EXTERNAL FEATURES OF
THE BRAINSTEM

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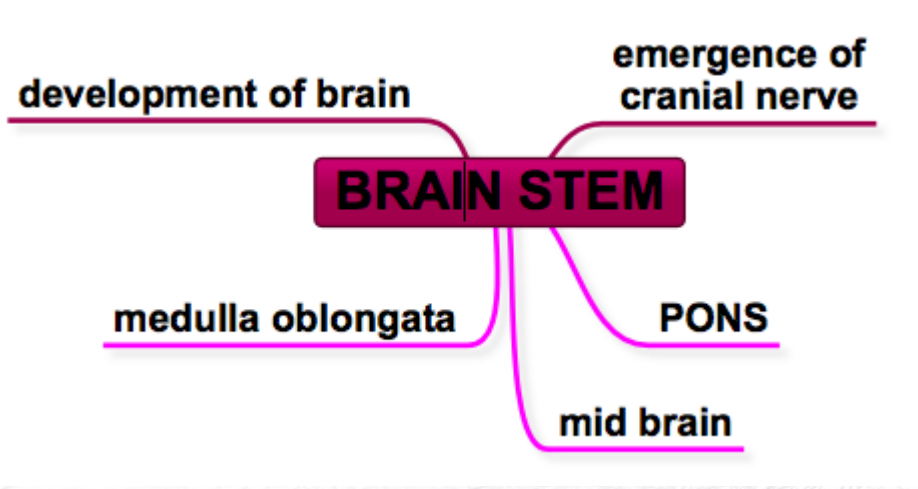
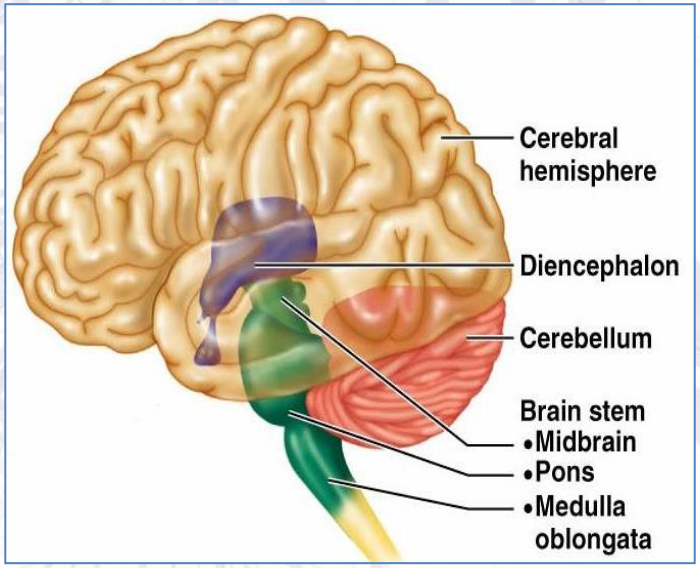
OBJECTIVES

- *List the components of brain stem.*
- *Describe the site of brain stem.*
- *Describe the relations between components of brain stem & their relations to cerebellum.*
- *Describe the external features of both ventral & dorsal surfaces of brain stem.*
- *List cranial nerves emerging from brain stem.*
- *Describe the site of emergence of each cranial nerve.*





Brainstem

- **The site**

Brainstem is located in **basilar part of occipital bone** (clivus). It connects the cerebrum to the spinal cord.

- **Parts of brainstem**

It composed from above downward:

- **Midbrain.**
- **Pons.**
- **Medulla oblongata.**

Each part is connected to the cerebellum by **three cerebellar peduncles**

1- Superior peduncle to midbrain.
2- Middle to pons.
3- inferior to medulla.

