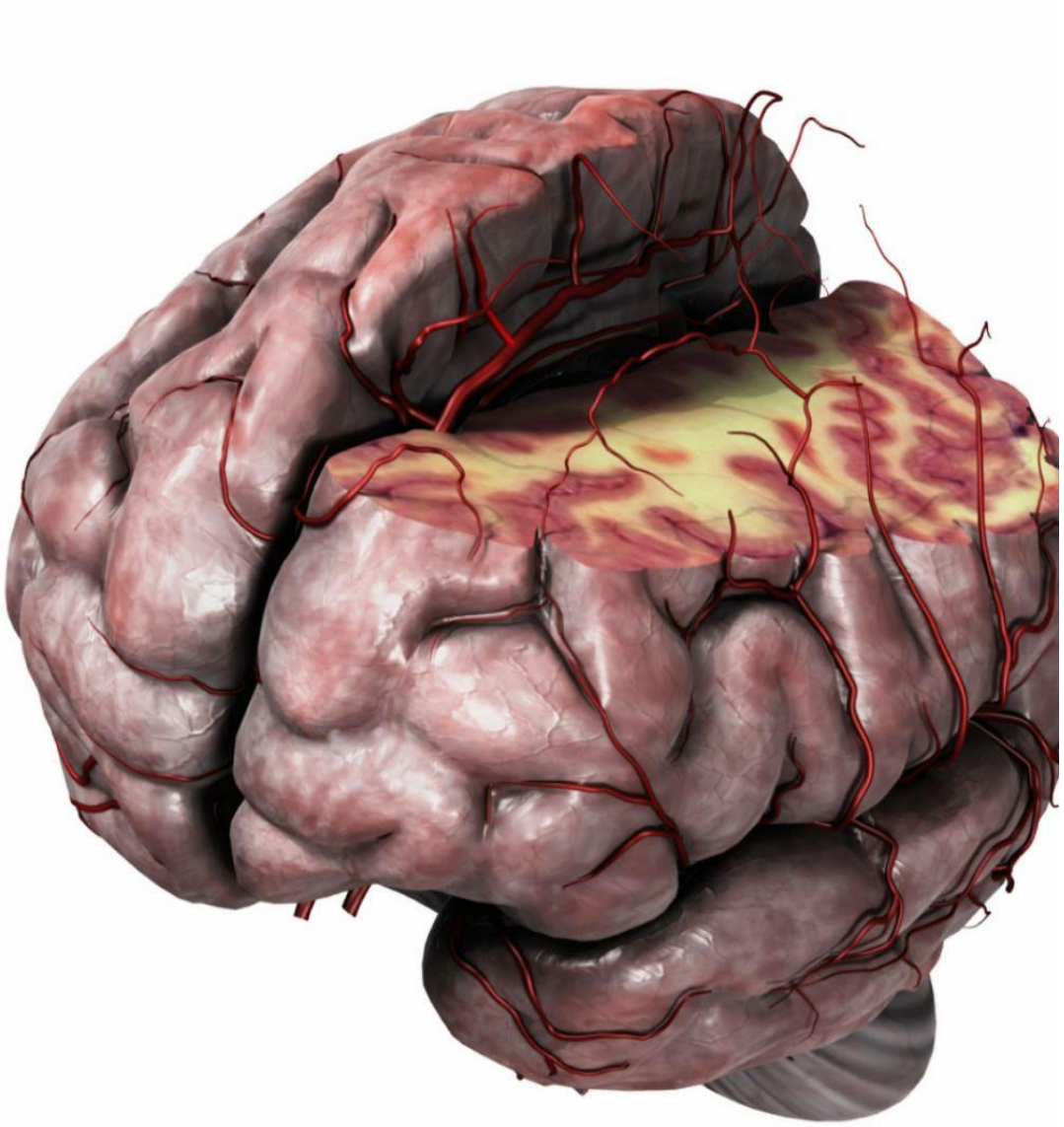
CEREBRAL WHITE MATTER



BY

DR ABULMAATY MOHAMED
ASSISTANT PROFESSOR
ANATOMY & EMBRYOLOGY
MUTAH UNIVERSITY

TYPES

A-association fibers :-

fibers connect different cortical areas of the same cerebral hemisphere.

to integrate the functions of these areas

B-commissural fibers :-

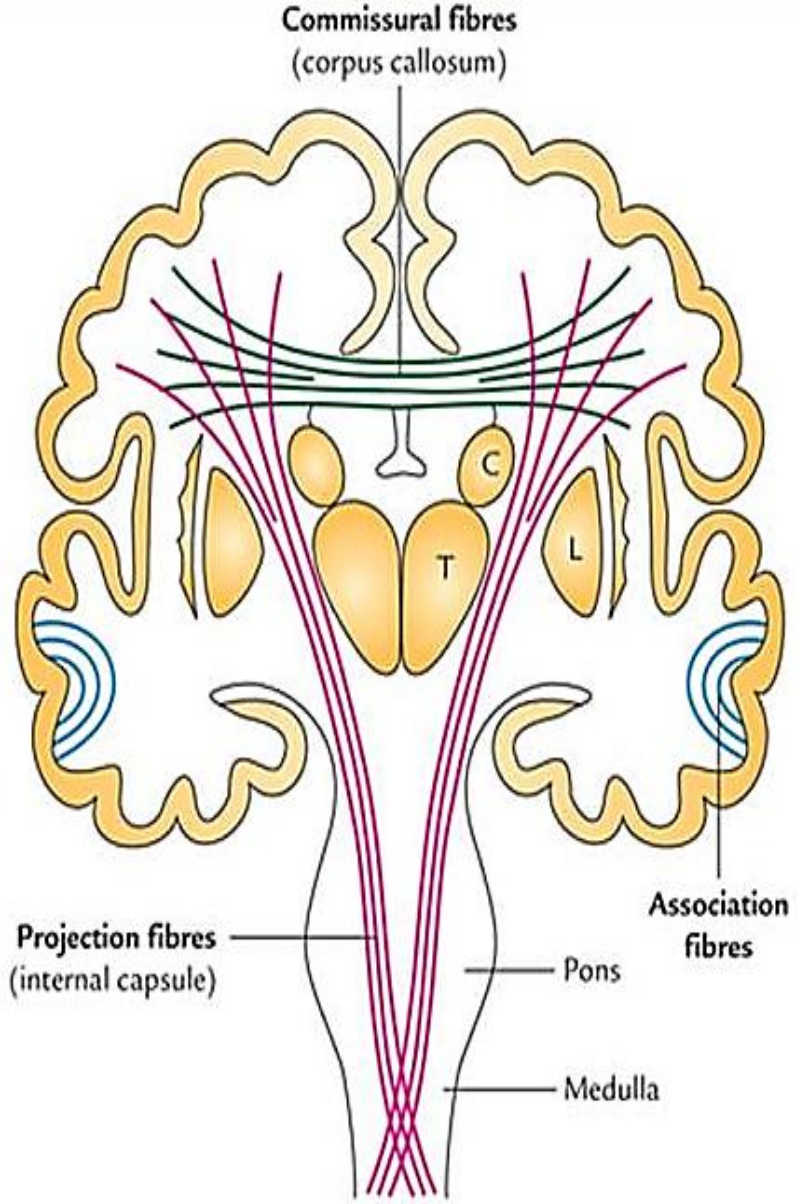
Fibers connect identical cortical areas of both cerebral hemispheres.

So these fibers cross the midline

For coordination between both sides

C- projection fibers :-

Fibers connect the cerebral cortex with lower centers they are either descending (efferent) or ascending (afferent) for integration of cerebral cortex with these parts

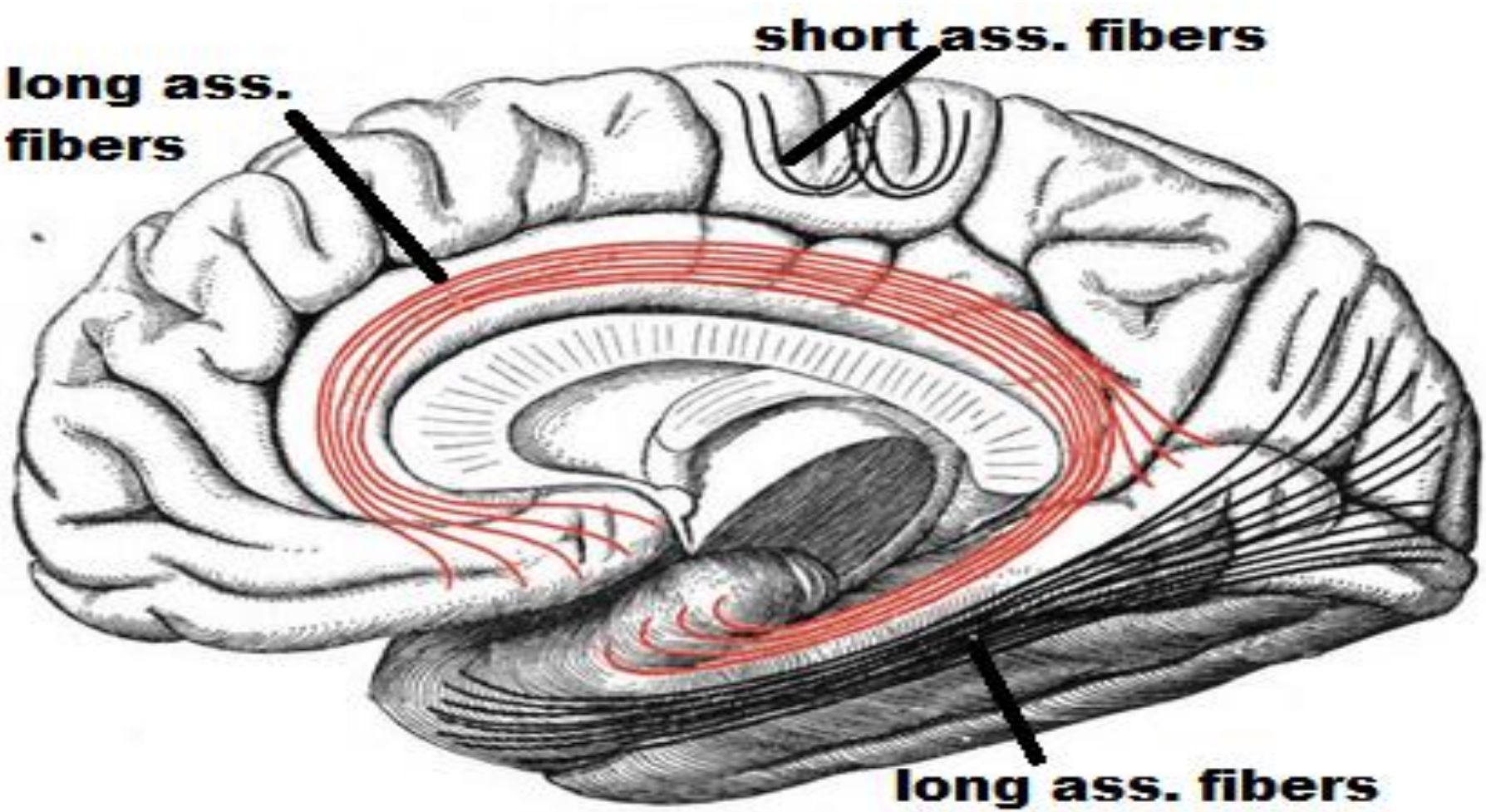


ASSOCIATION FIBERS

Types:

