

# 3-03-anatomy-II

# Today's Topics

Cerebral Cortex

Spinal Cord

The Peripheral Nervous System

# Cerebral Cortex

Cerebral hemispheres

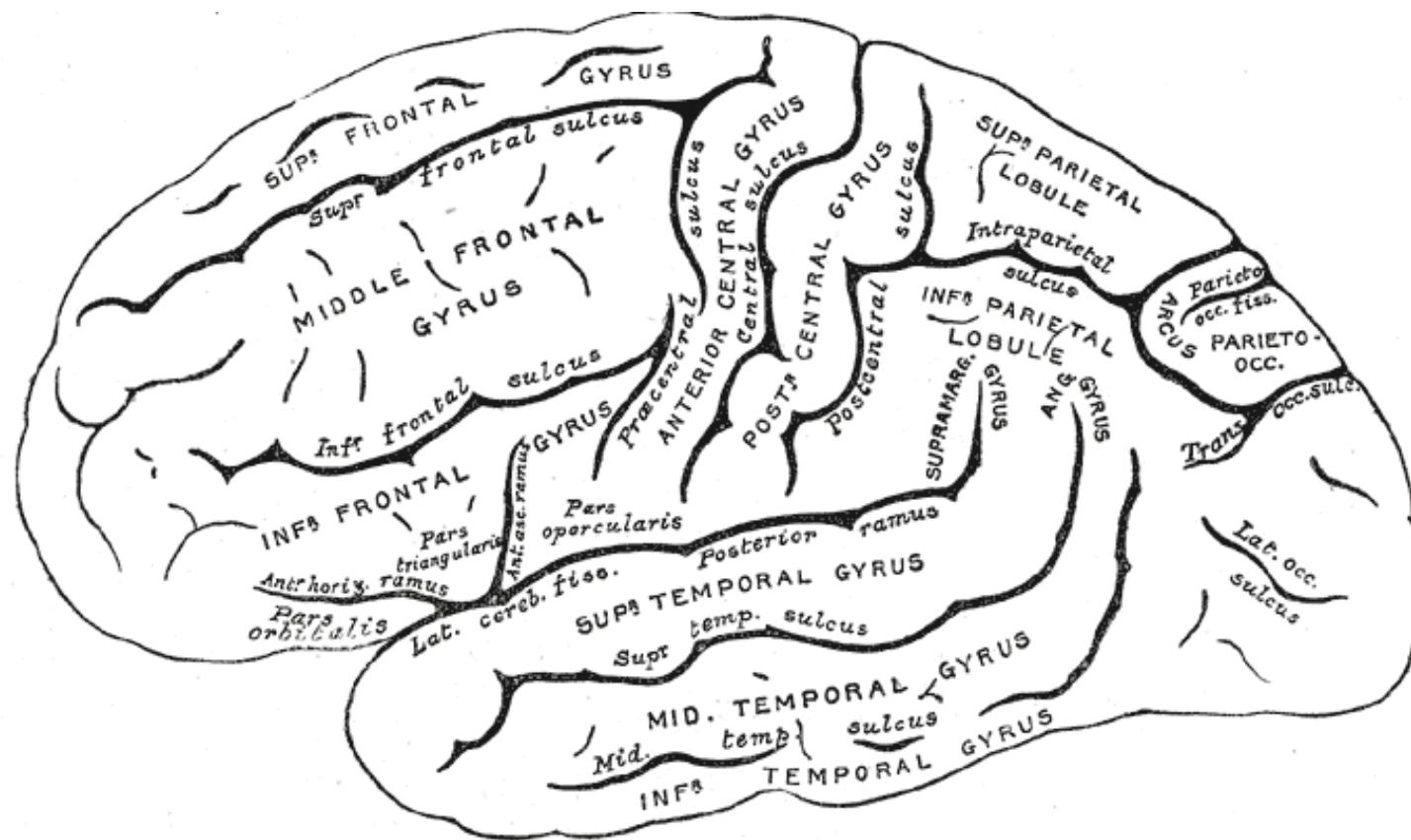
Groove (sulcus or sulci)

Bumps (gyrus or gyri)

