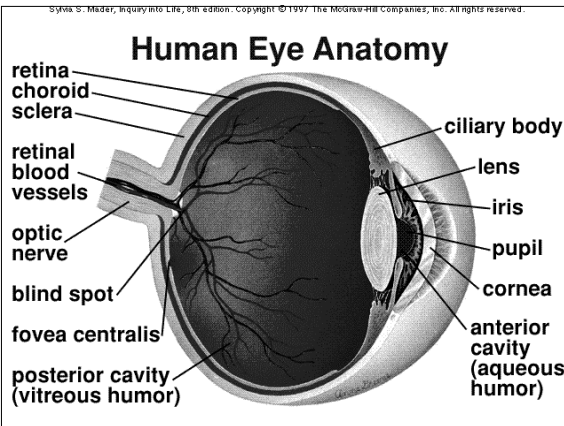


Special Senses

- Sight
- Hearing
- Equilibrium
- Smell
- Taste

Sensory Receptors

- Photoreceptors
 - Seeing
- Mechanoreceptors
 - Hearing & equilibrium
- Chemoreceptors
 - Smell and taste
- Nociceptors
 - Pain
- Thermoreceptors
 - Temperature



Anatomy of the Eye

External and Accessory Structures

- **Eye lids**
 - **Eyelashes**
 - **Ciliary glands**
- **Conjunctiva**
- **Lacrimal apparatus**
 - **Lacrimal glands**

Anatomy of the Eye

Internal Structures: The Eyeball

- **Tunics**
 - **Covering of the eye walls**
- **Humors**
 - **Fluid filled interior**

Tunics of the Eyeball

- **Sclera**
 - **Cornea**
- **Choroid**
 - **Ciliary body**
 - **Suspensory ligament**
 - **Lens**
 - **Iris and Pupil**
- **Retina**
 - **Rods and cones**

Eye Disorders

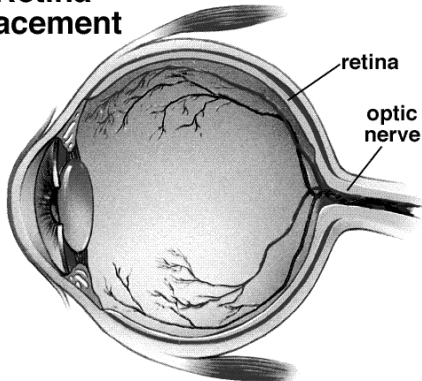
- **Cataracts**
 - Lens becomes hard and opaque
- **Glaucoma**
 - Drainage of aqueous humor blocked, pressure increases
- **Color blindness**
 - Lacking one or more cone receptors

Cavities of the Eye

- **Anterior cavity**
 - Aqueous humor
- **Posterior cavity**
 - Vitreous humor

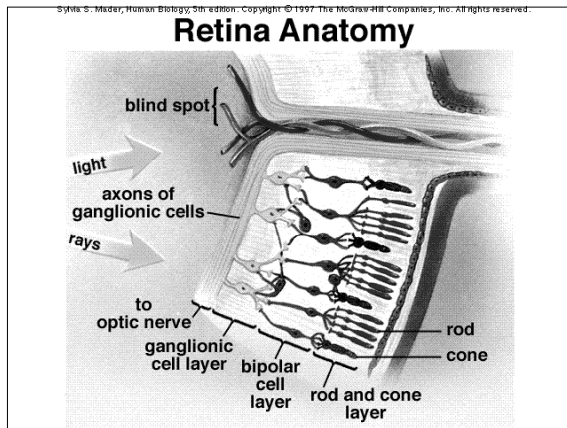
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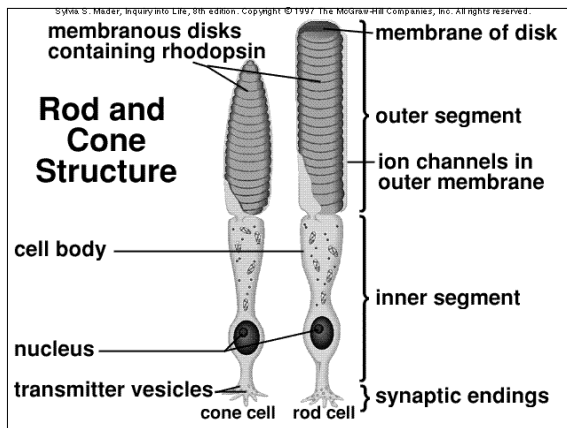
Retina Placement