A-short: connect adjacent gyri together

B-long: connect distant gyri of different lobes (will be discussed)

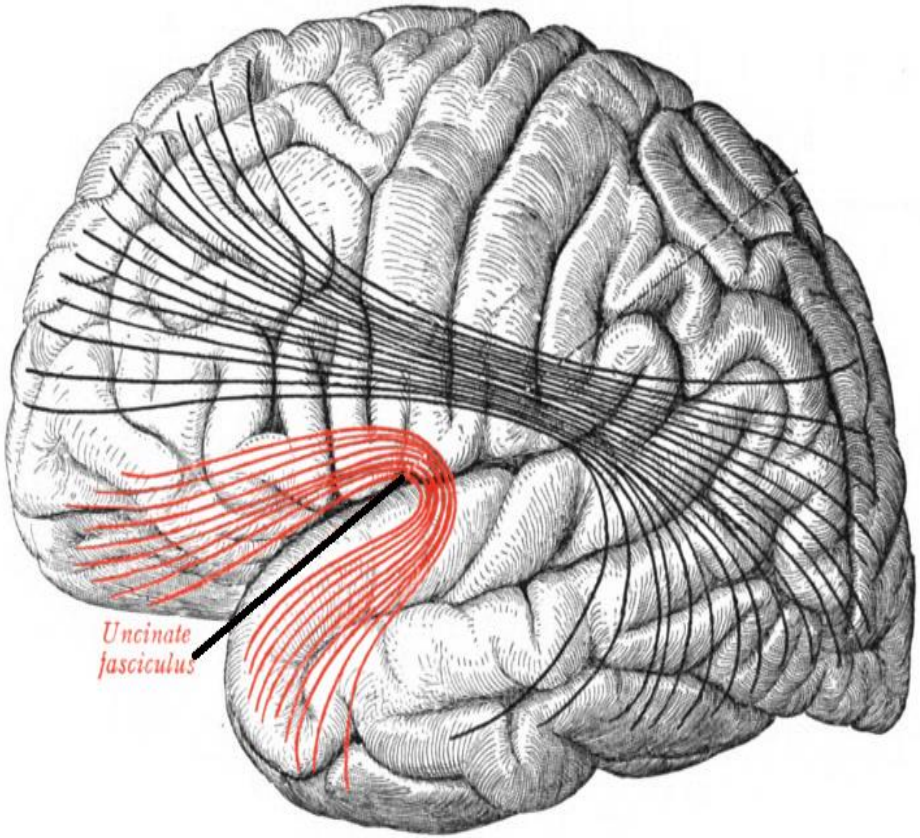


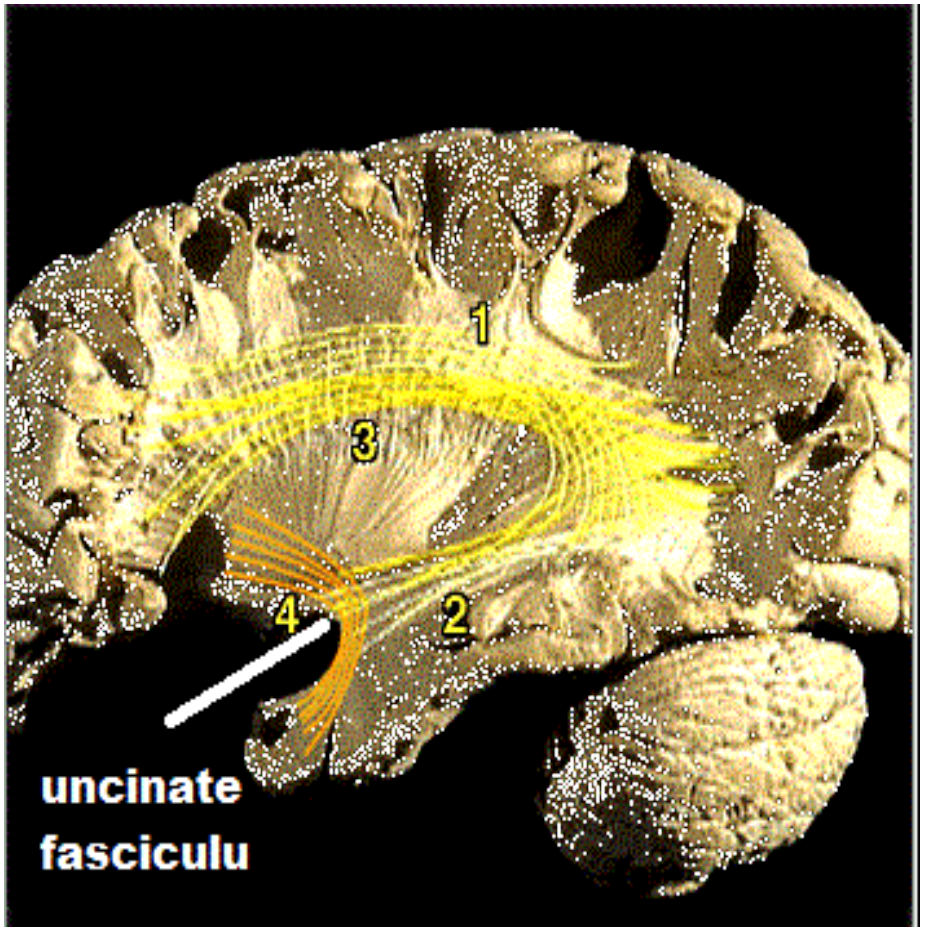
ASSOCIATION FIBERS

1-uncinate fasciculus: U shaped

-begins at the orbital gyri of frontal lobe, then arches over the stem of lateral sulcus to end in ant. part of temporal lobe

-it connects orbital gyri of frontal lobe & motor speech areas with the cortex of ant. part of temporal lobe



