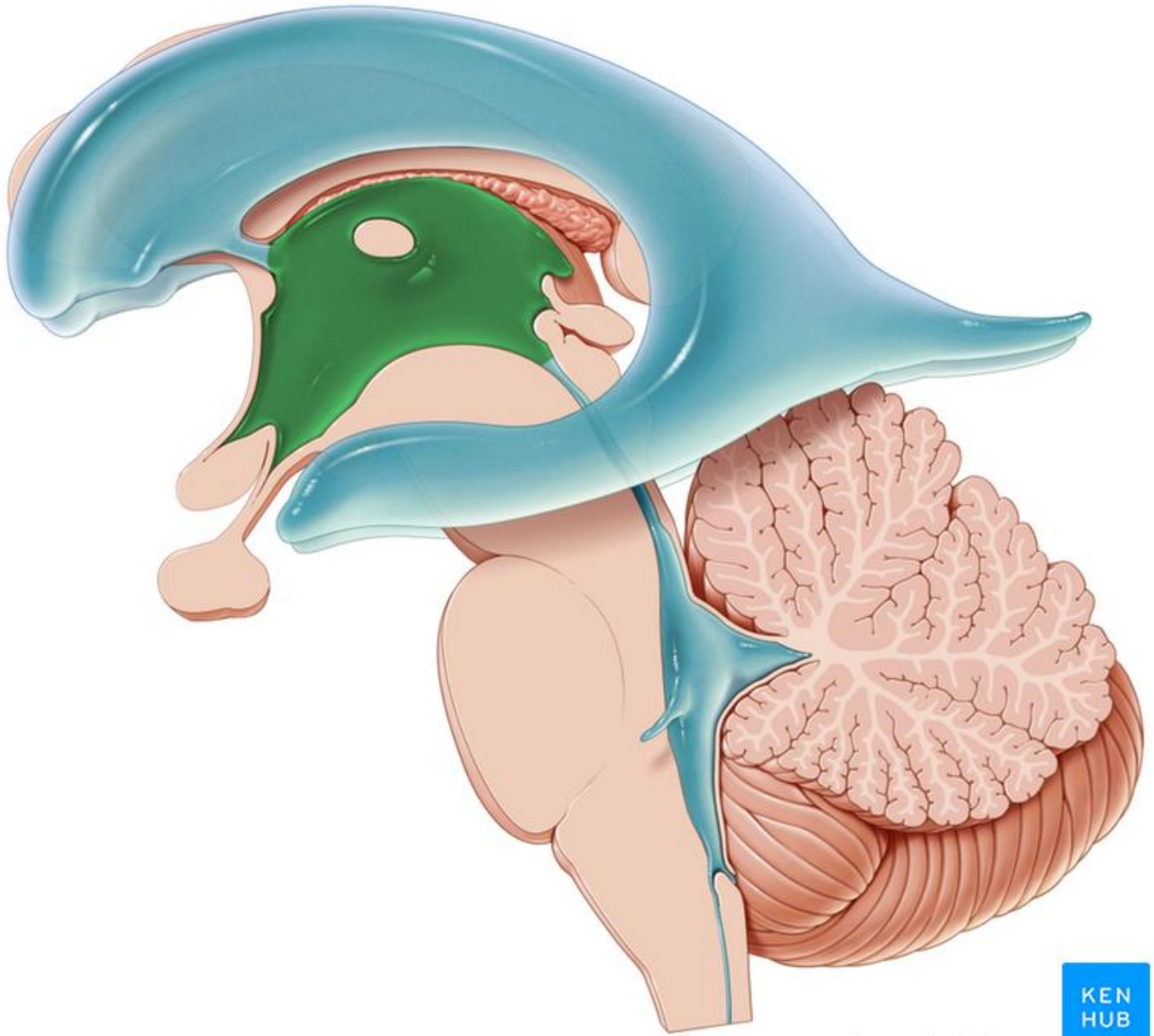
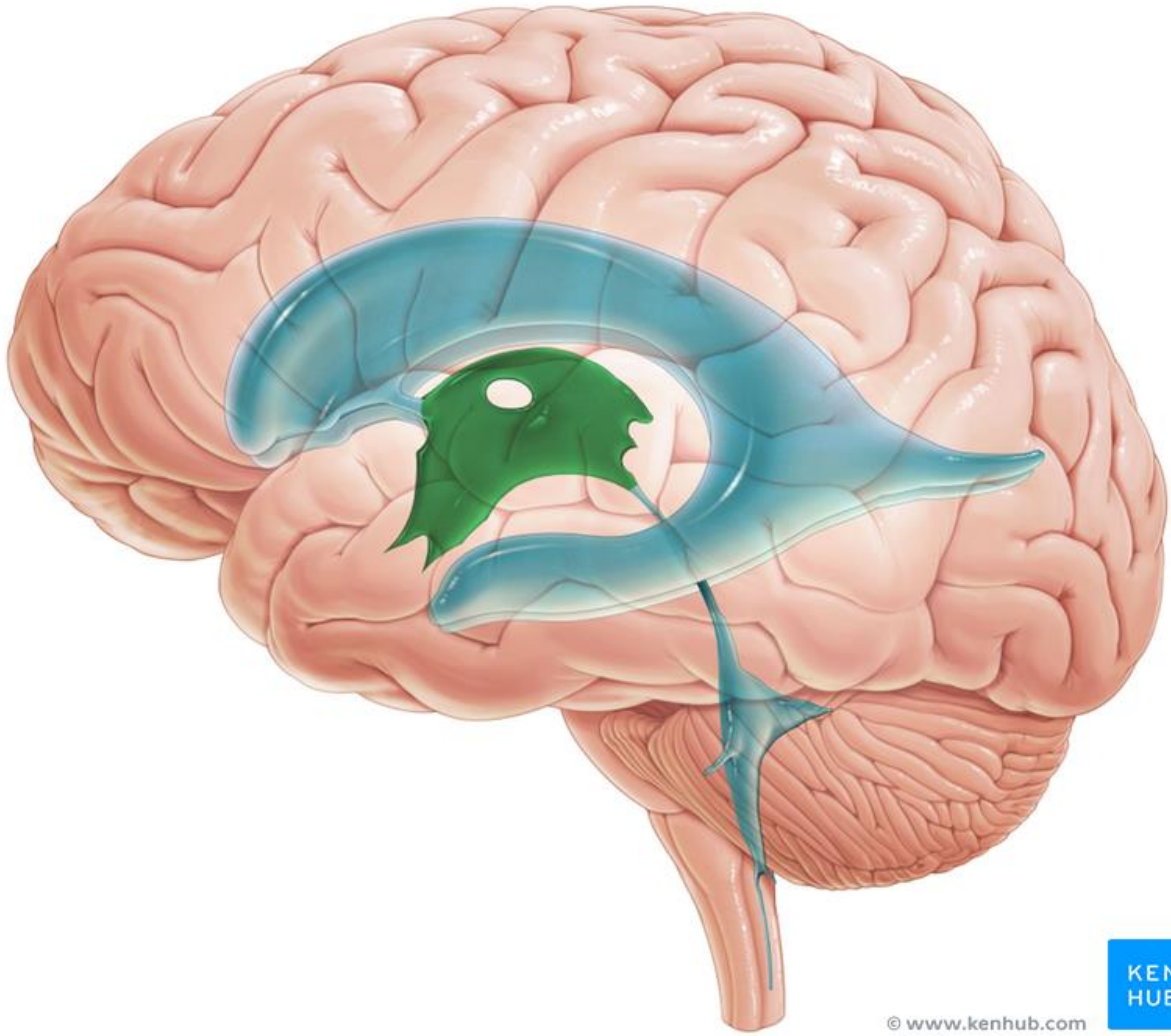


Brain Ventricles





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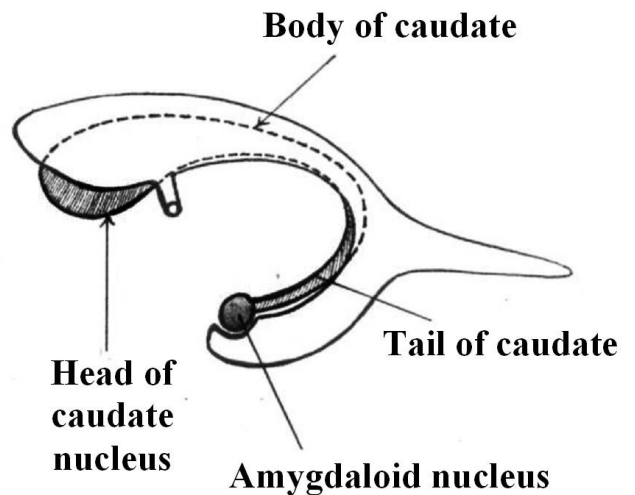
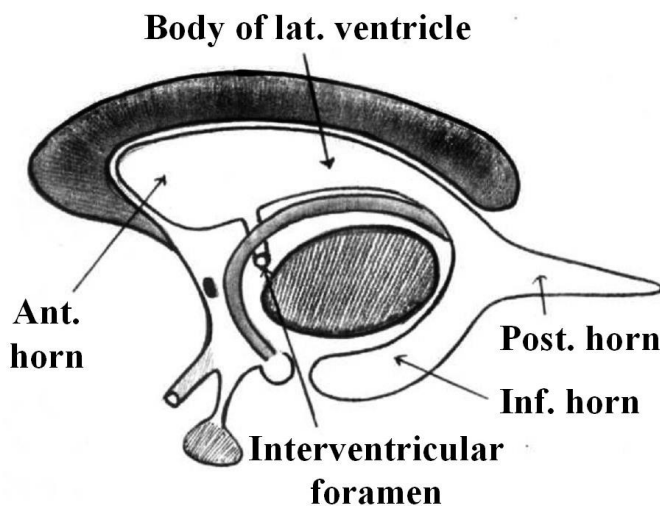
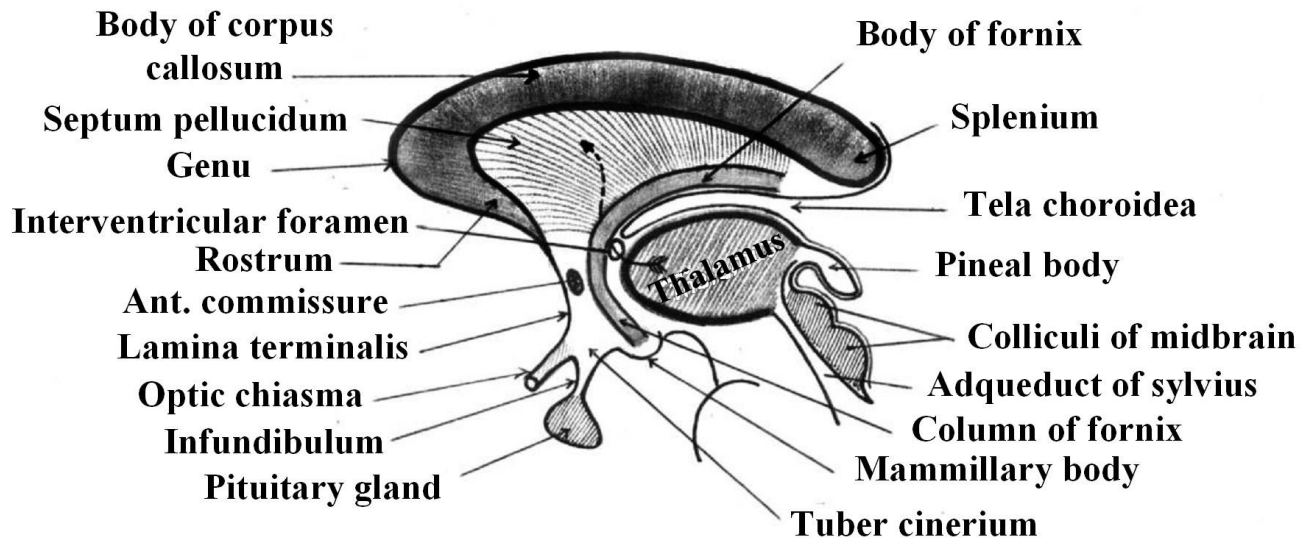
Lateral Ventricle

★ **Site:** It is the cavity of the cerebral hemisphere.

There are two lateral ventricles; one in each cerebral hemisphere.

★ **Lining:** It is lined by a cubical ciliated epithelium which is termed the ependyma.

★ **Communications:** The lateral ventricle communicates with the third ventricle through the inter-ventricular foramen which is situated in the anterior part of the medial wall of the lateral ventricle and is bounded in front by the column of the fornix and behind by the anterior end of the thalamus.



Lateral Ventricle

★ **Shape and parts:** The lateral ventricle is an elongated crescentic cavity which consists of a body (central part) and 3 horns (anterior, posterior and inferior):

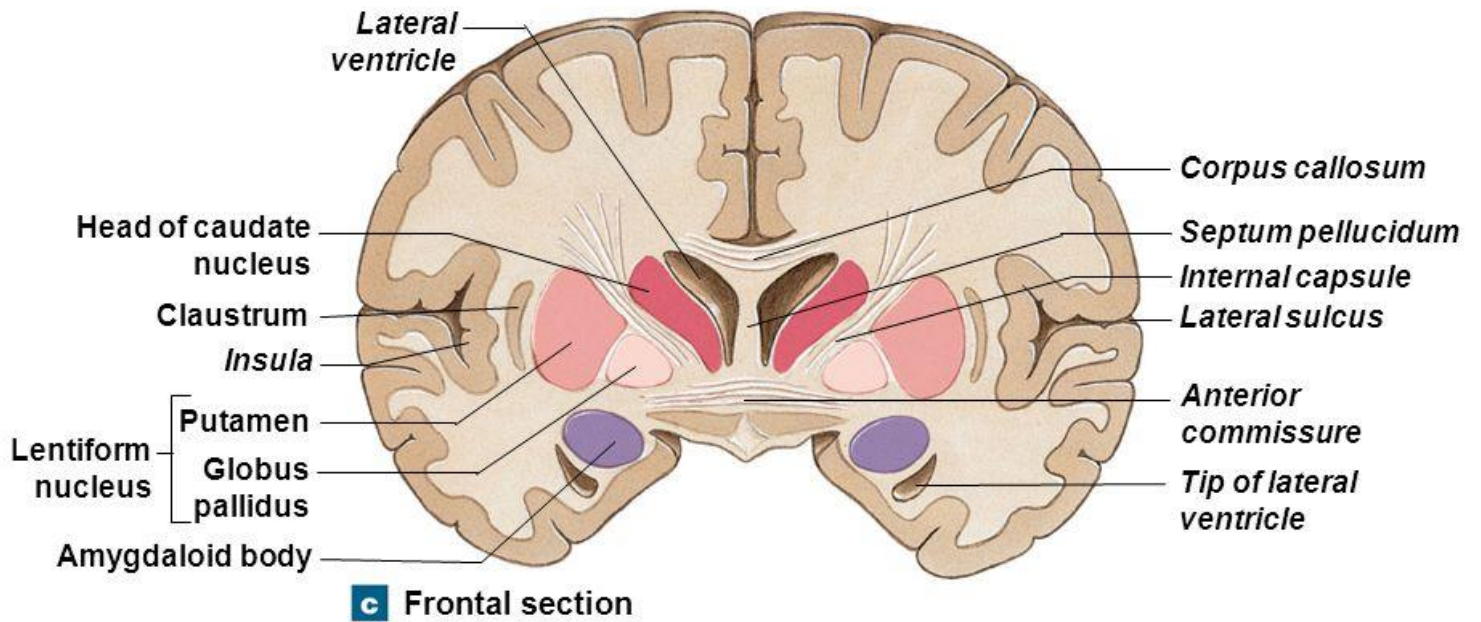
- a- **The anterior horn:** Is the part in front of the interventricular foramen which extends forwards and laterally into the frontal lobe. Its anterior extremity is 1.5 inches behind the frontal pole.
- b- **The central part (body):** Extends from the interventricular foramen to the splenium of the corpus callosum, where it becomes continuous with both the posterior and anterior horns. It lies in the parietal lobe.
- c- **The posterior horn:** runs backwards and medially into the occipital lobe.
- d- **The inferior horn:** Is the direct continuation of the body; it passes downwards and laterally round the posterior end of the thalamus, then forwards and medially into the temporal lobe.

N.B.: The region at the posterior end of the body from which the posterior and inferior horns diverge from each other is called the collateral trigone.