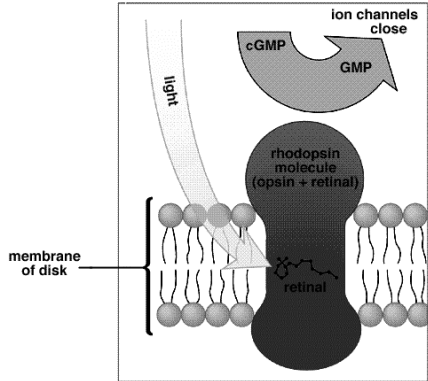
Retina Anatomy

- Rod and cone layer
- Bipolar cell layer
- Ganglionic cell layer
- Fovea centralis and macula lutea
- Optic disc - Blind spot
- Optic nerve

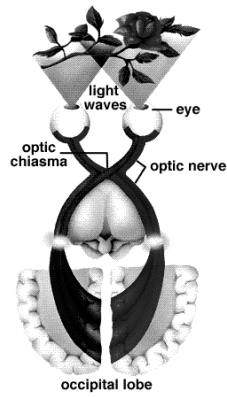




Rod and Cone Function



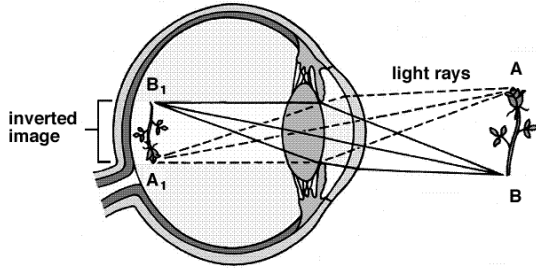
Optic Chiasma



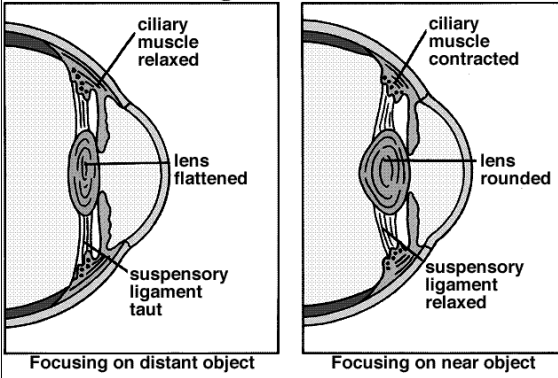
Visual Pathways to the Brain

- **Binocular vision**
- **Optic nerves**
- **Optic chiasma**
- **Optic tracts**
- **Thalamus**
- **Visual cortex in occipital lobes**

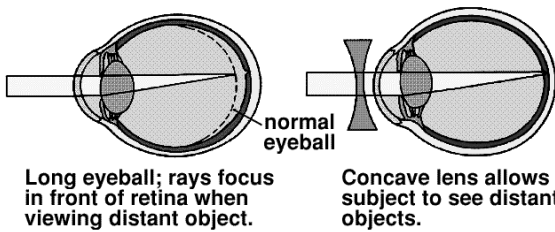
Focusing—General



Focusing—Far and Near



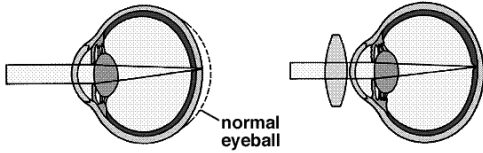
Nearsightedness



Long eyeball; rays focus in front of retina when viewing distant object.

Concave lens allows subject to see distant objects.