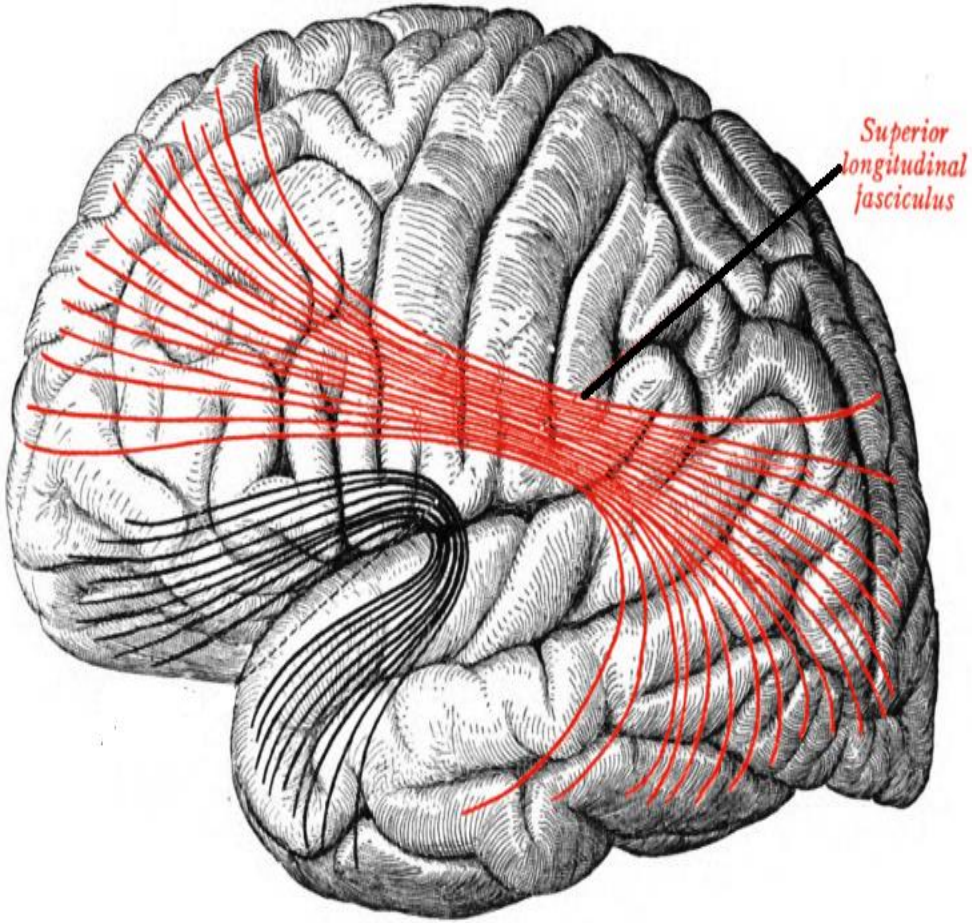


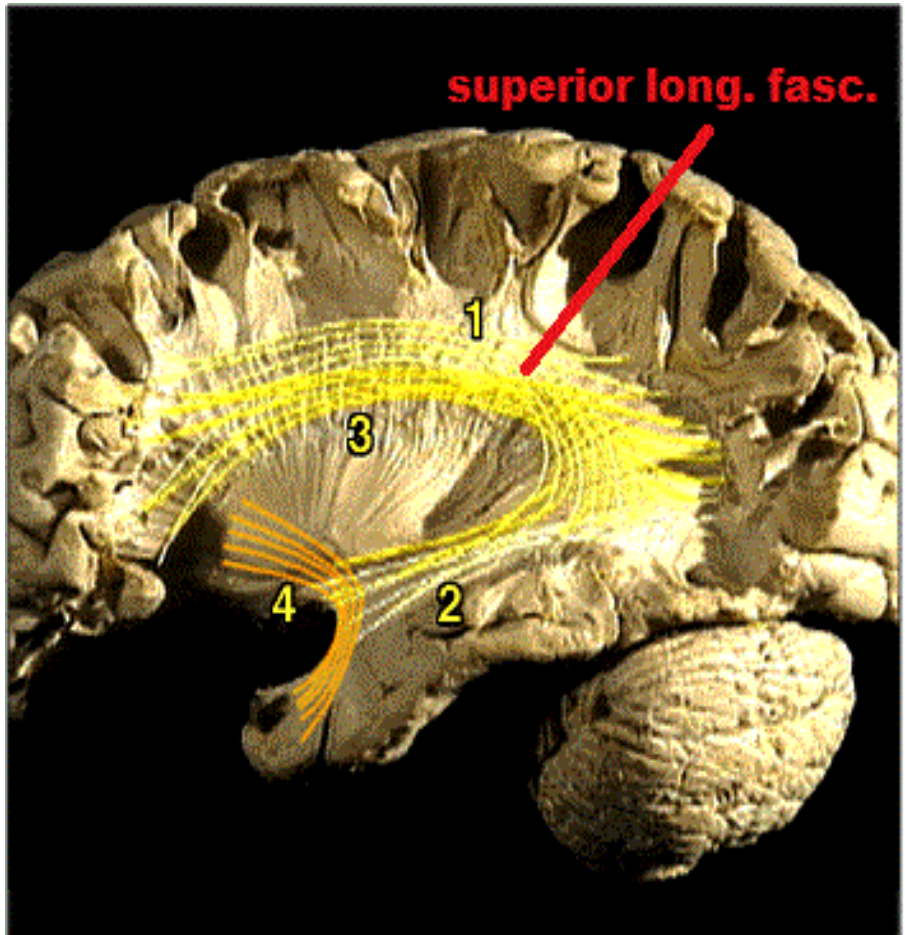
ASSOCIATION FIBERS

2-superior longitudinal fasciculus: largest

-begins in frontal lobe and run backward to reach the occipital lobe , then curve to enter temporal lobe

- connect frontal, occipital & temporal cortical areas





ASSOCIATION FIBERS

3-inferior longitudinal fasciculus:

Begins at occipital lobe and run forward to reach the temporal lobe

4-cingulum:

