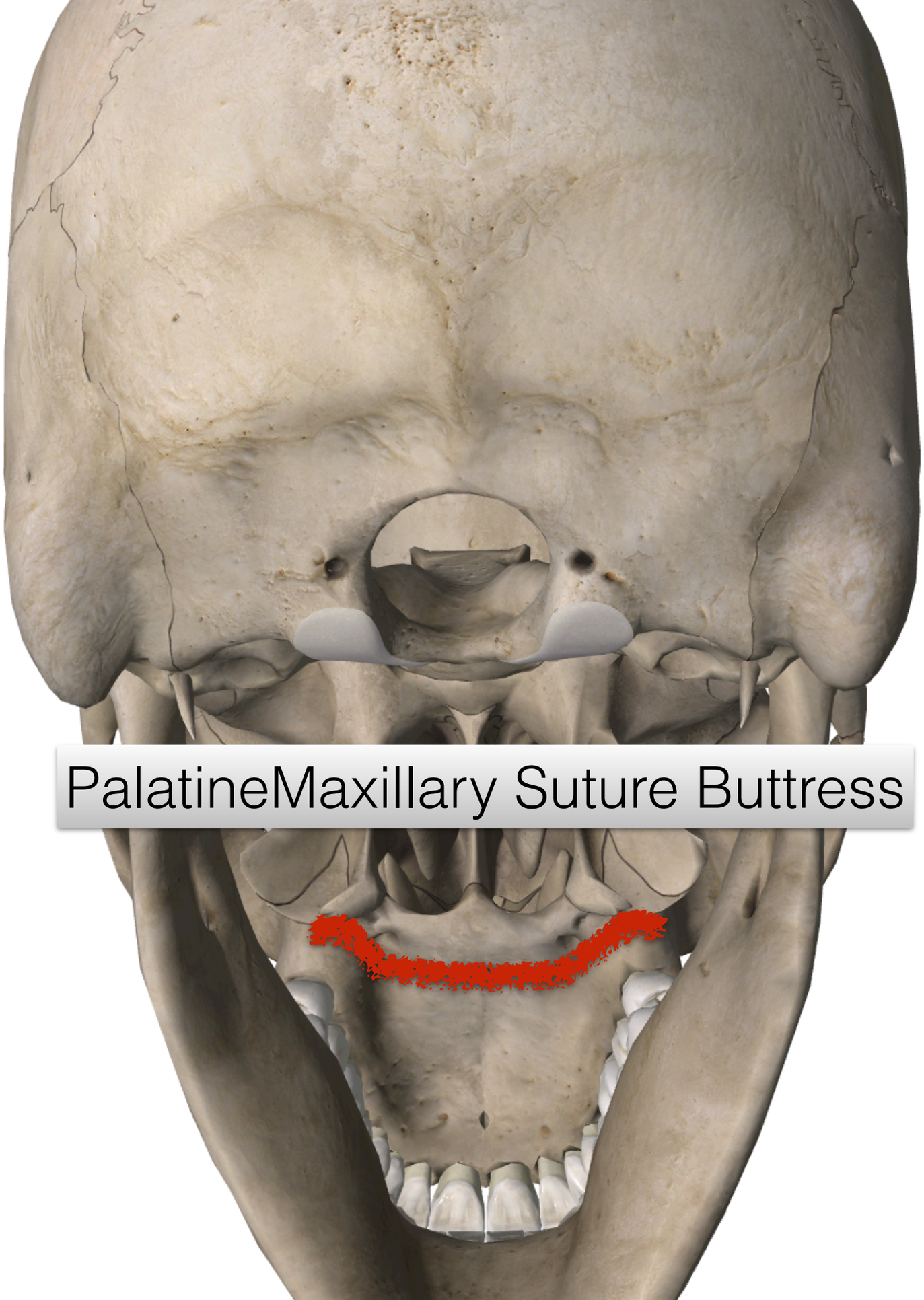
Often these three show up together, giving a band of tightness along the suture lines (along the medial AND/OR lateral orbit)

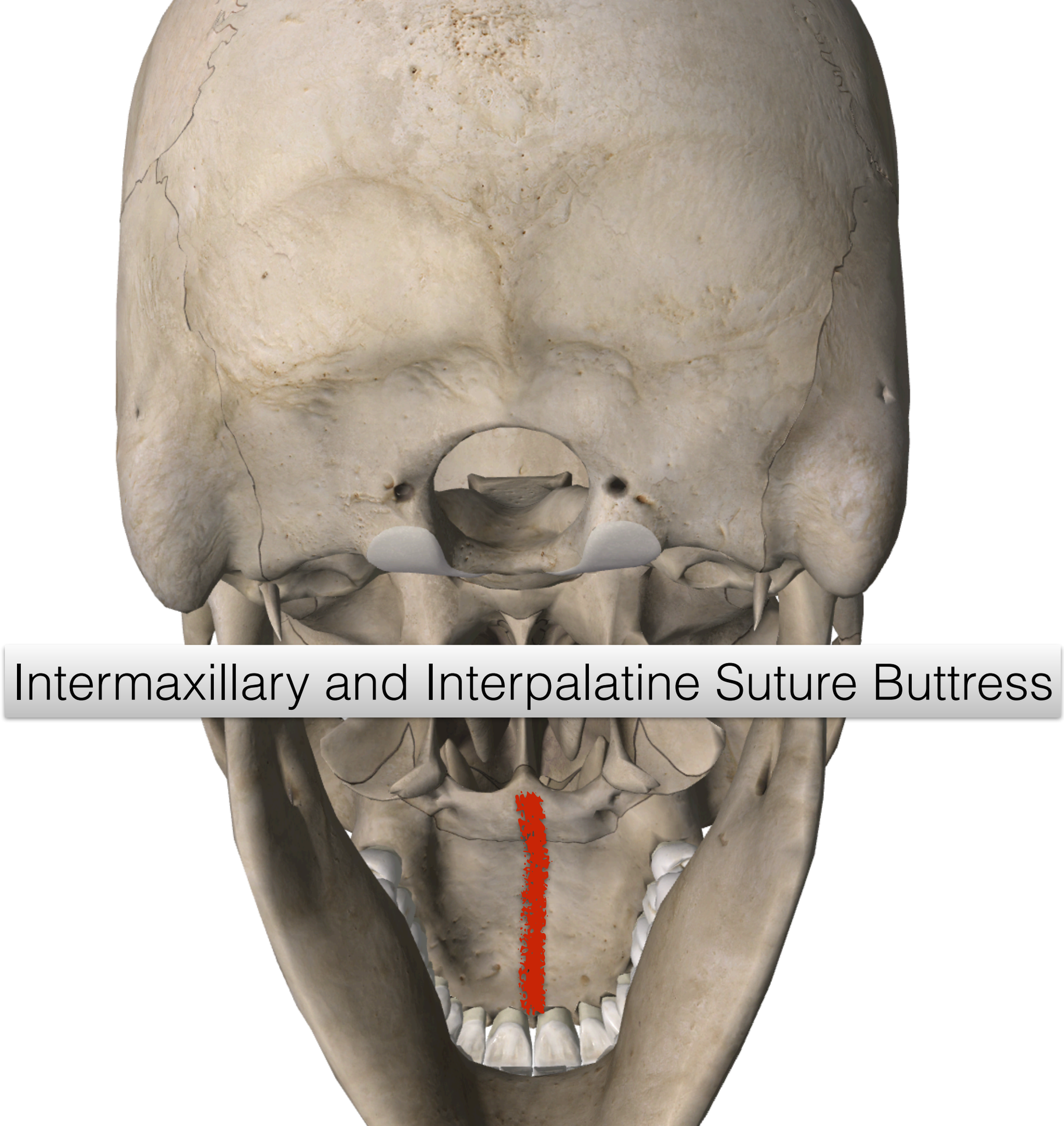


MaxillaryZygomatic and SphenoidZygomatic Suture Buttress



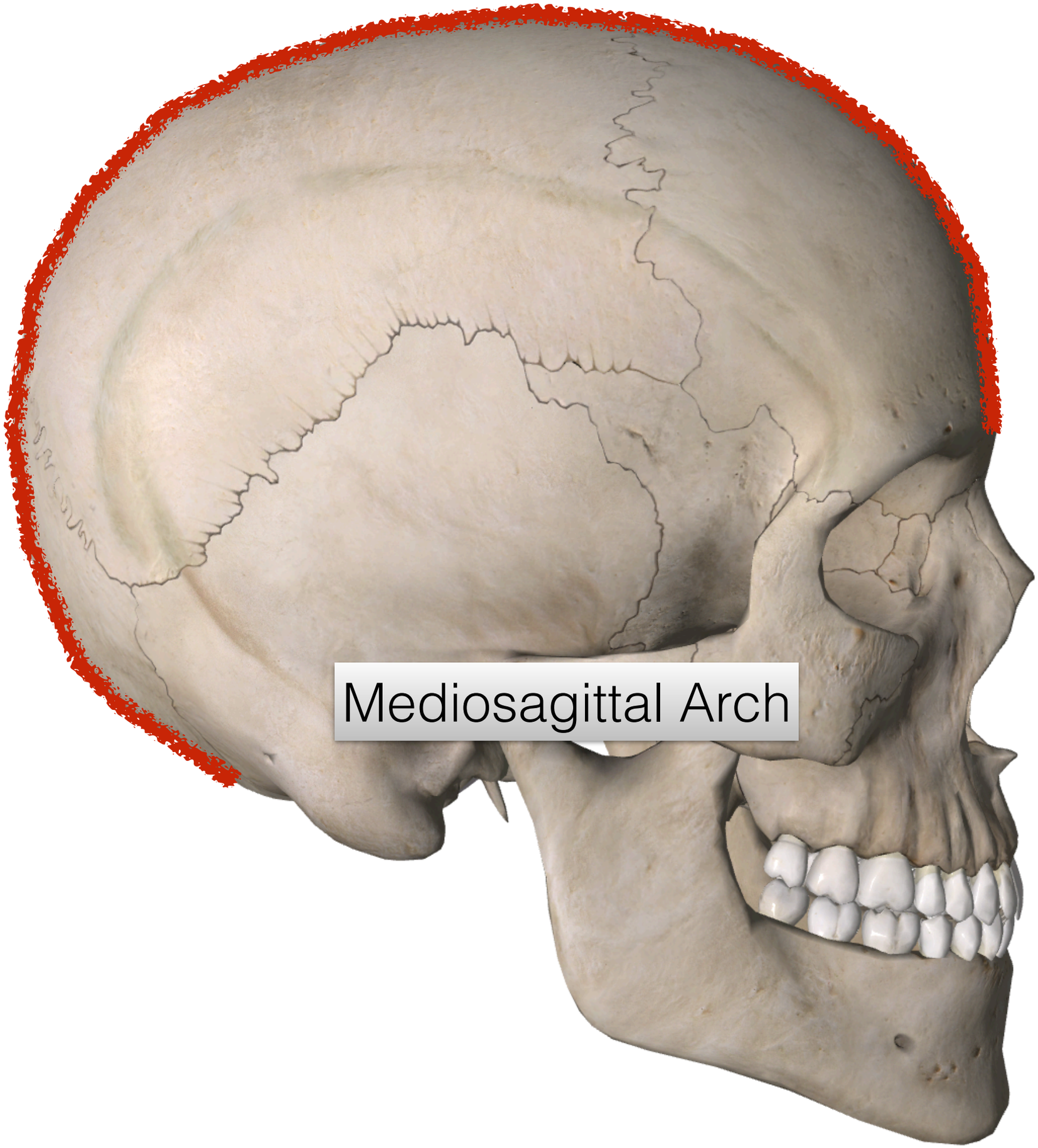
OccipitoMastoid Suture Buttress

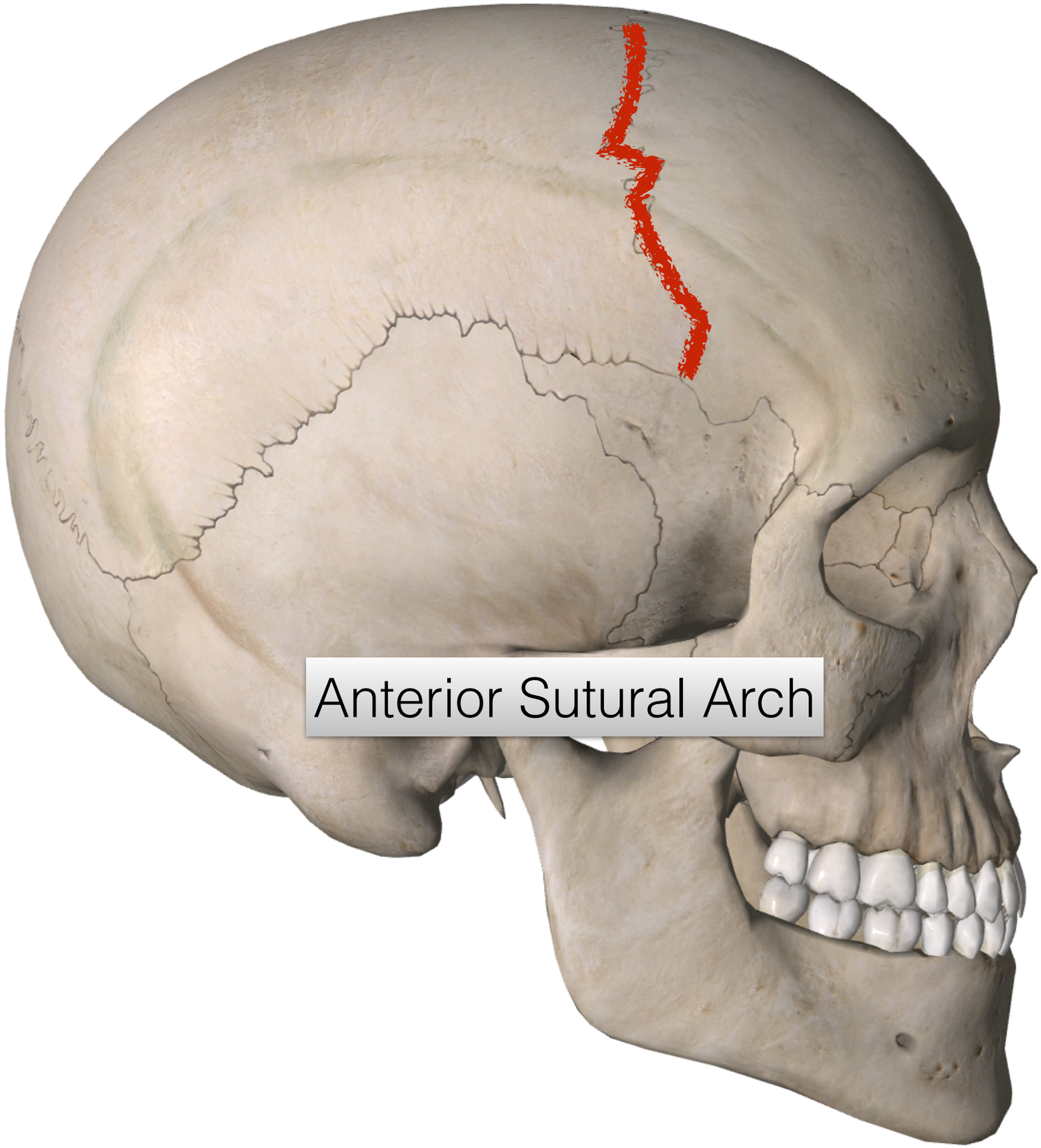

PalatineMaxillary Suture Buttress

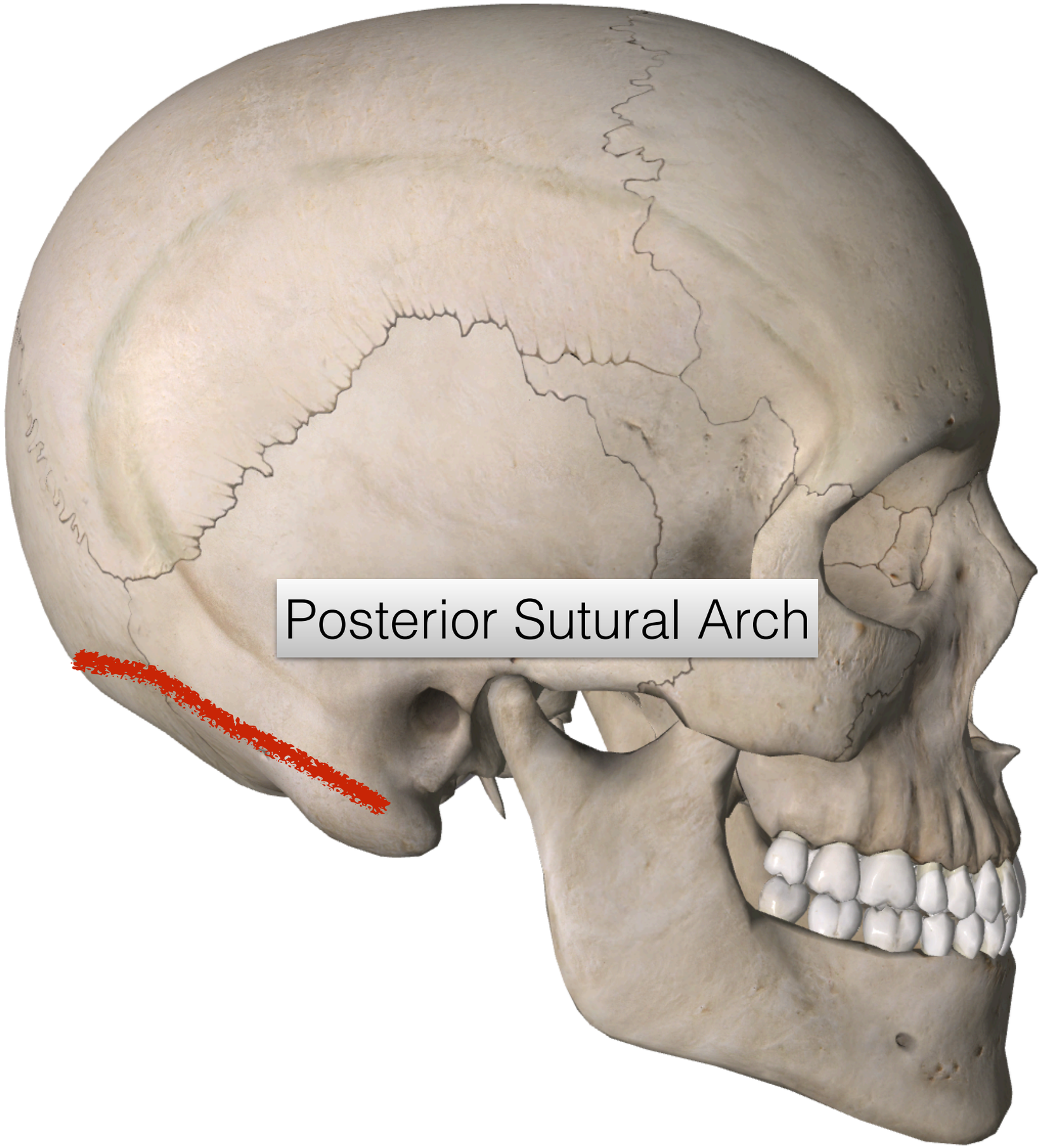


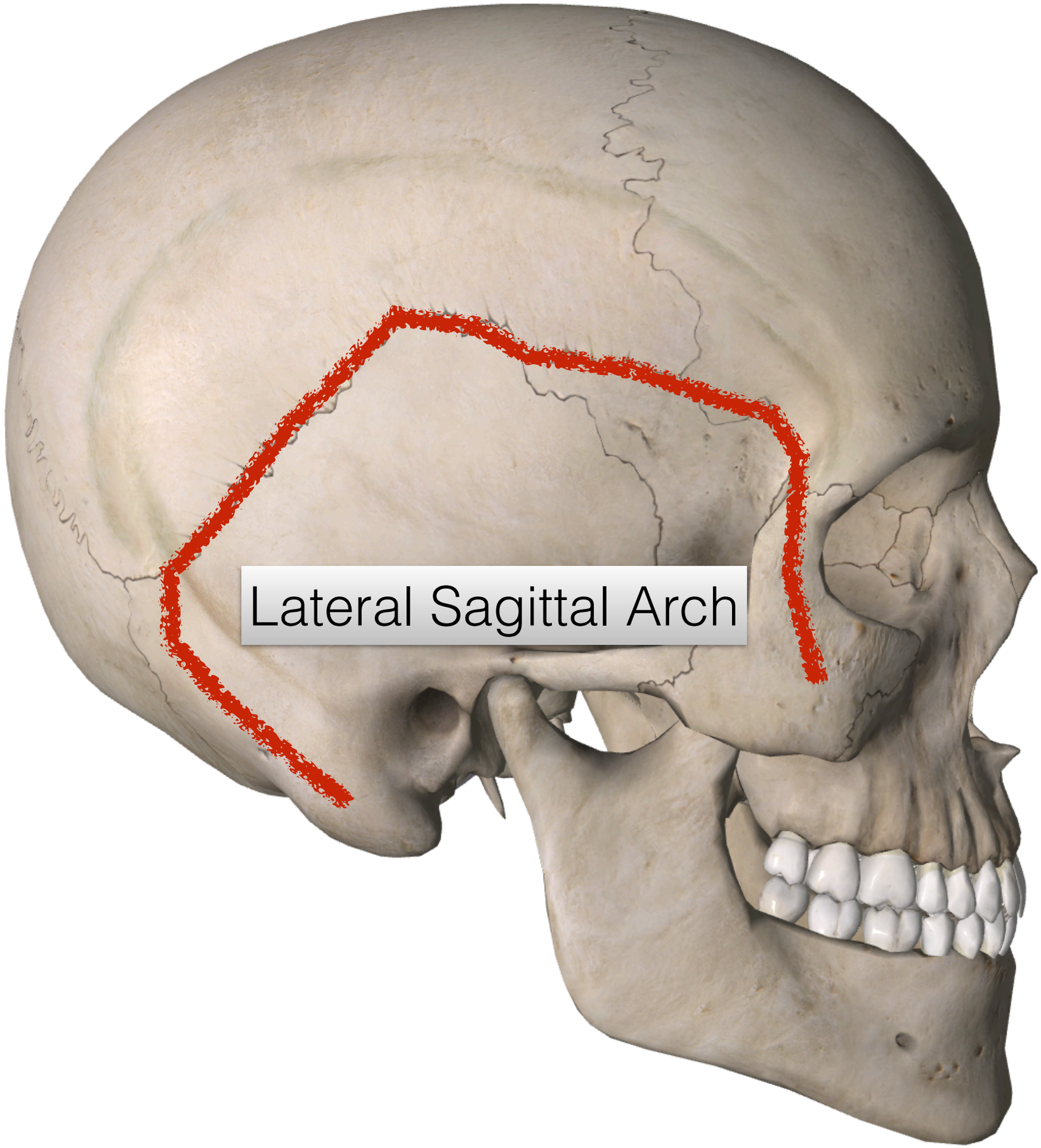
Intermaxillary and Interpalatine Suture Buttress

