

Midbrain

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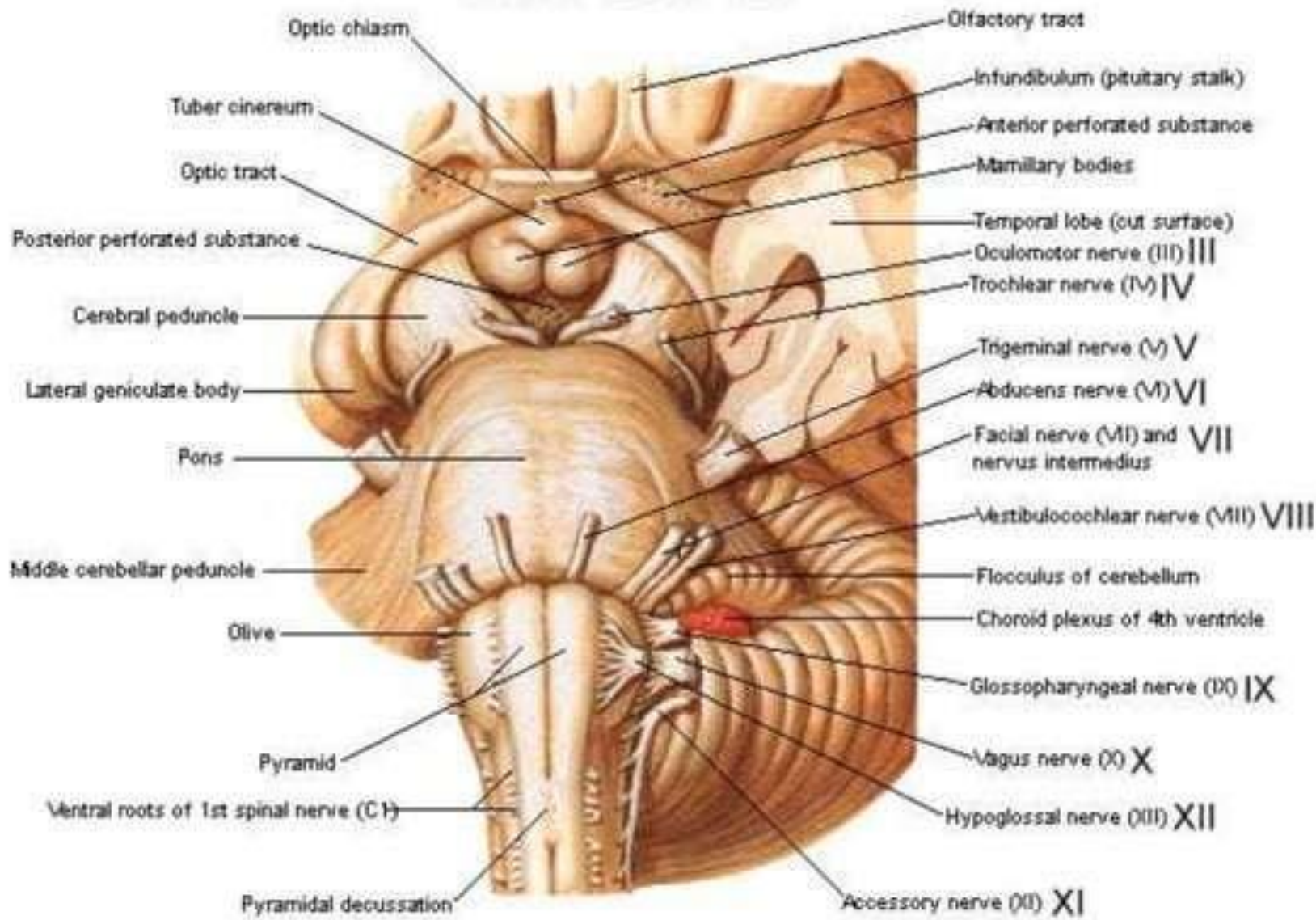
DEPT. OF ANATOMY

LTMMC & GH.