Grey vs. white matter

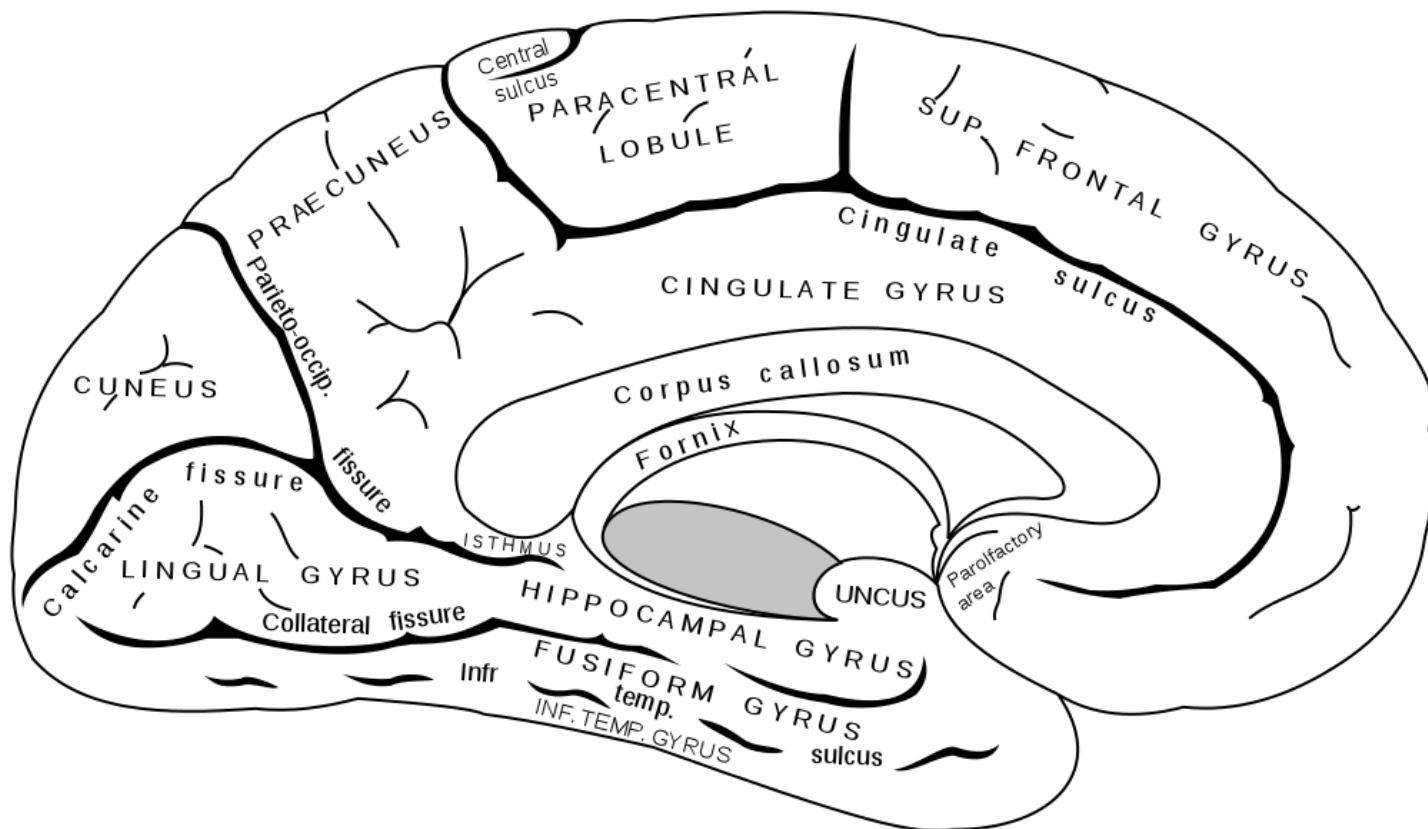
Lobes

# Cortical Gyri – Lateral

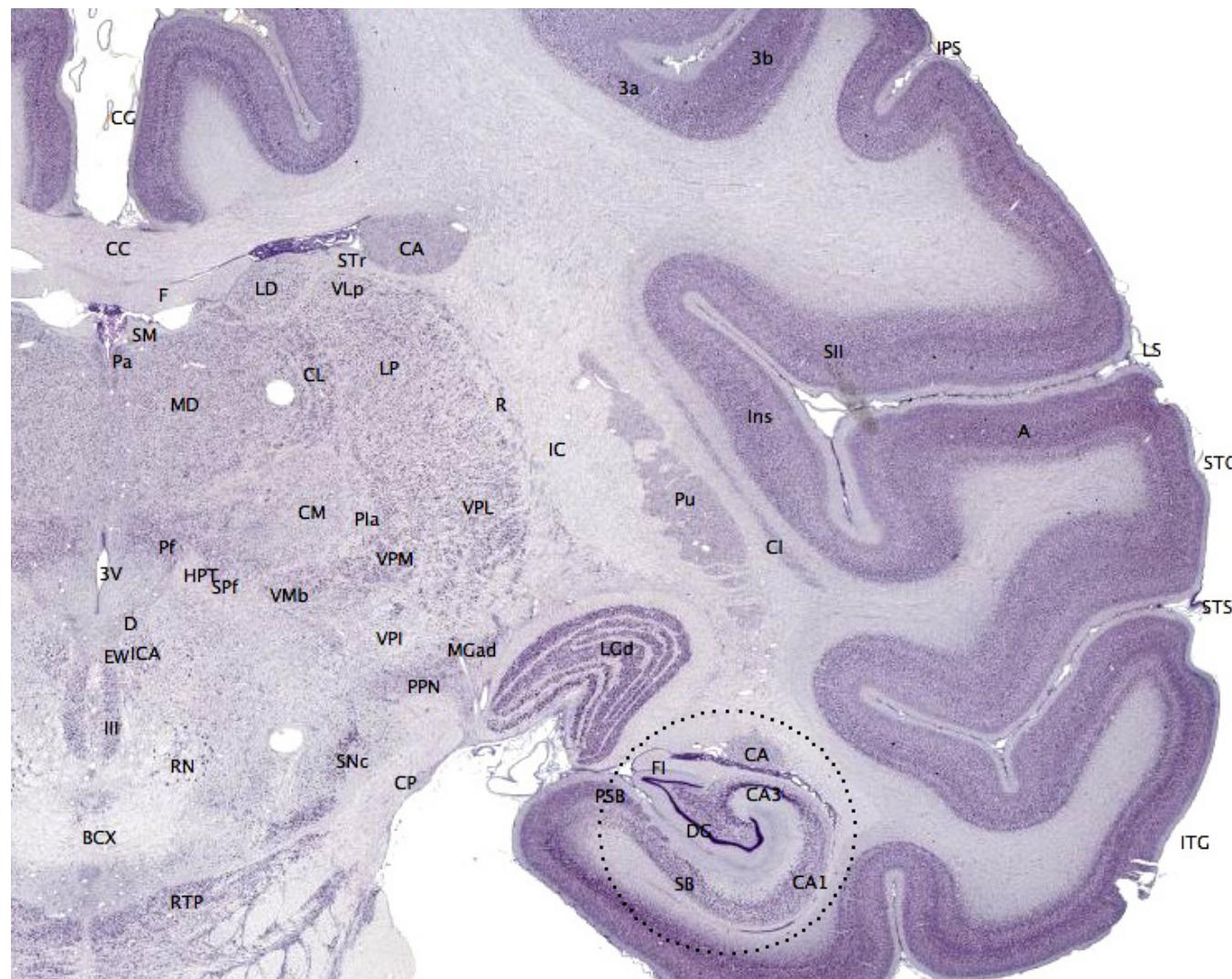


<https://upload.wikimedia.org/wikipedia/commons/3/35/Gray726.png>

# Cortical Gyri – Medial



# Gray vs. White Matter



# Lobes of the cerebral cortex

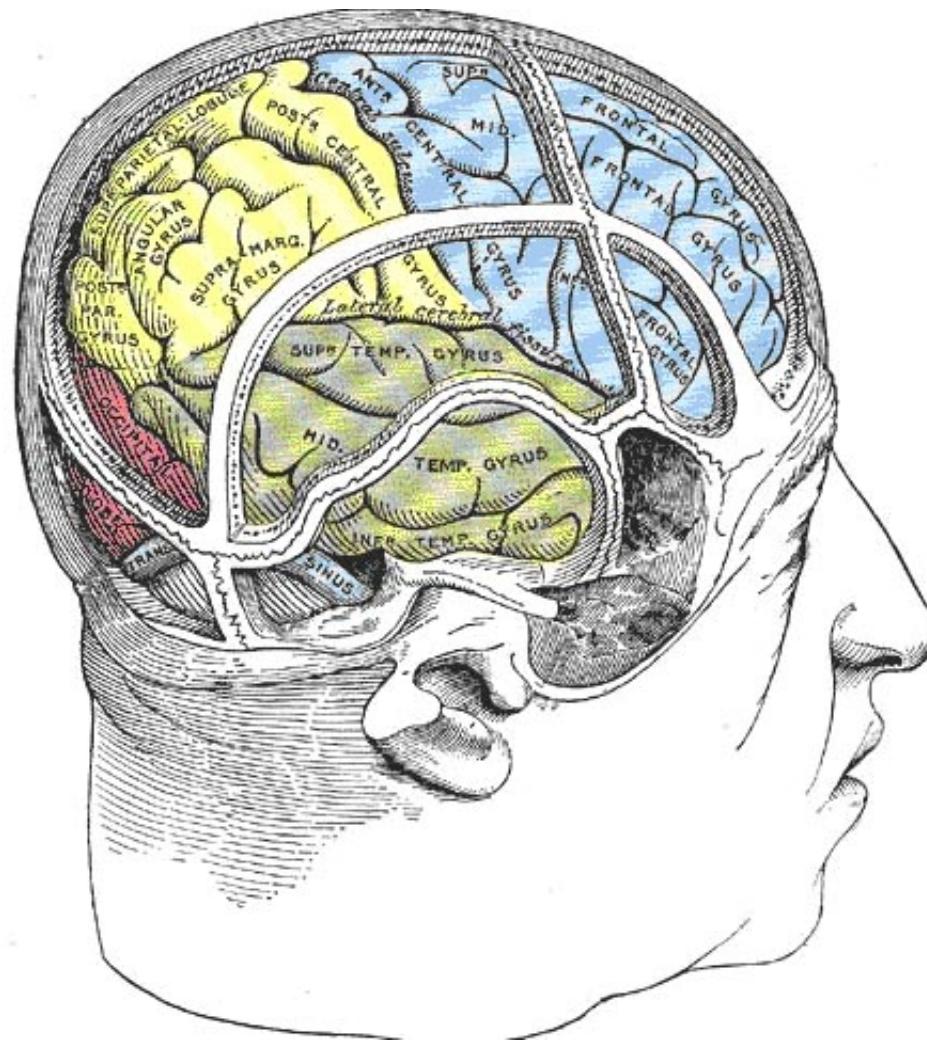
Frontal

Temporal

Parietal

Occipital

# Lobes



# Landmarks of the cortex

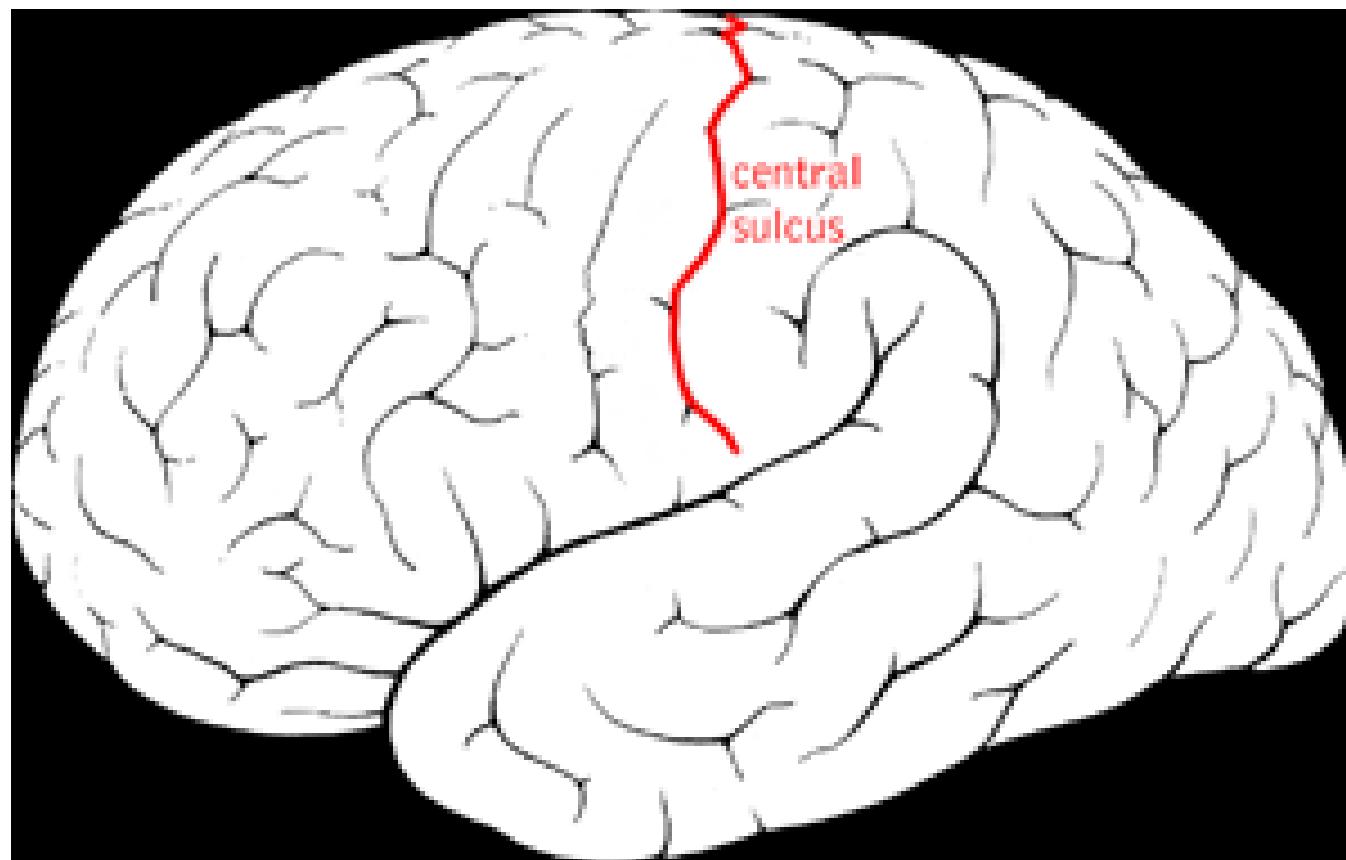
Longitudinal fissure

# Landmarks of the cortex

Lateral sulcus/fissure

