

VISIBLE  BODY®

The Brain

A nervous system lab activity using Visible Body Suite

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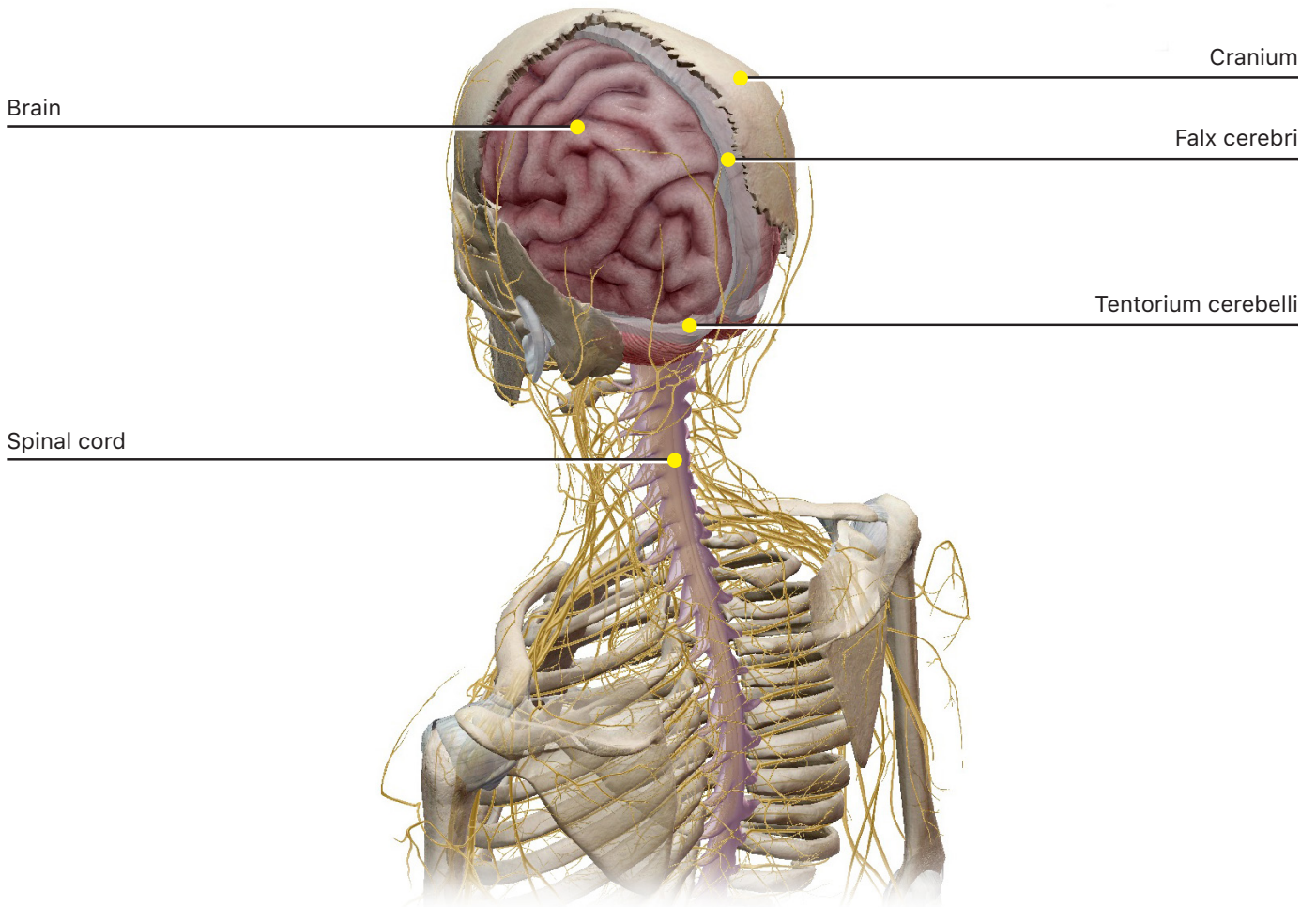
PRE-LAB EXERCISES

Open Visible Body Suite. Search for and select each of the Nervous System Views noted in the exercises below.

You are responsible for the identification of all **bold terms**.

A. Nervous System Overview

Open the Nervous System View "Nervous System." Use the systems icon to open the systems tray and deselect the two skeletal system icons to remove the bones, tendons, and ligaments from the view. Rotate the view as needed to examine the nervous system structures and answer the following questions.



1. The **nervous system** is anatomically separated into two parts. The structures inside the **cranium** and **spinal column** make up the _____ nervous system. Inside the cranium is the _____ and inside the spinal column is the _____.

2. The structures outside the cranium and spinal column make up the _____ nervous system, which is primarily composed of _____.

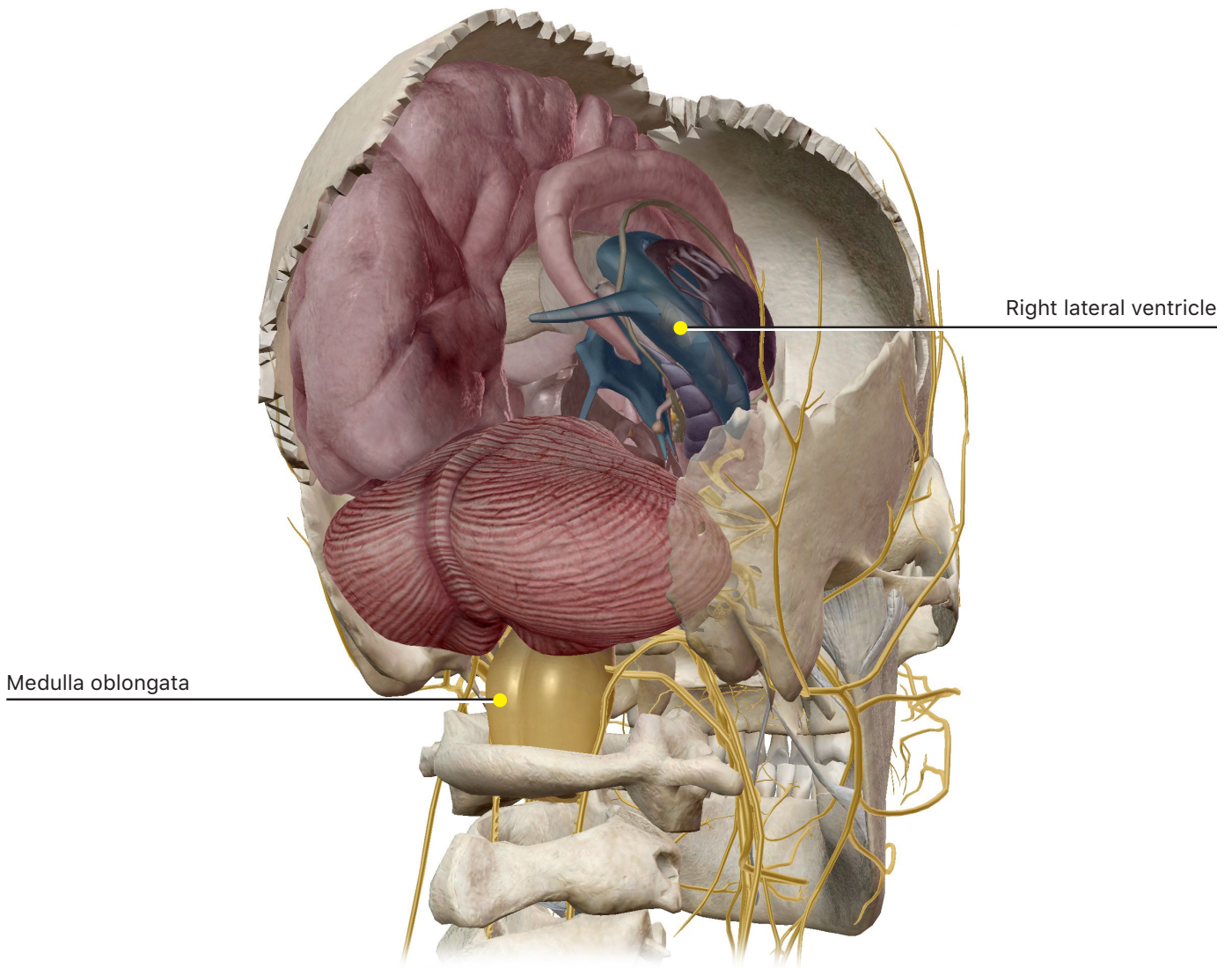
3. The cranial bones have been removed from this view, so you can easily zoom in and take a closer look at the brain. The largest, most superior structure of the brain is the **cerebrum**. Rotate the view to examine the superior portion of the brain. Find the **falx cerebri**, which separates the brain into _____ and _____ **hemispheres**.

4. Rotate the view to examine the posterior portion of the brain. Locate the **tentorium cerebelli**, which separates the cerebrum from the _____, the second largest structure of the brain.

5. In the systems tray on the left side of the screen, select the nervous system icon to add the rest of the nervous system structures, including protective layers of connective tissue, to the view. Select the outer protective layer around the brain. What is it called?

B. Brain Anatomy

Open the Nervous System View "Brain." Part of the skeletal system is included in this view, and some structures of the right side of the brain have been removed to expose the interior brain structures. Use this view to answer the following questions.



1. Rotate the view to examine the posterior portion and use the Dissect tool to hide the occipital bone. What is the most inferior part of the brain, which extends from its base toward the spinal column?

2. The brain has several fluid-filled cavities called **ventricles**. Which ventricle is visible as a dark blue transparent structure in the right portion of the brain?

3. What is the name of the fluid found in the ventricles? (Hint: Select any ventricle and use the book icon to read its description.)

4. Use the Dissect tool to hide the large cranial bones and rotate the view, so you can examine the left side of the brain from the right side. Open the Search tool and enter "**cranial nerves.**" Select the first choice and view the many paired cranial nerves that extend from the brain. How many pairs of cranial nerves are there? (Hint: Use the book icon to read a description of the cranial nerves.)

5. Do all the cranial nerves remain in the skull or do some travel out of the skull?

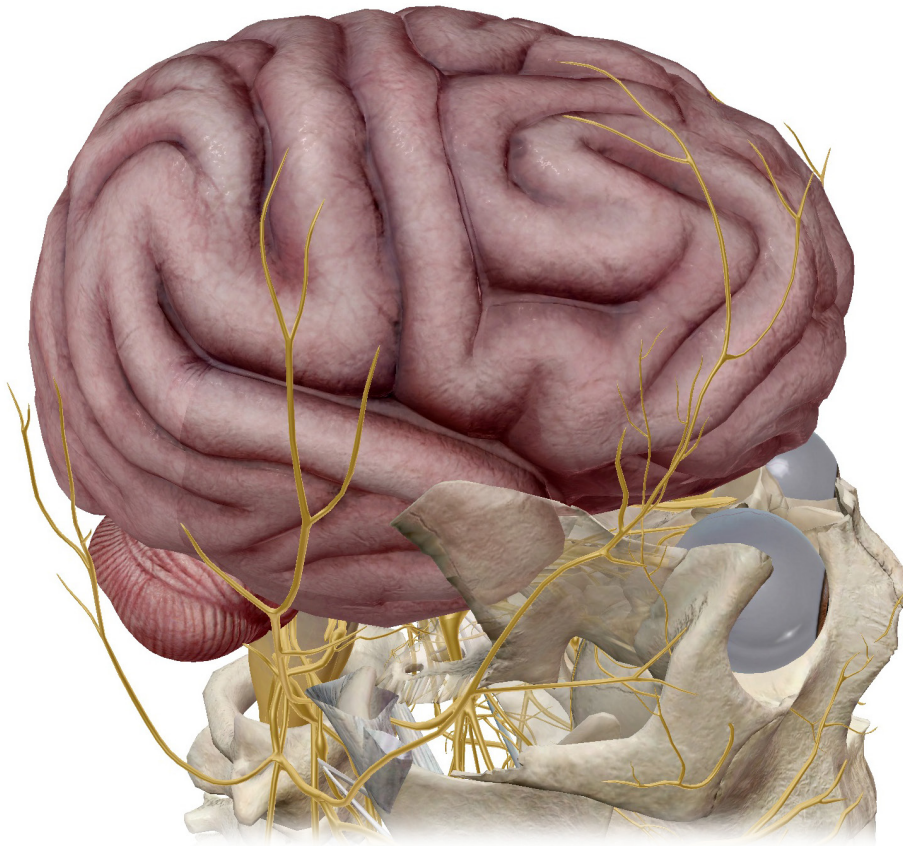
IN-LAB EXERCISES

Open Visible Body Suite. Search for and select each of the Nervous System Views noted in the exercises below.

You are responsible for the identification of all **bold terms** and the answers to all questions. You should be able to locate all the structures discussed below.

A. The Cerebrum

Open the Nervous System View "Brain," and use this view to answer the following questions about the cerebrum.



