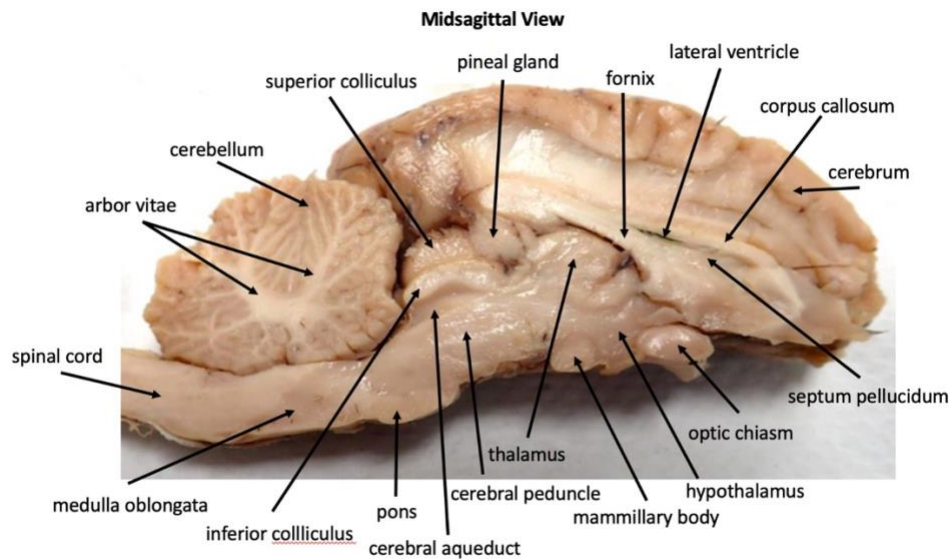


Objectives

1. Identify brain structures while performing brain dissection.
2. Explain the mechanism involved and perform pupillary, patellar and ciliospinal reflexes.
3. Explain the mechanism involved and perform smell and taste reflexes.
4. Explain the mechanism involved in balance.

Activity 1: Sheep Brain Dissection



Midbrain consists of cerebral peduncles and the colliculi (superior and inferior)

As previously learned in the pre-lab worksheet. The meninges are the protective coverings, which enclose the brain and spinal cord. The dura mater, the tough outer layer, will have been mostly removed when the brains were prepared for the dissection; however, some of the dura mater may remain near the base of the brain. The arachnoid layer, the middle layer, and pia mater, the inner layer, are still likely to cover the brain. The pia mater follows the gyri and sulci and most likely is still on your specimen and may be indistinguishable from the brain. Blood vessels are between the arachnoid layer and the pia mater.

Meningitis is an inflammation (swelling) of the protective membranes covering the brain and spinal cord. A bacterial or viral infection of the fluid surrounding the brain and spinal cord usually causes the swelling. A doctor confirms a diagnosis of bacterial meningitis with a spinal tap, what is the name of the fluid that he draws?

Materials (per group)