Introduction

- Upper and shortest part of the brain-stem.
- 2.5 cm long and 2.5 cm wide.
- Connects the hindbrain with the forebrain.
- Its cavity, the **cerebral aqueduct** (aqueduct of Sylvius) connects the third ventricle with the fourth ventricle.
- Passes through the tentorial notch.

Anteroinferior View



Brainstem

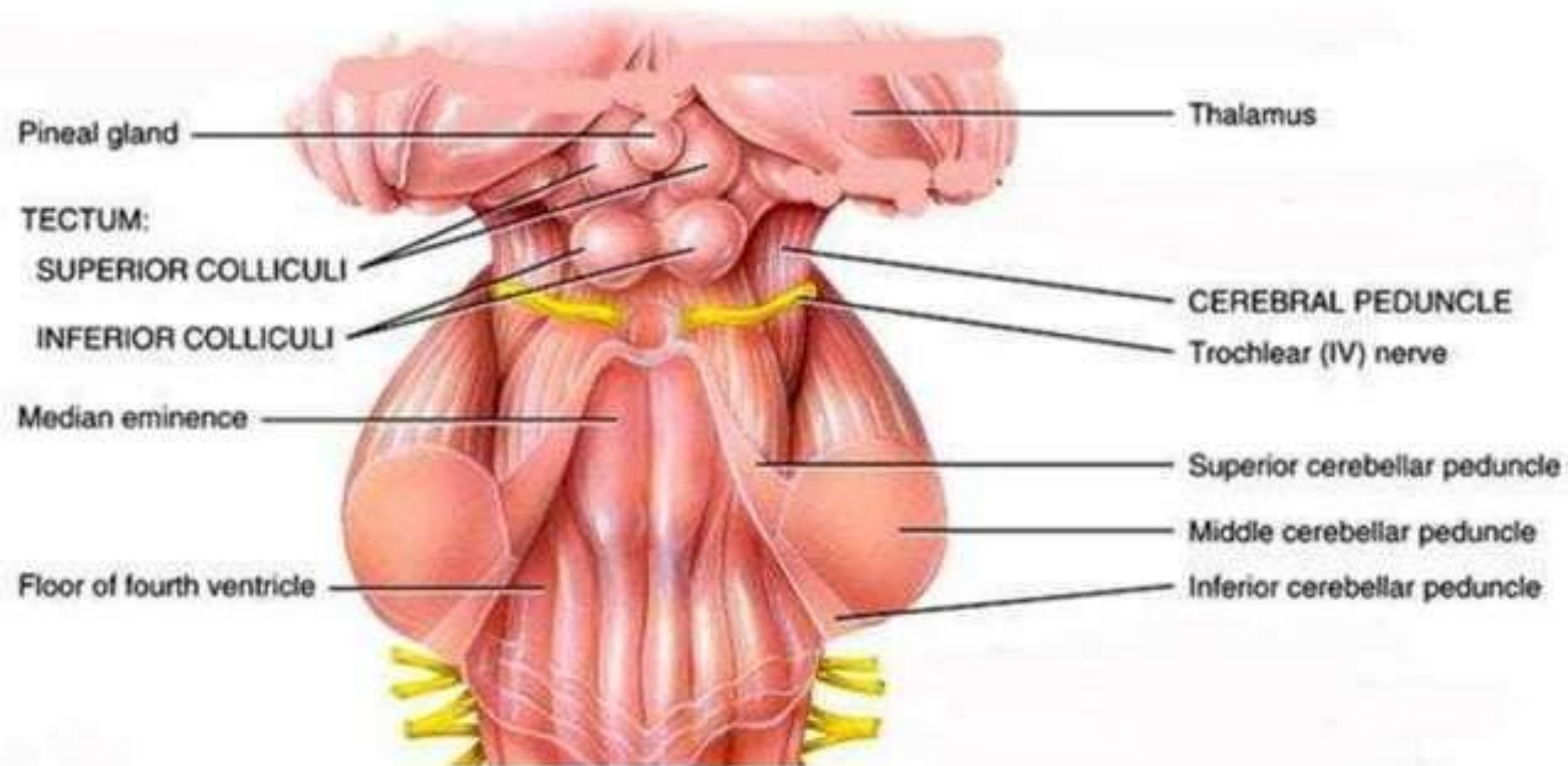
Posterolateral View



Relation

- **On each side** - optic tract, Parahippocampal gyrus, Posterior cerebral artery, Basal vein;
- **Anteriorly** -interpeduncular structures, viz. mammillary bodies,tuber cinereum, etc.;
- **Posteriorly** - splenium of corpus callosum, great cerebral vein, pineal body and posterior ends of right and left thalami.

MIDBRAIN



Structural components and functions of the midbrain

- **Superior colliculi** - Reflex centres for visual reflexes
- **Inferior colliculi** - Lower auditory centres, probably concerned with reflexes involving auditory stimuli
- **Red nuclei** - Involuntary control of muscle tone and posture

Structural components and functions of the midbrain

- **Substantia nigra** - Regulate the activity of basal nuclei
- **Nuclei of oculomotor and trochlear nerves** -Give motor fibres to these nerves which are concerned with the activities of both intrinsic and extrinsic muscles of the eyeball

White matter

- Cerebral peduncles containing number of ascending and descending tracts-Provides passage to the fibres of motor and sensory tracts

External Features -Ventral surface

2 Crura cerebri –

- Emerges from the cerebral hemispheres
- Converge downwards to enter the pons
- Forming the posterolateral boundaries of the interpeduncular fossa.
- Crossed transversely from above downwards by optic tract, posterior cerebral artery, superior cerebellar artery and taenia pontis (white ridge).

Ventral surface

Oculomotor nerve –

- Emerges from a groove on the medial side of the crus cerebri.

Trochlear nerve -

- Emerges on the dorsal aspect of the midbrain
- curls around the lateral aspect of the cerebral peduncle to appear on the ventral aspect of the midbrain lateral to the oculomotor nerve.
- 2 nerves run forward between the posterior cerebral and the superior cerebellar arteries.

