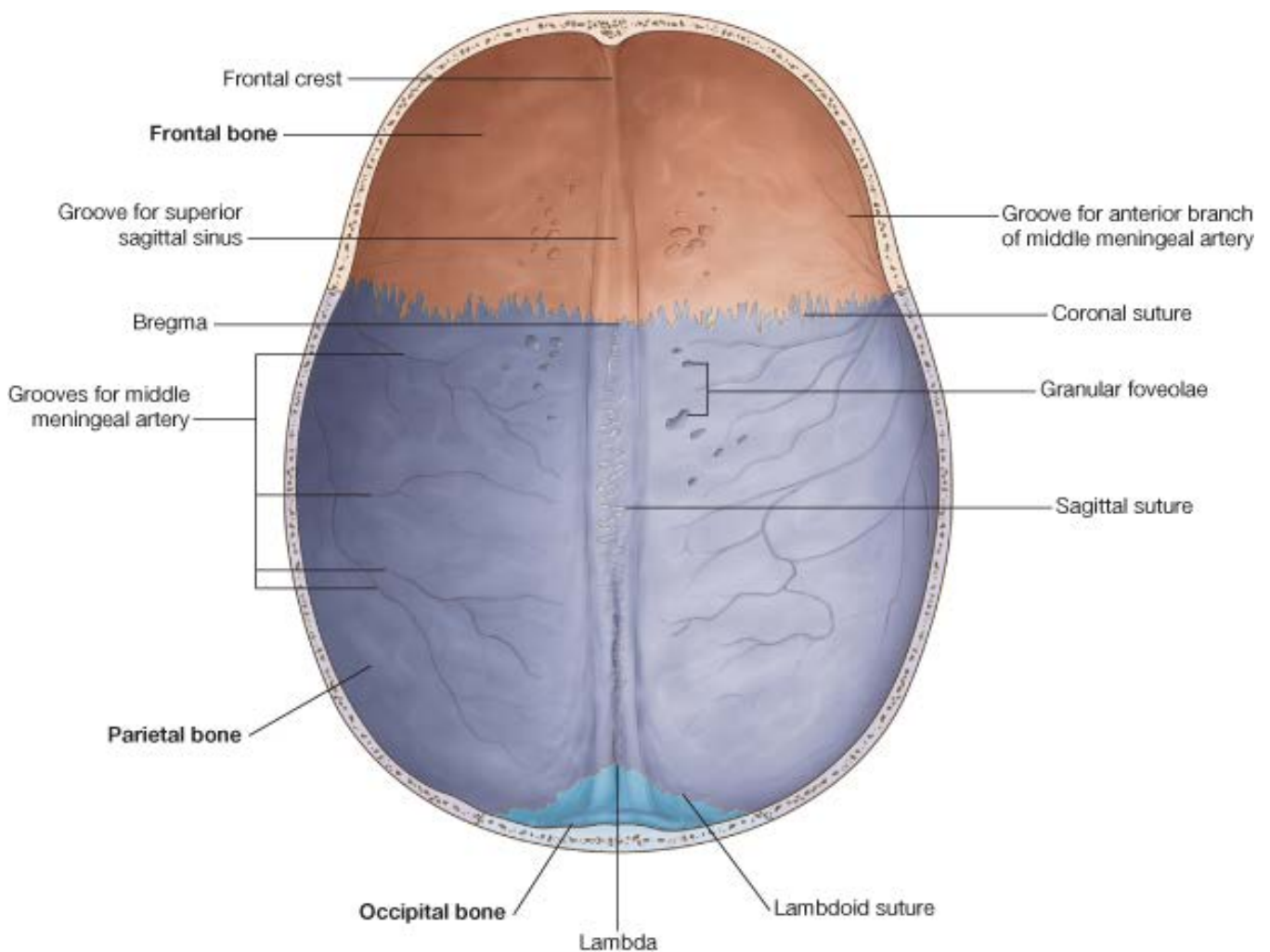


The cranial cavity contains the brain and its surrounding meninges, portions of the cranial nerves, arteries, veins, and venous sinuses.

