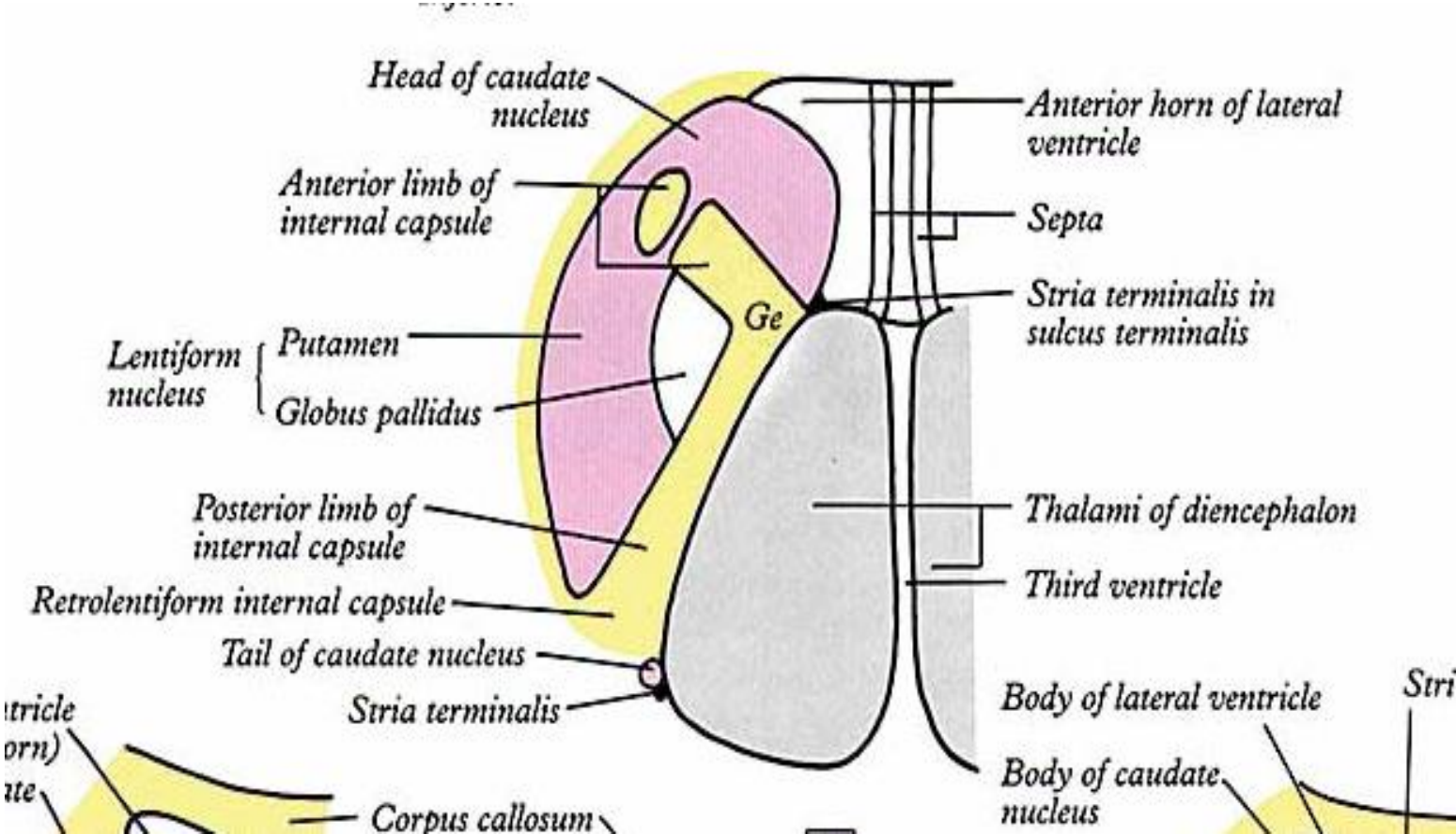
Basal nuclei

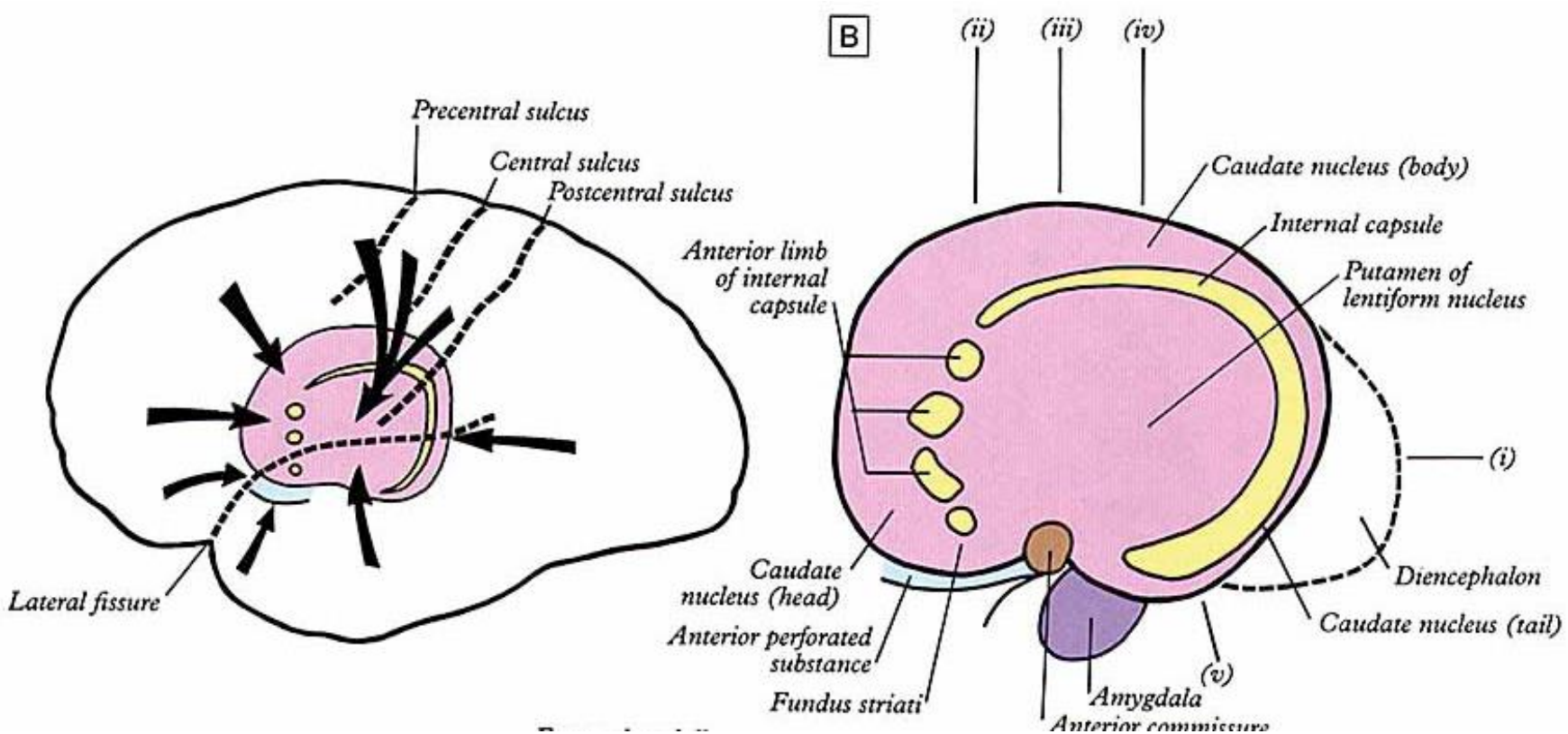
- **These are the sub cortical grey masses lateral to the thalamus in the inferior parts of each cerebral hemisphere. They include;**
- ***corpus striatum(****lentiform* **and** ***caudate nuclei)***
- ***claustrum, and***
- ***amygdaloid complex.***

Corpus striatum

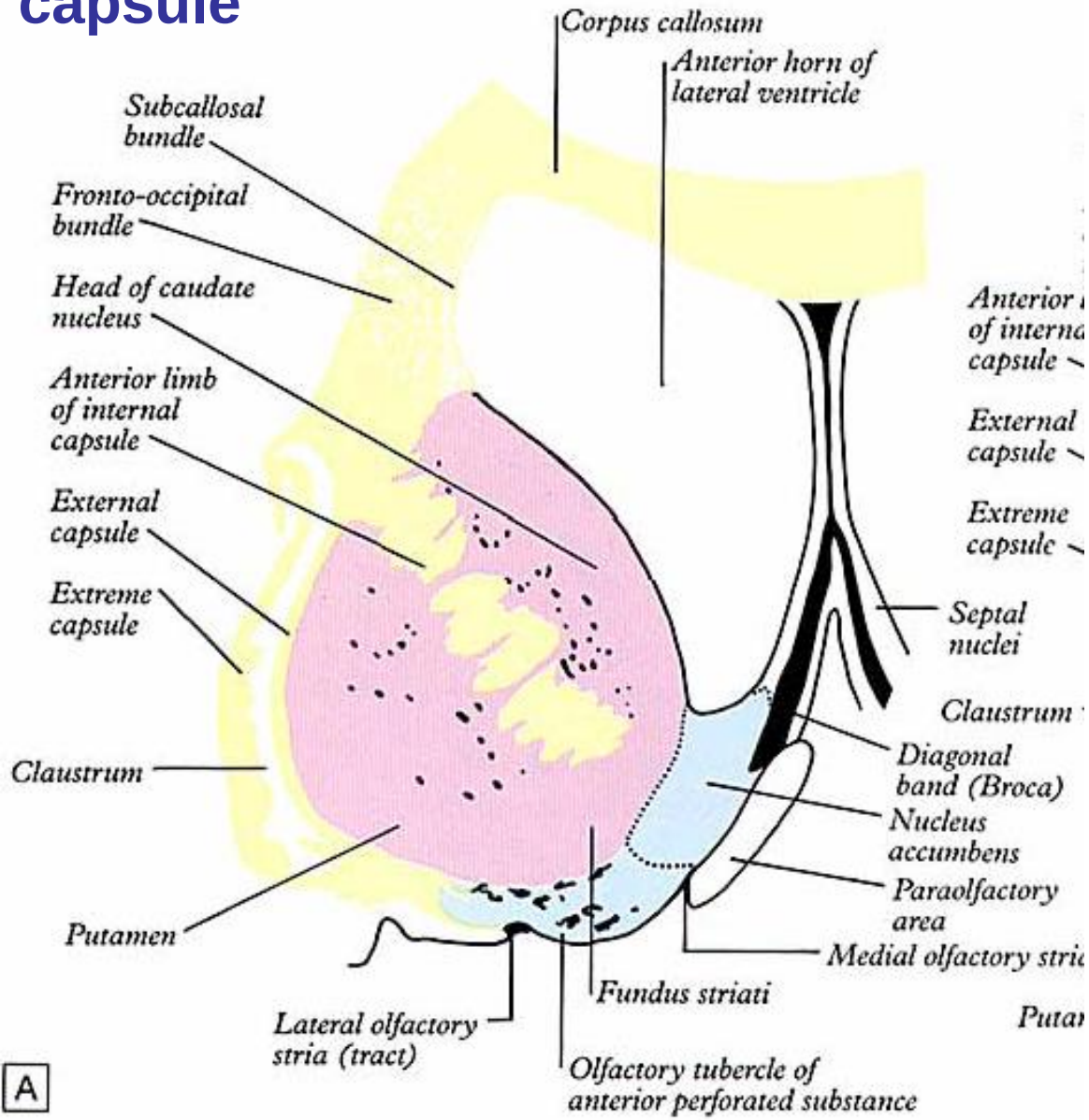
- functionally related to the *subthalamic* part of the diencephalon, and to *substantia nigra* of the midbrain
- comprises the *lentiform* and *caudate nuclei*, separated from one another by the internal capsule.

- **the lentiform nucleus is subdivided into**
- **the medially placed *globus pallidus*, or pallidum and a**
- **lateral part, the *putamen* ;'pruned' (مشذّب)from the caudate nucleus,**
- **it resembles the caudate nucleus in general texture and appearance,**
- **forms a structural/ functional unit with the caudate nucleus.**




Precentral sulcus
Central sulcus
Postcentral sulcus
Lateral fissure
B
(ii)
(iii)
(iv)
Caudate nucleus (body)
Internal capsule
Anterior limb of internal capsule
Putamen of lentiform nucleus
(i)
Diencephalon
Caudate nucleus (head)
Caudate nucleus (tail)
Anterior perforated substance
(v)
Fundus striati
Amygdala
Anterior commissure

The caudate nucleus is for the most part separated from the lentiform nucleus by the anterior limb of the internal capsule

