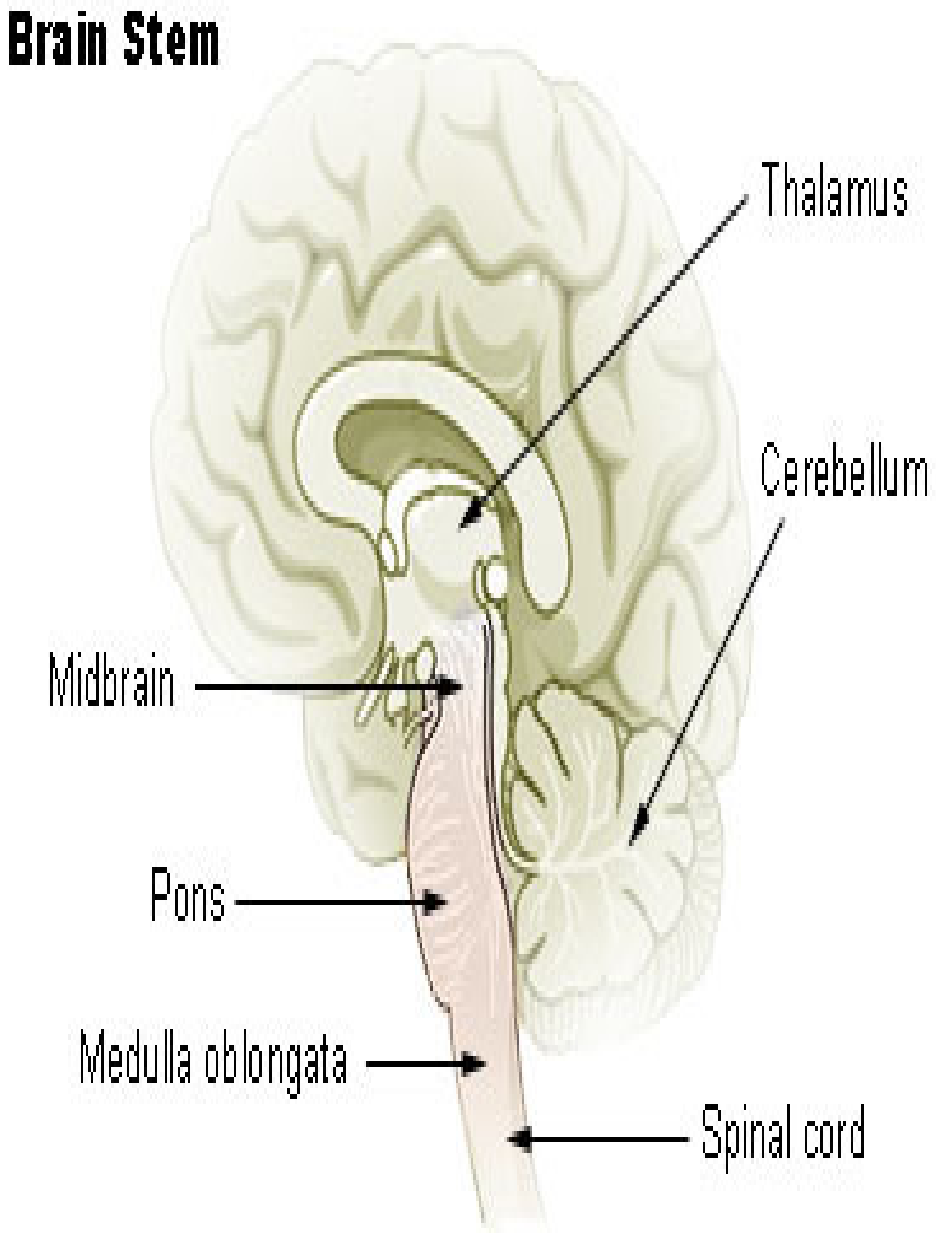
Brain stem lab

Brain stem

- Stalk like in shape
- Connects spinal cord forebrain

Parts:

1. Medulla oblongata
2. Pons
3. Midbrain

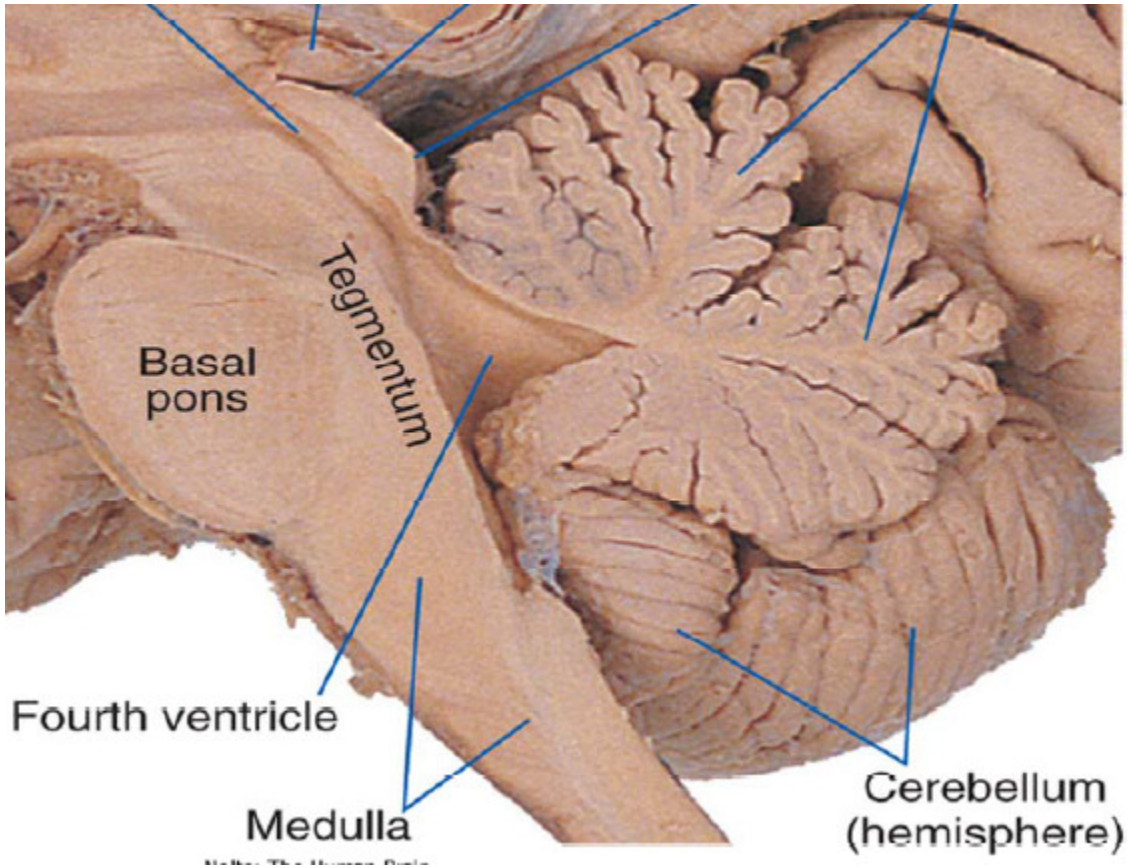


Functions

1. Conduit for ascending and descending tracts connecting spinal cord and cortex
2. Contains reflex centers (cardiac and respiratory centers) levels of consciousness
3. Contains important nuclei of cranial nerves (3^{rd} to 12^{th} cranial nerves)

Medulla oblongata

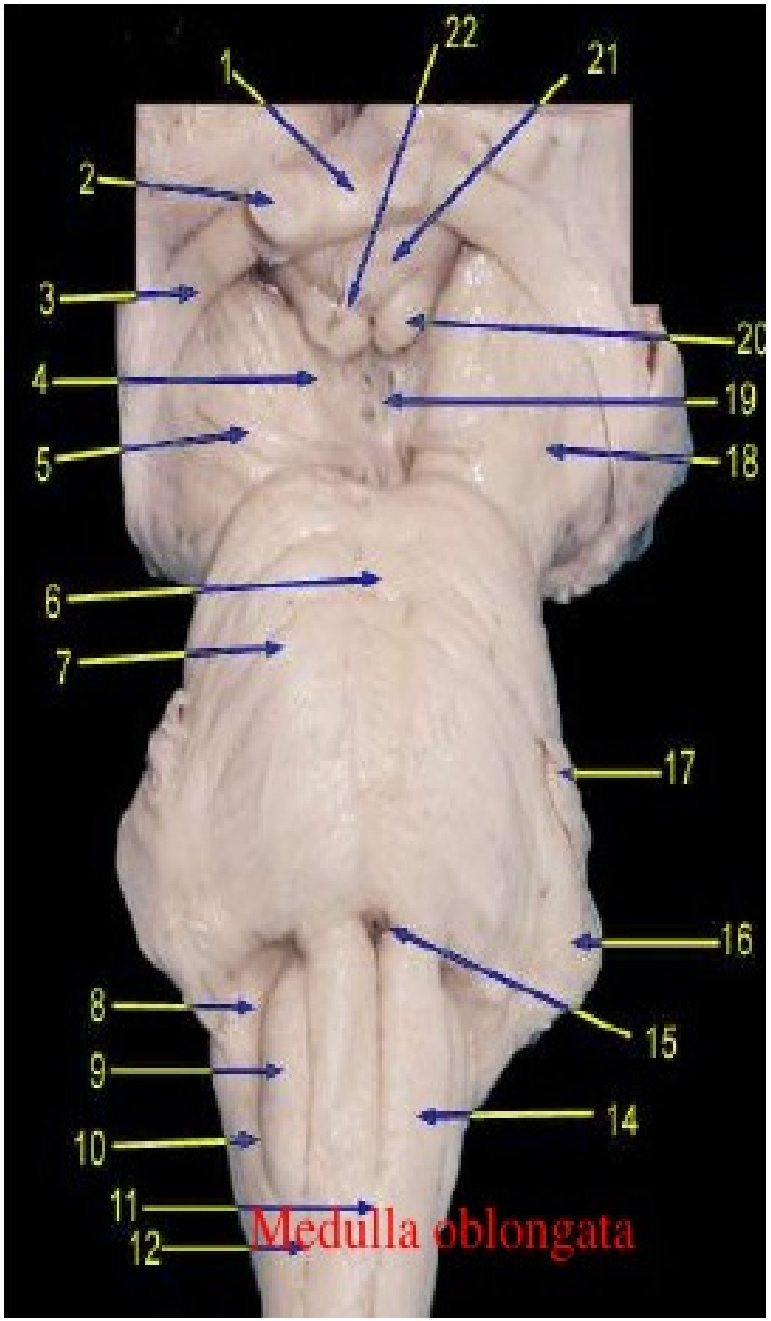
- Most caudal level of the brain stem
  - Continuous with the spinal cord
- Connects pons to spinal cord
- Conical in shape
- Cranial nerves IX–XII attach to the medulla
- Central canal of spinal cord continues into the lower medulla (close medulla)
- Upper medulla contains cavity of 4th ventricle(open medulla)



External structure of medulla

- Most inferior region of the brain stem.
- Becomes the spinal cord at the level of the foramen magnum.
- Medulla is broad above ,joins with pons narrow below, continous with spinal cord
- Length is about 3cm, width is about 2cm at its upper end
- Surfaces shows series of fissures
  - Anterior median fissure
  - Posterior median fissure

} Spinal cord



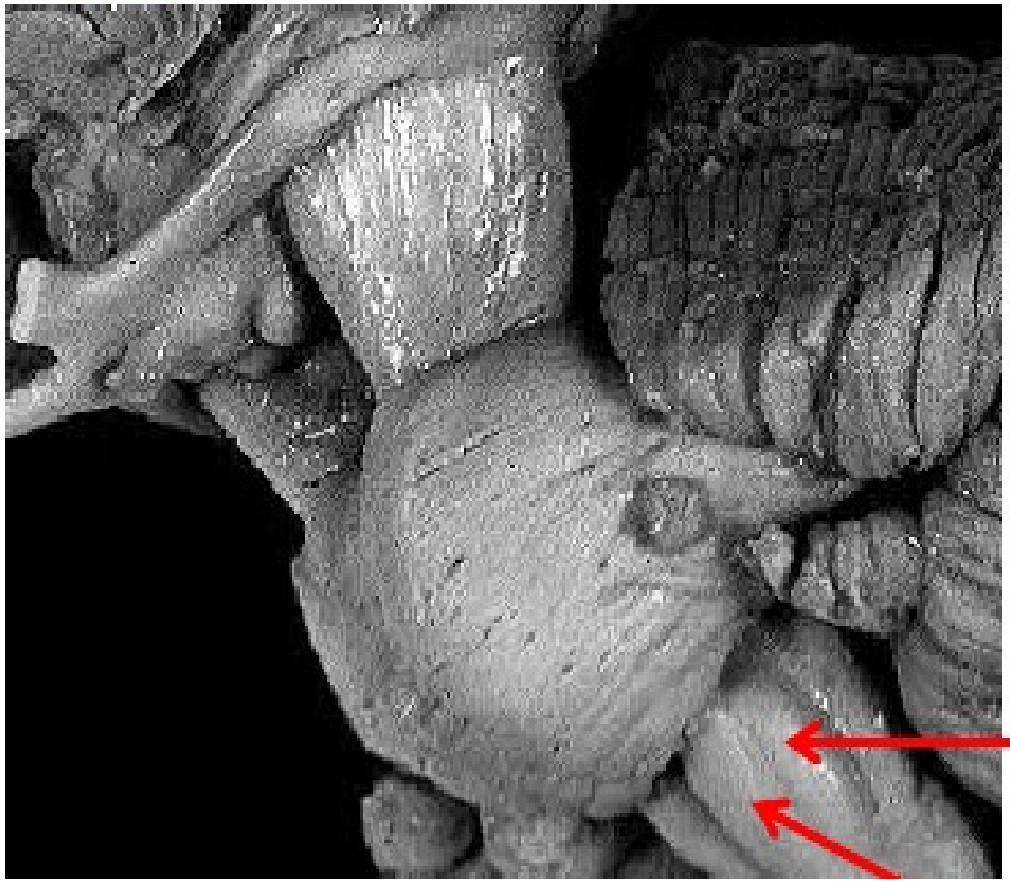
External surface of medulla

Ventral surface of medulla oblongata contains

➢Pyramid

•elevation between anterior median and anterolateral sulcus

•Formed due to decussation of corticospinal fibres.