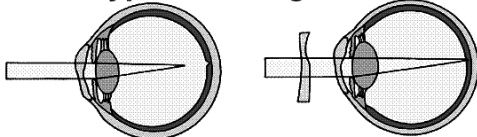
Farsightedness



Short eyeball; rays focus behind retina when viewing close objects.

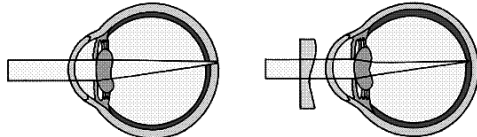
Convex lens allows subject to see close objects.

Two Types of Astigmatism



Uneven cornea; rays do not focus evenly.

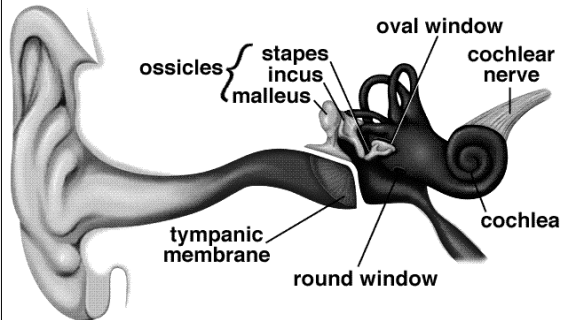
Uneven lens allows subject to see objects clearly.



Uneven lens; rays do not focus evenly.

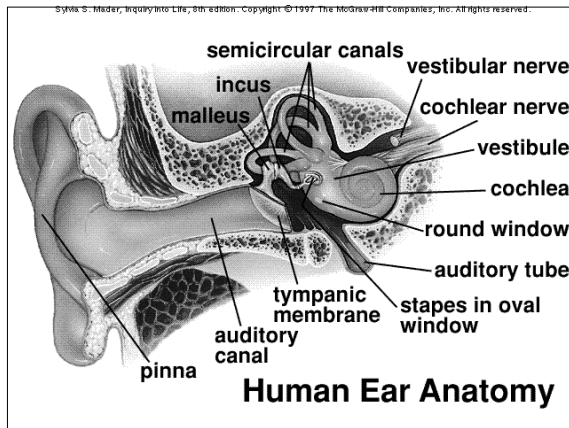
Uneven lens allows subject to see objects clearly.

Anatomy of Ear



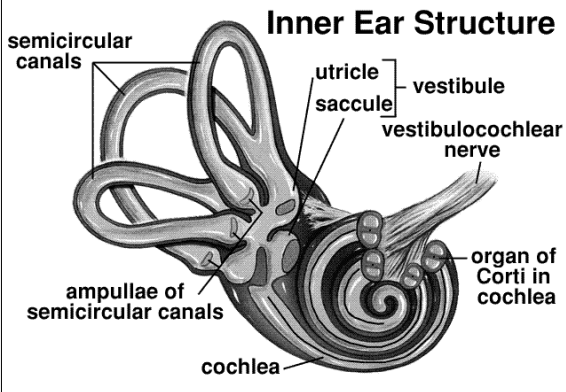
Anatomy of the Ear

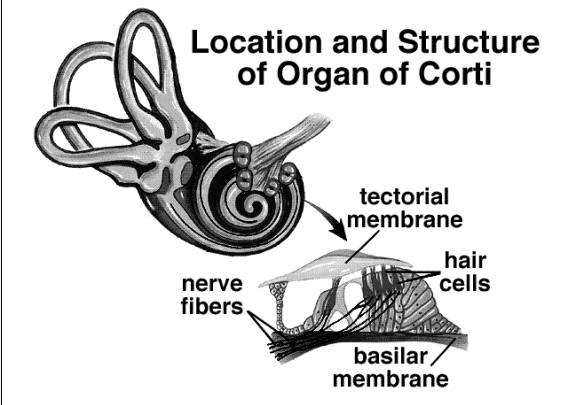
- **Outer (external) Ear**
 - Pinna
 - External auditory canal
 - Tympanic membrane
- **Middle ear**
 - Ossicles - malleus, incus, and stapes
 - Eustachian tube
- **Inner Ear**
 - Cochlea
 - Semicircular canals
 - Vestibule