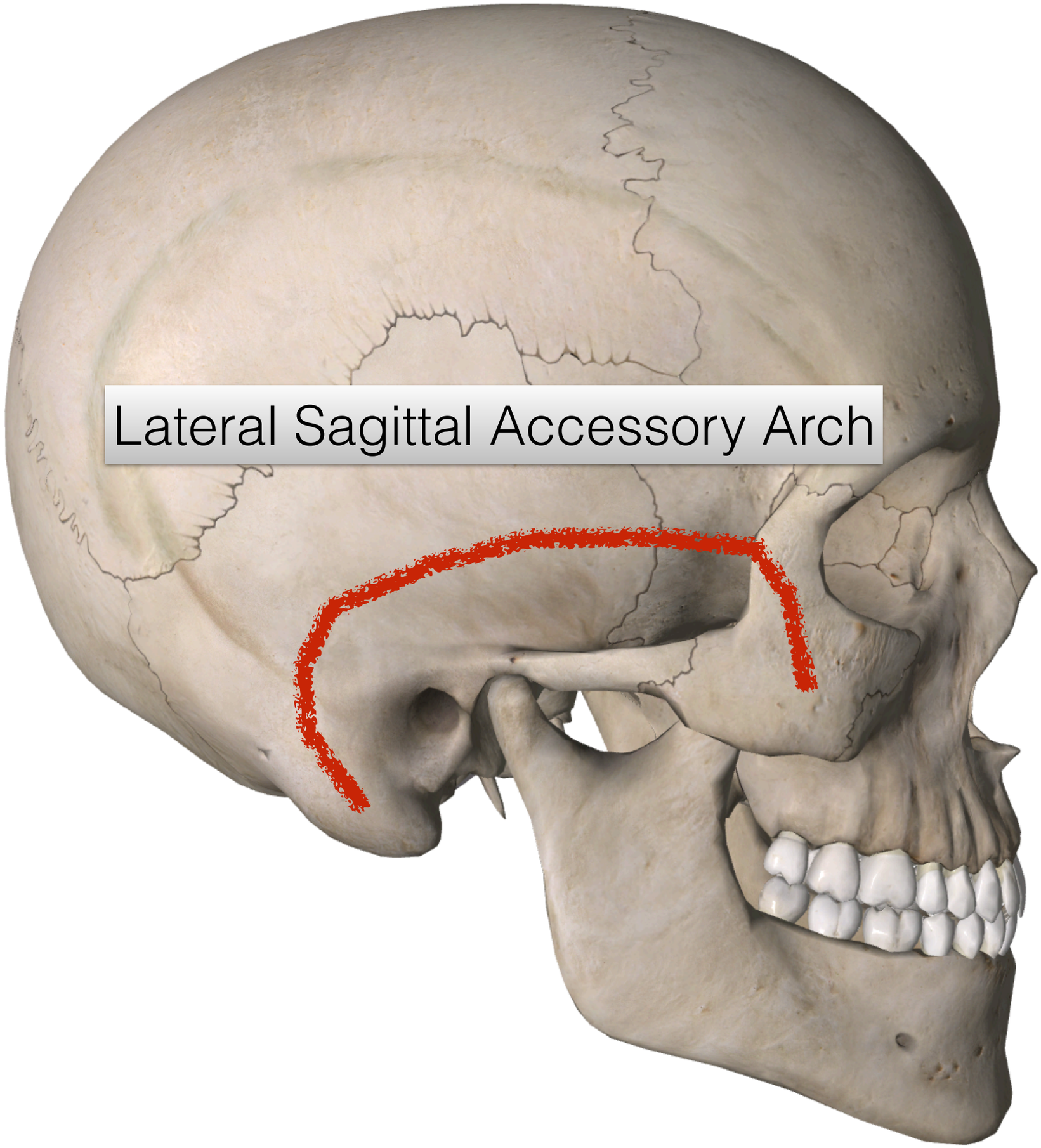
And the Arches…

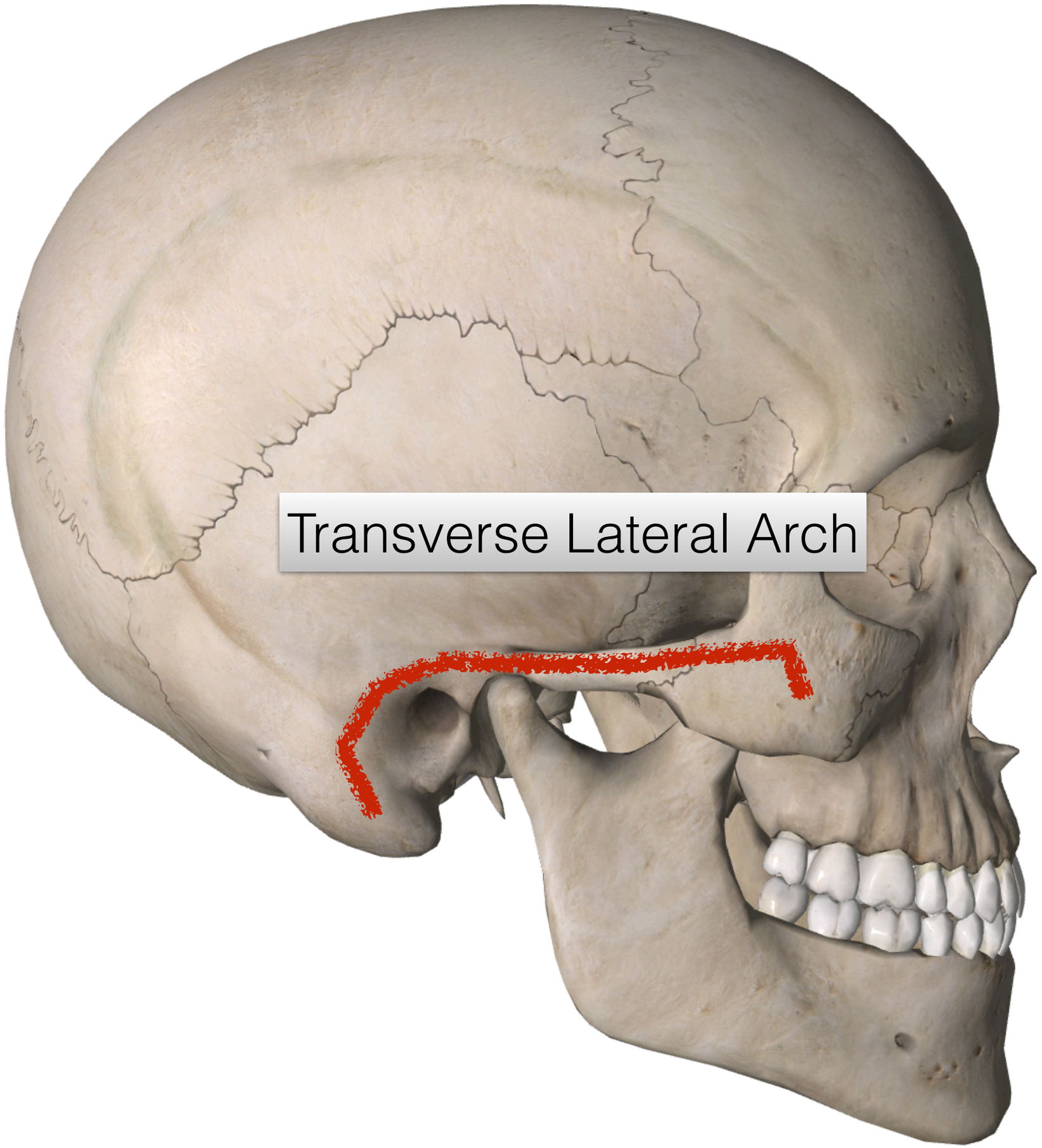

Mediosagittal Arch

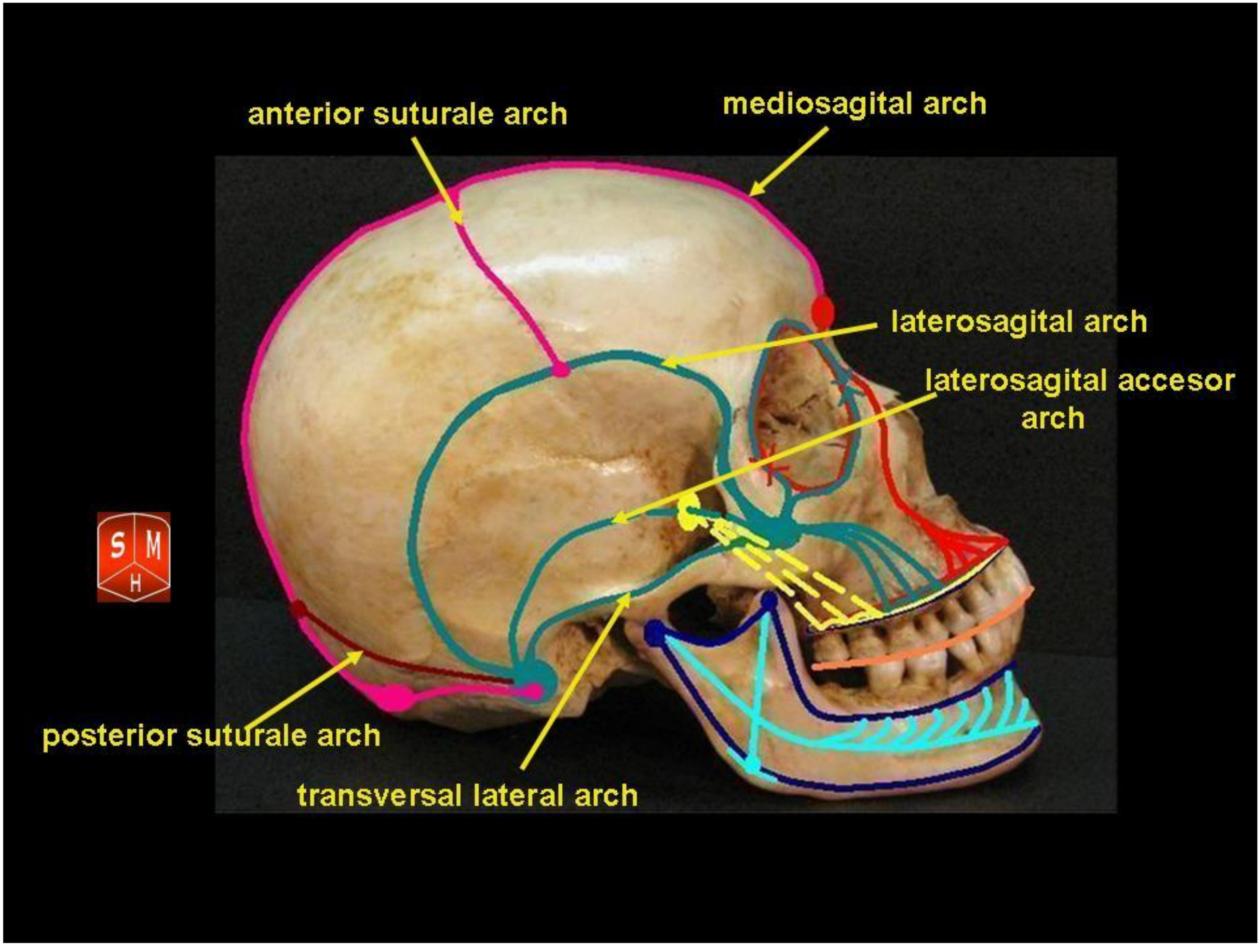

Anterior Sutural Arch


Posterior Sutural Arch


Lateral Sagittal Arch


Lateral Sagittal Accessory Arch


Transverse Lateral Arch


anterior suturale arch
mediosagital arch
laterosagital arch
laterosagital accesor arch
posterior suturale arch
transversal lateral arch

The Cranial Fossae and the RTM

Cranial Fossae and the RTM

- Because of the trigeminal nerve innervation. the floors of the cranial fossae can be restricted/tight.

- This can come from membranes causing CN V issues or CN V causing membrane tightness.

- Always look for these issues in any facial trauma or dental procedure (including cleanings) and especially with ANY dental appliances.

Tentorium

- The recurrent meningeal branches of V1 (ophthalmic division of the trigeminal nerve), also known as the nervus tentorii of Arnold, innervates the tentorium cerebelli.

- The posterior projections of these tentorial nerves form a plexus within the tentorium cerebelli and are predominate at the superior wall of the transverse sinus and the posterior half of the straight sinus. Lee et al. found innervation to be the most scarce at the tentorial notch and the anterior half of the straight sinus. This provided clinical significance so as to avoid retraction at the posterior aspect of the falx cerebri and tentorium cerebelli. Manipulation in this area was shown to cause hemodynamic fluctuations, including hypotension, bradycardia, arrhythmia, asystole, or apnea (known as the trigeminocardiac reflex) by eliciting neural signals stimulated by the sensory endings of the trigeminal nerve through the trigeminal ganglion to the sensory nucleus of the trigeminal nerve in the brainstem.

Falx

- In the anterior part of the falx cerebri, innervation is supplied by the anterior meningeal branches of the ethmoidal nerves, which derive from the nasociliary nerve (ophthalmic nerve, CN V1).

- Posteriorly, we find the ascending expansions of the tentorial branches, arising from the ophthalmic nerve (providing sensory input CN V1), which supply it.

Anterior Cranial Fossa

- meningeal branches from the anterior and posterior ethmoidal nerves, off the nasociliary nerve from the ophthalmic division of the trigeminal nerve (CN V1)

- meningeal branches from the maxillary nerve (CN V2)

Middle Cranial Fossa

- meningeal branches of ophthalmic, maxillary and mandibular divisions of trigeminal nerve (CN V1,2,3)

- tentorial branches of the ophthalmic and maxillary divisions of the trigeminal nerve extend posteriorly from the anterior end of the cavernous sinus to the upper surface of the tentorium cerebelli (CN V1,2)

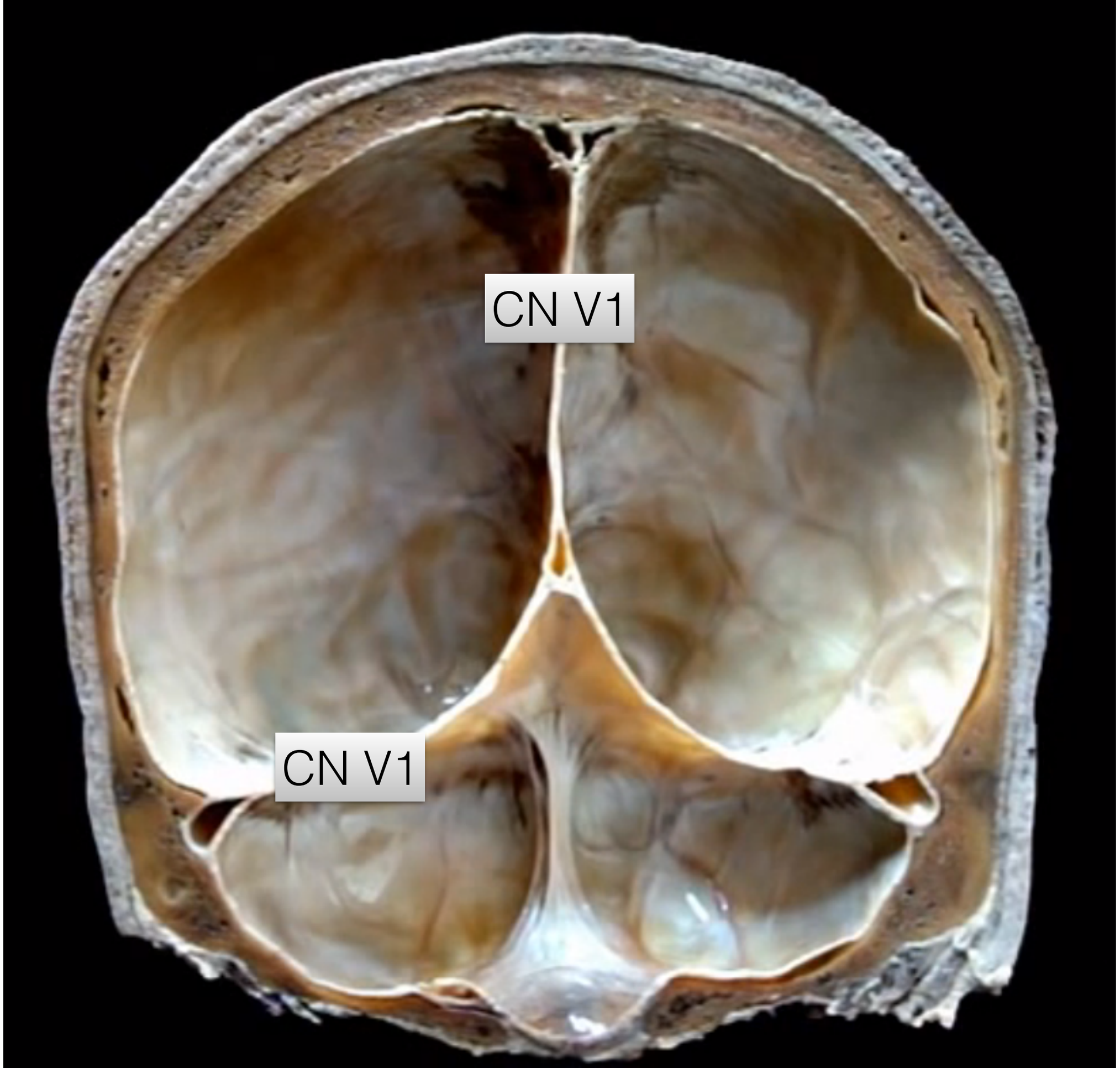
- middle meningeal nerve (a branch off the maxillary nerve (CN V2) supplies the anterior parts of the fossa

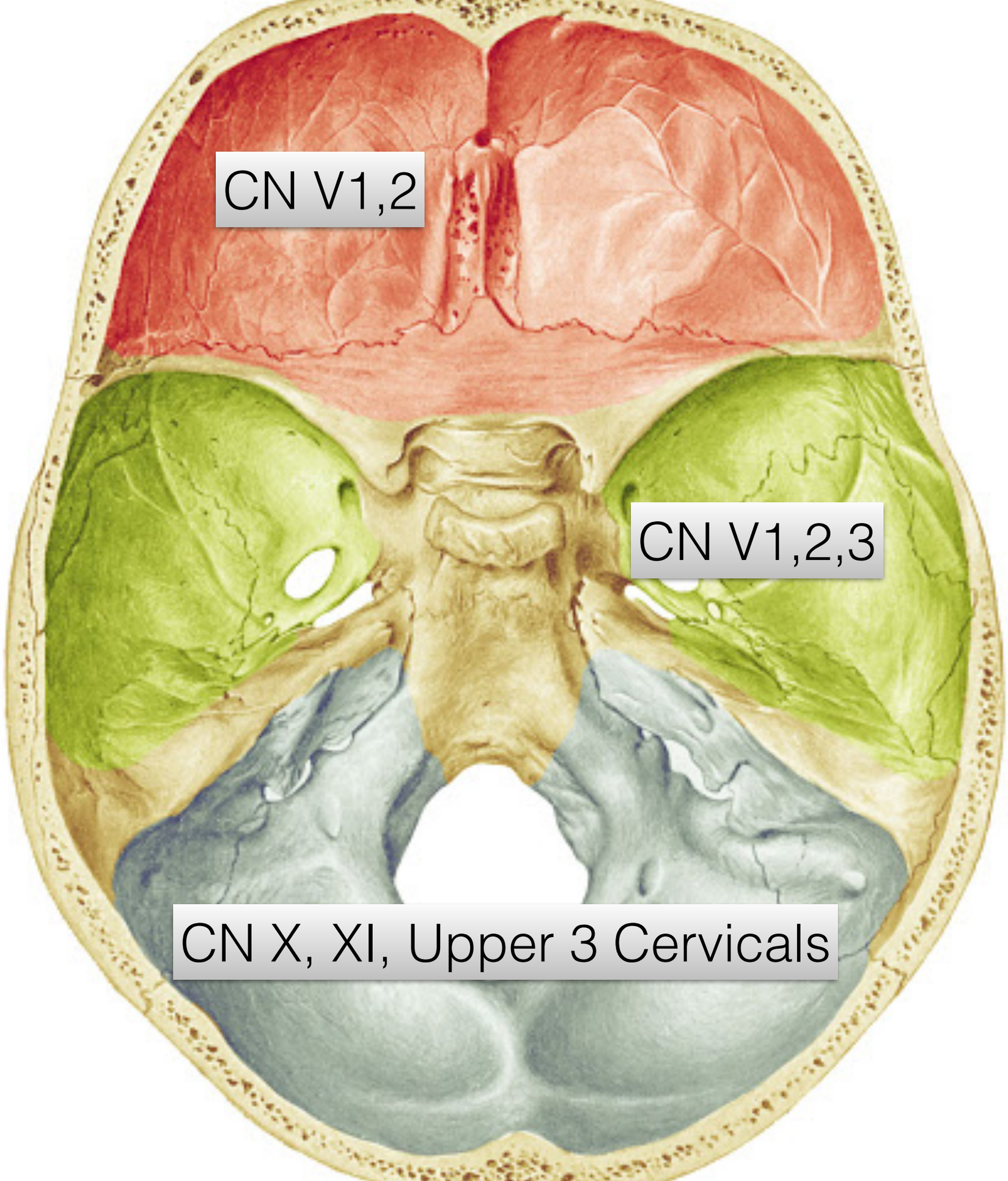
- meningeal branch of the mandibular nerve (CN V3) supplies the posterior parts of the fossa

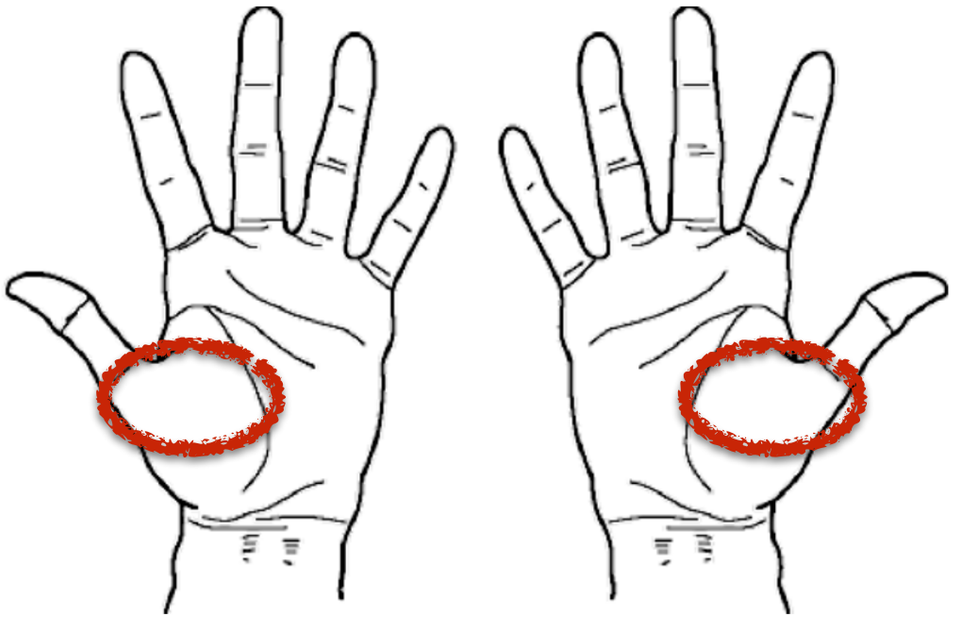
Posterior Cranial Fossa

- sensory meningeal branches from the vagus nerve (CN X) and glossopharyngeal nerve (CN IX) supply the inferior surface of the tentorium and dura of the posterior fossa

- small sensory branches of the C1 to C3 dorsal rami supply around the foramen magnum

