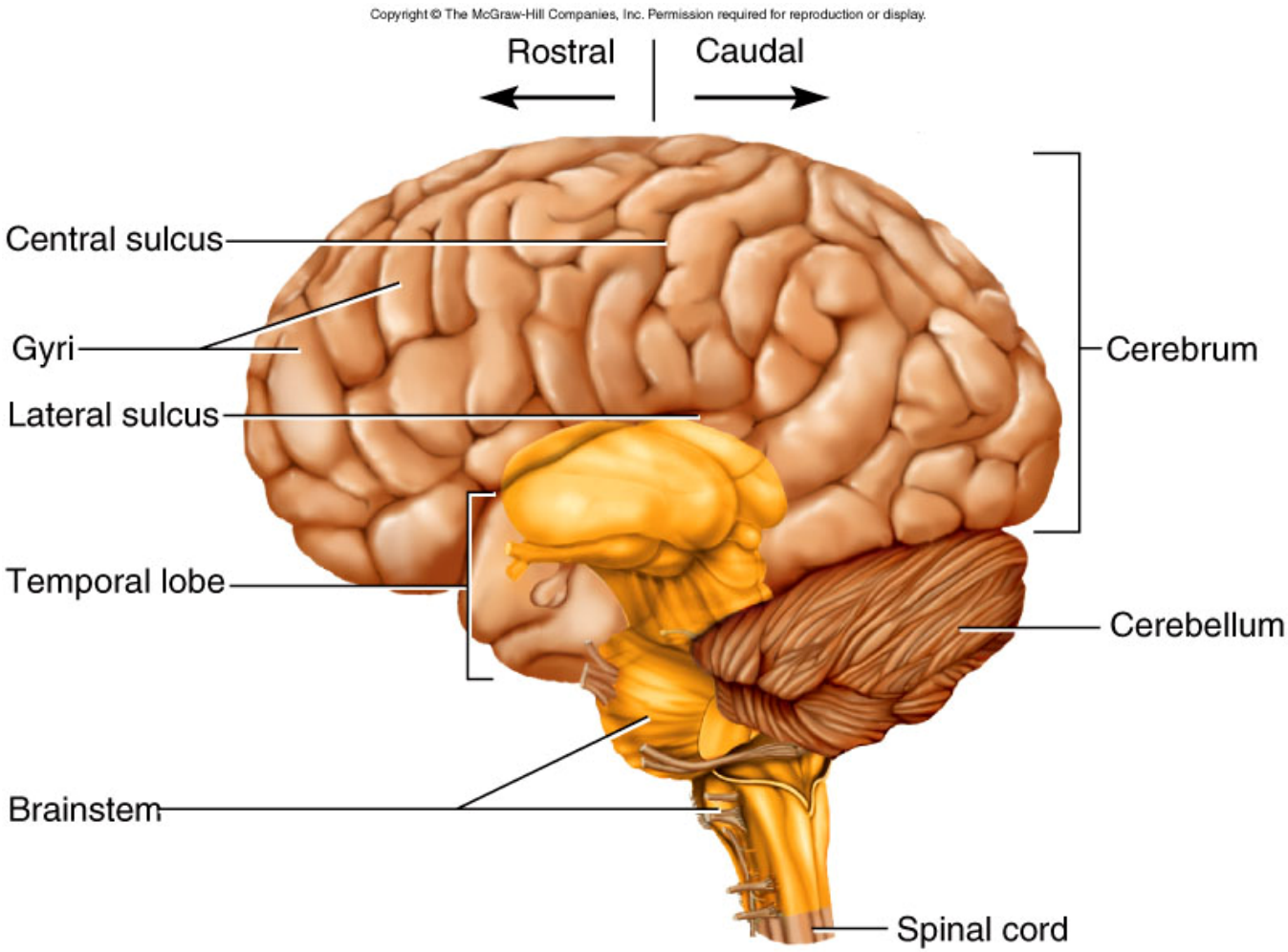
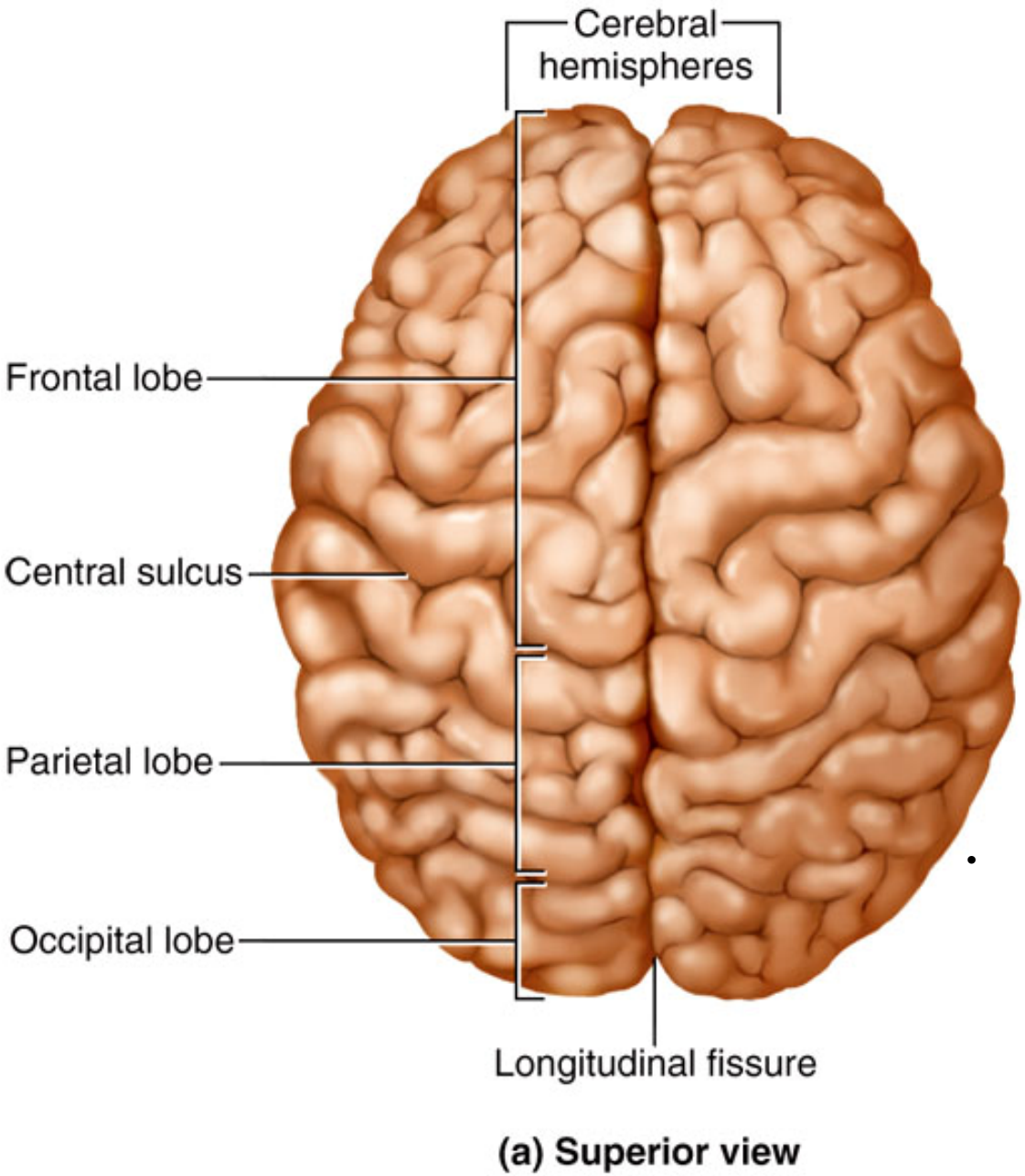
Brain Anatomy

