

Figure 14.7 Photo of lateral aspect of the human brain.



Dissection:

The Sheep Brain

Obtain a sheep brain, protective skin cream or disposable gloves, dissecting tray, and instruments, and bring them to your laboratory bench.

1. Turn your sheep brain so that you are viewing its left lateral aspect. Compare the various areas of the sheep brain (cerebrum, brain stem, cerebellum) to the photo of the human brain in Figure 14.7. Relatively speaking, which of these structures is obviously much larger in humans?
2. Place the ventral surface of the sheep brain down on the dissecting tray and observe the fragments of the dura mater. Feel its consistency and notice its toughness. Cut through the dura mater along the line of the longitudinal fissure. Gently force the cerebral hemispheres apart laterally to expose the corpus callosum, the huge fiber tract deep to the longitudinal fissure.
3. Examine the superior surface of the brain. Notice that, like the human brain, its surface is thrown into convolutions (fissures and gyri). Identify the arachnoid mater, which appears on the brain surface as a delicate “cottony” material spanning the fissures.

Ventral Structures

Figure 14.8a and b shows the important features of the ventral surface of the brain. Turn the brain over so that its ventral surface is up.

1. Look for the clublike 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 of humans?

Is the sense of smell more important as a protective and a food-getting sense in sheep *or* in humans?

2. The optic nerve (II) carries sensory impulses concerned with vision from the retina of the eye. Identify the optic nerves, the optic chiasma (the point where some of the fibers of each optic nerve cross over to the opposite side), and the optic tracts, which continue from the optic chiasma.

3. Posterior to the optic chiasma, identify the stalk of the pituitary gland and then the mammillary body. Notice that the sheep’s mammillary body is a single rounded eminence. In humans it is a double structure.

4. Identify the cerebral peduncles on the ventral aspect of the midbrain, just posterior to the mammillary body. Also identify the large oculomotor nerves (III), which arise from the ventral midbrain surface, and the tiny trochlear nerves (IV), seen at the midbrain-pons junction. These cranial nerves provide motor fibers to extrinsic muscles of the eyeball.

5. Moving posteriorly from the midbrain, identify first the pons and then the medulla oblongata.

6. Return to the junction of the pons and midbrain and proceed posteriorly to identify the following cranial nerves, all arising from the pons:

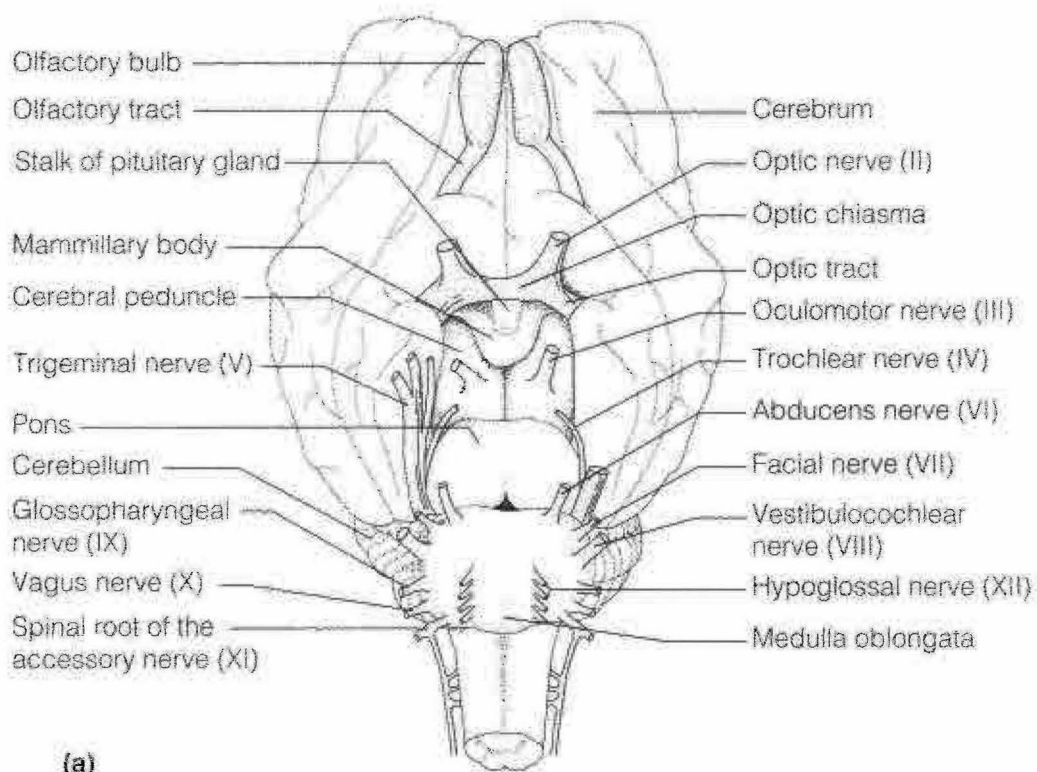
- Trigeminal nerves (V), which are involved in chewing and sensations of the head and face
- Abducens nerves (VI), which abduct the eye (and thus work in conjunction with cranial nerves III and IV)
- Facial nerves (VII), large nerves involved in taste sensation, gland function (salivary and lacrimal glands), and facial expressions

