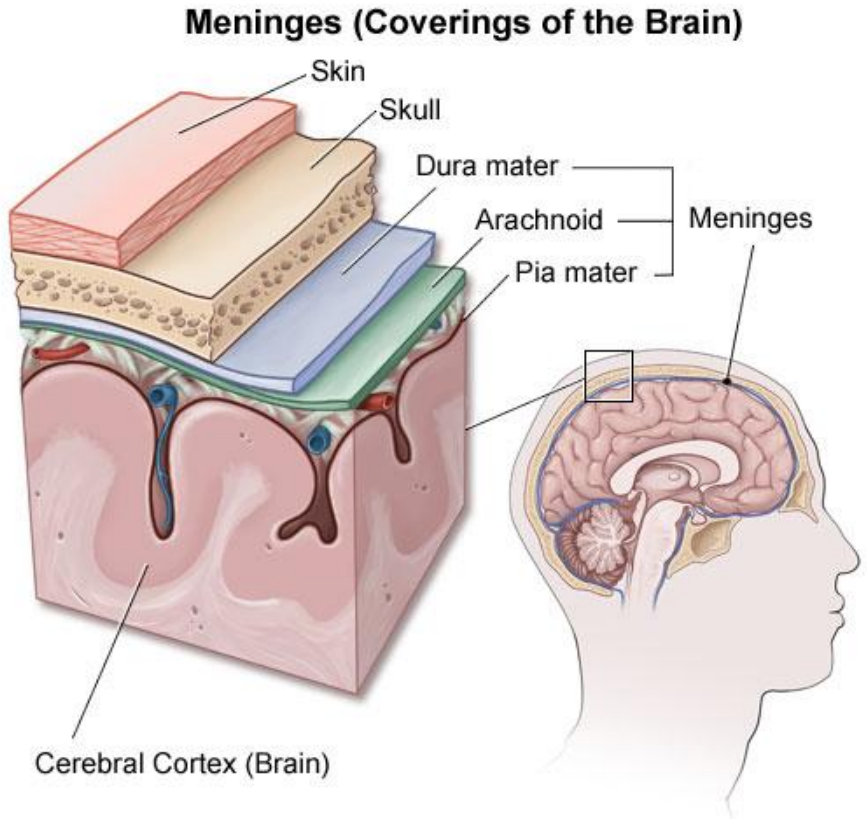
9.11 The Meninges

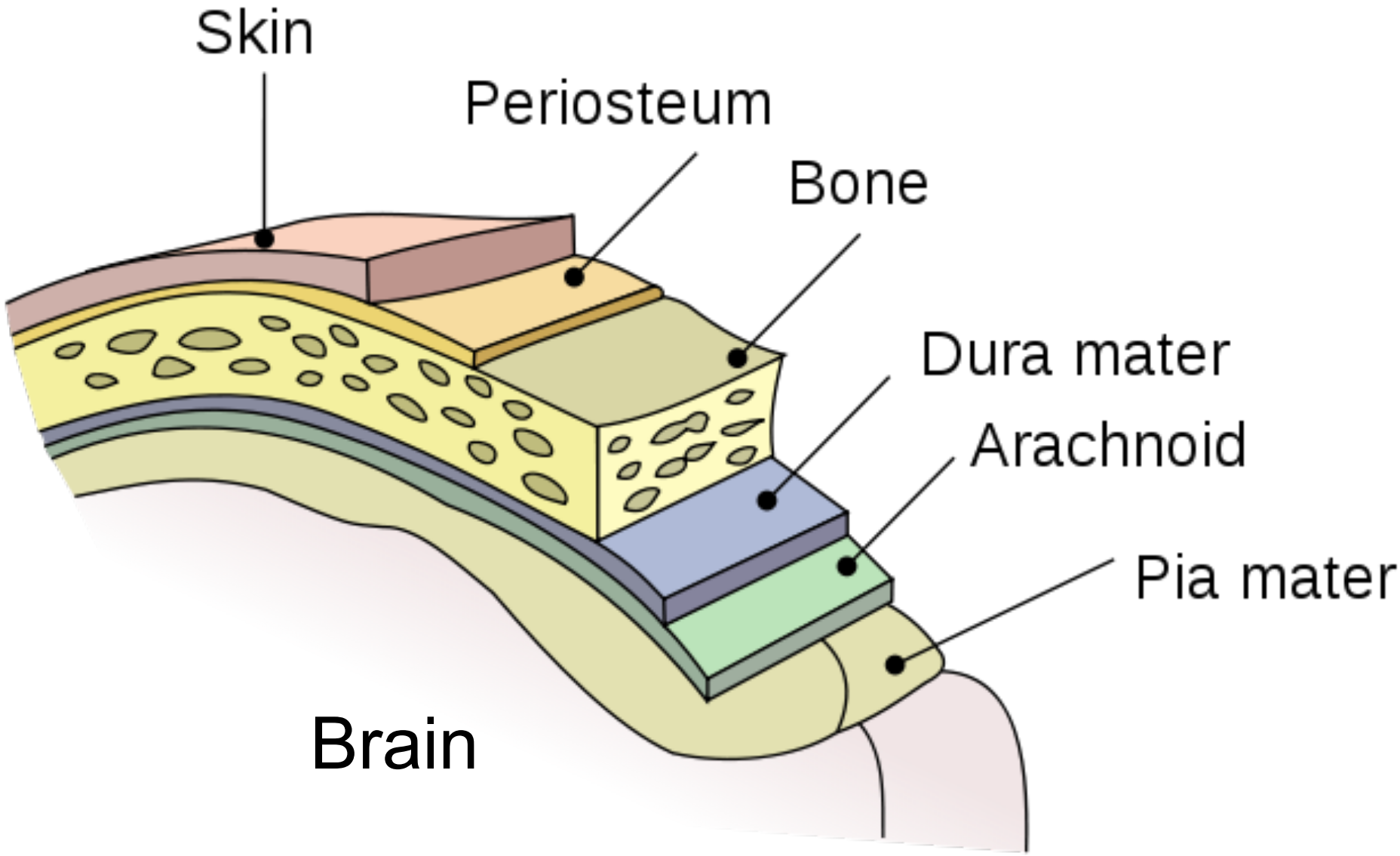
= membranes located between bone and soft tissues of the nervous system

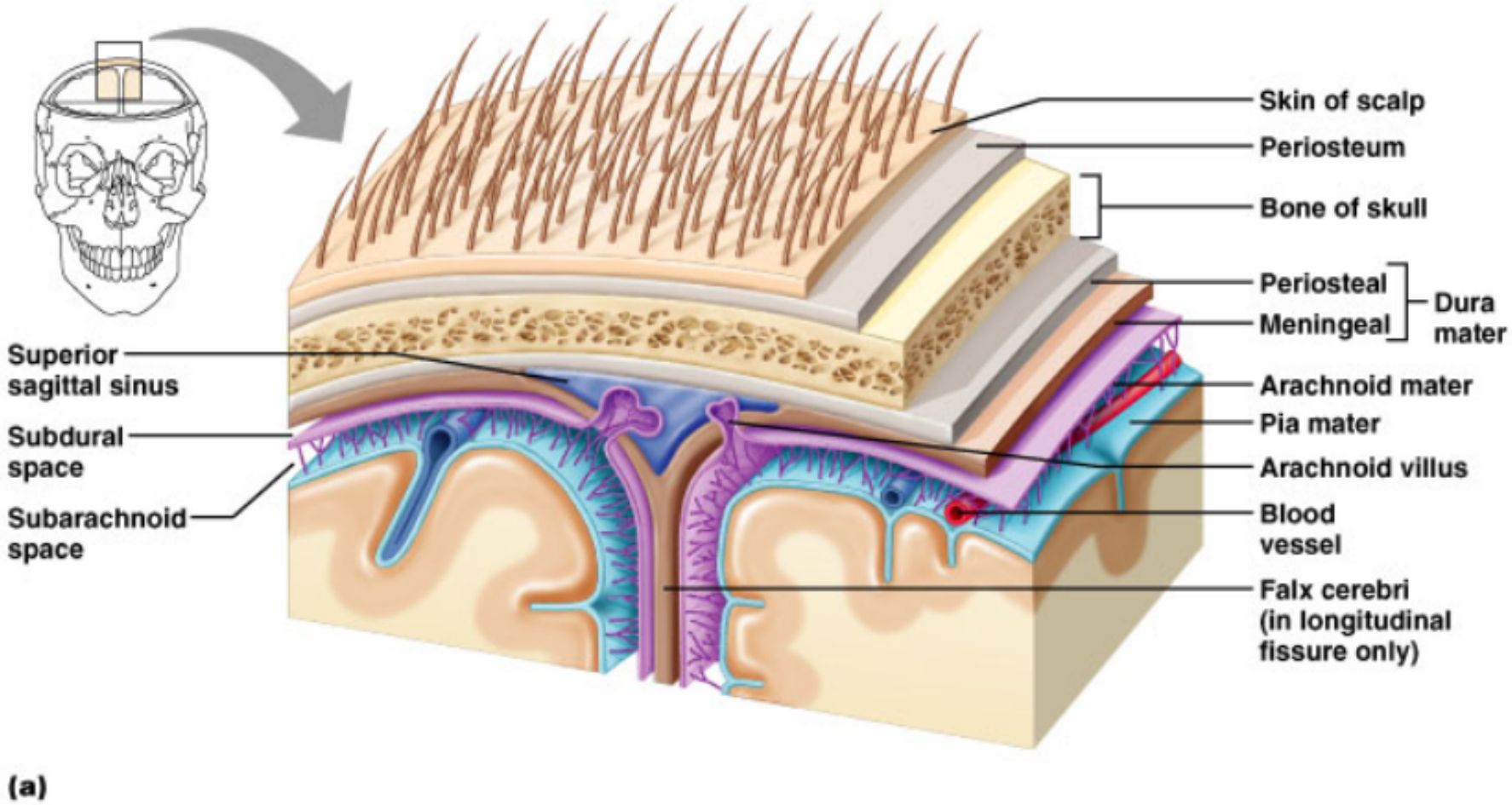


<u>Dura mater</u> - outermost layer

<u>Arachnoid mater</u> - no blood vessels, in between layer (resembles a spider web)

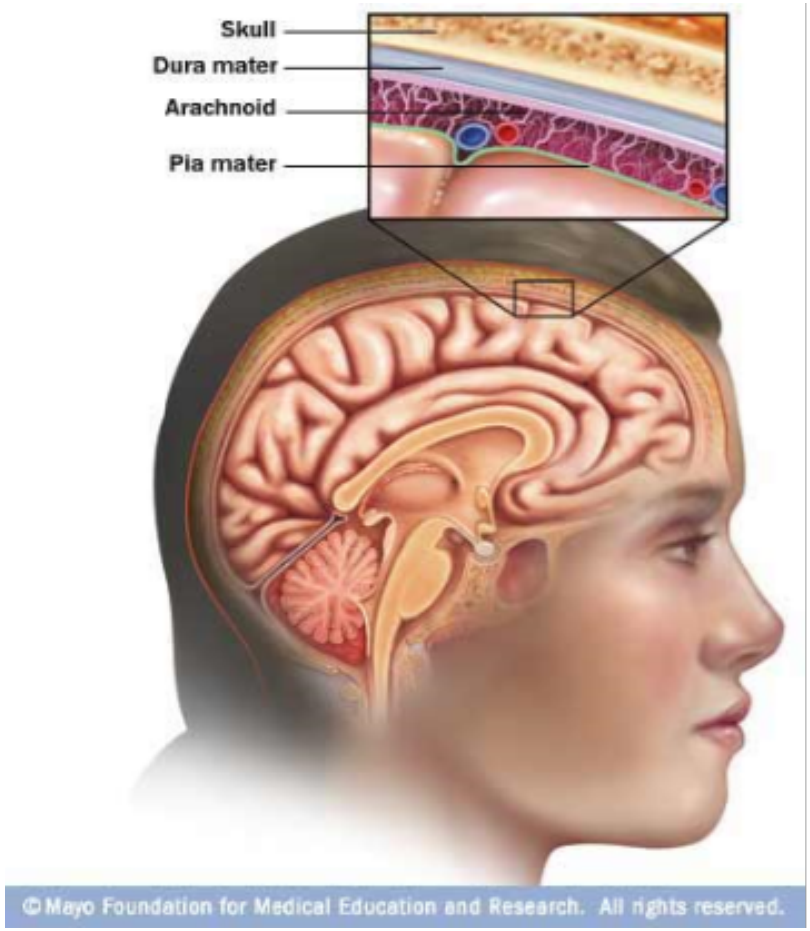
<u>Pia mater</u> -inner membrane, contains nerves and blood vessels to nourish cells


Skin
Periosteum
Bone
Dura mater
Arachnoid
Pia mater
Brain

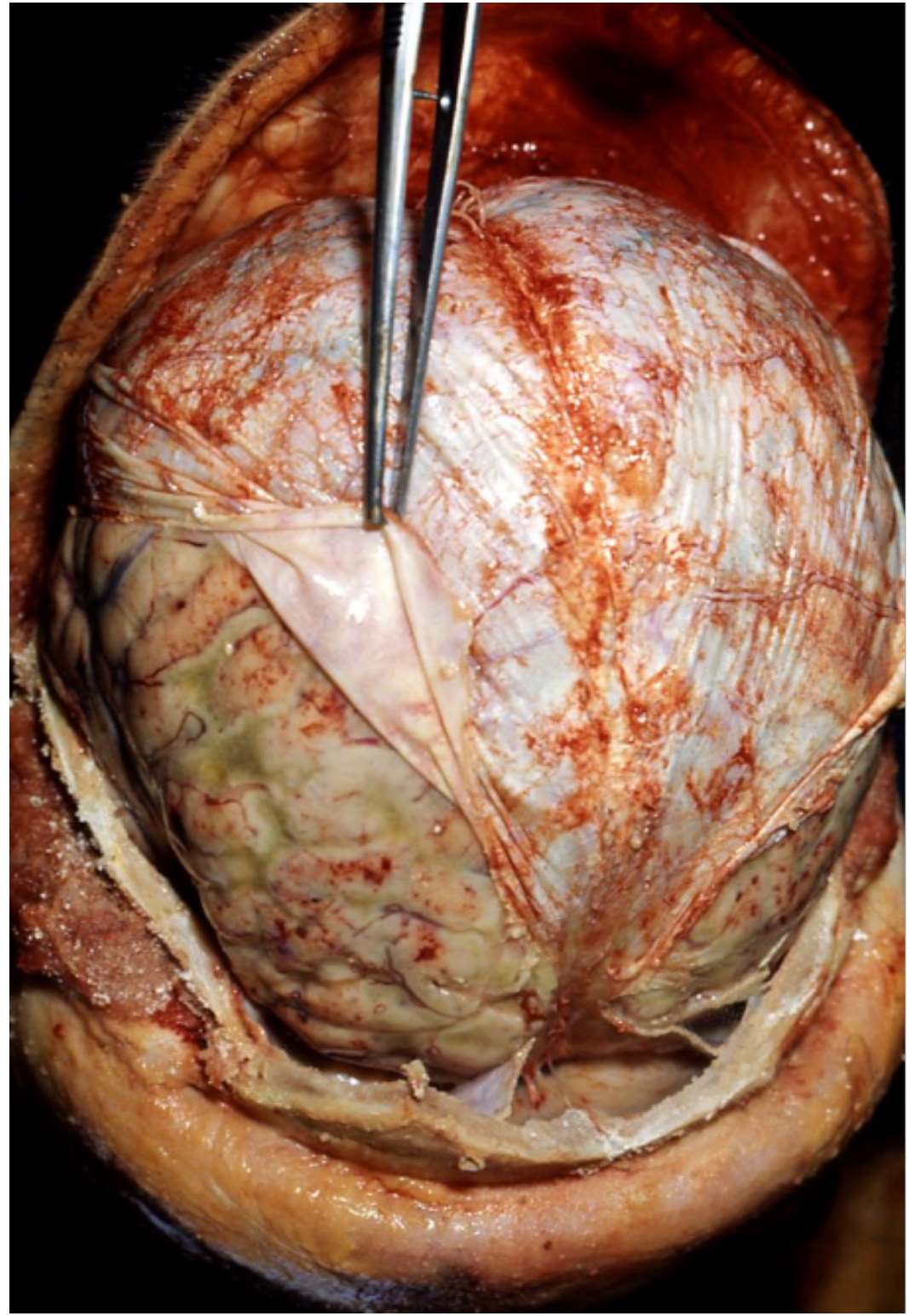


CSF - cerebrospinal fluid - between arachnoid and pia maters

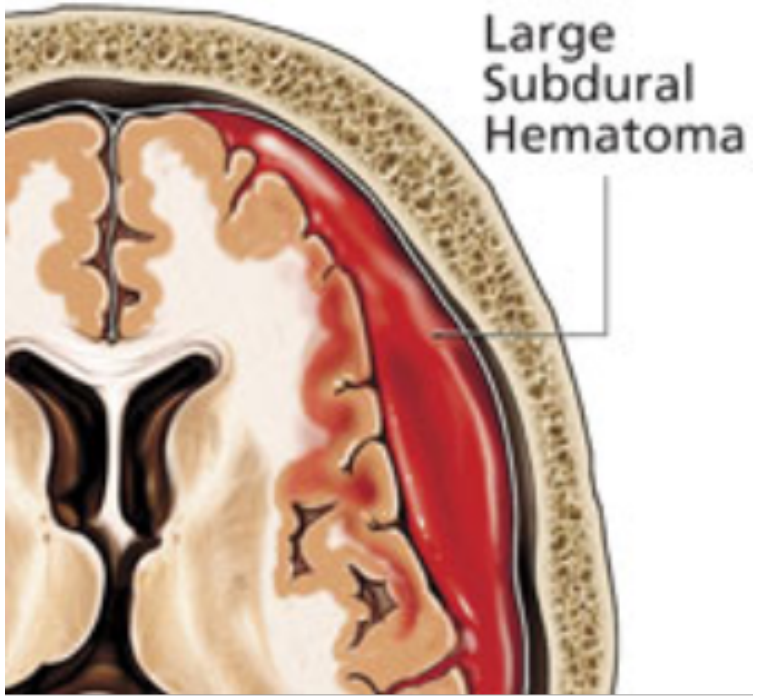
See video of a spinal tap: http://youtu.be/yYZxNsnf18Y

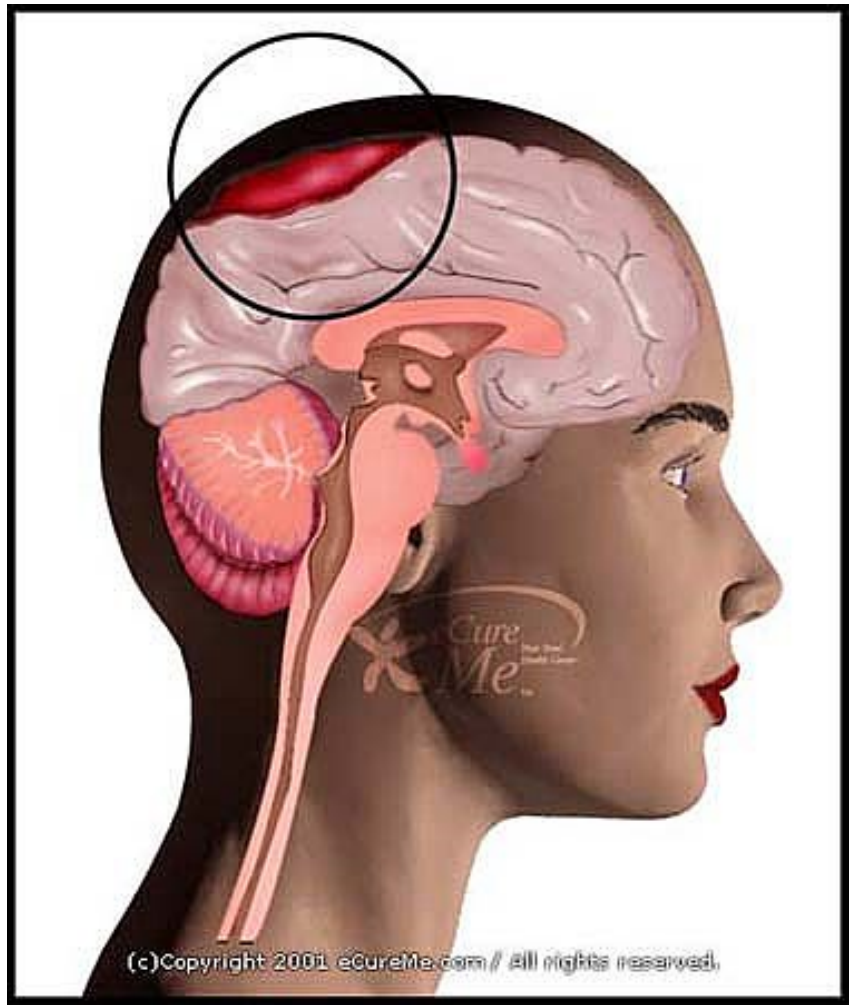


Dura mater is being peeled away in this photo.

