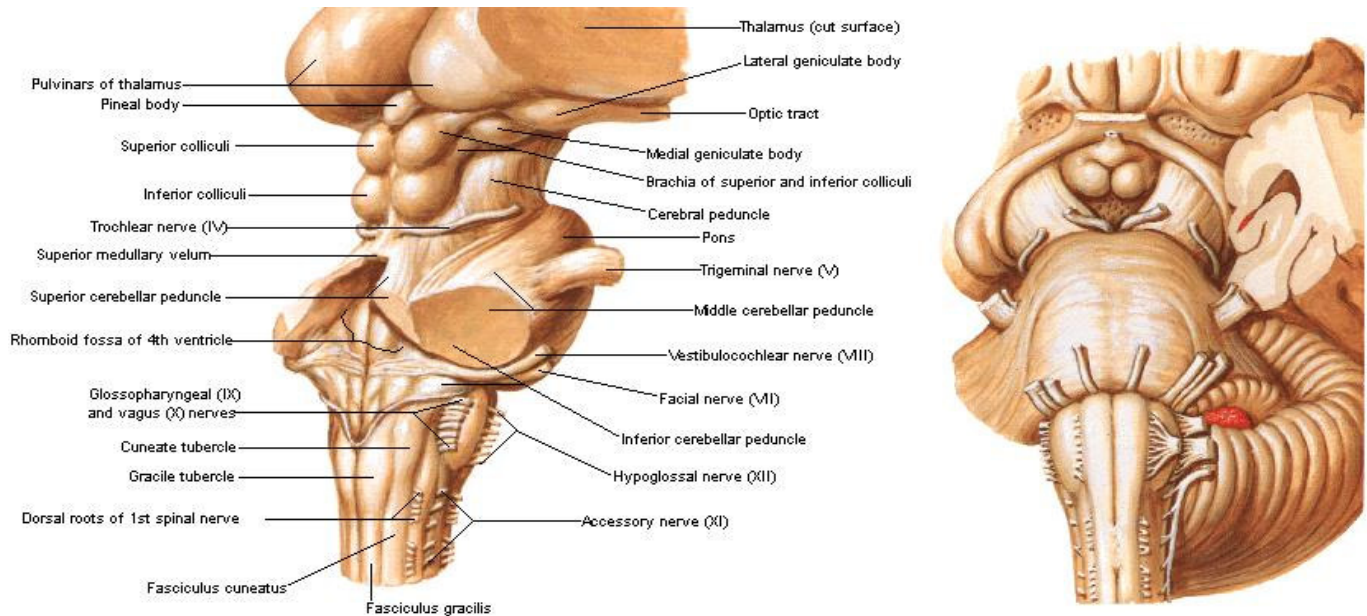


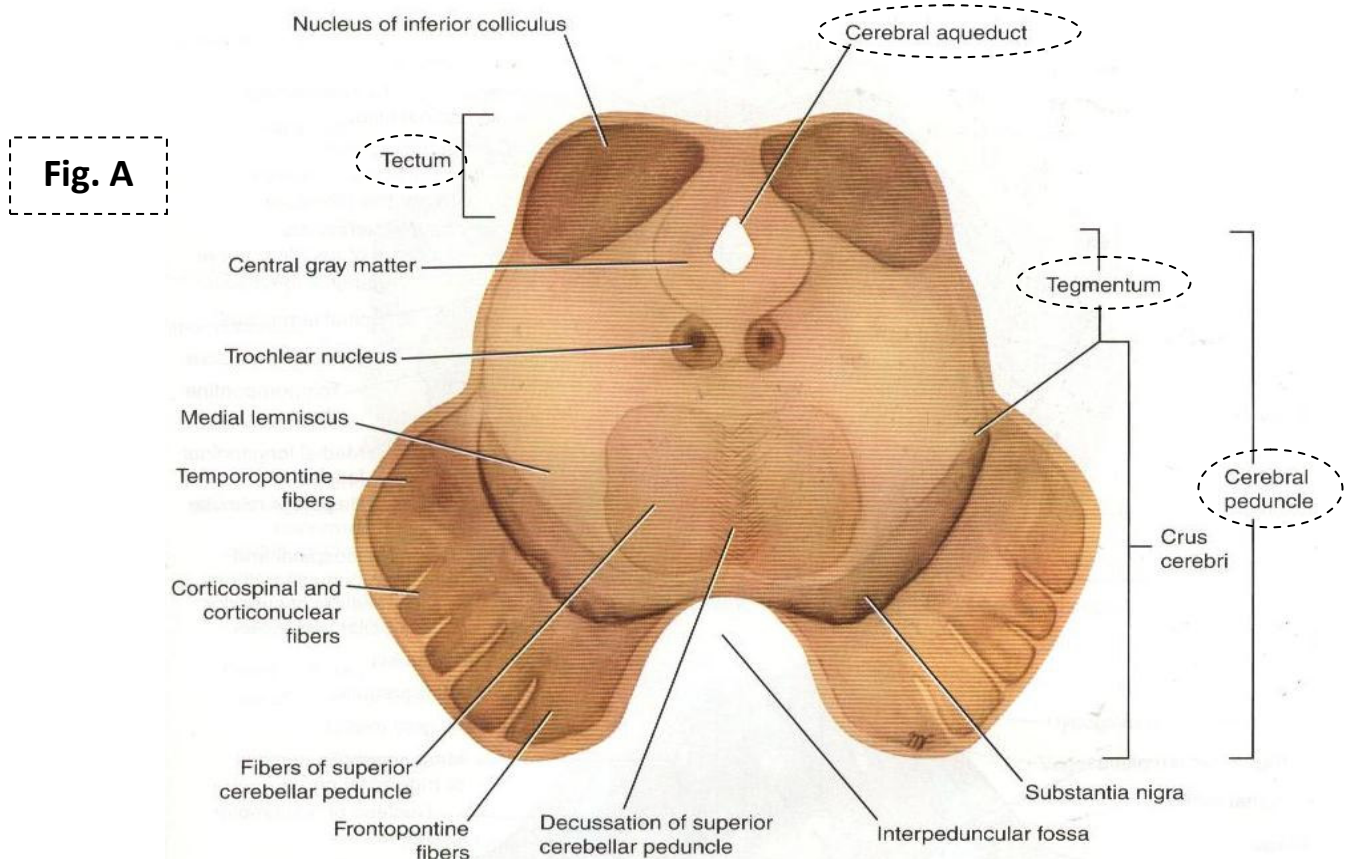
MIDBRAIN

DIVISIONS :

- Midbrain is formally divided into dorsal and ventral parts at the level of **cerebral aqueduct**.
- The dorsal portion is known as **tectum** which largely consists of inferior and superior colliculi (**corpora quadrigemina**).