7. Continue posteriorly to identify the following:

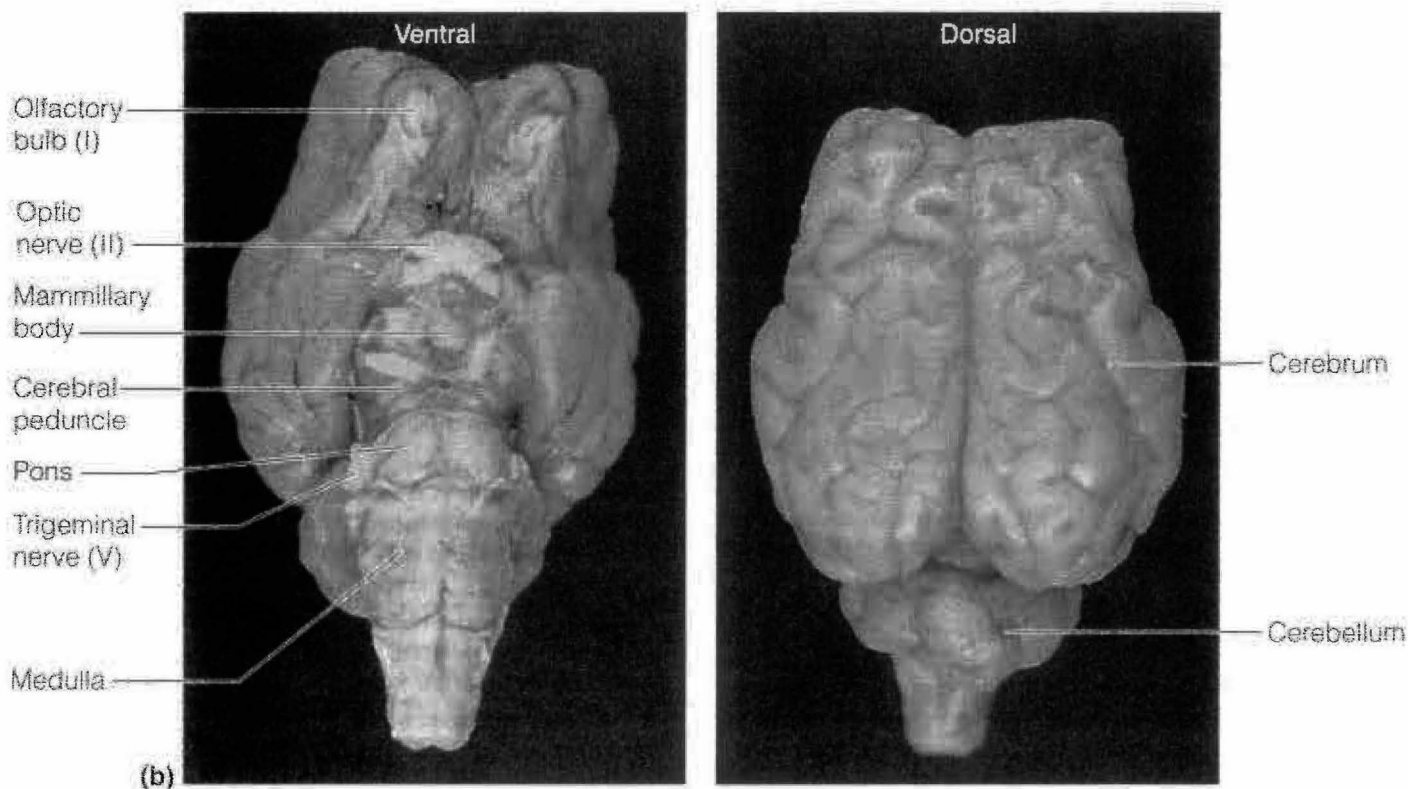
- Vestibulocochlear nerves (VIII), purely sensory nerves that are involved with hearing and equilibrium
- Glossopharyngeal nerves (IX), which contain motor fibers innervating throat structures and sensory fibers transmitting taste stimuli
- Vagus nerves (X), often called “wanderers,” which serve many organs of the head, thorax, and abdominal cavity
- Accessory nerves (XI), which serve muscles of the neck, larynx, and shoulder; notice that the accessory nerves arise from both the medulla and the spinal cord
- Hypoglossal nerves (XII), which stimulate tongue and neck muscles

