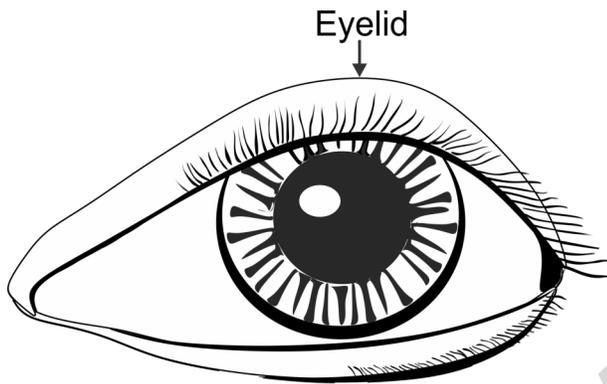


# An In-Depth Look at How Our Senses Work

For many of us, one of the first things we learned in science is that we have five senses—sight, hearing, touch, taste, and smell. You’ve known that almost your whole life, but have you ever stopped to wonder *why*? Why do your eyes see? Why does your tongue taste? What causes sinusitis, and why does it make it so hard to smell or even breathe? Those are a few things we’re going to look at in this unit. We’ll look at the parts of each system and then look at how they work together and what happens when something goes wrong. We’re going to start with our eyes.

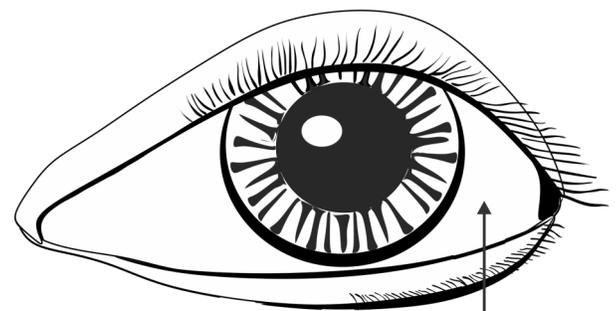


Our eyes rest in cavities in our skull called **orbits** or sockets. They are bordered by the brow and the cheekbone and are nearly surrounded by soft tissue that helps cushion the eyes.

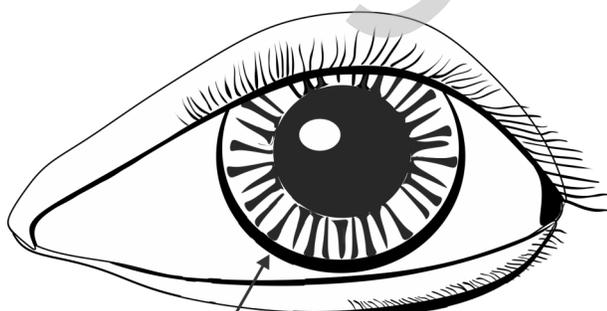
Above our eyes are the eyelids. These protect our eyes, but they also do much more. The eyelashes on them keep a lot of dust and other particles out of our eyes. A membrane inside the eyelid continually coats our eyes with moisture to keep our eyes moist and clean.

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The **sclera** is the white part of our eyes. It is strong and somewhat leathery. It makes up about 5/6 of the outside of our eyes.