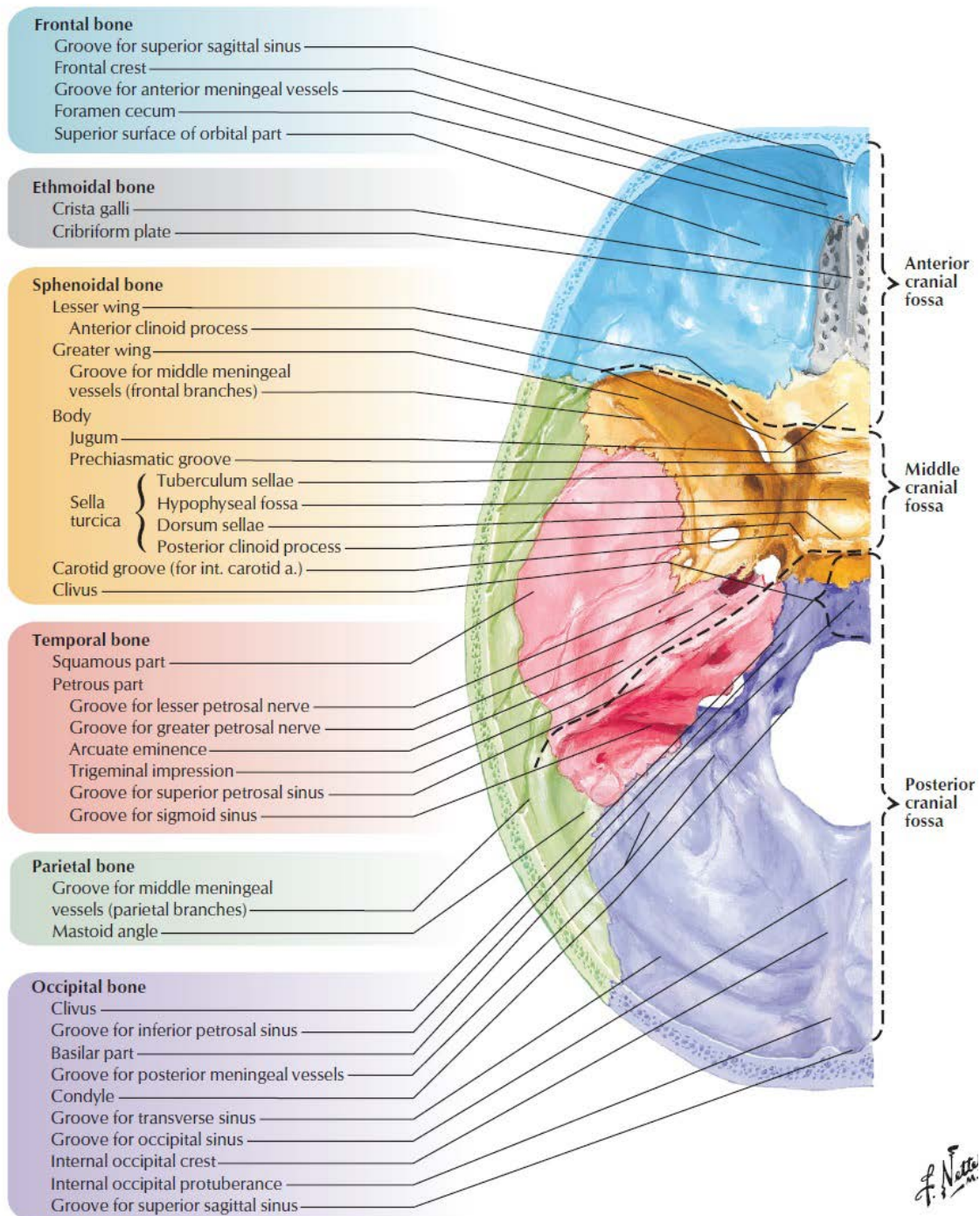
❖ Vault of the Skull

The internal surface of the vault shows the coronal, sagittal, and lambdoid sutures. In the midline is a shallow sagittal groove that lodges the **superior sagittal sinus**. On each side of the groove are several small pits, called **granular pits**, which lodge the **lateral lacunae** and **arachnoid granulations**. Several narrow grooves are present for the anterior and posterior divisions of the **middle meningeal vessels** as they pass up the side of the skull to the vault.



❖ Base of the Skull

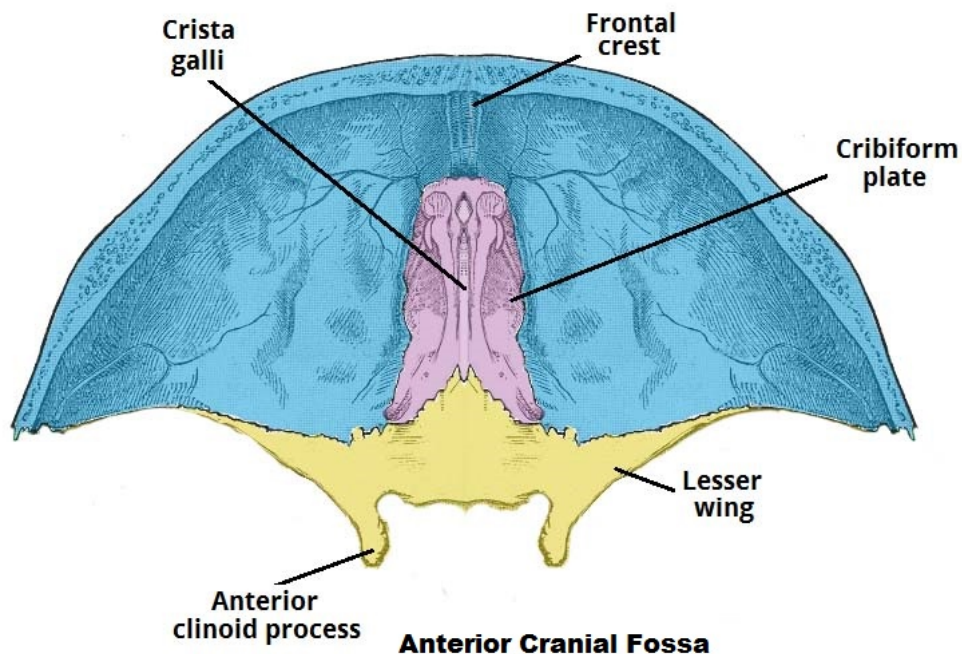
The interior of the base of the skull is divided into three cranial fossae: anterior, middle, and posterior. The anterior cranial fossa is separated from the middle cranial fossa by the lesser wing of the sphenoid, and the middle cranial fossa is separated from the posterior cranial fossa by the petrous part of the temporal bone.



