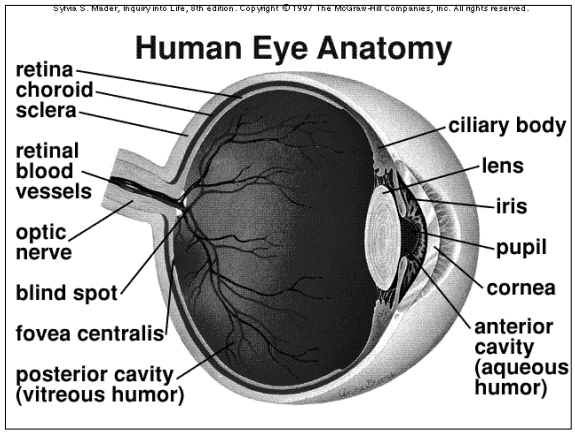
Special Senses

- 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

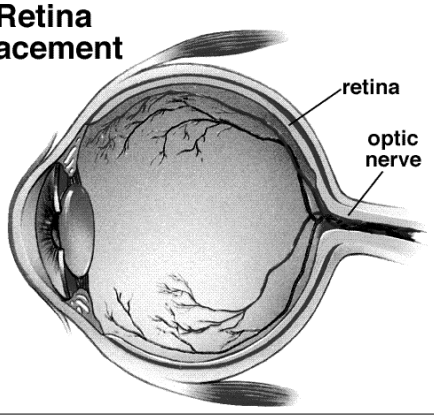
Eye Disorders

- 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

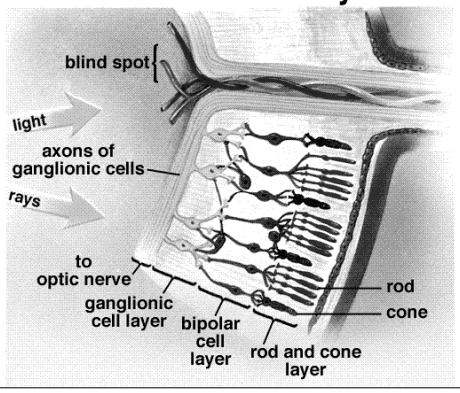
Retina Placement

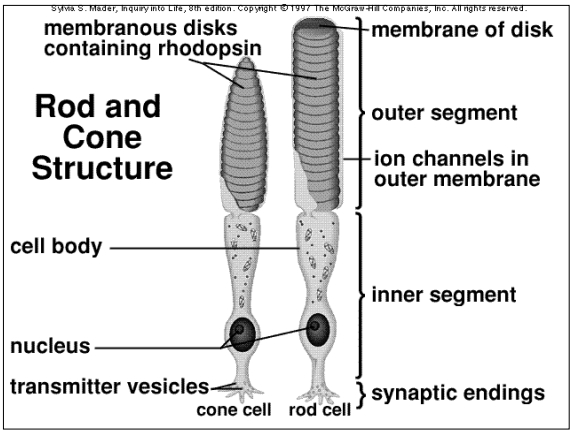


Retina Anatomy

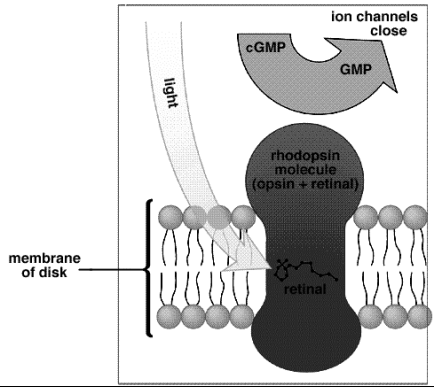
- Rod and cone layer
- Bipolar cell layer
- Ganglionic cell layer
- Fovea centralis and macula lutea
- Optic disc - Blind spot
- Optic nerve

