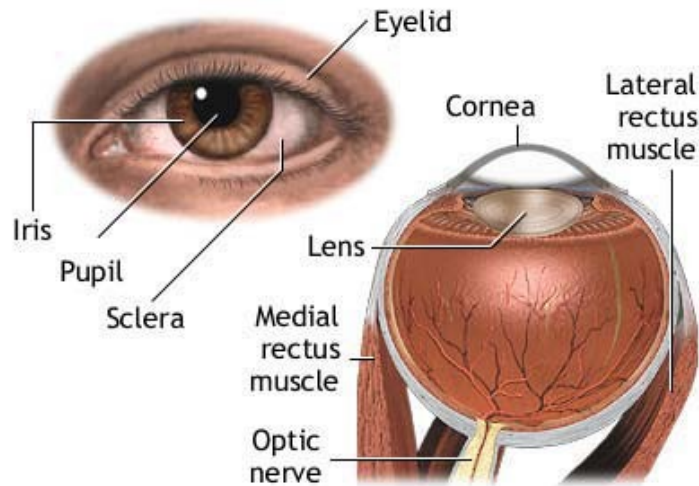


Notes: Anatomy of the Eye

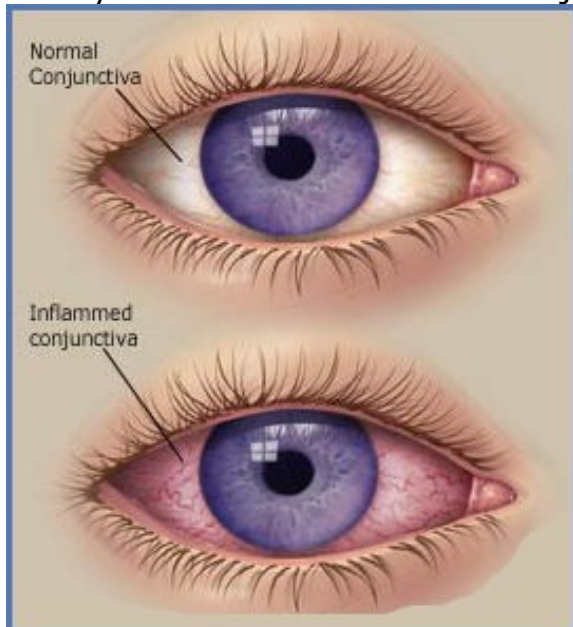
I. External Structures



Source: <http://medicalimages.allrefer.com/large/external-and-internal-eye-anatomy.jpg>

The eyes are protected anteriorly by **eyelids** and **eyelashes**. A delicate membrane called the **conjunctiva** lines the eyelids and covers the outside surface of the eyeball.

Pinkeye is inflammation of the conjunctiva.



Source: http://4.bp.blogspot.com/_B-

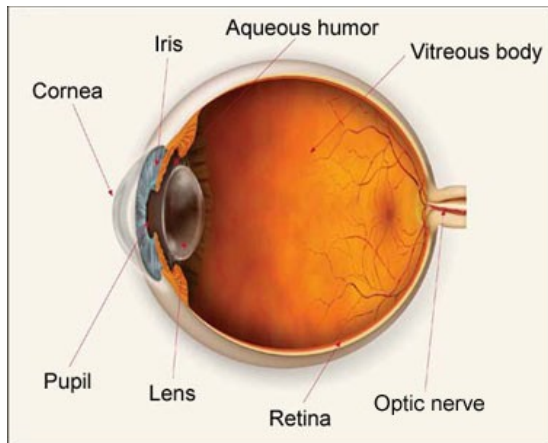
70vD8hAOk/RsDFTIHI33I/AAAAAAAAA9k/1p0vFQ77gAs/s400/pink.jpg

Caused by bacteria or virus, it causes reddened, irritated eyes. Pinkeye is highly contagious.

What about the role of tears for the eye?

Tears are produced by **lacrimal glands** which are located above the lateral end of each eye. They continually release a dilute salt solution onto the eyeball. Tears contain antibodies and **lysozyme**, an enzyme that destroys bacteria. Also, tears moisten and lubricate the eye. Did you realize that tears actually have a protective function?

