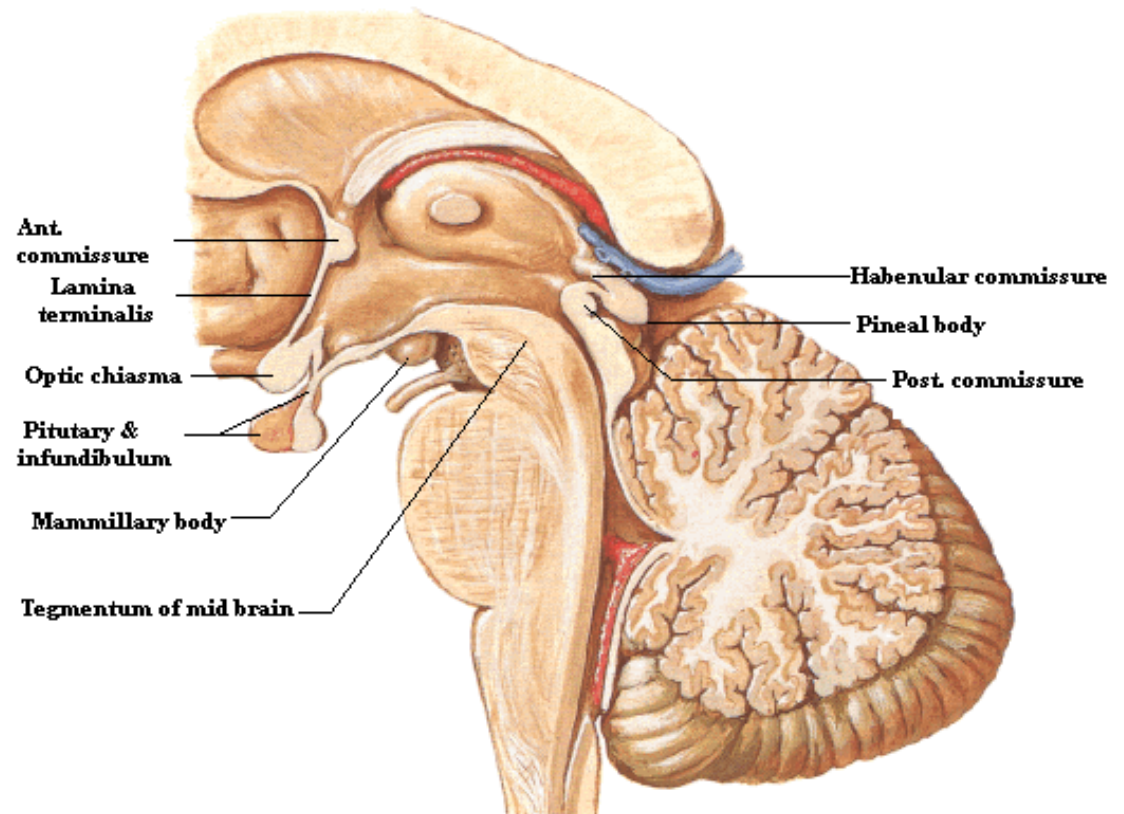
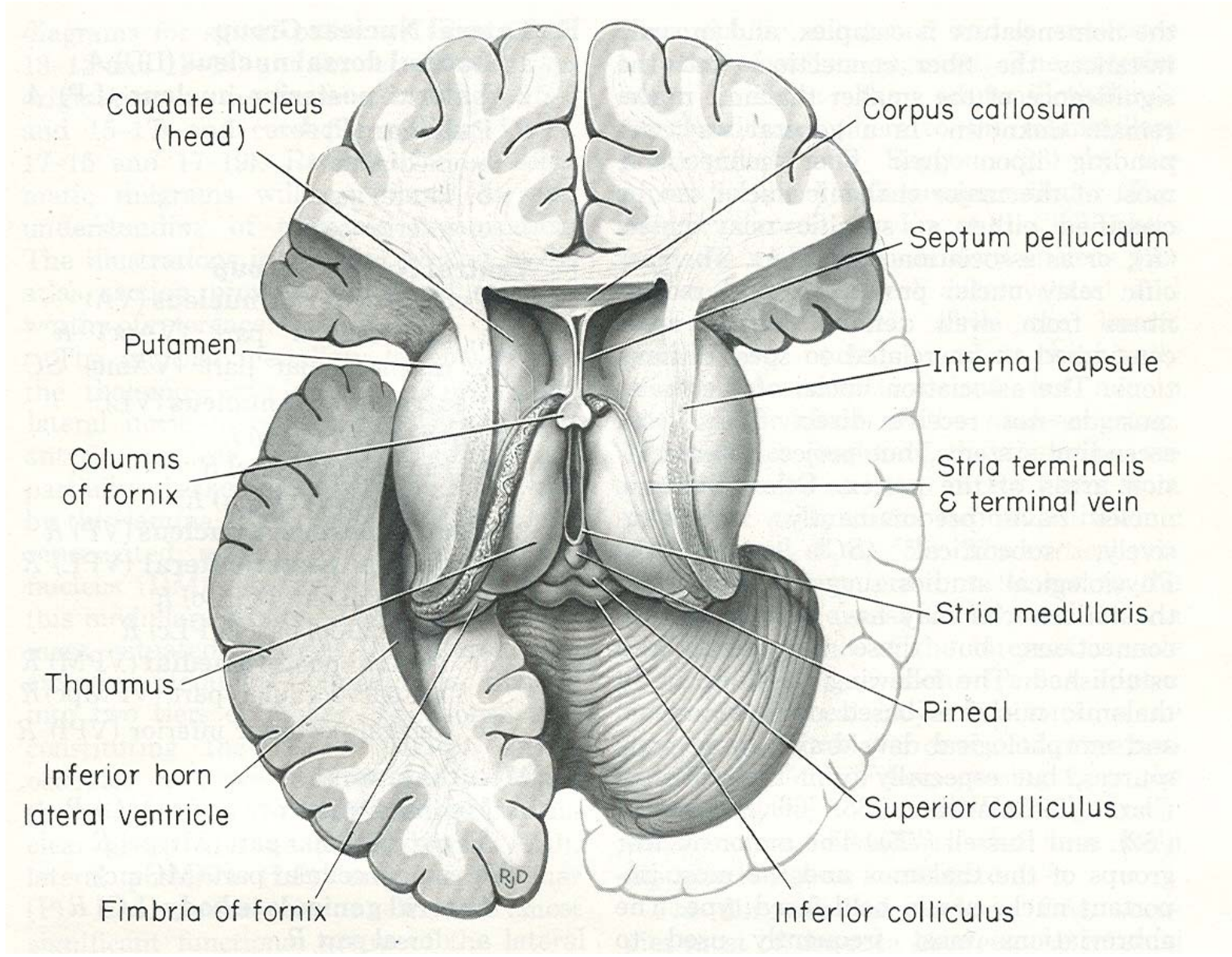


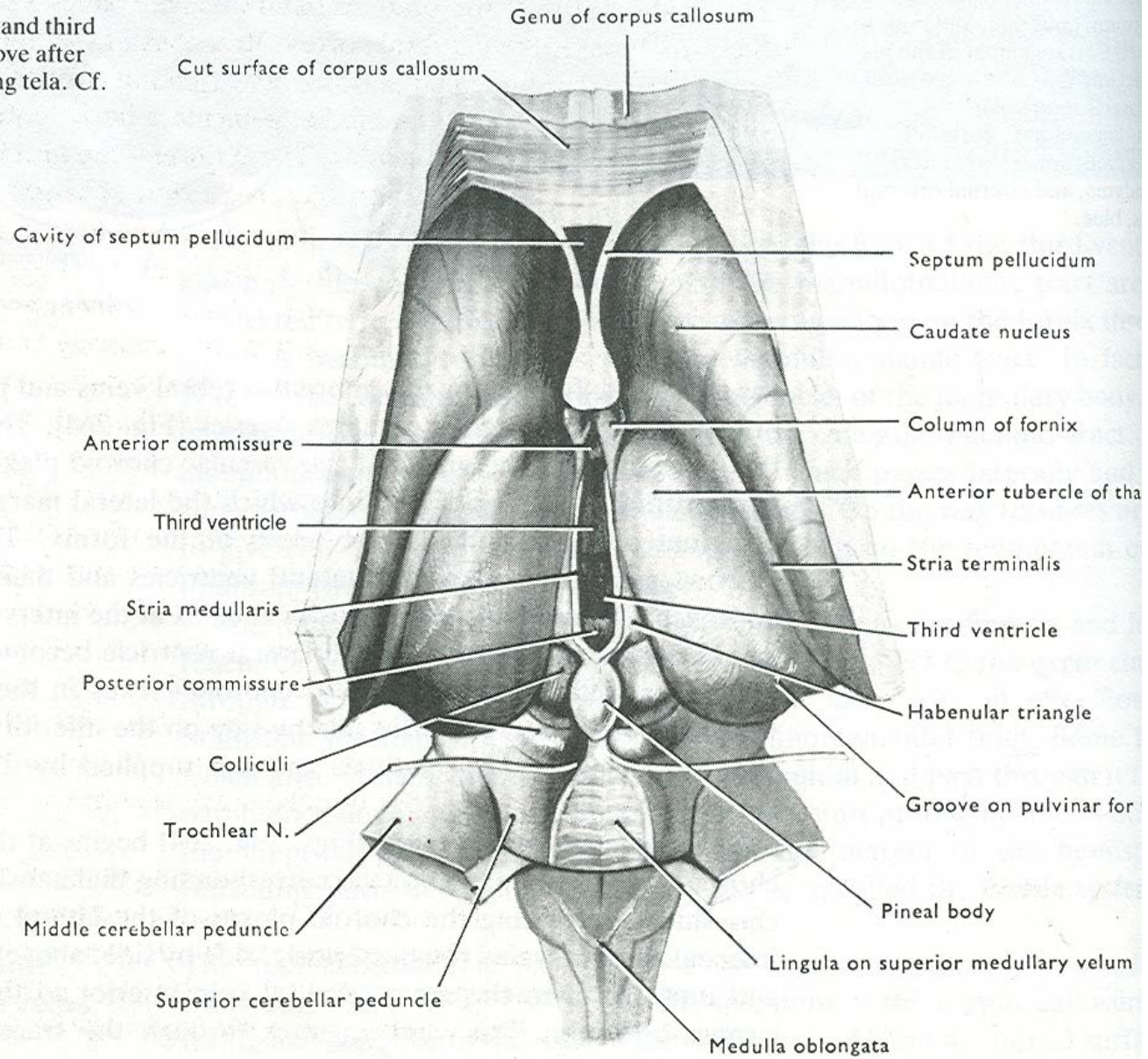
# Diencephalon

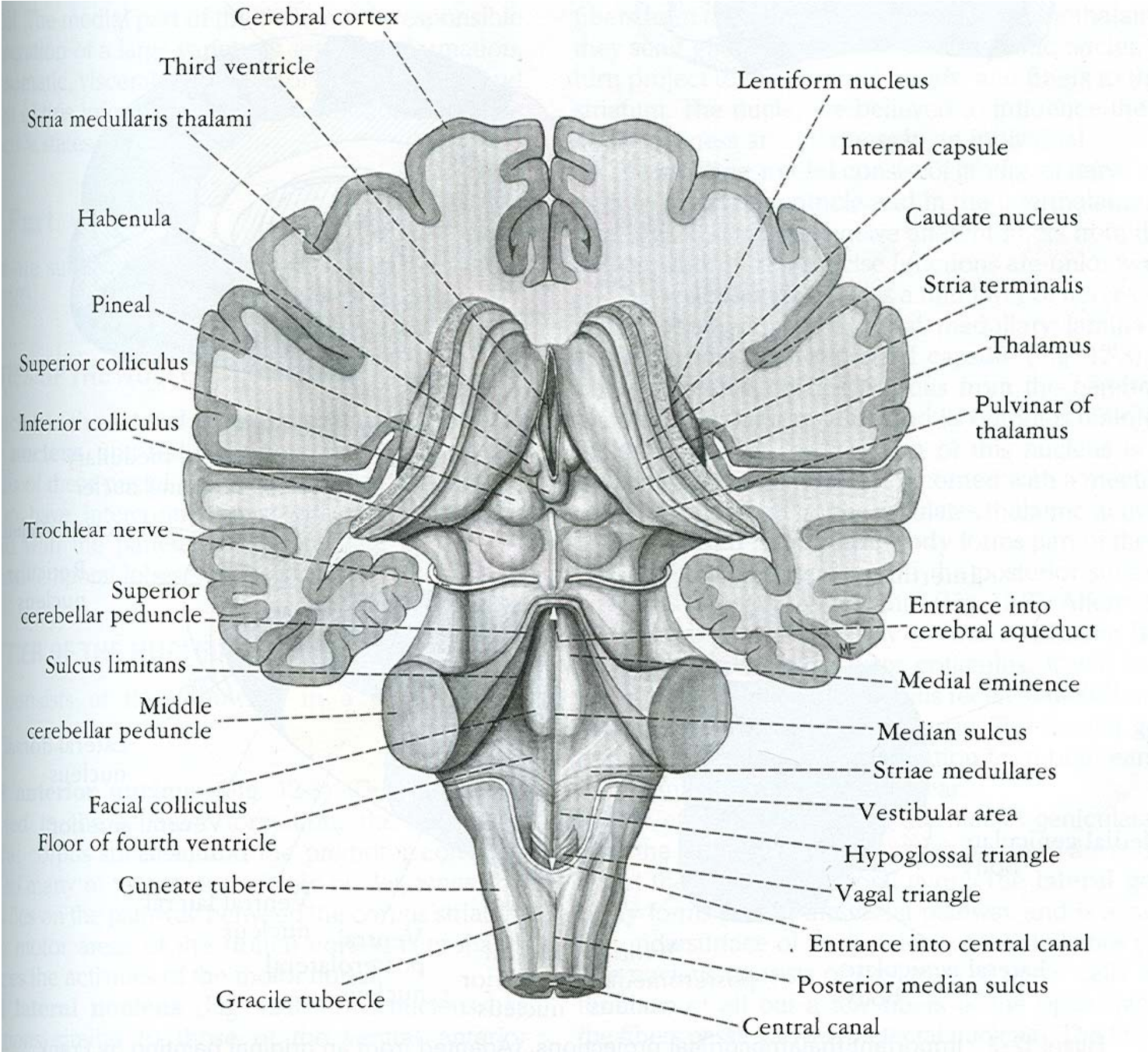
- From interventricular foramen to posterior commissure
- Divisible in to:
  - Thalamus
  - Hypothalamus
  - Subthalamus
  - Epithalamus
  - Metathalamus

