



Neuroanatomy

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Limbic System



Gyri of the Limbic Lobe

Outer Ring

Cingulate Gyrus

Isthmus of Cingulate Gyrus

Parahippocampal Gyrus

Uncus, Uncinate Gyrus

Inner Ring

Hippocampal Formation

Hippocampus, Ammon's Horn

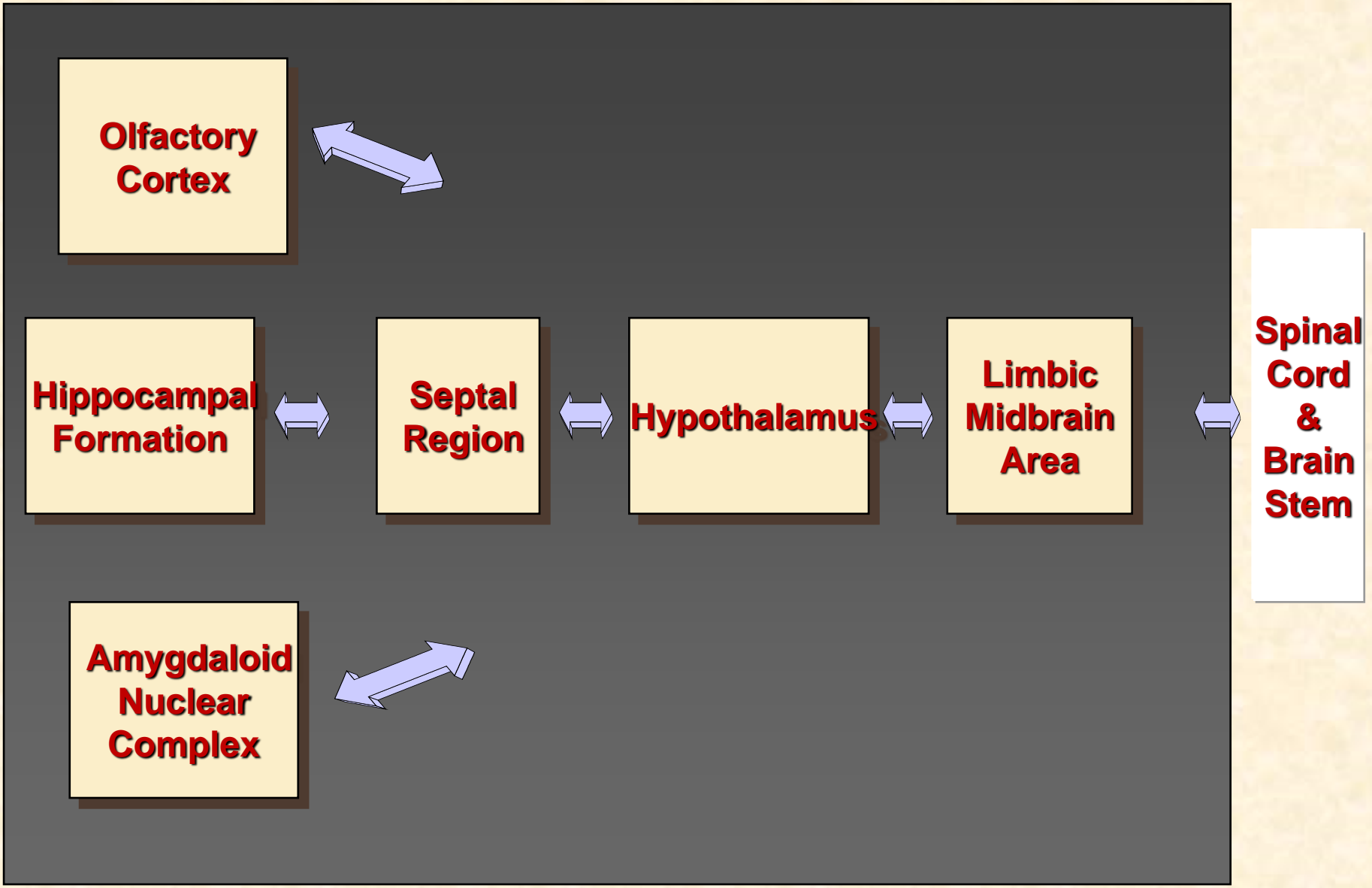
Dentate Gyrus

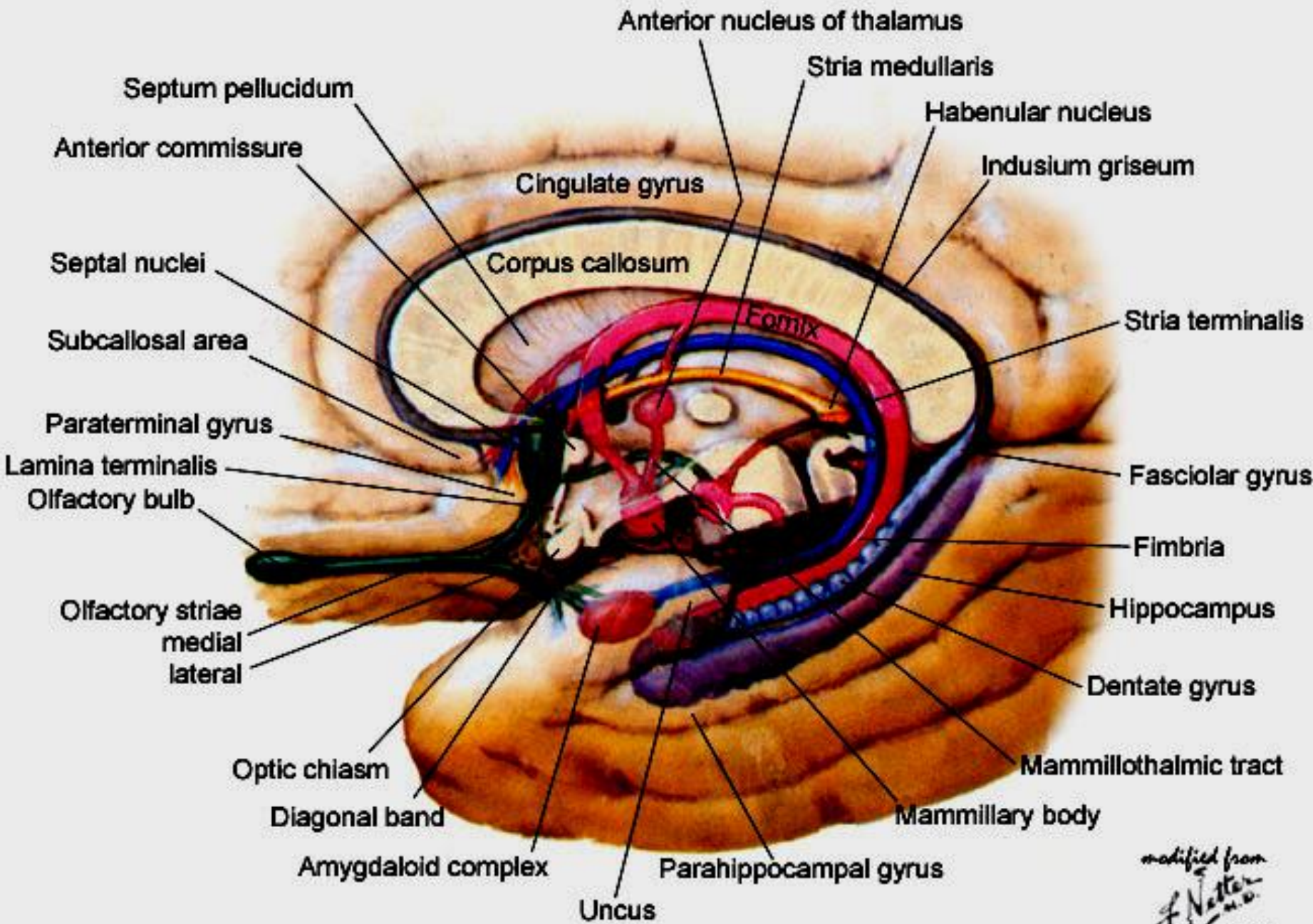
Fasciolar Gyrus

Indusium Griseum (Supracallosal Gyrus)

Paraterminal Gyrus (Subcallosal Gyrus)