Inner Ear Anatomy

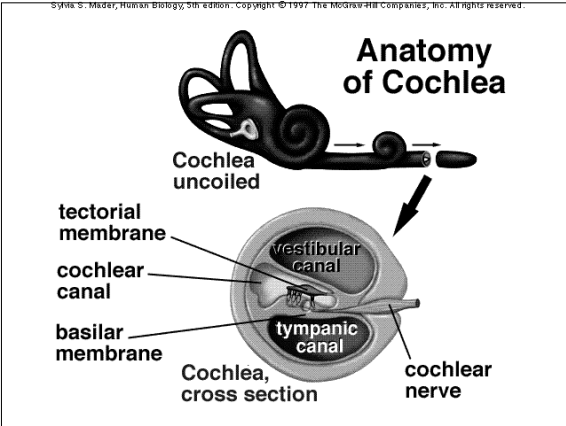
- **Cochlea**
 - Organ of Corti
- **Vestibule**
 - Utricle
 - Saccule
- **Semicircular canals**
 - Ampullae
 - Vestibulocochlear nerve

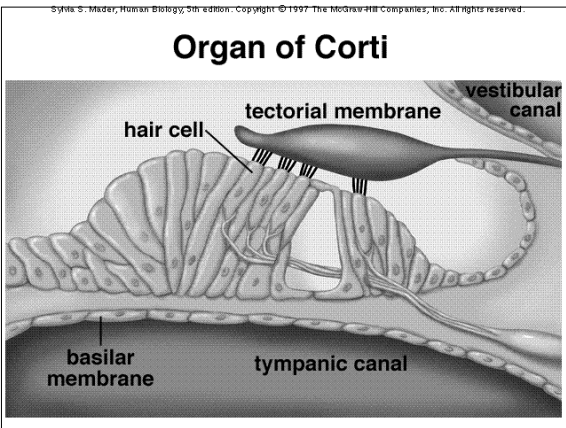




Mechanisms of Hearing

- Cochlea
 - Organ of Corti
 - Hair cells
 - Basilar membrane
 - Tectorial membrane
 - Cochlear nerve
 - Round window
 - Oval window

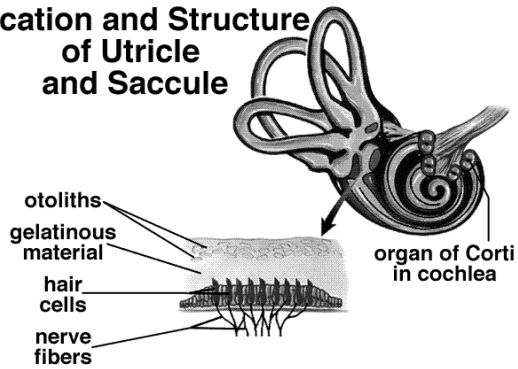


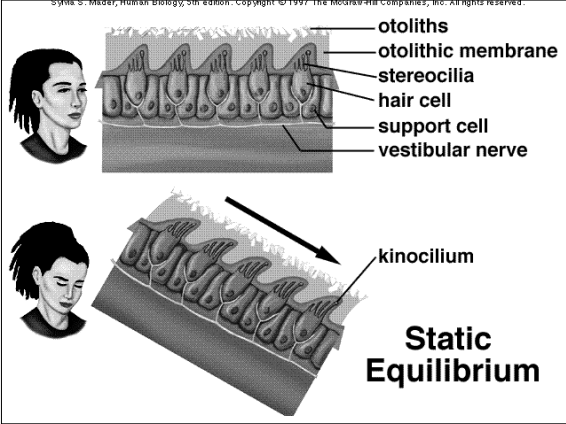


Mechanisms of Equilibrium

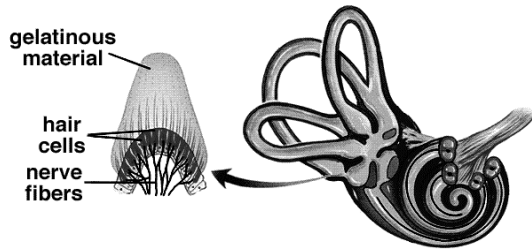
- **Static Equilibrium**
 - **Position of the head with respect to gravity**
 - **Vestibule**
- **Dynamic Equilibrium**
 - **Angular or rotational body movements**
 - **Semicircular canals**