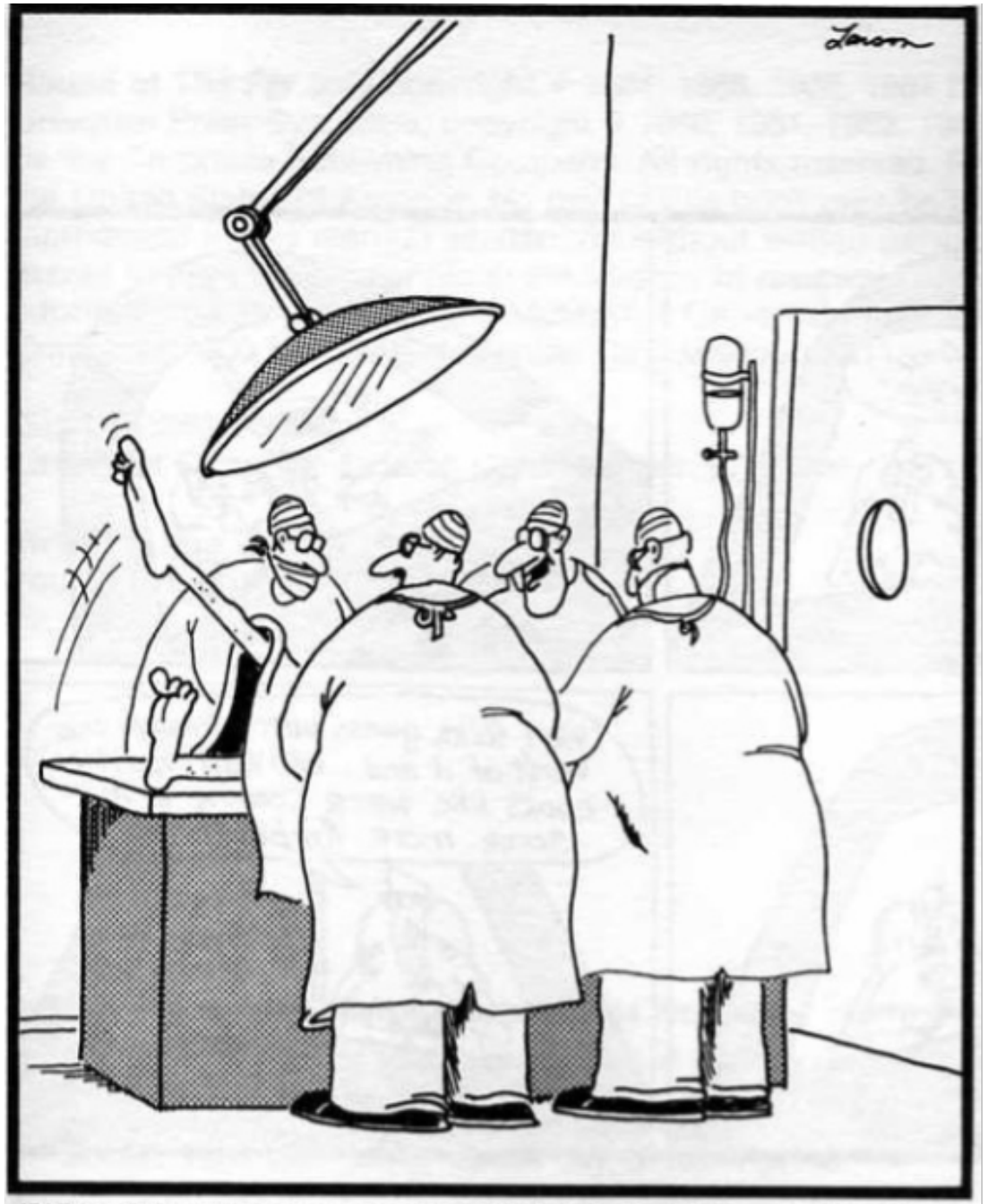


Subdural Hematoma

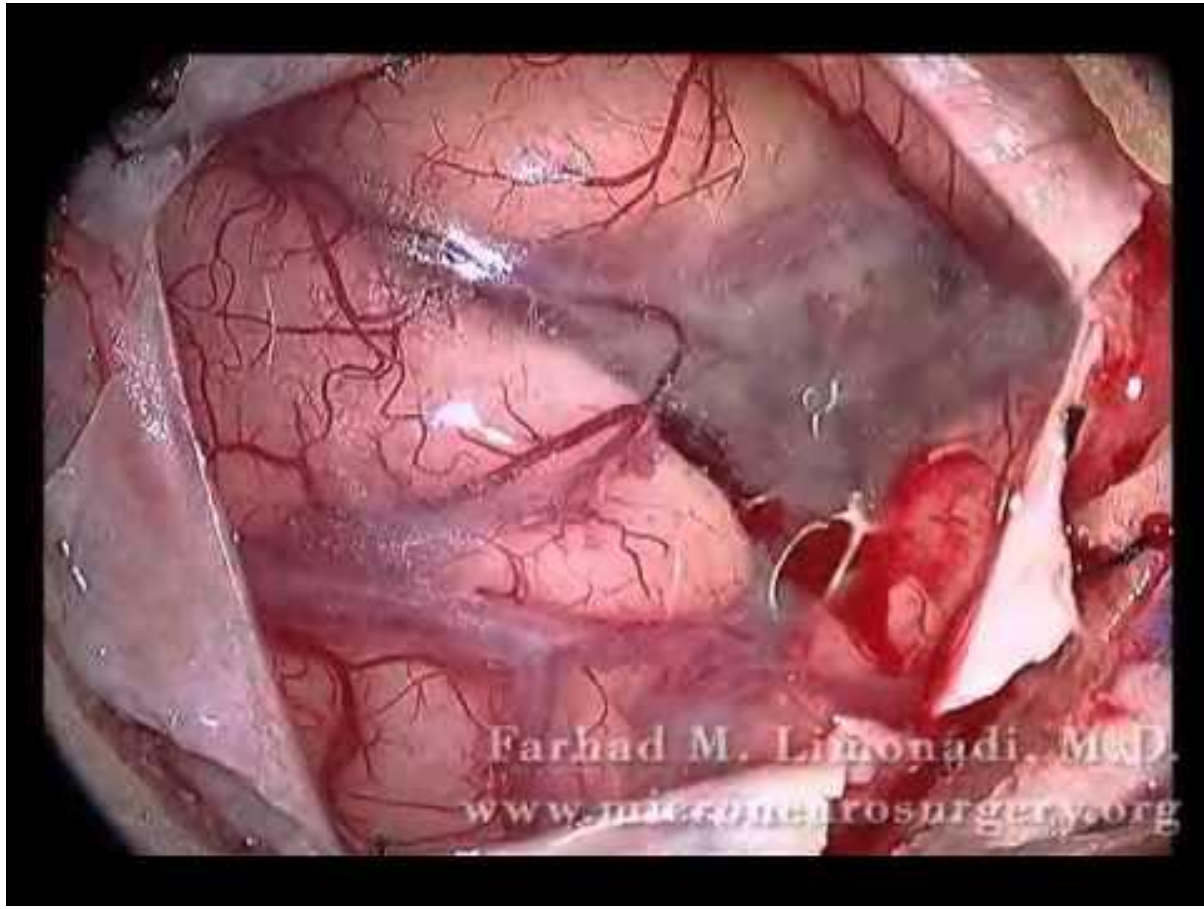




a type of hematoma, usually associated with traumatic brain injury. Blood gathers between the dura mater, and the brain, putting pressure on brain.



"Whoa! *That* was a good one! Try it, Hobbs — just poke his brain right where my finger is."



CNN Video
Showing cognitive tasks during brain surgery as a tumor is removed.

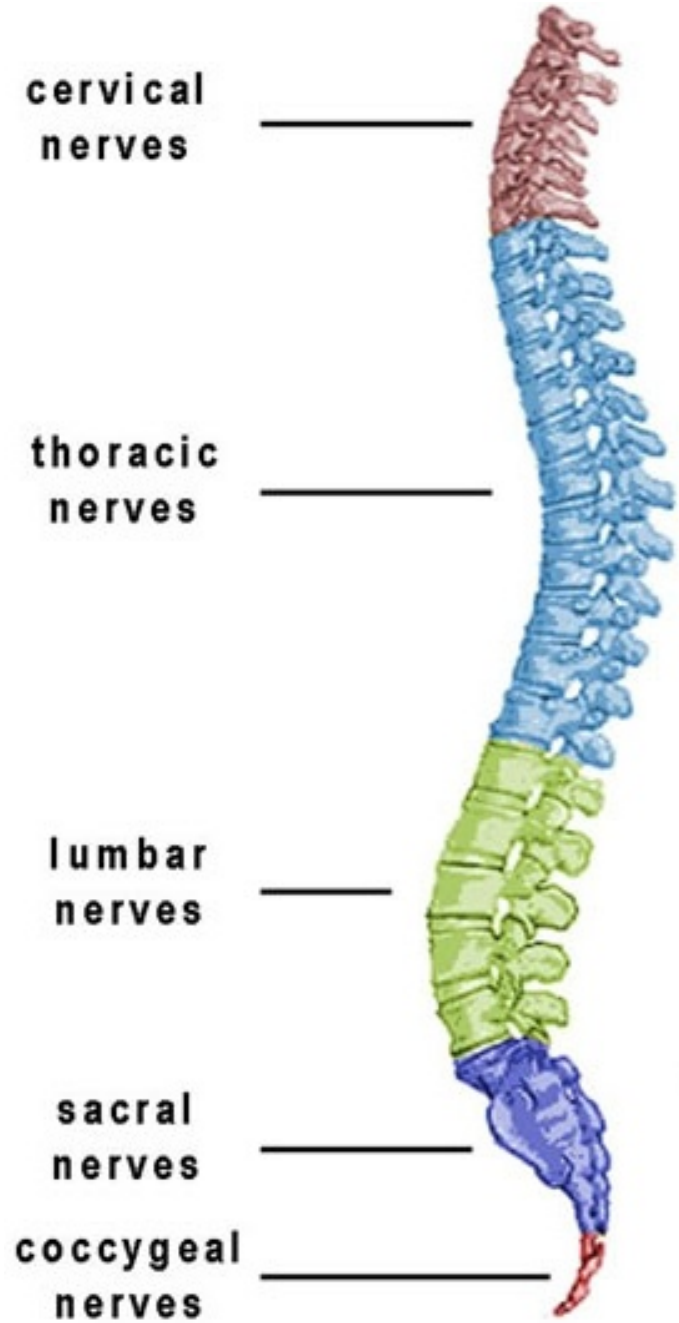
[Natgeo Brain Surgery Video]
- removal of tumor

Spinal Cord

passes down the vertebral canal, has 31 segments (each with a pair of spinal nerves)

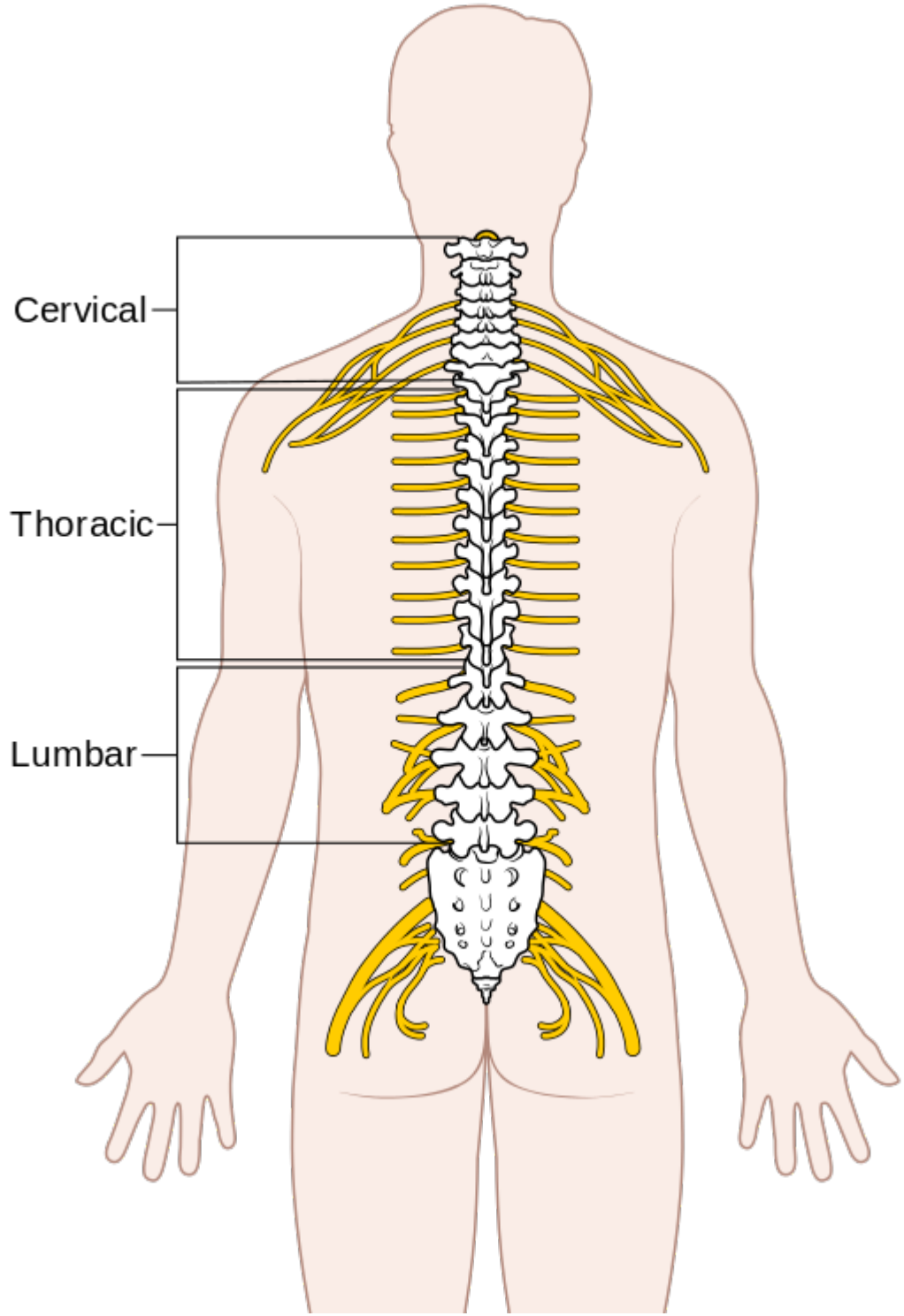
Cervical enlargement = supplies nerves to upper limbs (neck)

Lumbar enlargement = supplies nerves to the lower limbs (lower back)



ASCENDING - impulses travel to the brain (sensory)

DESCENDING - impulses travel to the muscles (motor)

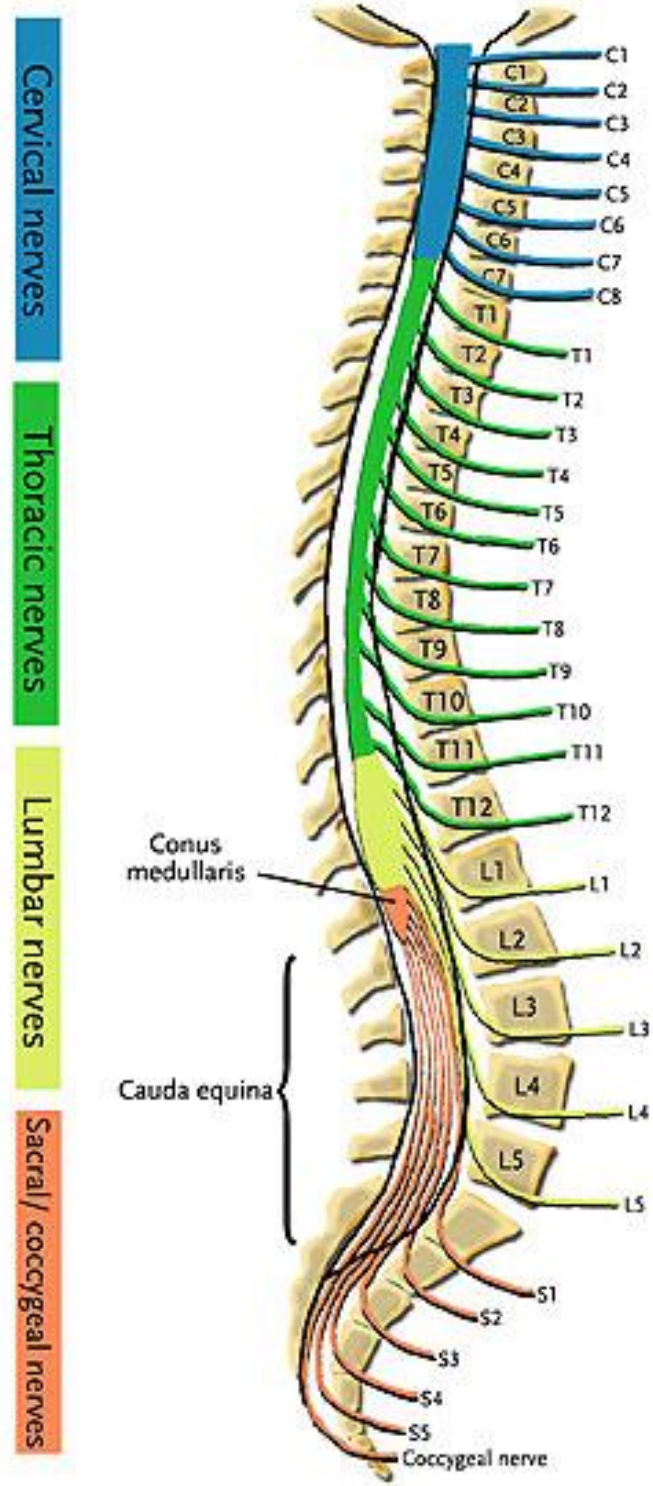


The nerves are numbered based on their location

C1 - C8

T1 - T12

L1 - L5



MENTAL HOSPITAL PHONE MENU

Please select from the following options menu:

If you are obsessive-compulsive, press 1 repeatedly.

