The Special Senses
Smell

(a) Sagittal view

(b) Enlarged aspect of olfactory receptors
Taste

(a) Dorsum of tongue showing location of papillae

Epiglottis
Palatine tonsil
Lingual tonsil
Vallate papilla
Fungiform papilla
Fillet papilla

(b) Details of papillae

Vallate papilla
Filiform papilla
Fungiform papilla

Taste bud
Taste pore

(c) Structure of a taste bud

Stratified squamous epithelium
Supporting cell
Connective tissue
Gustatory hair
Gustatory receptor cell
Basal cell
Sensory neurons
Effects of Different tastes on neurons
Eye terminology

- Lacrimal apparatus
- Lysozymes
- Meibomian glands
- Extrinsic eye muscles
### Tunics

**Fibrous tunic**
- Cornea (cover)
- Sclera (white)

**Vascular Tunic**
- Choroid (vascular)
- Iris (colored)
- Ciliary body (muscle)
- Pupil (light regulation)

**Retina**
- Photoreceptor layer
- Rods and cones
- Fovea centralis
- Optic disc
Responses of Pupil to Light

- Pupil constricts as circular muscles of iris contract (parasympathetic)
- Pupil dilates as radial muscles of iris contract (sympathetic)

- Bright light
- Normal light
- Dim light

Anterior views

16.07

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Normal Retina

- **Central fovea**
- **Macula lutea**
- **Optic disc**
- **Retinal blood vessels**

Right eye

16.08
Path of light through retina
Direction of visual data processing
Optic nerve
Retinal blood vessel
Nerve impulses propagate along optic nerve toward optic disk

Pigmented layer
Photoreceptor layer
Outer synaptic layer
Bipolar cell layer
Inner synaptic layer
Ganglion cell layer
Optic nerve

Rod
Cone
Horizontal cell
Bipolar cell
Amacrine cell
Ganglion cell

16.09
Refraction of Light Rays

(a) Refraction of light rays

(b) Viewing distant object

(c) Accommodation

16.11
Rods and Cones

Rods for B & W vision (120 million)
Cones for color vision (6 million)
Most in the Fovea
Image Formation

• Refraction of Light Rays
• Accommodation of the Lens
• Constriction of the Pupil
• Convergence
cGMP-gated Na⁺ channels open

Inflow of Na⁺ (dark current)

Membrane potential of −30 mV

Glutamate released at synaptic terminals inhibits bipolar cell

Isomerization of retinal activates enzyme that breaks down cGMP

cGMP-gated Na⁺ channels close

Inflow of Na⁺ slows

Hyperpolarizing receptor potential

Glutamate release turned off, which excites bipolar cell

(a) In darkness

(b) In light

16.15
Image Problems

- Cataracts
- Age-related macular disease
- Presbyopia (loss of lens elasticity)
- Color Blindness
- Light and dark adaptation
Hearing and Equilibrium
Section through one turn of the cochlea
16.20c
(d) Enlargement of spiral organ (organ of Corti)
Otoliths
Words to Know

- Cataracts
- Glaucoma
- Deafness
- Meniere’s syndrome
- Otitis media
- Anosmia
- Blepharitis
- Astigmatism
- Conjunctivitis
- Keratitis
- Otalgia
- Tinnitus
- Vertigo
- Myopia
- Hypermetropia
- Presbyopia
More Words

- Hyposmia
- Gustation
- Taste aversion