1. Use the Dissect tool to hide the skull bones, exposing the brain. Rotate the view to examine the exterior portion of the left side of the brain. By far, the largest part of the brain is the cerebrum, which is covered by convoluted folds. The folds appear dark because they are composed of **gray matter**, which consists mainly of cell bodies and unmyelinated fibers.

a. Select any of the folds. What are these folds called?

b. Zoom in and select any of the grooves between the folds. What are they called?

c. Sulci are important landmarks of the cerebrum. In the illustration, label the following sulci:

Superior frontal sulcus

Inferior frontal sulcus

Precentral sulcus

Central sulcus

Marginal sulcus

Postcentral sulcus

Lateral sulcus

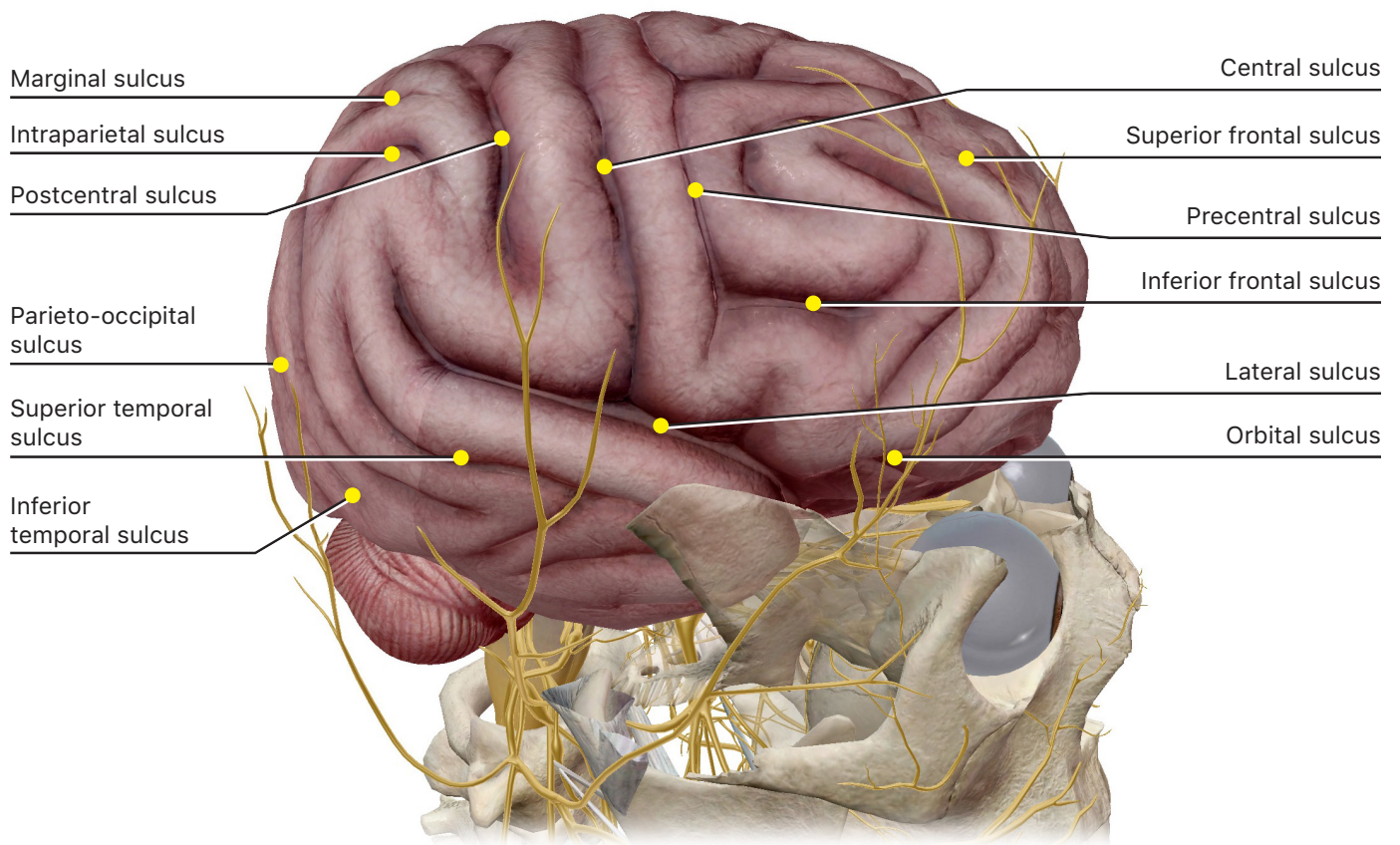
Superior temporal sulcus (includes angular sulcus)

Inferior temporal sulcus

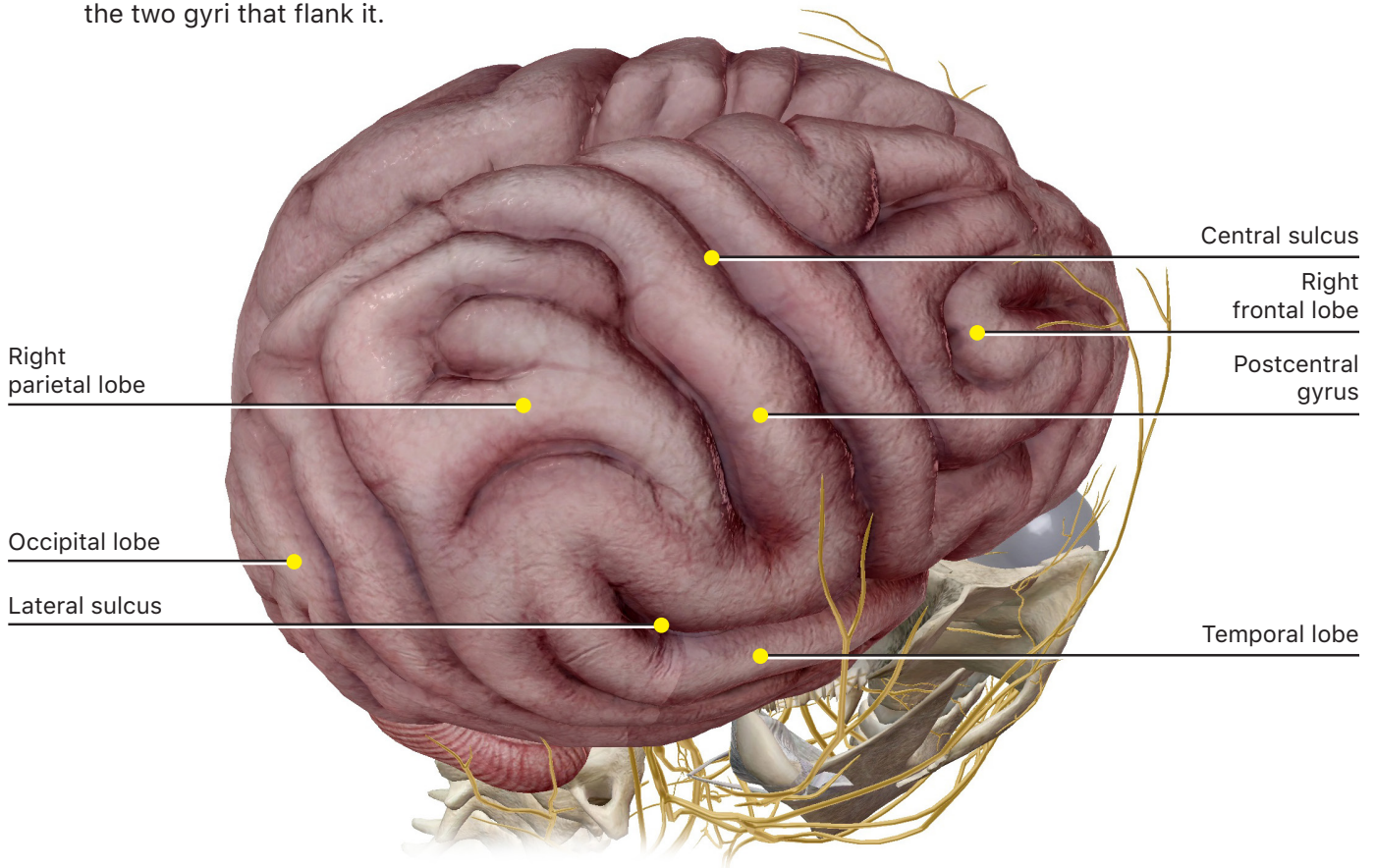
Intraparietal sulcus

Parieto-occipital sulcus (fissure)

Orbital sulci



2. The cerebrum is divided into functional regions called **lobes**. Select any of the **gyri** above the eyes, and then use the arrow in the content box to choose the **frontal lobe** from the selected structure list, highlighting it in the view. Rotate the view to locate the sulcus immediately behind the frontal lobe and the two gyri that flank it.



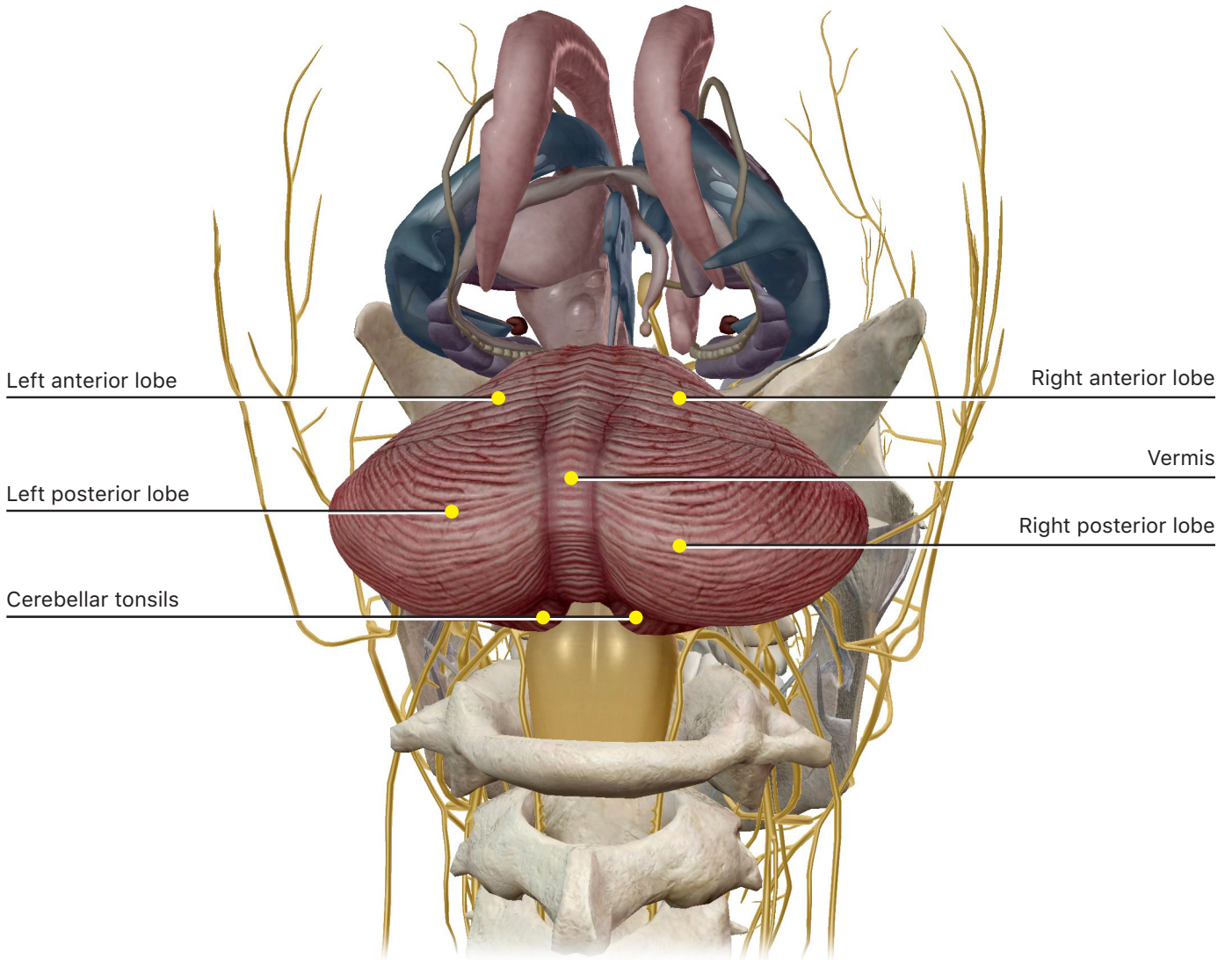
- a. Which sulcus defines the posterior boundary of the frontal lobe?
- b. Which gyri are located on either side of this sulcus?

3. Select the **postcentral gyrus**, and then use the arrow in the content box to choose the **parietal lobe** from the selected structure list, highlighting it in the view. Rotate the view to locate the sulci that separate the parietal lobe from the other cerebral lobes.