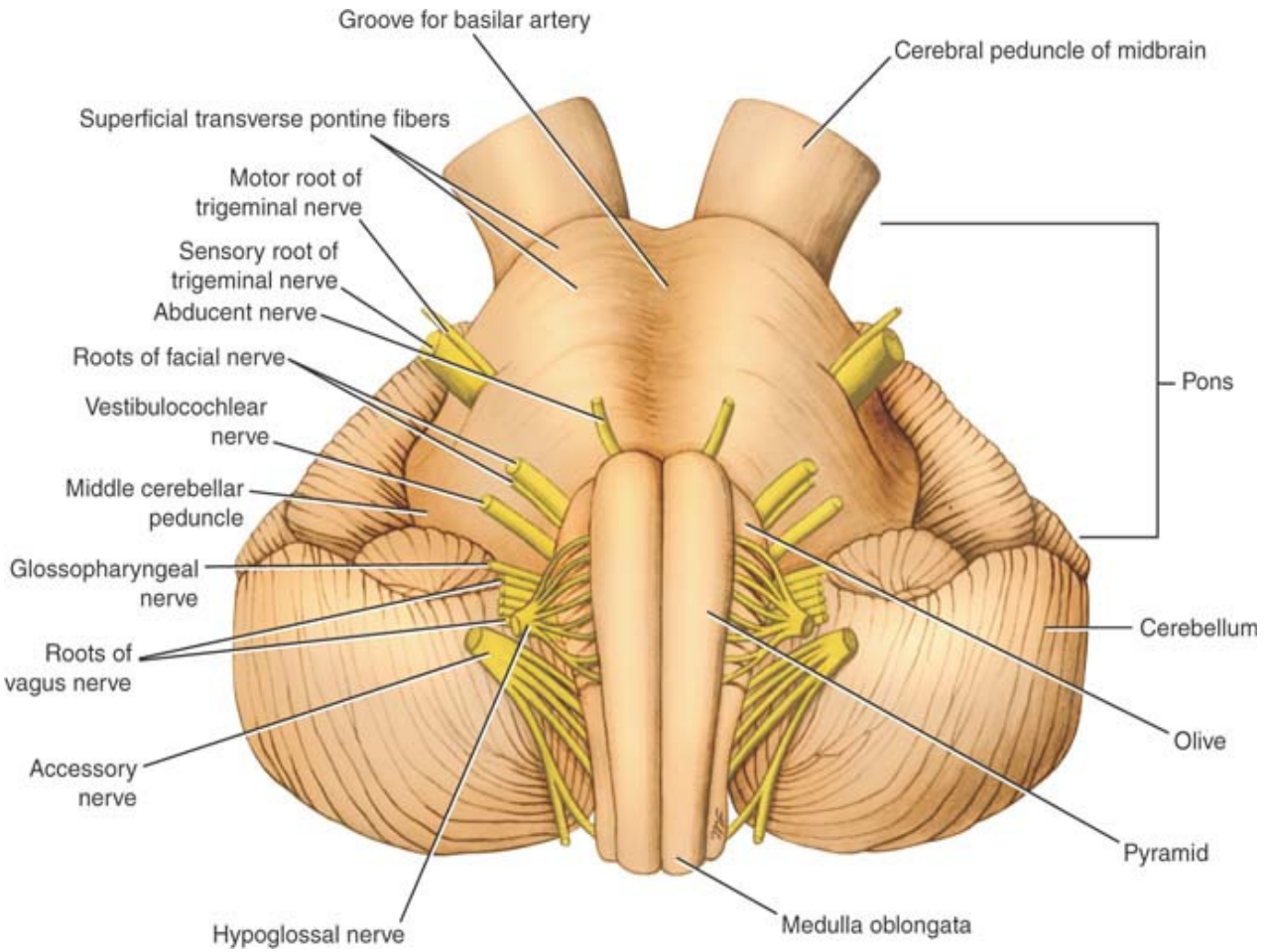
➢Olive

•Oval swelling between anterolateral posterolateral sulcus,half an inch long

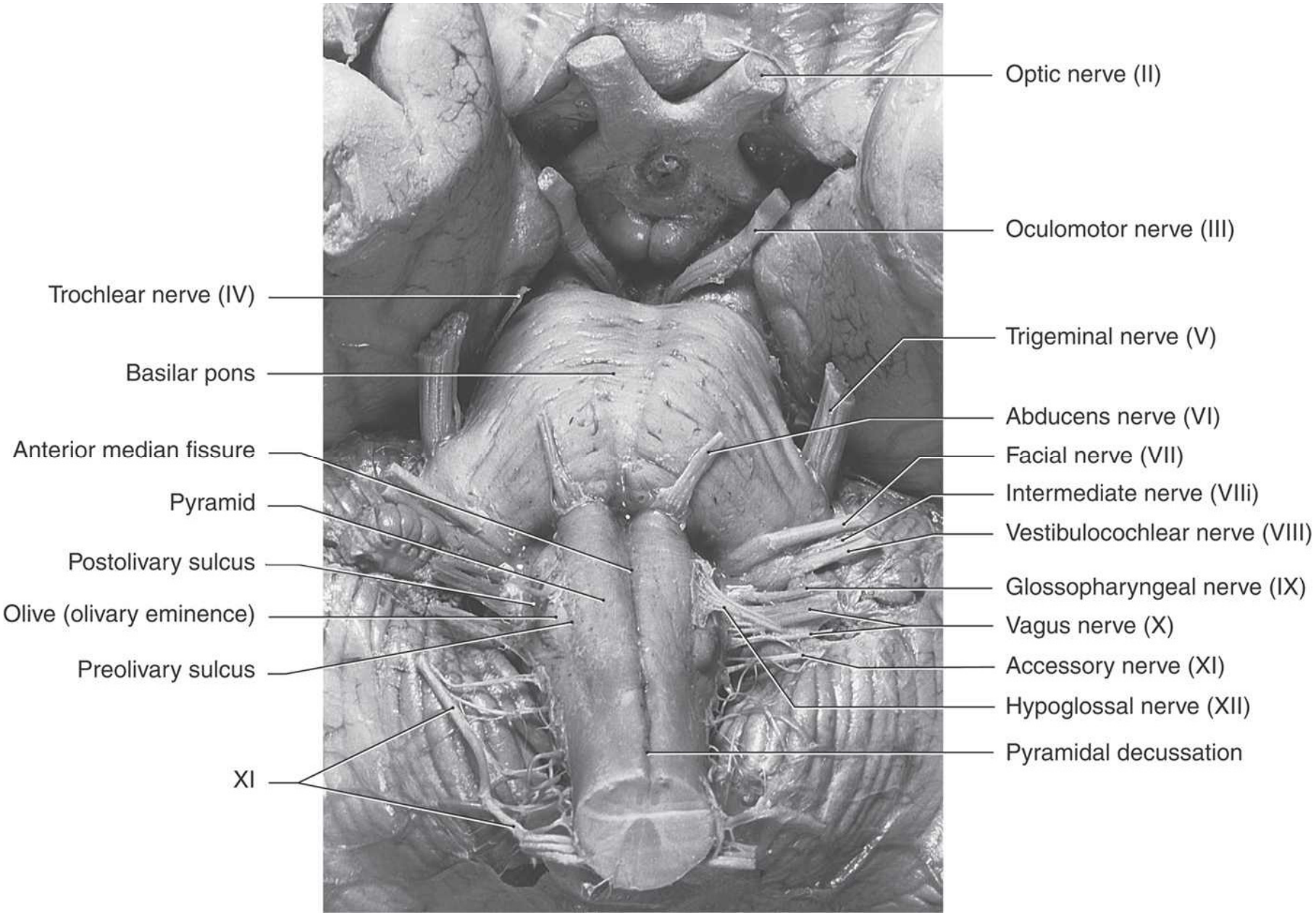
•Produced by large mass of gray matter called inferior olivary nucleus

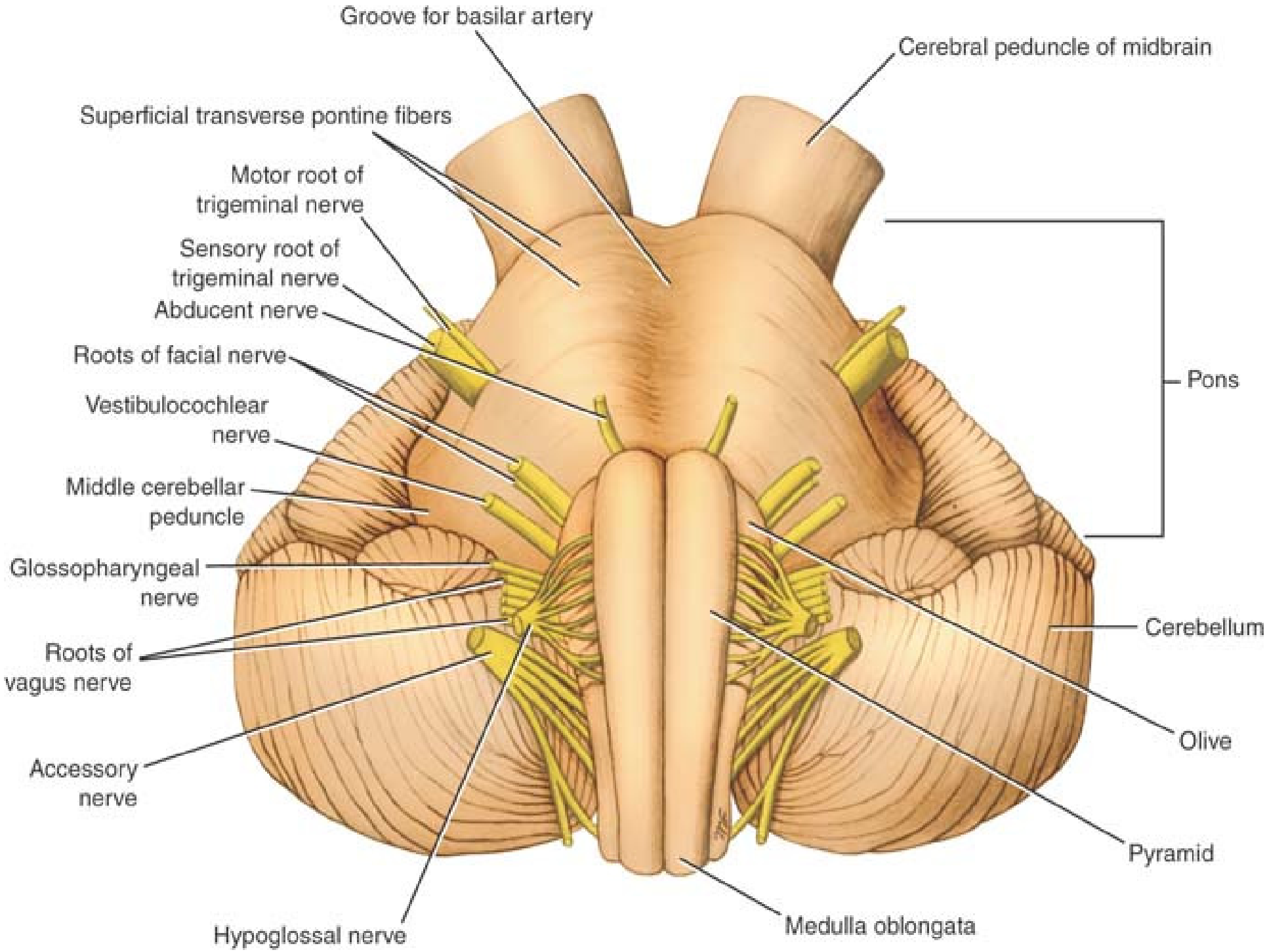
Gross appearance (ant. surface)

- Anterior median fissure
- Pyramid – pyramidal decussation
- Olives
- Groove bt pyramid an olive (12th emerges)
- Inferior cerebellar peduncle
- Groove bt olive and ICP (9th 10th & cranial 11th emerge)



