BASIC CONCEPTS OF

THE LIMBIC SYSTEM

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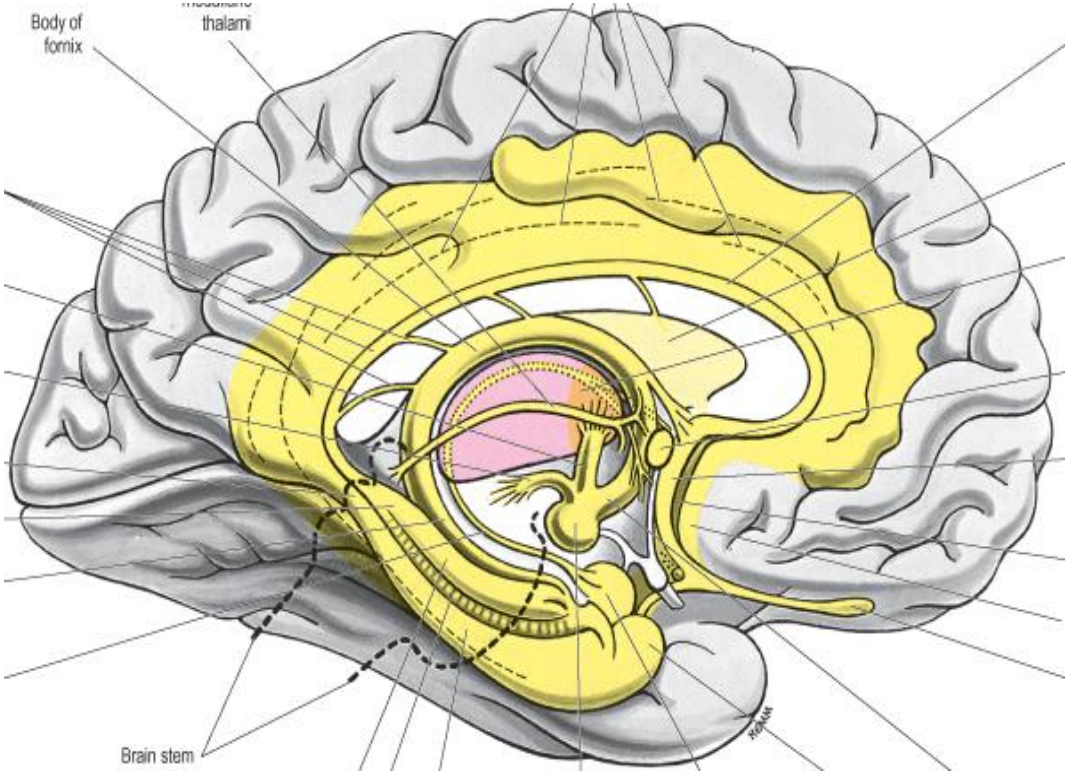
EXPECTED LEARNING OUTCOMES

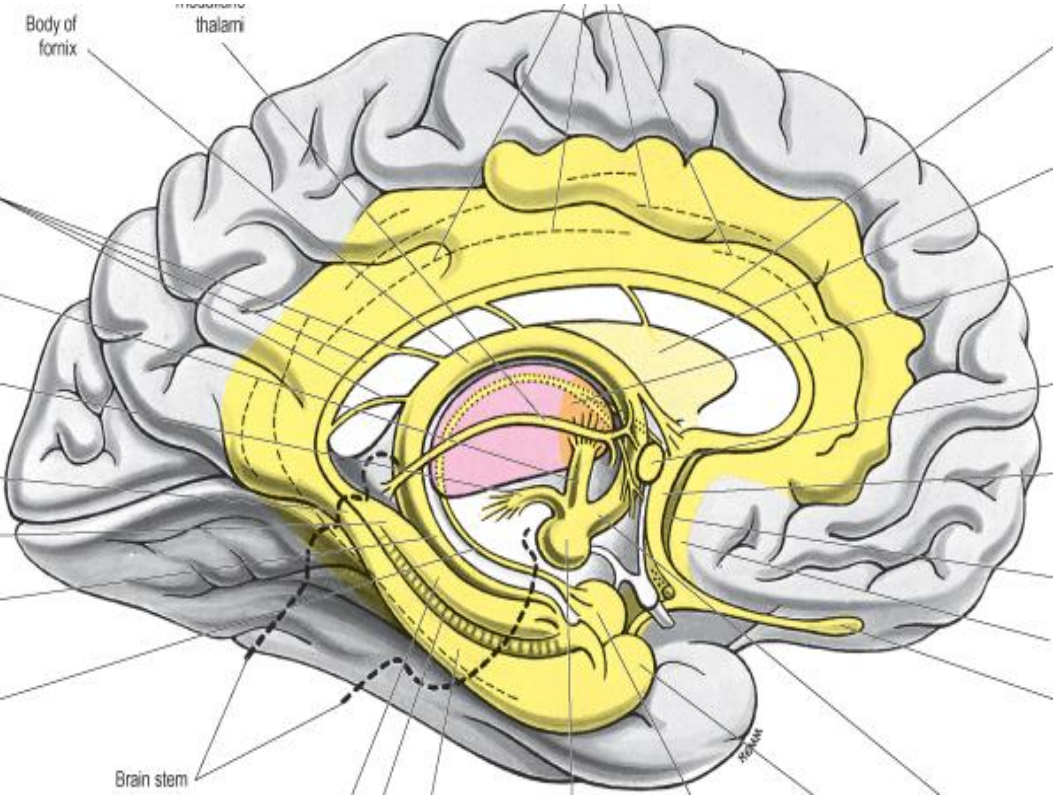
- Characteristics
- Functions
- Components
- Main connections/circuits
- Associated clinical aspects

HISTORICAL BACKGROUND



- 1870's: A rim of cortical tissue, associated nuclei and fiber tracts around the cerebral hilum
- "The limbic lobe"

HISTORICAL BACKGROUND



- 1930's: A circuit that explained the relationship between emotion and memory
- Rhinencephalon (obsolete)