Directional Terms and Landmarks



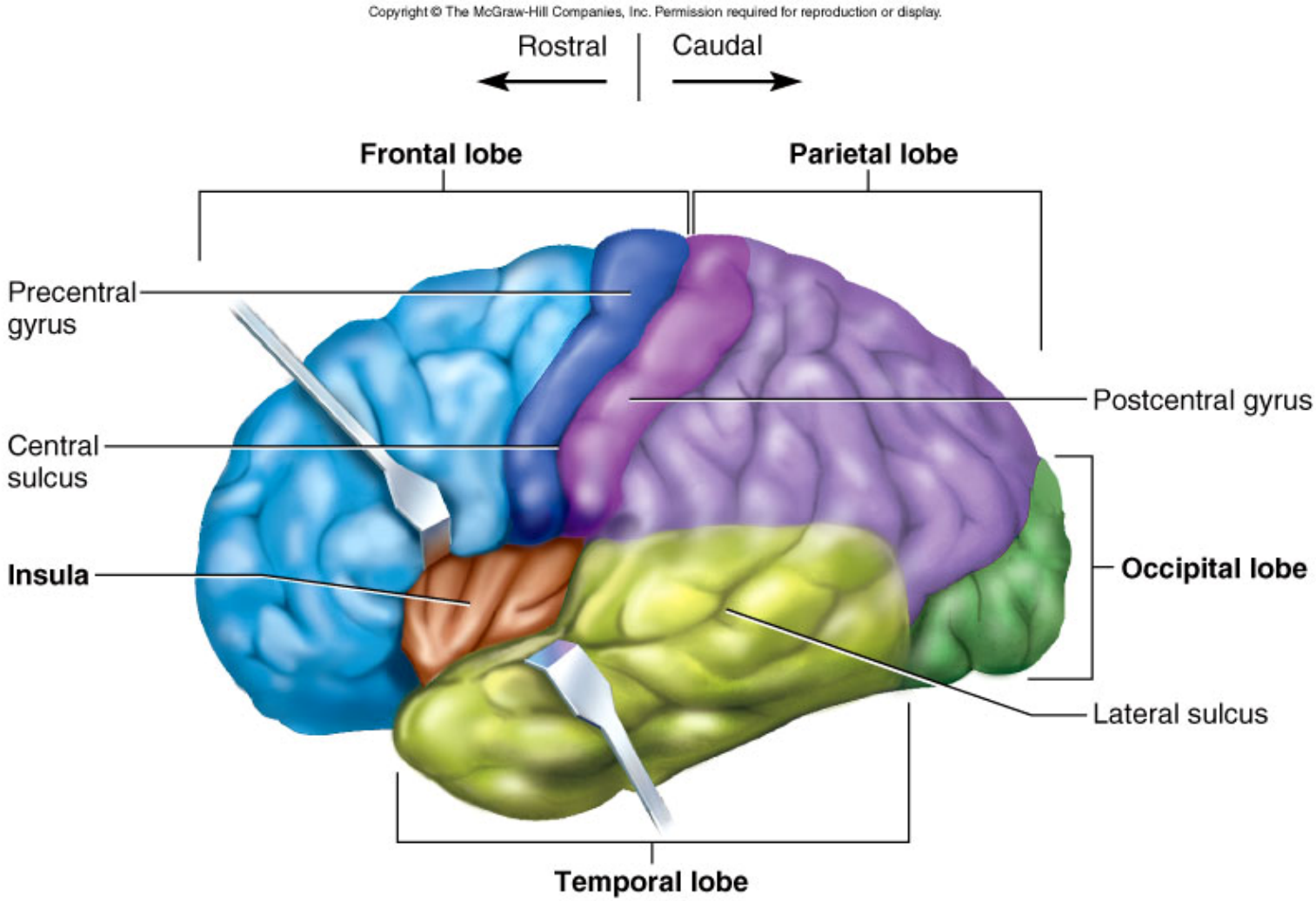
(b) Lateral view



(a) Superior view

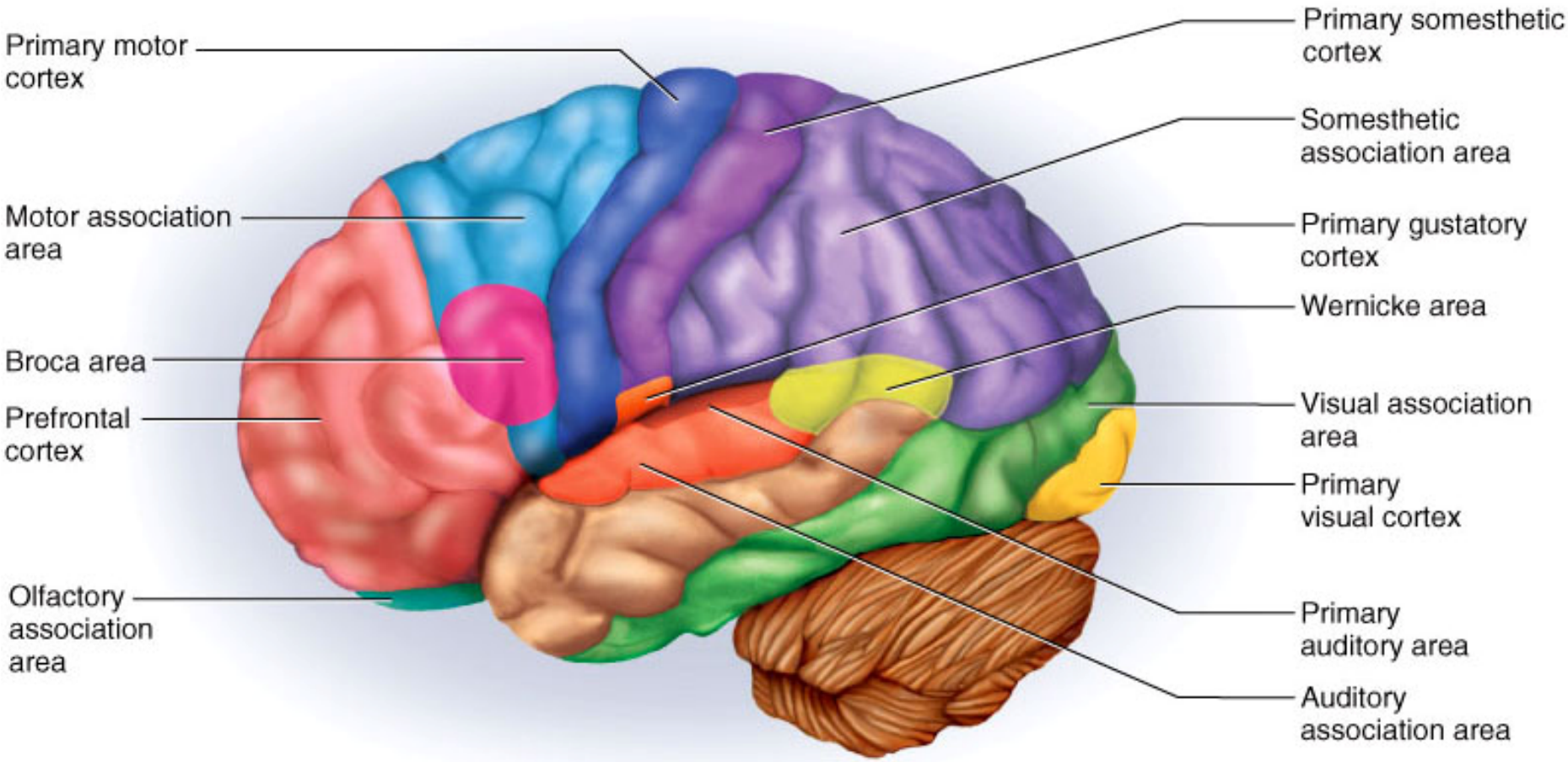
- **Longitudinal fissure - cerebral hemispheres.**
  - **gyri = folds; sulci = grooves**
  - **cortex = surface layer of gray matter**
  - **nuclei = deeper masses of gray matter**
  - **tracts = bundles of axons (white matter)**

Cerebrum -- Gross Anatomy

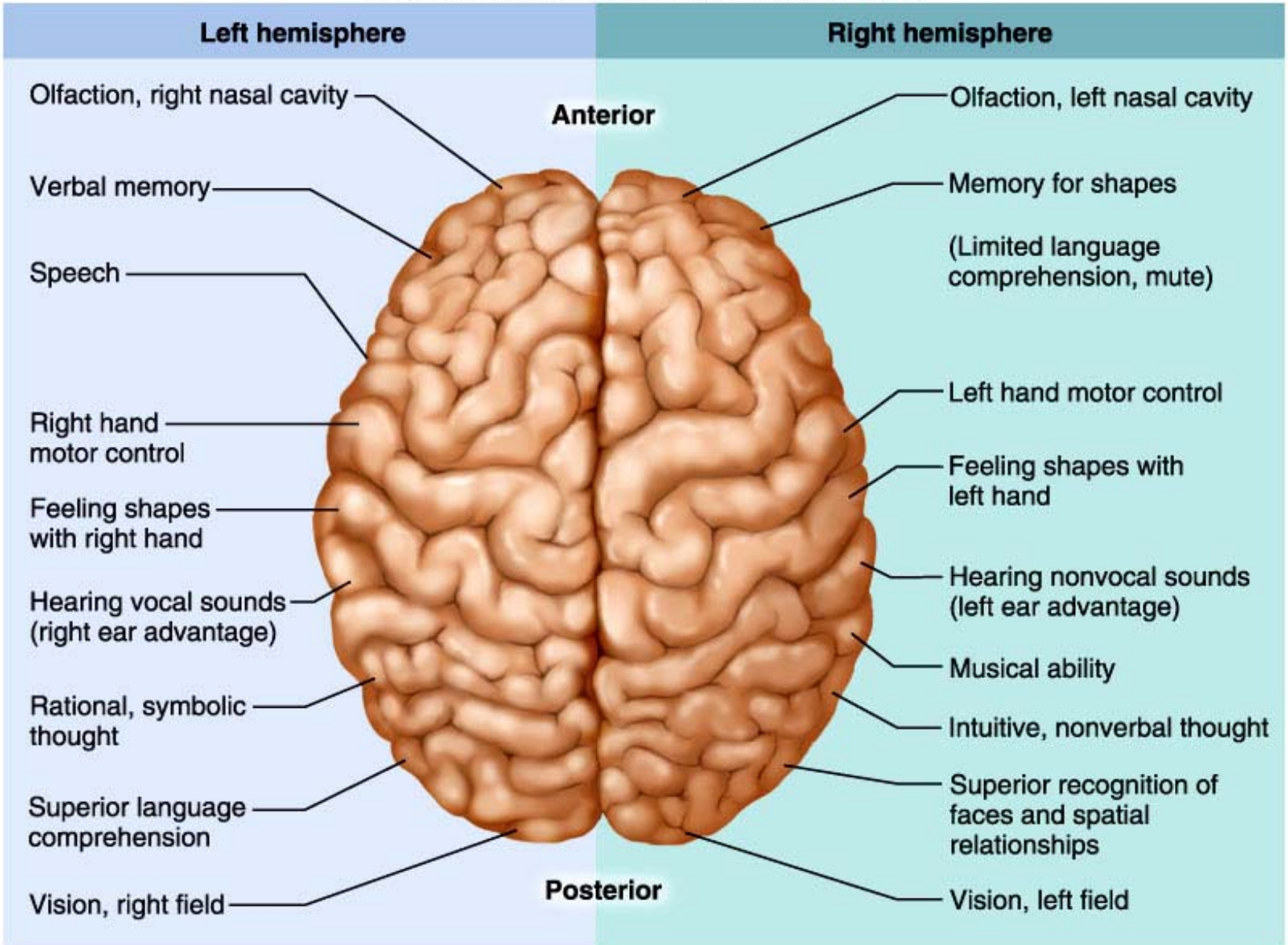


- **Cerebral cortex - 3mm layer of gray matter**
  - **extensive folds increase surface area - divided into lobes**