Retina Anatomy

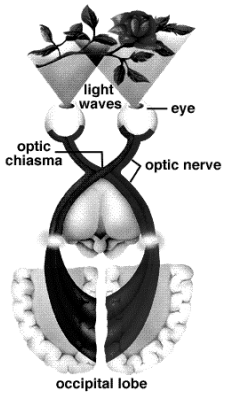




Rod and Cone Function



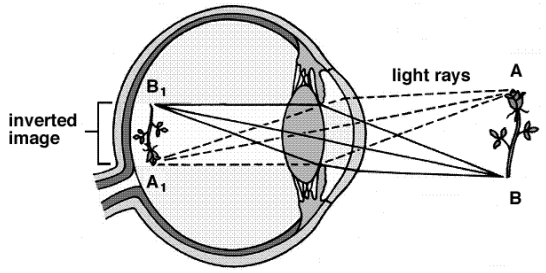
Optic Chiasma



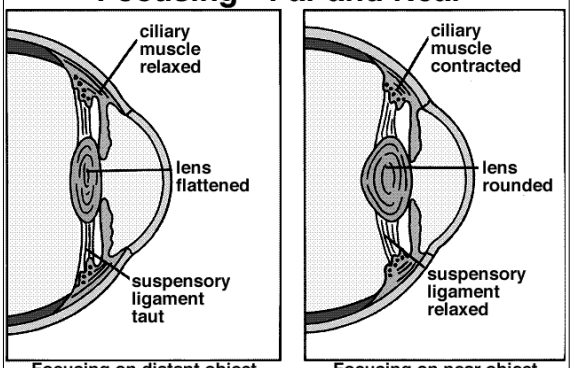
Visual Pathways to the Brain

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

Focusing—General



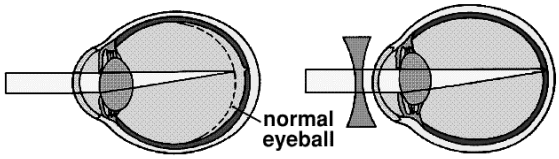
Focusing—Far and Near



Focusing on distant object

Focusing on near object

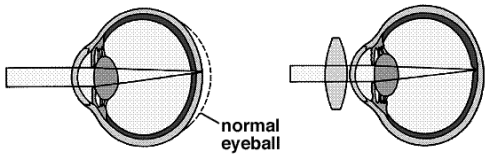
Nearsightedness



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

Concave lens allows subject to see distant objects.

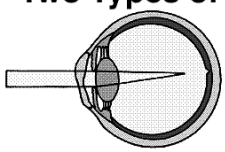
Farsightedness



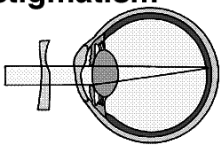
Short eyeball; rays focus behind retina when viewing close objects.

Convex lens allows subject to see close objects.

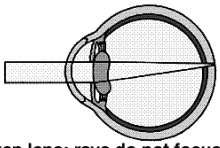
Two Types of Astigmatism



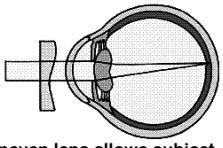
Uneven cornea; rays do not focus evenly.



Uneven lens allows subject to see objects clearly.

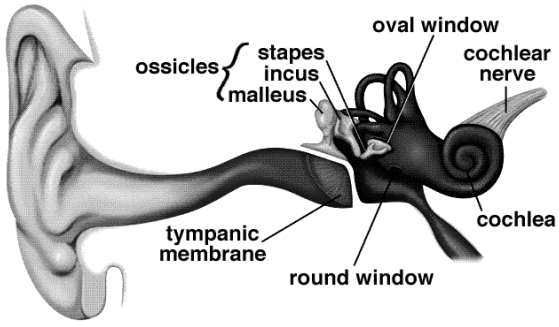


Uneven lens; rays do not focus evenly.



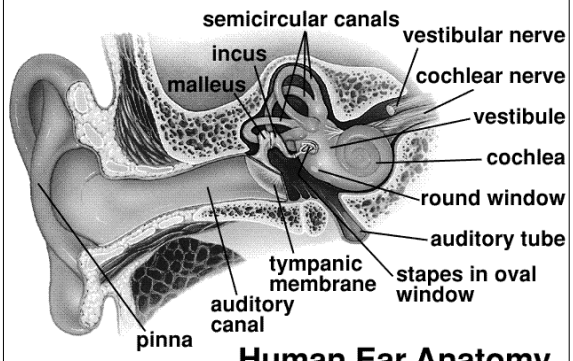
Uneven lens allows subject to see objects clearly.