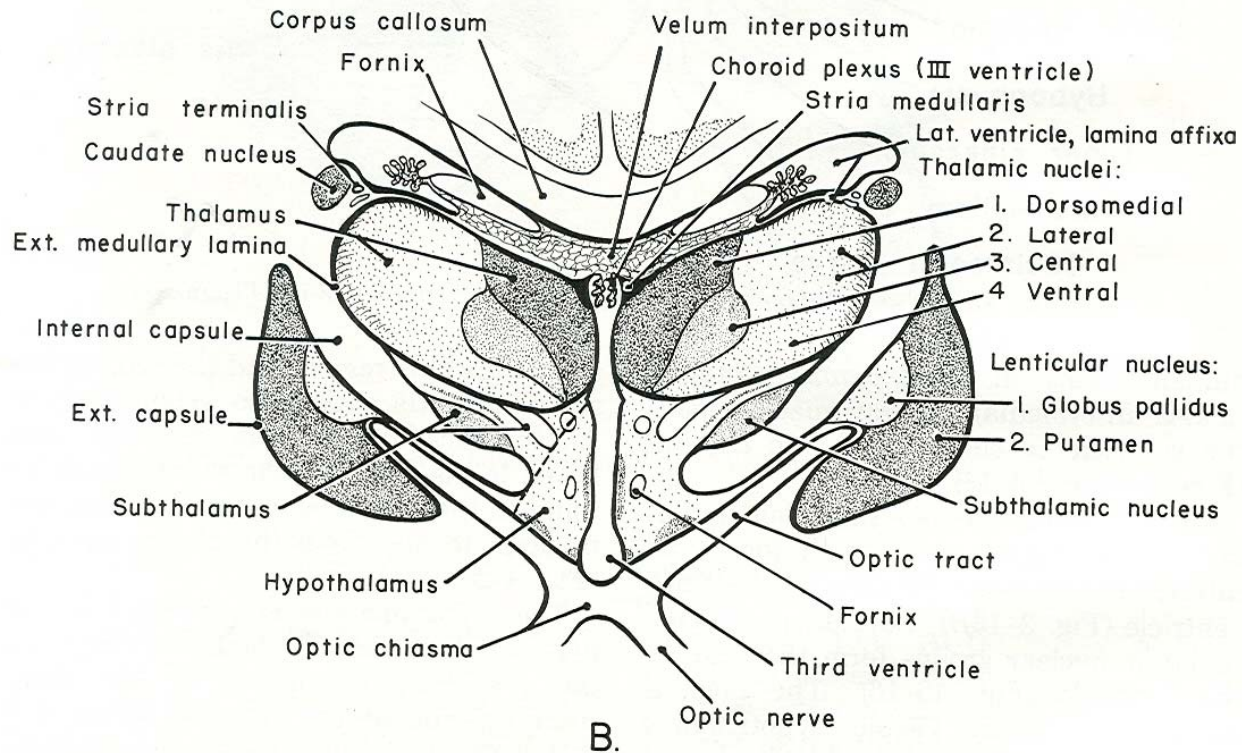
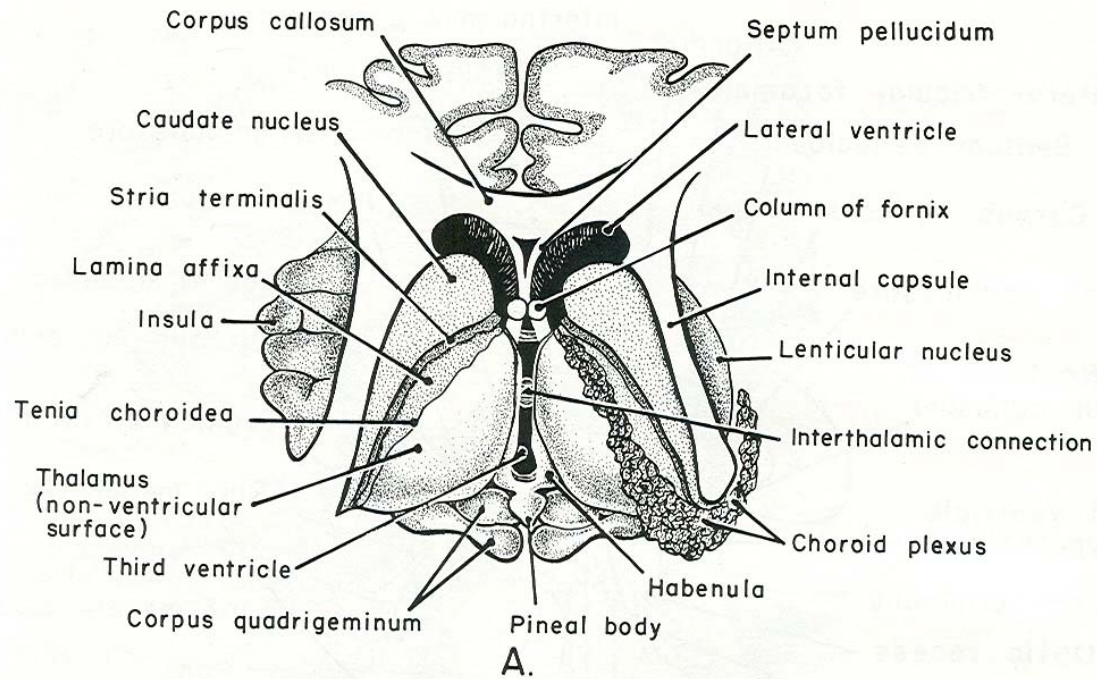


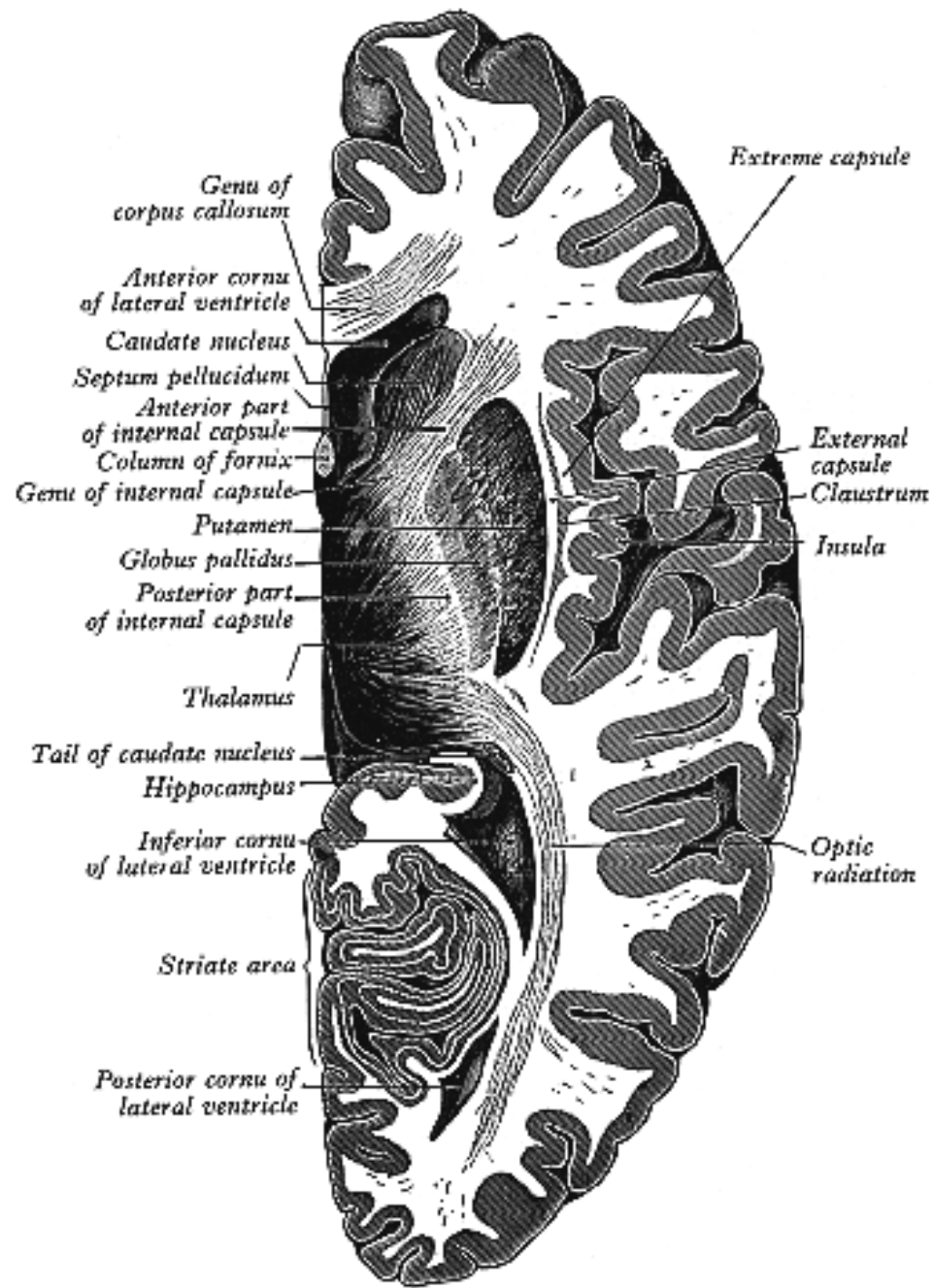


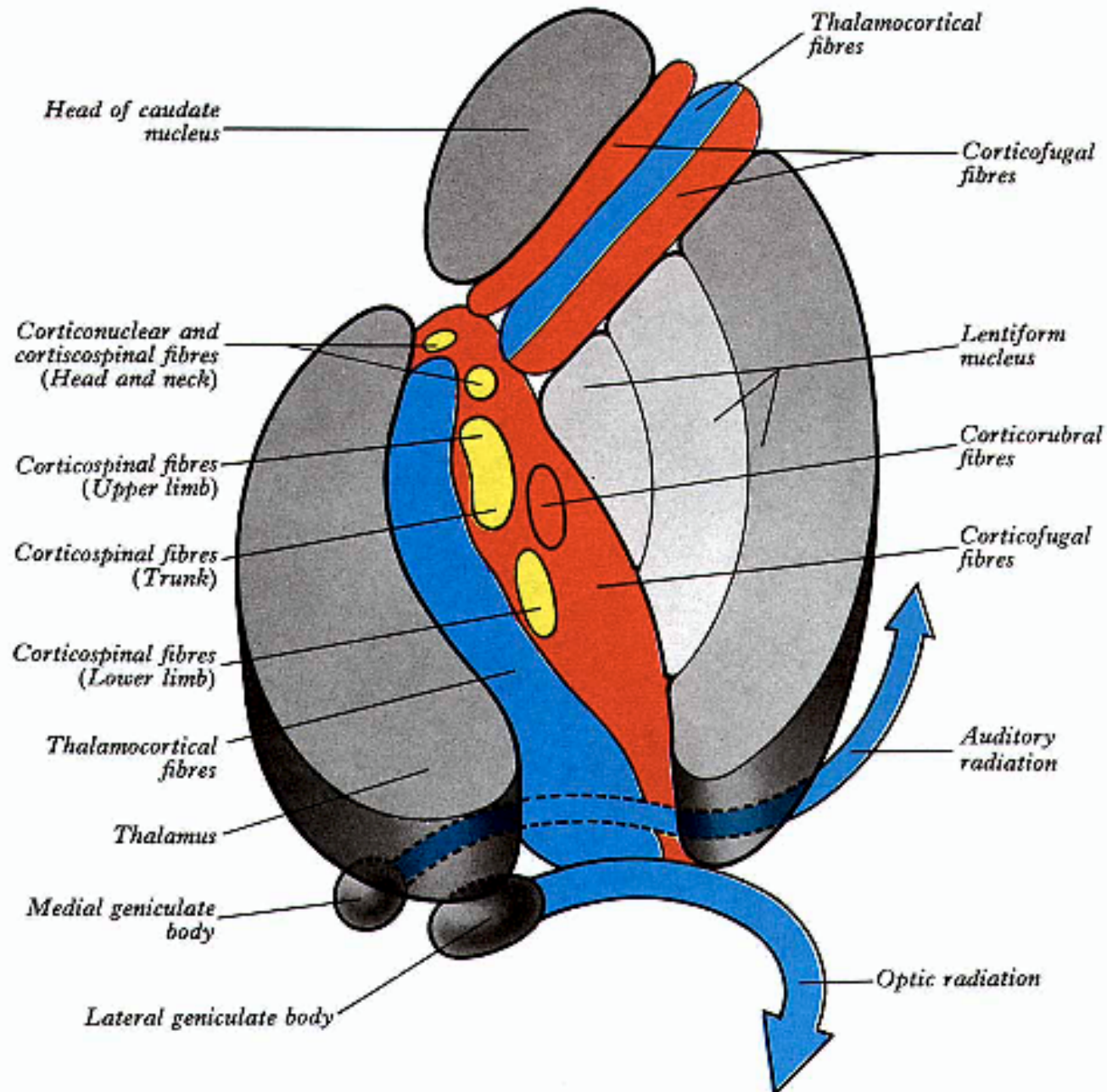
ami and third  
above after  
rlying tela. Cf.











# Thalamus

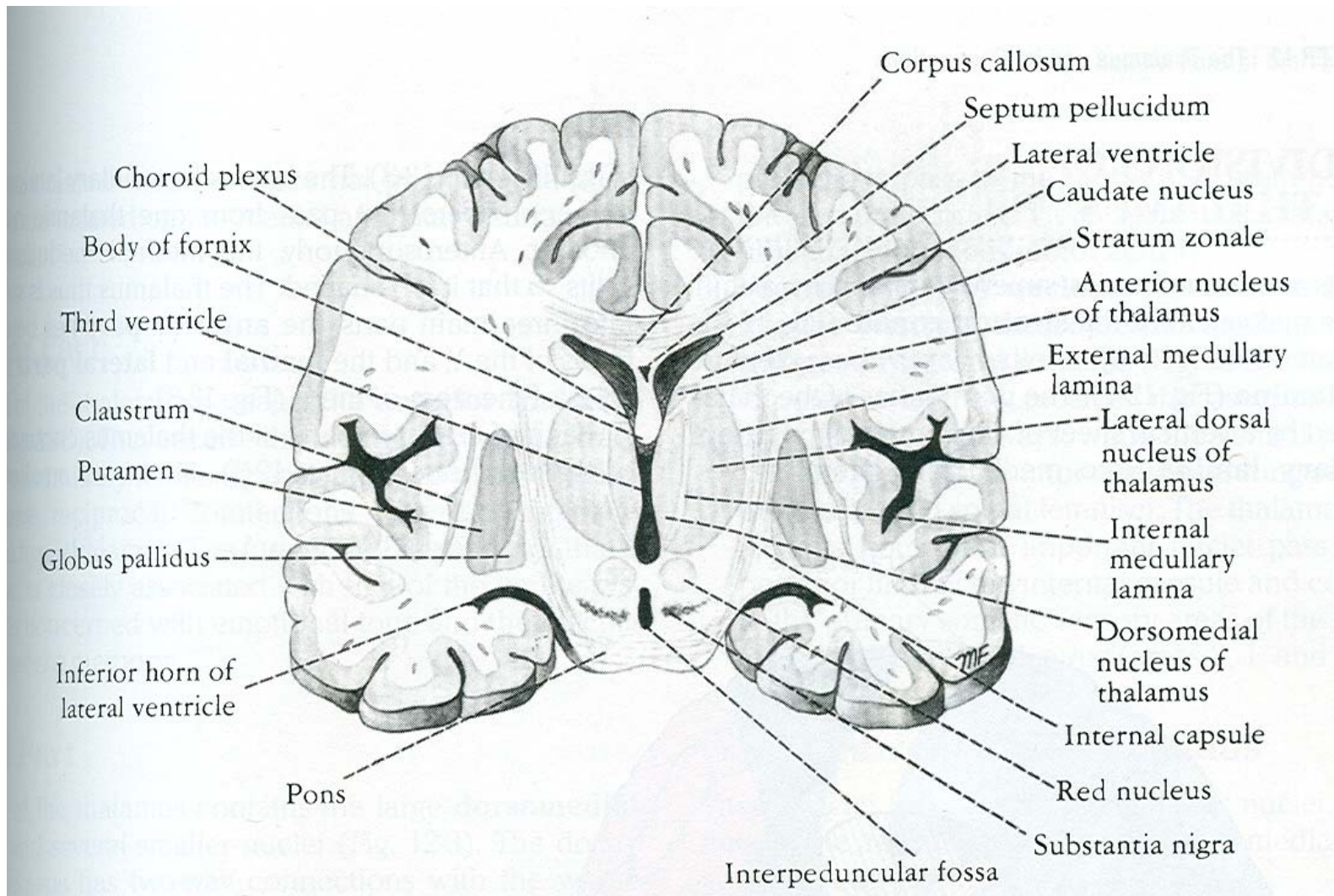
- Large mass of grey matter, lateral to 3<sup>rd</sup> ventricle.
- Processes the afferent impulses to cerebral cortex.
- Reciprocal connections with cerebral cortex & subcortical grey masses.
- Anterior & posterior ends
- Surfaces: **Medial**- lined by ependyma; forms lateral wall of third ventricle; interthalamic adhesion; hypothalamic sulcus

**Superior**- anterior tubercle; related to fornix, stria terminalis, caudate nucleus.

**Inferior**- related to hypothalamus anteriorly, to subthalamus posteriorly; post. Surface exhibits two swellings- MGB & LGB.