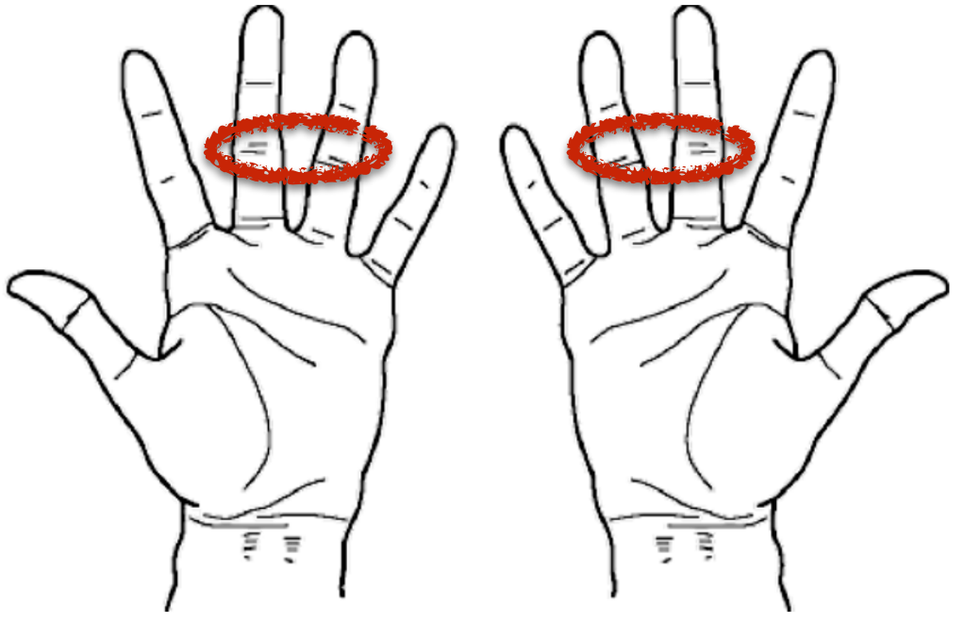

CN V1
CN V1

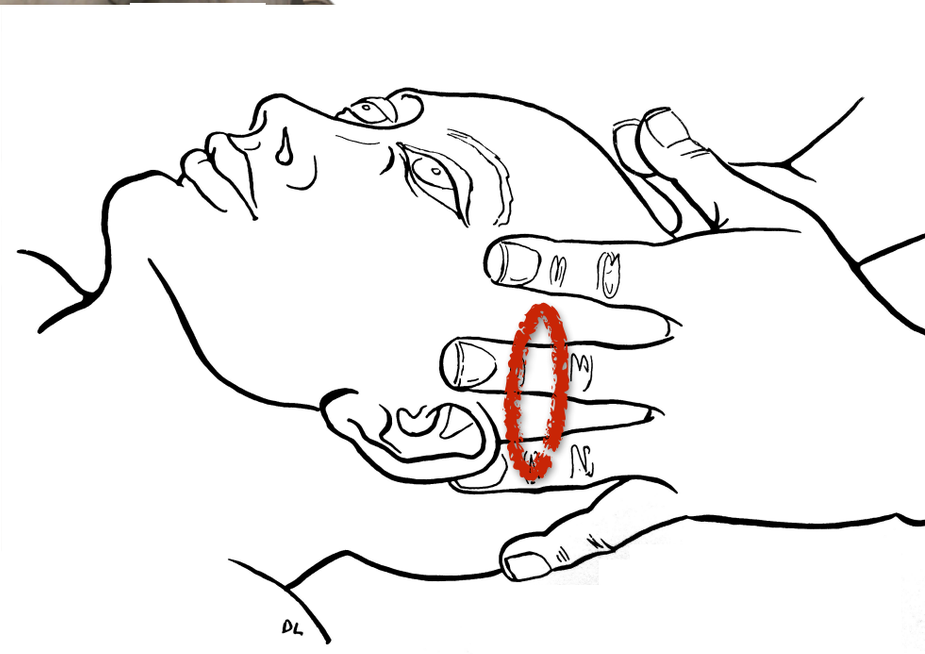

CN V1,2
CN V1,2,3
CN X, XI, Upper 3 Cervicals



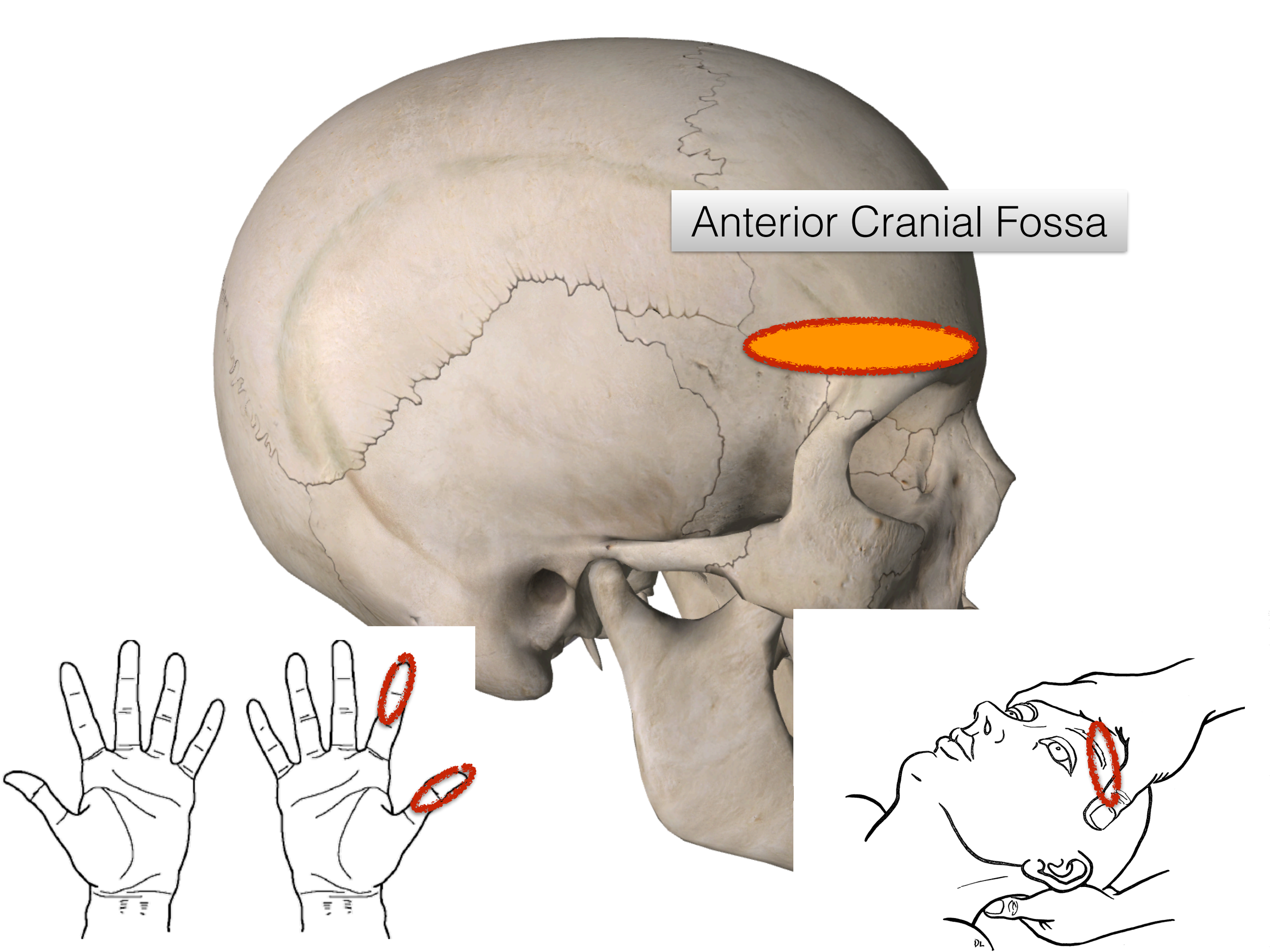
Tentorium

Tentorium

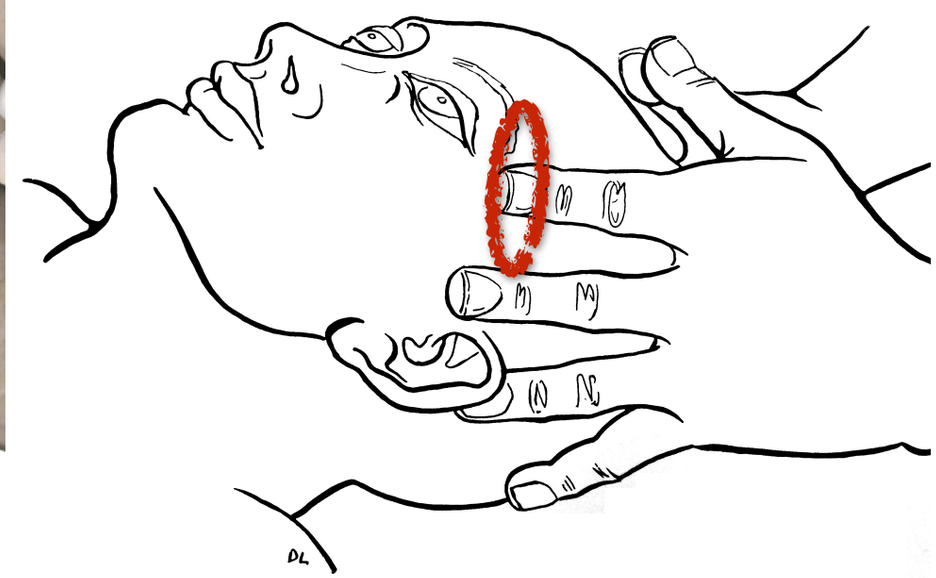


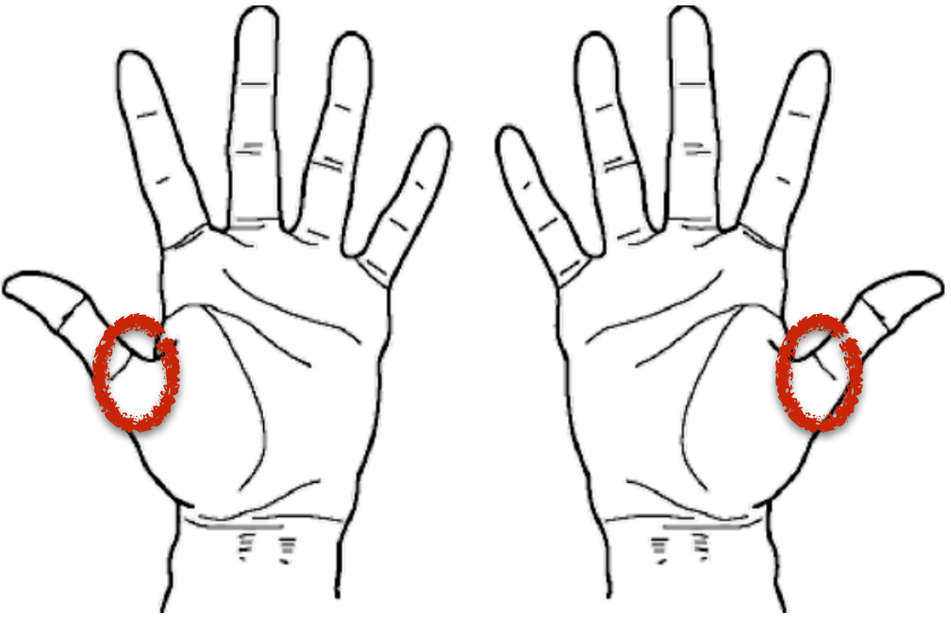


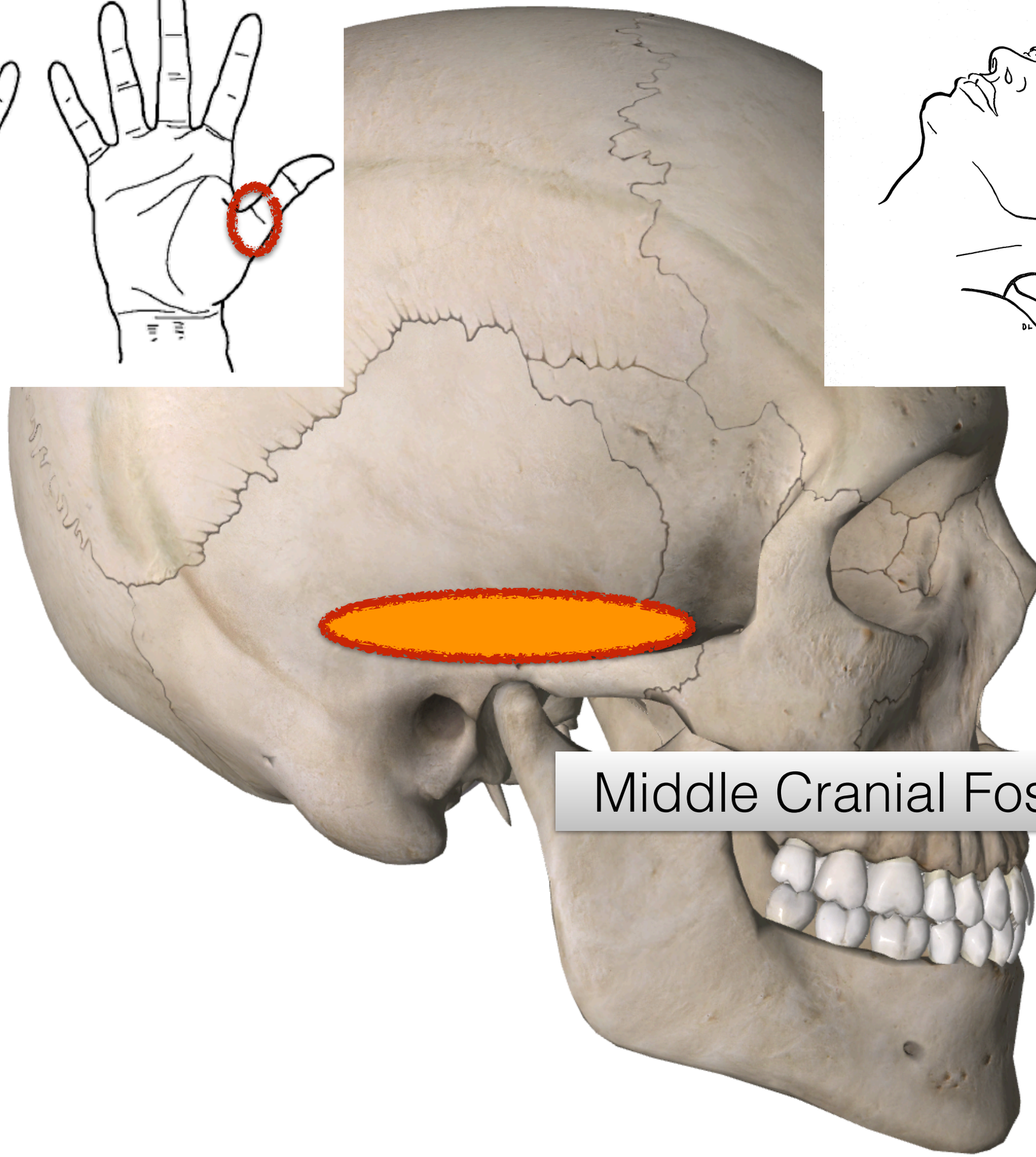
Anterior Cranial Fossa



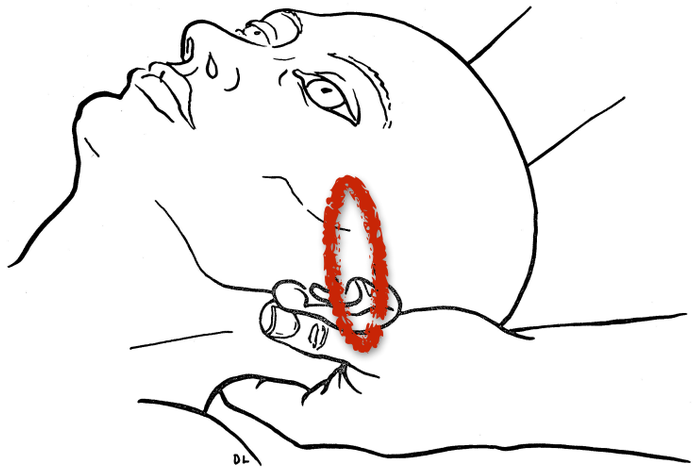
Anterior Cranial Fossa



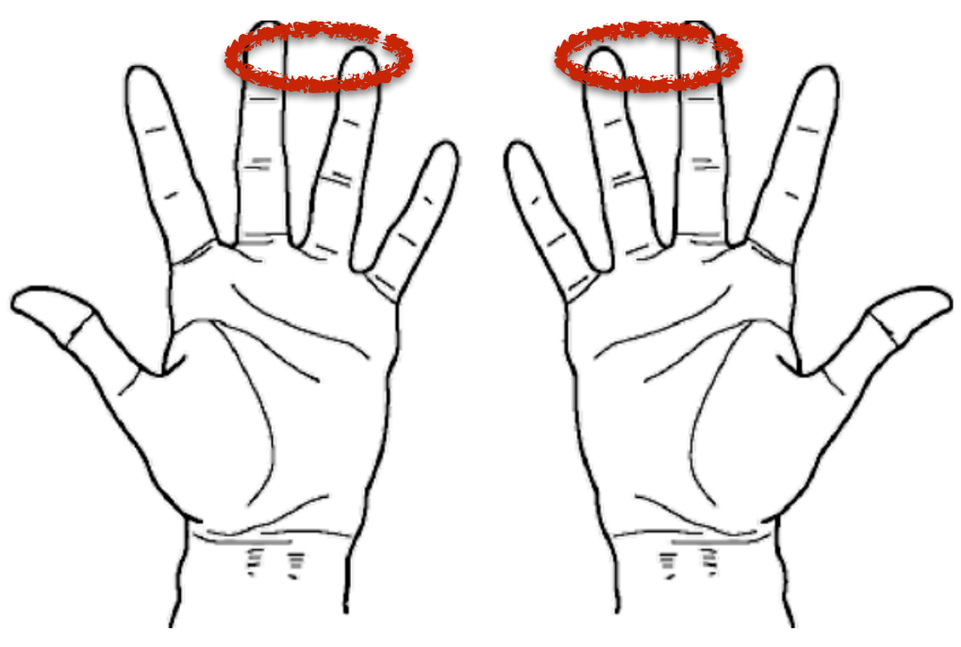


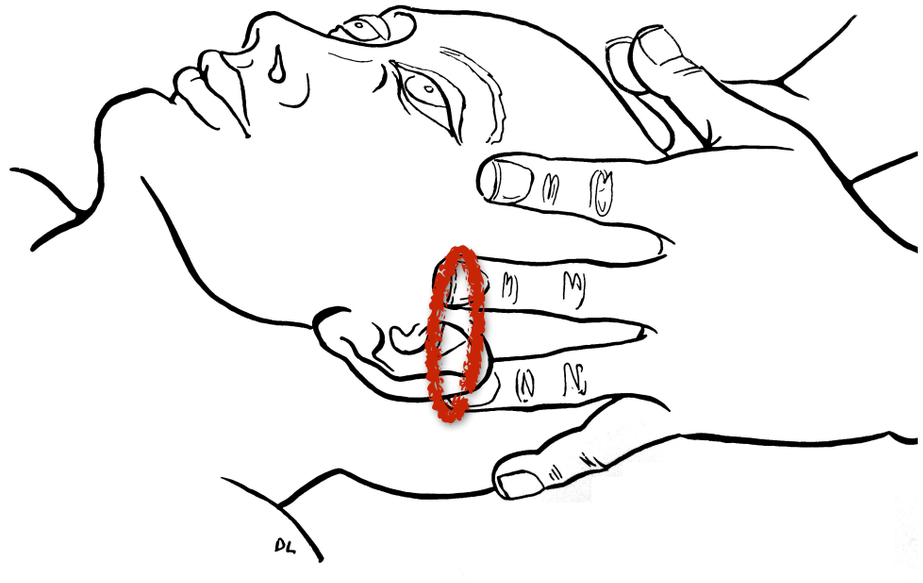


Middle Cranial Fossa

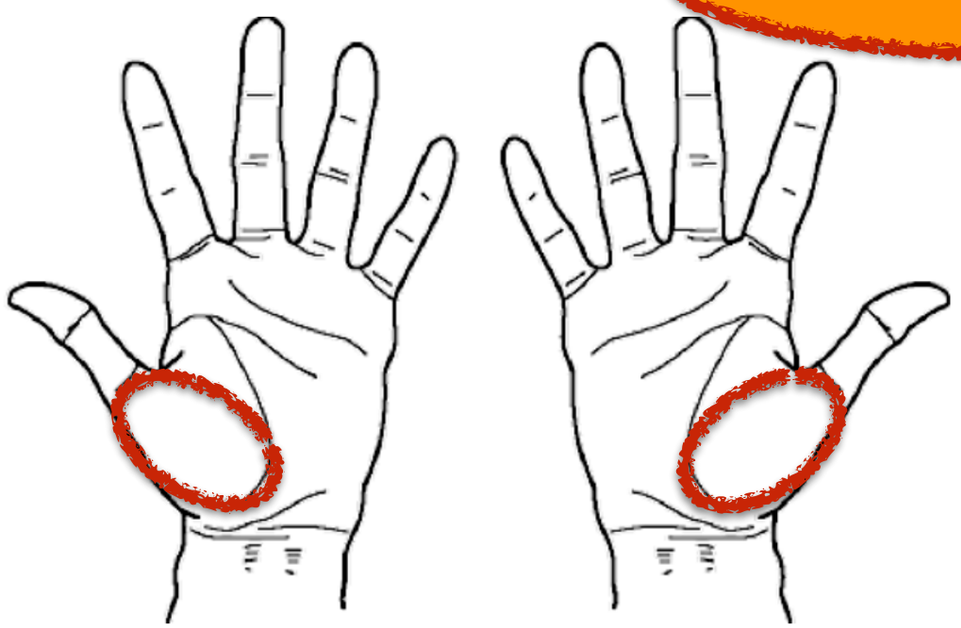


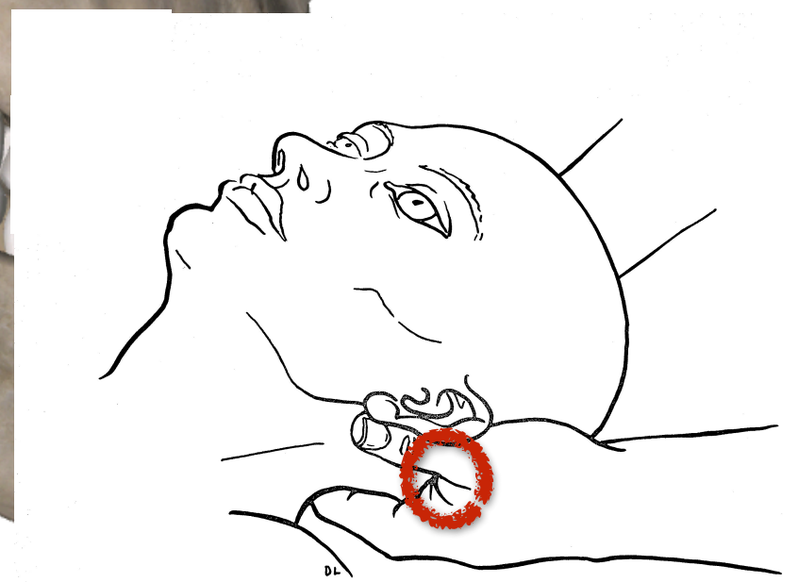
Middle Cranial Fossa

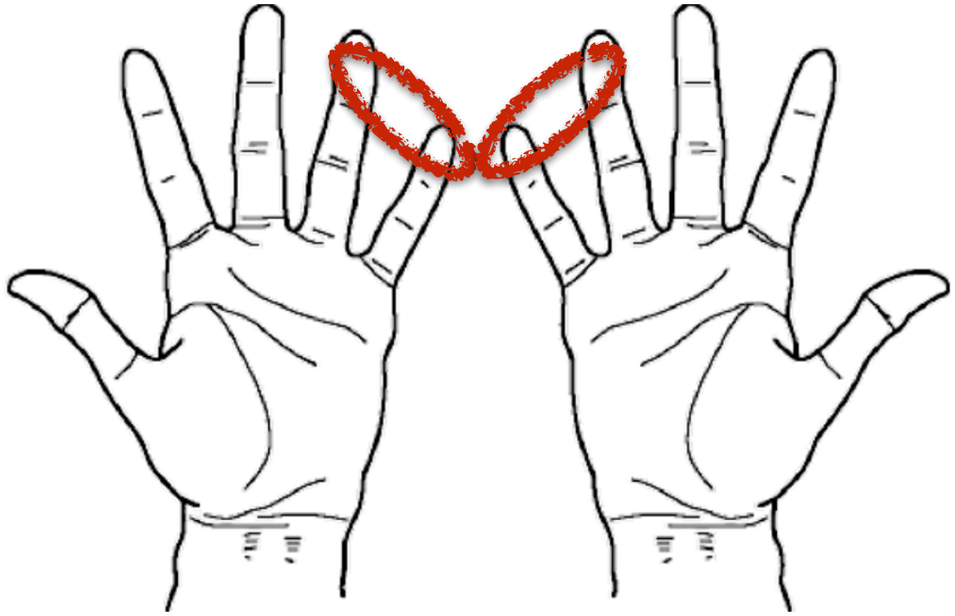


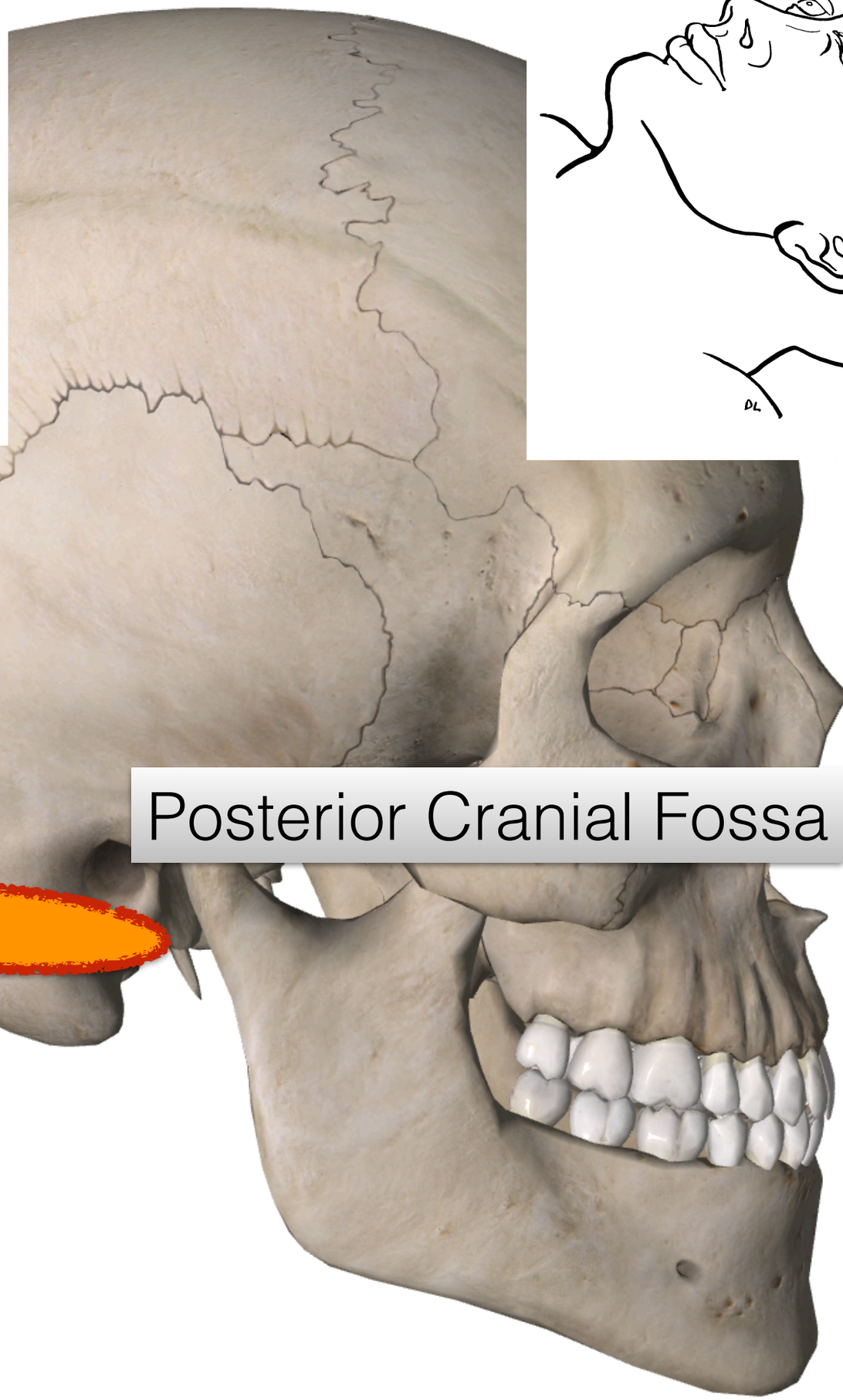


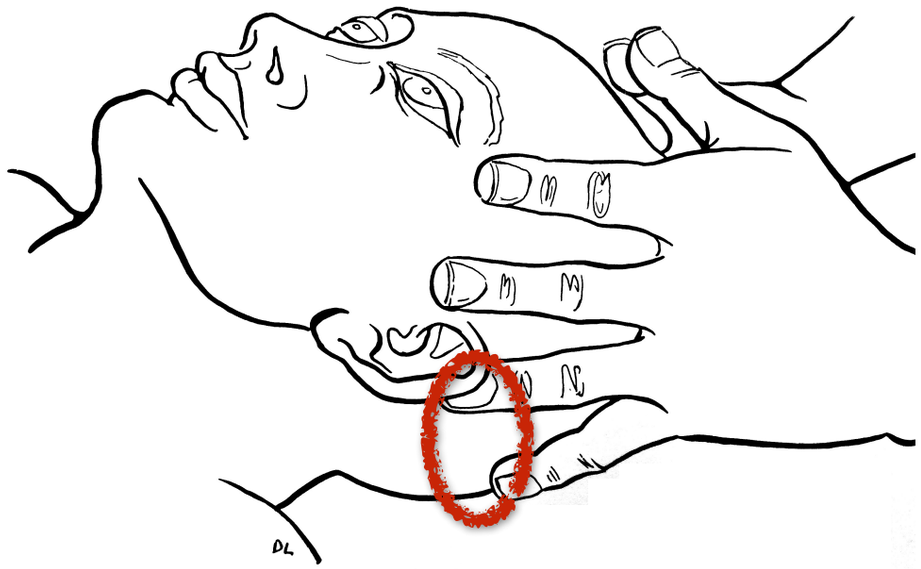
Posterior Cranial Fossa



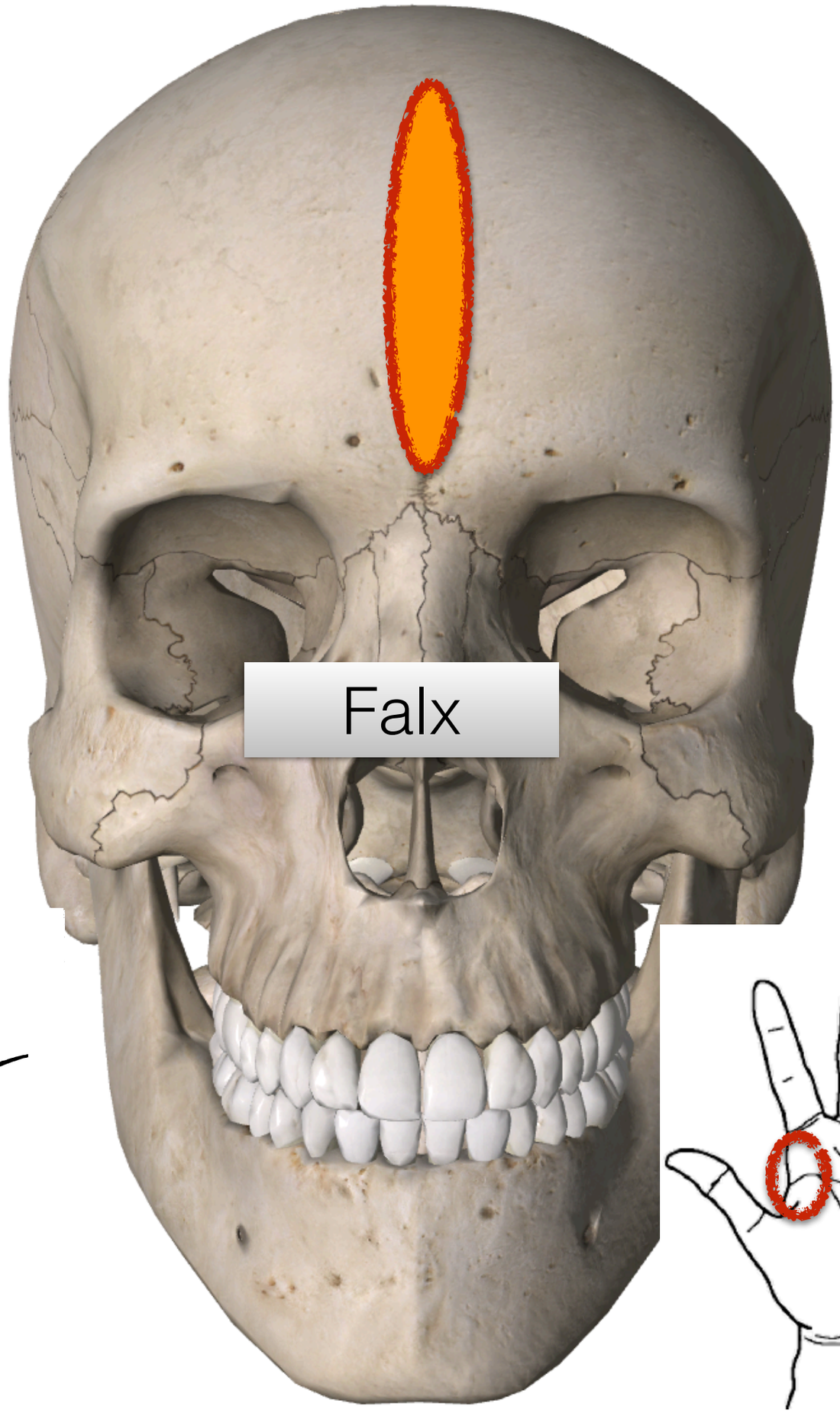


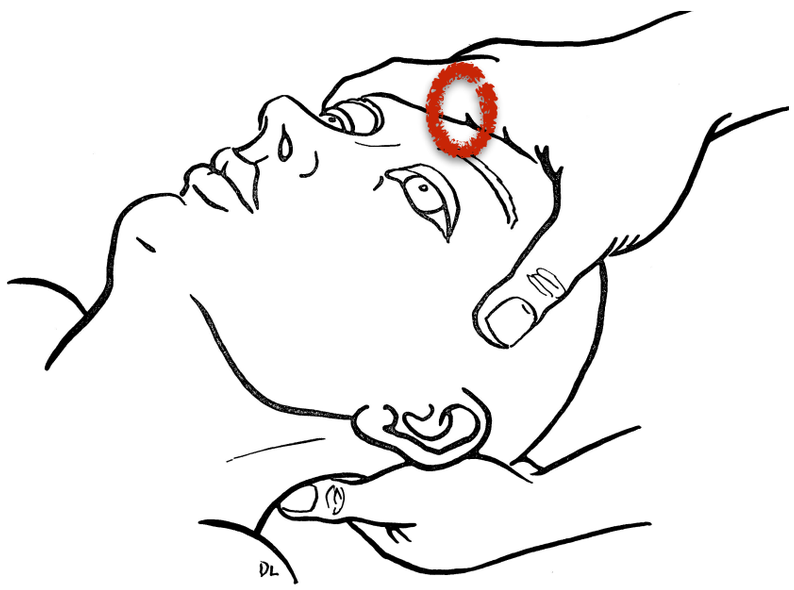


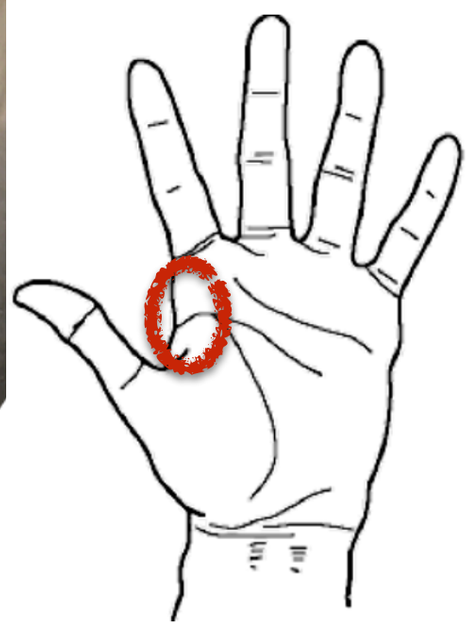


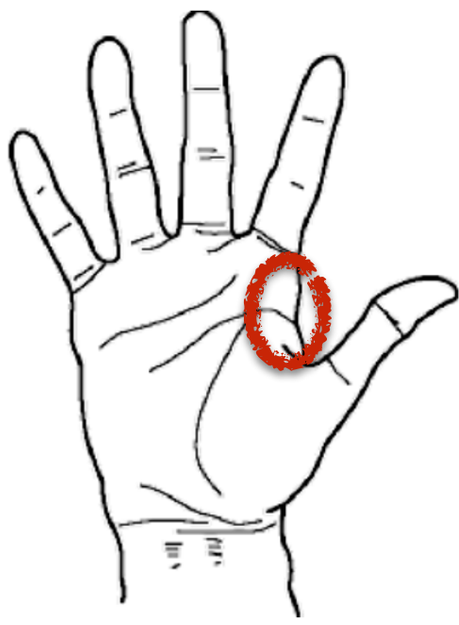


Posterior Cranial Fossa

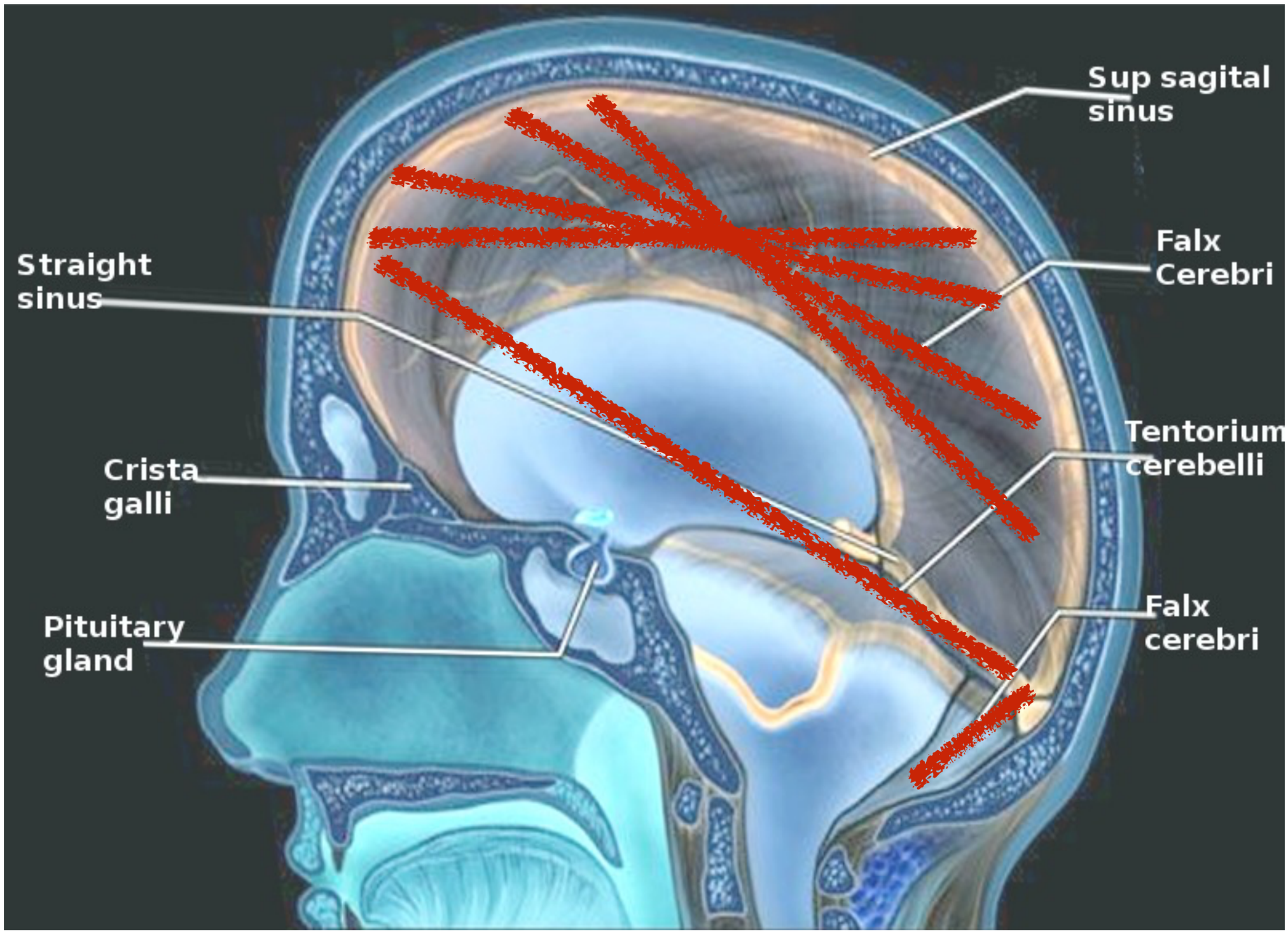

Falx





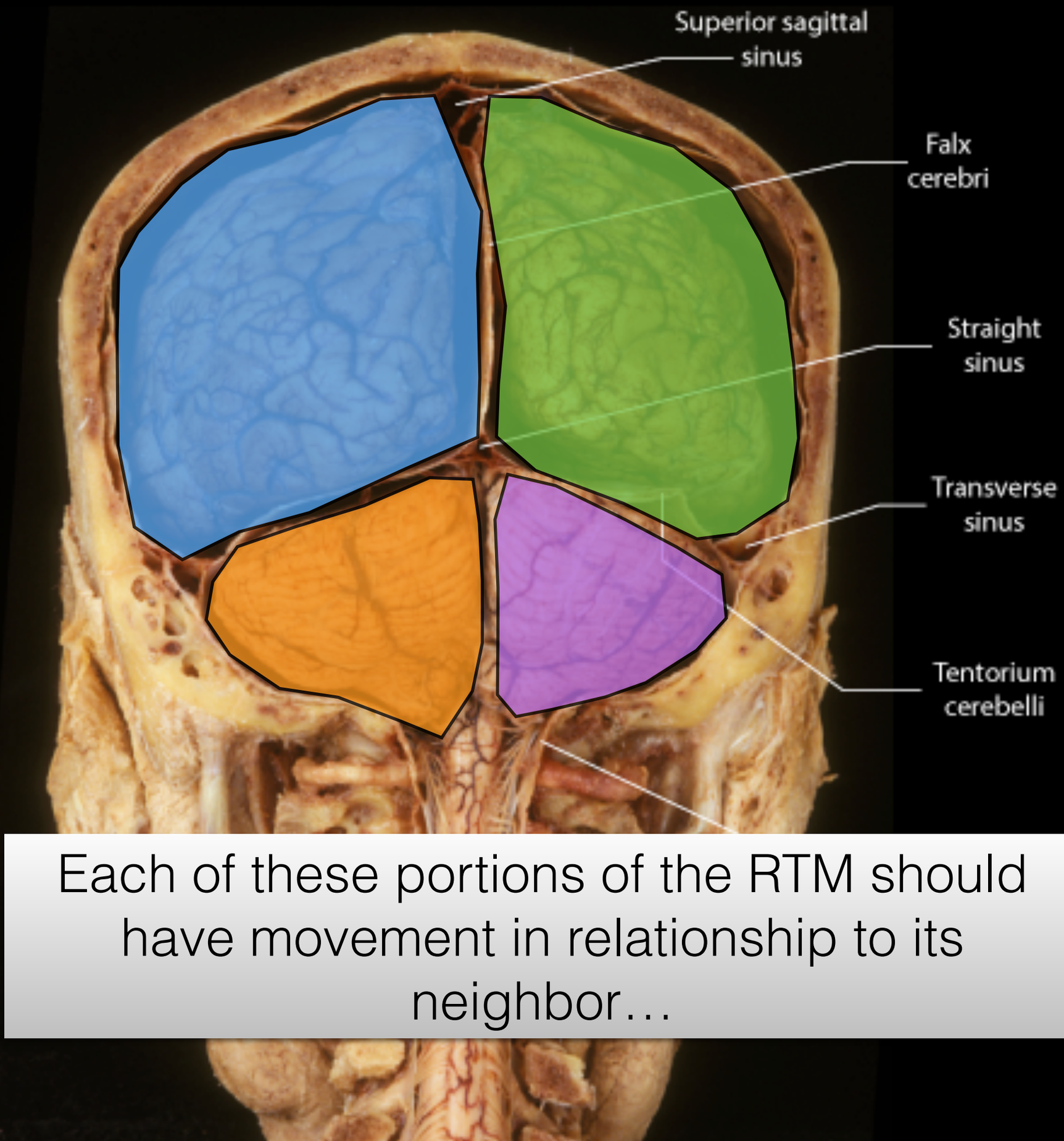


Tension in the falx can show up in a number of possible different vectors



The Cranial Fossae and the RTM

- When these structures move normally, you should be able to feel and induce movement of the bilaminar layer of the RTM.



Each of these portions of the RTM should have movement in relationship to its neighbor…

Dural Bands

Dural Bands

- These are bands of fibers or single fibers of tightness in the dura.

- Dr. Arbuckle's drawings show much of the story…

Dural Bands

- These bands are effectively buttresses made of dura.

- They give strength and some rigidity within a continuously moving system.

- The are not thickenings (like a callous) and so are not due to friction.

Dural Bands

- They are likely due to either trauma (single event) or repetitive movements of the bones of the skull.
- Single event trauma could occur multiple times…
- Or movement patterns could be repeated…

Dural Bands

