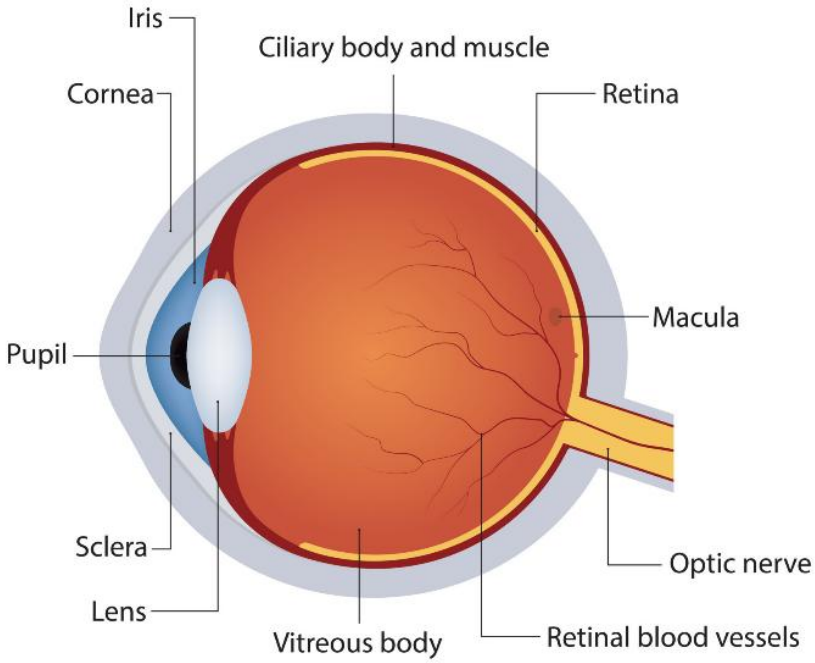
Sense organs

Eye

- The eye is a complex sensory organ responsible for detecting light and converting it into electrical signals that the brain can interpret as visual information.
- The human eye has several components that work together to facilitate the process of vision.

Structure of the Eye

The human eye is a complex organ responsible for vision, made up of several parts:



A. Cornea:

- The transparent outermost layer that refracts light entering the eye.

B. Sclera:

- The white part of the eye that provides structural support and protection.

C. Iris:

- The colored part of the eye that controls the size of the pupil, regulating the amount of light that enters.

D. Pupil:

- The black circular opening in the center of the iris that allows light to pass through.

E. Lens:

- A transparent, flexible structure that focuses light onto the retina.

F. Retina:

- The innermost layer that contains photoreceptor cells (rods and cones) responsible for detecting light.

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- **Rods**: Photoreceptors that are sensitive to low light levels, crucial for night vision.
- **Cones**: Photoreceptors responsible for color vision and sharpness of vision in well-lit conditions.

G. Optic Nerve:

- Transmits visual information from the retina to the brain.

H. Choroid:

- The vascular layer of the eye that supplies blood to the retina.

I. Macula:

- The central part of the retina responsible for detailed central vision.

J. Fovea:

- A small depression in the macula that contains a high concentration of cones and is the area of sharpest vision.

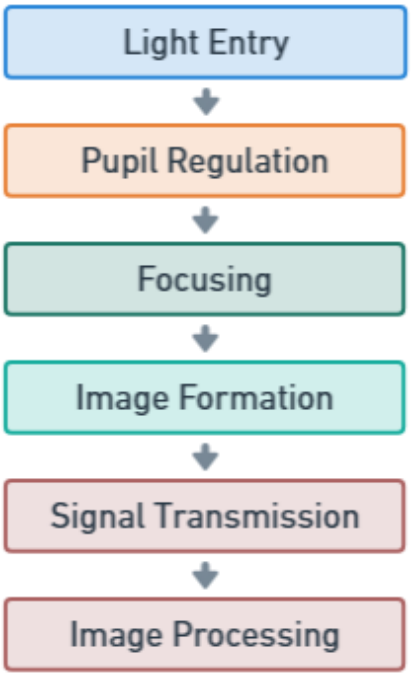
K. Aqueous Humor:

- A clear fluid that fills the space between the cornea and the lens, providing nutrients and maintaining intraocular pressure.

L. Vitreous Humor:

- A gel-like substance that fills the space between the lens and the retina, maintaining the shape of the eye.

Mechanism of Vision



1. Light Entry:

- Light enters the eye through the cornea, which bends (refracts) the light.

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2. **Pupil Regulation:**
   - The iris adjusts the size of the pupil to control how much light enters the eye.
3. **Focusing:**
   - The lens, with the help of ciliary muscles, adjusts its shape (accommodation) to focus light on the retina.
4. **Image Formation:**
   - Light is focused onto the retina, where photoreceptor cells (rods and cones) detect the light and convert it into electrical signals.
5. **Signal Transmission:**
   - These electrical signals are sent to the brain via the optic nerve.
6. **Image Processing:**
   - The brain processes these signals, interpreting them into the images we see.

Accommodation of the Eye

- **Accommodation** refers to the eye's ability to change the shape of the lens to focus on objects at varying distances.
  - When focusing on distant objects, the **ciliary muscles** relax, and the lens becomes flatter.
  - When focusing on close objects, the ciliary muscles contract, making the lens thicker.
- This process allows the eye to maintain a clear image (focus) on the retina regardless of whether the object is near or far.