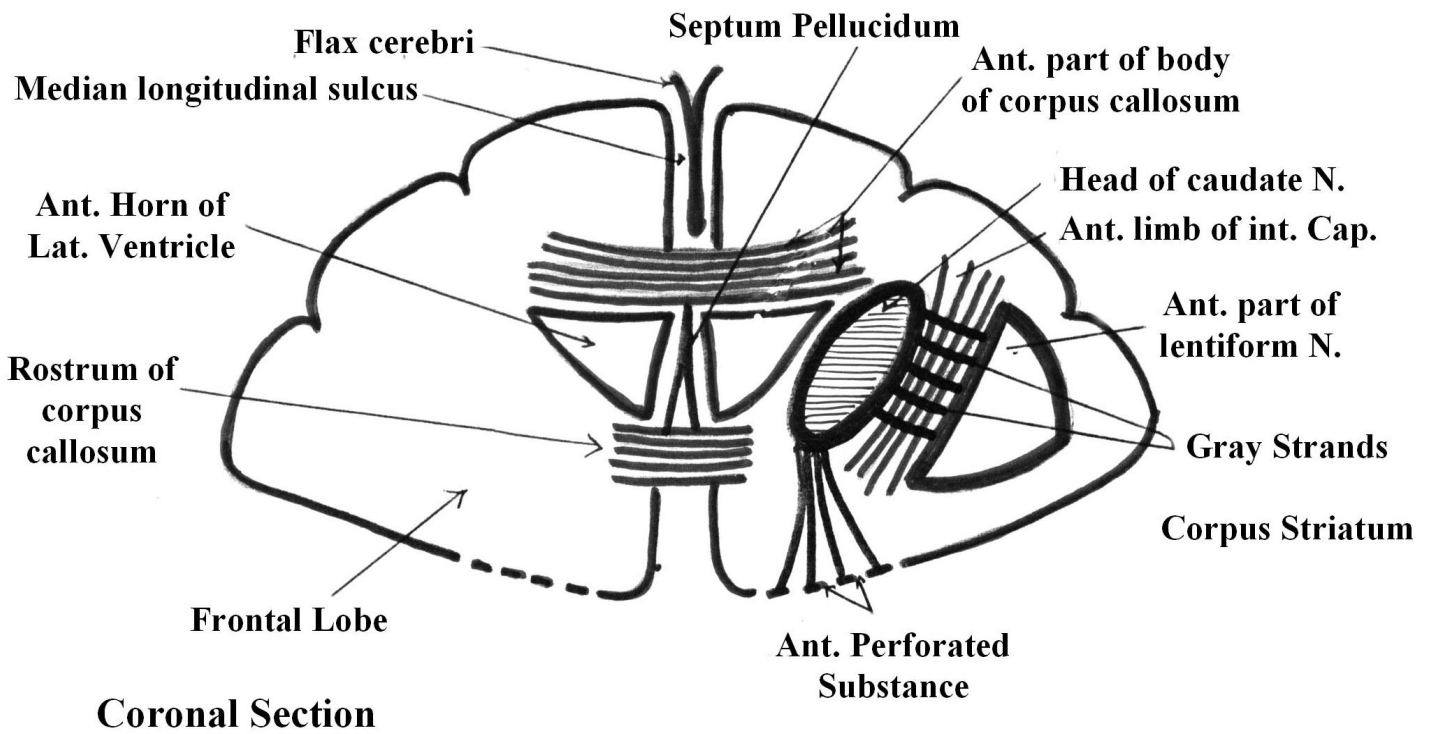
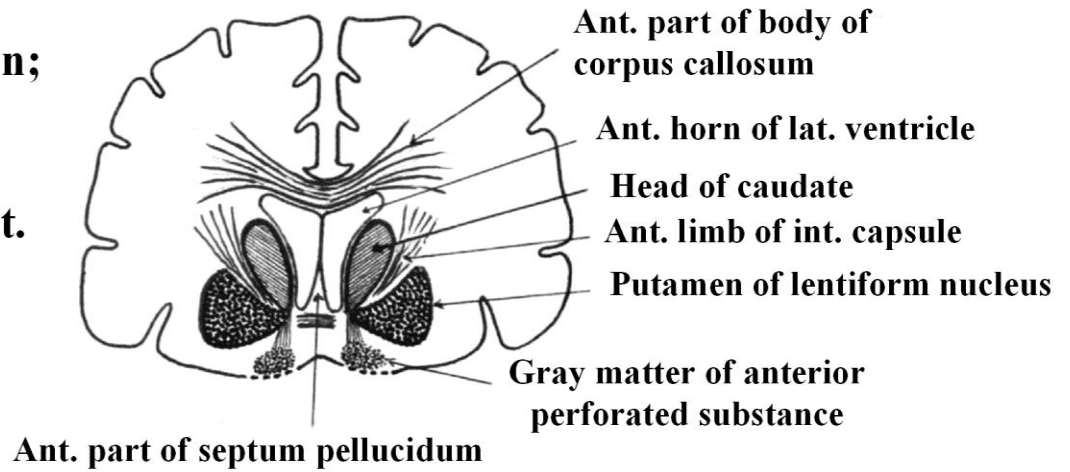
★ **Boundaries and relations:**

- A- **The anterior horn:** Is triangular in coronal section. Its medial wall is vertical while its lateral wall is sloping and serves also as the floor:
 - **Roof:** The anterior part of the body of corpus callosum.
 - **Medial wall:** Anterior part of septum pellucidum.
 - **Lateral wall and floor:** Head of caudate nucleus and the upper surface of the rostrum of corpus callosum.
 - **Anterior wall (limit):** The genu of corpus callosum.

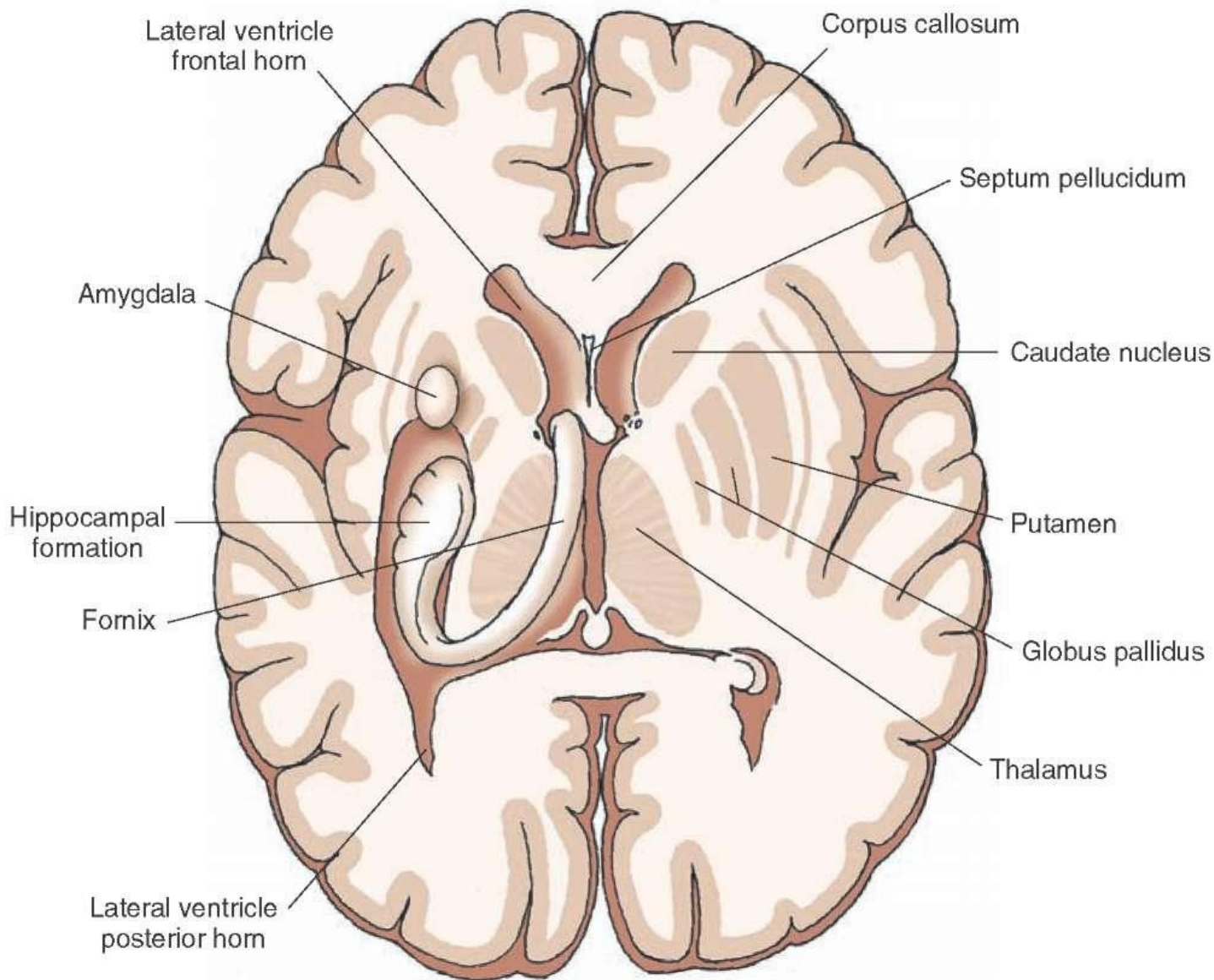
Figure 14-14c The Basal Nuclei

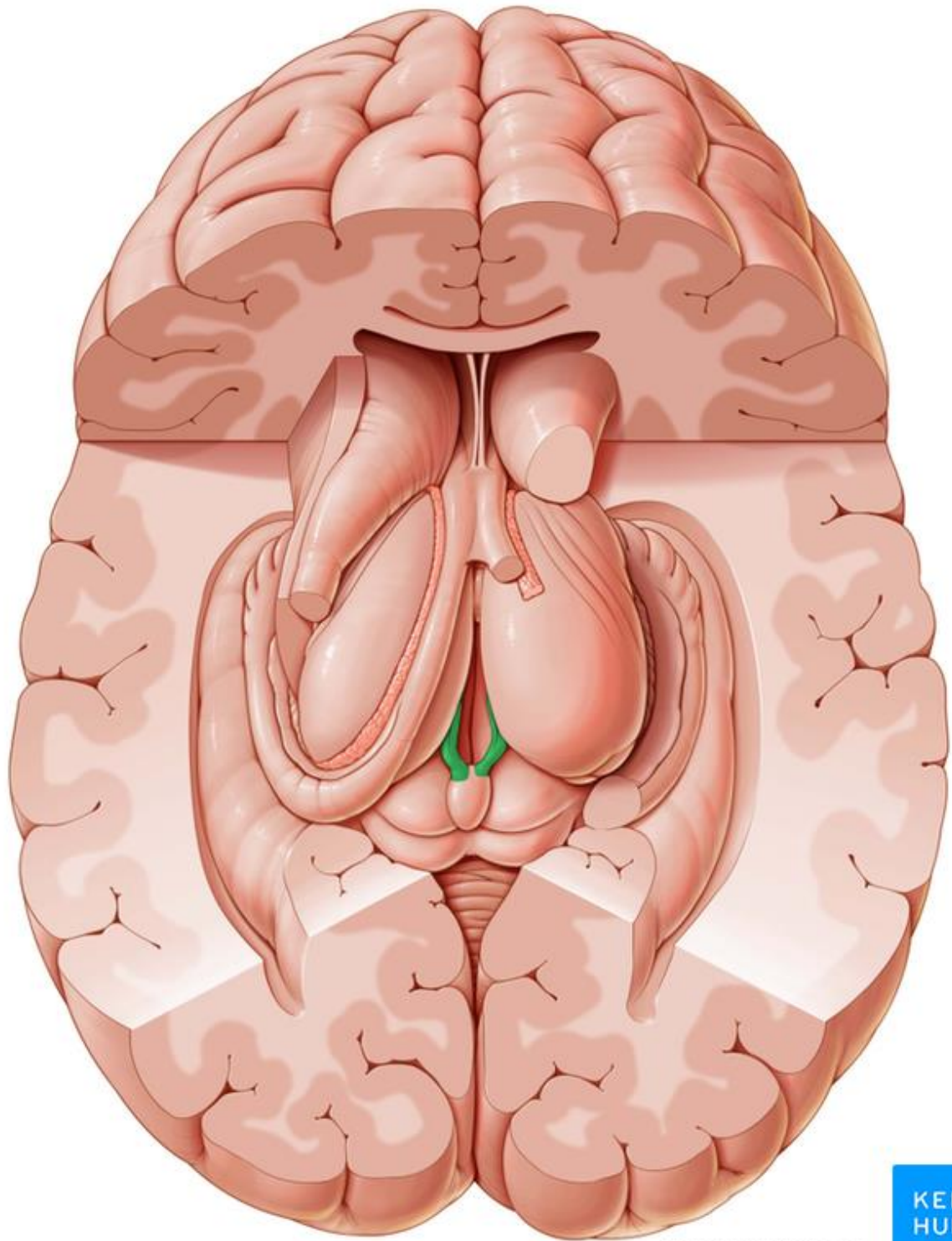


**Coronal Section;
Relations &
Boundaries of
Ant. horn of lat.
ventricle**



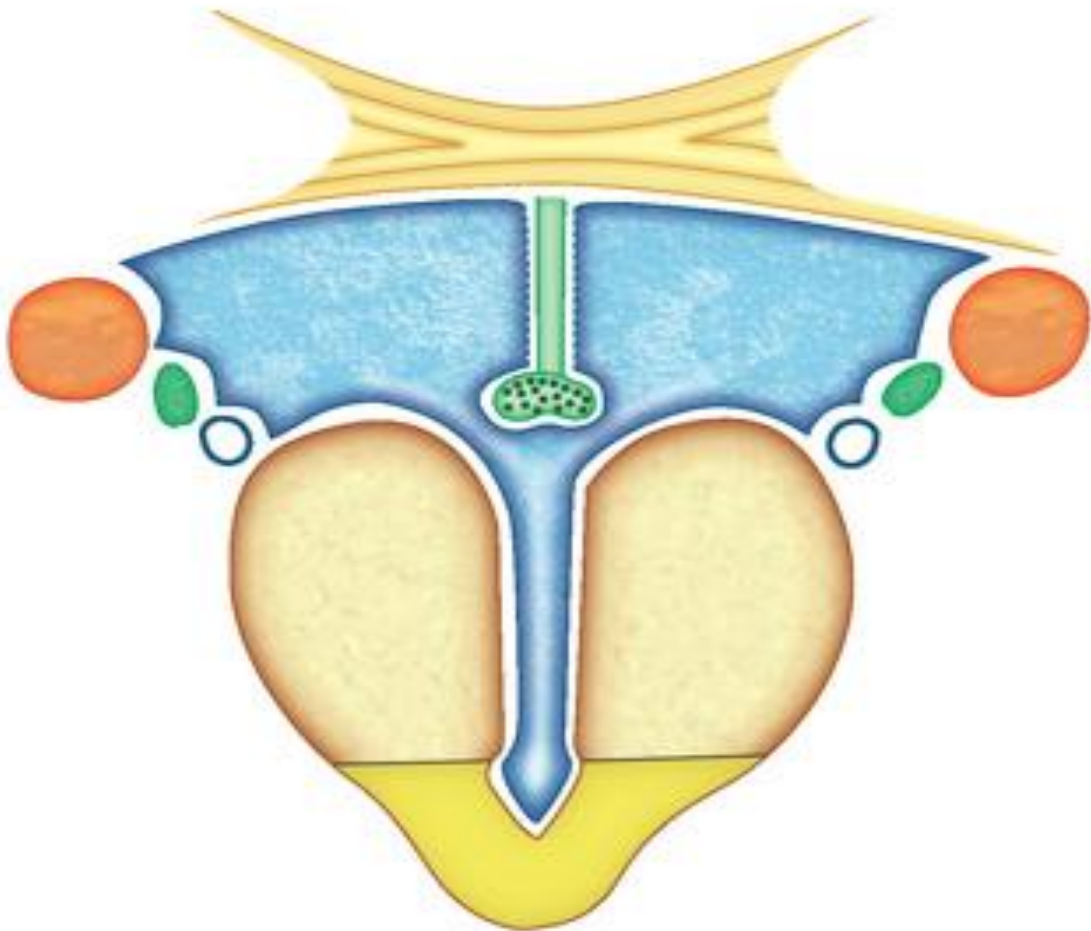
Anterior Horn of Lateral Ventricle

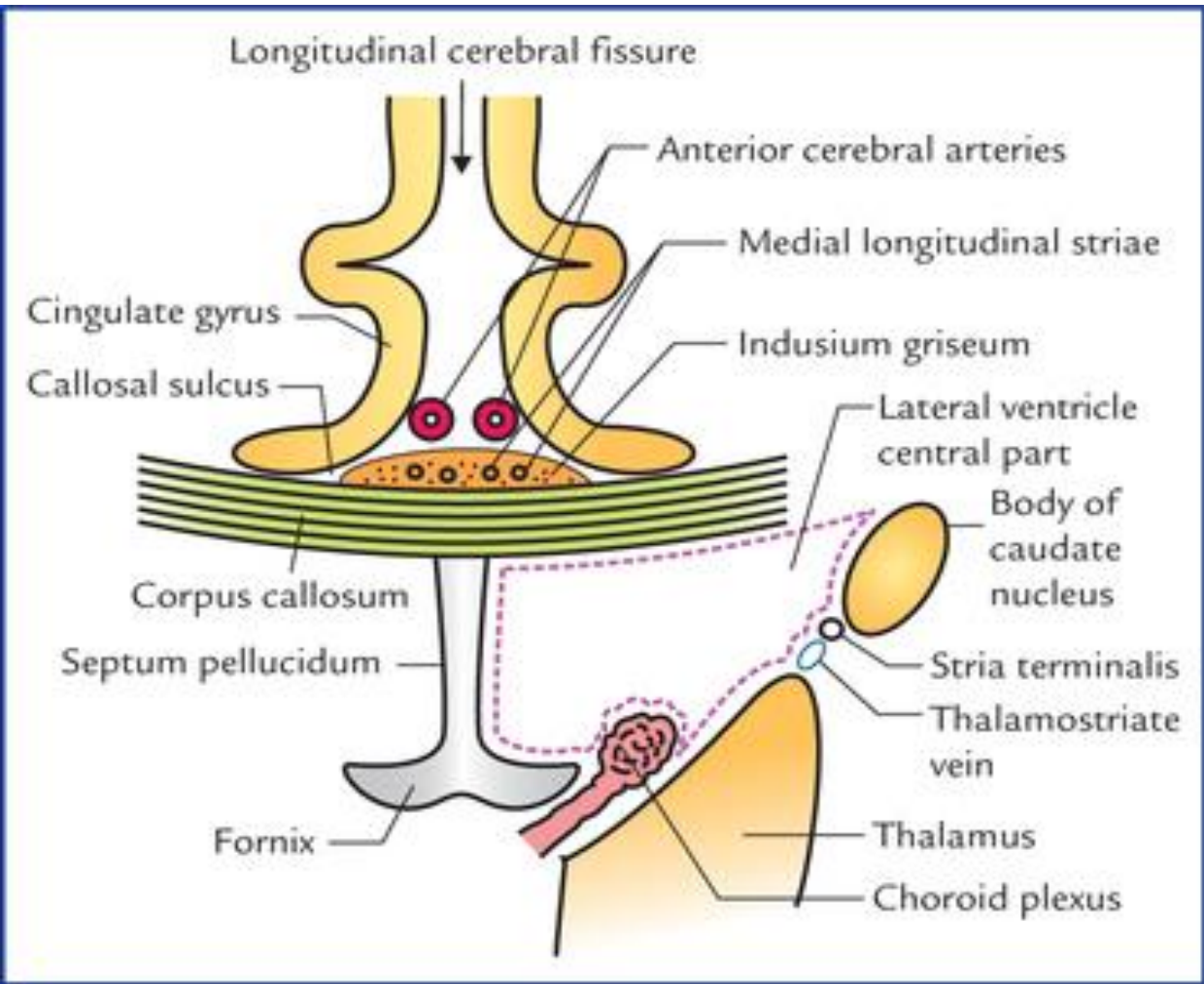




B- **The central part (the body):** Like the anterior horn, it is triangular in coronal section with a vertical medial wall and a sloping floor which serves also as the lateral wall:

- **Roof:** Is formed by the posterior part of the body of corpus callosum.
- **Medial wall:** Is formed by the posterior part of the septum pellucidum.
- **Floor:** Is formed from lateral to medial by:
 - 1-The body of the caudate nucleus which arches above and lateral to the thalamus, with the stria terminalis and the thalamo-striate vein in between.
 - 2-The lateral part of the dorsal (upper) surface of the thalamus.