- The ventral portion is known as **tegmentum**.



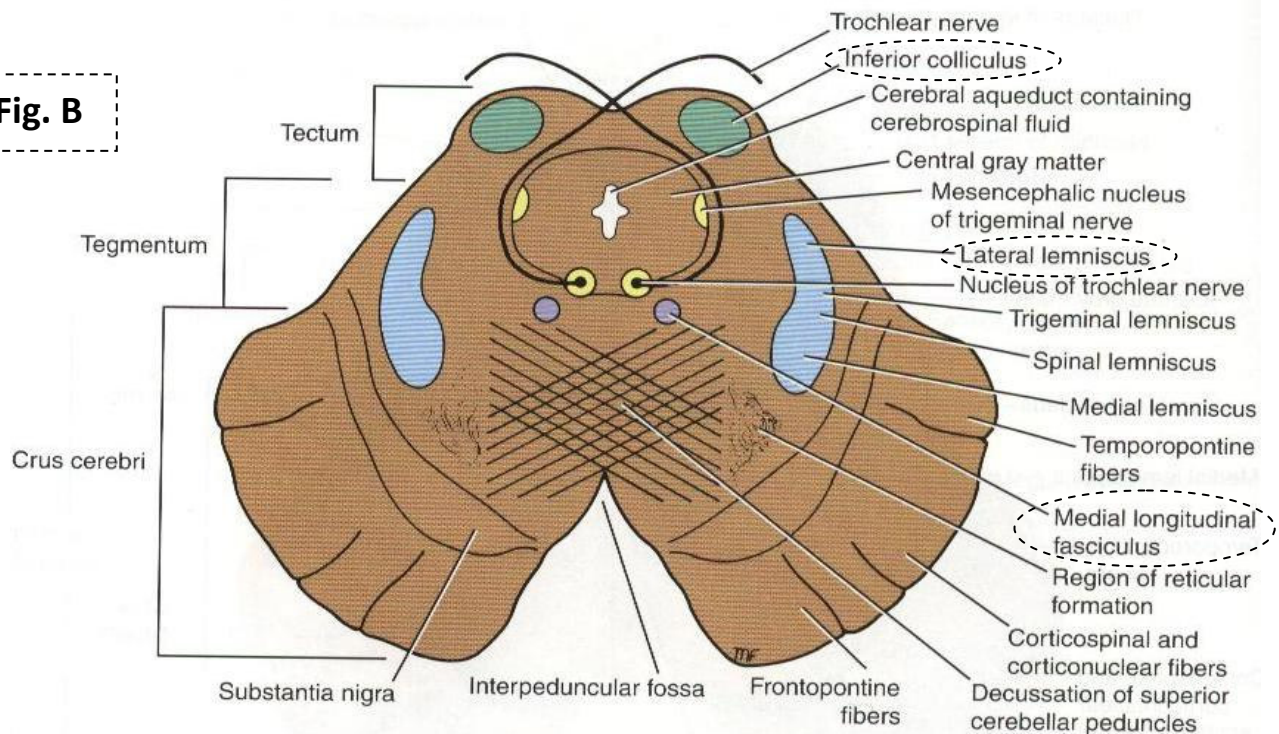
- Tegmentum is bounded ventrally by the massive fibre system of the **crus cerebri**.
- The term **cerebral peduncle** is sometimes used as a synonym for crus cerebri.
- Or the cerebral peduncle refers to the **whole midbrain** on either side *excluding the tectum*.



