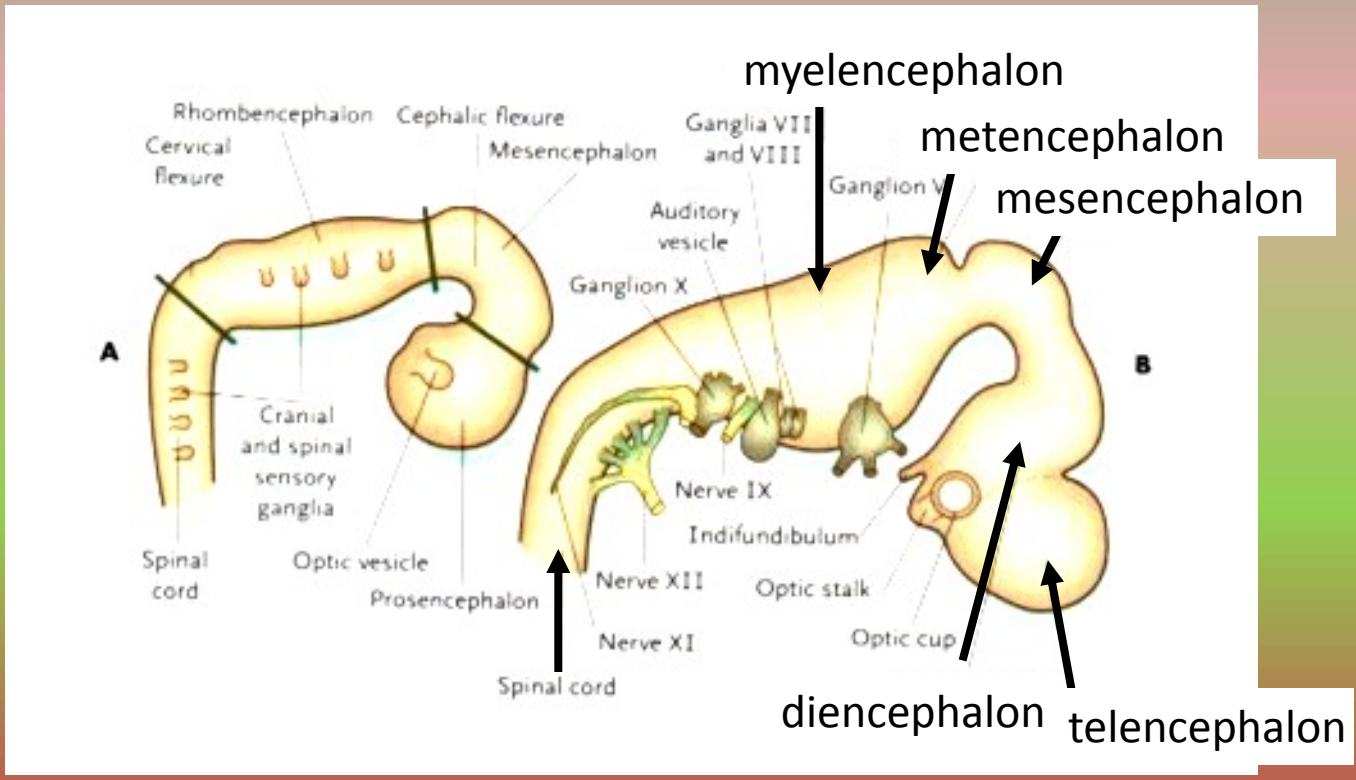
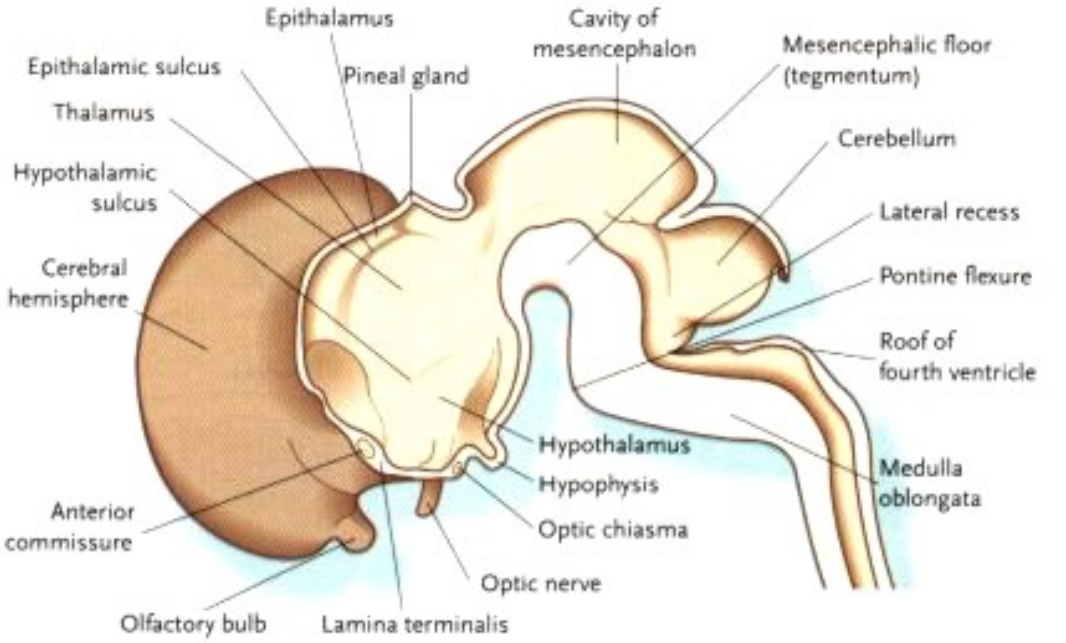
Telencephalon

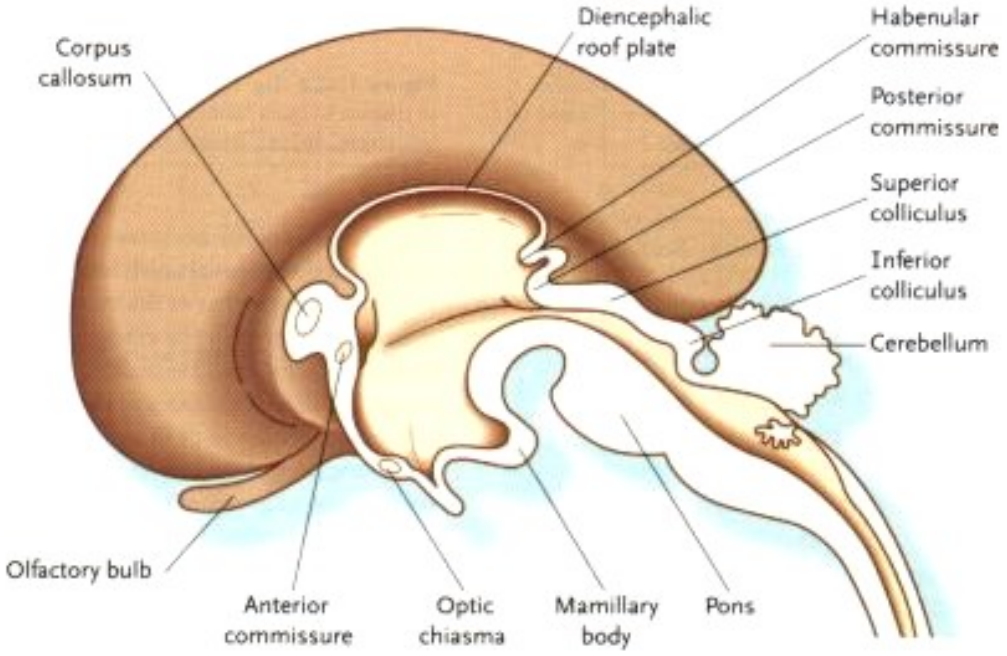
Ontogenic development of CNS

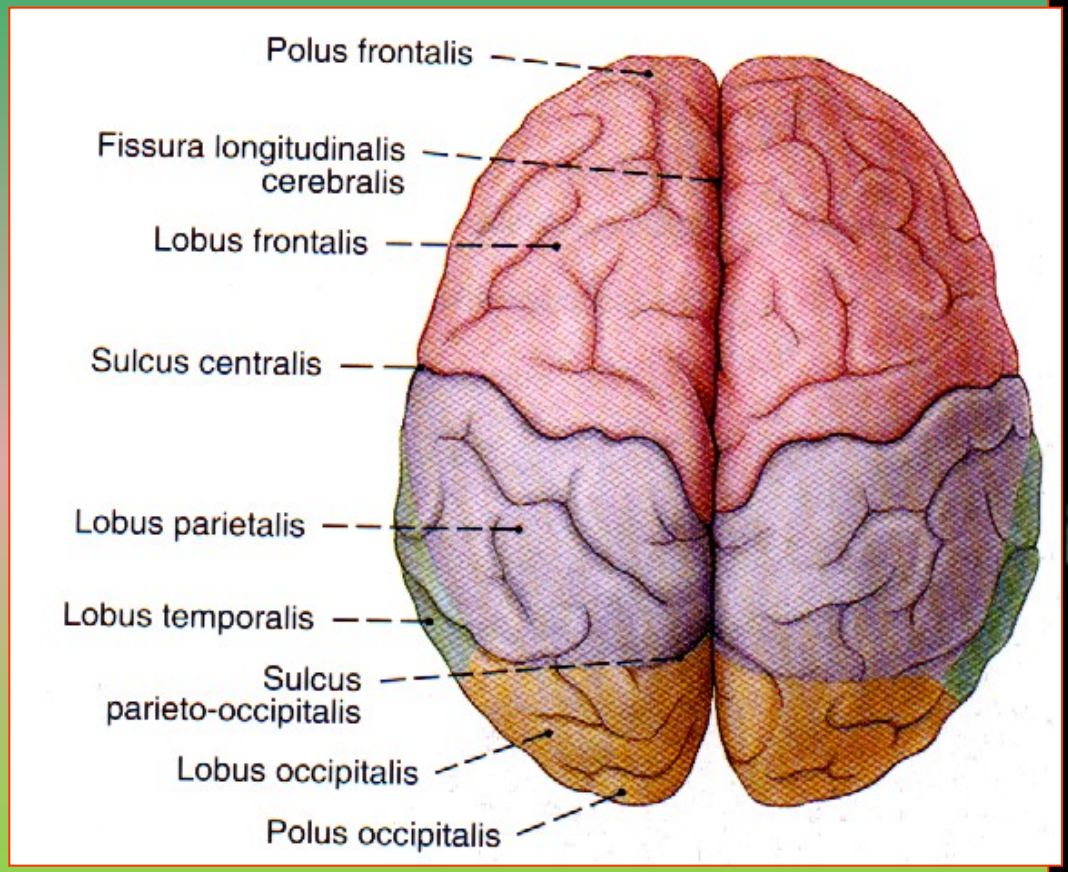
Primary pouches: prosencephalon, mesencephalon, rhombencephalon

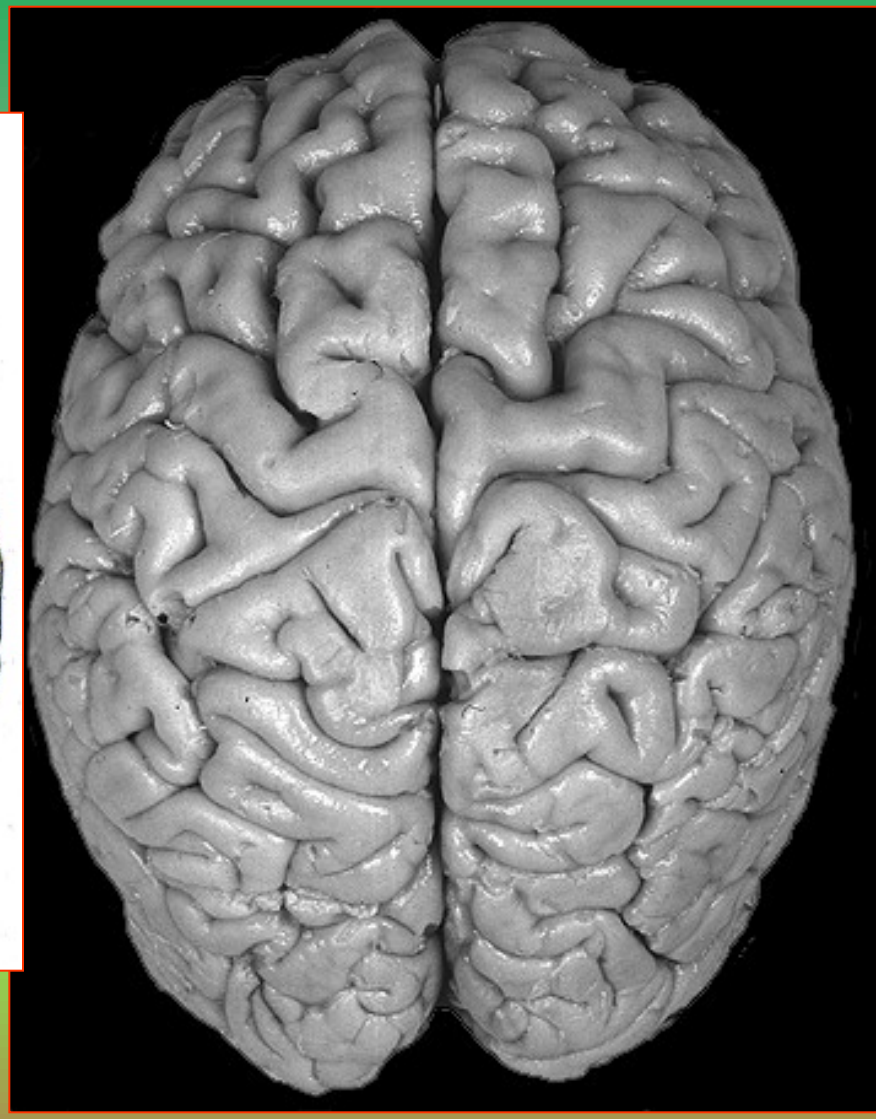
Secondary pouches: telencephalon
diencephalon
mesencephalon
metencephalon ---- pons (pons Varoli), cerebellum
myelencephalon --- medulla oblongata

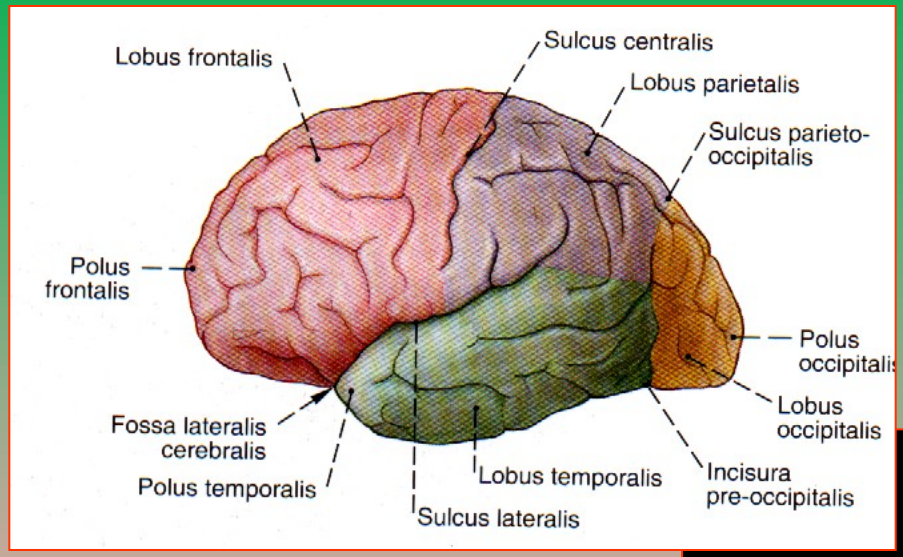


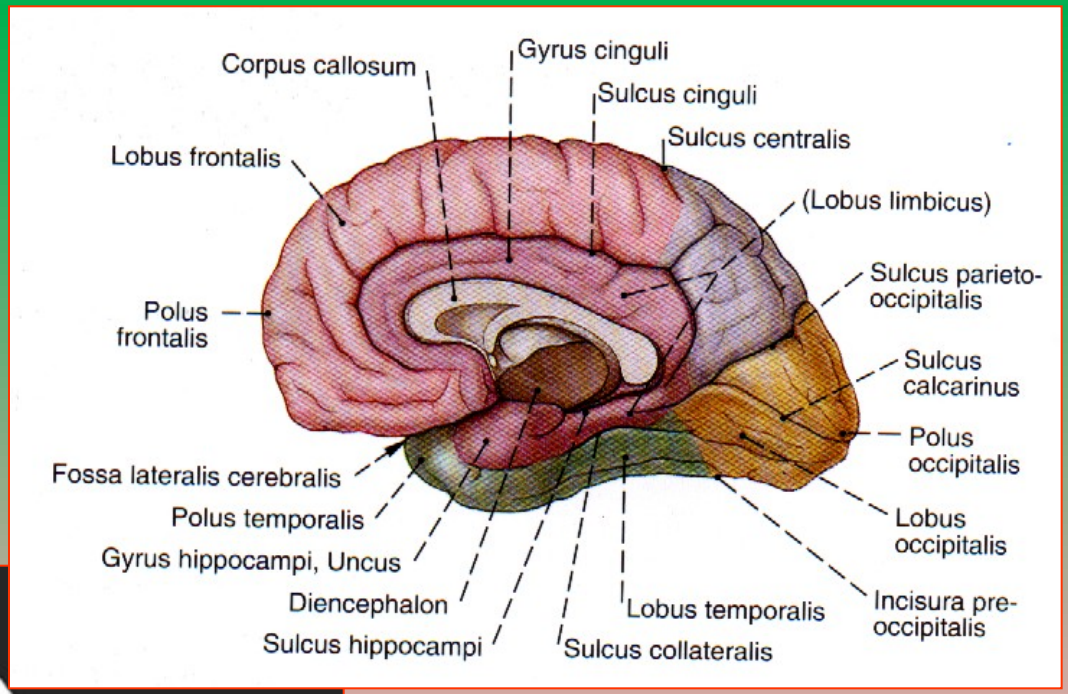

Epithalamus
Cavity of mesencephalon
Epithalamic sulcus
Pineal gland
Mesencephalic floor (tegmentum)
Thalamus
Cerebellum
Hypothalamic sulcus
Lateral recess
Cerebral hemisphere
Pontine flexure
Roof of fourth ventricle
Hypothalamus
Medulla oblongata
Hypophysis
Anterior commissure
Optic chiasma
Optic nerve
Olfactory bulb
Lamina terminalis

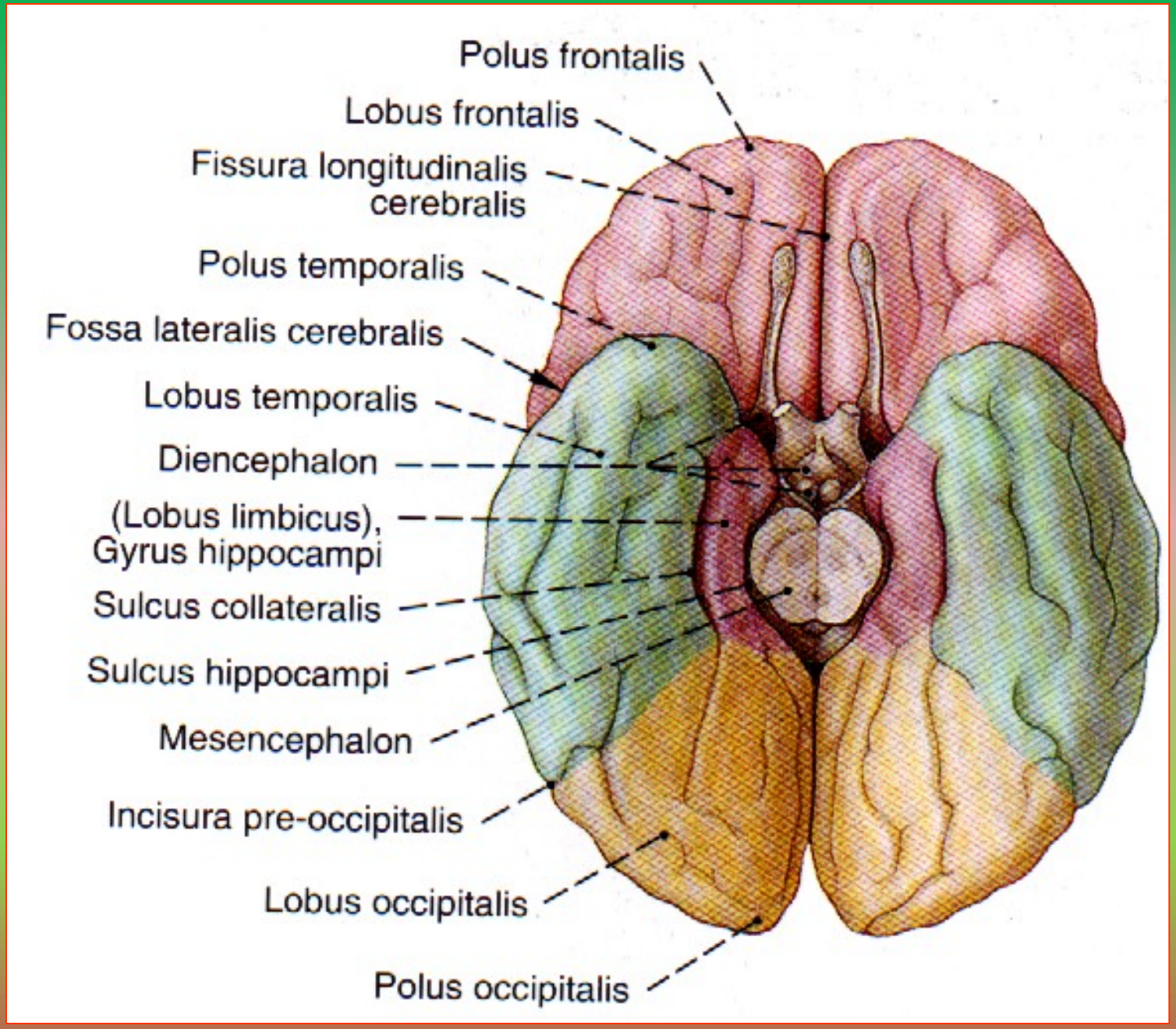

Diencephalic roof plate
Habenular commissure
Corpus callosum
Posterior commissure
Superior colliculus
Inferior colliculus
Cerebellum
Olfactory bulb
Anterior commissure
Optic chiasma
Mamillary body
Pons