- If the movement patterns (like chewing or walking) “caused” a vulnerability/strain in the head, the body’s response could be to tighten (like what happens to a ligament when stressed suddenly).

- Could these dural bands be the result of something like a cross bite where the temporals need extra support to counteract the movement fo the mandible?

Dural Bands

- Wolff's Law would not make the mandible "stronger/thicker" because all it is doing is moving in a different pattern.

- But Wolff's Law could make the dura "strengthen" to help counteract the different forces…

Dural Bands

- And, if something like gait were to disrupt the vestibule-ocular reflex, would the body not respond by trying to dampen movement?

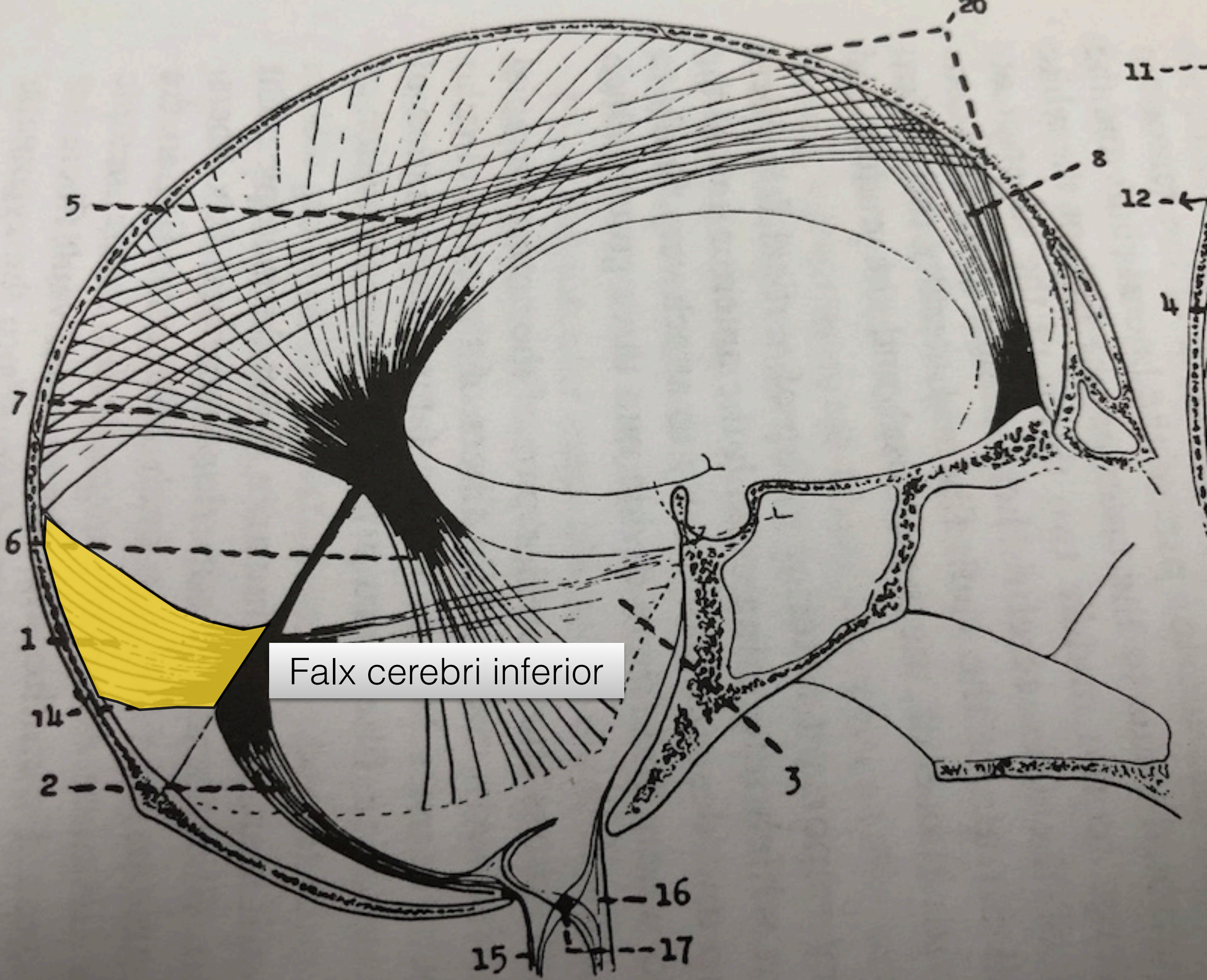
- If there is tension in the bones of the mid face due to poor differential growth, would this not put a pull/ push on the falx?

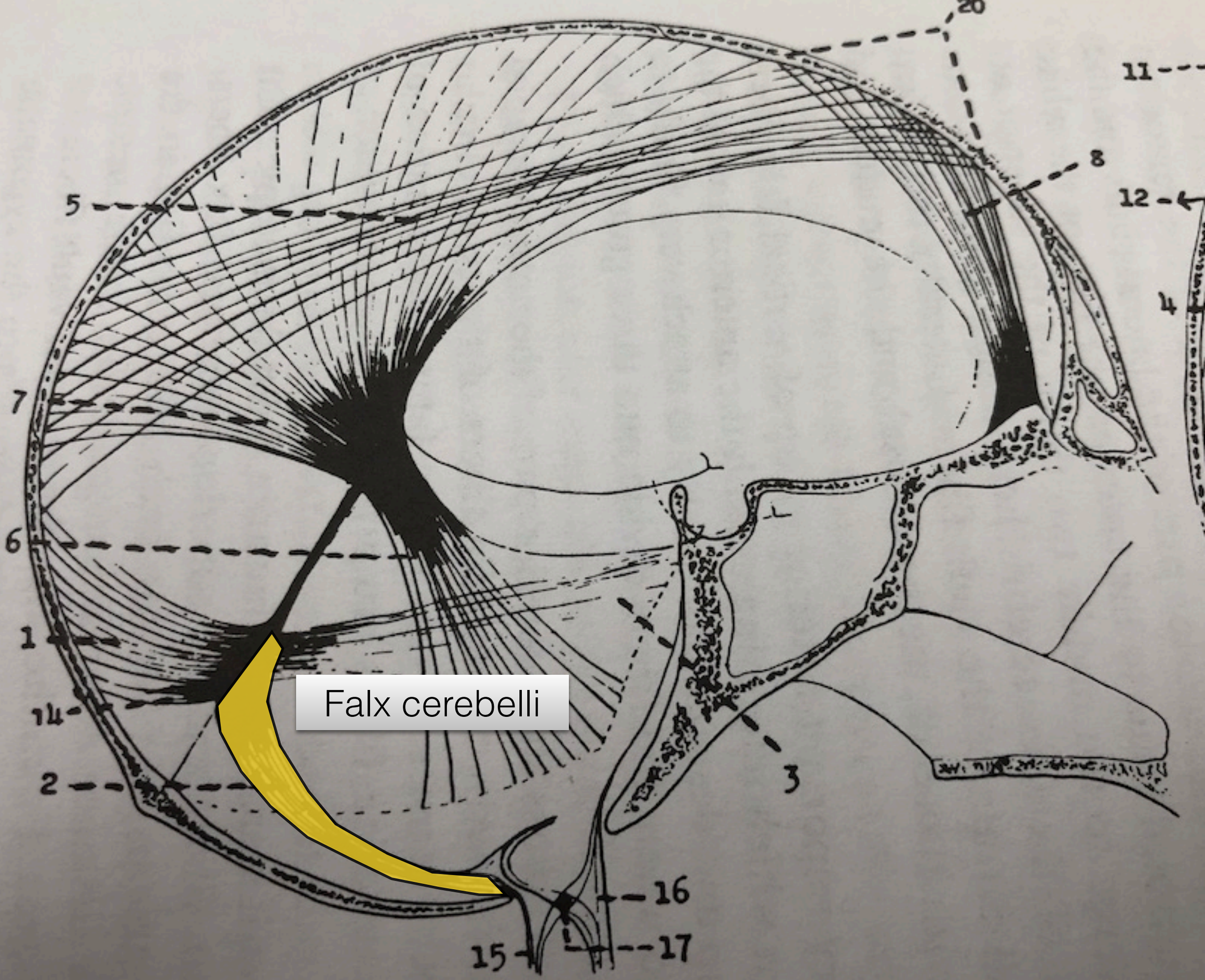
Dural Bands

- At best this is educated speculation, because we can only observe with our patients what we feel and note what seems to resolve the issue.

- As you feel these structures and their restrictions, let you mind explore possible causes…and cures.

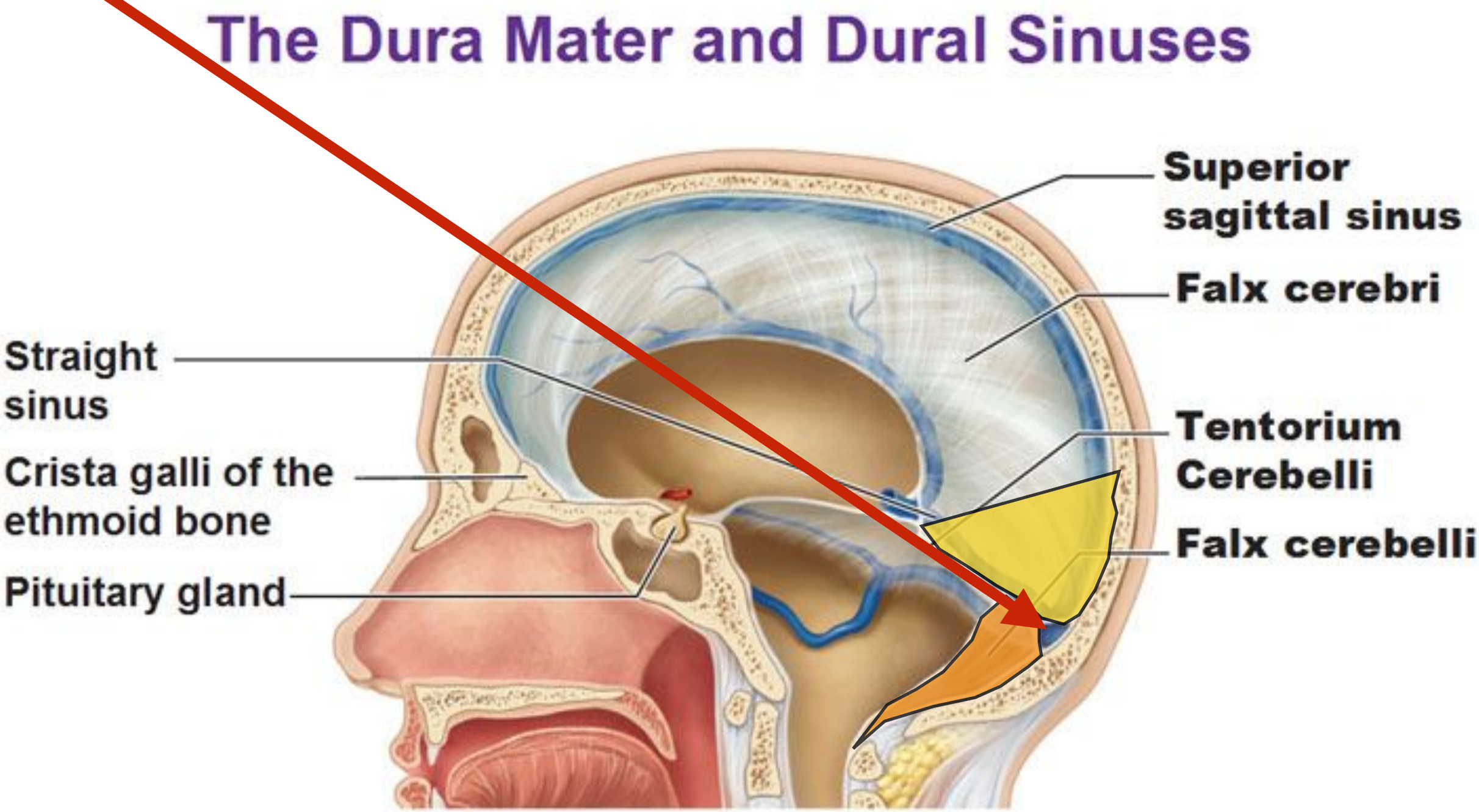
Horizontal Fiber Group


Falx cerebri inferior


Falx cerebelli

Tension at the confluence of the sinuses

Can cause a pull on the inferior falx cerebri



And/or the falx cerebelli

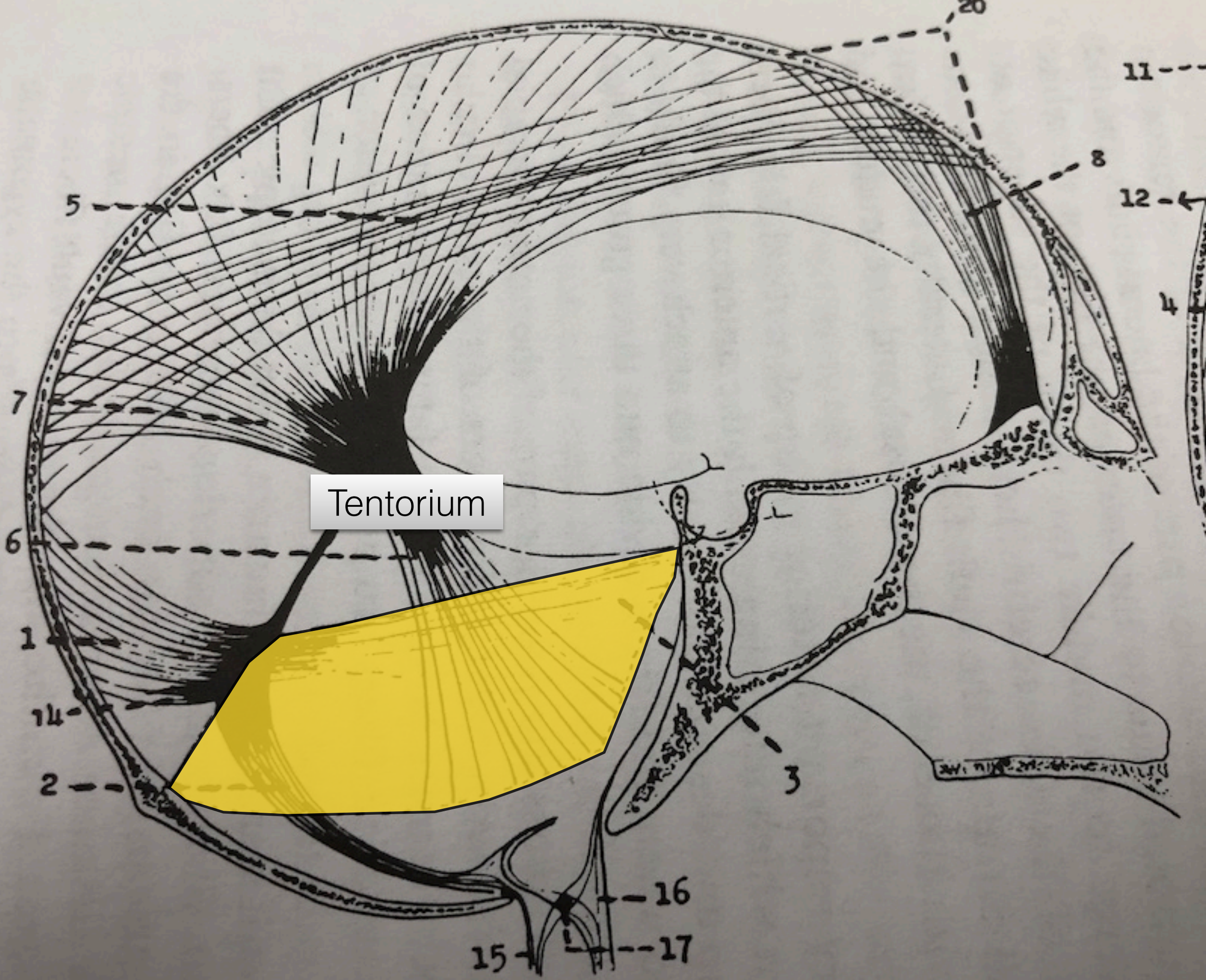
Which can also create tension here…

Arbuckle called this the confluence of the sinuses tripod

Dural Bands

- Look for restrictions here in direct trauma to the back of the head.

- And, if you normally treat the sinuses using venous sinus drainage, check and make sure your treatment is actually releasing this tension.


Tentorium
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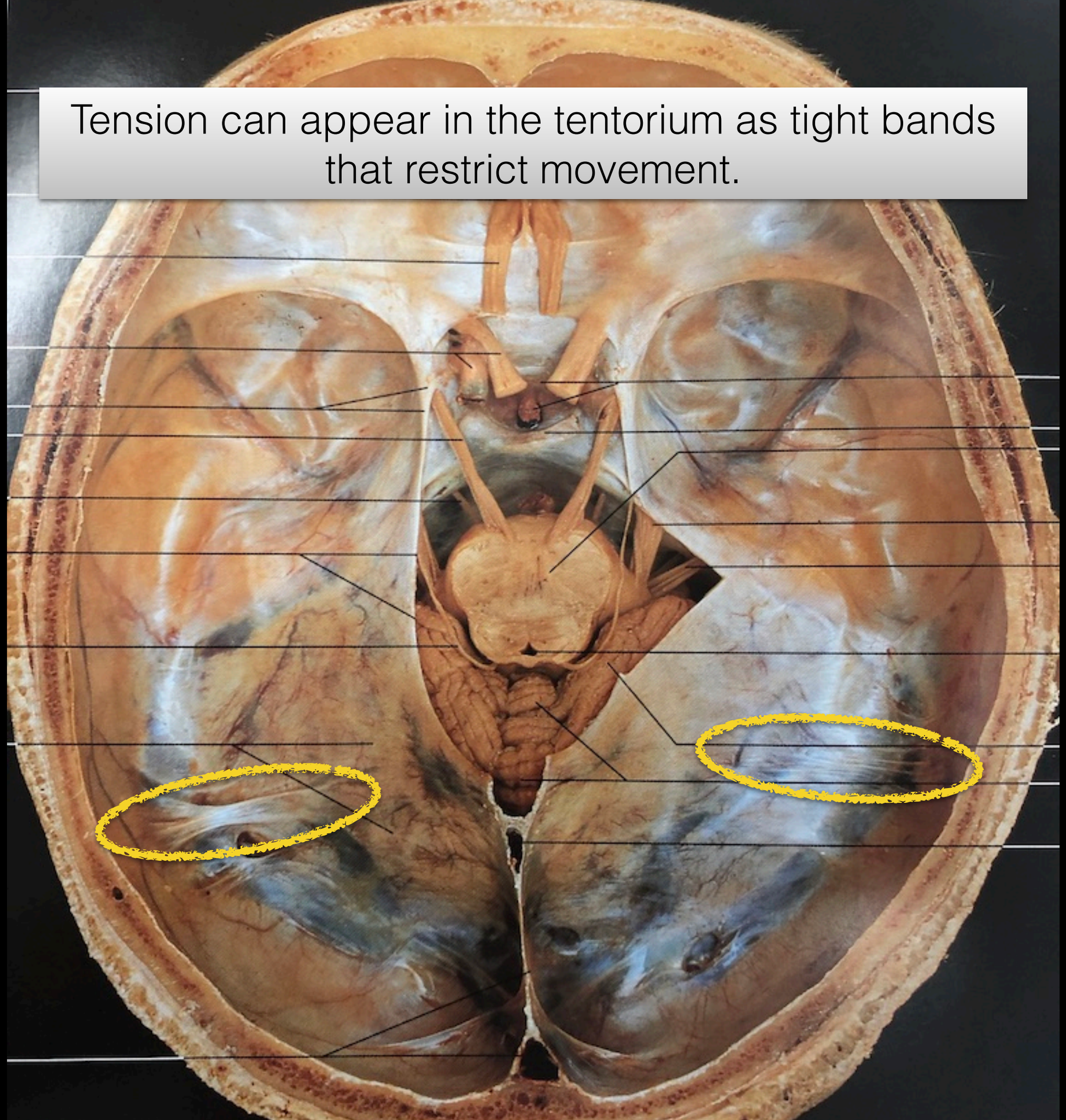
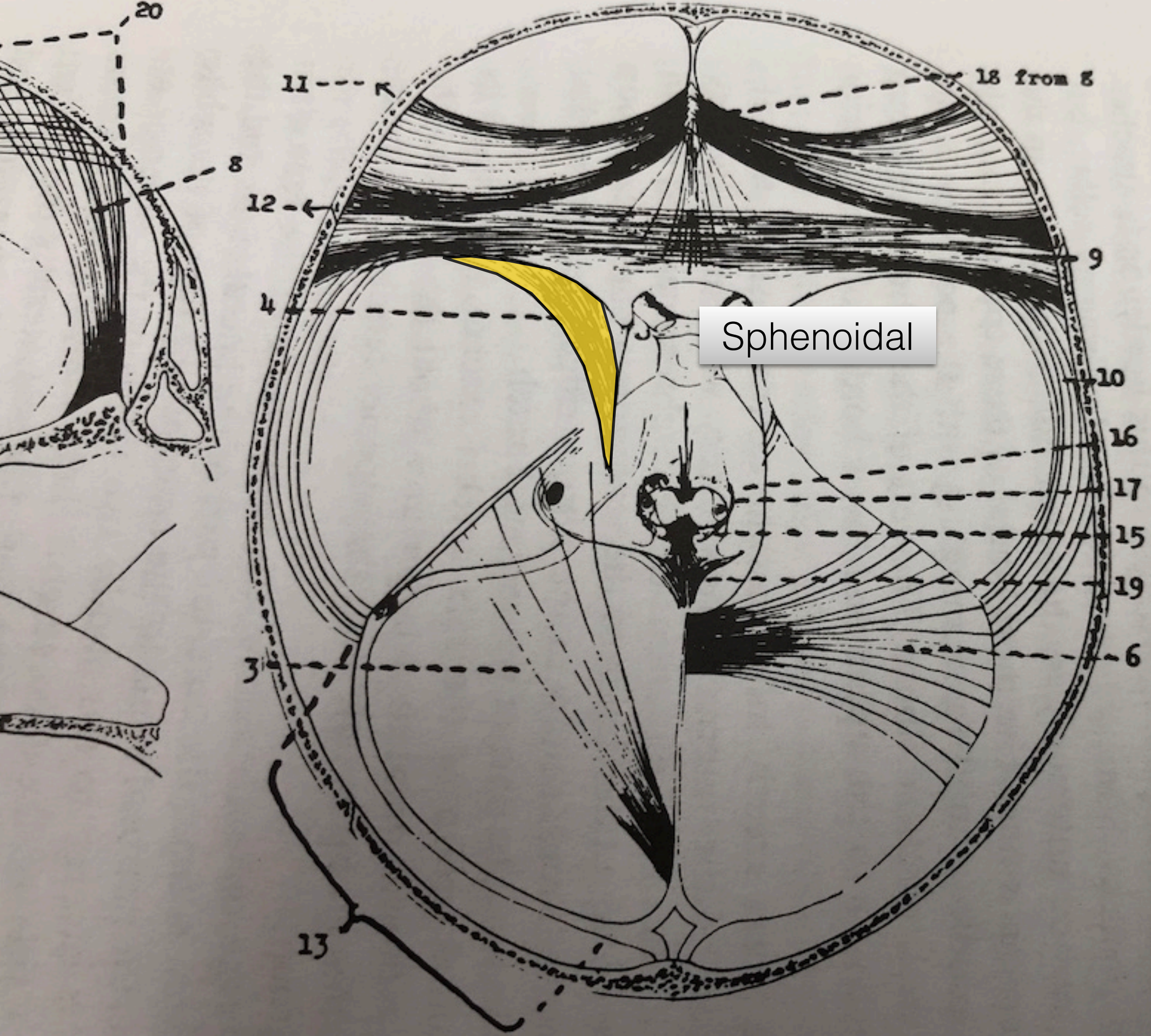
17

Tension can appear in the tentorium as tight bands that restrict movement.