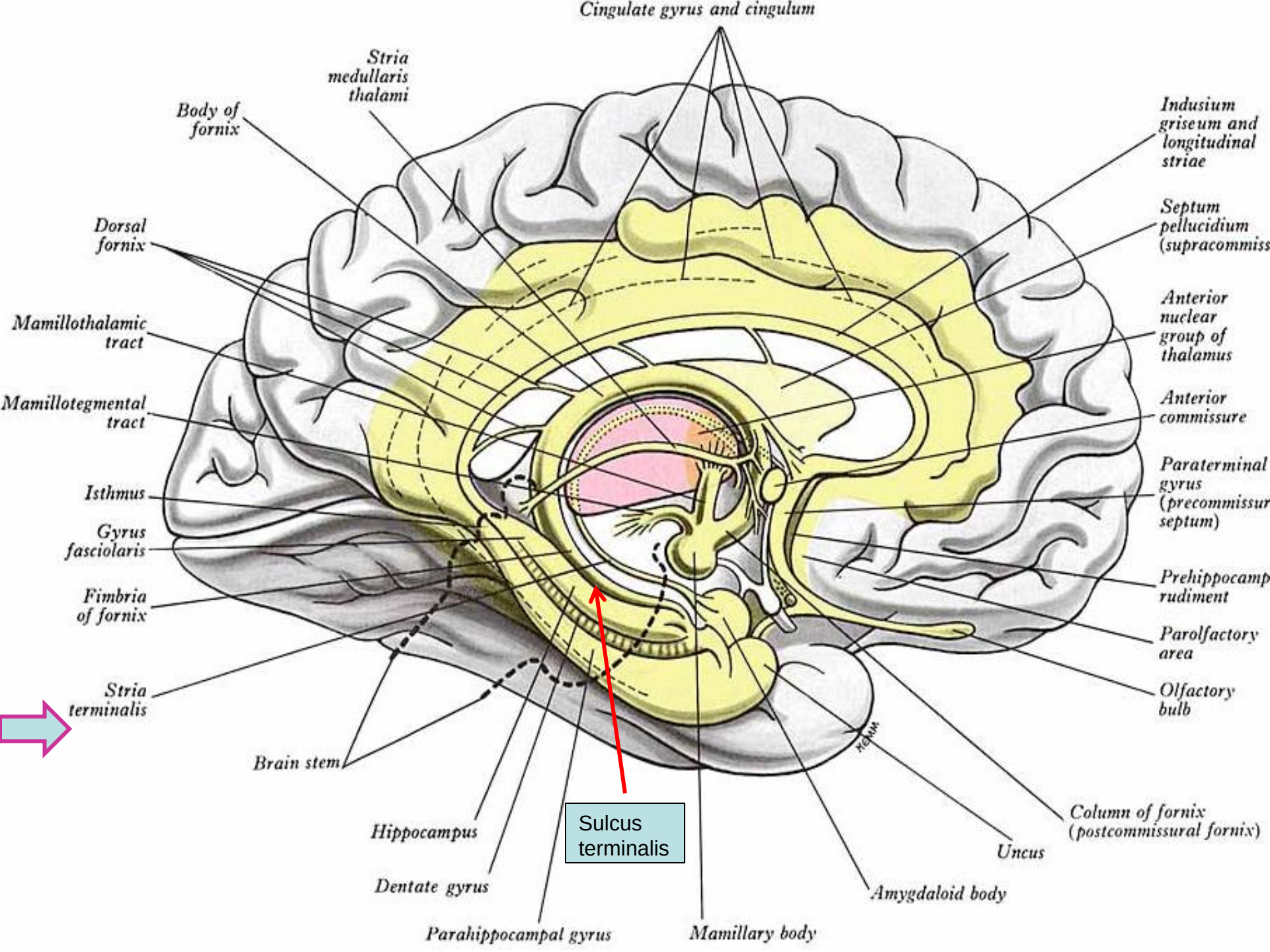


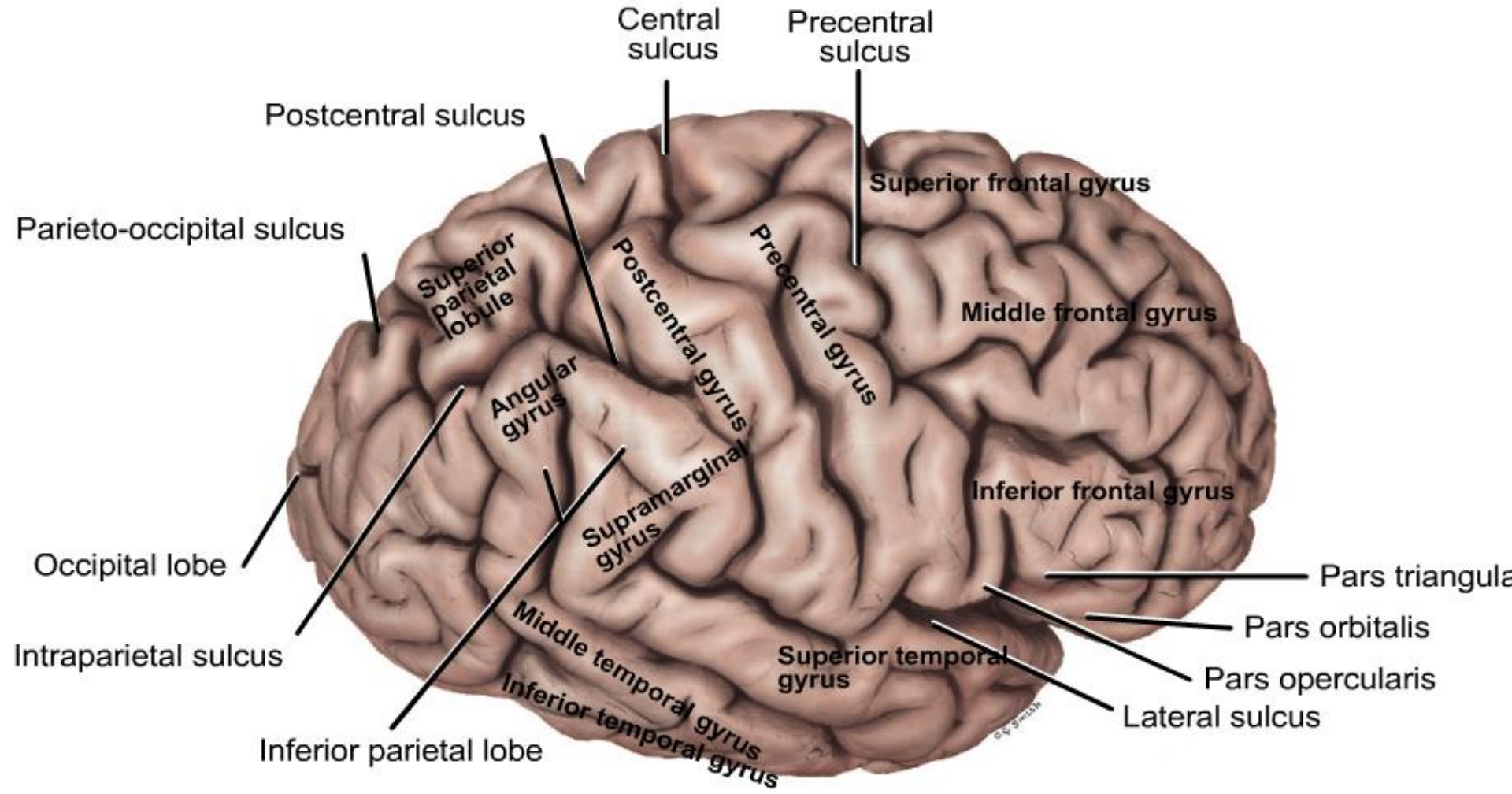
- **Dorsal Division**
- **A- Caudate Nucleus and lintiform n.**
- ***Caudate Nucleus*** **is an arcuate mass with a large anterior head which tapers to a body and a down-curving tail, covered with ependyma,**

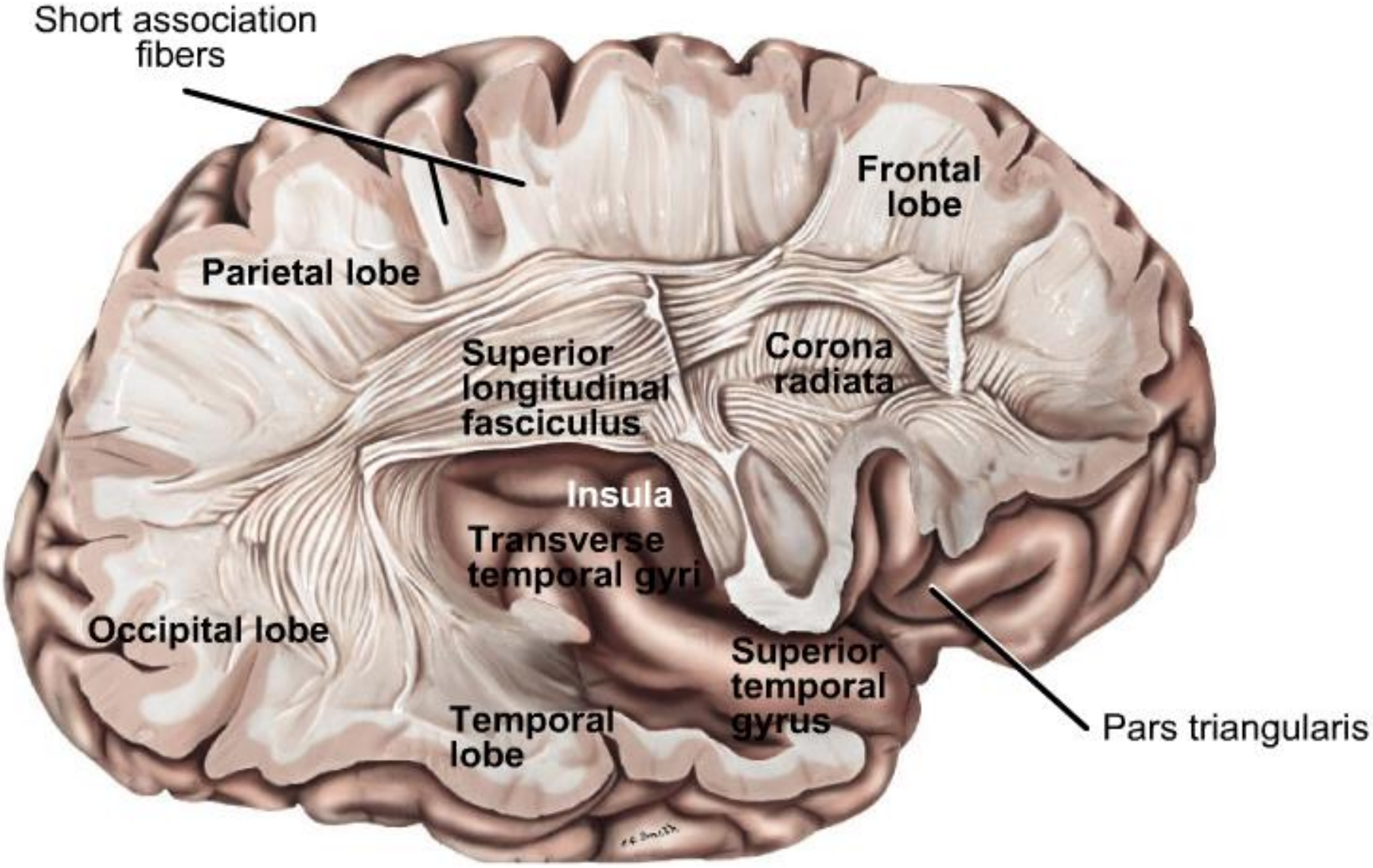
.

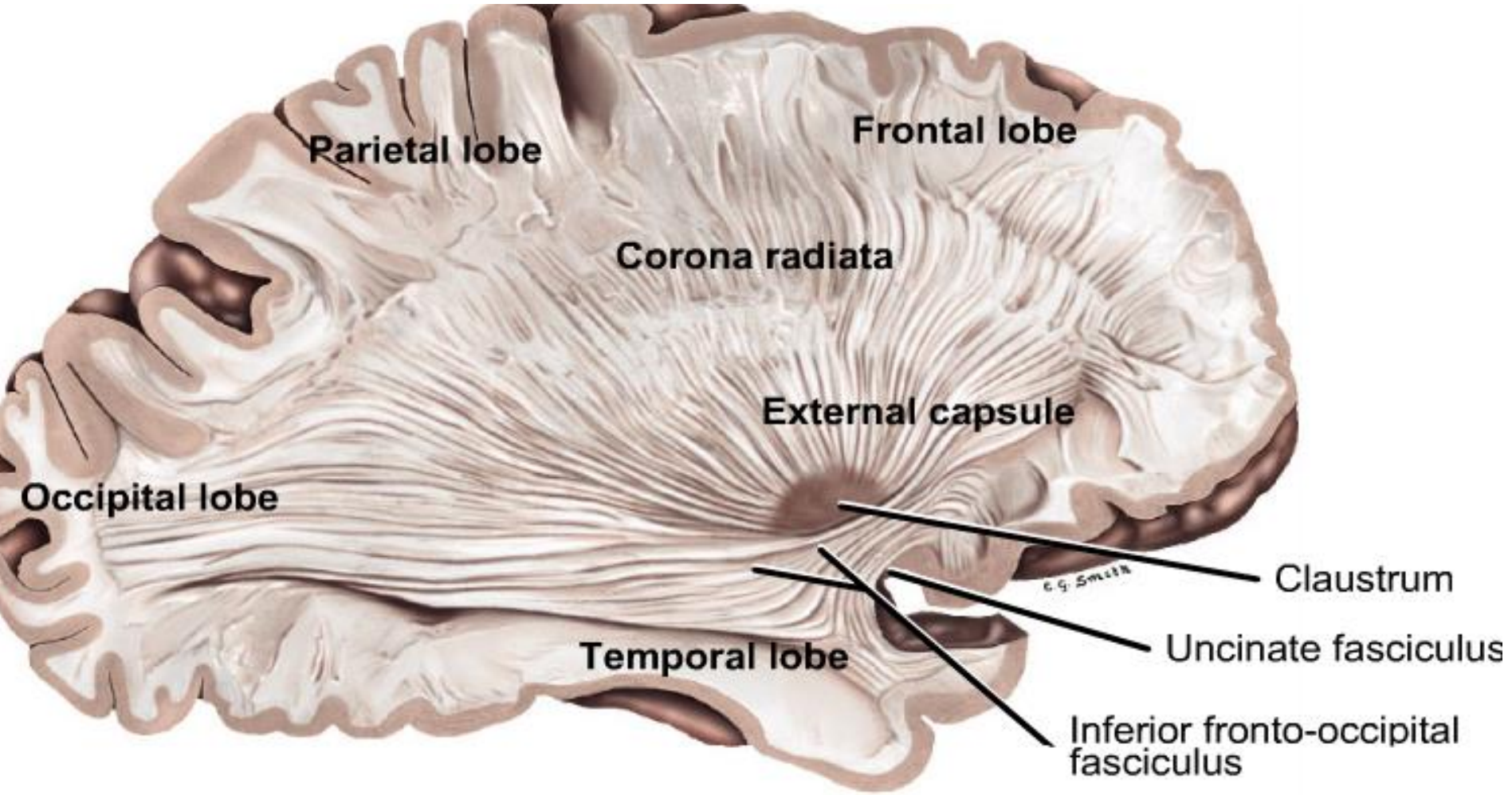
- **The head lies, in the floor and lateral wall of the anterior horn of the lateral ventricle in front of the interventricular foramen.**