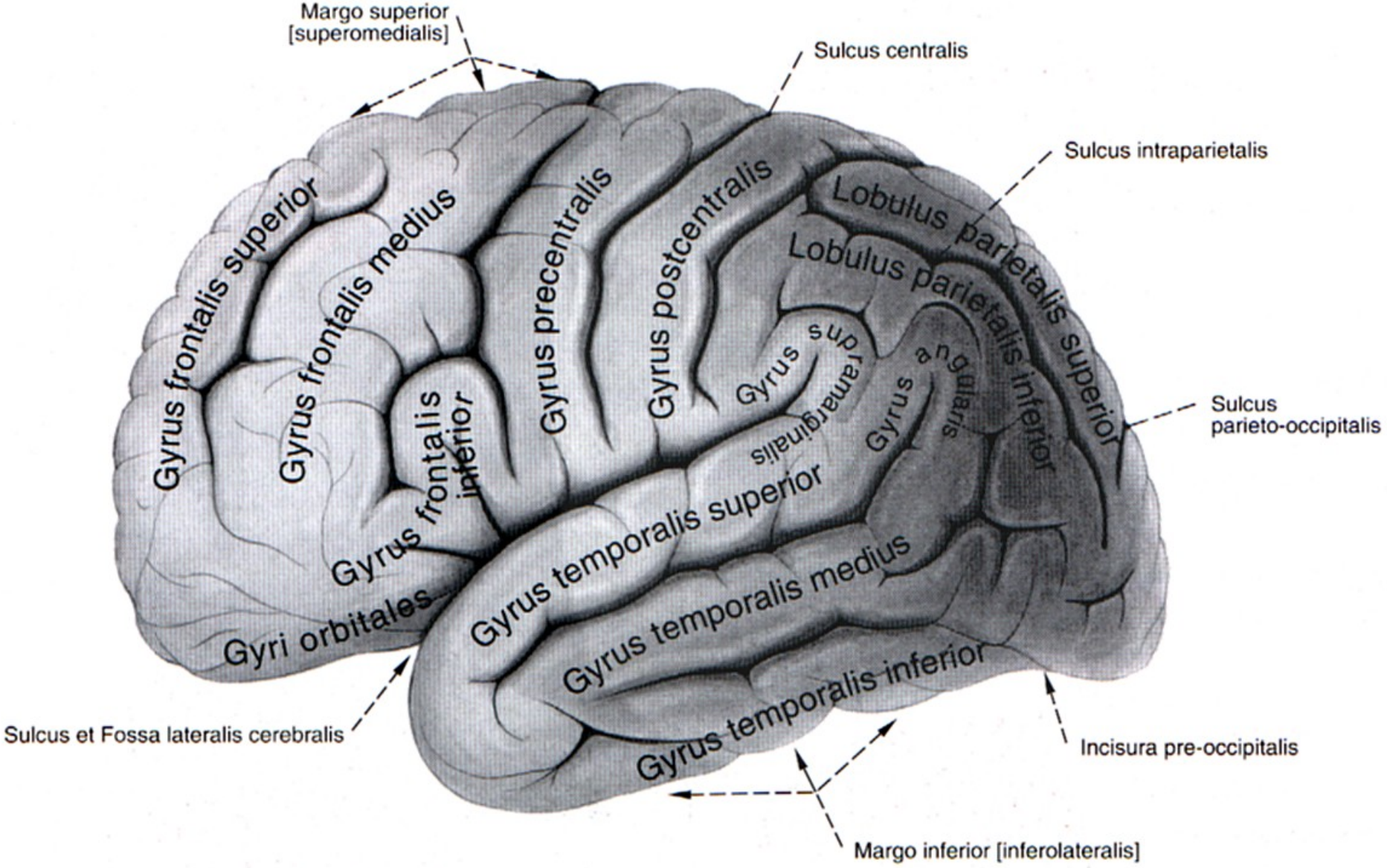

Polus frontalis
Fissura longitudinalis cerebralis
Lobus frontalis
Sulcus centralis
Lobus parietalis
Lobus temporalis
Sulcus parieto-occipitalis
Lobus occipitalis
Polus occipitalis

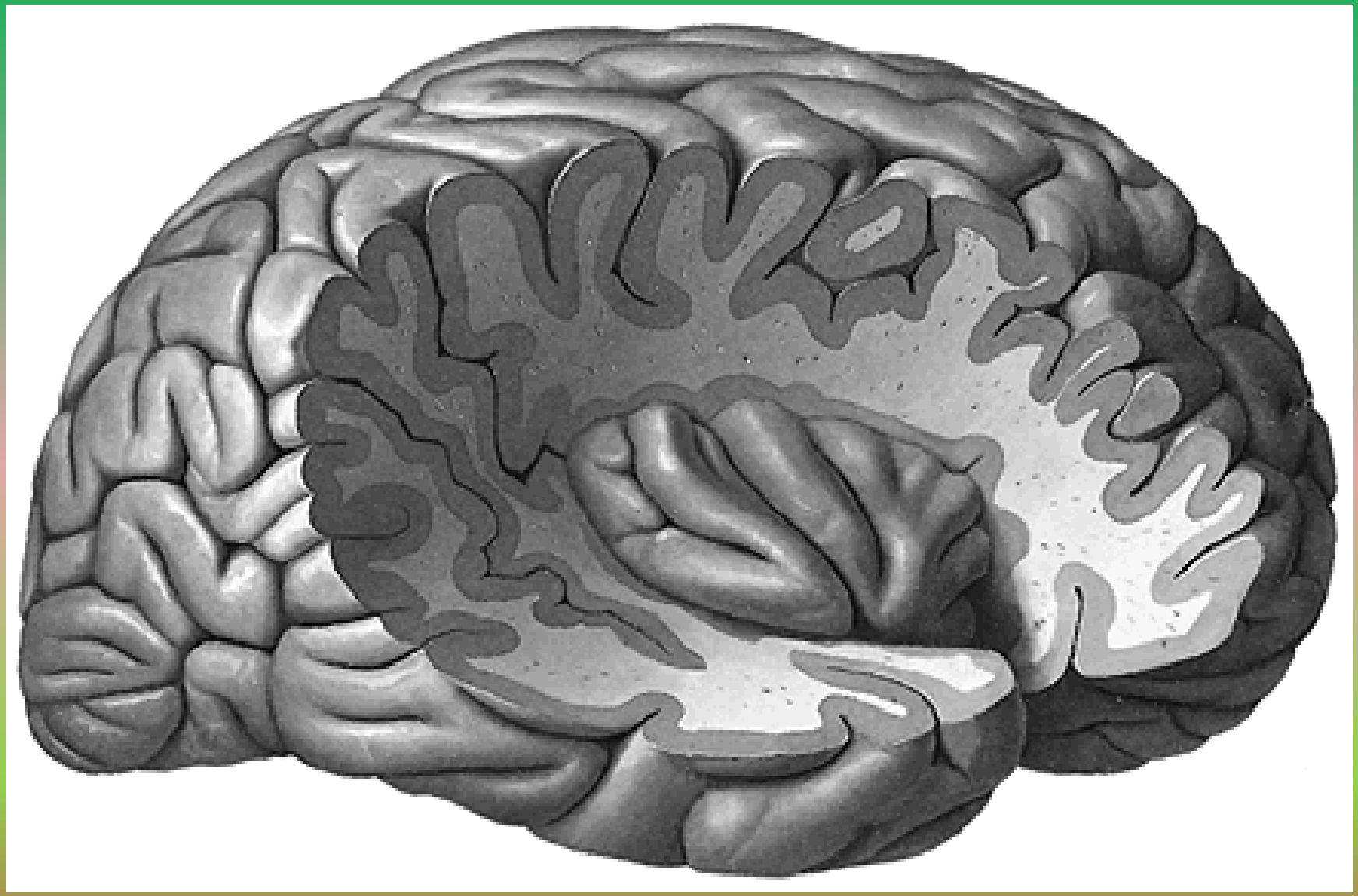


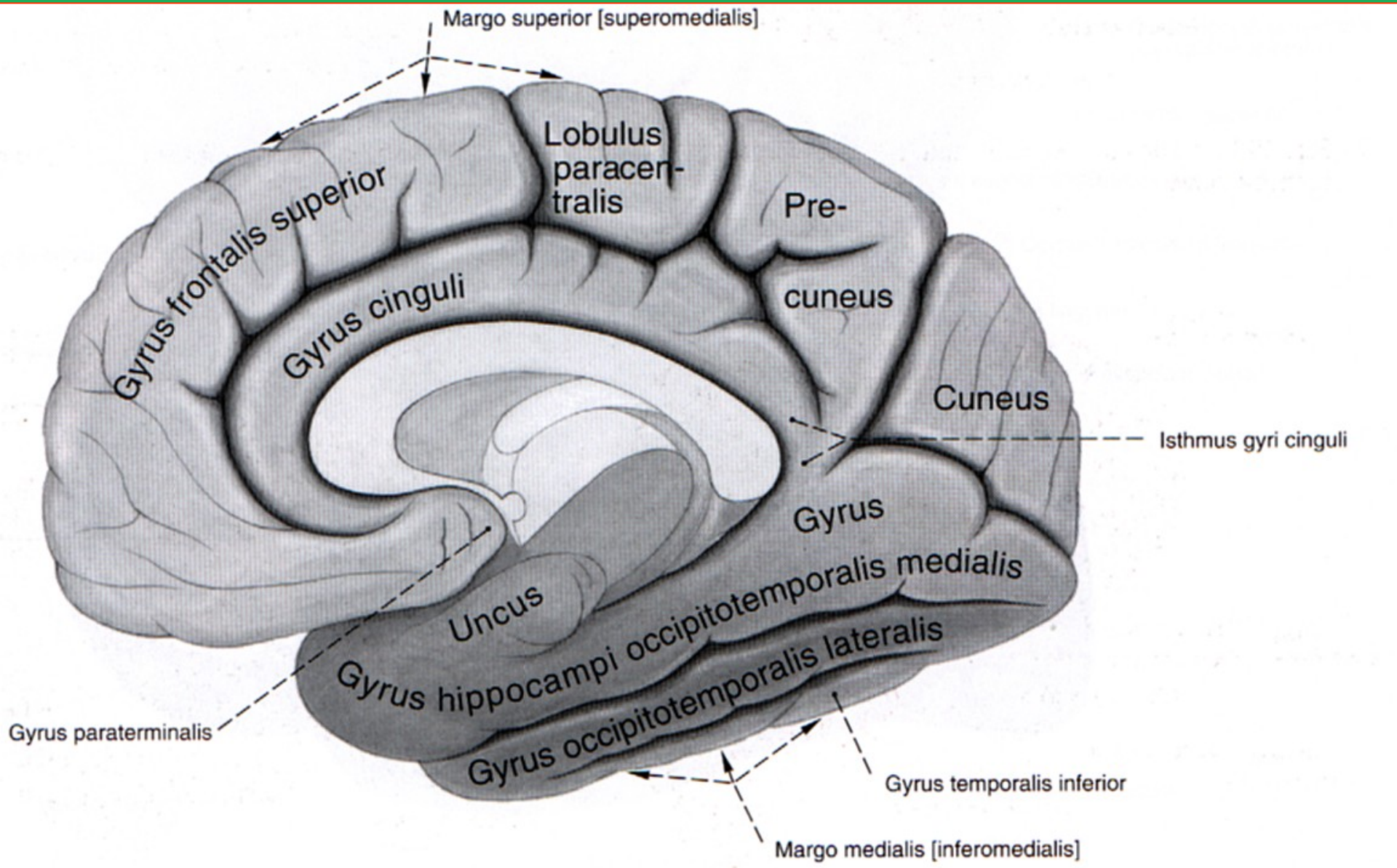

Lobus frontalis
Sulcus centralis
Lobus parietalis
Sulcus parieto-occipitalis
Polus frontalis
Polus occipitalis
Lobus occipitalis
Fossa lateralis cerebralis
Polus temporalis
Lobus temporalis
Incisura pre-occipitalis
Sulcus lateralis

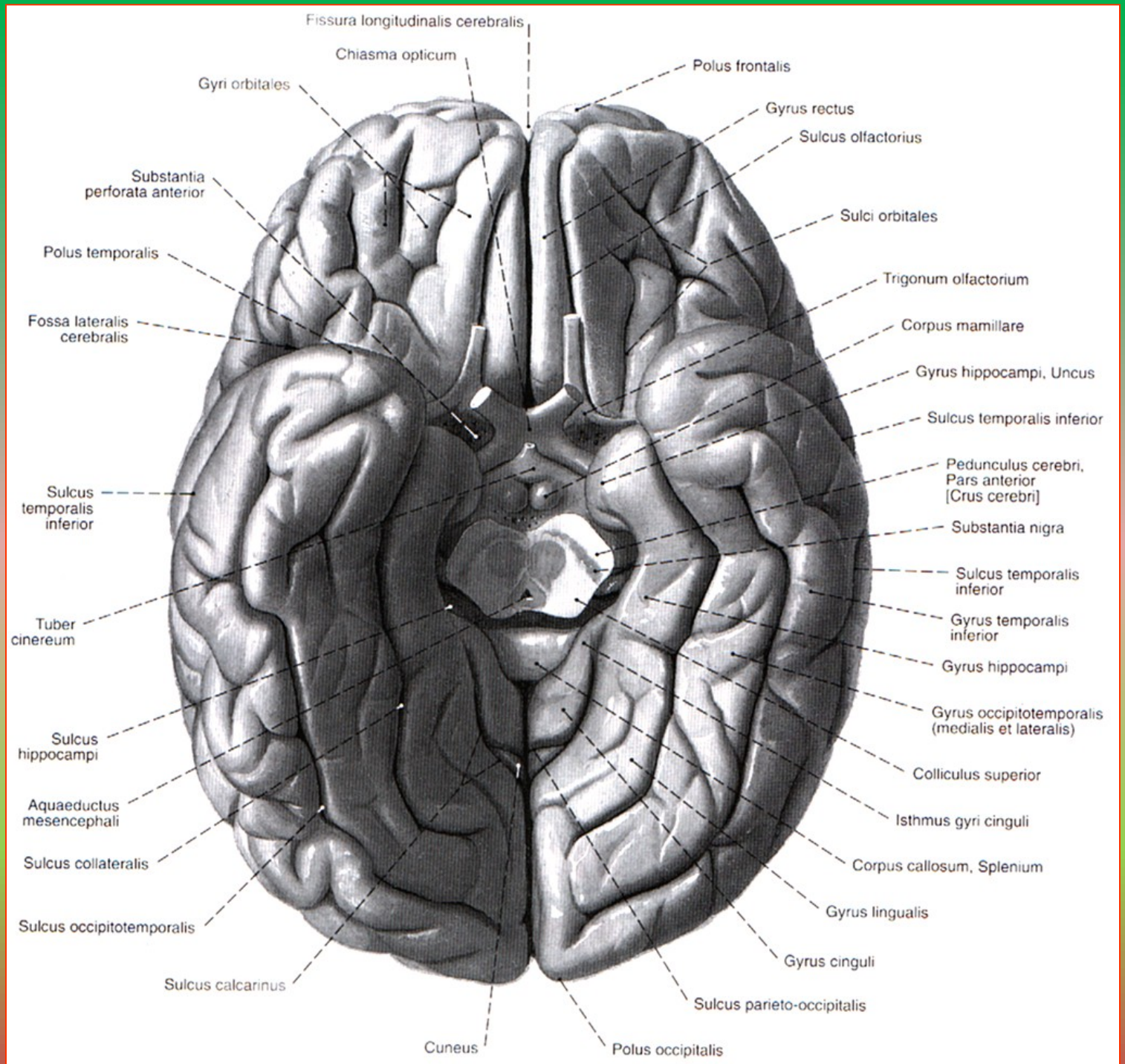

Corpus callosum
Gyrus cinguli
Sulcus cinguli
Sulcus centralis
Lobus frontalis
(Lobus limbicus)
Sulcus parieto-occipitalis
Polus frontalis
Sulcus calcarinus
Polus occipitalis
Fossa lateralis cerebralis
Polus temporalis
Lobus occipitalis
Gyrus hippocampi, Uncus
Diencephalon
Lobus temporalis
Incisura pre-occipitalis
Sulcus hippocampi
Sulcus collateralis


Polus frontalis
Lobus frontalis
Fissura longitudinalis cerebralis
Polus temporalis
Fossa lateralis cerebralis
Lobus temporalis
Diencephalon
(Lobus limbicus), Gyrus hippocampi
Sulcus collateralis
Sulcus hippocampi
Mesencephalon
Incisura pre-occipitalis
Lobus occipitalis
Polus occipitalis

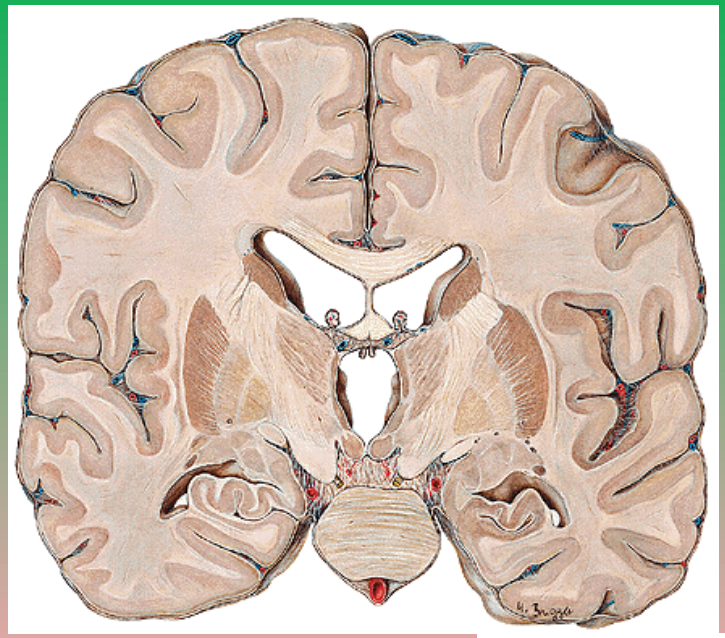

Margo superior [superomedialis]
Sulcus centralis
Sulcus intraparietalis
Lobulus parietalis superior
Lobulus parietalis inferior
Sulcus parieto-occipitalis
Gyrus frontalis superior
Gyrus frontalis medius
Gyrus frontalis inferior
Gyrus precentralis
Gyrus postcentralis
Gyrus supramarginalis
Gyrus angularis
Gyrus temporalis superior
Gyrus temporalis medius
Gyrus temporalis inferior
Gyri orbitales
Sulcus et Fossa lateralis cerebralis
Incisura pre-occipitalis
Margo inferior [inferolateralis]




Margo superior [superomedialis]
Lobulus paracen-tralis
Pre-
Gyrus frontalis superior
Gyrus cinguli
cuneus
Cuneus
Isthmus gyri cinguli
Gyrus
Gyrus hippocampi occipitotemporalis medialis
Uncus
Gyrus occipitotemporalis lateralis
Gyrus paraterminalis
Gyrus temporalis inferior
Margo medialis [inferomedialis]


Fissura longitudinalis cerebralis
Chiasma opticum
Gyri orbitales
Substantia perforata anterior
Polus temporalis
Fossa lateralis cerebralis
Sulcus temporalis inferior
Tuber cinereum
Sulcus hippocampi
Aquaeductus mesencephali
Sulcus collateralis
Sulcus occipitotemporalis
Sulcus calcarinus
Cuneus
Polus occipitalis
Polus frontalis
Gyrus rectus
Sulcus olfactorius
Sulci orbitales
Trigonum olfactorium
Corpus mamillare
Gyrus hippocampi, Uncus
Sulcus temporalis inferior
Pedunculus cerebri, Pars anterior [Crus cerebri]
Substantia nigra
Sulcus temporalis inferior
Gyrus temporalis inferior
Gyrus hippocampi
Gyrus occipitotemporalis (medialis et lateralis)
Colliculus superior
Isthmus gyri cinguli
Corpus callosum, Splenium
Gyrus lingualis
Gyrus cinguli
Sulcus parieto-occipitalis