Dural Bands

- Could these bands act like ligaments to limit motion?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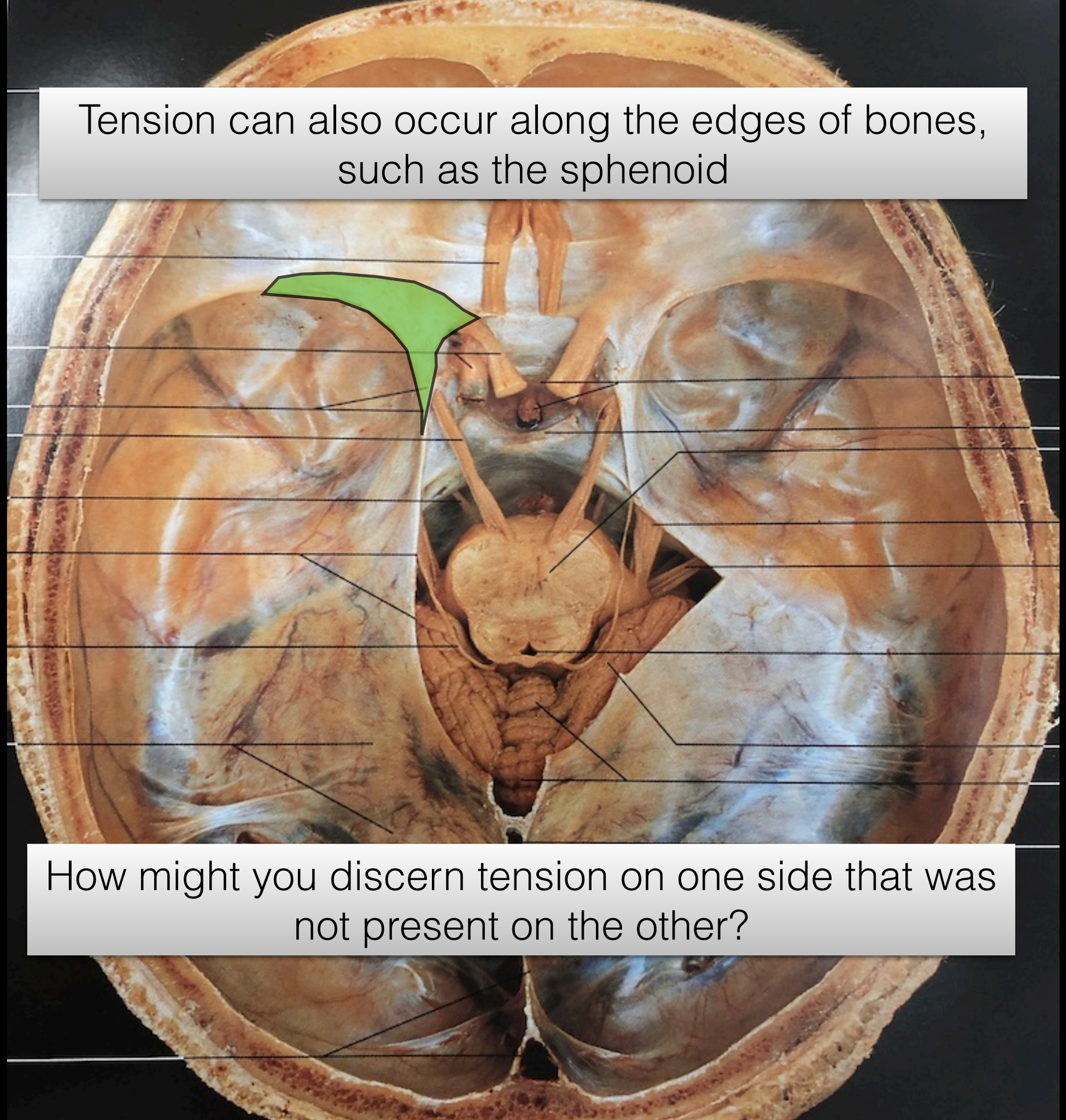
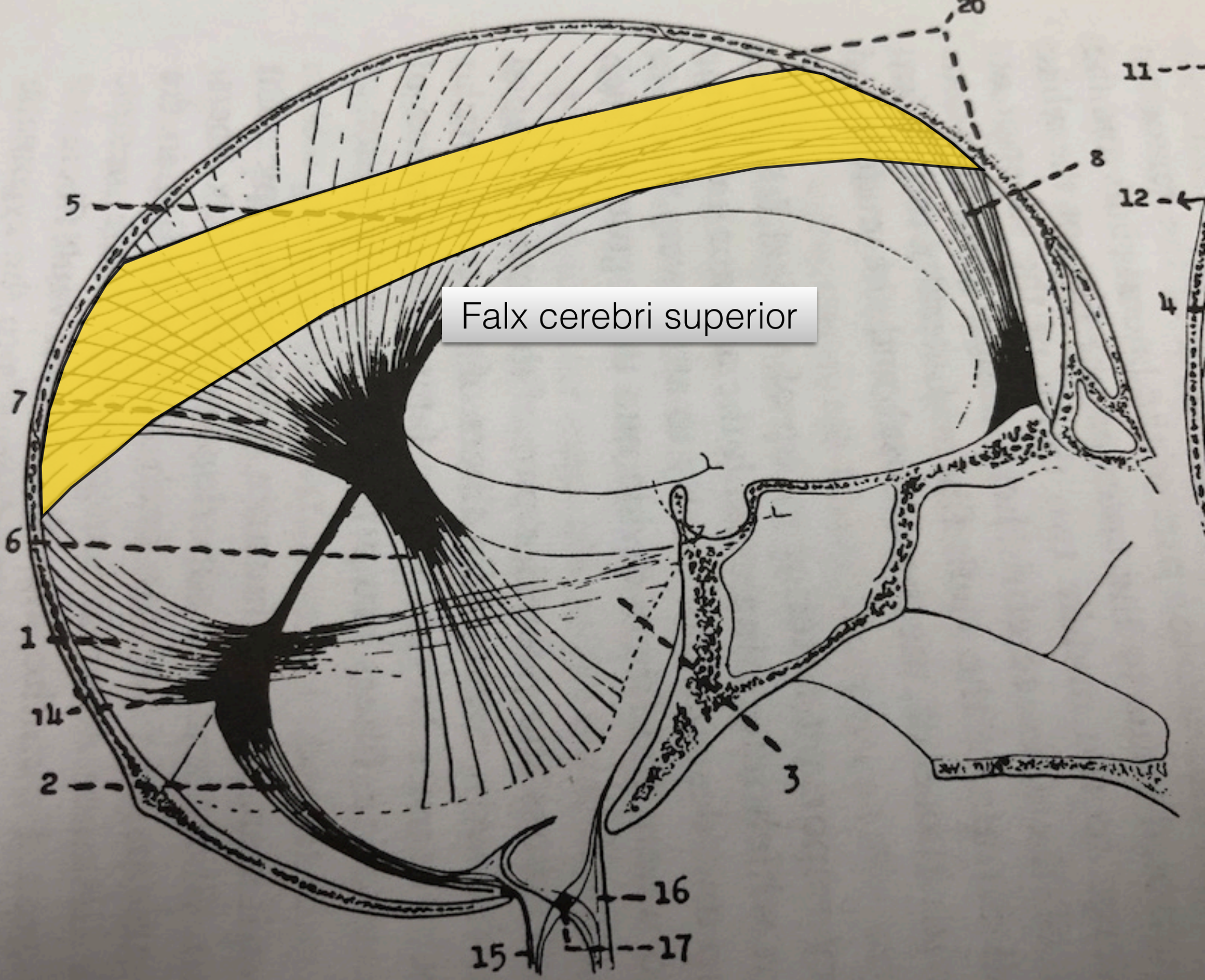
Sphenoidal

Tension can also occur along the edges of bones, such as the sphenoid



How might you discern tension on one side that was not present on the other?


Falx cerebri superior
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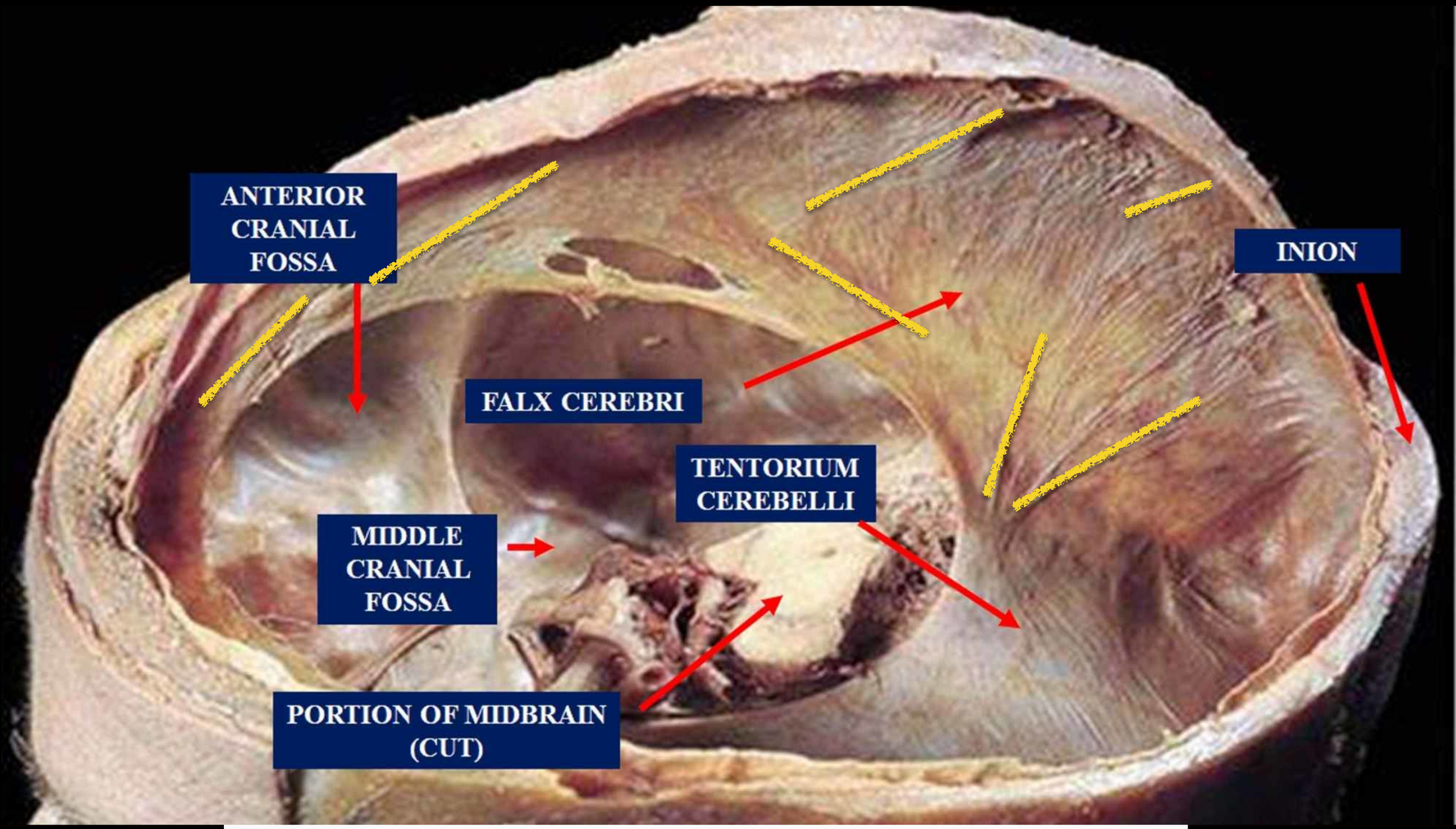
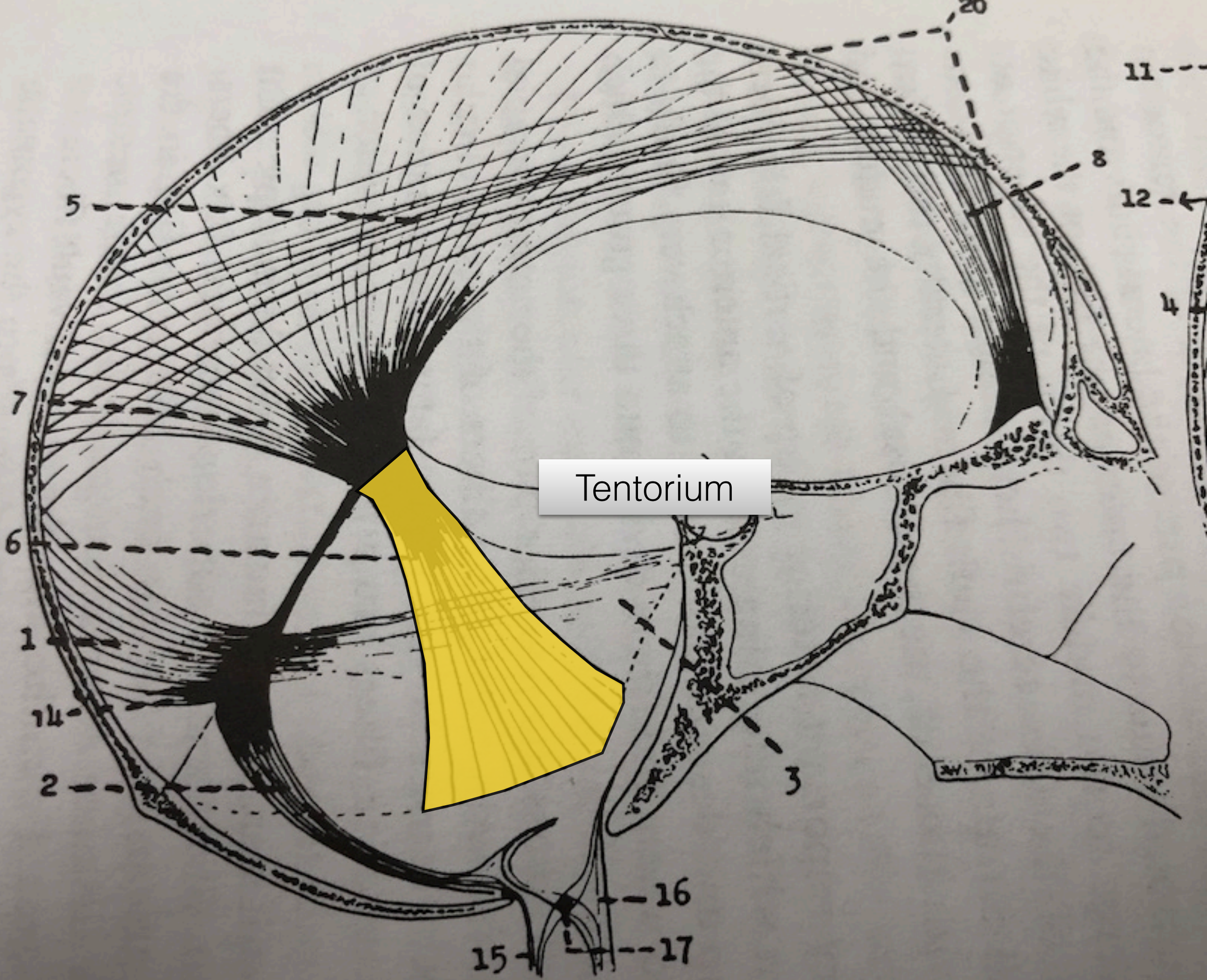


Notice the tension lines and the different directions in the falx - the more horizontal lines are the focus here.

Vertical Fiber Group


Tentorium
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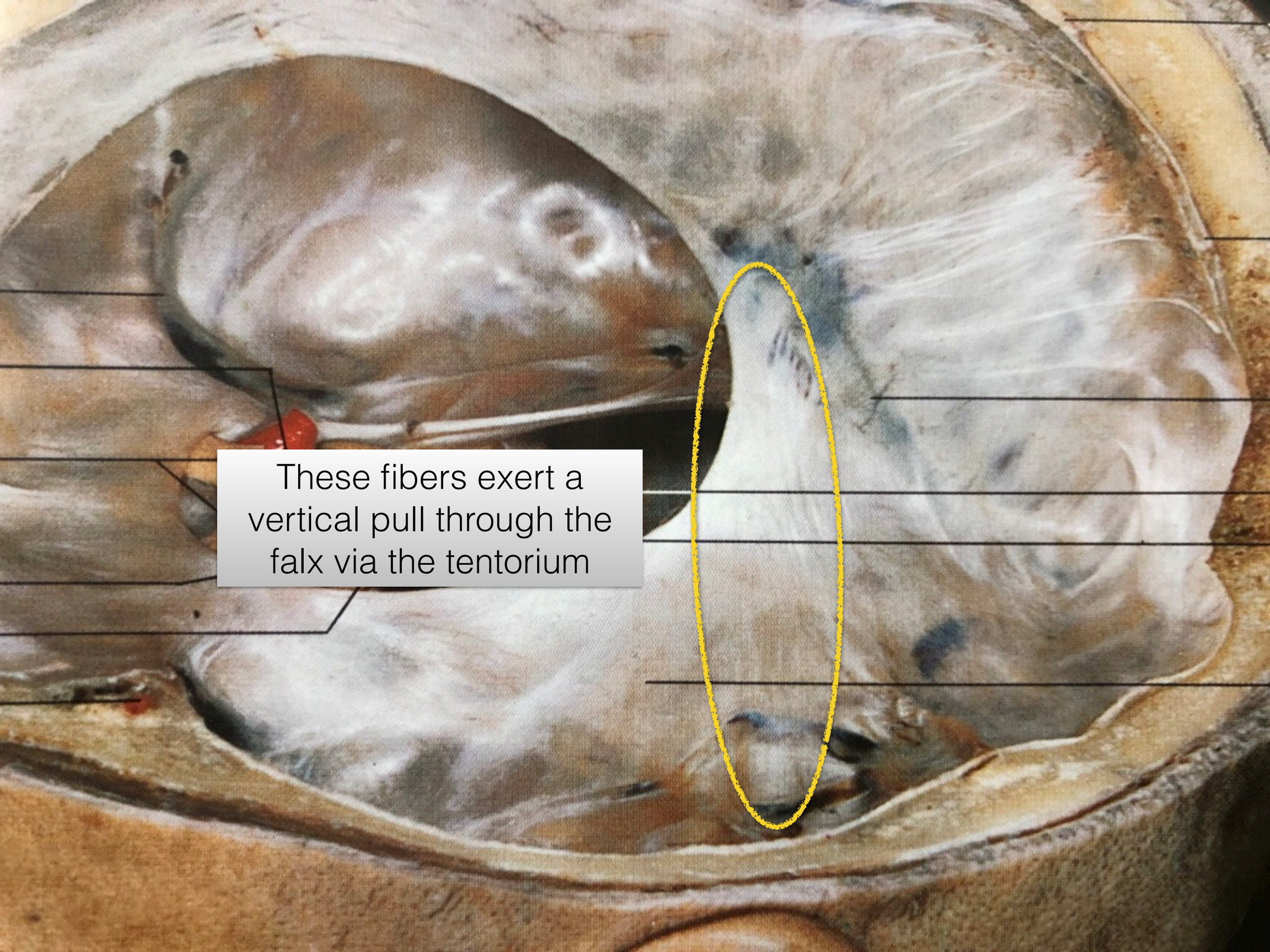
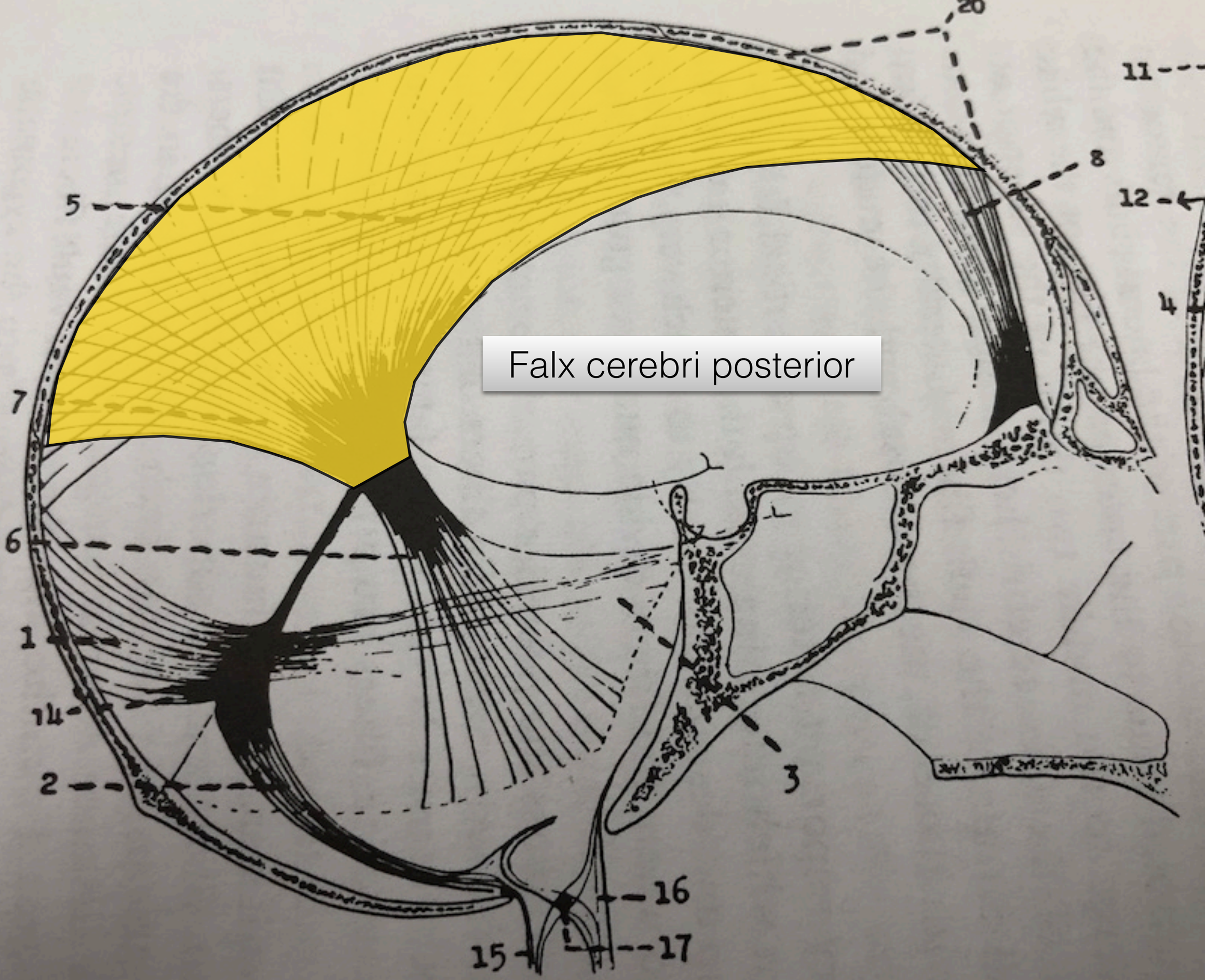