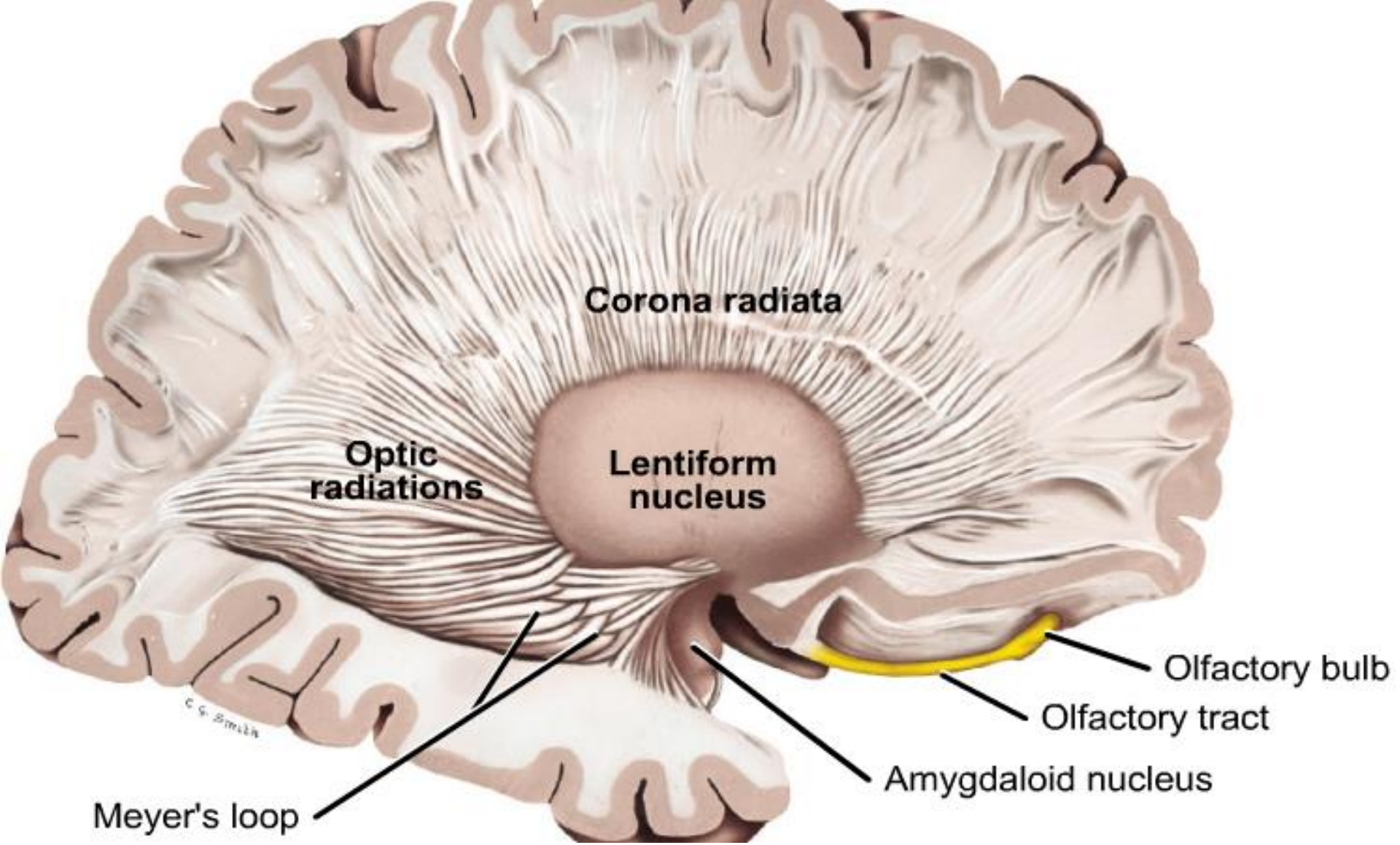
- **The tapering body of the nucleus is in the floor of the body of the ventricle; the tail follows the curve of the inferior horn and so is in the ventricular roof in the temporal lobe.**

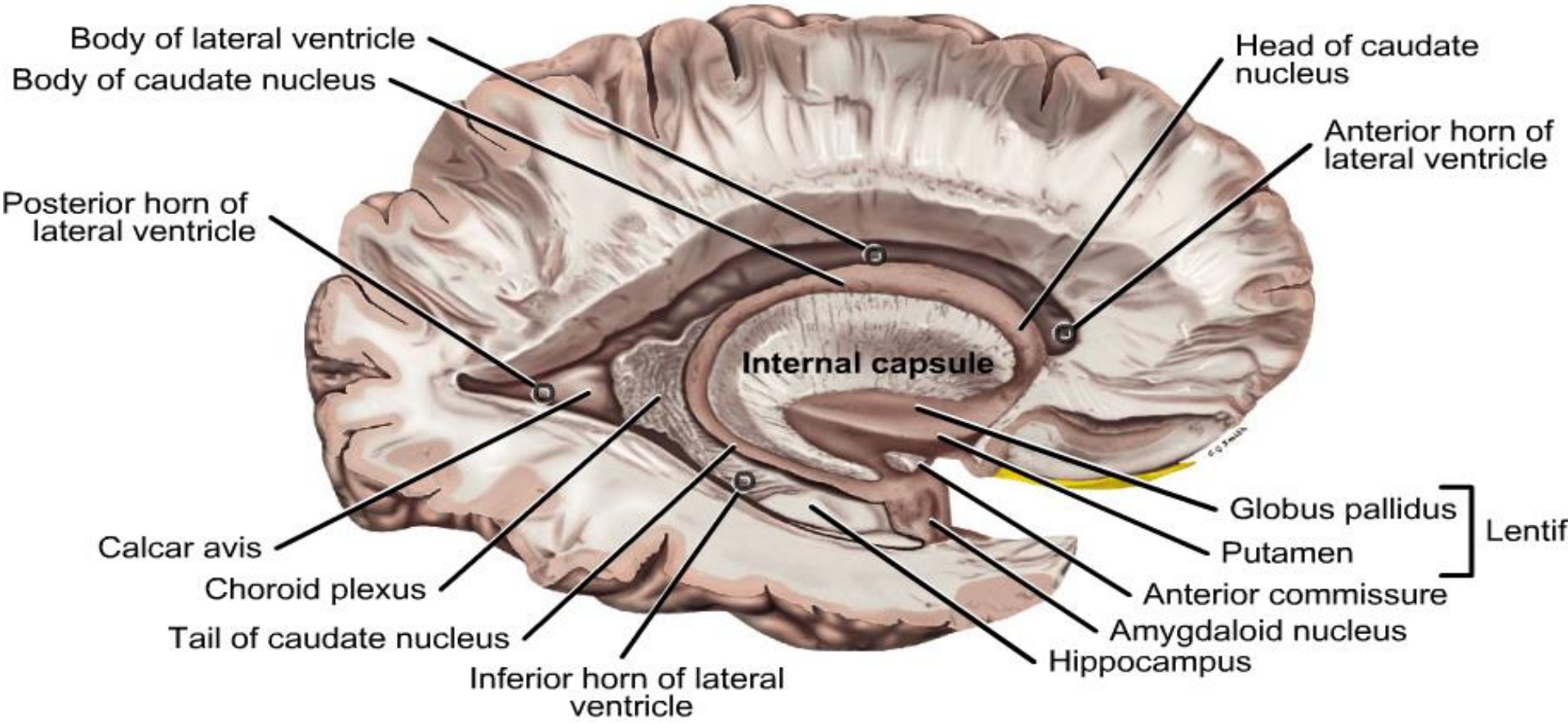

Cingulate gyrus and cingulum
Stria medullaris thalami
Body of fornix
Indusium griseum and longitudinal striae
Septum pellucidium (supracommiss
Dorsal fornix
Anterior nuclear group of thalamus
Mamillothalamic tract
Anterior commissure
Mamillotegmental tract
Paraterminal gyrus (precommissur septum)
Isthmus
Gyrus fasciolaris
Prehippocamp rudiment
Fimbria of fornix
Parolfactory area
Olfactory bulb
Stria terminalis
Brain stem
Column of fornix (postcommissural fornix)
Hippocampus
Sulcus terminalis
Uncus
Dentate gyrus
Amygdaloid body
Parahippocampal gyrus
Mamillary body

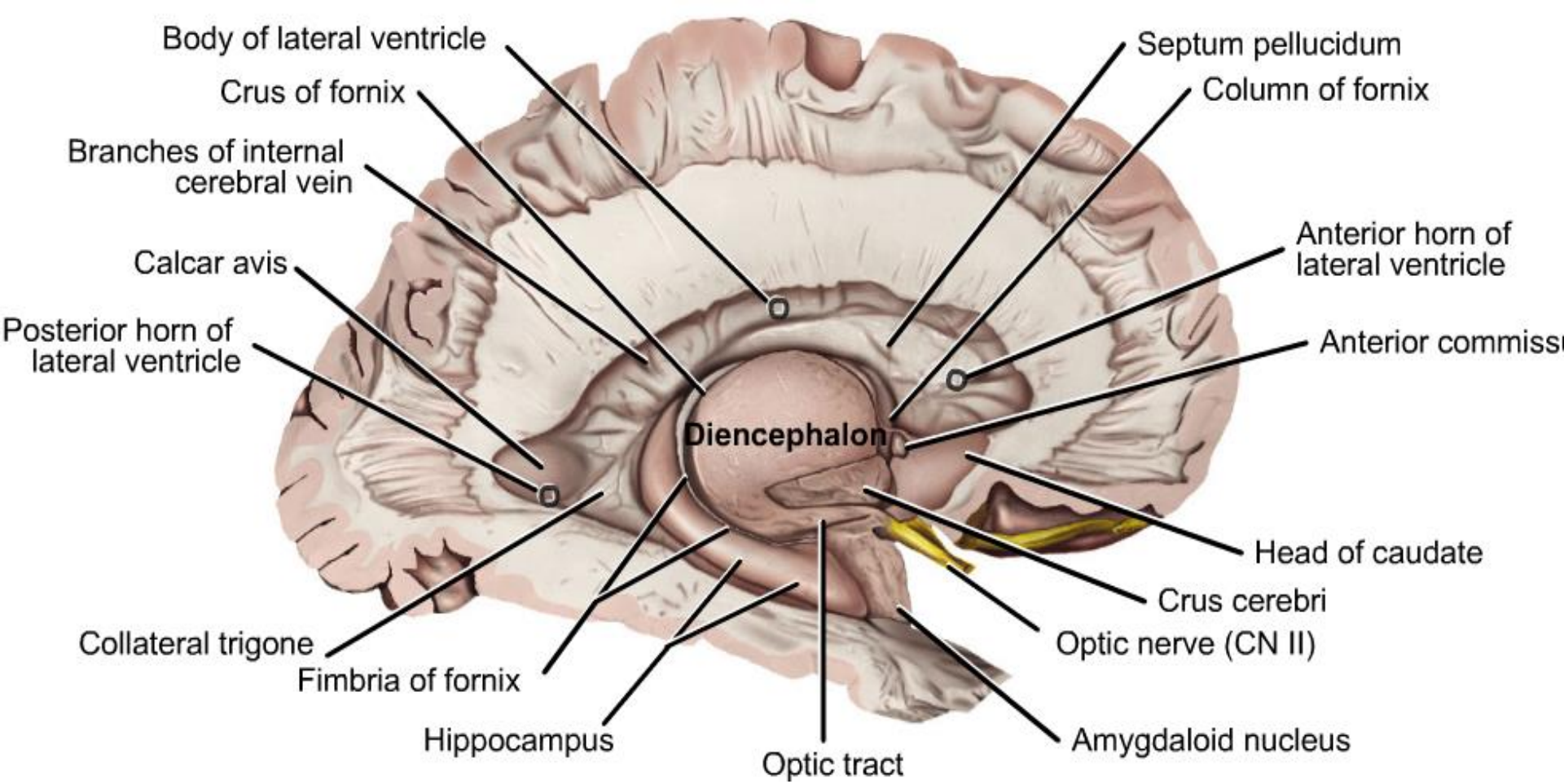

Central sulcus
Precentral sulcus
Postcentral sulcus
Superior frontal gyrus
Parieto-occipital sulcus
Superior parietal lobule
Postcentral gyrus
Precentral gyrus
Middle frontal gyrus
Angular gyrus
Supramarginal gyrus
Inferior frontal gyrus
Occipital lobe
Pars triangula
Pars orbitalis
Intraparietal sulcus
Middle temporal gyrus
Superior temporal gyrus
Pars opercularis
Lateral sulcus
Inferior temporal gyrus
Inferior parietal lobe


Short association fibers
Frontal lobe
Parietal lobe
Superior longitudinal fasciculus
Corona radiata
Insula
Transverse temporal gyri
Occipital lobe
Superior temporal gyrus
Temporal lobe
Pars triangularis