- **Development of the brain**

The brain develops from **cranial part of neural tube** and then the cranial part divides into 3 parts:

- **Forebrain** :

Subdivided into :-

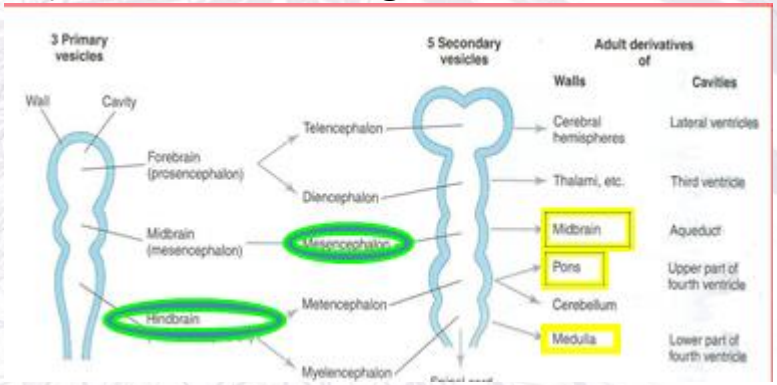
1) Two cerebral hemispheres. **2 lateral ventricles**
2) Diencephalon. **3rd ventricle**

- Midbrain. **cerebral aqueduct**

- Hindbrain: 4th ventricle

Subdivided into :-

1) Pons.
2) Cerebellum.
3) Medulla oblongata



VENTRAL SURFACE OF BRAINSTEM

<table>
<tr><th>midbrain</th><th>pons</th><th>Medulla abolongata</th></tr>
<tr><td rowspan="4">- Crus cerebri (basis pedunculi):
-A large column of descendig fibers.
-Seperated by interpeduncular fossa.</td><td>- Basilar sulcus:
-Lodge the basilar artery.</td><td>- Ventral median fissure:
-Its lower part is marked by decussation of most of pyramidal fibers (75%-90%).
- It is continuation of ventral median fissure of the spinal cord.</td></tr>
<tr><td rowspan="3">- Transvers pontine (pontocerebellar) fibers:
-Originate from pontine nuclei, cross the midline & pass through the contralateral middle cerebellar peduncle to enter the opposite cerebellar hemisphere.</td><td>- Pyramids:
-lateral to ventral fissure.
-Elevation overlies the corticospinal (pyramidal) tract.</td></tr>
<tr><td>- Olives:
-Lateral to pyramids.
-Elevation overlies the inferior olivary nuclei.
control of movement</td></tr>
<tr><td>- Anteriolateral sulcus:
-Between the pyramids and olives.</td></tr>
</table>