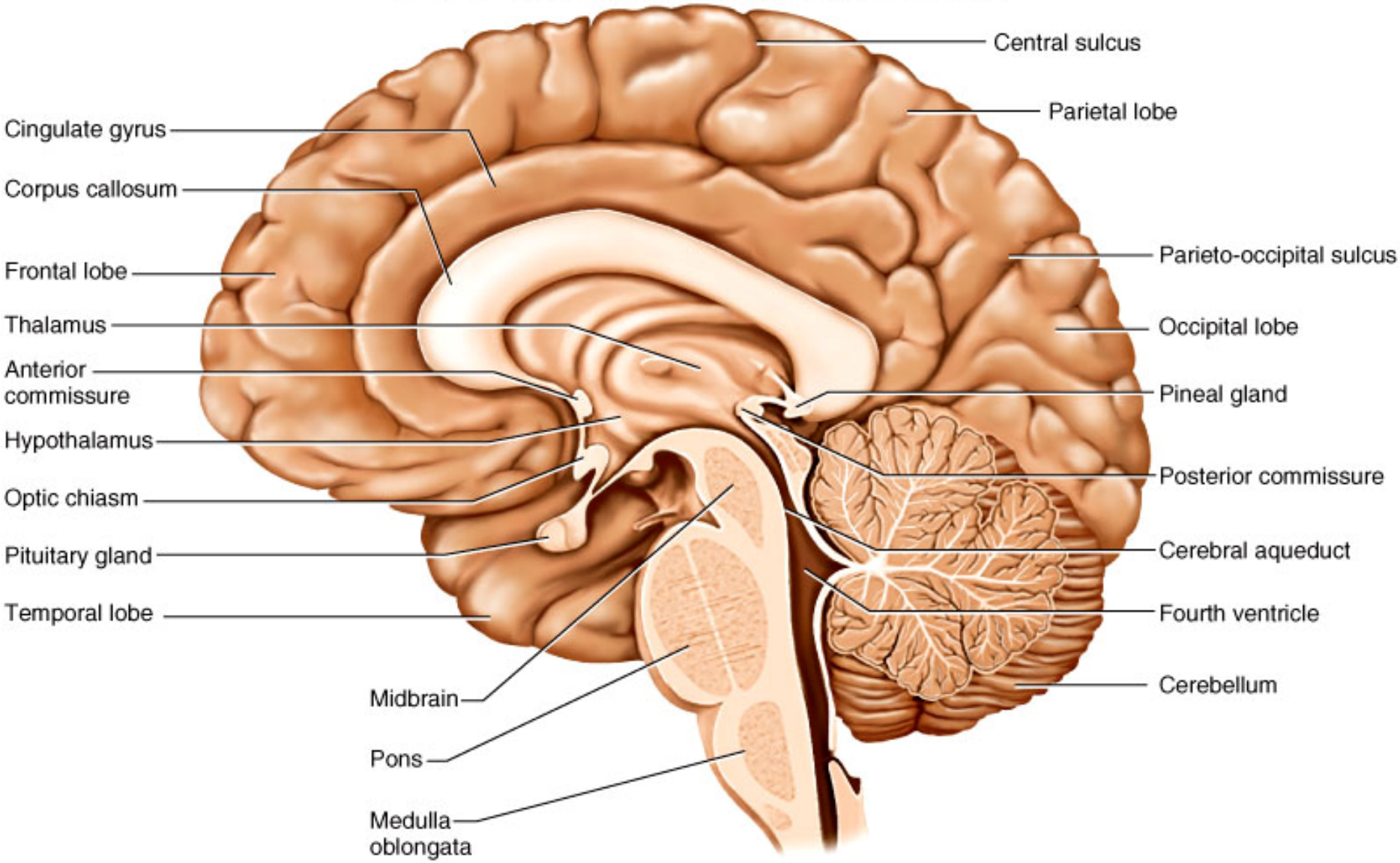
Functional Regions of Cerebral Cortex



Lateralization of Cerebral Functions

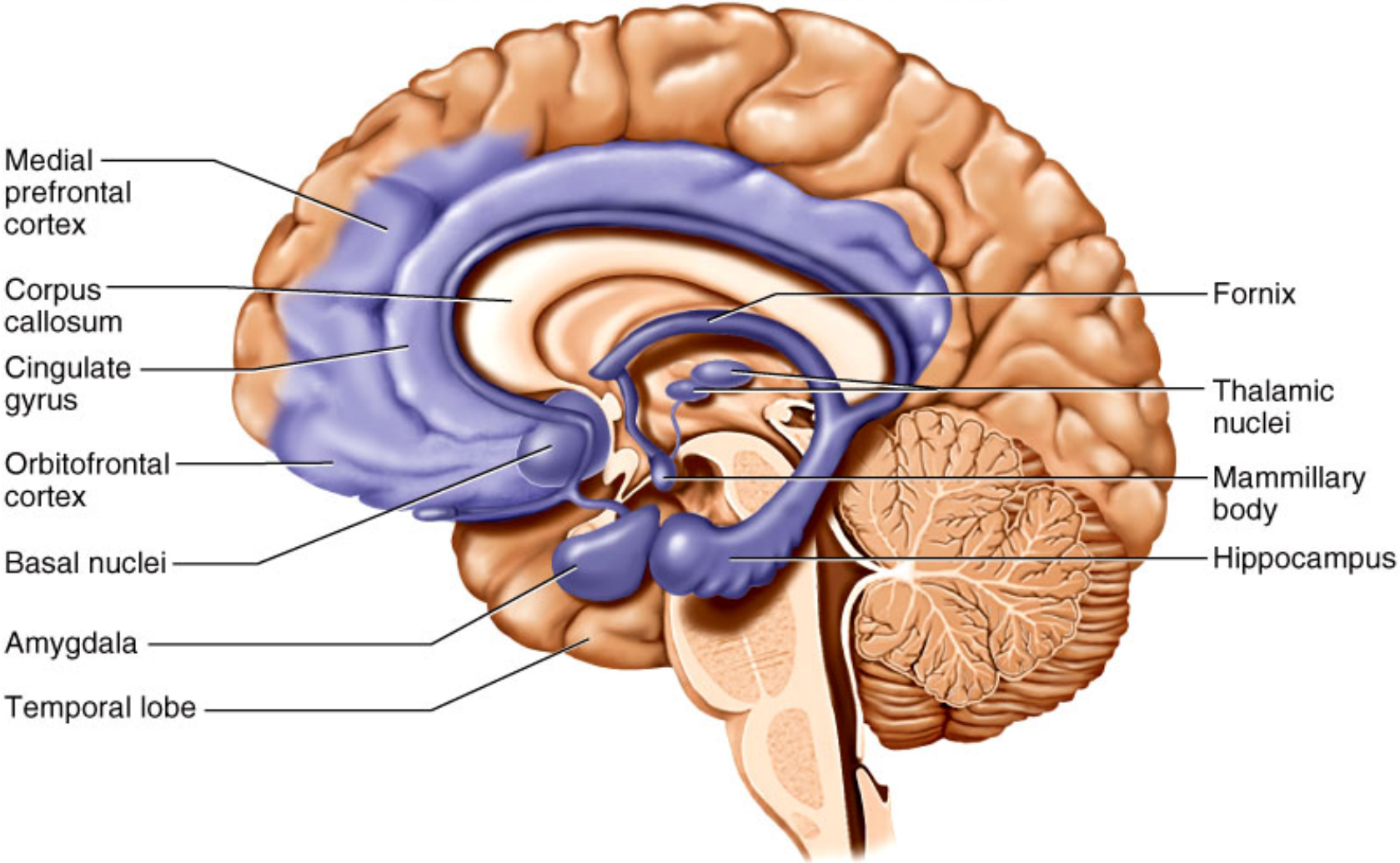


Median Section of the Brain



(a)

Limbic System

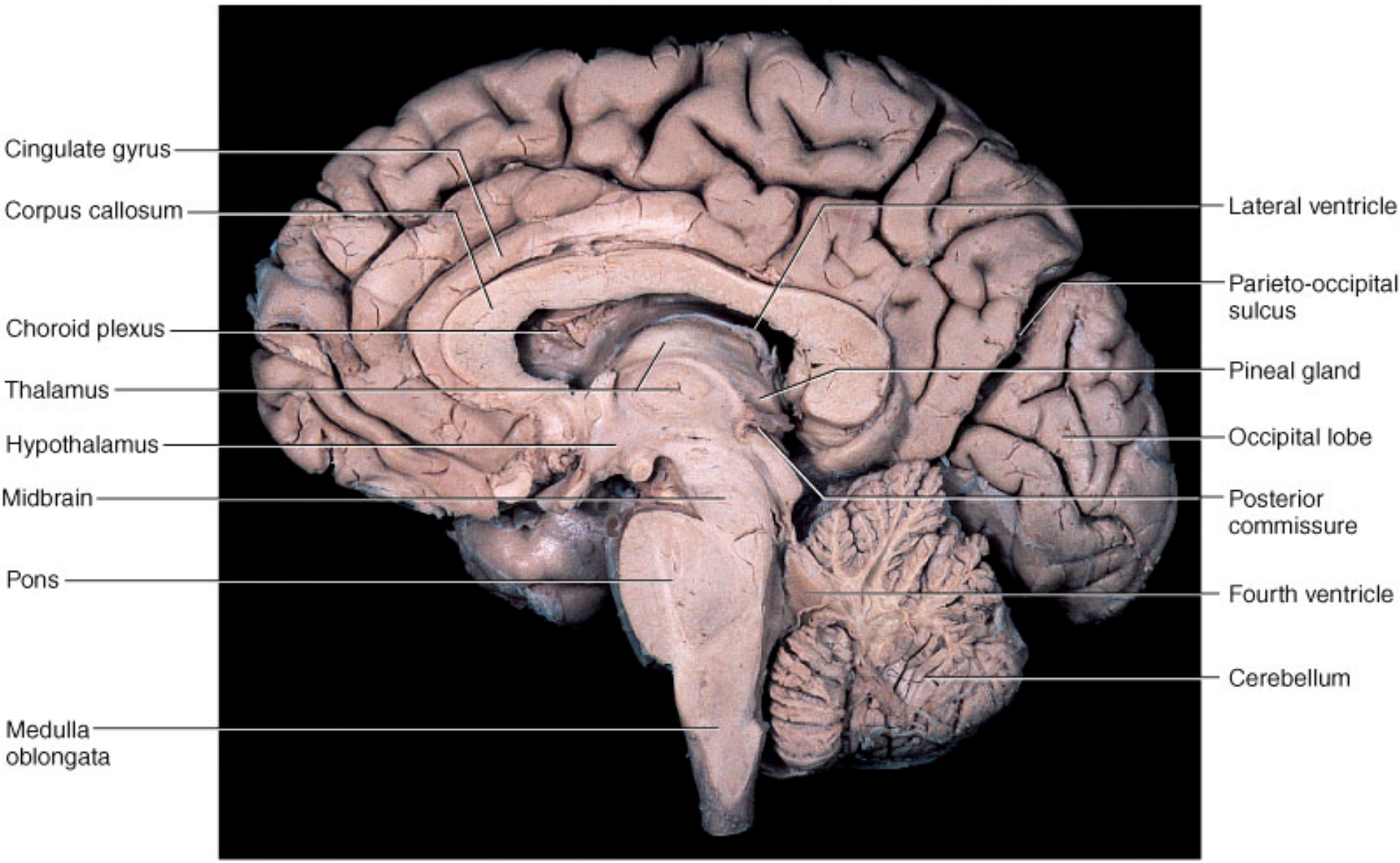


- **Loop of cortical structures**
  - **amygdala, hippocampus and cingulate gyrus**
- **Role in emotion and memory**
  - **pleasure and aversion centers**