- a. Which sulcus defines the posterior border of the parietal lobe?
- b. Which lobe is located posterior to this sulcus?
- c. Which sulcus defines the lateral border of the parietal lobe?
- d. Which lobe is located below this sulcus?

B. The Cerebellum

Open the Nervous System View "Brain," and use this view to answer the following questions about the cerebellum.



1. Rotate the view to examine the posterior portion of the brain and use the Dissect tool to hide the cerebrum. Examine the **cerebellum** and rotate the view as needed to identify its key structures.

- The two posterior lobes are separated by the _____.
- In front of the posterior lobes are two _____.
- Between the posterior lobes and the medulla oblongata are the paired _____.
- On each side of the cerebellum, between the lobes and the pons is the _____.

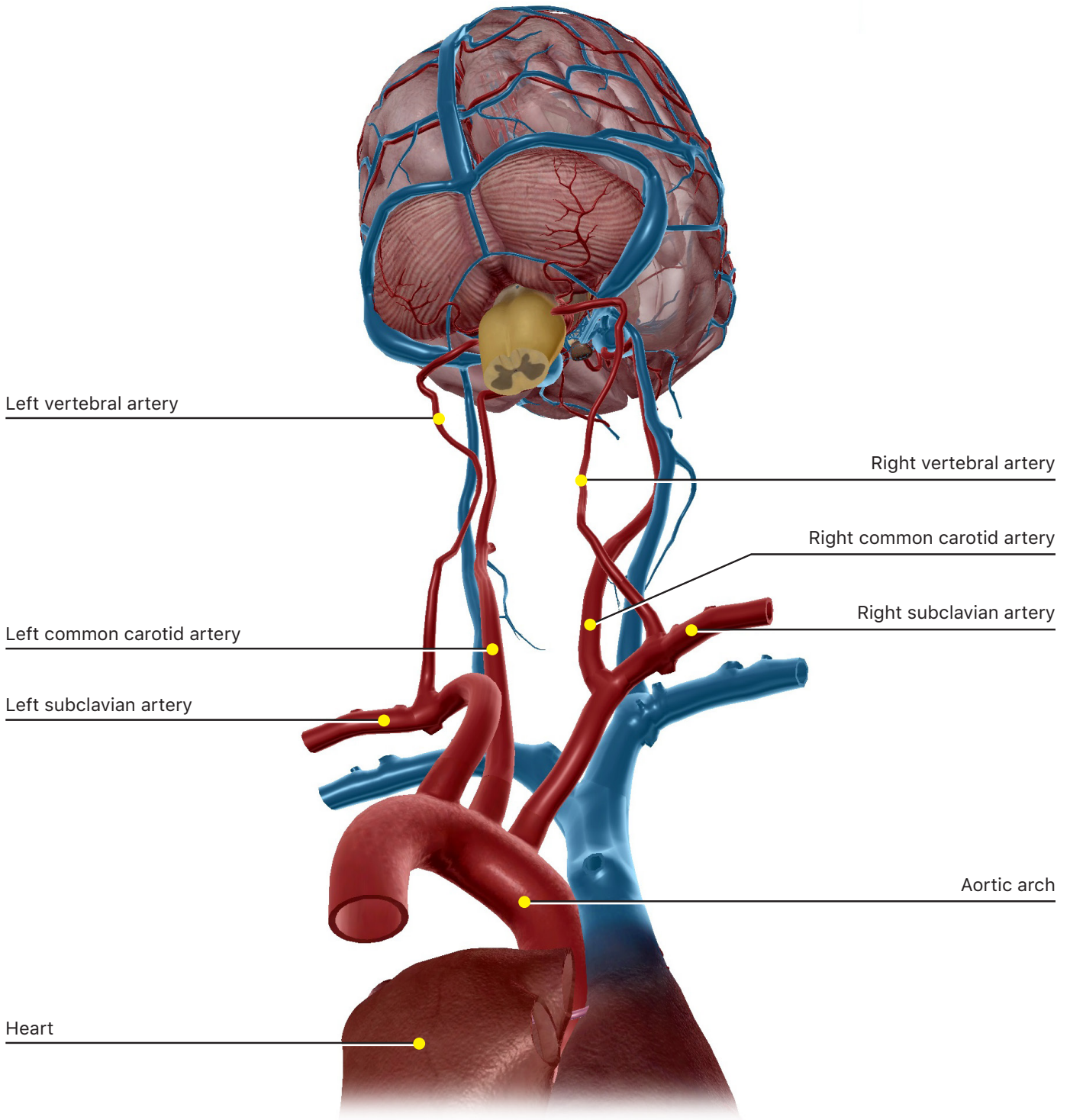
5. Use the Dissect tool to remove the right posterior lobe from the view and examine the patterns of gray and **white matter** in the cut section of the cerebellum. Select the cut surface and use the book icon to read the definition.

a. The interior of the cerebellum is made up of a central stem of _____ with a central gray mass called the _____.

b. The branching tree-like network is called the _____.

C. Brain Blood Supply

Open the Nervous System View "Brain Blood Supply." Use this view to answer the following questions.



1. Rotate the view to examine the posterior portion and locate the aortic arch leaving the heart. Then, locate the three large vessels that branch from the aorta and carry blood upward.

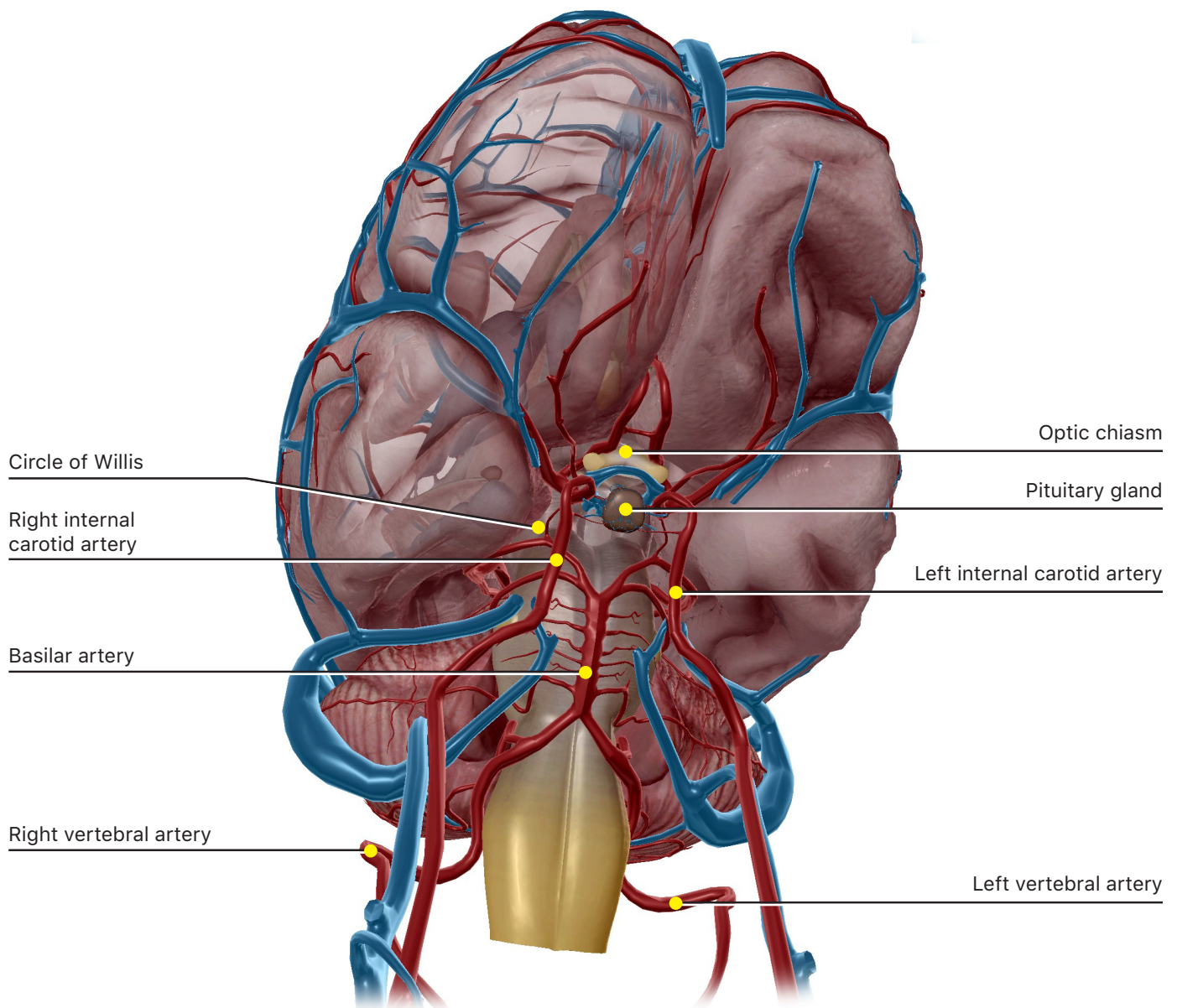
a. Which branch of the left **subclavian artery** carries blood to the brain?

b. Which branch of the right subclavian artery carries blood to the brain?

c. Which branch of the left **common carotid artery** carries blood to the brain?

d. From which branch of the aorta does the right common carotid artery arise?

2. Rotate the view, so you can examine the brain from below. What is formed by the fusion of the two **vertebral arteries**?

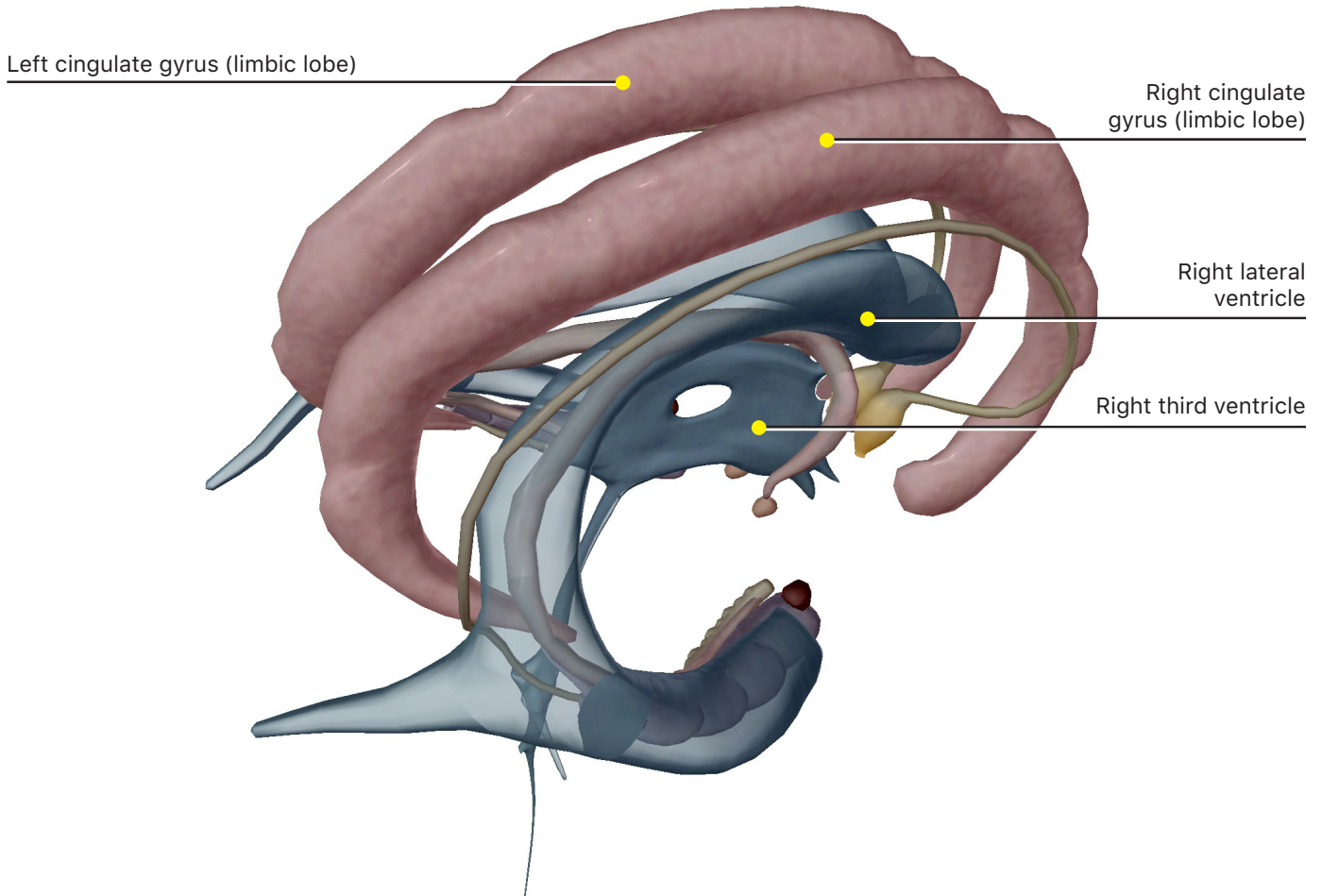


3. Use the Dissect tool to hide the two large **cavernous sinuses**. Use the Search tool and enter "**circle of Willis**." Choose "Circle of Willis, R." from the search results to highlight the right side of this network. The circle of Willis is an **anastomosis** at the base of the brain that can supply collateral circulatory routes. The circle surrounds what two structures?