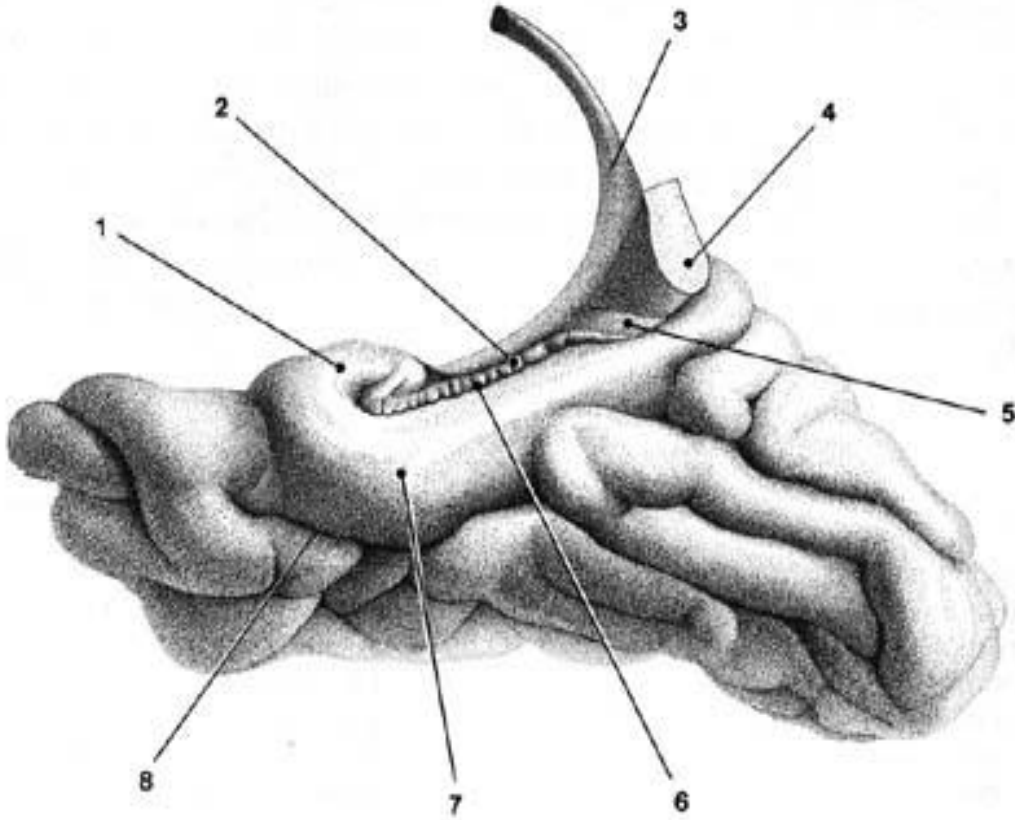
Subcallosal Area (Parolfactory Area)





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F. Netter M.D.
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Hippocampal Formation