Insula of Dissected Brain

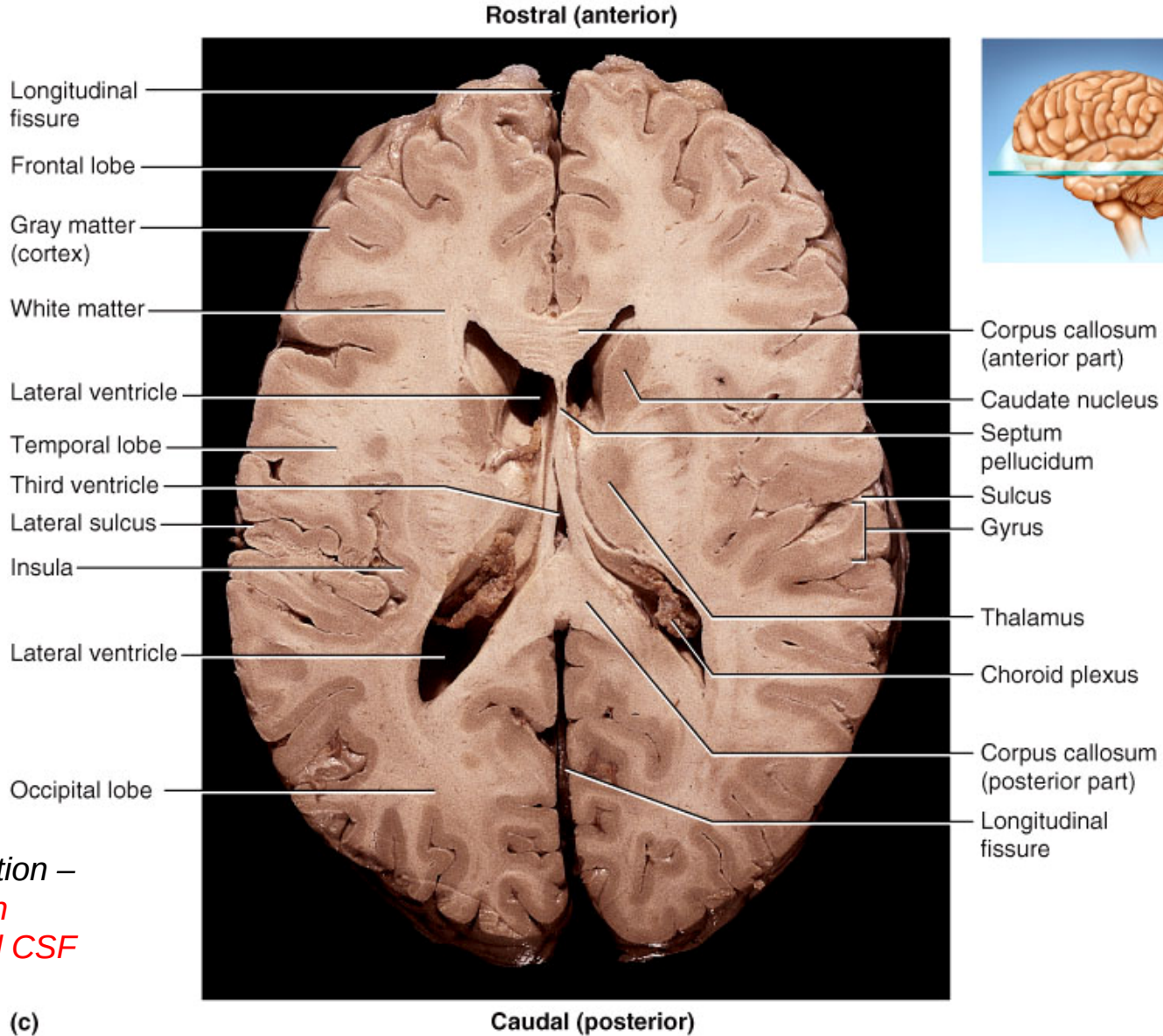
(c) Lateral view

Median Section of Cadaver Brain



(b)

Ventricles of the Brain



Study the Slide Presentation –
The Relationship Between Meninges, Ventricles, and CSF of the CNS.

Dorsolateral View of Brainstem

Diencephalon:
- Thalamus
- Lateral geniculate body
- Pineal gland
- Medial geniculate body

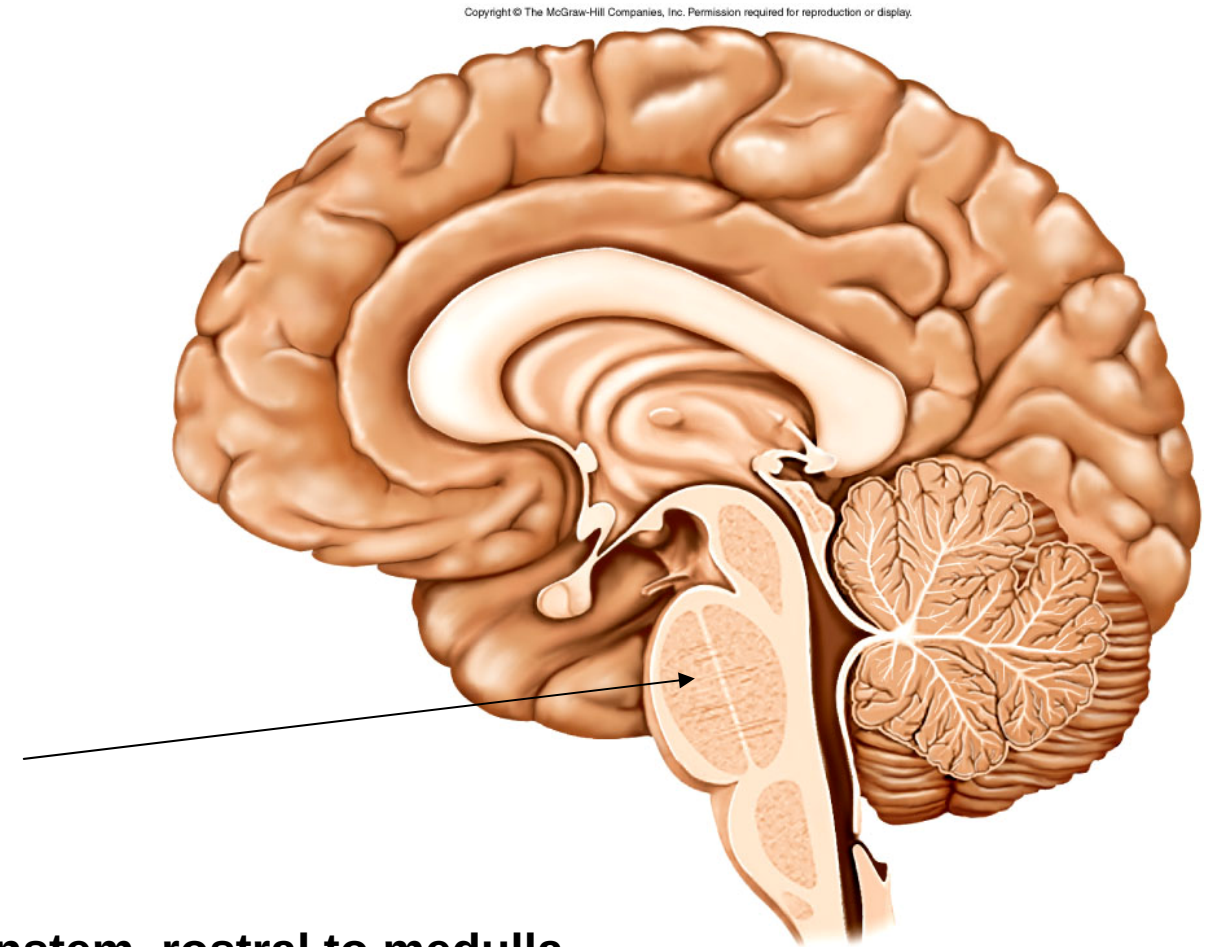
Midbrain:
- Superior colliculus
- Inferior colliculus
- Cerebral peduncle

Hindbrain:
- Pons
- Fourth ventricle
- Medulla oblongata

- Optic tract
- Superior cerebellar peduncle
- Middle cerebellar peduncle
- Inferior cerebellar peduncle
- Olive
- Cuneate fasciculus
- Gracile fasciculus
- Spinal cord

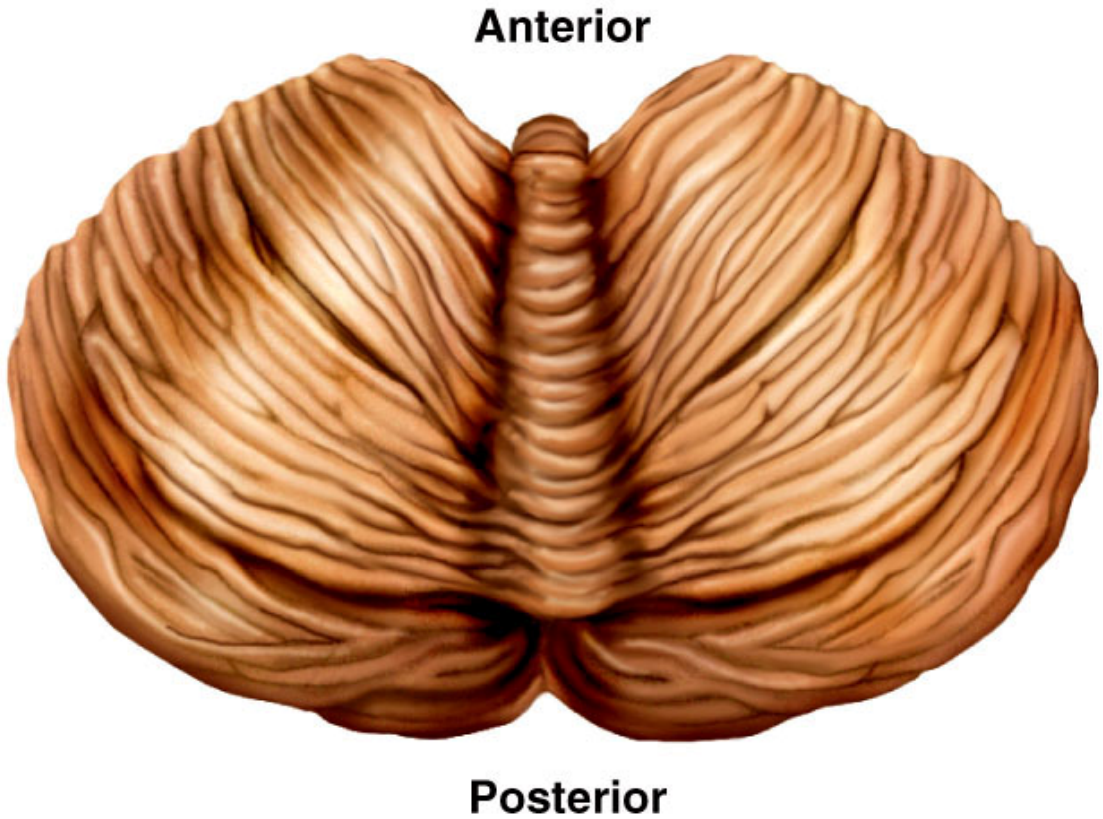
(b) Dorsolateral view

Pons



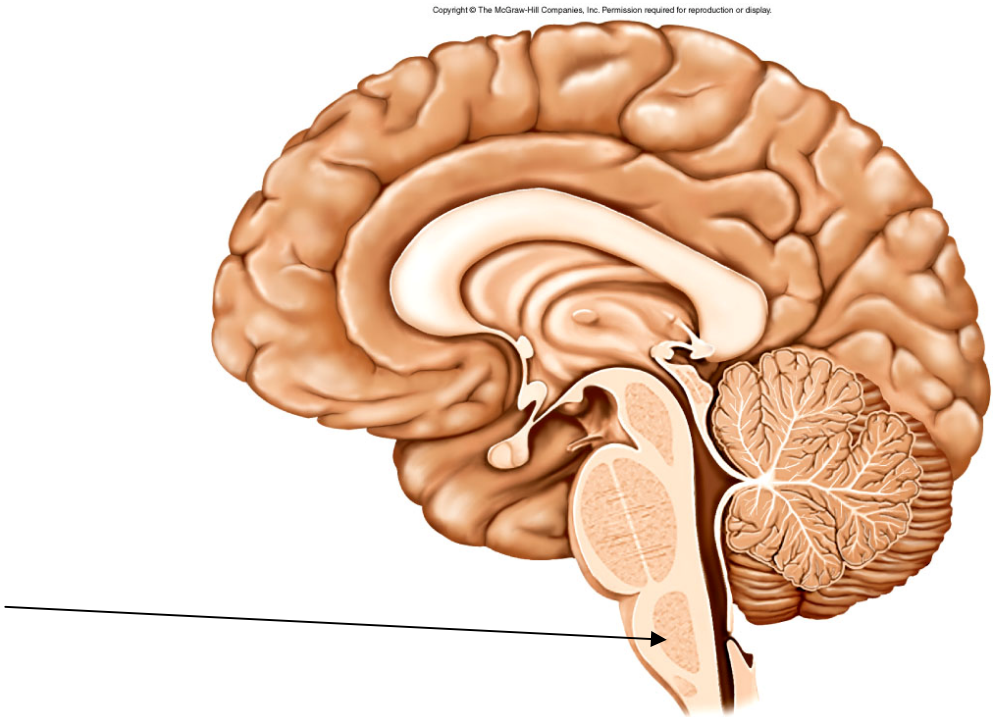
- Bulge in brainstem, rostral to medulla
- Ascending sensory tracts
- Descending motor tracts
- Pathways in and out of cerebellum