4. Blood from the brain drains into a large dorsal **sinus** called the _____. Blood then travels through several other **sinuses** that join to form the _____, which leave the skull and enter the neck.

D. The Limbic System

Open the Nervous System View "Limbic System." Note that the ventricles are shown, but they are not part of the limbic system.

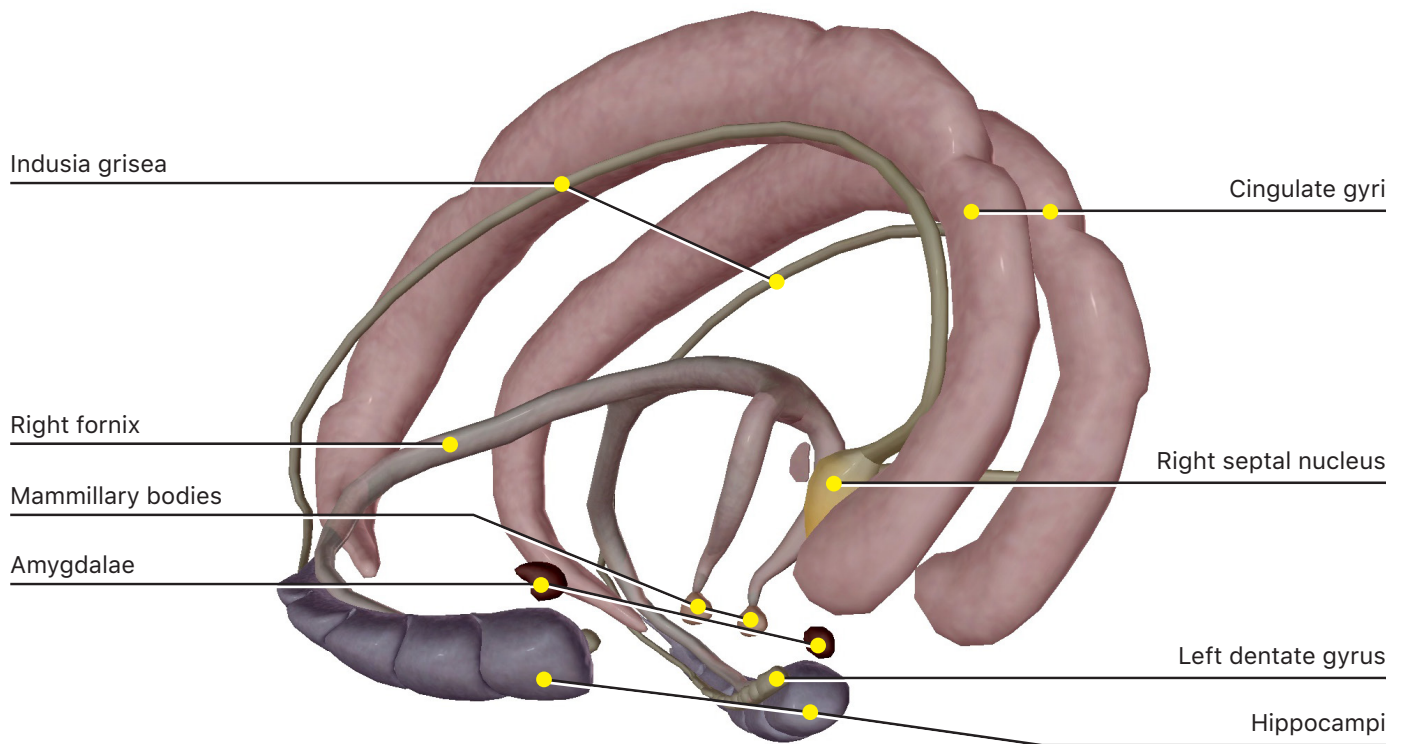


1. Select one of the large, paired lobes at the top of the view. These are the _____ lobes, which are also called _____.
2. Use the arrow in the content box to choose **Limbic System** from the selected structures list and use the book icon to read its definition.
 - a. What are the main roles of the limbic system?
 - b. Where is the limbic system found?

3. Select one of the blue ventricles and use the arrow in the content box to choose Ventricles from the selected structures list. Use the Hide tool to hide all the ventricles. Note the circular shape of the limbic system.

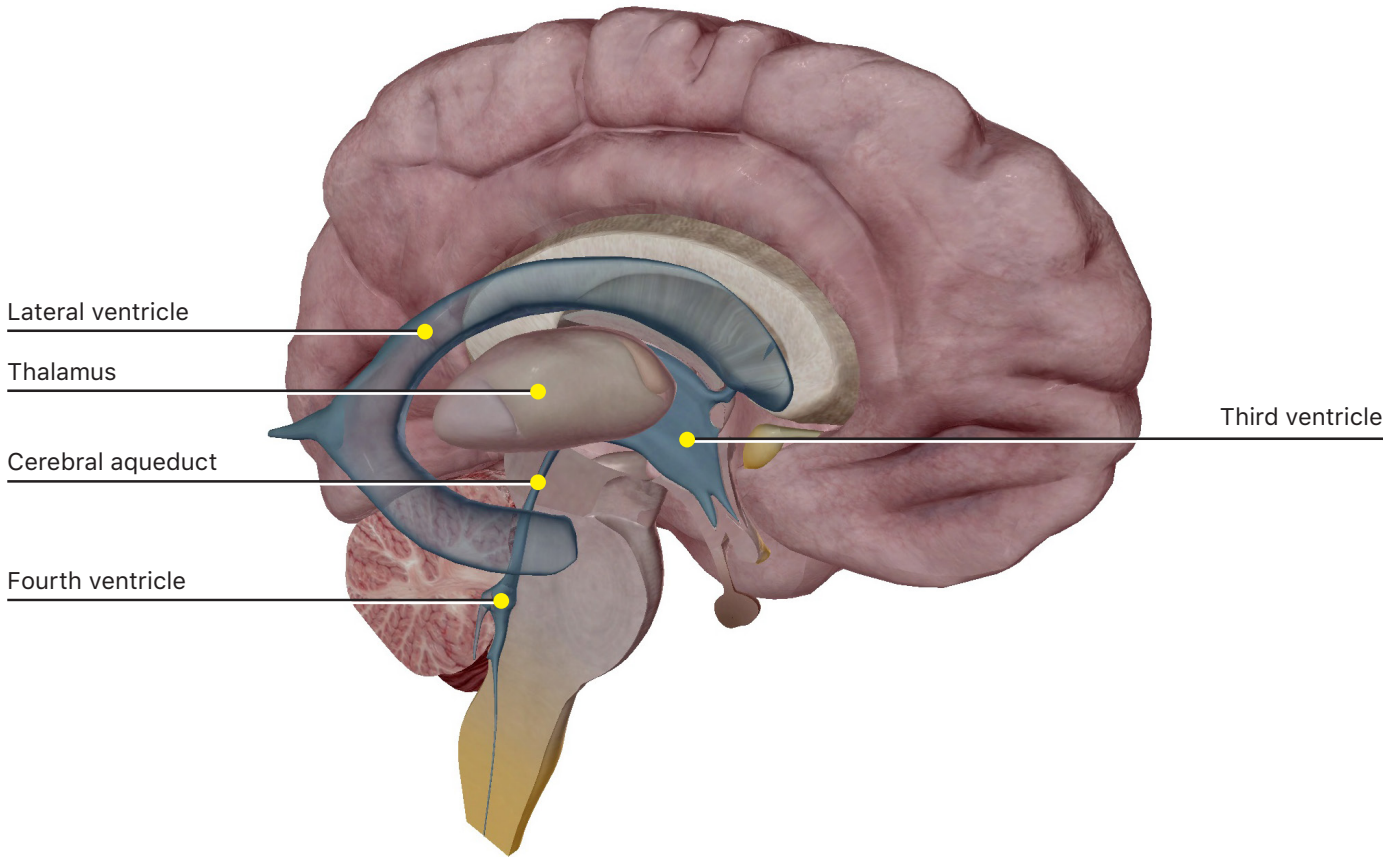
a. What are the large, purple, segmented structures at the bottom of the view?

b. List all the parts of the limbic system and locate the ones that are visible in this view.



E. The Thalamus

Open the Nervous System View "Thalamus." Use this view to answer the following questions.



1. Locate the right **lateral ventricle** and rotate the view to examine the third ventricle, found between the two cerebral hemispheres (only one is visible). Use the book icon to read a description of the ventricles.

a. The third ventricle connects with the **fourth ventricle** via the _____.

b. The fourth ventricle is continuous with the _____, which carries **cerebrospinal fluid** down into the **hindbrain** and the **spinal cord**.

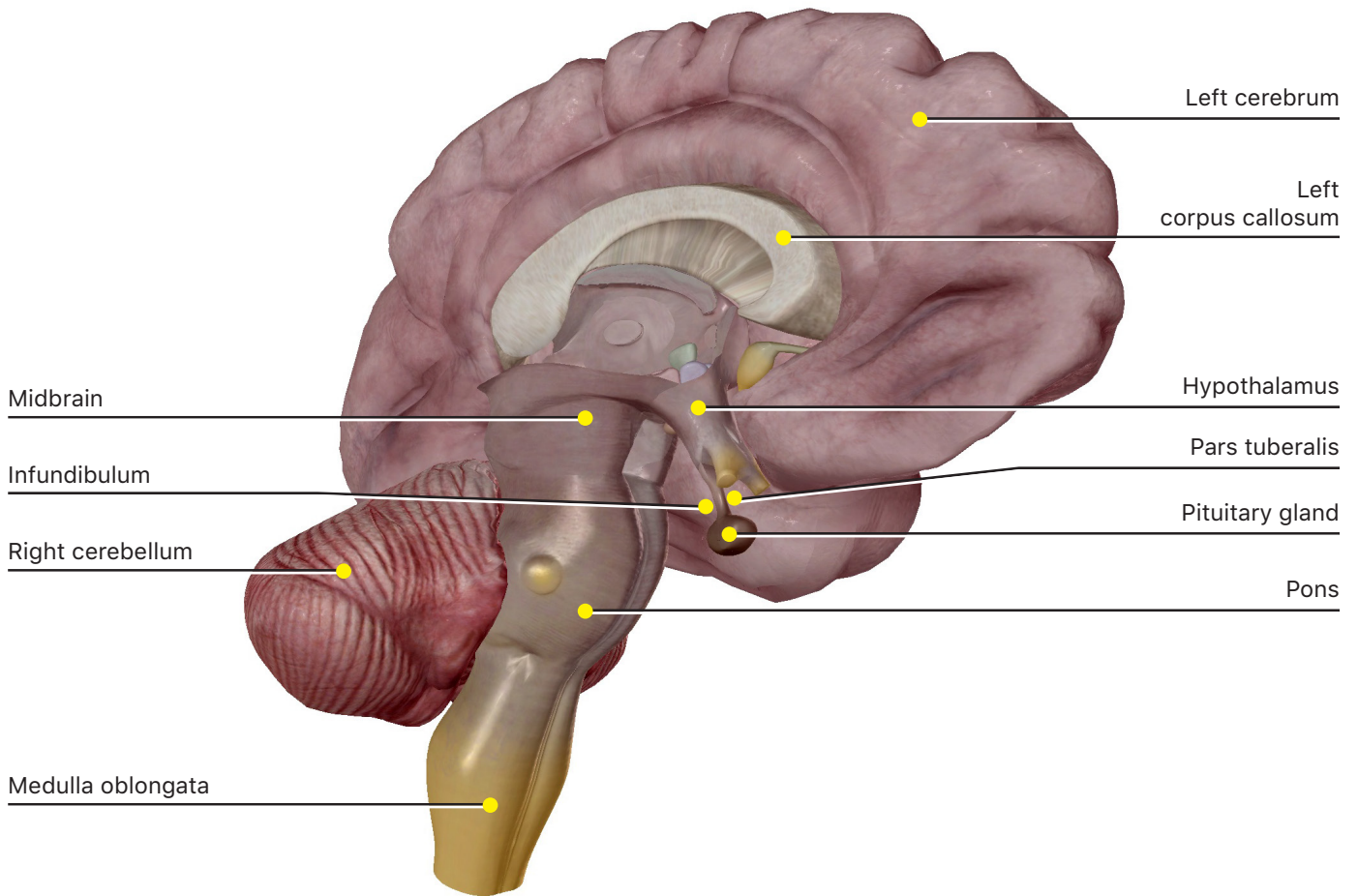
2. Select the right **thalamus** in the center of the view and use the book icon to read its definition.

a. The thalamus is one of the three regions of the _____.

b. Its main role is to act as a _____ between the cerebrum and the rest of the nervous system.

c. What are the main functions of the thalamus?