Anterior Cranial Fossa

The anterior cranial fossa lodges the frontal lobes of the cerebral hemispheres. It is bounded anteriorly by the inner surface of the frontal bone, and in the midline is a

frontal crest for the attachment of the **falx cerebri**. Its posterior boundary is the sharp lesser wing of the sphenoid. The medial end of the lesser wing of the sphenoid forms the **anterior clinoid process** on each side, which gives attachment to the **tentorium cerebelli**. The median part of the anterior cranial fossa is limited posteriorly by the groove for the optic chiasma. The floor of the fossa is formed by the ridged orbital plates of the frontal bone laterally and by the **cribriform plate** of the ethmoid medially. The **crista galli** is a sharp upward projection of the ethmoid bone in the midline for the attachment of the falx cerebri. The upper surface of the cribriform plate supports the olfactory bulbs, and the small perforations in the cribriform plate are for the **olfactory nerves**.



Middle Cranial Fossa

The middle cranial fossa consists of a small median part and expanded lateral parts. The median raised part is formed by the body of the sphenoid, and the expanded lateral parts form concavities on either side, which lodge the **temporal lobes** of the **cerebral hemispheres**. It is bounded anteriorly by the lesser wings of the sphenoid and posteriorly by the superior borders of the petrous parts of the temporal bones. Laterally lie the squamous parts of the temporal bones, the greater wings of the sphenoid, and the parietal bones. The floor of each lateral part of the middle cranial fossa is formed by the greater wing of the sphenoid and the squamous and petrous parts of the temporal bone.

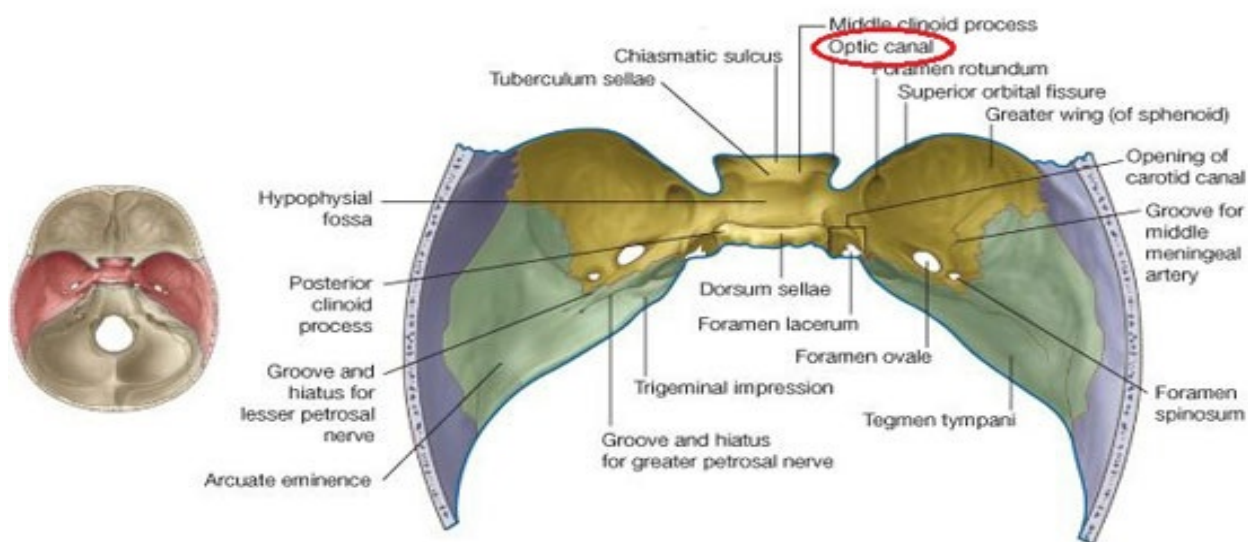
The sphenoid bone resembles a bat having a centrally placed **body** with **greater** and **lesser wings** that are out stretched on each side. The body of the sphenoid contains

the **sphenoid air sinuses**, which are lined with mucous membrane and communicate with the nasal cavity; they serve as voice resonators. Anteriorly, the **optic canal** transmits the optic nerve and the ophthalmic artery (branch of the internal carotid artery, to the orbit). The **superior orbital fissure**, which is a slit like opening between the lesser and the greater wings of the sphenoid, transmits the lacrimal, frontal, and nasociliary branches of ophthalmic division of the trigeminal n., trochlear, oculomotor, and abducent nerves, together with the superior ophthalmic vein. The sphenoparietal venous sinus runs medially along the posterior border of the lesser wing of the sphenoid and drains into the cavernous sinus. The **foramen rotundum**, which is situated behind the medial end of the superior orbital fissure, perforates the greater wing of the sphenoid and transmits the maxillary nerve from the trigeminal ganglion to the pterygopalatine fossa. The **foramen ovale** lies posterolateral to the foramen rotundum. It perforates the greater wing of the sphenoid and transmits the large sensory root and small motor root of the mandibular nerve to the infra temporal fossa; the lesser petrosal nerve also passes through it. The small **foramen spinosum** lies postero-lateral to the foramen ovale and also perforates the greater wing of the sphenoid. The foramen transmits the middle meningeal artery from the infratemporal fossa into the cranial cavity. The large and irregularly shaped **foramen lacerum** lies between the apex of the petrous part of the temporal bone, the sphenoid bone and the occipital bone. The inferior opening of the foramen lacerum in life is filled by cartilage and fibrous tissue, and only small blood vessels pass through this tissue from the cranial cavity to the neck. The **carotid canal** opens into the side of the foramen lacerum above the closed inferior opening. The internal carotid artery enters the foramen through the carotid canal and immediately turns upward to reach the side of the body of the sphenoid bone. Lateral to the foramen lacerum is an impression on the apex of the petrous part of the temporal bone for the **trigeminal ganglion**.