Sclera

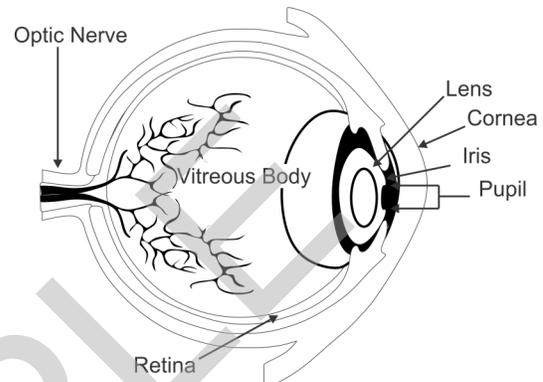
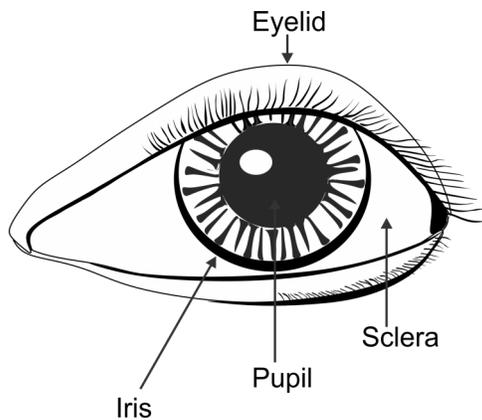
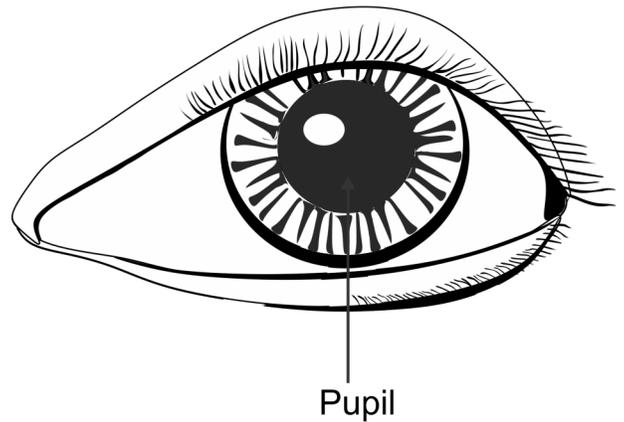


Iris

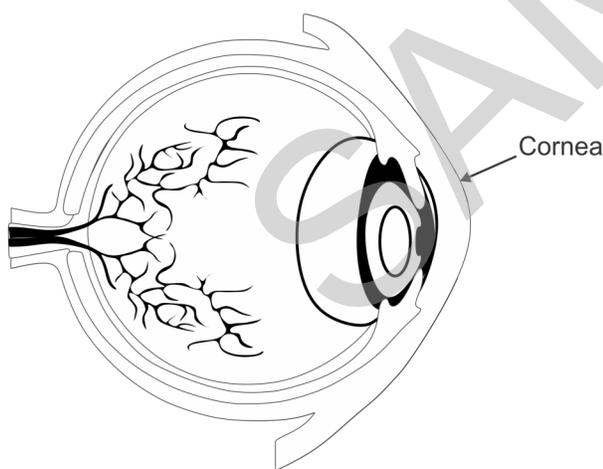
As we move in toward the middle of our eyeball, the next part is the **iris**. This is the colored part of our eyes. It has muscles that control the size of the pupil. **Melanin** is a pigment found in our bodies, and the more melanin there is in the iris, and the closer it is to the surface, the darker color our eyes are. Someone with brown eyes has more melanin and has it closer to the surface than

someone with blue eyes. Melanin also helps protect our eyes because it absorbs strong light that could blur our vision or harm our eyes.

The **pupil** is the opening in the center of our eyes. Its job is to make sure the right amount of light enters our eyes at all times. When the light around us is dim, it enlarges to let in as much light as it can. When the light is bright, it shrinks to keep our eyes safe from too much light. It also helps our eyes focus on objects.

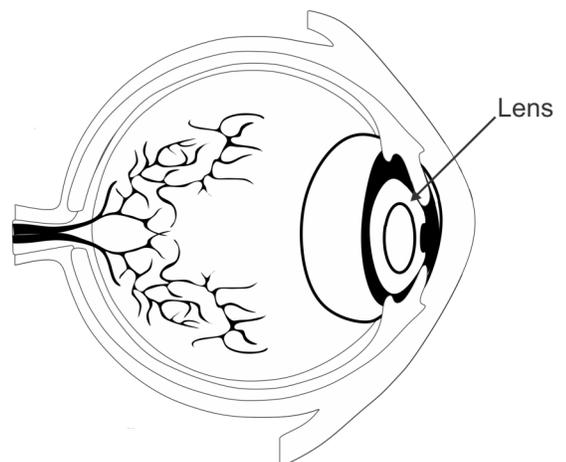


Now let's take a look at what the eye looks like on the inside. We're already talked about what the iris and pupil do. Let's take a look at the cornea.