DORSAL SURFACE OF BRAINSTEM

<table>
<tr><th>MIDBRAIN</th><th colspan="2">MEDULLA ABOLONGATA</th></tr>
<tr><td rowspan="2">Has four elevations:
- Two superior colliculi:
Concered with the visual reflexes.
- Two inferior colliculi:
Related to auditory pathway.</td><td>Closed medulla:</td><td>- Open medulla:</td></tr>
<tr><td>-The caudal part. Opens to central canal.
- Dorsal median sulcus.</td><td>- the cranial (rostal) part. opens to 4th ventricle.</td></tr>
<tr><td>PONS</td><td rowspan="3">Fasciculus gracilis:
-Lateral to dorsal median sulcus.
-In its upper part, Gracile tubercle which produced by gracile nucleus.</td><td rowspan="3">- Inverted V-shaped sulcus: divides it to three parts (medial to lateral):
1) Hypoglossal triangle
Overlies hypoglossal nucleus.
2) Vagal triangle.
Overlies dorsal vagal nucleus.
3) Vestibular area.
Overlies vestibular nuclei.</td></tr>
<tr><td>-Separated from medulla by imaginary line along inferior border of middle cerebellar peduncles.</td></tr>
<tr><td>-Separated into two parts by median sulcus (medial to lateral):
-Medial eminence & facial colliculus: overlies abducent nucleus.
-Vestibular area:
overlies vestibular nuclei.</td><td>Fasciculus cuneatus:
-Lateral to Fasciculus gracilis.
-In its upper part, Cuneate tubercle which produced by cuneate nucleus.</td></tr>
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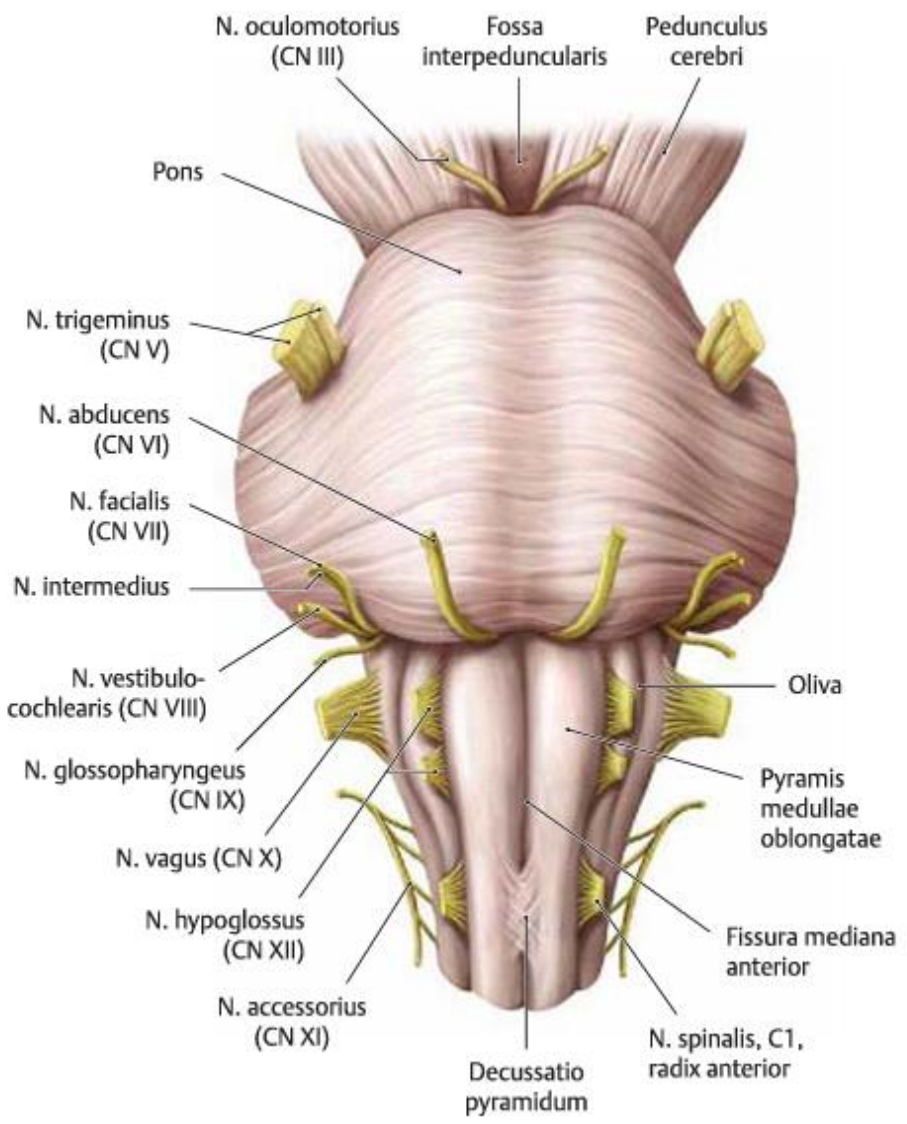
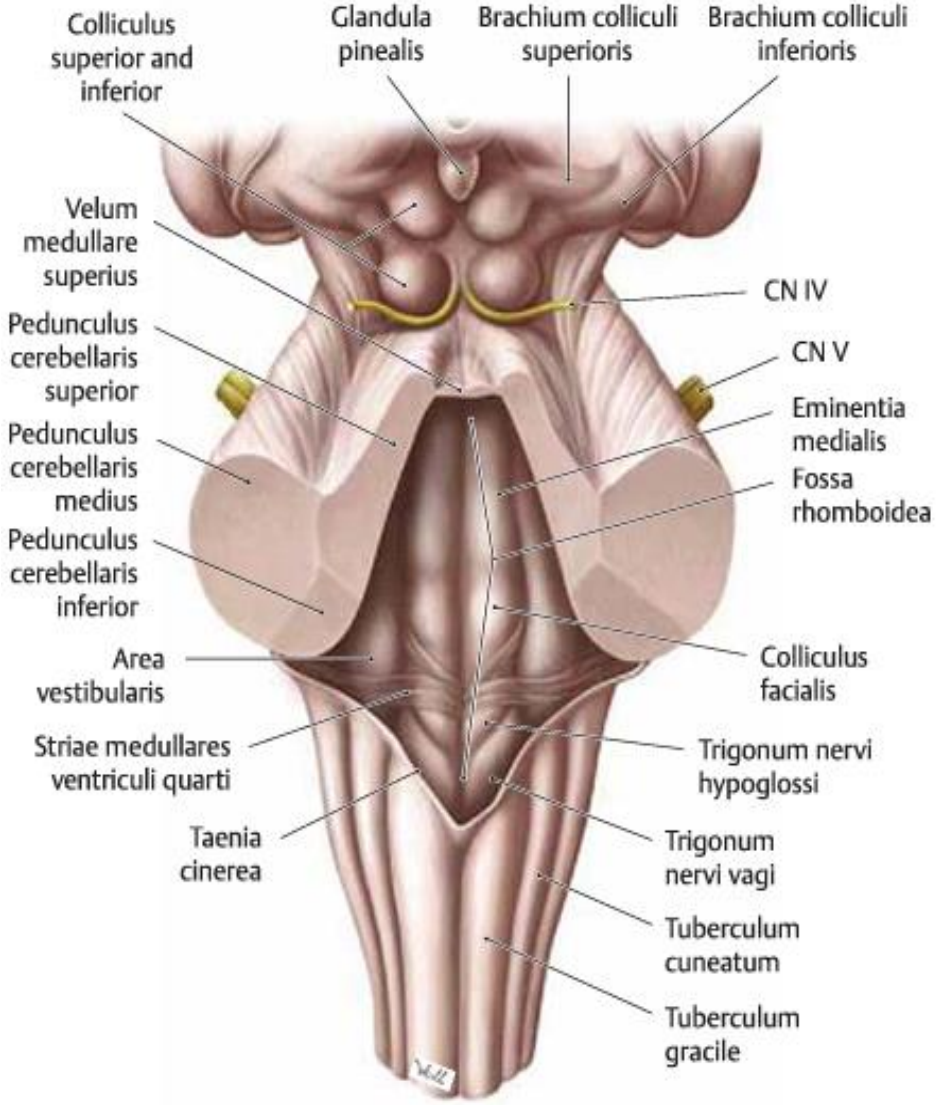
ANTERIOR AND POSTERIOR VIEWS OF BRAINSTEM