Cross-section of Pons



(b) Superior view

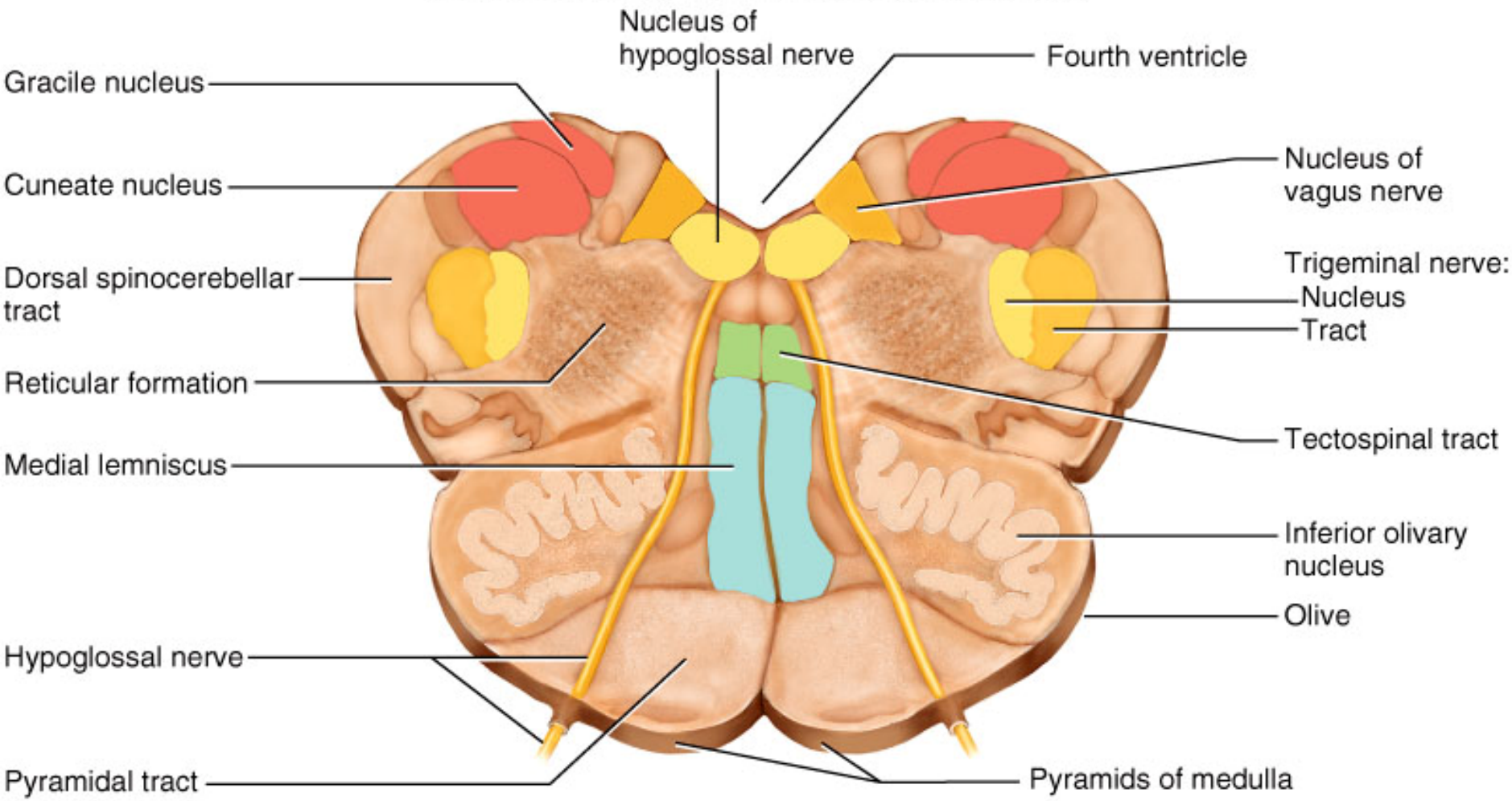
Medulla Oblongata



(a)

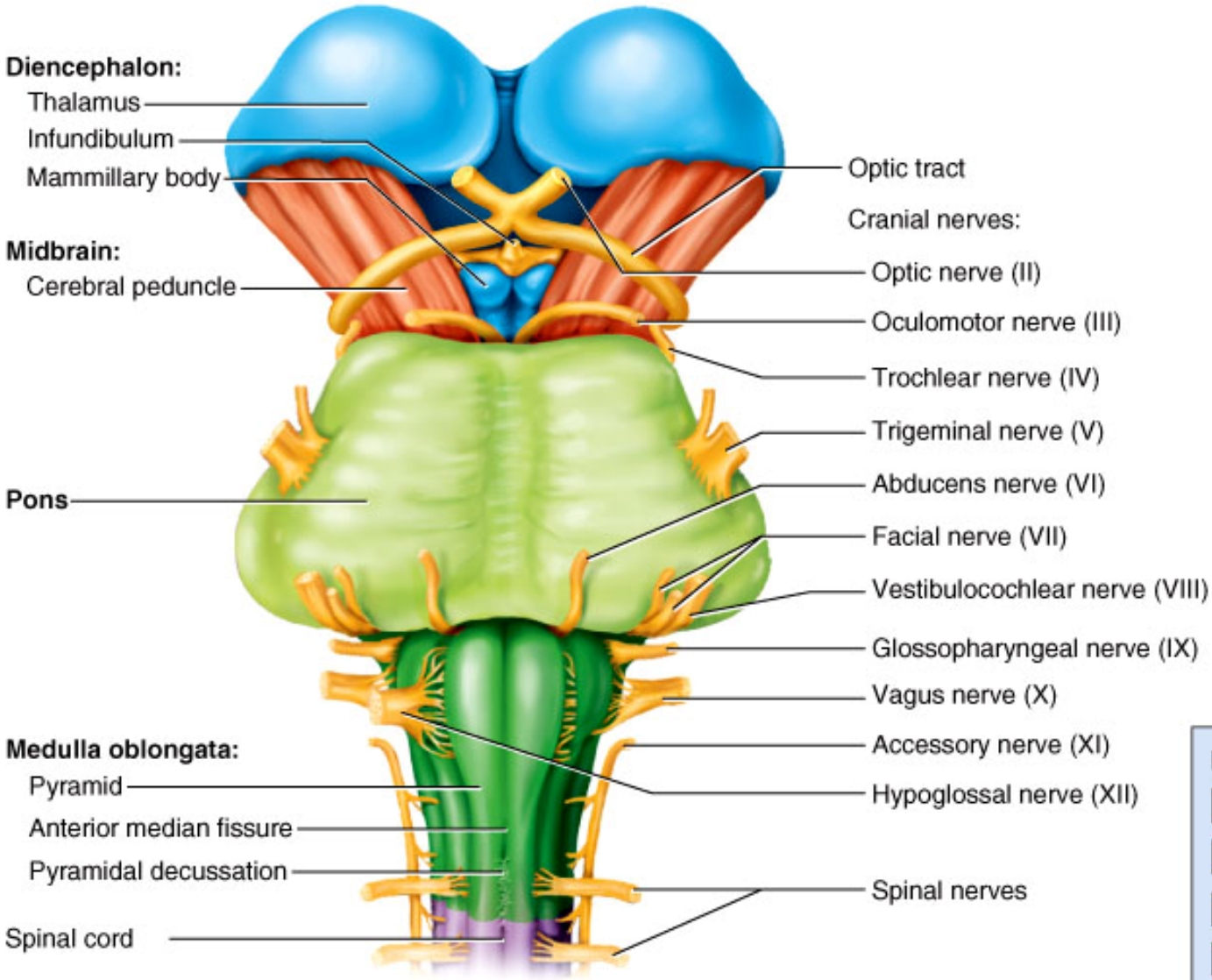
- 3 cm extension of spinal cord
- Ascending and descending nerve tracts
- Nuclei of sensory and motor CNs (IX, X, XI, XII)
- Pyramids and olive visible on surface