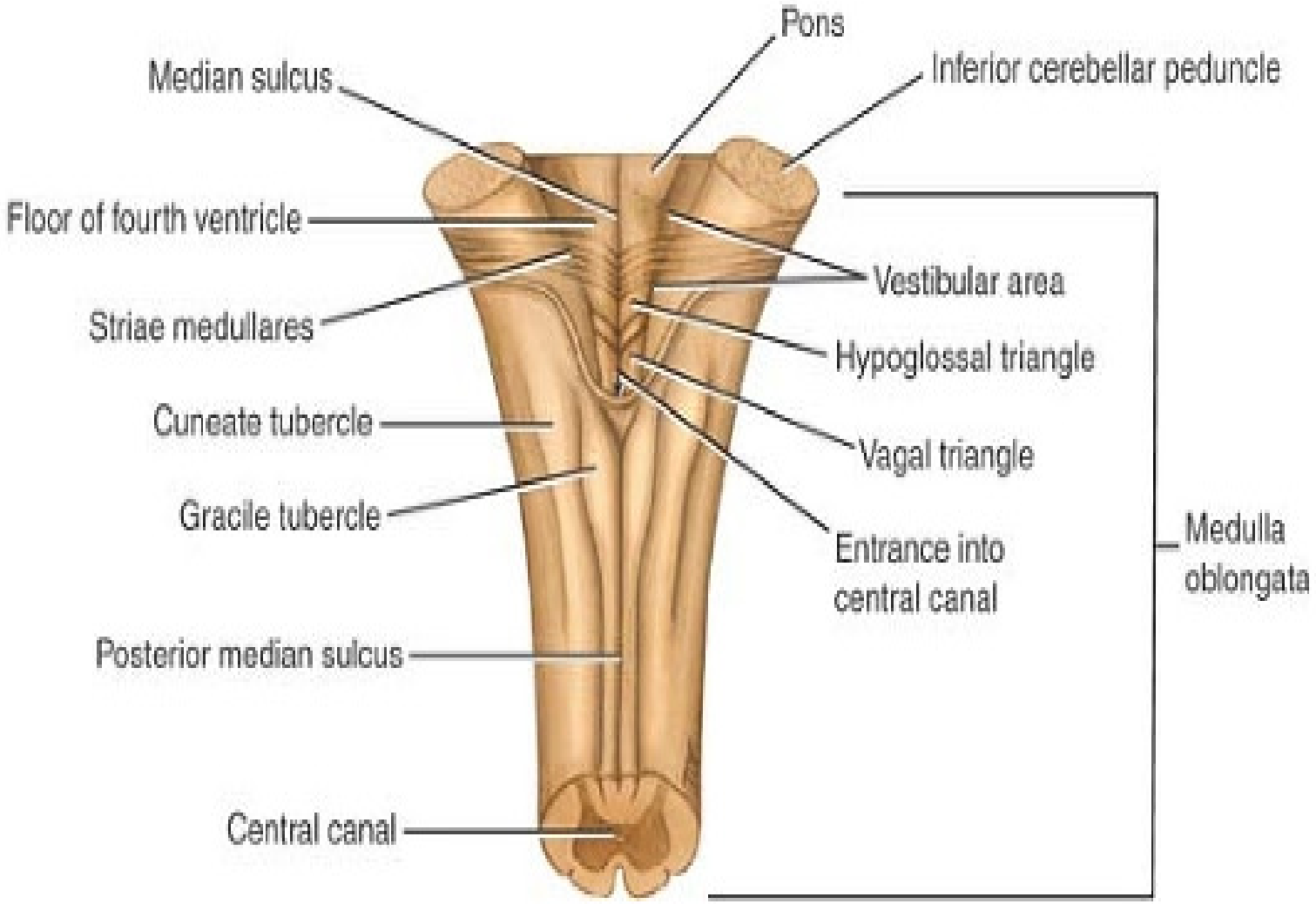
Gross appearance (ant. surface)




Groove for basilar artery
Cerebral peduncle of midbrain
Superficial transverse pontine fibers
Motor root of trigeminal nerve
Sensory root of trigeminal nerve
Abducent nerve
Roots of facial nerve
Vestibulocochlear nerve
Middle cerebellar peduncle
Glossopharyngeal nerve
Roots of vagus nerve
Accessory nerve
Hypoglossal nerve
Pons
Cerebellum
Olive
Pyramid
Medulla oblongata

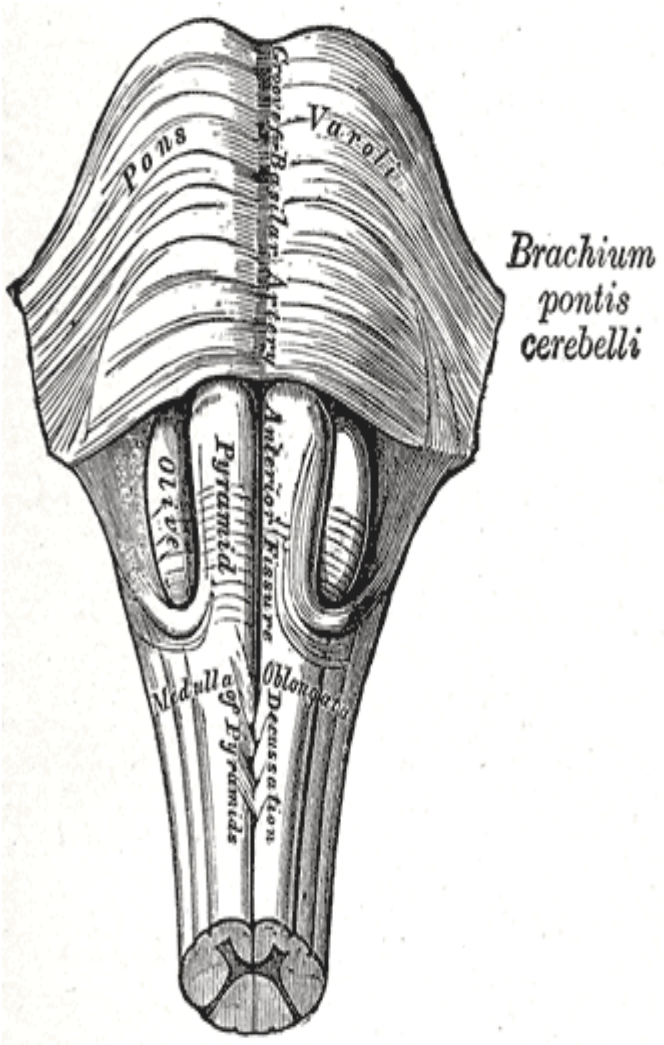
Gross appearance(post. Surface)

- Floor of 4th ventricle (upper 1/2)
- Posterior median sulcus
- Gracile tubercle
- Cuneate tubercle



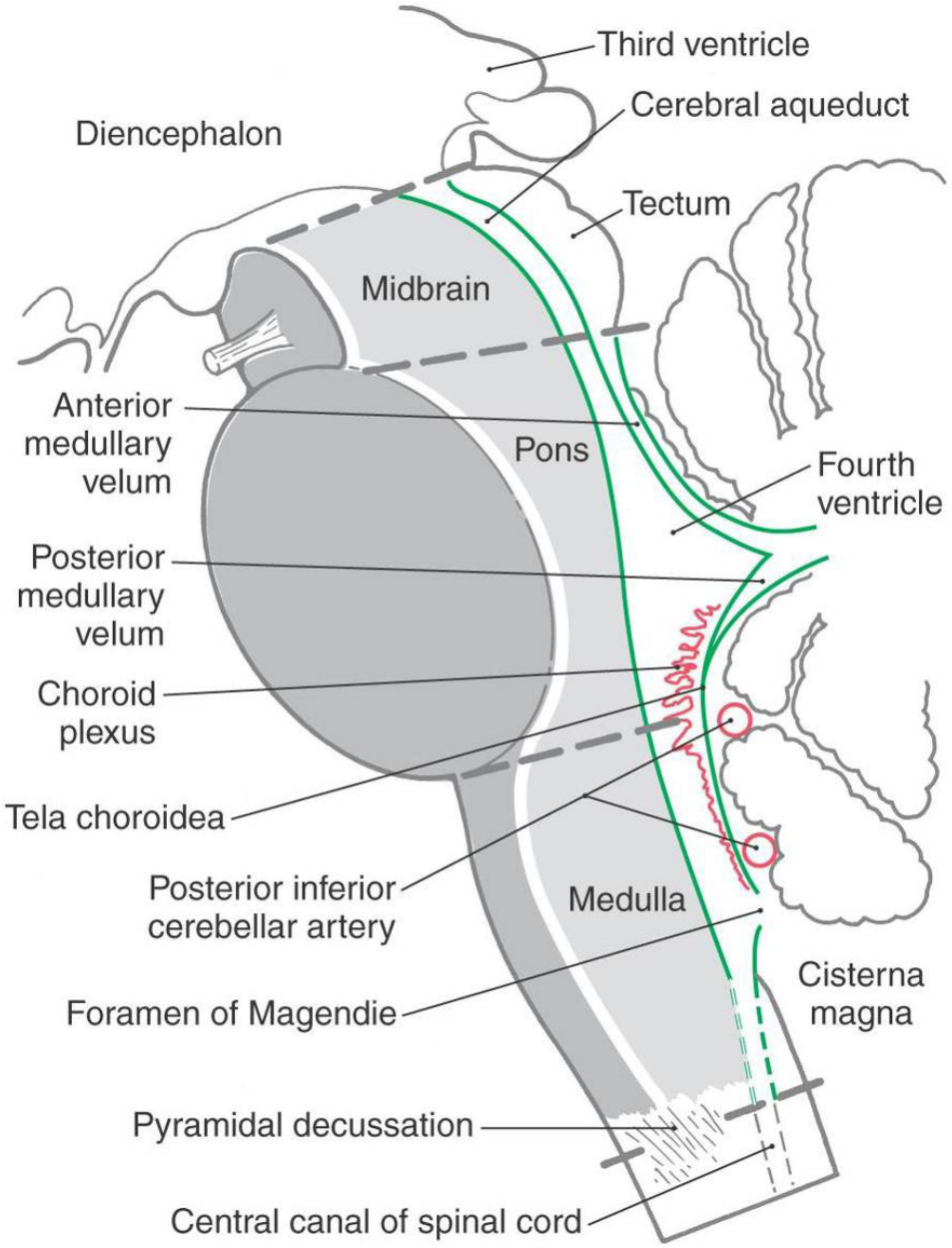
Pons

- Located anterior to cerebellum
- 1 inch long
- Anterior surface is convex & shows transverse fibers that converge on each side to form middle cerebellar peduncle
- Located between the midbrain and medulla oblongata



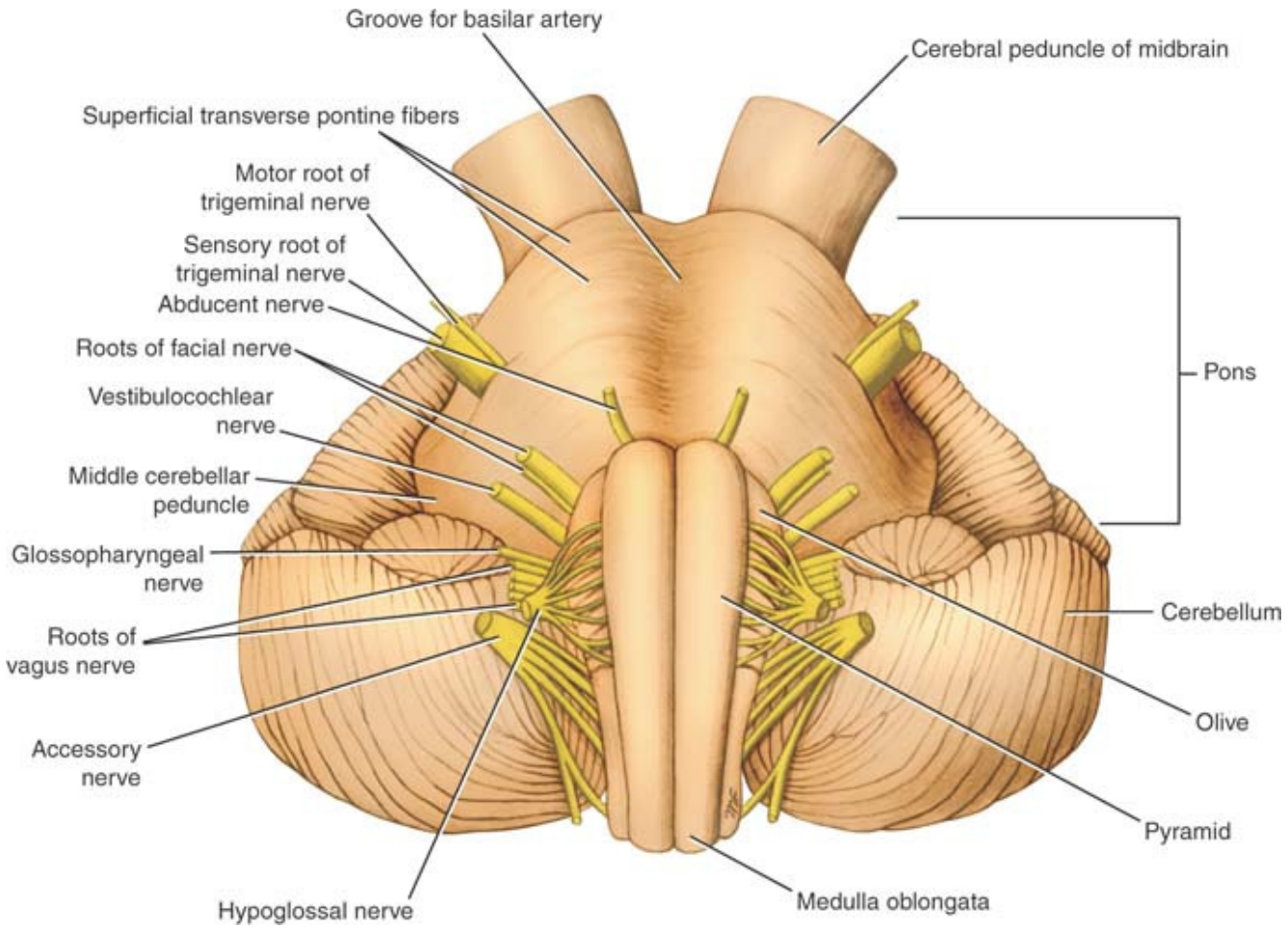
Pons

- extends from the pons-medulla junction to an imaginary line drawn from the exit of the trochlear nerve posteriorly to the rostral edge of the basilar pons anteriorly
- **Pontine tegmentum**
- **Basilar pons**