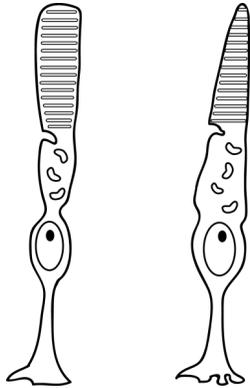
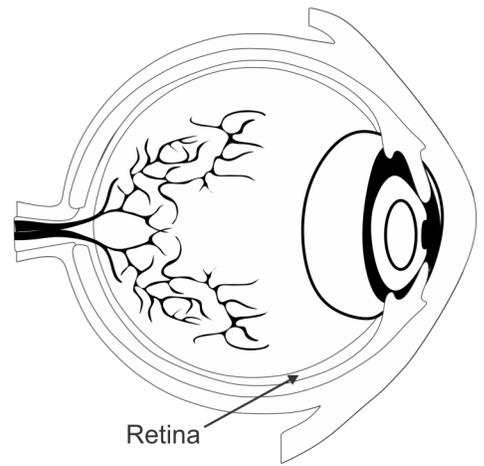


The **cornea** is made of transparent tissue, and it covers the iris, the remaining 1/6 of the eye that the sclera does not cover. It is the part of the eye that allows light to enter.

The **lens** is a transparent and flexible piece of the eye behind the iris that directs light to the retina. The ciliary body, which is around the lens, continually adjusts the shape of the lens so we can see clearly, whether we are looking at things close to us, far away from us, or looking back and forth like you might do when you are in car.