These fibers exert a vertical pull through the falx via the tentorium


Falx cerebri posterior
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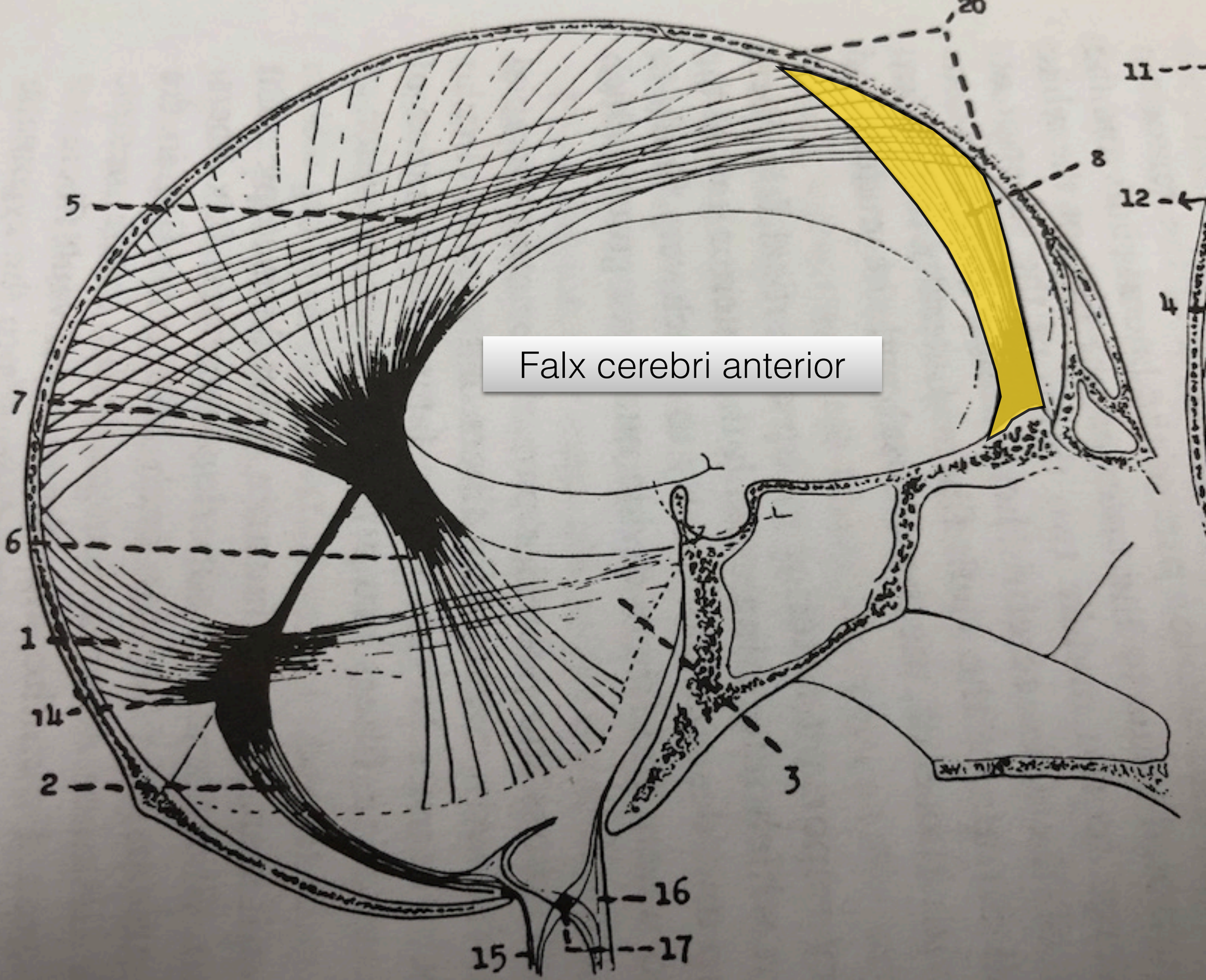
Falx cerebri anterior
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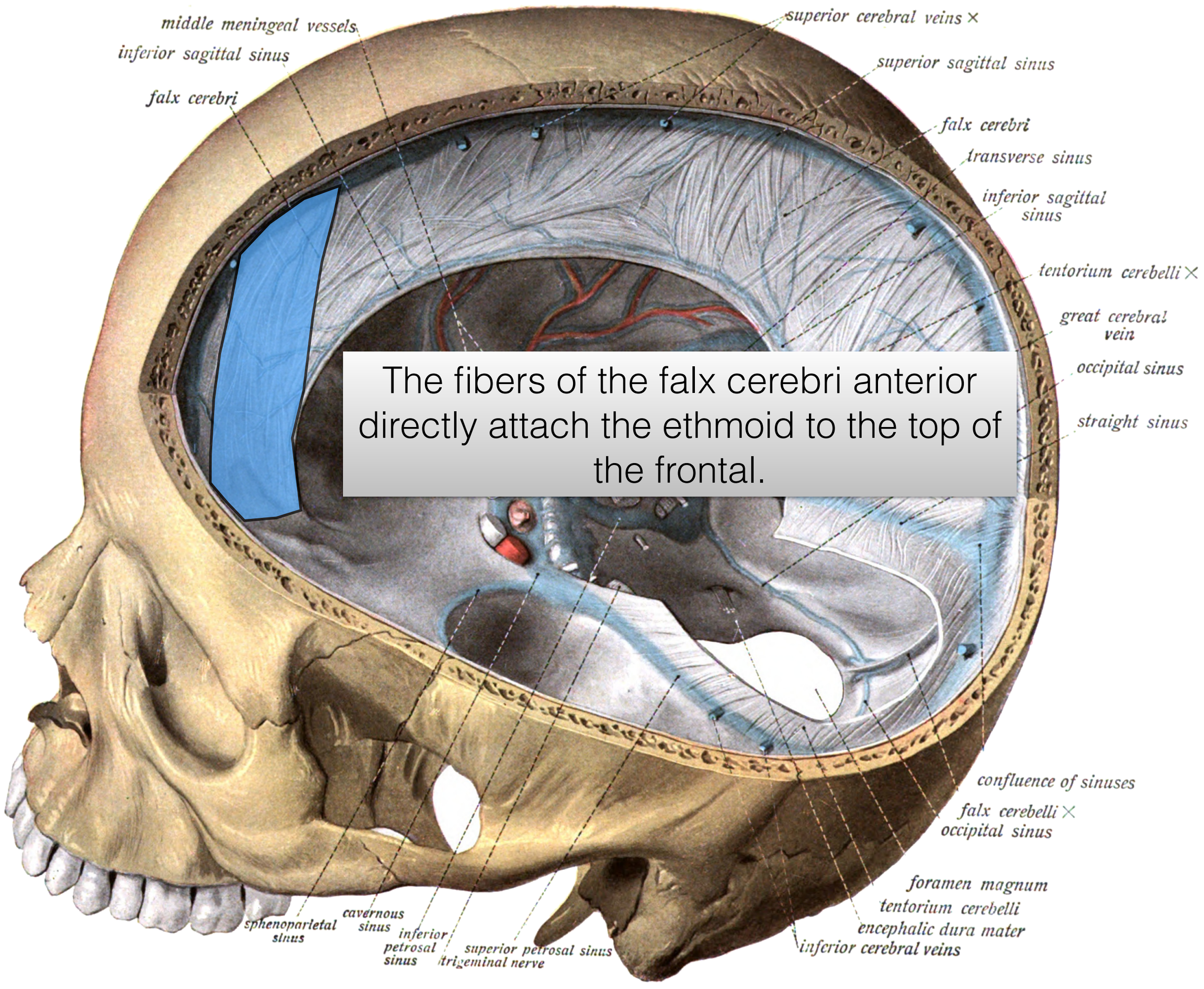
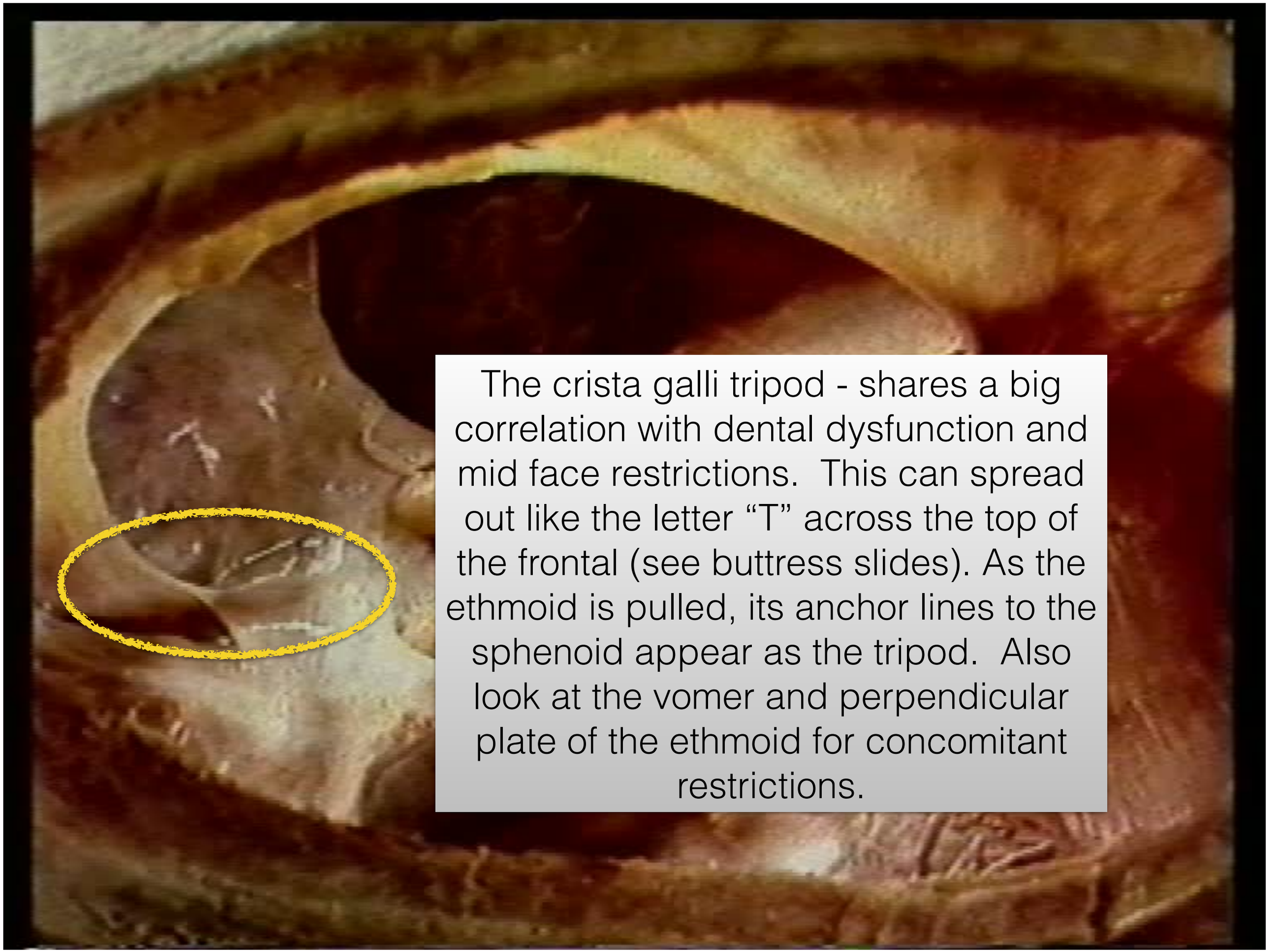
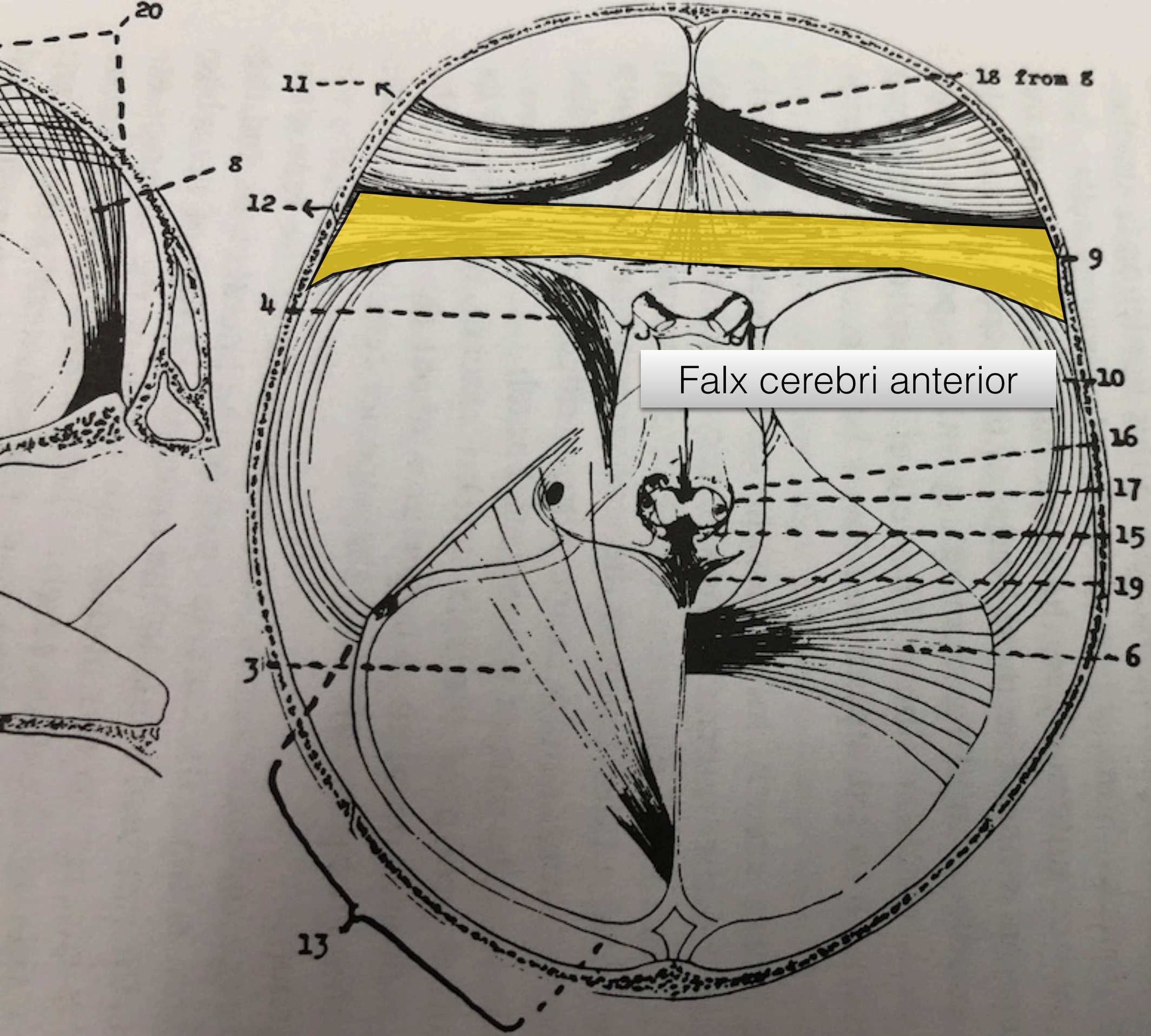


The fibers of the falx cerebri anterior directly attach the ethmoid to the top of the frontal.



The crista galli tripod - shares a big correlation with dental dysfunction and mid face restrictions. This can spread out like the letter “T” across the top of the frontal (see buttress slides). As the ethmoid is pulled, its anchor lines to the sphenoid appear as the tripod. Also look at the vomer and perpendicular plate of the ethmoid for concomitant restrictions.

Transverse Fiber Group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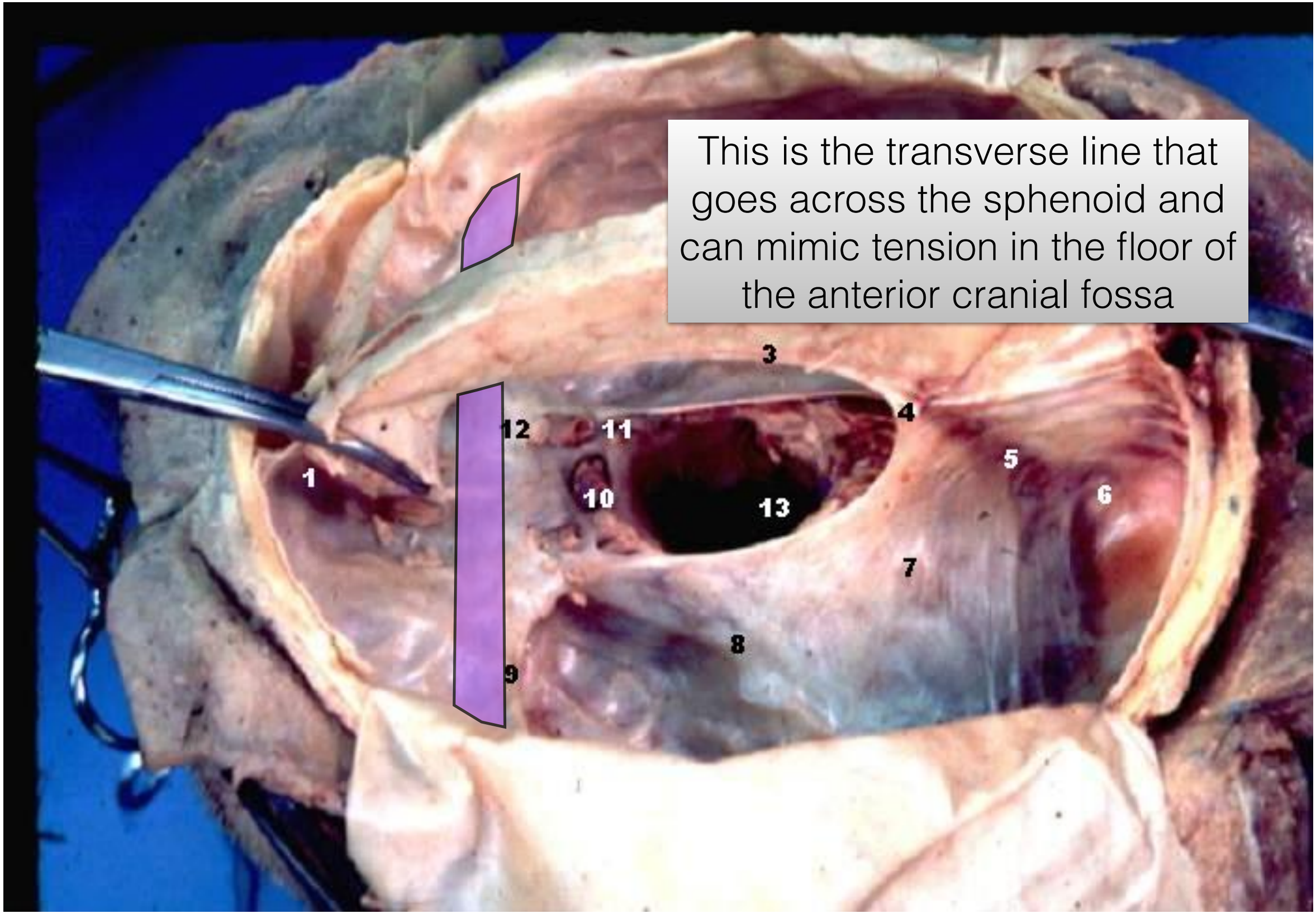
Falx cerebri anterior


This is the transverse line that goes across the sphenoid and can mimic tension in the floor of the anterior cranial fossa
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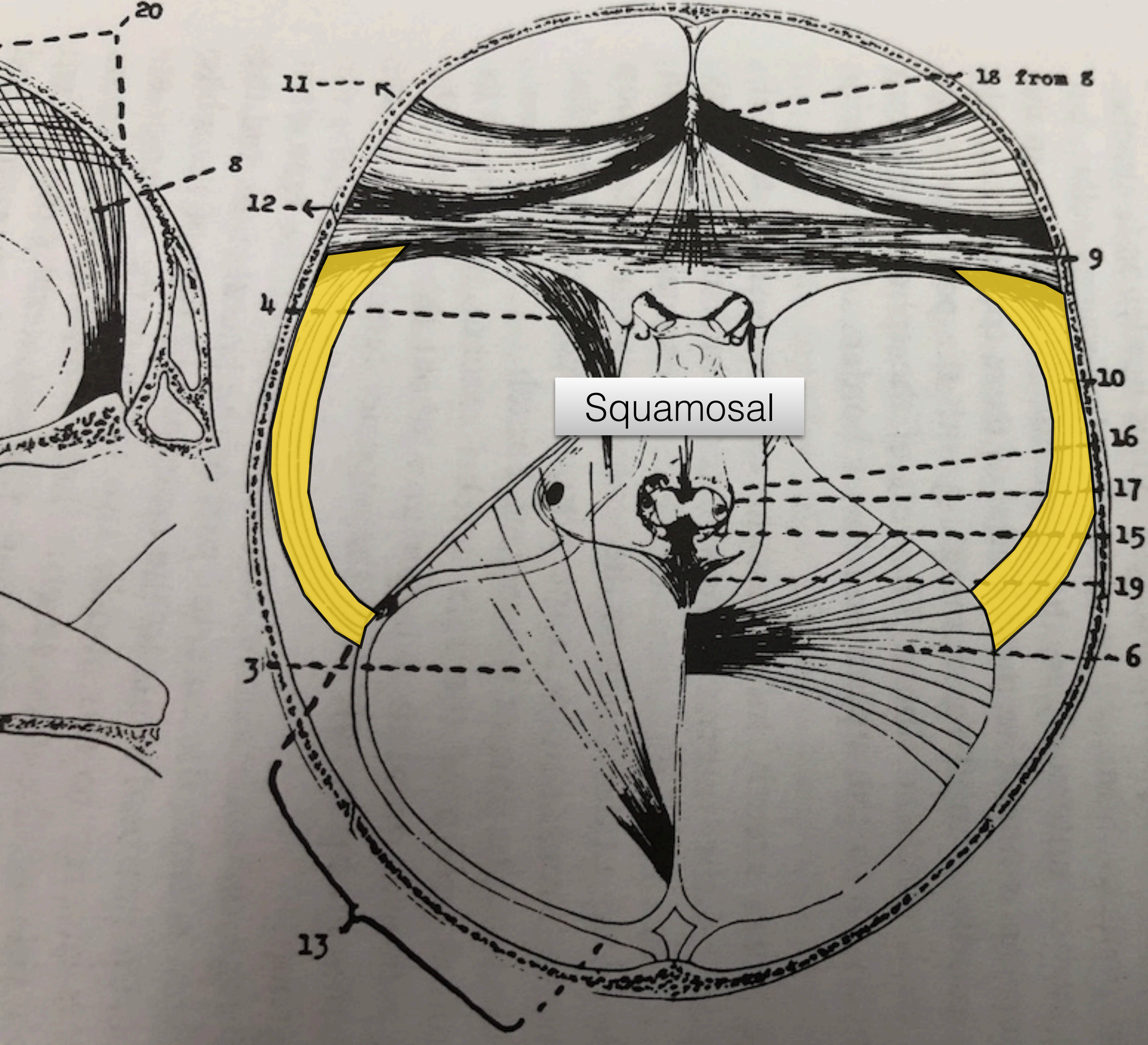
Circular Fiber Group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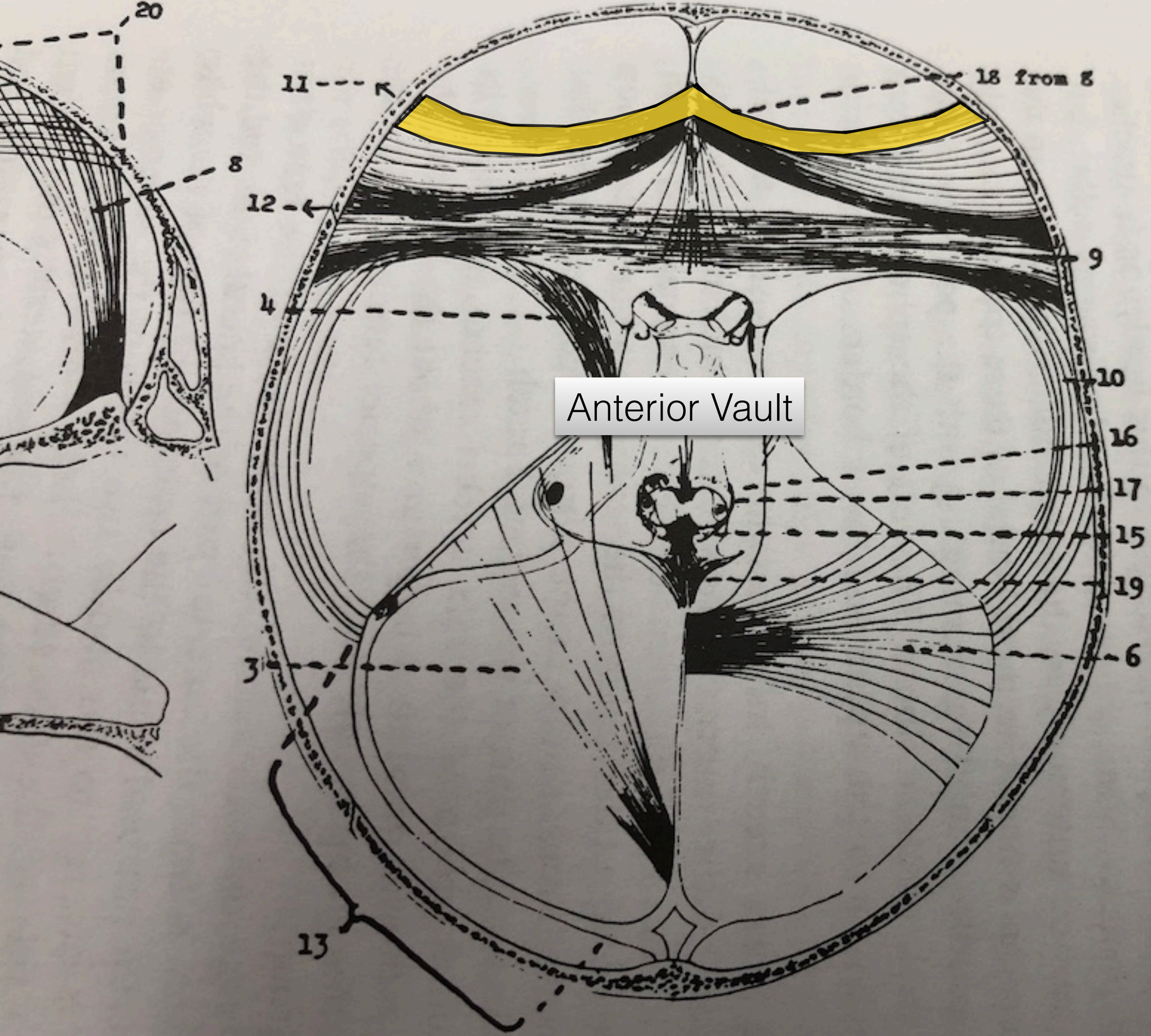
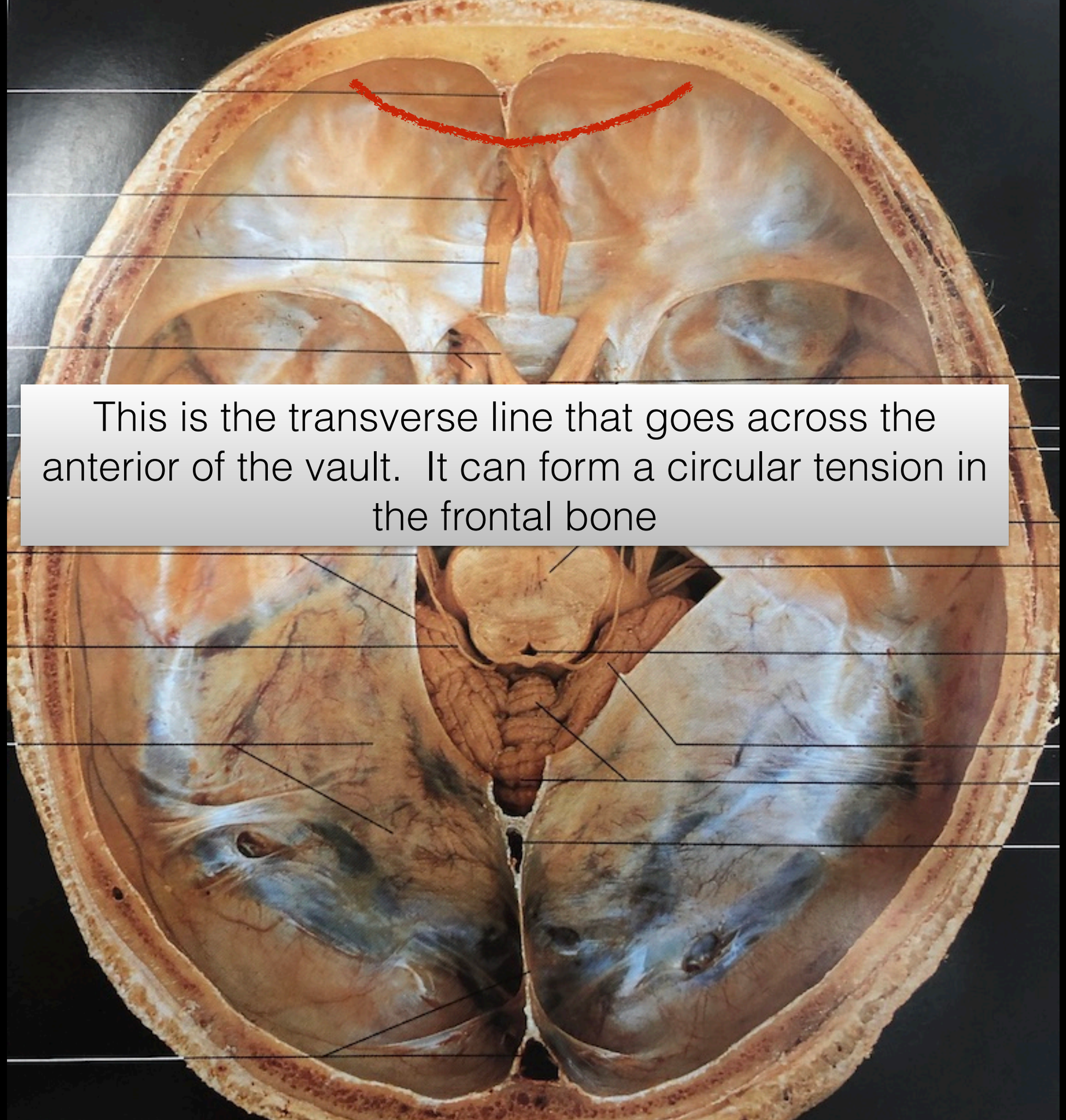
Squamosal

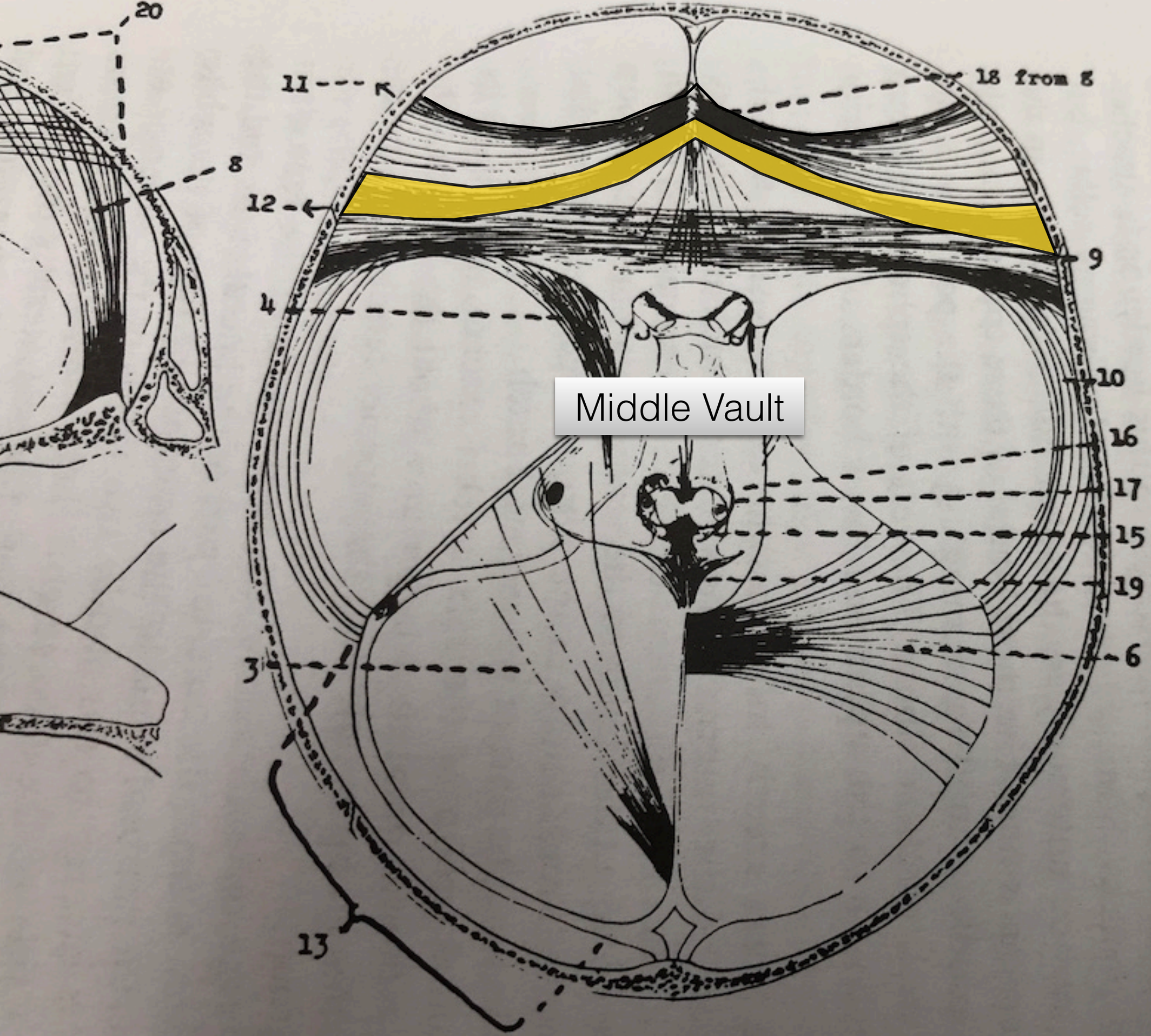
Could this band be utilized by the body to add stability to the temporal against excessive movement?