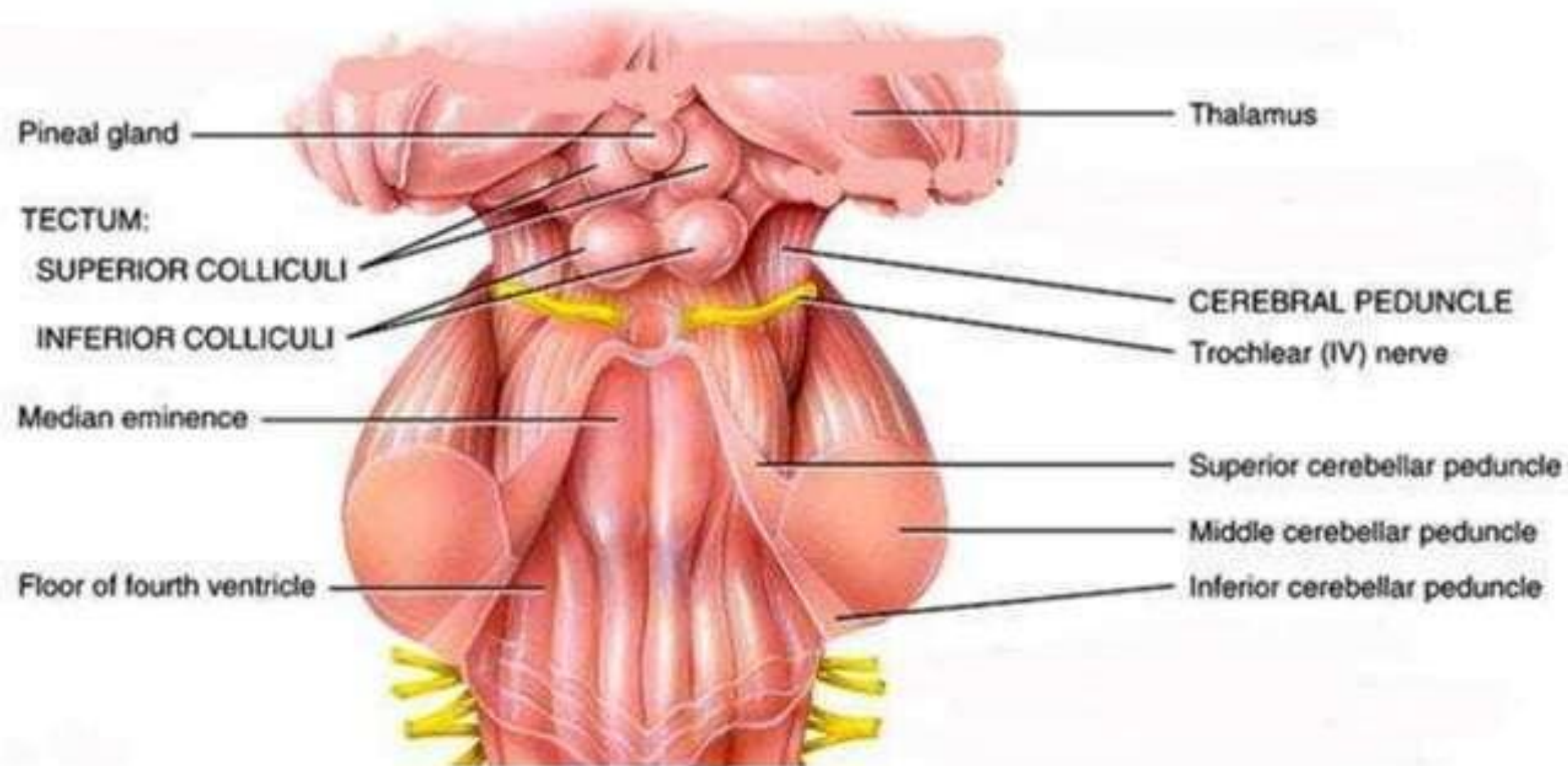
Dorsal surface

- Presents **four rounded elevations**:
- **2 superior & 2 inferior colliculi** (*corpora quadrigemina*).
- Colliculi are separated from each other by a cruciform sulcus.
- **Vertical limb** of sulcus when traced above forms a surface depression which lodges the **pineal body** and when traced below, it becomes continuous with the **frenulum veli** (a median ridge on the dorsal surface of the superior medullary velum).

Dorsal surface

- **Trochlear nerves** emerges one on each side of the upper part of frenulum veli decussation in the superior medullary velum.
- Thick ridges of white mater extending from lateral side of each colliculus constitute their **brachia**