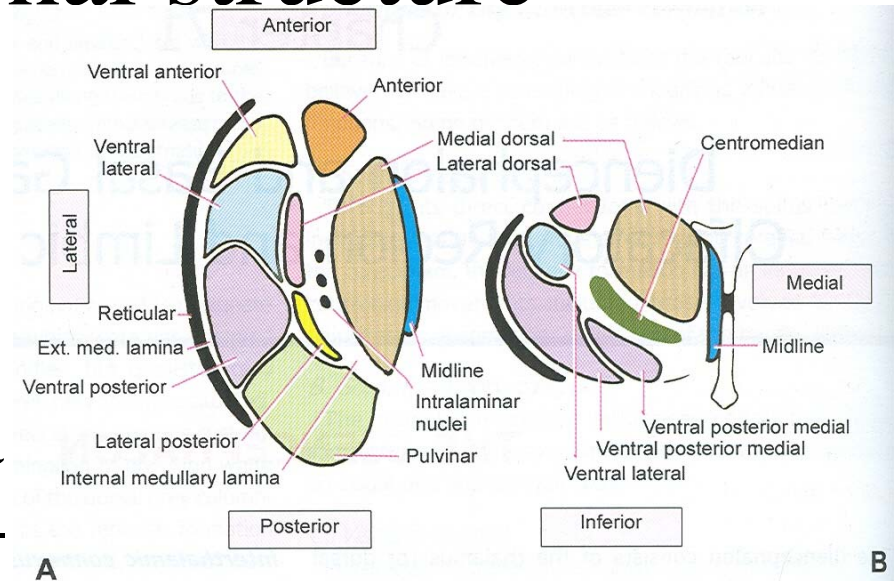
**Lateral**- in contact with internal capsule.





# Thalamus- internal structure

- Stratum zonale
- External medullary lamina
- Internal medullary lamina-



**Anterior-** anteroventral, anterodorsal, anteromedial

**Medial-** Dorsomedial

**Lateral-Dorsal-** lateral dorsal, lat. Posterior, pulvinar

**Ventral-** ventral anterior, ventral lateral, ventral posterior

# Thalamic nuclei-contd.

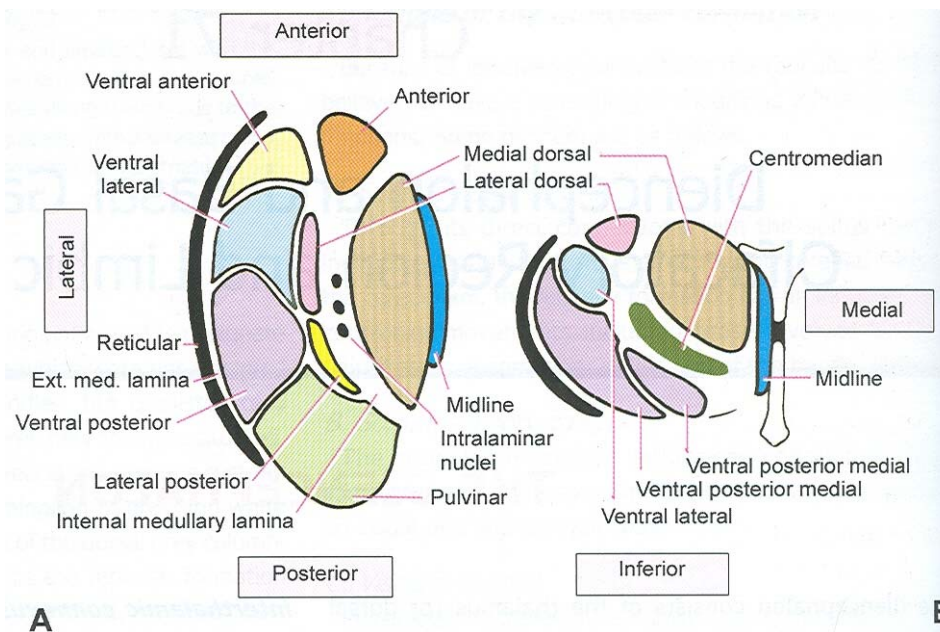
- Midline nuclei- closely associated with interthalamic adhesion; concerned with visceral activity; connected to hypothalamus, dorsomedian & to intralaminar nuclei.
- Intralaminar nuclei- separate medial & lateral nuclei. Main nuclei-centromedian, parafascicular; afferents from reticular formation, fore brain, pallidal; efferent to putamen.

- **Anterior nucleus:**

Mamillary body → AN → cingulate gyrus  
(mamillothalamic tract)

- **Dorsomedial nucleus:**

Amygdaloid body → DM → cingulate gyrus, parietal lobe, prefrontal cortex  
Globus pallidus } piriform lobe

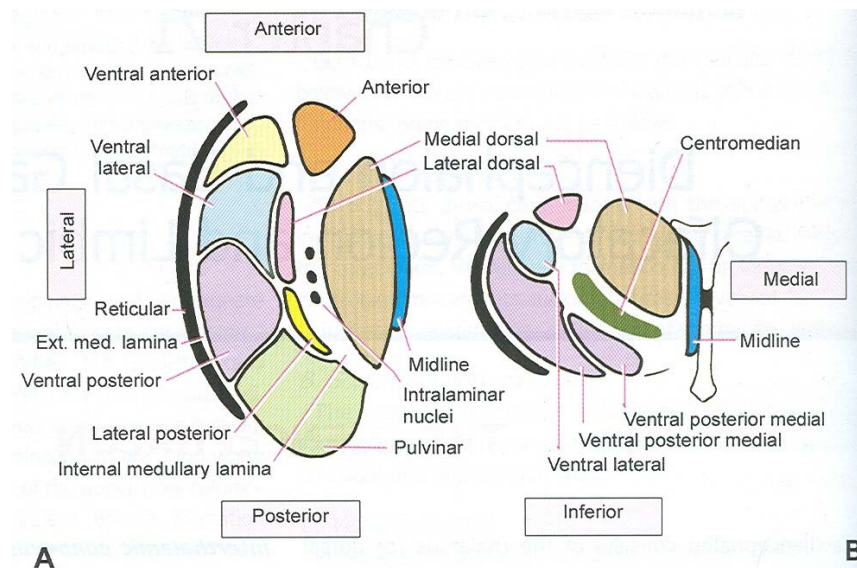


## Ventral group

- **Ventral anterior:** Globus pallidus → VA → Premotor & motor c. cortex
- **Ventral lateral-** sub. nigra, GP, precentral C.C → VM → precentral C. C.
- **Ventral Posterior:** **Ventral Posteromedial (VPM)**  
(largest somatic relay) **Ventral posterolateral (VPL)**  
Medial lemniscus → VPL → Sup. Thalamic radiations → Sensory C. Cortex  
(3,1,2)  
Spinothalamic tract → VPL ( post. Limb of Int. capsule)

Trigemino-thalamic

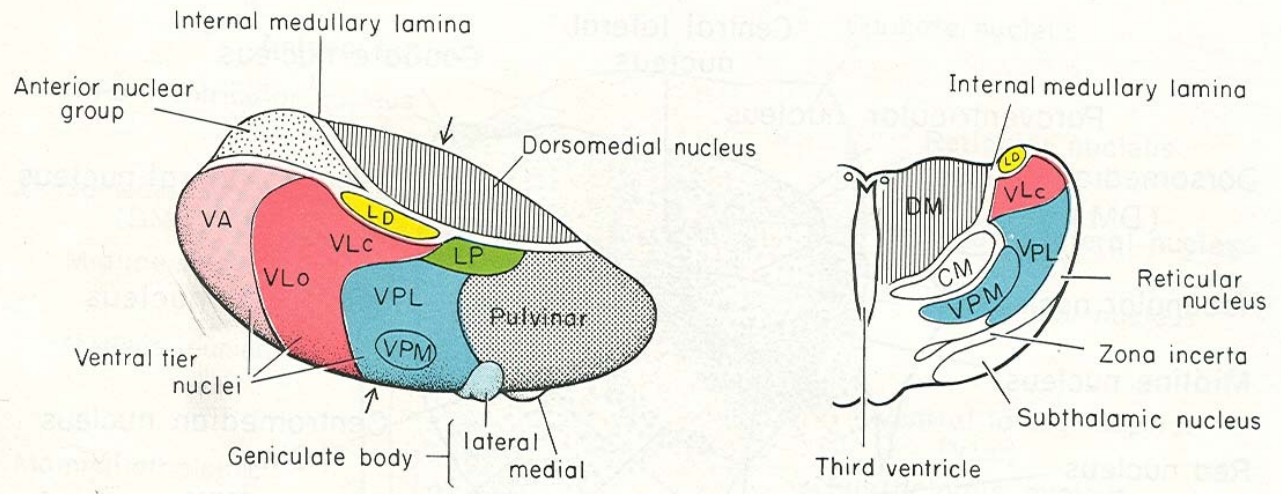
Solitariothalamic → VPM → Sensory Cerebral Cortex (3,1,2)