CAUDAL PART :

- In the caudal part of midbrain the **inferior colliculus** constitutes part of the *ascending acoustic (auditory) projection*.
- Ascending auditory fibres run in the **lateral lemniscus** which terminates in the inferior colliculus.
- Efferent fibres from the colliculus terminate in the **medial geniculate nucleus of the thalamus**.
- This nucleus projects to the auditory cortex of the temporal lobe.

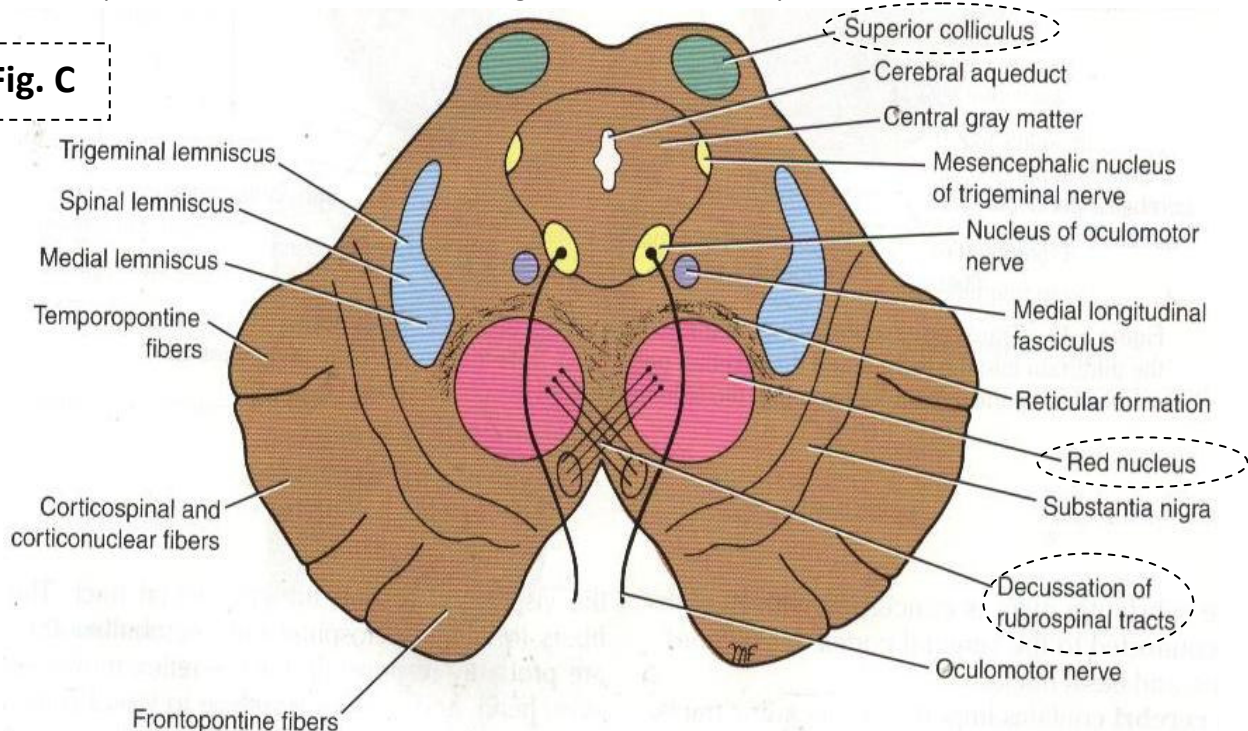
Fig. B



ROSTRAL PART :

