INTERNAL STRUCTURE OF THE BRAIN STEM

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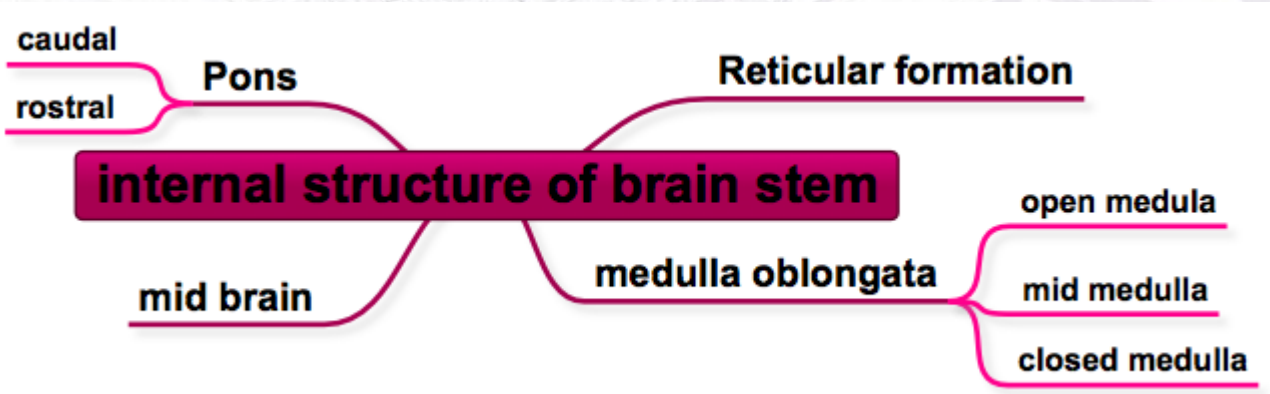
OBJECTIVES

- Distinguish the internal structure of the components of the brain stem in different levels and the specific criteria of each level.
- 1. Medulla oblongata (closed, mid and open medulla)
- 2. Pons (caudal and rostral).
- 3. Mid brain (superior and inferior colliculi).
- Describe the Reticular formation (structure, function and pathway) being an important content of the brain stem.



Internal structures of medulla oblongata

(closed) Medulla Caudal	Mid Medulla	(open) Medulla Rostral
pyramid	pyramid	pyramid
Spinal Nucleus of Trigeminal (Trigeminal sensory nucleus): continuation of Substantia Gelatinosa	Gracile & Cuneate nuclei → Internal arcuate fibers → sensory Decussation	Inferior Olivary Nucleus Control of movement
		Medial longitudinal fasciculus Links vestibular nuclei with nuclei of extraocular ms.(3,4&6) to help cordination head&eye movement
Motor Decussation By: pyramidal fibers *un crossed fibers from the ventral corticospinal tract.	Medial leminiscus (ascending internal arcuate fiber) → thalamus	Lower part of floor of 4th ventricle
		Inferior Cerebellar Peduncle Connect M.O with cerebellum
		Cochlear nuclei
		Dorsal motor Nucleus of Vagus *Hypoglossal Nucleus
		Vestibular nuclei complex (equilibrium)
		Solitary Nucleus Receive taste sensation from tongue 7&9&10
		medial lemniscus
		Nucleus Ambiguus :give motor f. to constrictor of pharynx & int.ms. Of larynx

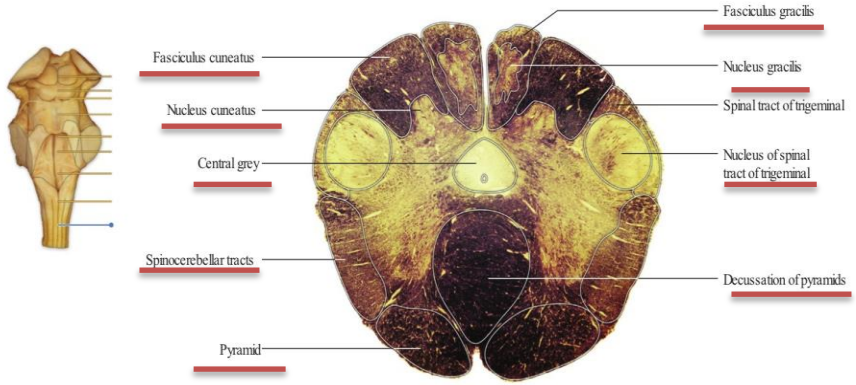


Figure 9.5 **Transverse section through the caudal medulla at the level of the decussation of the pyramids.** The sections shown in Figures 9.5–9.13 have been stained by the Weigert–Pal method. Areas rich in nerve fibres stain darkly, while areas rich in cell bodies are relatively pale.

