

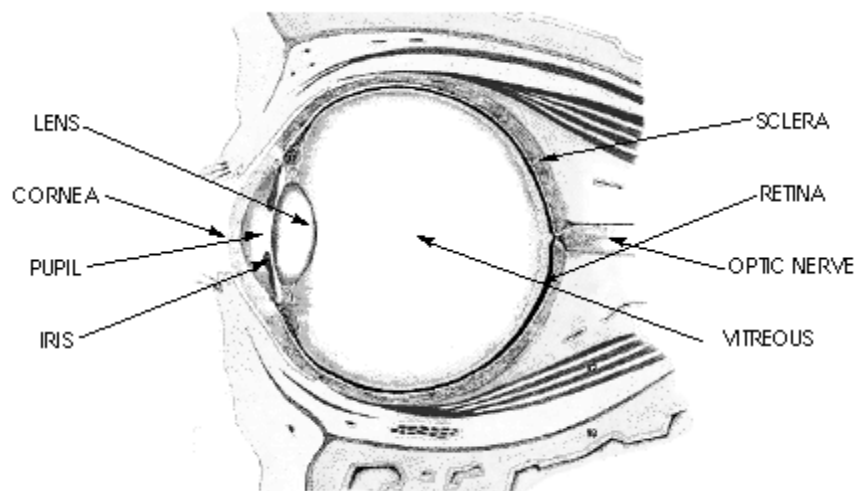
Name _____

How the Eye Works

The eye is one way our brain receives stimuli from the environment. They respond to light energy.

The **sclera** (the "white") surrounds most of the eye and gives it its structural strength. In the front of the eye is the **cornea**, transparent tissue that sticks out slightly from the sclera. Just behind the cornea, and easily seen through it, is the **iris**, which is the part of the eye with the characteristic brown, blue, hazel, or green color. There is a circular hole, the **pupil**, in the center of the iris. It appears black, because the interior of the eye is designed to absorb light, not to reflect it.

Take a look at what happens when light from an object enters the eye.



The light passes through the **cornea** into the **aqueous body**, which is simply a cavity filled with fluid. From there, passing through the pupil (which, as you remember, is a hole in the iris), the light passes through the **lens**. Muscles around the eye contract or relax to adjust the shape of the lens, focusing the light rays. Then light goes through the **vitreous body**, before striking the **retina**. The vitreous body is similar to the aqueous. The

retina is like a projection screen, or like the film of a camera. .

The retina has over 100 million light-sensitive cells to process the light and sends the information along the **optic nerve**. This leads to the brain, which finishes off the job of processing and interpretation.

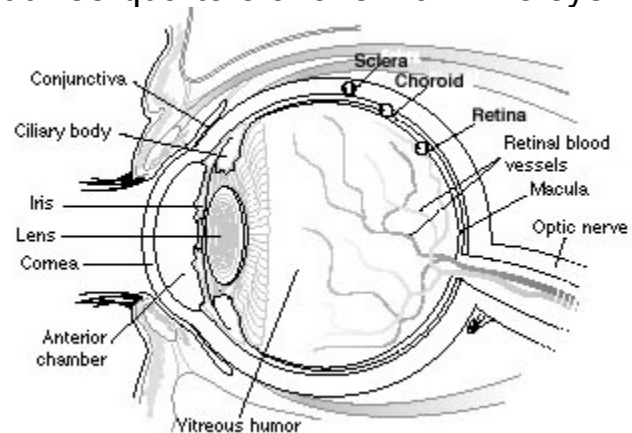
Structure and Function of the Eye

The eye of an adult measures about one inch from the front to the back of the eye; a child's eye measures about three-quarters of one inch. The eye has three layers:

Sclera - the outer protective white coating of the eye

Choroid - the middle layer which contains blood vessels to nourish the eye

Retina - the inner layer which contains the nerves that bring information to the brain for seeing



The **cornea** is the clear part of the front of the eye that bends light rays. The **conjunctiva** is a thin tissue that lines the eyelids and the eyeball up to the edge of the cornea. The **iris** is the colored part of the eye that is made up of a spongy tissue and is an extension of the choroid. The **pupil** is the opening in the iris (black) that allows light into the eye. The **lens** helps focus light rays onto the retina. The lens can change shape to focus on near or distant objects.