If you are co-dependent, please ask someone to press 2 for you.

If you have multiple personalities, press 3, 4, 5 and 6.

If you are paranoid, we know who you are and what you want, stay on the line so we can trace your call.

If you are schizophrenic, listen carefully and a little voice will tell You which number to press.

If you are manic-depressive, hang up. It doesn't matter which number you press, nothing will make you happy anyway.

If you are dyslexic, press 9-6-9-6.

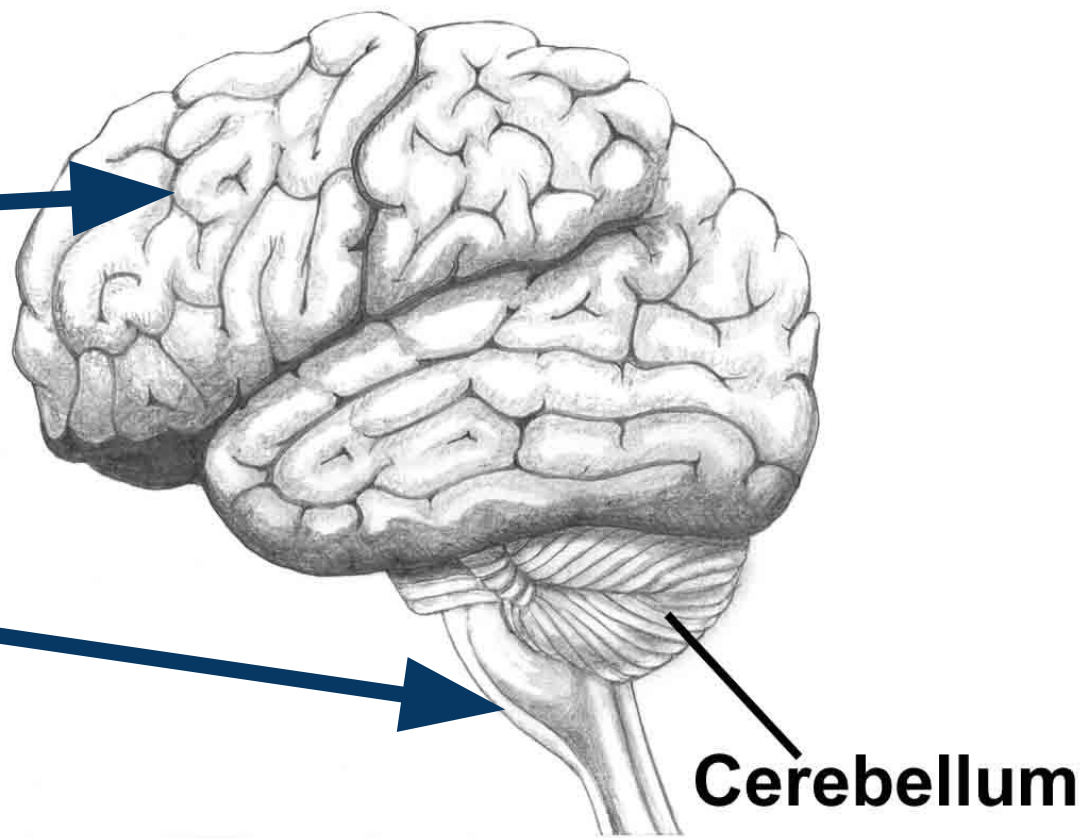
If you are bipolar, please leave a message after the beep or before the beep or after the beep. But Please wait for the beep.

If you have low self-esteem, please hang up. Our operators are too busy to talk with you.

9.13 THE BRAIN

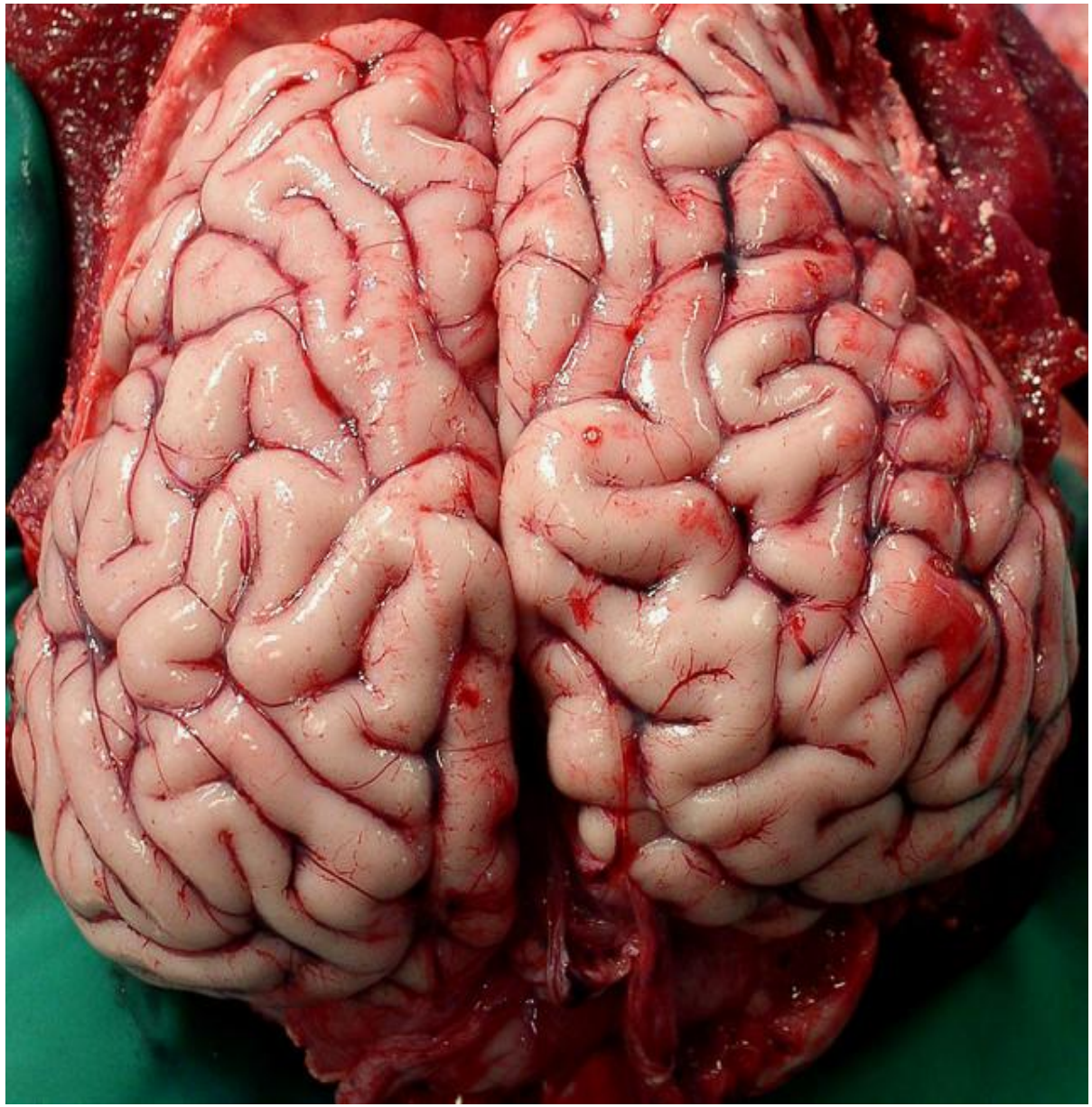
3 Major Parts

- Cerebrum
- Cerebellum
- Brain Stem



CEREBRUM
- wrinkly large part of the brain

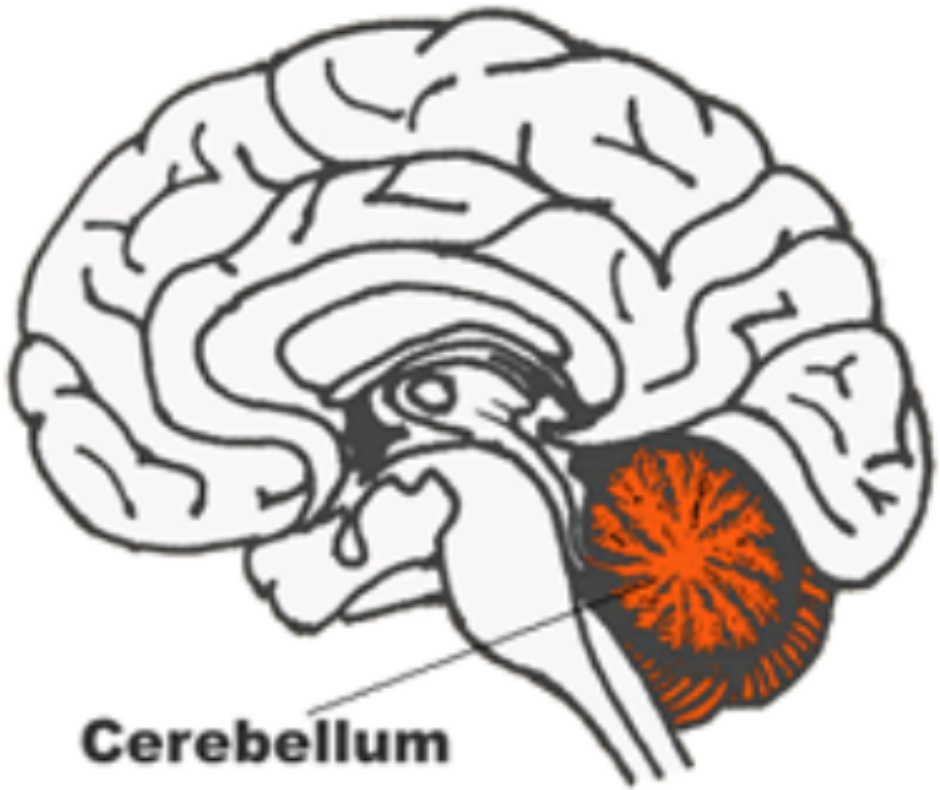
higher mental function, solving problems



CEREBELLUM

Balance and coordination

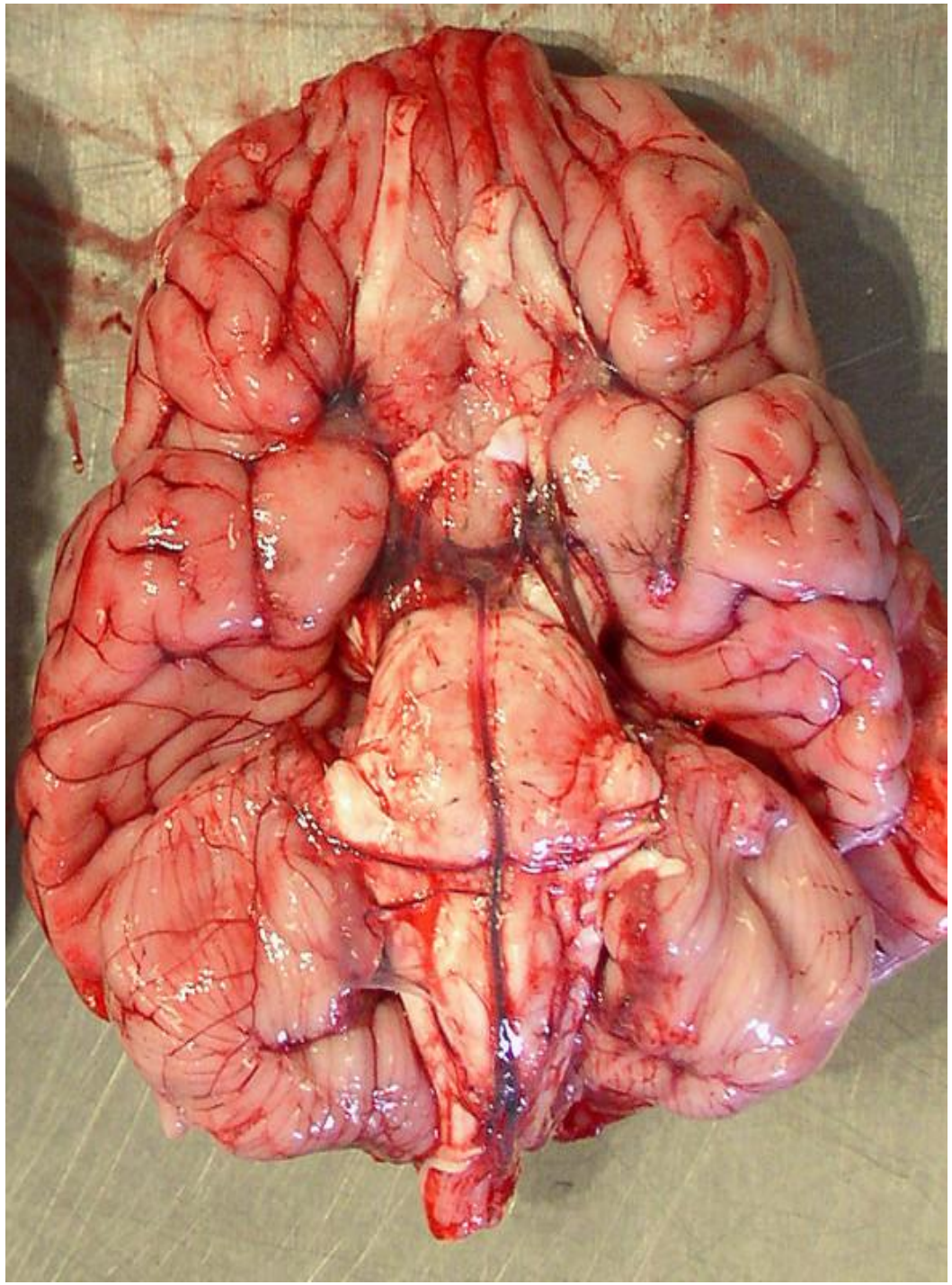
Located at the back of the brain

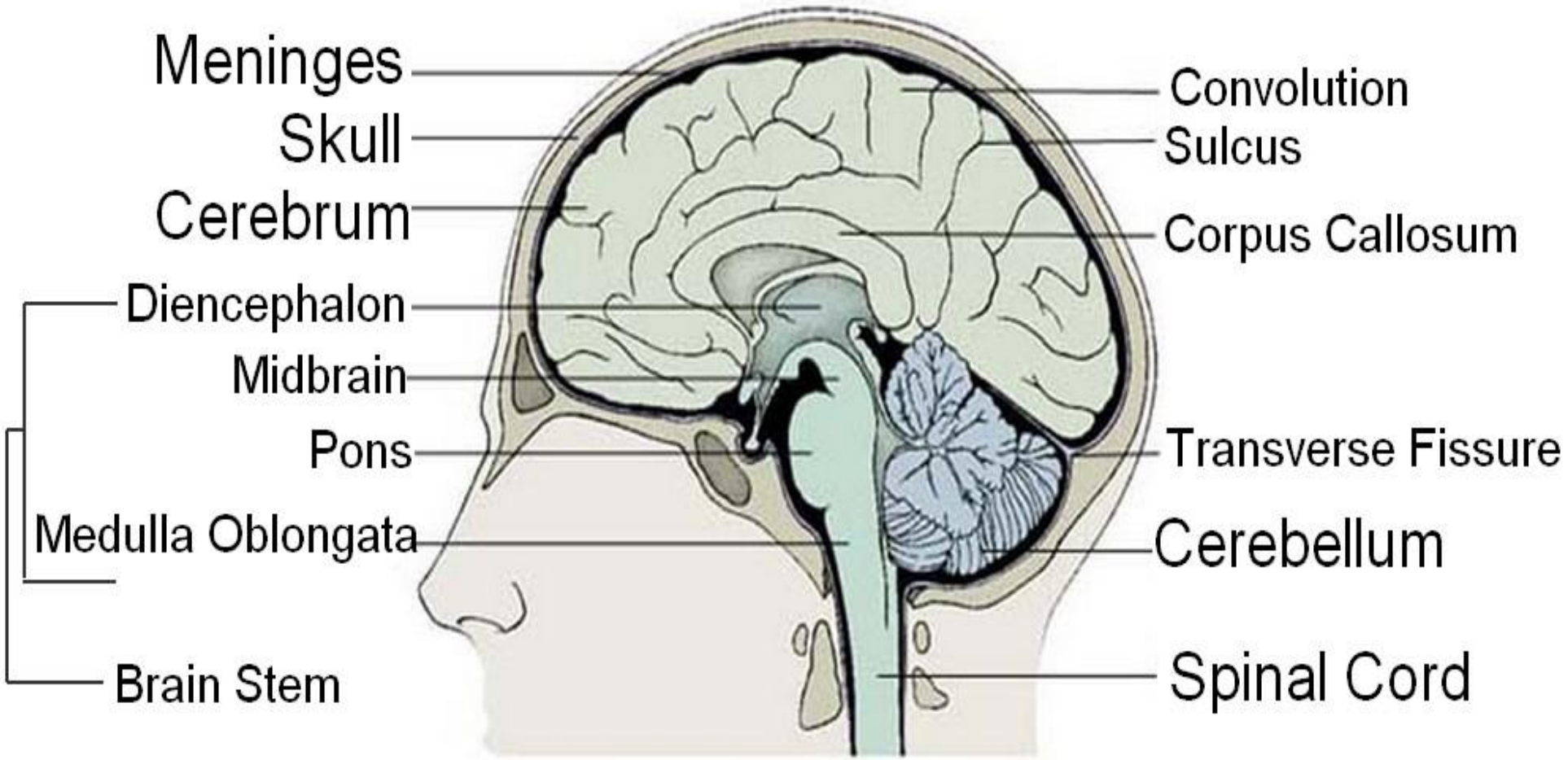


Brain Stem -

regulates visceral functions

(autonomic system)