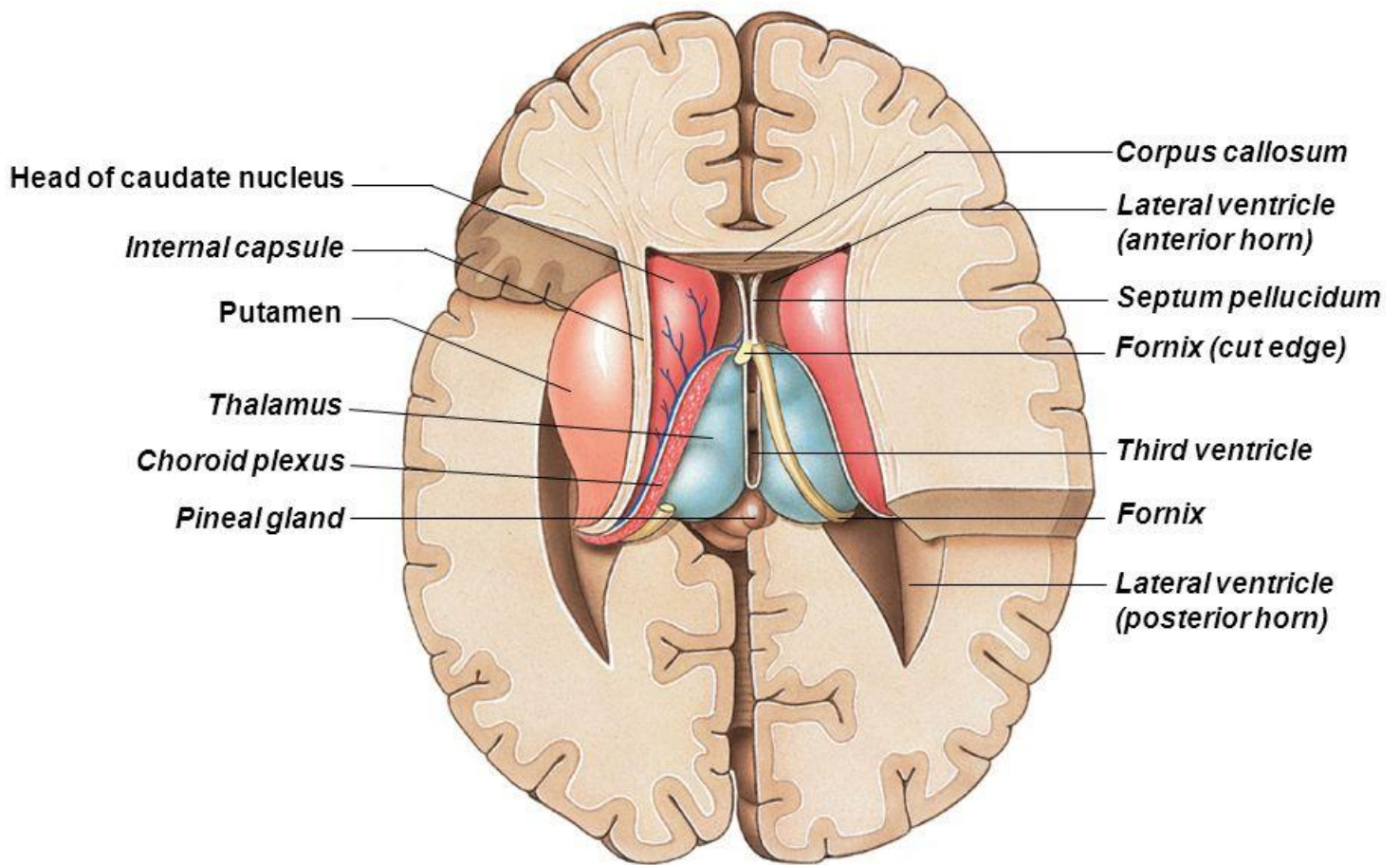




3- The body of the fornix which arches above the medial part of the dorsal (upper) surface of the thalamus obscuring it from the floor of the lateral ventricle.

- **N.B.:** The part of the upper surface of the thalamus in the floor of the body of the lateral ventricle is partly hidden by the choroids plexus, which projects into the body of the ventricle through a slit-like interval between the free lower edge of the fornix and the upper surface of the thalamus. This slit-like interval is called the choroid fissure (see the tela choroidea).

Figure 14-14b The Basal Nuclei



b A horizontal section as seen in a dissection

Central part (or) body cont...

Roof :

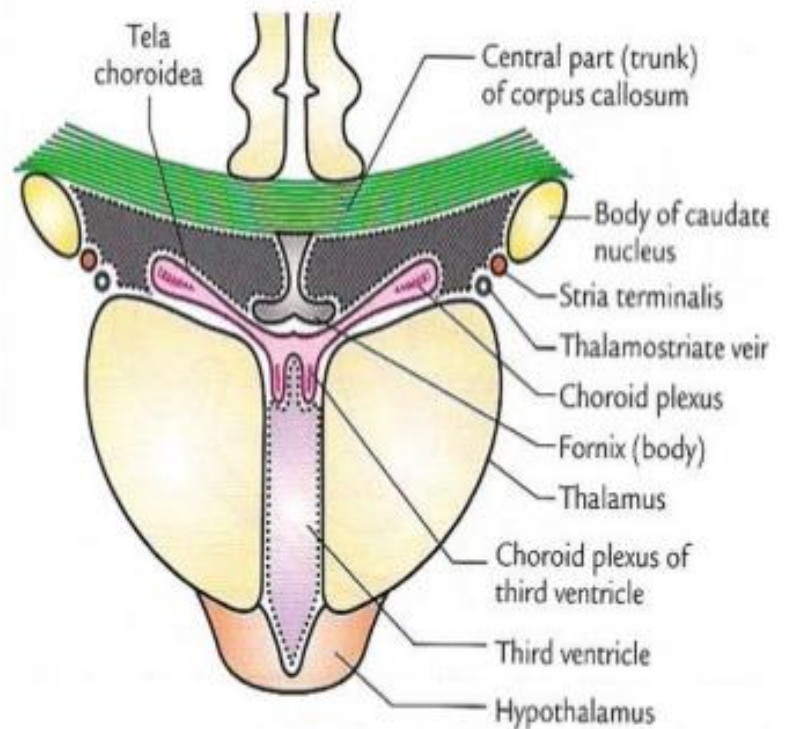
- ✓ Under surface of body of corpus callosum

Floor : (from lateral to medial side)

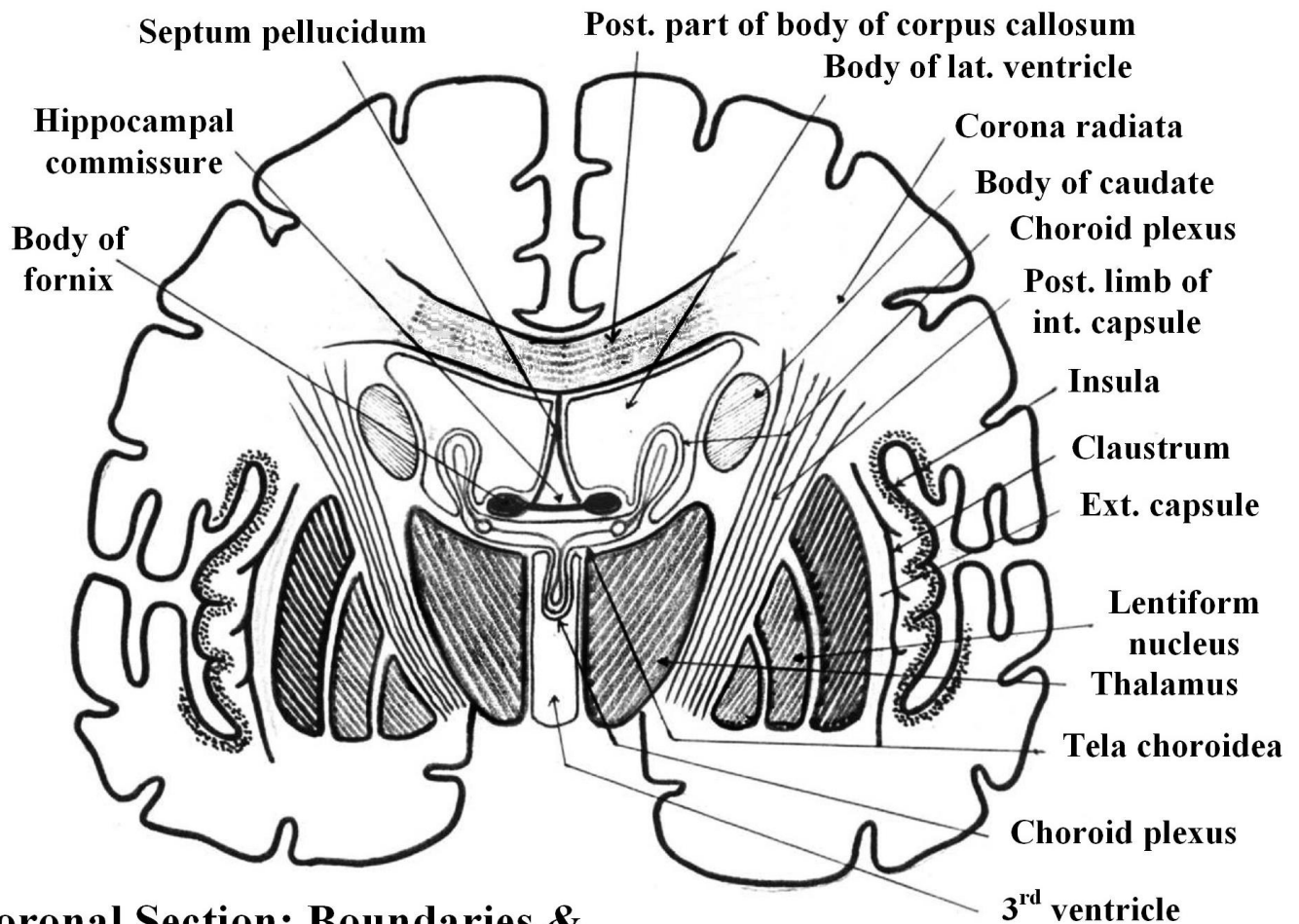
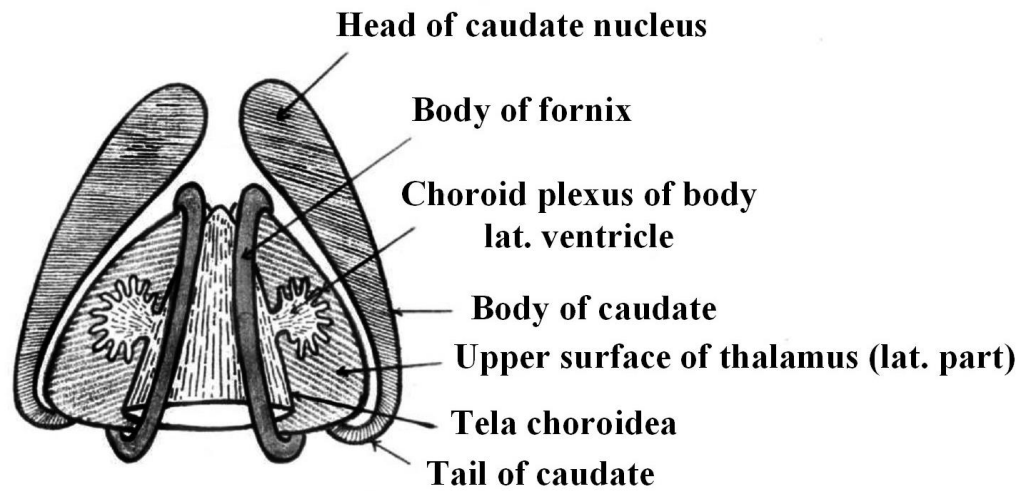
- ✓ Body of caudate nucleus
- ✓ Stria terminalis & thalamostriate vein
- ✓ Upper surface of thalamus (lateral part)
- ✓ Choroid plexus
- ✓ Upper surface of body of fornix

Medial wall :

- ✓ Septum pellucidum



Two thalami seen from above

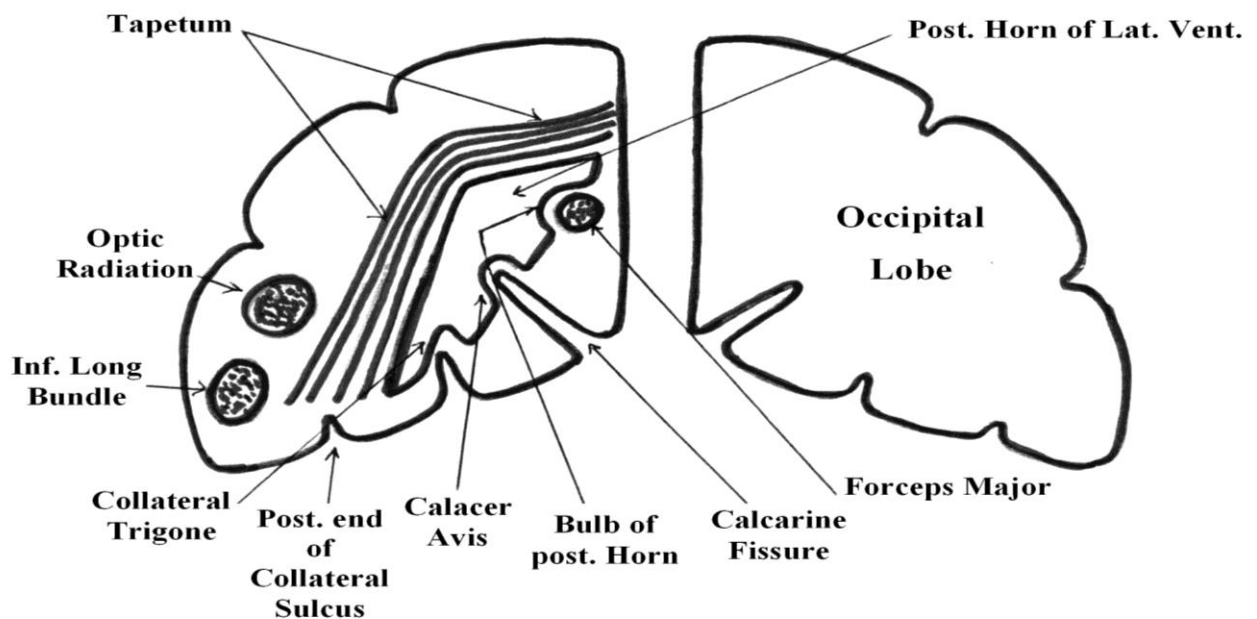


Coronal Section; Boundaries & Relations of body of lat. ventricle

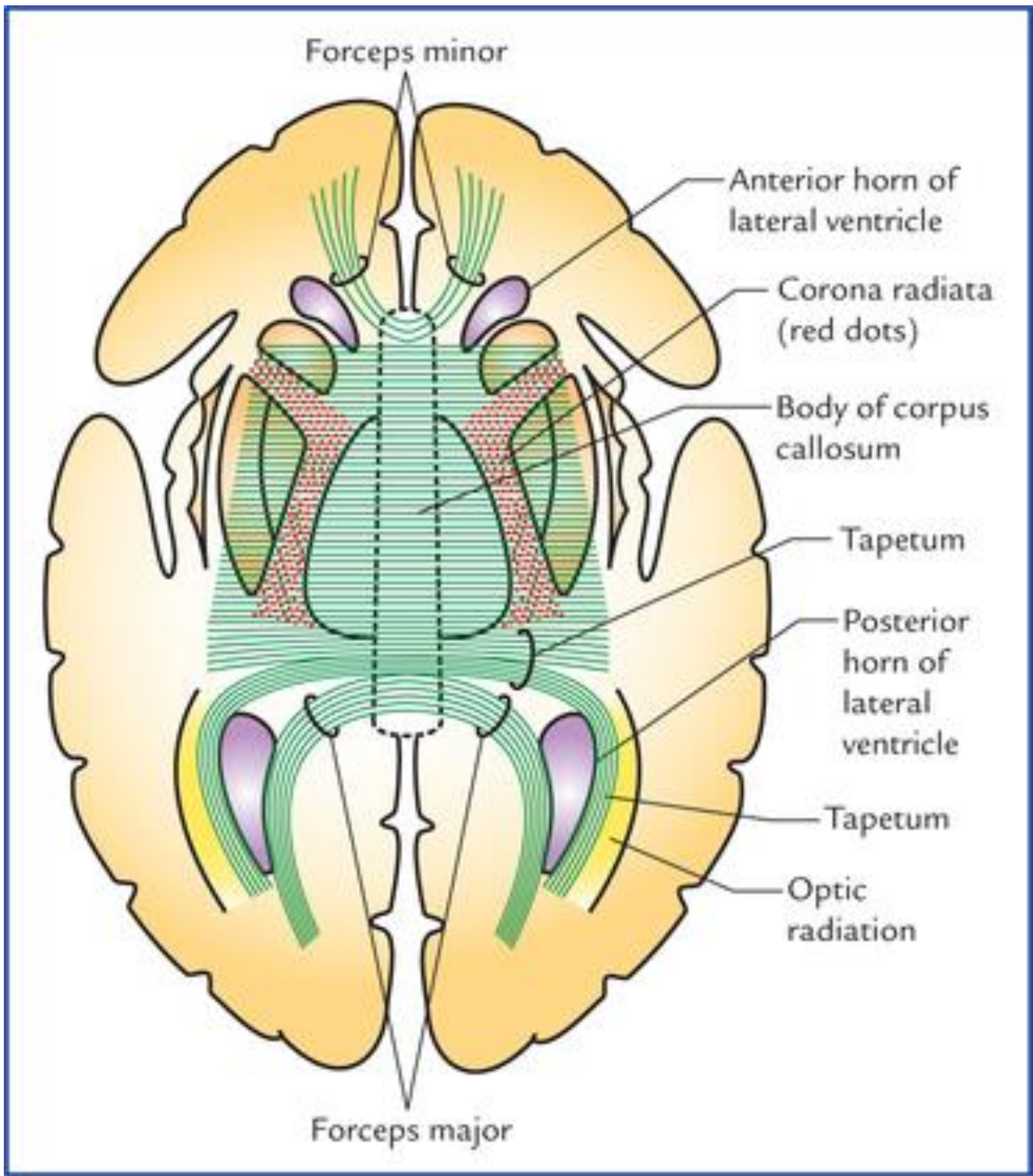
C- **The posterior horn:** Begins at the splenium of the corpus callosum and runs backwards and medially in the occipital lobe:

- **Roof and lateral wall:** Are formed by the tapetum of corpus callosum, lateral to which run the fibres of the optic radiation.
- **Medial wall:** Is sloping and shows two parallel elevations or swellings:
 - a- The upper swelling is caused by the forceps major and is called the bulb of the posterior horn.
 - b- The lower swelling is produced by the deep calcarine sulcus and is termed the calcar avis.