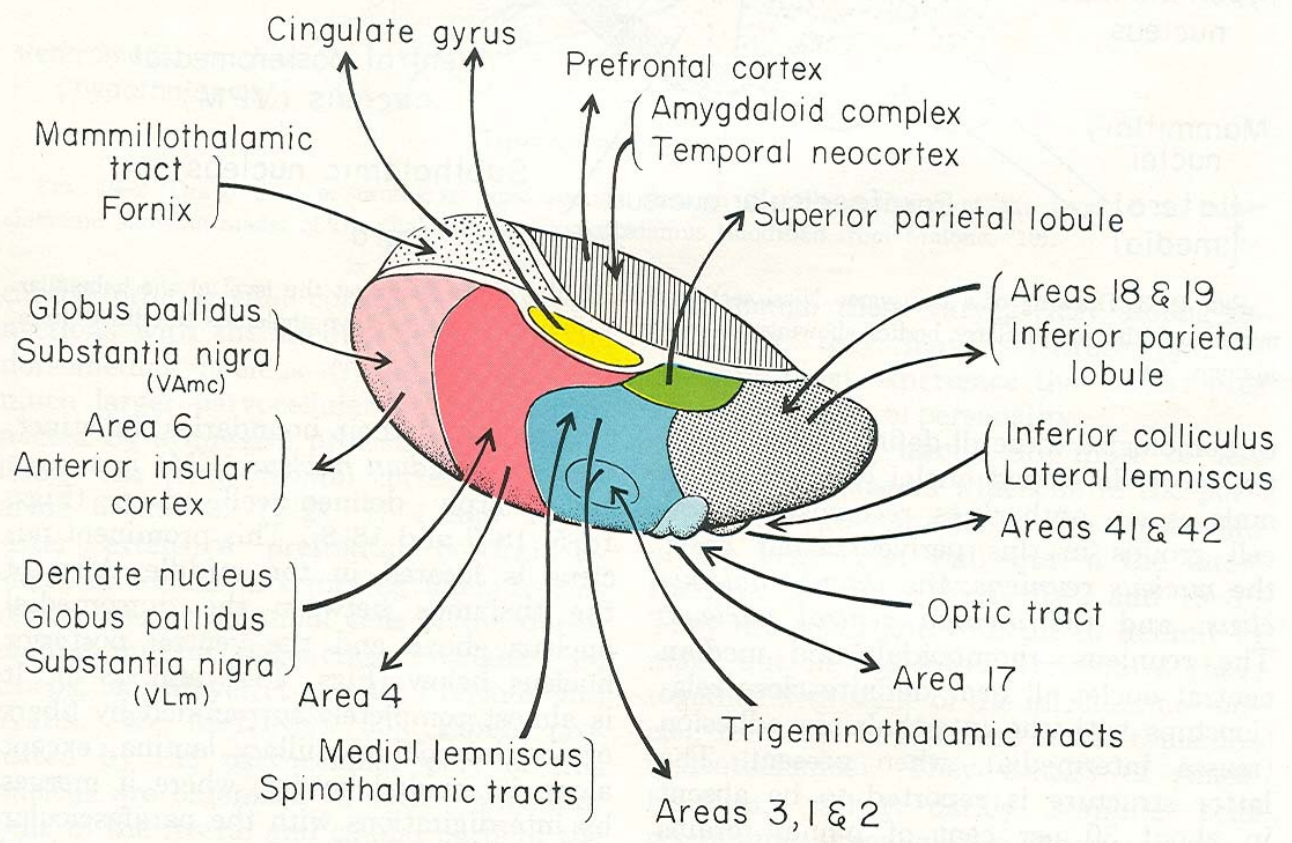
## Lateral Group

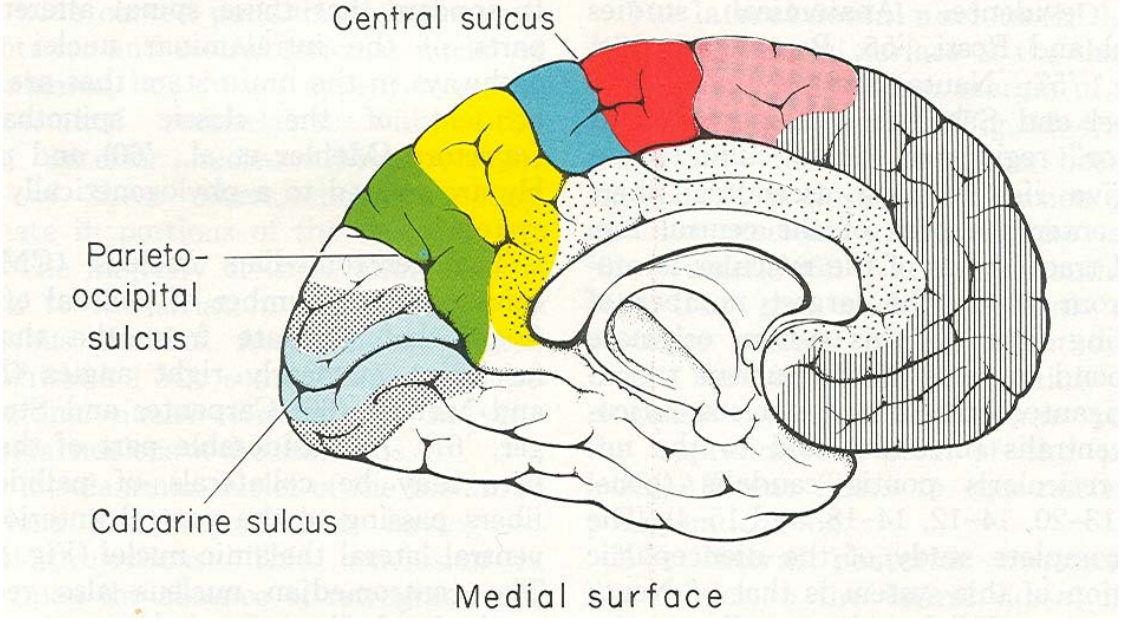
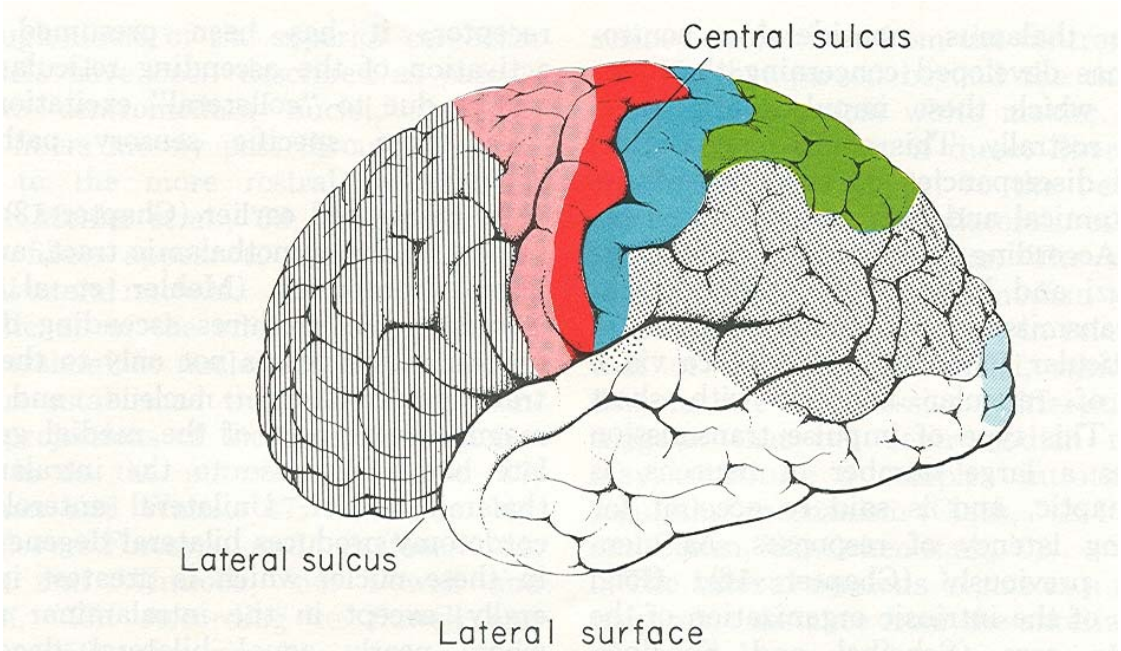
- Lateral dorsal
- Lateral posterior
- Pulvinar

Superior colliculus → LD, LP, P → sup. Parietal lobule, cingulate gyrus, parahippocampal & hippocampus, Parietal area  
Retina → P → association visual area

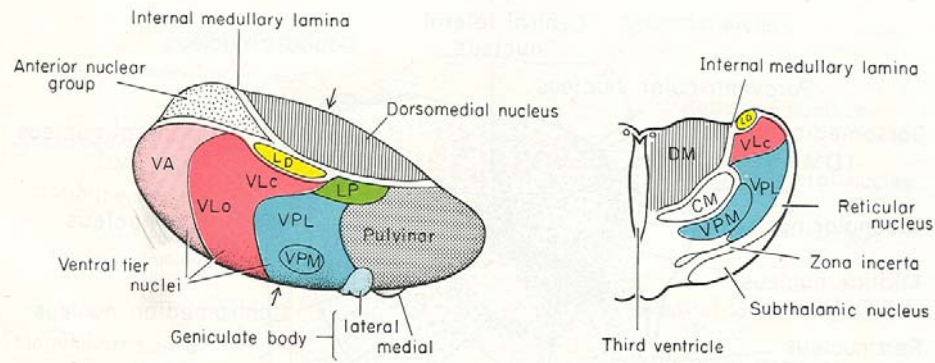


A.

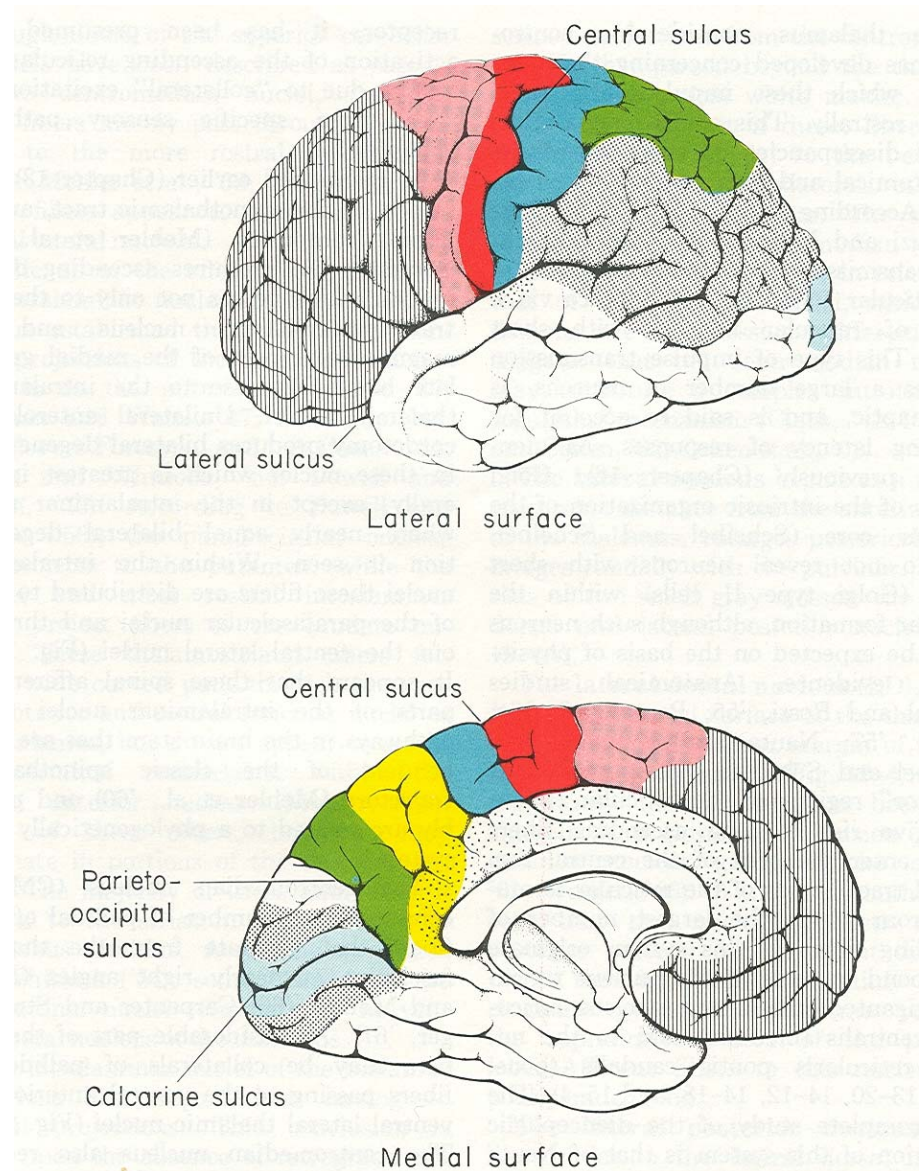
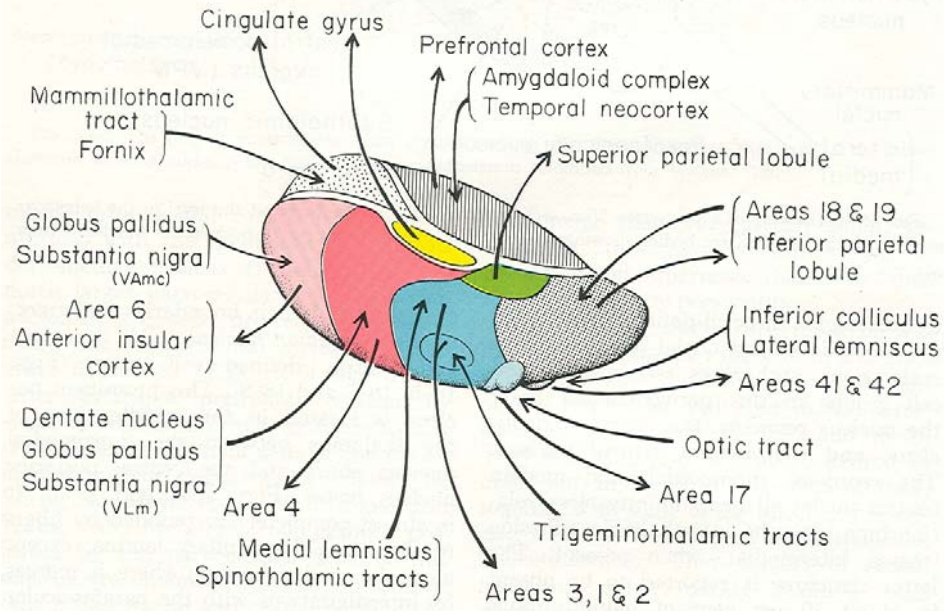


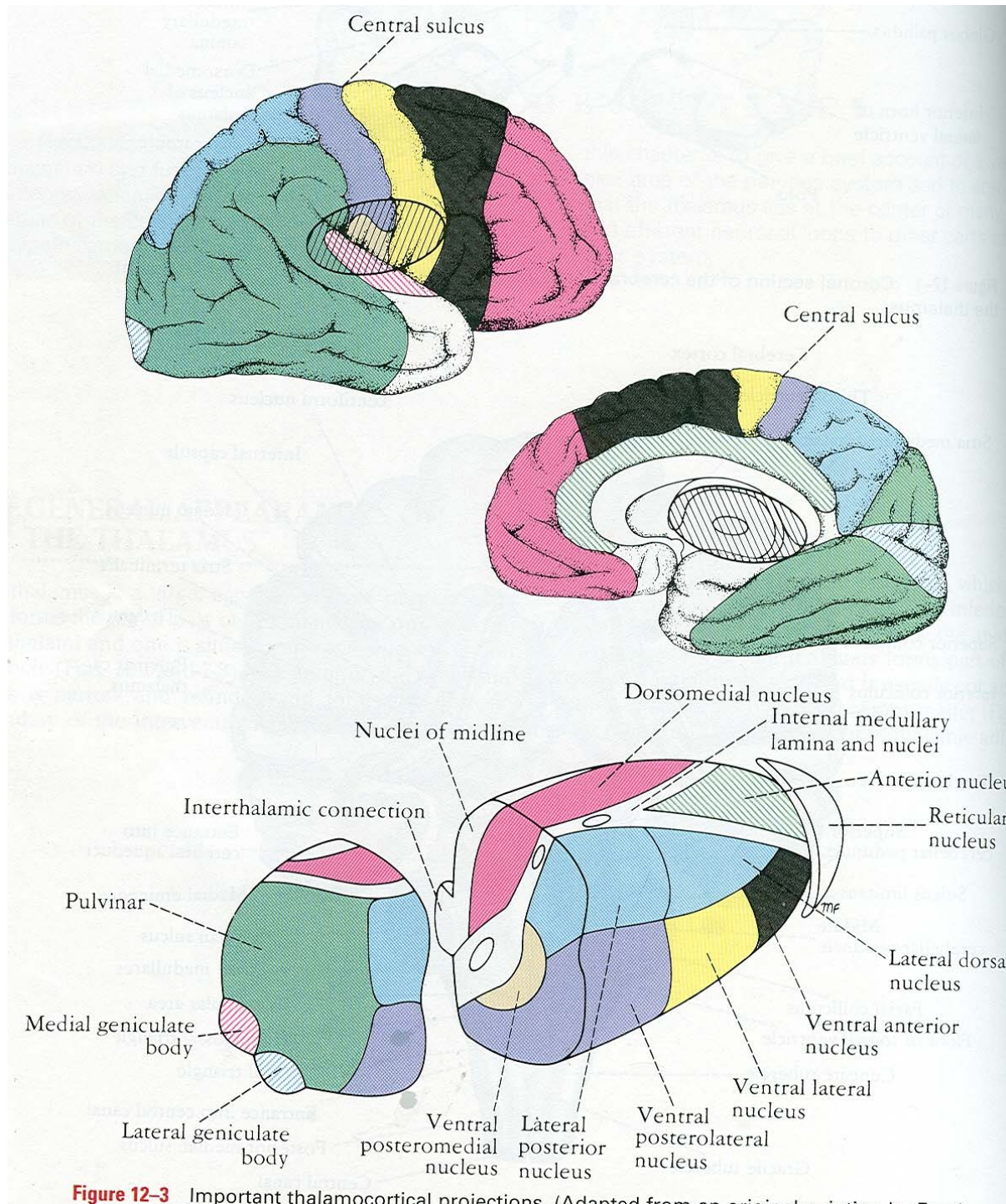






A.