3. For each of the following large structures, select any part of the structure and use the arrow in the content box to choose the entire structure. Use the book icon to read its definition, and then list its main functions below.



a. **Cerebrum**

b. **Cerebellum**

c. **Midbrain** (mesencephalon)

d. **Pons**

e. **Medulla oblongata**

4. Select any part of the cerebrum, and then use the arrow in the content box to choose **Forebrain** from the selected structures list. Use the book icon to read its definition, and then list its structures below.

5. Select the medulla oblongata, and then use the arrow in the content box to choose **Hindbrain** from the selected structures list. Use the book icon to read its definition, and then list its structures below.

6. Select the pons and use the book icon to read its definition. Which structures make up the **brainstem**?

7. Select the third ventricle and use the Dissect tool to remove it from the view. Select the exposed **hypothalamus** and use the book icon to read its definition.

a. What is the function of the hypothalamus?

8. Rotate the view to examine it from below. The hypothalamus extends into a stalk with a bulb on the end.

a. What are the two parts of the stalk?

b. What is the name of the posterior portion of this structure?

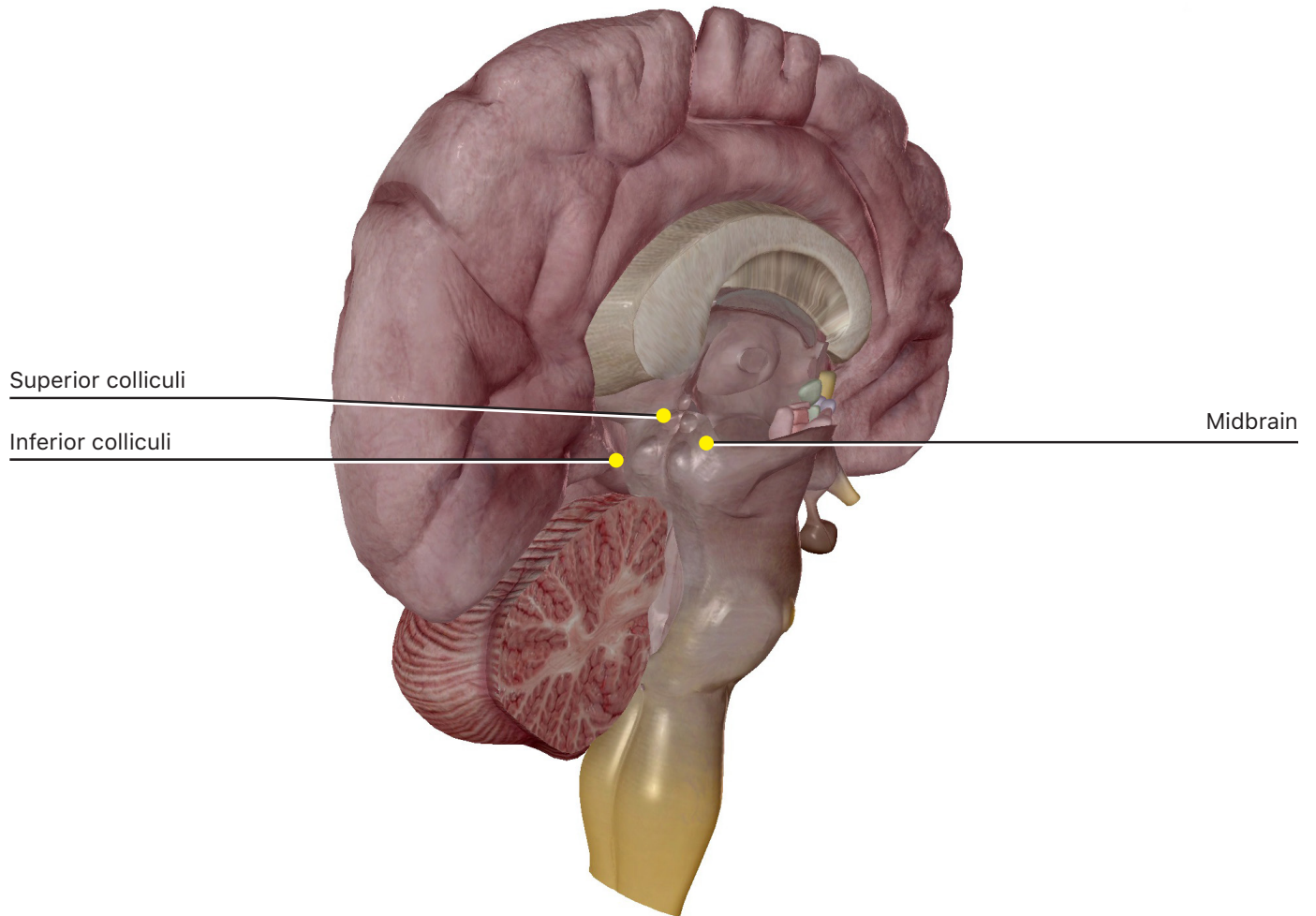
c. What is the name of the anterior portion of this structure?

9. Find the **corpus callosum**, which is located beside the left lateral ventricle and below the left cingulate gyrus (limbic lobe).

a. What is the function of the corpus callosum?

b. What is the corpus callosum composed of?

10. Rotate the view to examine the posterior structures. Select the midbrain to highlight it and zoom in.



a. You will see two lumps protruding from the midbrain, which are the _____ and the _____.

b. Between the midbrain and the third ventricle is a small, oval structure called the _____. It controls _____.

PUTTING IT ALL TOGETHER

1. Responsible for conscious thought, the largest structure of the brain is the _____.
It has right and left _____.

The _____ is responsible for balance and fine-tuning movement.

2. Which two structures are shared by the brainstem and the hindbrain?

3. The brainstem connects the _____ to the _____. It is responsible for the most primitive and basic brain functions.

4. Which brain system is responsible for processing emotions?

5. Cerebrospinal fluid is found in large chambers called _____.

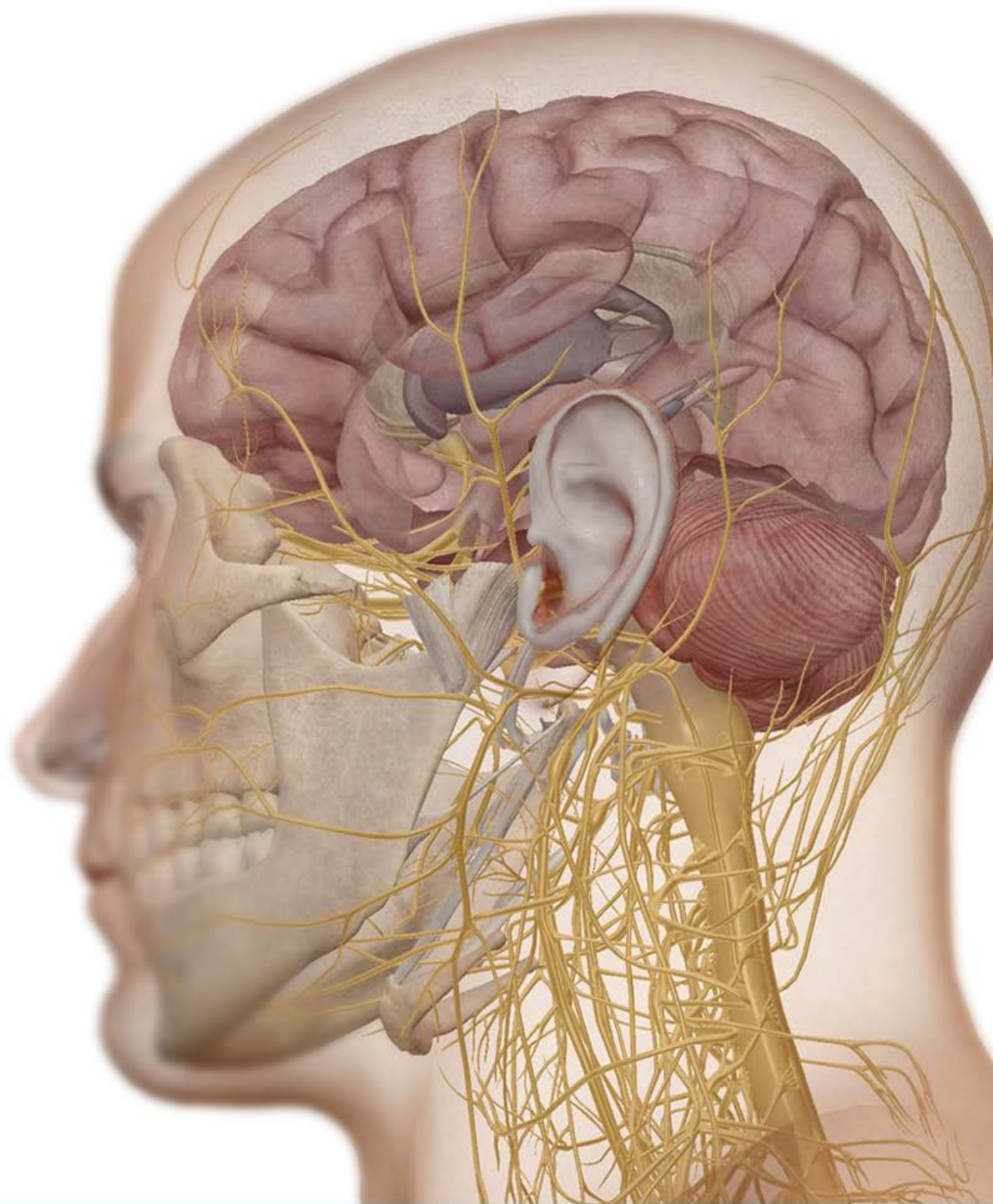
6. The brain is supplied with collateral circulation via several vessels that arise from three branches of the _____. One important anastomosis, located at the base of the brain, is the _____.

7. Blood leaves the brain through a series of _____ and ultimately exits the skull via the _____.

8. Different parts of the brain communicate via tracts of _____.

TIME TO PRACTICE!

**SEARCH FOR AND TAKE THE FOLLOWING NERVOUS SYSTEM QUIZZES:
CENTRAL NERVOUS SYSTEM, CEREBELLUM, DIENCEPHALON, AND LIMBIC SYSTEM**