Coronal Section, Boundaries & Relations of Post. Horn of Lat. Ventricle

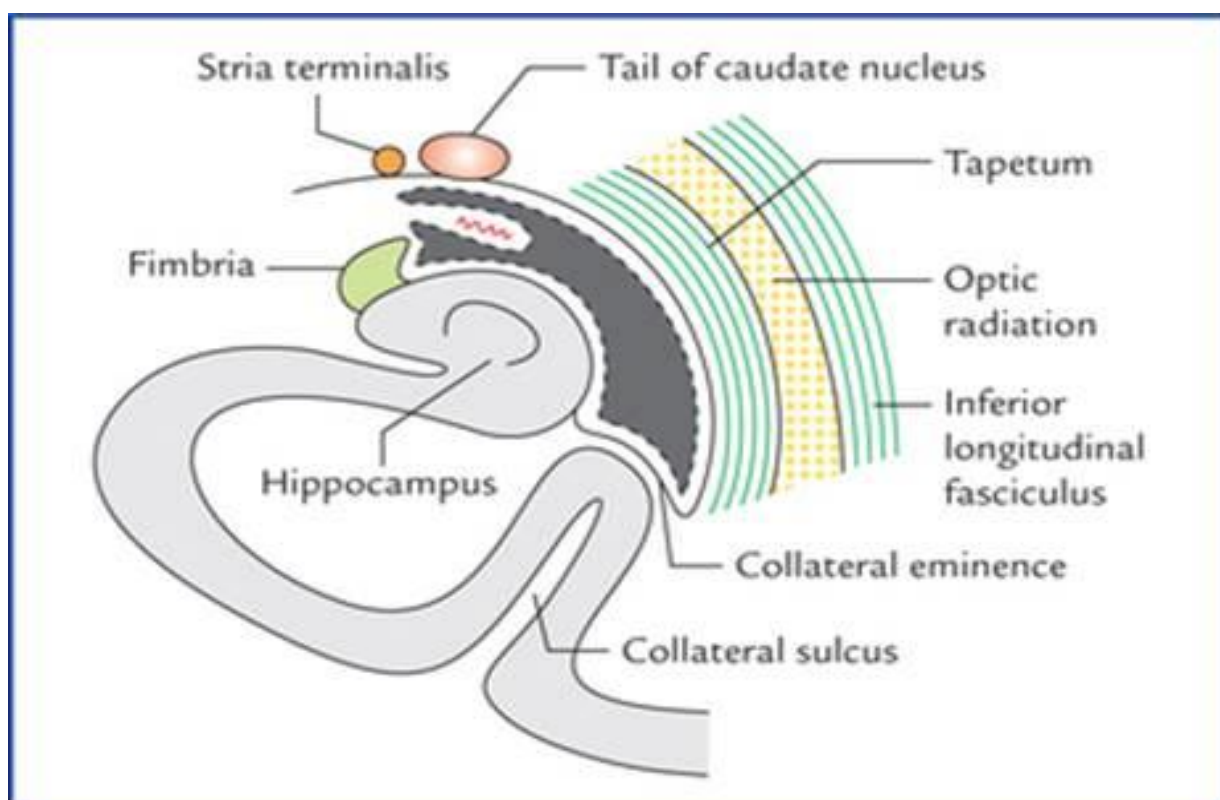
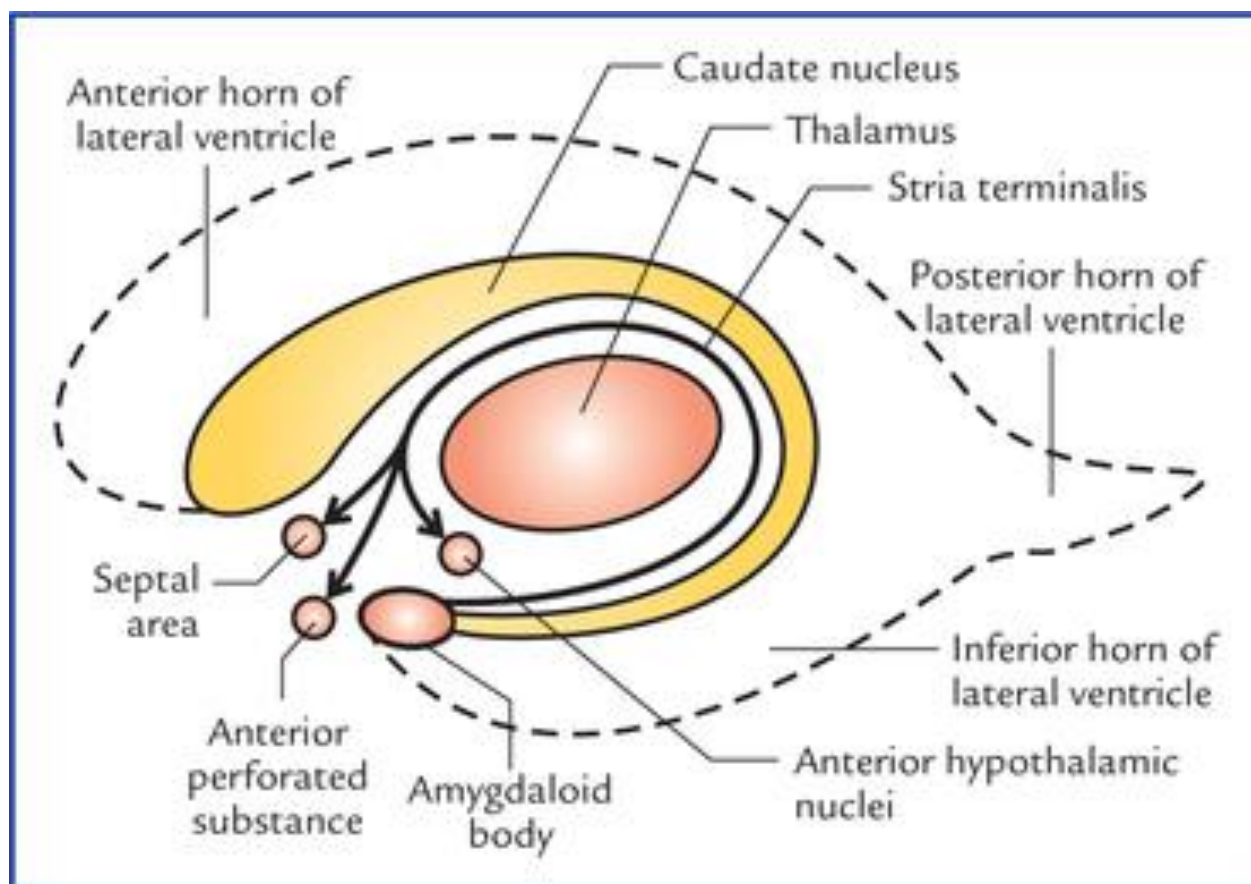


Posterior Horn of Lateral Ventricle Coronal Section



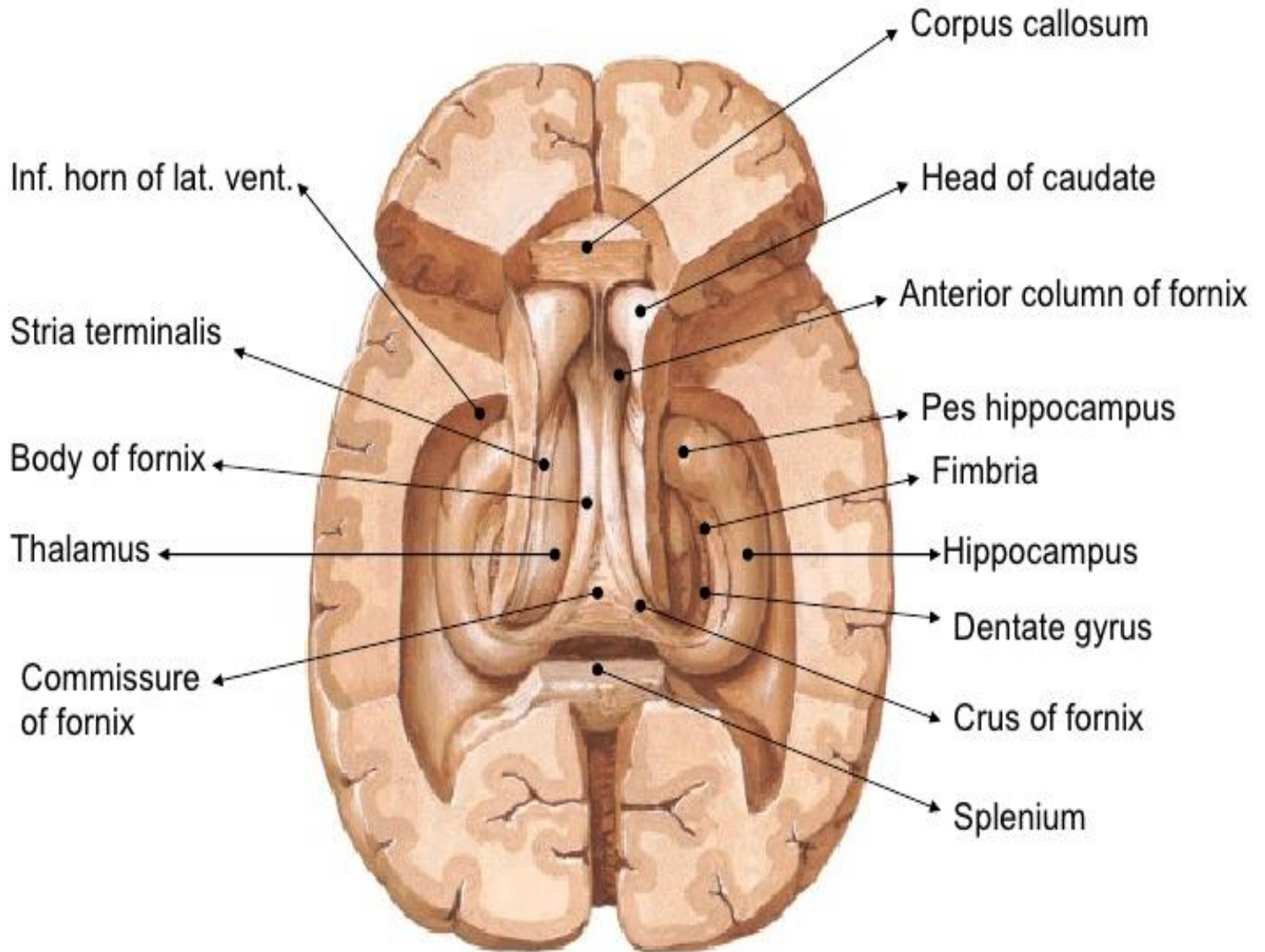
D- ***The inferior horn:***

- ***Roof:*** Is occupied by the tail of the caudate nucleus passing forwards to end in the amygdaloid nucleus which produces an elevation in the anterior part of the roof. The stria terminalis; a bundle of nerve fibres which are the axons of the cells of the amygdaloid nucleus, runs backwards along the medial edge of the tail of caudate in the roof of the inferior horn.
- ***Floor:*** shows:
 - a- A prominent elevation along its medial border, which is produced by the upper surface of the hippocampus. Its anterior end (below the amygdaloid nucleus) is expanded to form the pes hippocampi.
(The cells of the cortex of the hippocampus send their axons upwards through the substance of the hippocampus to reach its upper surface where they spread out medially as a thin layer of white matter called the alveus. The nerve fibres of the alveus converge on the medial border of the hippocampus, where they form a bundle, known as the fimbria of hippocampus which run backwards to become continuous with the crus of the fornix).
 - b- Lateral to the hippocampus, the collateral sulcus forms a slight elevation known as the collateral eminence.
- ***Lateral wall:*** Is formed by the tapetum.
- ***Medial wall:*** Is occupied by the lower part of the choroids fissure through which the choroids plexus (branch from the anterior choroidal artery) enters the inferior horn.

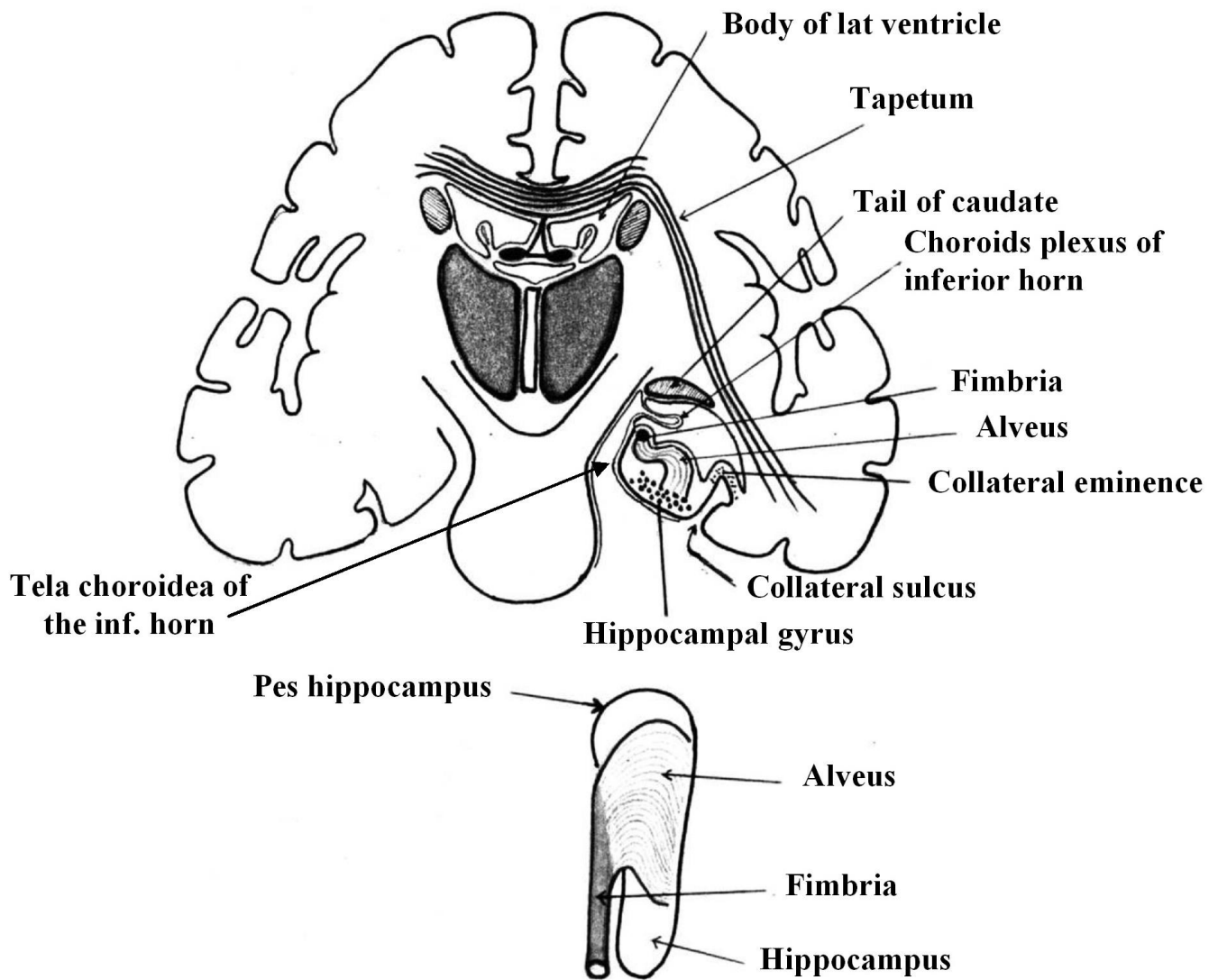


Hippocampus and Fornix

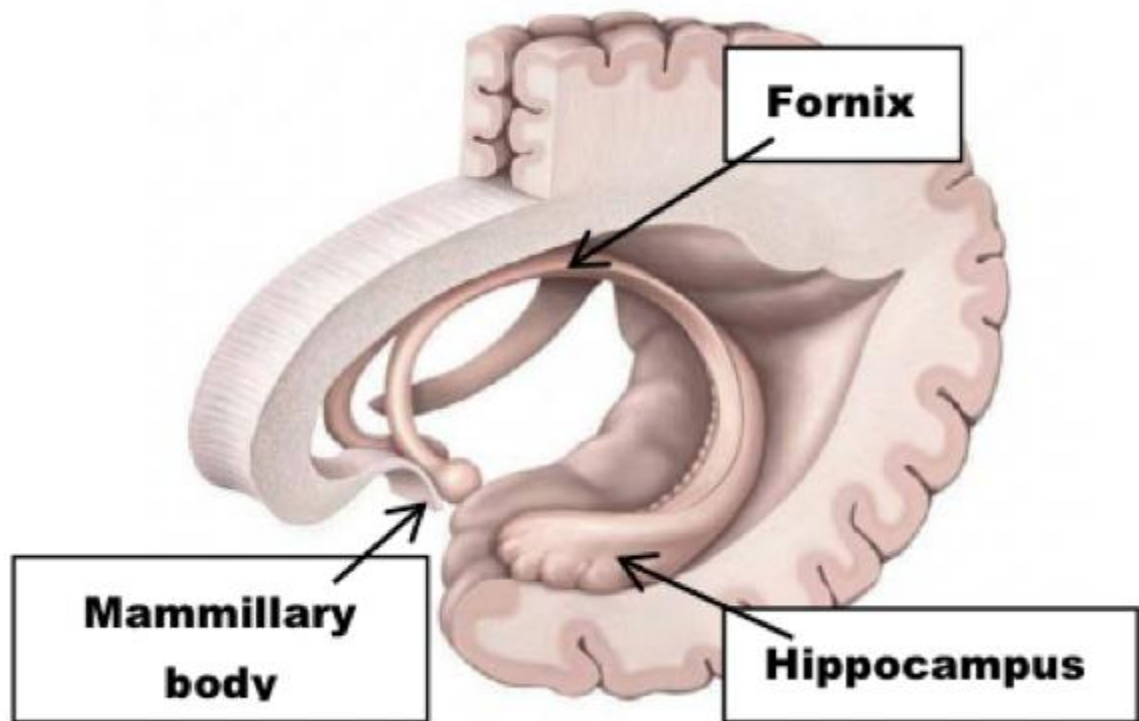
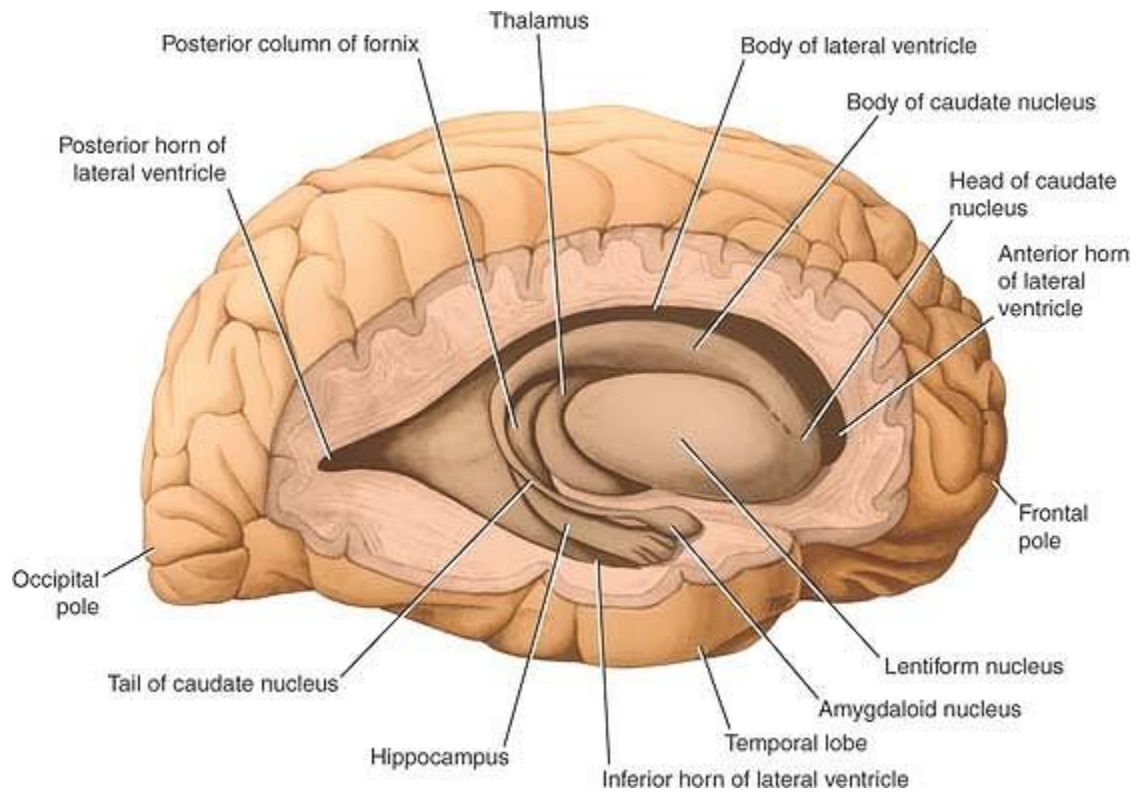
Superior Dissection



