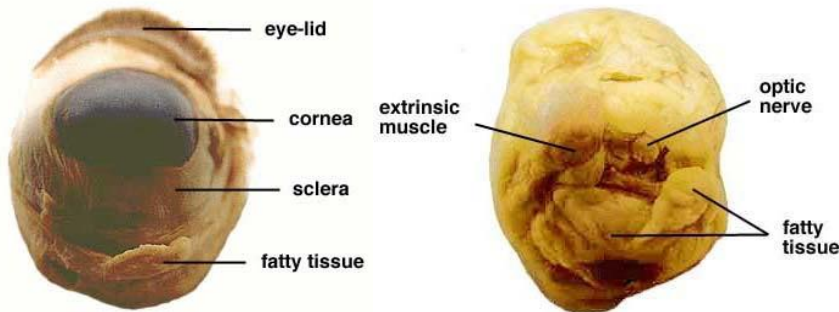


Instructions for Sheep Eye Dissection

The anatomy of the human eye can be better shown and understood by the actual dissection of an eye. One eye of choice for dissection, that closely resembles the human eye, is that of the sheep.

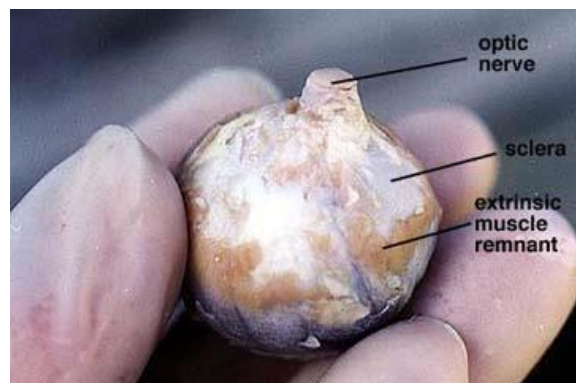
Begin the dissection by gathering the equipment and supplies listed here. (sheep eye, dissecting pan, scissors, scalpel, tweezers, paper towels and a device with a camera for recording information about the eye as it is dissected.) You will be taking a picture of each step as you complete it and writing notes to explain what you see.



PART 1: External Anatomy of the eye

Step 1:

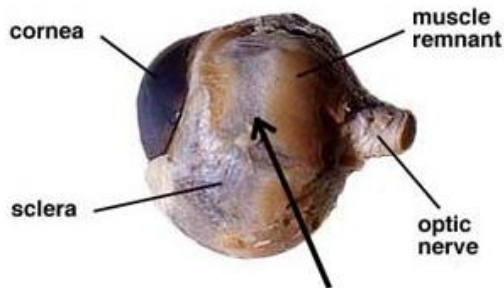
- A. Wash the sheep eye in running water to remove the preservative fluid. Dry the eye with paper toweling.
- B. Examine the front of the eye and locate the eye-lid, cornea, sclera (white of the eye) and fatty tissue.
- C. Examine the back of the eye and find extrinsic muscle bundles, fatty tissue and the optic nerve. The four extrinsic muscles (humans have six) move the sheep eye while the fatty tissue cushions the eye. If the optic nerve is not visible use the tweezers to move the fatty tissue around until the nerve is exposed.
- D. Take the notes/photos you need to record what you have observed so far.



Step 2:

- A. Use your scissors to cut away the eye-lid, muscle and fatty tissue from both the front and rear surfaces of the eye. **Be careful not to remove the optic nerve.**
- B. Cut along the **surface** of the sclera until all the tissue is removed and your specimen looks similar to the photographs you see here. The sclera is very tough so you do not need to worry about cutting into this layer of the eye.
- C. When you have finished removing the tissue surrounding the eye identify the sclera, cornea, optic nerve, and the remaining extrinsic muscle remnants. The cloudy nature of the cornea is caused by the death of this tissue. It is transparent in the living state.
- D. Take the notes/photos you need to record what you have observed so far.

Part 2: Internal Posterior (back) Anatomy



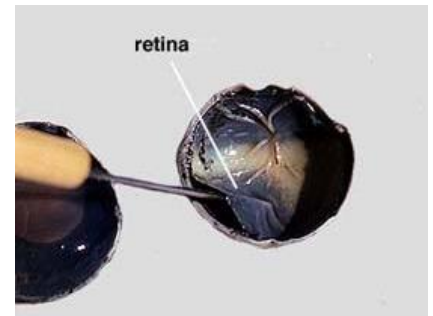
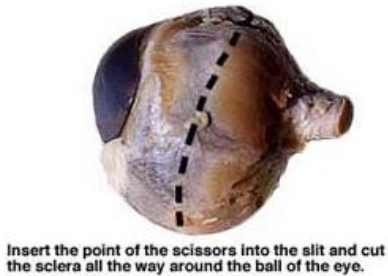
Step 3: Place your eye specimen in the dissection pan.