# Landmarks of the cortex

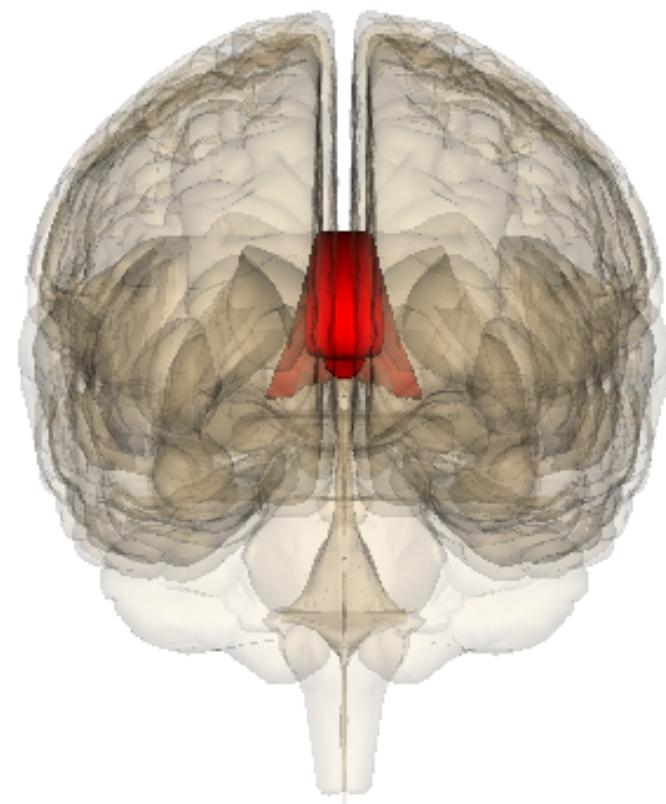
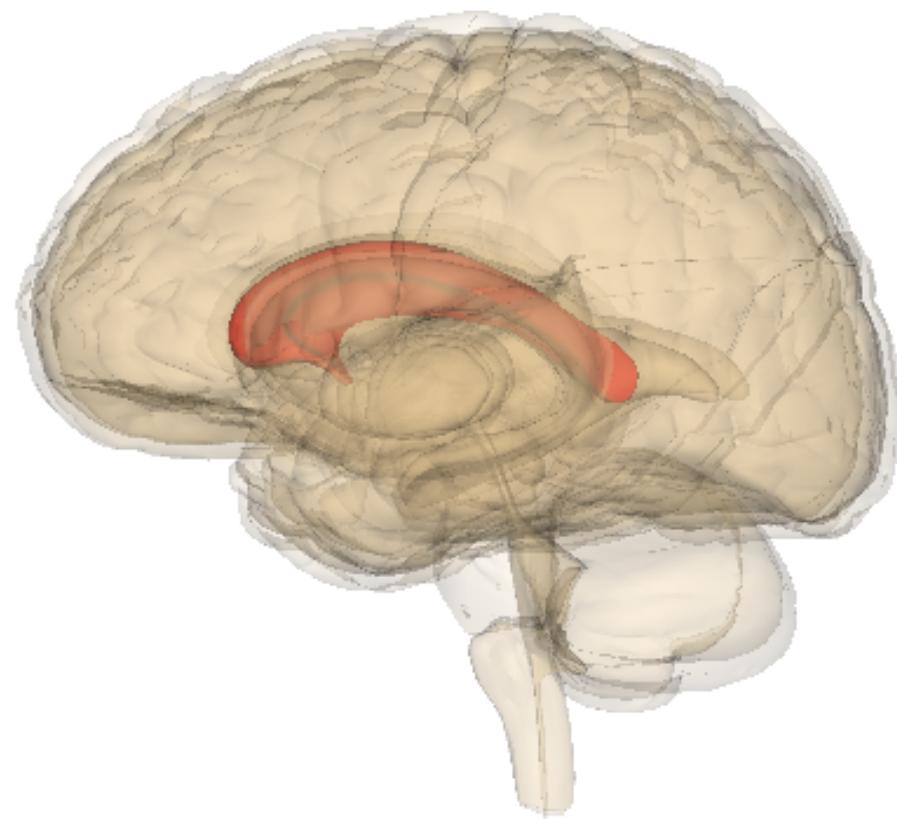
Central sulcus



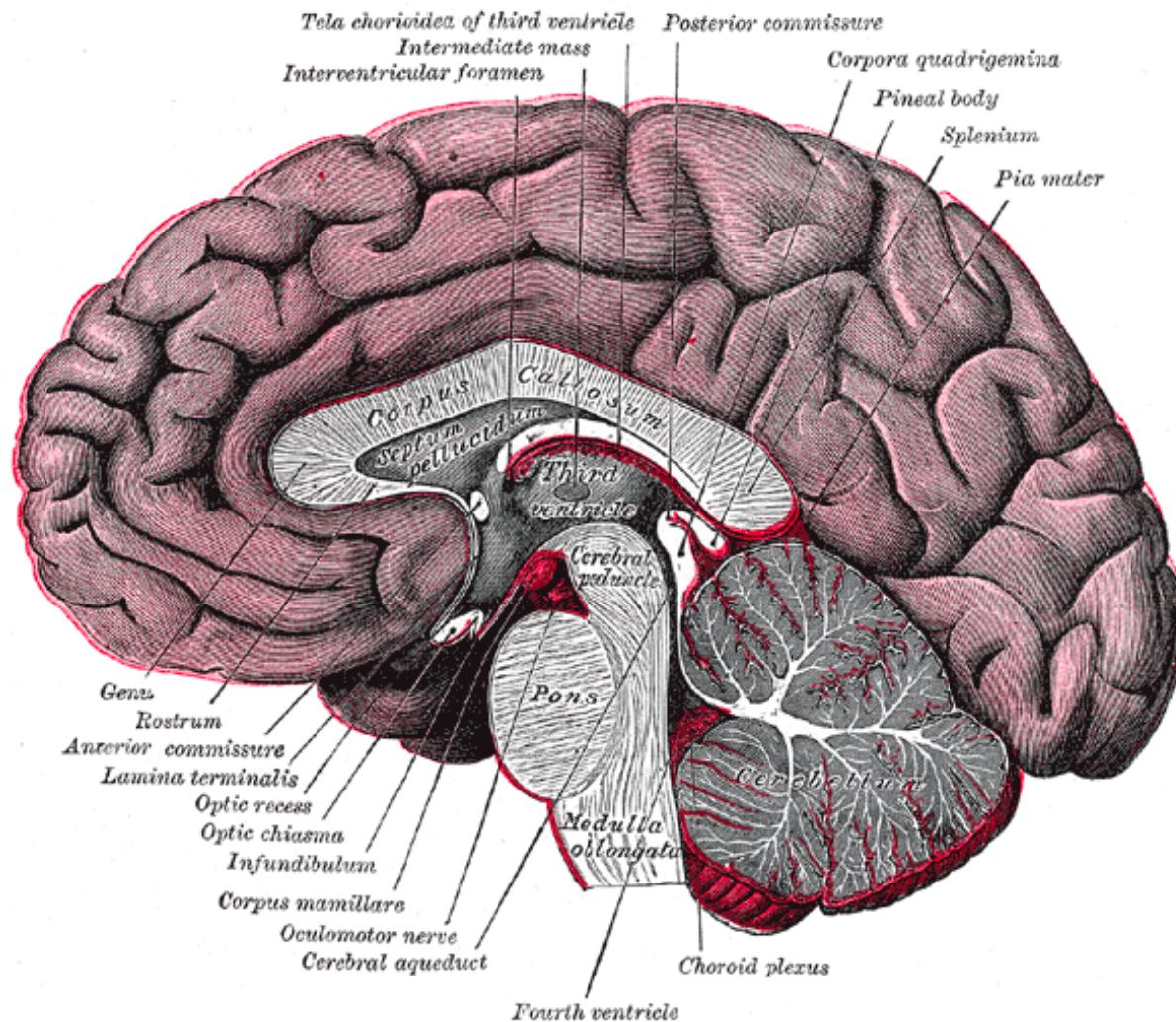
[https://upload.wikimedia.org/wikipedia/commons/8/88/Central\\_sulcus\\_.jpg](https://upload.wikimedia.org/wikipedia/commons/8/88/Central_sulcus_.jpg)

# Representative fiber tracts in the cortex

# Corpus callosum



# Anterior, Posterior Commissures

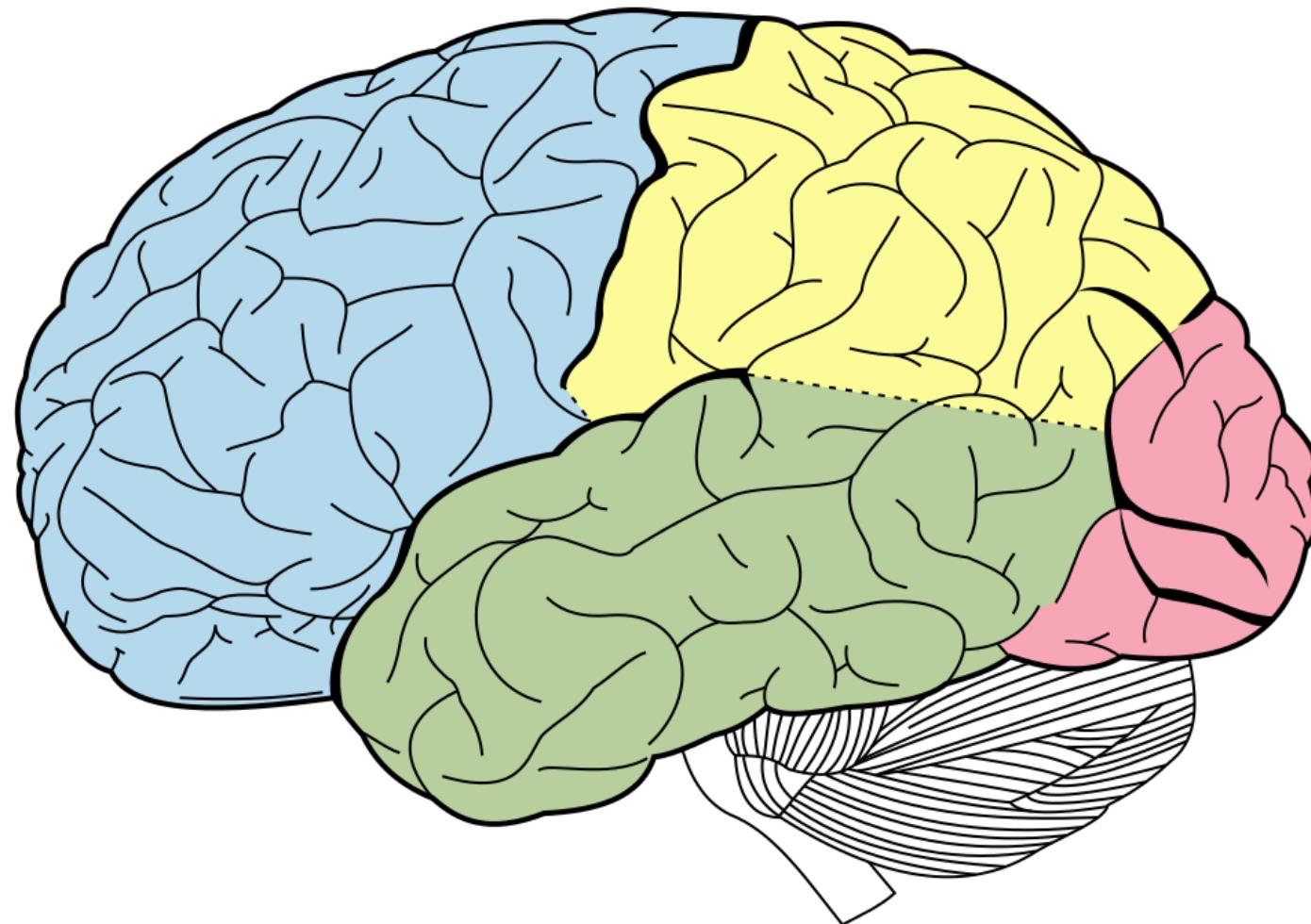


# Frontal lobe

Where is it?