Coronal section, Boundaries & Relations of Inf. Horn of Lat. Ventricle



Floor of Inf. Horn Seen from Above

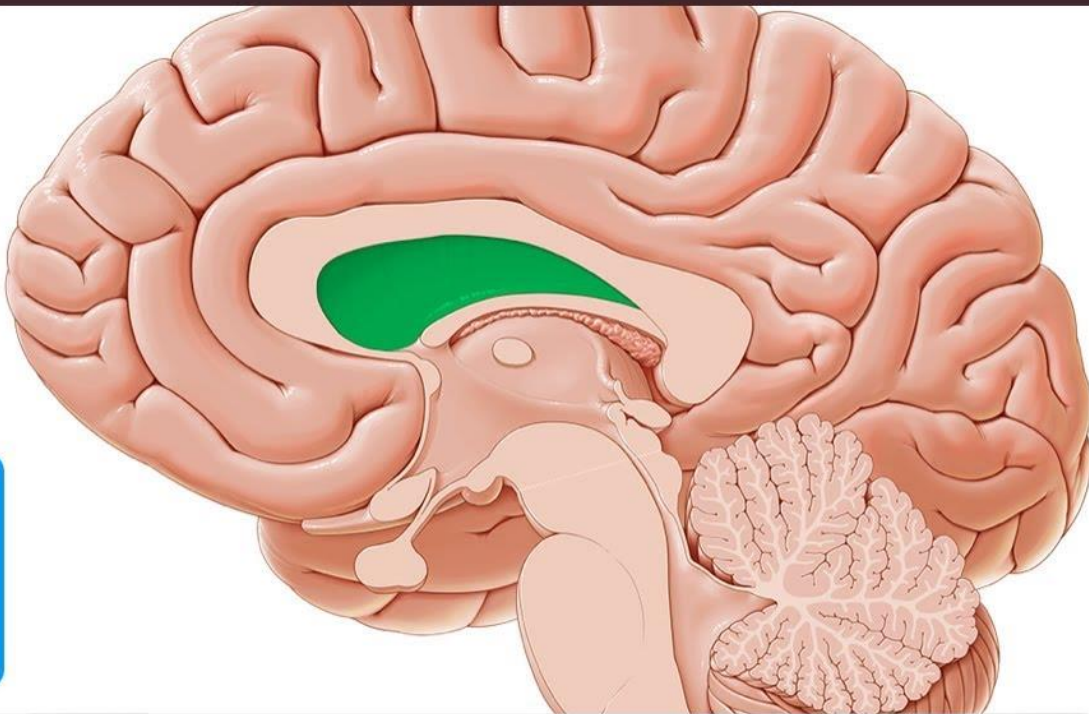


The Septum Pellucidum (Lucidum)

- It is a vertical sheet, consisting of gray and white matter, which occupies the interval between the rostrum, genu and the anterior part of the body of the corpus callosum. Posteriorly, it is attached to the columns and the body of the fornix, i.e. the septum pellucidum occupies the interval between the fornix and the corpus callosum.
- It consists of two layers, with a slit-like cavity in between.
- As a whole, the septum pellucidum forms a partition between the ant. horns and the central parts of the 2 lateral ventricles.



Septum pellucidum



K

Third Ventricle (Cavity of Diencephalon)

1. **Site and shape:**

- It is the cavity of the diencephalon. It represents the lumen of the cephalic end of the primitive neural tube.
- It lies between the 2 thalami, forming a deep perpendicular cleft or cavity which is much deeper in front than behind and has a very irregular outline.

2. **Communications:** The 3rd ventricle communicates:

- a- In front: with lateral ventricles through the interventricular foramina.
- b- Behind with the aqueduct of the midbrain.

3. **Boundaries and relations:**

a- **Roof:**

- Consists of ependyma, which is invaginated into the interior by the choroid plexus of the 3rd ventricle (a pair of plexuses).
- Superiorly, it is related to the tela choroidea which contains the posterior choroidal artery and the internal cerebral vein.
- More superiorly, it is related to the body of the fornix, septum pellucidum and the body of corpus callosum.

b. **Floor:** consists of:

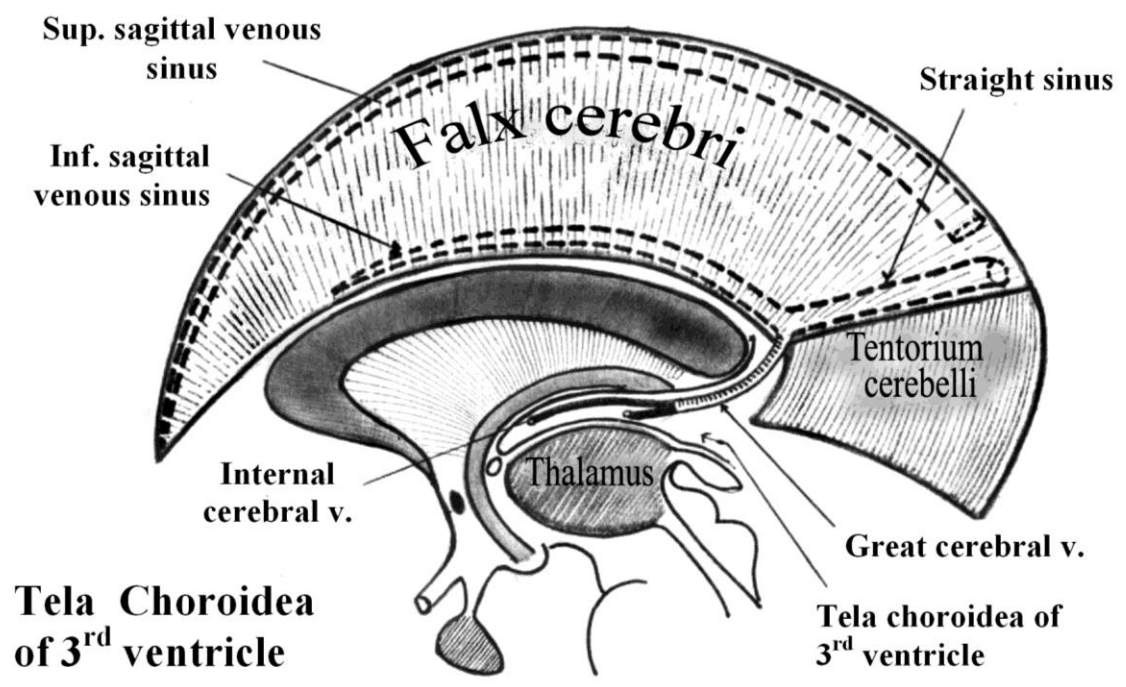
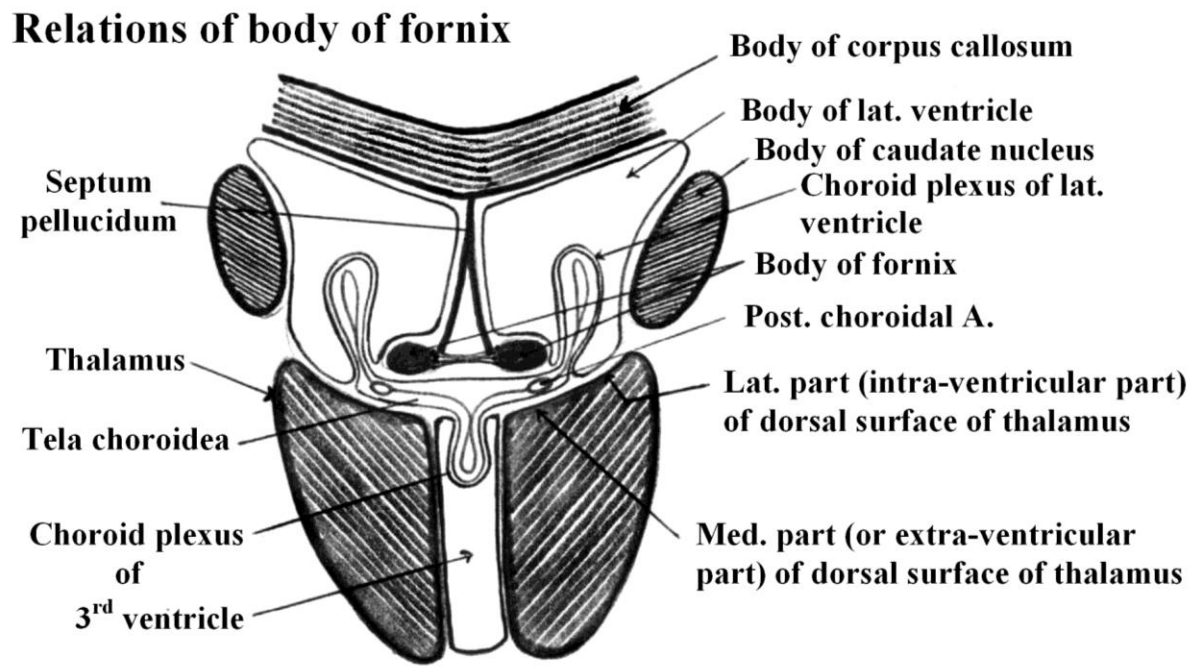
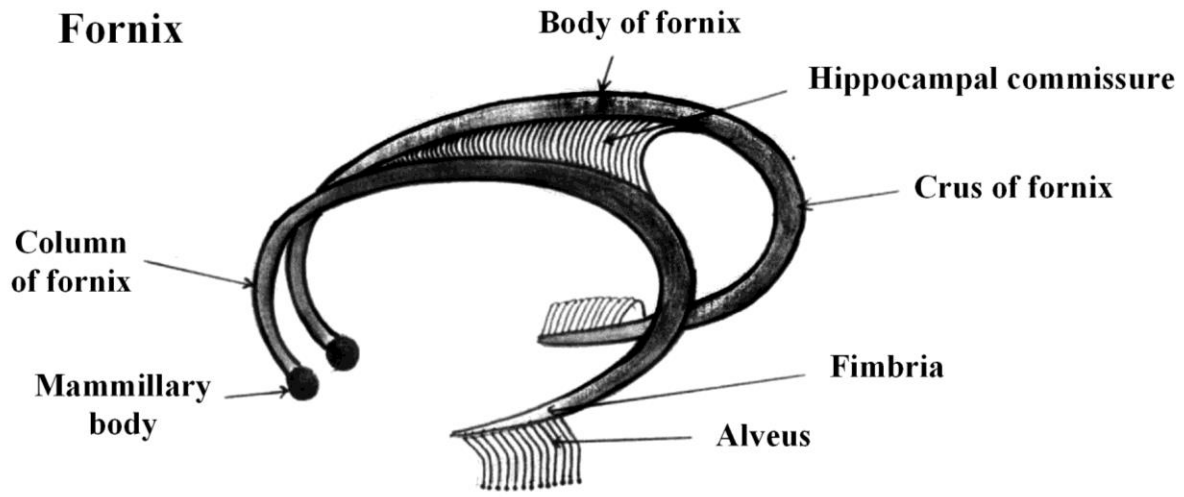
- The hypothalamus (optic chiasma, infundibulum, tuber cinereum, the corpora mammillaria and the posterior perforated substance..... (in front).
- The subthalamus (behind).

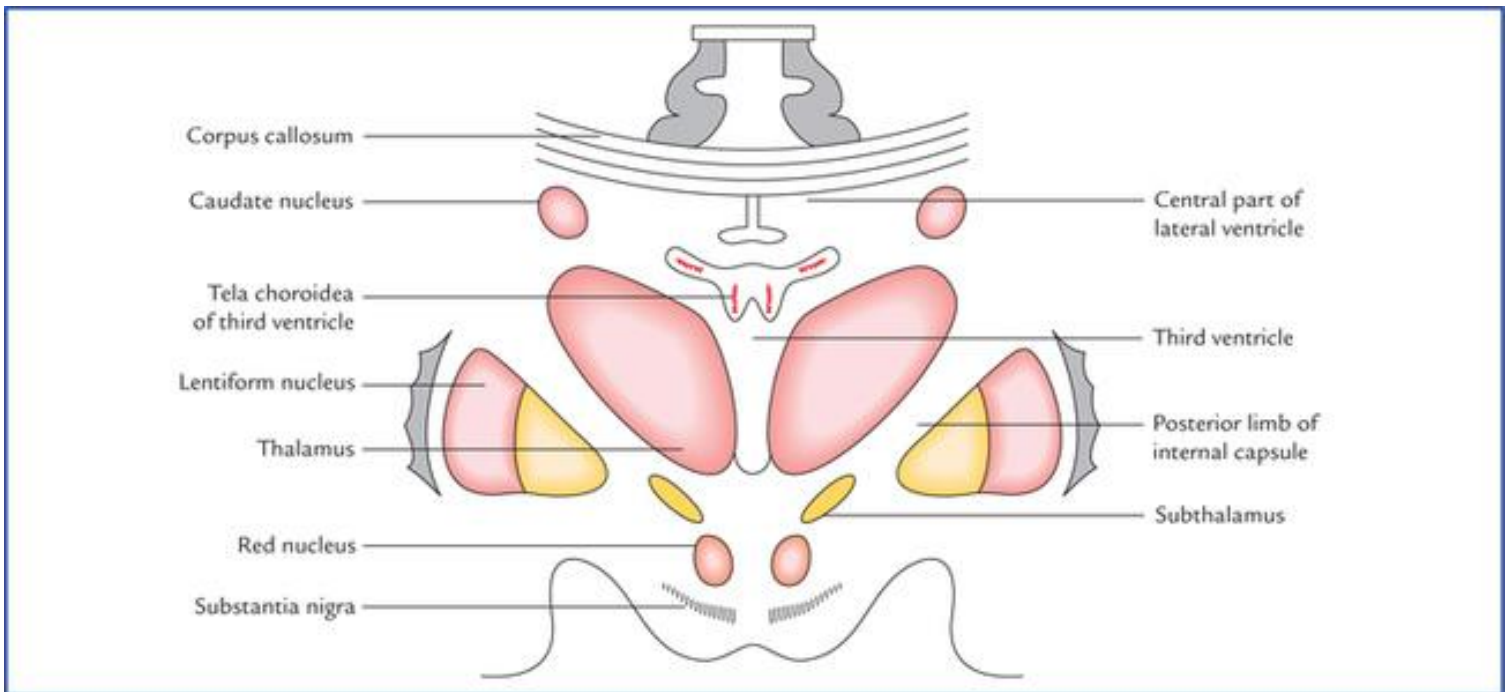
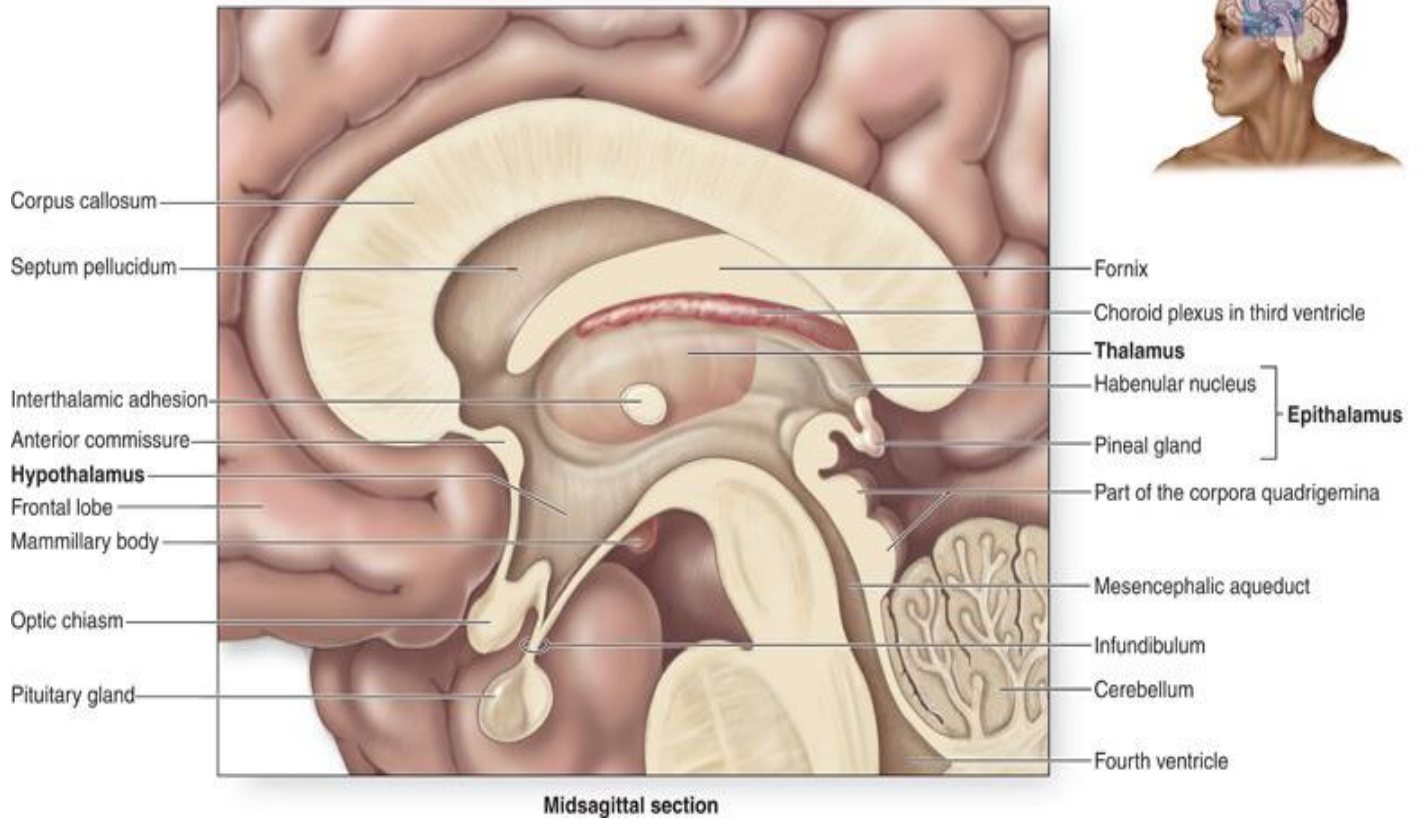
c. **Anterior wall:** is formed by:

- The lamina terminalis.
- The anterior commissure.
- The column of fornix.

d. **Posterior wall:** is formed from below upwards by:

- The upper opening of the aqueduct of the midbrain.
- The posterior commissure.
- The stalk of the pineal body.
- The habenular commissure.