- A. Turn the specimen so the cornea is on your left and the optic nerve is on your right.
- B. Select a place to make an incision of the sclera midway between the cornea and optic nerve. Use the point of the scalpel to make a small cut through the sclera. Fluid should ooze out of the eyeball when you have cut deeply enough. You will be reminded of how tough the sclera is when you make this cut.
- C. Take the notes/photos you need to record what you have observed so far.



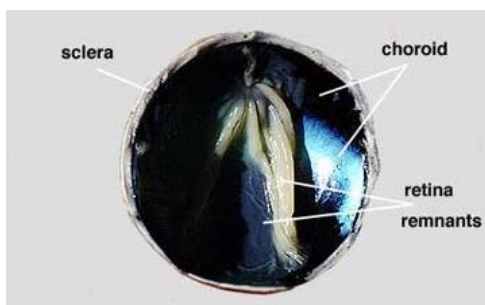
Step 4:

- A. Insert the point of the scissors into the slit made by the razor blade and cut the sclera with a shallow snipping motion. Turn the eye as you continue the cutting action. Cut the sclera all the way around the ball of the eye. You will need to support the eye in the palm of your hand while you complete this step of the dissection. Do not be surprised if some fluid from the eye oozes from the slit as you make this cut.
- B. Take the notes/photos you need to record what you have observed so far. Make some written observations about the sclera and vitreous humor.



Step 5:

- A. Arrange the two hemispheres of the eye as you see in the above photograph.
- B. Observe the semi-fluid vitreous humor that fills the central cavity of the eye. It is transparent in the living eye but might be cloudy in the preserved specimen. The vitreous humor along with the aqueous humor helps to maintain the shape of the eye. More will be said about the aqueous humor later.
- C. The retina lines the posterior (back) cavity of the eye and extends forward to the ciliary body. Use your tweezers to lift and pull the retina back from the underlying choroid layer. See the photograph on the right side above.
- D. Notice that the retina is only firmly attached to the choroid at one place. This region is the optic disc or blind spot. Here the nerve fibers leave the retina and form the optic nerve, which is directly behind the blind spot.
- E. Take the notes/photos you need to record what you have observed so far. Make written observations about the vitreous humor.



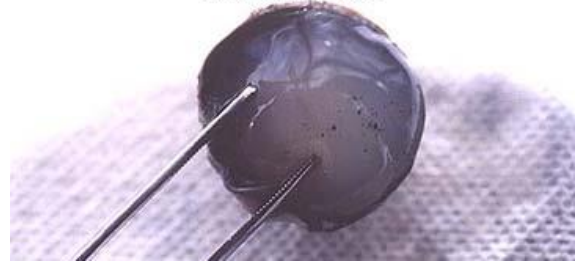
Step 6:

- A. Use your forceps to peel the retina away from the underlying choroid coat. The retina should remain attached at the blind spot.
- B. The choroid coat is dark and relatively thin. Use your forceps or probe to gently separate the choroid from the outer sclera.

- C. Verify that the eye has three distinct layers, the retina, choroid and sclera. See left photograph above. The choroid contains an extensive network of blood vessels that bring nourishment and oxygen to itself and the other two layers. The dark color, caused by pigments, absorbs light so that it is not reflected around inside of the eye. In just a moment you will see that the choroid extends forward to the ciliary body.
- D. Take the notes/photos you need to record what you have observed so far. Make written observations about the retina, blind spot and sclera.

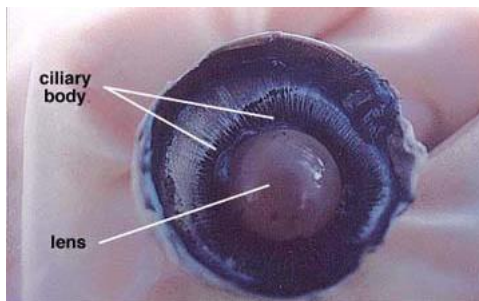
Part 3: Anterior (front) Interior Anatomy

Remove the vitreous humor from the anterior hemisphere of the eyeball. Try not to disturb the lens as the watery fluid is removed.



Step 7:

- A. Use your tweezers to remove the vitreous humor from the anterior hemisphere of the eye. See photograph above. This will take some time and effort as the semi-fluid material separates easily. It helps to turn the hemisphere on edge and to use a scraping motion to remove the fluid. Try not to disturb the lens that is just below the vitreous humor.
- B. Take the notes/photos you need to record what you have observed so far.