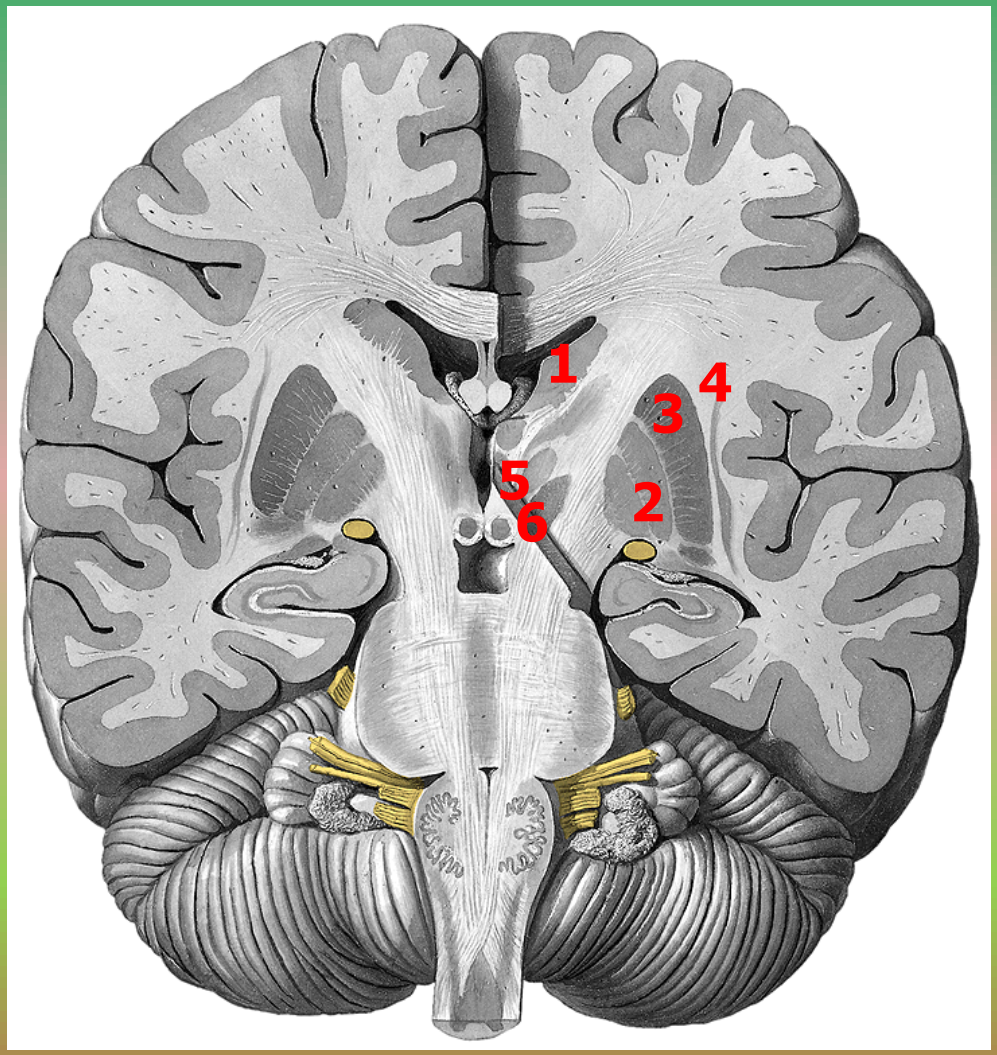
Structure of telencephalon



Gray matter
Basal ganglia
Cortex

White matter - pathways
Projection
Commissural
Association

Basal ganglia

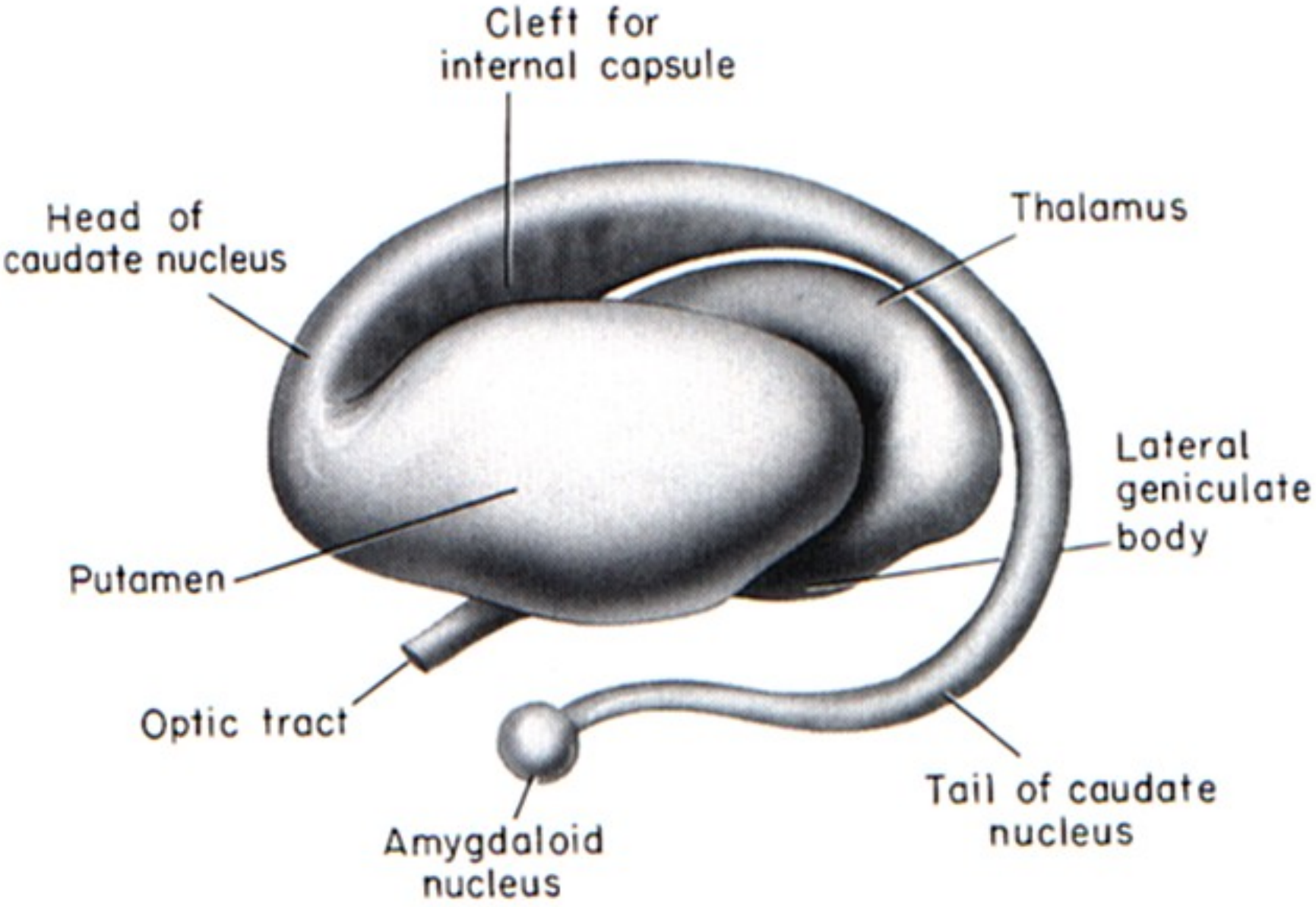


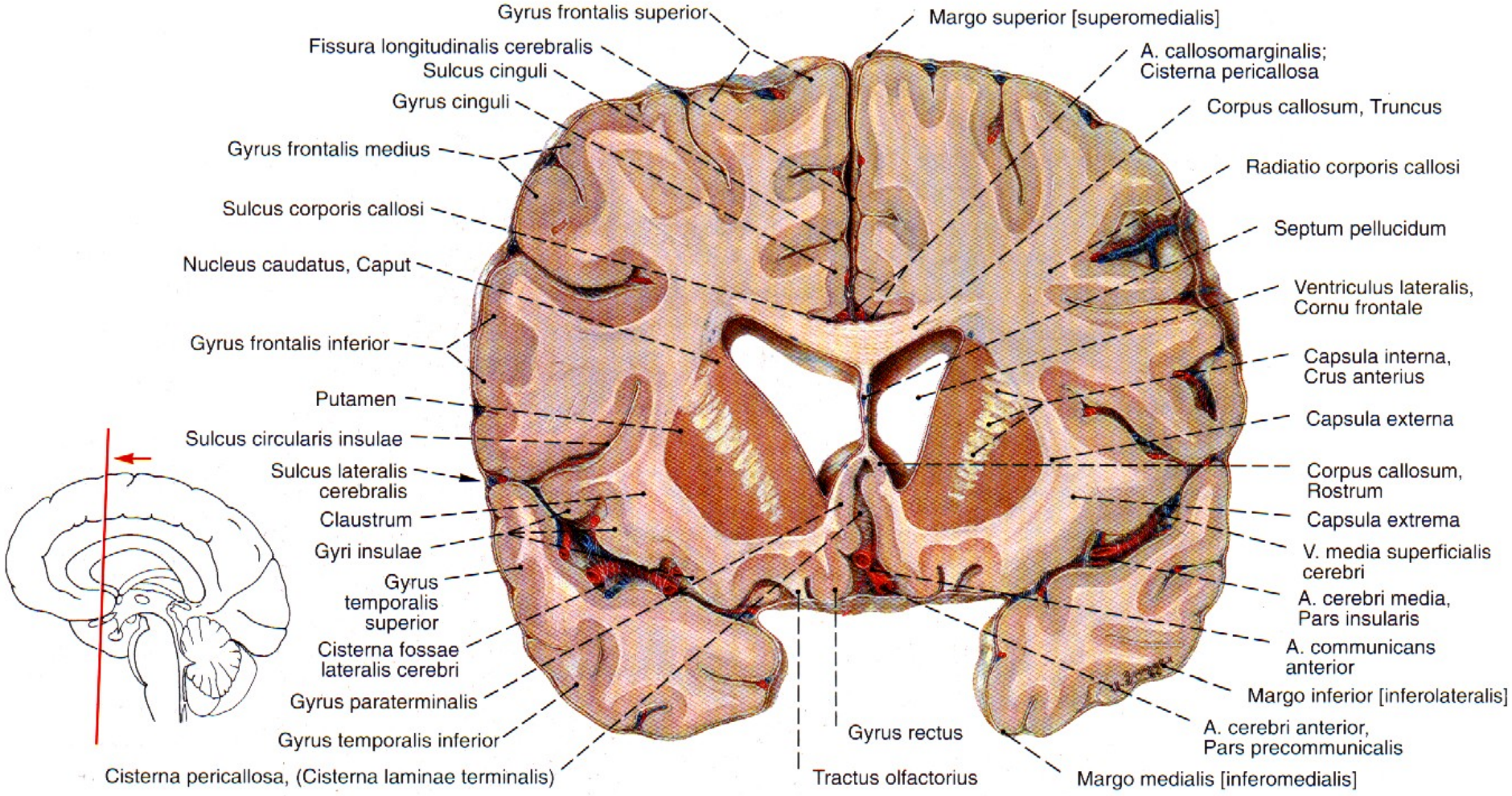
1 ncl. caudatus
2 globus pallidus
3 putamen
4 claustrum
corp. amygdaloideum

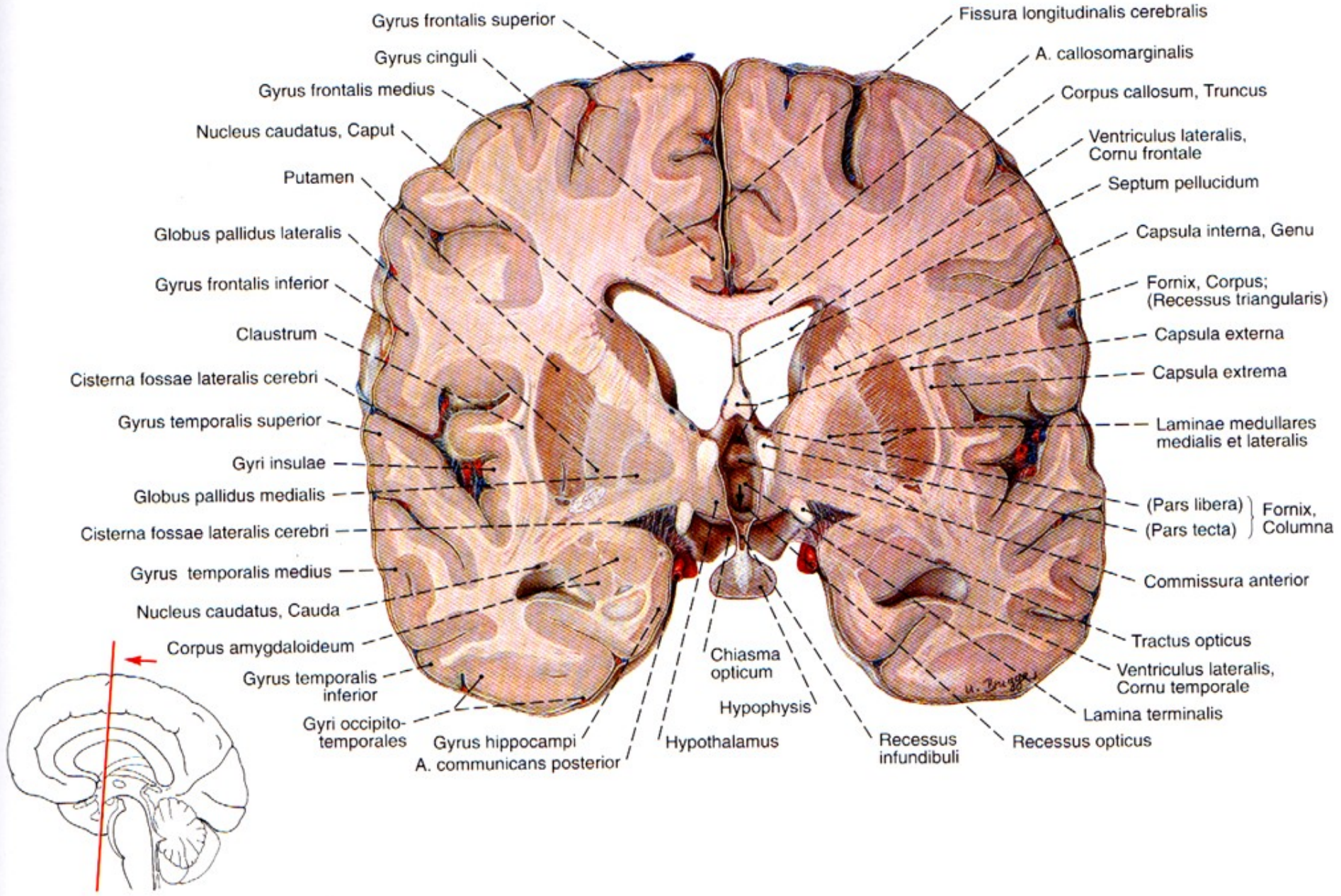
Functionally

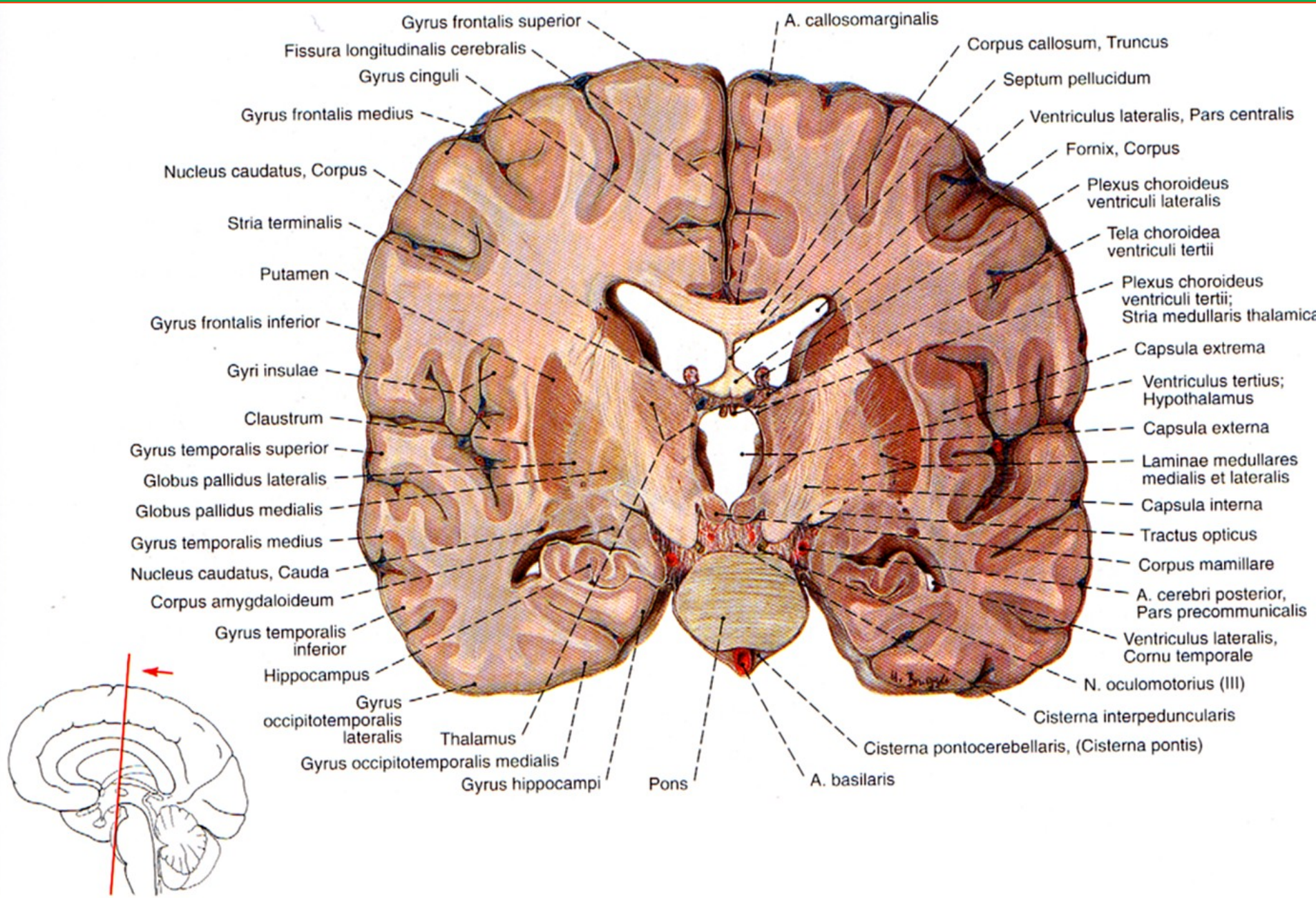
5 ncl. subthalamicus
6 substantia nigra

globus pallidus + putamen
= **ncl. lentiformis**
ncl. caudatus + putamen
= **corpus striatum**


Cleft for internal capsule
Head of caudate nucleus
Thalamus
Lateral geniculate body
Putamen
Optic tract
Tail of caudate nucleus
Amygdaloid nucleus


Gyrus frontalis superior
Fissura longitudinalis cerebralis
Sulcus cinguli
Gyrus cinguli
Gyrus frontalis medius
Sulcus corporis callosi
Nucleus caudatus, Caput
Gyrus frontalis inferior
Putamen
Sulcus circularis insulae
Sulcus lateralis cerebralis
Claustrum
Gyri insulae
Gyrus temporalis superior
Cisterna fossae lateralis cerebri
Gyrus paraterminalis
Gyrus temporalis inferior
Cisterna pericallosa, (Cisterna laminae terminalis)
Tractus olfactorius
Gyrus rectus
Margo superior [superomedialis]
A. callosomarginalis; Cisterna pericallosa
Corpus callosum, Truncus
Radiatio corporis callosi
Septum pellucidum
Ventriculus lateralis, Cornu frontale
Capsula interna, Crus anterius
Capsula externa
Corpus callosum, Rostrum
Capsula extrema
V. media superficialis cerebri
A. cerebri media, Pars insularis
A. communicans anterior
Margo inferior [inferolateralis]
A. cerebri anterior, Pars precommunicalis
Margo medialis [inferomedialis]


Gyrus frontalis superior
Gyrus cinguli
Gyrus frontalis medius
Nucleus caudatus, Caput
Putamen
Globus pallidus lateralis
Gyrus frontalis inferior
Claustrum
Cisterna fossae lateralis cerebri
Gyrus temporalis superior
Gyri insulae
Globus pallidus medialis
Cisterna fossae lateralis cerebri
Gyrus temporalis medius
Nucleus caudatus, Cauda
Corpus amygdaloideum
Gyrus temporalis inferior
Gyri occipito-temporales
Gyrus hippocampi
A. communicans posterior
Hypothalamus
Chiasma opticum
Hypophysis
Recessus infundibuli
Recessus opticus
Lamina terminalis
Ventriculus lateralis, Cornu temporale
Tractus opticus
Commissura anterior
(Pars libera)
(Pars tecta)
Fornix, Columna
Laminae medullares medialis et lateralis
Capsula extrema
Capsula externa
Fornix, Corpus; (Recessus triangularis)
Capsula interna, Genu
Septum pellucidum
Ventriculus lateralis, Cornu frontale
Corpus callosum, Truncus
A. callosomarginalis
Fissura longitudinalis cerebralis