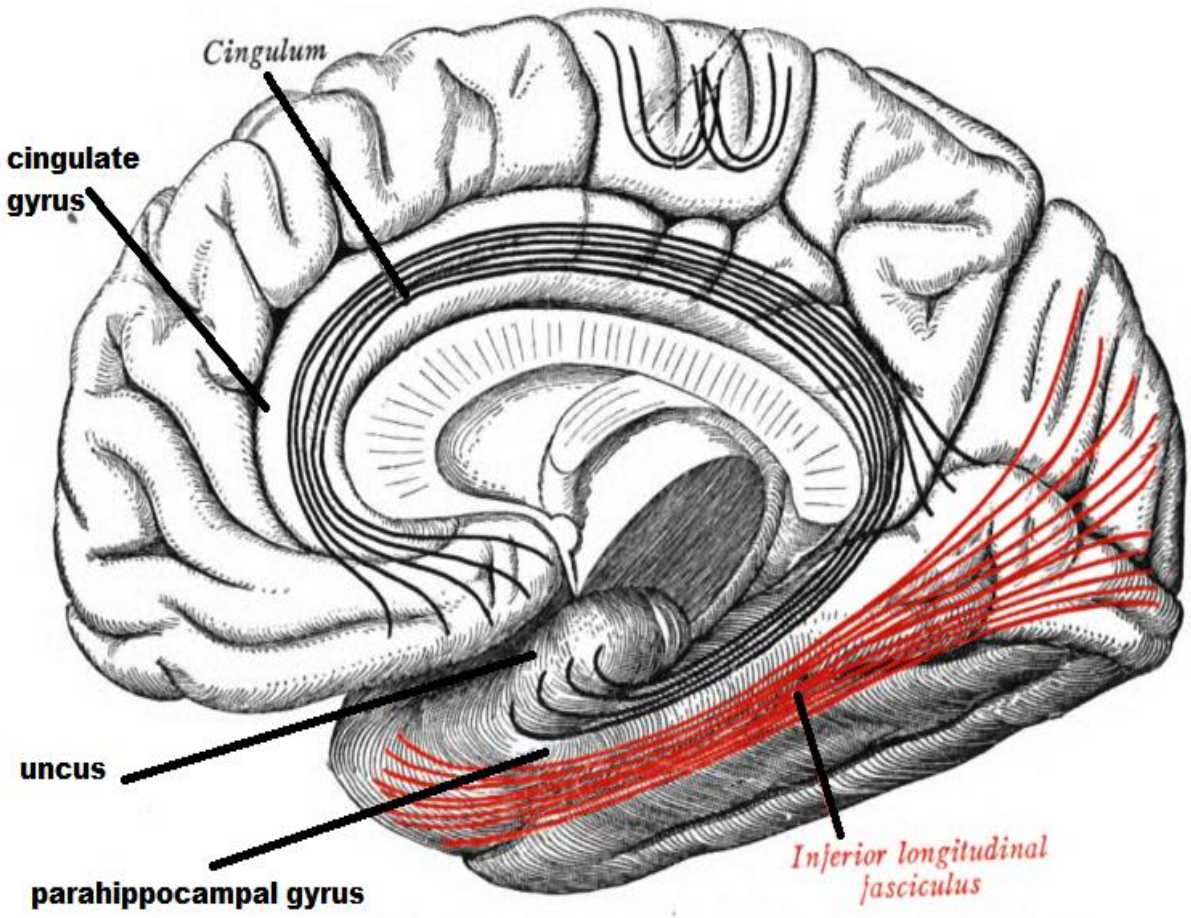
Begins at ant. perforated substance

---- cingulate gyrus

--- isthmus

----parahippocampal gyrus

----And ends at uncus



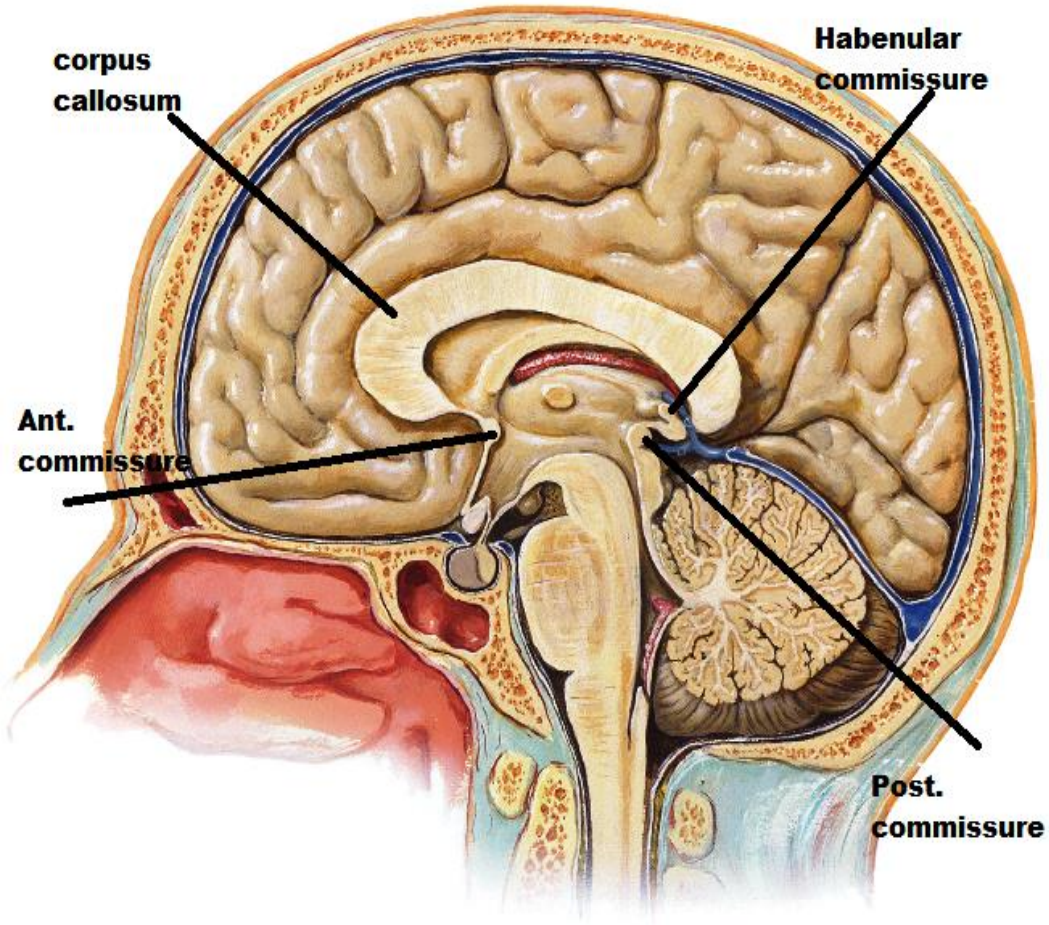
Commissural fibers

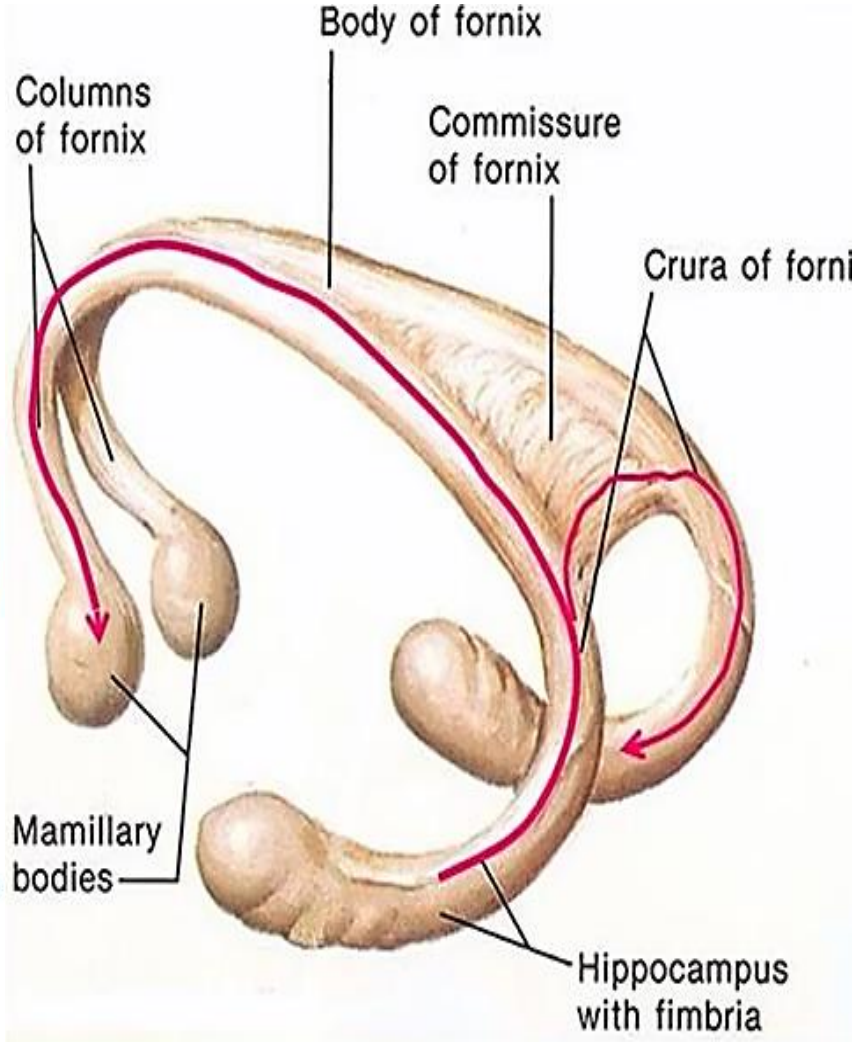
Types

1. Corpus callosum 2. Anterior commissure

3. Habenular commissure 4. Posterior commissure

5. Hippocampal commissure.



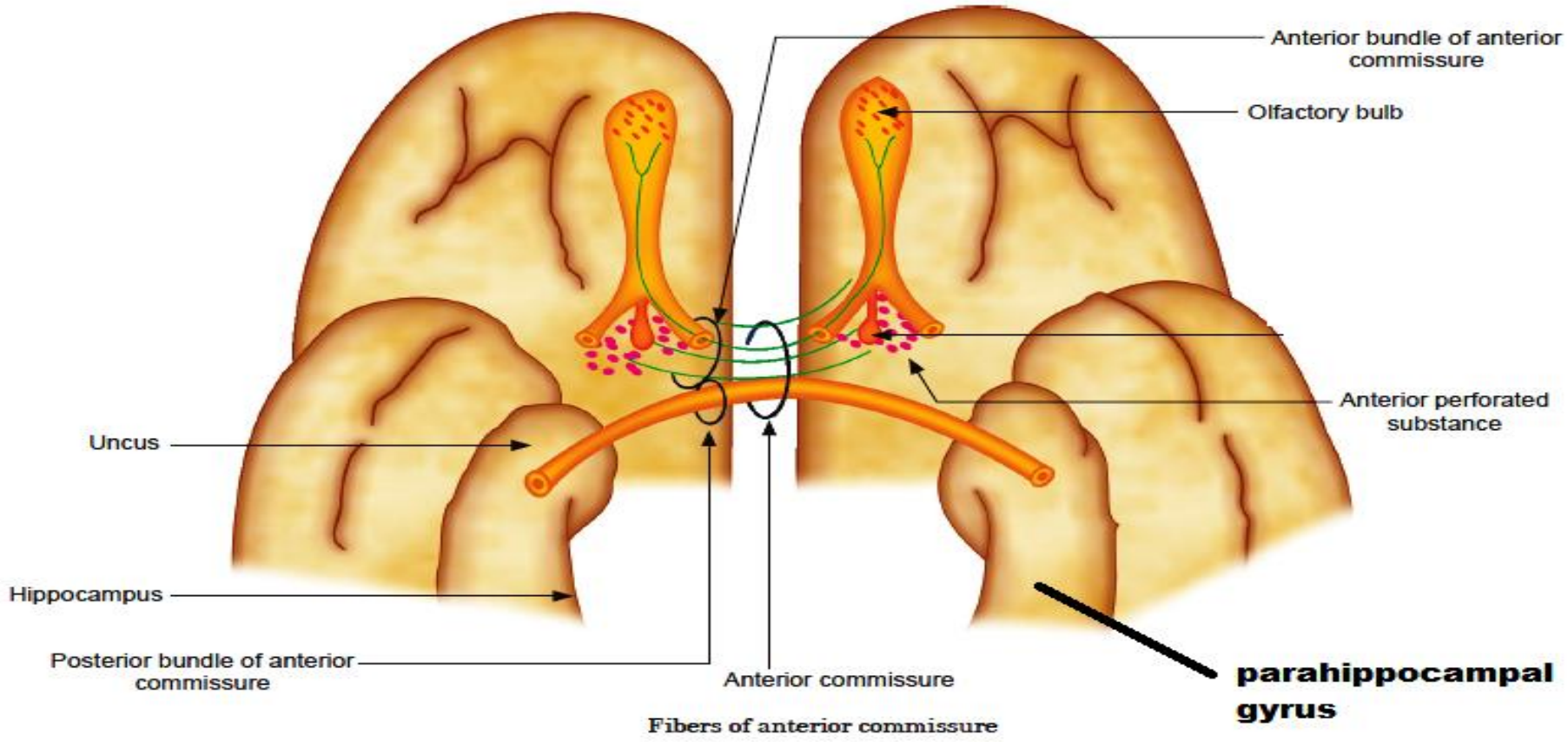


COMMISSURAL FIBERS

1-anterior commissure:

-it is a small rounded bundle embedded in the upper end of lamina terminalis, just in front columns of fornix

-connects olfactory structures of both sides :olfactory bulb, ant. perforated substance, uncus & ant. part of parahippocampal gyrus



COMMISSURAL FIBERS

2-post. commissure (midbrain commissure)

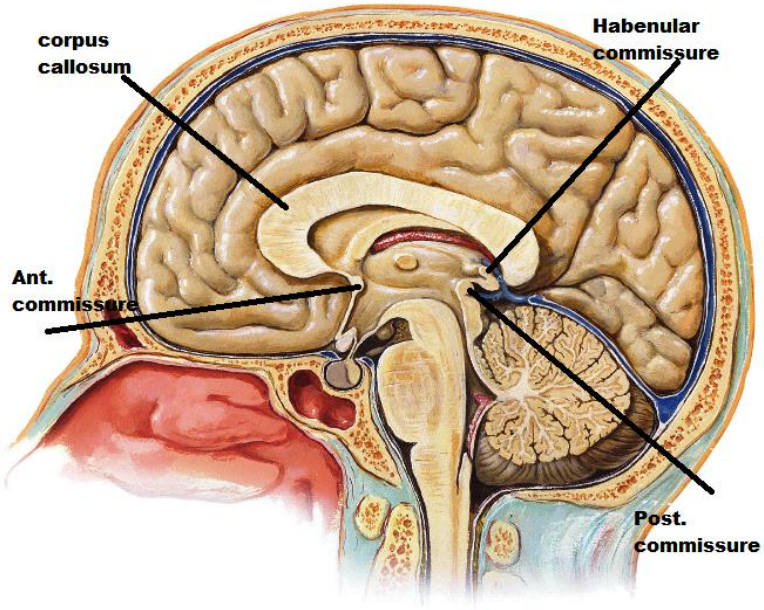
-in inferior lamina of pineal stalk, above the upper end of cerebral aqueduct

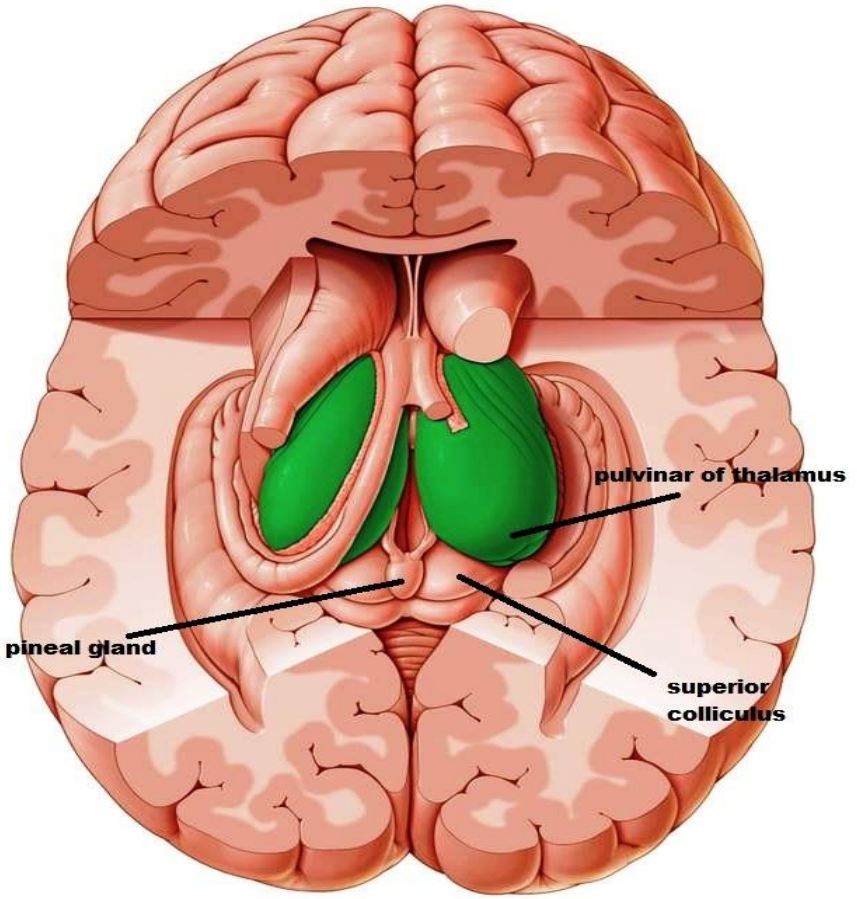
-it connects the following structures on both sides:

Midbrain nuclei

Pulvinar of thalamus

superior colliculus





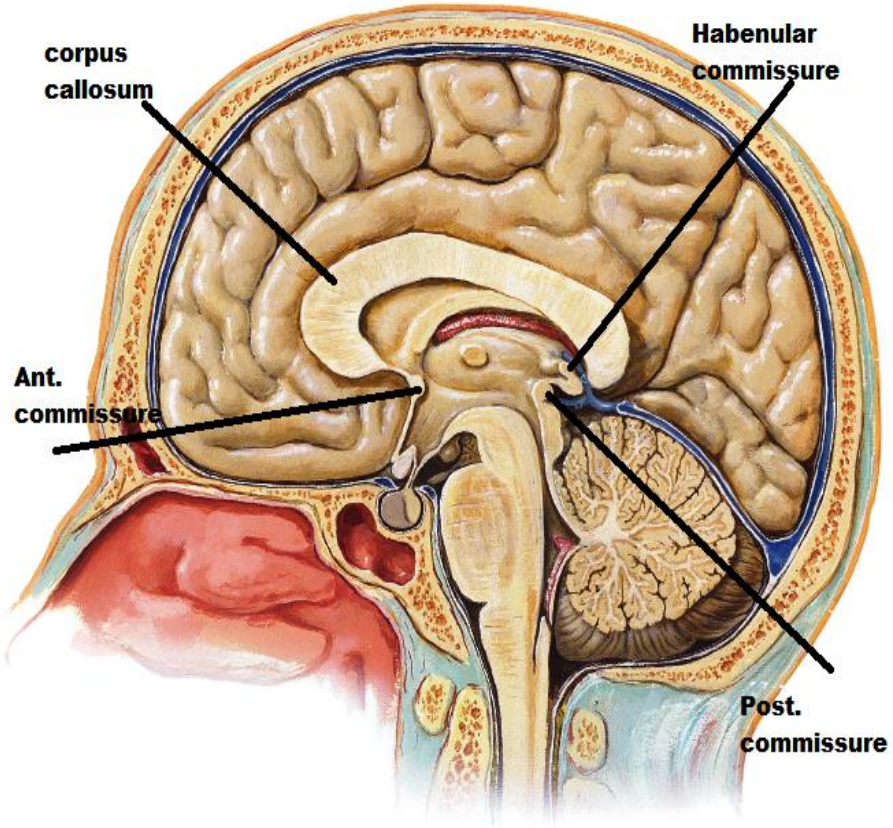
COMMISSURAL FIBERS

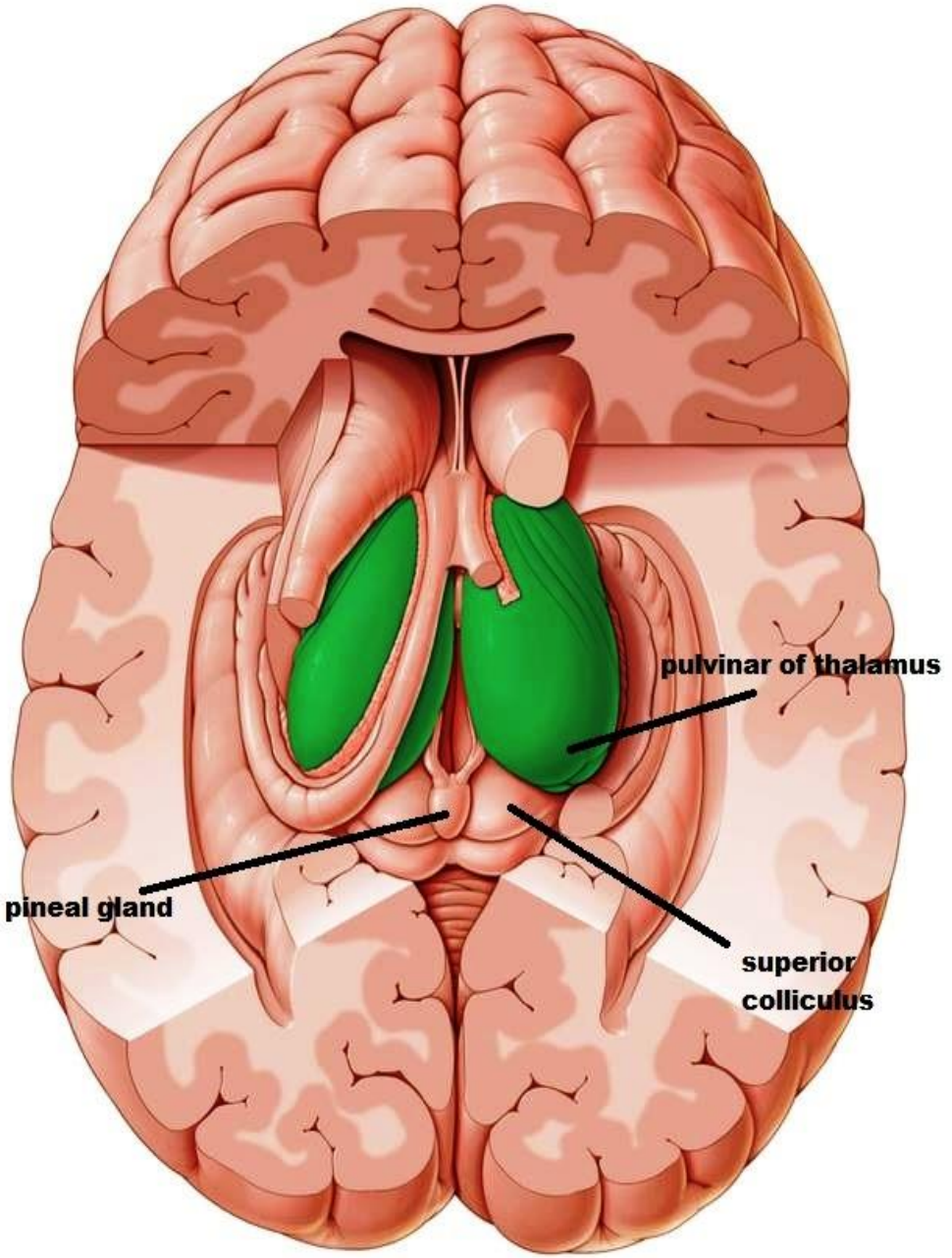
3-habenular commissure:

-in superior lamina of pineal stalk

-it connects habenular nuclei

of both sides of epithalamus



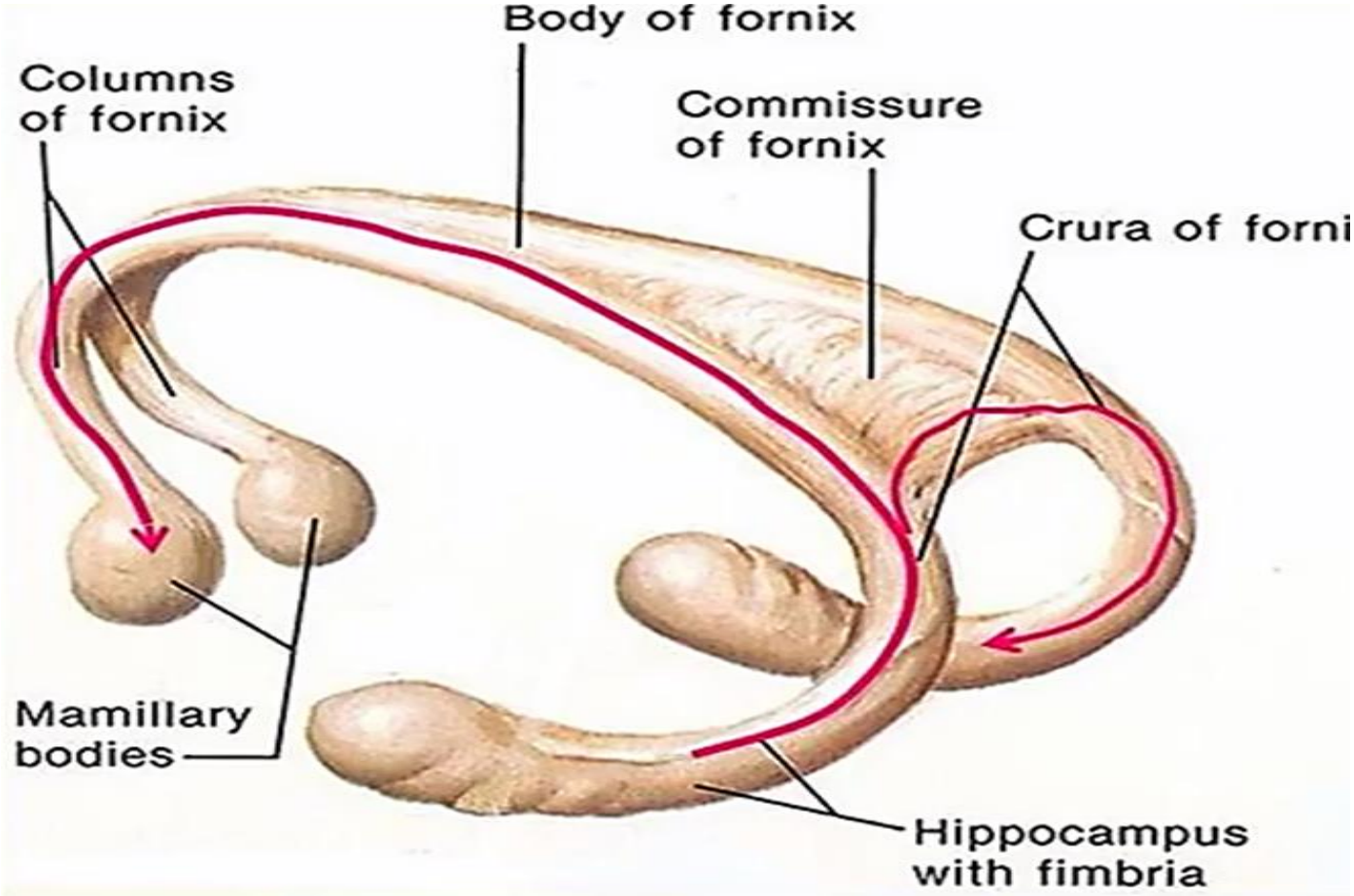


COMMISSURAL FIBERS

4-hippocampal (fornix) commissure:

-Transverse fibers that connect the 2 crura of the fornix with each other, just before formation of the body.