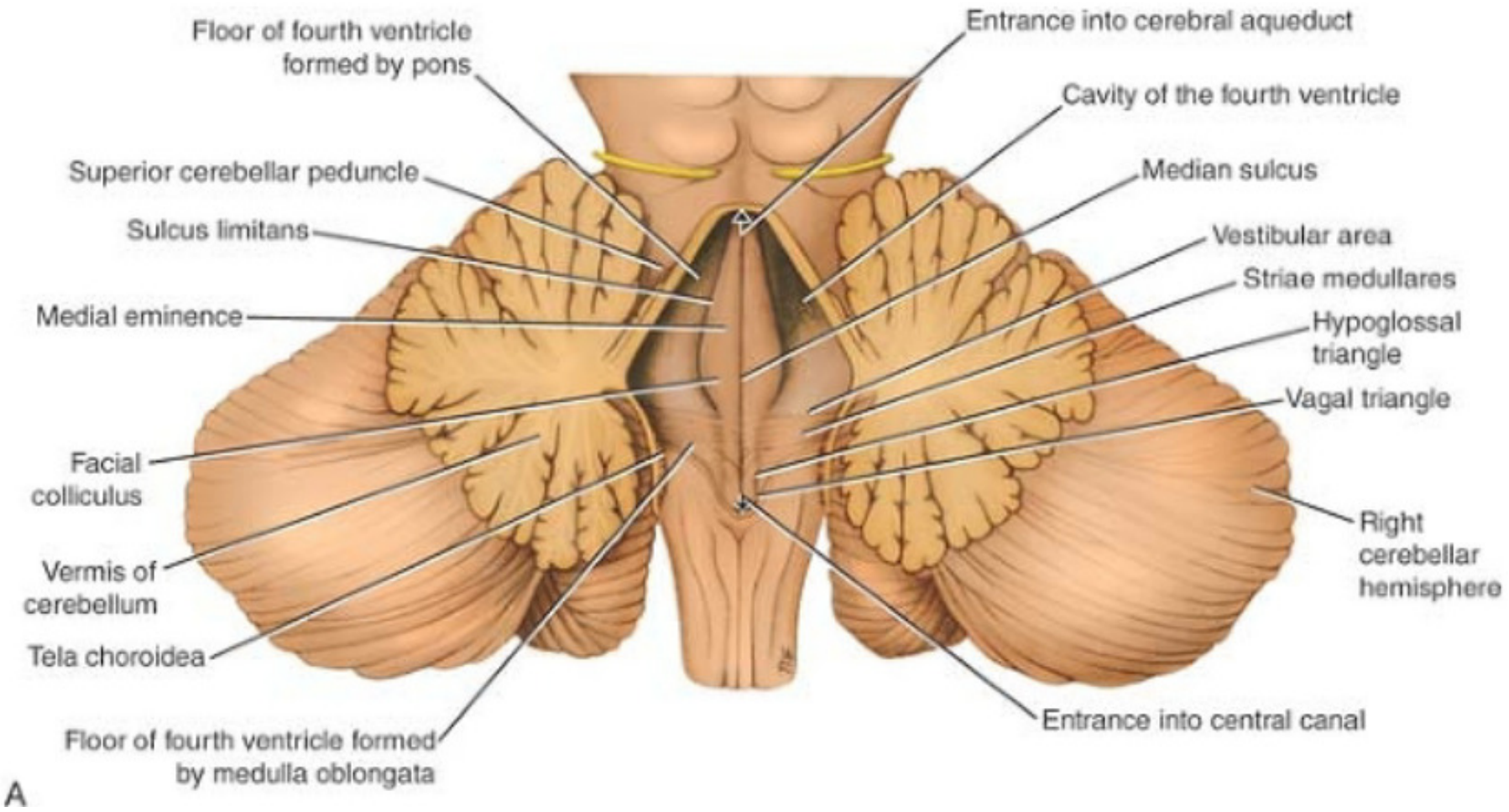
Gross appearance (anterior surface)

- Basilar groove (midline)..lodges basilar artery
- 5th nerve emerges from anterolateral surface (small motor (medial) and large sensory (lateral)
- 6th 7th & 8th emerges at pontomedullary junction M→L



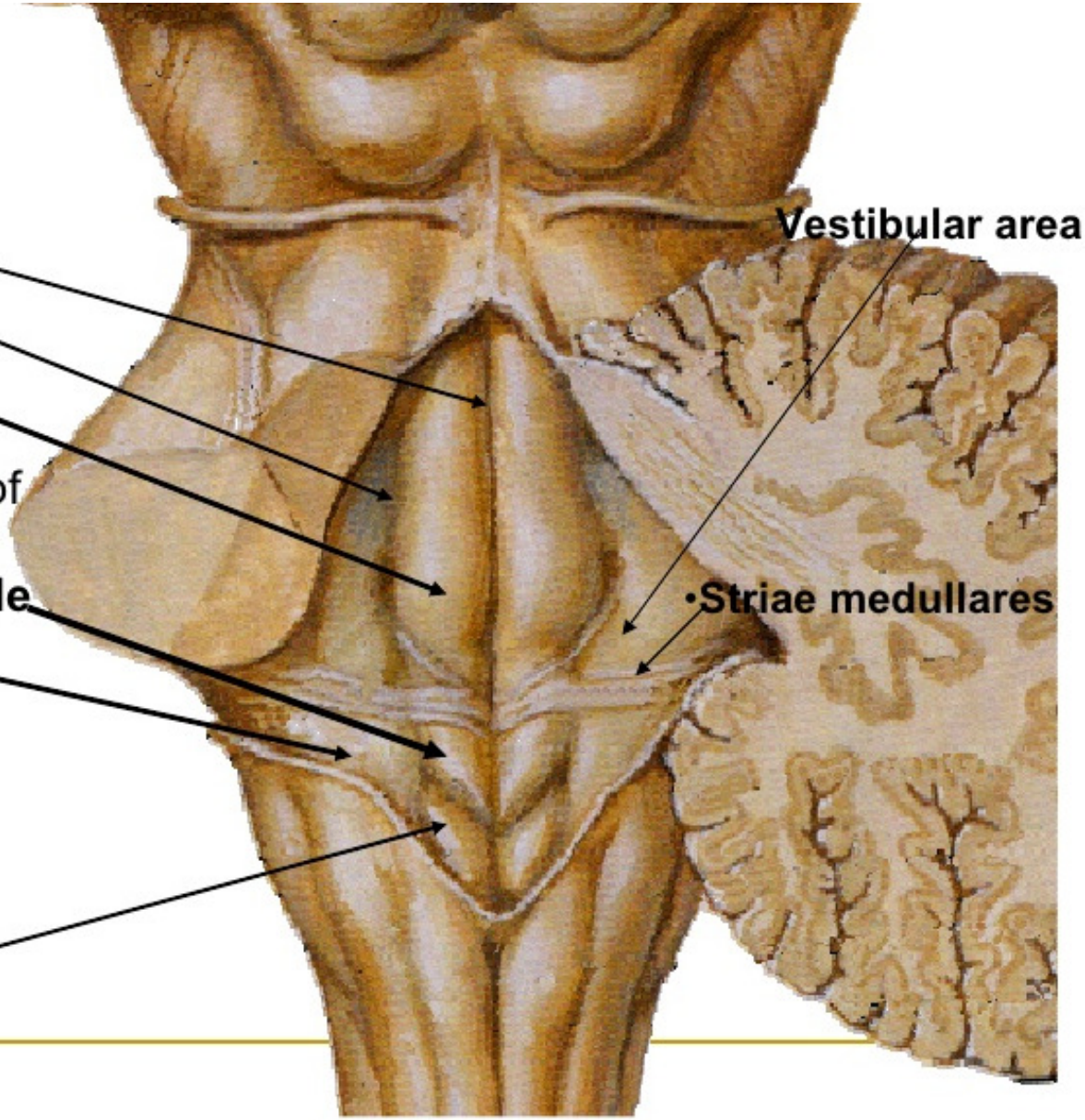
Forth ventricle: Floor or Rhomboid Fossa

- Diamond-shaped
- Formed by posterior surface of the pons and the cranial half of the medulla oblongata



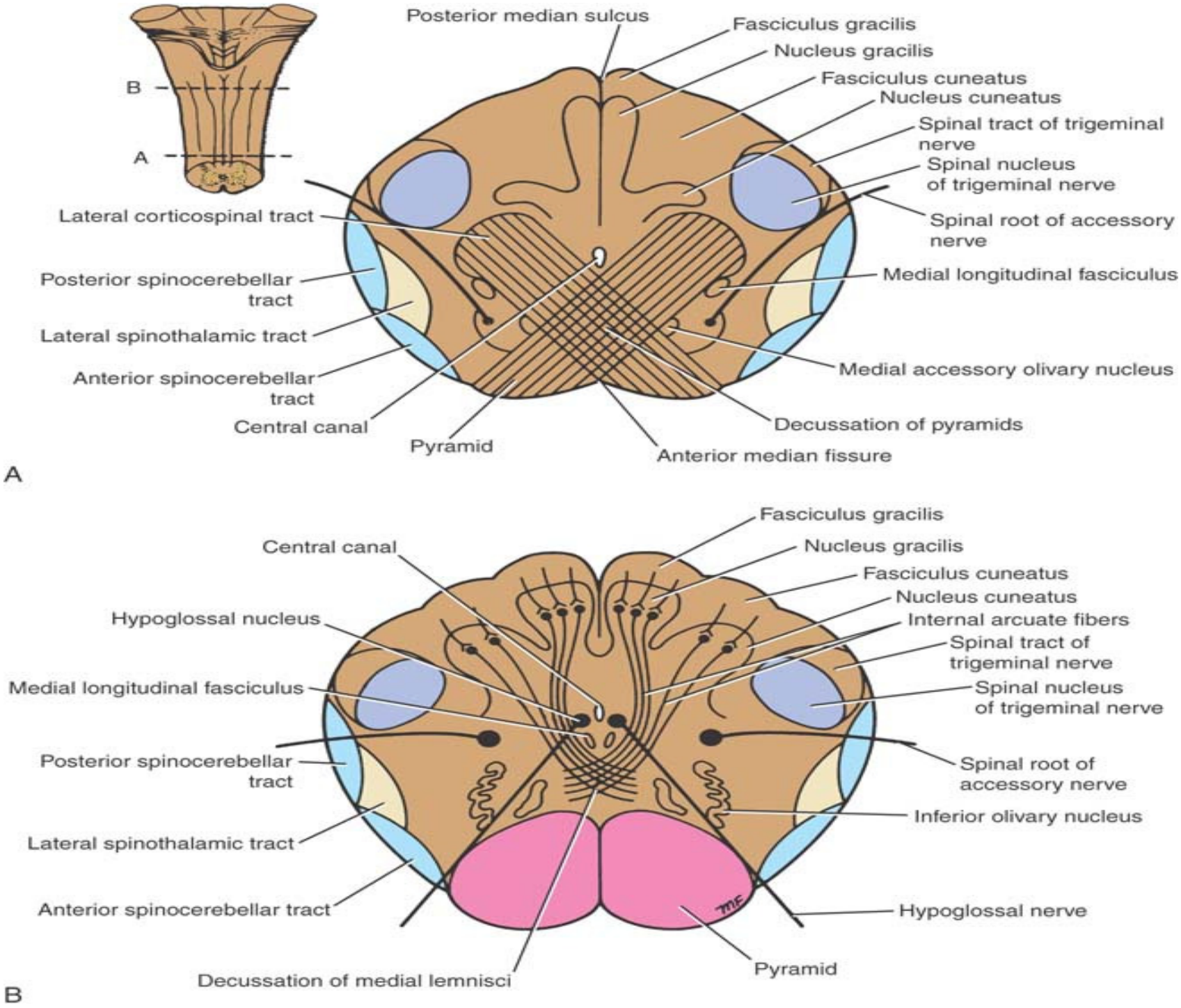
Pontine part

- Median sulcus
- Sulcus limitans
- **Medial eminence**
  - **Facial colliculus**: overlies nucleus of abducent n. and genu of facial nerve
  - **Hypoglossal triangle**
- **Vestibular area**
  overlies vestibular nuclei
- Acoustic tubercle overlying dorsal cochlear nucleus
- **Inferior fovea**
  (Vagal triangle)