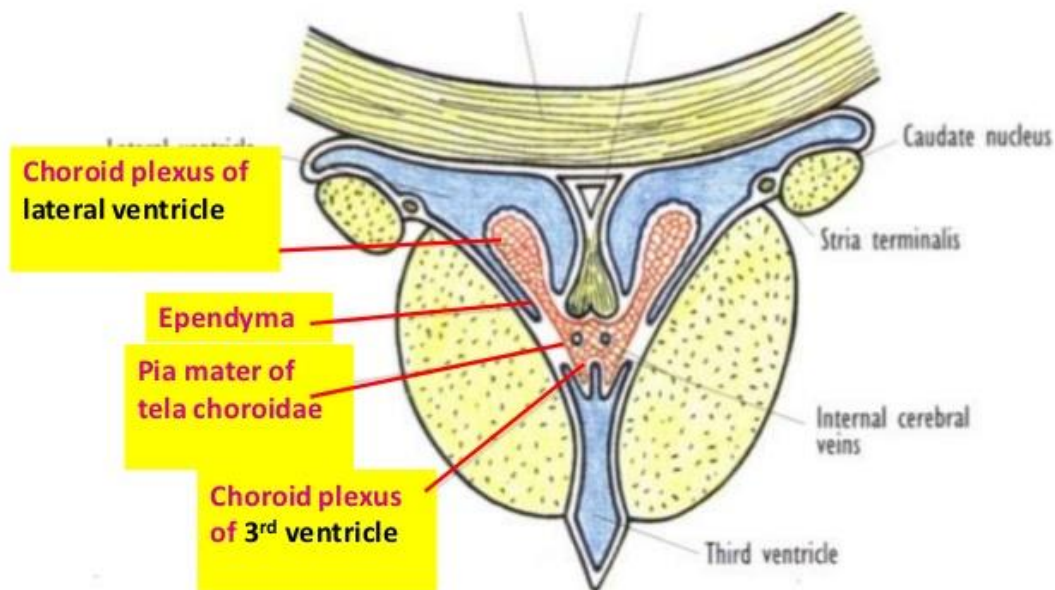


e. **Lateral wall:**

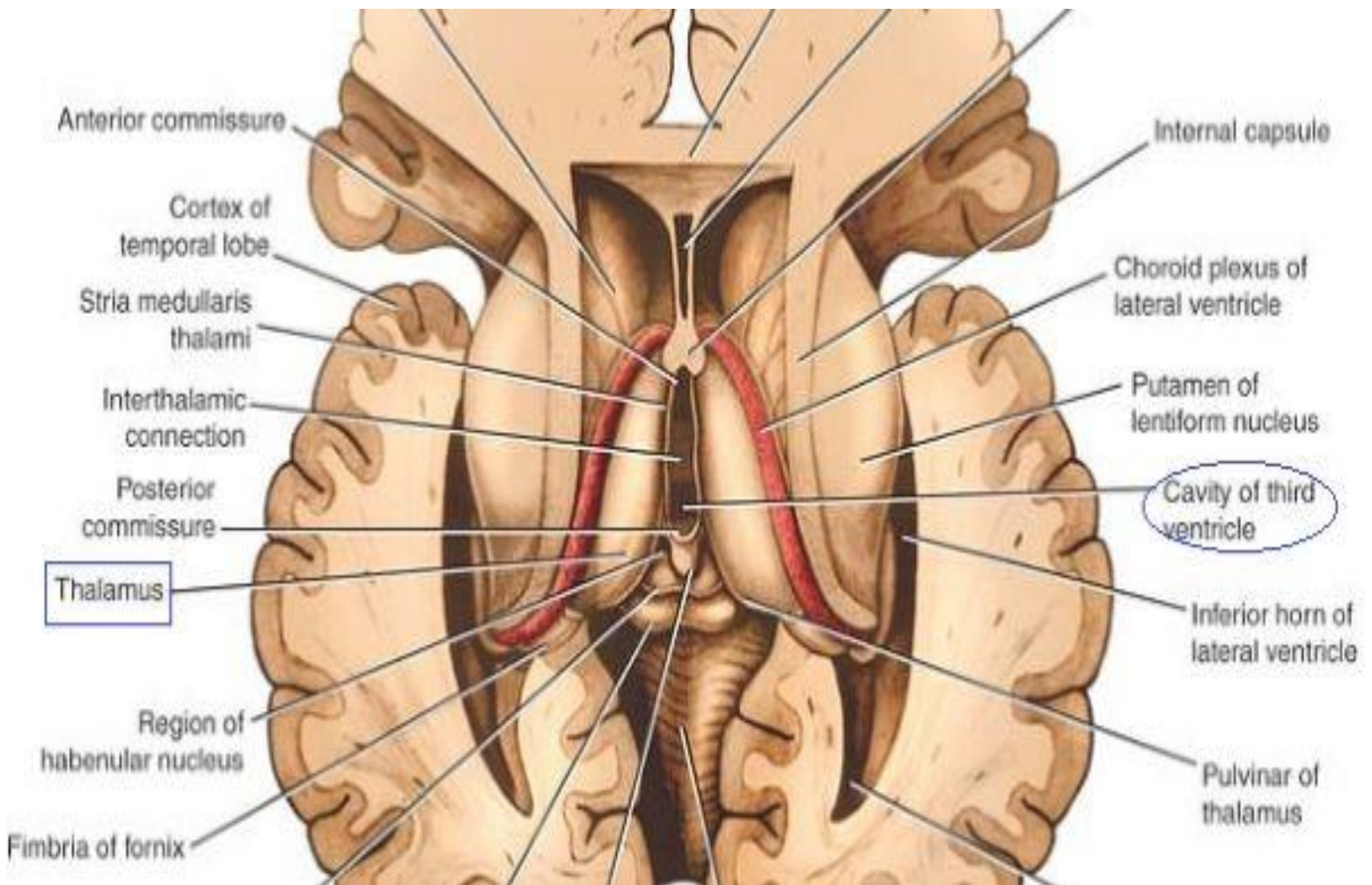
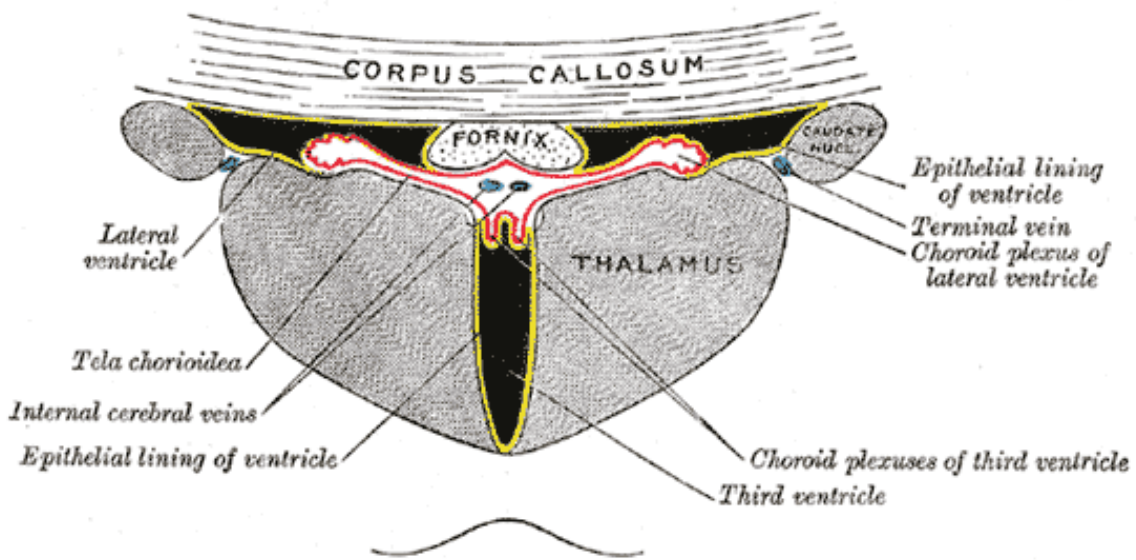
- Is marked by a shallow sulcus, which curves upwards and forwards from the aqueduct of the midbrain, to the interventricular foramen and is termed the hypothalamic sulcus.
- Above this sulcus, the lateral wall is formed by the medial surface of the thalamus, which is fused to the thalamus of the opposite side by a mass of gray matter called the interthalamic connexion.
- Below the sulcus, the lateral wall is formed by the vertical part of the hypothalamus.

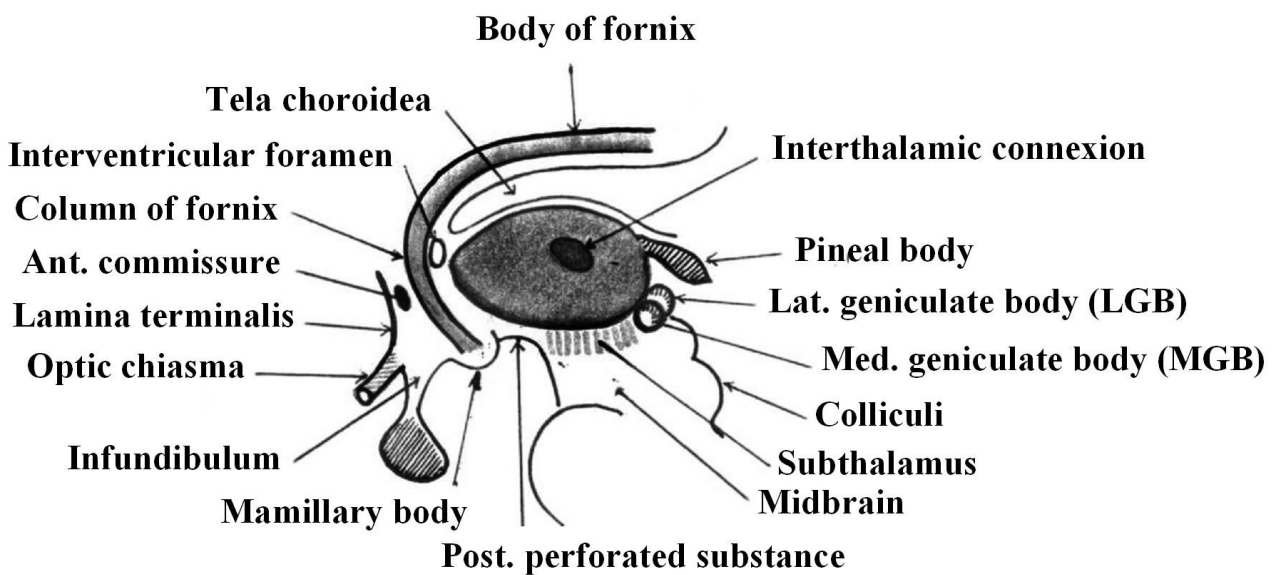
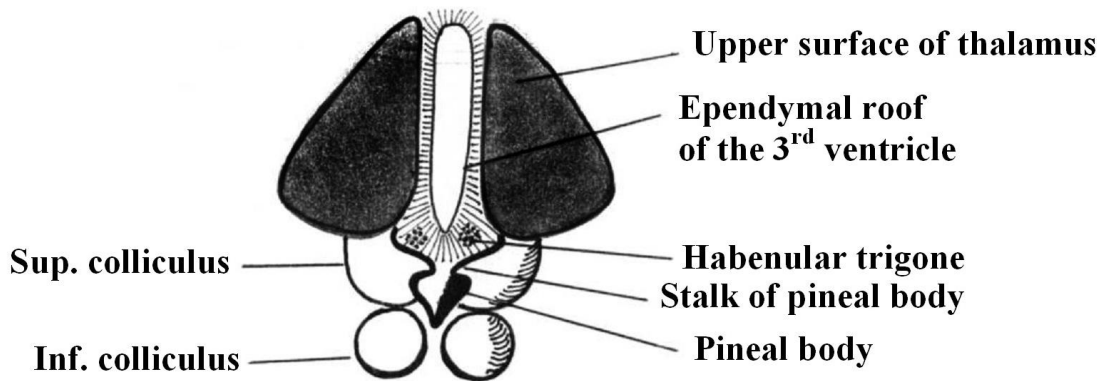
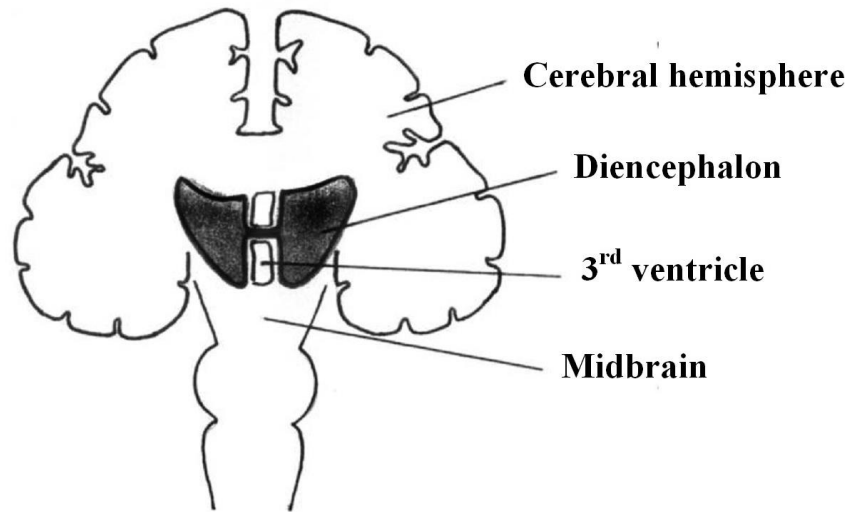
4. **Recesses of third ventricle:**

- Below and in front the 3rd ventricle has 2 recess:
 - a- Optic recess: above and in front of the optic chiasma.
 - b- Infundibular recess: below and behind optic chiasma.
- Above and behind the 3rd ventricle has 2 recesses:
 - a- Suprapineal recess: above the stalk of the pineal body.
 - b- Pineal recess: projects into the stalk of the pineal body above the posterior commissure, below the habenular commissure.



Coronal section of the interventricular foramen showing the choroid plexus of 3rd & lateral ventricles





Sagittal Section Showing:

- Parts of diencephalon

- Relations of thalamus

Fourth Ventricle

1. ***Site:***

- It is the cavity of the hindbrain.
- It is situated between the cerebellum (behind) and the pons and upper part of the medulla (in front).

2. ***Shape:***

- It is diamond or rhomboid-shaped when seen from behind but is tent-shaped when seen from the side.
- It has:
 - A floor.
 - A roof.
 - Four lateral boundaries where the roof and the floor meet.
 - Four angles.

3. ***Boundaries:***

The 4th ventricle is bounded on each side by:

- Superior cerebellar peduncle.....(above and laterally).
- Inferior cerebellar peduncle, cuneate and gracile tubercles.....(below and laterally).

(i.e. The 4th ventricle is bounded on each side from above downwards by the superior cerebellar peduncle, the inferior cerebellar peduncle, cuneate and gracile tubercles).

4. ***Angles:*** The 4th ventricle has:

- Upper angle.
- Lower angle.
- Rt. and Lt. lateral angles; each angle lies at the meeting of the superior and inferior cerebellar peduncles of its own side.

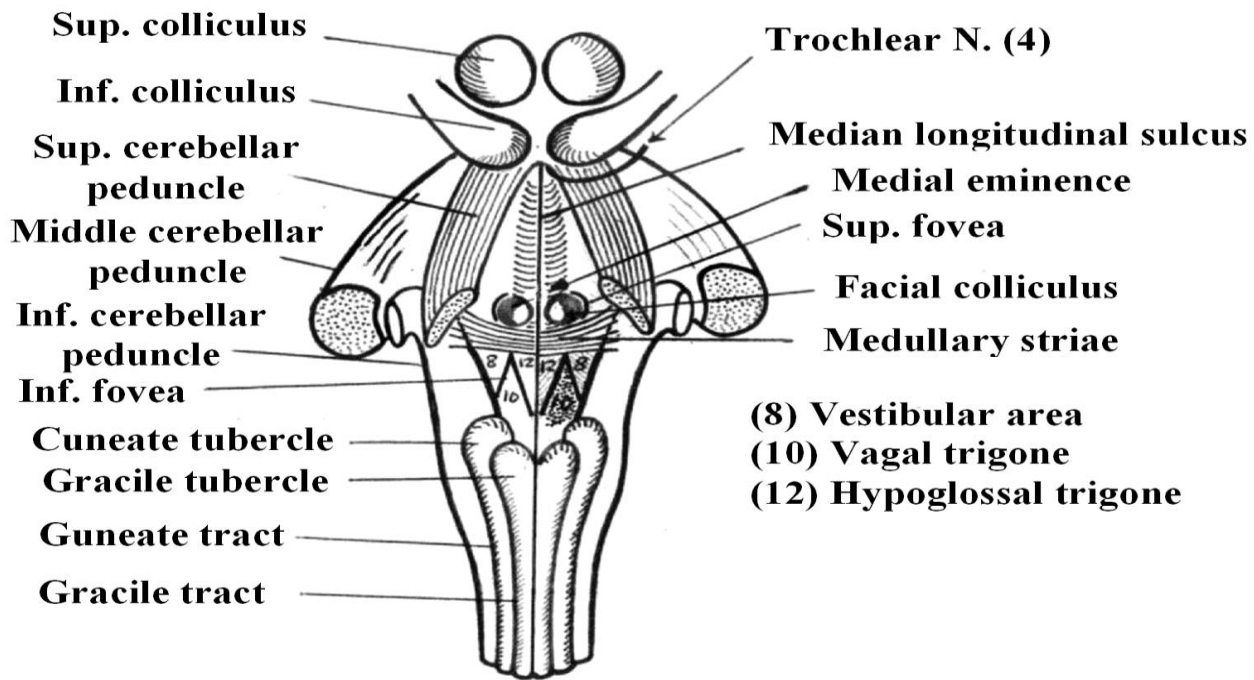
5. ***Floor of 4th ventricle:***

- It is diamond-shaped or rhombic in outline.
- It is formed above by the posterior surface of the pons and below by the posterior surface of the upper part of the medulla (open medulla).
- The floor is divided into Rt. and Lt. longitudinal halves by a median vertical groove called the median longitudinal sulcus.