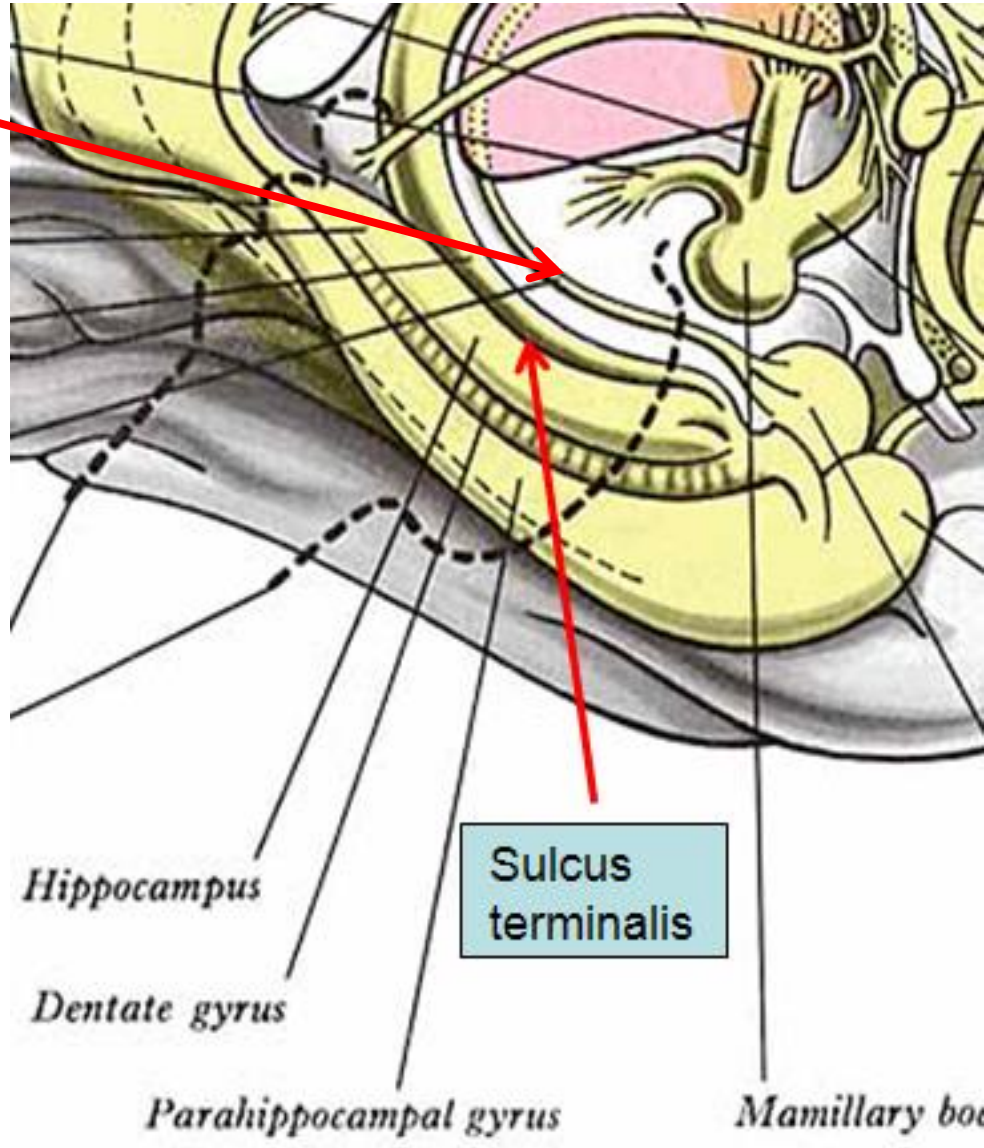

Parietal lobe
Frontal lobe
Corona radiata
External capsule
Occipital lobe
Claustrum
Uncinate fasciculus
Temporal lobe
Inferior fronto-occipital fasciculus


Corona radiata
Optic radiations
Lentiform nucleus
Olfactory bulb
Olfactory tract
Amygdaloid nucleus
Meyer's loop

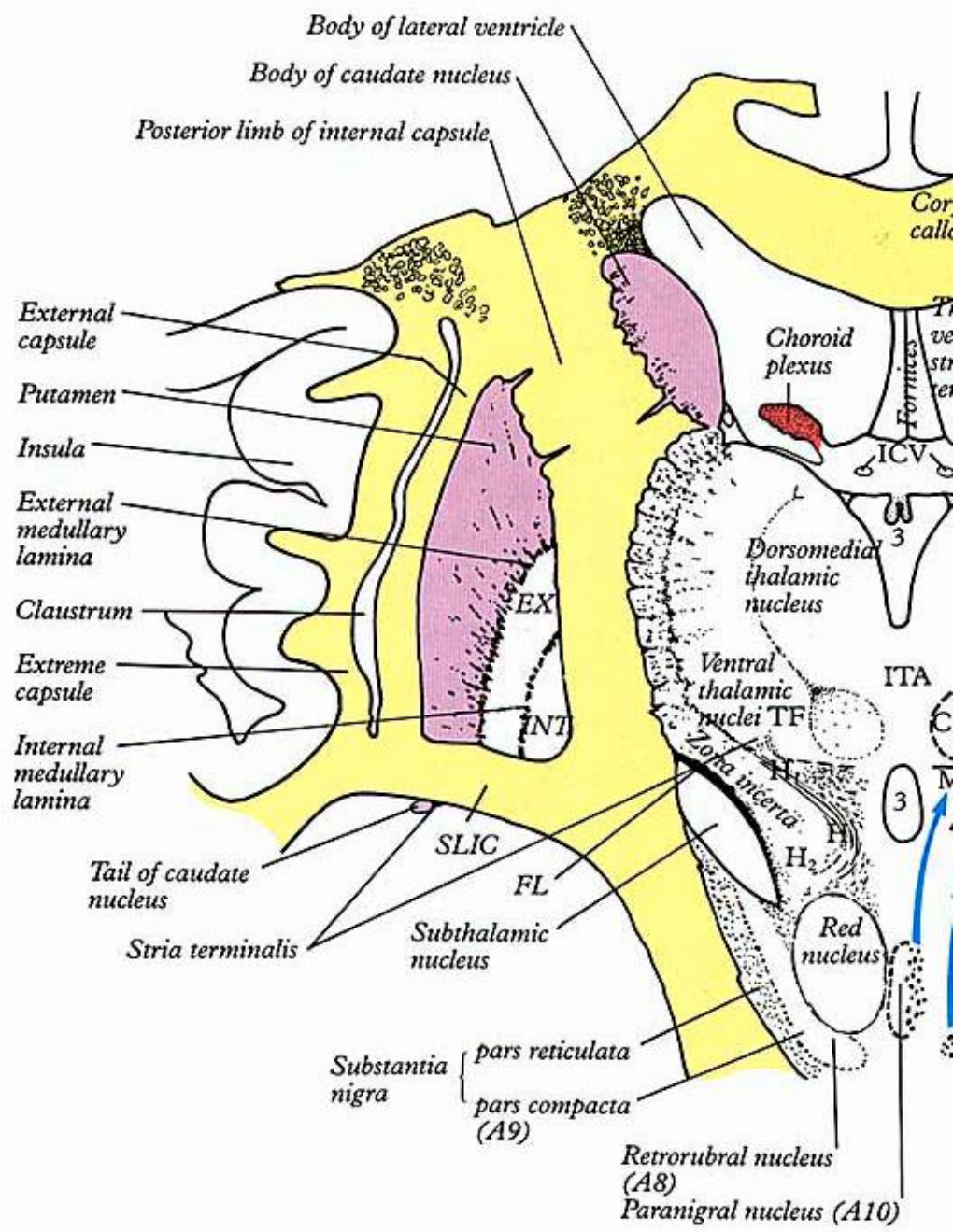

Body of lateral ventricle
Body of caudate nucleus
Posterior horn of lateral ventricle
Calcar avis
Choroid plexus
Tail of caudate nucleus
Inferior horn of lateral ventricle
Head of caudate nucleus
Anterior horn of lateral ventricle
Internal capsule
Globus pallidus
Putamen
Lentif
Anterior commissure
Amygdaloid nucleus
Hippocampus


Body of lateral ventricle
Crus of fornix
Branches of internal cerebral vein
Calcar avis
Posterior horn of lateral ventricle
Septum pellucidum
Column of fornix
Anterior horn of lateral ventricle
Anterior commissu
Diencephalon
Head of caudate
Crus cerebri
Optic nerve (CN II)
Collateral trigone
Fimbria of fornix
Hippocampus
Optic tract
Amygdaloid nucleus

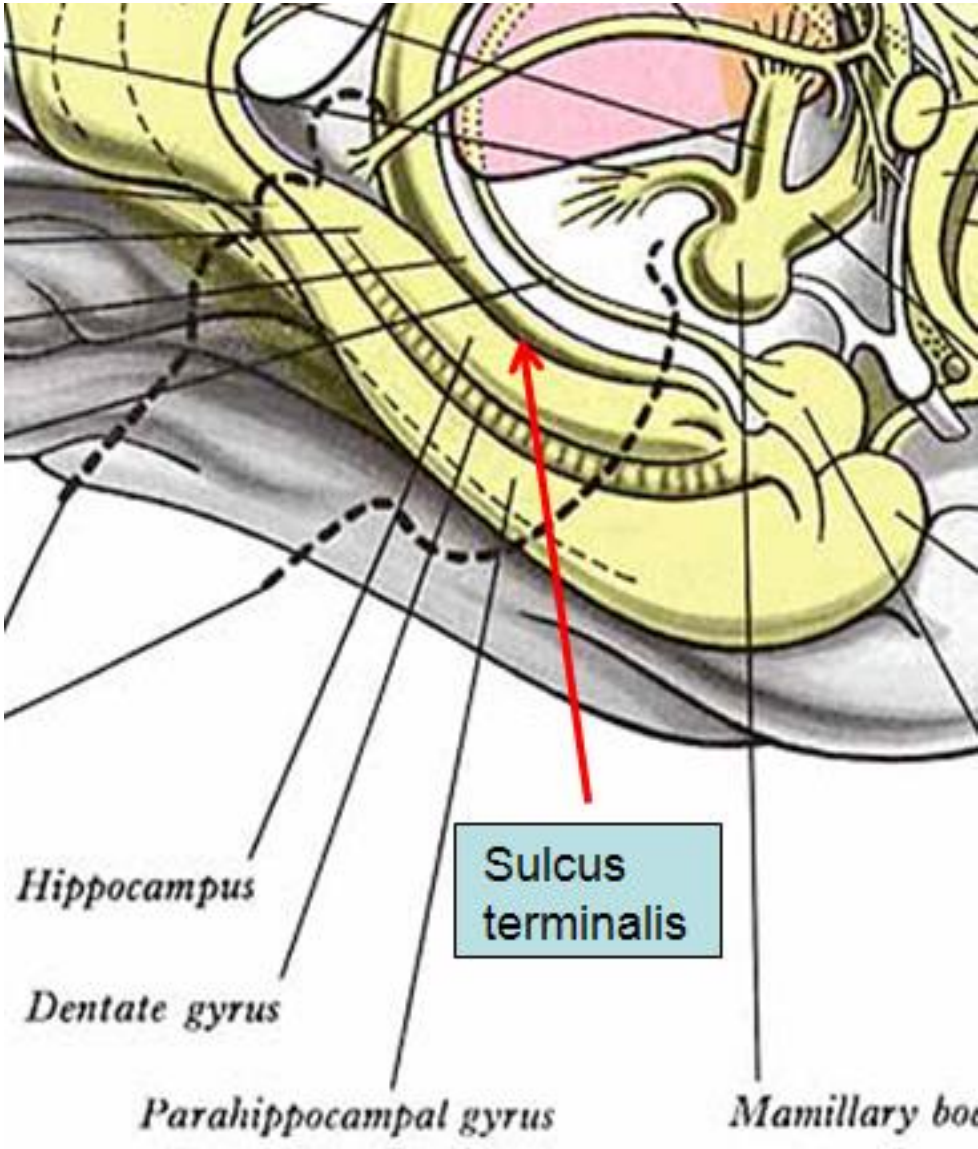
The stria terminalis:- ***bundles of fibers arises in amygdaloid body along medial side of tail of caudate n. in the roof of the inferior horn of the lateral horn of lateral ventricle., curving upward with the cau.n. and with thalamostrial vein between thalamus and cau.n. through the interventricular foramen end in the anterior hypothalamus and septal nuclei.***



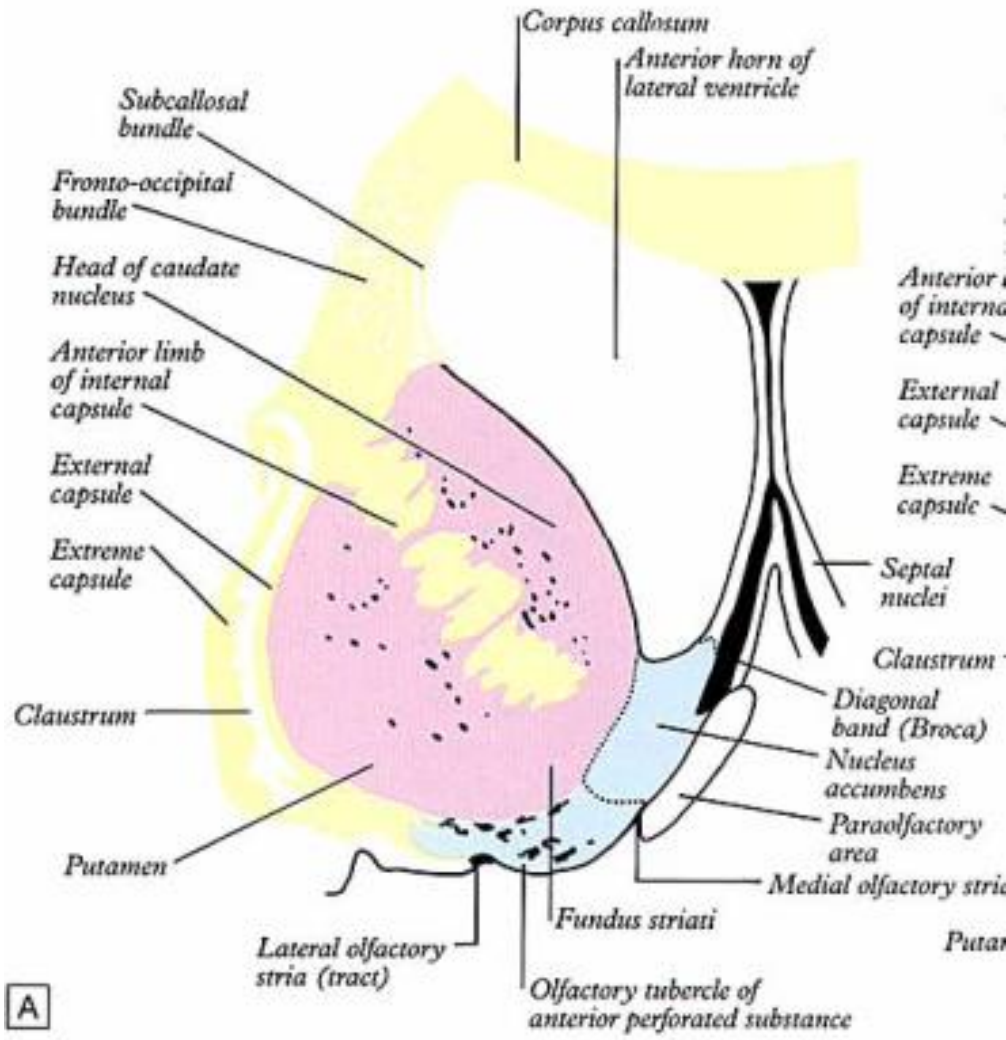
SLIC = sublentiform internal capsule;
TF = thalamic fasciculus;
3 = 3rd ventricle.