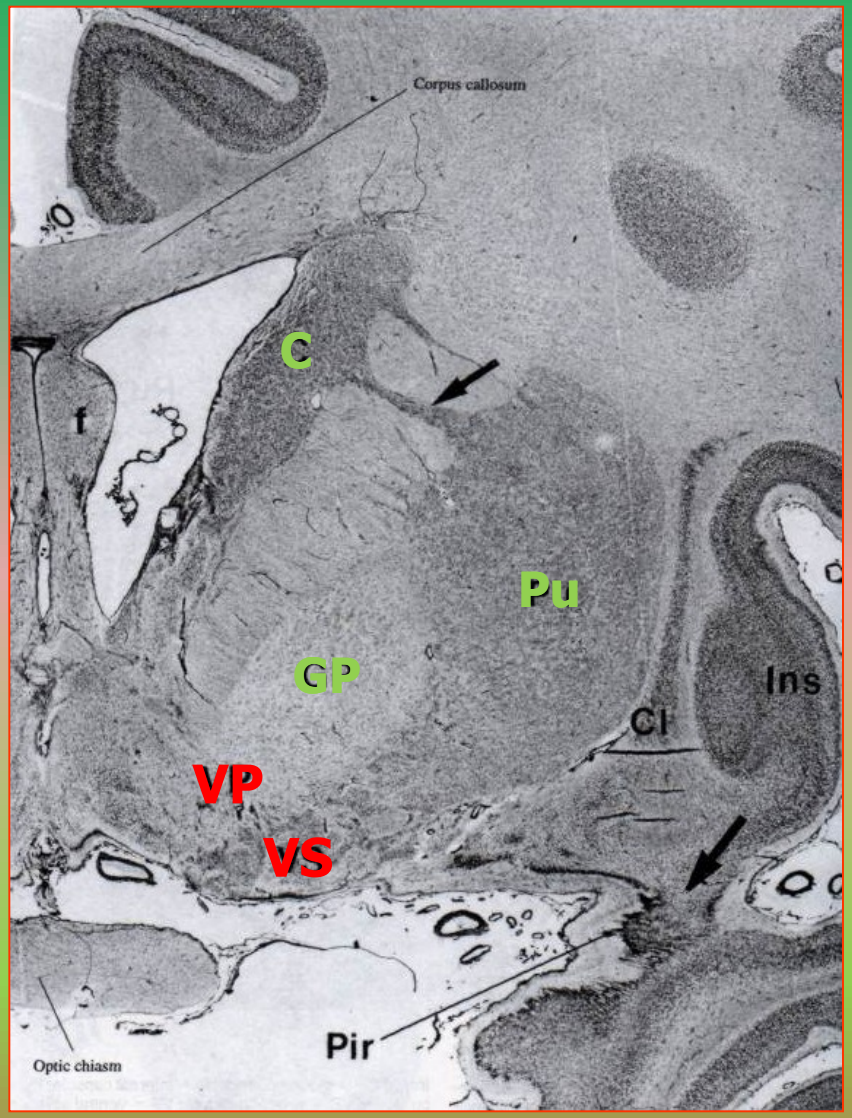

Gyrus frontalis superior
Fissura longitudinalis cerebralis
Gyrus cinguli
Gyrus frontalis medius
Nucleus caudatus, Corpus
Stria terminalis
Putamen
Gyrus frontalis inferior
Gyri insulae
Claustrum
Gyrus temporalis superior
Globus pallidus lateralis
Globus pallidus medialis
Gyrus temporalis medius
Nucleus caudatus, Cauda
Corpus amygdaloideum
Gyrus temporalis inferior
Hippocampus
Gyrus occipitotemporalis lateralis
Thalamus
Gyrus occipitotemporalis medialis
Gyrus hippocampi
Pons
A. basilaris
Cisterna pontocerebellaris, (Cisterna pontis)
Cisterna interpeduncularis
N. oculomotorius (III)
Ventriculus lateralis, Cornu temporale
A. cerebri posterior, Pars precommunicalis
Corpus mamillare
Tractus opticus
Capsula interna
Laminae medullares medialis et lateralis
Capsula externa
Ventriculus tertius; Hypothalamus
Capsula extrema
Plexus choroideus ventriculi tertii; Stria medullaris thalamica
Tela choroidea ventriculi tertii
Plexus choroideus ventriculi lateralis
Fornix, Corpus
Ventriculus lateralis, Pars centralis
Septum pellucidum
Corpus callosum, Truncus
A. callosomarginalis

Development of BG

Palleostriatum (pallidum) = globus pallidus
lat. + med. segment – **dorsal pallidum**
ventral pallidum

Neostriatum (striatum)
ncl. caudatus, putamen – **dorsal striatum**
ncl. accumbens – **ventral striatum**

Archistriatum
corpus amygdaloideum

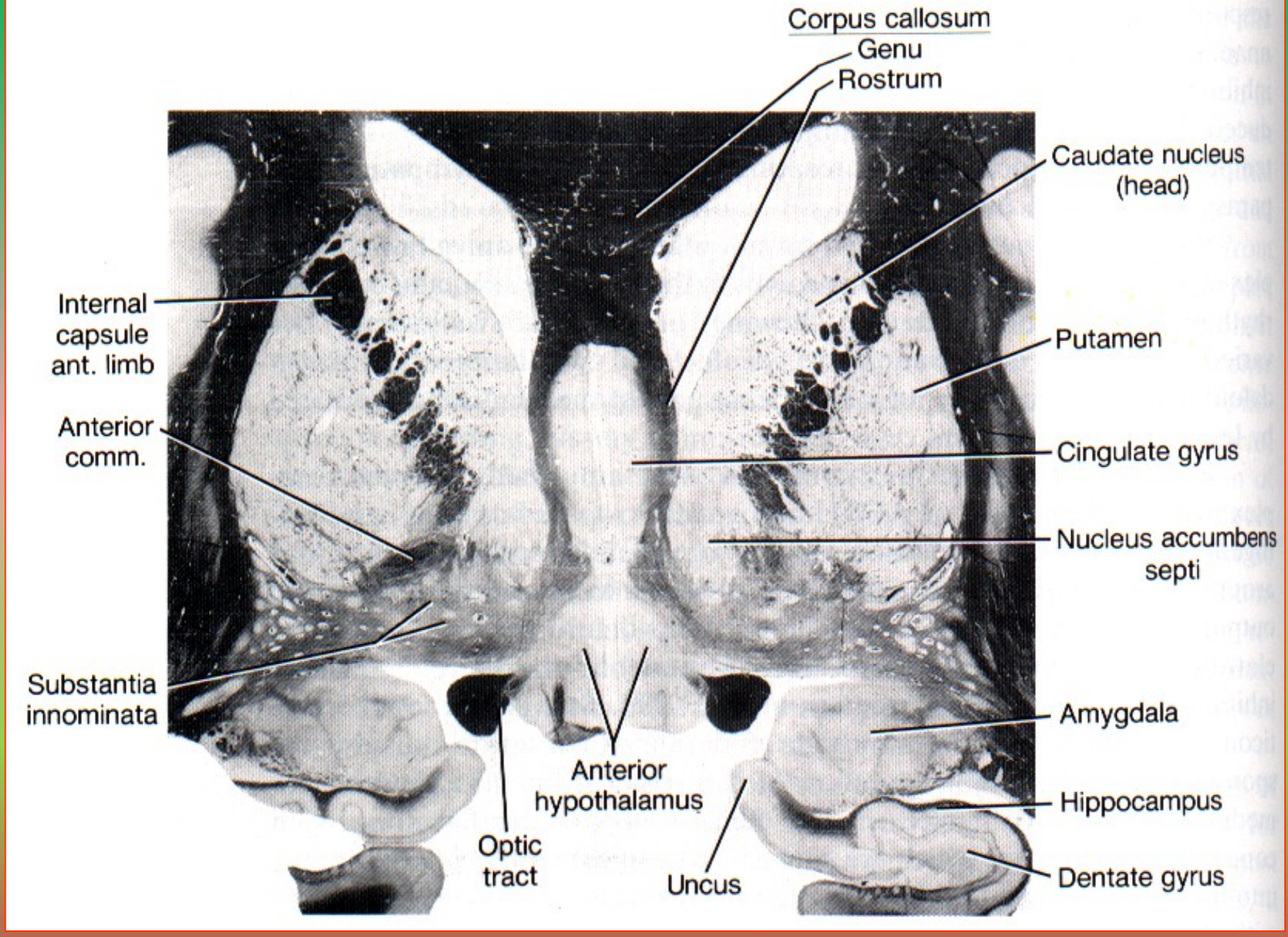


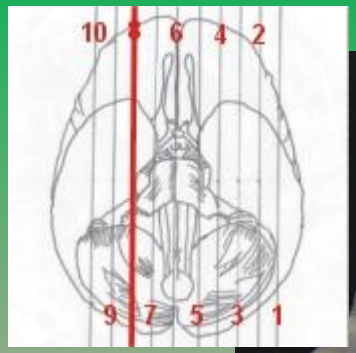
Ncl caudatus + putamen
= dorsal striatum

Globus pallidus
= dorsal pallidum

VS = ventr. striatum (ncl. accumbens septi)
VP = ventral pallidum (ncl. basalis Meynerti)

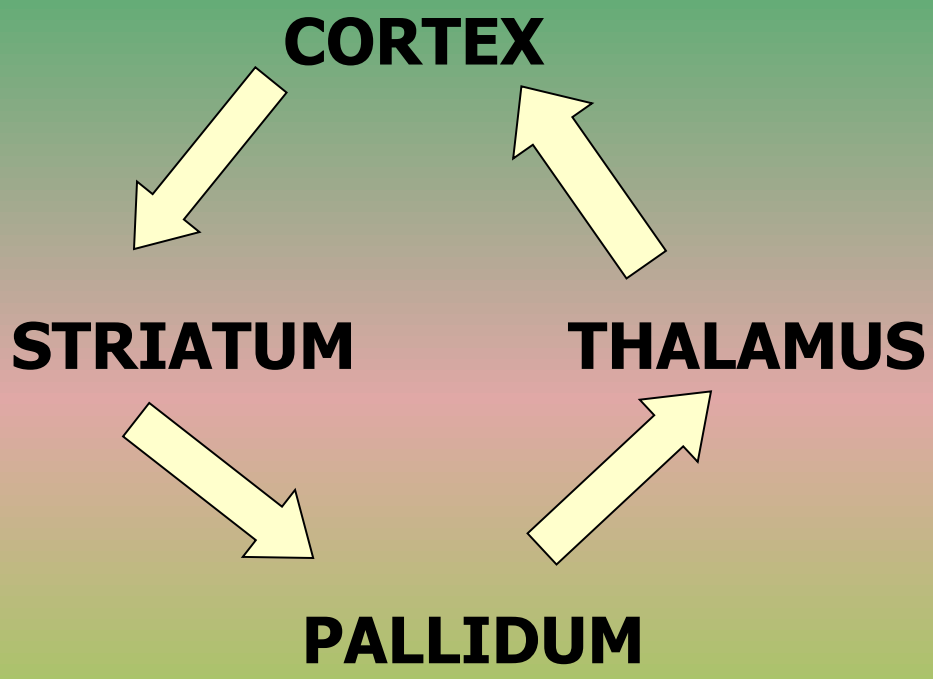
SUBSTANTIA INNOMINATA a NCL. ACCUMBENS





Corpus amygdaloideum

Functional connections of BG



Function of BG

inhibition of cortical and subcortical motor functions

Cerebral cortex

ALLOCORTEX

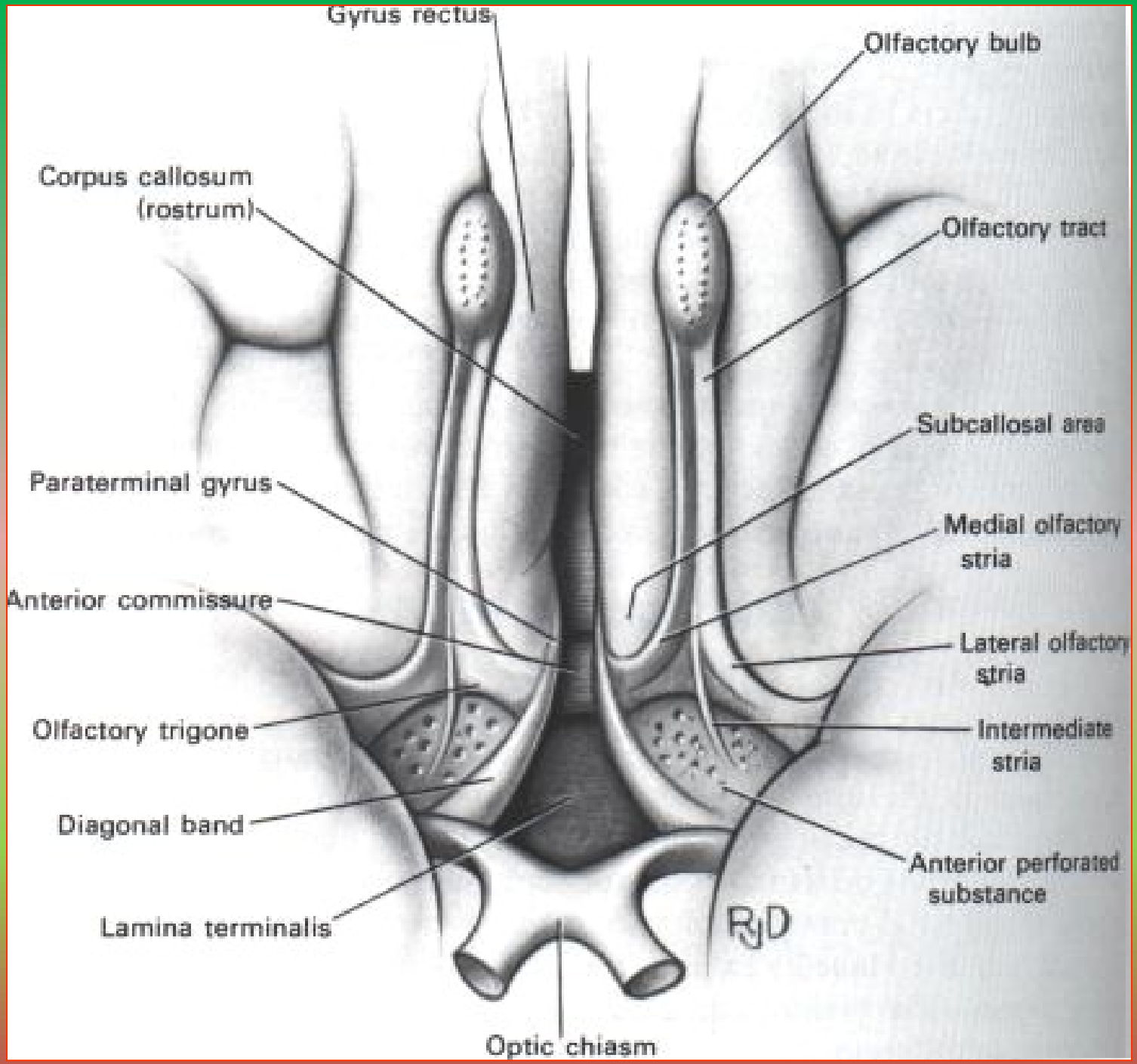
3-4 layers

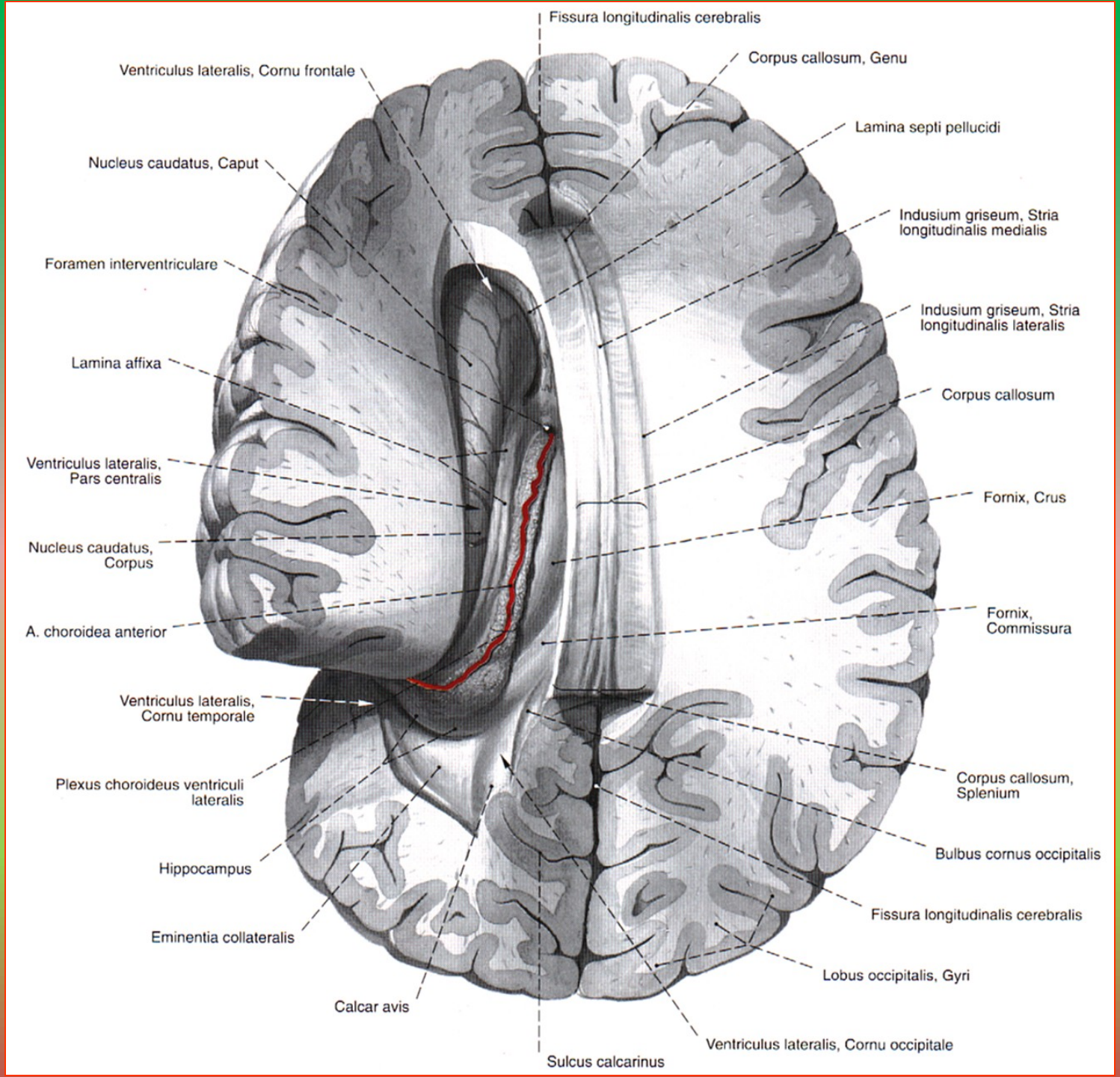
a) palleocortex (rhinencephalon)