1. uncus

2. dentate gyrus

3. fornix

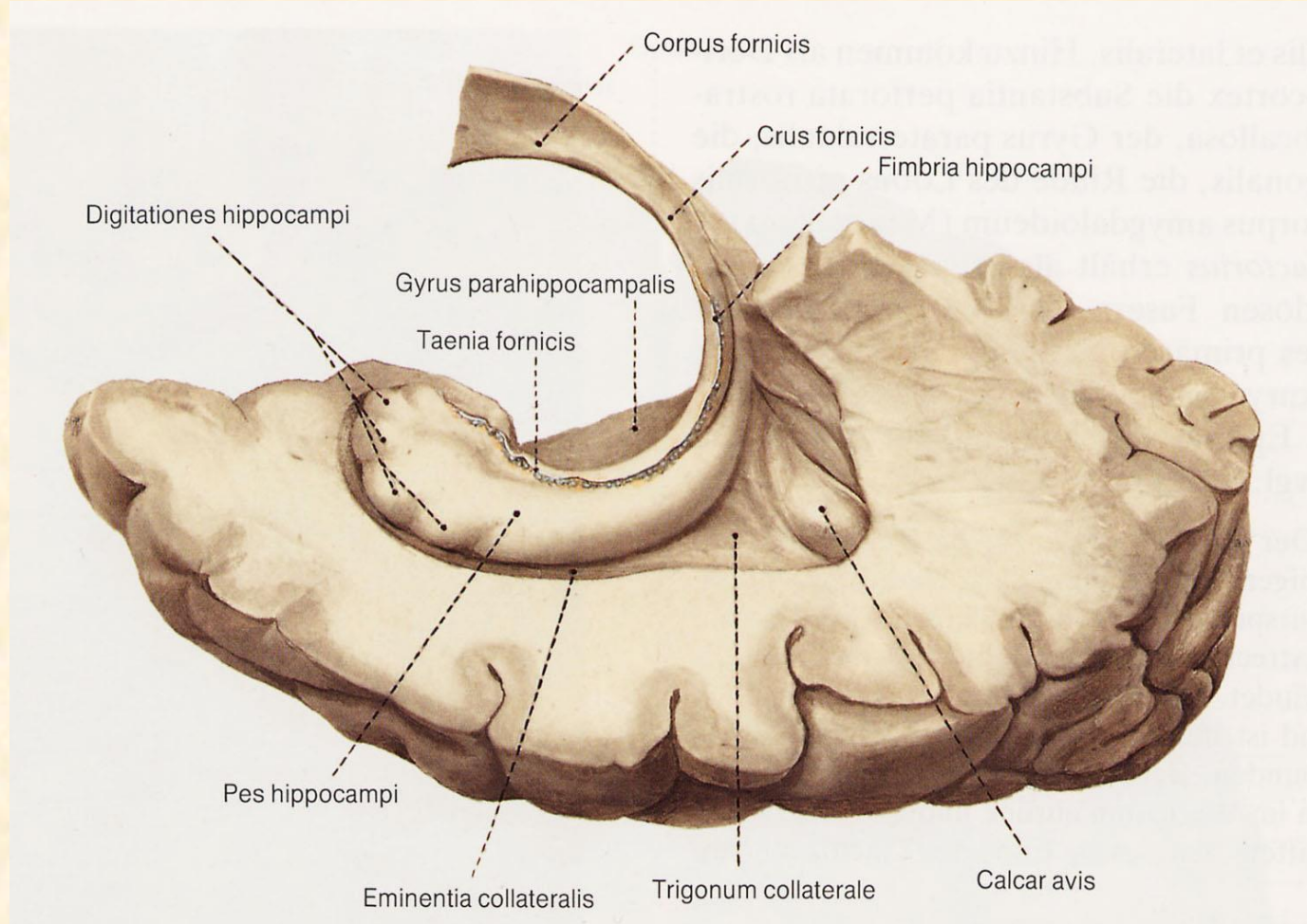
4. corpus callosum

5. fasciolar gyrus