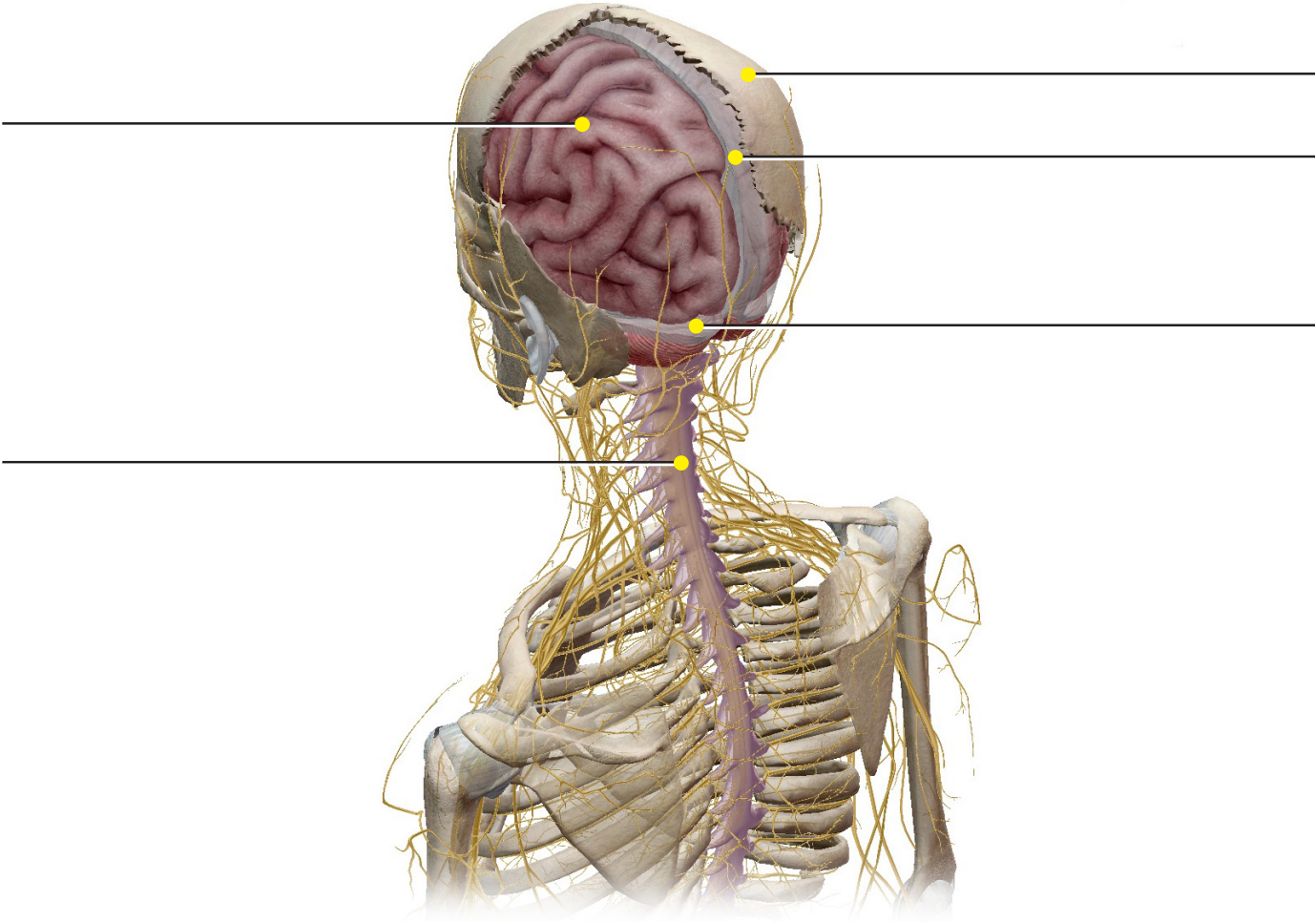


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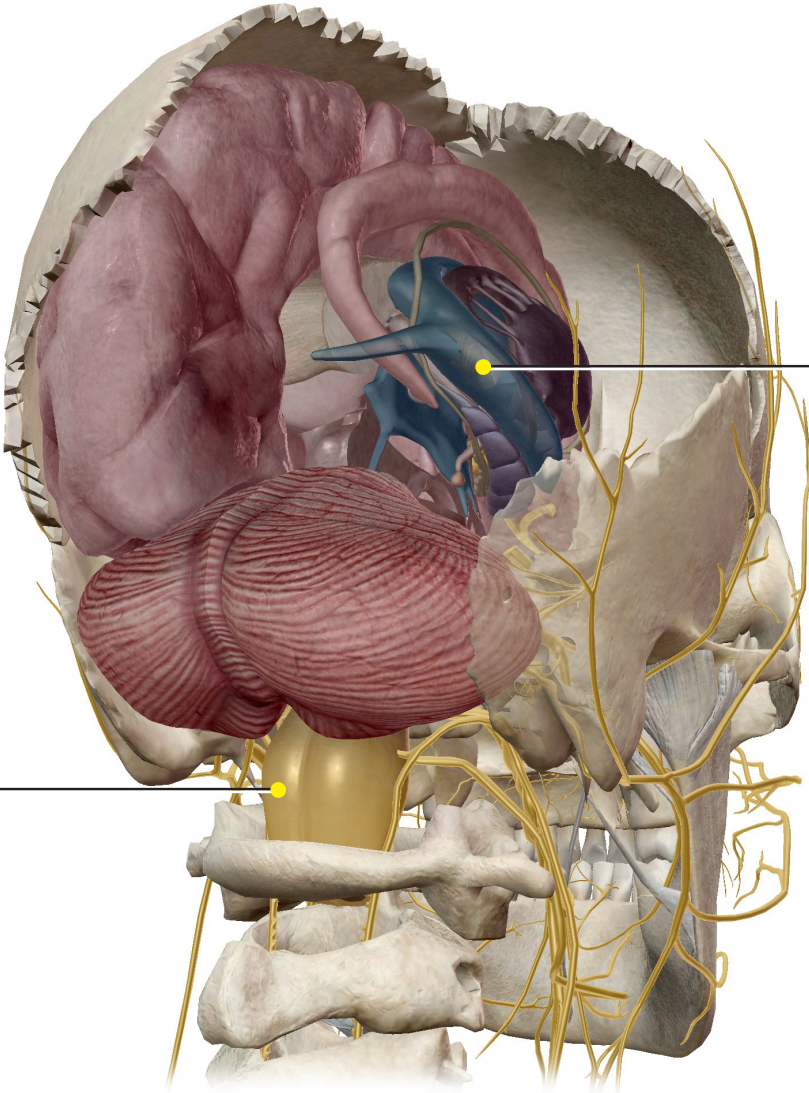
Student Practice

Label the structures in the following figures.

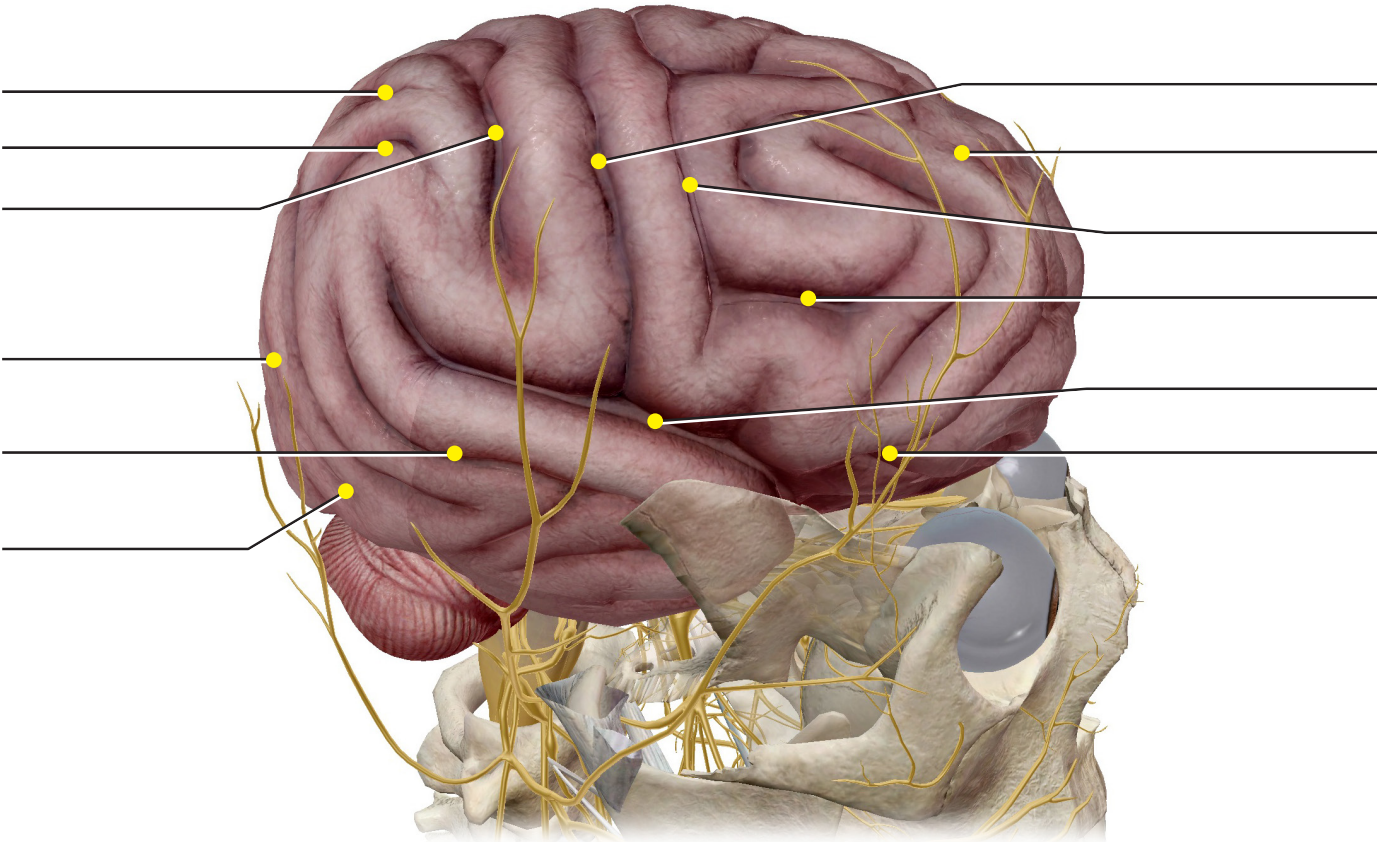
Source: Nervous System View "Nervous System"



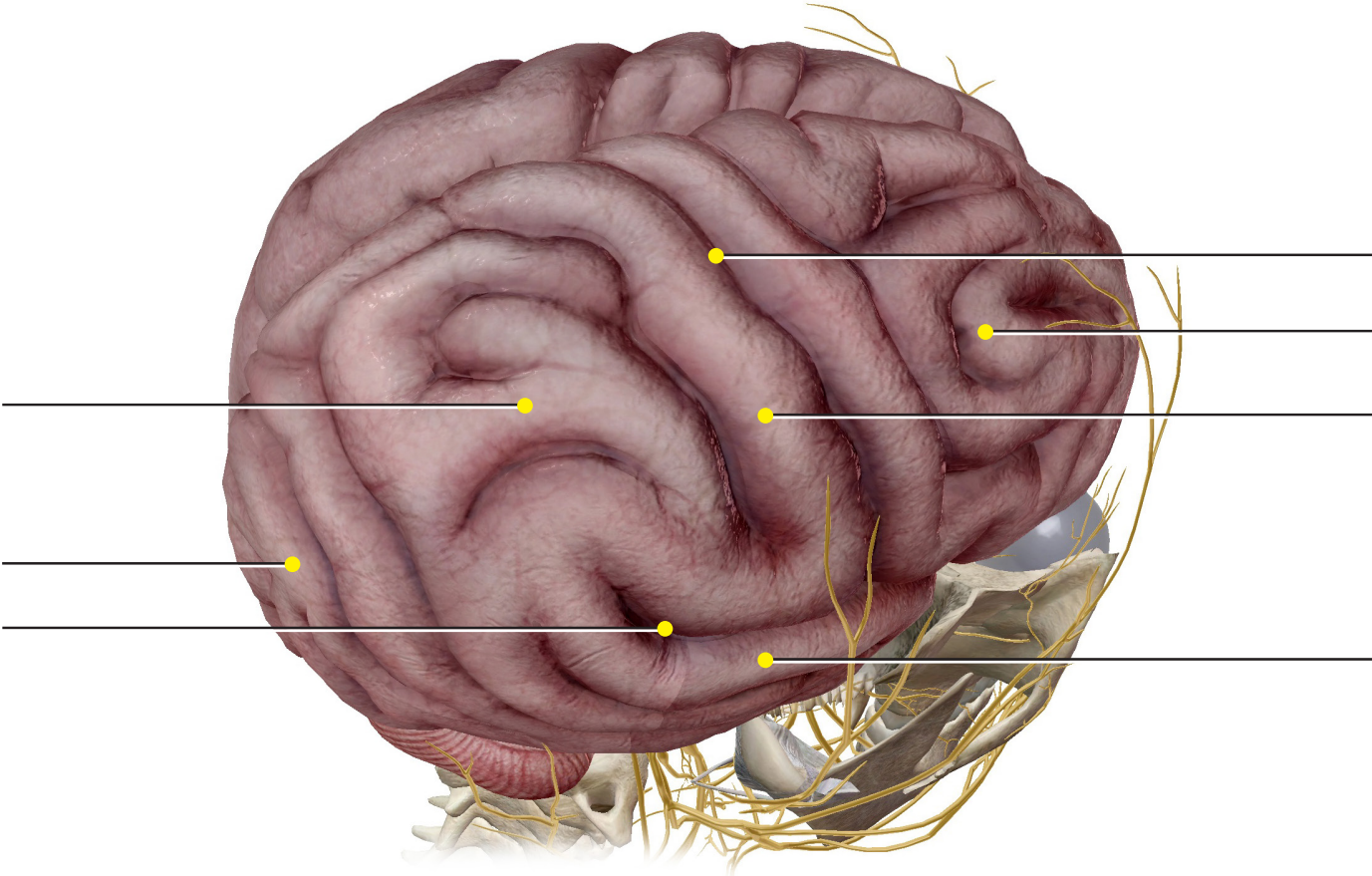
Source: Nervous System View "Brain"