MIDBRAIN



Brainstem

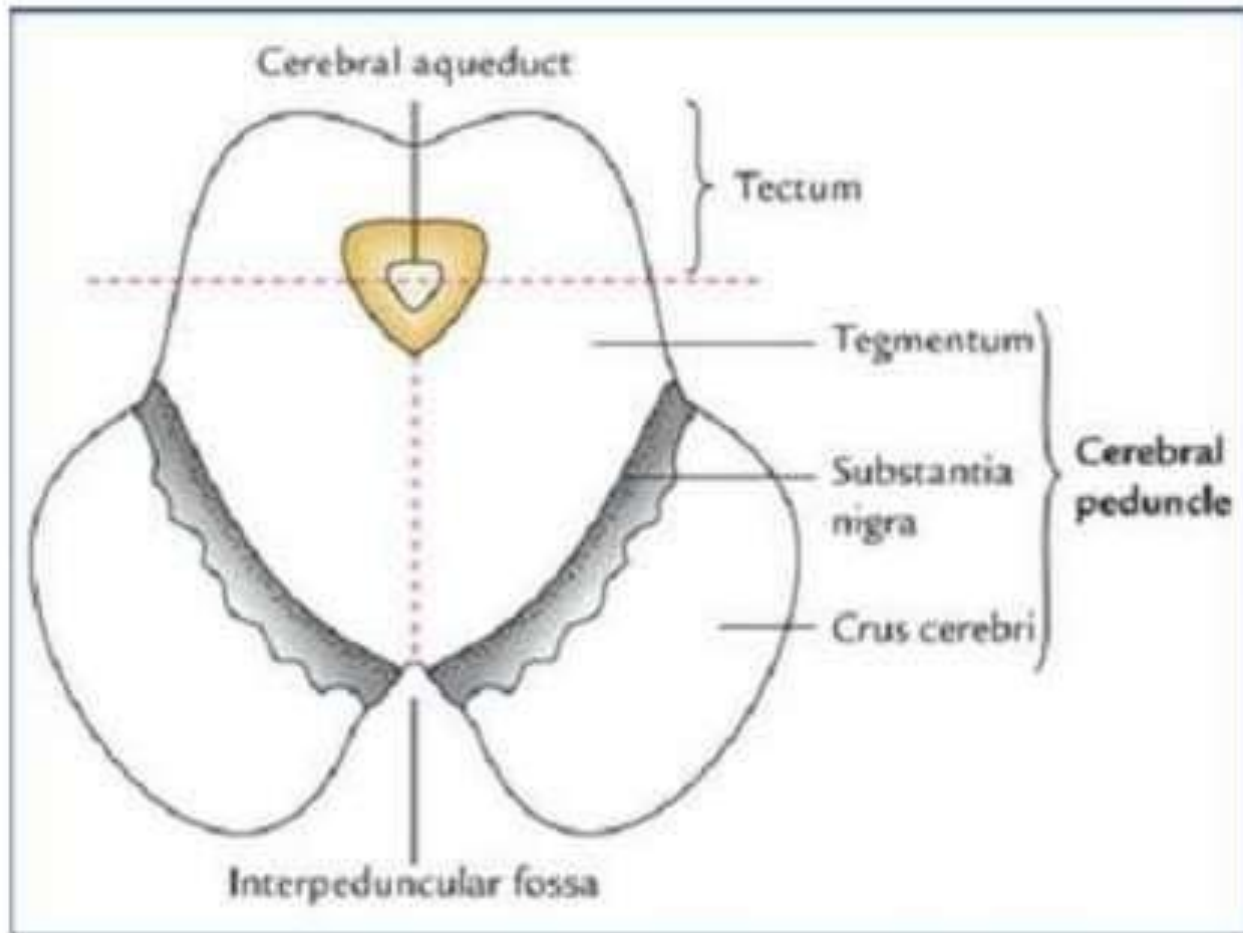
Posterolateral View



Brachium

- **Superior brachium** - connect the superior colliculus to the lateral geniculate body and the optic tract, and is made up of optic tract fibres.
- **Inferior brachium** -connect the inferior colliculus to the medial geniculate body, and is made up of auditory fibres.
- Superior and inferior colliculi are concerned with reflex activities triggered by auditory and visual impulses respectively.