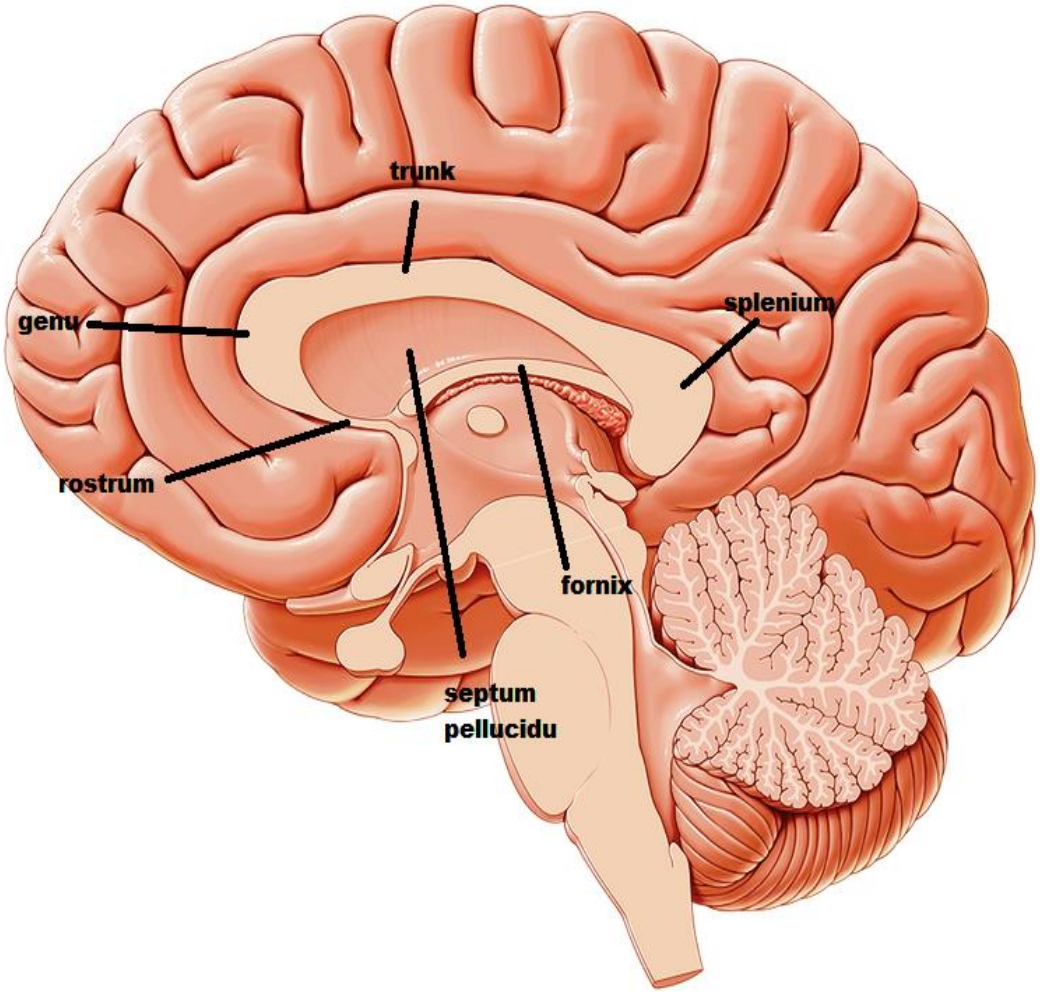
-it connects the hippocampal formations of both sides



COMMISSURAL FIBERS

5-corpus callosum

def.: largest and the main commissure in the brain. Its fibers connect **nearly** all the symmetrical cortical areas of the 2 hemispheres



COMMISSURAL FIBERS C.C.

parts:

1-rostrum:

in sagittal section

It is thinnest part of corpus callosum .

From the genu it directs

backwards and downwards

to end at the level of ant. Commissure

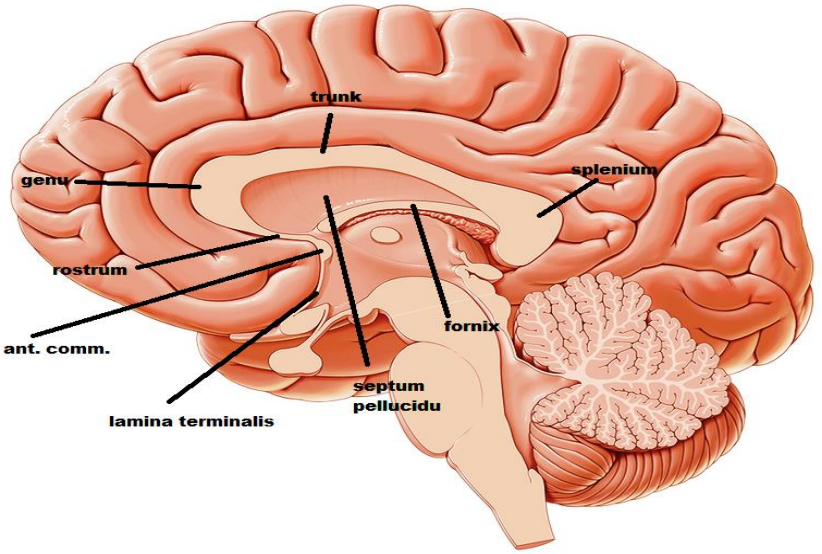
to be continued with lamina terminalis

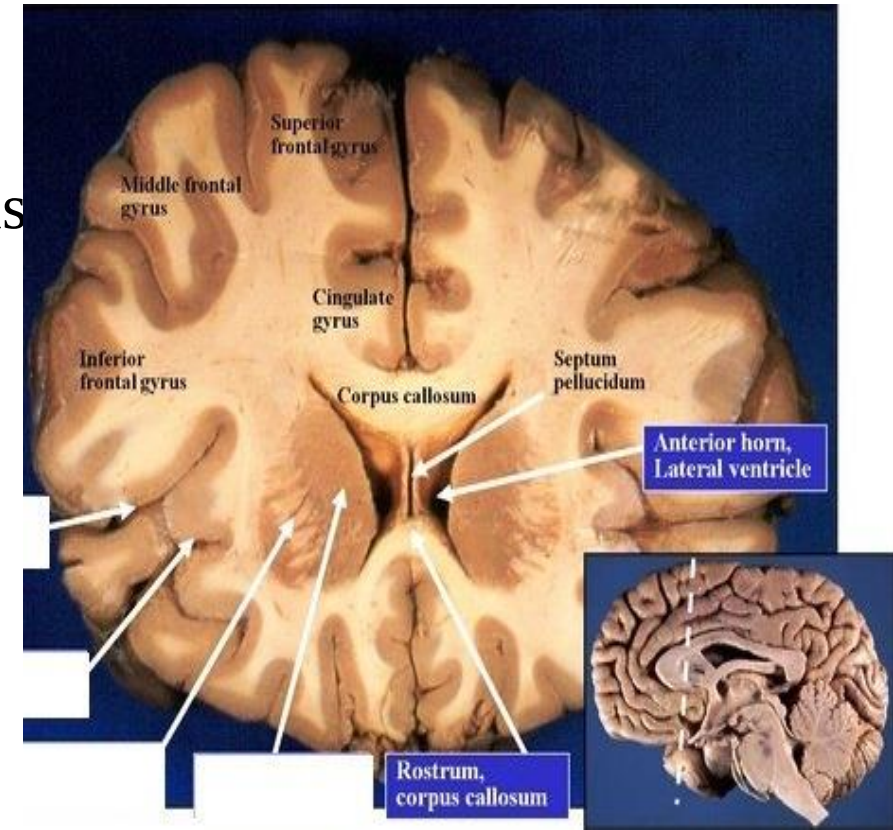
in coronal section: inverted V shape,

its fibers connect

the orbital surfaces of

frontal lobes on both sides





COMMISSURAL FIBERS C.C.

parts:

2-genu

in sagittal section

-curved ant. end of corpus callosum

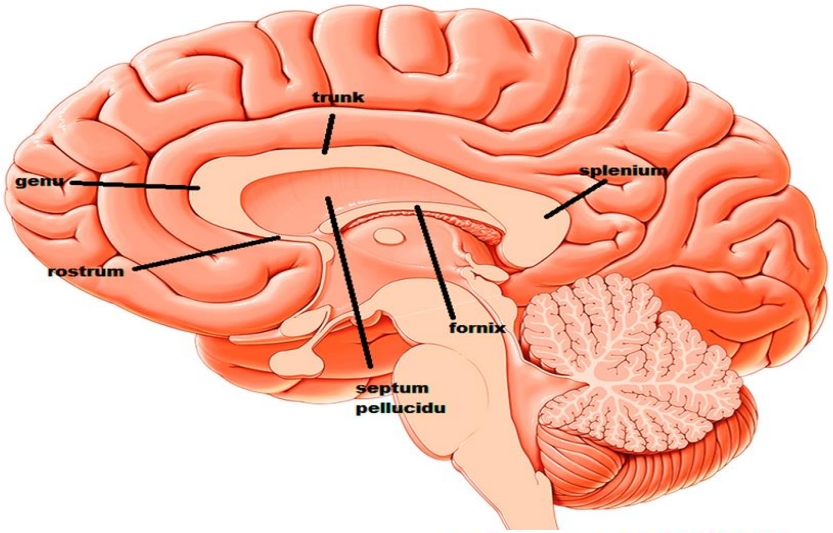
-it is 4 cm behind the frontal pole

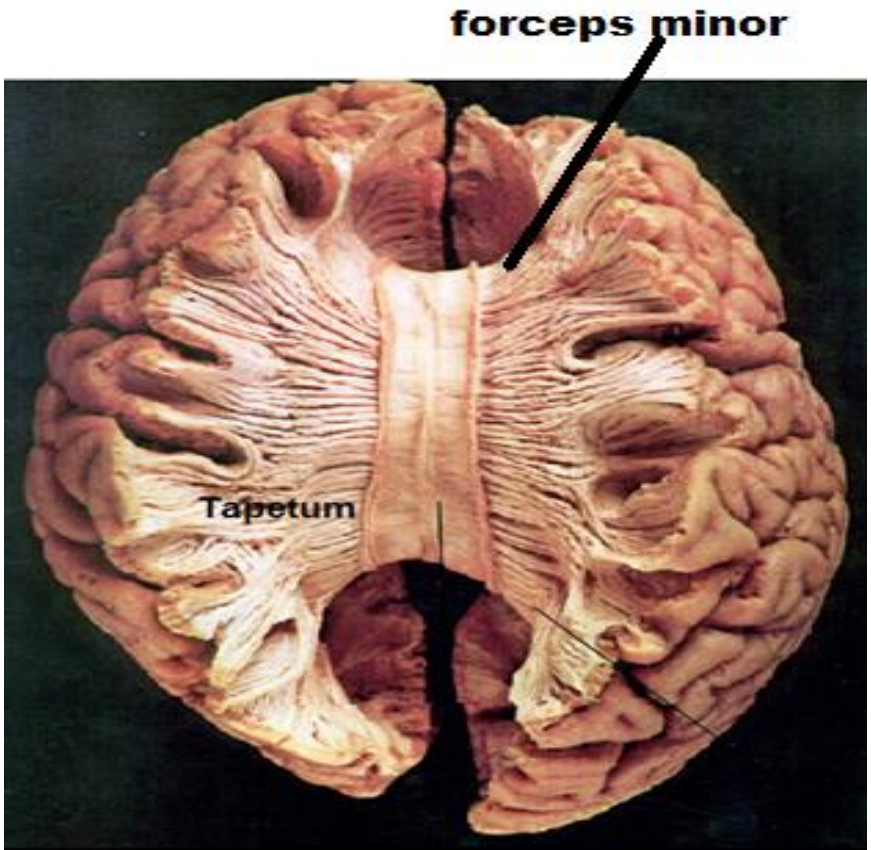
in horizontal section :

on both sides, the fibers pass horizontally forward

forming forceps minor which connect identical areas of both frontal lobes

except orbital surfaces





COMMISSURAL FIBERS C.C.

parts:

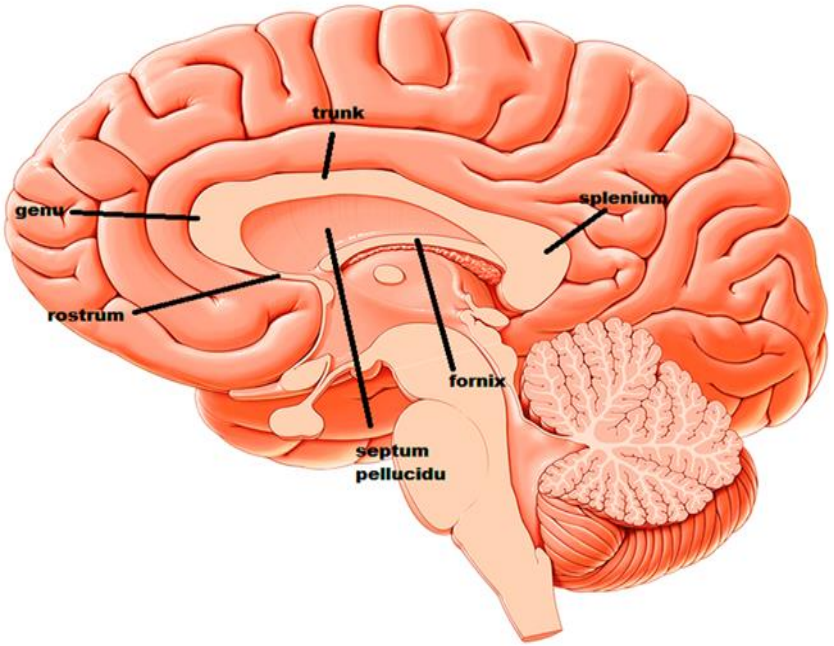
3-trunk(body)

in sagittal section

-the main part of corpus callosum.

-Extends between genu and splenium

-its upper surface is convex



in coronal section

the fibers on both sides diverge

upward& laterally to connect

the parietal lobes on both sides,

downward and laterally to connect

the temporal lobes on both sides.

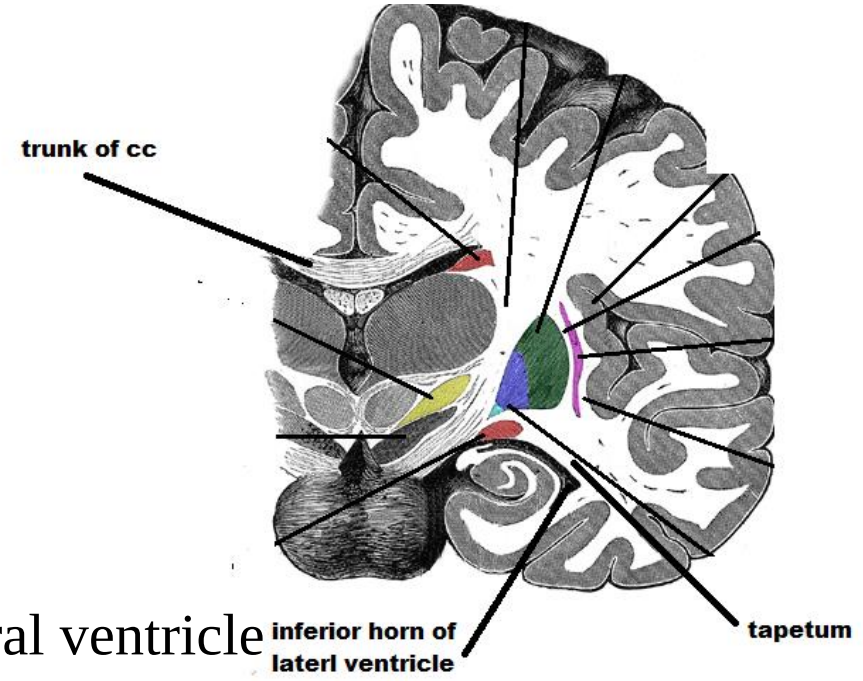
most of its fibers intersect

with fibers of corona radiate,

but some fibers not intersect

with corona & form the tapetum

of lateral wall of inferior horn of lateral ventricle



COMMISSURAL FIBERS C.C.

parts:

4-splenium

in sagittal section:

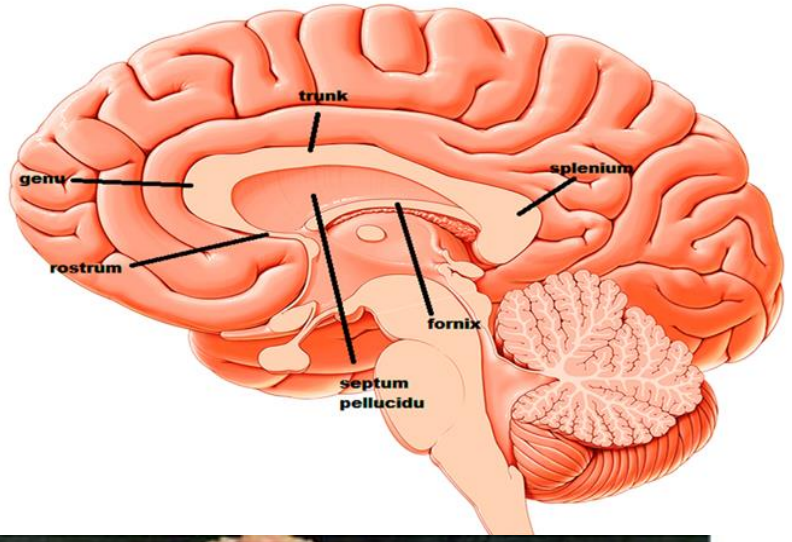
the rounded post. end of corpus callosum

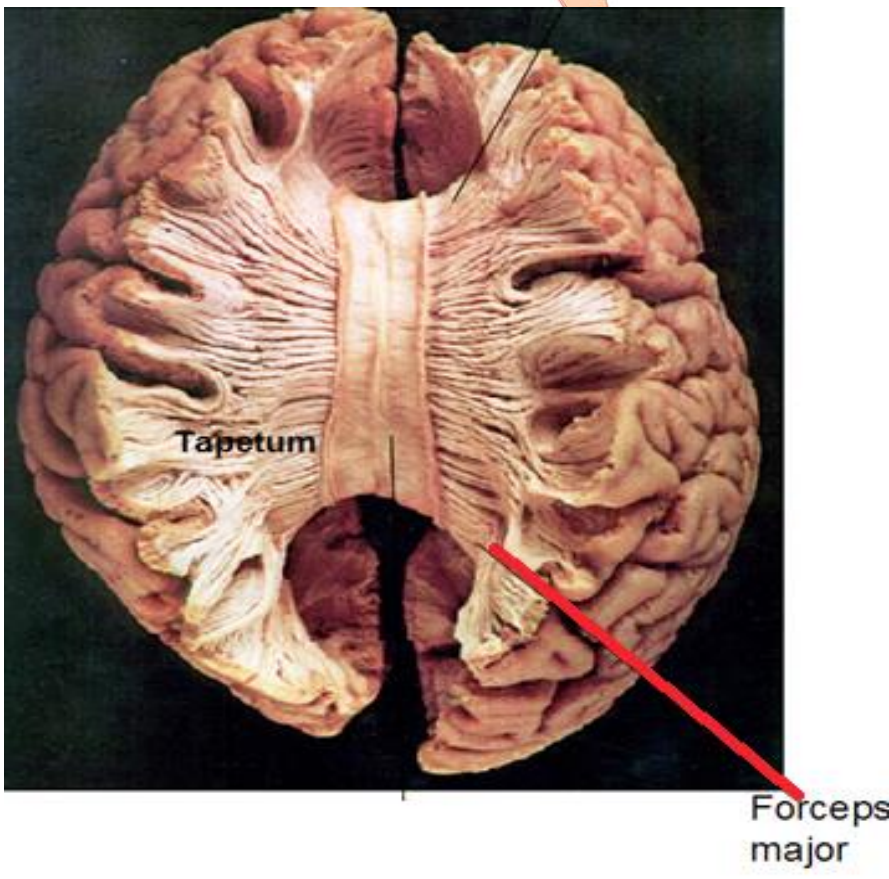
It is 6 cm in front of occipital pole.

in horizontal section :

on both sides, the fibers pass
horizontally backwards
forming forceps major which connect
identical areas of both
occipital lobes

Fibers of forceps major,
while passing backwards
and medially along the upper part
of medial wall of posterior horn
of lateral ventricle, form a bulge on the
wall called bulb of posterior horn.





COMMISSURAL FIBERS C.C.