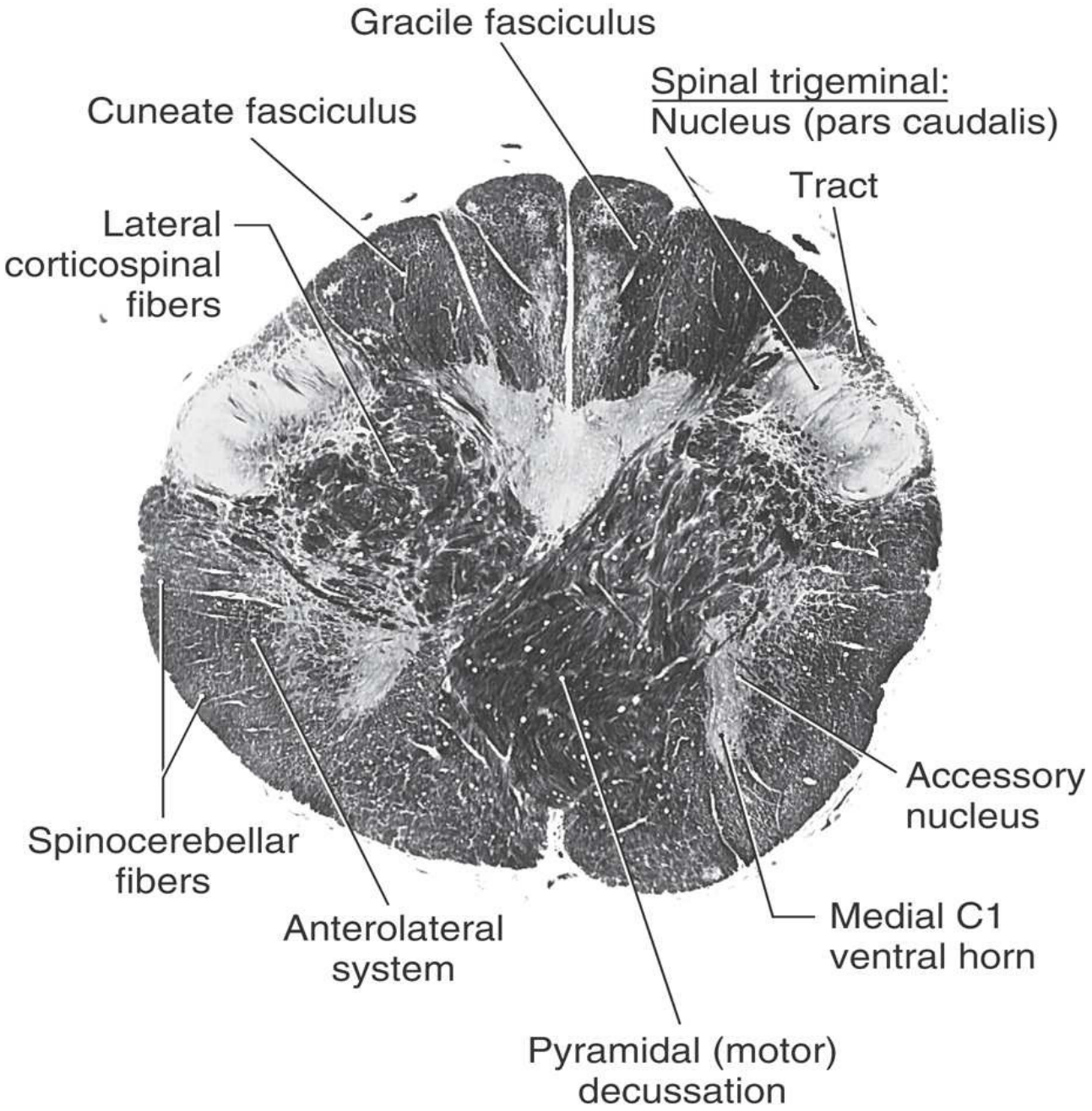


Internal structure of medulla

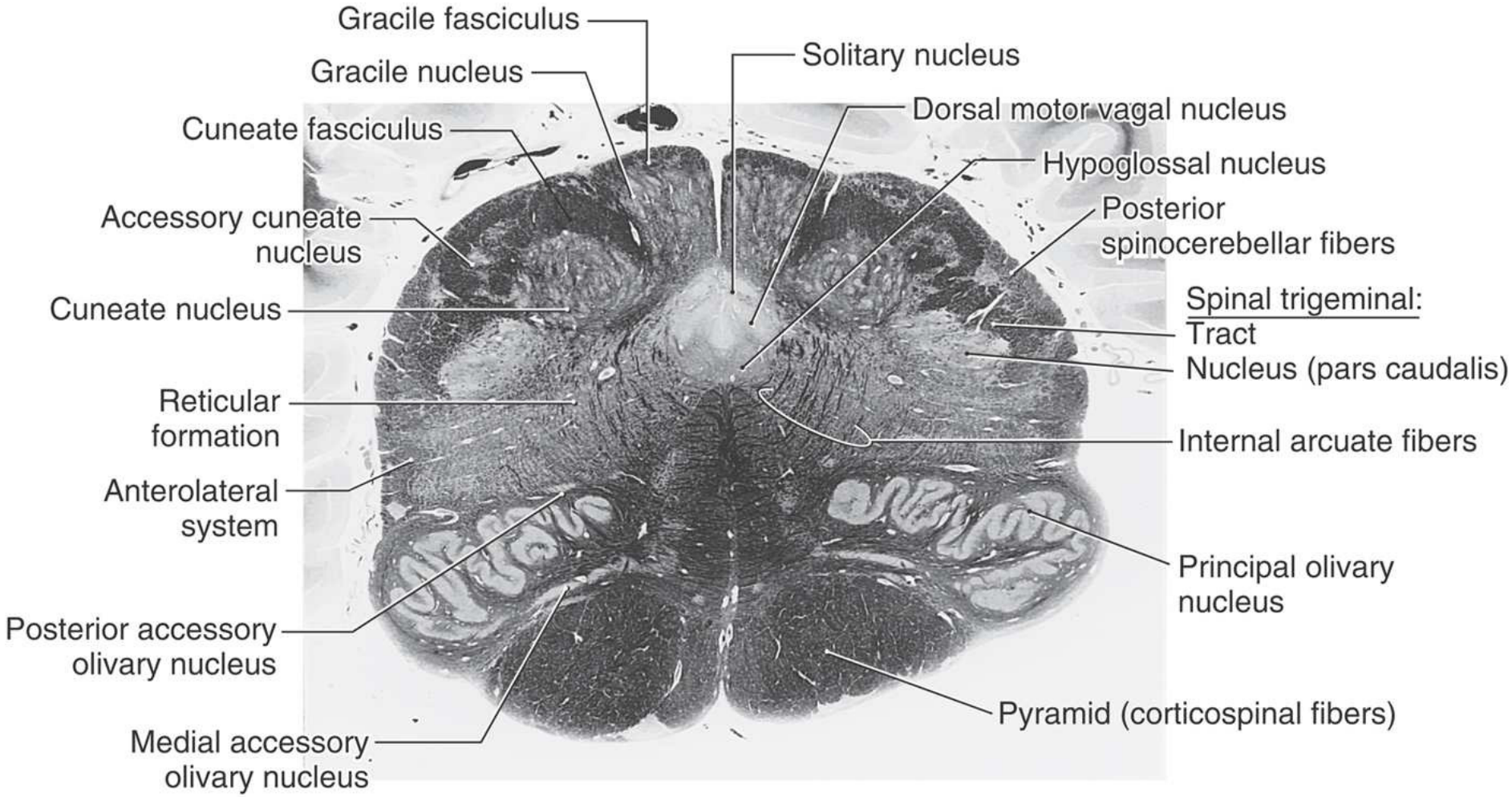
1. Level of decussation of pyramids(motor / close medulla)
2. Level of decussation of leminisci (sensory/ close medulla)
3. Level of olives (open medulla)
4. Level Just Inferior to the Pons


B
A
Posterior median sulcus
Fasciculus gracilis
Nucleus gracilis
Fasciculus cuneatus
Nucleus cuneatus
Spinal tract of trigeminal nerve
Spinal nucleus of trigeminal nerve
Spinal root of accessory nerve
Medial longitudinal fasciculus
Medial accessory olivary nucleus
Decussation of pyramids
Anterior median fissure
Pyramid
Central canal
Anterior spinocerebellar tract
Lateral spinothalamic tract
Posterior spinocerebellar tract
Lateral corticospinal tract
A
Fasciculus gracilis
Nucleus gracilis
Fasciculus cuneatus
Nucleus cuneatus
Internal arcuate fibers
Spinal tract of trigeminal nerve
Spinal nucleus of trigeminal nerve
Spinal root of accessory nerve
Inferior olivary nucleus
Hypoglossal nerve
Pyramid
Decussation of medial lemnisci
Anterior spinocerebellar tract
Lateral spinothalamic tract
Posterior spinocerebellar tract
Medial longitudinal fasciculus
Hypoglossal nucleus
Central canal
B

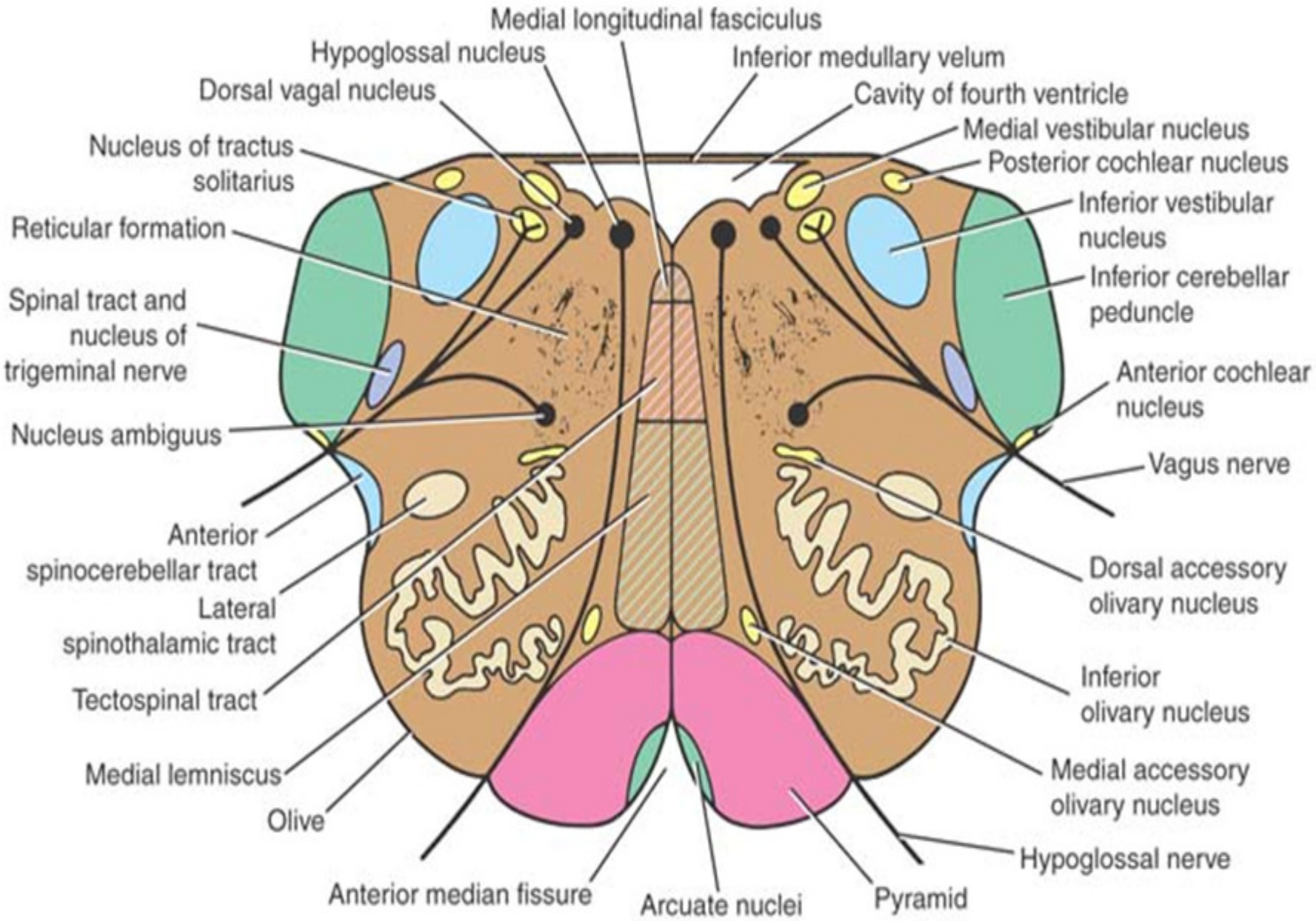
Level of decussation of pyramids



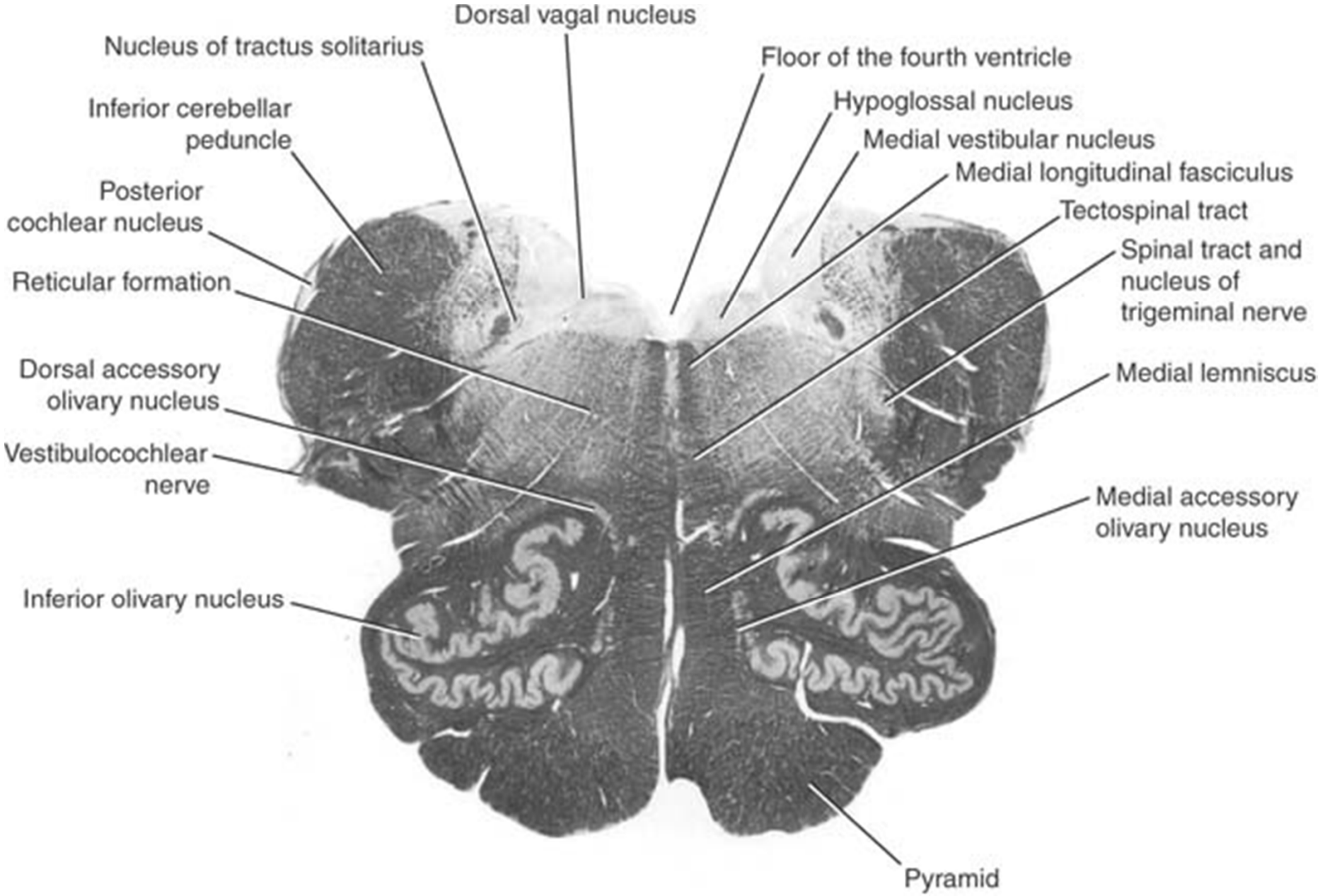
Level of decussation of leminisci



Medulla oblongata at the level of olives



Level of olives (open medulla)