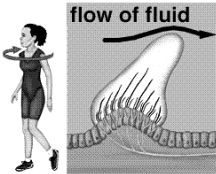
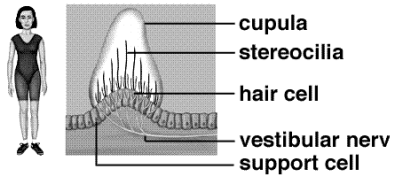
Location and Structure of Utricle and Saccule





Location and Structure of Ampulla





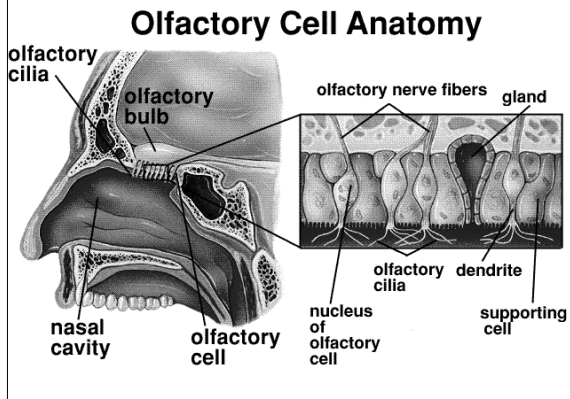
Dynamic Equilibrium

Hearing and Equilibrium Deficits

- **Deafness**
 - Hearing loss of any degree
 - **Conduction deafness**
 - Interference with conduction of sound waves to inner ear
 - **Sensorineural deafness**
 - Damage to receptor cells in Organ of Corti, cochlear nerve, or neurons of auditory cortex
- **Equilibrium problems**
 - Nausea, dizziness, vertigo

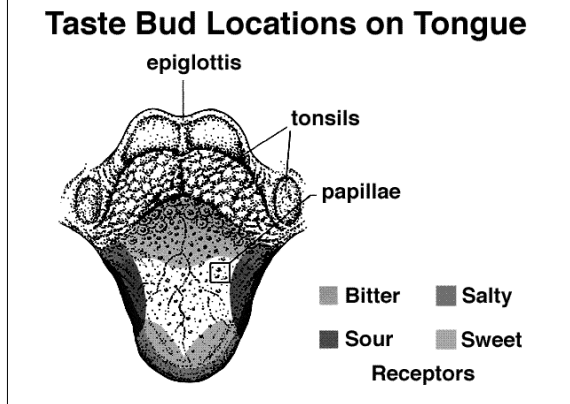
Taste and Smell

- **Chemoreceptors**
- **Olfactory receptor cells**
 - Olfactory nerve
- **Taste buds**
 - **Papillae**
 - Gustatory cells
 - Gustatory hairs
 - Facial, glossopharyngeal and vagus nerves

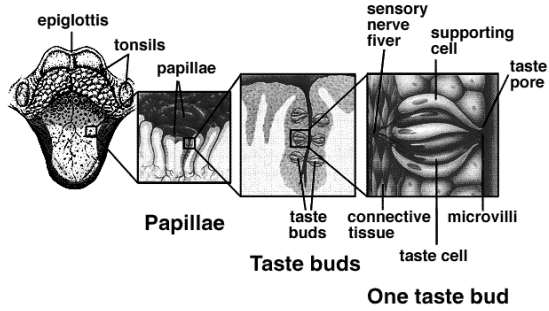


Basic Taste Sensations

- Salty
- Sweet
- Sour
- Bitter



Taste Buds — Detailed



The End