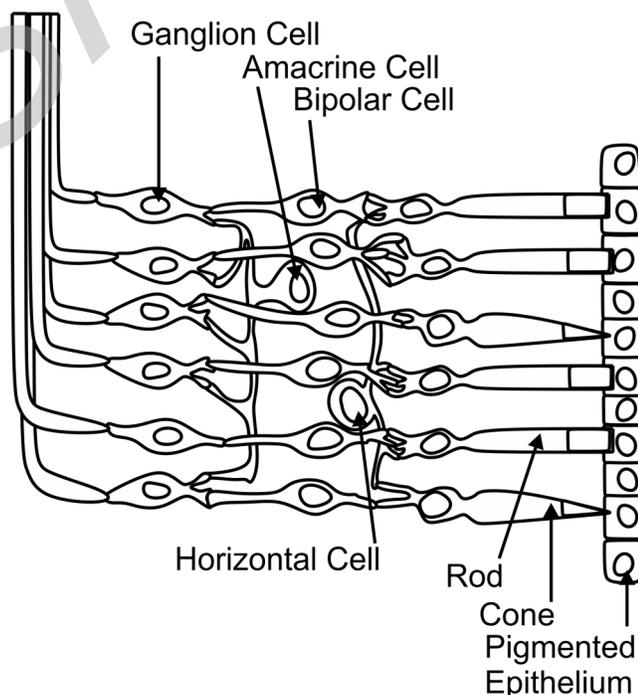


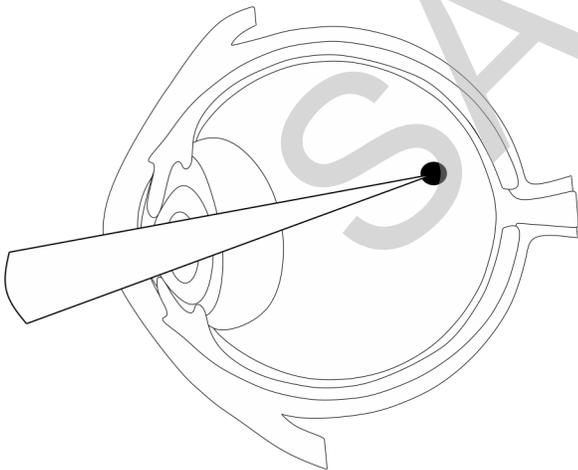
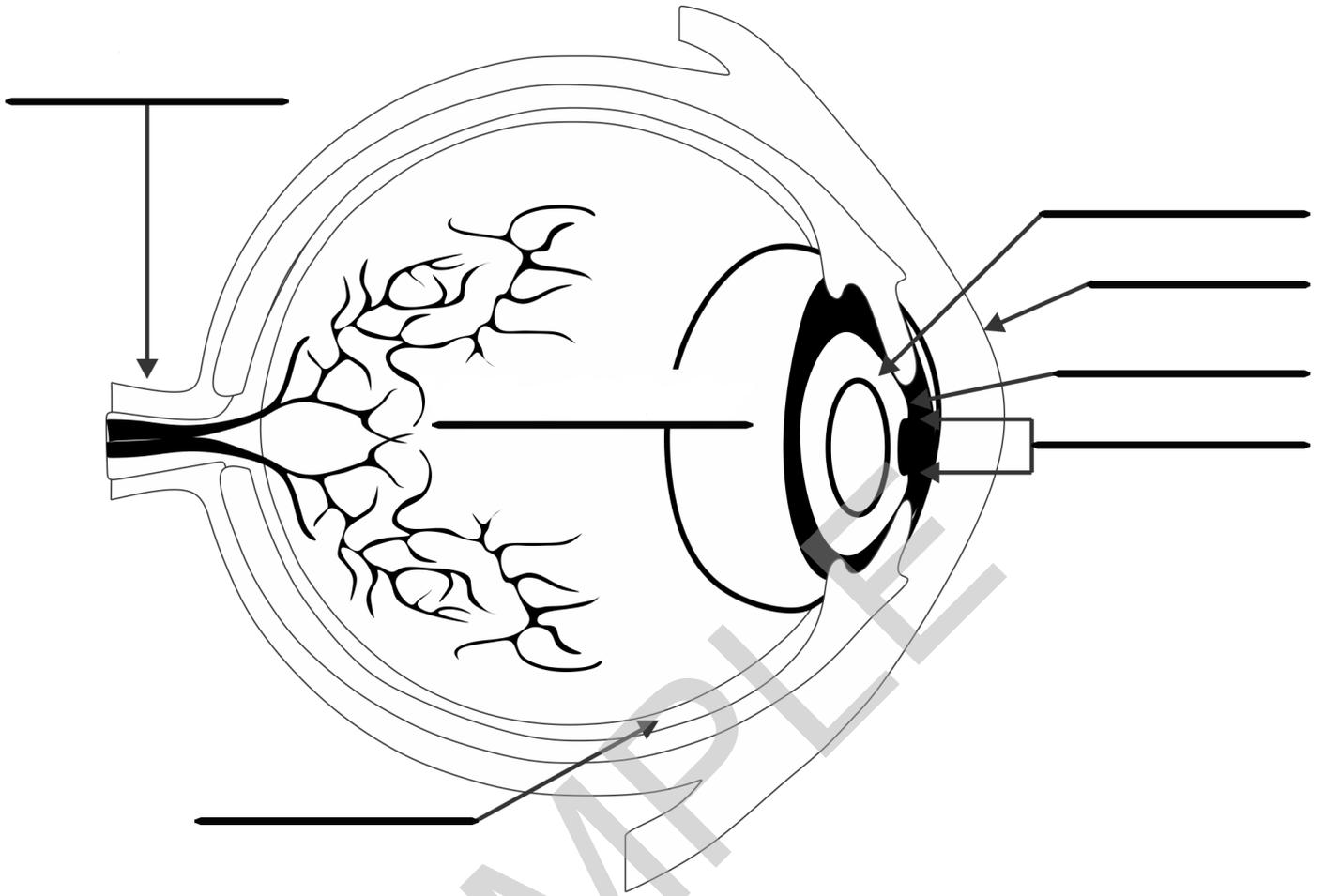
The **retina** is an extremely fragile piece of the eye. It's only about as strong as wet tissue paper, which is why it's deep in our eye and not out front. The retina is the part of the eye that changes the light we see into electrical signals our brains can process. To do this, it needs two special types of cells: rods and cones.