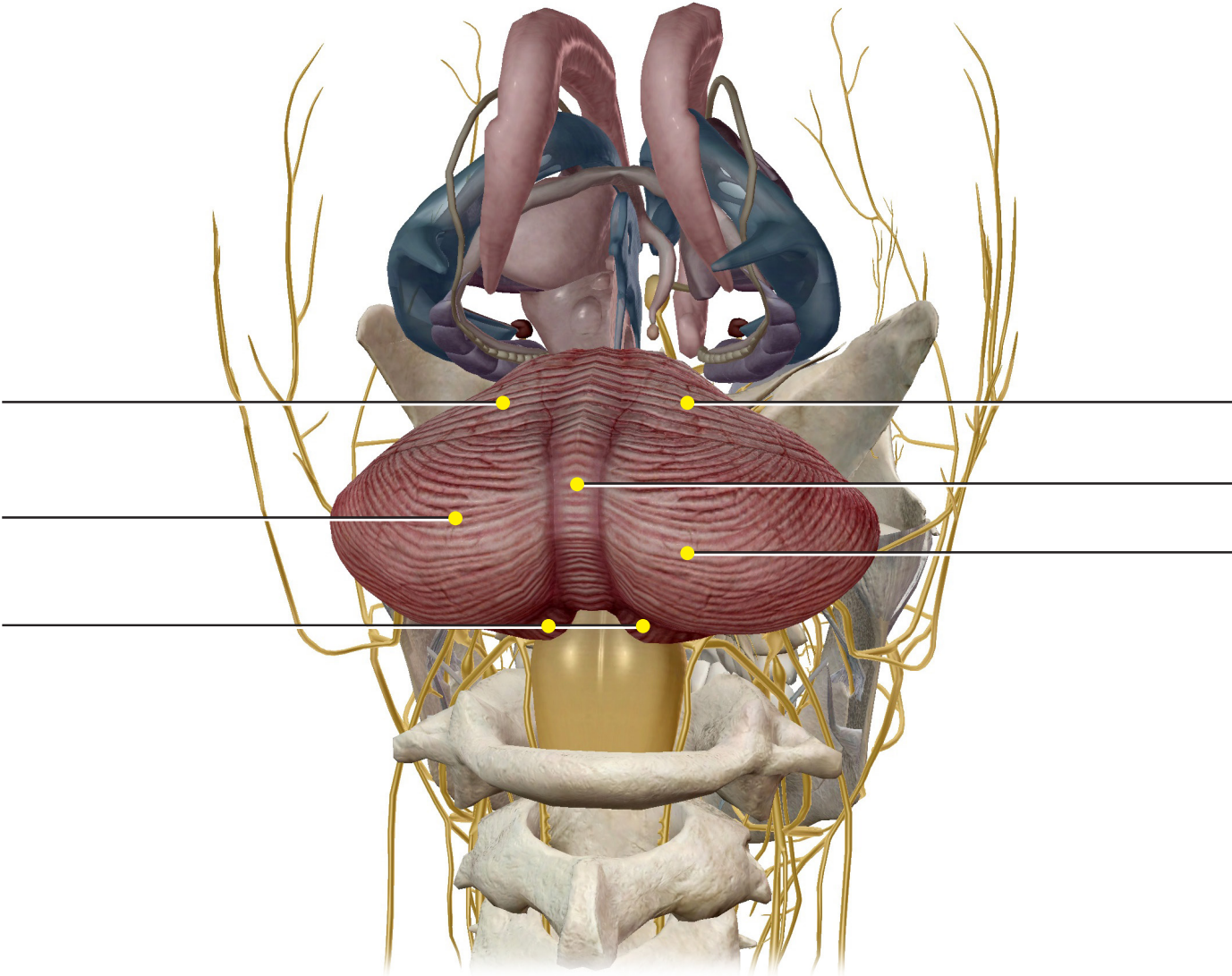
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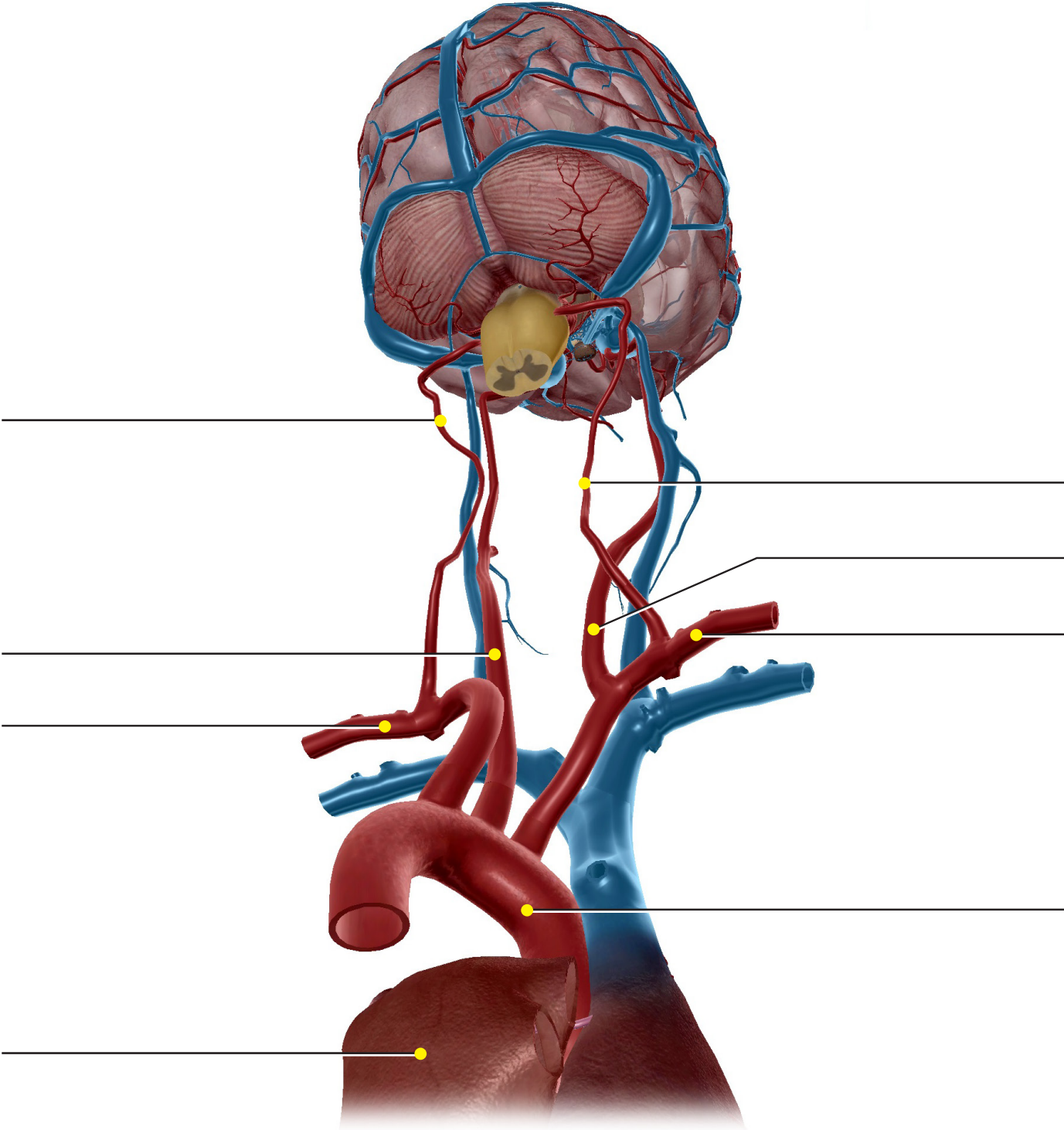
Source: Nervous System View "Brain"



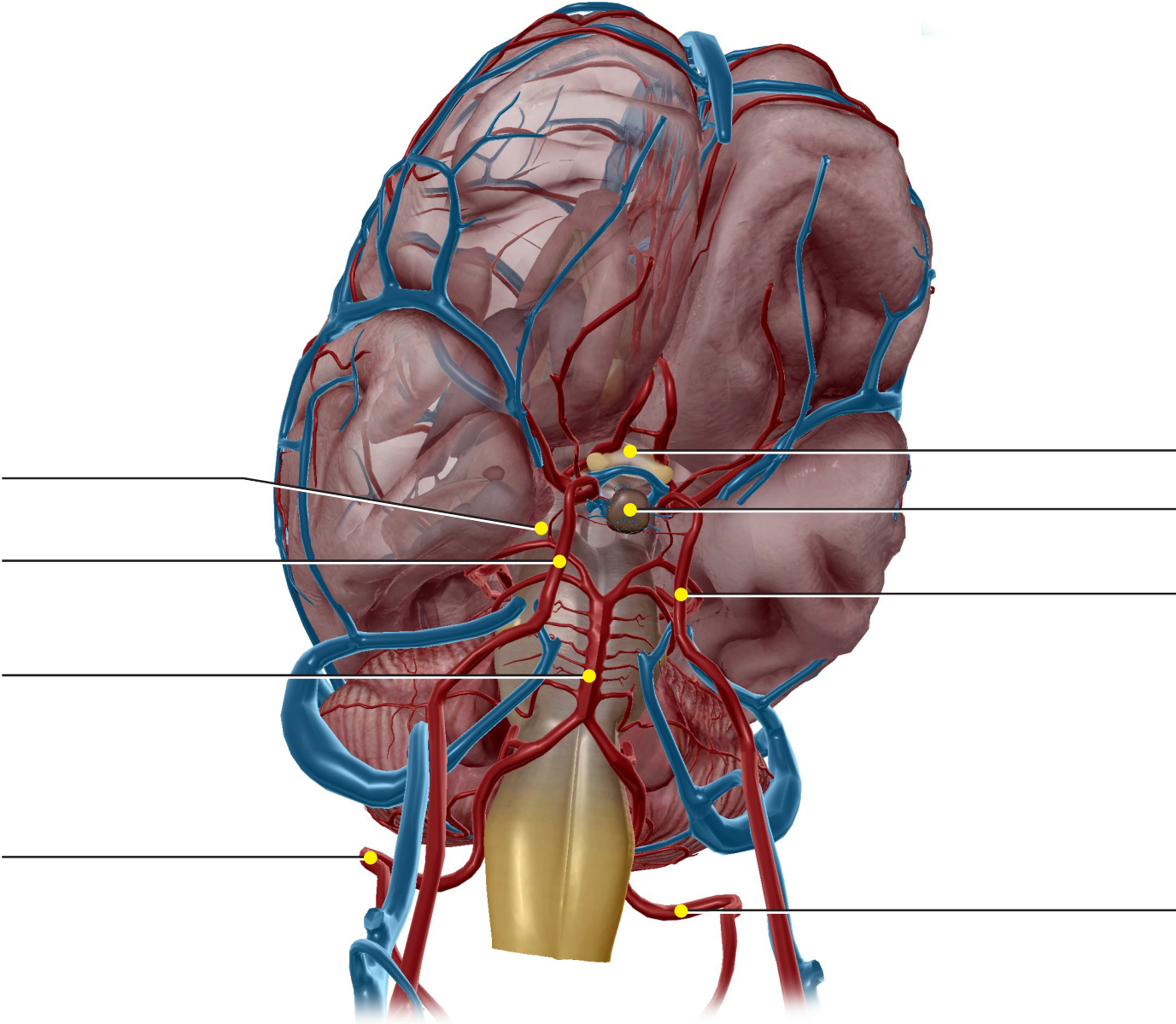
Source: Nervous System View "Brain"



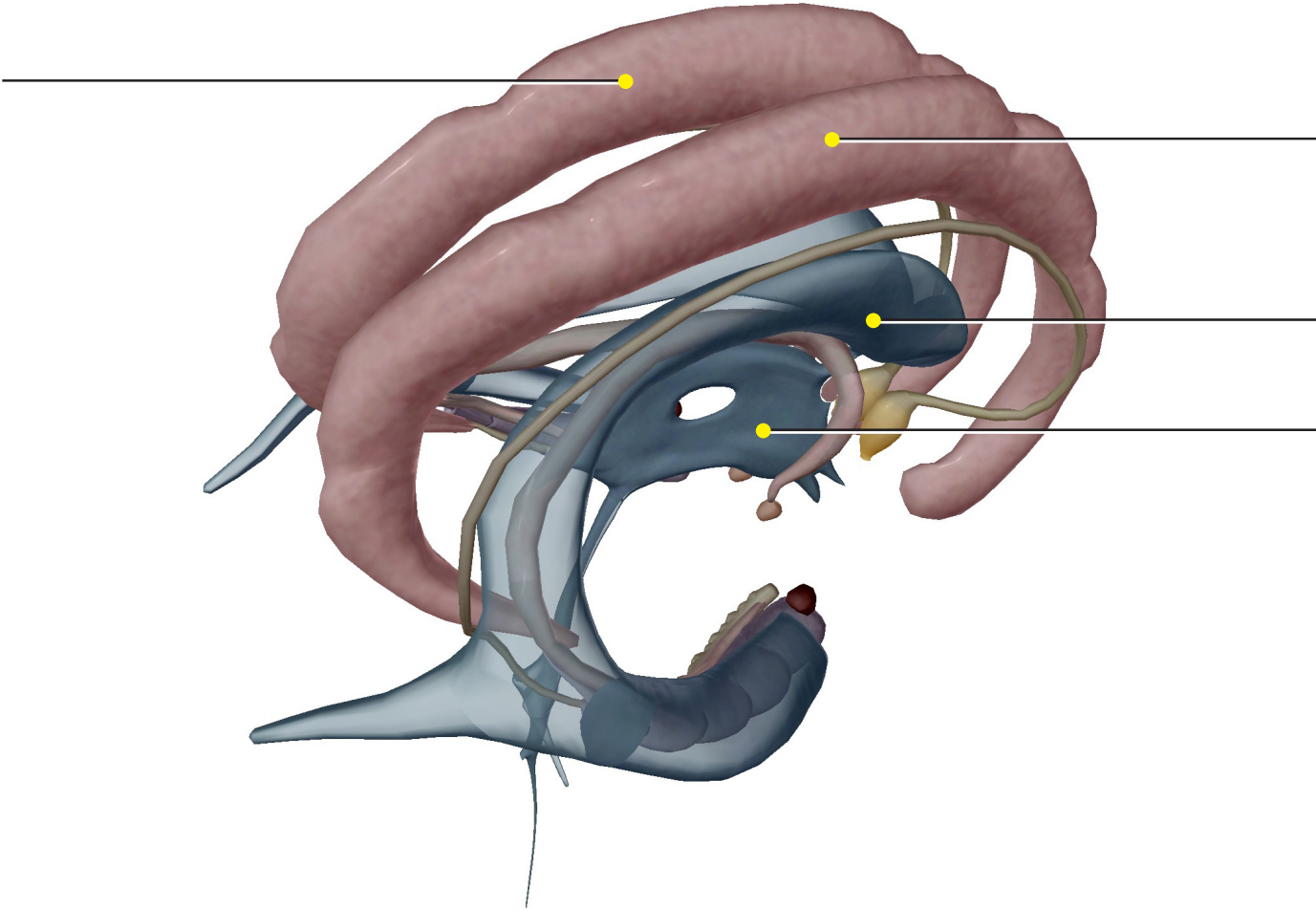
Source: Nervous System View "Brain Blood Supply"