CHARACTERISTICS

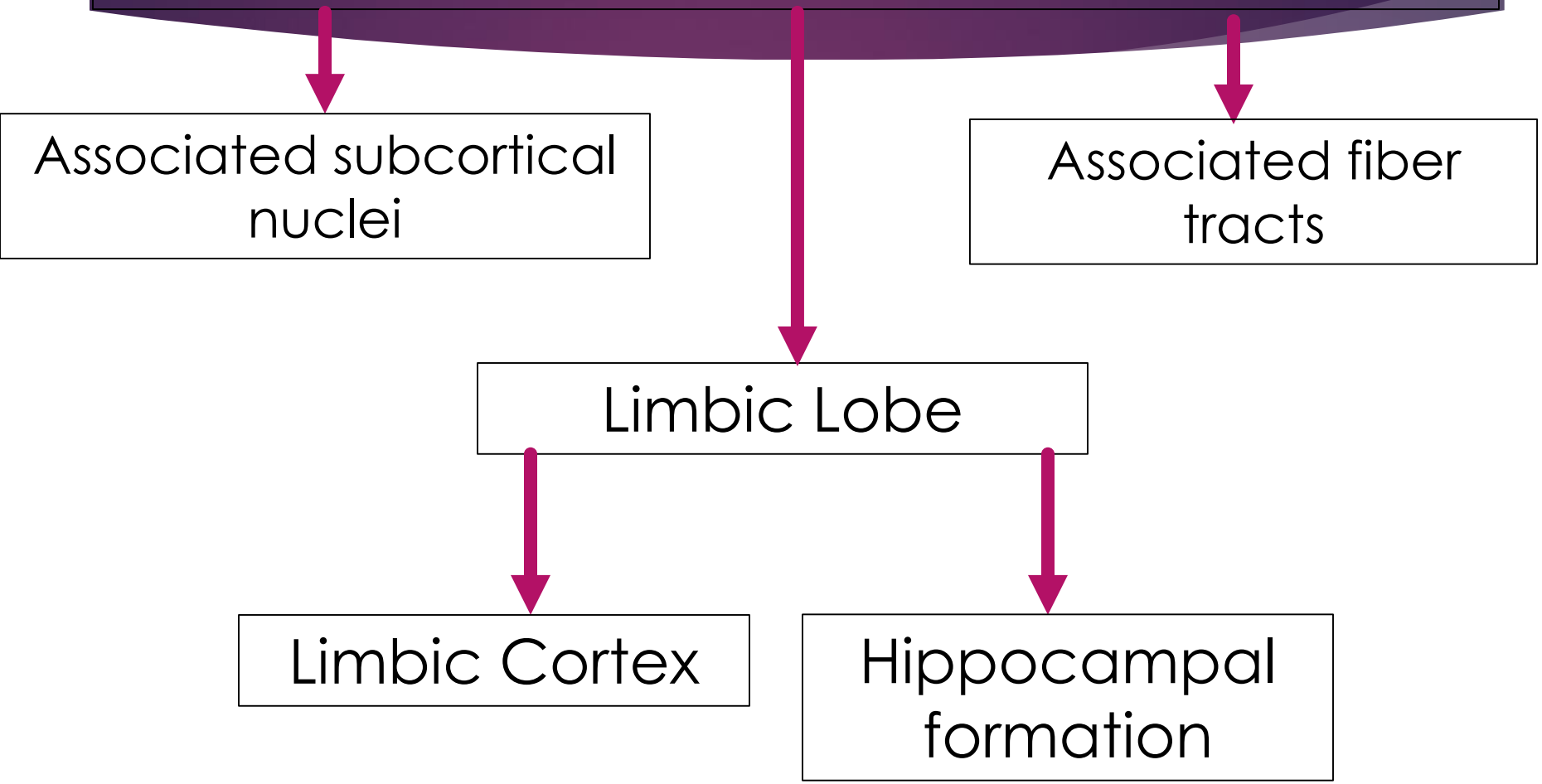
1. Presence of allocortices
2. Prolonged after discharge
3. Paucity of neocortical input (relatively independent)
4. Neocortical input can modify activity

FUNCTIONS

- Preservation of self (homeostatic) and preservation of species (reproduction)

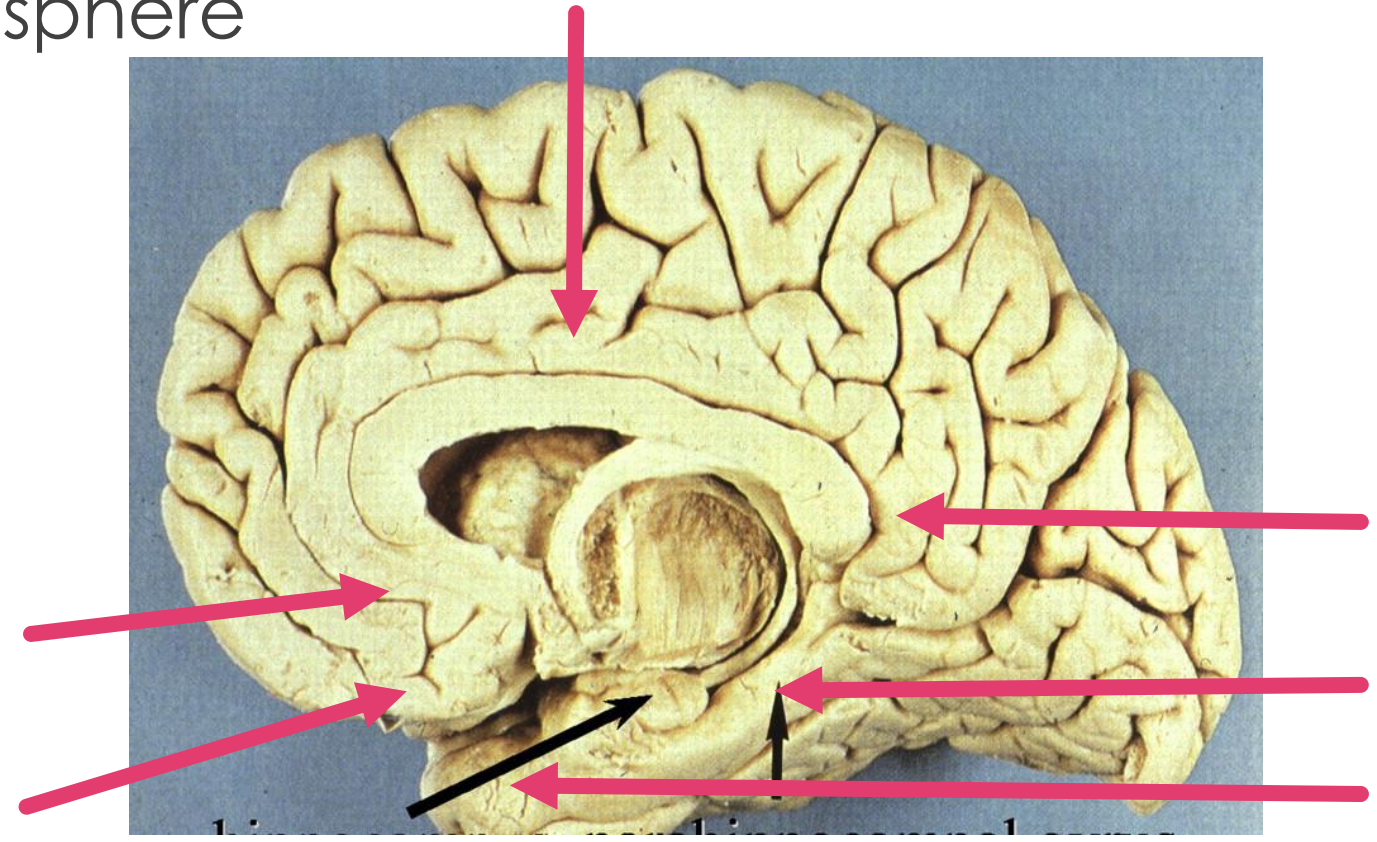
1. Regulate emotions and its visceromotor responses (either endocrine and autonomic)
2. Temporary storage of information (learning & memory)
3. Regulation of sexual responses
4. Regulation of food intake (feeding)