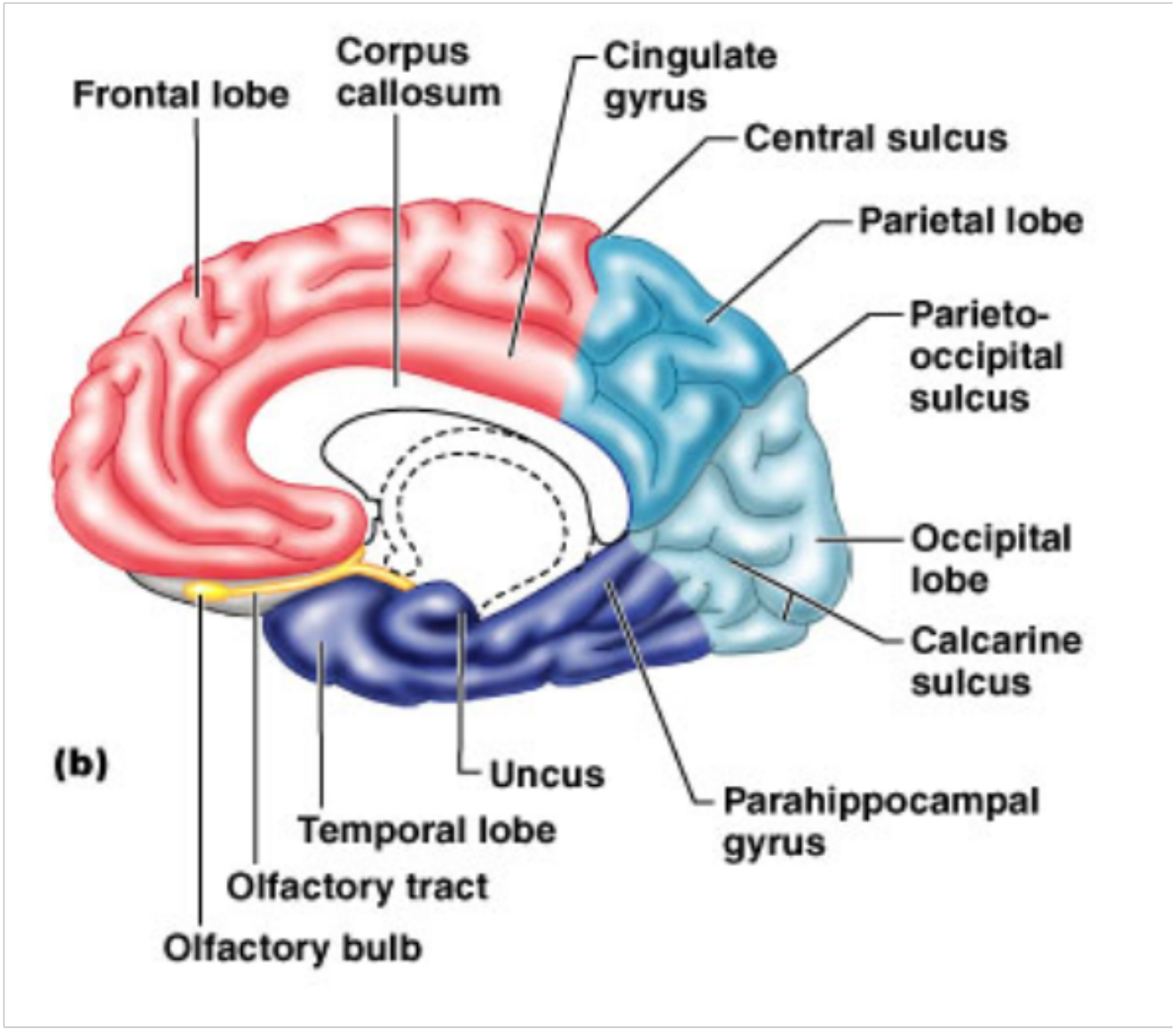



Meninges
Skull
Cerebrum
Diencephalon
Midbrain
Pons
Medulla Oblongata
Brain Stem
Convolution
Sulcus
Corpus Callosum
Transverse Fissure
Cerebellum
Spinal Cord

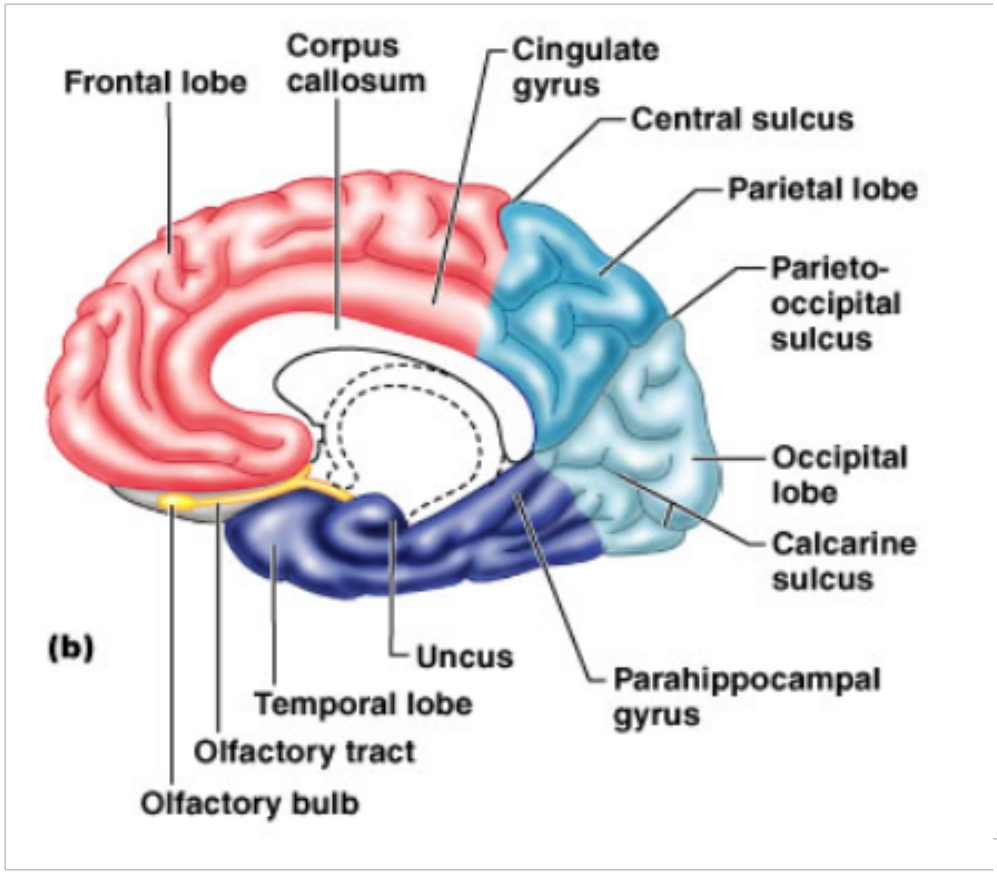
1. Cerebral Hemispheres
   - left and right side separated by the ....

2. Corpus Callosum

- connects the two hemispheres



The Cerebral Hemispheres



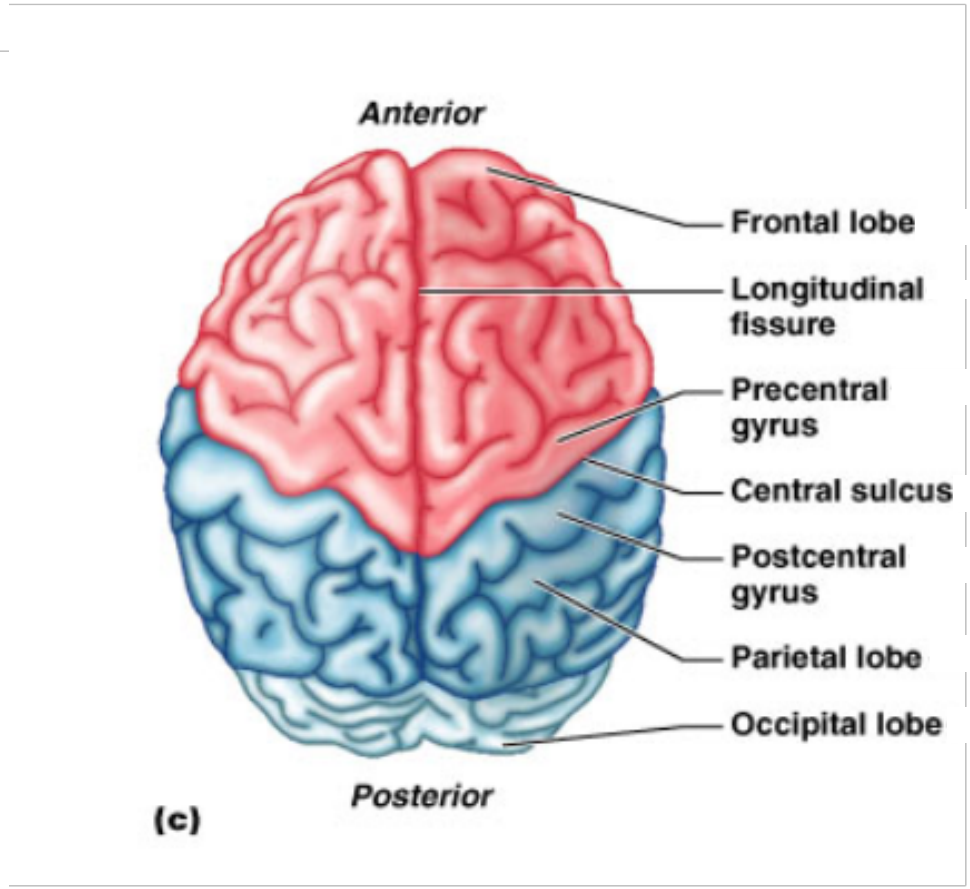
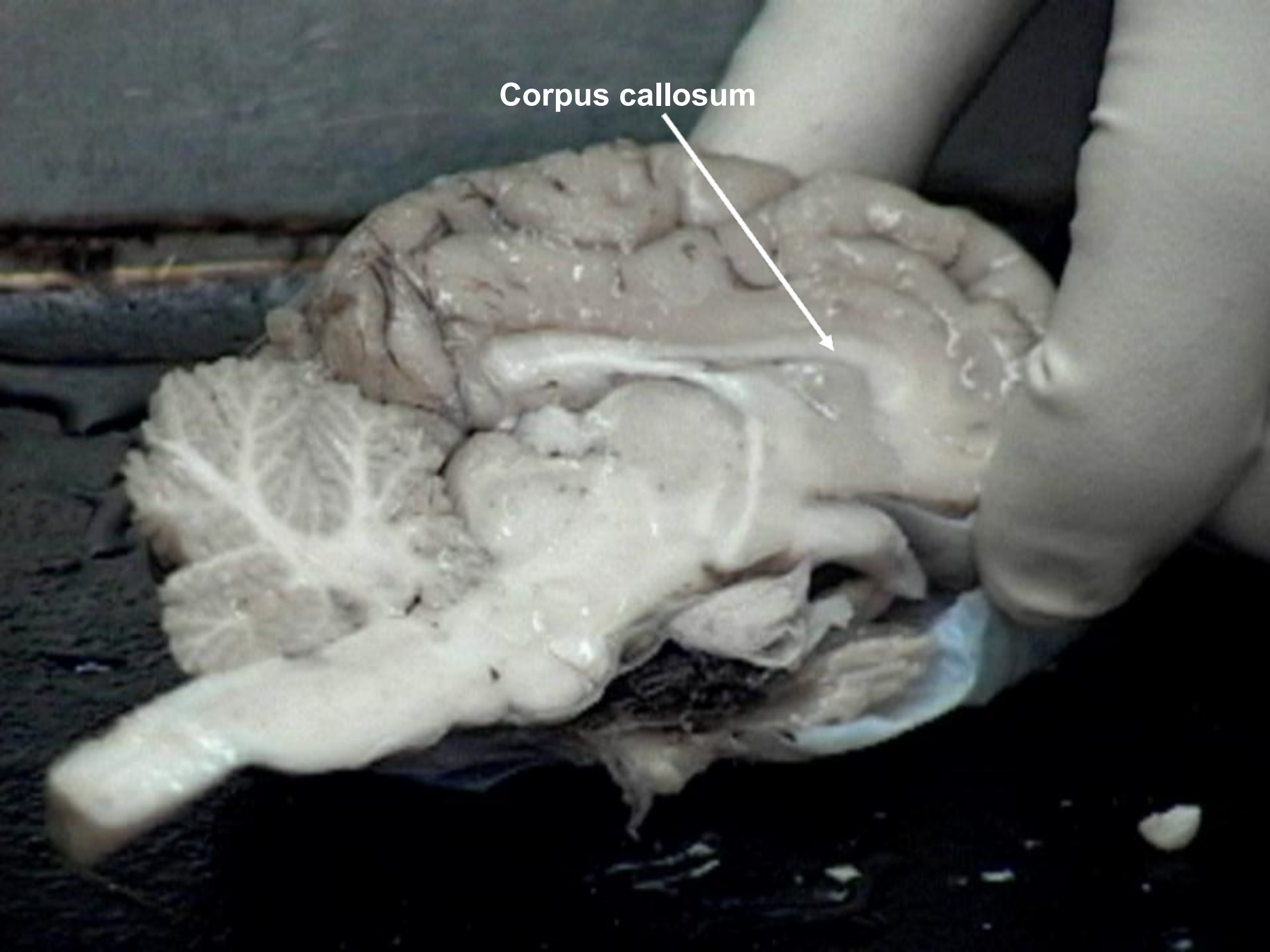


Figure 13.7b, c


Corpus callosum

3. Convolutions of the Brain

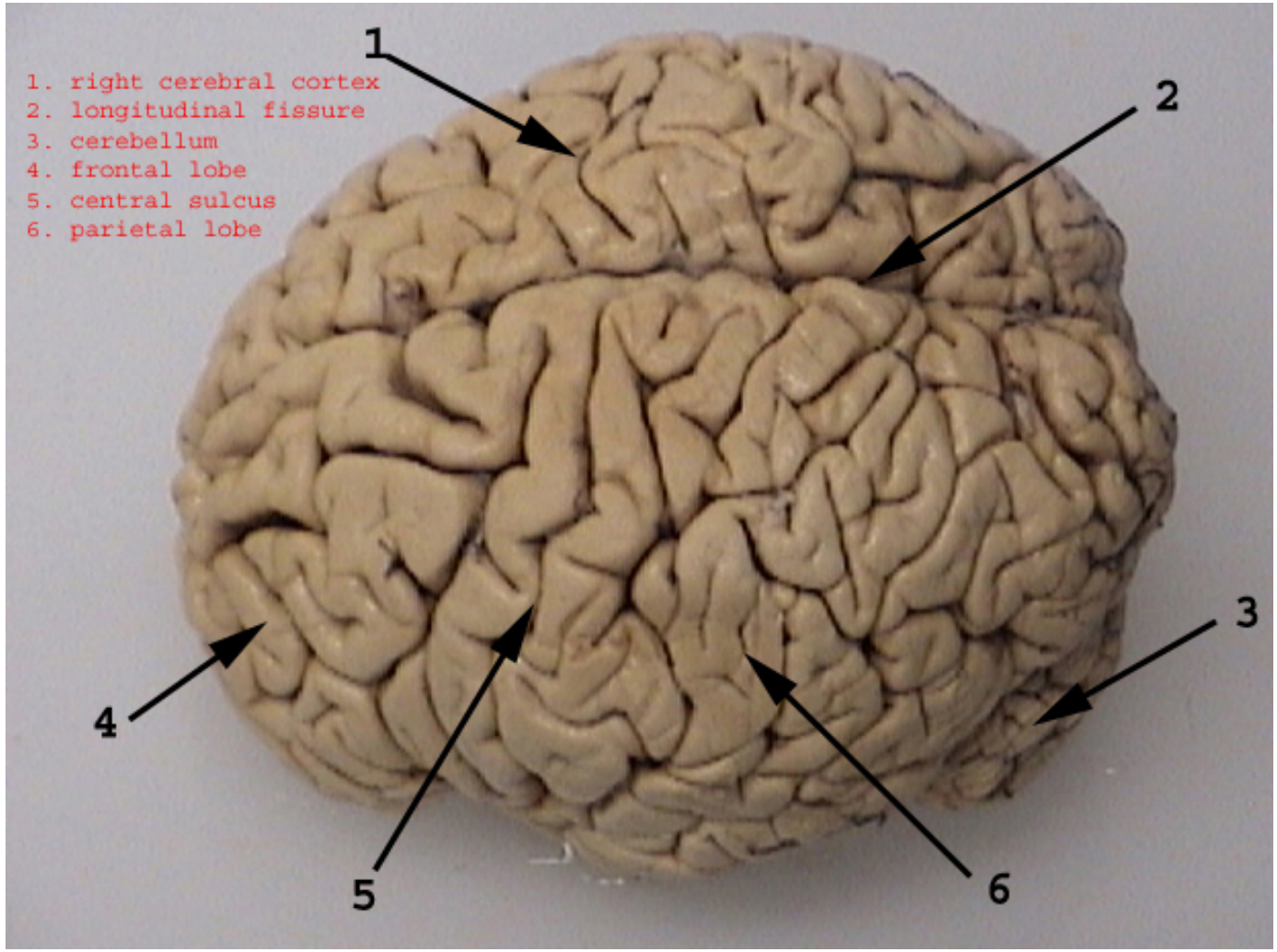
- the wrinkles and grooves of the cerebrum