The sulcus terminalis is especially prominent anterosuperiorly (because of the large size of the head and body of the caudate nucleus relative to the tail;



- ***In the temporal lobe*, Together, the caudate nucleus and putamen are referred to as the *dorsal striatum*. The tail of the nucleus contacts but remains distinct from the amygdaloid complex.**



Lentiform Nucleus

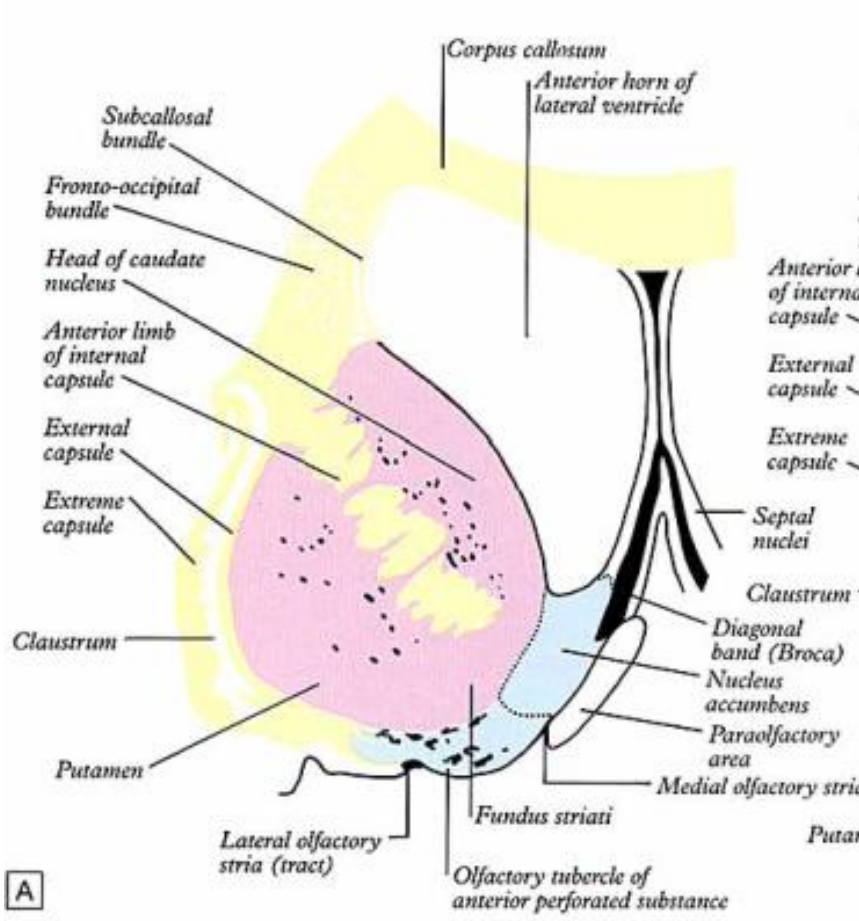
- **It lies immediately deep to the insular cortex, from which it is separated by**

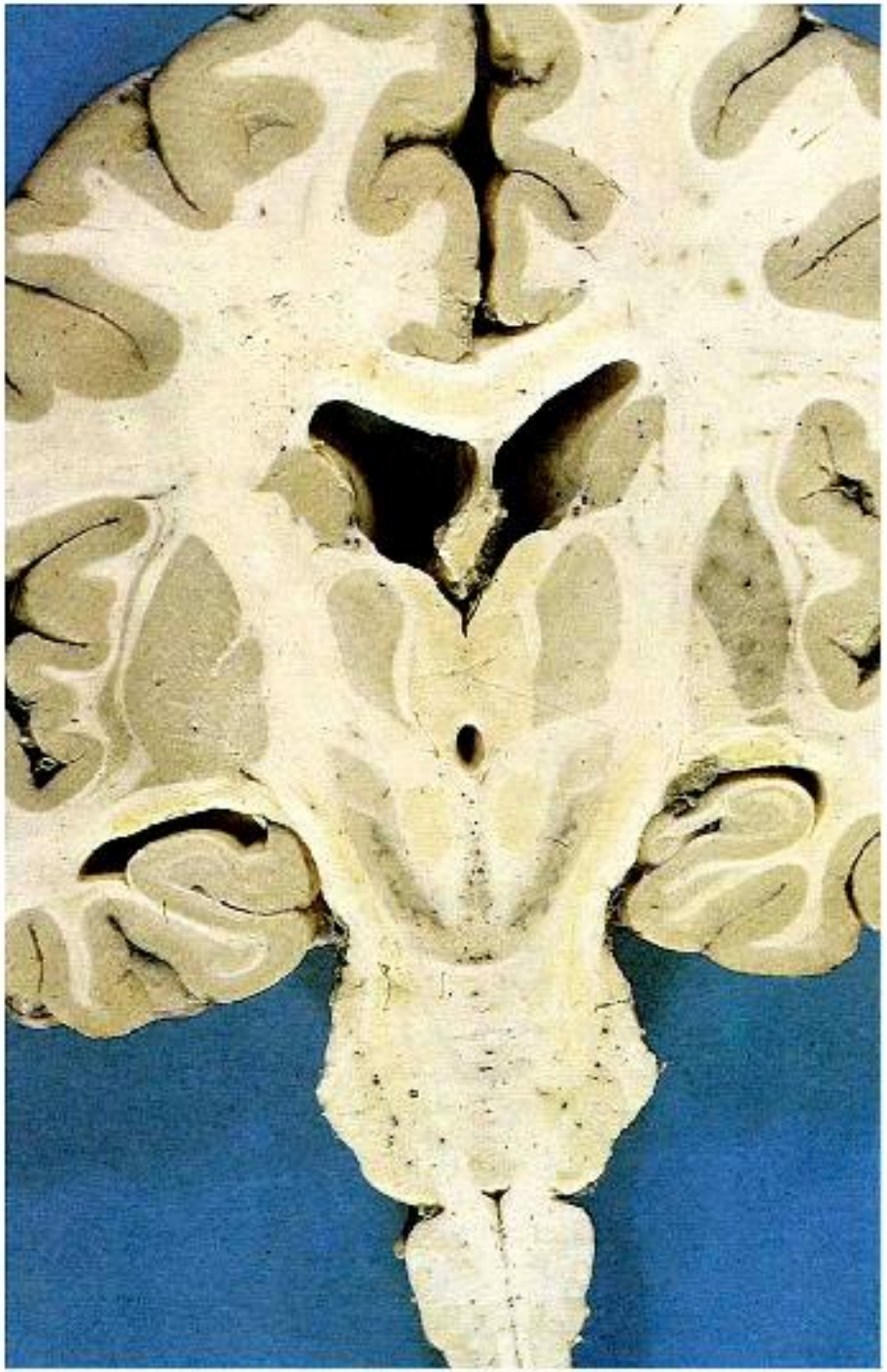
1-white matter (extreme capsule) ,

2-claustrum and

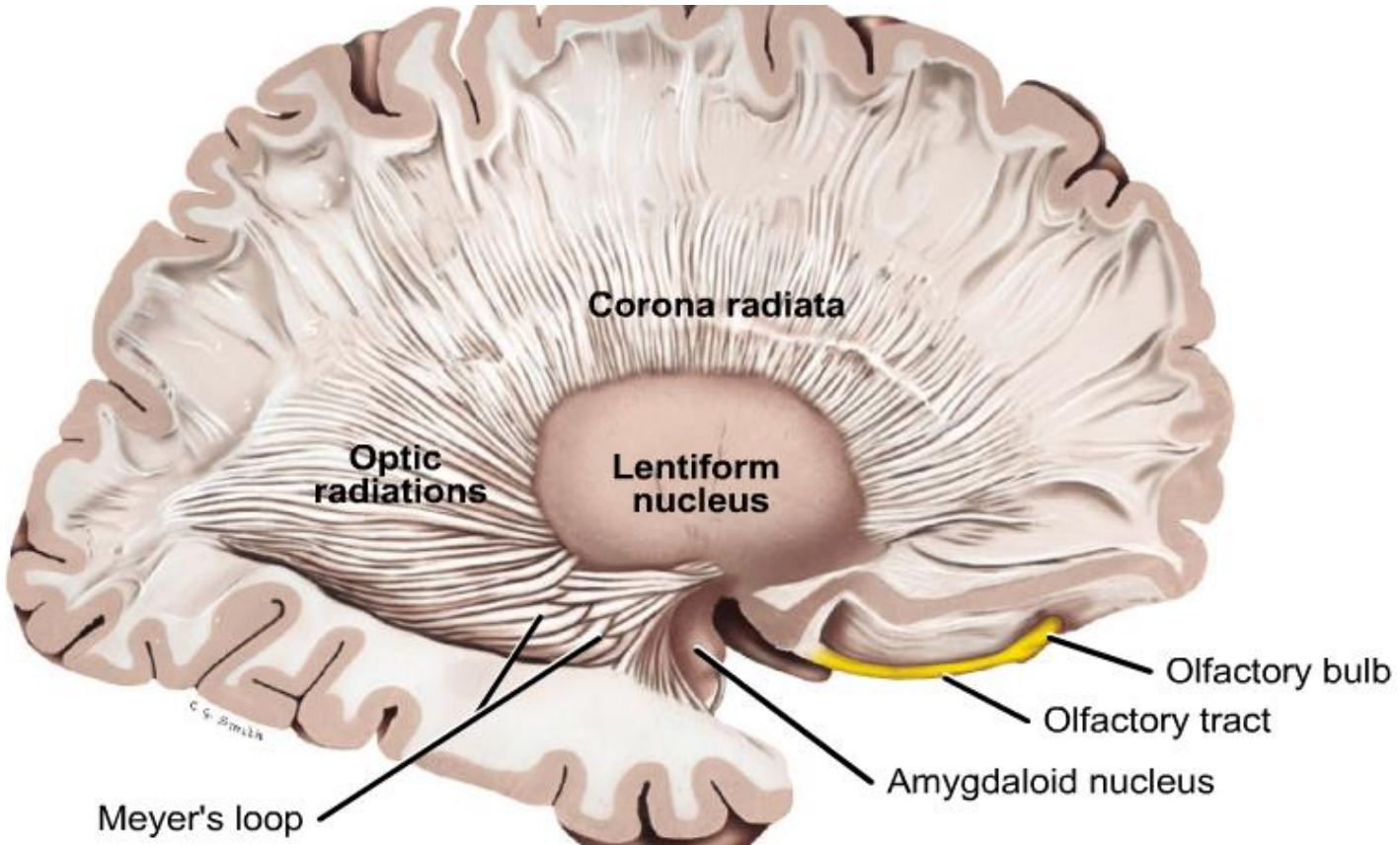
3-external capsule.