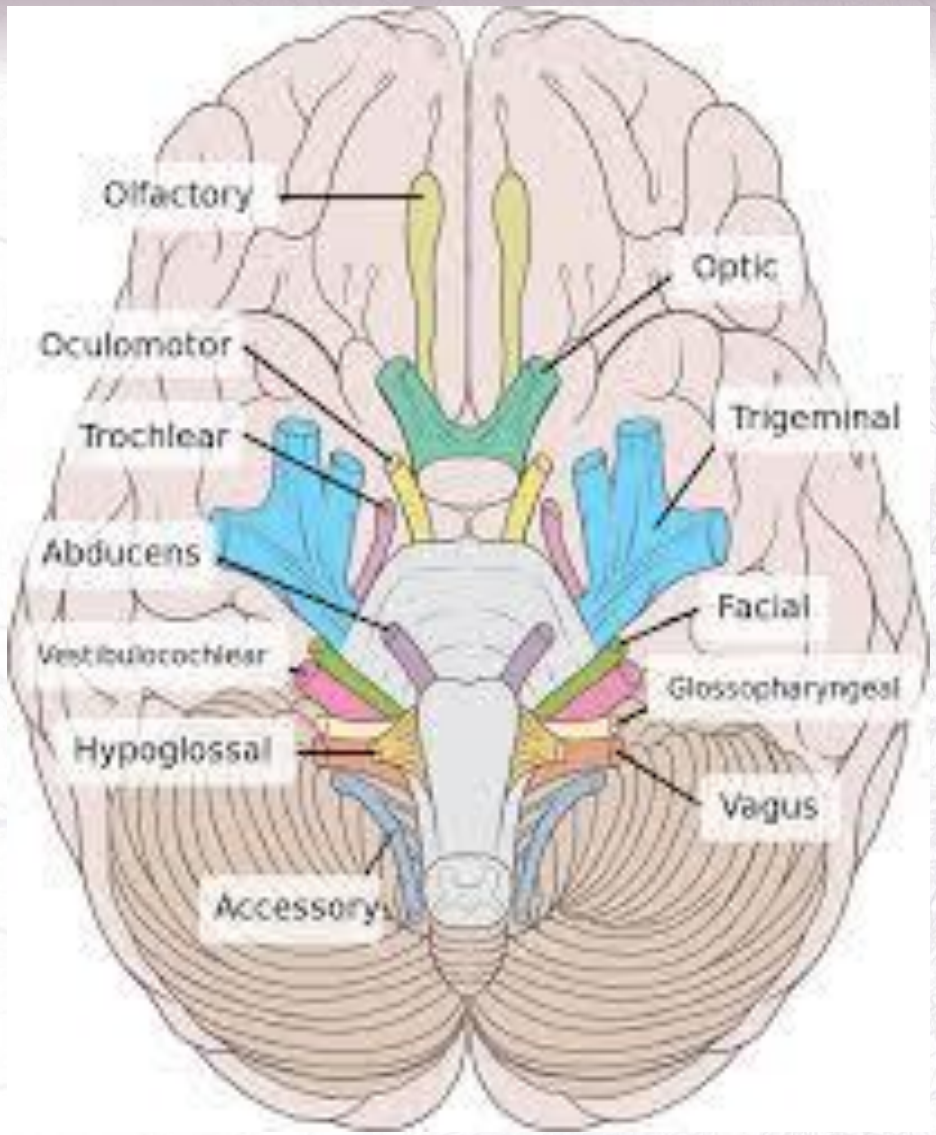
B Anterior view.