- The **superior colliculus** of the rostral area of the midbrain is part of the *visual system*.
- Its main afferents are **corticotectal fibres** originating from the visual cortex of the occipital lobe and from the frontal eye field of the frontal lobe.
- These inputs are concerned with controlling movements of the eyes.

Fig. C



EYE MOVEMENTS :

- These movements of eyes are those occurring when a moving object is followed (**smooth pursuit**).
- Or when the direction of the gaze is altered (**saccadic eye movement**).
- **Corticotectal fibres** from the visual cortex are involved in the **accommodation reflex**.

PRETECTAL NUCLEUS :

- A small number of visual fibres running in the **optic tract** terminate just rostral to the superior colliculus in the **pretectal nucleus**.
- This nucleus has *connections* with **parasympathetic neurons** controlling the *smooth* muscle of the eye and is part of the circuit mediating the **pupillary light reflex**.

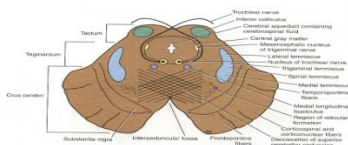
CEREBRAL AQUEDUCT :

- Ventral to the colliculi the **cerebral aqueduct** runs the length of the midbrain.
- Surrounding the aqueduct is a pear shaped arrangement of grey matter called **periaqueductal (central) grey**.

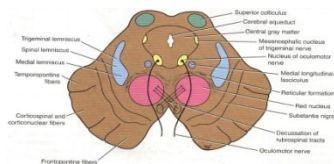
See Fig. A

NUCLEI :

- In the ventral part of the periaqueductal grey at the level of the inferior and superior colliculi lie the **trochlear** and **oculomotor nuclei** respectively.
- These innervate the *extraocular* muscles controlling the eye movements.
- Close to the nuclei runs the **medial longitudinal fasciculus** which links them to the **abducens nucleus** in the Pons and is important in the control of gaze.



See Fig. B



See Fig. C

SUPERIOR CEREBELLAR PEDUNCLE :

- At the level of the inferior colliculus the central portion of the tegmentum is dominated by the **superior cerebellar peduncles (brachium conjunctivum)**.
- These fibres originate in the *cerebellum* coursing ventromedially as they run into the midbrain.

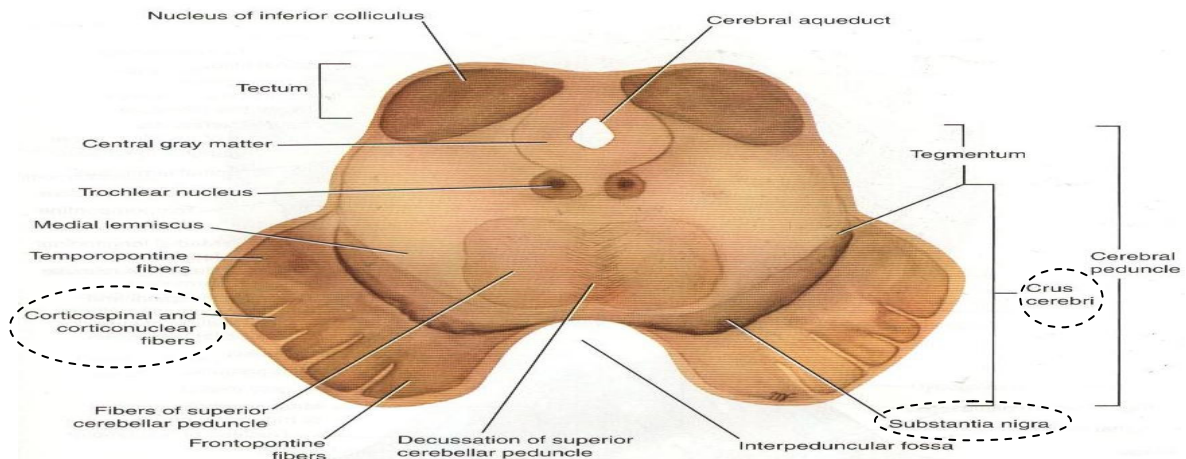
RED NUCLEUS :