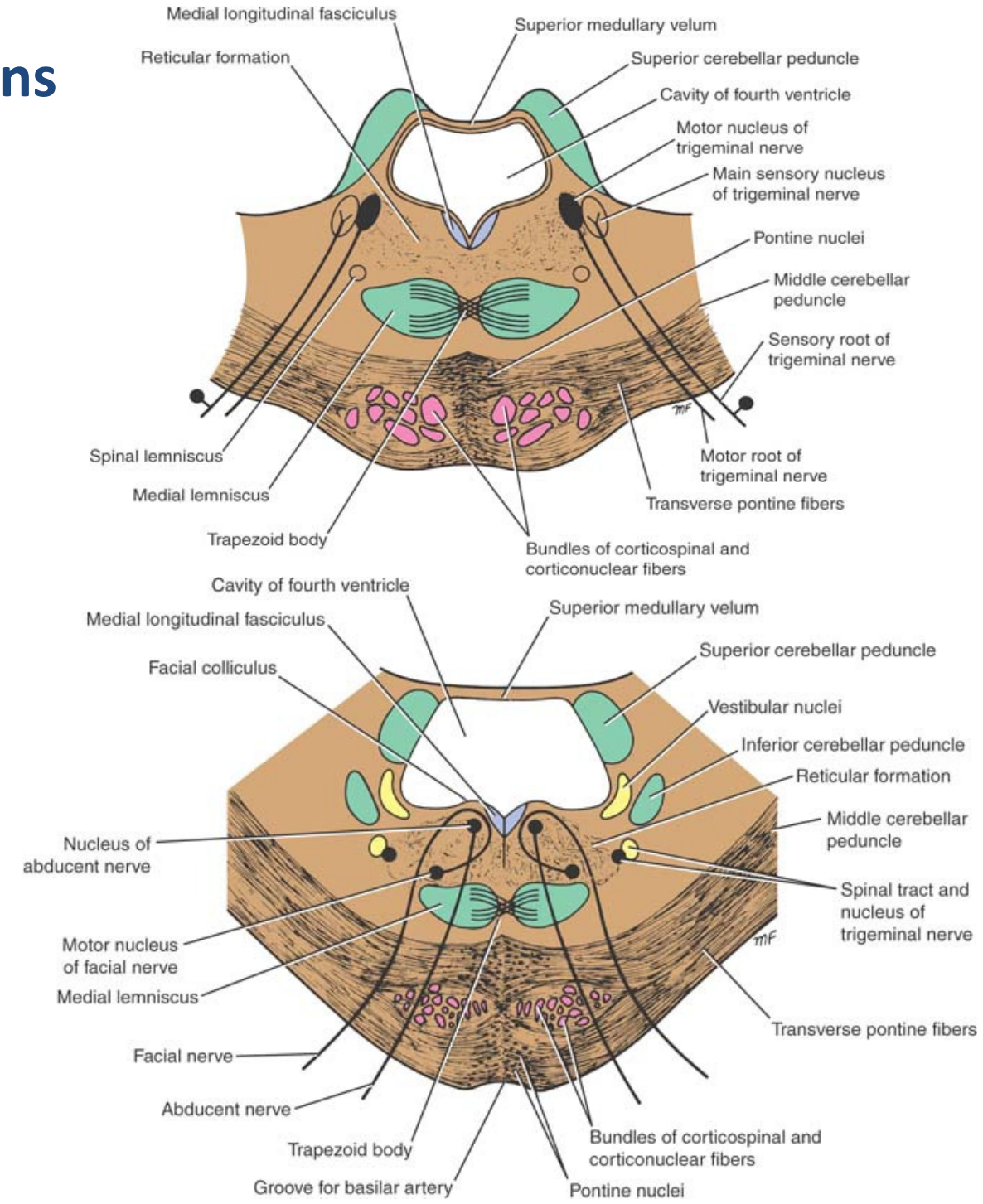
Internal structure of pons

- Its divided by transversely running fibers of trapezoid body into:

1. Tegmentum (post part)
2. Basal part (ant part)

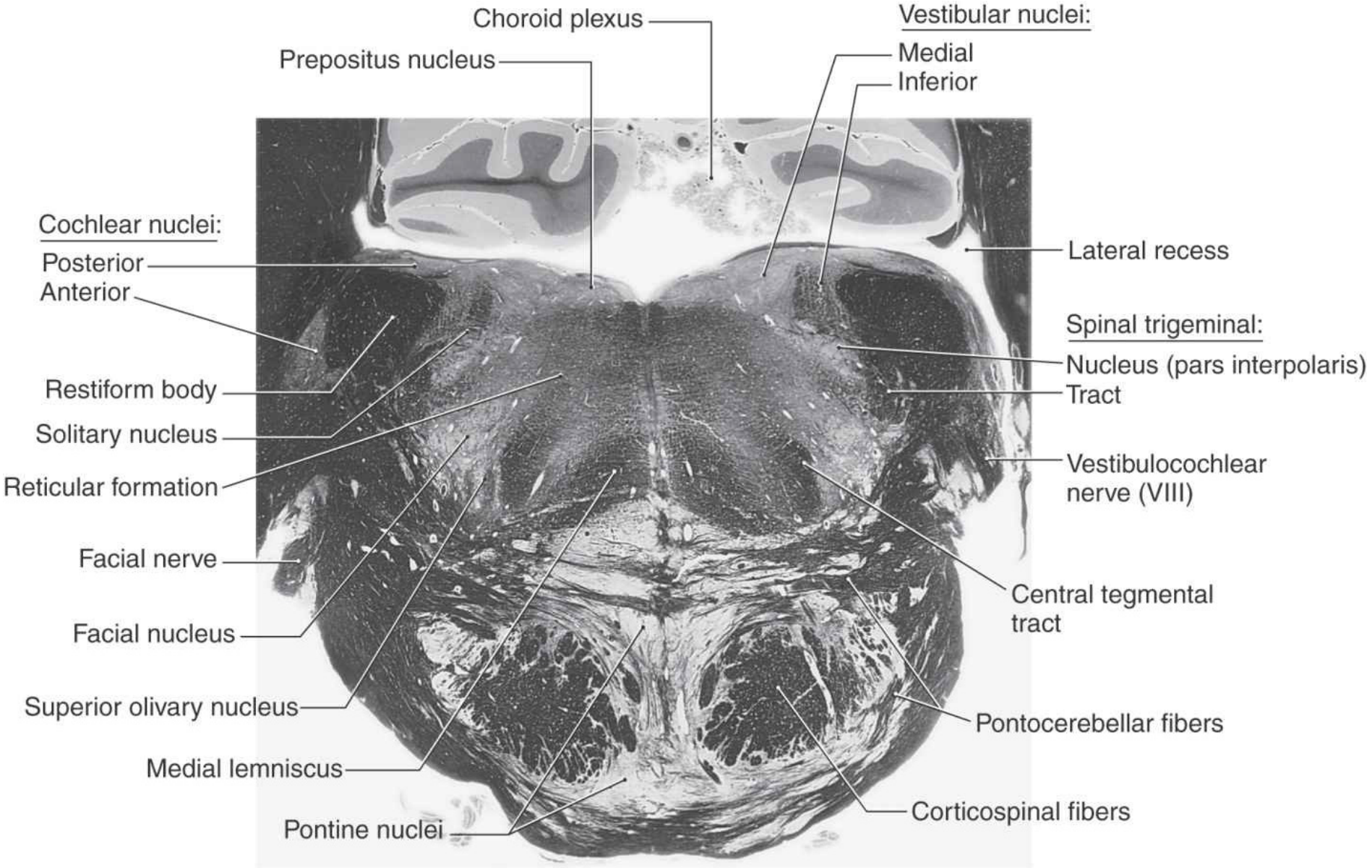
levels

- Level through caudal part (facial colliculus)
- Level through cranial part (trigeminal nuclei)



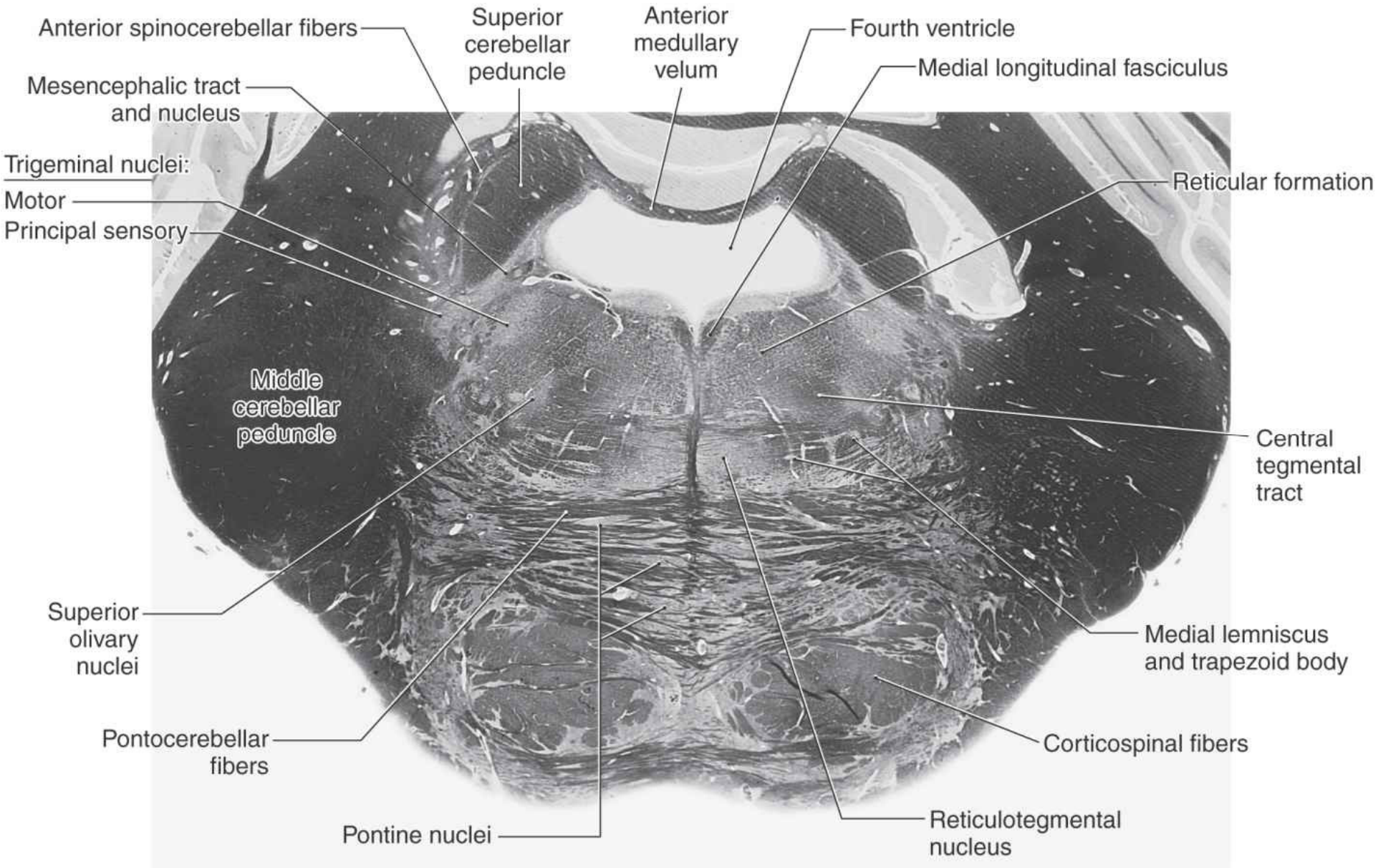
Internal structure of pons

- Level through caudal part (facial colliculus)



