External Anatomy of the Sheep Brain

Purpose

In this exercise students will reinforce their knowledge of the general surface anatomy of the sheep brain. This laboratory exercise will include indicating orientations and directions, the identification of the major regions/lobes of the brain, distinctive surface features, locations of major gyri, sulci, fissures, and cranial nerves, as well as some of the major behavioral functions associated with these areas. Upon completion of these exercises students should be able to identify structure/function relationships of pinned areas on a laboratory exam. Prior to completing this activity students should visit and complete the sheep brain dissection guide at:

Sheep Brain Dissection Guide:  http://academic.uofs.edu/department/psych/sheep/

Additional online and text sources students may wish to consult before, during, and after the laboratory exercise include:

Atlas of the Sheep Brain:  http://www.msu.edu/user/brains/sheepatlas/
Sheep Brain-Anatomy of Memory:  http://www.exploratorium.edu/memory/braindissection/index.html


Materials

1 Sheep Brain (dura mater intact)
1 Sheep Brain (dura mater removed)
Latex Gloves
Lab Coat
Dissecting Tray
Paper Towels
Dissecting Kit:
Scalpel
Fine Straight Forceps
Fine Curved Forceps
8 Dissecting Pins
Curved Probe
Safety Precautions

Each sheep brain was originally fixed with a formaldehyde solution and is maintained in a preservative called Carosafe™. This preservative is much less toxic than formaldehyde and serves to prevent mold growth and tissue deterioration. Due to the presence of these chemicals, students are required to wear laboratory coats and gloves at all times. Students should notify the instructor immediately if any of these chemicals come into direct contact with their skin or eyes. Since formaldehyde is a possible human carcinogen, students who are or may be pregnant may opt out of participating directly in this laboratory exercise. If you experience any irritation in your respiratory system or if you become dizzy at any point during the laboratory exercise, tell one of your group partners immediately, notify your instructor, and get assistance leaving the room (Do not stand-up by yourself!). All food and beverages should be left outside of the classroom and students should wash their hands thoroughly following the completion of the laboratory exercise.

Method

The image below shows a human and sheep brain (dorsal view) indicating the significant size difference between the two species. What similarities and differences can you detect between these to brains?

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
Orientations & Directions

Label the picture below with the terms provided in the table and complete the statements on the following page using anatomical landmarks/areas on the surface of the sheep brain. After labeling the picture and completing the statements, examine the sheep brains you have been given to reinforce your familiarity with these terms.

<table>
<thead>
<tr>
<th>Anterior</th>
<th>Posterior</th>
<th>Dorsal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventral</td>
<td>Lateral</td>
<td>Medial</td>
</tr>
</tbody>
</table>
Complete each of the following statements using major landmarks of the sheep brain (e.g., sulci, gyri, fissures, major neuroanatomic surface regions). Use different brain regions to complete each statement.

The ____________________ is dorsal to the ____________________.
The ____________________ is ventral to the ____________________.
The ____________________ is rostral to the ____________________.
The ____________________ is caudal to the ____________________.
The ____________________ is medial to the ____________________.
The ____________________ is dorsal and rostral to the ____________________.
The ____________________ is ventral and rostral to the ____________________.
The ____________________ is medial to the ____________________.
The ____________________ is caudal and lateral to the ____________________.

Cranial Nerves

Using the two sheep brains, locate each of the following cranial nerves. Describe the general location using the terminology for direction and orientation and indicate the sensory and/or motor function of each nerve. Indicate the approximate location of each nerve on the image of the ventral surface of the sheep brain below.
[1] Cranial Nerve I

Name: ______________________________________________________
Location: ____________________________________________________

Function(s): _________________________________________________
______________________________________________________________

[2] Cranial Nerve II

Name: ______________________________________________________
Location: ____________________________________________________

Function(s): _________________________________________________
______________________________________________________________

[3] Cranial Nerve III

Name: ______________________________________________________
Location: ____________________________________________________

Function(s): _________________________________________________
______________________________________________________________


Name: ______________________________________________________
Location: ____________________________________________________

Function(s): _________________________________________________
______________________________________________________________

[5] Cranial Nerve V

Name: ______________________________________________________
Location: ____________________________________________________

Function(s): _________________________________________________
______________________________________________________________
[6] Cranial Nerve VI

Name: ______________________________________________________
Location: ___________________________________________________
Function(s): _________________________________________________
________________________________________________________________

[7] Cranial Nerve VII

Name: ______________________________________________________
Location: ___________________________________________________
Function(s): _________________________________________________
________________________________________________________________

[8] Cranial Nerve VIII

Name: ______________________________________________________
Location: ___________________________________________________
Function(s): _________________________________________________
________________________________________________________________