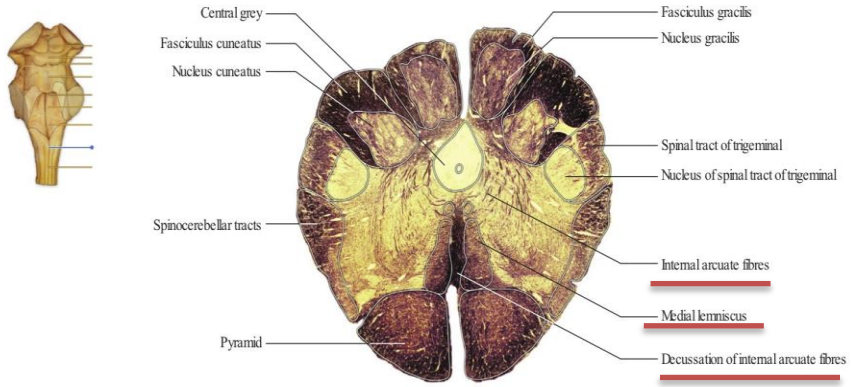


Figure 9.6 **Transverse section through the mid-medulla at the level of the great sensory decussation.**

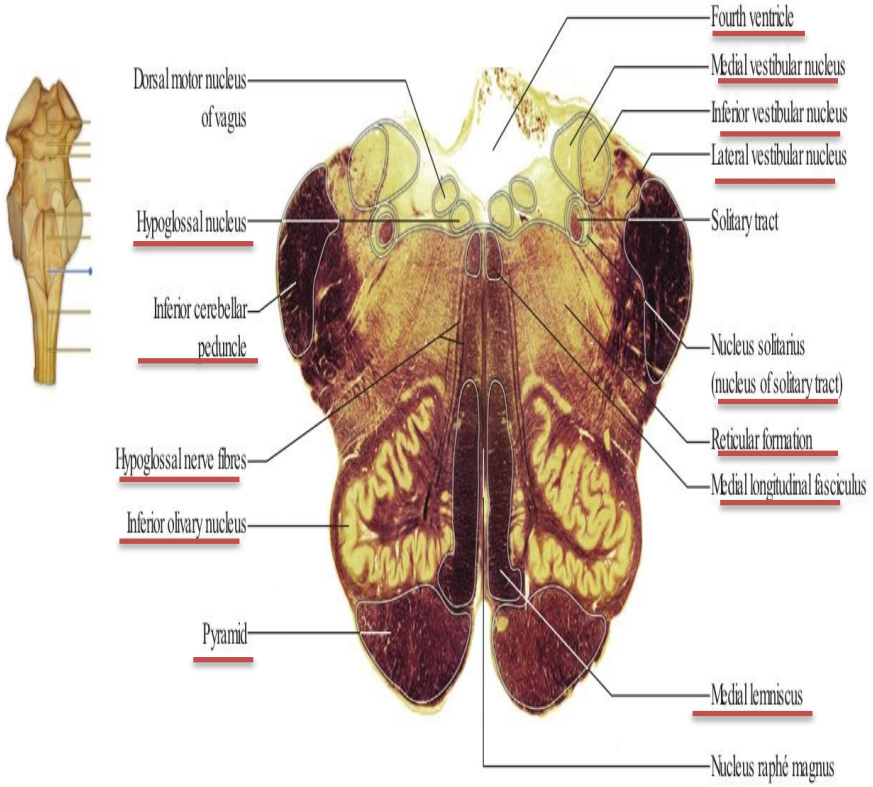
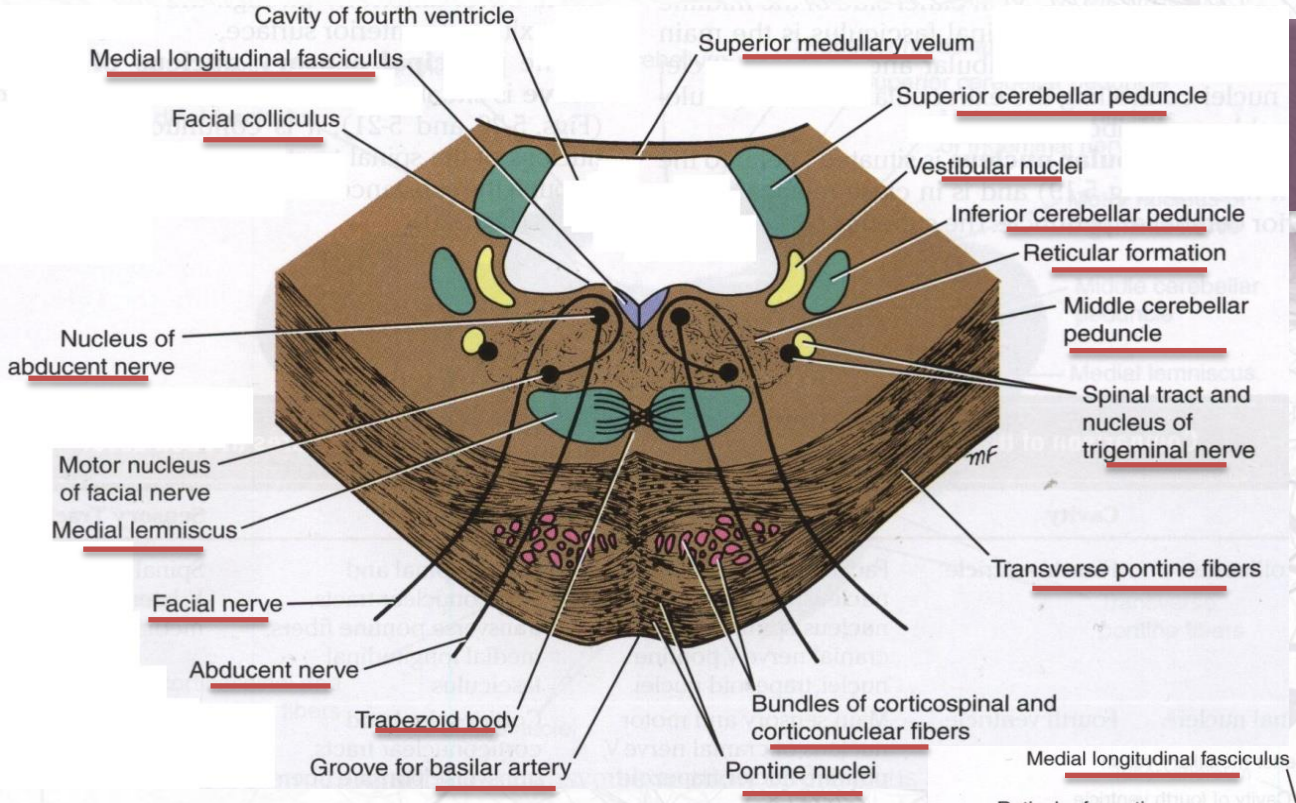
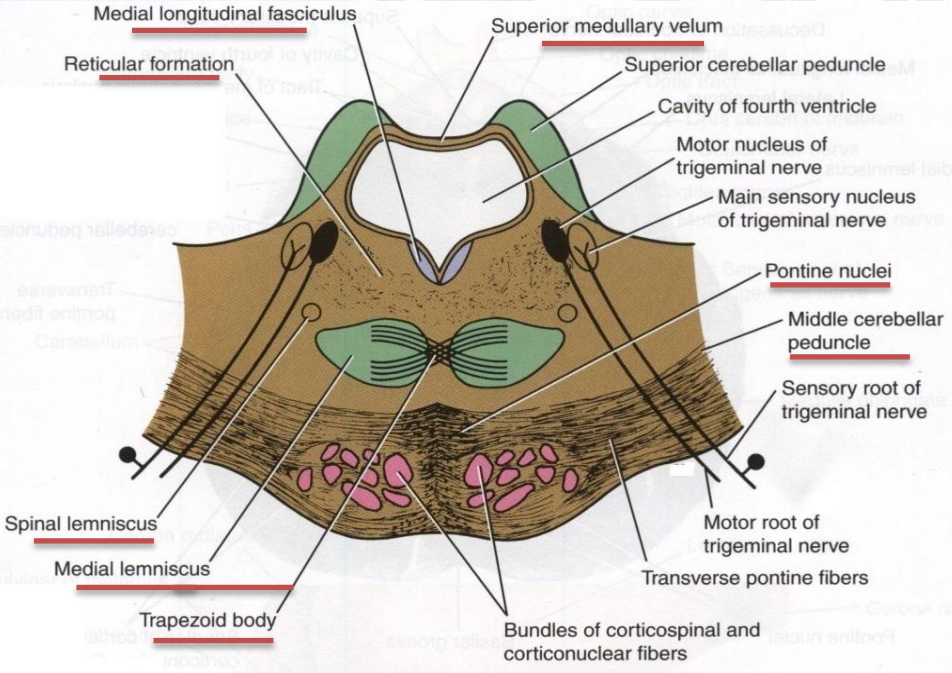