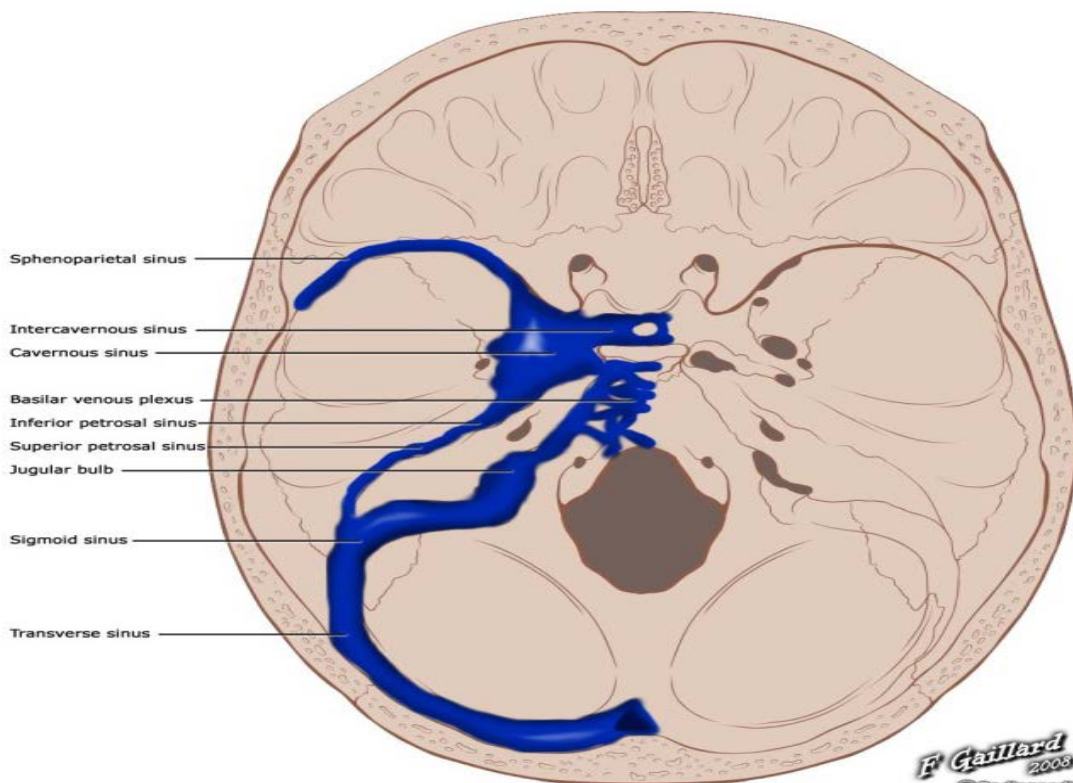
On the anterior surface of the petrous bone are two grooves for nerves; the largest medial groove is for the **greater petrosal nerve**, a branch of the facial nerve; the smaller lateral groove is for the **lesser petrosal nerve**, a branch of the tympanic plexus. The greater petrosal nerve enters the foramen lacerum deep to the trigeminal ganglion and joins the **deep petrosal nerve** (sympathetic fibers from around the internal carotid artery), to form the **nerve of the pterygoid canal**. The lesser petrosal nerve passes forward to the foramen ovale.

The median part of the middle cranial fossa is formed by the body of the sphenoid bone. In front is the **sulcus chiasmatis**, which is related to the optic chiasma and leads laterally to the **optic canal** on each side. Posterior to the sulcus is an elevation, the **tuberculum sellae**. Behind the elevation is a deep depression, the **sella turcica**, which lodges the **pituitary gland**. The sella turcica is bounded posteriorly by a

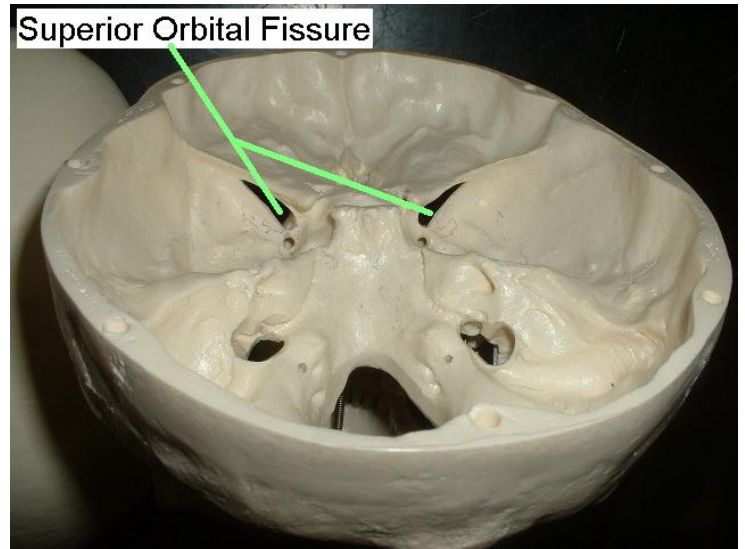
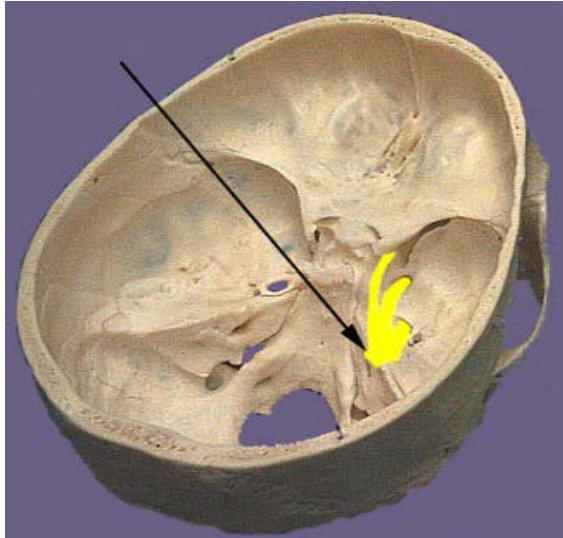
square plate of bone called the **dorsum sellae**. The superior angles of the dorsum sellae have two tubercles, called the **posterior clinoid processes**, which give attachment to the fixed margin of the tentorium cerebelli. The cavernous sinus is directly related to the side of the body of the sphenoid. It carries in its lateral wall the 3rd and 4th cranial nerves and the ophthalmic and maxillary divisions of the 5th cranial nerve. The internal carotid artery and the 6th cranial nerve pass forward through the sinus.



