4.1: Lab 4: Brain and Cranial Nerves

- Complete the dissection of the sheep brain and identify (with a pin) all of the structures of the brain using the corresponding vocabulary list.
- Locate structures of the brain and cranial nerves on the various models in the lab.
- Identify the 12 cranial nerves as well as their target organs.
- Determine the composition of the brain from dissections.
- Determine/trace the path of cerebrospinal fluid through the brain.
- Differentiate histology from different regions of the brain.
- Demonstrate an adequate understand of the material in this section.

The central nervous system entails all neurons of the brain and spinal cord. The brain is the central processing organ of the body and contains 100 billion neurons and a remarkable 1 trillion glial cells. It is estimated that cortical neurons alone consume around 5 billion ATP molecules per second. What's more, some neurons can have axons that extend several feet. Unlike the spinal cord, the gray and white matter in the brain are arranged in three segments. From deep to superficial, the innermost region is made of gray matter which is surrounded by the myelinated axons of the white matter. The thin layer of the cerebral cortex responsible for higher order cognition is the outermost layer of gray matter. The brain is divided into four major regions, the brainstem, diencephalon, cerebellum, and cerebrum. The brainstem contains the medulla oblongata, pons, and midbrain (which houses the pineal gland). Caudal to the forebrain is the diencephalon, a region which contains the epithalamus, hypothalamus, thalamus and third ventricle.

There are four cavities in the brain called ventricles; here cerebrospinal fluid (CSF) is produced and circulated by ependymal cells and the choroid plexuses. The two largest ventricles lie within each cerebral hemisphere and are known as the lateral ventricles. Cerebrospinal fluid drains from the lateral ventricles, through the interventricular foramen.
and into the third ventricle. The third ventricle lies between the halves of the thalamus. From here, it flows through the cerebral aqueduct (aqueduct of sylvius) and into the fourth ventricle, which lies between the cerebellum and the pons. Cerebrospinal fluid drains from the fourth ventricle, into the lateral and median apertures and down through the central canal of the spinal cord. Cerebrospinal fluid leaks out through foramina into the subarachnoid space where it is reabsorbed by veins on the surface of the brain and spinal cord.

Like the spinal cord, the brain is protected by three meninx, the dura, arachnoid and pia mater. Unlike the spinal meninges, the cranial dura mater is subdivided into two distinct layers; the periosteal layer, which is the superficial mot layer, and the inner meningeal dura mater. The two dural layers form the superior sagittal sinus which collectively channels venous blood from the brain. The falx cerebri divides the cerebrum into left and right hemispheres, the falx cerebelli divides the cerebellum into left and right hemispheres, and the tentorium cerebelli forms a physical barrier between the cerebrum and the cerebellum.

Vocabulary for the Brain and Cranial Nerves on page(s) 162-163.