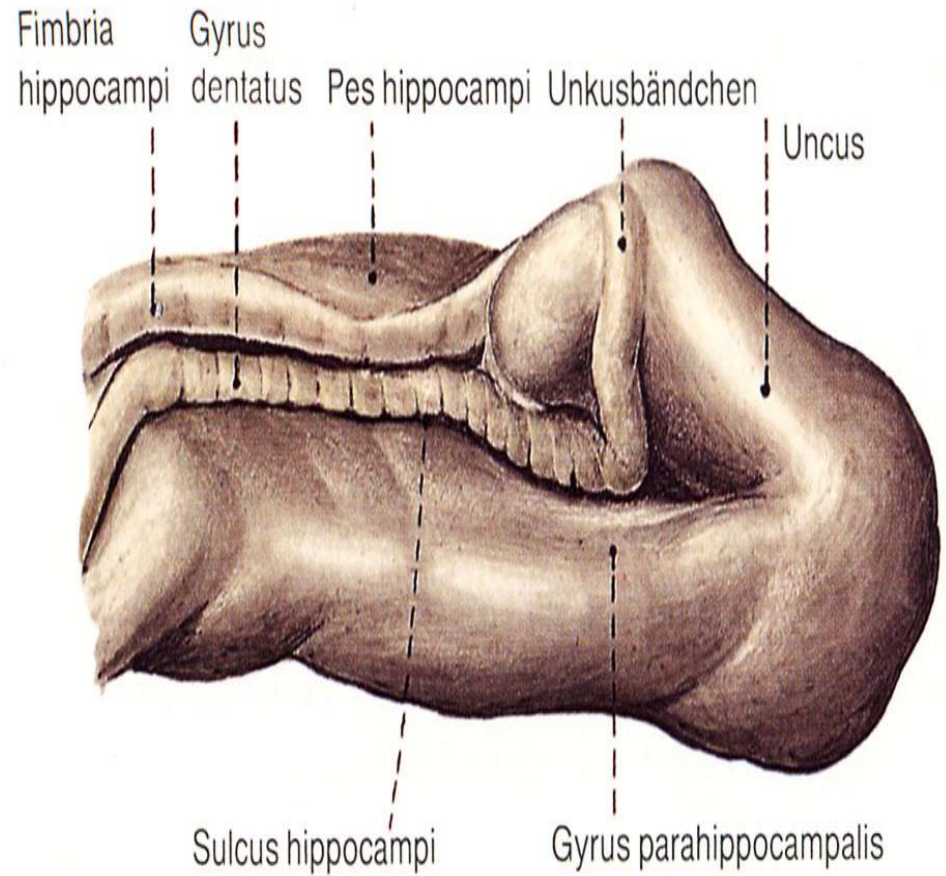
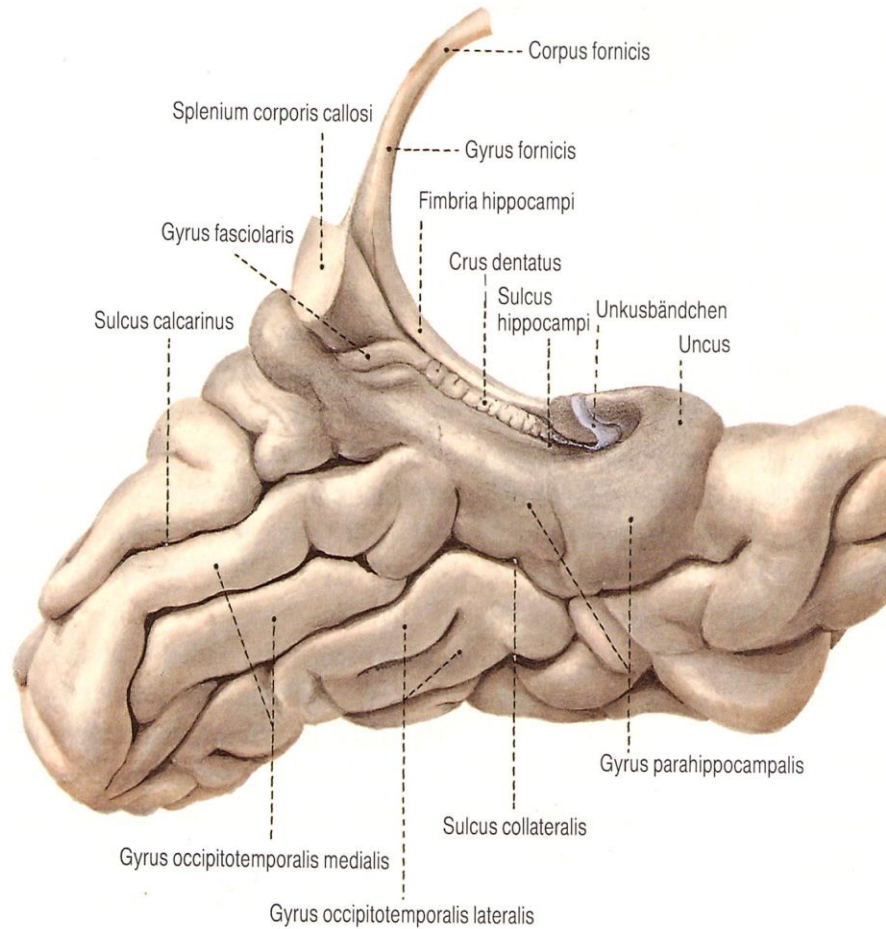
6. hippocampal sulcus