Fissures = deep groove

Sulcus = shallow groove

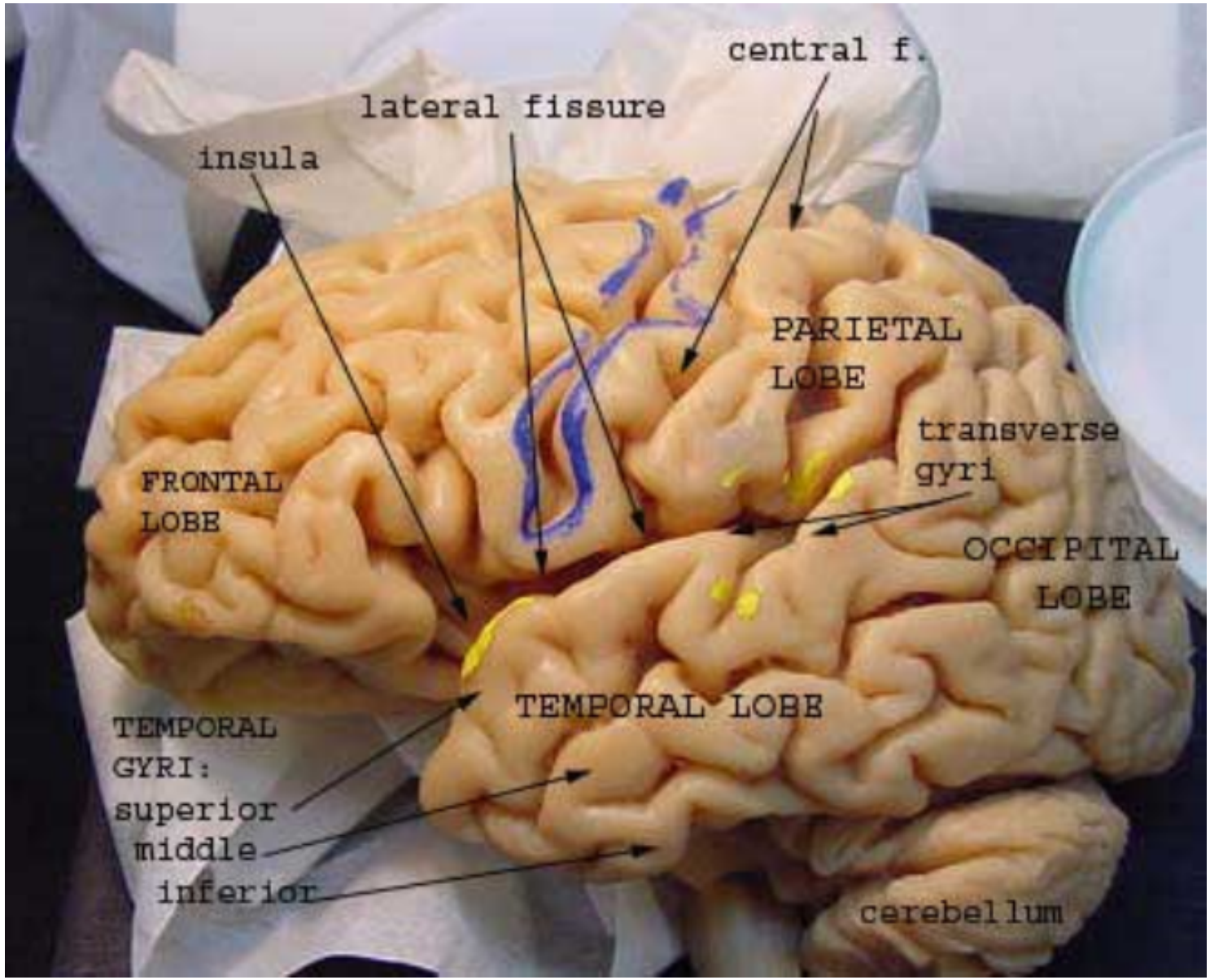
Gyrus = bump

4. Fissures – separate lobes



Longitudinal fissure - separate right and left sides

Transverse Fissure - separates cerebrum from cerebellum



Lateral Fissure separates the temporal lobe from the Frontal and Parietal lobes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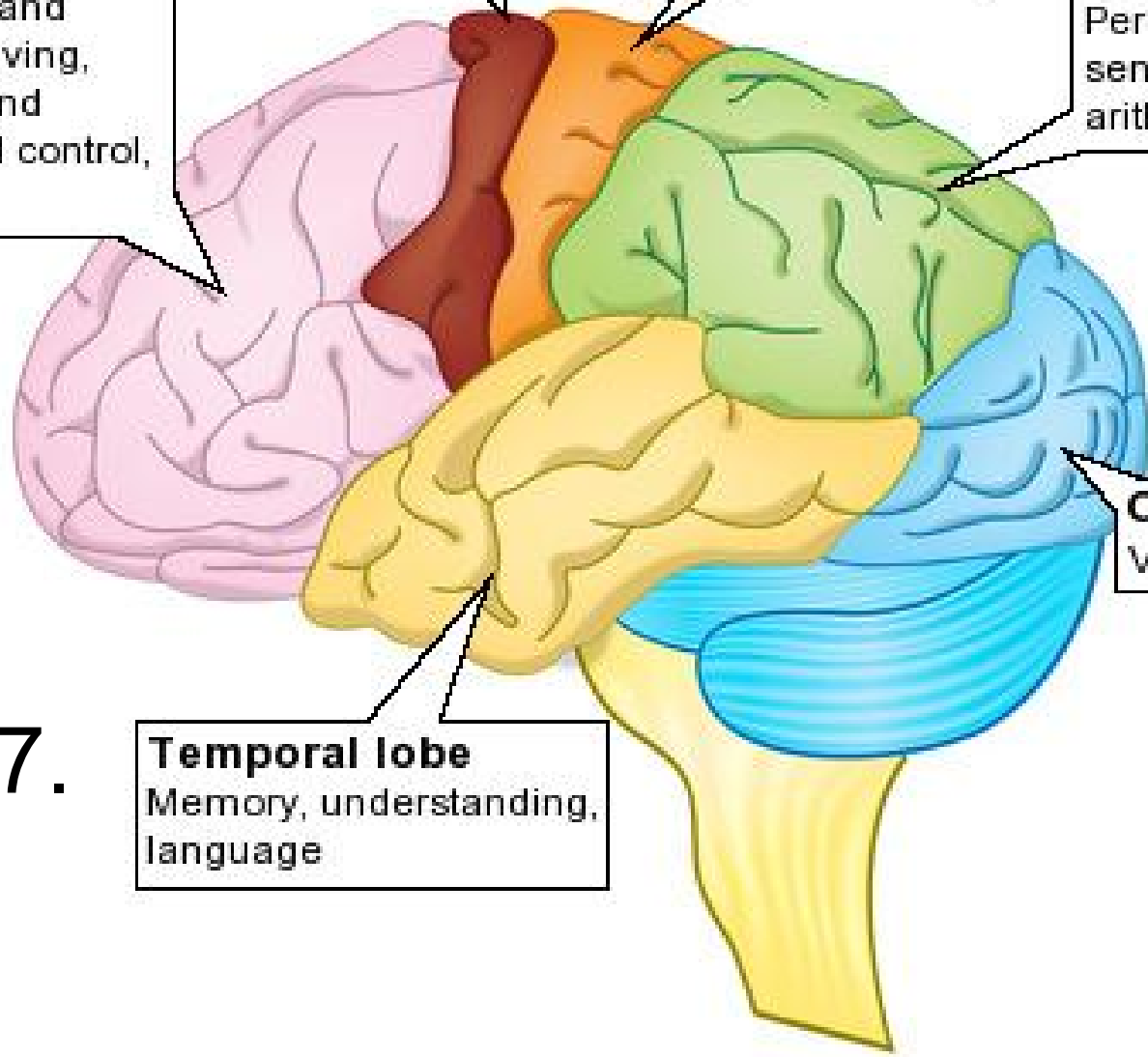
Lobes of the Brain



5. **Frontal lobe**
Executive functions, thinking, planning, organising and problem solving, emotions and behavioural control, personality

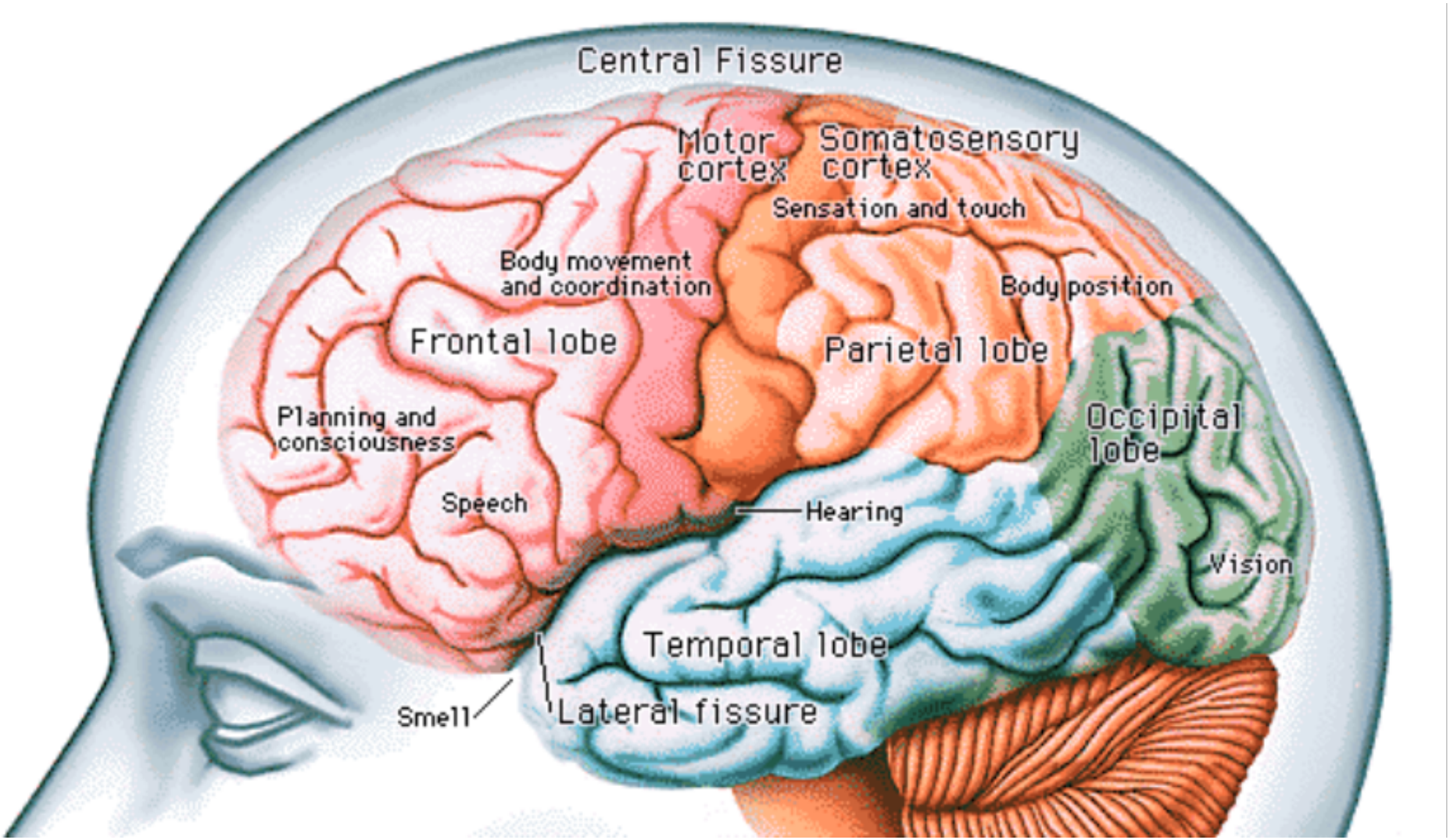
9. **Motor cortex**
Movement

10. **Sensory cortex**
Sensations

6. **Parietal lobe**
Perception, making sense of the world, arithmetic, spelling

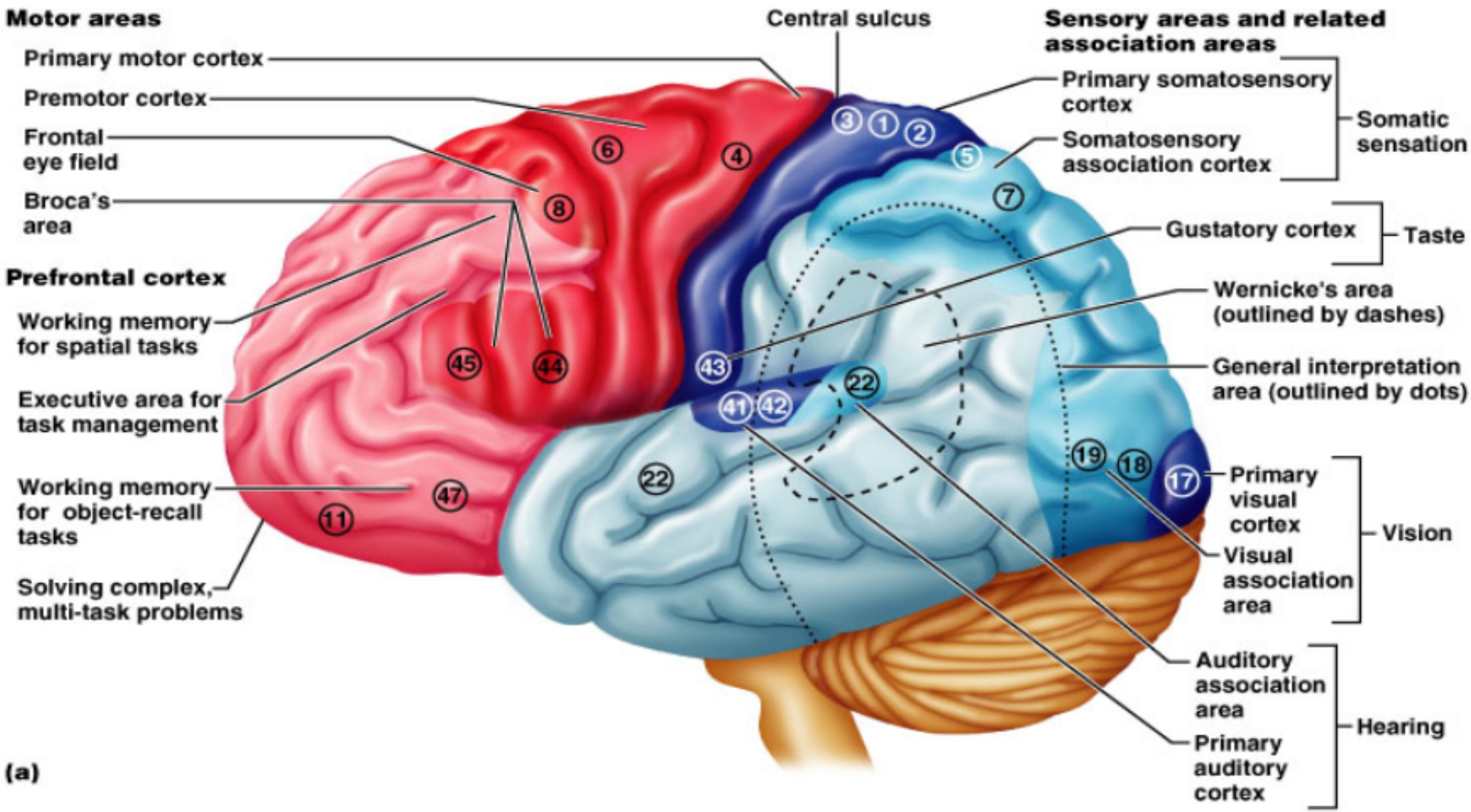
8. **Occipital lobe**
Vision

7. **Temporal lobe**
Memory, understanding, language

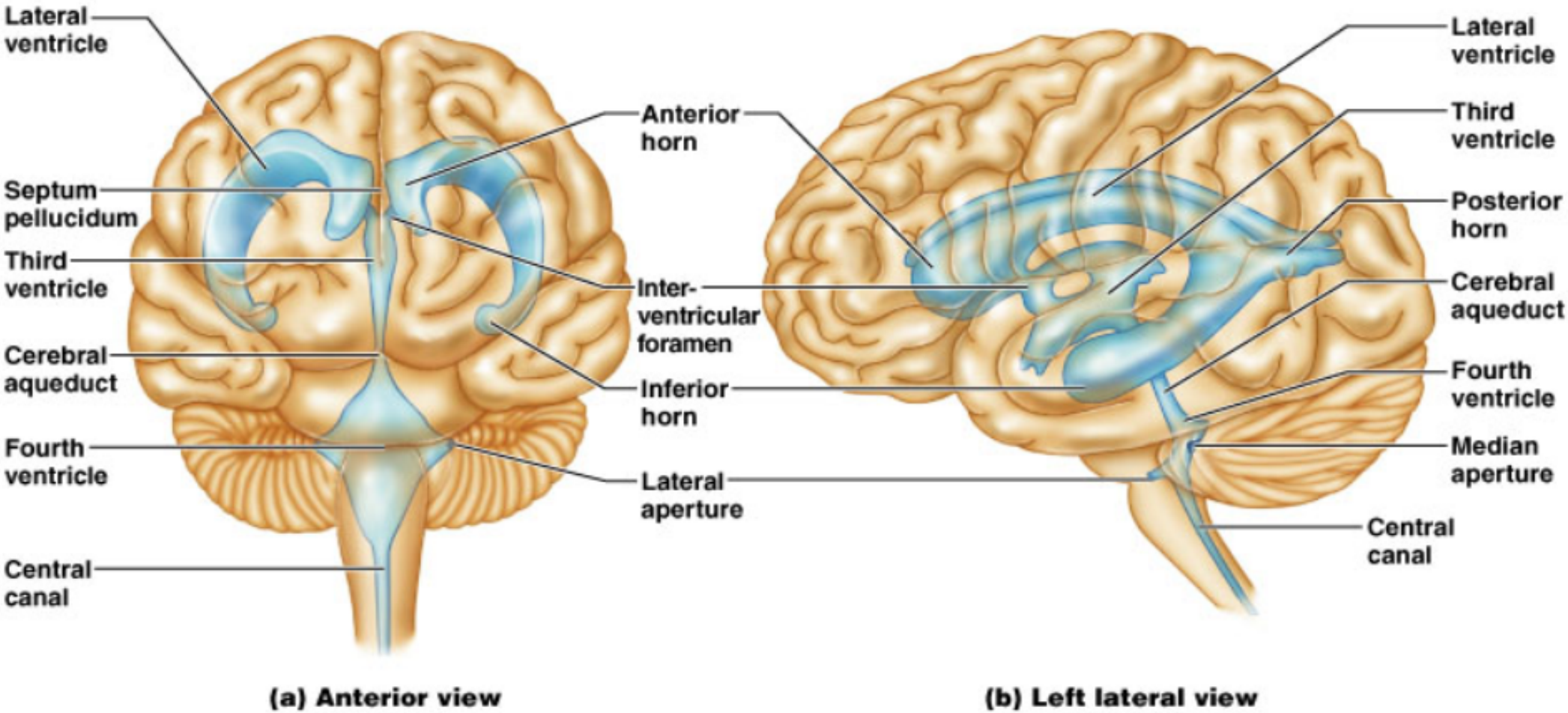


11. Cerebral Cortex - thin layer of gray matter that is the outermost portion of cerebrum (the part with all the wrinkles)