Internal structure



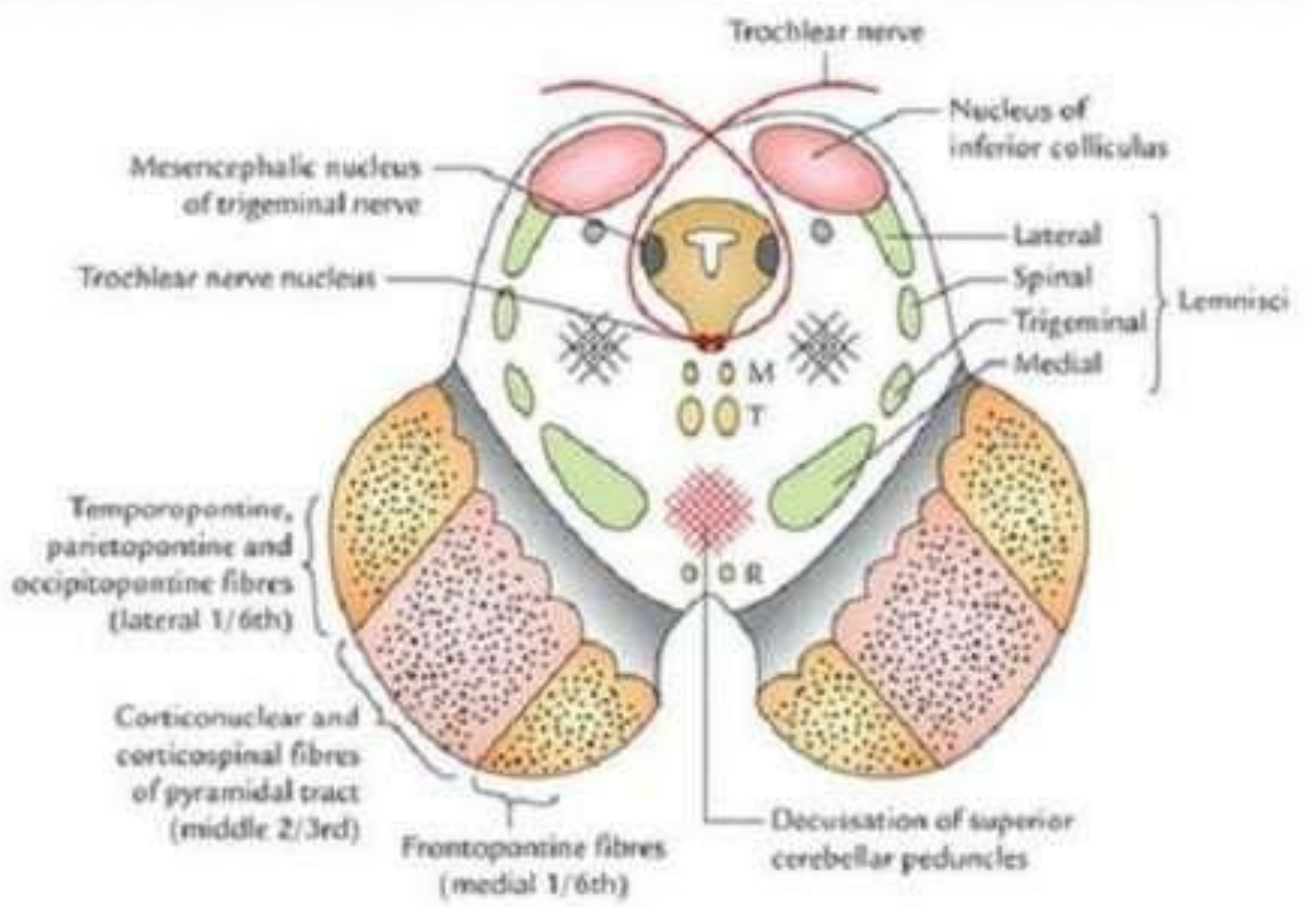
Internal structure

- Small posterior part is called tectum and consists of four colliculi.
- Large anterior part is divided into two equal right and left halves by a vertical plane, the cerebral peduncle.
- Each cerebral peduncle is further subdivided into three parts, from dorsal to ventral these are: (a) teg-mentum, (b) substantia nigra, and (c) crus cerebri.

Crus cerebri (Basis pedunculi)

- Part of cerebral peduncle situated anterolateral to the substantia nigra.
- Contains important descending tracts which connect the cerebral cortex to the anterior horn cells of the spinal cord, cranial nerve nuclei, and pontine nuclei.

Transverse section of the midbrain at the level of inferior colliculi.