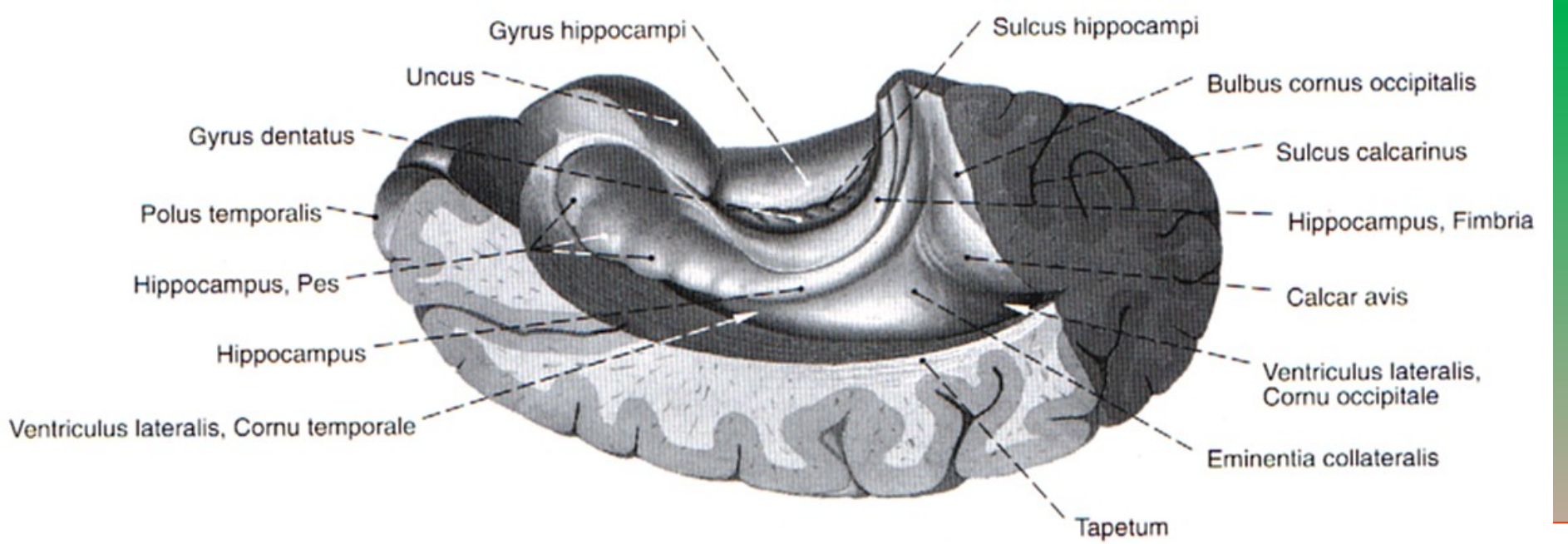
b) archicortex

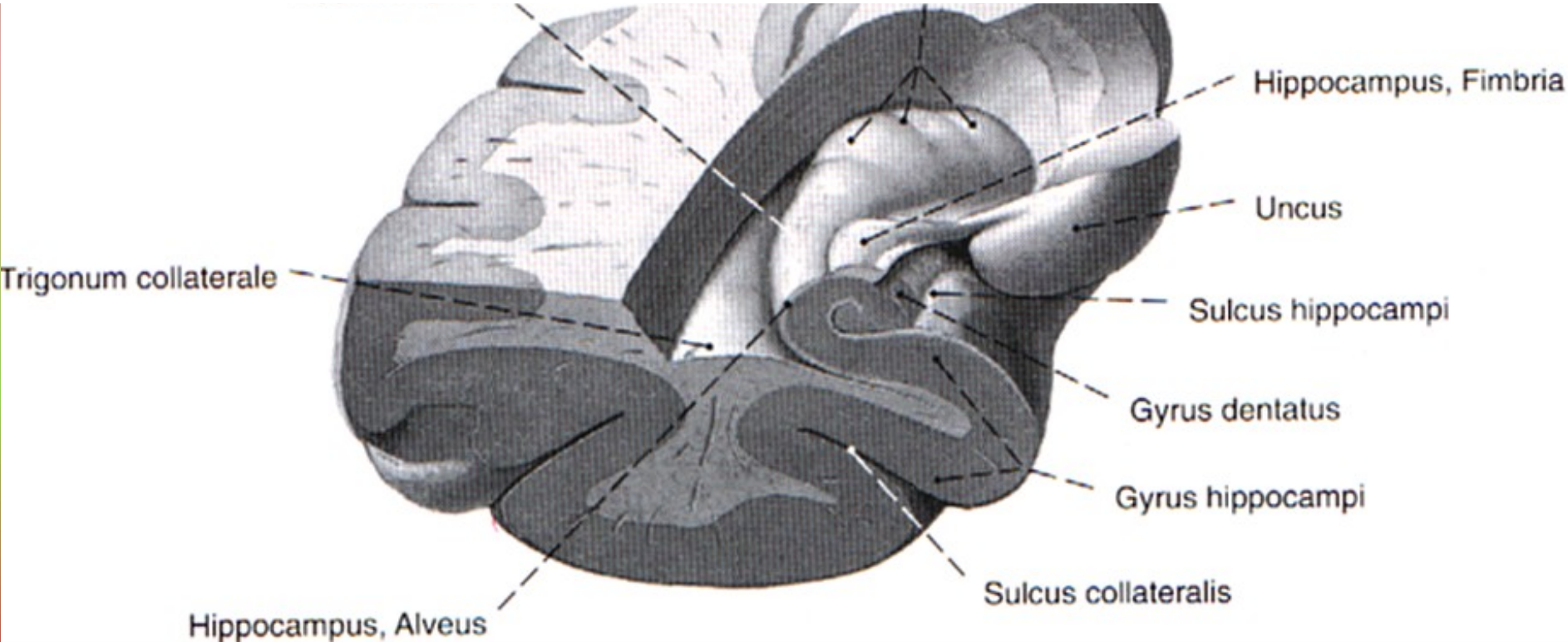
NEOCORTEX

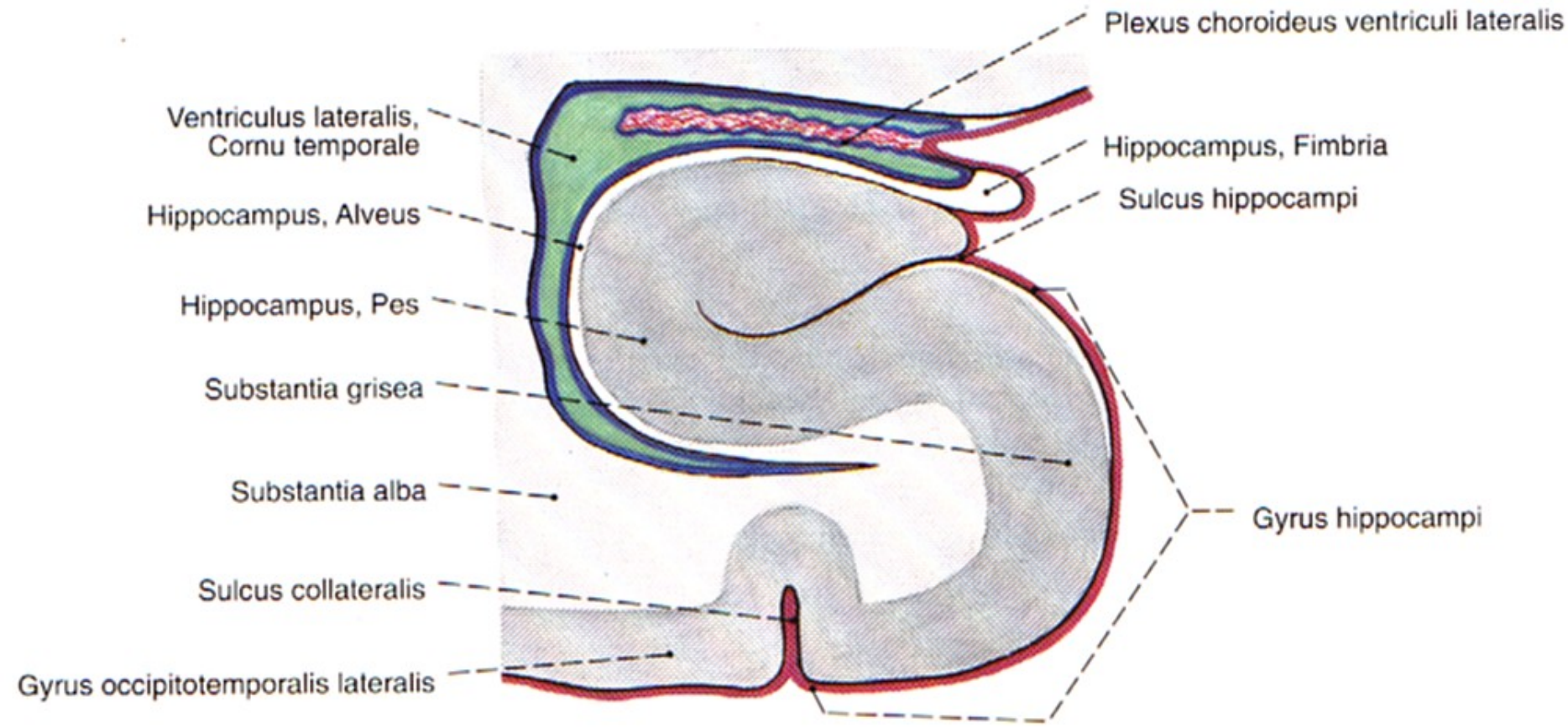
6 layers

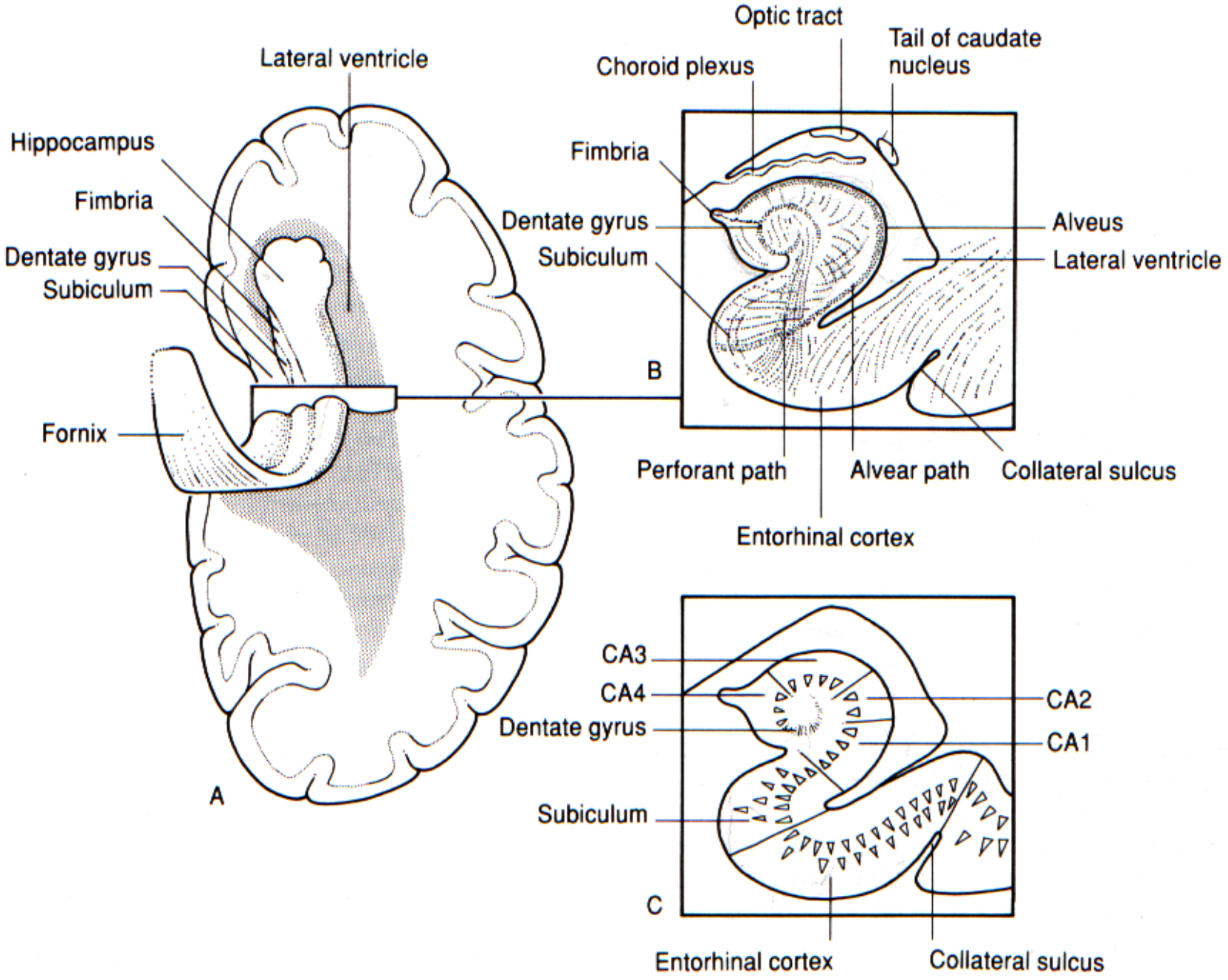

Gyrus rectus
Olfactory bulb
Corpus callosum (rostrum)
Olfactory tract
Subcallosal area
Paraterminal gyrus
Medial olfactory stria
Anterior commissure
Lateral olfactory stria
Olfactory trigone
Intermediate stria
Diagonal band
Anterior perforated substance
Lamina terminalis
RJD
Optic chiasm


Fissura longitudinalis cerebralis
Ventriculus lateralis, Cornu frontale
Corpus callosum, Genu
Lamina septi pellucidi
Nucleus caudatus, Caput
Indusium griseum, Stria longitudinalis medialis
Foramen interventriculare
Indusium griseum, Stria longitudinalis lateralis
Lamina affixa
Corpus callosum
Ventriculus lateralis, Pars centralis
Fornix, Crus
Nucleus caudatus, Corpus
A. choroidea anterior
Fornix, Commissura
Ventriculus lateralis, Cornu temporale
Plexus choroideus ventriculi lateralis
Corpus callosum, Splenium
Bulbus cornus occipitalis
Hippocampus
Fissura longitudinalis cerebralis
Eminentia collateralis
Lobus occipitalis, Gyri
Calcar avis
Ventriculus lateralis, Cornu occipitale
Sulcus calcarinus


Gyrus hippocampi
Sulcus hippocampi
Uncus
Bulbus cornus occipitalis
Gyrus dentatus
Sulcus calcarinus
Polus temporalis
Hippocampus, Fimbria
Hippocampus, Pes
Calcar avis
Hippocampus
Ventriculus lateralis, Cornu occipitale
Ventriculus lateralis, Cornu temporale
Eminentia collateralis
Tapetum

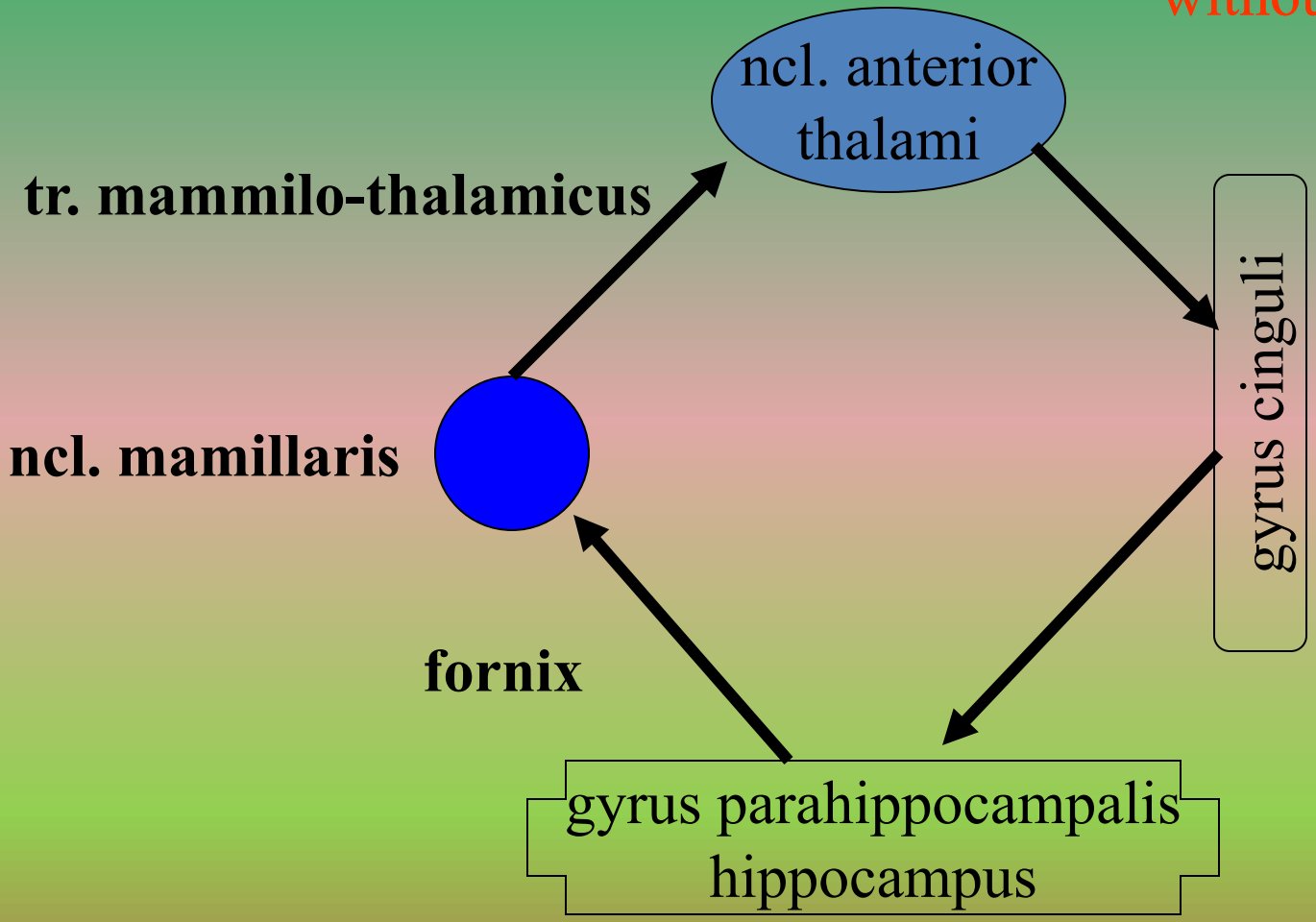

Hippocampus, Fimbria
Uncus
Trigonum collaterale
Sulcus hippocampi
Gyrus dentatus
Gyrus hippocampi
Sulcus collateralis
Hippocampus, Alveus


Plexus choroideus ventriculi lateralis
Ventriculus lateralis,
Cornu temporale
Hippocampus, Fimbria
Sulcus hippocampi
Hippocampus, Alveus
Hippocampus, Pes
Substantia grisea
Substantia alba
Gyrus hippocampi
Sulcus collateralis
Gyrus occipitotemporalis lateralis


Lateral ventricle
Hippocampus
Fimbria
Dentate gyrus
Subiculum
Fornix
A
Optic tract
Choroid plexus
Tail of caudate nucleus
Fimbria
Dentate gyrus
Subiculum
B
Alveus
Lateral ventricle
Perforant path
Alvear path
Collateral sulcus
Entorhinal cortex
CA3
CA4
Dentate gyrus
Subiculum
CA2
CA1
C
Entorhinal cortex
Collateral sulcus

Limbic system – classic conception
Papez's circuit (James Papez 1939)