Figure 9.7 **Transverse section through the rostral medulla at the level of the inferior olivary nucleus.**

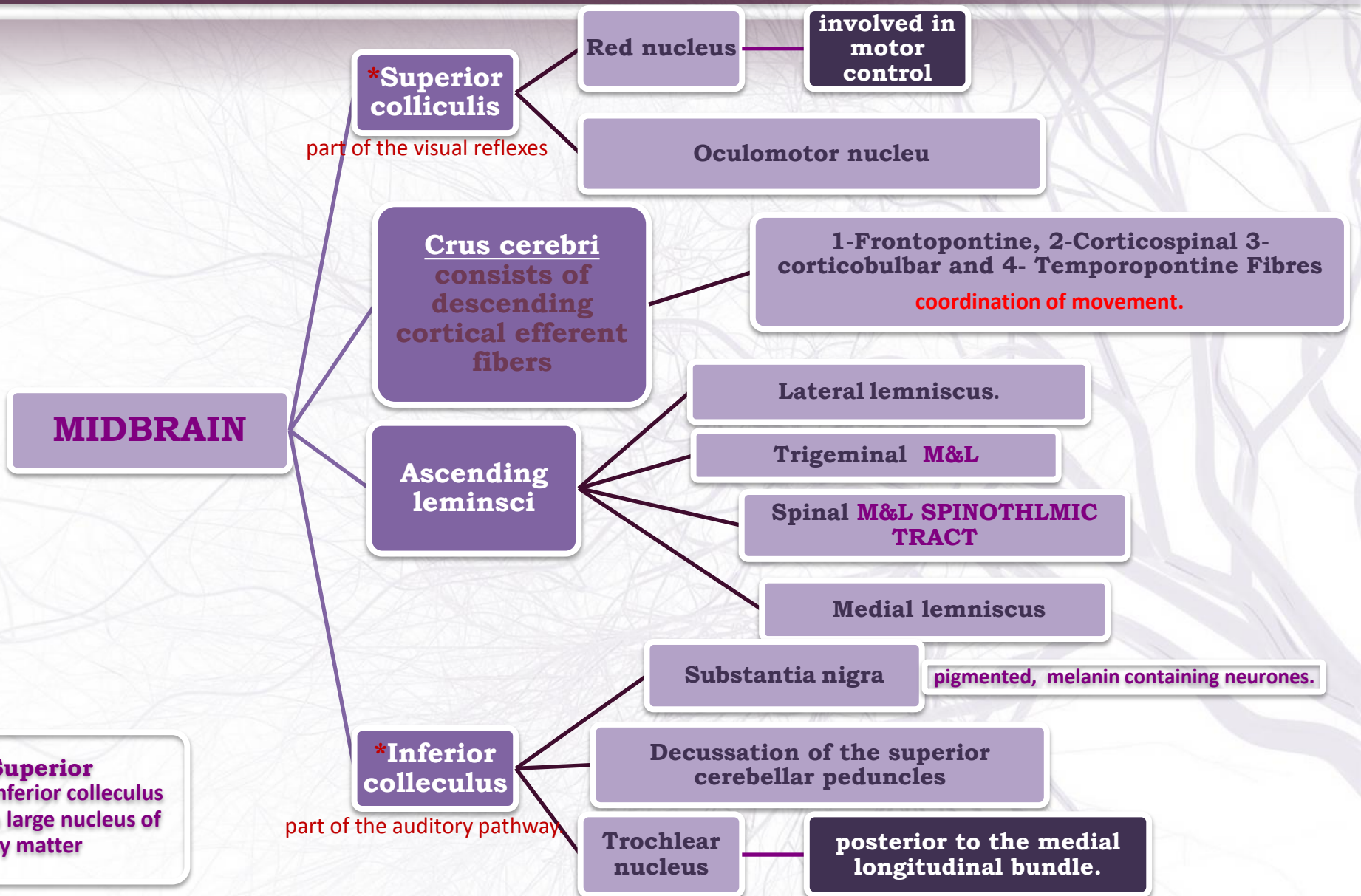
Internal structures of Pons

CAUDAL PART	ROSTRAL(cranial) PONS
Trapezoid Body acoustic fibres from cochlear nuclei to ascend into midbrain as lateral lemniscus and terminate in inferior colliculus).	***Superior Medullary Velum***
pontocerebellar fibres **pass to cerebllum through middle cerebellar peduncle**	
pontine nuclei receive cortico pontine fibers. Their axons form the transverse pontocerebellar fibers	***Medial longitudinal fasciculus***
MIDDLE cerebellar peduncles	
Bundles of corticospinal & corticonuclear fibres (pyramidal fiber)	
Medial Lemniscus	
spinal tract	
nucleus of Trigeminal.motor&sensory	
Abducent nucleus	
Facial motor nucleus	


Cavity of fourth ventricle
Medial longitudinal fasciculus
Superior medullary velum
Facial colliculus
Superior cerebellar peduncle
Vestibular nuclei
Inferior cerebellar peduncle
Reticular formation
Middle cerebellar peduncle
Nucleus of abducent nerve
Spinal tract and nucleus of trigeminal nerve
mF
Motor nucleus of facial nerve
Medial lemniscus
Transverse pontine fibers
Facial nerve
Abducent nerve
Trapezoid body
Bundles of corticospinal and corticonuclear fibers
Groove for basilar artery
Pontine nuclei


Medial longitudinal fasciculus
Superior medullary velum
Reticular formation
Superior cerebellar peduncle
Cavity of fourth ventricle
Motor nucleus of trigeminal nerve
Main sensory nucleus of trigeminal nerve
Pontine nuclei
Middle cerebellar peduncle
Sensory root of trigeminal nerve
Spinal lemniscus
Motor root of trigeminal nerve
Medial lemniscus
Transverse pontine fibers
Trapezoid body
Bundles of corticospinal and corticonuclear fibers

MIDBRAIN


MIDBRAIN
*Superior colliculis
part of the visual reflexes
Red nucleus
involved in motor control
Oculomotor nucleu
Crus cerebri consists of descending cortical efferent fibers
1-Frontopontine, 2-Corticospinal 3-corticobulbar and 4- Temporopontine Fibres
coordination of movement.
Ascending leminsci
Lateral lemniscus.
Trigeminal M&L
Spinal M&L SPINOTHLMIC TRACT
Medial lemniscus
*Inferior colleculus
part of the auditory pathway
Substantia nigra
pigmented, melanin containing neurones.
Decussation of the superior cerebellar peduncles
Trochlear nucleus
posterior to the medial longitudinal bundle.
* Superior &Inferior colleculus is a large nucleus of gray matter