the latter of which separates the claustrum from the lentiform nucleus

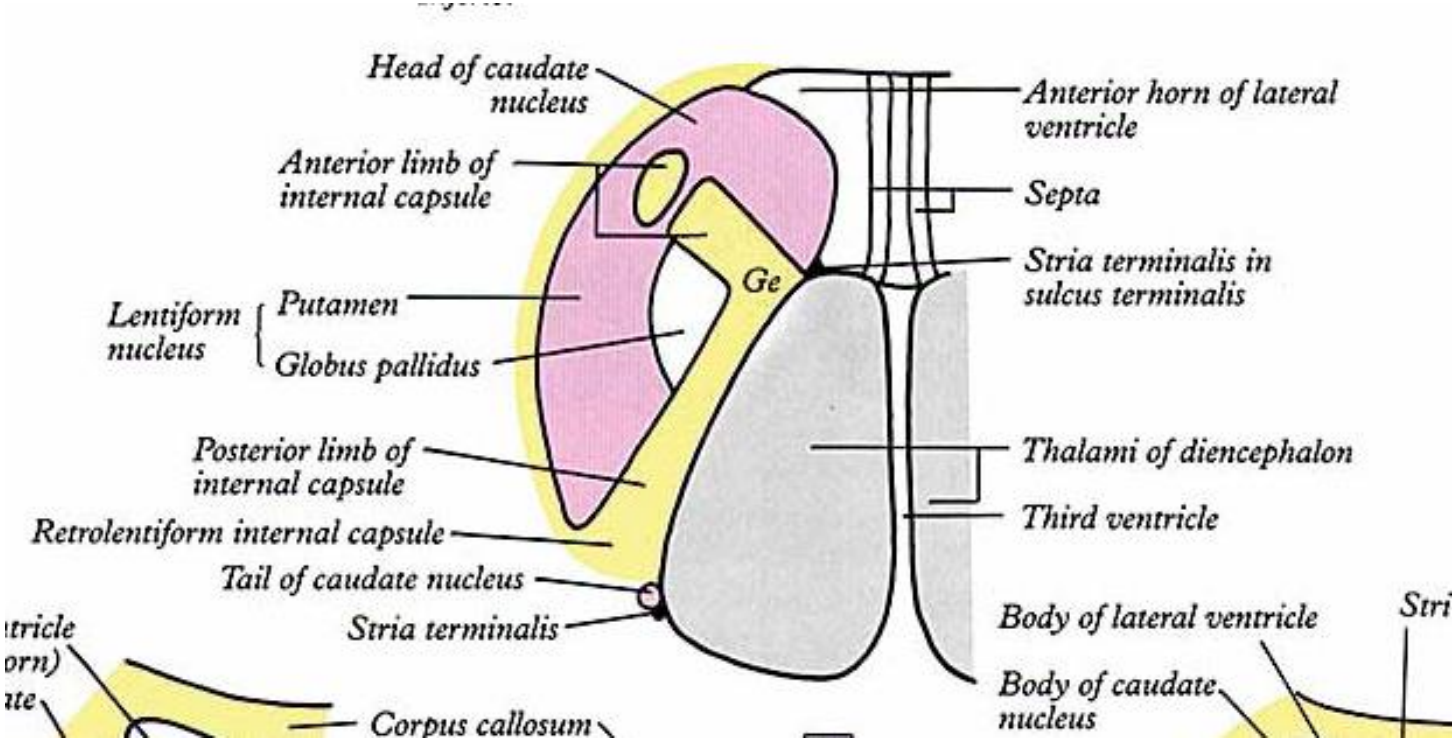




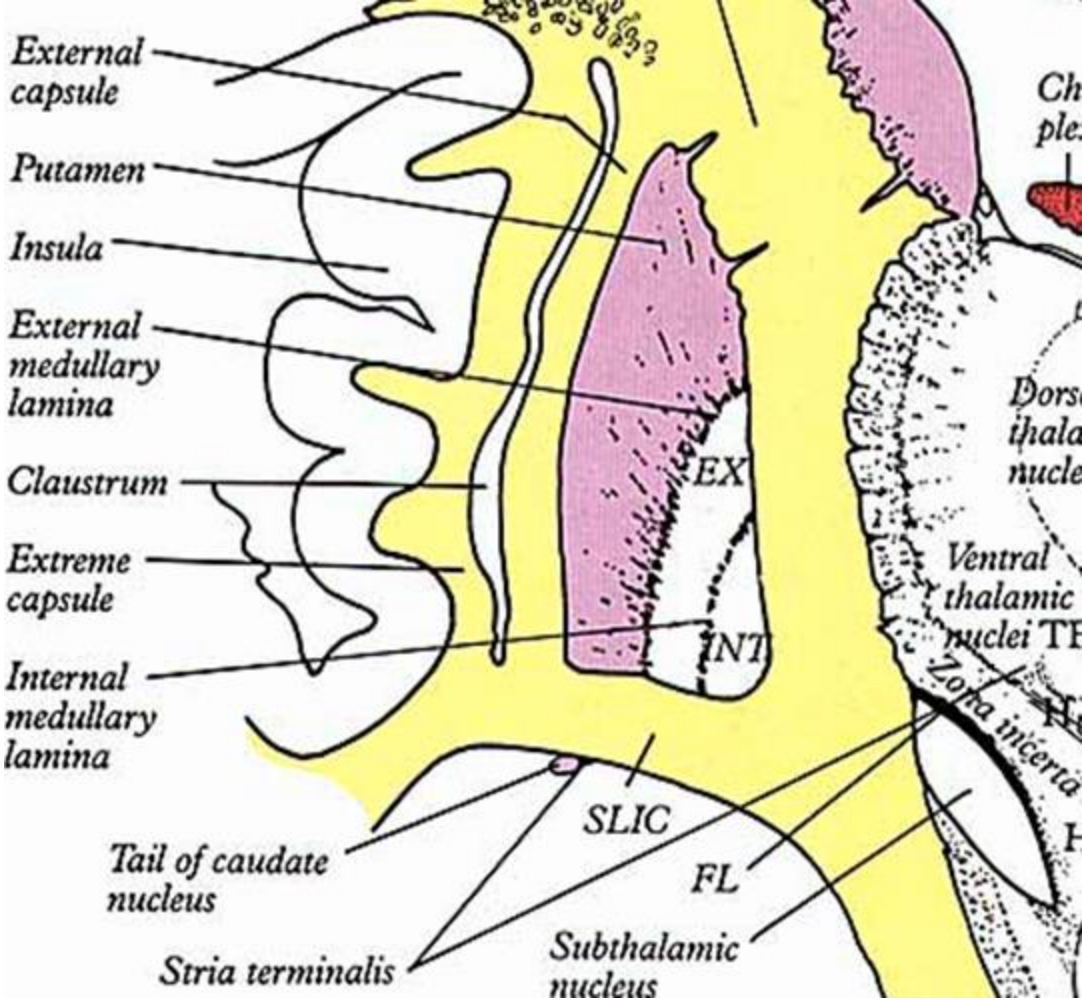
- **The name of the lentiform ('lens-shaped'), its apex directed medially and slightly backwards, and its somewhat convex base laterally and forwards.**



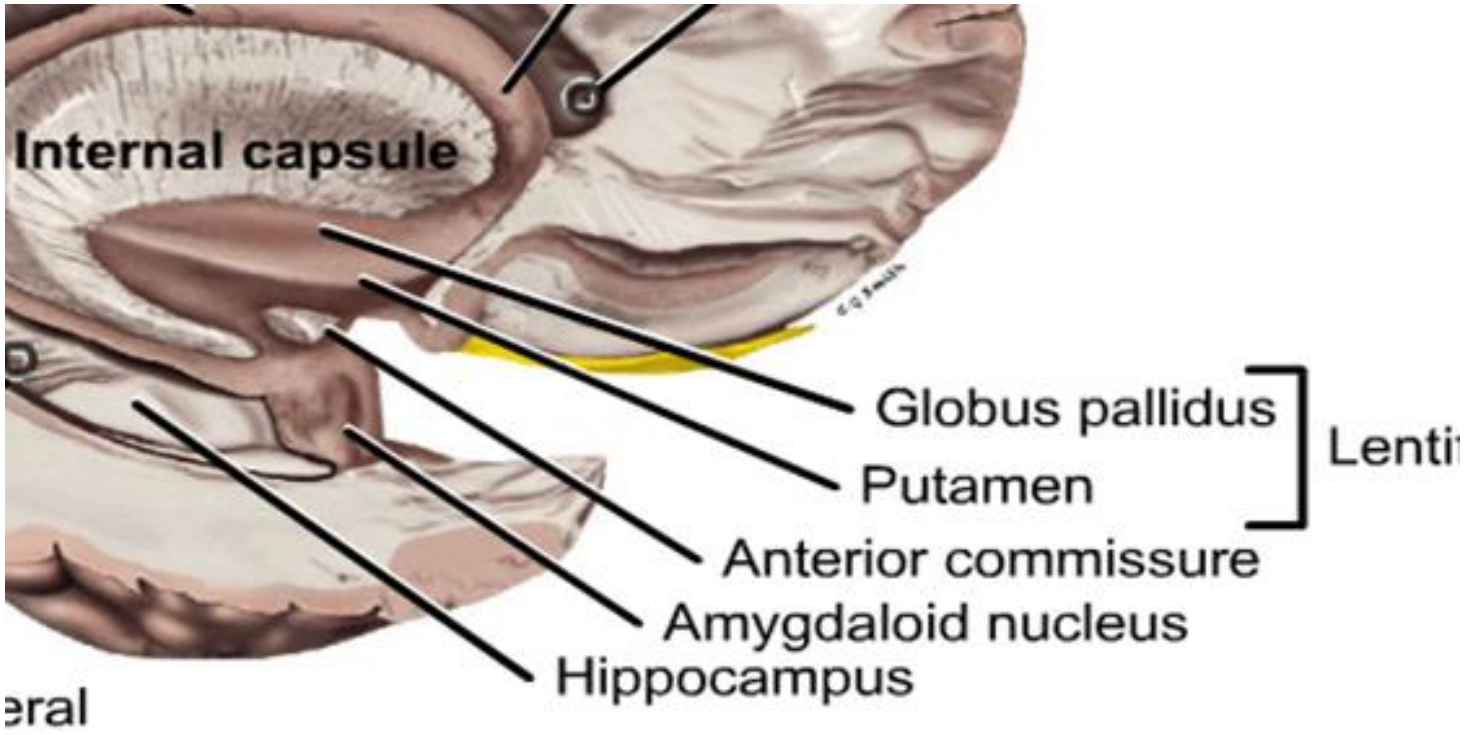
- **The nucleus is separated from the medially placed caudate nucleus by the internal capsule, the latter surrounding it almost completely. The laterally-placed putamen is separated from the globus pallidus by a sheet of myelinated axons known as the *external medullary lamina*.**
- **Ventral Division**



- **A similar but less substantial sheet, the *internal medullary lamina*, divides the *globus pallidus* (or dorsal pallidum) into lateral (or external) and medial (or internal) segments.**



- **Inferiorly, a little behind the fundus striati, the lentiform nucleus is grooved by the anterior commissure interconnecting inferior parts of the temporal lobes and the anterior olfactory cortex of the two sides.**



Without comment

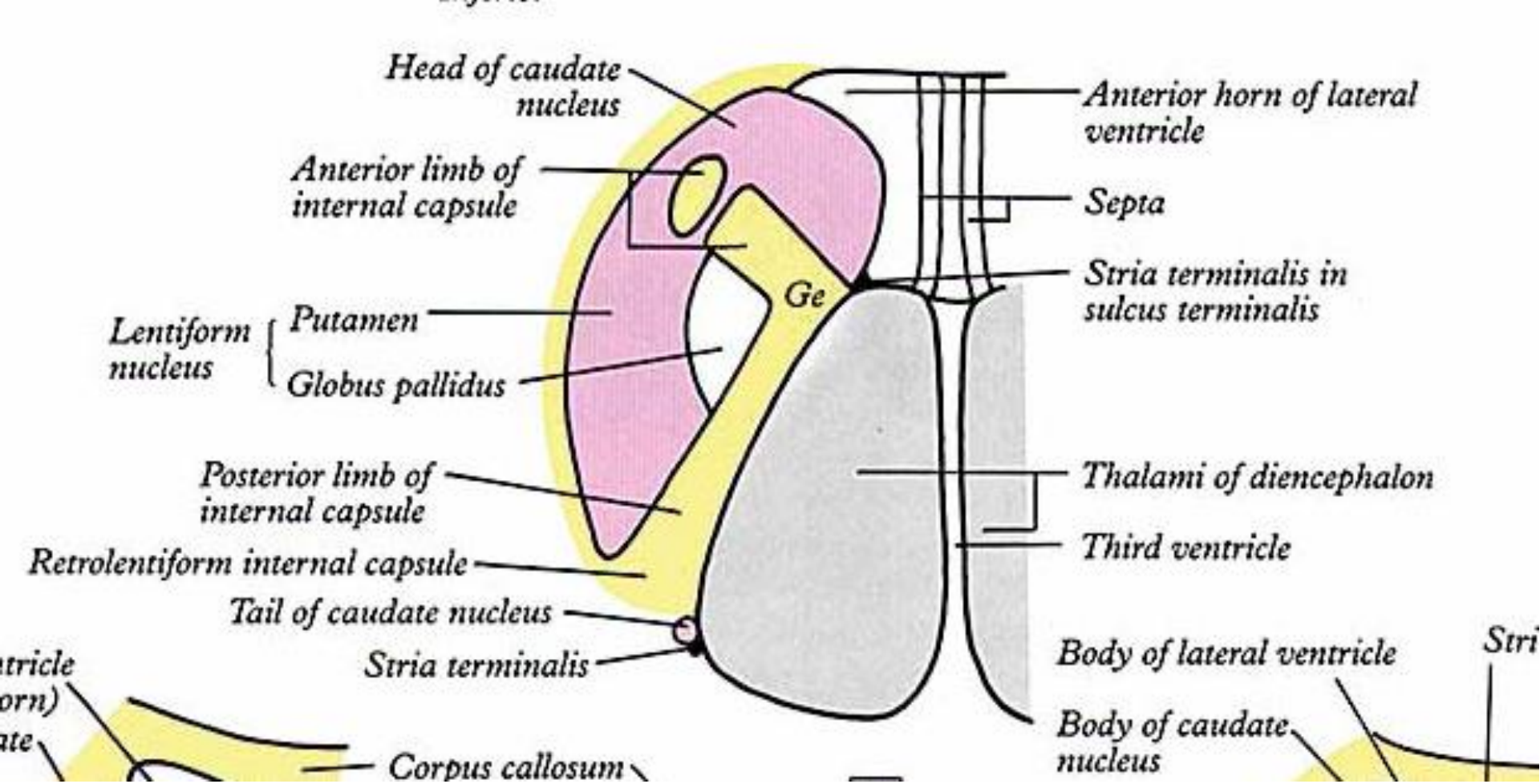
- **Ventral Division (*ventral striatum*.)**
- **In front of the anterior commissure, much of the grey of the anterior perforated substance (and especially the olfactory tubercle)**

1-The nucleus Accumbens and the

2- Olfactory tubercle .

separated from its dorsal equivalent by the anterior commissure and predominantly it is posterior to the ventral striatum.

- Arterial Blood Supply
- lenticulostriate vessels, derived from the roots of **middle and anterior cerebral arteries** and enter through the anterior perforated substance. ((which are commonly involved in cerebral haemorrhage))
- anterior and posterior choroidal arteries.
- thalamostriate branches of the posterior cerebral artery.