[9] Cranial Nerve IX

Name: ______________________________________________________
Location: ___________________________________________________
Function(s): _________________________________________________
________________________________________________________________

[10] Cranial Nerve X

Name: ______________________________________________________
Location: ___________________________________________________
Function(s): _________________________________________________
________________________________________________________________

Name: ______________________________________________________
Location: ___________________________________________________

Function(s): _________________________________________________

[12] Cranial Nerve XII

Name: ______________________________________________________
Location: ___________________________________________________

Function(s): _________________________________________________

Sheep Brain Measurements

Use the sheep brain with dura mater removed. Measure the length, height, and width of each hemisphere.

Length of Left Hemisphere: __________ cm
Height of Left Hemisphere: __________ cm
Width of Left Hemisphere: __________ cm

Length of Right Hemisphere: __________ cm
Height of Right Hemisphere: __________ cm
Width of Right Hemisphere: __________ cm

Are there differences? If there are differences, are they consistent with what other lab groups are finding? Do you have any hypotheses about why any such differences may exist?

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

Dorsal View - Major Sulci, Fissures, & Gyri

Examine the dorsal surface of the sheep brain. Identify the major regions, sulci, fissures, and gyri listed below and label them on the picture provided.

○ Ansatus Sulcus
○ Anterior Sigmoides Gyrus
- Anterior Sylvian Gyrus
- Cerebellum
- Coronal Sulcus
- Crucial Sulcus
- Diagonal Sulcus
- Ectolateral Sulcus
- Ectolateral Gyrus
- Entolateral Sulcus
- Entolateral Gyrus
- Frontal Gyrus
- Lateral Sulcus
- Lateral Gyrus
- Medial Longitudinal Fissure
- Medulla
- Posterior Sigmoid Gyrus
- Posterior Sylvian Gyrus
- Suprasylvian Sulcus
- Suprasylvian Gyrus
Lateral View - Major Sulci, Fissures, & Gyri

Examine the lateral surface of the sheep brain. Identify the major regions, sulci, fissures, and gyri listed below.

- Anterior Sigmoid Gyrus
- Anterior Sylvian Gyrus
- Cerebellum
- Claustrocortex (Insular Cortex)
- Ectolateral Sulcus
- Ectolateral Gyrus
- Medulla
- Orbital Sulcus
- Orbital Gyrus
- Parahippocampal Cortex
- Periamygdaloid Cortex
- Periform Lobe
- Pons
- Posterior Sylvian Gyrus
- Rhinal Fissure
- Suprasylvian Sulcus
- Suprasylvian Gyrus
- Sylvian Sulcus
- Temporal Lobe
Ventral View - Major Sulci, Fissures, & Gyri

Examine the ventral surface of the sheep brain. Identify the major regions, sulci, fissures, and gyri listed below and label them on the picture provided.

- Cerebellum
- Cerebral Peduncle
- Hypothalamus
- Infundibulum
- Medulla
- Olfactory Bulb
- Optic Chiasm
- Optic Nerve
- Parahippocampal Gyrus
- Pituitary Gland
- Pons
- Pyramidal Tract
- Pyriform Lobe
**Brain Structures Corresponding with Brain Subdivisions**

Find each of the following brain structures/regions on the sheep brain (with dura mater removed unless otherwise specified) and place a check mark in the appropriate bullet point. Provide a basic description of the function of each area where indicated.

**Telencephalon**

- **Basal Ganglia**
  Function: ________________________________

- **Limbic System**
  Function: ________________________________
    - **Amygdala**
      Function: ________________________________
    - **Hippocampus**
      Function: ________________________________
    - **Fornix**
      Function: ________________________________
    - **Cingulate Cortex**
      Function: ________________________________

**Diencephalon**

- **Hypothalamus**
  Function: ________________________________

- **Mammillary Bodies**
  Function: ________________________________

- **Thalamus**
  Function: ________________________________

- **Pineal Body**
  Function: ________________________________

**Mesencephalon**

- **Red Nucleus**
  Function: ________________________________
- Reticular formation
  Function: ______________________________________________________

- Substantia Nigra
  Function: ______________________________________________________

- Superior Colliculi
  Function: ______________________________________________________

- Inferior Colliculi
  Function: ______________________________________________________

Metencephalon

- Cerebellum
  Function: ______________________________________________________
    - Folia
    - Cerebellar Vermi
    - Cerebellar Hemisphere

- Pons
  Function: ______________________________________________________

- Trapezoid Bodies

Myelencephalon

- Medulla Oblongata
  Function: ______________________________________________________

- Pyramidal Tracts