Functional and Structural Areas of the Cerebral Cortex

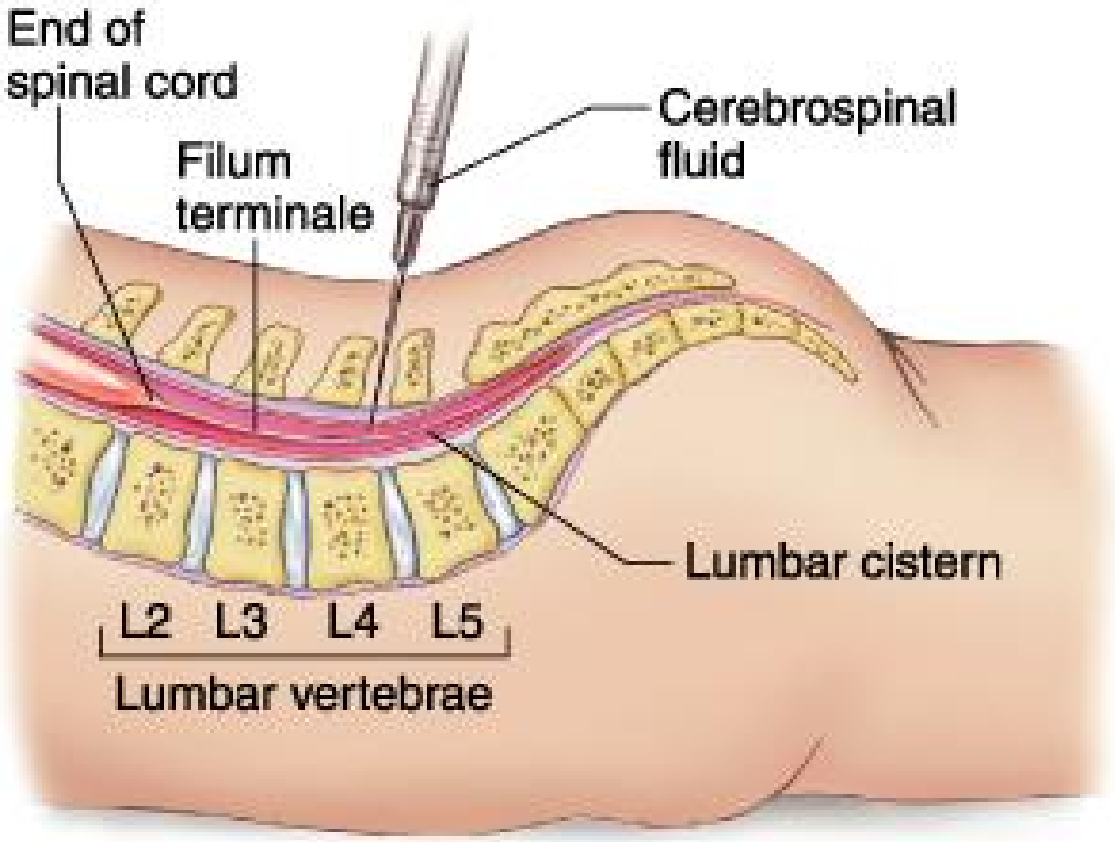


11.VENTRICLES OF THE BRAIN



Fluid filled cavities, contain CSF

12. Cerebrospinal Fluid (CSF) - fluid that protects and supports brain



See procedure at http://youtu.be/yYZxNsnf18Y

Lumbar puncture (spinal tap) is performed in your lower back, in the lumbar region. During lumbar puncture, a needle is inserted between two lumbar bones (vertebrae) to remove a sample of cerebrospinal fluid .

This can diagnose infections, such as meningitis; disorders of the central nervous system, such as multiple sclerosis; or cancers of the brain or spinal cord.

13. Association Areas

- higher levels of thinking, interpreting and analyzing information

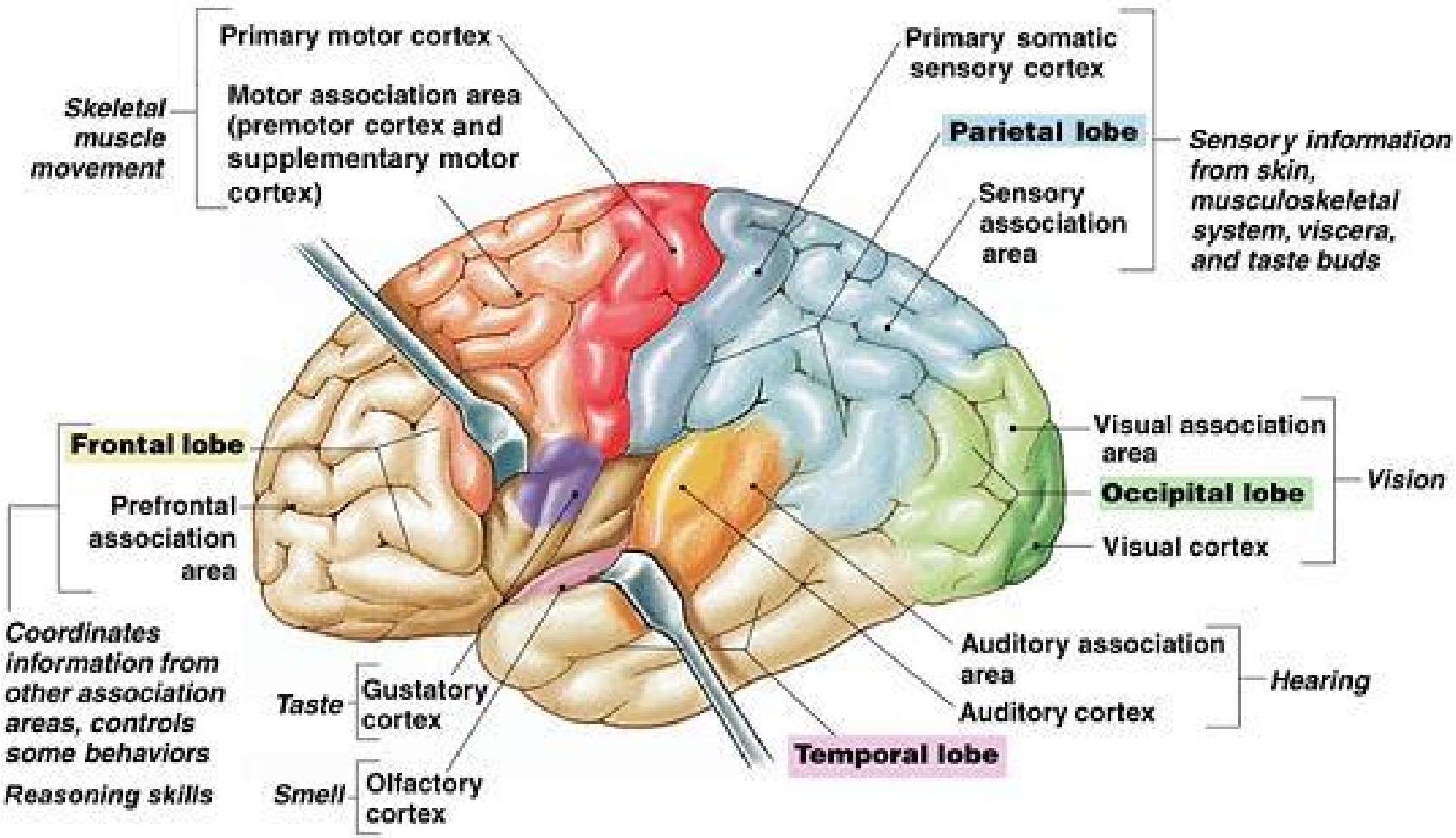
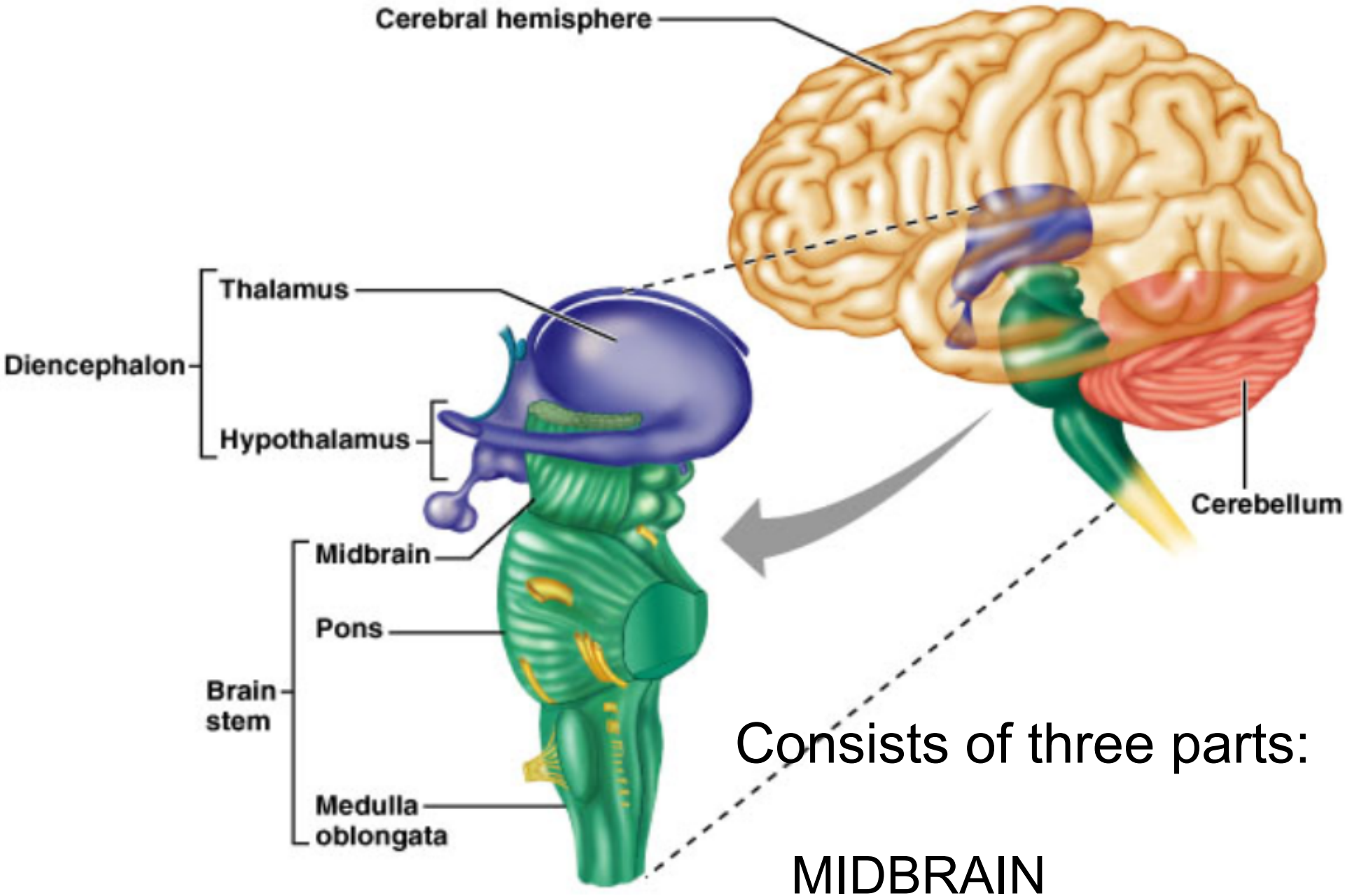


Fig. 9-15



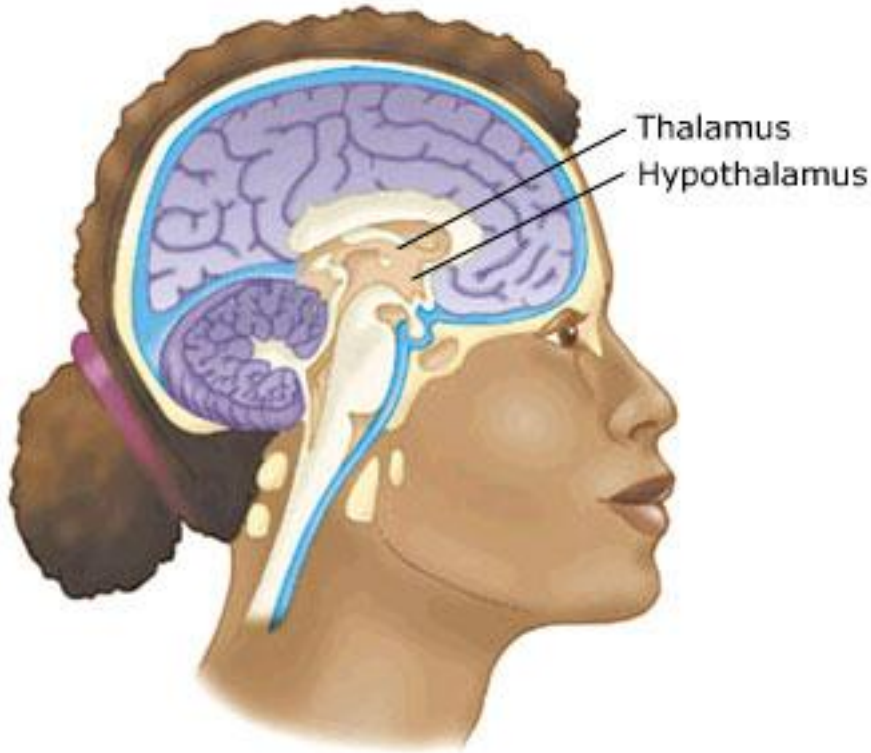
BRAIN STEM

Consists of three parts:

MIDBRAIN
PONS
MEDULLA OBLONGATA

1. Diencephalon

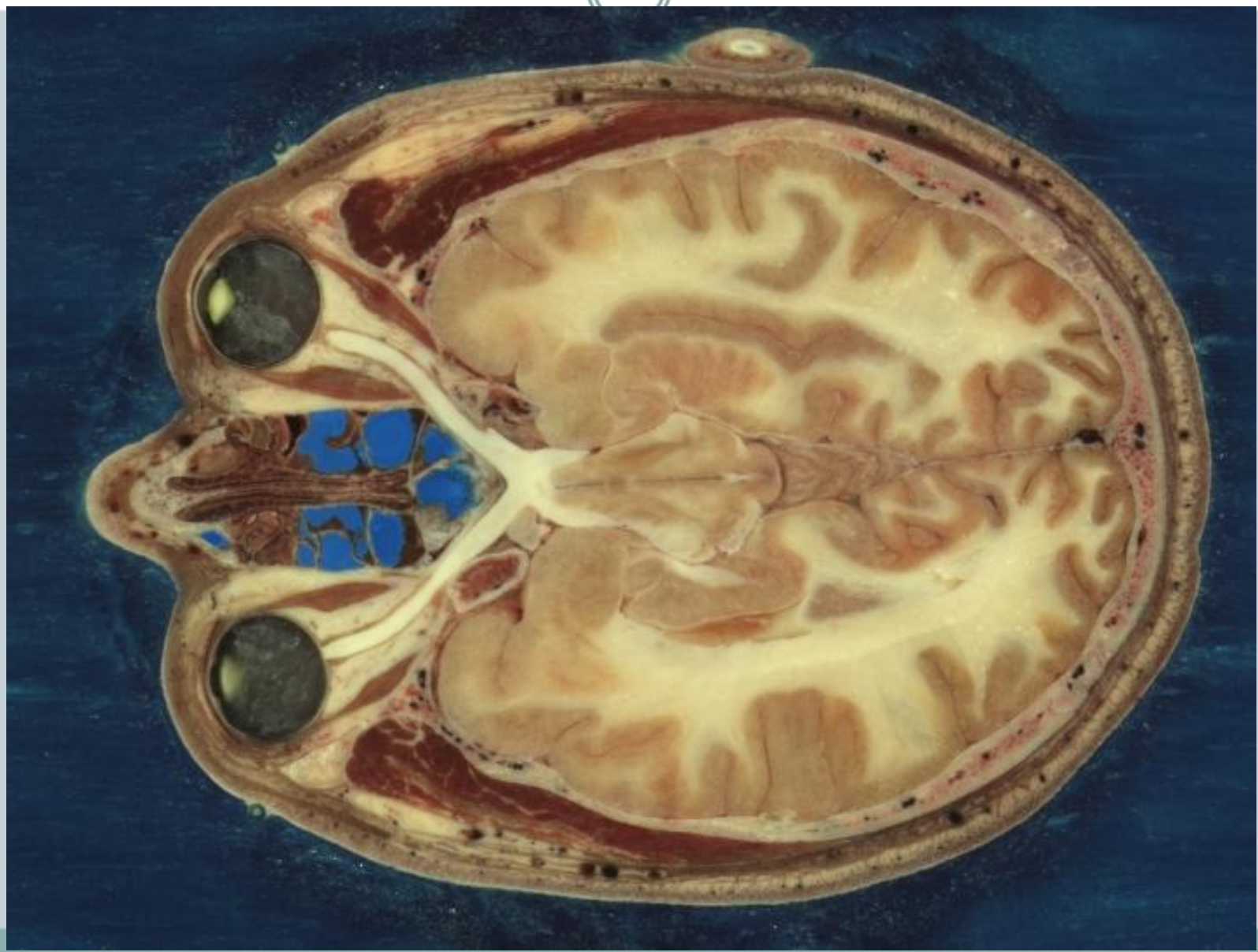
has 2 parts.....

