

Nervous System Lab

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Neuron Anatomy

Utilizing the neuron model, lecture notes and diagrams:

- Draw a typical motor neuron. Label and describe the primary function of the three parts listed.
 - Cell body
 - Dendrites
 - Axon
- Describe how a nerve impulse is transmitted from one neuron to another. Be sure to include the following terms:
 - Action potential
 - Synaptic knob
 - Synaptic cleft
 - Neurotransmitter
 - Receiving (postsynaptic) membrane

Neuron Classification

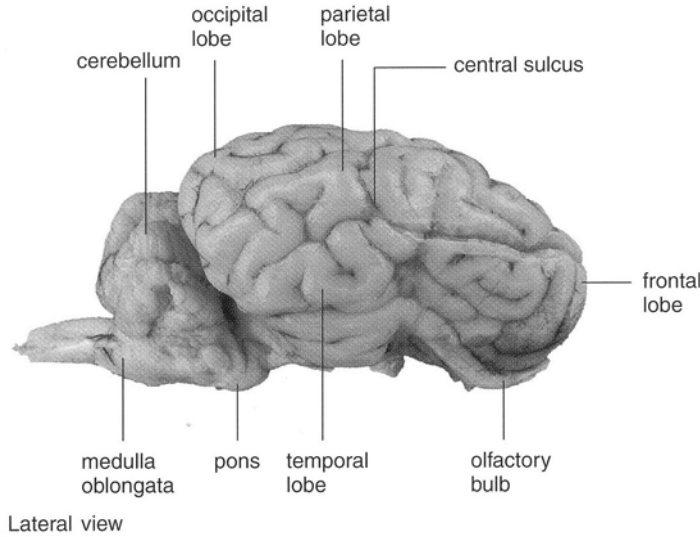
Utilizing your lecture notes and textbook:

- Describe the three classes of neurons based upon their function.

The Human Brain

Utilizing a brain model, textbook and your notes:

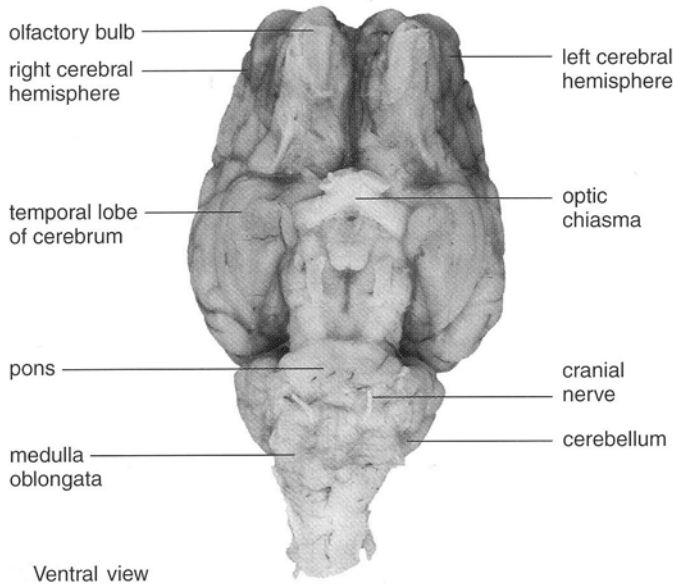
- Discuss the externally visible regions of the cerebral hemispheres, diencephalons, brain stem and cerebellum.
- Locate on a model, draw and describe below the region of the cerebral hemisphere that controls each of the following functions:
 - Motor movement
 - Sensory perception
 - Sight
 - Reasoning
 - Hearing
 - Smell
- **SHEEP BRAIN DISSECTION**
 - Obtain sheep brain, gloves, dissecting tray and instruments
 - **Lateral view:** View your sheep brain from the lateral aspect (from the side)
 - Compare relative sizes of the cerebrum, brain stem and cerebellum of the sheep brain to the human brain
 - which of these structures are most prominent in humans?



- Locate the frontal, parietal, occipital and temporal lobes
- Locate the central sulcus. Which two lobes does it separate?
 - **Dorsal view:** Place the sheep brain on the tray inferior surface down

- Observe the pia mater (innermost meninge) extending down into the sulci/fissures on the superior and lateral surfaces of the brain
 - Cut through this meningeal tissue along the longitudinal fissure. Gently force the cerebral hemispheres apart laterally to expose the corpus callosum, the large fiber tract deep to the longitudinal fissure
 - Carefully dissect open some sulci. Note their depth compared to the longitudinal fissure.
 - Examine the cerebellum. Note that in contrast to humans, it is not divided longitudinally.