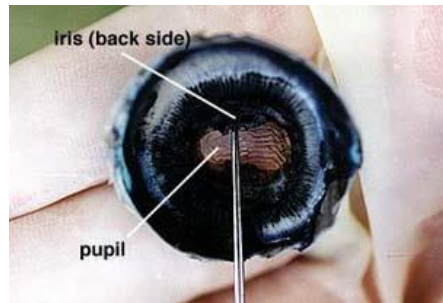


Step 8:

- A. Removal of the vitreous humor reveals the lens, ciliary body and suspensory ligaments. In the normal condition the lens is transparent except, when as a condition of aging, the lens turns cloudy. The cloudy condition, called cataract, prevents or reduces the amount of light reaching the retina. Cataract can be treated by removing the lens and replacing it with a stiff artificial one. The normal lens is convex shaped and somewhat elastic. It is held in place by the suspensory ligaments that in turn join with the smooth muscle containing ciliary body. When the smooth muscle fibers contract the resulting force flattens the lens and the degree of bending of the light rays is reduced. Relaxation of the smooth muscle results in a thickening of the lens and a greater bending of the rays of light.
- B. Take the notes/photos you need to record what you have observed so far.

Step 9:

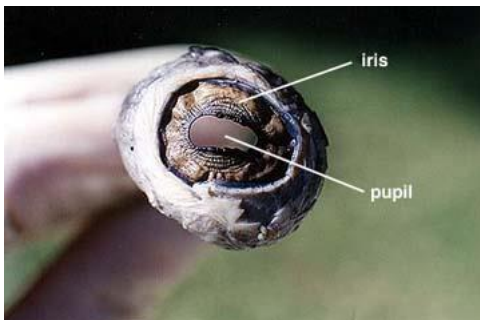
- A. Remove the lens by pulling it free from its attachments. Note the shape of the lens, its stiffness and opaqueness. Suspensory ligaments may also be visible along the edge of the lens.
- B. Take the notes/photos you need to record what you have observed so far. Make some written observations about the lens.



Step 10:

- A. When the lens is removed, an opening, allowing light to enter the eye is seen. This opening, the pupil is located in the center of the iris. Two muscle layers of the iris regulate the size of the pupil. One layer increases the pupil size with decreasing light intensity and the other layer reduces pupil size with increasing light intensity.
- B. Note the oblong shape of the sheep pupil; in humans the pupil is circular. The back side of the iris can be seen just above the pointer in the photograph above. Part of the iris is being lifted by the pointer but the iris continues all the way around the pupil opening.
- C. A second cavity or space is present between the iris and the cornea. This space is filled with a second semi-liquid fluid, the aqueous humor. This fluid, like the vitreous humor helps to maintain the shape of the eye. Glaucoma is a condition where the fluid pressure becomes too high causing eye damage.
- D. Take the notes/photos you need to record what you have observed so far.

PART 4: Removal of Cornea & Lens



Step 11:

- A. Remove the cornea from the front eye hemisphere.
- B. Use a scalpel to puncture a small slit at the boundary between the cornea and sclera.
- C. Then insert the scissors into the slit and cut all the way around the cornea to remove it.

- D. Notice the thickness of the cornea. How does it compare to the thickness of the sclera? Carefully observe the front side of the iris and pupil. What shape is the sheep's pupil? How does it compare to the shape of the human pupil? Notice that the back or posterior color of the iris is black while the anterior or front of the iris is colored. What color is your sheep's eye?
- E. Take the notes/photos you need to record what you have observed so far. Make written observations about the pupil, iris and cornea.

Step 12: Find the lens

- A. Wash all the ligaments and vitreous gel from the lens. Observe the texture of the lens.
- B. Make written observations about the lens.

Part 5: Cleaning Up

Step 13:

- A. Rinse your tools and dissecting pan in the sink, make sure all tools are dried and placed back inside dissecting kits. Leave pans upside down on paper towels to dry. Wrap the sheep eye in a paper towel and place in disposal bin.

Step 14:

- A. Using damp paper towel and soap, thoroughly wipe down your lab counter, and any other surfaces that may be contaminated. Dispose of the paper towel in the garbage can.

Step 15:

- A. Wash your hands with soap and water. Return to your desk and begin working on your lab report.

**Lab Report: Use MPS Science Lab Report Form and Content found on Homework Website under Lab Documents
And Guidelines Below**

I. Title

II. Background

- Compare and contrast the human and sheep eye
 - Research if sheep can discern color, compare musculature, have differences in kinds of photoreceptors, pupil structure, color variations to the iris, etc.
- Make sure to have at least 2 works cited and use in text citations!

III. Purpose

The purpose of this lab was to.....

IV. Material:

Refer to the “Sheep Eye Dissection” handout for the materials.

V. Procedure:

Refer to the “Sheep Eye Dissection” handout for the procedure.

VI. Results

- Labeled Pictures
 - When labeling pictures use straight leader lines and labels must be horizontal.
(May use blue or black ink but must be visible without question)

VII. Analysis

- Summarize results – Refer to each structure in the lab and describe location and function
- Error and expansion/improvement

VIII. Conclusion

- Explain how the purpose was or wasn't met – without saying “The purpose was.....and it was met because..”