Head of caudate nucleus
Anterior limb of internal capsule
Lentiform nucleus
Putamen
Globus pallidus
Posterior limb of internal capsule
Retrolentiform internal capsule
Tail of caudate nucleus
Stria terminalis
Corpus callosum
Anterior horn of lateral ventricle
Septa
Stria terminalis in sulcus terminalis
Thalami of diencephalon
Third ventricle
Body of lateral ventricle
Body of caudate nucleus

- The nervous system acts to preserve the individual in a changing environment so that the species is maintained. This implies long-term homeostasis of bodily functions, appropriate feeding, drinking and reproductive behaviour, and an ability to respond to and overcome various forms of stress. It also implies control of the growth of the individual to physical and reproductive maturity. Any skeletal motor behaviour is complemented by appropriate changes in autonomic and endocrine functions

Thalamus

- ***Dorsal thalamus***
- ***Ventral thalamus ,*** **subthalamic tracts**
- ***Epithalamus***

ventral thalamus

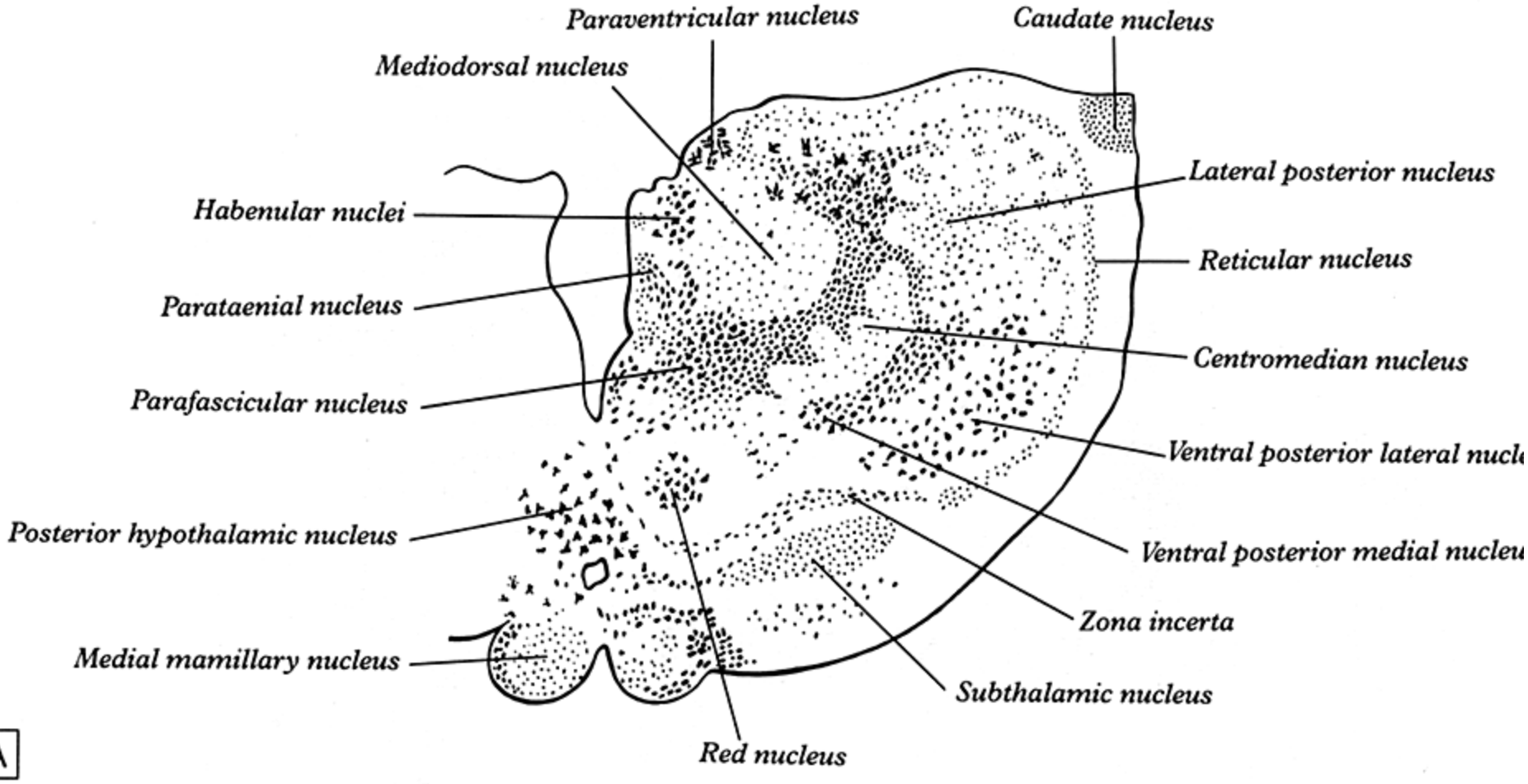
- The main nuclear groups of the ventral thalamus comprise the ***reticular nucleus, the zona incerta, the fields of Forel and the pregeniculate nucleus*** and also include the ***upper pole of the red nucleus and substantia nigra and the entopeduncular nucleus.***

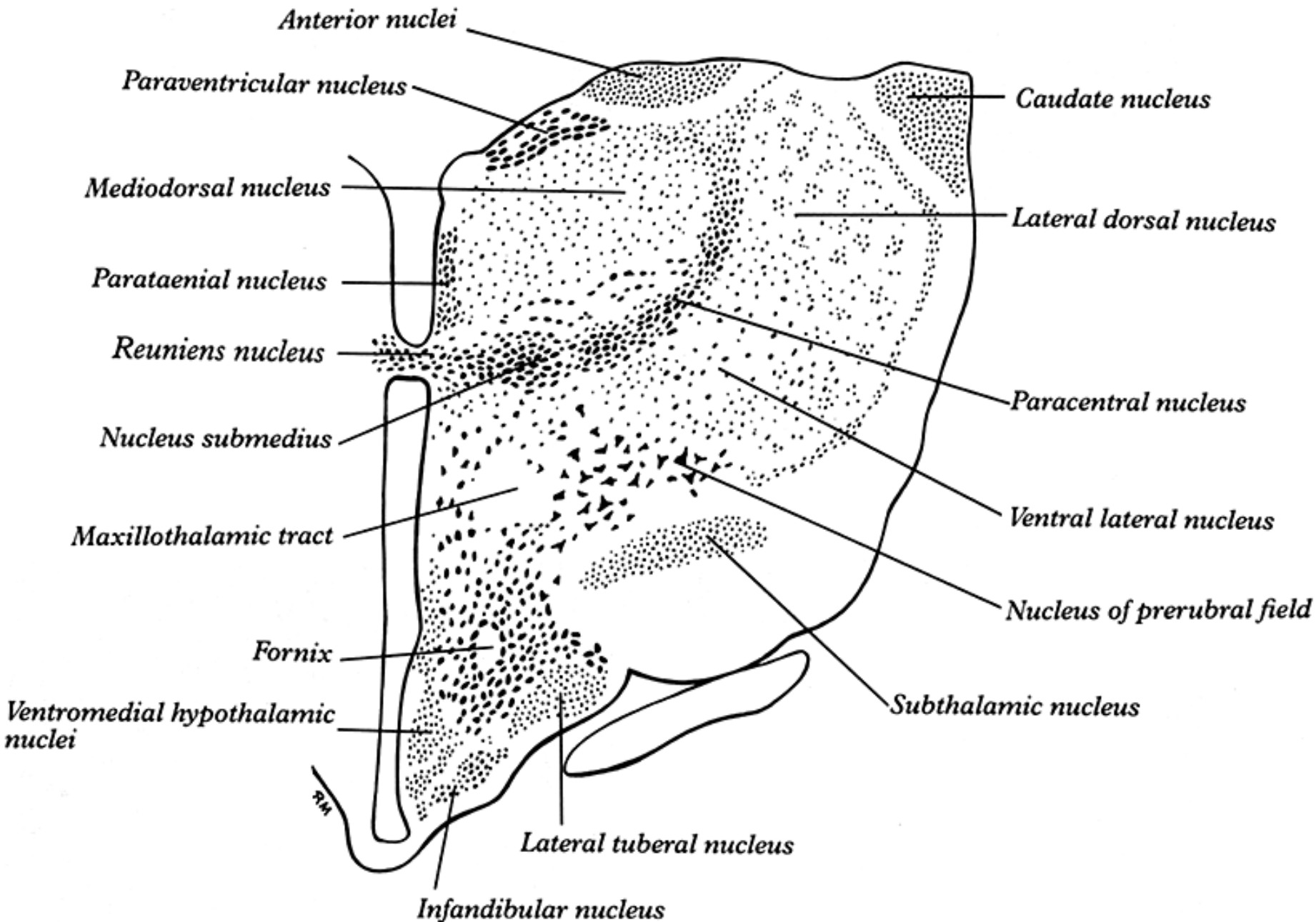
The main subthalamic tracts are:

- **the upper parts of the medial, spinal and trigeminal lemnisci and the solitariothalamic tract, approaching their terminations in the thalamic nuclei**
- **dentatothalamic tract from the contralateral superior cerebellar peduncle accompanied by ipsilateral rubrothalamic fibres**
- **fasciculus *retroflexus***
- **fasciculus lenticularis**
- **fasciculus subthalamicus**
- **ansa lenticularis**
- **fascicles from the prerubral field (H field of Forel)**
- **the continuation of the fasciculus lenticularis (in the H2 field of**

Dorsal Thalamus

- The thalamus of each side, an obliquely lying ovoid nuclear mass about 4 cm long, borders the third ventricle. The expanded posterior pole is the pulvinar.
- Major Structure of the Thalamus

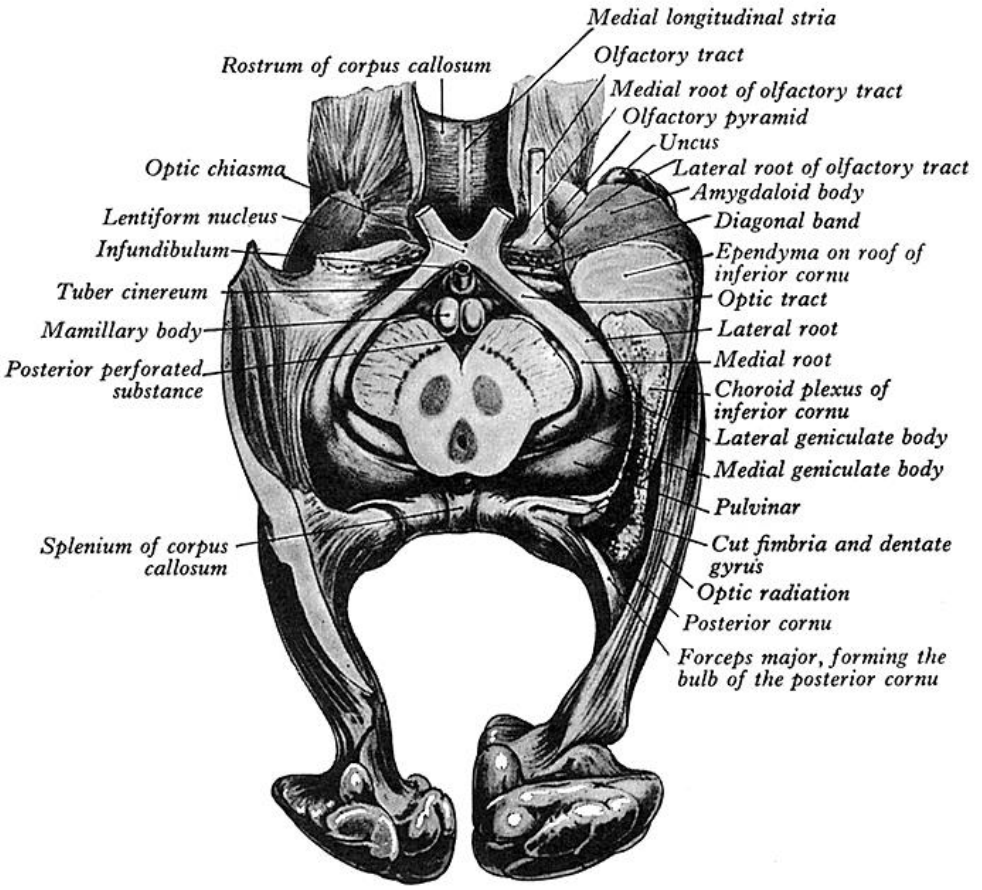

Paraventricular nucleus
Caudate nucleus
Mediodorsal nucleus
Lateral posterior nucleus
Habenular nuclei
Reticular nucleus
Parataenial nucleus
Centromedian nucleus
Parafascicular nucleus
Ventral posterior lateral nucl
Posterior hypothalamic nucleus
Ventral posterior medial nucleu
Zona incerta
Medial mamillary nucleus
Subthalamic nucleus
Red nucleus
A


Anterior nuclei
Paraventricular nucleus
Mediodorsal nucleus
Parataenial nucleus
Reuniens nucleus
Nucleus submedius
Maxillothalamic tract
Fornix
Ventromedial hypothalamic nuclei
Infandibular nucleus
Lateral tuberal nucleus
Caudate nucleus
Lateral dorsal nucleus
Paracentral nucleus
Ventral lateral nucleus
Nucleus of prerubral field
Subthalamic nucleus
RM

- Anterior (rostral) nuclei;
- Medial nuclei;
- Lateral nuclei in the dorsal half of the lateral nuclear mass extending posteriorly to include the pulvinar;
- Ventral nuclei in the ventral half of the lateral nuclear mass;

the medial geniculate nuclear complex and the lateral geniculate nucleus are best considered as components of the thalamus proper;

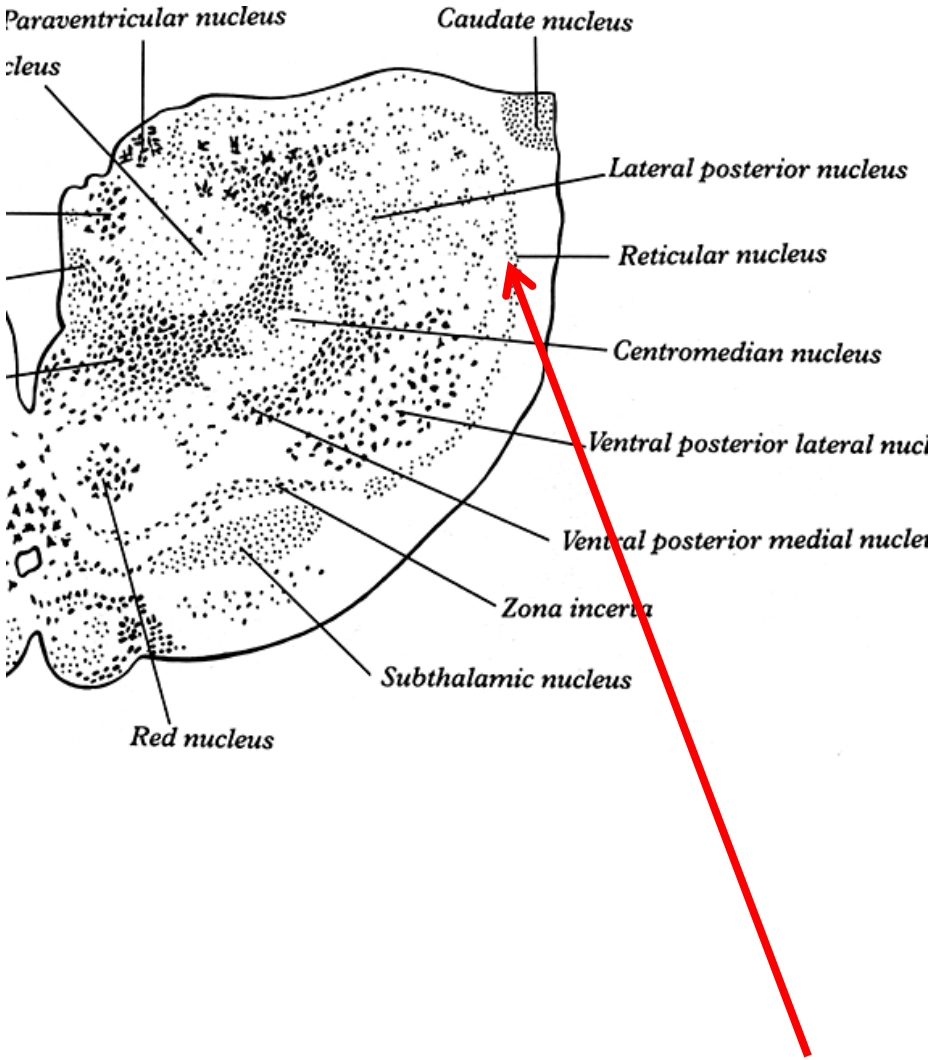
- The lateral geniculate nucleus receives a major afferent input from the retina.