Medulla Oblongata



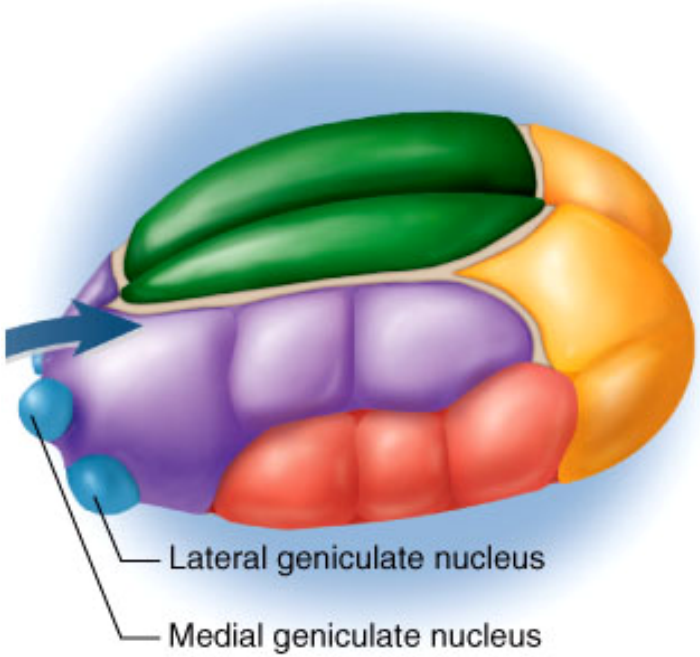
(c) Medulla oblongata

Medulla and Pons



(a) Ventral view

Diencephalon: Thalamus, Hypothalamus & Epithalamus

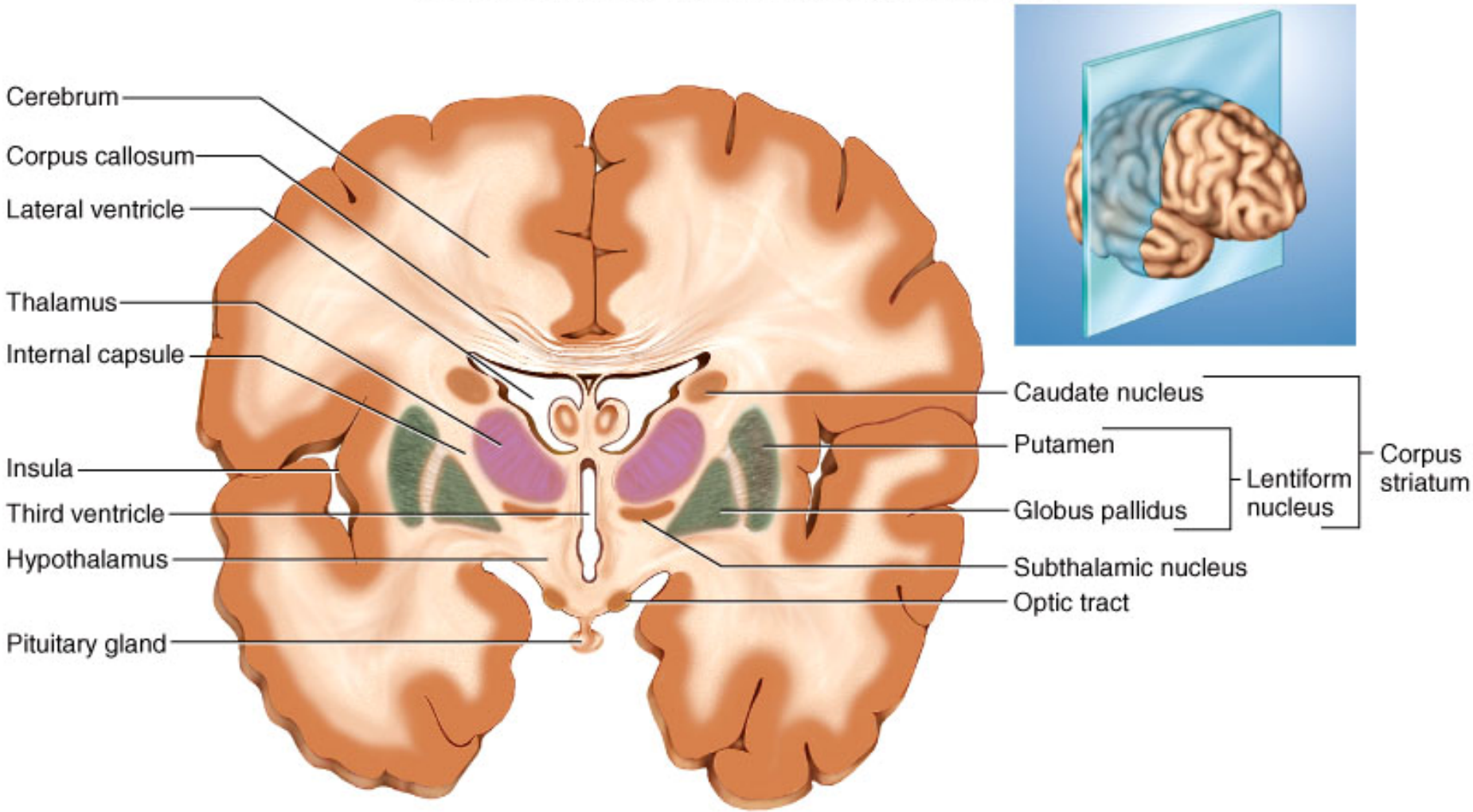


(a) Thalamus

Thalamic Nuclei	
Anterior group	Part of limbic system; memory and emotion
Medial group	Emotional output to prefrontal cortex; awareness of emotions
Ventral group	Somesthetic output to postcentral gyrus; signals from cerebellum and basal nuclei to motor areas of cortex
Lateral group	Somesthetic output to association areas of cortex; contributes to emotional function of limbic system
Posterior group	Relay of visual signals to occipital lobe (via lateral geniculate nucleus) and auditory signals to temporal lobe (via medial geniculate nucleus)

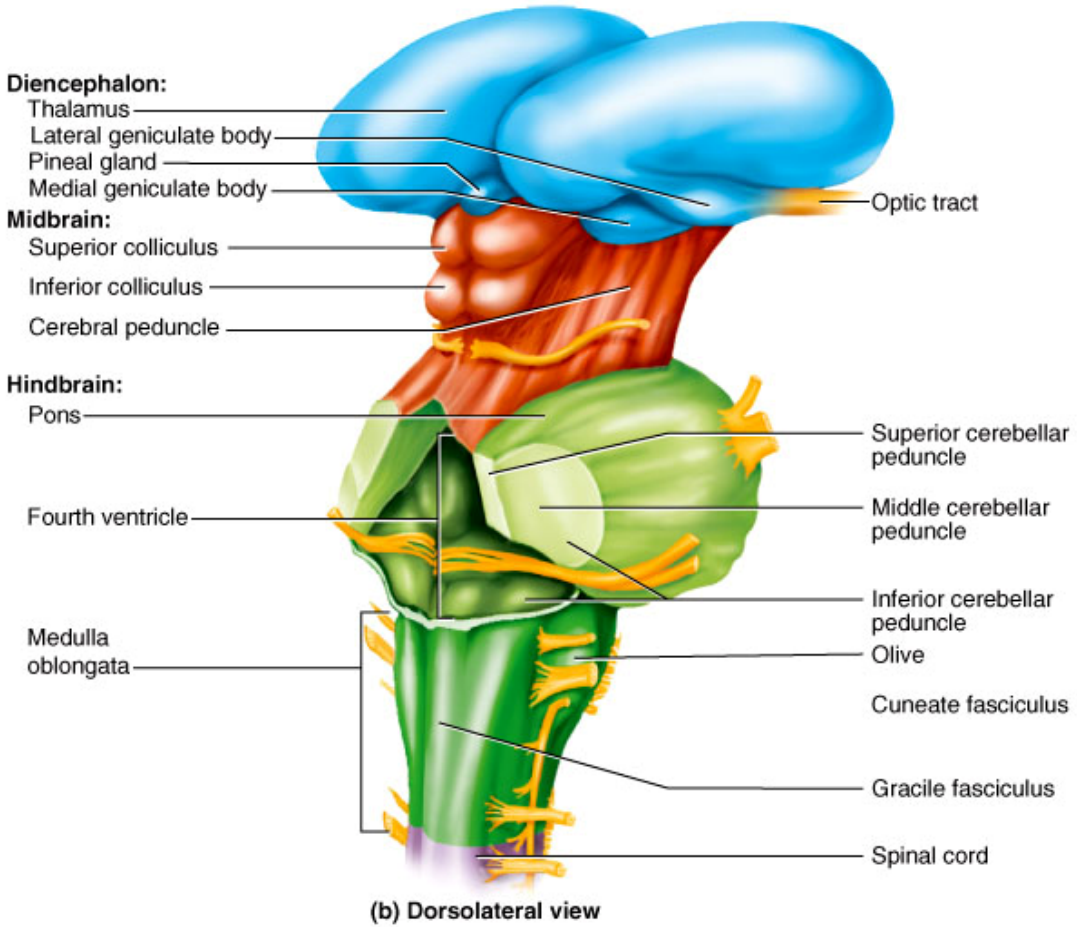
- **Oval mass of gray matter protrudes into lateral ventricle and 3rd ventricle**
- **23 nuclei receive nearly all sensory information on its way to cerebral cortex**
- **Relays signals from cerebellum to motor cortex**
- **Emotional and memory functions**

Thalamus



- **Masses of gray matter deep to cortex**
  - **corpus striatum (lentiform nucleus) = caudate nucleus, putamen, and globus pallidus**
- **Motor control**
  - **substantia nigra and motor cortex**