Anatomy of Ear



Anatomy of the Ear

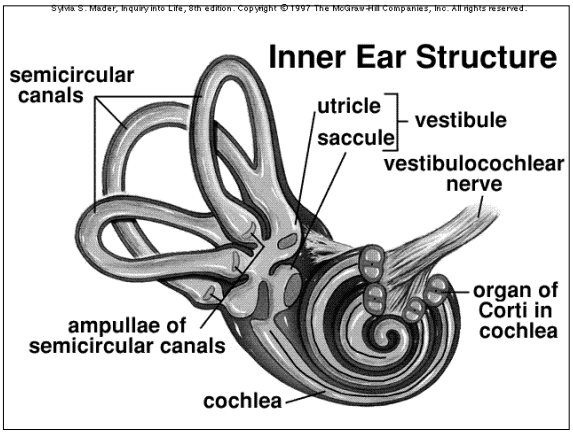
- Outer (external) Ear
  - Pinna
  - External auditory canal
  - Tympanic membrane
- Middle ear
  - Ossicles - malleus, incus, and stapes
  - Eustachian tube
- Inner Ear
  - Cochlea
  - Semicircular canals
  - Vestibule

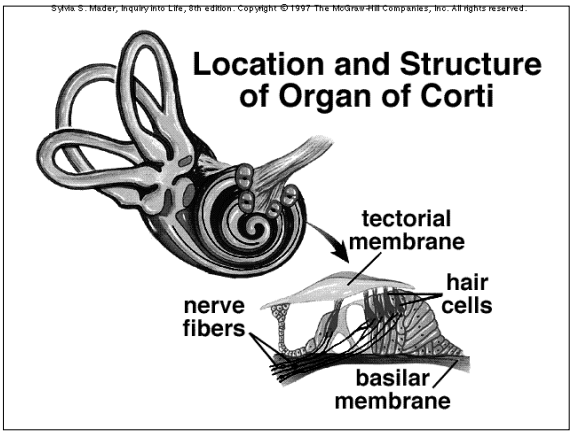


Human Ear Anatomy

Inner Ear Anatomy

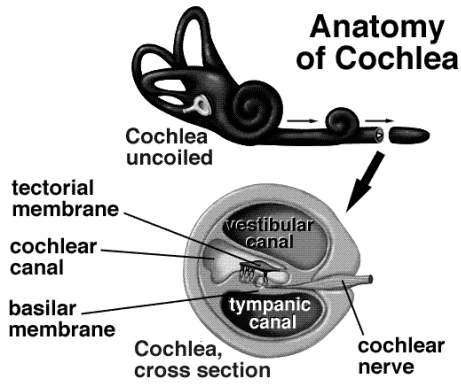
- Cochlea
  - Organ of Corti
- Vestibule
  - Utricle
  - Saccule
- Semicircular canals
  - Ampullae
  - Vestibulocochlear nerve