*7. parahippocampal
gyrus*

8. collateral sulcus

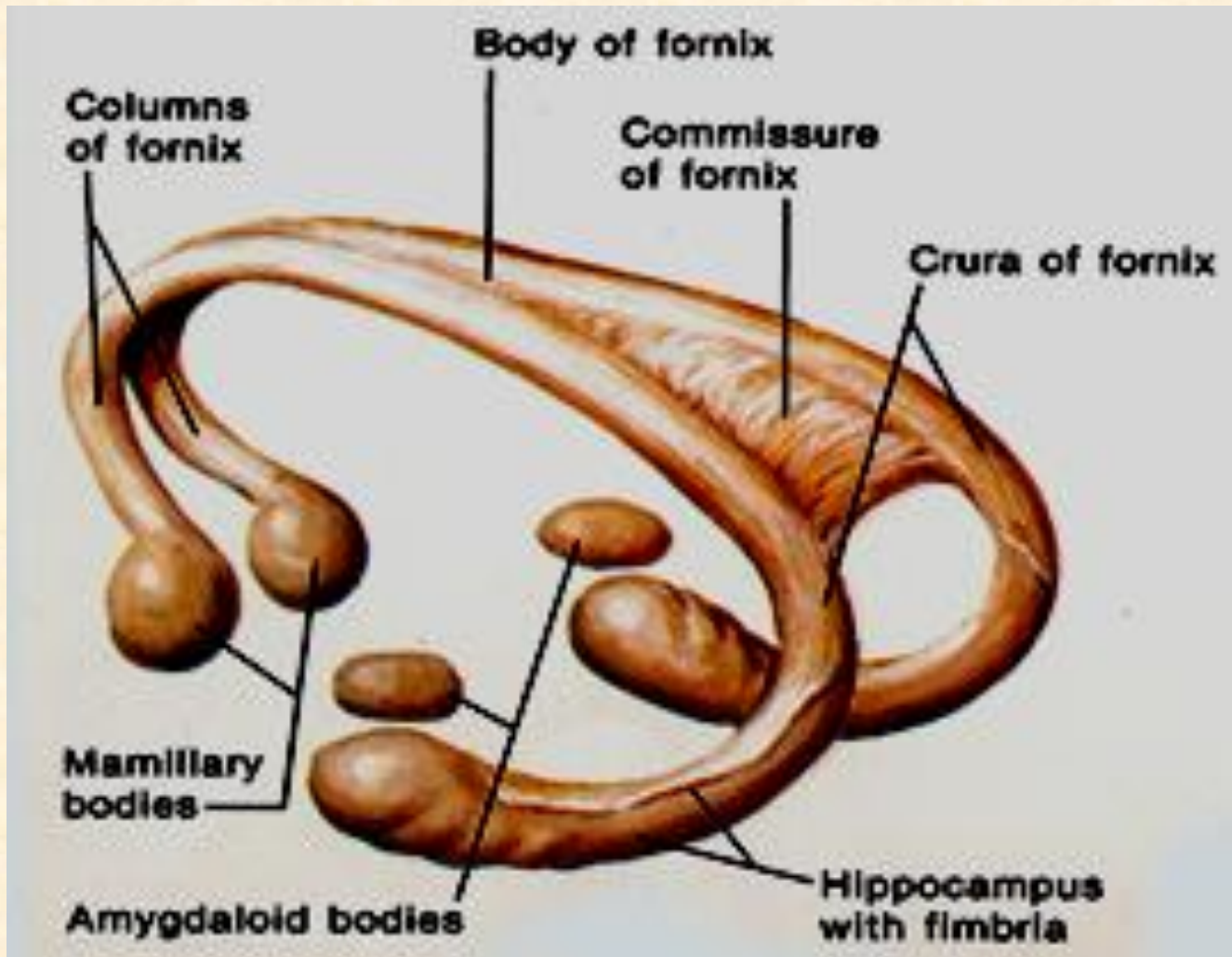


Hippocampal Formation (Lateral View)



Hippocampal Formation (Medial View)

FORNIX



Hippocampal Connections

Afferent Connections

- Cingulate gyrus
- Entorhinal Cortex
- Septal Nuclei
- Opposite hippocampus (fornix commissure)
- Indusium griseum
- Dentate Gyrus

Efferent Connections

FORNIX

- Mammillary body
- Anterior nuclei of the thalamus
- Tegmentum of midbrain
- Septal Nuclei
- Hypothalamus
- Habenular nuclei

Papez Circuit

- A. Hippocampal Formation
- B. mammillary body
- C. thalamic anterior nucleus
- D. cingulate gyrus

- 1. *fornix*
- 2. *mammillothalamic tract*
- 3. *thalamocortical radiation*
- 4. *cingulum*



Functions of the limbic system

1. Emotion - Affective Behavior

Amygdala

Limbic and Prefrontal *Cortex*

- *Desire, Motivation, Goal-directed Behavior*
- *Schizophrenia (emotional withdrawal)*
- *Temporal lobe Dysfunction*

(Temporal epilepsy preceded by Olfactory or acoustic aura)

Hypothalamus and Brain Stem

- *ANS - maintenance of self (appetites)*
maintenance of species (sexual function)

cf. Klüver-Bucy Syndrome

2. Memory and Learning

Papez Circuit

cf. Korsakoff's syndrome (Anterograde Amnesia)