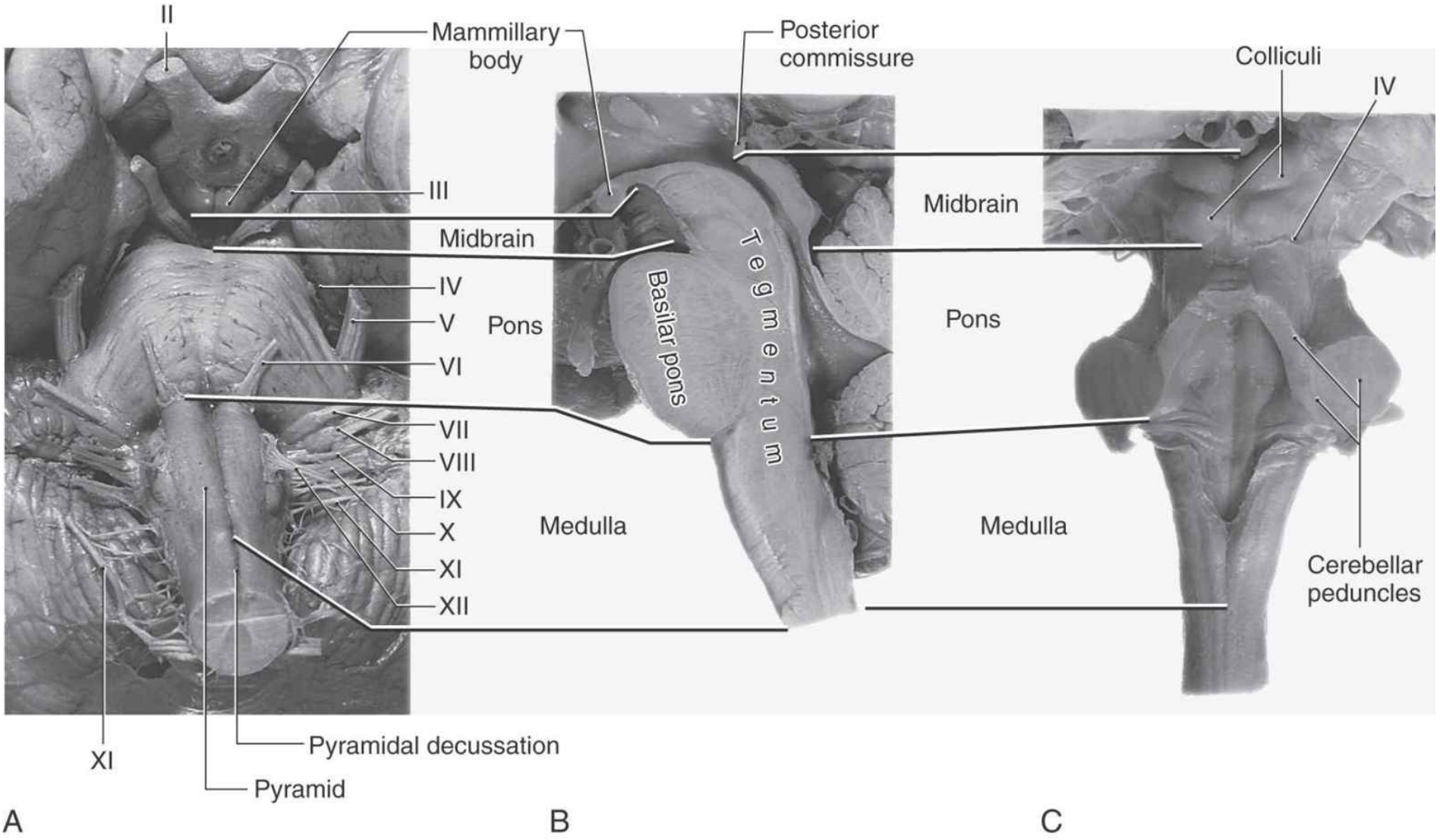
Internal structure of pons

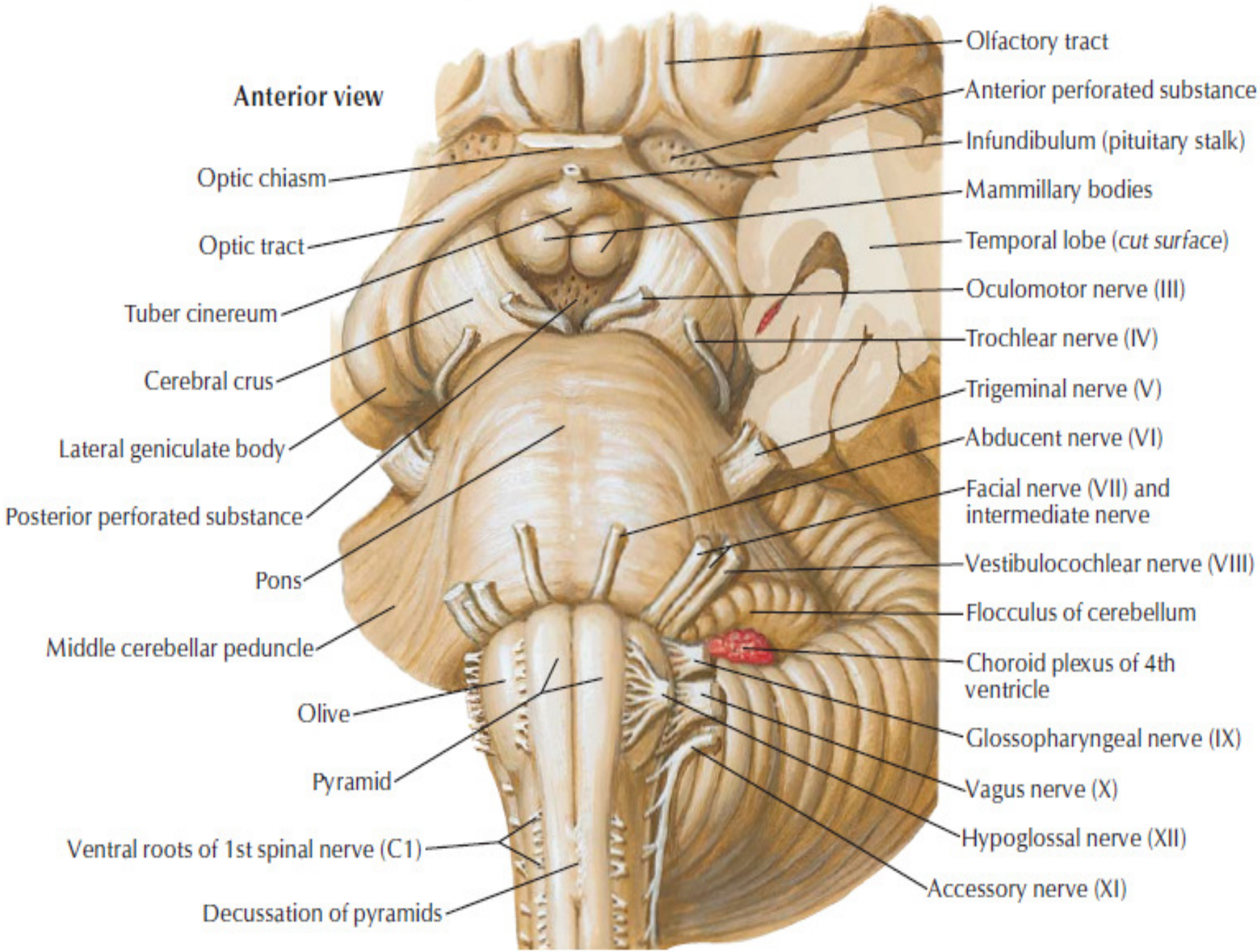
- Level through cranial part (trigeminal nuclei)



Midbrain

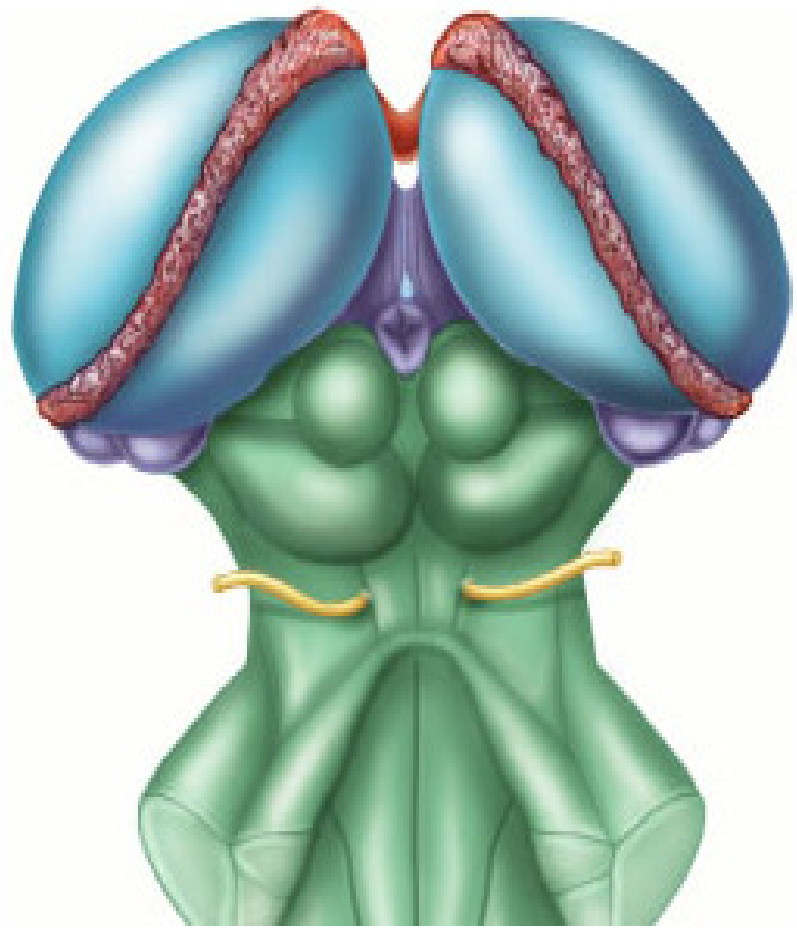
- From the pons-midbrain junction to join the diencephalon (thalamus)
- line drawn from the posterior commissure posteriorly to the caudal edge of the mammillary bodies anteriorly




Anterior view
Optic chiasm
Optic tract
Tuber cinereum
Cerebral crus
Lateral geniculate body
Posterior perforated substance
Pons
Middle cerebellar peduncle
Olive
Pyramid
Ventral roots of 1st spinal nerve (C1)
Decussation of pyramids
Olfactory tract
Anterior perforated substance
Infundibulum (pituitary stalk)
Mammillary bodies
Temporal lobe (*cut surface*)
Oculomotor nerve (III)
Trochlear nerve (IV)
Trigeminal nerve (V)
Abducent nerve (VI)
Facial nerve (VII) and intermediate nerve
Vestibulocochlear nerve (VIII)
Flocculus of cerebellum
Choroid plexus of 4th ventricle
Glossopharyngeal nerve (IX)
Vagus nerve (X)
Hypoglossal nerve (XII)
Accessory nerve (XI)

The Midbrain-posterior view

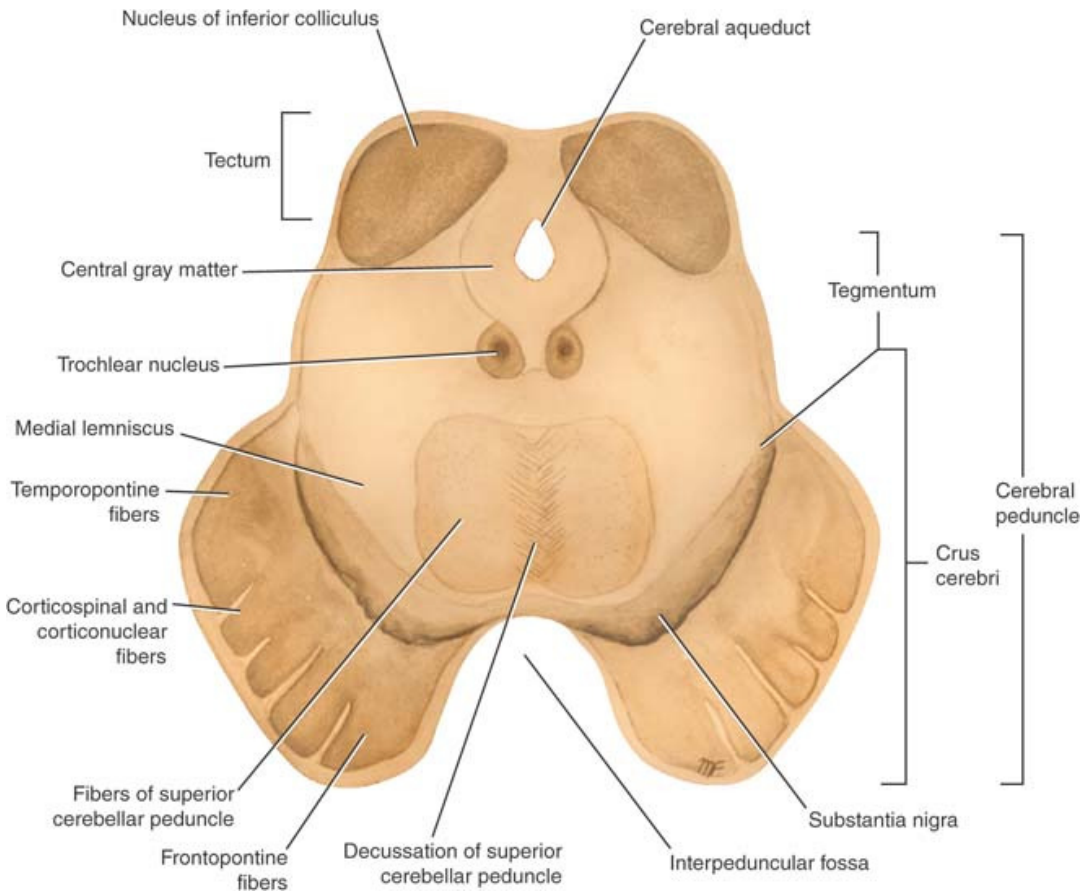
- Corpora quadrigemina – the largest nuclei
  - Divided into the superior and inferior colliculi
    - Superior colliculi – nuclei that act in visual reflexes
    - Inferior colliculi – nuclei that act in auditory reflexes
- Trochlear nerve emerges below the level of inf. Colliculus (from posterior surface)
- Occulomotor nerve emerges at the level of sup. colliculus
- Sup.brachium (to lateral geniculate body)
- Inf. Brachium (to medial geniculate body)
- 4^{th} emerges