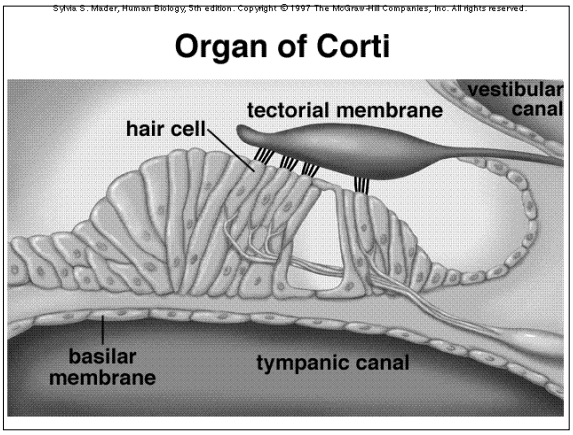




Mechanisms of Hearing

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

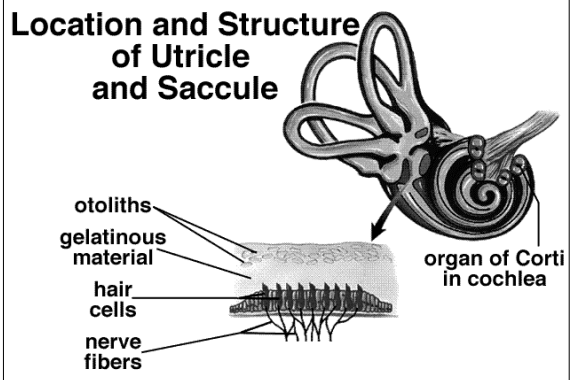


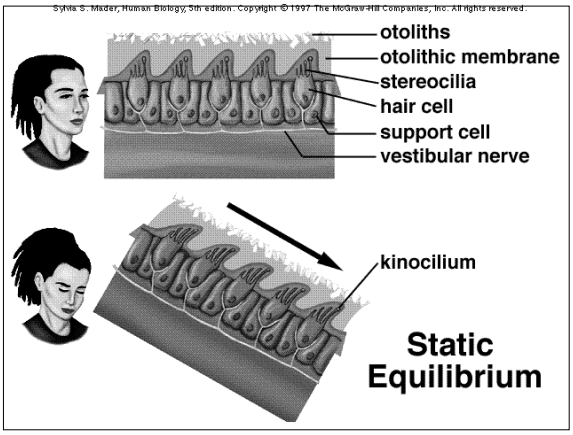


Mechanisms of Equilibrium

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

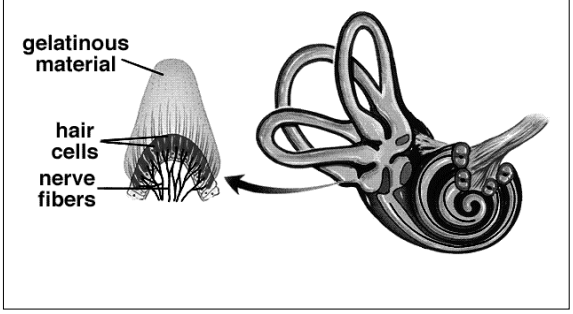
Location and Structure of Utricle and Saccule

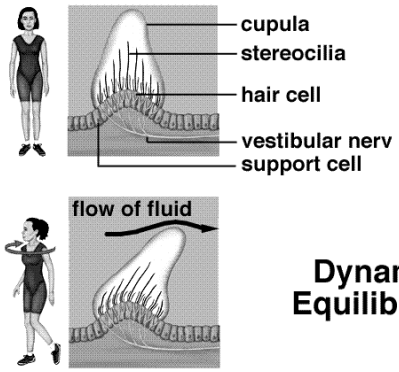




Static Equilibrium

Location and Structure of Ampulla





Dynamic Equilibrium

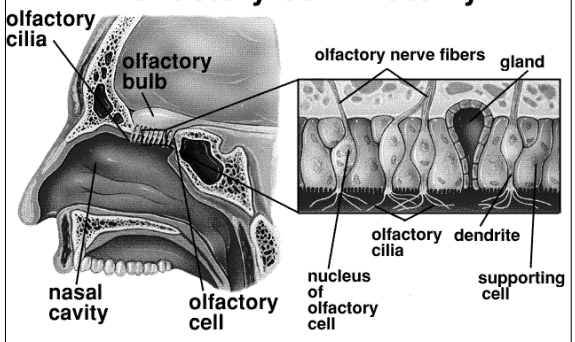
Hearing and Equilibrium Deficits

- 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

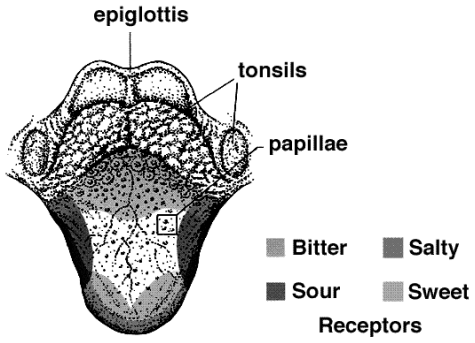
Olfactory Cell Anatomy



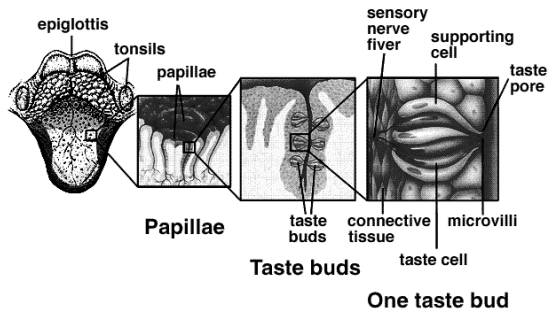
Basic Taste Sensations

- Salty
- Sweet
- Sour
- Bitter

Taste Bud Locations on Tongue



Taste Buds — Detailed



The End