COMPONENTS OF THE LIMBIC SYSTEM

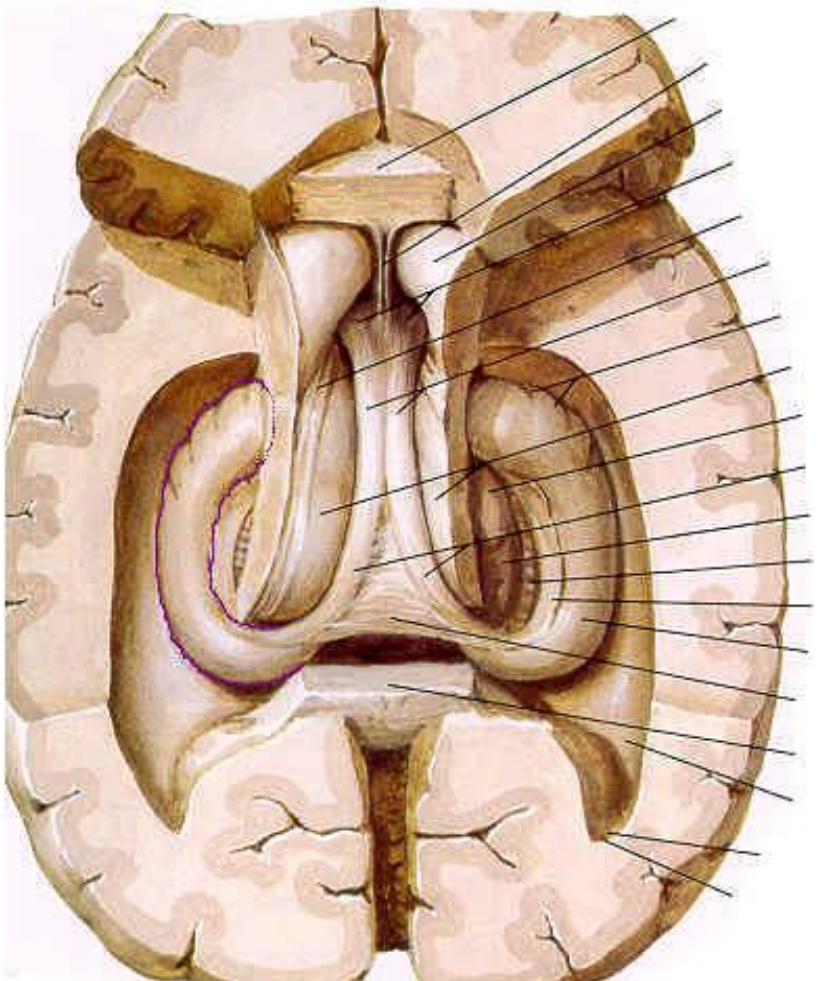


THE LIMBIC CORTEX

- Cortical tissue on the medial wall of the cerebral hemisphere

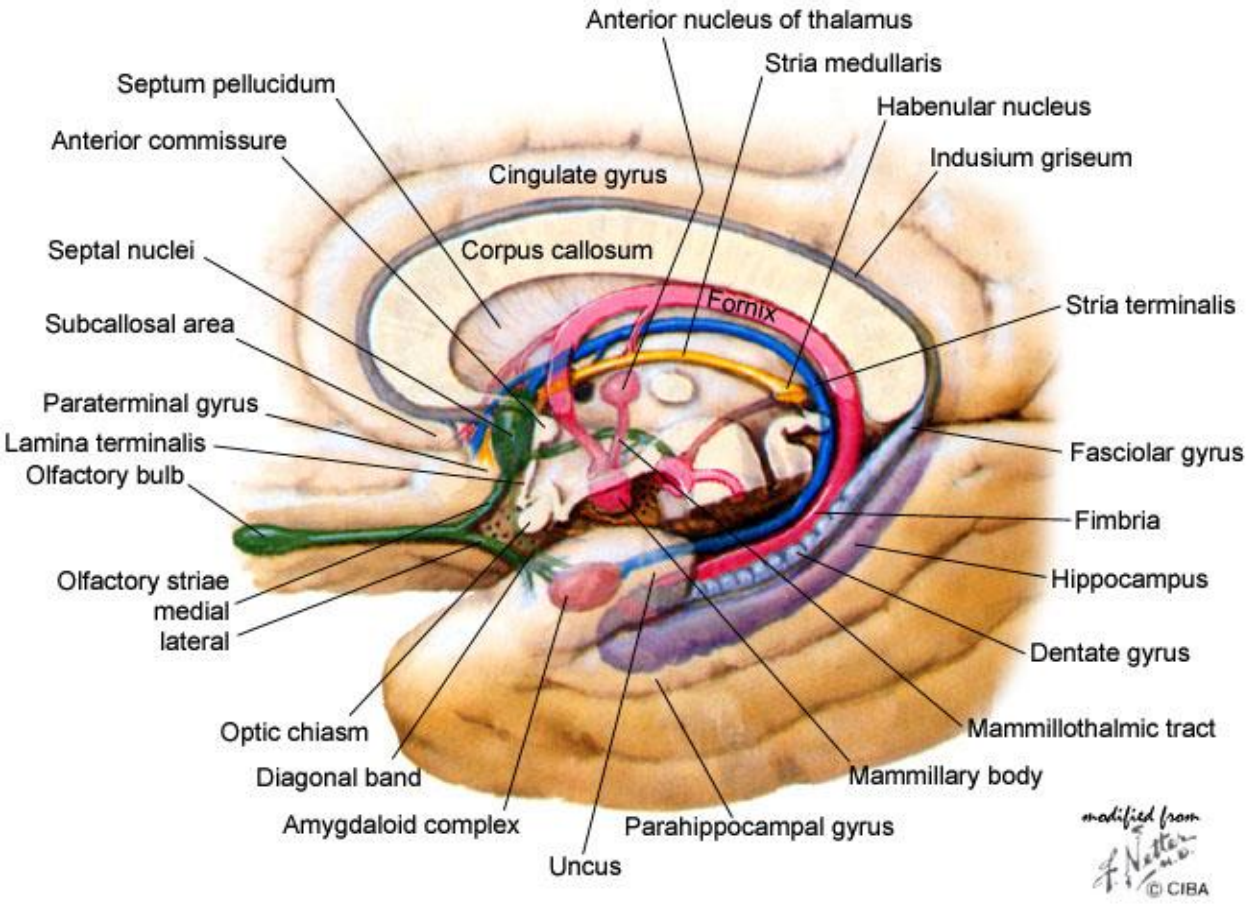


HIPPOCAMPAL FORMATION

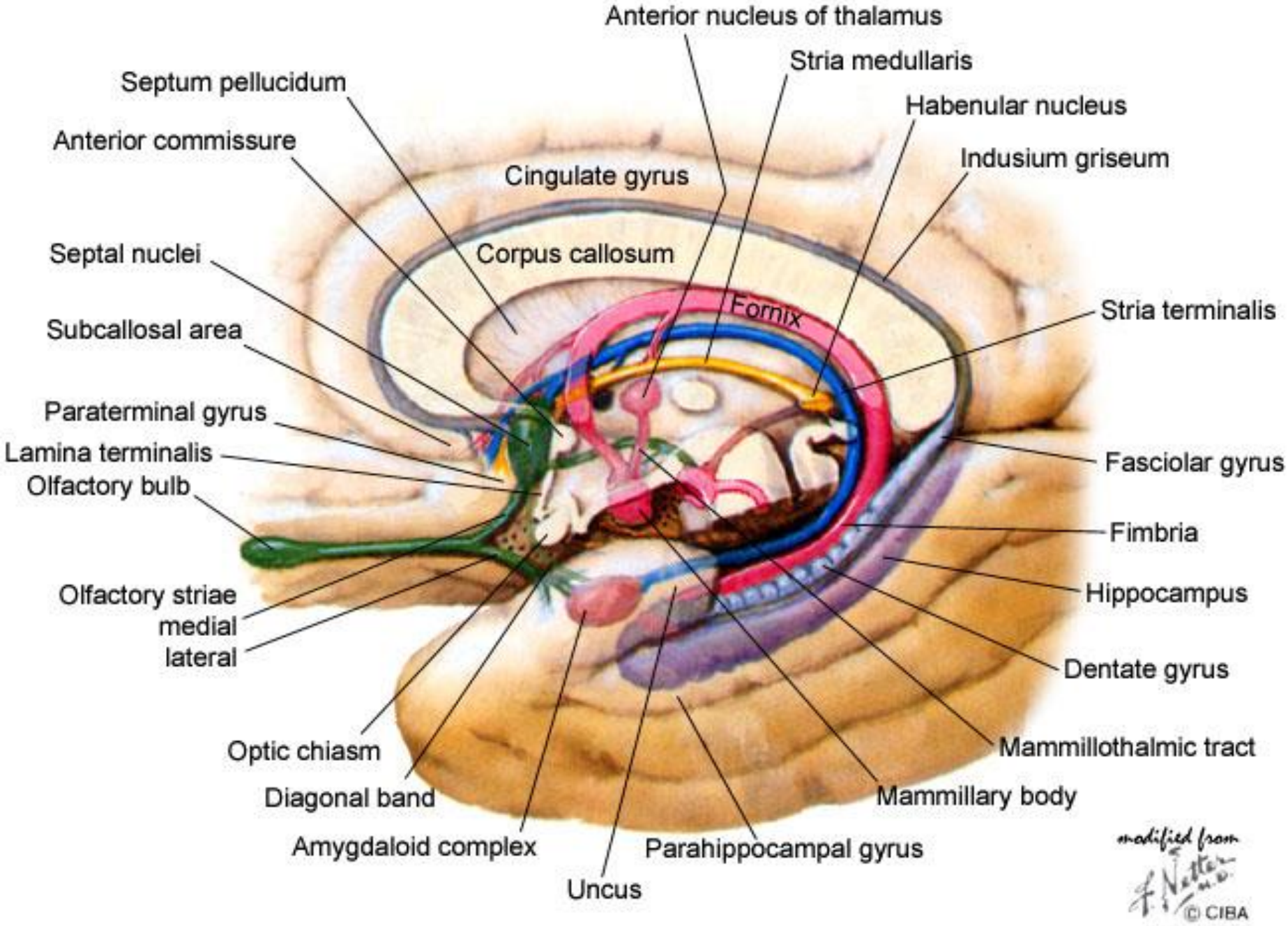


- Hippocampus proper
- Dentate gyrus
- Subicular nuclear complex
- Entorhinal cortex
- Hippocampal rudiments

SUBCORTICAL NUCLEI



1. Amygdala nuclear complex
2. Anterior thalamic nuclei
3. Septal nuclei
4. Hypothalamus
5. Habenular nuclei
6. Ventral striatum