- Anterior to central sulcus
- Superior to lateral fissure
- Dorsal to temporal lobe

# Lobes of the Cerebral Cortex

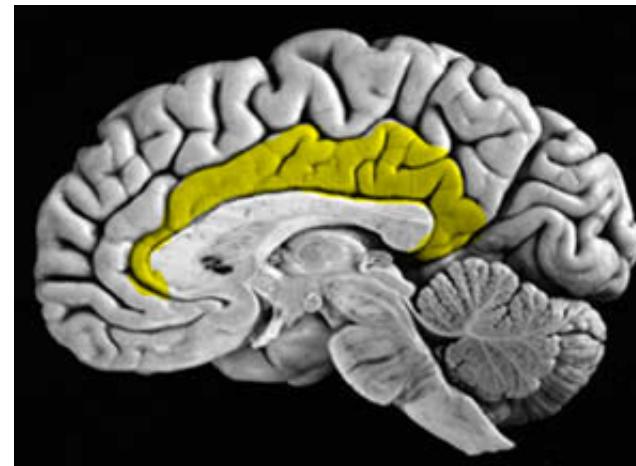


# Frontal lobe

What does it do?

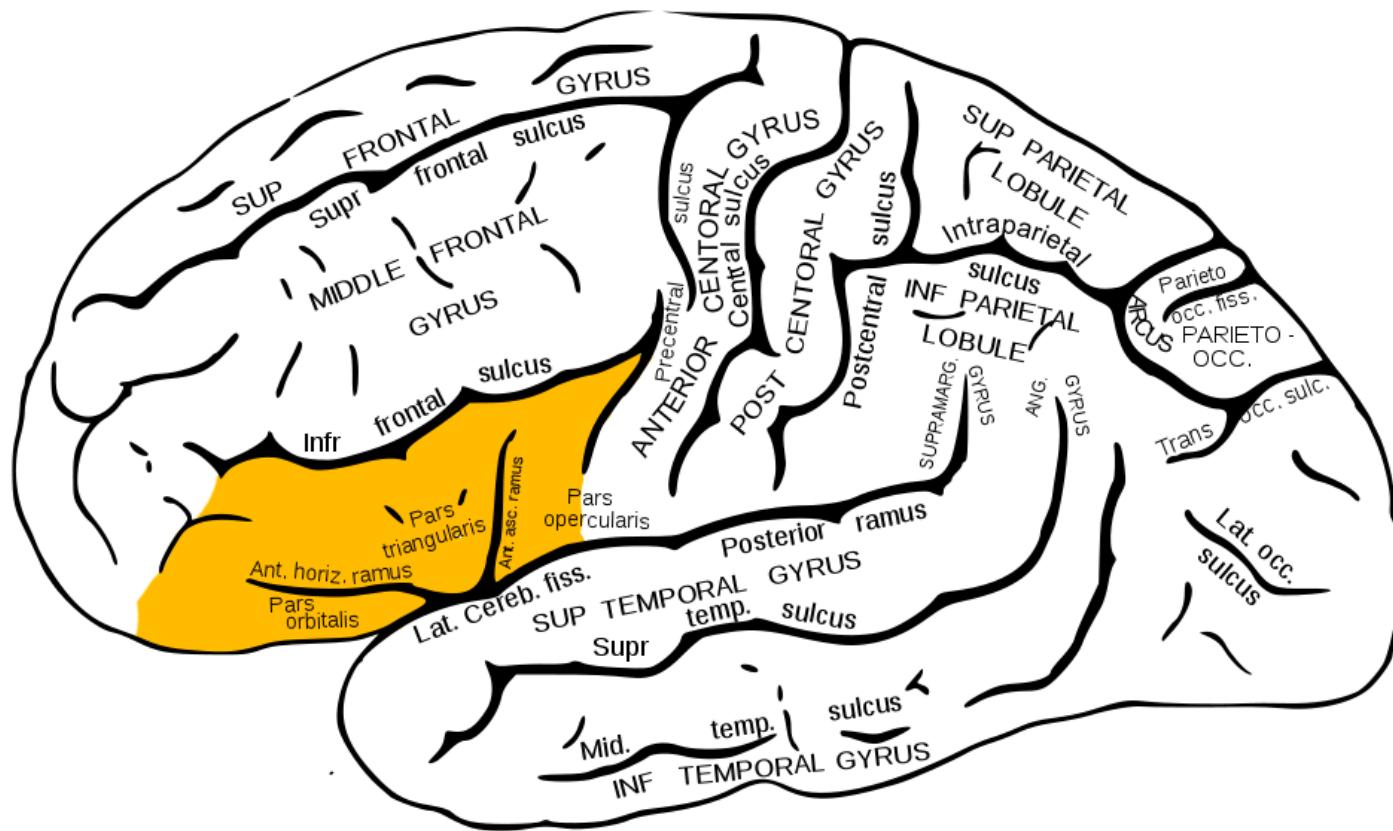
- Primary motor cortex (M1)
  - Supplementary motor cortex
  - Frontal eye fields (FEF)
- Prefrontal cortex
  - Planning, problem solving, working memory...?
- Basal forebrain
  - Nucleus accumbens
- Anterior cingulate cortex (ACC)
- Primary olfactory cortex

# Cingulate Gyrus



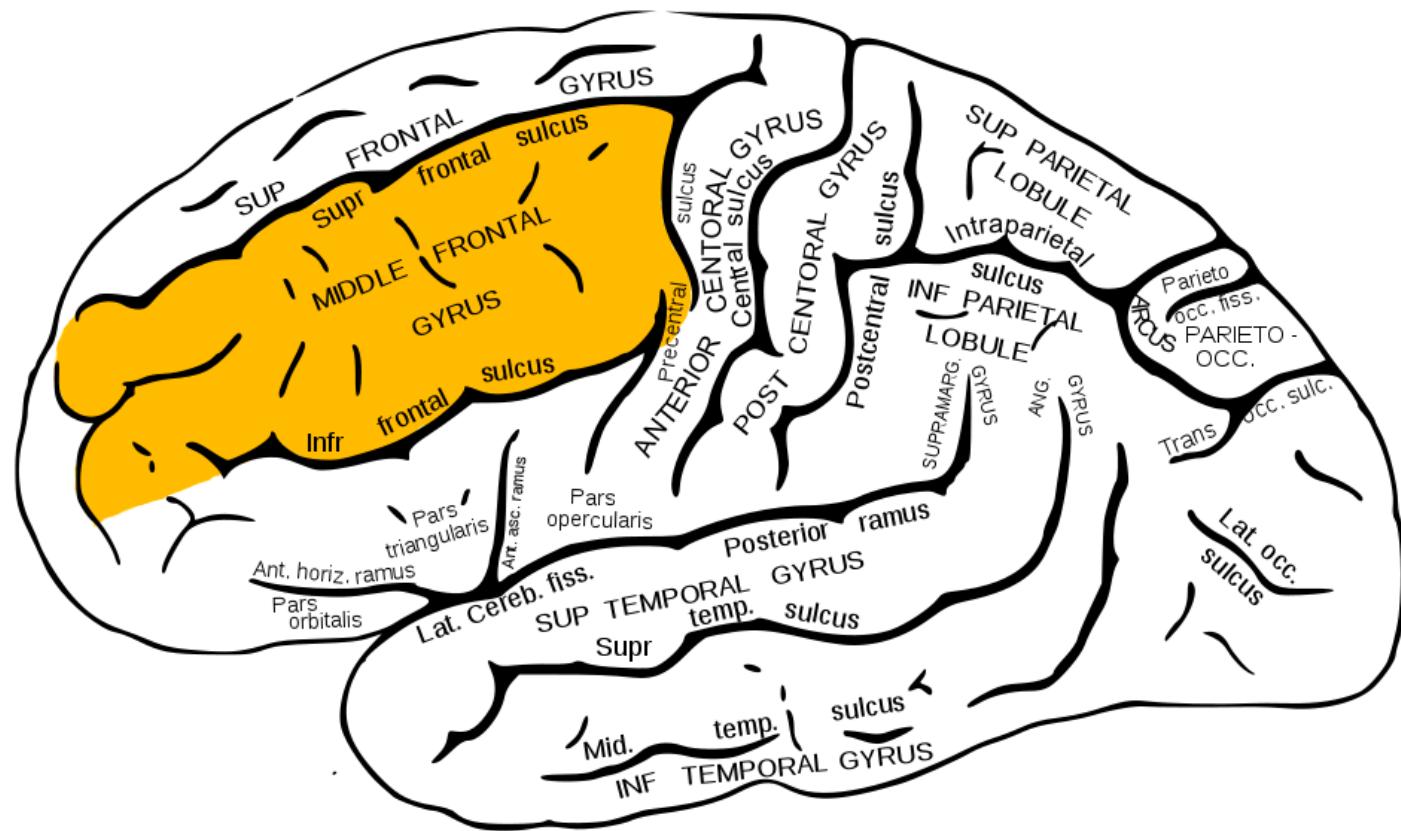
[http://cis.jhu.edu/data.sets/cortical\\_segmentation\\_validation/photos/cir](http://cis.jhu.edu/data.sets/cortical_segmentation_validation/photos/cir)

# Inferior Frontal Gyrus (IFG)



[https://upload.wikimedia.org/wikipedia/commons/b/b2/Gray726\\_inferior\\_frontal\\_gyrus\\_lateral\\_view.png](https://upload.wikimedia.org/wikipedia/commons/b/b2/Gray726_inferior_frontal_gyrus_lateral_view.png)

# Middle Frontal Gyrus (MFG)



[https://upload.wikimedia.org/wikipedia/commons/7/7f/Gray726\\_middle.gif](https://upload.wikimedia.org/wikipedia/commons/7/7f/Gray726_middle.gif)