without specific function

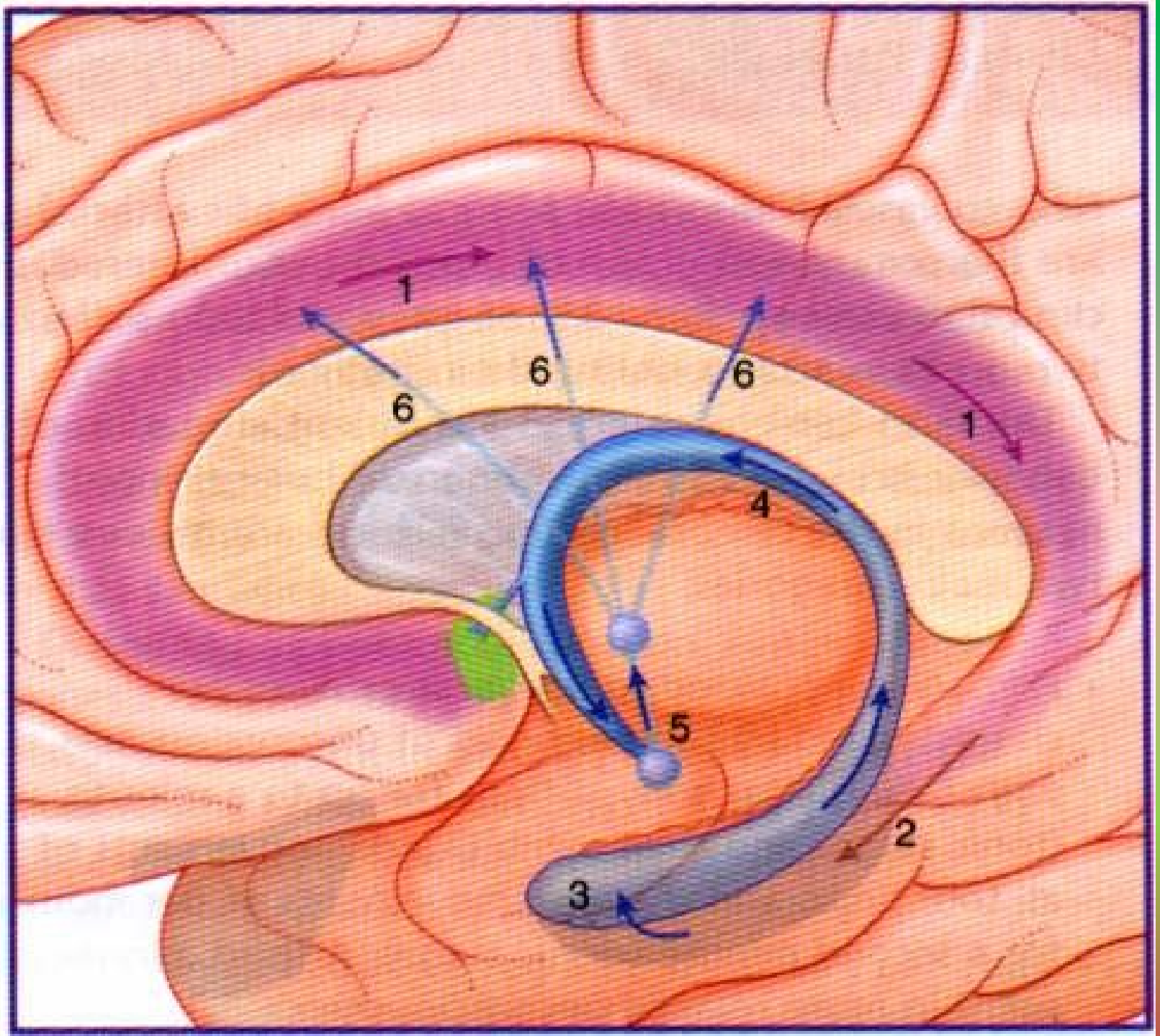


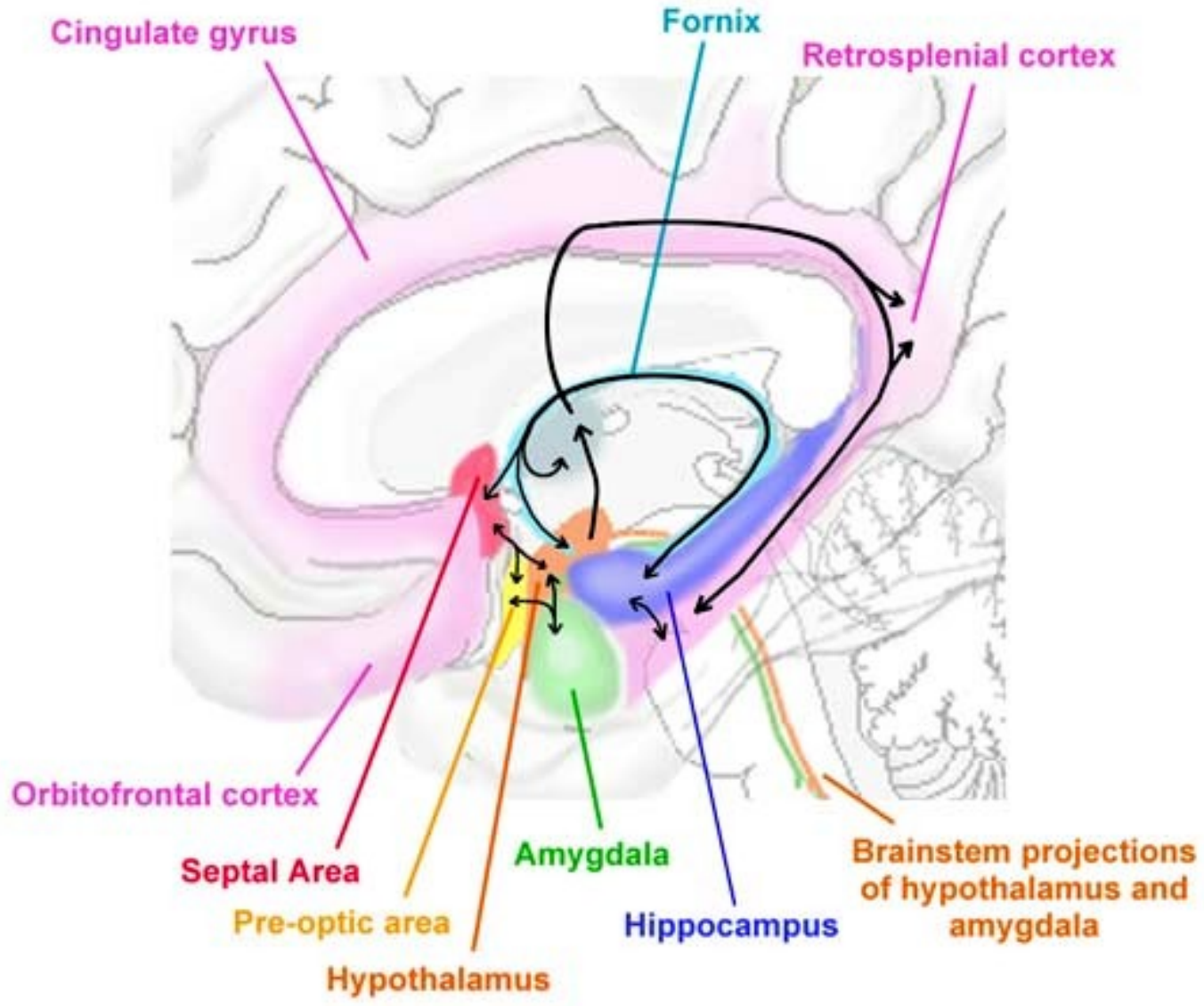
RECENT CONCEPTION OF LIMBIC FOREBRAIN

- basomedial telencephalon, structures of diencephalon and mesencephalon for emotion and motivation of our behavior

Regular structures

- g. cinguli, g. parahippocampalis, hippocampus, insular cortex, neocortical regions of forebrain - basal frontotemporal regions, orbital cortex
- area septalis, amygdalar ncll., ventral striatum (pallidum)
- ncl. anterior et medialis dorsalis thalami, habenulla
- hypothalamus (ncl. mammillaris)

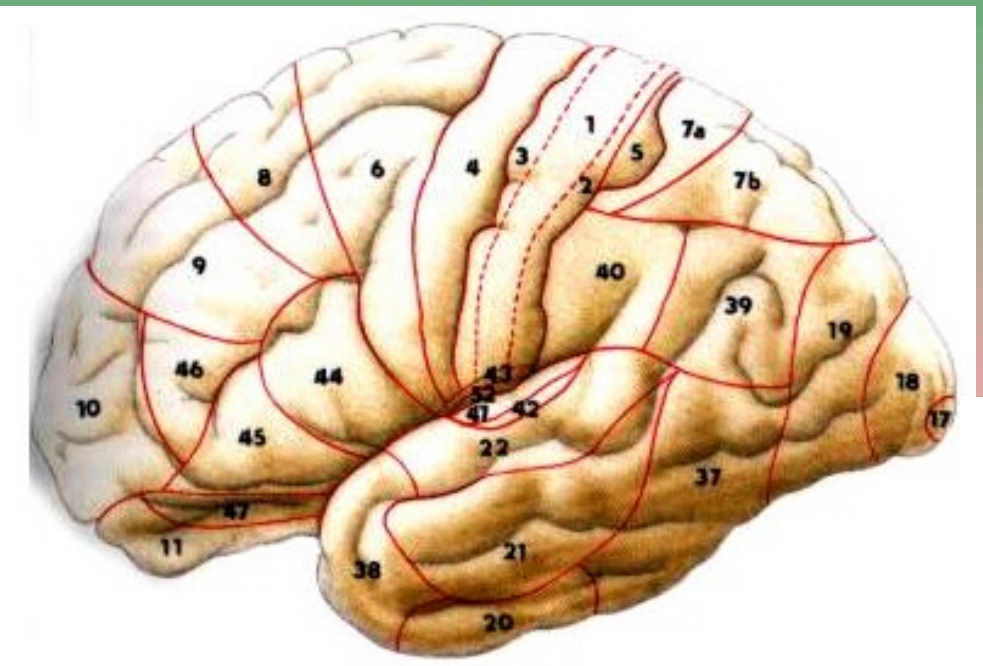

1
6
6
6
1
4
5
2
3

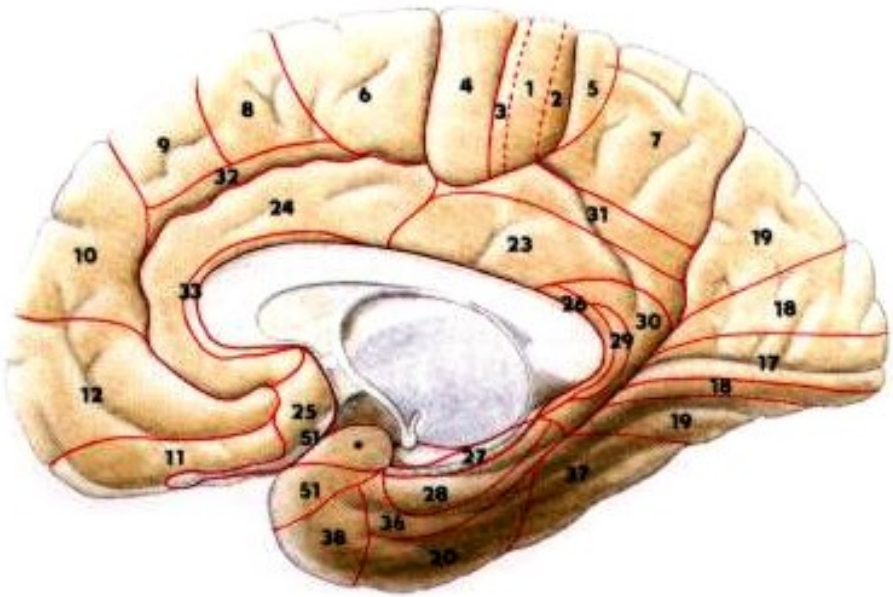


"Limbic" areas

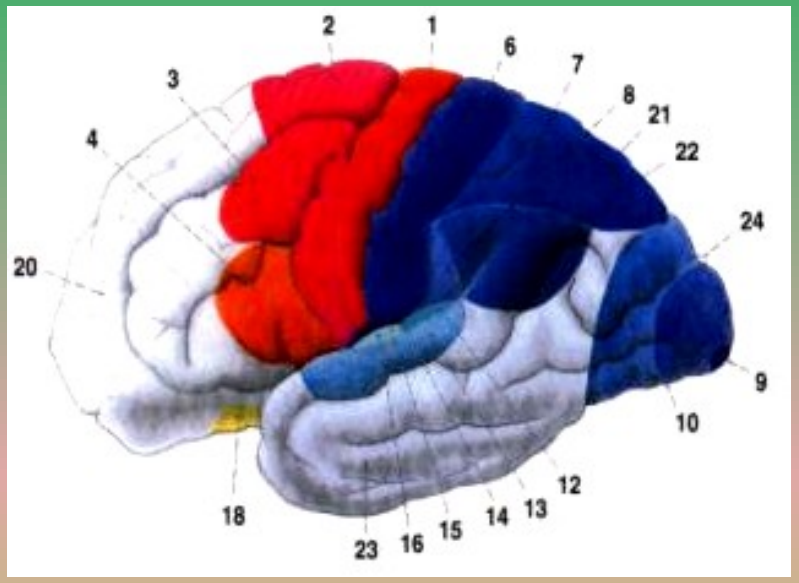
Brodman's map (cytoarchitectonic map of cortex)

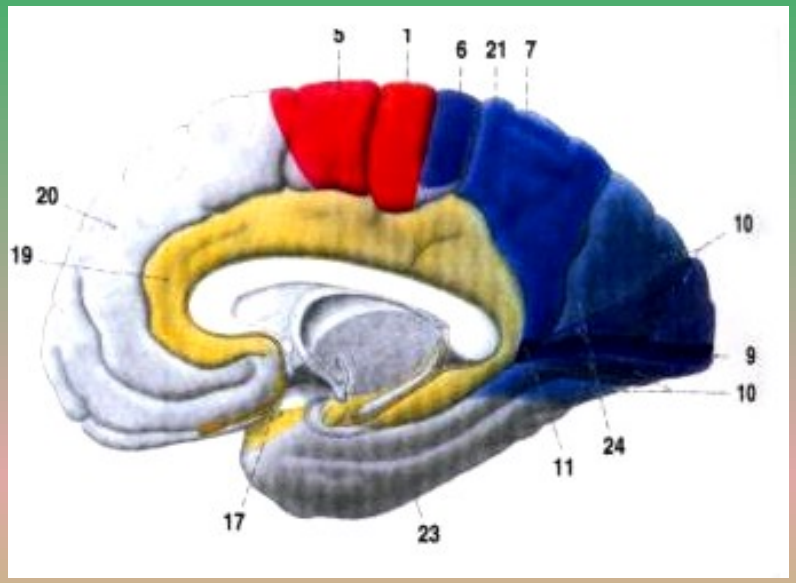
- **11 regiones**
  52 areae





Functional regions of cortex

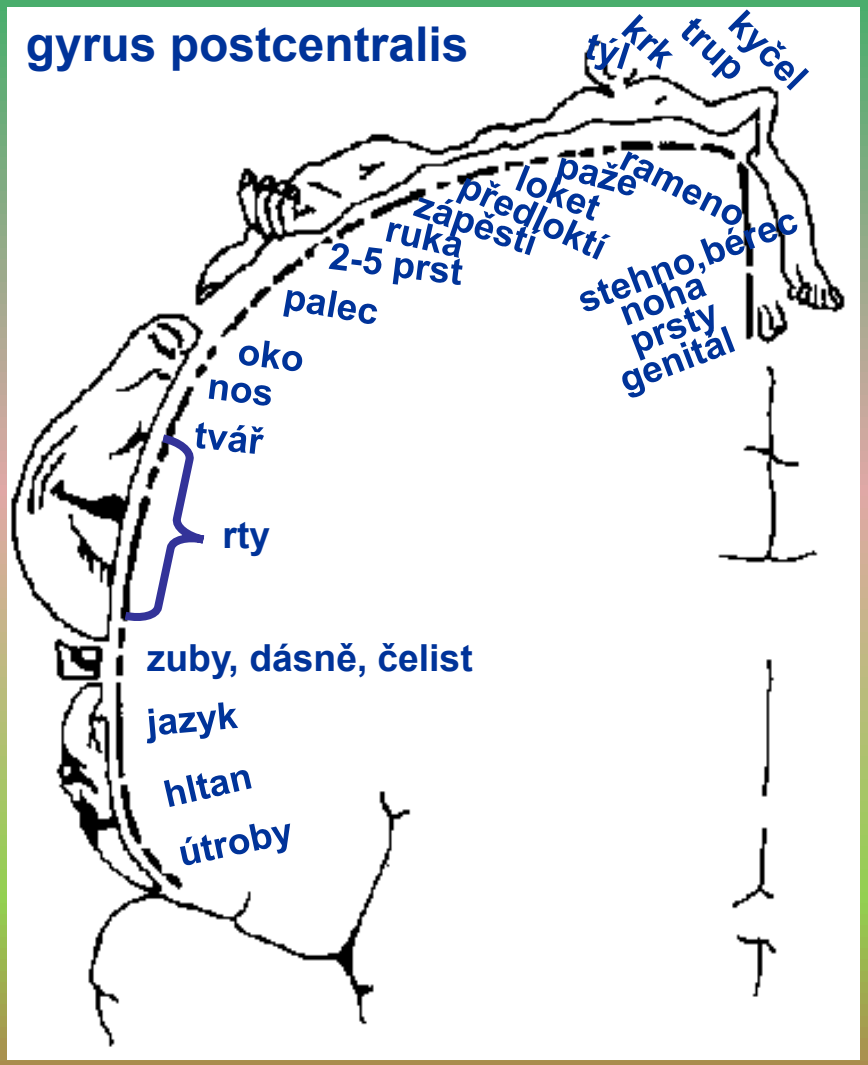


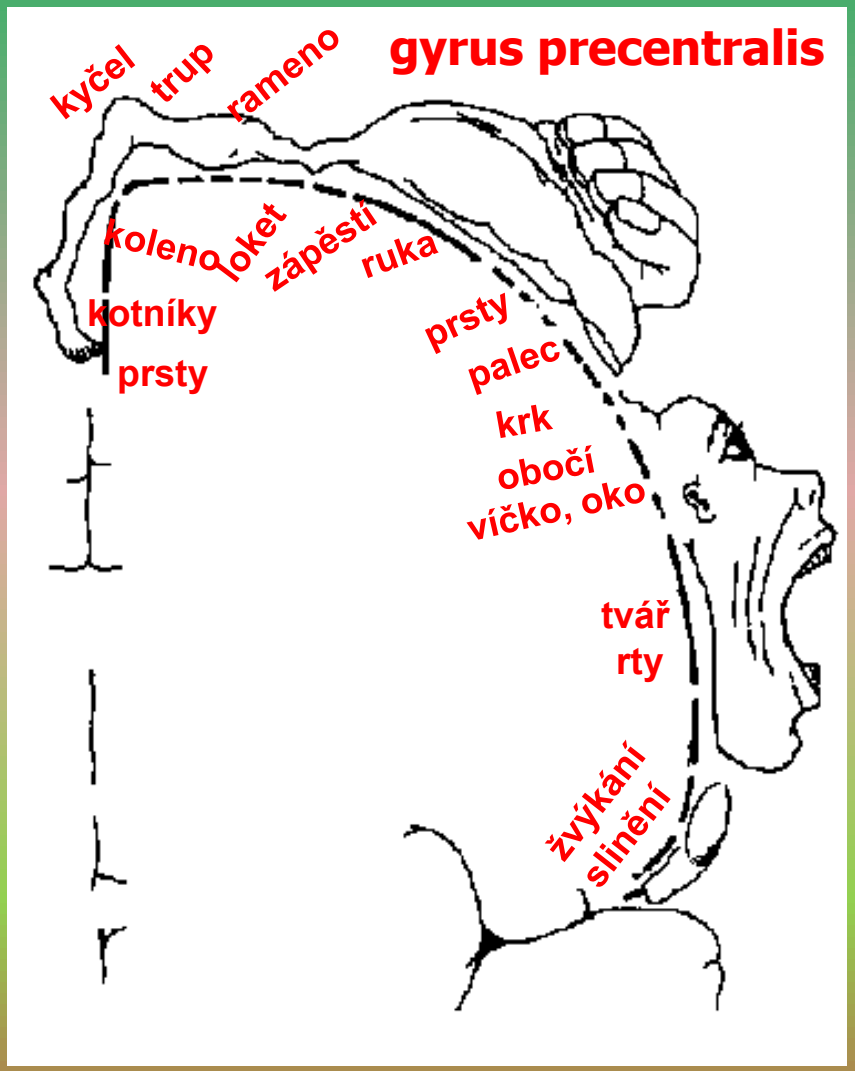


Primary motor c. (a 4), **primary somatic sensory c.** (a 3,1,2), **primary visual c.** (a 17), **primary auditory c.** (a 41,42)