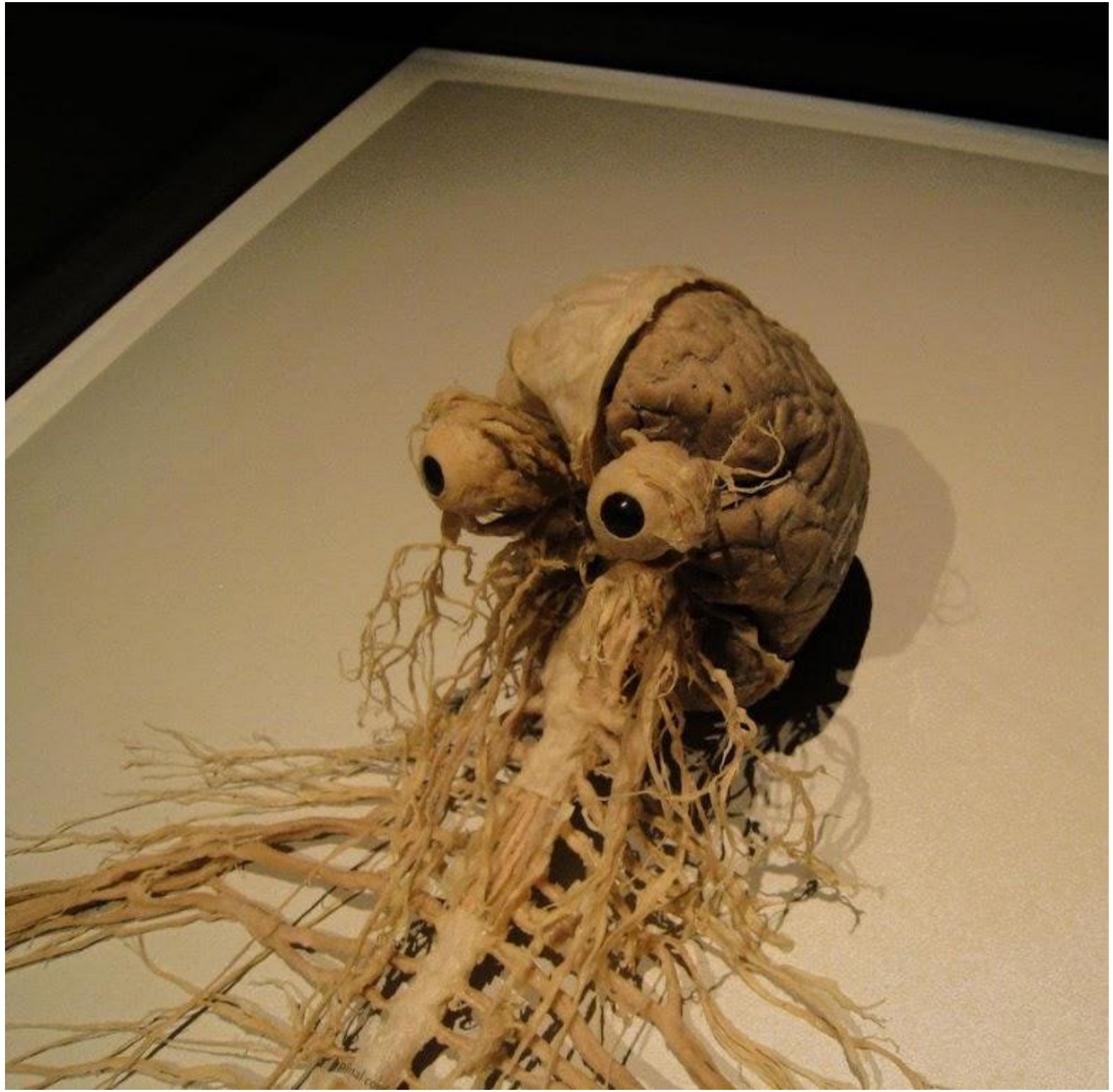


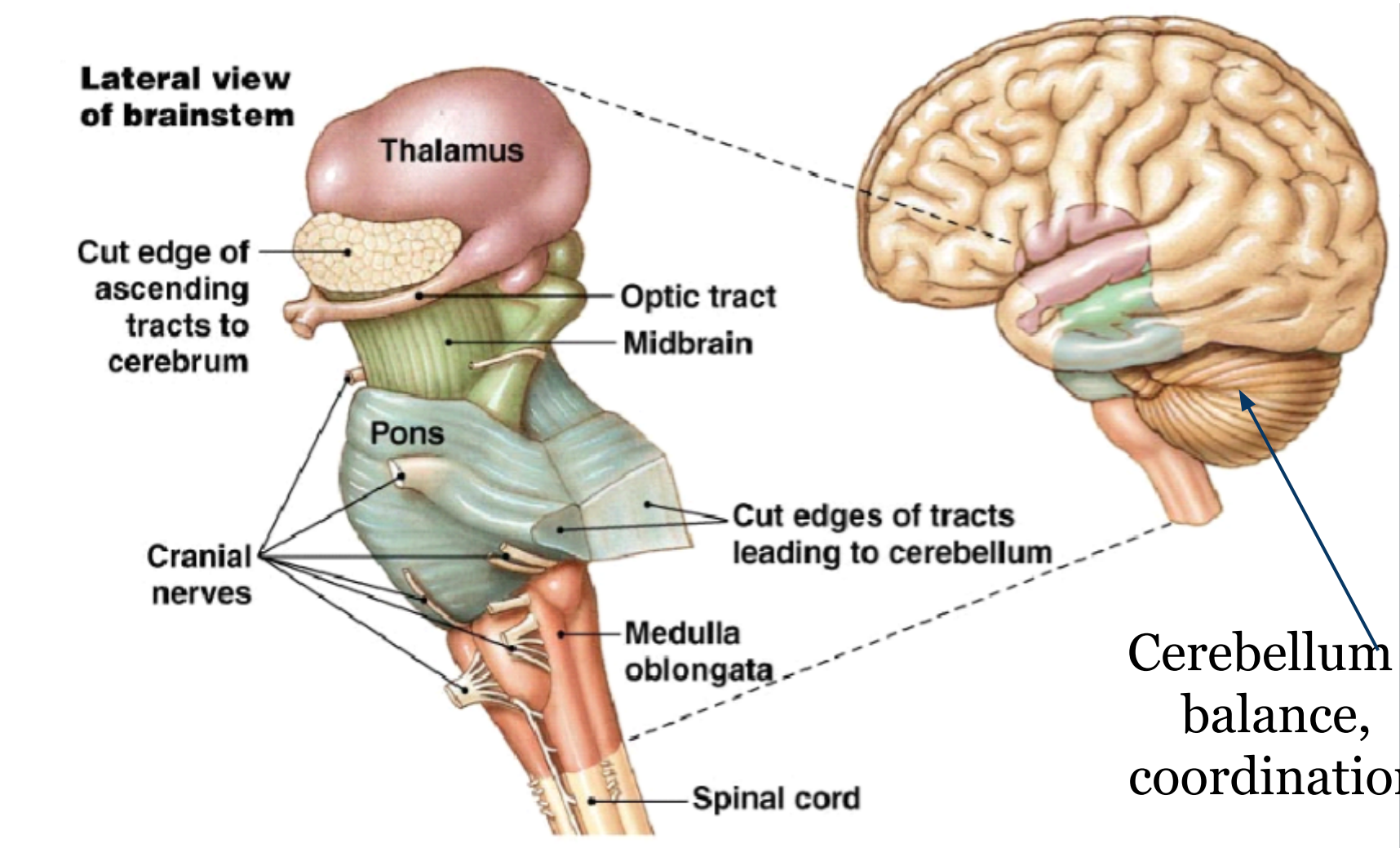
Hypothalamus - hormones, heart rate, blood pressure, body temp, hunger

Thalamus - relay station

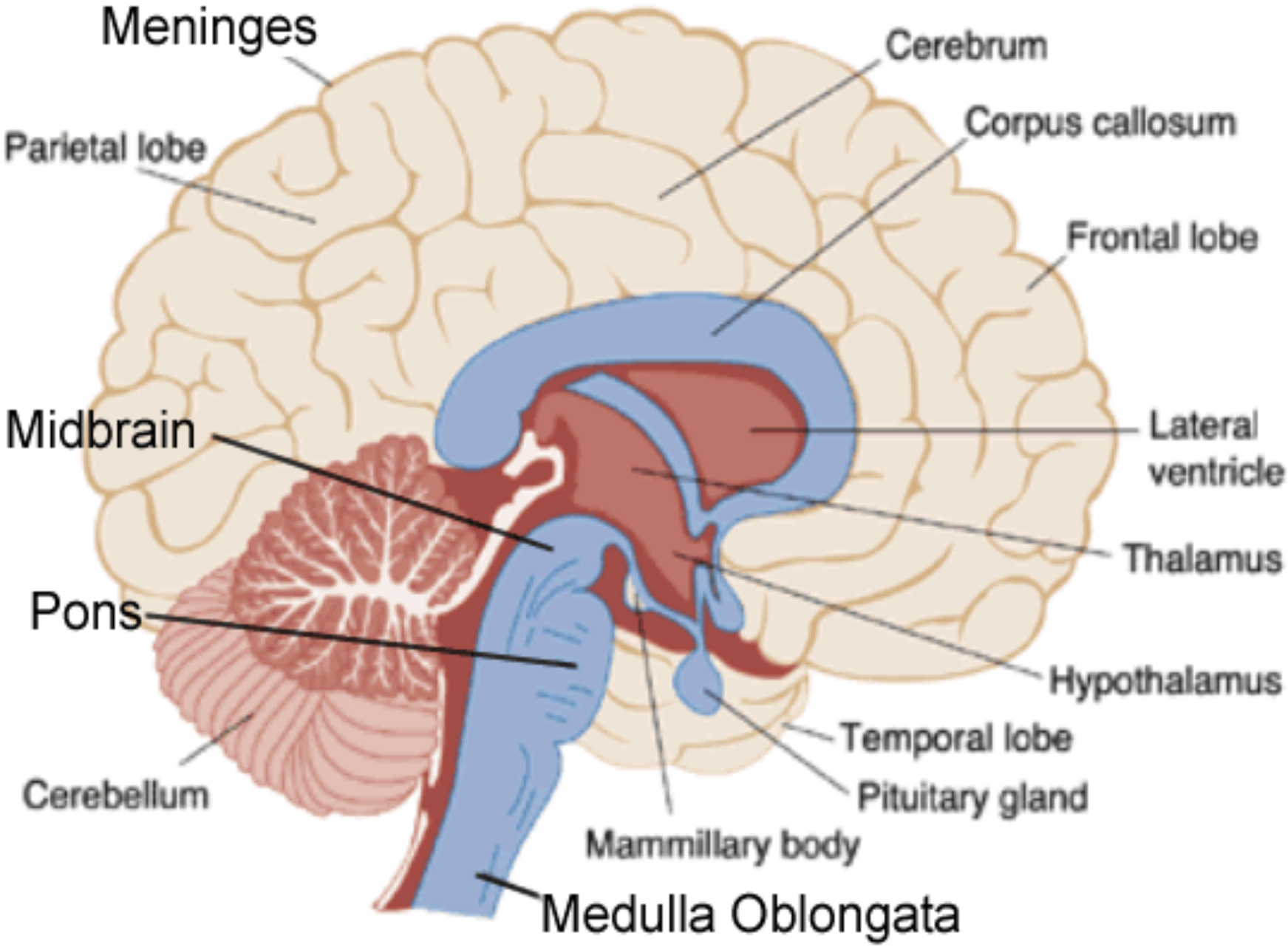
4. Optic Tract / Chiasma - optic nerves cross over each other





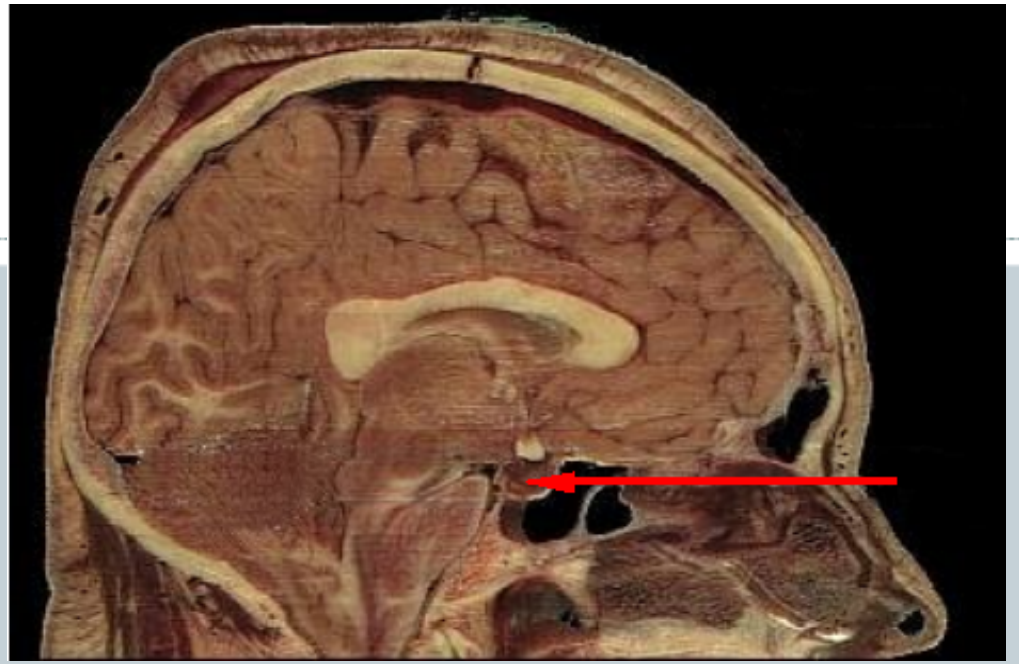


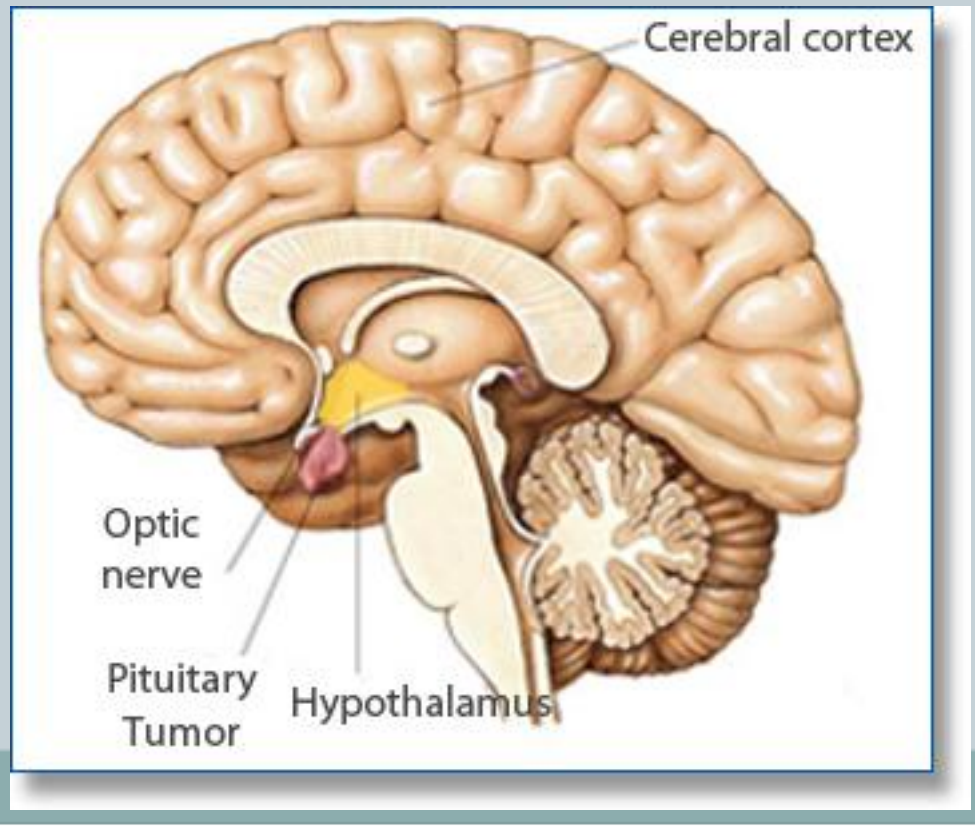
5. Midbrain – visual reflexes, eye movements
6. Pons - relay sensory information
7. Medulla – heart, respiration, blood pressure

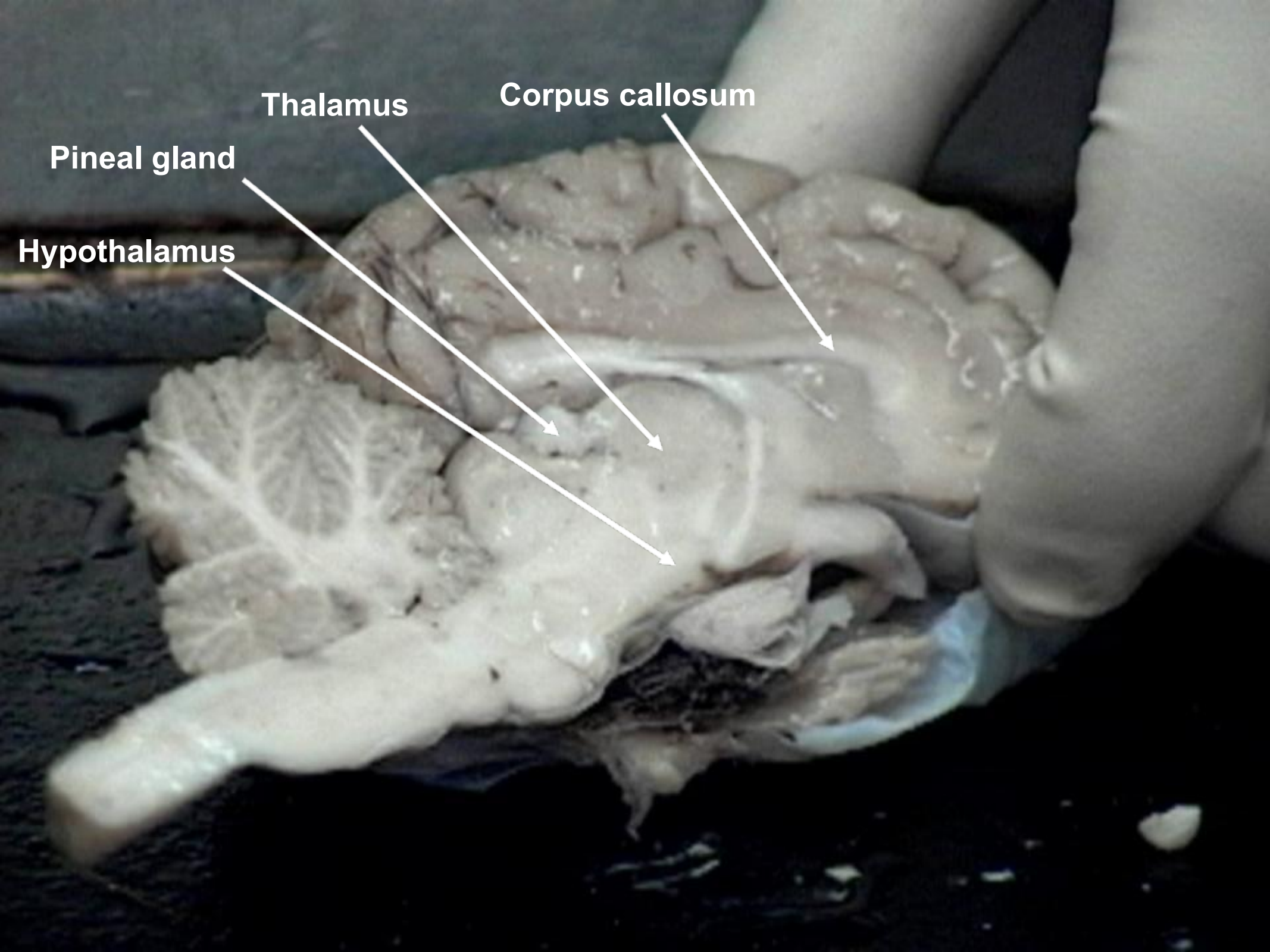

Meninges
Cerebrum
Corpus callosum
Parietal lobe
Frontal lobe
Midbrain
Lateral ventricle
Thalamus
Pons
Hypothalamus
Temporal lobe
Cerebellum
Pituitary gland
Mammillary body
Medulla Oblongata