# Temporal lobe

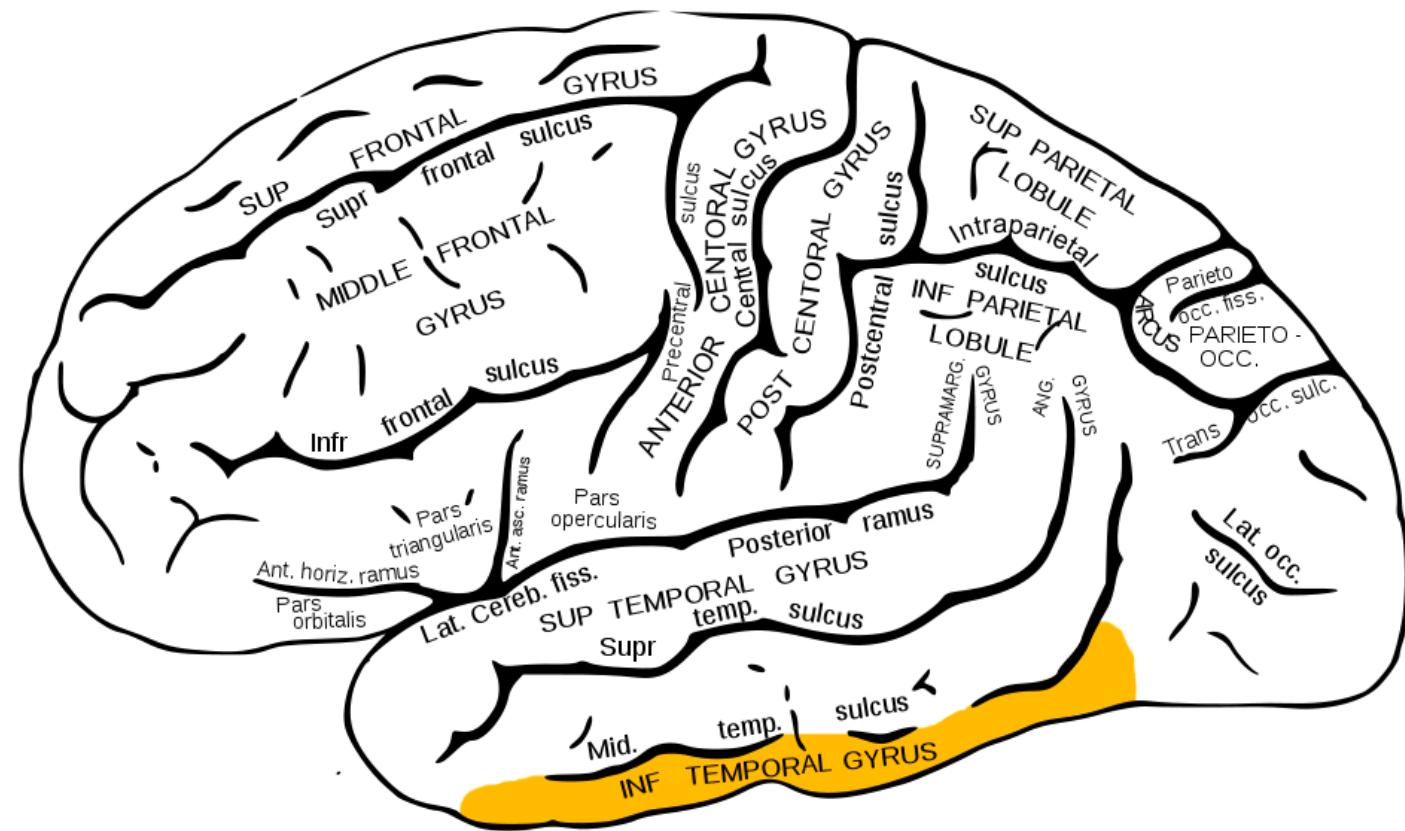
Where is it?

- Ventral to frontal, parietal lobes
- Inferior to lateral fissure ## Temporal lobe

What does it do?

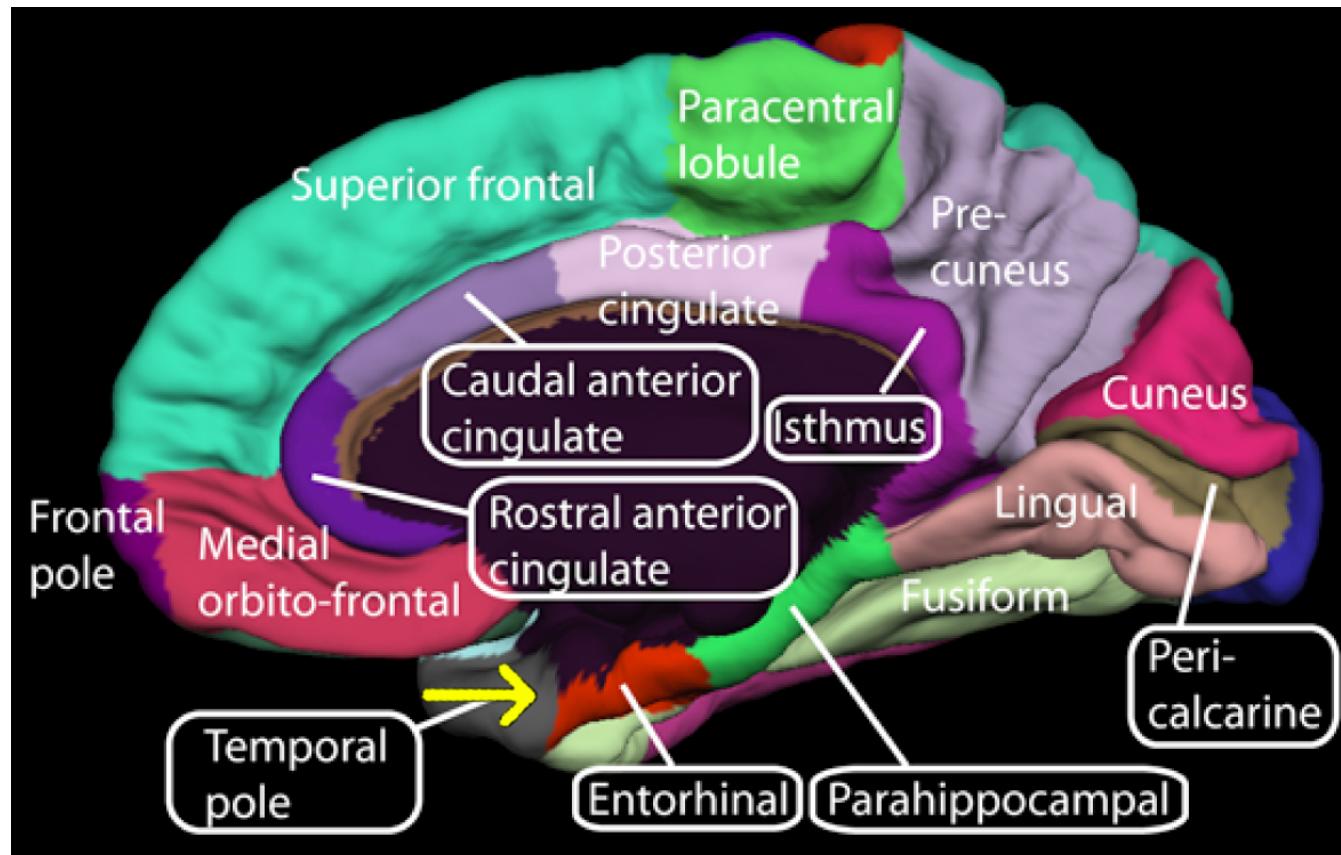
- Primary auditory cortex
- Object, face recognition
- Storage of memories about events, objects
- Amygdala, hippocampus

# Inferior Temporal Gyrus (ITG)



[https://upload.wikimedia.org/wikipedia/commons/1/18/Gray726\\_inferiorTemporalGyrus.png](https://upload.wikimedia.org/wikipedia/commons/1/18/Gray726_inferiorTemporalGyrus.png)

# Entorhinal Cortex (ER)



[https://upload.wikimedia.org/wikipedia/commons/1/15/Medial\\_surface\\_entorhinal\\_cortex.png](https://upload.wikimedia.org/wikipedia/commons/1/15/Medial_surface_entorhinal_cortex.png)

# Parietal lobe

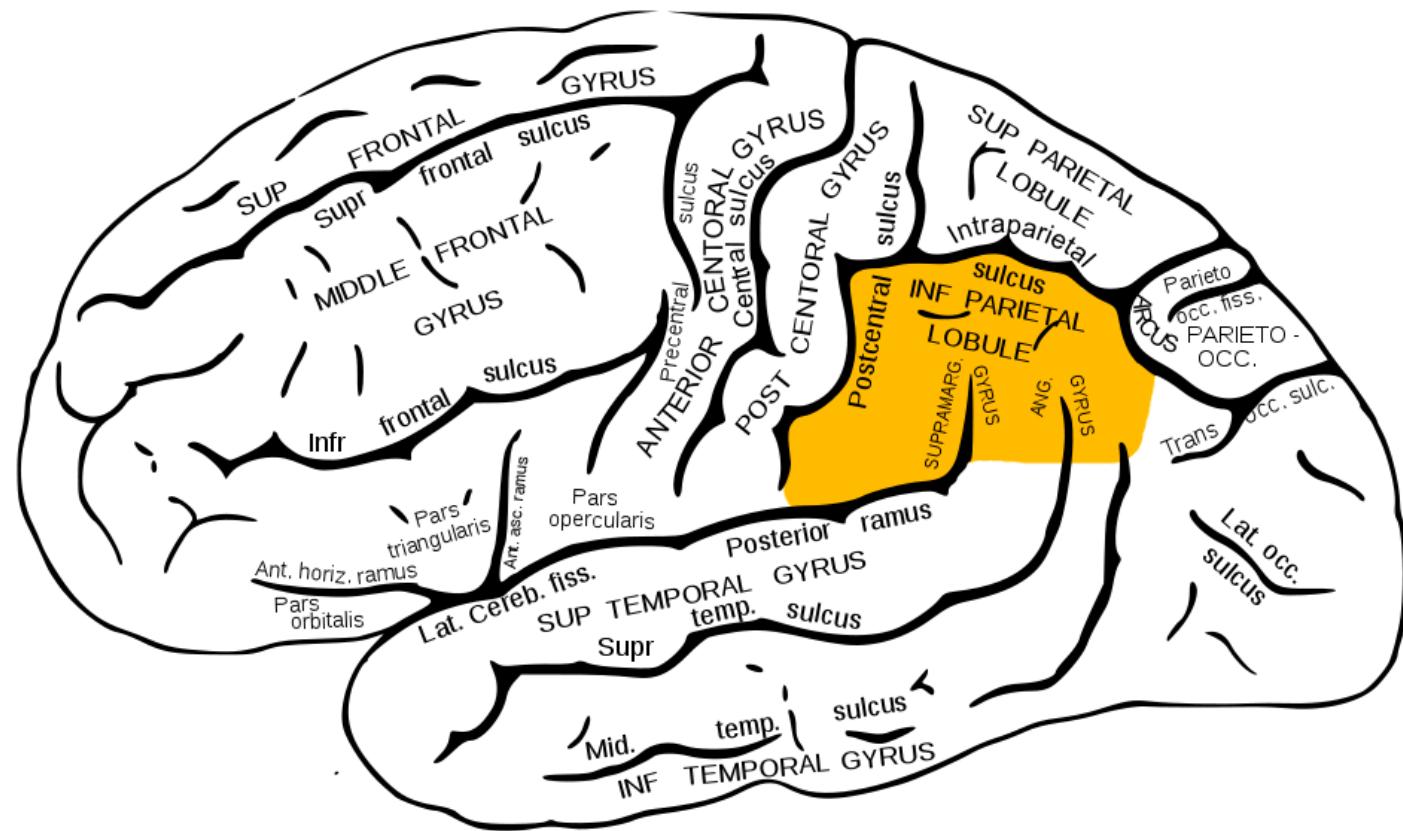
Where is it?