Anterior Vault



This is the transverse line that goes across the anterior of the vault. It can form a circular tension in the frontal bone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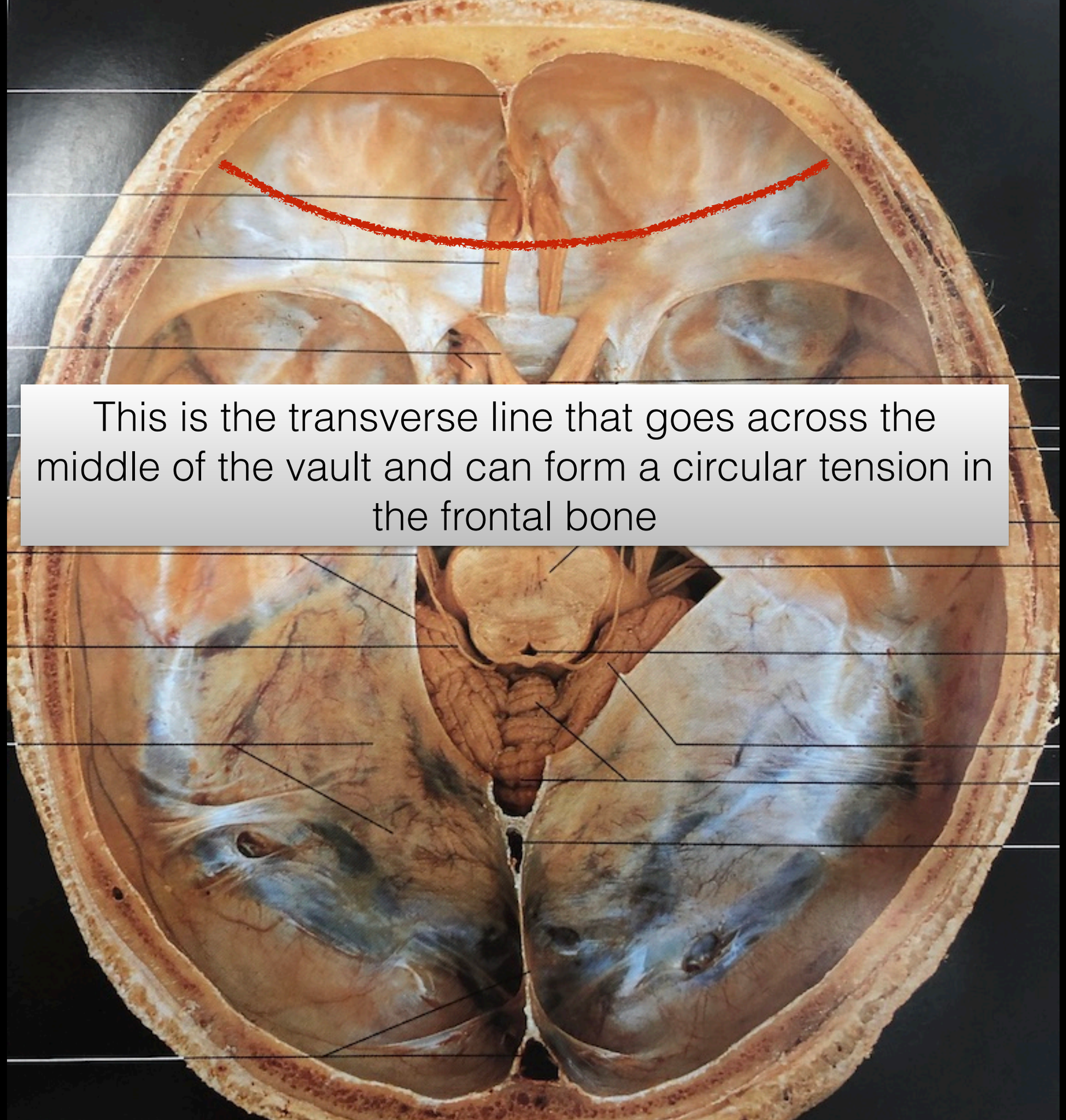
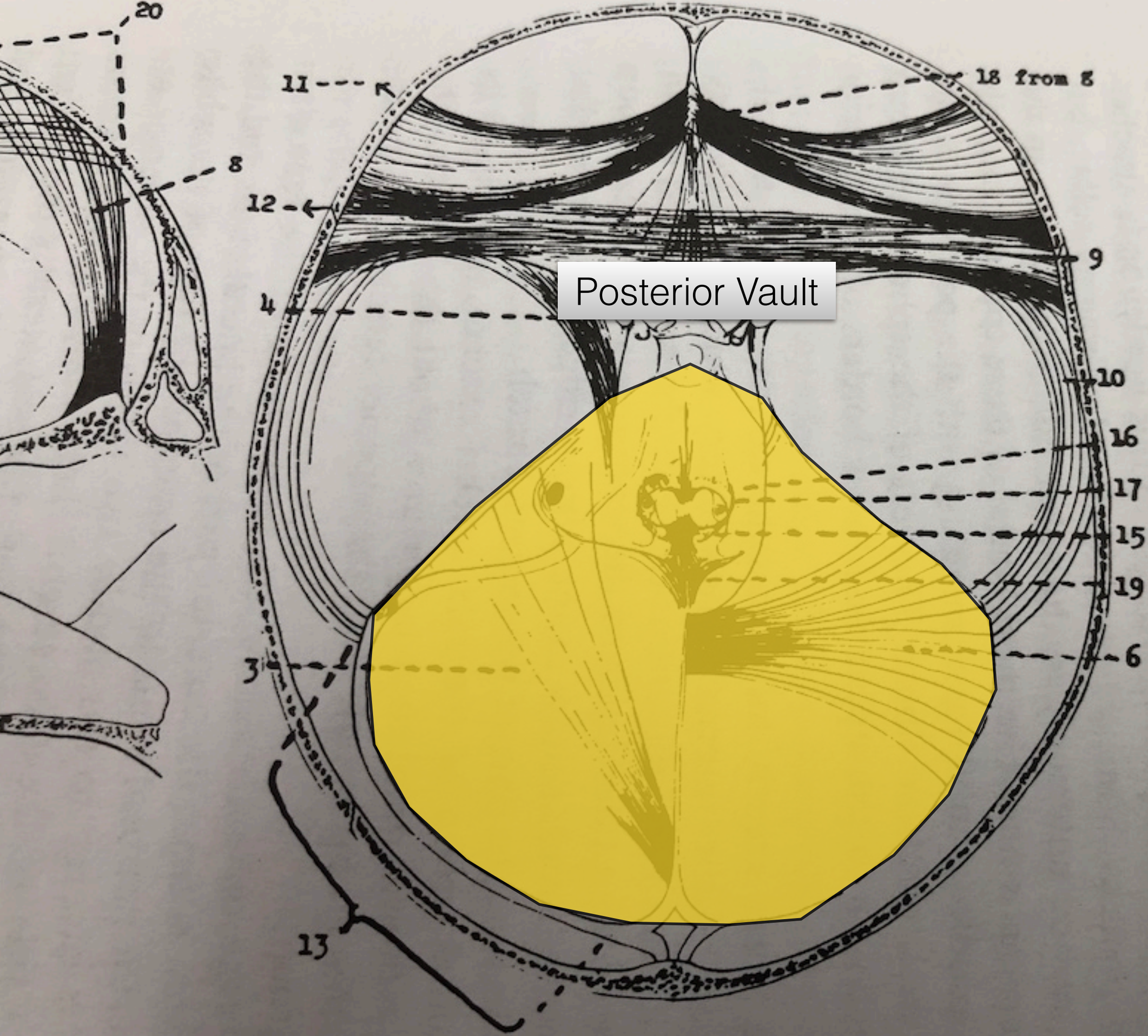
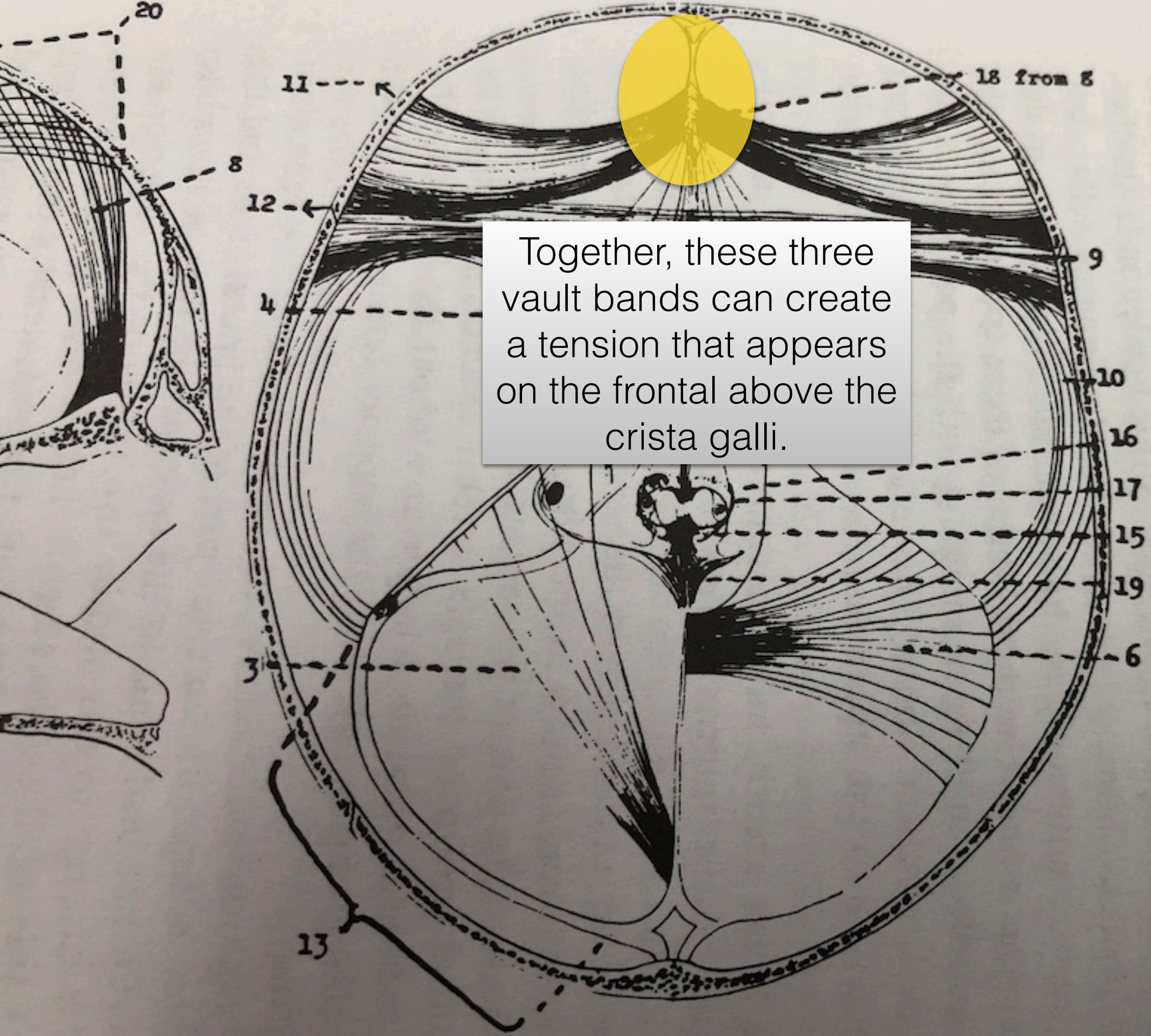
Middle Vault



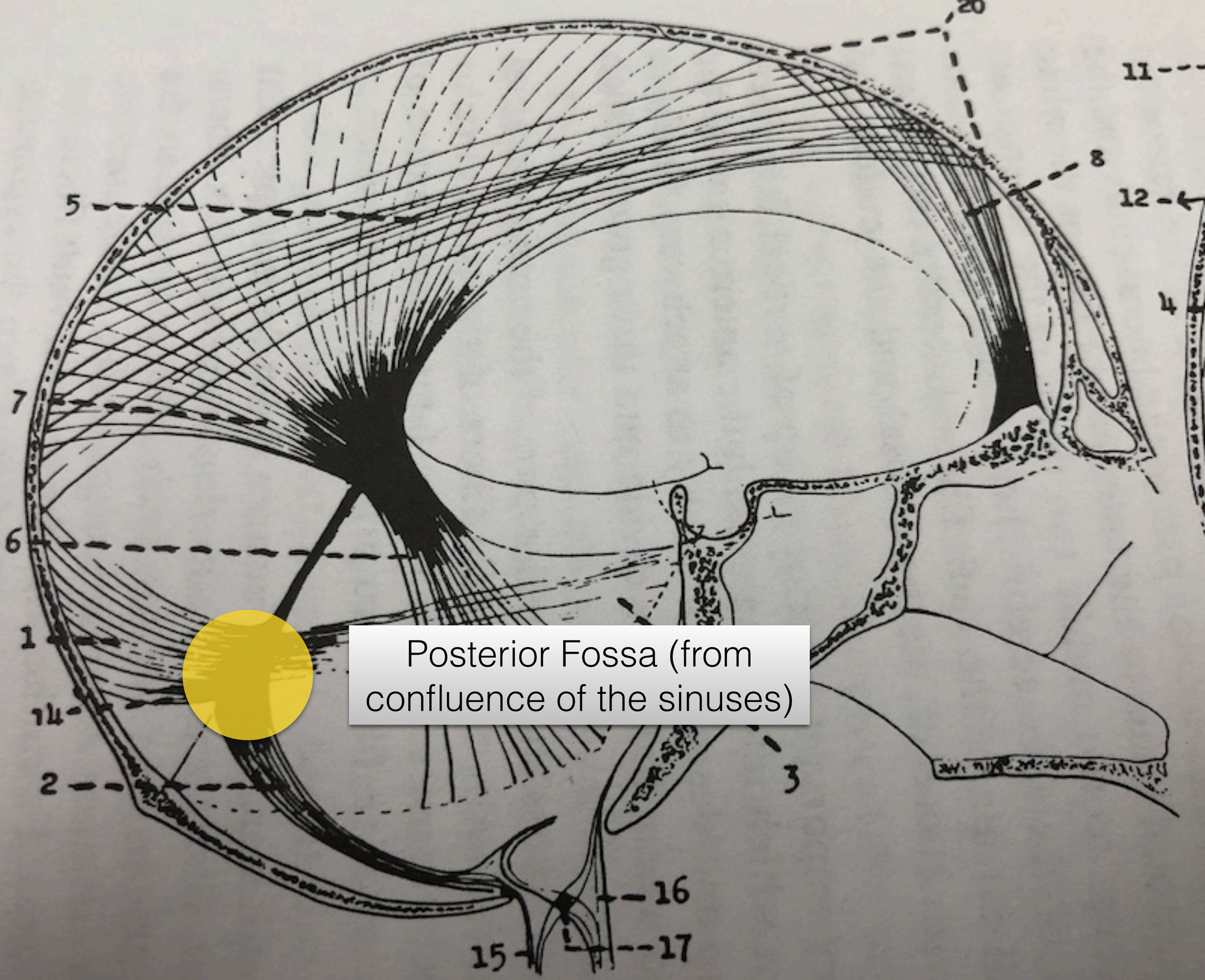
This is the transverse line that goes across the middle of the vault and can form a circular tension in the frontal bone



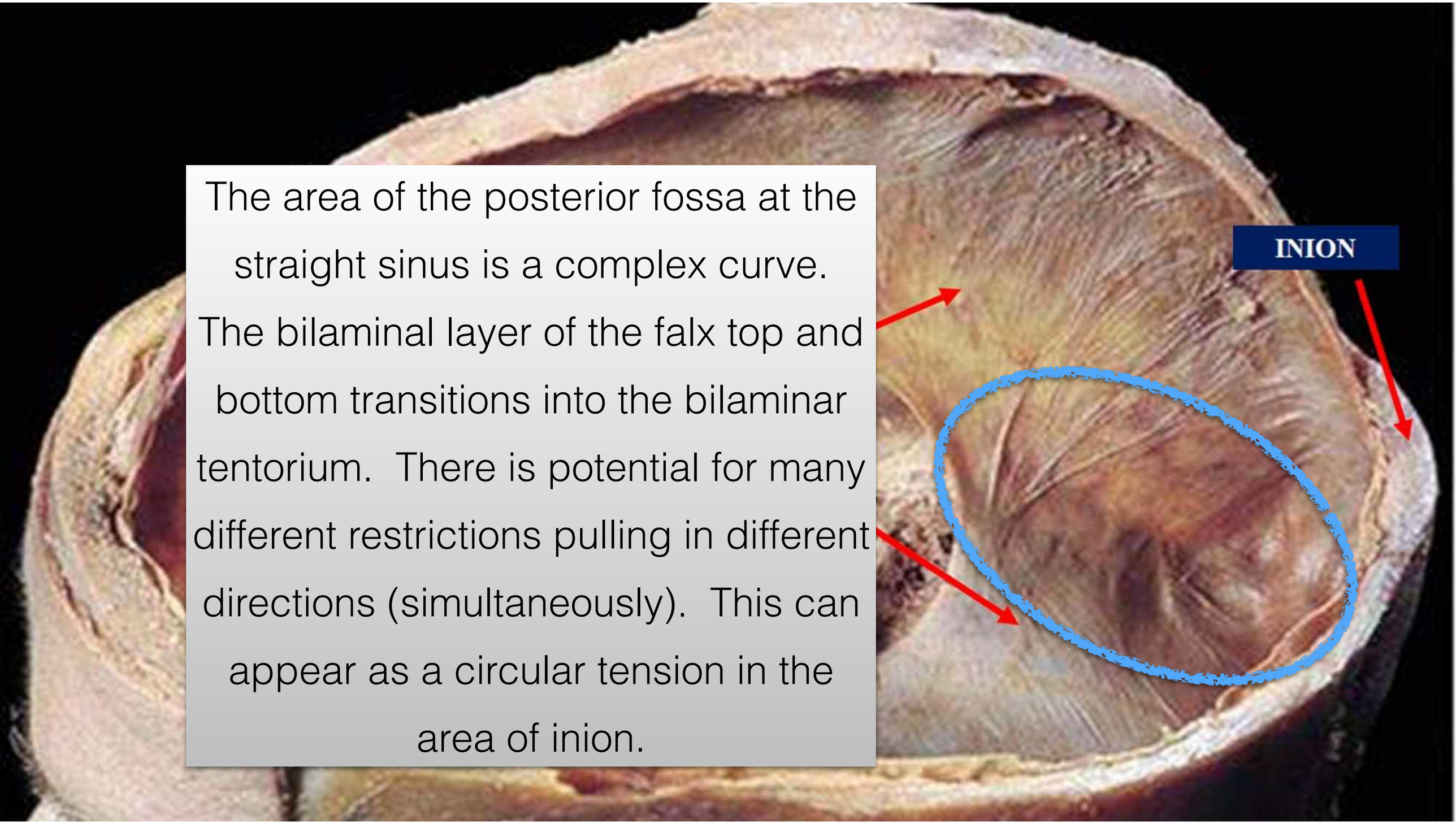
Posterior Vault



Together, these three vault bands can create a tension that appears on the frontal above the crista galli.



Posterior Fossa (from confluence of the sinuses)



The area of the posterior fossa at the straight sinus is a complex curve. The bilaminal layer of the falx top and bottom transitions into the bilaminar tentorium. There is potential for many different restrictions pulling in different directions (simultaneously). This can appear as a circular tension in the area of inion.

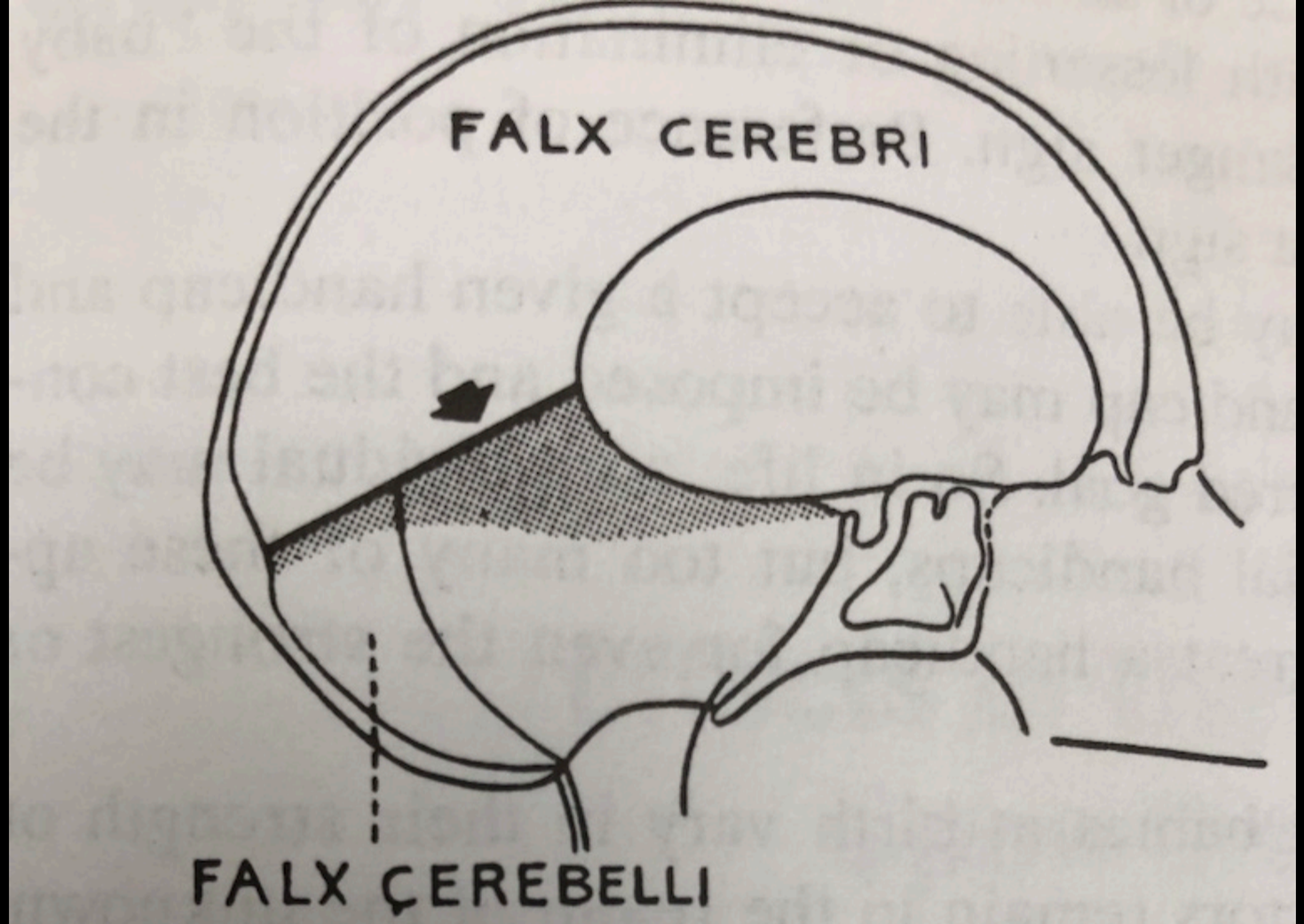


Fig. 3

Sagittal plane showing dural reduplications. The shaded area is the tentorium cerebelli, and the arrow above points to the "white line" at the junction of the posterior part of the falx with the peak of the tentorium.