Anterior nucleus of thalamus
Stria medullaris
Septum pellucidum
Habenular nucleus
Anterior commissure
Indusium griseum
Cingulate gyrus
Corpus callosum
Septal nuclei
Fornix
Stria terminalis
Subcallosal area
Paraterminal gyrus
Fasciolar gyrus
Lamina terminalis
Olfactory bulb
Fimbria
Hippocampus
Olfactory striae
medial
lateral
Dentate gyrus
Optic chiasm
Mammillothalmic tract
Diagonal band
Mammillary body
Amygdaloid complex
Parahippocampal gyrus
Uncus
modified from
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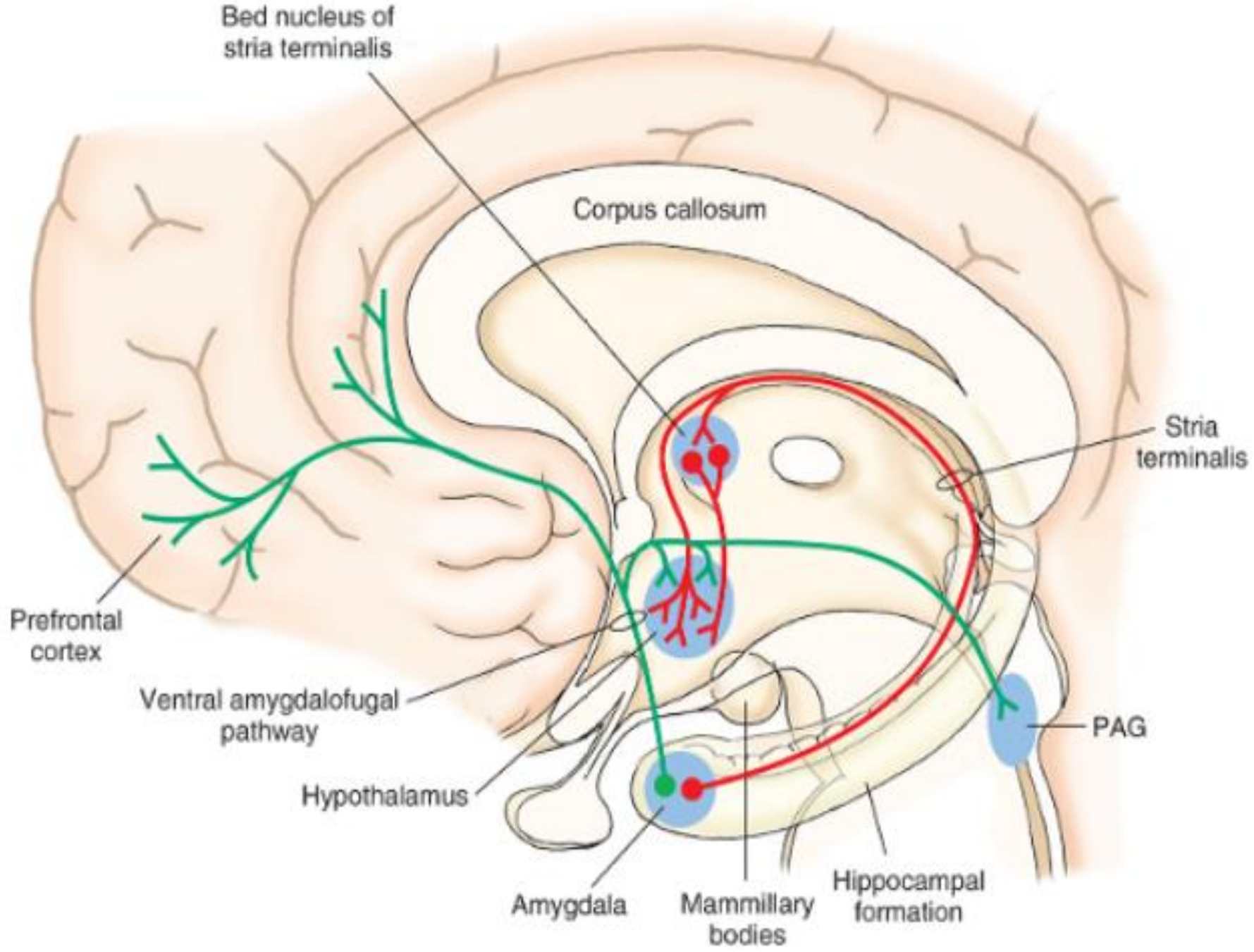
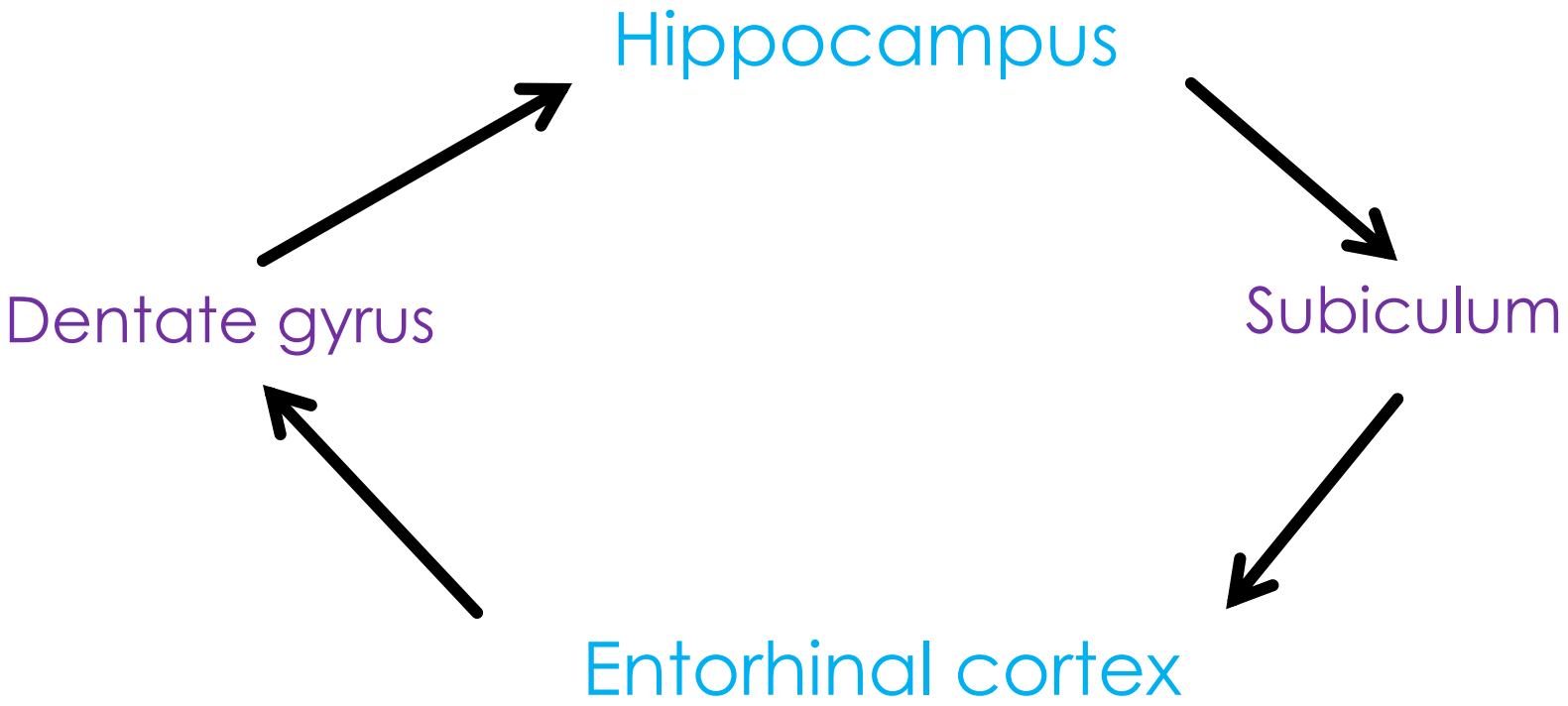
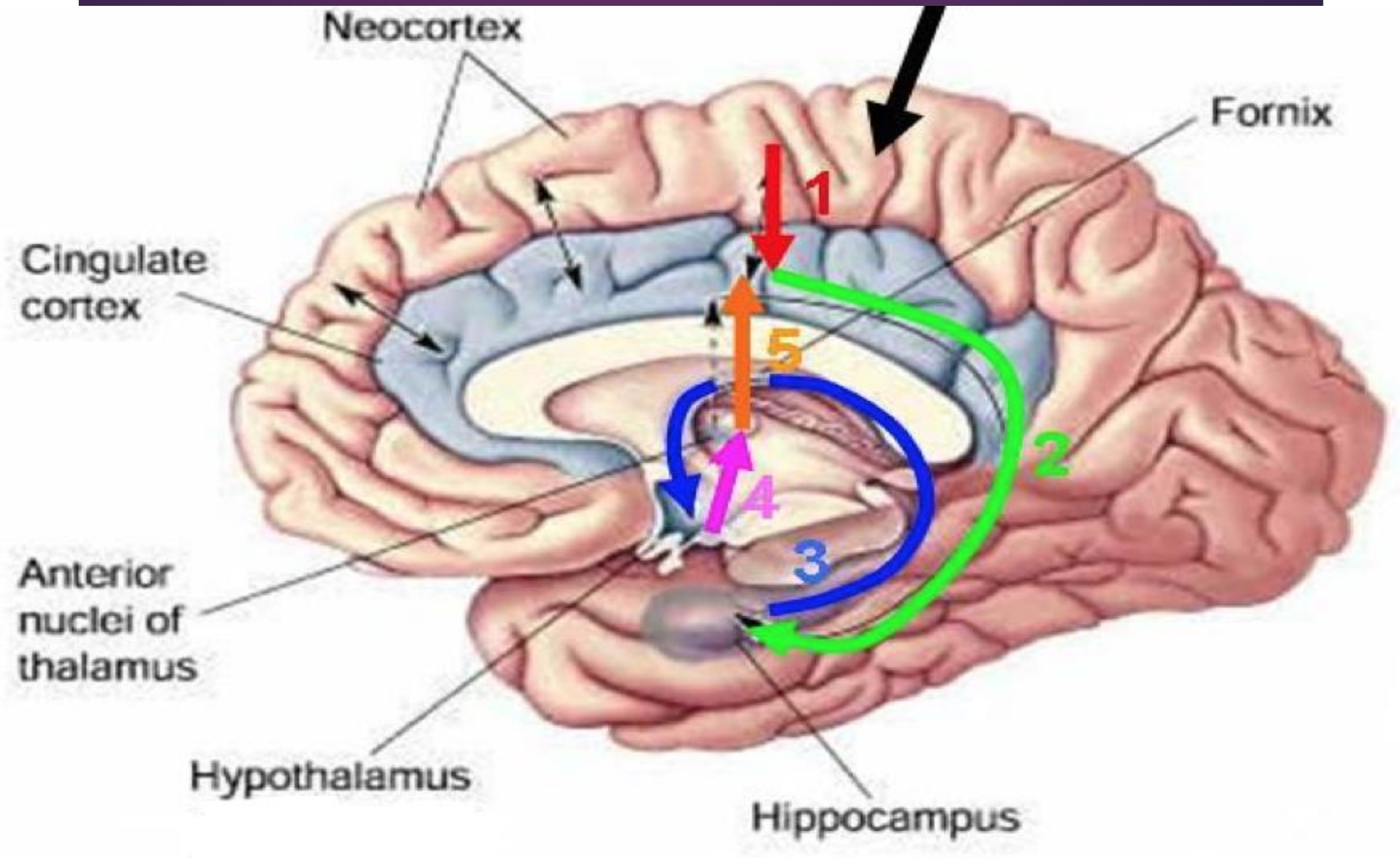