- Forceps
- Sheep Brain
- Scalpel
- Pins
- Tray
- Gloves

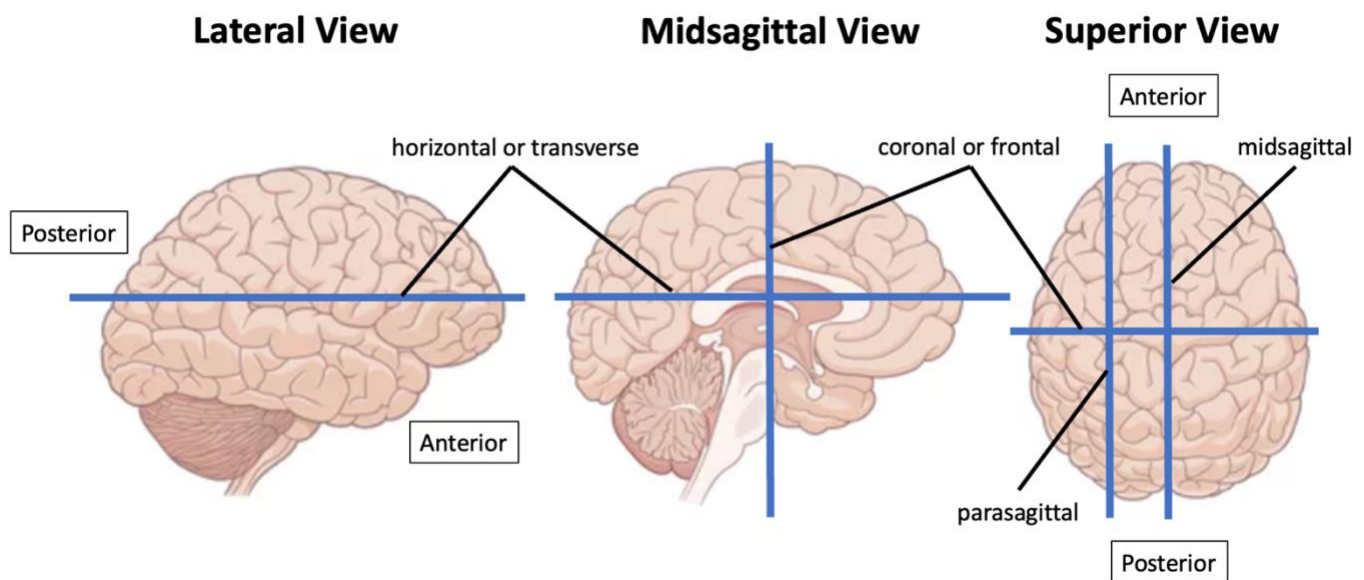
Anatomical Planes and Ventricles

A midsagittal section separates left from right on a structure, down the middle; evenly. A parasagittal cut is also performed down the middle but the two divided structures are not even. We will be performing a midsagittal cut as shown in the figure below, through the longitudinal fissure and the corpus callosum.

You will also be able to see the ventricles of the brain. The ventricles of the brain are a network of communication of cavities filled with CSF (cerebral spinal fluid). It consists of two lateral ventricles that meet in the 3rd ventricle. The fluid from the lateral ventricles reaches the 3rd ventricle via the interventricular foramen. From the 3rd ventricle, the CSF will travel through the aqueduct of the midbrain and then reach the 4th ventricle. Identify the structures as shown in the figure below. **When done, throw away the blade from the scalpel in a biohazard bin along with brain specimens and clean the scalpel, pins, and tray with soap and water. Rinse and clean lab stations with ethanol.**

Procedure:

- A. **Locate the brain stem.** This area is made up of the midbrain, pons, and medulla. Make a midsagittal cut and look at the cerebellum.
- B. **Examine the ventral surface of the sheep brain.** The next several steps will view this surface of the brain. A pair of olfactory bulbs may be seen, one under each lobe of the frontal cortex. Several important parts of the visual system are visible in the ventral view of the brain.
- C. **Examination of the midsagittal Cut:** Before cutting locate the lobes: frontal, parietal, temporal, and occipital. Now you will make a mid-sagittal cut. Hold the brain level and flat and cut along the longitudinal fissure. Locate the corpus callosum, pineal gland, lateral ventricle, thalamus, hypothalamus, and epithalamus.
- D. **Examination of the coronal cut:** Perform a coronal cut and examine the gray and white matter.



Activity 2: Reflex Activities

A. Pupillary Reflexes

Materials: Flashlight

Procedures:

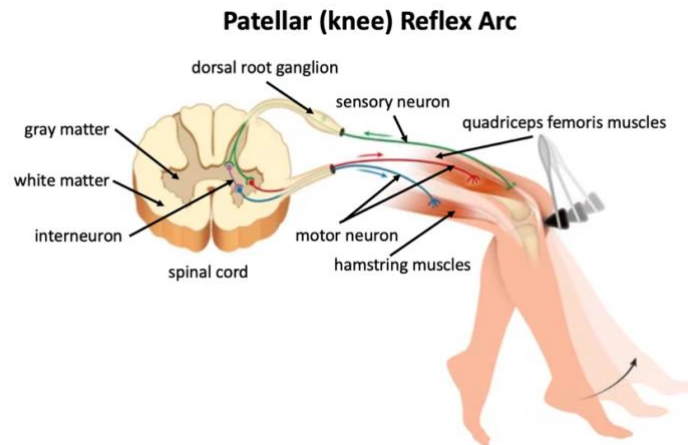
- Observe the size of your partner's pupils in each intensity of light. Flash a light into one eye and observe the pupillary responses. Do both eyes change simultaneously?
- Move your hand suddenly toward your partner's eyes. Describe your partner's reactions.

B. Patellar Reflexes

Materials: Reflex Hammer

Procedures:

- Have your partner sit in a chair or on a laboratory stool with legs uncrossed. Be sure to maintain a relaxed lower body.
- Gently tap the patellar tendon of one leg with a reflex hammer and note the response. Describe the reflex arc.
- Repeat the process but instruct your partner to perform the Jendrassik maneuver, that is, to clasp his or her hands in front, and keep the fingers locked sideways. Try to vigorously pull your hands away from one another at the same exact time the tendon is tapped. What happens to the patellar reflex when the Jendrassik maneuver is performed at the same time the patella is struck?



C. Ciliospinal Reflex

Procedures:

- Pinch the skin on one side of the nape of your neck and note the dilation of the pupil on the ipsilateral side.
- Which division of the nervous system is activated? Explain why the pupils dilate when the skin is pinched.

Activity 3: Reaction Time Activity for smell and taste reflexes

Materials: Jellybeans and timer

Procedures: This experiment requires that you have two laboratory partners. One person is the timekeeper, another is the experimenter, and another is the subject.

- A. The subject shuts his or her eyes and holds his or her nostrils closed.
- B. When directed by the timekeeper, the experimenter places a jellybean on the subject's tongue.
- C. The subject reports what jellybean flavor he/she tastes, record the time it took for the subject to determine a taste. **DO NOT** tell the subject whether he or she is wrong.
- D. Record the actual substance, the subject's response and the length of the time taken for the response, in the table below.

Taste and smell experiment – **eyes and nostrils closed.**

Actual Substance	Subject's Response Time taken
a)	
b)	
c)	
d)	

The subject shuts his or her eyes and keeps his or her nostrils open. Repeat the preceding procedures but now the subject can smell the piece of food. Record the results in the table below.

Taste and Smell experiment- **eyes closed, nostrils open**

Actual Substance	Subject's Response Time taken
a)	
b)	
c)	
d)	

- a) Could the subject(s) taste the jellybean while holding their nose(s)? YES or NO
- b) Was the subject(s) able to taste the jellybean once they regained their sense of smell? YES or NO
- c) Were any jellybean flavors so strong that the subject(s) could identify them without a sense of smell? YES or NO. If so, which flavor?
- d) Why does food often seem tasteless when you have a cold?

Presence or Absence of Smell

Concentrations that are only 10 to 15 times above threshold values evoke maximum intensity of smell, which contrasts with most other systems of the body in which the reach of intensity discrimination may reach 1 trillion to 1. This might be explained by the fact that smell is concerned more with detecting the presence or absence of odors than with quantifying their intensity.

Activity 4: Special Senses Activity for Balance

Balance Test

Balance or equilibrium is controlled by the **semicircular canals!!!!** of the inner ear. Each of the three canals is oriented along one of the 3 dimensions of the body (the x, y and z axes), so motion in any direction is felt when the fluid inside the canals triggers tiny hairs on the inside. The brain integrates this information into a sense of balance.

Procedure: Have a person stand on both feet without moving while their eyes are closed. Then have them balance on one foot with their eyes closed. Finally, have them walk a straight line with their eyes closed.

- a) How does vision work in concert with the sense of balance?

- b) Can you see why people are asked to walk a straight line to test sobriety?