- Beneath the inferior colliculus the superior cerebellar peduncles *decussate* in the midline.
- Rostral to the decussation at the level of the superior colliculus the portion of the tegmentum is occupied by **red nucleus**.
- Some of the fibres of the superior cerebellar peduncles terminate in the red nucleus.
- The red nucleus is involved in *motor* control.
- Its other major source of afferents is the motor cortex of the frontal lobe.
- Efferent fibres from the red nucleus cross in the **ventral tegmental decussation** and descend to the spinal cord in the **rubrospinal tract**.
- The red nucleus also projects to the **inferior olivary nucleus of the medulla** via the **central tegmental tract**.

See Fig. C

SUBSTANTIA NIGRA :

- The most ventral part of the midbrain tegmentum is occupied by the **substantia nigra**.
- A subdivision of this nucleus known as **pars compacta**.
- It consists of **pigmented melanin containing neurones** that *synthesise dopamine as their transmitter*.
- These neurones project to the **caudate nucleus** and **putamen of the basal ganglia** in the forebrain.
- Degeneration of the pars compacta of the substantia nigra is associated with Parkinson's disease.
- Other **non pigmented** subdivision of the substantia nigra is called the **pars reticulata**.
- Pars reticulata is considered to be a functional homologue of the **medial segment of the globus pallidus** which is also part of the basal ganglia.



CRUS CEREBRI :

- Ventral to the substantia nigra lies the massive **crus cerebri**.
- This consists **entirely of descending cortical efferent fibres** that have left the cerebral hemisphere by traversing the internal capsule.
- Approximately the middle 50% of the crus consists of **corticobulbar** and **corticospinal fibres**.

FIBRES :

- The **corticobulbar fibres** end predominantly in or near the **motor cranial nerve nuclei** of the brain stem.
- The **corticospinal fibres (pyramidal)** traverse the Pons to enter the medullary pyramid and thence the **corticospinal tract**.

MIDDLE CEREBELLAR PEDUNCLE :

- On either side of the corticobulbar and corticospinal fibres the crus cerebri contains **corticopontine fibres** that originate from widespread regions of the cerebral cortex and terminate in the **pontine nuclei** of ventral Pons.
- From the pontine nuclei *connections* are established with the **cerebellum** via the **middle cerebellar peduncle** which are involved in the coordination of movement.

THE END

LoveTomy Team 426

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Dr. S Dr. noop Omar H

ابتنسم !! همي بروحي

M.A.M Abo Slo7 Cute Killer



SELF QUIZ

1- Regarding the midbrain, which one is incorrect :

- a. The corpora quadrigemina is located at the tectum aspect of the midbrain.
- b. Cerebral peduncle sometimes means whole midbrain excluding tectum.
- c. Inferior colliculus constitutes part of the acoustic projection.
- d. The dorsal part of the midbrain is called tegmentum.
- e. All of the above.

2- Choose the correct answer :

- a. Central grey is pear-shaped arrangement surrounding the 4th ventricle.
- b. Optic tract fibers terminate in the tectal nucleus.
- c. Pretectal nucleus has connection with parasympathetic neurons.
- d. Cerebral aqueduct is located dorsal to the colliculi.
- e. Non of the above.

3- Regarding the substantia nigra choose the incorrect :

- a. Pars compacta synthesise dopamine as neurotransmitter.
- b. Substantia nigra occupied the most ventral part of the midbrain tegmentum.
- c. Pars reticulata is non-pigmented subdivision of the substantia nigra.
- d. Pars compacta project to the caudate nucleus & globus pallidus.
- e. All of the above.

4- Regarding the fibers pass through crus cerebri :

- a. Corticopontine fibers originate from the sensory cortex.
- b. The corticospinal fibers enter medullary pyramid.
- c. Approximately the middle 50% of the crus consists of corticobulbar & corticospinal fibers.
- d. Corticobulbar fibers end in or near the motor cranial nuclei of the brain stem.
- e. All of the above.

1. d	2. c	3. d	4. a
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