Bed nucleus of stria terminalis
Corpus callosum
Stria terminalis
Prefrontal cortex
Ventral amygdalofugal pathway
PAG
Hypothalamus
Amygdala
Mammillary bodies
Hippocampal formation

THE INTRINSIC CIRCUIT



THE PAPEZ CIRCUIT



KLUVER-BUCY SYNDROME

- Results from bilateral destruction of amygdala

1. Hypersexuality
2. Hyperorality
3. Docility
4. Dietary changes (hyperphagia)
5. Visual agnosia

OTHER CLINICAL ASPECTS

- Schizophrenia
- Amnesia - Alzheimer's disease; Korsakoff psychosis
- Bipolar disorder
- Epilepsy

DIENCEPHALON

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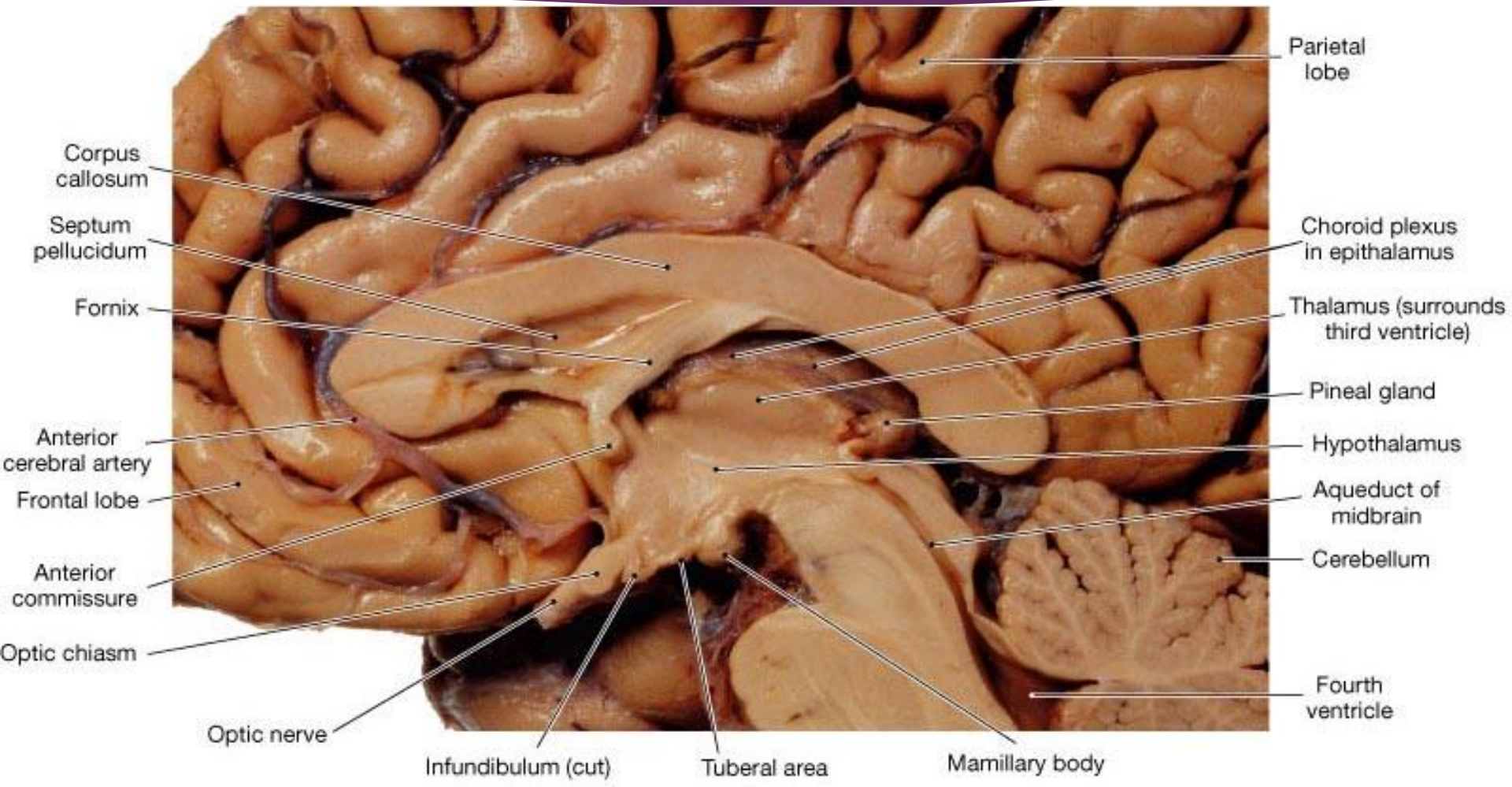
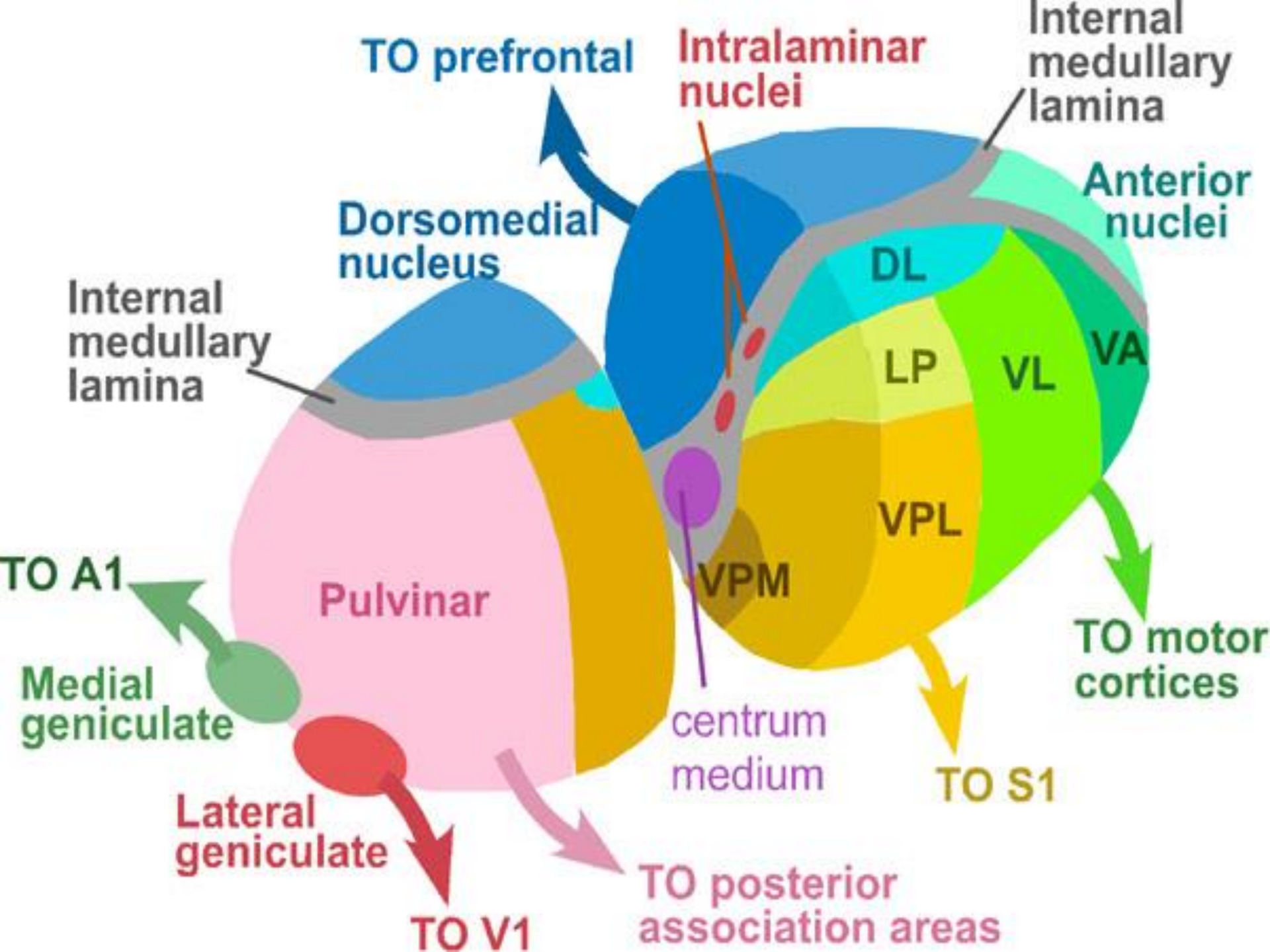
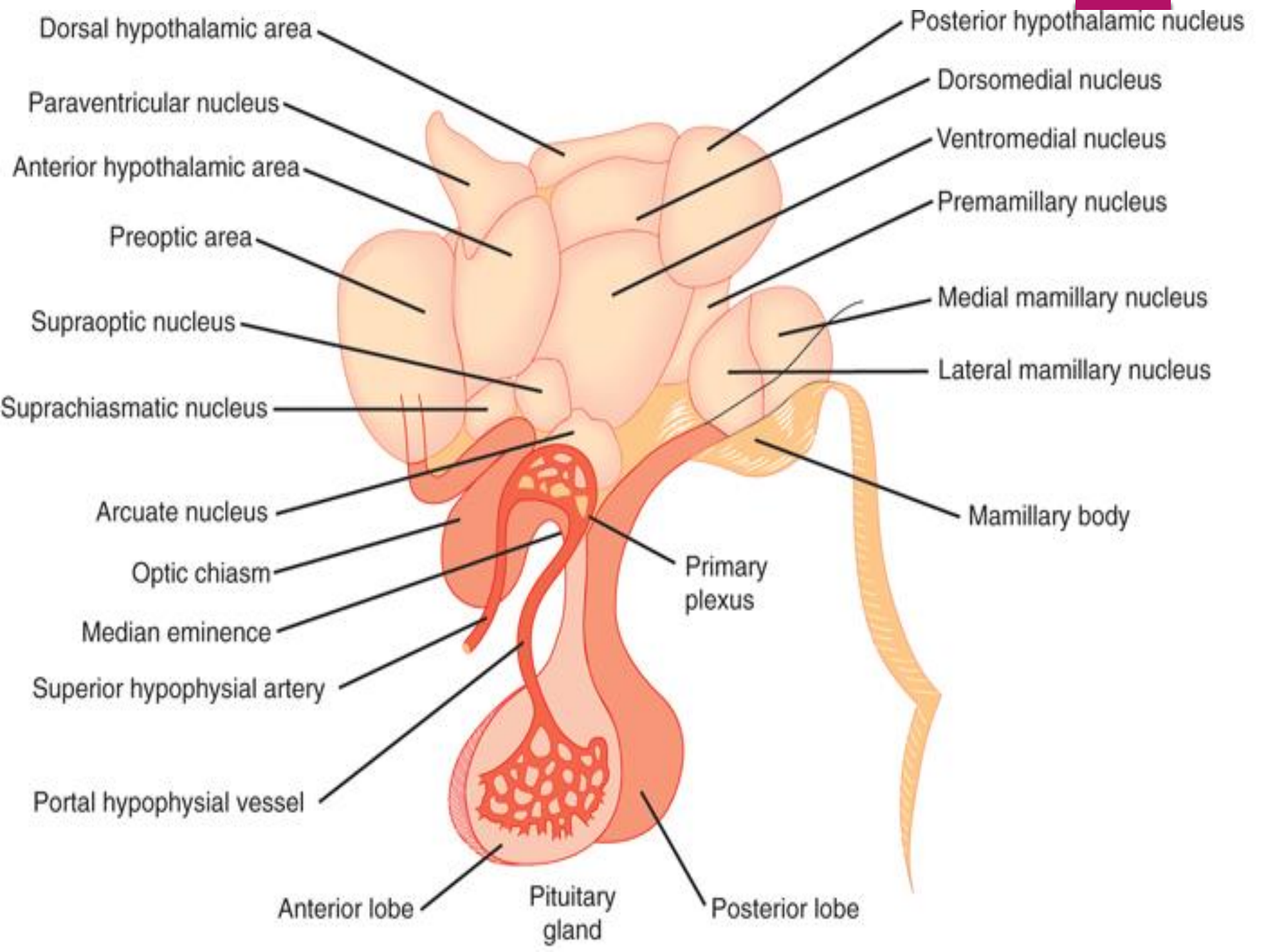
COMPONENTS OF THE DIENCEPHALON