The movement of the eye is controlled by six external eye muscles called **extrinsic muscles**.



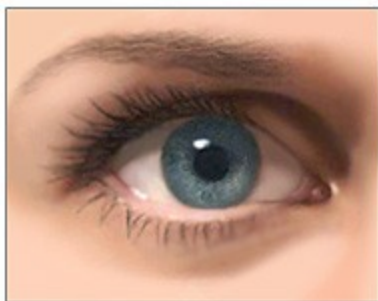
Source: http://www.chla.org/atf/cf/%7B1CB444DF-77C3-4D94-82FA-E366D7D6CE04%7D/eye_diagram.jpg

The eye is a hollow sphere whose wall is composed of three layers. The eyeball is filled with fluids called **humors** which help the eye to maintain its shape. The interior of the eyeball is divided into two sections by the **lens**, the focusing mechanism of the eye. The smaller chamber that is anterior to the lens is filled with a watery fluid called **aqueous**

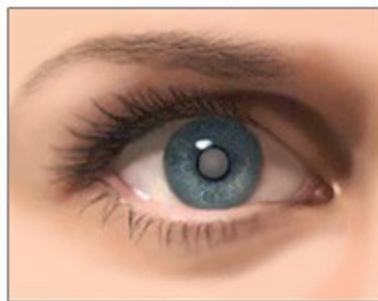
humor. The larger chamber that is posterior to the lens is filled with a gel-like substance called **vitreous humor**. The fluids help to maintain the shape of the eyeball. Aqueous humor is reabsorbed into veins through the canal of Schlemm.

What happens if the aqueous humor is blocked? Pressure inside the eye increases and begins to compress the optic nerve and retina. This condition is known as **GLAUCOMA**.

Normal, clear lens



Lens clouded by cataract



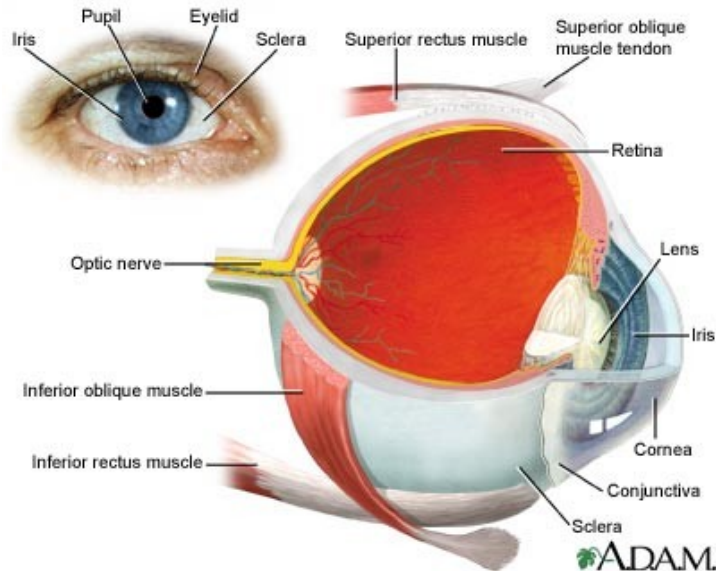
What is a **CATARACT**?

Cataracts form when the transparent lens begins to harden and become opaque.

A cataract is an opacity (clouding) of the normally clear lens which may develop as a result of aging, metabolic disorders, trauma or heredity

Source: <http://0.tqn.com/f/p/440/graphics/images/en/18012.jpg>

Cataracts cause hazy vision and can lead to blindness.



Source:
<http://adam.about.com/b/a/eye.jpg>

Layers of the Eyeball

1. **sclera**-outermost, protective layer, "white of the eye" (anterior portion of sclera is transparent and forms cornea)
2. **choroid**- middle layer, blood-rich nutritive layer
3. **retina**-innermost layer, contains photoreceptors

Sclera-- called the "fibrous tunic" provides protection
Choroid-- called the "nutritive tunic" provides nutrition
Retina-- called the "sensory tunic" provides sensory info

The **SCLERA** (WHITE OF THE EYE) consists of tough white connective tissue. The sclera helps maintain the shape of the eye.