- Caudal to frontal lobe
- Dorsal to temporal lobe
- Posterior to central sulcus

What does it do?

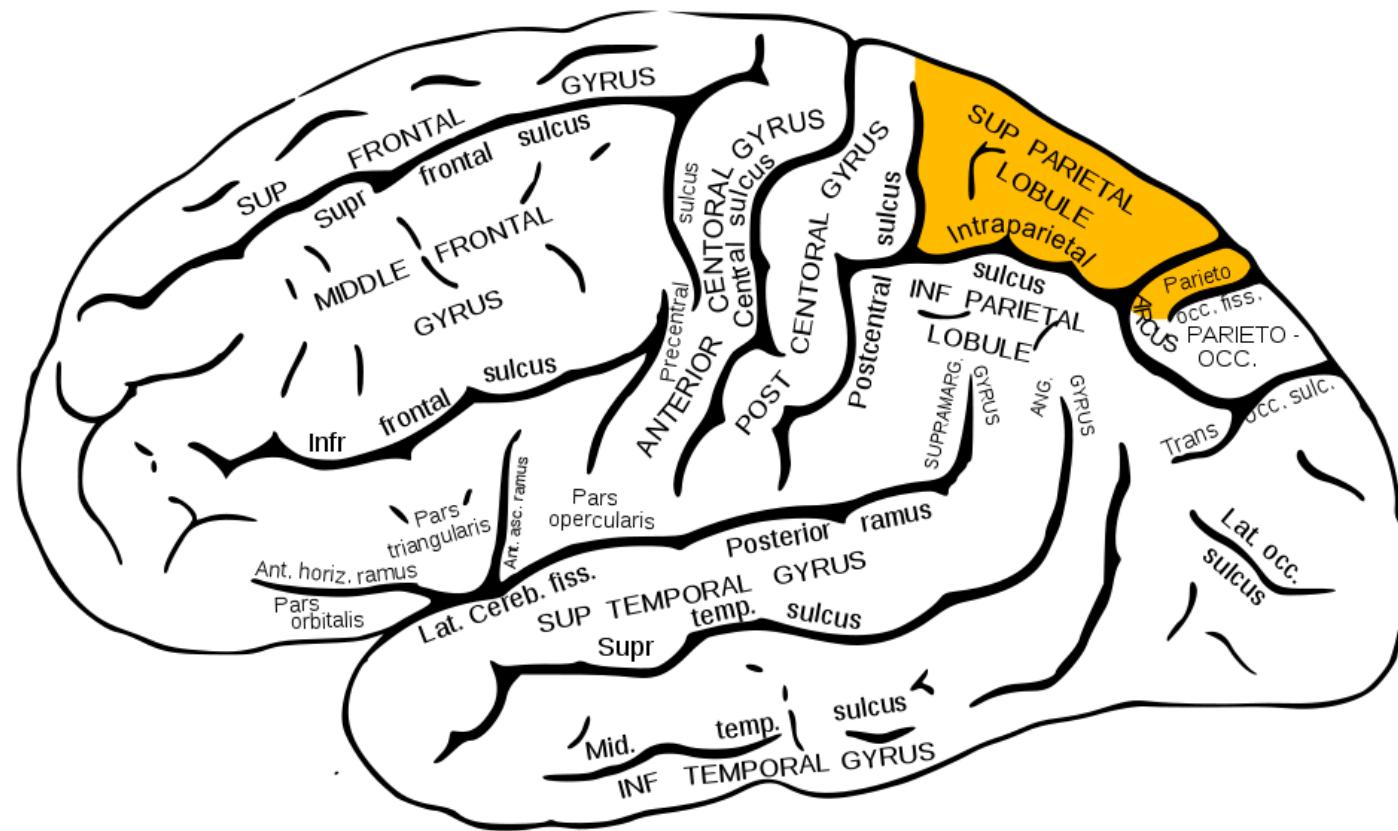
- Primary somatosensory cortex
- Perception of spatial relations, action planning

# Inferior Parietal Lobule



[https://upload.wikimedia.org/wikipedia/commons/e/e3/Gray726\\_inferior\\_parietal\\_lobule\\_lateral\\_view.png](https://upload.wikimedia.org/wikipedia/commons/e/e3/Gray726_inferior_parietal_lobule_lateral_view.png)

# Superior Parietal Lobule



[https://upload.wikimedia.org/wikipedia/commons/9/9d/Gray726\\_superior\\_lateral\\_surface\\_of\\_brain.png](https://upload.wikimedia.org/wikipedia/commons/9/9d/Gray726_superior_lateral_surface_of_brain.png)

# Occipital lobe

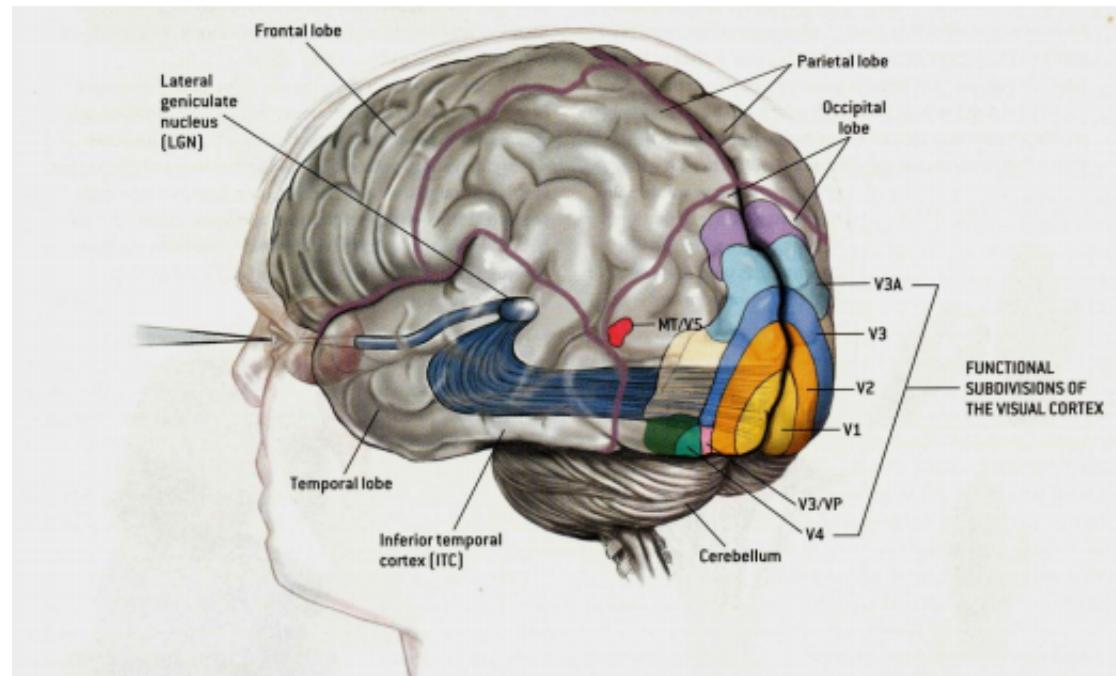
Where is it?

- Caudal to parietal & temporal lobes

What does it do?

- Primary visual cortex (V1)

# Visual Cortex



<http://bethycotter.wdfiles.com/local-files/introducingtheeye/Screen%20Shot%202012-08-24%20at%2011.36.20%20PM.png>

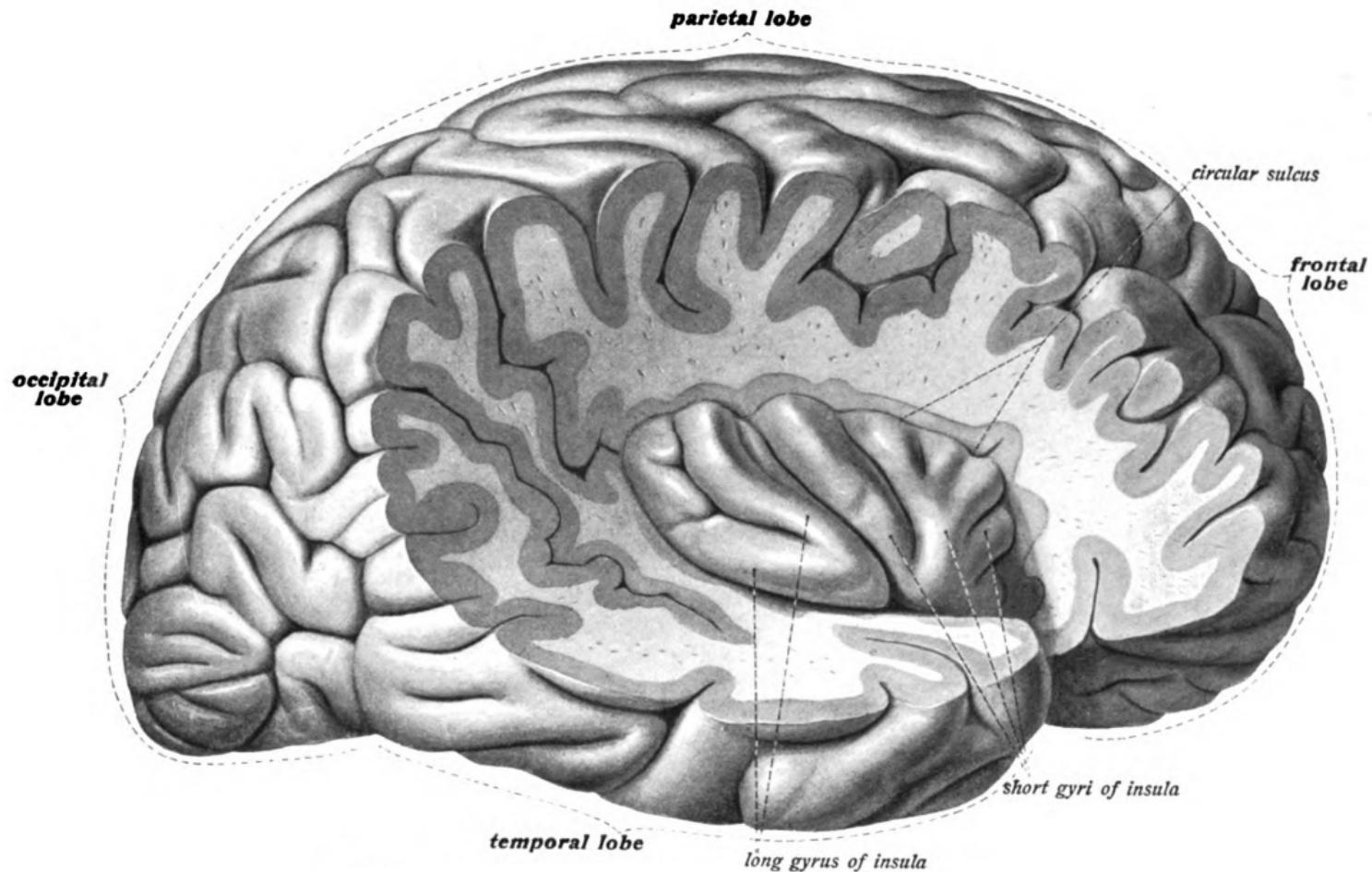
# Insular cortex (insula)

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Where is it?