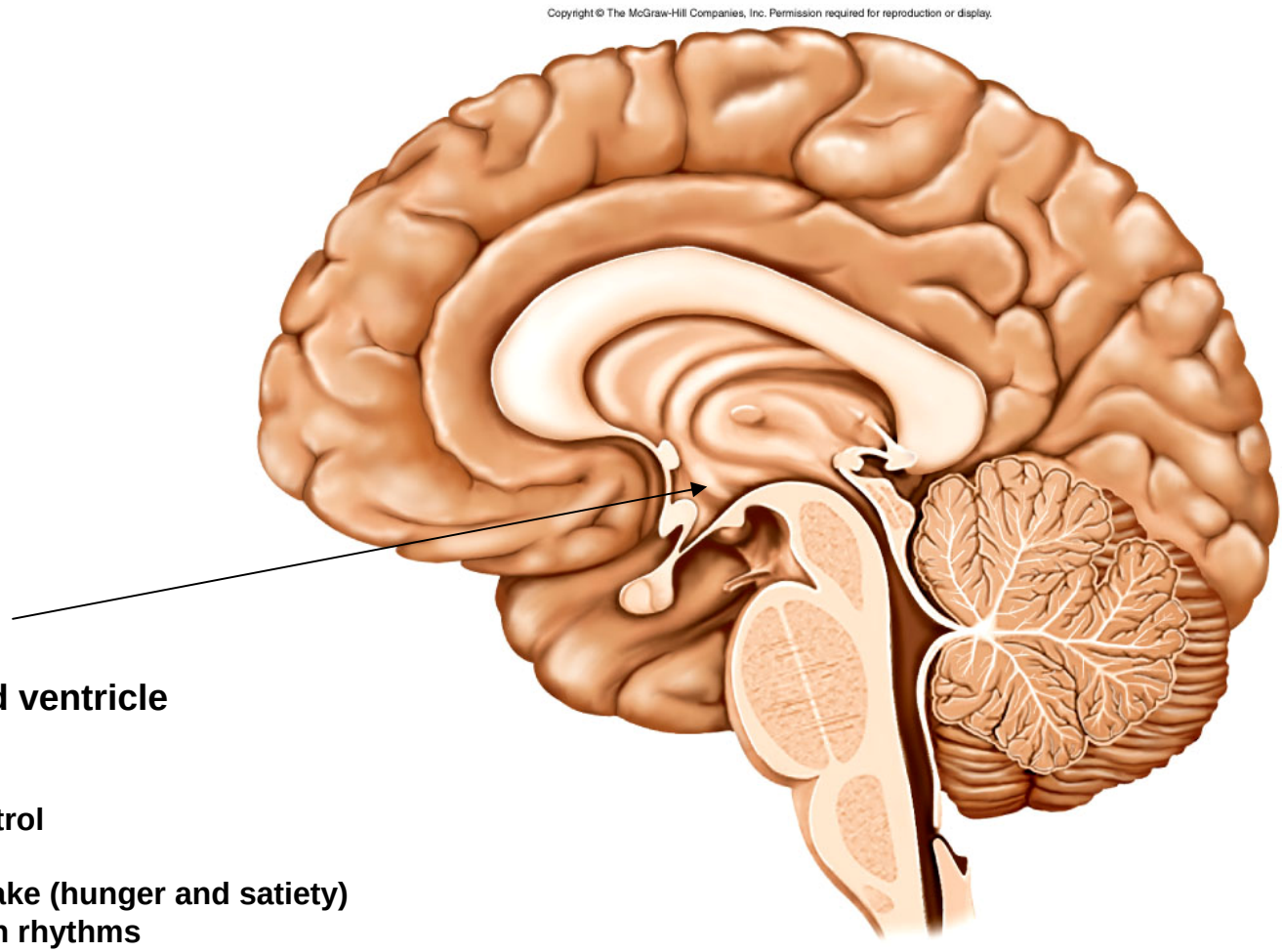
Superior and Inferior Colliculus



(b) Dorsolateral view

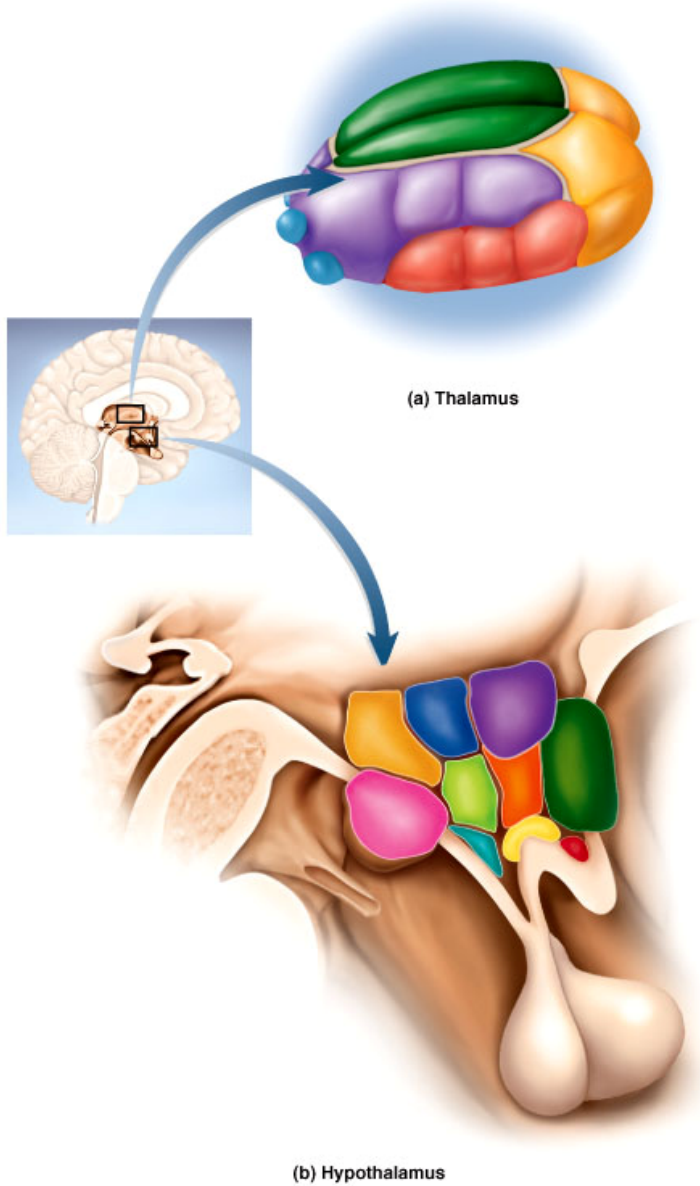
- **Tectum (4 nuclei - corpora quadrigemina)**
  - **superior colliculus (tracks moving objects, blinking, pupillary and head turning reflexes)**
  - **inferior colliculus (reflex turning of head to sound)**

Hypothalamus



- **Walls and floor of 3rd ventricle**
- **Functions**
  - **hormone secretion**
  - **autonomic NS control**
  - **thermoregulation**
  - **food and water intake (hunger and satiety)**
  - **sleep and circadian rhythms**
  - **memory (mammillary bodies)**
  - **emotional behavior**

Hypothalamus



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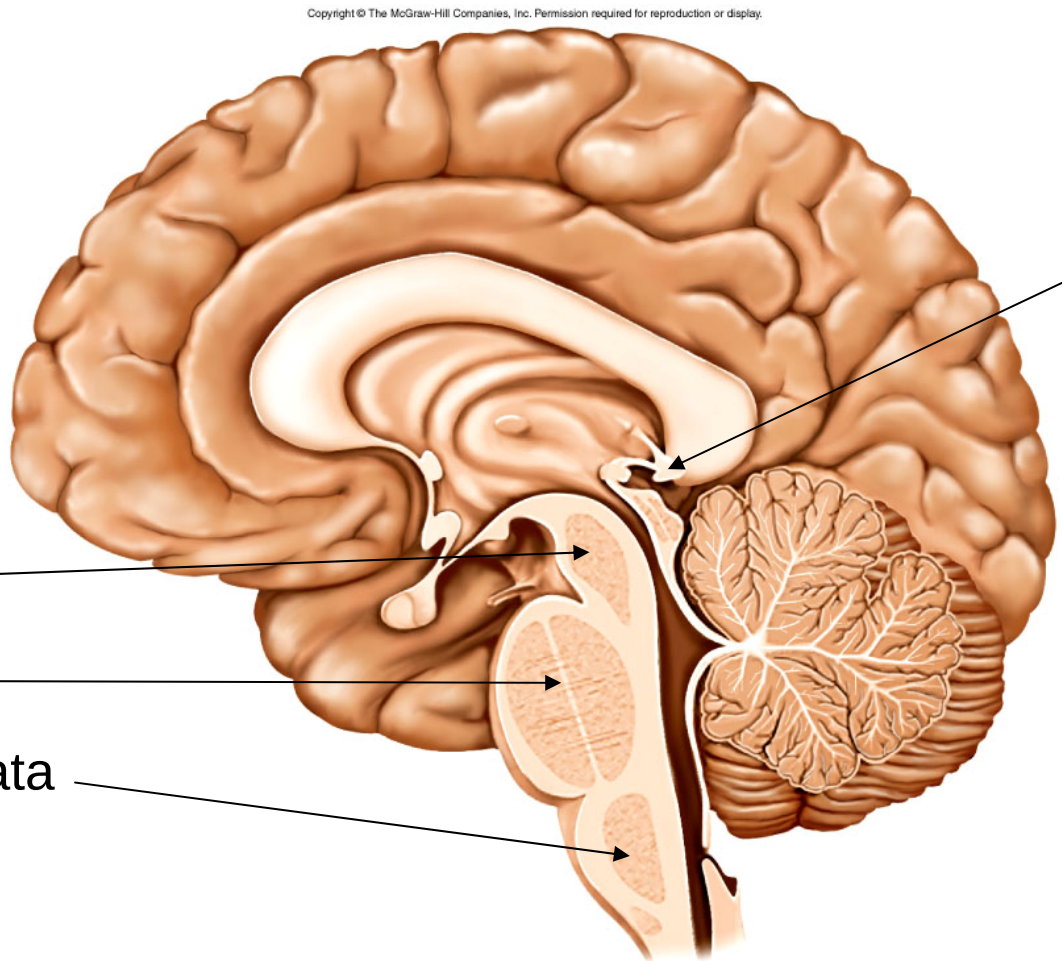
Hypothalamic Nuclei	
Anterior nucleus	Thirst center; thermoregulation
Arcuate nucleus	Regulates appetite: secretes releasing hormones that regulate anterior pituitary
Dorsomedial nucleus	Rage and other emotions
Mammillary nuclei	Relay between limbic system and thalamus; involved in long-term memory
Paraventricular nucleus	Produces oxytocin (involved in childbirth, lactation, orgasm); controls posterior pituitary
Posterior nucleus	Functions with periaqueductal gray matter of midbrain in emotional, cardiovascular, and pain control
Preoptic nucleus	Hormonal control of reproductive functions
Suprachiasmatic nucleus	Biological clock; regulates circadian rhythms and female reproductive cycle
Supraoptic nucleus	Produces antidiuretic hormone (involved in water balance); controls posterior pituitary
Ventromedial nucleus	Satiety center (suppresses hunger)

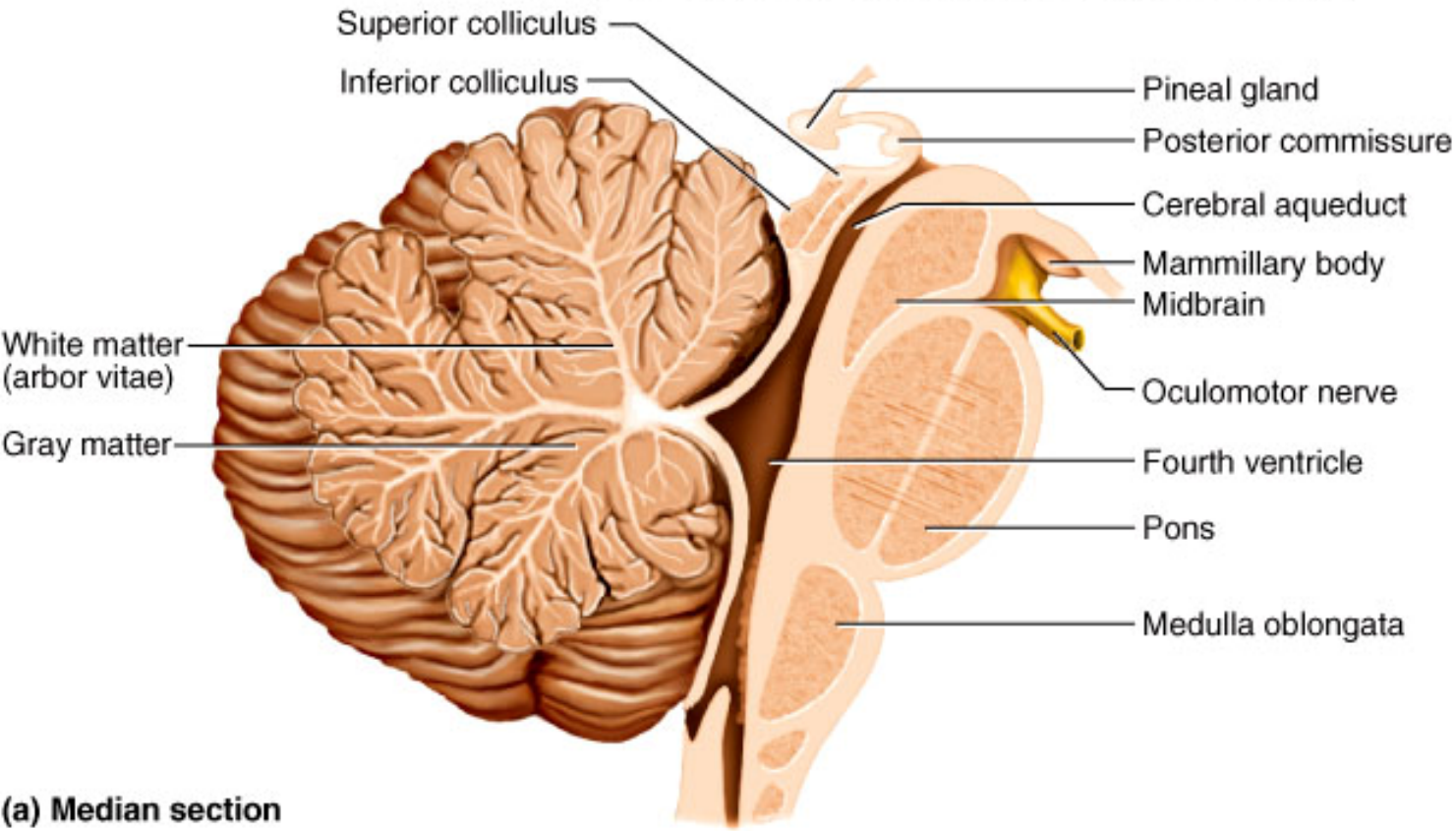
- **Mammillary bodies contain 3 to 4 nuclei that relay signals from limbic system to thalamus**