Cerebral Peduncles - Tract

- Corticospinal and corticonuclear fibres (pyramidal tract) occupy the middle two-thirds of the crus.
- Frontopontine fibres occupy the medial one-sixth of the crus. The temporopontine, *parietopontine, and occipitopontine fibres occupy the lateral one-sixth* of the crus

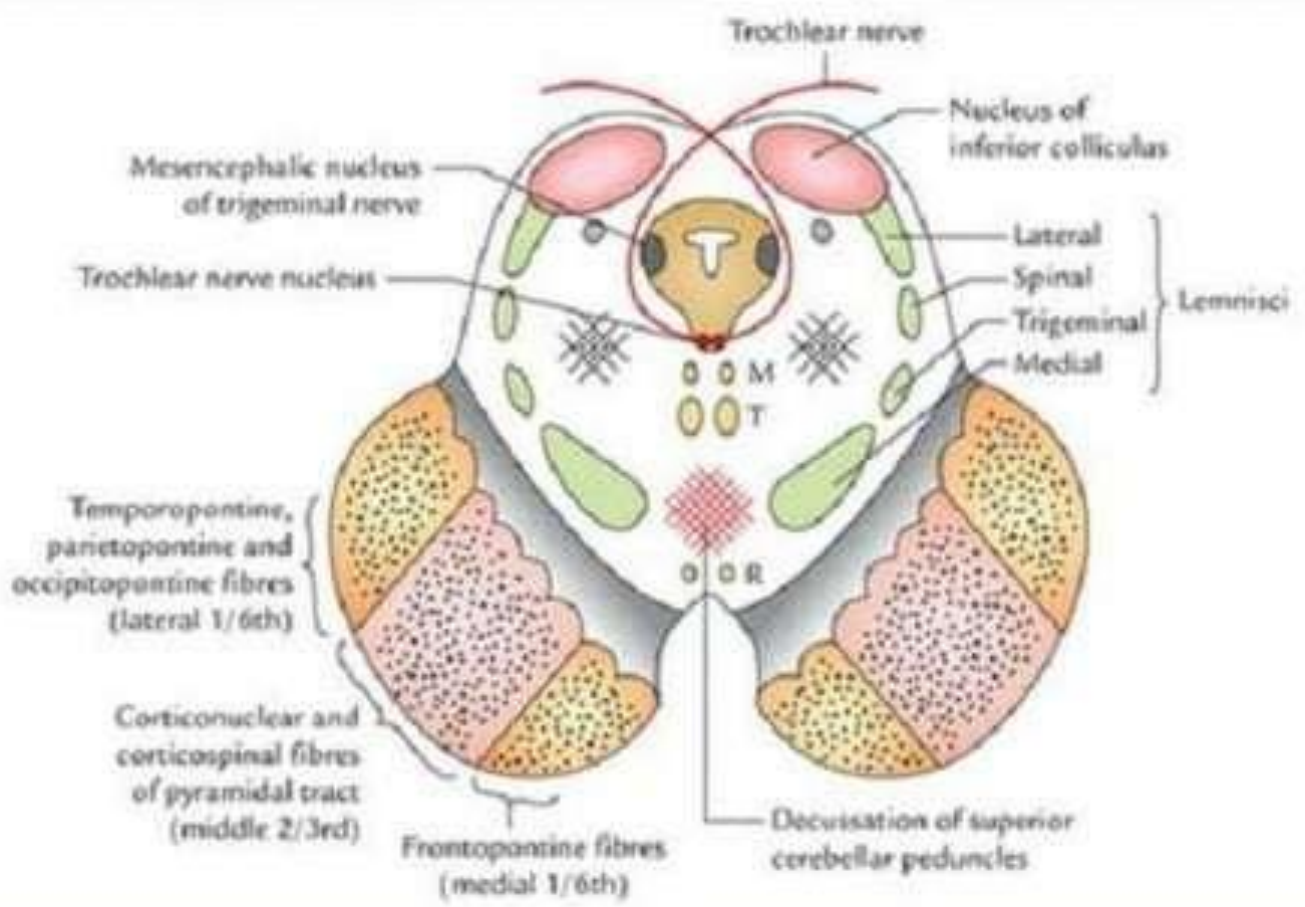
Substantia nigra

- Curved (crescent-shaped) pigmented band of grey mater (thicker medially than laterally) situated between tegmentum and crus cerebri
- Large motor nucleus that extends throughout the length of midbrain
- Divided into two parts:
 - (a) Dorsal part (*pars compacta*) containing medium sized cells and
 - (b) Ventral part (*pars reticularis*) containing fewer cells. The *pars reticularis* is intermingled with the fibres of crus cerebri.