Dorsal Structures

1. Refer to Figure 14.8b as a guide in identifying the following structures. Reidentify the cerebral hemispheres. How does the depth of the fissures in the sheep’s cerebral hemispheres compare to that in the human brain?



(a)



(b)

Figure 14.8 Intact sheep brain. (a) Diagrammatic ventral view, (b) Photographs showing ventral and dorsal views.

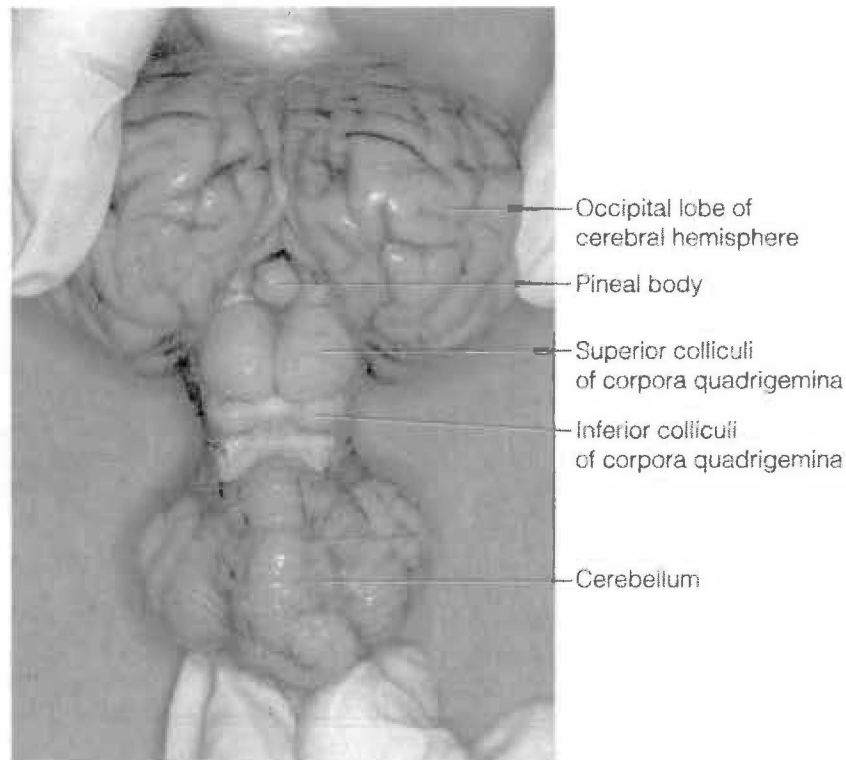


Figure 14.9 Means of exposing the dorsal midbrain structures of the sheep brain.