Internal structure of midbrain

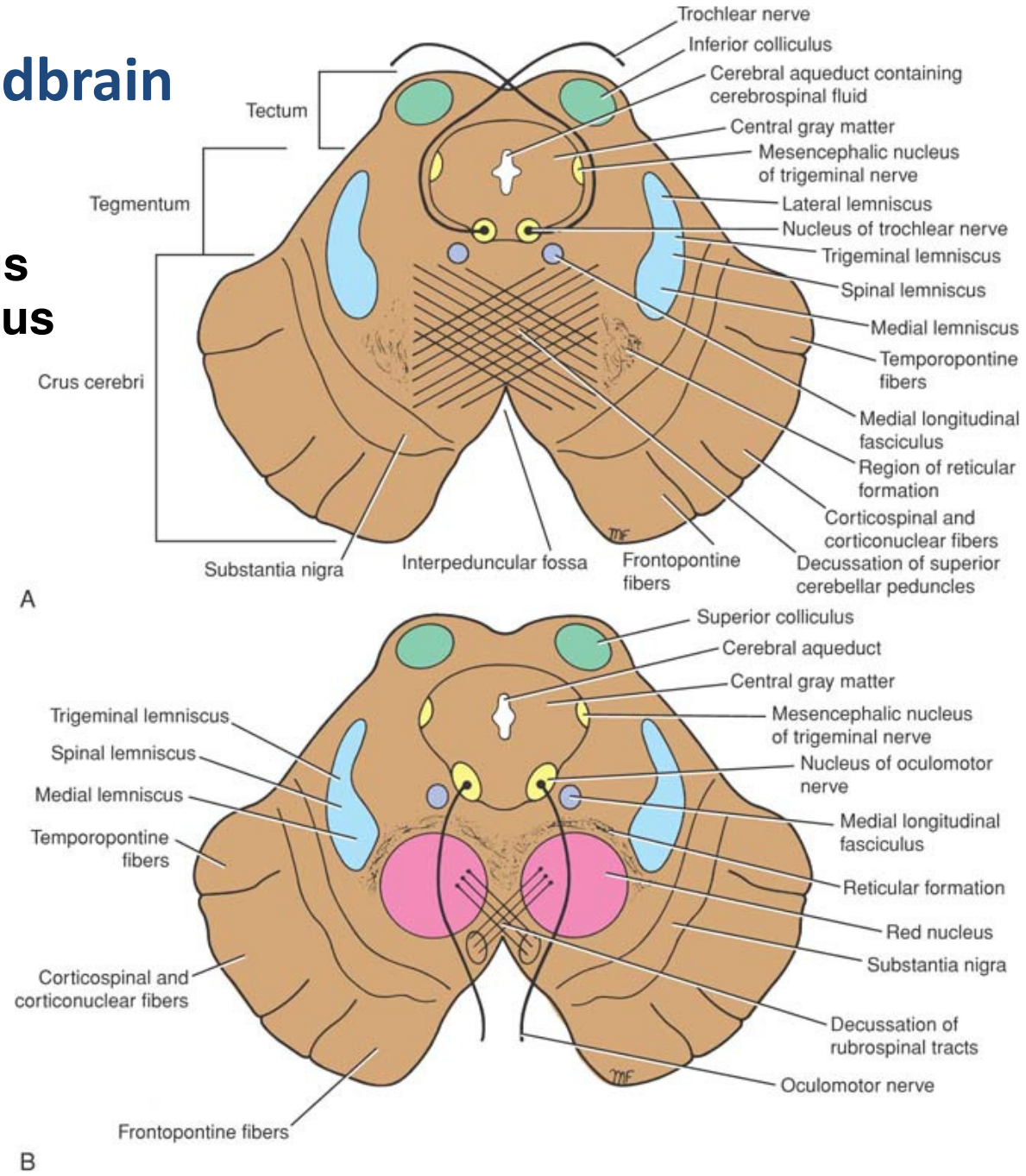
Cerebral peduncle is divided into crus cerebri (ant) & tegmentum (post)

Tectum is post to cerebral aqueduct

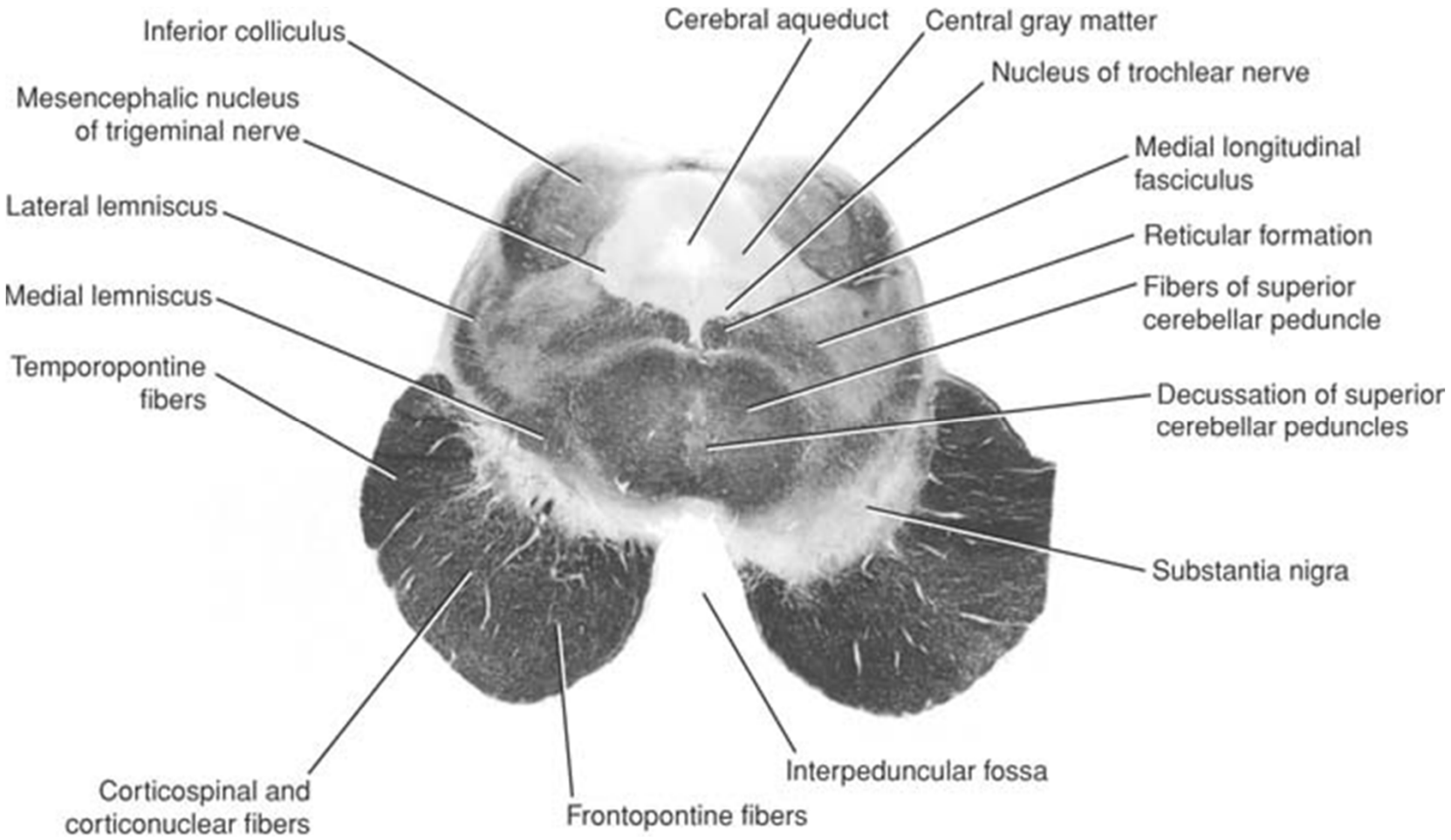


Internal structure of midbrain

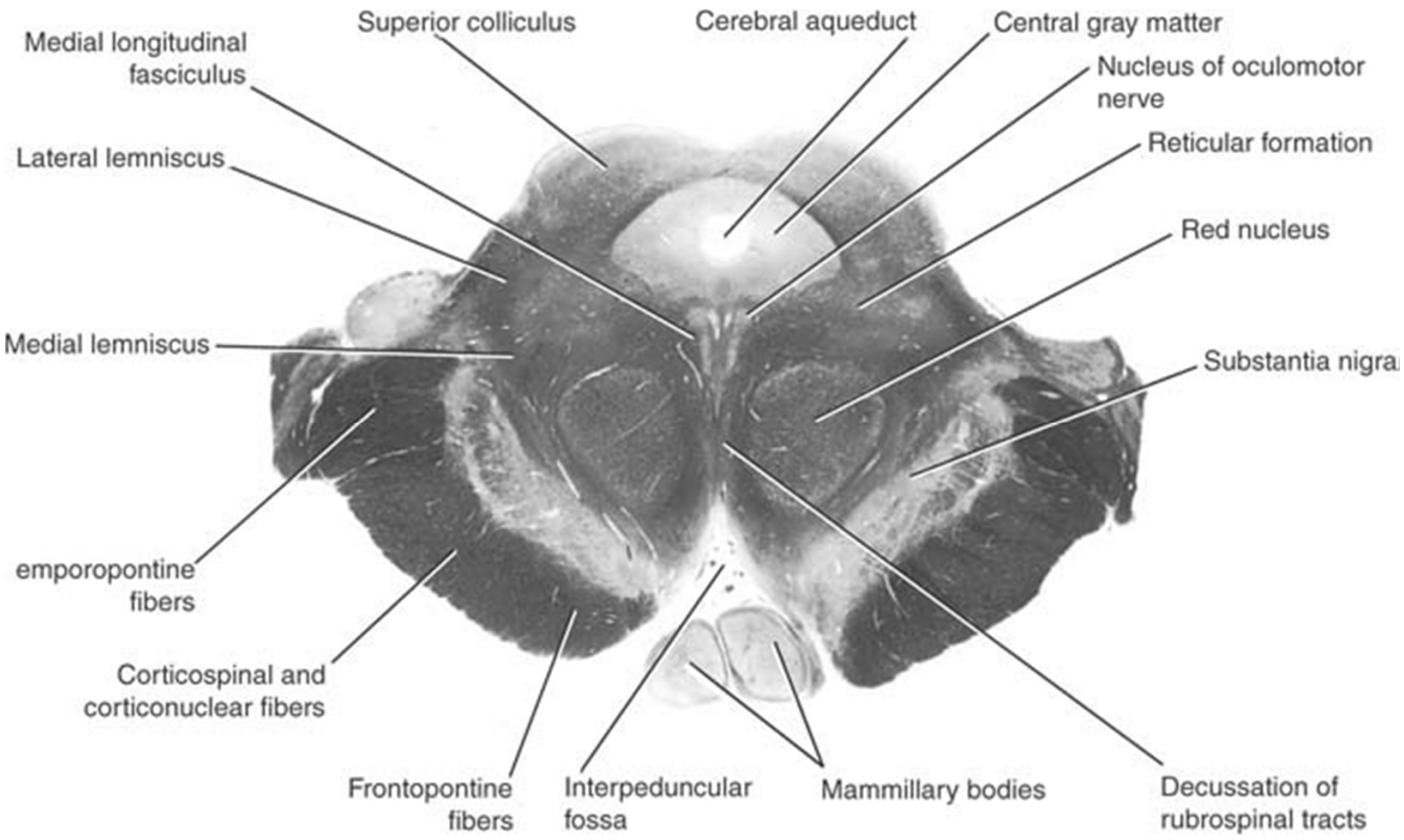
- **Level of inferior colliculus**
- **Level of superior colliculus**

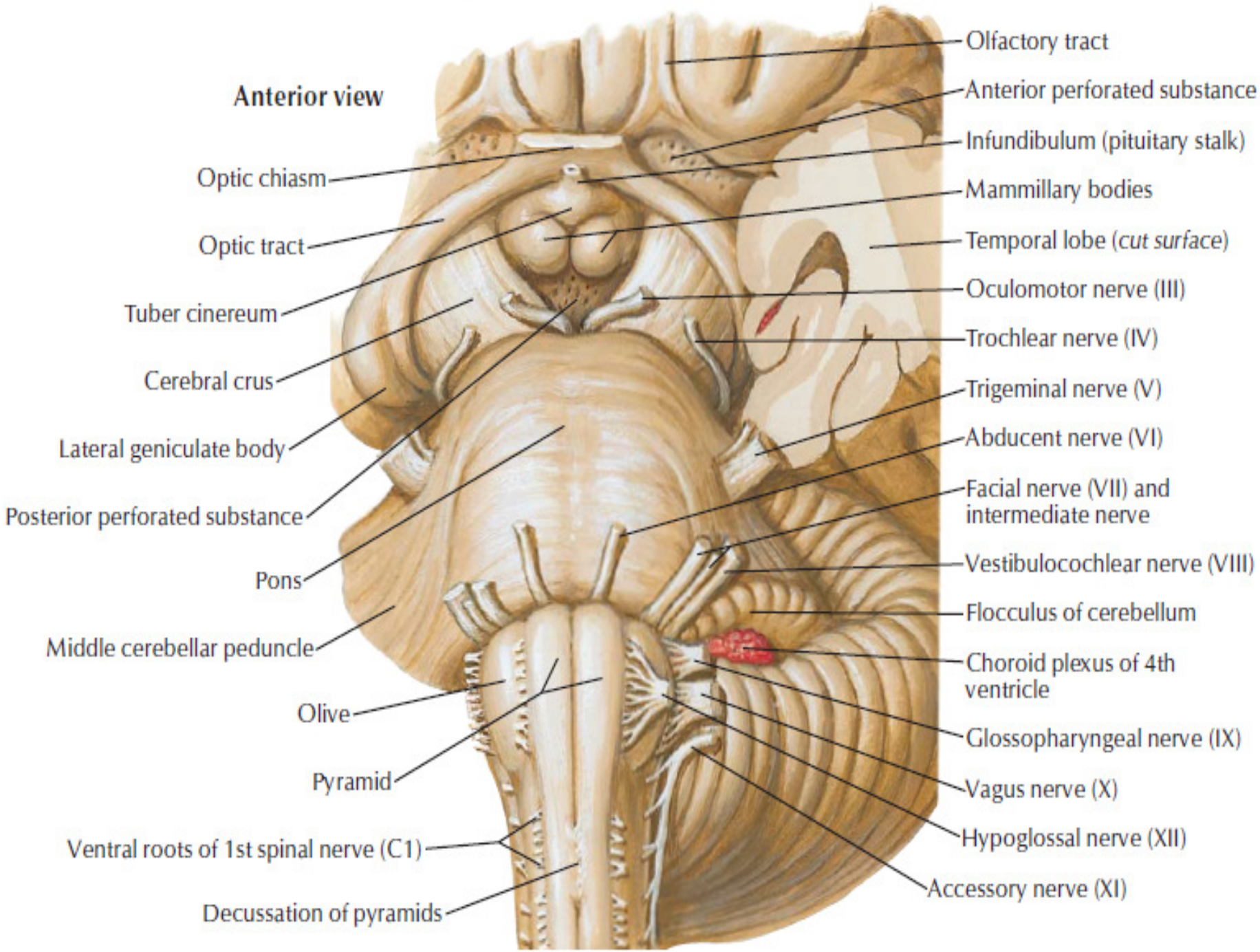


Midbrain (inf colliculus)



Midbrain (sup. colliculus)

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