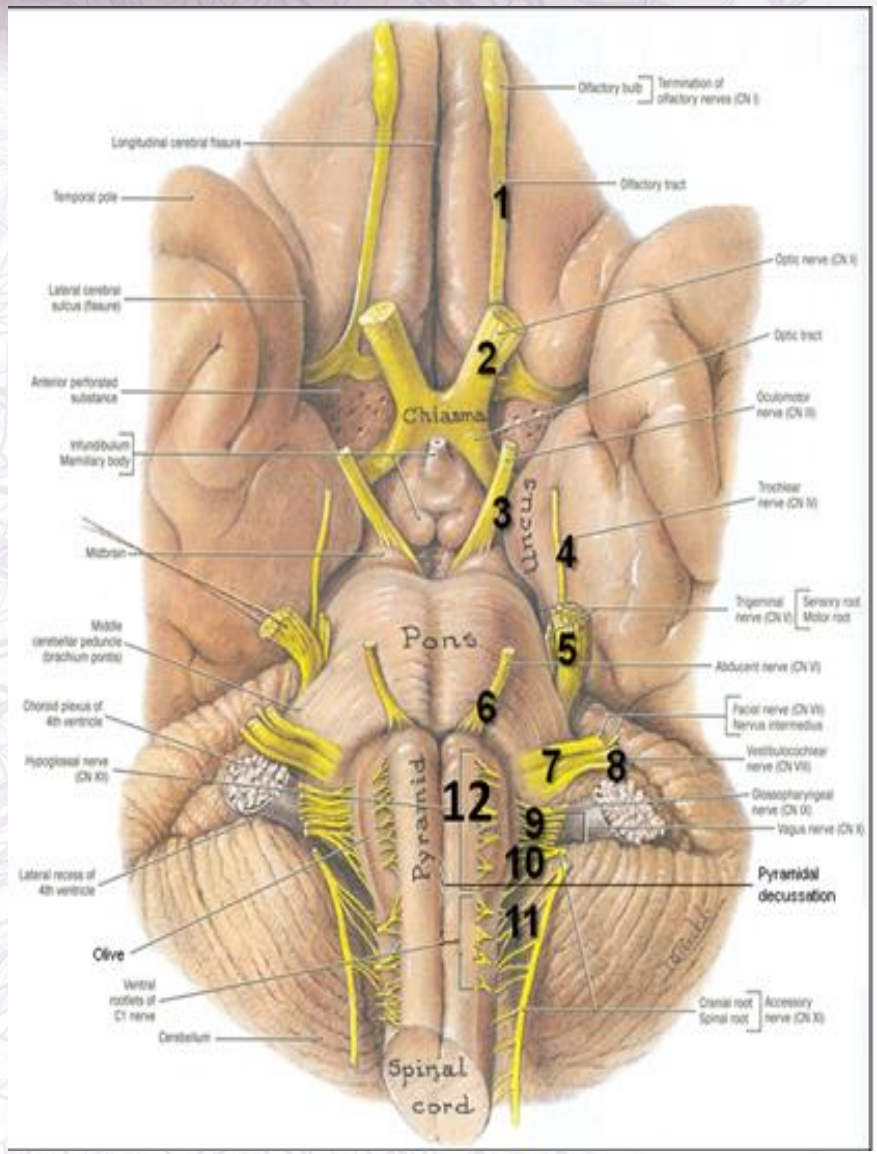


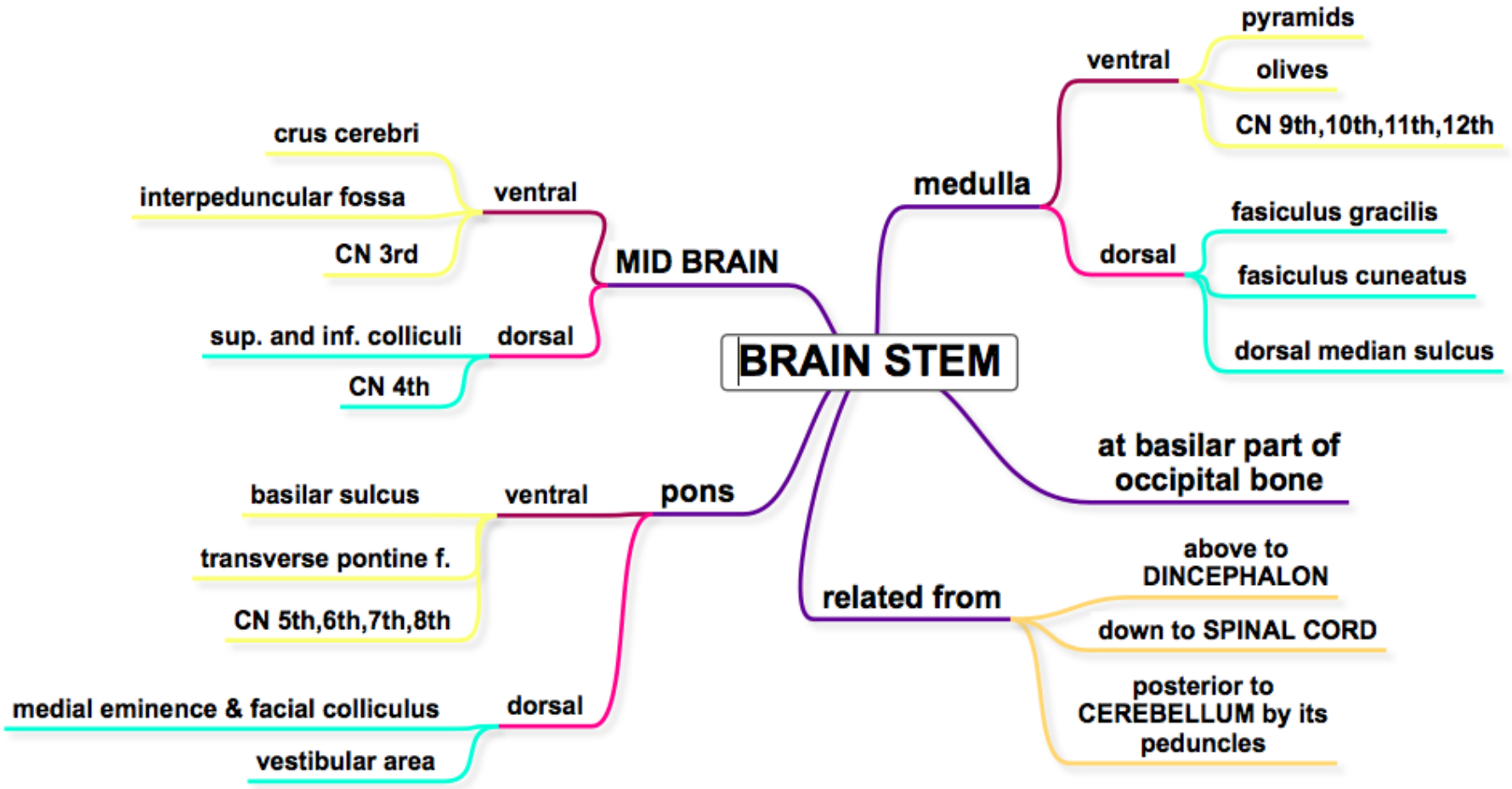
D Posterior view.

Cranial nerves and their emergences		
Midbrain	**Pons**	**Medulla abolongata**
3rd oculomotor nerve:	**5th trigeminal nerve:**	**9th glossopharyngal nerve:**
-from medial aspect of crus cerebri. -At the level o superior coolliculi.	**- From the anteriolateral aspect of the pons.**	**10th vagus:**
	6th abducent nerve:	**cranial part of 11th accessory nerve:**
	- From sulcus between pons and pyramids.	
4th trochlear nerve:	**7th facial nerve:**	**- All emerge from a sulci dorsolateral to olives.**
- caudal to inferior colliculus. - The only cranial nerve emerging from dorsal surface of brain stem.	**-From cerebellopontine angle. - as 2 roots, medial motor and lateral sensory roots.**	
		12th hypoglossal nerve:
	8th vestibuloccochlear nerve:	**- From sulcus between pyramids and olives.**
	- From cerebellopontine angle. - As 2 roots, vestibular and cochlear roots.	

CRANIAL NERVES






BRAIN STEM
MID BRAIN
ventral
crus cerebri
interpeduncular fossa
CN 3rd
dorsal
sup. and inf. colliculi
CN 4th
pons
ventral
basilar sulcus
transverse pontine f.
CN 5th,6th,7th,8th
dorsal
medial eminence & facial colliculus
vestibular area
medulla
ventral
pyramids
olives
CN 9th,10th,11th,12th
dorsal
fasiculus gracilis
fasiculus cuneatus
dorsal median sulcus
at basilar part of occipital bone
related from
above to DINCEPHALON
down to SPINAL CORD
posterior to CEREBELLUM by its peduncles

Questions for review

Q1-The 3rd and 4th cranial nerves from:
A- medulla.
B- pons.
C- midbrain.