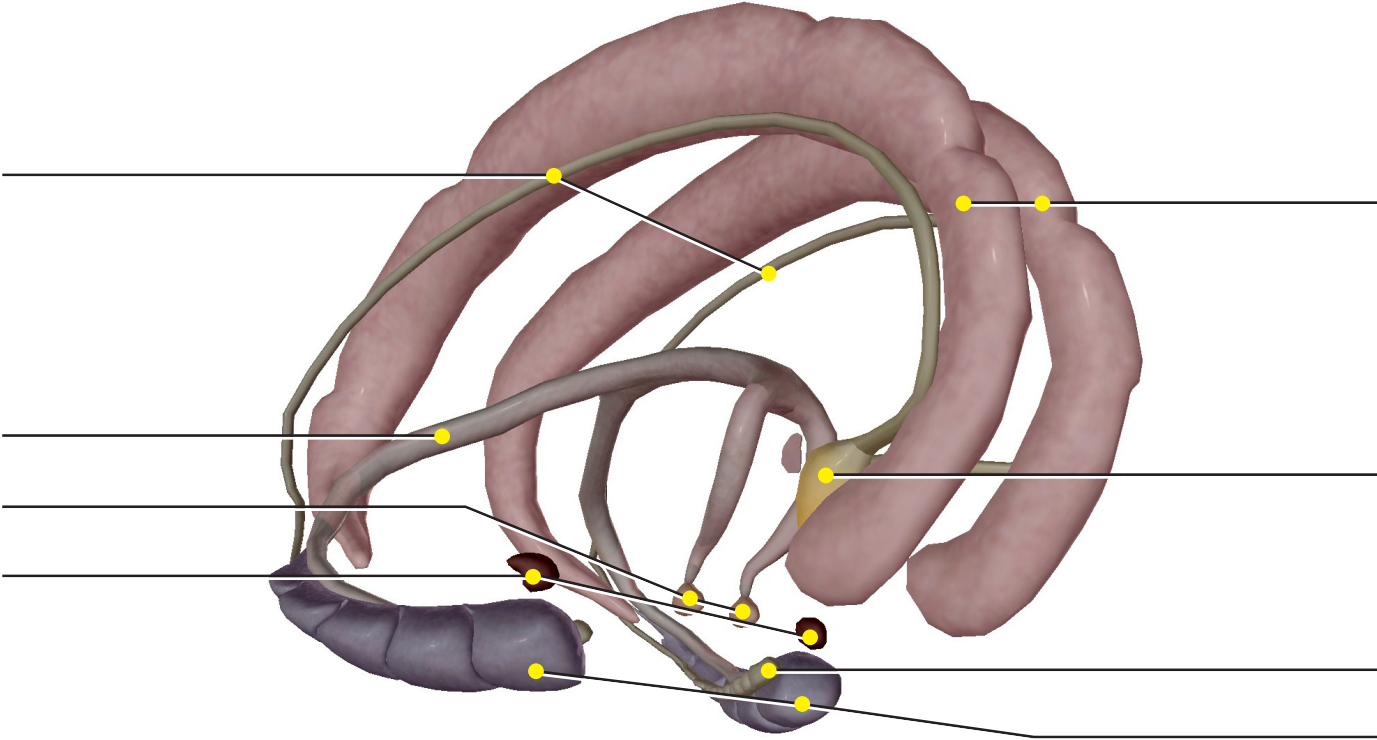
Source: Nervous System View "Brain Blood Supply"



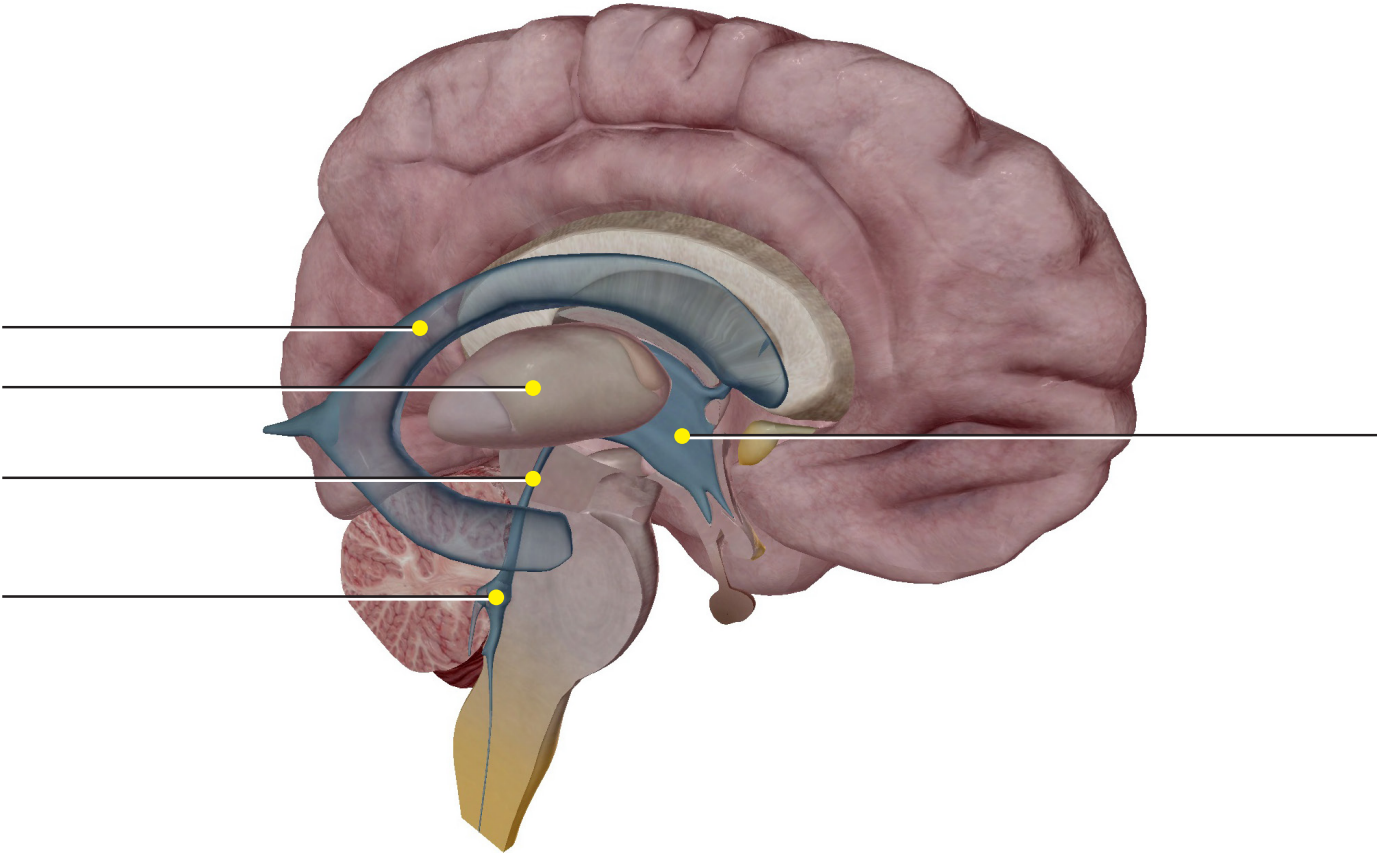
Source: Nervous System View "Limbic System"



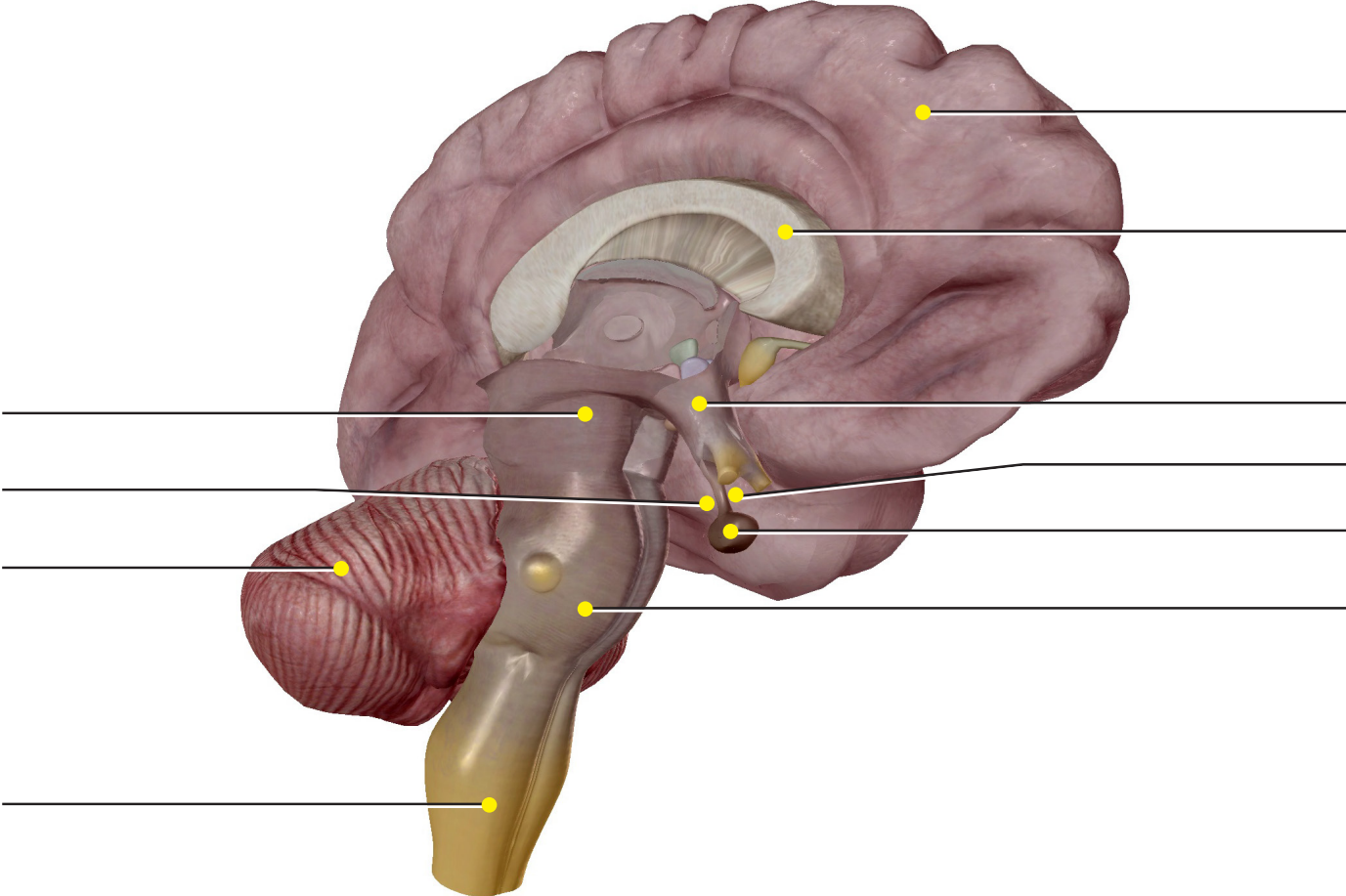
Source: Nervous System View "Limbic System"



Source: Nervous System View "Thalamus"



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