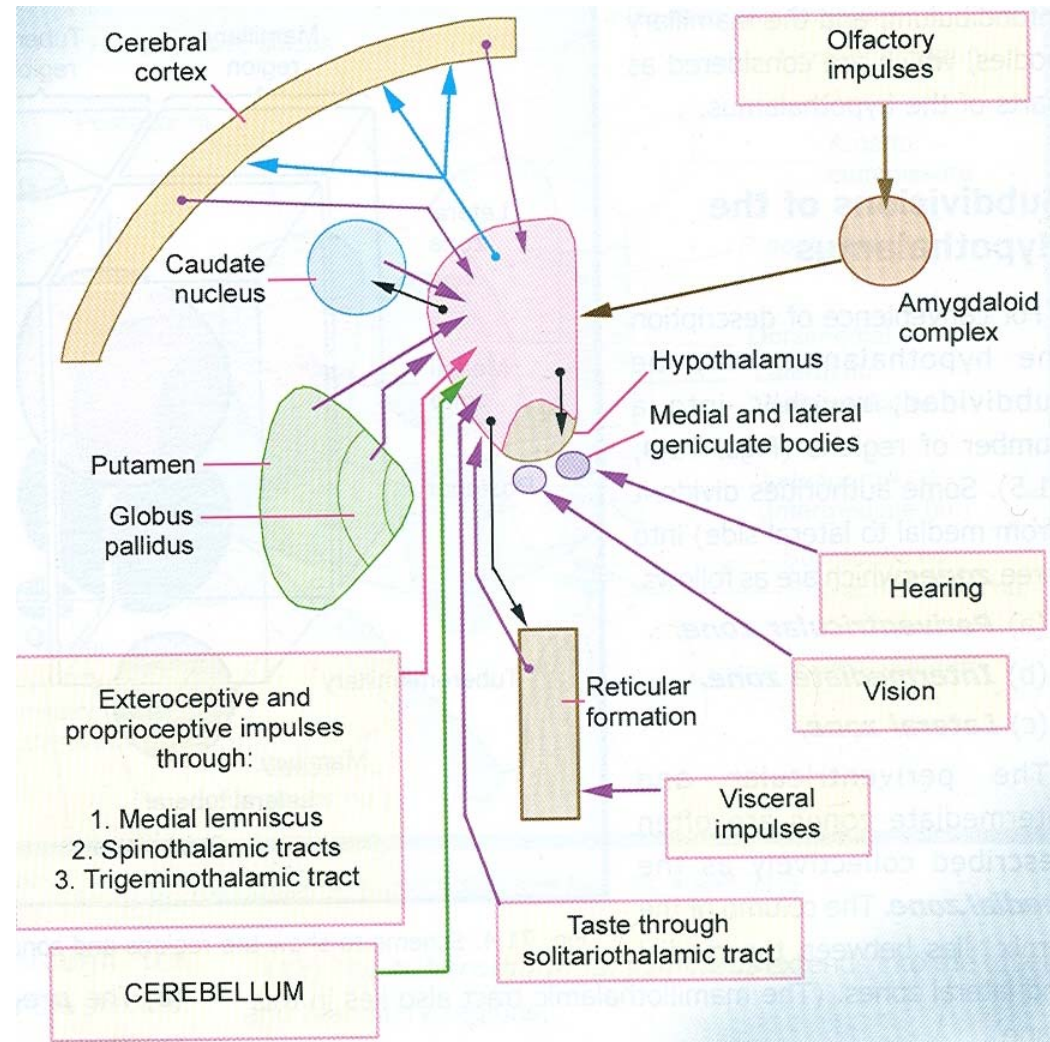


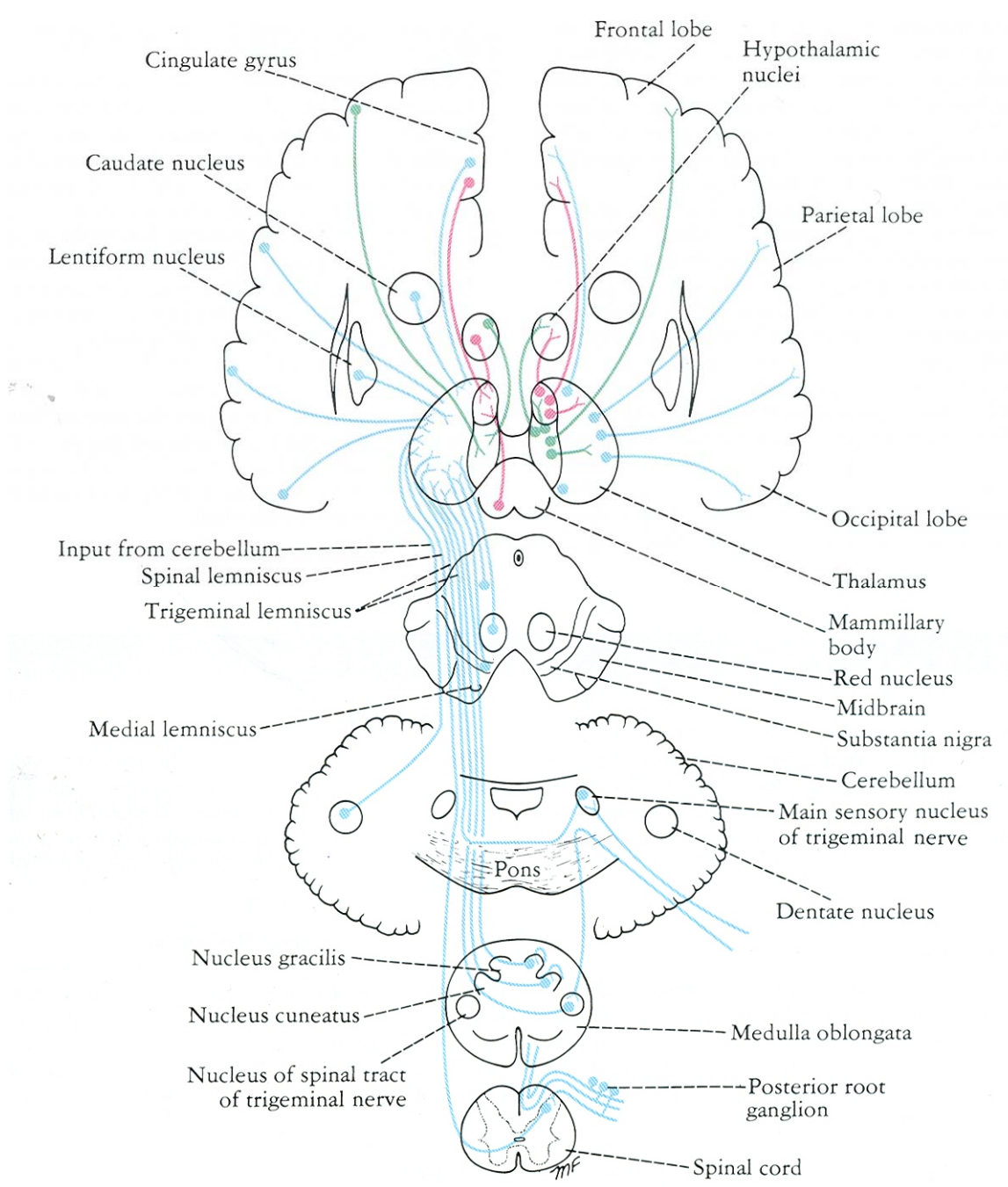


**Figure 12-3** Important thalamocortical projections. (Adapted from an original painting by Frost)

## Afferent connections

1. Spinothalamic tract  
Medial lemniscus  
Trigemino-thalamic  
Solitariothalamic
2. Optic tract
3. Auditory pathway
4. Mamillothalamic tract
5. Cerebellar fibres
6. Corpus striatum & globus pallidus
7. From cerebral cortex