Epithalamus



- **Epithalamus consists of pineal gland (endocrine) and the habenula (connects limbic system to midbrain)**
- **Epithalamus tissue forms thin roof over the third ventricle.**

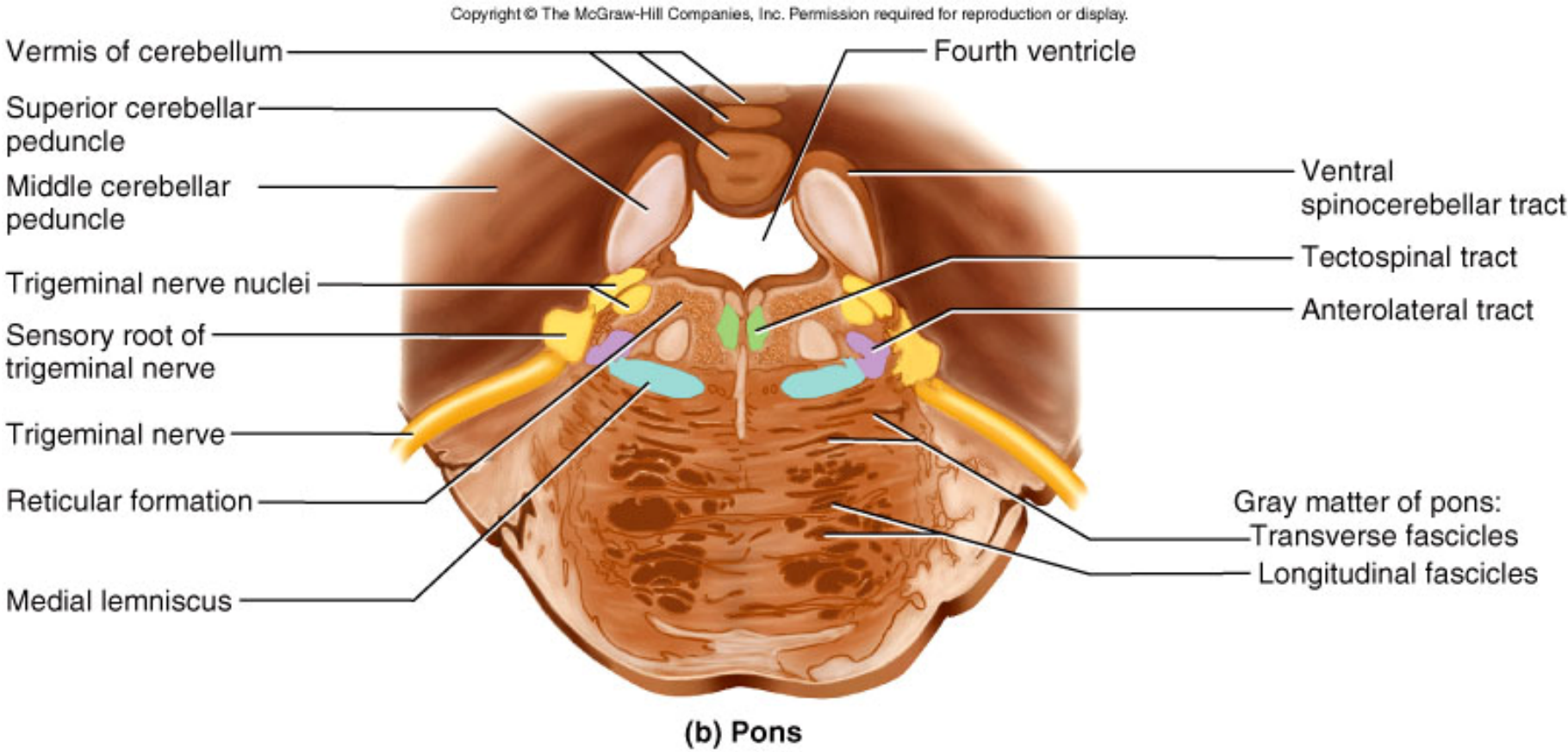
Cerebellum



(a) Median section

- **Central aqueduct**
- **CN III and IV**
  - **eye movement**
- **Cerebral peduncles**
  - **hold corticospinal tract**

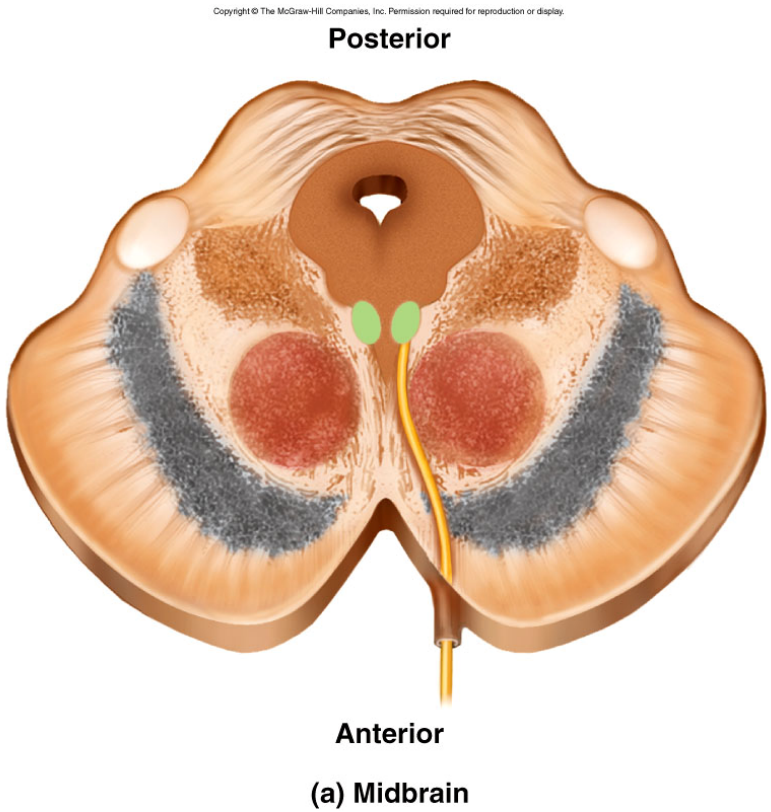
Cerebellum



(b) Pons

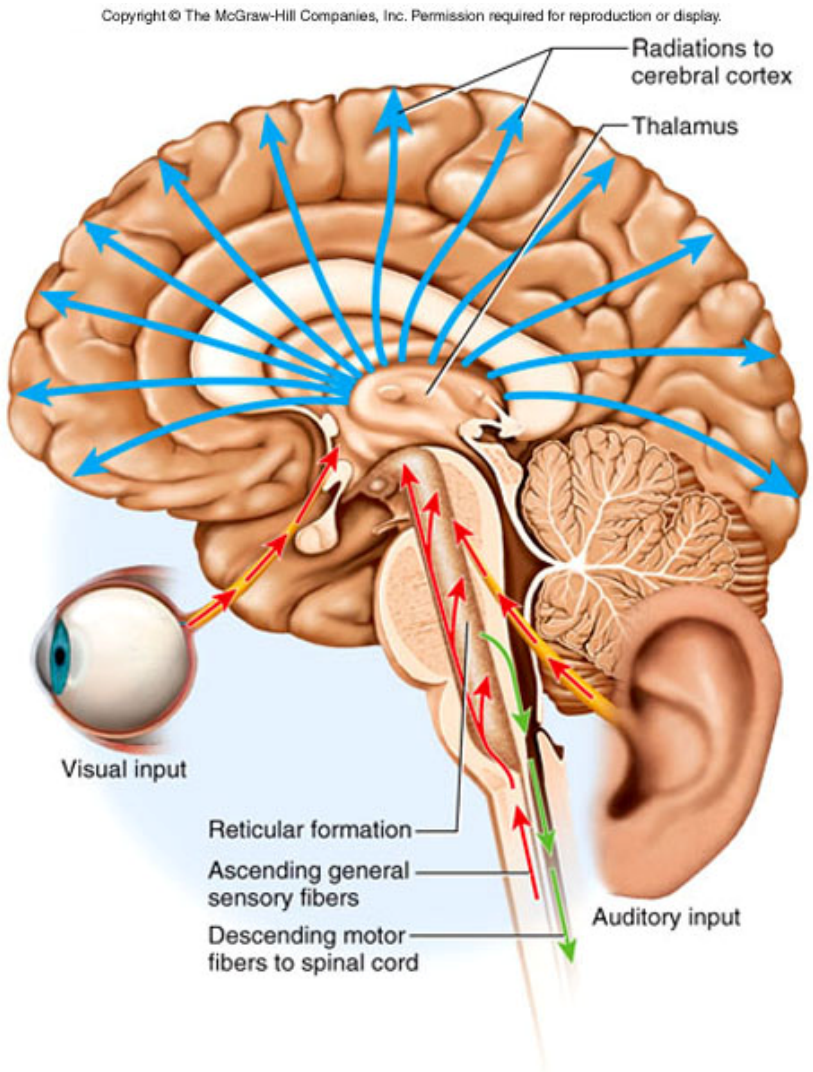
- **Two hemispheres connected by vermis**
- **Cortex = surface folds called folia**
- **Output comes from deep gray nuclei**
  - **granule and purkinje cells**

Cerebellum



- Sits atop 4th ventricle
- White matter (arbor vitae) visible in sagittal section
- Connected to brainstem by cerebellar peduncles
  - superior peduncle = output to midbrain, thalamus, and cortex
  - middle peduncle = input from cerebral cortex and inner ear
  - inferior peduncle = spinocerebellar tracts (proprioception)

Reticular Formation



Tracts of Cerebral White Matter