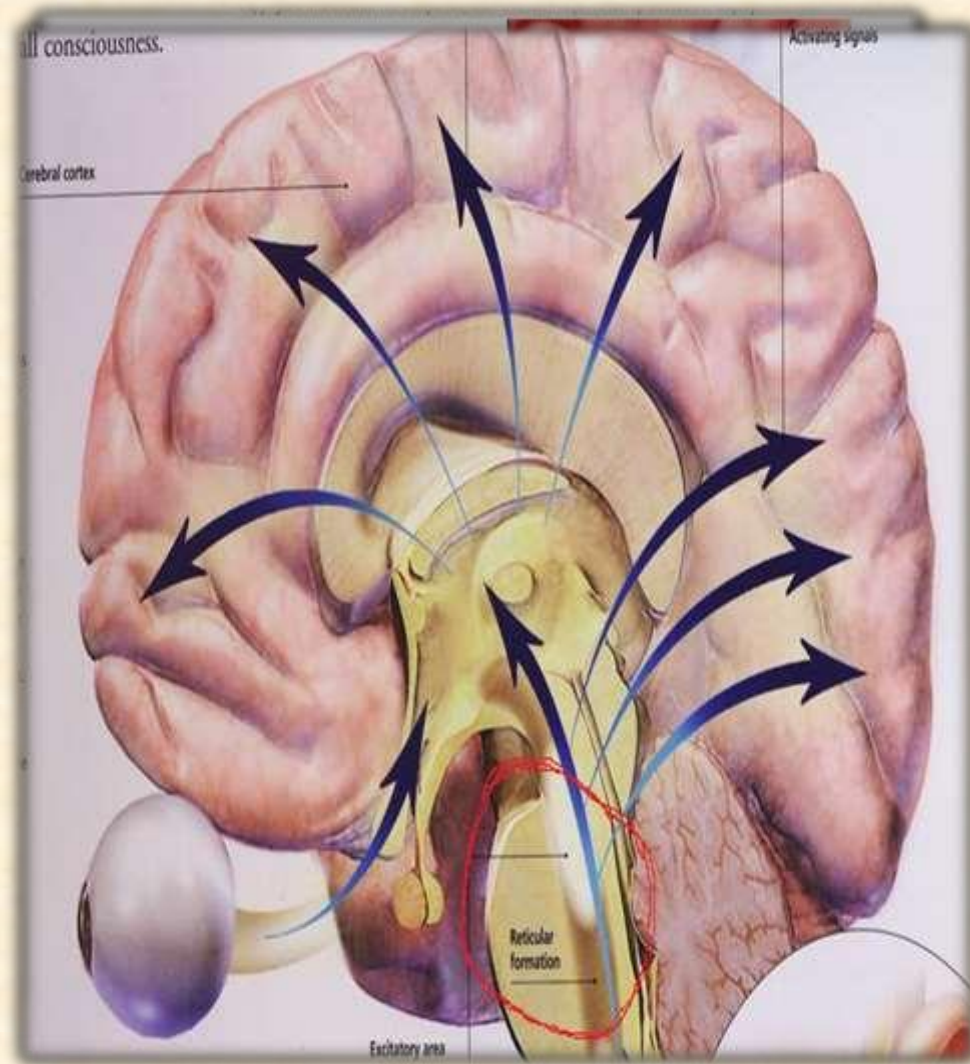
Klüver-Bucy syndrome

- ◆ **Monkey or cats with bilateral damage of temporal lobes including amygdala and hippocampal formation**
- ❖ **Fail to display normal fear of anxiety (docility)**
 - attempt to pick up snakes and lighted matches
- ❖ **Regression to oral stage**
 - put almost anything into mouth
- ❖ **Marked increase in both the amount and diversity of sexual activity**