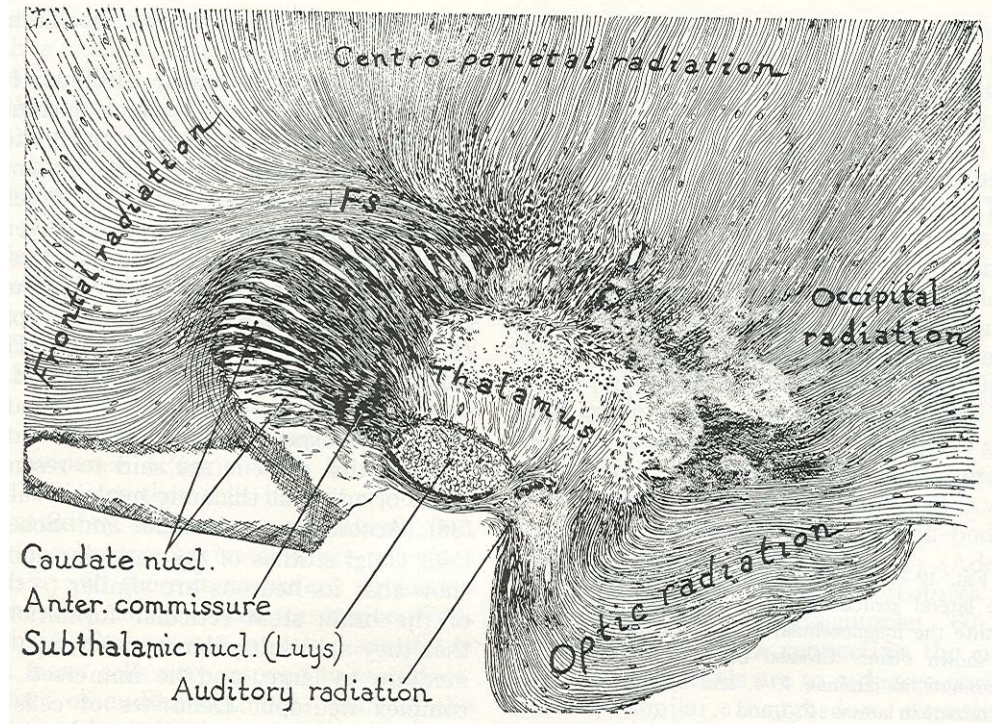


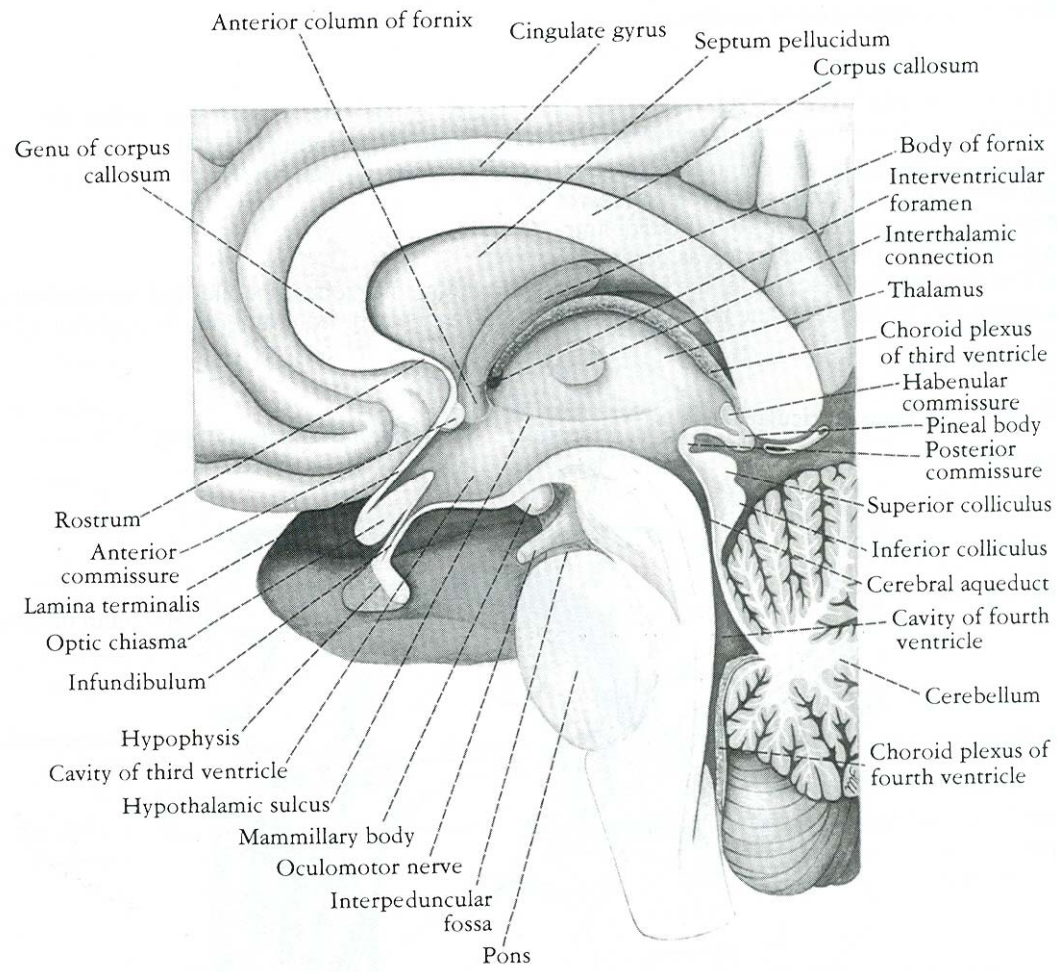


## Thalamic radiations (efferent)

1. Anterior (frontal)
2. Superior  
(centroparietal)
3. Posterior  
(occipital)
4. Inferior  
(temporal)

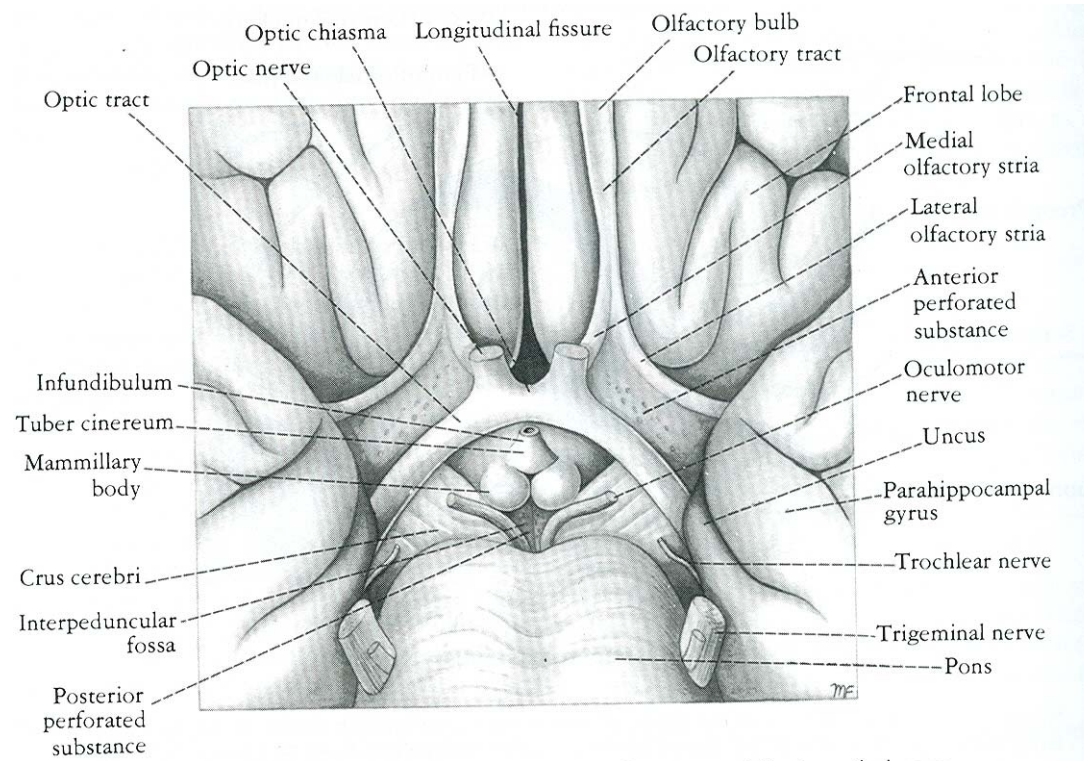
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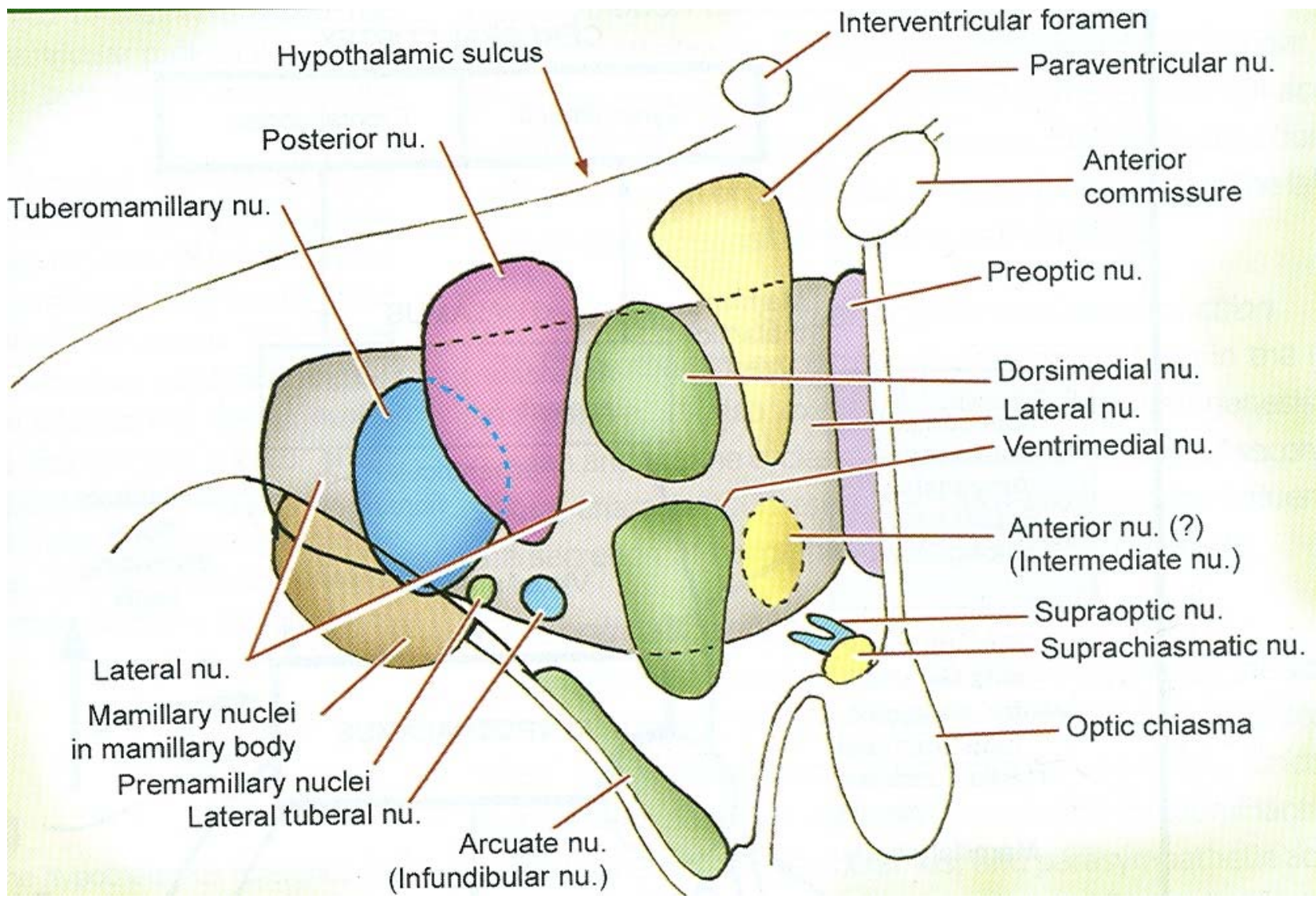


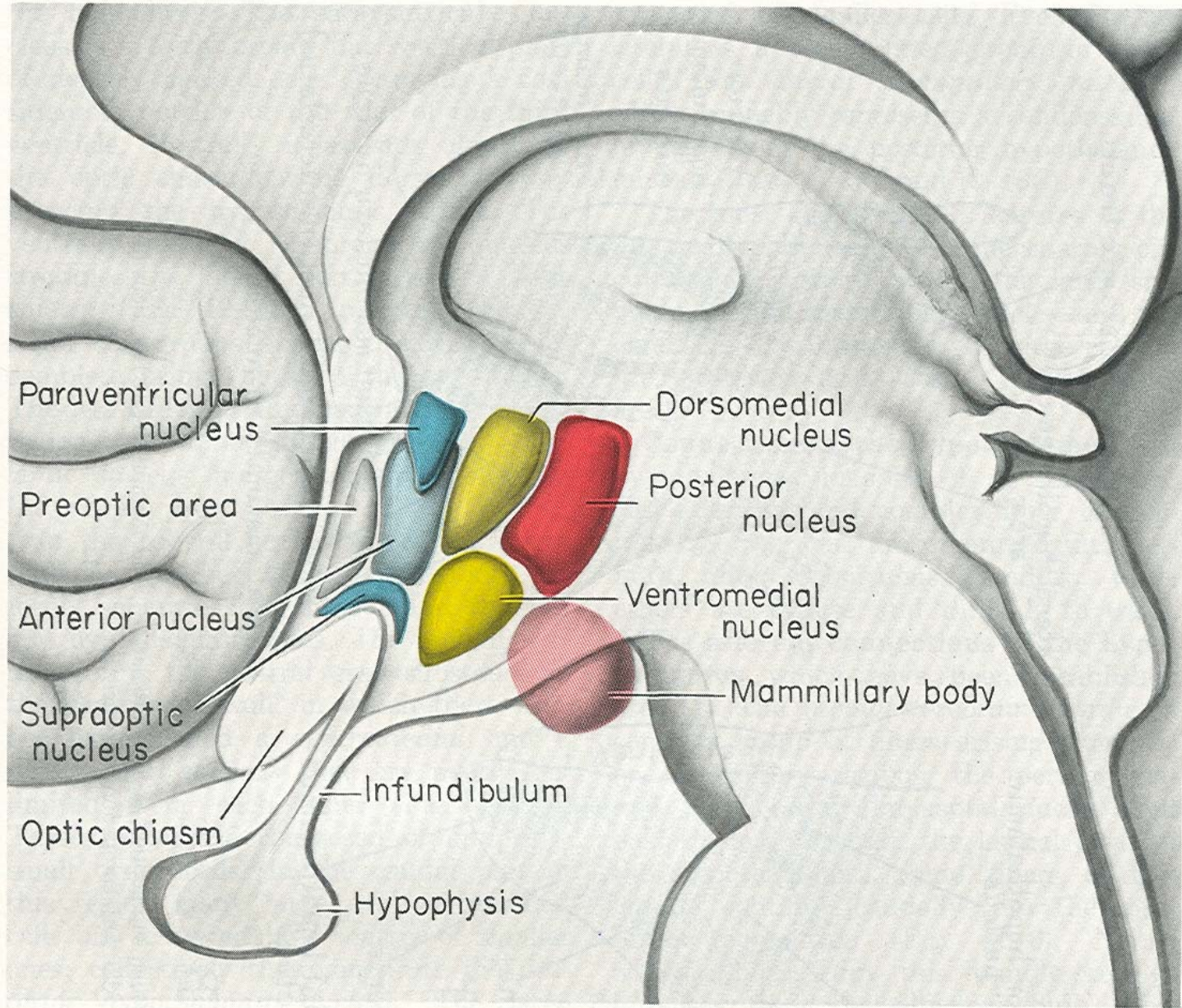
# Hypothalamus

- Below the thalamus, forms lower lateral wall of 3<sup>rd</sup> ventricle.
- Laterally in contact with internal capsule & subthalamus.
- Posteriorly merges with subthalamus.
- Anteriorly extends up to lamina terminalis.
- Inferiorly related to structures in floor of 3<sup>rd</sup> ventricle.
- Medial and lateral zones