Middle Cranial Fossa



F. Gaillard
2008



Posterior Cranial Fossa

The posterior cranial fossa is deep and lodges the parts of the hindbrain, namely, the **cerebellum**, **pons**, and **medulla oblongata**. Anteriorly, the fossa is bounded by the superior border of the petrous part of the temporal bone, and posteriorly it is bounded by the internal surface of the squamous part of the occipital bone. The floor of the posterior fossa is formed by the basilar, condylar, and squamous parts of the occipital bone and the mastoid part of the temporal bone.

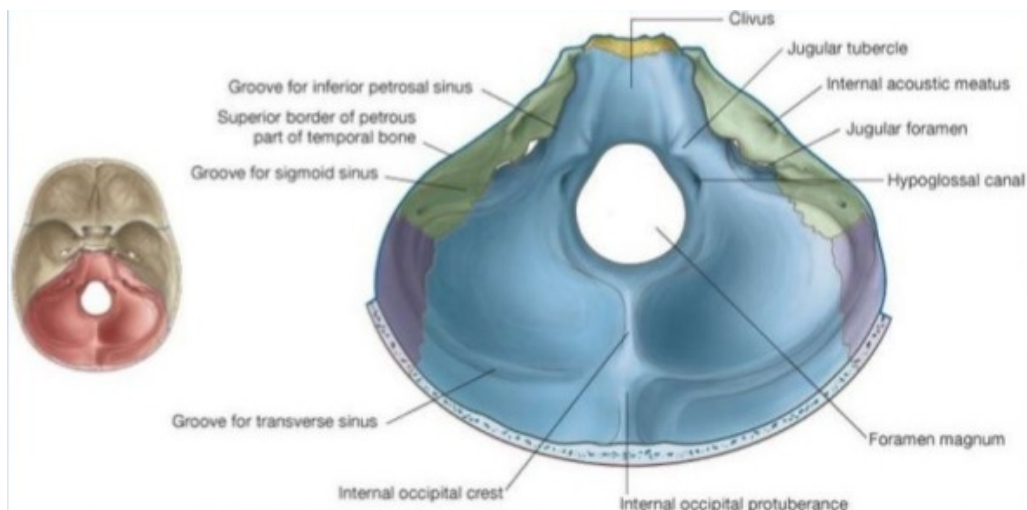
The roof of the fossa is formed by a fold of dura, the **tentorium cerebelli**, which intervenes between the cerebellum below and the occipital lobes of the cerebral hemispheres above.

The **foramen magnum** occupies the central area of the floor and transmits the medulla oblongata and its surrounding meninges, the ascending spinal parts of the accessory nerves, and the two vertebral arteries.