parts

4-splenium

in coronal section

some fibers of splenium

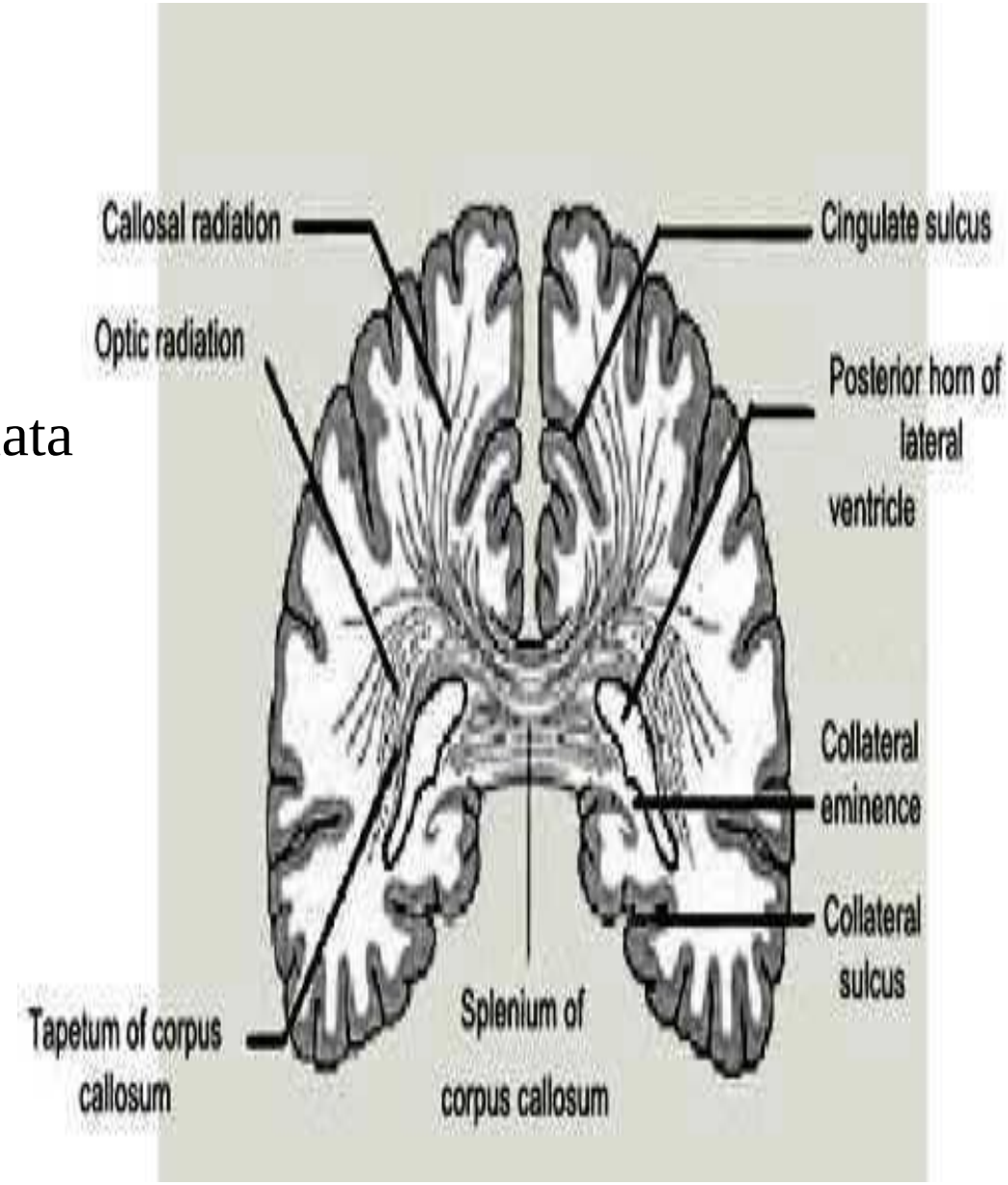
pass laterally then downward

& not intersect with corona radiata

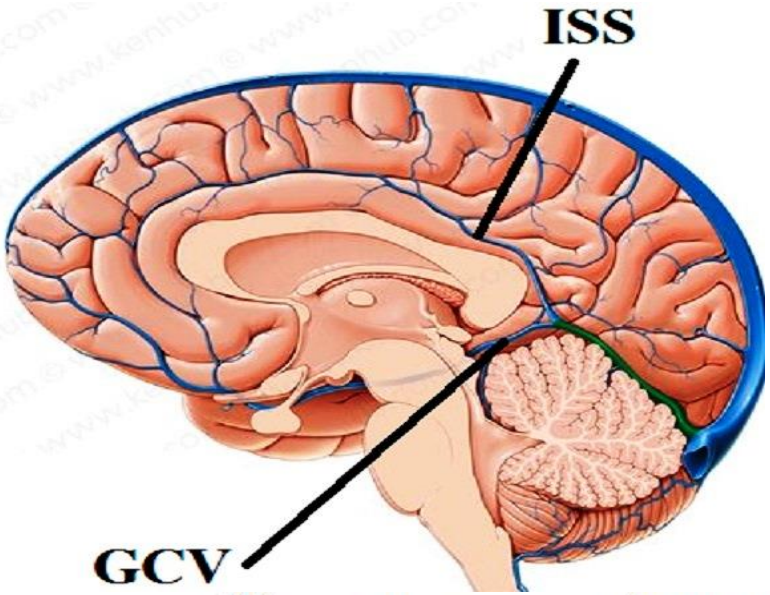
forming tapetum of roof

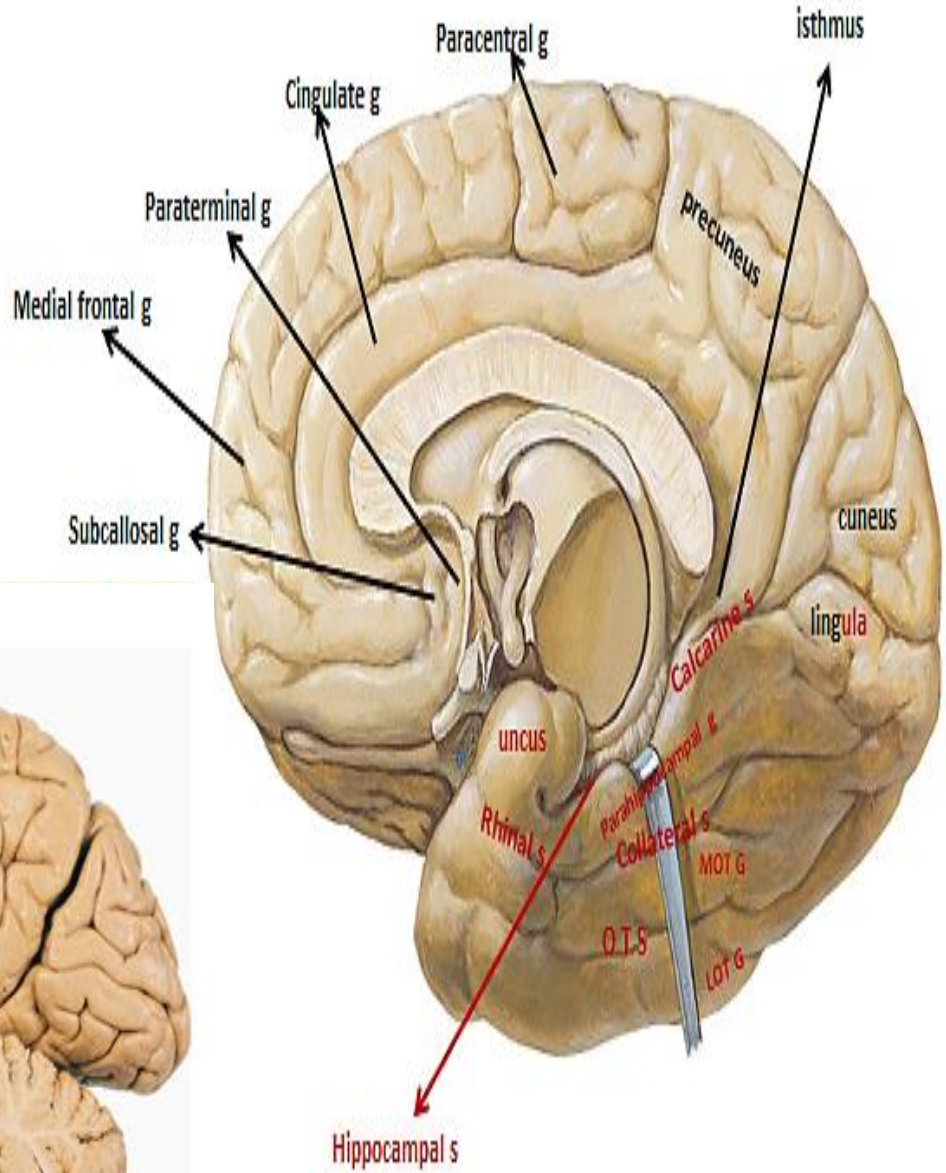
& lateral wall of post horn

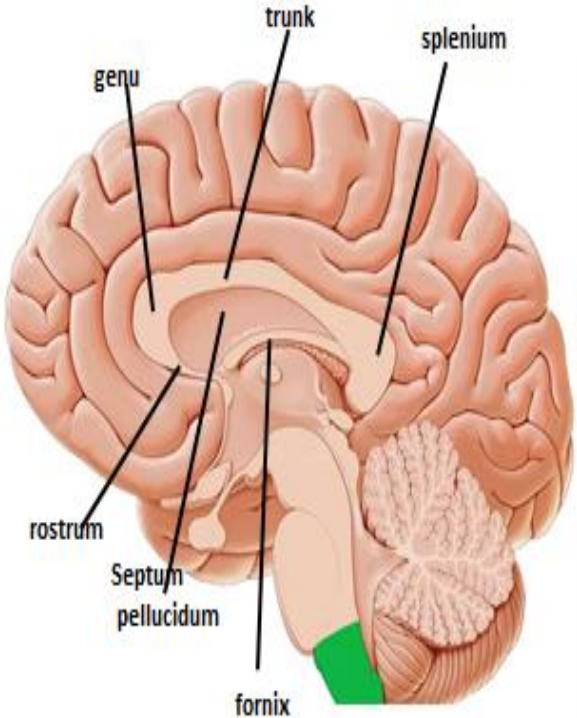
of lateral v.

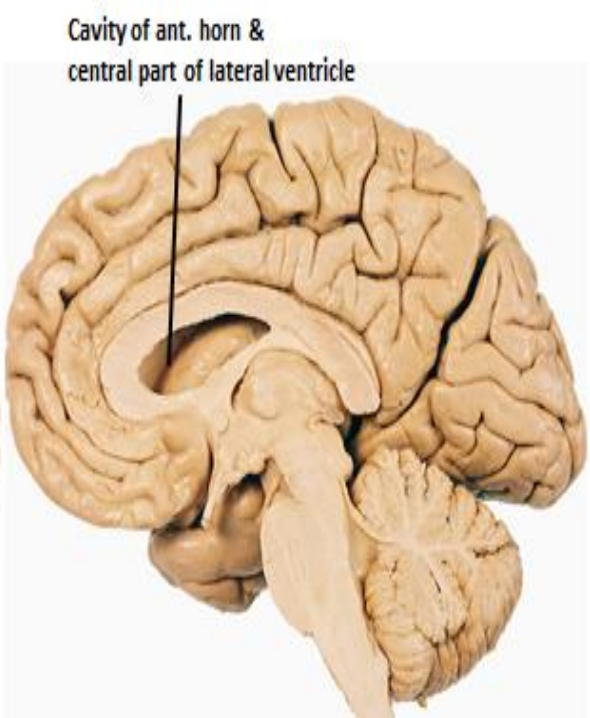


COMMISSURAL FIBERS C.C.









COMMISSURAL FIBERS C.C.

Relation

1-Rostrum

Inferiorly: callosal sulcus contains anterior cerebral artery
paraterminal & subcallosal gyri.

Superiorly:

septum pellucidum.

anterior horn of lateral ventricle.

2-genu

anteriorly: callosal sulcus contains anterior cerebral artery
cingulate gyrus.

posteriorly:

septum pellucidum.

anterior horn of lateral ventricle.

COMMISSURAL FIBERS C.C.

Relation

3-trunk

superiorly: callosal sulcus contains anterior cerebral artery
cingulate gyrus
falx cerebri contains inferior sagittal sinus.

inferiorly:
septum pellucidum, fornix
central part of lateral ventricle.

4-splenium

superiorly: : callosal sulcus
cingulate gyrus
falx cerebri contains inferior sagittal sinus.

Posteriorly isthmus
great cerebral vein of Galen which joins with inferior sagittal sinus to form straight sinus

inferiorly: pineal body
tectum of midbrain.
pulvinar of thalamus

THANQ