Diseases of the Eye

1. **Cataracts:**
   - Clouding of the lens that leads to blurred vision. It often occurs with aging.
2. **Glaucoma:**
   - A condition where increased intraocular pressure damages the optic nerve, leading to vision loss.
3. **Macular Degeneration:**
   - A disease that affects the macula, leading to loss of central vision, common in older adults.
4. **Myopia (Nearsightedness):**
   - A condition where distant objects appear blurry because the light focuses in front of the retina.
5. **Hyperopia (Farsightedness):**

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- A condition where near objects appear blurry because light focuses behind the retina.

6. **Astigmatism:**
   - Irregular curvature of the cornea or lens causing distorted or blurred vision.
7. **Conjunctivitis (Pink Eye):**
   - Inflammation of the conjunctiva, the membrane covering the white of the eye, often caused by infection or allergy.
8. **Retinal Detachment:**
   - Separation of the retina from the underlying tissue, which can lead to blindness if not treated promptly.

Functions of the Eye:

1. **Vision**
   - The primary function of the eye is to detect light and convert it into neural signals that are processed by the brain to create images.
2. **Color Detection**
   - The cones in the retina allow for the perception of different colors.
3. **Light Intensity Regulation**
   - The iris regulates the size of the pupil to control the amount of light entering the eye, preventing damage to the retina.
4. **Focus Adjustment (Accommodation)**
   - The lens adjusts to focus light precisely on the retina, allowing for clear vision of objects at various distances.
5. **Depth Perception**
   - The eye contributes to spatial awareness and depth perception, especially when working together with the other eye (binocular vision).

Ear

- The ear is a sensory organ responsible for detecting sound and maintaining balance.
- It is divided into three main parts: **the outer ear, the middle ear, and the inner ear.**
- Each part plays a crucial role in the process of hearing and balance.

Structure of the Ear

The ear is divided into **three** main sections, each with distinct functions in hearing and balance:

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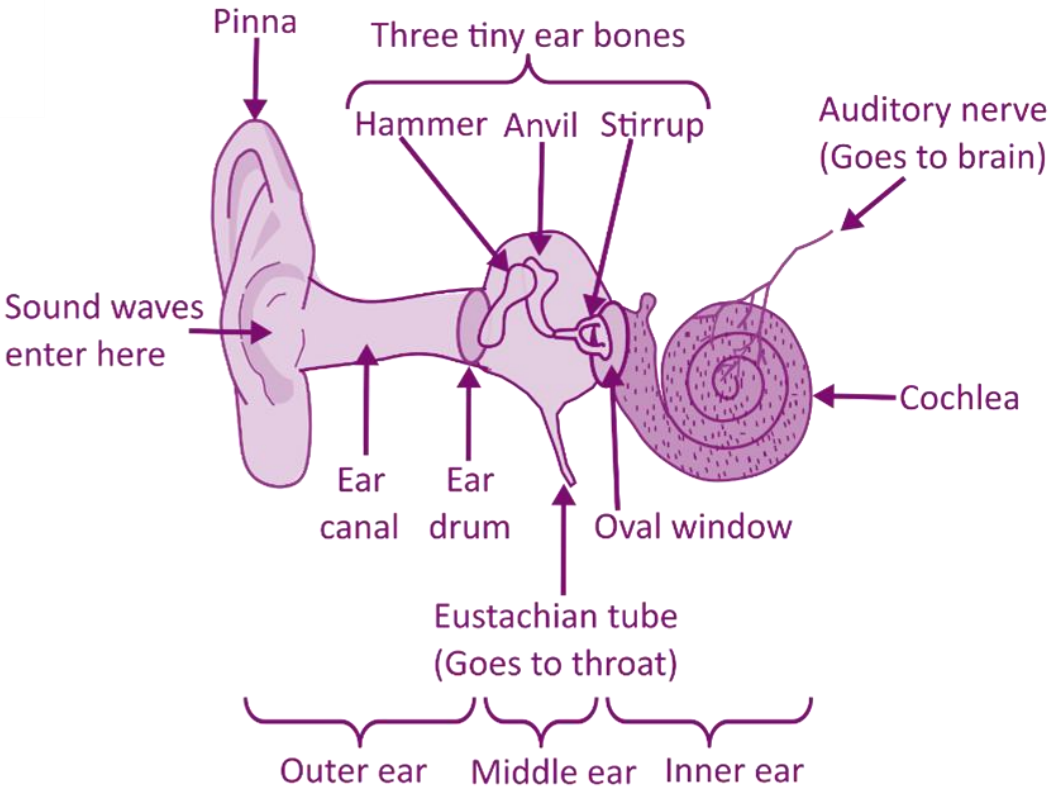

1. Outer Ear

A. Pinna (Auricle):

- The external, visible part of the ear that collects sound waves and directs them into the ear canal.

B. Ear Canal (External Auditory Meatus):

- A tube that channels sound waves from the pinna to the eardrum.

C. Tympanic Membrane (Eardrum):

- A thin membrane that vibrates when sound waves reach it, transmitting sound to the middle ear.

2. Middle Ear

A. Ossicles:

- Three tiny bones (malleus, incus, and stapes) that amplify vibrations from the eardrum and transfer them to the inner ear.

I. Malleus (Hammer):

- Attached to the eardrum.

II. Incus (Anvil):

- The middle bone.

III. Stapes (Stirrup):

- The smallest bone, which connects to the oval window of the cochlea.

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