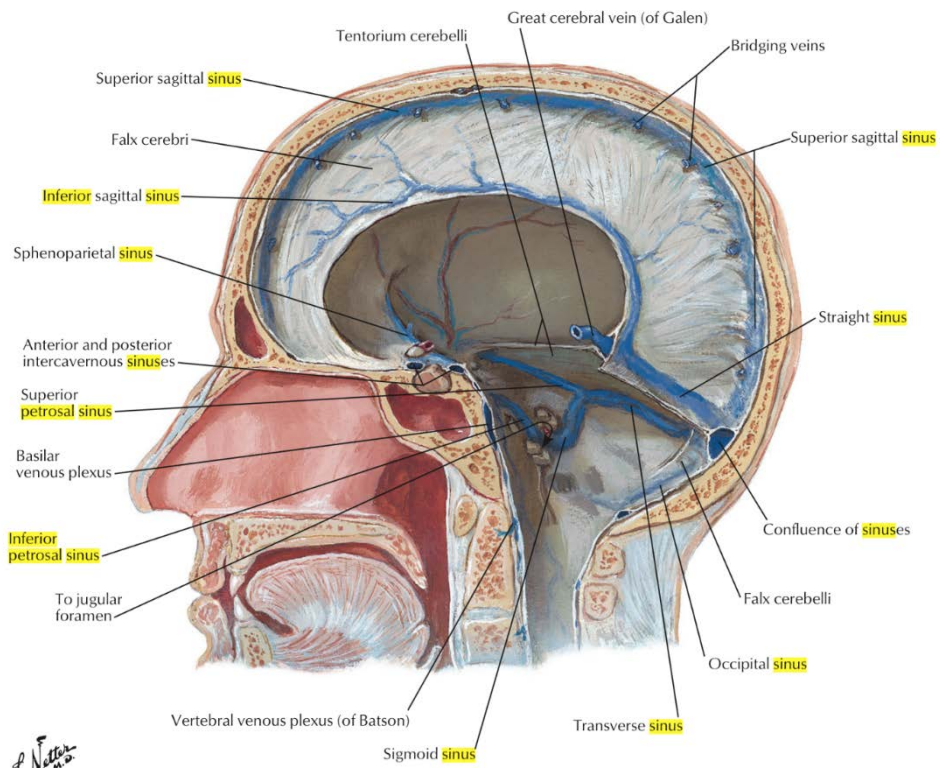
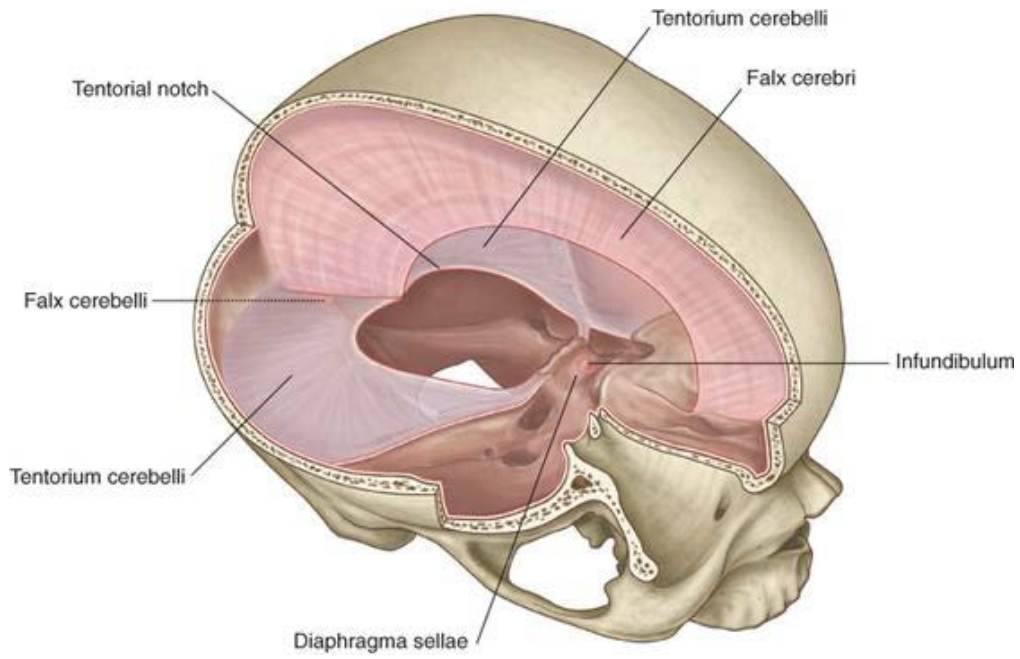
The **hypoglossal canal** is situated above the anterolateral boundary of the foramen magnum and transmits the **hypoglossal nerve**. The **jugular foramen** lies between the lower border of the petrous part of the temporal bone and the condylar part of the occipital bone. It transmits the following structures from before backward: the **inferior petrosal sinus**; the **9th, 10th, and 11th cranial nerves**; and the large **sigmoid sinus**. The inferior petrosal sinus descends in the groove on the lower border of the petrous part of the temporal bone to reach the foramen. The sigmoid sinus turns down through the foramen to become the **internal jugular vein**. The **internal acoustic meatus** pierces the posterior surface of the petrous part of the temporal bone. It transmits the vestibulocochlear nerve and the motor and sensory roots of the facial nerve.

The **internal occipital crest** runs upward in the midline posteriorly from the foramen magnum to the **internal occipital protuberance**; to it is attached the small **falx cerebella** over the **occipital sinus**.

On each side of the internal occipital protuberance is a wide groove for the **transverse sinus**. This groove sweeps around on either side, on the internal surface of the occipital bone, to reach the postero-inferior angle or corner of the parietal bone. The groove now passes onto the mastoid part of the temporal bone, and here the transverse sinus becomes the **sigmoid sinus**. The **superior petrosal sinus** runs backward along the upper border of the petrous bone in a narrow groove and drains into the sigmoid sinus. As the sigmoid sinus descends to the jugular foramen, it deeply grooves the back of the petrous bone and the mastoid part of the temporal bone. Here, it lies directly posterior to the mastoid antrum.