- Carefully examine the cerebellum. Notice that, in contrast to the human cerebellum, it is not divided longitudinally, and that its fissures are oriented differently.
- To expose the dorsal surface of the midbrain, gently force the cerebrum and cerebellum apart, as shown in Figure 14.9. Identify the corpora quadrigemina, four rounded prominences on the dorsal midbrain surface. What is the function of the corpora quadrigemina?

Also locate the pineal body, which appears as a small oval protrusion in the midline just anterior to the corpora quadrigemina.

Internal Structures

- The internal structure of the brain can only be examined after further dissection. Position the brain ventral side down and make a cut completely through it in a superior to inferior direction. Cut through the longitudinal fissure, corpus callosum, and midline of the cerebellum. Refer to Figure 14.10 as you work.
- A thin nervous tissue membrane immediately ventral to the corpus callosum separates the lateral ventricles from each other. Pierce this membrane and probe the cavity of the lateral ventricle.

- Identify the thalamus, which forms the walls of the third ventricle. The intermediate mass spanning the ventricular cavity appears as a round protrusion of the thalamus wall.
- The hypothalamus forms the floor of the third ventricle. Identify the optic chiasma, stalk of the pituitary, and mammillary body on its exterior surface. You can see the pineal body at the posterior end of the third ventricle.
- Locate the midbrain by identifying the corpora quadrigemina that form its dorsal roof. Follow the cerebral aqueduct through the midbrain tissue to the fourth ventricle. Identify the cerebral peduncles, which form its anterior walls.
- Identify the pons and medulla, anterior to the fourth ventricle. The medulla continues into the spinal cord without any obvious anatomical change, but the point at which the fourth ventricle narrows to a small canal is generally accepted as the beginning of the spinal cord.
- Identify the cerebellum posterior to the fourth ventricle and notice the internal treelike arrangement of its white matter called the arbor vitae.
- Check with your instructor to determine if cow spinal cord sections (preserved) are available for the spinal cord studies in Exercise 15. If not, save the small portion of the spinal cord from your brain specimen. Otherwise, dispose of all organic debris in the appropriate laboratory containers and clean the dissecting instruments and tray before leaving the laboratory. ■