- medial to temporal lobe
- deep inside lateral fissure

# Insula



[https://upload.wikimedia.org/wikipedia/commons/b/b4/Sobo\\_1909\\_635.jpg](https://upload.wikimedia.org/wikipedia/commons/b/b4/Sobo_1909_635.jpg)

# Insula

What does it do?

- Primary gustatory cortex
- self-awareness, interpersonal experiences, motor control

# Brodmann Areas

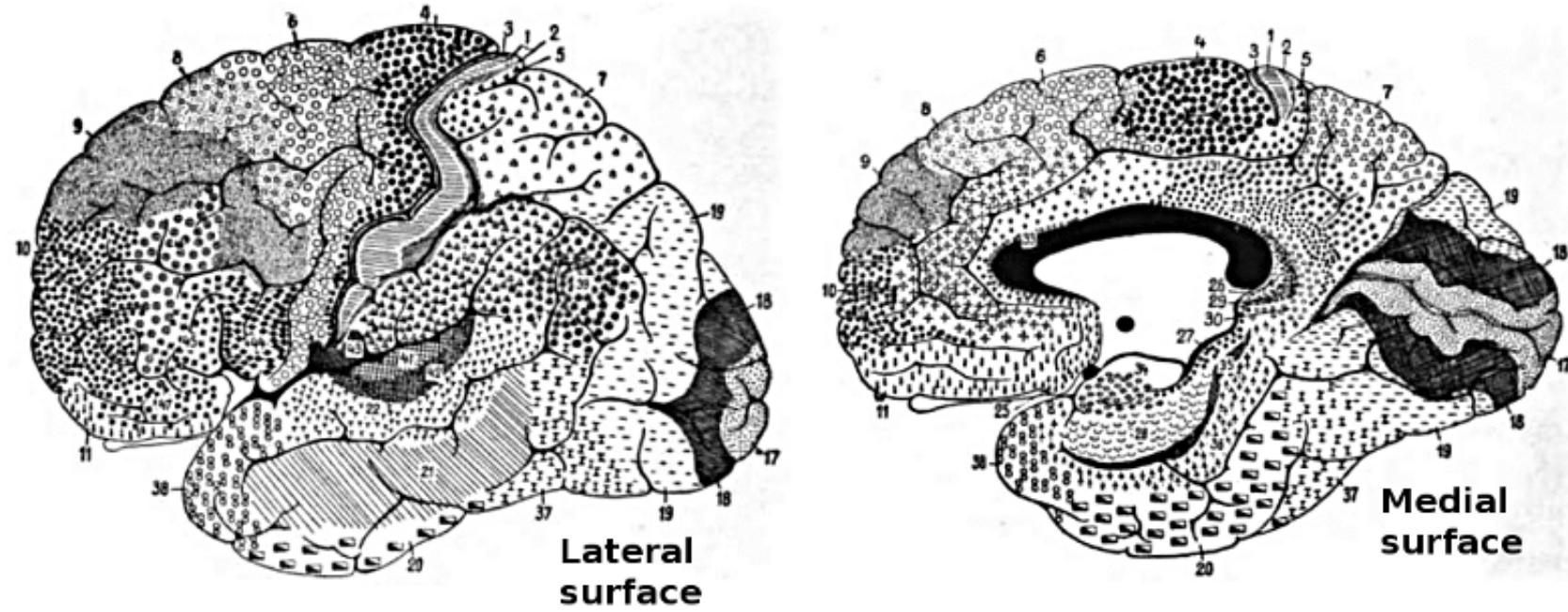
## Korbinian Brodmann

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- Cytoarchitectonic differences in cerebral cortex

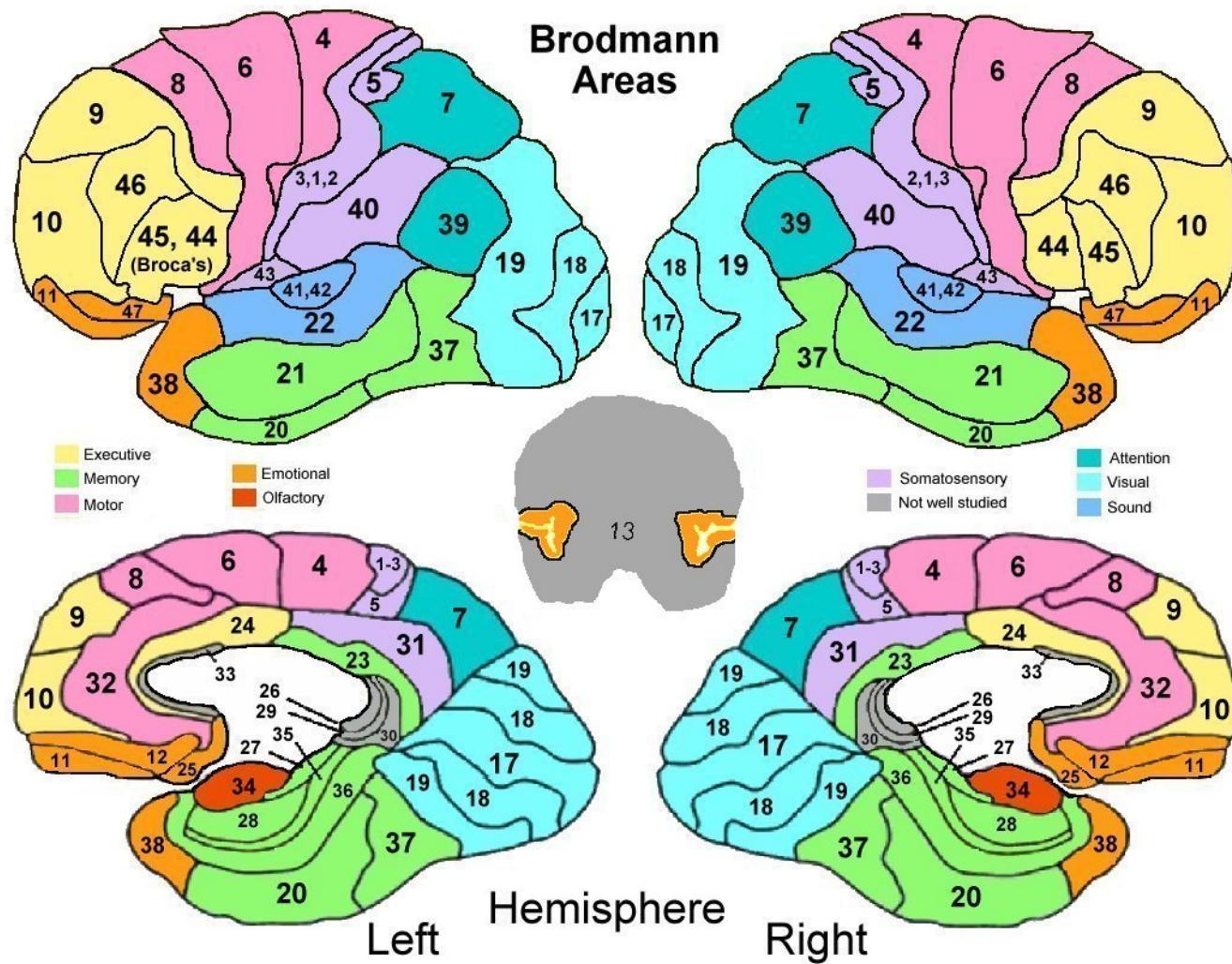


# Brodmann Areas



<https://upload.wikimedia.org/wikipedia/commons/0/09/Brodmann-areas.png>

# Brodmann Areas

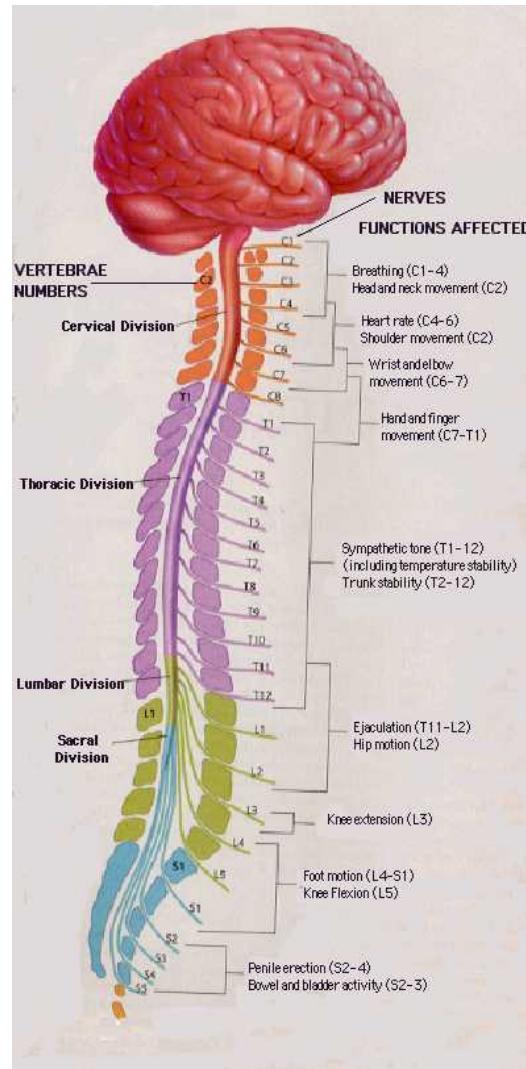


# Spinal cord

## Rostral/Caudal axis

- Spinal column w/ vertebrae
- Cervical (8), thoracic (12), lumbar (5), sacral (5), coccygeal (1)
- Spinal segments & 31 nerve pairs
- Cauda equina