Posterior Cranial fossa

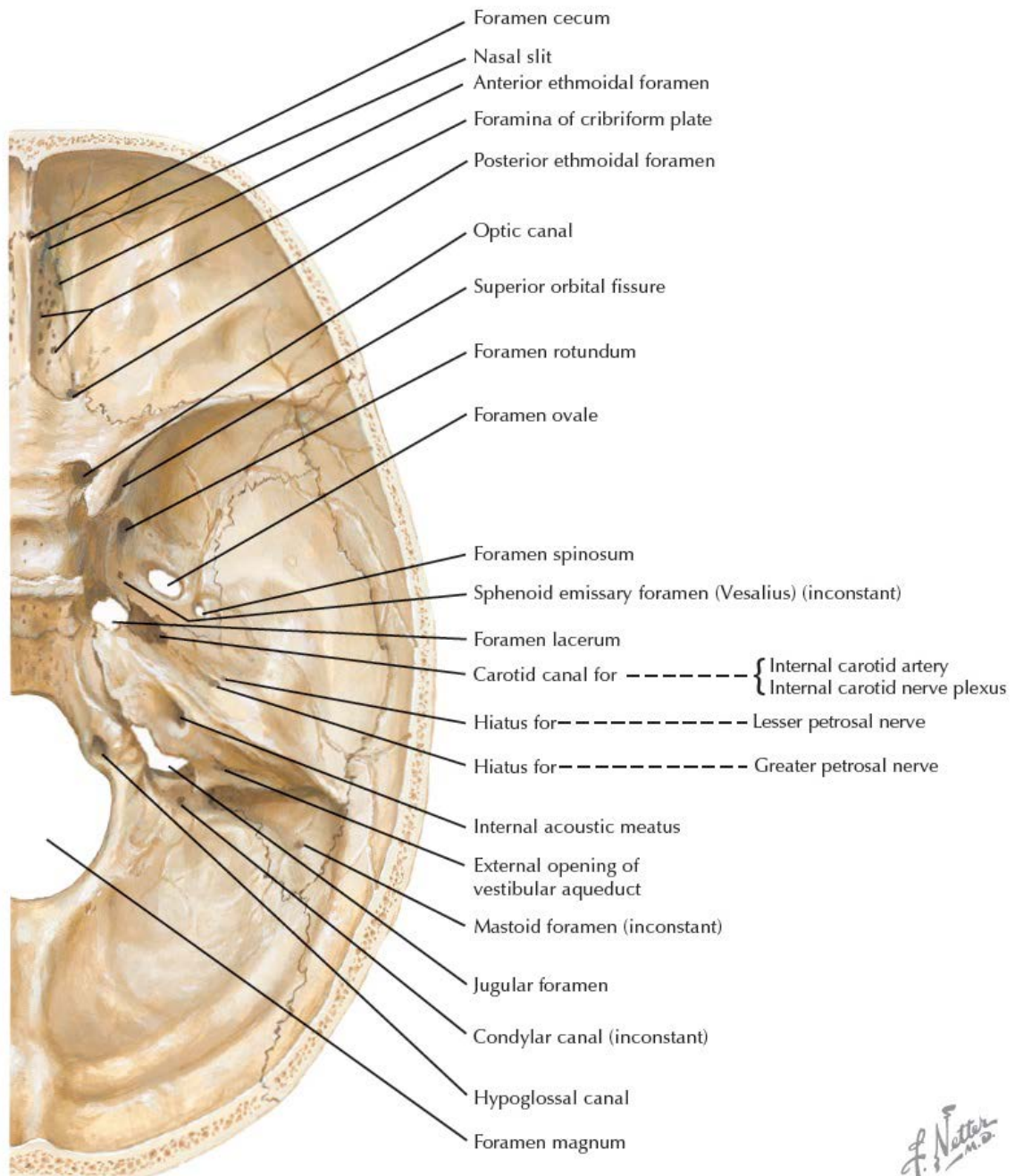


A. Netter

Major Foramina and Fissures

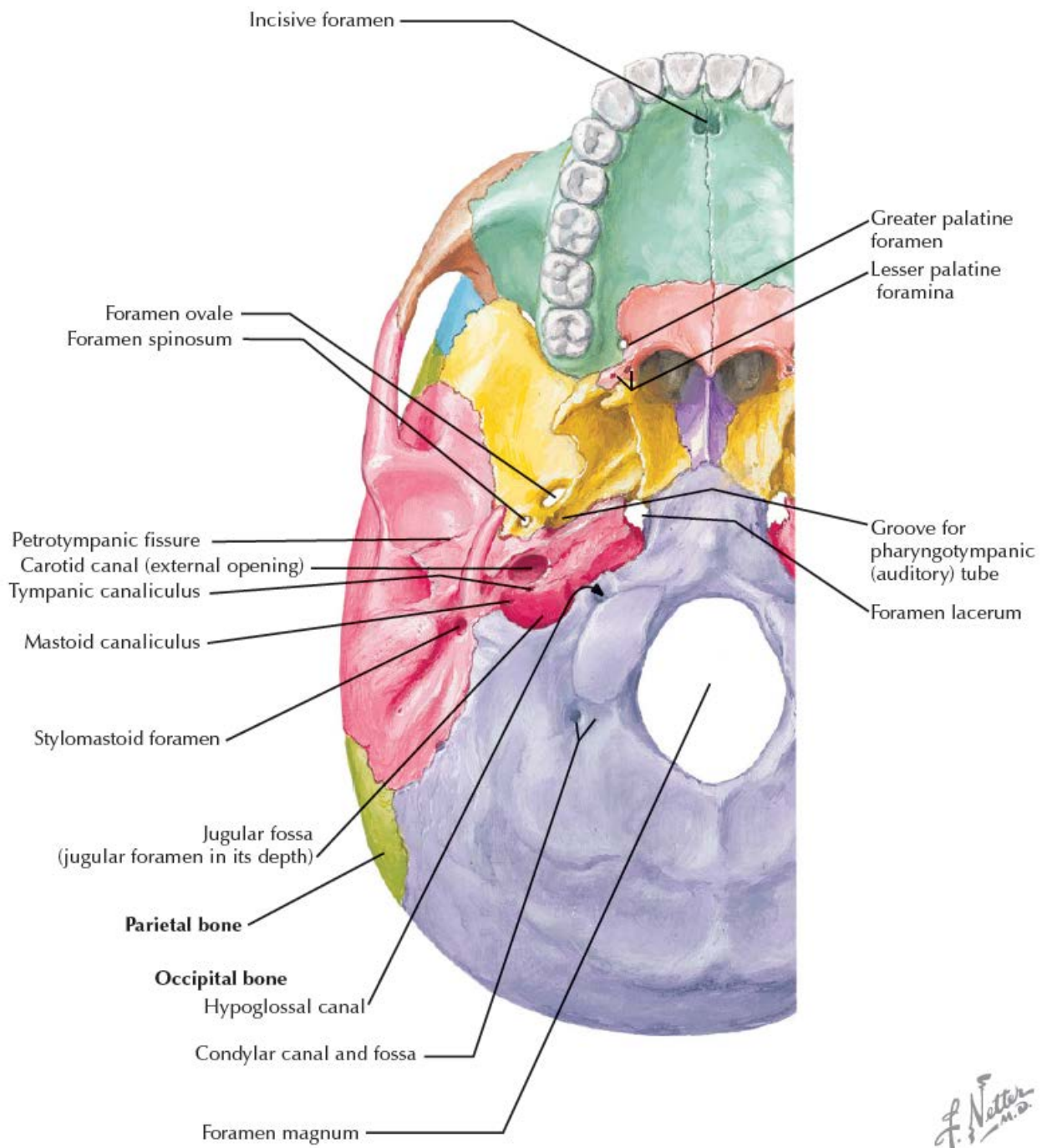
❖ SUPERIOR VIEW OF THE CRANIAL BASE

Foramen/Fissure	Located in or Formed by	Structures Passing through
Cribriformplate	Ethmoid	Olfactorynerves.from the olfactory bulb
Foramen cecum	Between the frontal and the ethmoid bones	Emissary vein. From nasal cavity to the superior sagittal sinus
Anterior ethmoid foramen		Anterior ethmoid n.and vessels
Posteriorethmoid foramen		Posterior ethmoid n. and vessels
Optic canal	Sphenoid	Opticn.,ophthalmic a.
Superior orbital fissure	Between the greater and the lesser wings of the sphenoid	Nasociliary, frontal, and lacrimal branches of the ophthalmic division of the trigeminal n.,oculomotor n., trochlear n.,abducensn.,superior ophthalmic vein.
Foramen rotundum	Sphenoid	Maxillary division of the trigeminal n.
Foramen ovale		Mandibular division of the trigeminal n. ,accessory meningeal a., lesser petrosal n., emissary v.
Foramen spinosum		Middle meningeal vessels and meningeal branch of the mandibular division of the trigeminal n.
Foramen lacerum	Articulation of the sphenoid (greater wing andbody), temporal (petrous portion),and occipital (basilar portion) bones	Nothing passes through it Filled with fibrocartilage during Life (although the anterior wall of the foramen has an opening for the pterygoid canal and the posterior wall has an opening for The carotid canal)
Carotid canal	Temporal (petrousportion)	Internal carotida., internal Carotid n. plexus (sympathetics)
Hiatus for the lesser petrosal n.		Lesser petrosal n.
Hiatus for the greater petrosal n.		Greater petrosal n.
Internal acoustic meatus		Facial n., vestibulocochlear n.
Jugular foramen	Temporal (petrous portion) and occipital	Glossopharyngeal n.,vagus n., spinal accessory n., inferior petrosal sinus, sigmoid sinus.
Hypoglossal canal	Occipital	Hypoglossal n.
Foramen magnum		Medulla oblongata, vertebral arteries, spinal roots of the spinal accessory n.



❖ INFERIOR VIEW OF THE CRANIAL BASE

Foramen / Fissure	Located in or Formed by	Structures Passing through
Incisive foramen	Maxilla (palatine process)	Nasopalatine n., sphenopalatine a.
Greater palatine foramen	Palatine	Greater palatine n. and vessels