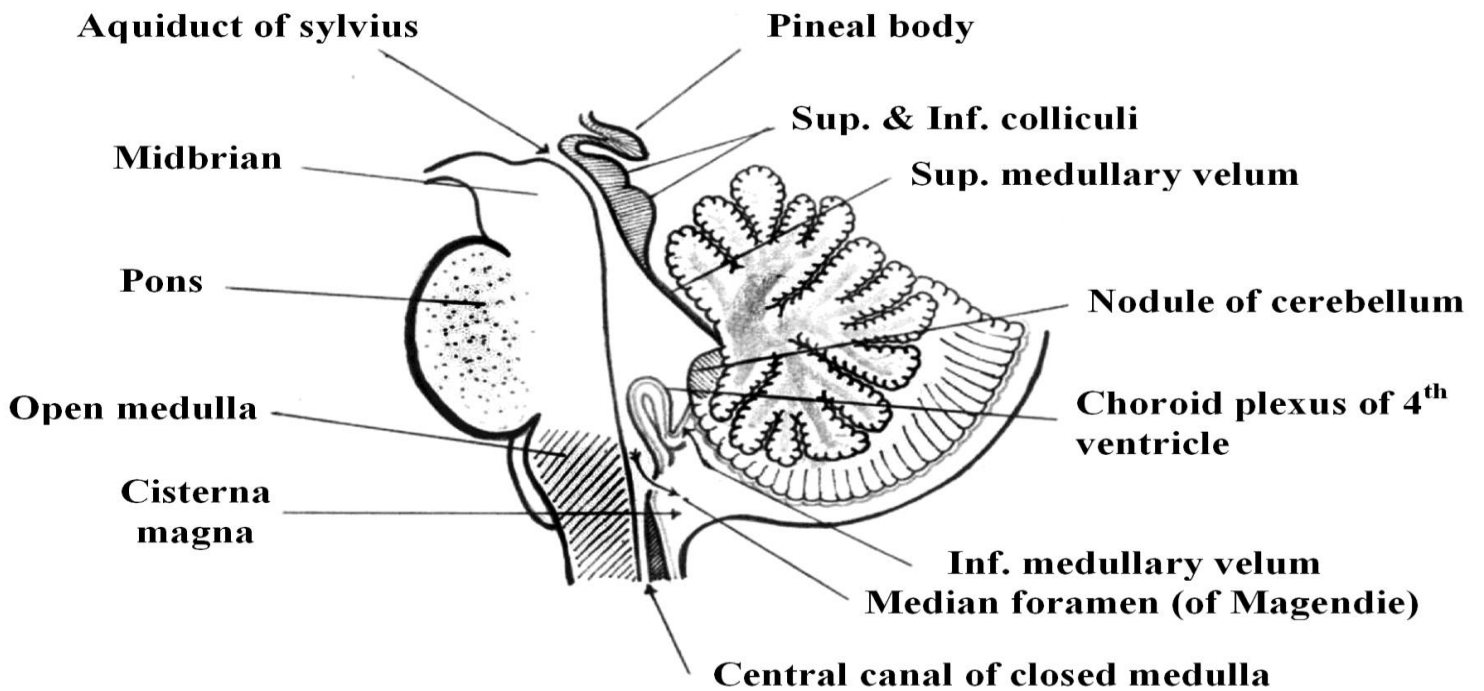
- The floor is crossed at its widest point by transversely running nerve bundles called the medullary stria, which divides the floor into upper (or pontine) part and lower (or medullary) part (i.e. they run at the ponto-medullary junction).
- ***The upper (or pontine) part:*** presents
 - i. A smooth longitudinal elevation on either side of the median sulcus called the medial eminence.
 - ii. On the medial eminence just above the medullary stria there is a small rounded elevation called the facial colliculus which is caused by the facial nerve fibres as they turn around the abducent nucleus.
 - iii. The facial colliculus is bounded laterally by a crescentic depression called-the superior fovea.
 - iv. Pontine vestibular area: lies lateral to the superior fovea. It overlies superior, lateral and upper 1/2 of medial vestibular nuclei.

(N.B.: The pontine part of the floor is bounded on either side by the superior cerebellar peduncles).
- The lower (or medullary) part; on either side of the middle line it presents:
 - i. A small inverted V-shaped depression called the inferior fovea, placed with its apex directed upwards, close to the medullary stria.
 - ii. The inferior fovea divides the medullary part into 3 triangular areas, from medial to lateral:
 - a- Hypoglossal trigone: medial to the inferior fovea; overlies the nucleus of the 12th (hypoglossal) nerve.
 - b- Vagal trigone: between the limbs of the inferior fovea; overlies the dorsal nucleus of the 10th (vagus) nerve.
 - c- Vestibular area: lies lateral to the inferior fovea; overlies the inferior and lower 1/2 of medial vestibular nuclei.

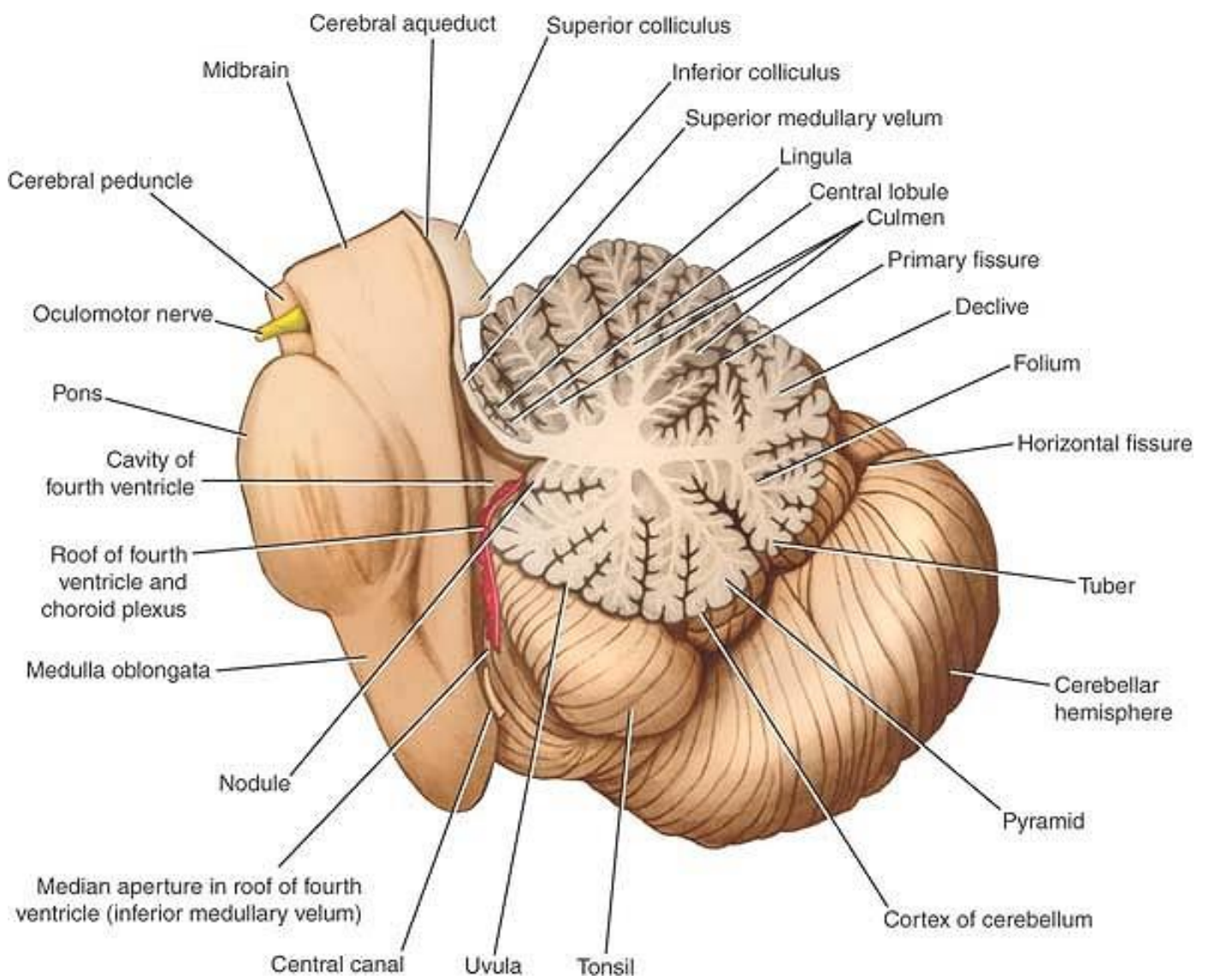
(N.B.: The medullary part is bounded on either side by the gracile and cuneate tubercle and the inferior cerebellar peduncle).



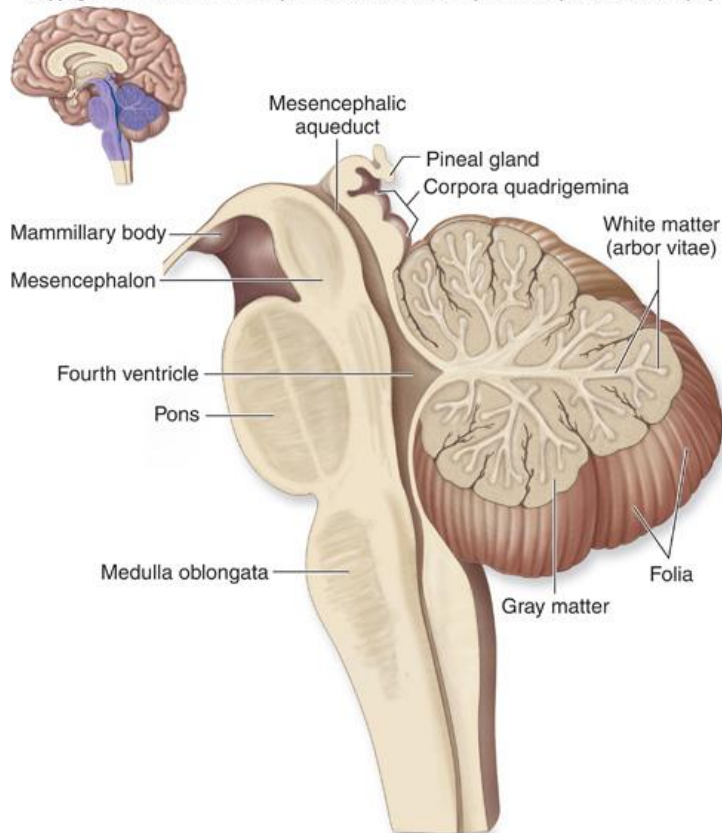
Floor of 4th Ventricle



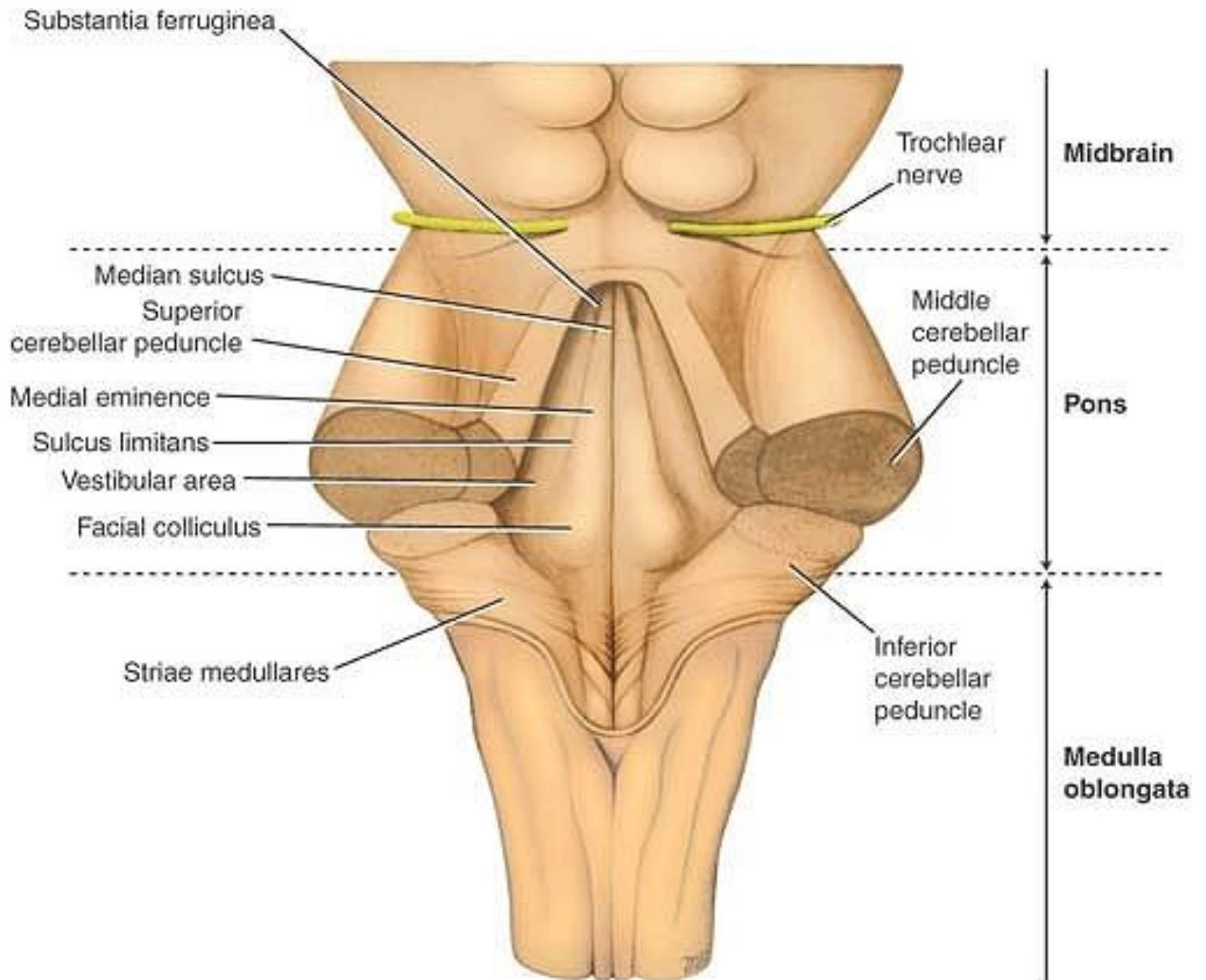
Roof of 4th Ventricle



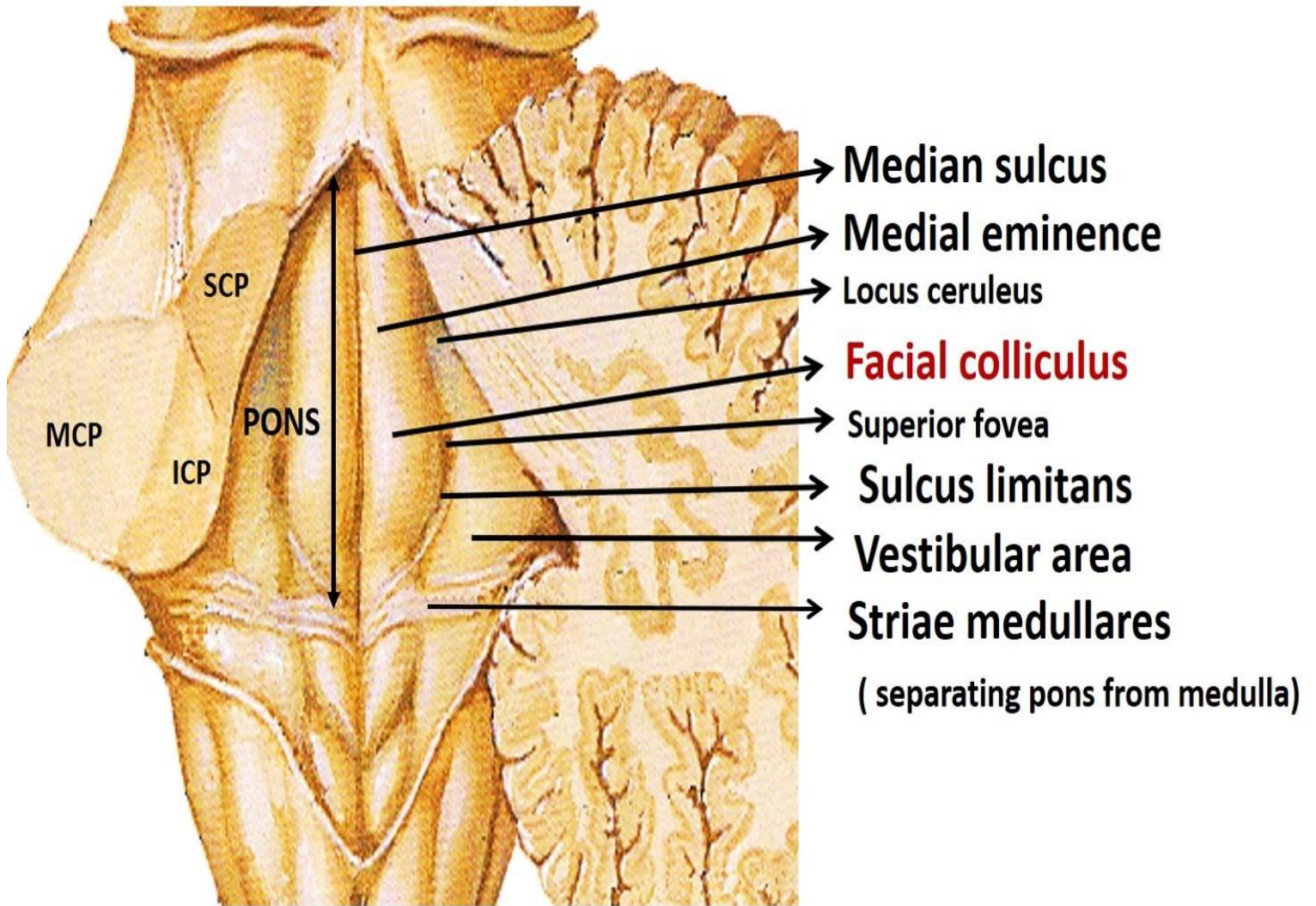
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(a) Midsagittal section