Paraventricular nucleus

Preoptic area

Anterior nucleus

Supraoptic nucleus

Optic chiasm

Infundibulum

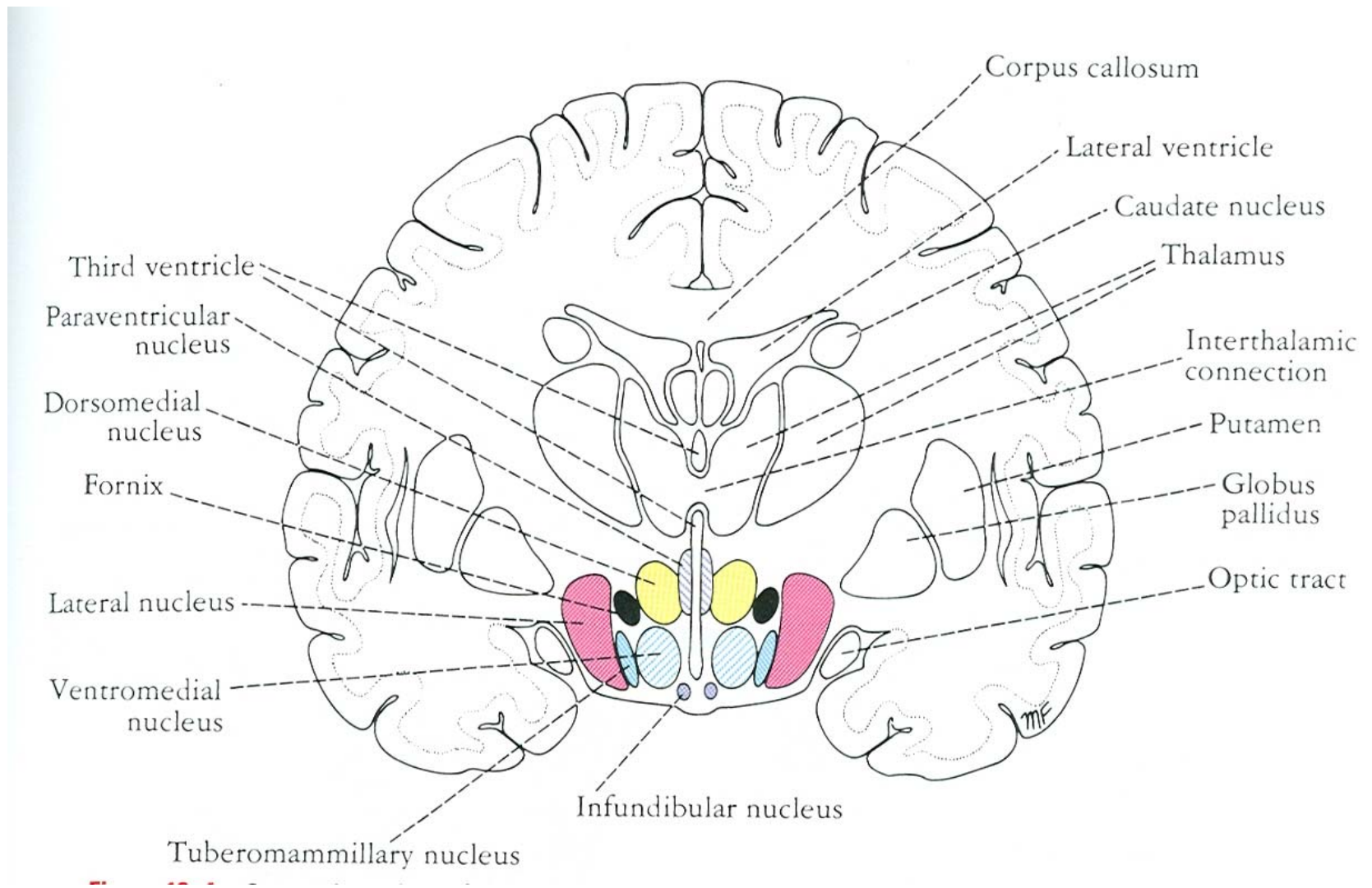
Hypophysis

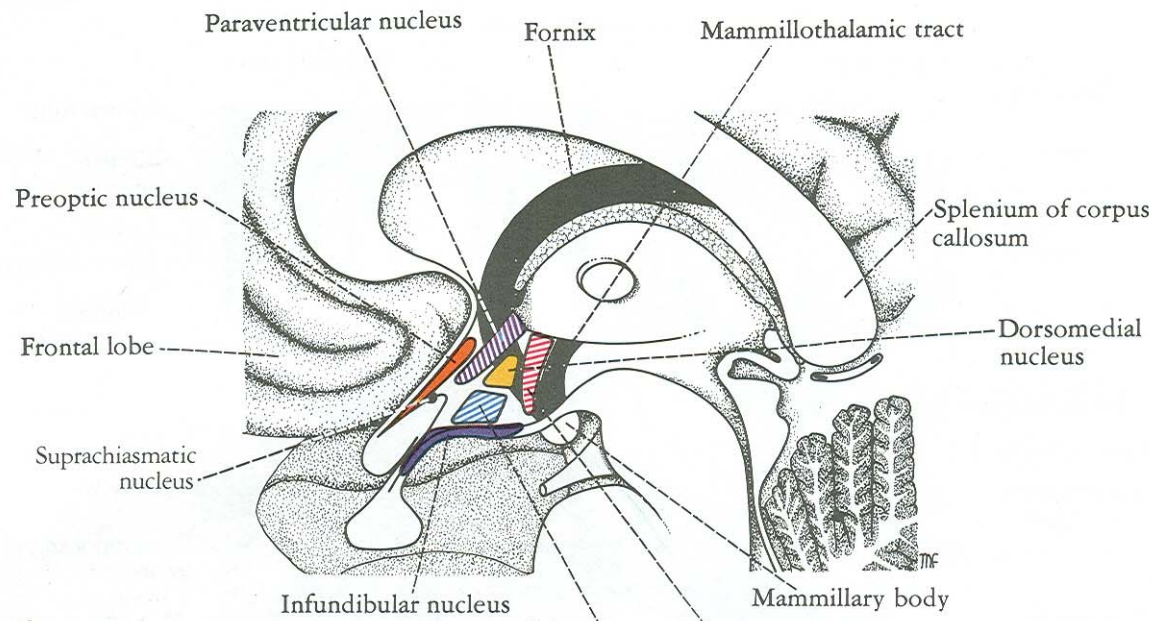
Dorsomedial nucleus

Posterior nucleus

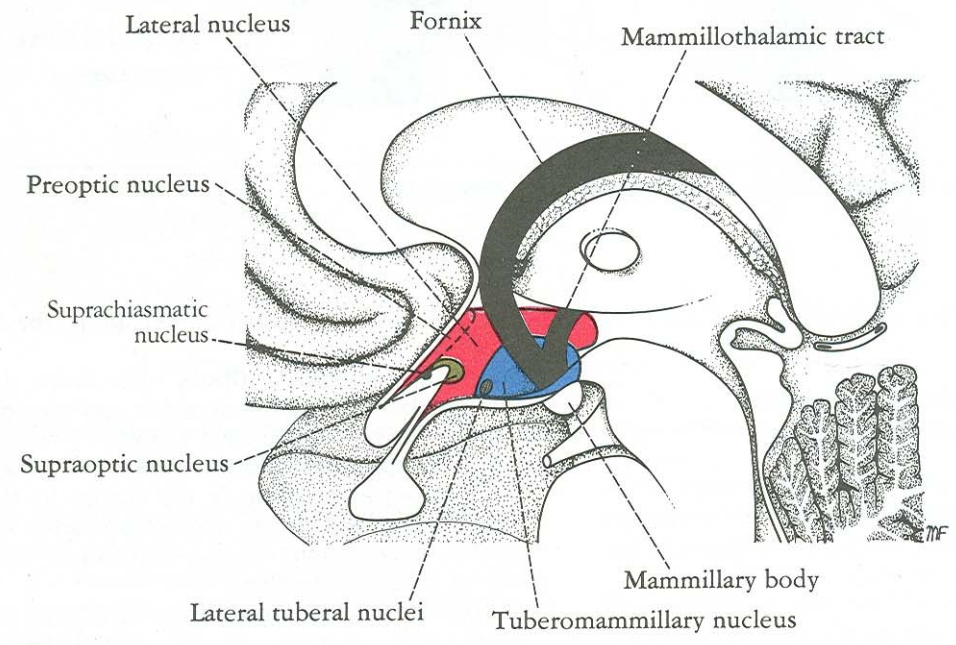
Ventromedial nucleus

Mammillary body





A



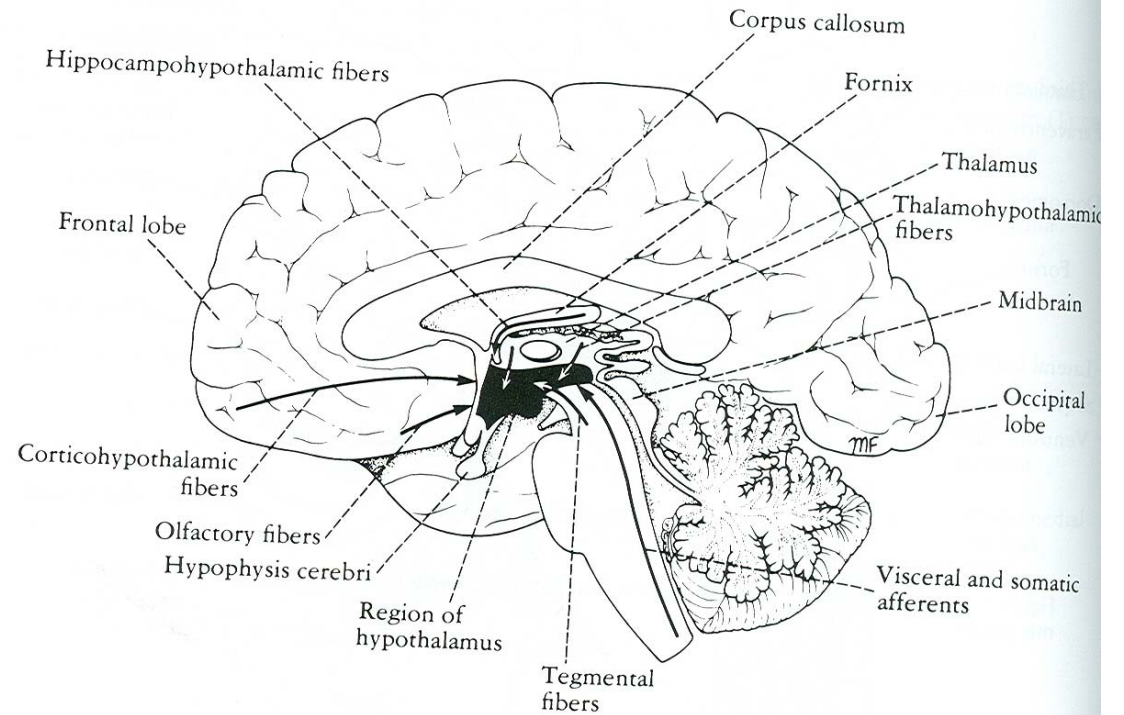
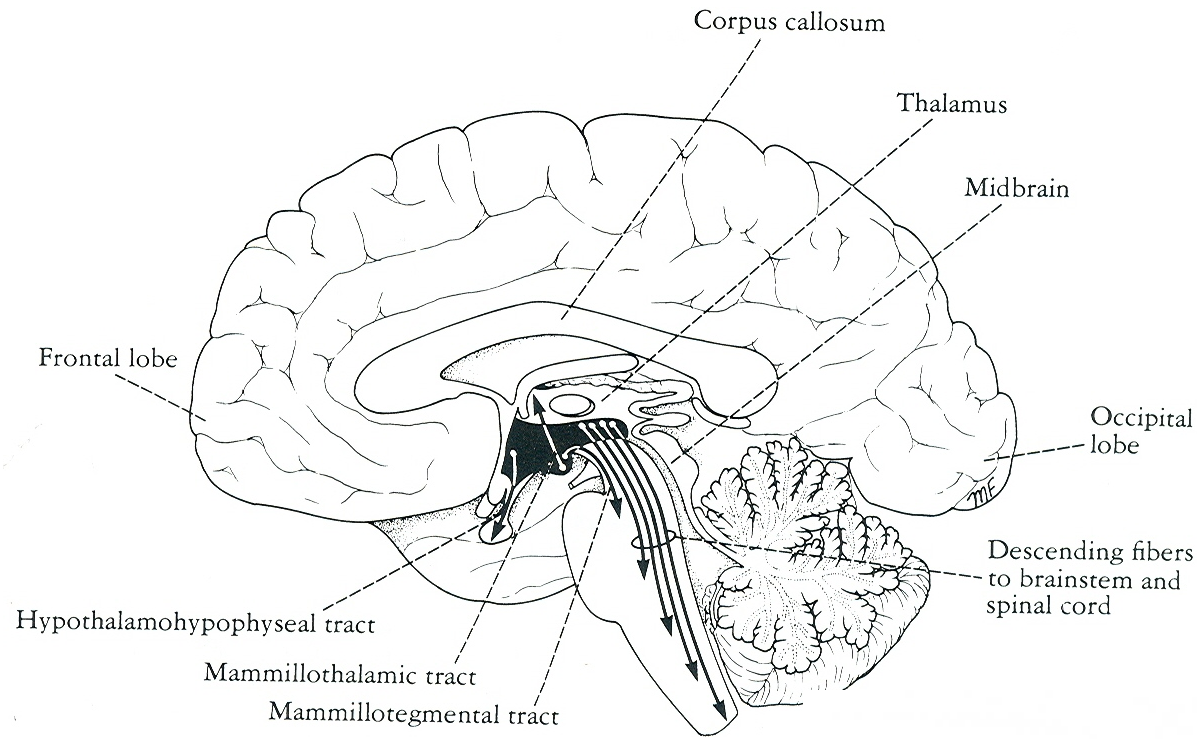
B

	Medial zone (Periventricular and intermediate)	Lateral zone
	Preoptic nucleus	
Supraoptic region	Paraventricular nu. Periventricular cell groups Suprachiasmatic nu. Intermediate cell groups (= anterior nucleus ?)	Supraoptic nucleus*
Tuberal region	Dorsomedial nucleus Ventrimedial nucleus Arcuate (infundibular) nucleus Premamillary nucleus	Lateral tuberal nucleus
Mamillary or posterior region	Posterior nucleus (lies partly in tuberal region)	Tuberomamillary nucleus*
	Mamillary nuclei	

\*From a functional point of view the supraoptic and tuberomamillary nuclei are grouped with the nuclei of the intermediate zone.

# Afferent connections

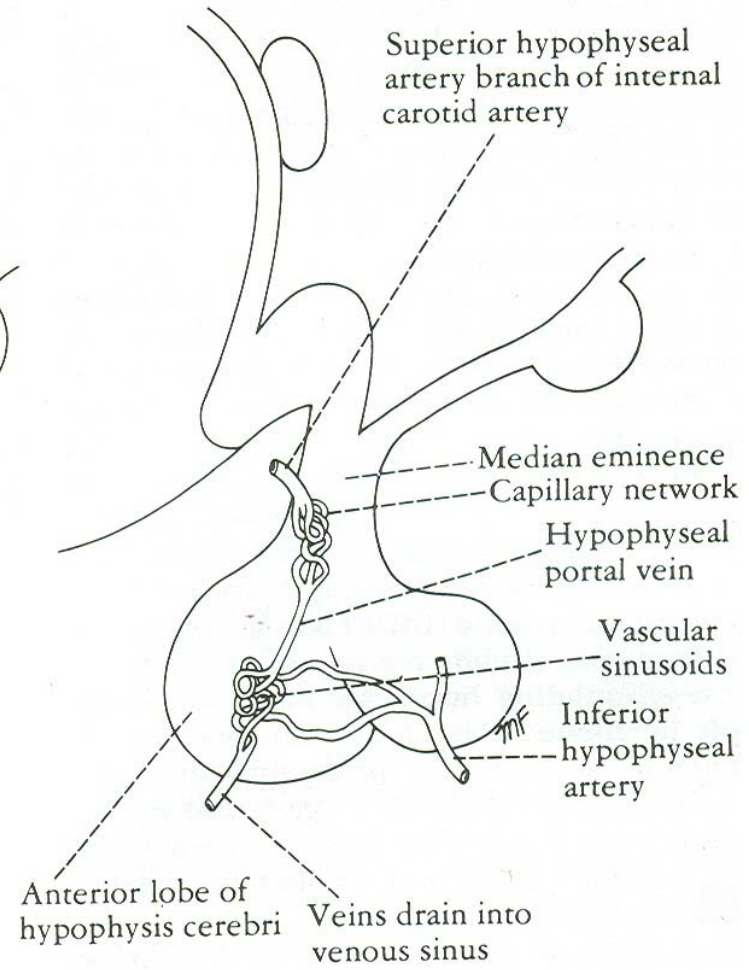
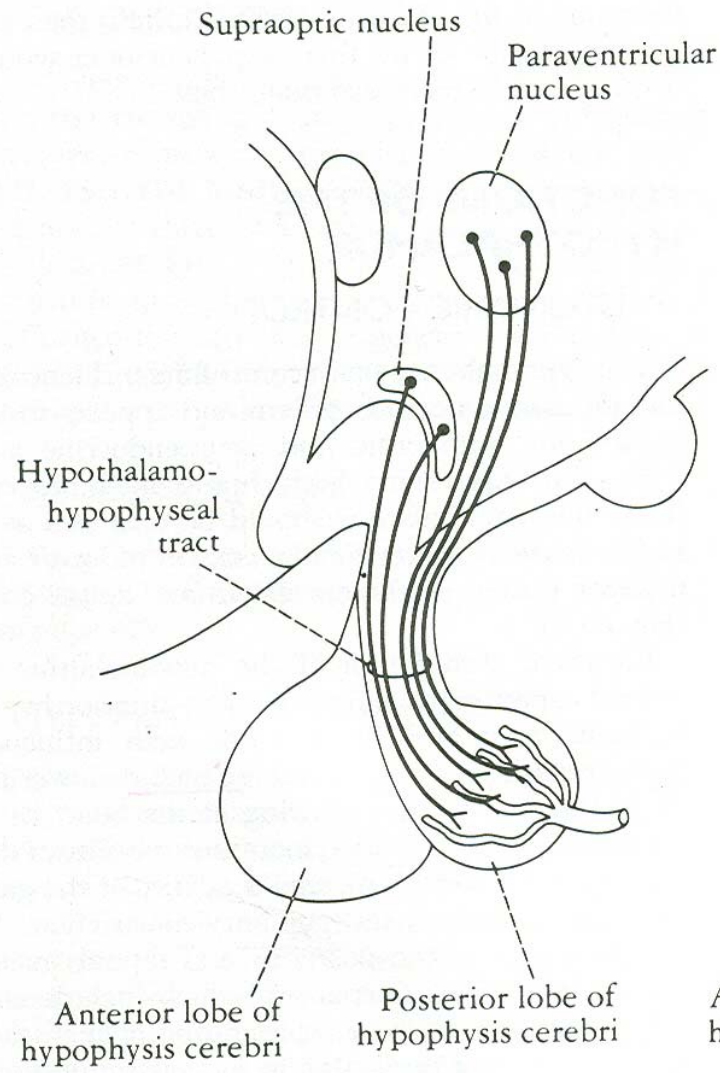
1. From spinal cord & brainstem (via reticular formation)
2. Nucleus of tractus solitarius
3. Olfactory pathways
4. Limbic system
5. Locus coeruleus
6. From piriform cortex, orbital cortex
7. From subthalamus & zona incerta