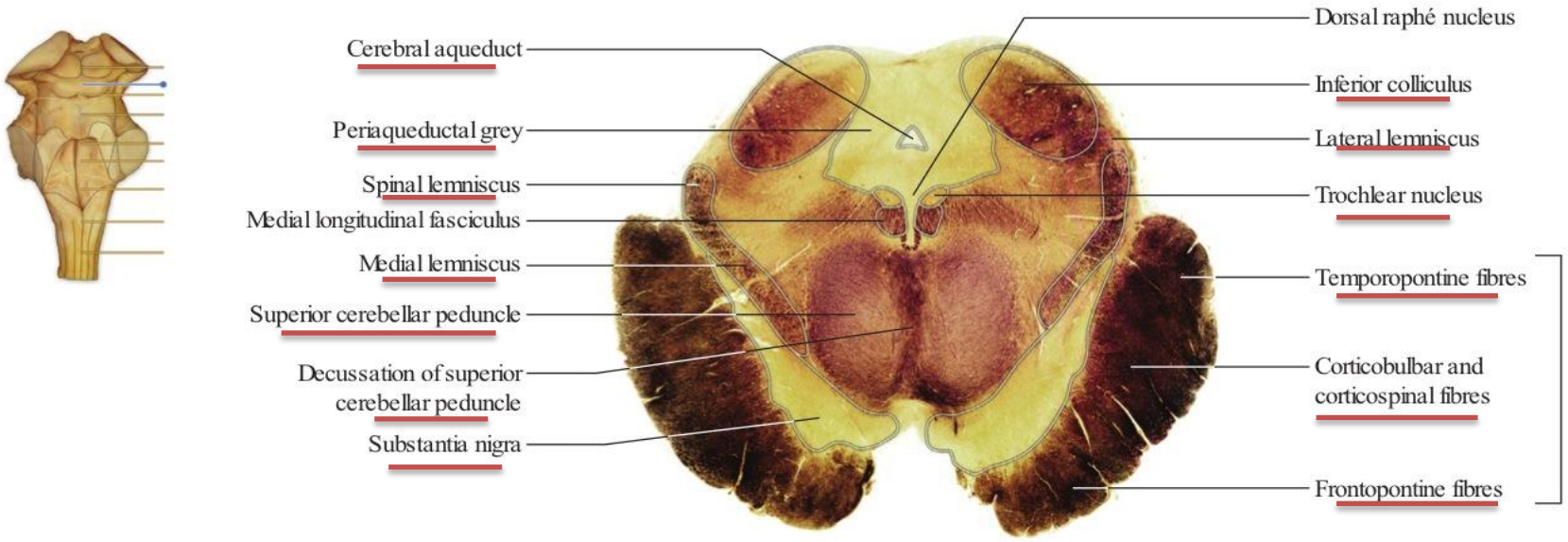


Figure 9.12 **Transverse section through the caudal midbrain at the level of the inferior colliculus.**