Forms upper part of floor of 4th ventricle



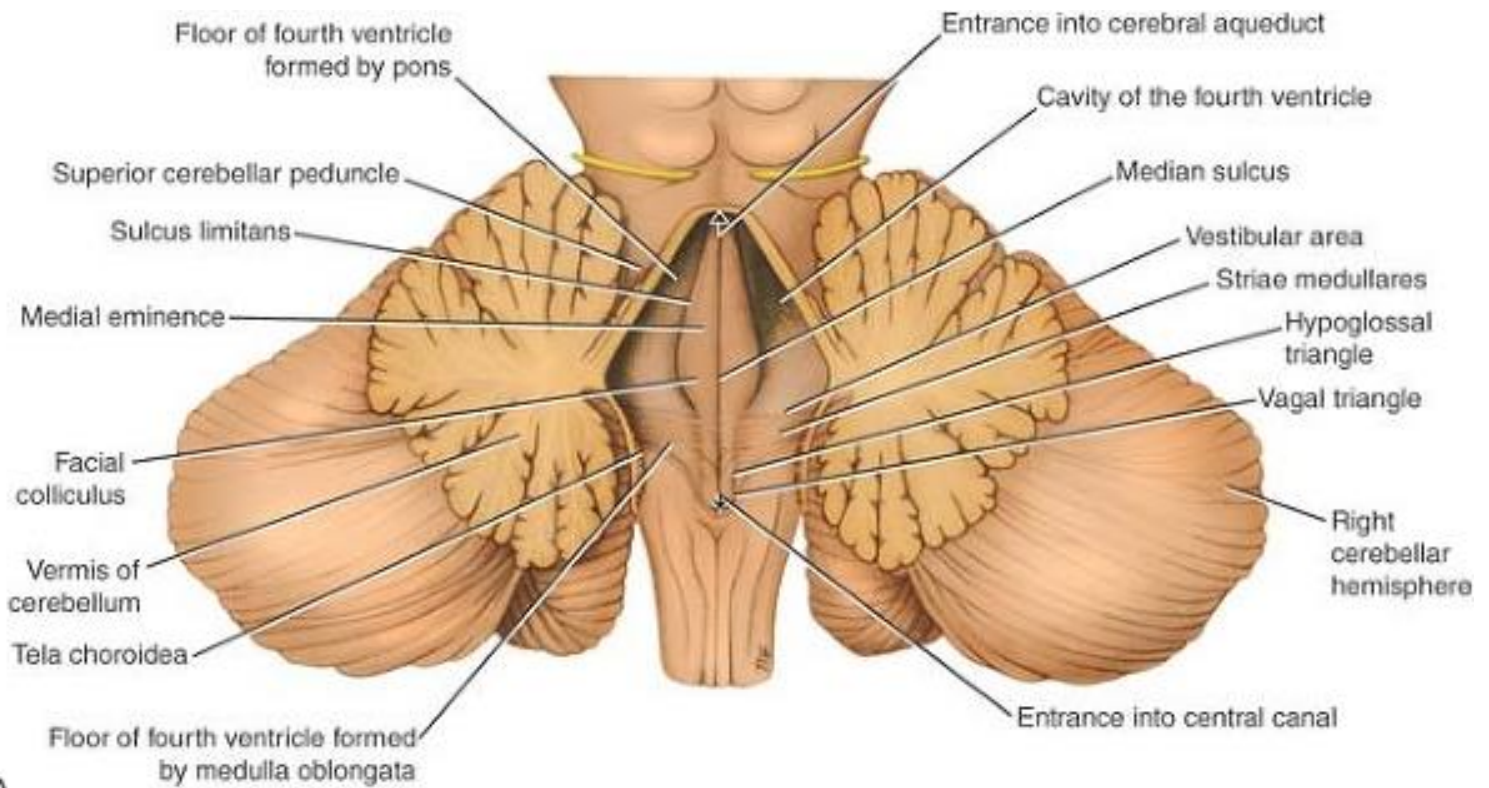
SCP, MCP, ICP – Superior, middle and inferior cerebellar peduncles

6. ***The roof of the 4th ventricle:***

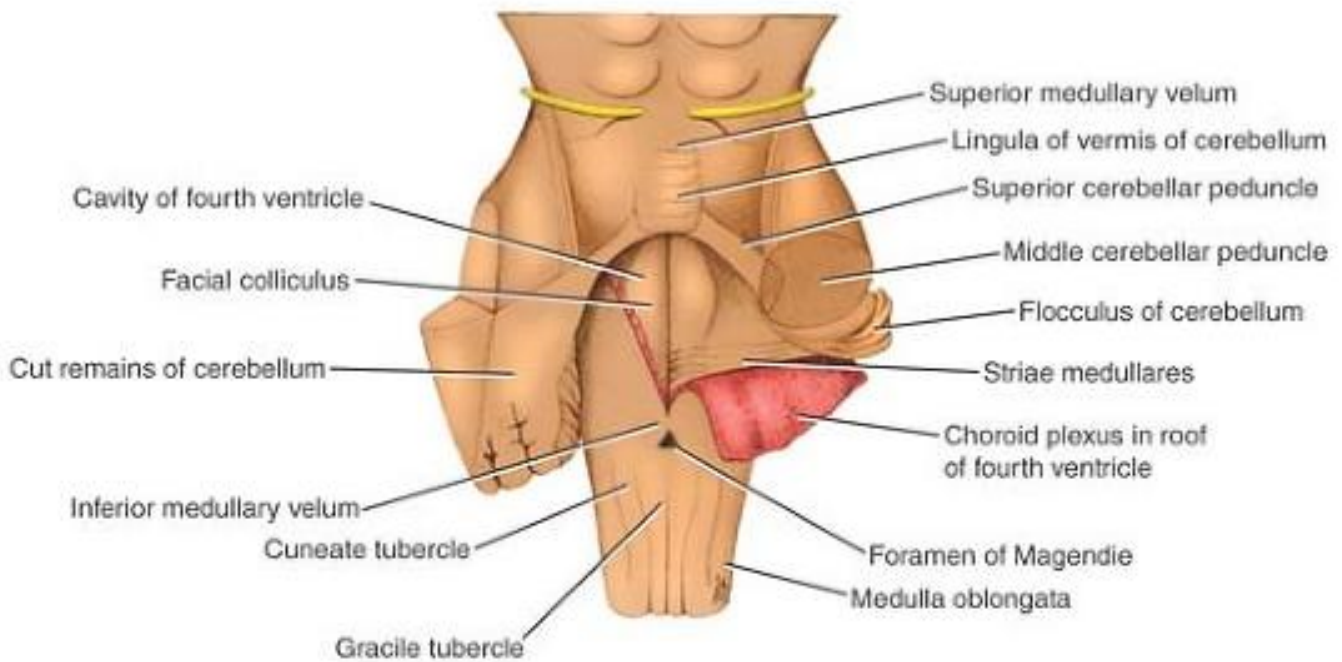
- i. In its upper part it consists of:
 - The elevated medial borders of the 2 superior cerebellar peduncles.
 - A connecting sheet of white matter termed the superior medullary velum stretched between the elevated medial borders of the 2 peduncles.
- ii. The lower part of the roof is also divisible into 2 areas:
 - Upper area formed by the nodule of the cerebellum (in the median plane) and the inferior medullary velum on each side of the nodule.
 - Lower area consists of ependyma and pia mater in contact with each other.
This thin area is invaginated into the interior of the cavity of the ventricle by the choroids plexus of the 4th ventricle. The lowest part of this area of the roof is pierced by a wide median aperture (foramen of Magendi) which connects the interior of the 4th ventricle to the subarachnoid space.
- iii. Recesses of the roof of 4th ventricle:
 - a- Median recess: The roof of the 4th ventricle is drawn backwards towards the cerebellum in a tent-like manner; this part of the cavity of the ventricle forms a median recess with an upper wall formed by the lower end of the superior Medullary velum and a lower wall formed by the nodule of the cerebellum.
 - b- Two lateral recesses:
At the lateral angles of the 4th ventricle, the roof is drawn out laterally and forwards to form a wider tubular pouch on either side called the lateral recess. Each lateral recess opens at its extremity into the subarachnoid space by a lateral aperture (foramen of Luschka).

7. ***Connections of the 4th ventricle:***

- a- At its upper angle, the 4th ventricle is connected to the aqueduct of sylvius (of the midbrain) which connects the 4th ventricle with the 3rd ventricle above.
- b- At its lower angle, the 4th ventricle is connected to the central canal of the closed medulla which is continuous below with the central canal of the spinal cord.
- c- At its roof, the 4th ventricle is connected to the subarachnoid space by a median and 2 lateral apertures through which the CSF drains out into the subarachnoid space.



A

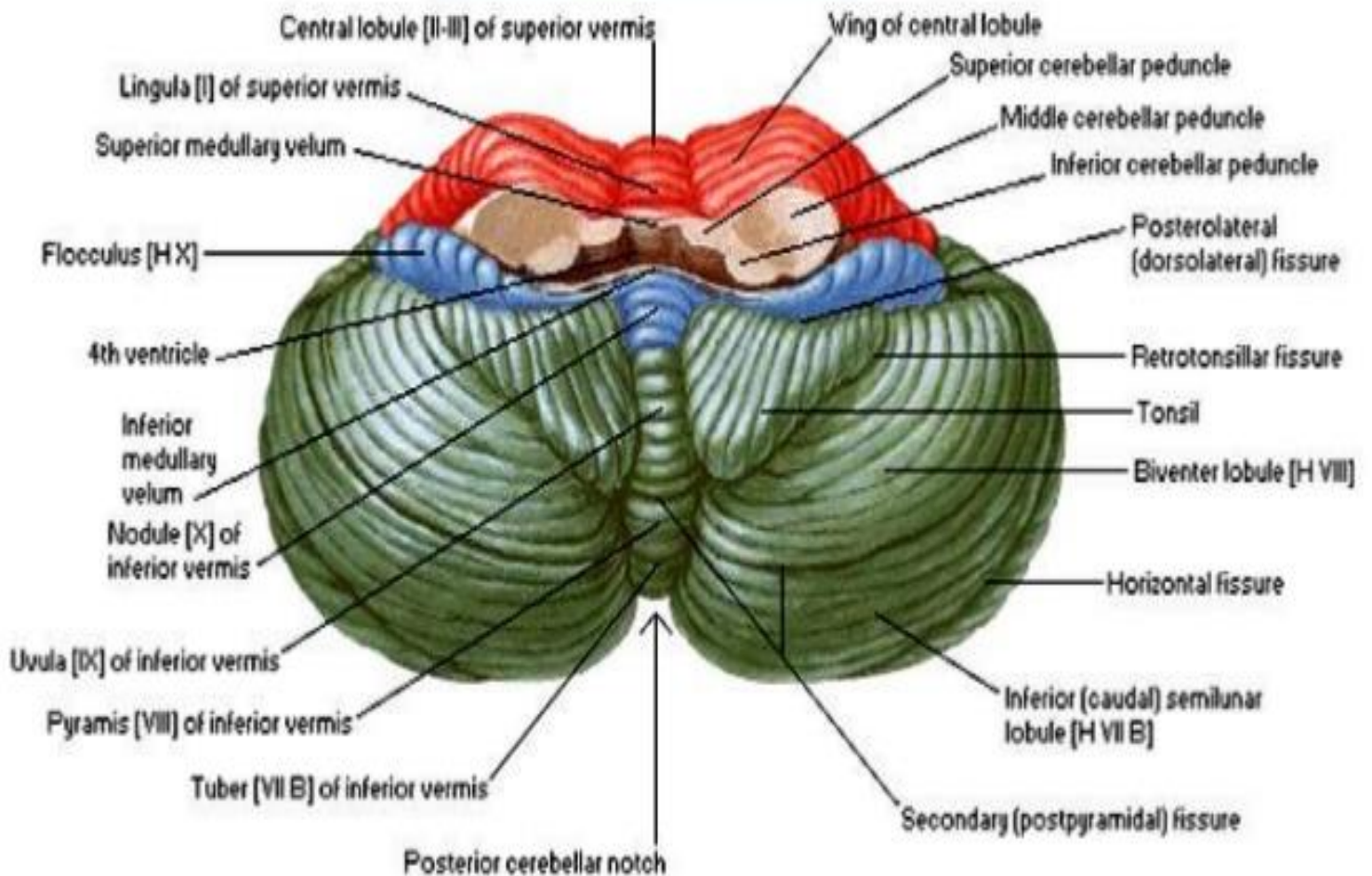


B

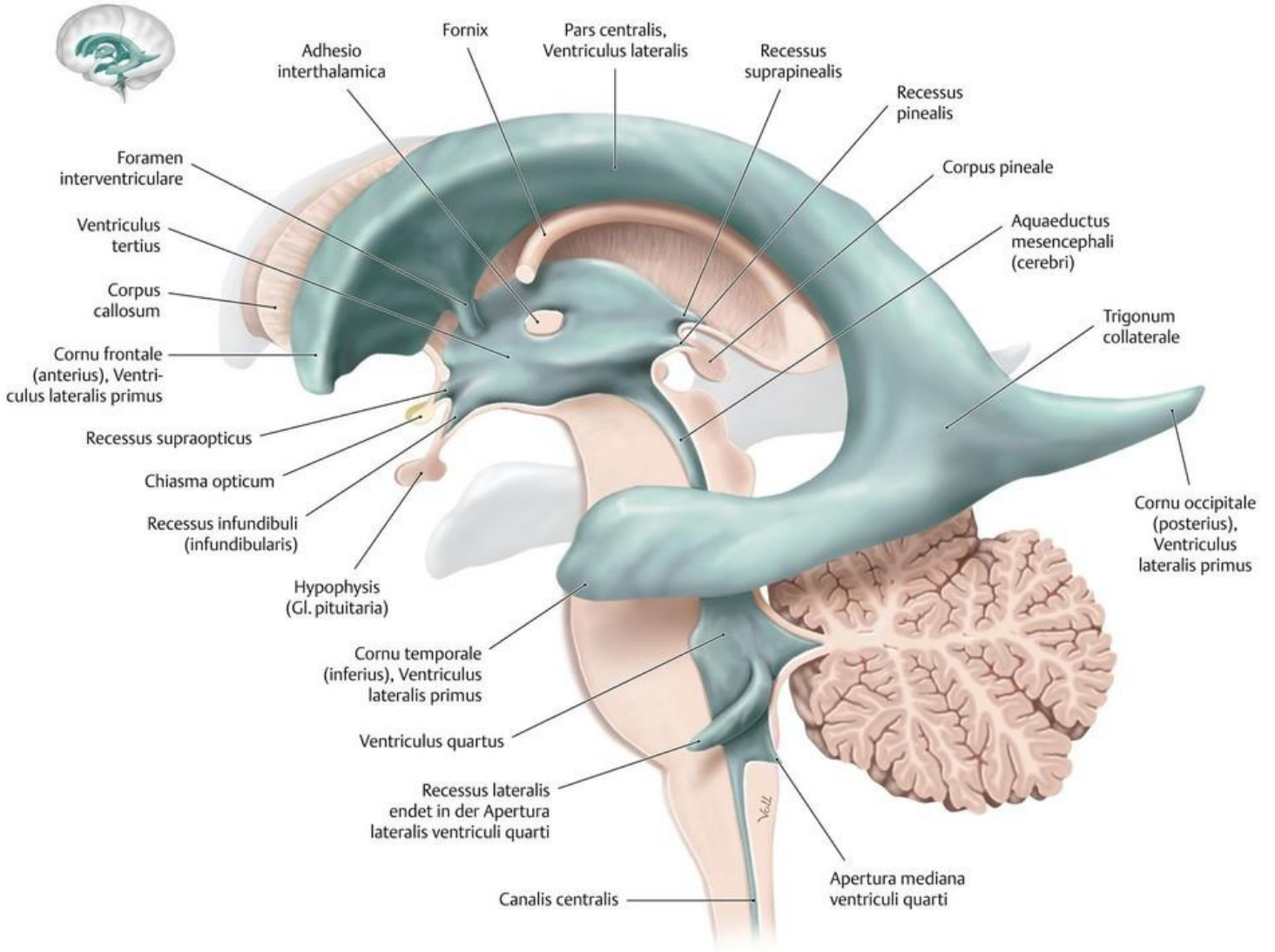
Cerebellum Inferior Surface

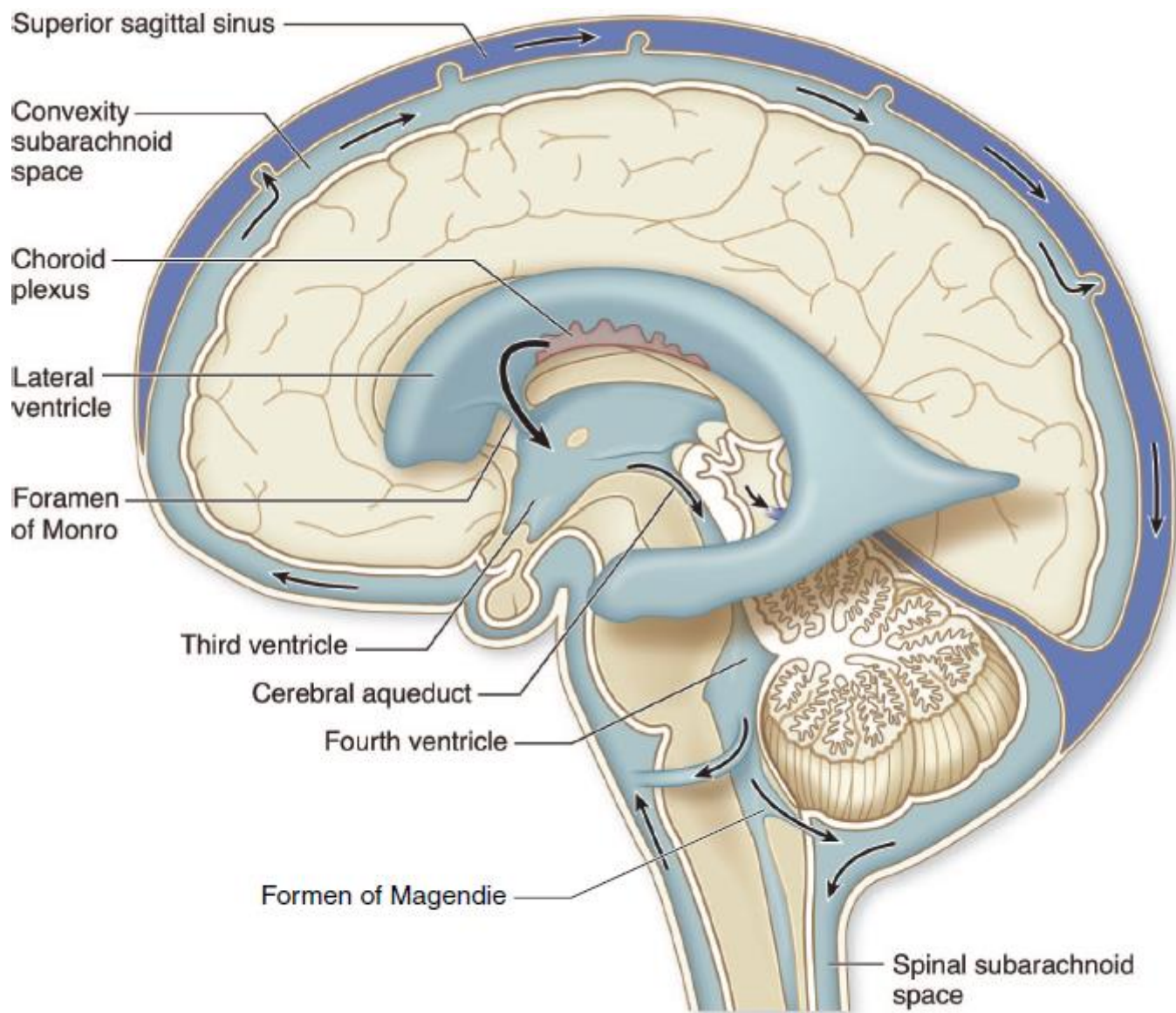
Anterior lobe

Flocculonodular lobe



Posterior lobe





Source: A. H. Ropper, M. A. Samuels, J. P. Klein, S. Prasad: Adams and Victor's Principles of Neurology, 11th Edition
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