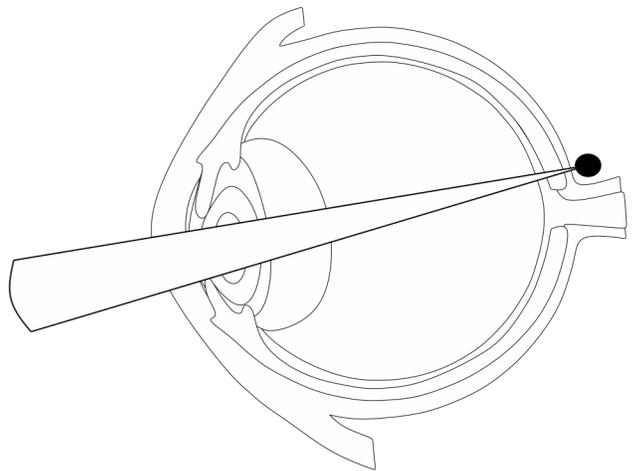
**Rods and cones** are cells that are extremely sensitive to light. They get their names from their shape. You can see the difference between the rod (on the left) and the cone (on the right). They have pigments inside that can detect the smallest particle of light that hits the retina. They allow us to see color and shades of gray, and they allow us to see when there isn't a lot of light. Defects in these pigments cause color blindness, which is when you aren't able to tell certain colors apart.

Our retinas actually have five layers, with different types of cells in each layer. Scientists are still studying to understand exactly how some of the types of cells work, and we won't try to memorize all the layers right now. But it's important to understand just how incredibly complex our eyes and the simple act of seeing really are. You can see the rods and cones in the diagram below.





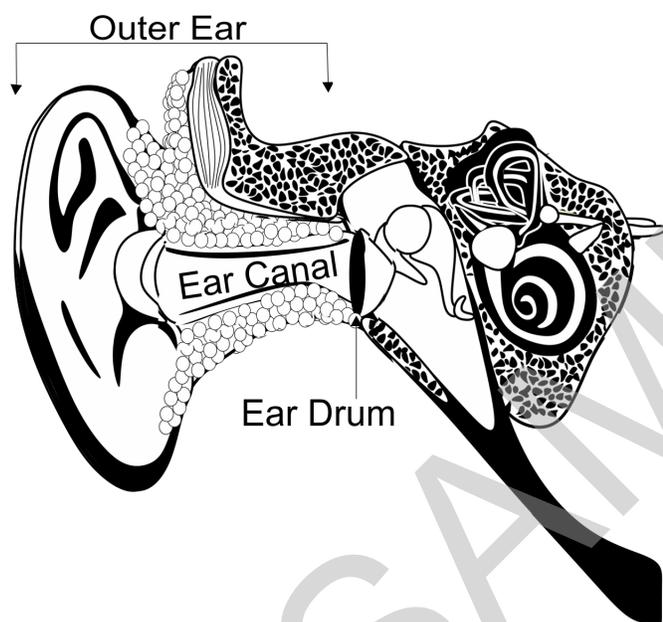
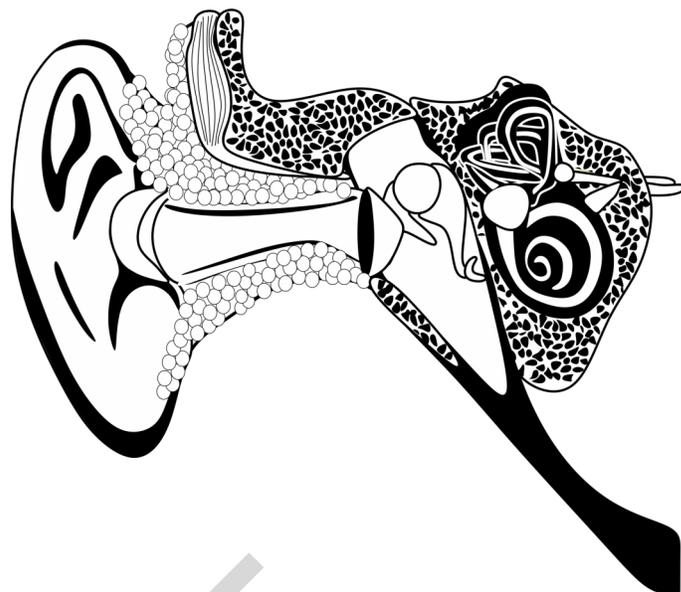
Focal point is before the retina



Focal point is after the retina

The next sense we're going to look at is the sense of hearing. Like our eyes and our sense of sight, our ears and our sense of hearing are made of many parts that have to work together to function properly.