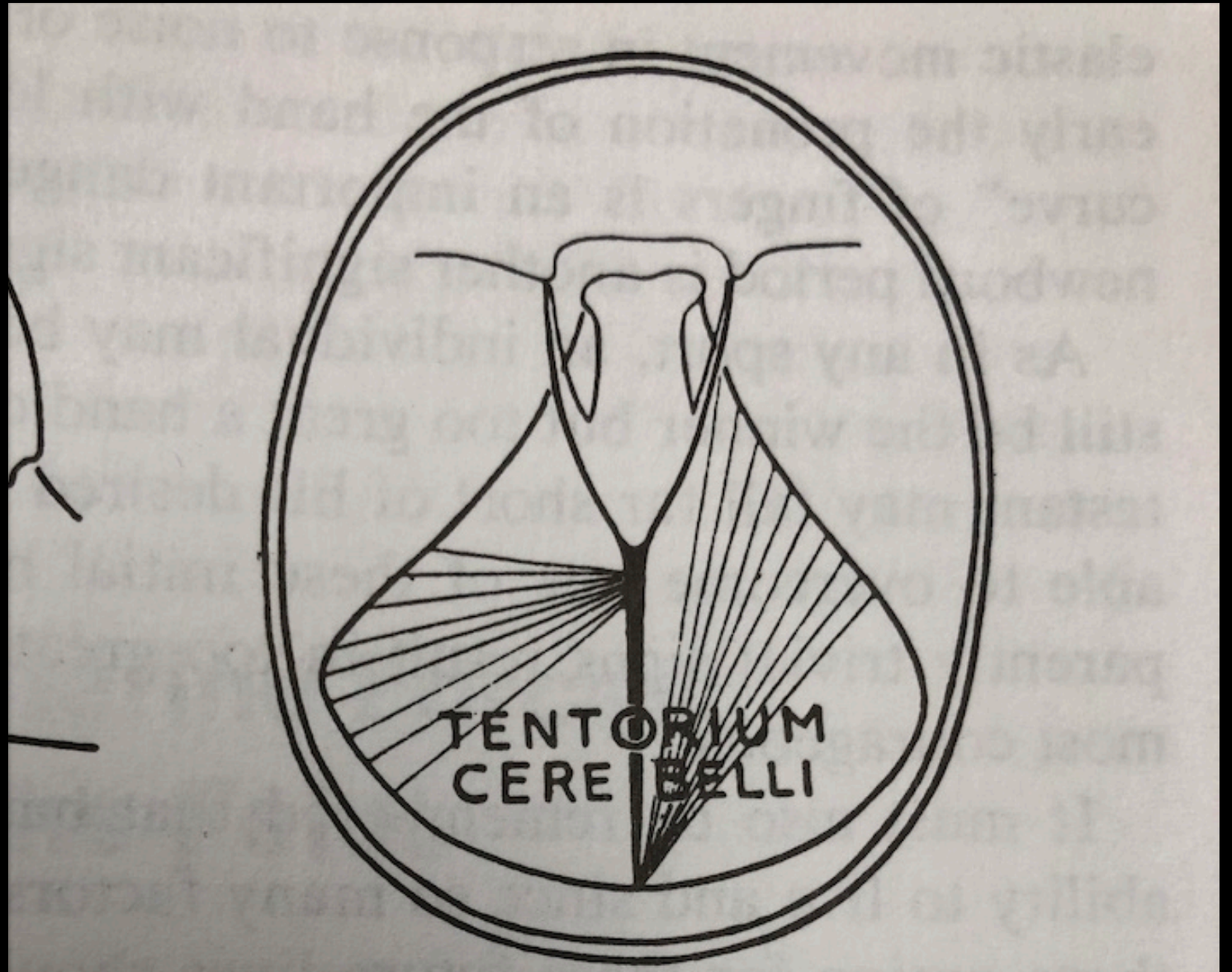


Fig. 4

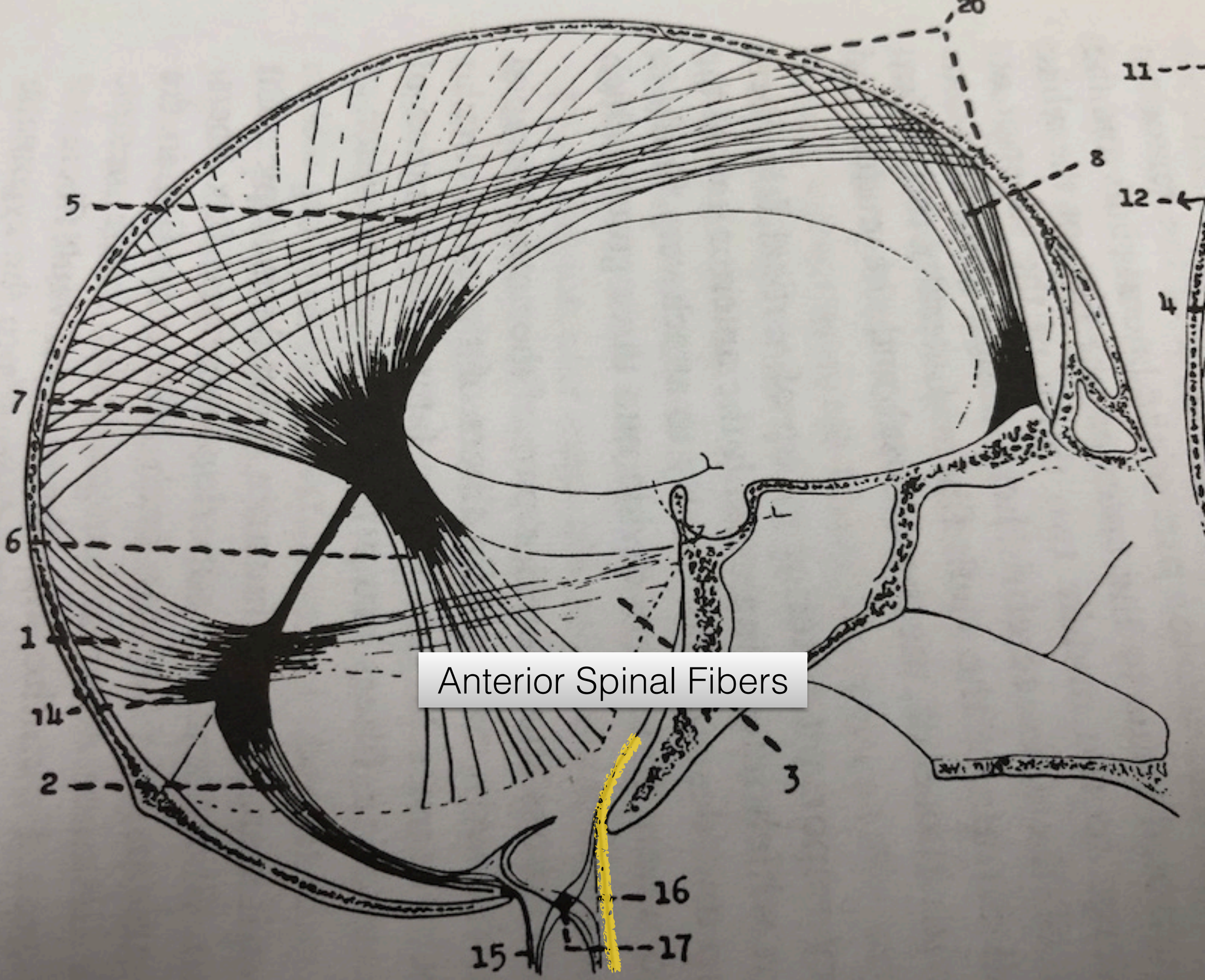
Transverse plane showing tentorium cerebelli. The V-shaped structure is the tentorial notch. Vertical stress fibers in upper layer of tentorium are illustrated on the left, with horizontal stress fibers in lower layer of tentorium on the right. The heavy vertical line in the center is the "white line."

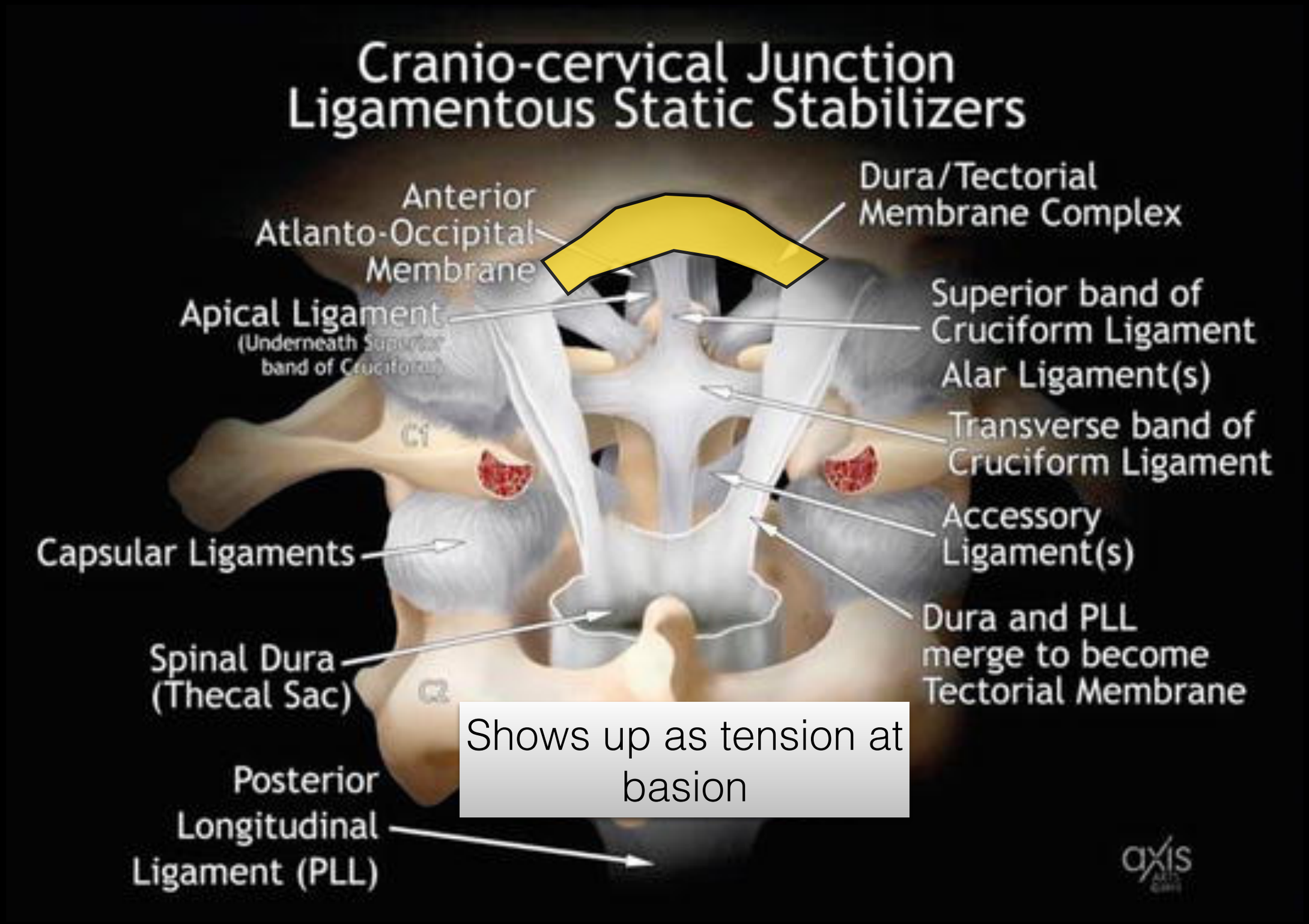
Spinal Group

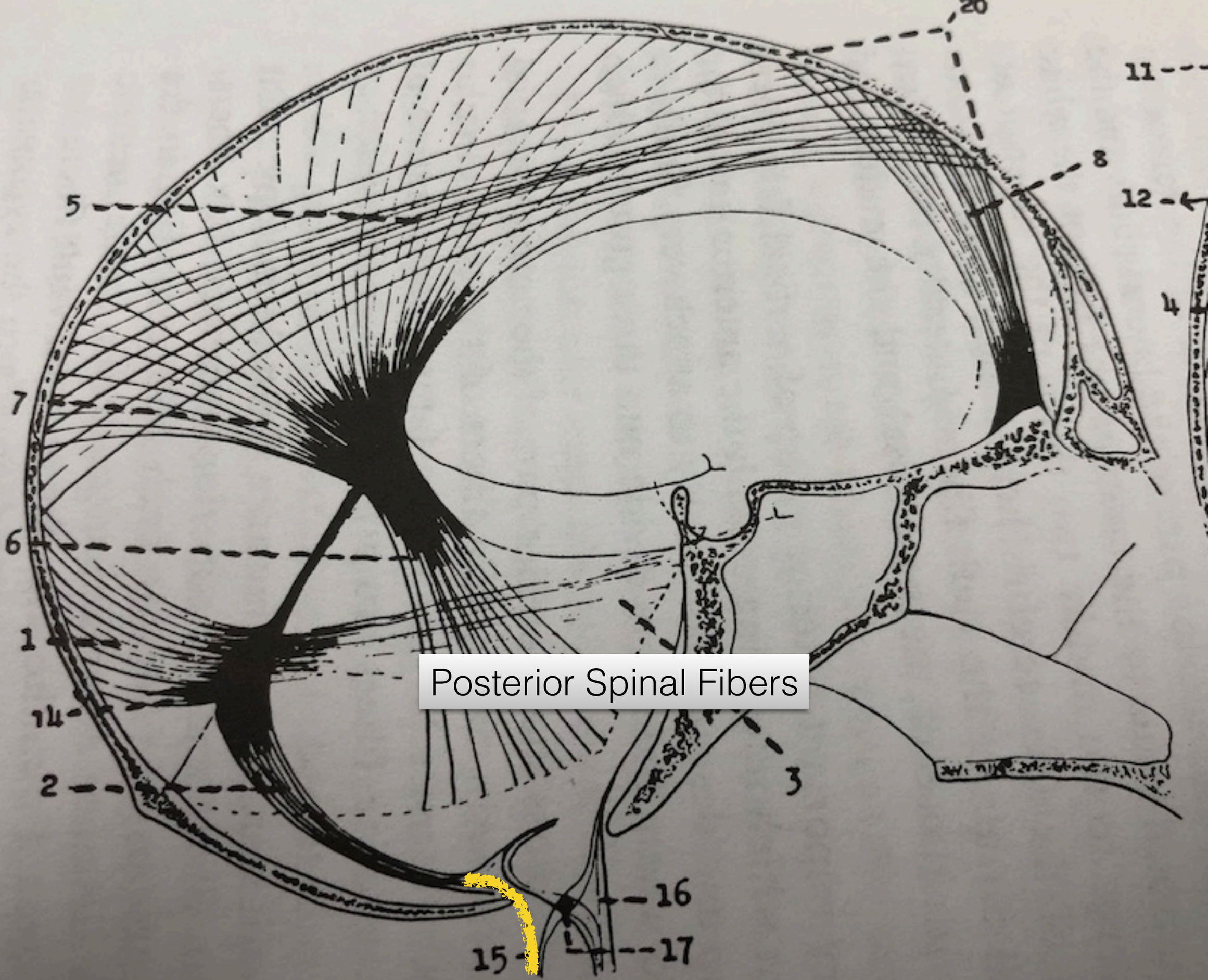
Spinal Group

- At the foramen magnum, the dura effectively becomes the anterior and posterior longitudinal ligaments.

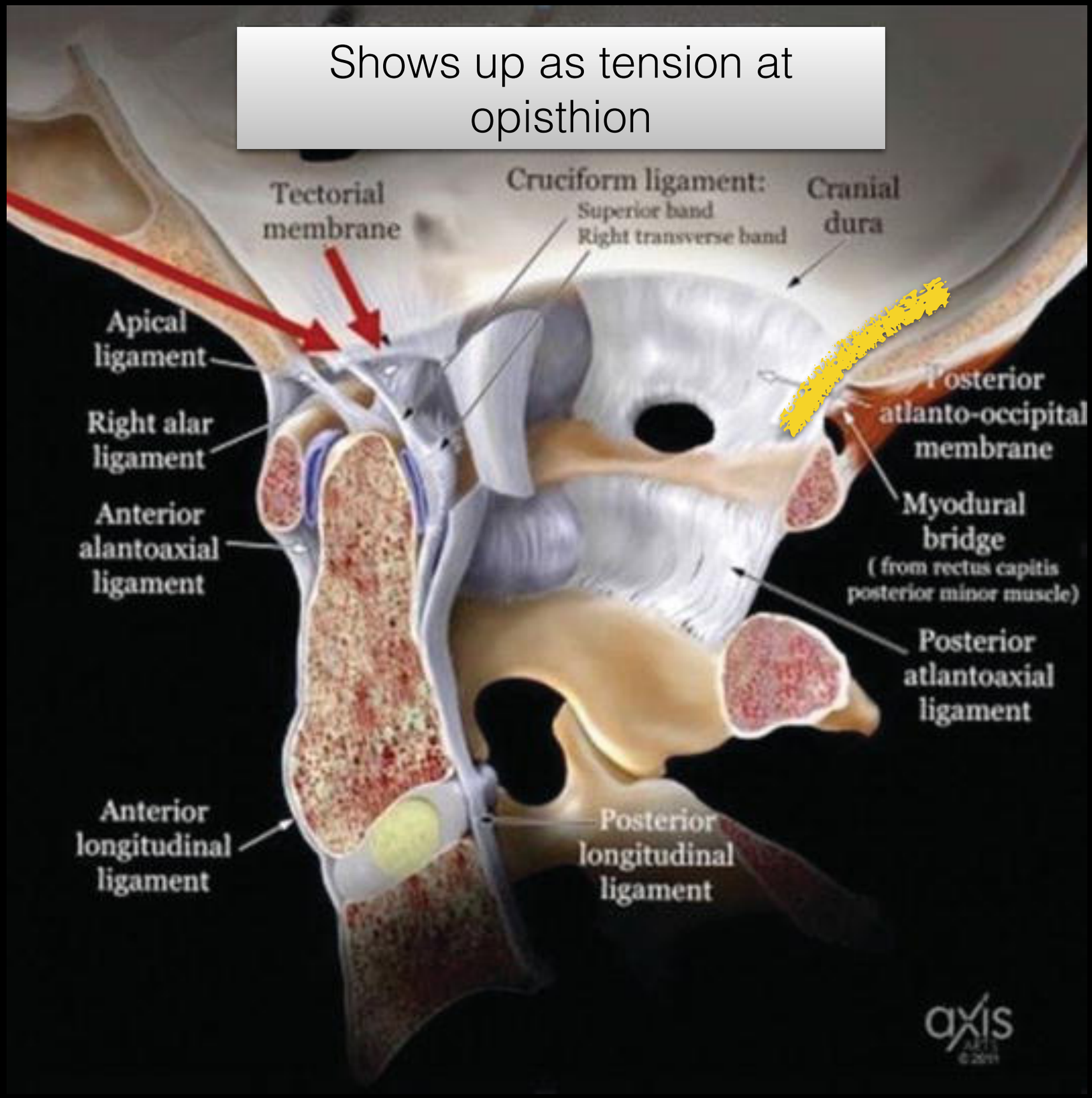
- Tension starting from above or coming from below can show up at the foramen magnum.

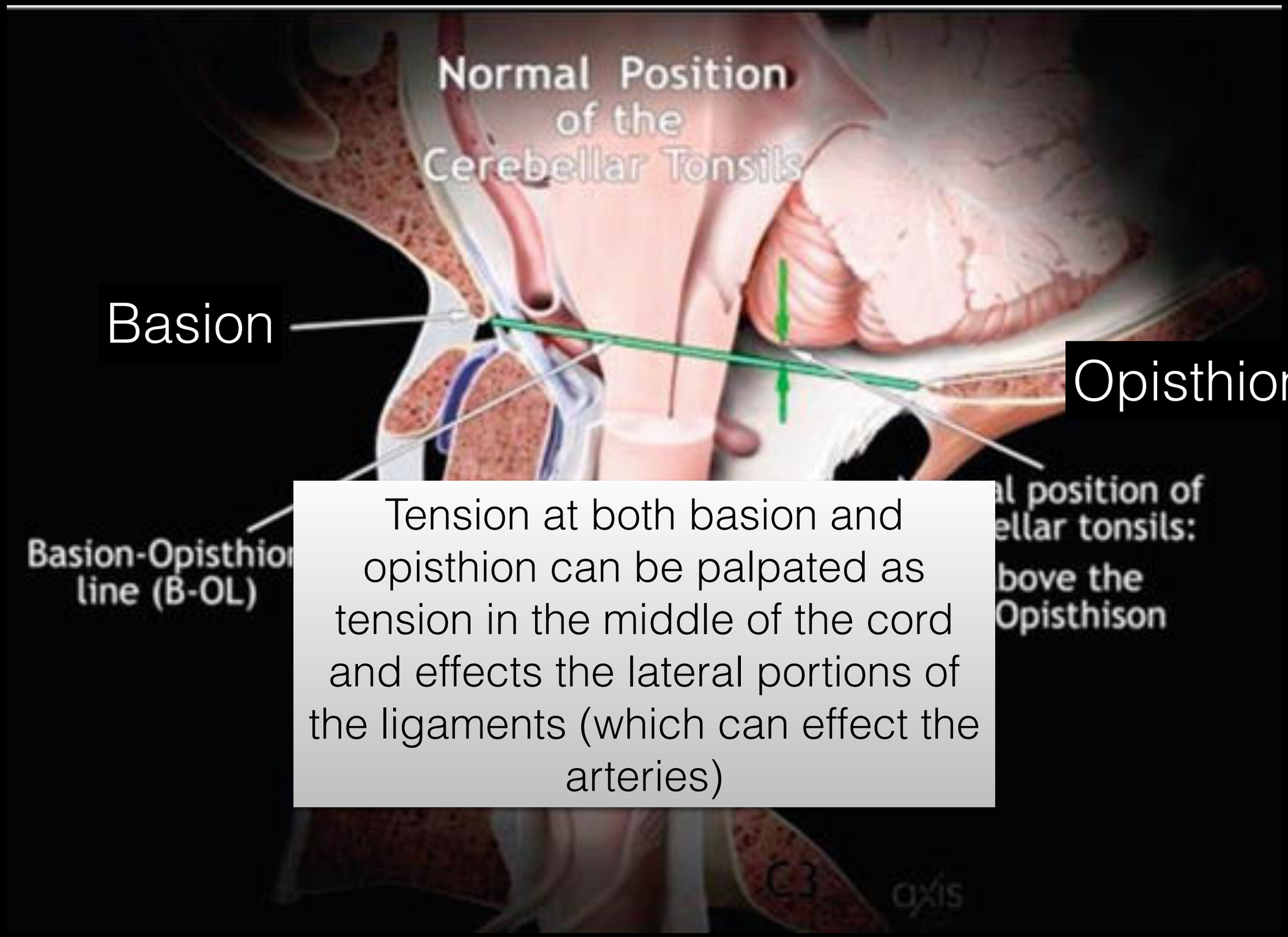

Anterior Spinal Fibers


Cranio-cervical Junction
Ligamentous Static Stabilizers
Anterior
Atlanto-Occipital
Membrane
Apical Ligament
(Underneath Superior
band of Cruciform)
Dura/Tectorial
Membrane Complex
Superior band of
Cruciform Ligament
Alar Ligament(s)
Transverse band of
Cruciform Ligament
Accessory
Ligament(s)
Dura and PLL
merge to become
Tectorial Membrane
Capsular Ligaments
Spinal Dura
(Thecal Sac)
Posterior
Longitudinal
Ligament (PLL)
Shows up as tension at basion
axis


Posterior Spinal Fibers

Shows up as tension at opisthion





Tension at both basion and opisthion can be palpated as tension in the middle of the cord and effects the lateral portions of the ligaments (which can effect the arteries)

Diagnosis
(the teachings of a Jedi Master)

"YOU MUST UNLEARN WHAT YOU HAVE LEARNED"

- Sequence well, young Jedi…
- Have an accurate diagnosis, you must
- Use more than one hold to get the diagnosis, you must
- Listen with your whole hand, you must

- Use the force…not too little, not too much
- Blend with the tissue, you must
- Don’t be afraid of what you feel…
- Give what you feel a name, you must (if you can’t name it, at least give it a good description)

- For the Jedi, you may alter your forces and open your mind…
- To palpate and blend with the fluid layer, the membranous layer, the inner and outer table of the bone, the blood vessels and nerves, the embryology, the tensegrity system of the body (the mechanism)…
- Then, set these things aside.
- What remains belongs to Dr. Arbuckle…

- Call patterns the name given by the Master…Dr. Arbuckle…
- Name hard feeling bones for the lines that make up the sensation…the buttresses
- Call hard restrictions within the dura….dural bands
- Yes. Hmmmm

Diagnosis of various cranial restrictions

Non Dominant Hand

Finding a hard end feel here indicates traditional Sutherland membrane restriction

Dominant Hand Thumb and Index Finger

Testing Vector

Non Dominant Hand

Finding a hard end feel on either side (or both) during rotation indicates a sutural restriction. The sub occipital area also has a leather glove feel.

Dominant Hand Thumb and Index Finger

Testing Vector (with rotation).

Non Dominant Hand

Testing Vector

Dominant Hand Thumb and Index Finger

A hard end feel here suggests buttress restrictions

Non Dominant Hand

Testing Vector

Dominant Hand Thumb and Index Finger

A hard end feel here suggests dural band restrictions

Non Dominant Hand

Testing Vector

Dominant Hand Thumb and Index Finger

An overall feeling of tension here (the whole head) suggests brain and/or arachnoid membrane restriction

Sequencing

- Treat within the layer that you find the most restriction.
- Remove the key restrictions within that layer from most to least restricted.
- Retest.

Take Home Messages

The Take Home Messages

- Buttresses are designed to help us absorb forces in the head and provide strength.
- They should not test as having tension.
- They can span multiple sutures and function independently of the membranes.
- Treating them effectively can resolve long standing issues.

Cranial Osteopathy

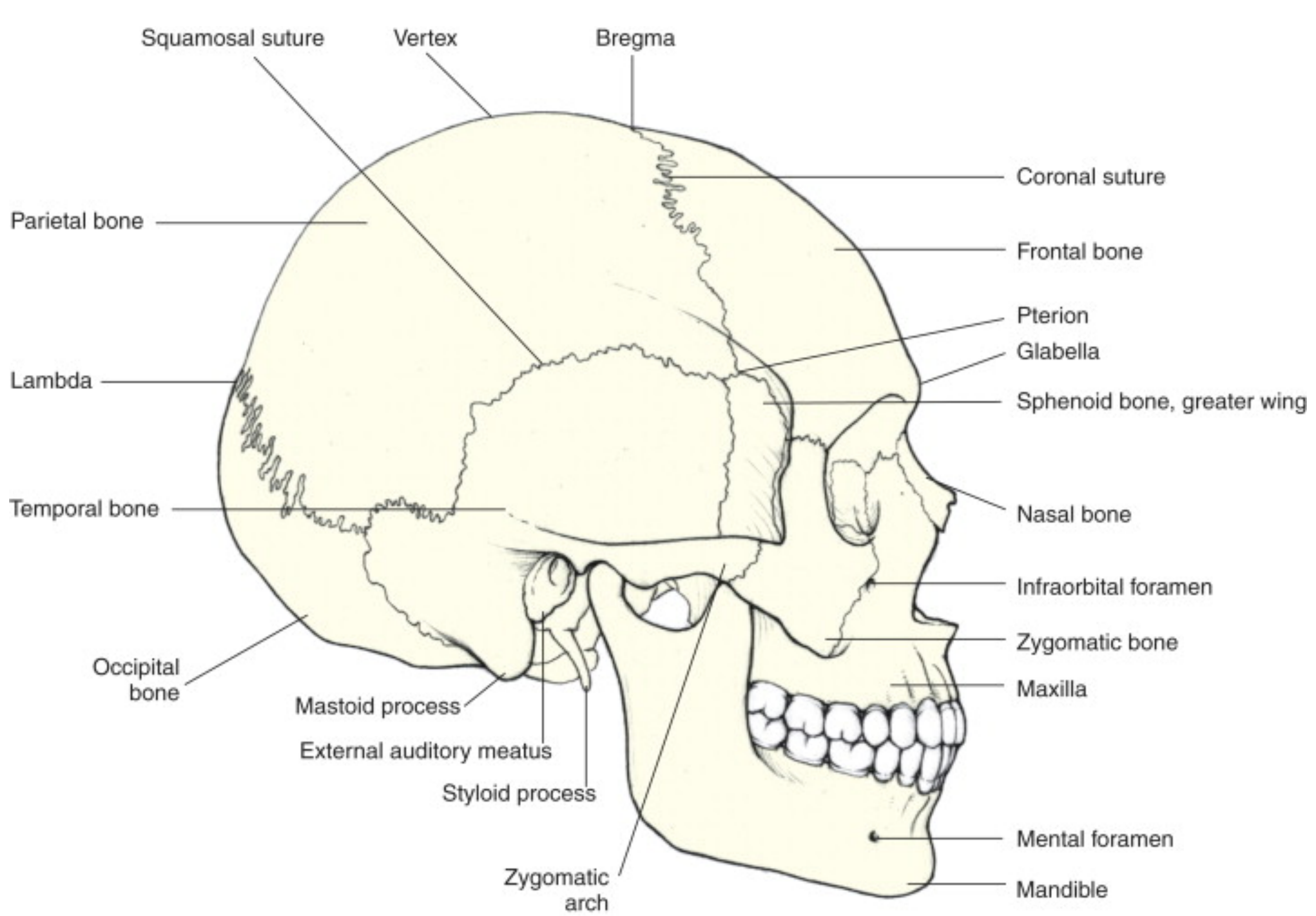
- Those methods work fairly well, but are they able to treat everything?

- Still said that if we were not getting the results that we were expecting that we did know our anatomy well enough….

Cranial Osteopathy

- Traditional cranial treatments leave out many of the sutures as a separately identifiable and treatable restriction.

- Thankfully, Sutherland taught a few students this approach and it has been passed down to a small number of osteopaths.


Squamosal suture
Vertex
Bregma
Coronal suture
Parietal bone
Frontal bone
Pterion
Glabella
Lambda
Sphenoid bone, greater wing
Temporal bone
Nasal bone
Infraorbital foramen
Zygomatic bone
Occipital bone
Maxilla
Mastoid process
External auditory meatus
Styloid process
Mental foramen
Zygomatic arch
Mandible

Cranial Osteopathy

- The sutural approach goes well beyond the V spread.

- It is very powerful and can also address the membranes and fluids of the cranium in the hands of a skilled operator.

- But does it address enough of the things that can be restricted in the head? (or is there more anatomy to treat?)

Cranial Osteopathy

- We typically learn that the body is symmetric and should move symmetrically unless a structure only grows on one side (liver, for example).

- But is that true? (and most specifically, is it true in trauma?)

Can the method you currently know reliably locate and treat these restrictions?

Cranial Osteopathy

- Thanks to the work of one of Sutherland's first students, Beryl Arbuckle, we have at least one more layer of restrictions to look for and treat.

The Take Home Messages

- If buttresses are restricted, look for a mechanism of injury (trauma) to explain the tension - this can lead to resolving the underlying cause.

The Take Home Messages

- Dural bands are areas of fibers under tension. If these fibers function like ligaments, their presence indicates trauma or repeated mechanical injury.

- Treat by finding both ends of the tension and using indirect methods.

- Then ask WHY?

The Take Home Messages

- If a band comes from something like a cross bite, you will need the help of a dentist to reach good resolution of the symptoms.

- If the band comes from incomplete differential growth…how to do you help growth to complete?

“Osteopathy is a science built upon the principle that man is a machine - if a student is allowed to go to clinics before he masters anatomy, he gets cures mixed with an imperfect knowledge of the machine he tries to adjust.”

–Beryl Arbuckle

Thank You!

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