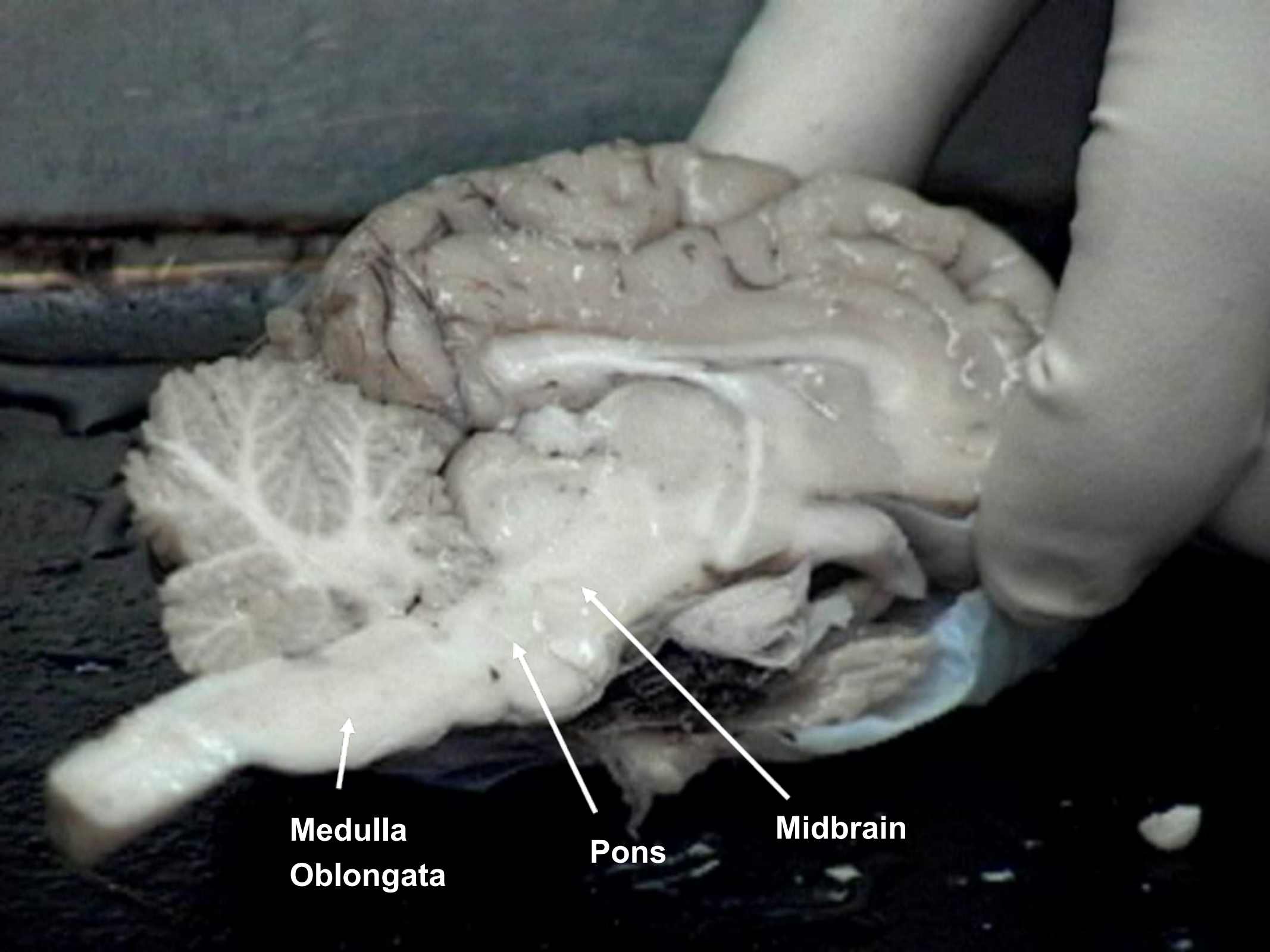
Pituitary Gland

The "master gland" of the endocrine system. It controls hormones.



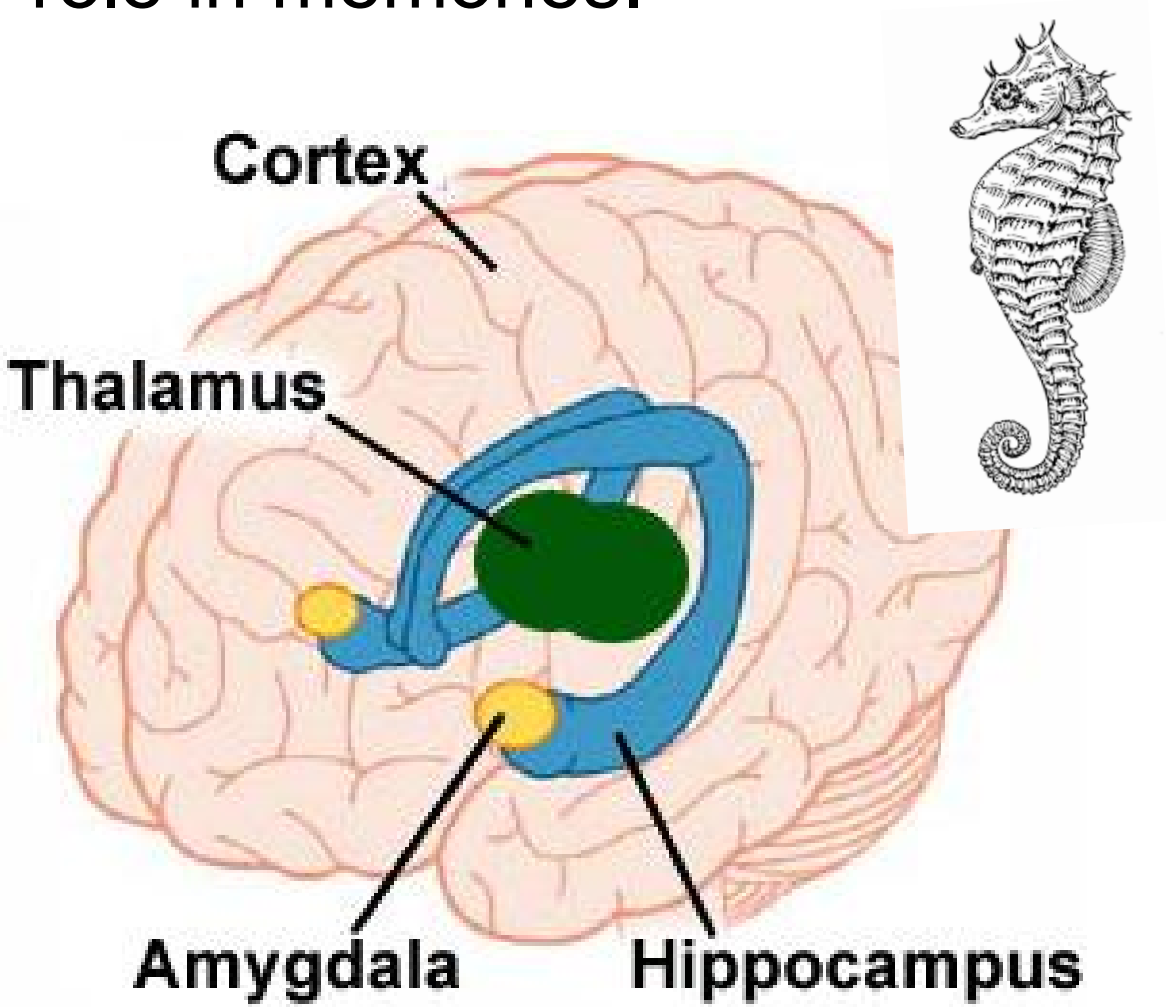



Thalamus
Corpus callosum
Pineal gland
Hypothalamus


Medulla
Oblongata
Pons
Midbrain

9. HIPPOCAMPUS

Memory is controlled by the **HIPPOCAMPUS** ("sea horse"; that's its shape). The hippocampus plays a major role in memories.

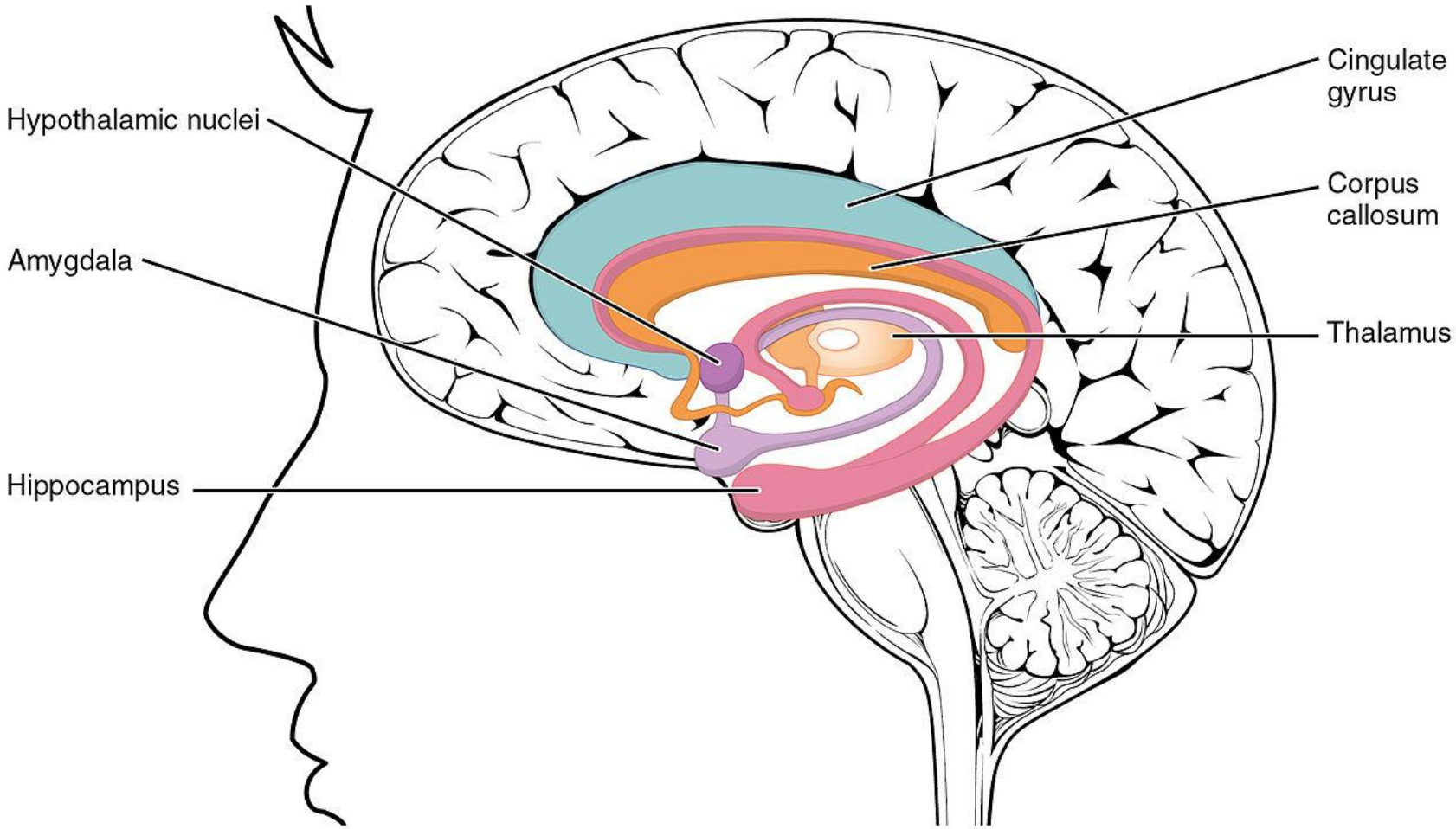


Amygdala - storage of memories associated with emotional events.

~Also associated with **fear** response and **aggression**

10. The LIMBIC SYSTEM

- includes the hypothalamus, the hippocampus, the amygdala, and several other nearby areas.
- main function is in emotions

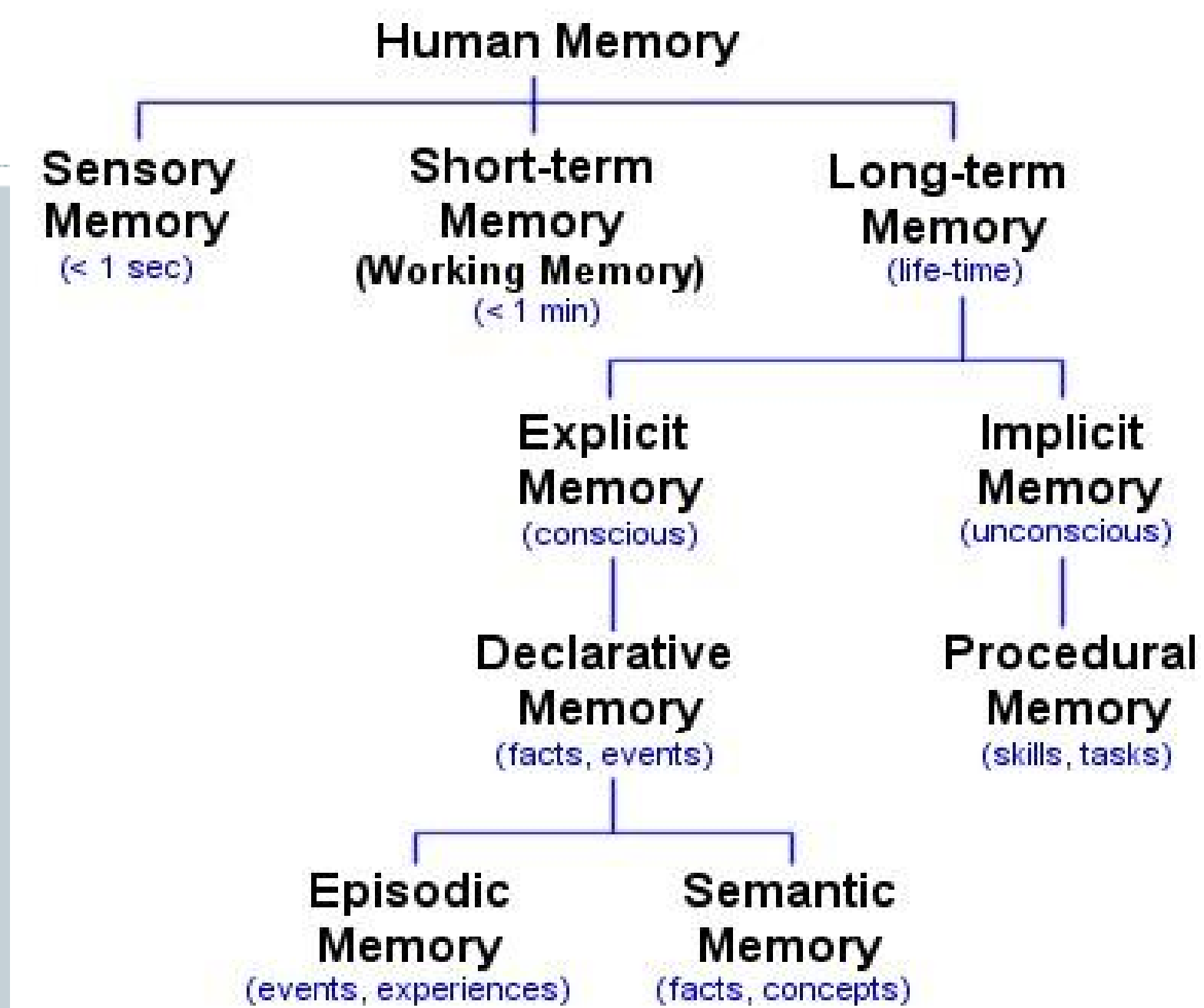


MEMORY

We used to classify memory as being long-term or short-term. The new classification is four memory systems that process information for storage and retrieval:

Types of Memory:

Short vs Long Term


Human Memory
Sensory Memory
(< 1 sec)
Short-term Memory
(Working Memory)
(< 1 min)
Long-term Memory
(life-time)
Explicit Memory
(conscious)
Implicit Memory
(unconscious)
Declarative Memory
(facts, events)
Procedural Memory
(skills, tasks)
Episodic Memory
(events, experiences)
Semantic Memory
(facts, concepts)

How important are your memories?

If you were involved in a traumatic event, such as a rape or a terrorist attack, would you take a pill that would make it so that you did not remember the event?

http://psychcentral.com/news/2011/05/27/drug-metyrapone-to-erase-bad-memories/26532.html

Episodic Memory

Involved in remembering personal experiences, such as a phone conversation you had yesterday or the movie you watched last week.

Challenge:

Do you remember the first Harry Potter movie? Wh was the story? How many details do you remember?

Semantic Memory

Manages the storage and retrieval of general knowledge of facts, such as the number of days in a year or the colors in a rainbow.

Naming objects is
also semantic memory.

Semantic Memory Tasks

1. *What do you call this thing?*
2. *Where do Kangaroos live?*
3. *What actor played Bella in Twilight?*

Procedural Memory

Allows us to learn activities and skills that will then be performed automatically with little or no conscious thought.

Examples are riding a bicycle or driving a car.

Challenge:

1. Can you make a teacup with a length of string?
2. Do you know how to use a can opener?

Working Memory

provides temporary storage and manipulation of the information necessary for such complex cognitive tasks as language comprehension, learning, and reasoning.

Working Memory Test

Memory Game

Another Memory Game

Memory - Sometimes it's good to forget things.. why?

http://www.scientificamerican.com/article.cfm?id=memory-brain-tour-video

Video on memory and where memories are stored and retrieved.

Check out these brain images!