Lesser palatine foramina	Palatine	Lesser palatine n. and vessels
Foramen ovale	Sphenoid	Mandibular division of the trigeminal n., accessory meningeal a., lesser petrosal n., emissary v.
Foramen spinosum	Sphenoid	Middle meningeal vessels and meningeal branch of the mandibular division of the trigeminal n.
Foramen lacerum	Articulation of the Sphenoid (greater wing and body), temporal (petrous portion), and occipital (basilar portion) bones	Nothing passes through it Filled with fibrocartilage during Life (although the anterior wall of the foramen has an opening for the pterygoid canal and the posterior wall has an opening for the carotid canal)
Carotid canal	Temporal (petrous portion)	Internal carotid a., internal carotid n. plexus (sympathetics)
Jugular foramen	Temporal (petrous portion) and occipital	Glossopharyngeal n., vagus n., spinal accessory n., inferior petrosal sinus, sigmoid sinus, posterior meningeal a.
Petro tympanic fissure	Temporal	Chorda tympani n., anterior tympanic a.
Stylo mastoid foramen		Facial n., stylomastoid a.
Tympano mastoid fissure		Auricular branch of the vagus n.
Hypoglossal canal	Occipital	Hypoglossal n.
Foramen magnum		Medulla oblongata, vertebral arteries, spinal roots of the spinal accessory n.



❖ ANTERIOR VIEW

Foramen/ Fissure	Located in or Formed by	Structures Passing through
Supra orbital foramen	Frontal	Supra orbital n.and vessels
Optic canal	Sphenoid	Optic n.,ophthalmic a.
Superior orbital fissure	Between the Greater and Lesser wing of the sphenoid	Nasociliary, frontal, and lacrimal branches of the ophthalmic division of the trigeminal n., oculomotor n., trochlear n., abducens n., superior ophthalmic vein.
Inferior orbital fissure	Between the Greater wing of the sphenoid and Maxilla and orbital portion of the palatine bones	Maxillary division of the trigeminal n. and its zygomatic n., infraorbital vessels, inferior ophthalmic vein and sympathetic nerves
Anterior ethmoid foramen	Between the Frontal and Ethmoid bones	Anterior ethmoid n.and vessels
Posteriorethmoidforamen		Posteriorethmoidn.andvessels
Zygomatico facial foramen	Zygomatic	Zygomatico facial n. and vessels
Infra orbital foramen	Maxilla	Infra orbital n.andvessels
Mental foramen	Mandible	Mental n. and vessels