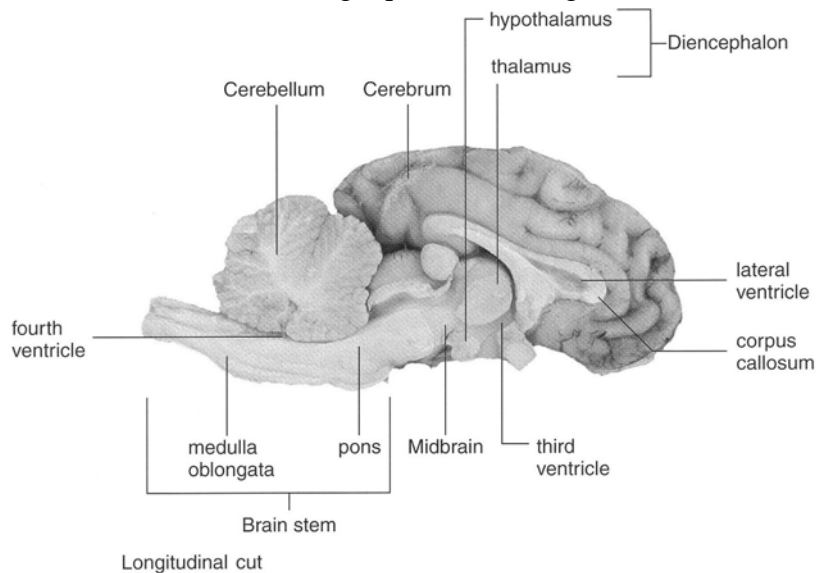
○ **Ventral view:** Turn the brain over and check out its inferior aspect



- Olfactory bulbs: Note the club-like olfactory bulbs on the inferior surface of the frontal lobes of the cerebral hemispheres.
- How does the size of these olfactory bulbs compare with those in humans?
- Can you surmise as to whether the sense of smell more important for food acquisition/protection in sheep or humans?

- **Optic Chiasm:** Note the X-shaped structure. Locate the

- optic nerve - carries sensory impulses from the retina
- optic chiasm – site where fibers from each optic nerve cross over to the opposite side
- optic tracts - nerve posterior to the chiasm
- Pituitary: Stalk of the pituitary gland is posterior to the chiasm
 - this structure may or may not be present
- Brain Stem: Locate the midbrain, pons and medulla oblongata posterior to the chiasm
- **Internal structures:** With the brain ventral side down, obtain the large knife and make a mid-sagittal cut along the longitudinal fissure and midline of the cerebellum creating equal left and right halves. Share half of the brain with a



group without a specimen as needed.

- Diencephalon: Identify the thalamus and hypothalamus
- Brain Stem: Locate the midbrain, pons and medulla oblongata
- Cerebellum: Notice the treelike arrangement of its white matter

Dispose of your brain specimen as directed and wash/dry/return the dissection instruments. Wash your desktop and your hands before leaving.

Spinal Cord

Utilizing a model or appropriate diagram of the spinal cord, identify, draw and describe the functions of the following parts:

- Gray matter
- Dorsal root
- Dorsal root ganglion
- Ventral root
- Spinal nerves

The Reflex Arc

Identify, draw and describe the function of each element of the reflex arc:

- Receptor
- Sensory neuron
- Interneuron
- Motor neuron
- Effector

Activities:

View the following slides. Drawing optional.

- Glass slides Tray 21
 - Spinal cord xs + ls, nerve cells (ox spinal cord), spinal nerve

Somatic Reflexes

- Patellar (knee-jerk) reflex
 - Seat the subject on the lab bench with legs hanging free (or the knees crossed)
 - Tap the patellar ligament sharply with the reflex hammer just below the knee to elicit response
 - Note: knee-jerk reflex assess the L2-L4 level of the spinal cord
 - Test both knees and record your observations.
 - Which muscle contracted?
- Achilles (ankle-jerk) reflex
 - Remove your shoe
 - Have your partner use one hand to dorsiflex your foot to increase tension on the gastrocnemius (calf) muscle
 - Sharply tap the Achilles tendon with a reflex hammer
 - Note: ankle-jerk reflex assesses the first two sacral segments of the spinal cord
 - What is the result?

Autonomic Reflex (may be performed next week during the Senses lab)

- Pupillary reflexes
 - Obtain a flashlight
 - Conduct the test in an area where the lighting is relatively dim
 - Standing to the left of the subject, instruct him or her to view a distant object. Using a quick rising motion, shine the light into the right eye.
 - What is the pupillary response of the right eye with the introduction of light?
 - What is the pupillary response in the left eye when the light enters the right eye? (this is called a consensual response)