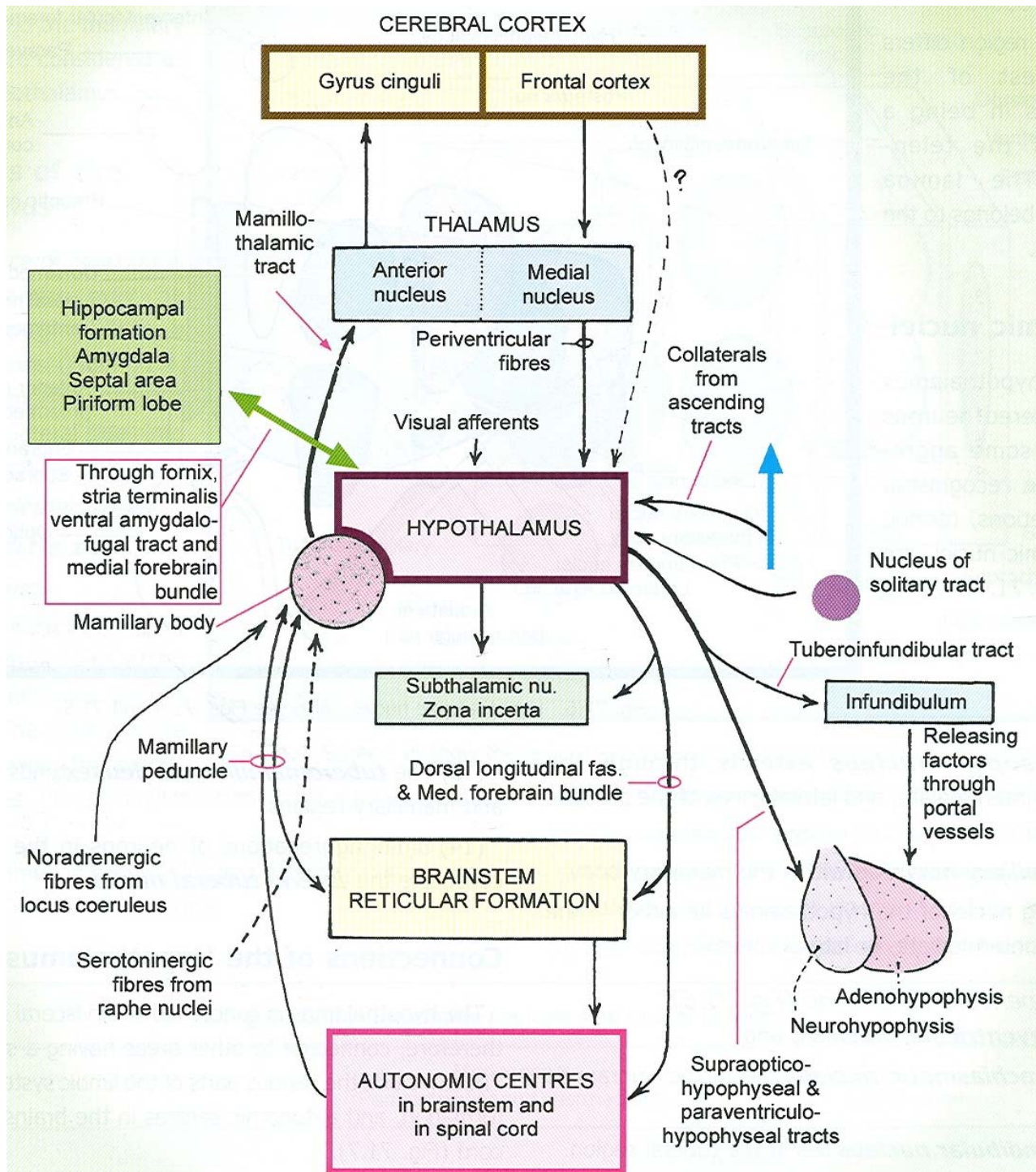


# Efferent connections

1. To autonomic centres in brain stem and spinal cord e.g. tractus solitarius, dorsal nucleus of vagus, nucleus ambiguus, intermedio-lateral grey column.
2. To hippocampal formation, septal nuclei, amygdaloid complex, tegmentum.
3. To anterior nucleus of thalamus (mamillothalamic tract)
4. To subthalamus & tegmentum (mamillo-tegmental tract)
5. To neocortex
6. Control of pituitary gland
  - neurosecretion
  - release of vasopressin (ADH); oxytocin
  - control of post. Neurohypophysis
  - production of releasing factors (tubero-hypophyseal)
  - hypothalamo-hypophysial portal system





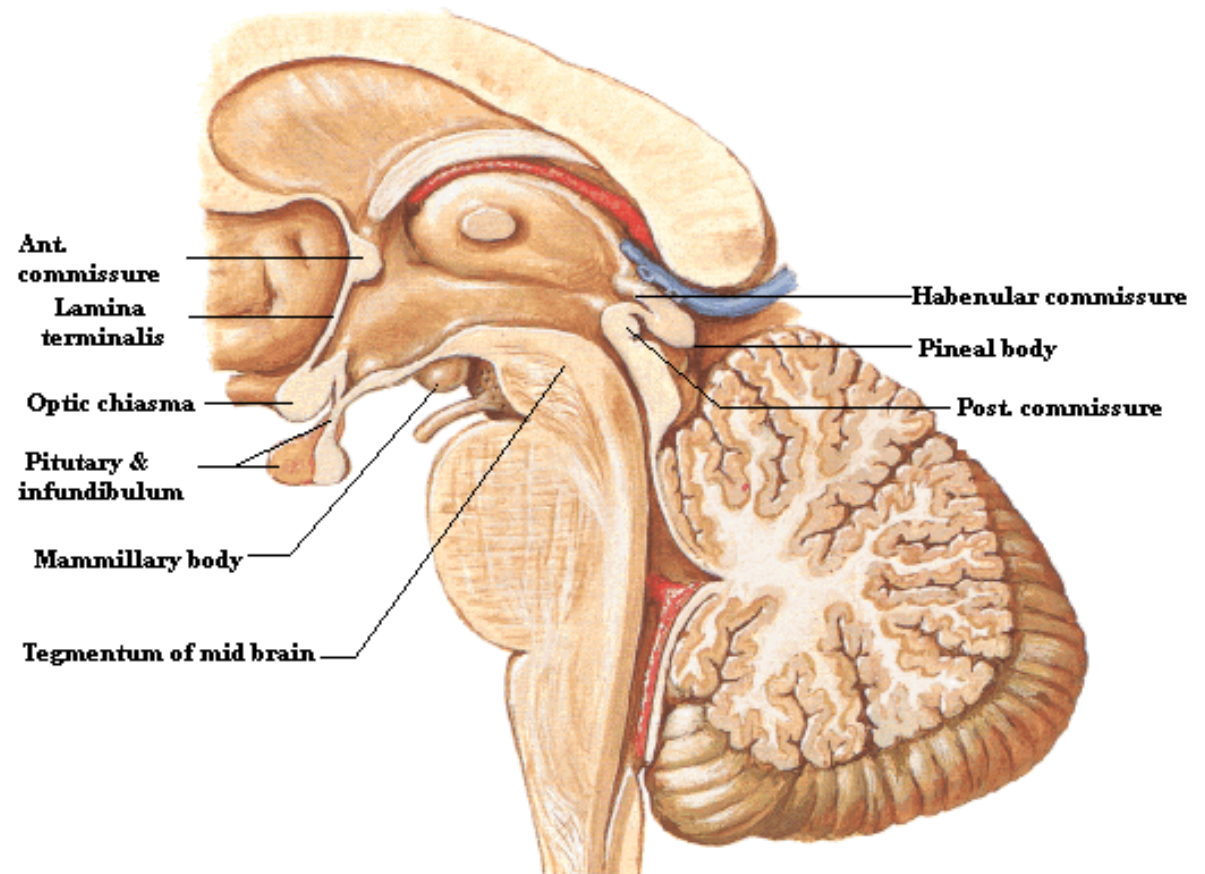


# Functions

1. Regulation of eating & drinking behaviour
2. Regulation of sexual activity & reproduction
3. Control of autonomic activity
4. Control of endocrine system
5. Emotional behaviour
6. Response to stress
7. Temperature regulation
8. Biological clock

# Epithalamus

- Visceral efferent pathway to convey impulses to brain stem.
- Pineal body
- Habenular trigone
- Stria medullares

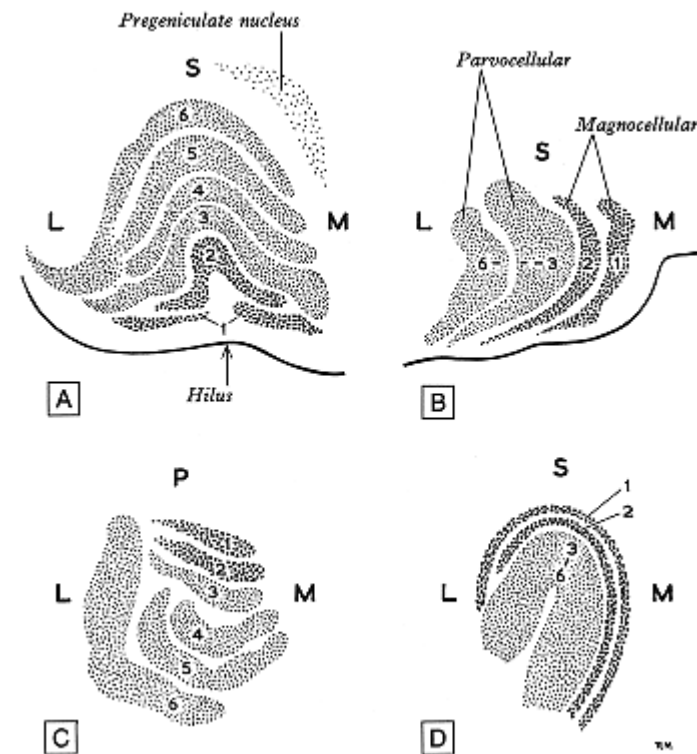


# Pineal body

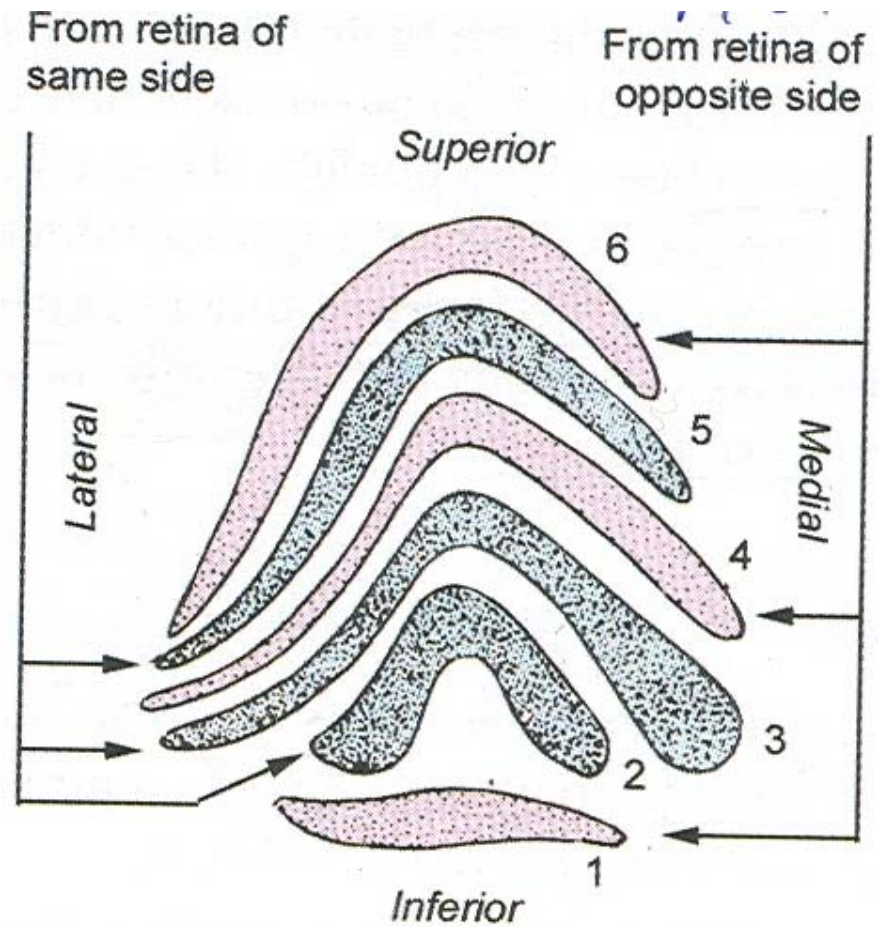
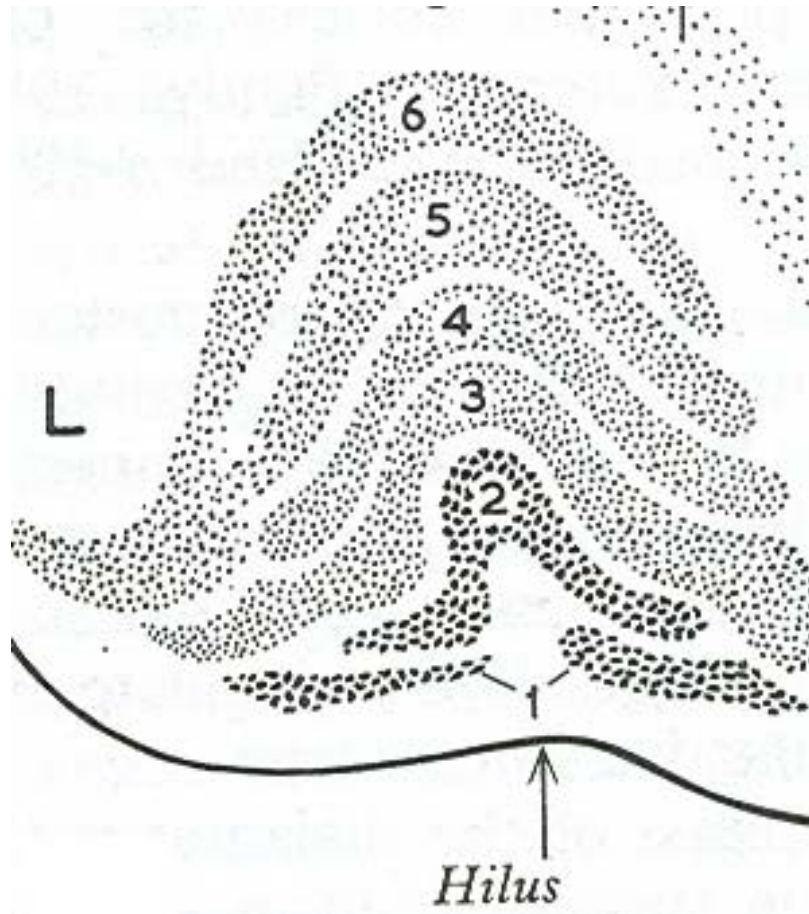
- Cone shaped body attached to roof of 3<sup>rd</sup> ventricle
- Rudimentary gland
- Richly vascular connective tissue along with glia cells and pineal cells.
- Receives fibres from stria medullares, habenular nuclei & post. Com.
- Inhibits gonadal function.
- After 16 yrs., calcereous bodies present which are visible in skull x-rays.
- Identification & position of pineal gland in skull films.

# Metathalamus

- Medial geniculate body
- Lateral geniculate body



# Lateral geniculate body



# Subthalamus

- Lies below post. part of thalamus
- Inferiorly continuous with tegmentum
- Laterally related to internal capsule
- Reticular nucleus: separated from thalamus.

somatic, visceral, auditory, reticular formation send afferents to reticular nucleus which connects to dorsal part of thalamus.

- Zona incerta: connected to reticular nucleus; function not known.
- Subthalamic nucleus: closely related to zona incerta on one side and red nucleus on the other side. Subthalamic fasciculus pass to globus pallidus.



# Applied anatomy

- **Lesions of thalamus:** sensory loss
  - thalamic pain
  - thalamic hand
  - abnormal involuntary movements
- **Subthalamic lesions:** sudden, forceful, jerky/violent involuntary movements in a contralateral extremity.
- **Pineal body:** pineal tumors result in alteration of reproductive function.
- **Hypothalamus:**
  - Obesity/wasting
  - Sexual disorders
  - Hypo/hyperthermia
  - Diabetes insipidus
  - Disturbance in sleep
  - Emotional disorders