Secondary and association areas

Representation of contralateral body parts





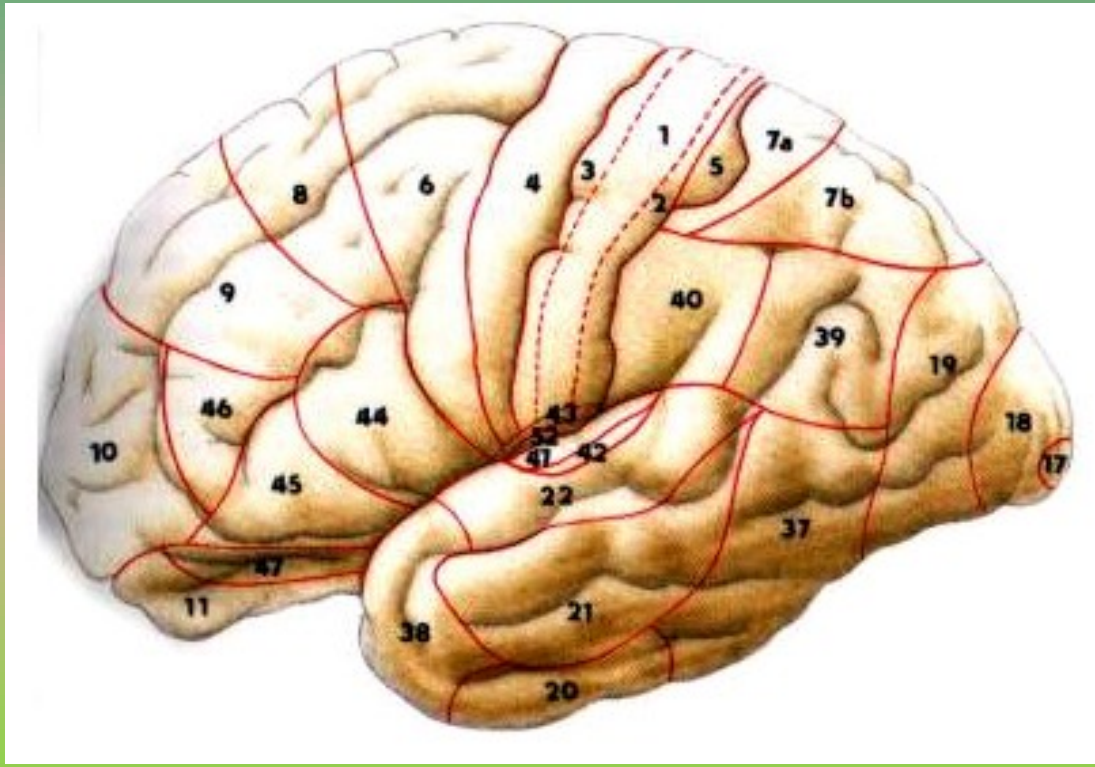
„sensory homunculus“

„motor homunculus“

CORTICAL AREAS FOR SPEECH - I

Broca's (motor) cortical area - g. front. inf. a44, 45

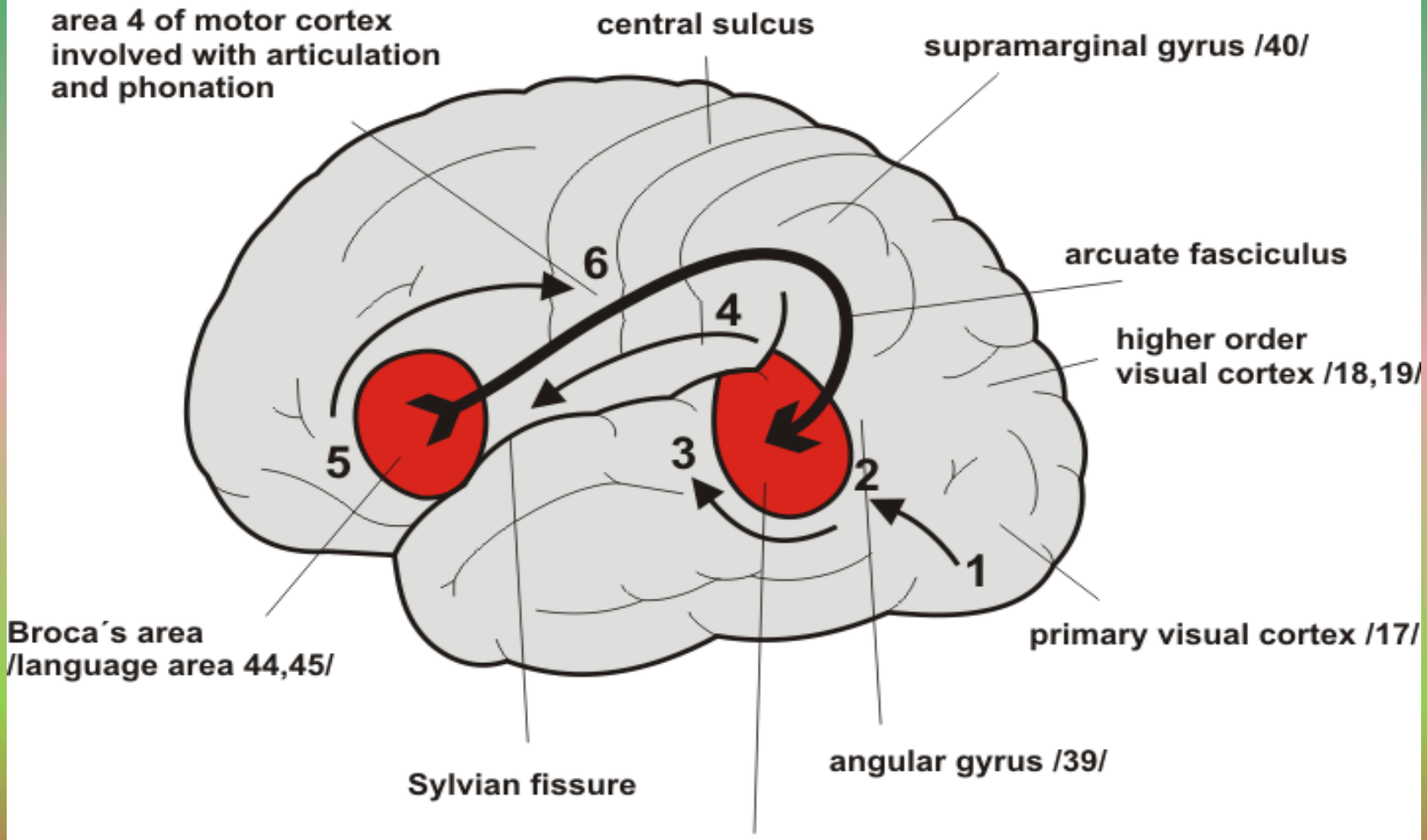
lesion - expressive aphasia – the lack of speech, but understanding is OK



Wernicke's (sensory) cortical area - a 22,39,40 in dominant hemi-sphere

- **lesion - receptive aphasia – the lack of understanding**

CORTICAL AREAS FOR SPEECH - II

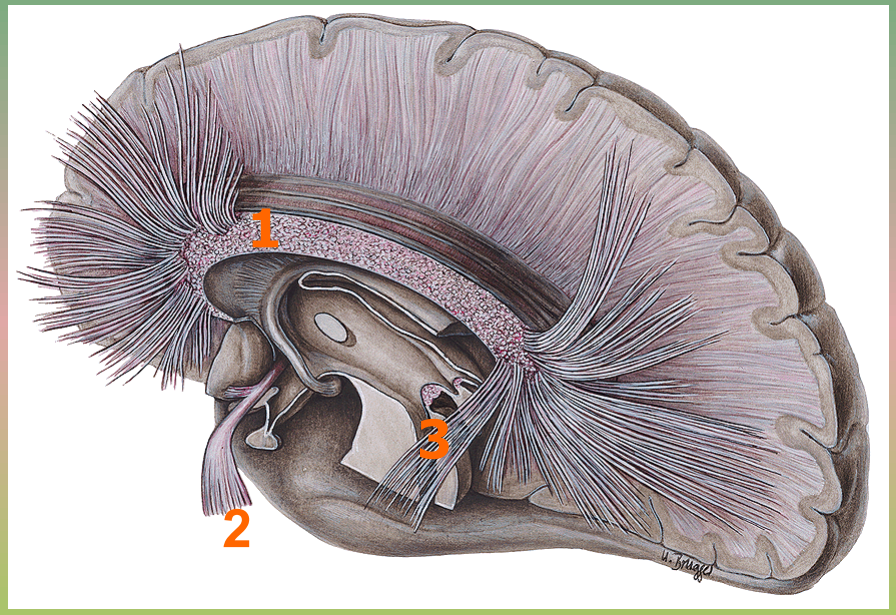


White matter of the telencephalon - corpus medullare

Fibers

commissural
projection
association

Commissural fibers

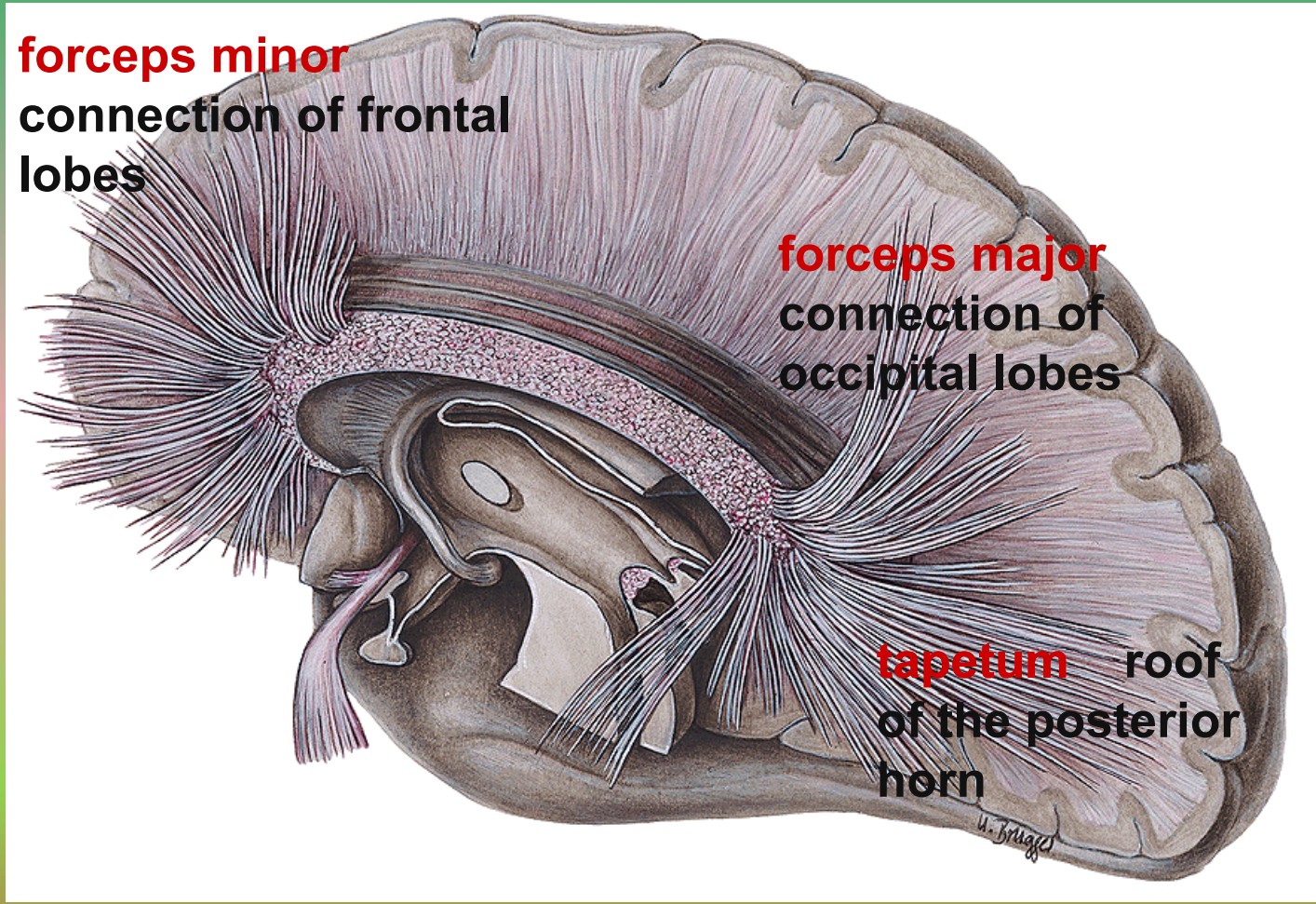


1 corpus callosum
neocortex

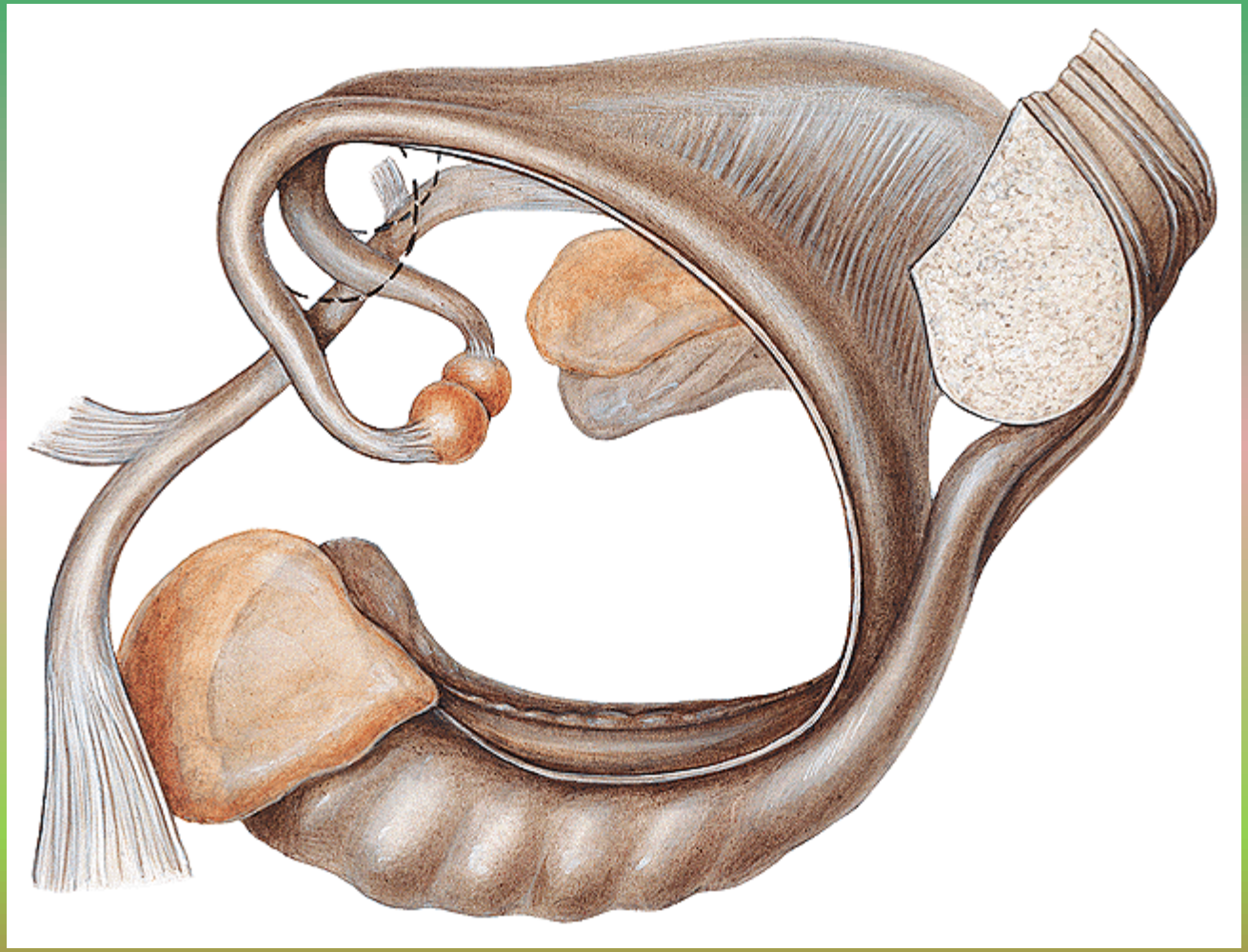
2 commissura ant.
pars ant.- paleocortex
pars post. - neocortex

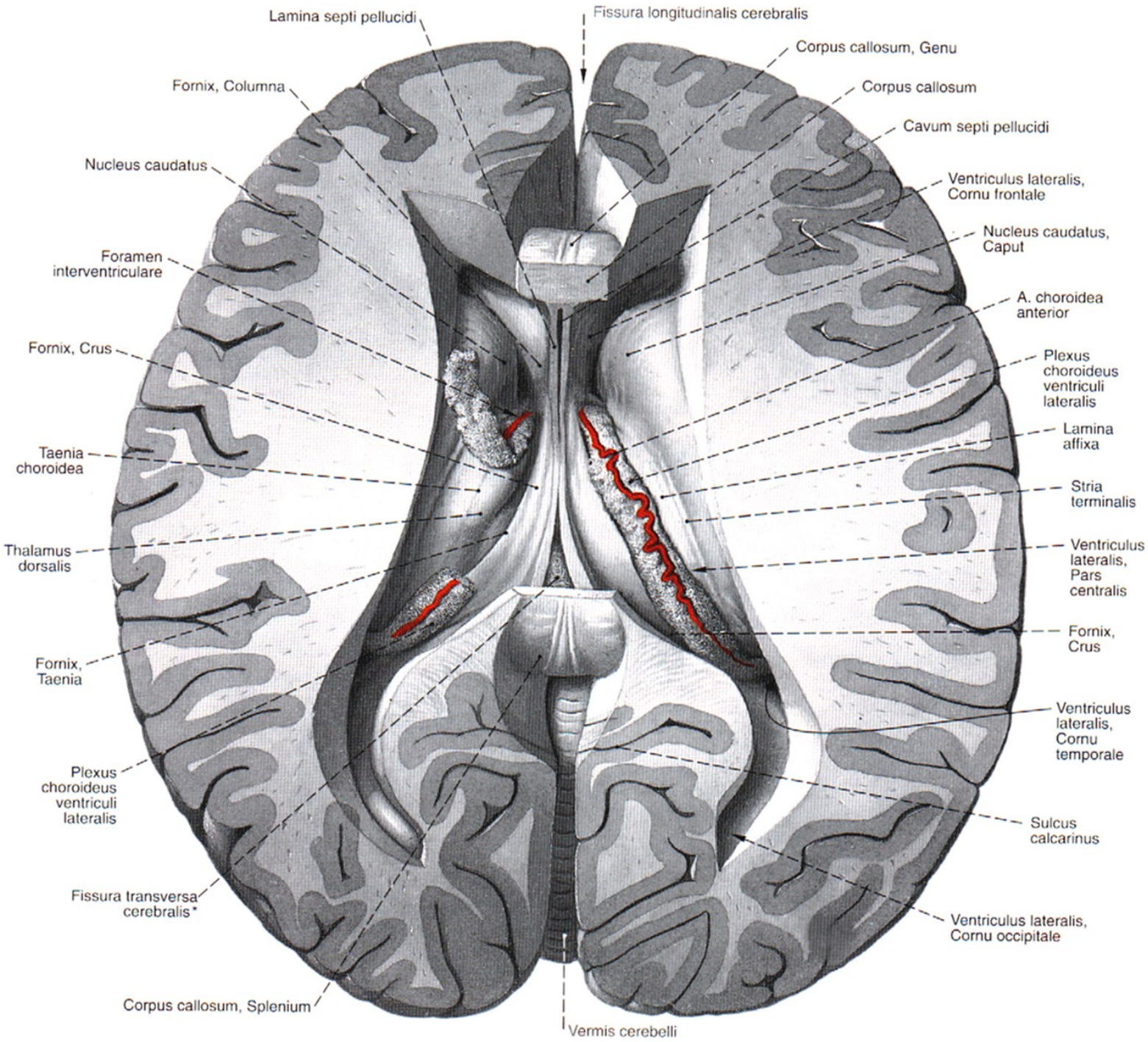
3 commissura fornicis
archicortex

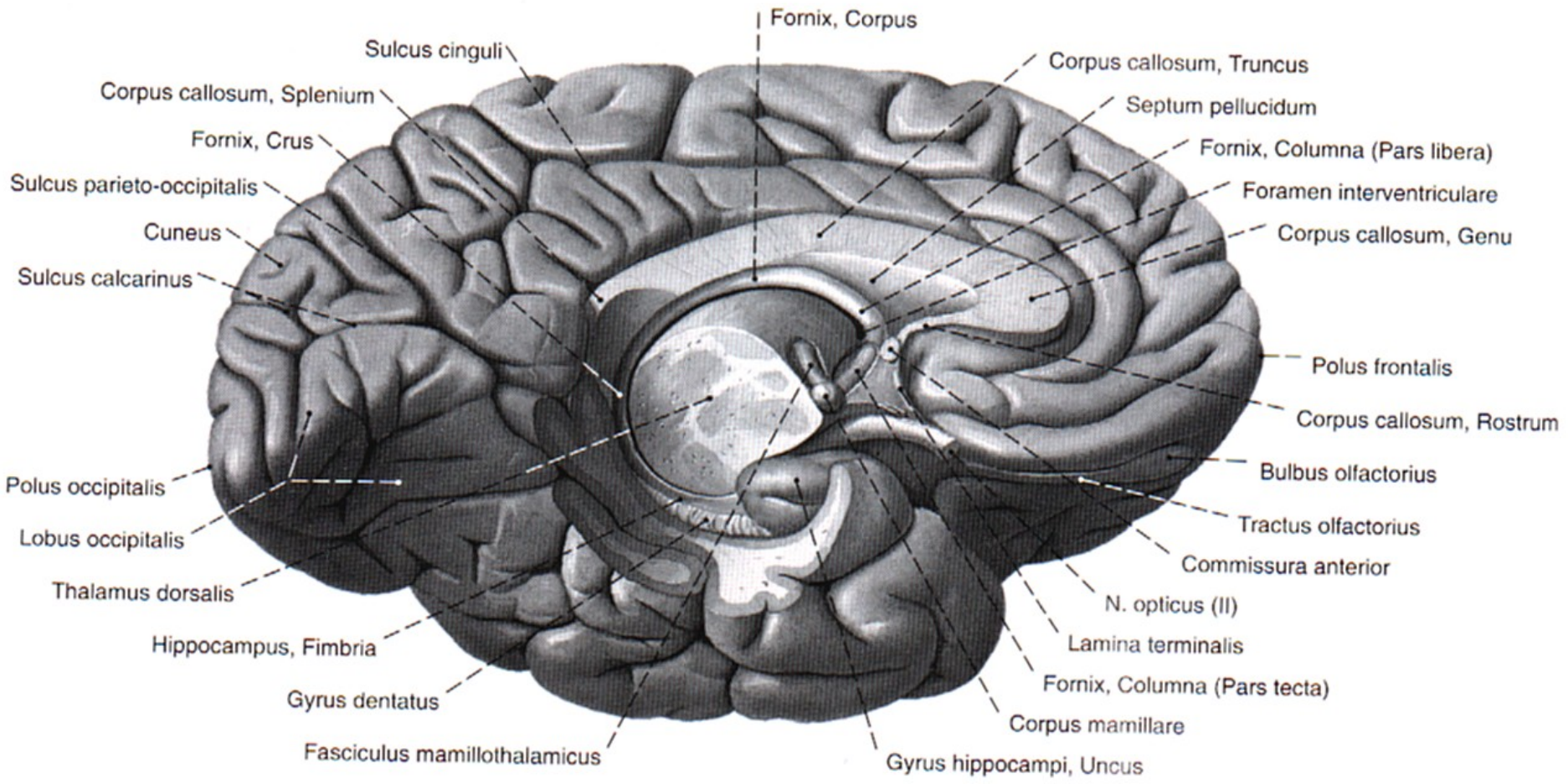
Corpus callosum - 300 million fibers



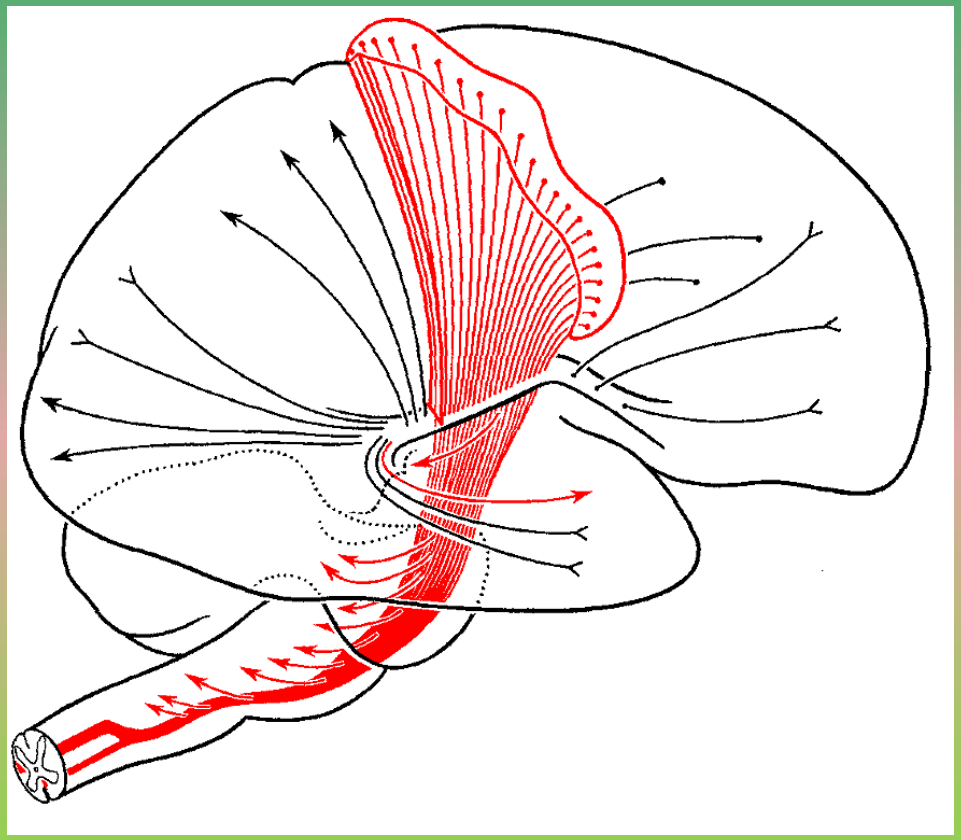
Commissura fornicis et anterior




Lamina septi pellucidi
Fissura longitudinalis cerebralis
Corpus callosum, Genu
Fornix, Columna
Corpus callosum
Cavum septi pellucidi
Nucleus caudatus
Ventriculus lateralis, Cornu frontale
Nucleus caudatus, Caput
Foramen interventriculare
A. choroidea anterior
Fornix, Crus
Plexus choroideus ventriculi lateralis
Lamina affixa
Taenia choroidea
Stria terminalis
Thalamus dorsalis
Ventriculus lateralis, Pars centralis
Fornix, Crus
Fornix, Taenia
Ventriculus lateralis, Cornu temporale
Plexus choroideus ventriculi lateralis
Sulcus calcarinus
Fissura transversa cerebralis
Ventriculus lateralis, Cornu occipitale
Corpus callosum, Splenium
Vermis cerebelli