Medial Geniculate Complex

- ***The medial geniculate body ; is a rounded elevation posteriorly on the ventrolateral surface of the thalamus, separated from the pulvinar by the superior quadrigeminal brachium. It receives the inferior quadrigeminal brachium of inferior coliculus and conveys auditory impulse to the superior temporal gyrus .***

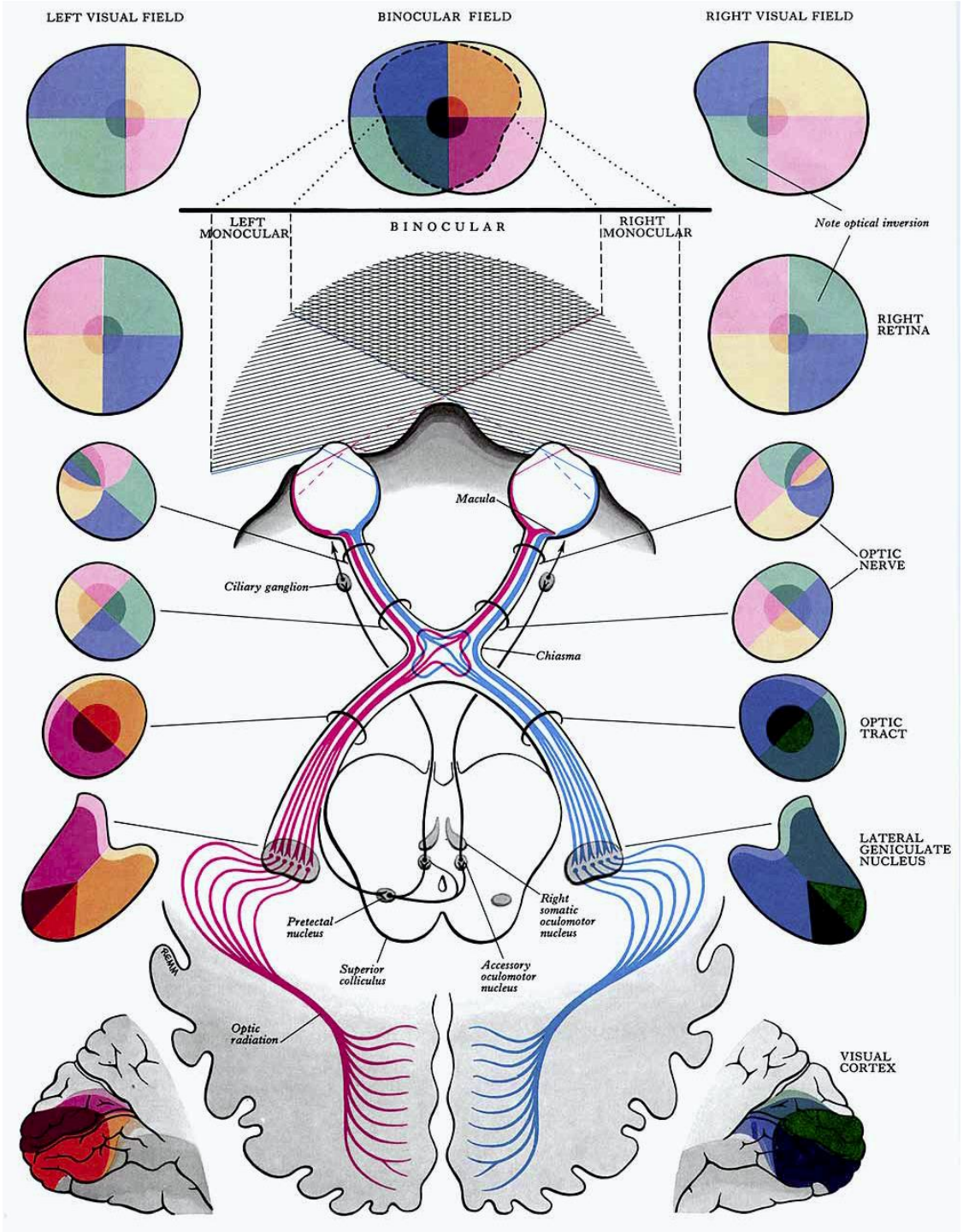
- Intralaminar nuclei,
- Midline nuclei; which either abut the ependyma of the lateral walls of the third ventricle medially, or lie adjacent to (and to some extent within) the interthalamic adhesion;
- Reticular nuclei, together with the ventral geniculate (pregeniculate) nucleus and the zona incerta, form the ventral thalamus.

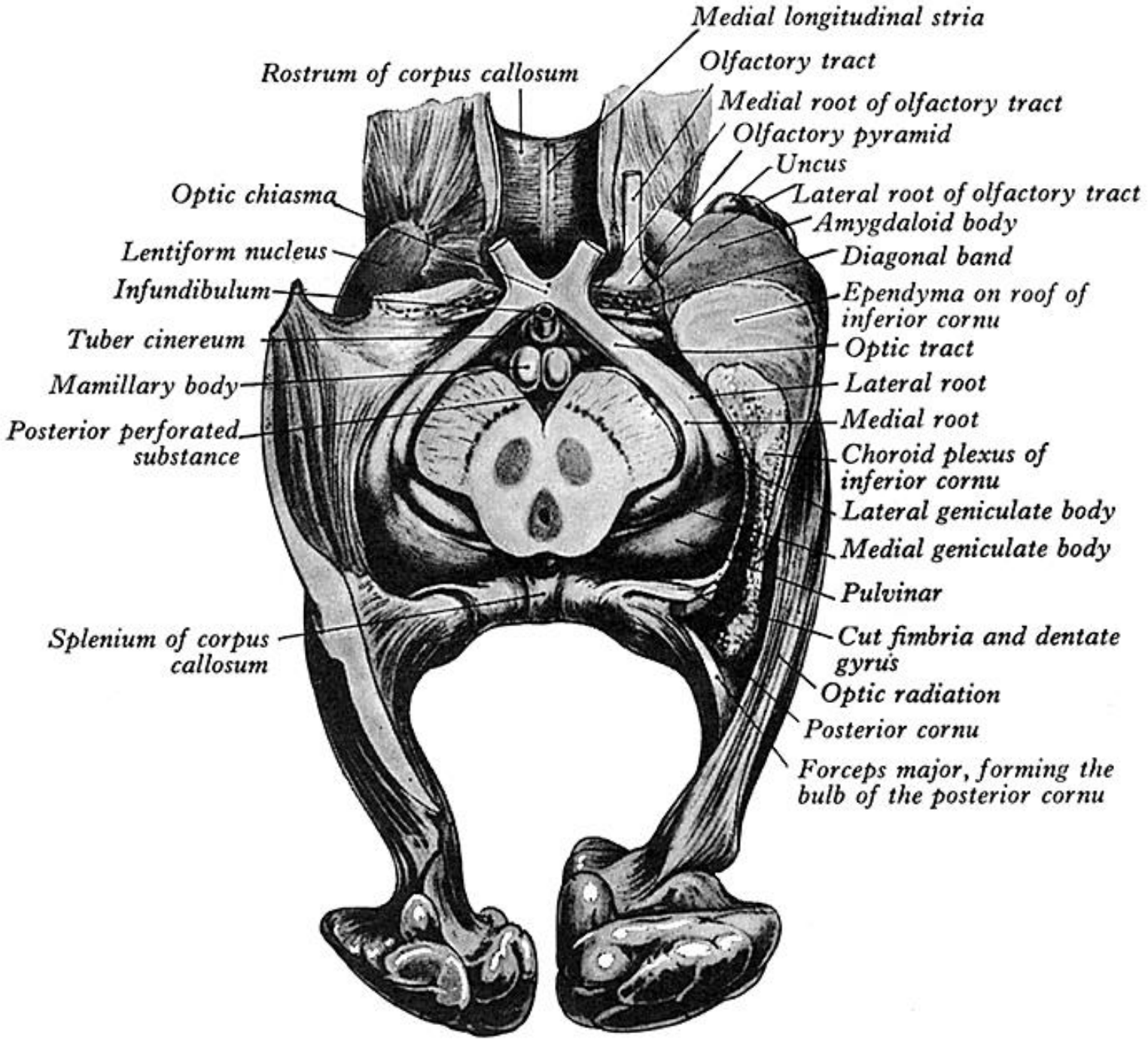


Optic pathway

- ***Optic tract fibres terminate in the lateral geniculate nucleus of the thalamus, the superior colliculus, pretectal area and nuclei of the accessory optic tract in the midbrain, and in the suprachiasmatic nucleus of the hypothalamus. A direct retinal input to the inferior pulvinar has also been reported***

- **A relay of fibres from neurons in the lateral geniculate nucleus traverses the posterior limb of the internal capsule, emerging as a broad optic radiation of axons of secondary visual neurons, curving dorsomedially to the occipital cortex (visual area)**
- **The efferent fibres of the lateral geniculate nucleus pass principally to the primary visual cortex (area 17) in the banks of the calcarine sulcus (see below). It is possible that additional small projections pass to extra striate visual areas in the occipital lobe**


LEFT VISUAL FIELD
BINOCULAR FIELD
RIGHT VISUAL FIELD
LEFT MONOCULAR
BINOCULAR
RIGHT MONOCULAR
Note optical inversion
RIGHT RETINA
Macula
OPTIC NERVE
Ciliary ganglion
Chiasma
OPTIC TRACT
LATERAL GENICULATE NUCLEUS
Right somatic oculomotor nucleus
Pretectal nucleus
Superior colliculus
Accessory oculomotor nucleus
Optic radiation
VISUAL CORTEX


Medial longitudinal stria
Olfactory tract
Rostrum of corpus callosum
Medial root of olfactory tract
Olfactory pyramid
Uncus
Optic chiasma
Lateral root of olfactory tract
Amygdaloid body
Lentiform nucleus
Diagonal band
Infundibulum
Ependyma on roof of inferior cornu
Tuber cinereum
Optic tract
Mamillary body
Lateral root
Posterior perforated substance
Medial root
Choroid plexus of inferior cornu
Lateral geniculate body
Medial geniculate body
Pulvinar
Splenium of corpus callosum
Cut fimbria and dentate gyrus
Optic radiation
Posterior cornu
Forceps major, forming the bulb of the posterior cornu

Epithalamus

- The epithalamus, following the terminology

1.anterior and posterior paraventricular nuclei,

2.medial and lateral habenular nuclei,

3.stria medullaris thalami and

4.pineal body.

Paraventricular Nuclei

- **The paraventricular nuclei are small, darkly stained neurons which form a densely cellular region immediately underlying the ependyma of the third ventricle dorsally. They are often considered as part of the midline thalamic nuclei**

Habenular Nuclei and Stria Medullaris

- ***The habenular nuclei lie posteriorly at the dorsomedial corner of the thalamus, immediately deep to the ependyma of the third ventricle, with the stria medullaris thalami above and laterally.***

- ***Lesions of habenular and nuclei area of the medial diencephalon indicate a role in the regulation of visceral and neuroendocrine functions. It has also been suggested that these nuclei play a part in the control of sleep mechanisms***

Hypothalamus

- **hypothalamus acts to integrate responses to both internal and external afferent stimuli with the complex analysis of our world provided by the cerebral cortex.**
- **together provide visceral and somatic control.**

- **The hypothalamus influences both parasympathetic and sympathetic autonomic systems.**
- **In ageing and especially in Alzheimer's dementia there is a marked loss of vasopressin neurons in the supra chiasmatic nucleus which may be associated with diminished *circadian rhythms* and sleep disturbances**

- **Biological Rhythms**
- ***Circadian Clocks***
- **It is common experience that the functions of our body show regular, recurrent cycles over the day and night. For example, you are awake and able to read this sentence because your internal clock has defined this time as your active phase.**

- Regulation of Plasma Osmotic Pressure,
- Blood Volume and Water Intake
- Sleep–Wake Cycle
- Regulation of Plasma Osmotic Pressure,
- Blood Volume and Water Intake
- Regulation of the Cardiovascular System
- Temperature Regulation
- Regulation of Food Intake and Metabolism
- Sexual Behaviour and Reproduction

Amygdaloid body

- ***Complex nuclei lies over the tip of the inferior horn of the lateral ventricles and fused with the claustrum and anterior perforated substance.***
- ***Continuous with the tail of caudate nucleus posteriorly and with the uncus medially.***
- ***Concerned with olfaction***
- ***Efferent fibers pass to the stria terminalis and to anterior hypothalamus and septal nuclei***

Salam

PREPERED BY :

Prof. Dr. Talib Jawad