The anterior portion of the sclera forms a transparent layer called the **cornea**. The **cornea** is the part of the eye through which light enters. Just inside the **cornea** is a small chamber filled with fluid known as the **aqueous humor**. At the posterior portion of the chamber, the pigmented **choroid**, which contains the blood vessels of the eye, becomes a disk-like structure called the **iris**.

The **iris** (a diaphragm) is the portion of the eye that gives your eye its color. The **iris** controls the amount of light entering the eye by altering the diameter of the pupil.

In the middle of the **iris**, there is a small opening called the **pupil**. The light travels through the pupil as it passes through the eye. The pupil appears as a small black disk in the center of the eye. Tiny muscles in the iris regulate the size of the pupil, controlling the amount of light that enters the eye.

In dim light, the **pupil** opens to increase the amount of light.

In bright light, the **pupil** closes to decrease the amount of light entering the eye.

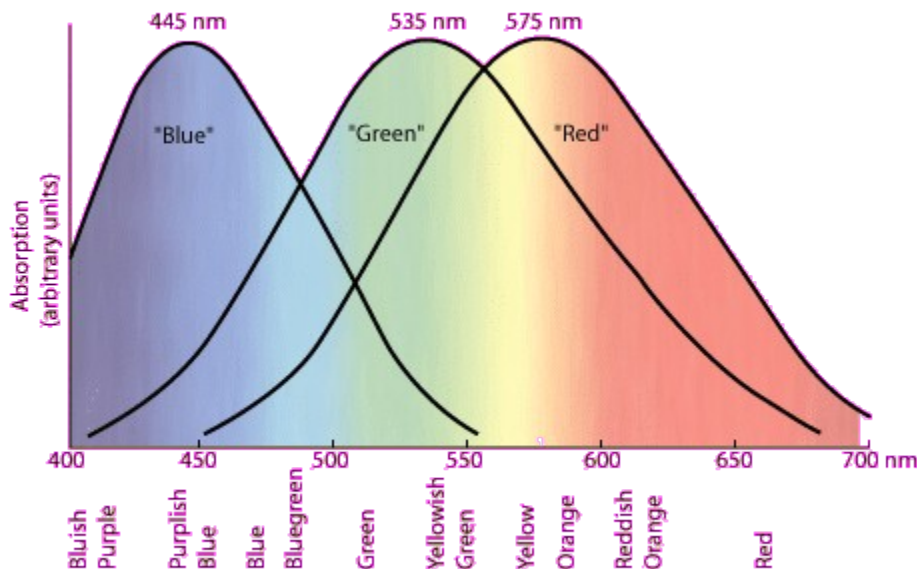
Behind the iris is the **lens**. Light is focused by the **lens**. The lens changes shape when pulled by muscles around its edges.

Small muscles attached to the **lens** cause it to bend. The changing shape of the **lens** enables the eye to focus on close and distant objects. Posterior to the lens is a large chamber called the **vitreal chamber** which is filled with a transparent jelly-like fluid called the **vitreous humor**.

Special photoreceptor cells are arranged in a layer in the retina. The photoreceptors convert light energy into impulses that are carried to the central nervous system.

There are two types of photoreceptors: rods and cones. There are about 125 million rods and 7 million cones on a single retina.

Rods are extremely sensitive to all colors of light but do not distinguish different colors.



Source: <http://230nsc1.phy-astr.gsu.edu/hbase/vision/imgvis/colcon.gif>

Cones are less sensitive than rods but they do respond differently to light of different colors producing color vision. Humans have three kinds of cones. Each type of cone contains a pigment that absorb different wavelengths of light. When the signals from these three kinds of cone are integrated, a person is able to see all the colors in the visible spectrum.

In dim light when only rods are activated, you may see objects clearly, but not their colors. As the amount of light increases, the cones are stimulated and the colors become clear.

The impulses leave the eye by way of the optic nerve and the nervous impulses are carried to the part of the brain known as the optic lobe or occipital lobe. The brain interprets the visual images and provides information about the external world.