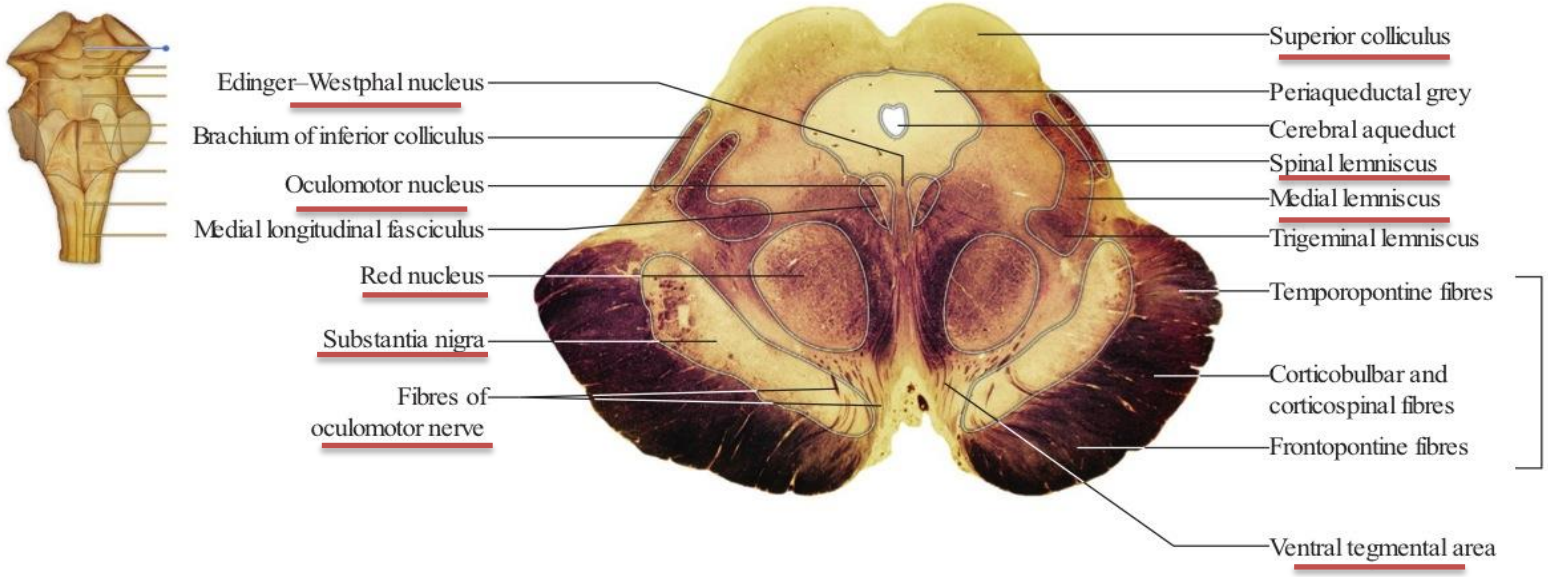


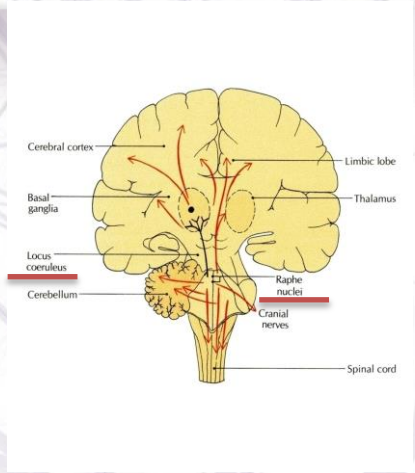
Figure 9.13 **Transverse section through the rostral midbrain at the level of the superior colliculus.**

RETICULAR FORMATION

1.Reticular Tracts :

- Reticulo spinal tracts

Influence a muscle tone & posture



- **Reticular Activating system:**
  - **Formed of some of the ascending fibers of the reticular formation.**
  - **They activate the cerebral cortex through the thalamus.**

2. Reticular Neurons

Raphe Nuclei

- **They're serotonergic.**
- Its ascending fibers **to the cerebral cortex are involved in the mechanisms of sleep.**
- Its descending fibers **to the spinal cord are involved in the modulation of Pain.**

Locus Ceruleus

- **It is the main noradrenergic cell group of the brain.**
- **Helps in arousal and sleep-wake cycles.**

Questions

1.The Inferior colleculus receives fibers from

A-medial lemniscus

B- lateral lemniscus

C- Anterior lemniscus

2.The fiber of trochlear nerve decussate in

A- superior medullary velum

B- Inferior medullary velum

C- lateral medullary velum

3Which of the following Substantialnigra associated with

A- parkinon's disease

B- Bell's Palsy

C- tic douloureux

Answers :

1.B 2.A 3.A

Questions

4.Function of crus cerebrai
A- descending of cortical efferent fiber
B- coordination movement
C- both A&B

5.The superior colleculus it's responsible for
A- auditory reflex
B- visual reflex