Fornix, Corpus
Sulcus cinguli
Corpus callosum, Truncus
Corpus callosum, Splenium
Septum pellucidum
Fornix, Crus
Fornix, Columna (Pars libera)
Sulcus parieto-occipitalis
Foramen interventriculare
Cuneus
Corpus callosum, Genu
Sulcus calcarinus
Polus frontalis
Corpus callosum, Rostrum
Bulbus olfactorius
Polus occipitalis
Tractus olfactorius
Lobus occipitalis
Commissura anterior
Thalamus dorsalis
N. opticus (II)
Lamina terminalis
Hippocampus, Fimbria
Fornix, Columna (Pars tecta)
Gyrus dentatus
Corpus mamillare
Fasciculus mamillothalamicus
Gyrus hippocampi, Uncus

Projection fibers



short

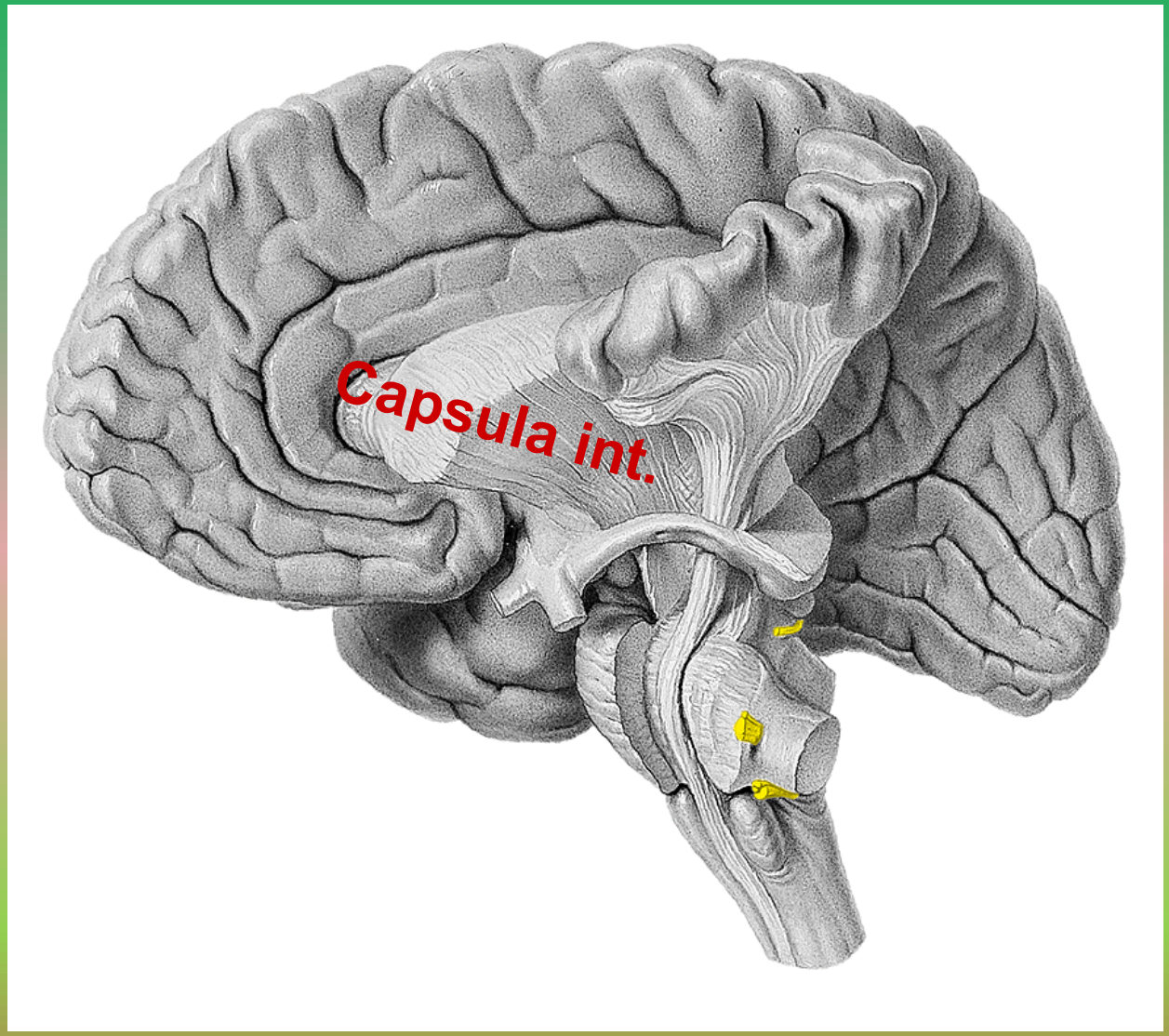
- connections between cortex and BG

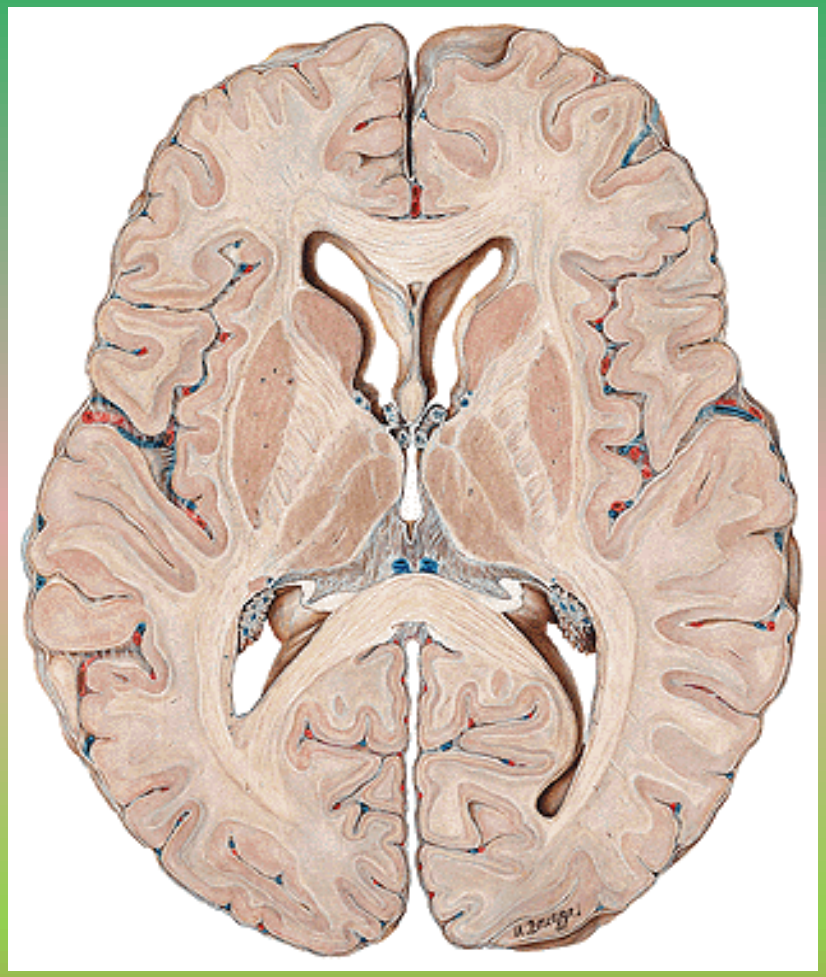
reciprocal connections between cortex and thalamus

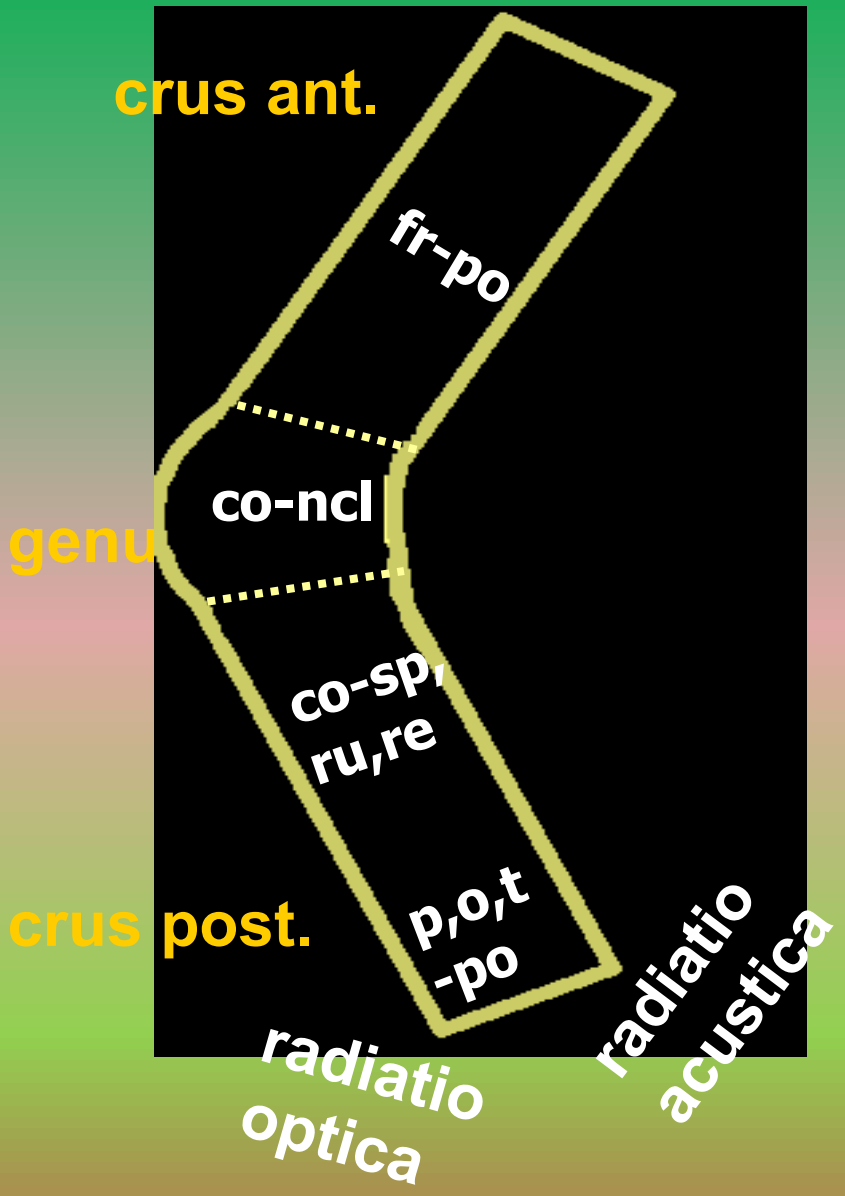
long

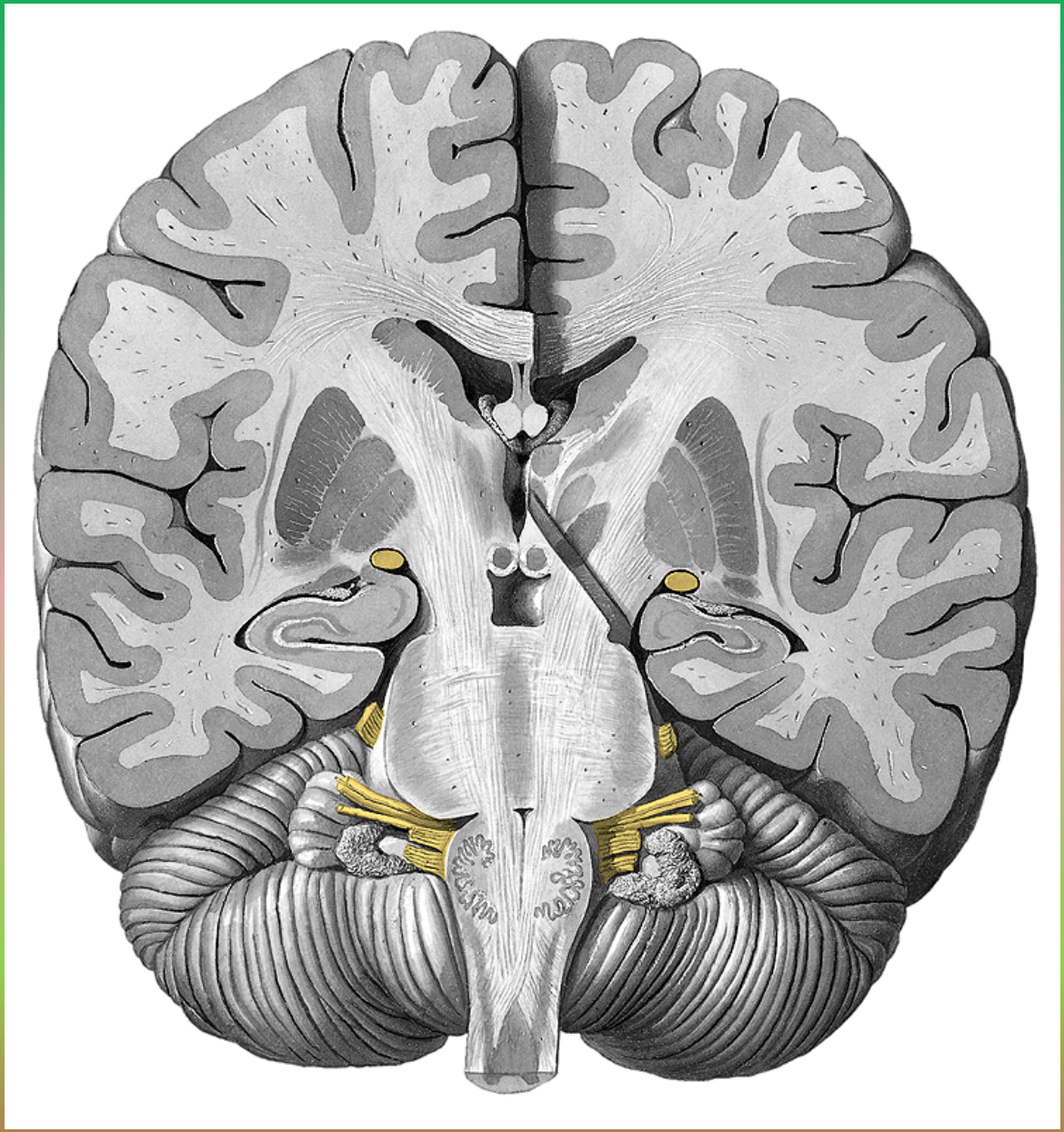
tr. co-sp
tr. co-ncl
tr. co-ret
tr. co-tec
tr. co-ru
tr. co-bulb
tr. co-po

} capsula interna

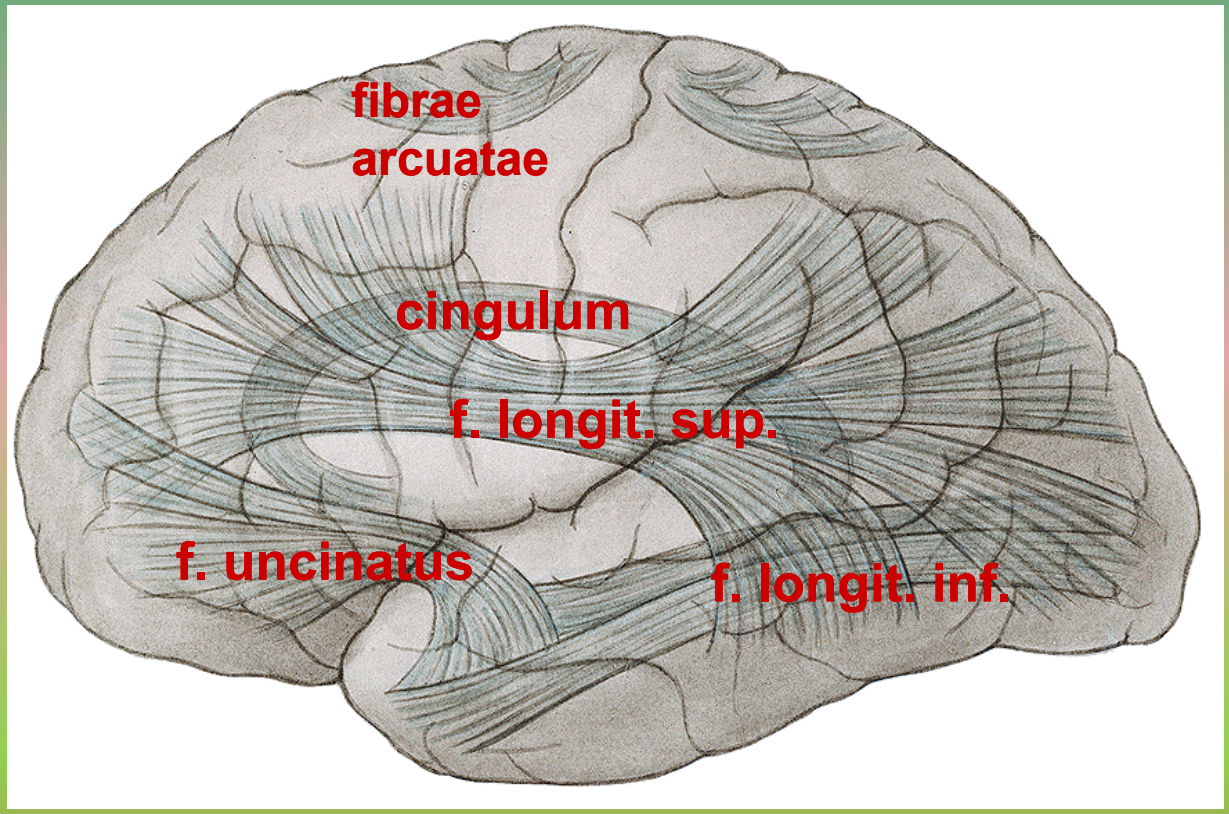

Capsula int.




crus ant.
fr-po
genu
co-ncl
co-sp,
ru,re
crus post.
p,o,t
-po
radiatio
optica
radiatio
acustica



Association fibers: **short** (fibrae arcuatae), **long**



- Illustrations were copied from:
- **Atlas der Anatomie des Menschen/ Sobotta. Putz,R., und Pabst,R. 20. Auflage. München: Urban & Schwarzenberg, 1993**
- **Netter: Interactive Atlas of Human Anatomy. Windows Version 2.0**