# Spinal cord

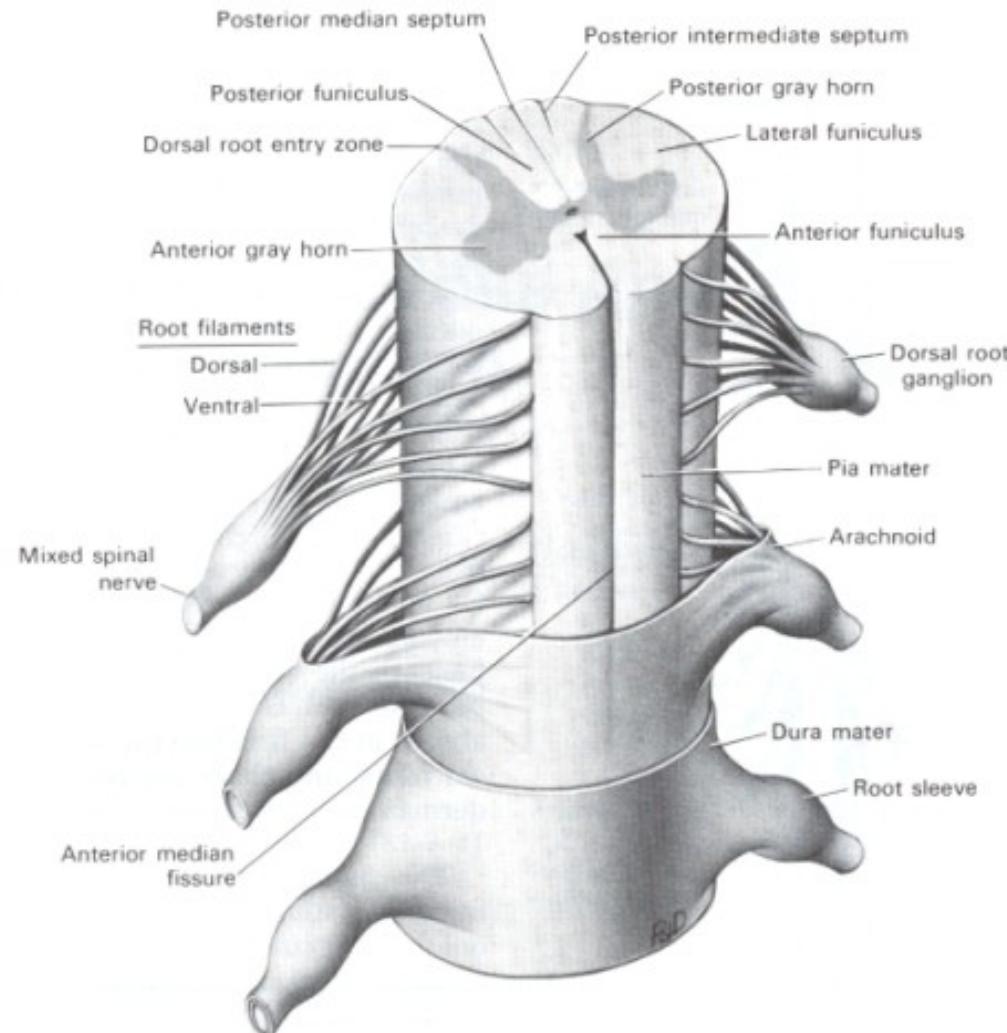


# Spinal cord

## Organization of the spinal cord

- Dorsal/Ventral
  - Dorsal root (sensory)
  - Ventral root (mostly motor)
- Grey (interior) vs. white matter (exterior)

# Spinal Cord



# Organization of the PNS

Somatic division

Autonomic

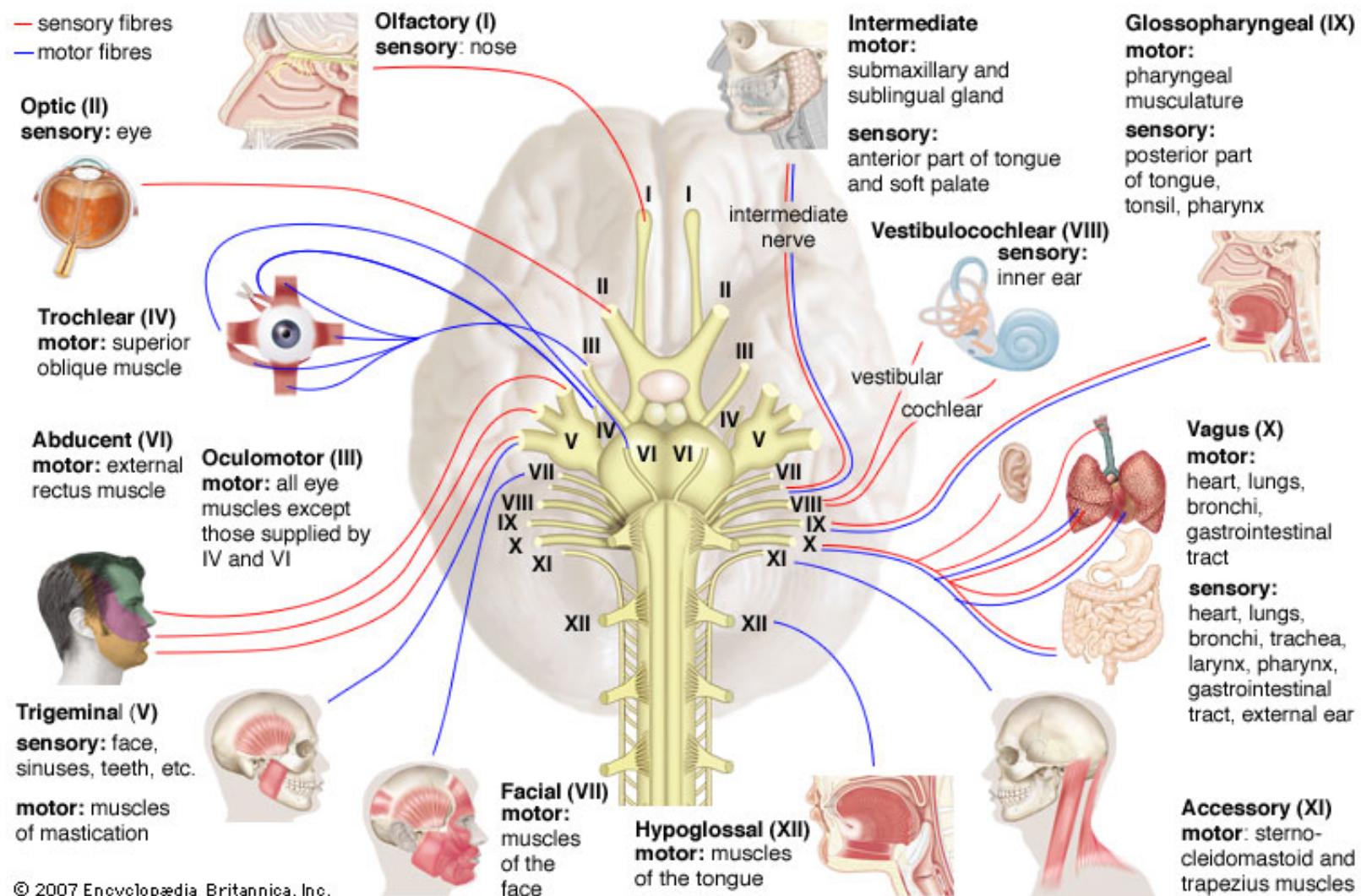
Cranial nerves

Spinal nerves

# Cranial nerves

- Afferents (input), efferents (output), or mixed
- Innervate head and neck
- Olfactory (I), ocular (II), (VIII) auditory, vagus (X), etc.
- Spinal nerves

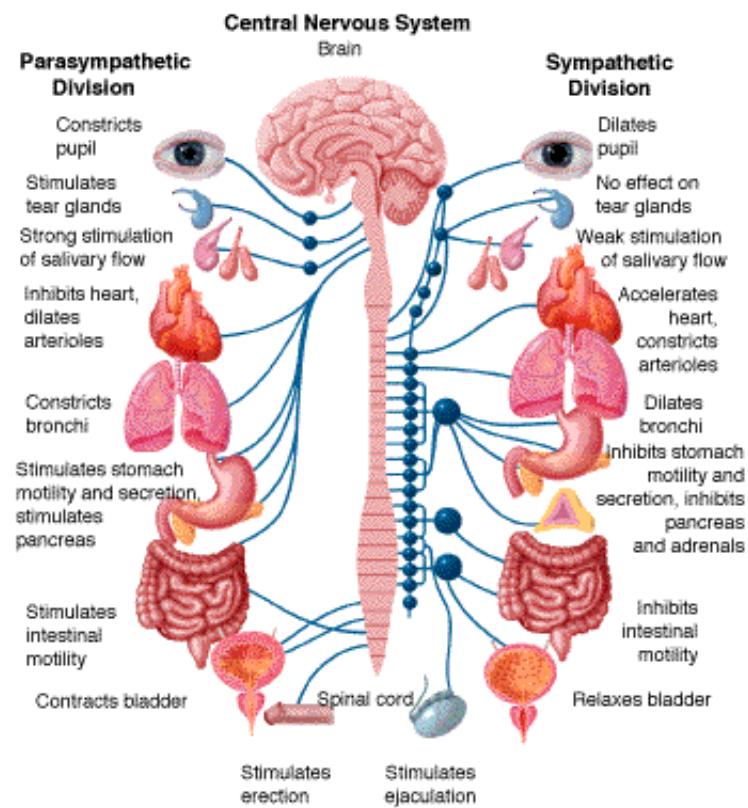
# Cranial nerves



# Autonomic nervous system

- CNS & PNS components
- Controls “vegetative functions”
  - Limited voluntary control
- Two divisions
  - Sympathetic
  - Parasympathetic

# ANS



[https://4.bp.blogspot.com/\\_FBNLGBBprSE/TB5b9zkM11I/AAAAAAAHAH/](https://4.bp.blogspot.com/_FBNLGBBprSE/TB5b9zkM11I/AAAAAAAHAH/)

# Sympathetic division

- Prepares body for action
- “Fight or flight”
- Spinal cord
  - ganglion chain along spinal column to End organs
- NTs
  - Preganglionic:ACh
  - Post: NE

# Parasympathetic division

- “Around” sympathetic
- Restorative function
- “Rest & digest”
- Spinal cord -> ganglia near end organs -> end organ
  - NT:ACh