C- None of these

6.Trigeminal sensory nucleus (spiral)receives
A. Pain & temperature
B. Touch
C. proprioceptive

Answers :
4.C 5.B 6.A

Questions

7.Where are fibers of the corticospinal tract located in the medulla?

A .Inferior olivary nucleus
B. Pyramid
C. Medial lemniscus

8. What is the only cranial nerve that exits dorsally ?

A. Trochlear
B. Oculomotor
C. Abducent

9. Through which cerebral peduncle do cerebellar efferent enter the midbrain?

A. Superior cerebellar peduncle
B. Middle cerebellar peduncle
C. Inferior cerebellar peduncle

Answers :
7.B 8.A 9.A

Questions

10. Solitary nucleus receive taste sensation from which nerves?

A. Trigeminal & facial nerve
B. Glossopharyngeal &facial nerve
C. Hypoglossal & glossopharyngeal

11. Which one of the nucleus is lying in the tegmentum of the midbrain?

A. Oculomotor nerve
B. Trochlear nerve
C. Red nucleus

12. The medial lemniscus rotates 90 degree almost horizontally in which part of the brain stem ?

A. Midbrain
B. Pons
C. Medulla oblongata

Answers :
10.B 11.C 12.B

Questions

13- The floor of 4th ventricle is formed by :

a.Superior medullary velum .

b. Open medulla and pons .

c. Superior cerebellar peduncles .

d. Inferior cerebellar peduncles .

14- The roof of 4th ventricle is formed by :

a.Superior medullary velum .

b. Open medulla and pons .

c. Superior cerebellar peduncles .

d. Inferior cerebellar peduncles

GOOD LOCK ☺

Answers :
13.B 14.A