The eye is filled with fluids that help nourish and keeps the pressure within the eye constant. The **anterior chamber**, the front part of the eye between the iris and the cornea, is filled with **aqueous humor**, a watery fluid that nourishes the lens and maintains the pressure within the eye. The back part of the eye is filled with **vitreous humor**, a transparent gel. The **retina** is made up of ten layers and contains over one million cells. The **optic nerve** has nerve fibers that send information to the brain for interpretation of objects seen.

The **macula** is the area of the retina that is responsible for central vision; its central portion is referred to as the **fovea** and is responsible for the sharpest vision. The macula houses the highest concentration of the cones which are responsible for color and sharp vision. The rods, which compose the rest of the retina, are more sensitive to light and are responsible for night vision and peripheral vision. Attached to the globe of the eye are six muscles that aid in the movement of the eye. Movement of the eye may be caused by one, a few, or all of the muscles working together.

Sheep Eye Dissection

By dissecting the eye of a sheep, which is similar to the eyes of all mammals including humans, you will gain an understanding of the structure and function of the parts of the eye.

Materials

Sheep eye, dissecting pan, dissecting kit, safety glasses, lab apron, and gloves

Procedure - External Structure

1. Obtain a sheep eye, place it in your dissecting pan
2. Rotate the eye until the larger bulge or **tear gland** is on the top of the eye. The eye is now in the position it would be in a body as you face the body.
3. On the outside of the eye, locate the following parts:
 - **fat**- surrounds the eye & cushions it from shock
 - **tear or lacrimal gland** - forms a bulge on the top outer area of the eye & produces tears to wash the surface of the eye
 - **tear ducts** - tubes to carry the tears from the gland to the eye
 - **optic nerve** - a white cord on the back of the eye about 3mm thick just toward the nasal side; carries messages between the eye & brain
 - **muscles** - reddish, flat muscles found around the eye to raise, lower, & turn (right & left) the eye

4. Turn the eye so that it is facing you & examine these structures on the front surface of the eye:

- **eyelids** - two moveable covers that protect the eye from dust, bright light, and impact
- **sclera** - this is the tough, white outer coat of the eye that extends completely around the back & sides of the eye
- **cornea** - a clear covering over the front of the eye that allows light to come into the eye (preservative often makes this appear cloudy)
- **iris** - round black tissue through the cornea that controls the amount of light that enters the inner part of the eye (may be colored in humans)
- **pupil** - the round opening in the center of the eye that allows light to enter and whose size is controlled by the iris

Procedure - Internal Structure

5. Place the eye in the dissecting pan so it is again facing you. Using your scalpel, pierce the white part of the eye or sclera just behind the edge of the cornea. Make a hole large enough for your scissors.

6. Using your scissors, carefully cut around the eye using the edge of the cornea as a guide. Lift the eye & turn it as needed to make the cut and be careful not to squeeze the liquid out of the eye.

7. After completing the cut, carefully remove the front of the eye and lay it in your dissecting pan.

8. Place the back part of the eye in the pan with the inner part facing upward.

9. Locate the following internal structures of the eye:

- **cornea** - observe the tough tissue of the removed cornea; cut across the cornea with your scalpel to note its thickness
- **aqueous humor** - fluid in front the eye that runs out when the eye is cut
- **iris** - black tissue of the eye that contains curved muscle fibers
- **ciliary body** - located on the back of the iris that has muscle fibers to change the shape of the lens

- **lens** - can be seen through the pupil; use your scalpel & dissecting needle to carefully lift & work around the edges of the lens to remove it
- **vitreous humor** - fluid inside the back cavity of the eye behind the lens
- **retina** - tissue in the back of the eye where light is focused; connects to the optic nerve; use forceps to separate the retina from the back of the eye & see the dark layer below it

1. List three observations you made when you examined the surface of the eye:

2. Identify the following structures, show your teacher:

- Cornea
- Tear gland
- Optic nerve
- Iris
- Pupil
- Retina
- Ciliary body
- Sclera

<i>Teacher Initials</i>