Q2- Abducent 6th cranial nerve emerge from:
A- sulcus between pyramids and olives.
B- sulcus between pons and pyramids.
C- at cerebellopontine angle.

Q3- all cranial nerves emerge from the brainstem except :
A- 9th and 10th CN.
B- 3rd and 4th CN.
C- 1st and 2nd CN.

Q4- all cranial nerves emerge from ventral surface of brainstem except :
A- 4th trochlear nerve.
B- 5th trigemenal nerve.
C- 6th abducent nerve.

Q5- 5th trigemenal nerve emerge from:
a- cerebellopontine angle.
B-middle of anteriolateral of pons.
C- at junction of pons and medulla.

Q6- lateral to ventral median fissure:
A- olives.
B- pyramids.
C- fasiculus gracilis.

Q7- facial colliculus overlies:
A- facial nucleus.
B- vestibular nuclei.
C- abducent nucleus.

Q8- in the cranial part of medulla (open medulla), it opens into:
A- 4th ventricle.
B- 3rd ventricle.
C- central canal.

Q9- from medial to lateral of dorsal surface of medulla:

A- fissure, pyramids, olives.

B- fasiculus gracilis, fasiculus cuneatus.

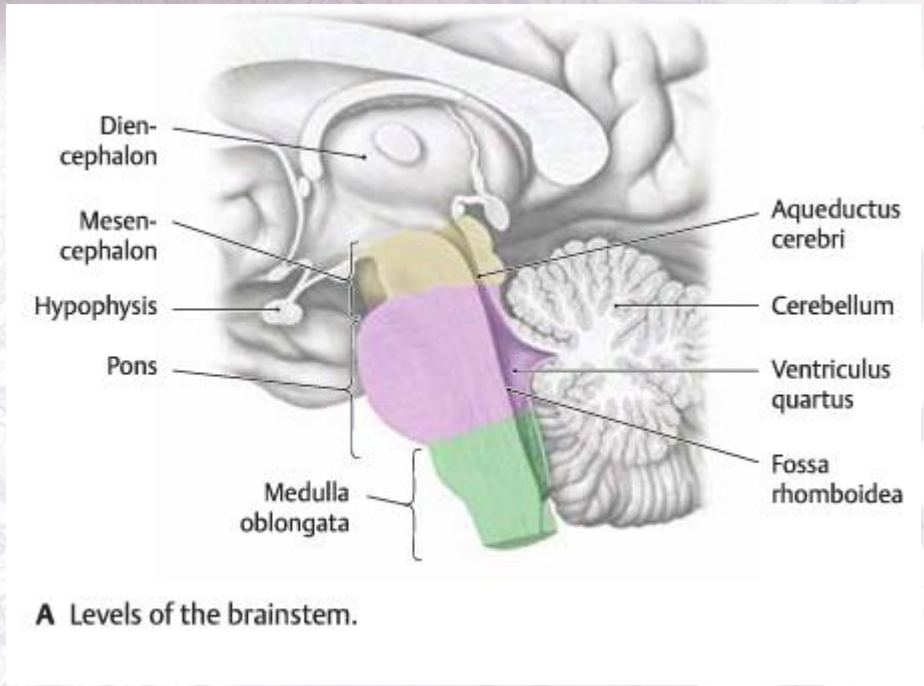
C- hypoglossal triangle, vagal triangle, vestibular area.

Q10- pons develops from:

A- forebrain.

B- hindbrain.

C- midbrain.



A Levels of the brainstem.

Answers	
Q1- c	Q6- b
Q2- b	Q7- c
Q3- c	Q8- a
Q4- a	Q9- b
Q5- b	Q10- b