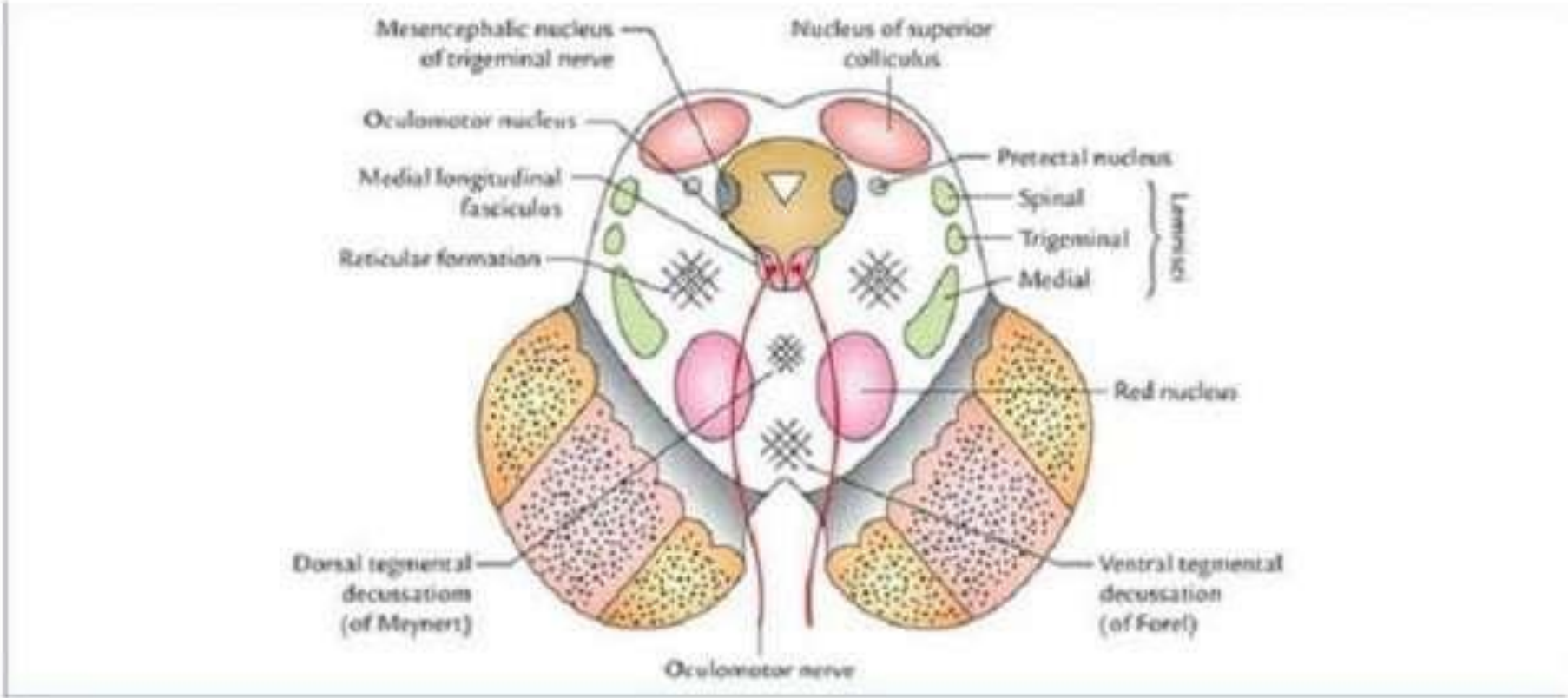
Substantia nigra

- Made up of deeply pigmented nerve cells which contain **melanin** (a polymerized form of dopamine) and iron.
- Cells synthesize **dopamine** which is carried through their axons (***nigrostriatal fibres***) to *the corpus striatum*.

Transverse section of the midbrain at the level of inferior colliculi.



Transverse section of the midbrain at the level of superior colliculi.



THANK YOU