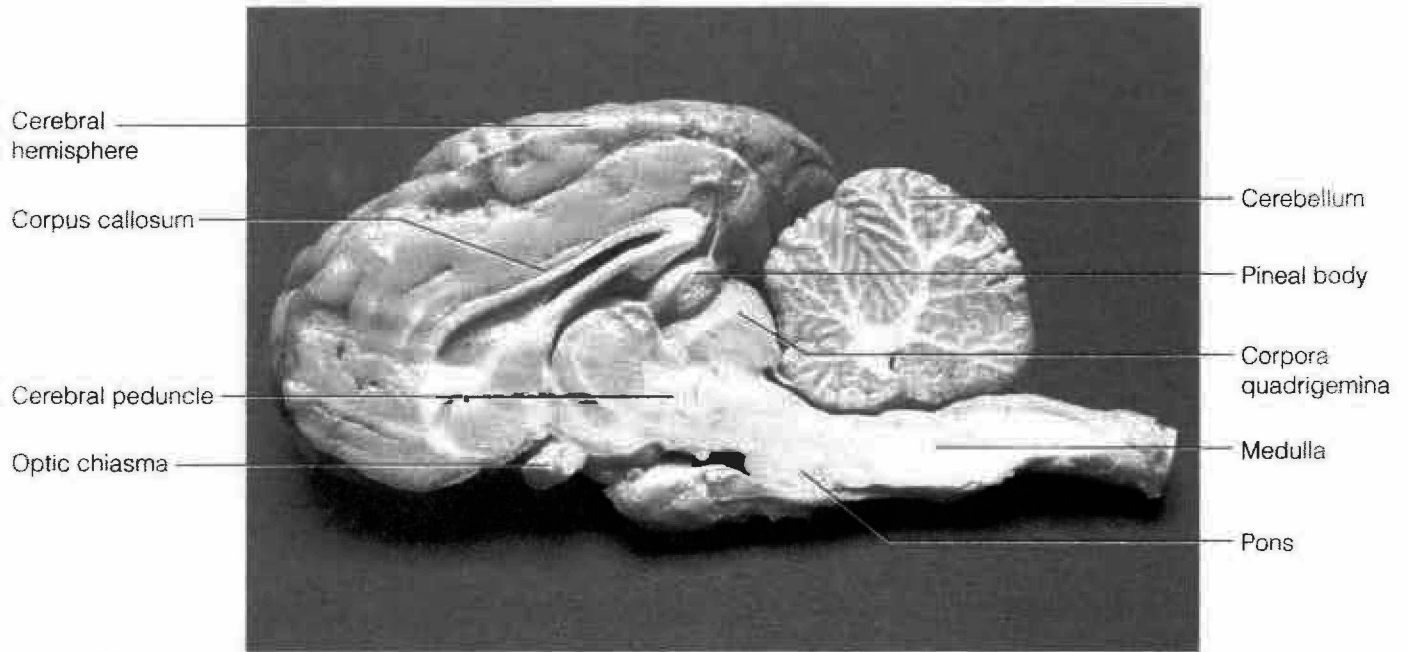
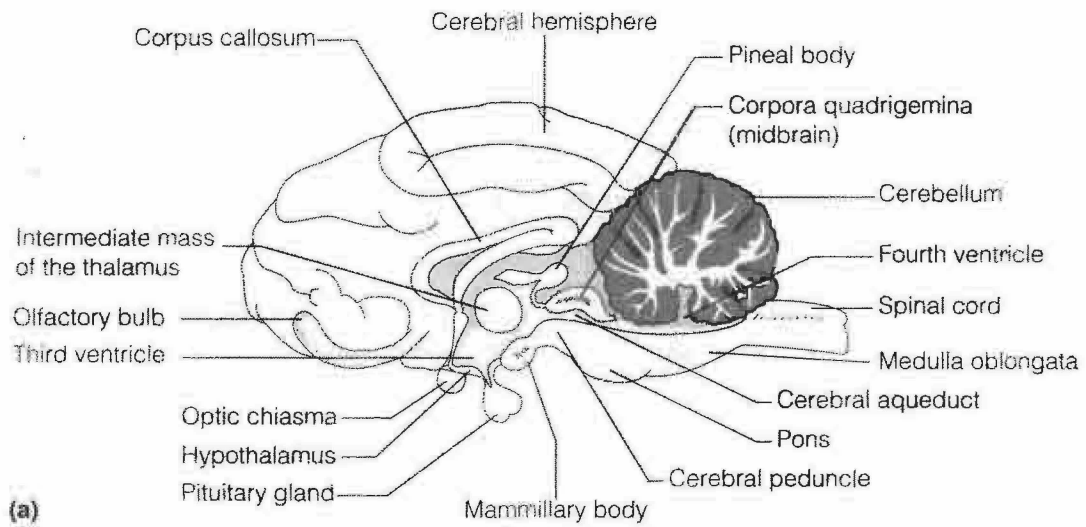


Figure 14.10 Sagittal section of the sheep brain showing internal structures. (a) Diagrammatic view. (b) Photograph.