TO prefrontal
Intralaminar nuclei
Internal medullary lamina
Anterior nuclei
Dorsomedial nucleus
DL
Internal medullary lamina
LP
VL
VA
VPL
TO A1
Pulvinar
VPM
TO motor cortices
Medial geniculate
centrum medium
TO S1
Lateral geniculate
TO posterior association areas
TO V1


Dorsal hypothalamic area
Paraventricular nucleus
Anterior hypothalamic area
Preoptic area
Supraoptic nucleus
Suprachiasmatic nucleus
Arcuate nucleus
Optic chiasm
Median eminence
Superior hypophysial artery
Portal hypophysial vessel
Anterior lobe
Pituitary gland
Posterior lobe
Primary plexus
Mamillary body
Lateral mamillary nucleus
Medial mamillary nucleus
Premamillary nucleus
Ventromedial nucleus
Dorsomedial nucleus
Posterior hypothalamic nucleus

HYPOTHALAMIC OUTPUT

- Brain stem – reticular formation; autonomic preganglionic neurons
- Anterior thalamic nucleus – to cerebral cortex
- Pituitary gland – both adenohypophysis and neurohypophysis

HYPOTHALAMIC NUCLEI

1. Supraoptic – ADH
2. Paraventricular – oxytocin
3. Mammillary – limbic
4. Suprachiasmatic – circadian rhythm

THE END