We normally divide the ear into three sections—the outer ear, the middle ear, and the inner ear. The fleshy part of the ear on the outside of your head is called the **auricle**. The small piece at the bottom is the earlobe.



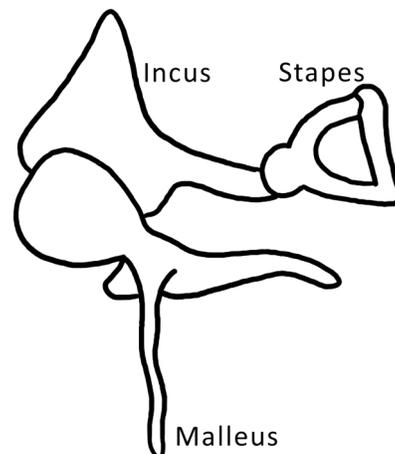
The **auditory canal**, or ear canal, is the path you see when you look inside your ear. In the first part of the canal, the part closest to the outside of your body, there are hairs and glands that work together to keep the ear clean. The glands produce wax, and the wax and hairs trap dirt that could get in your ears. The canal leads to the eardrum.

The temporal bone surrounds the rest of the canal and is the hardest bone in the body. It also surrounds the middle and inner ear.

The **eardrum** is a very thin membrane that is stretched tightly in the ear. It is very small, only about 2/5 inch (10 millimeters) around. It is also called the tympanic membrane, and it separates the outer ear from the middle and inner ear.

The middle ear is made of three bones called the malleus (or hammer), the incus (or anvil), and the stapes (or stirrup). The malleus is the largest of the three. One end of it attaches to the eardrum, and the other attaches to the incus.

The incus connects the malleus and the stapes. The stapes is the smallest bone in the entire body. It is actually smaller than a grain of rice. Part of the stapes is attached to a membrane called the oval window, which is the path to the inner ear.



# Terminology

Using what you learned, define these words in the best way you can. Use the back of the page if you need more room.

Orbits: \_\_\_\_\_

Sclera: \_\_\_\_\_

Iris: \_\_\_\_\_

Melanin: \_\_\_\_\_

Pupil: \_\_\_\_\_

\_\_\_\_\_

Cornea: \_\_\_\_\_

Lens: \_\_\_\_\_

Retina: \_\_\_\_\_

Rods and cones: \_\_\_\_\_

\_\_\_\_\_

Optic nerve: \_\_\_\_\_

Vitreous body: \_\_\_\_\_

\_\_\_\_\_

Visual acuity: \_\_\_\_\_

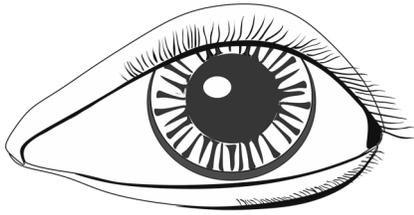
Myopia: \_\_\_\_\_

Hyperopia: \_\_\_\_\_

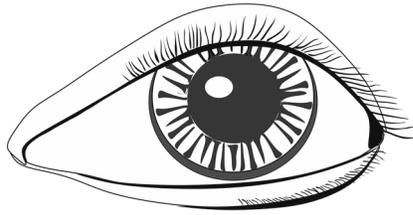
Auricle: \_\_\_\_\_

Auditory canal: \_\_\_\_\_

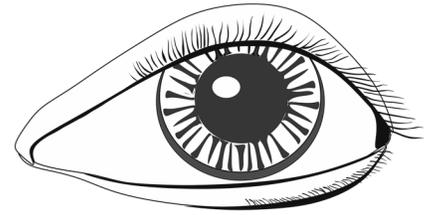
Which of the following is the name of the pigment responsible for eye color? Draw a circle around it.



Calcium



Melanin



Sulphur

Which middle ear bone gets its name from its anvil-like shape? Draw a circle around it.



Malleus



Incus



Stapes

Which of the following words is related to our sense of smell? Draw a circle around it.

Optical

Auditory

Visual

Olfactory

Subcutaneous

Tactile

What are the three layers of the skin?