The Reticular Formation

Definition:-

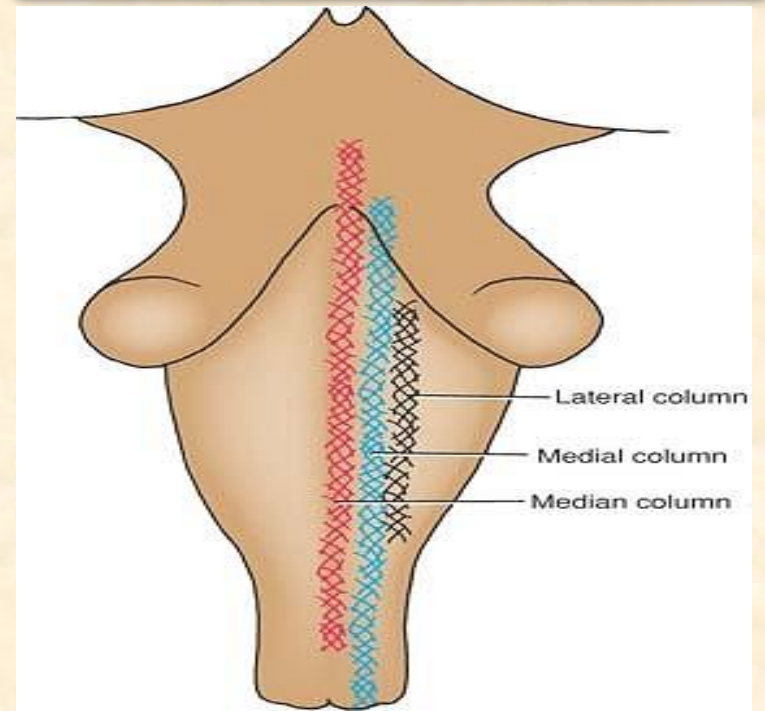
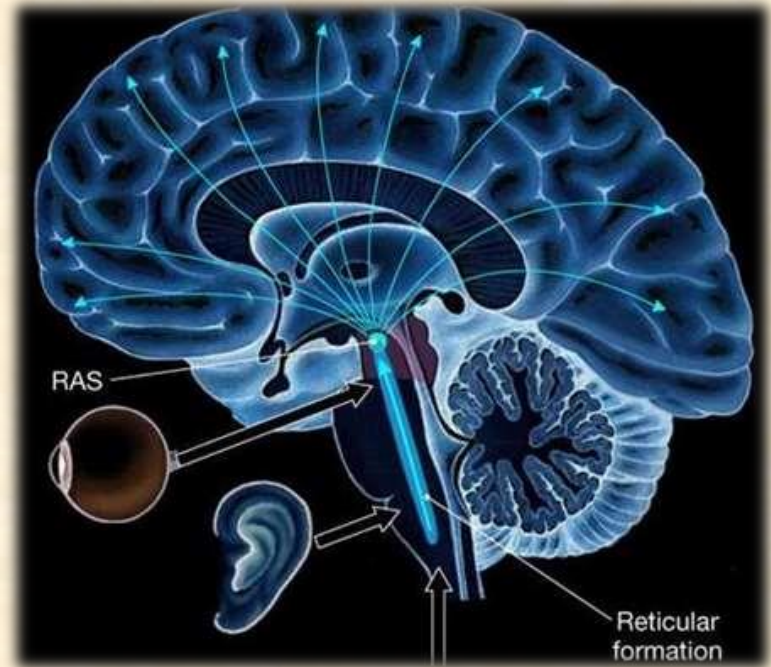
Diffuse ill defined mass of nerve cells and fibres forming a network of reticulum in the central portion of the brainstem



- The reticular formation is situated in brain stem, and extends downwards into spinal cord and upwards up to thalamus and sub thalamus.

- The entire reticular formation is broadly arranged into three columns:

- Median
- Medial
- Lateral



Functions of the RF

- Role in Sleep and Wakefulness cycle.**
- Responsible for the alerting responses**
- Controls muscle tone (reticulospinal and reticulobulbar) .**
- Influences Endocrine Secretion (Hypothalamus)**
- Role in somatic and visceral function**
- Influences circadian rhythm.**
- Influences Autonomic nervous system.**

RETICULAR FORMATION CONNECTIONS

AFFERENTS

Spinal cord

spino reticular tract and via collaterals from all ascending tracts.

Brain stem

afferents from the cranial nerves

Tectoreticular

Tectum (Superior and inferior colliculi)

Cerebellum (cerebello reticular)

Basal ganglia

Neocortex – Cortico reticular fibres from the motor, sensory cortex

Limbic lobe

EFFERENTS

- **spinal cord.**
- descending reticulospinal tracts (medial inhibitory and lateral facilitatory)
- **Brain stem**
- **Reticulobulbar**
- **Cerebellum**
- **Red nucleus and Substantia Nigra**
- **Thalamus-Subthalamus-Hypothalamus**
- **Corpus striatum**

THANK YOU