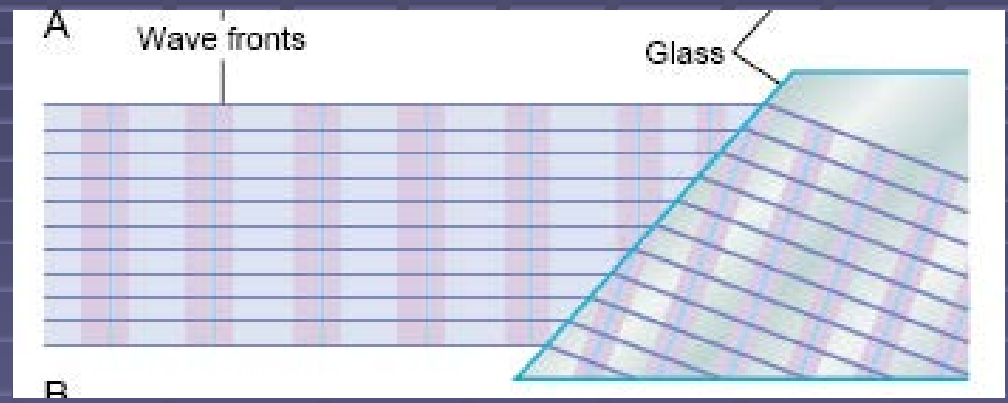
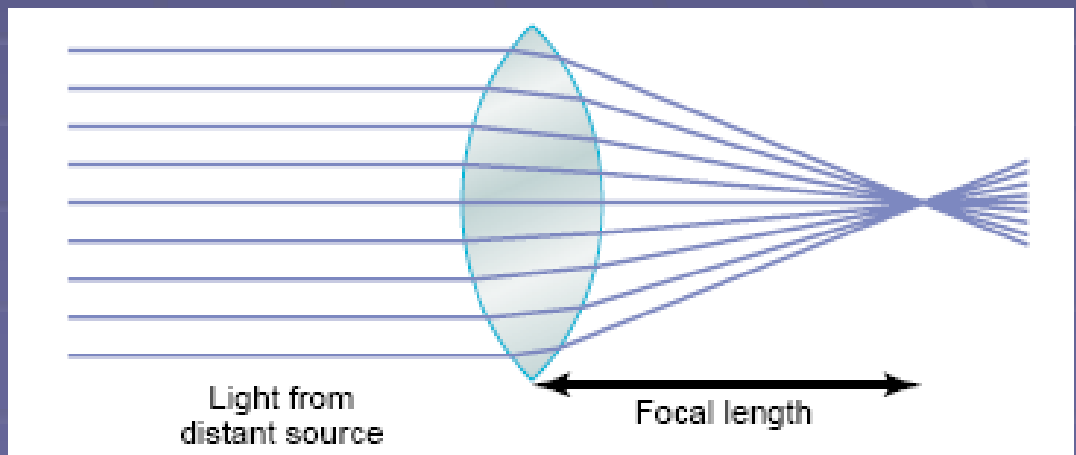
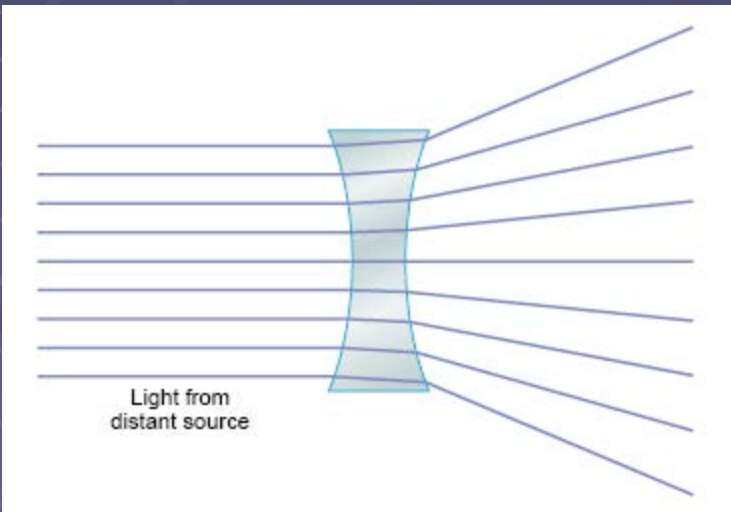
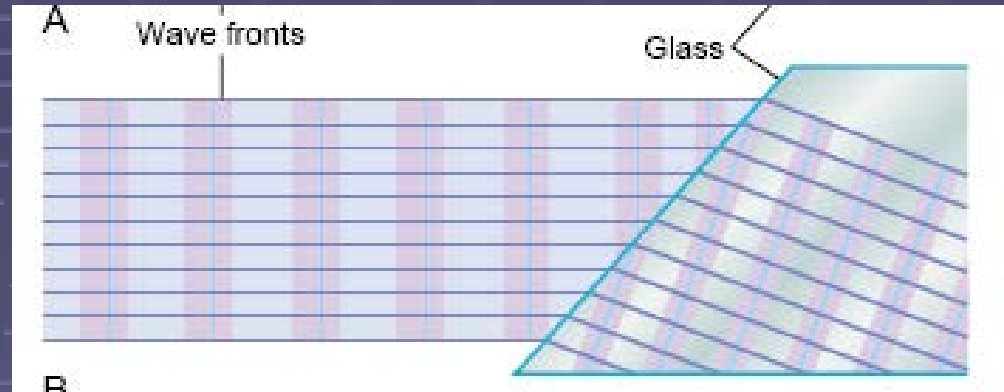


Optics of Vision

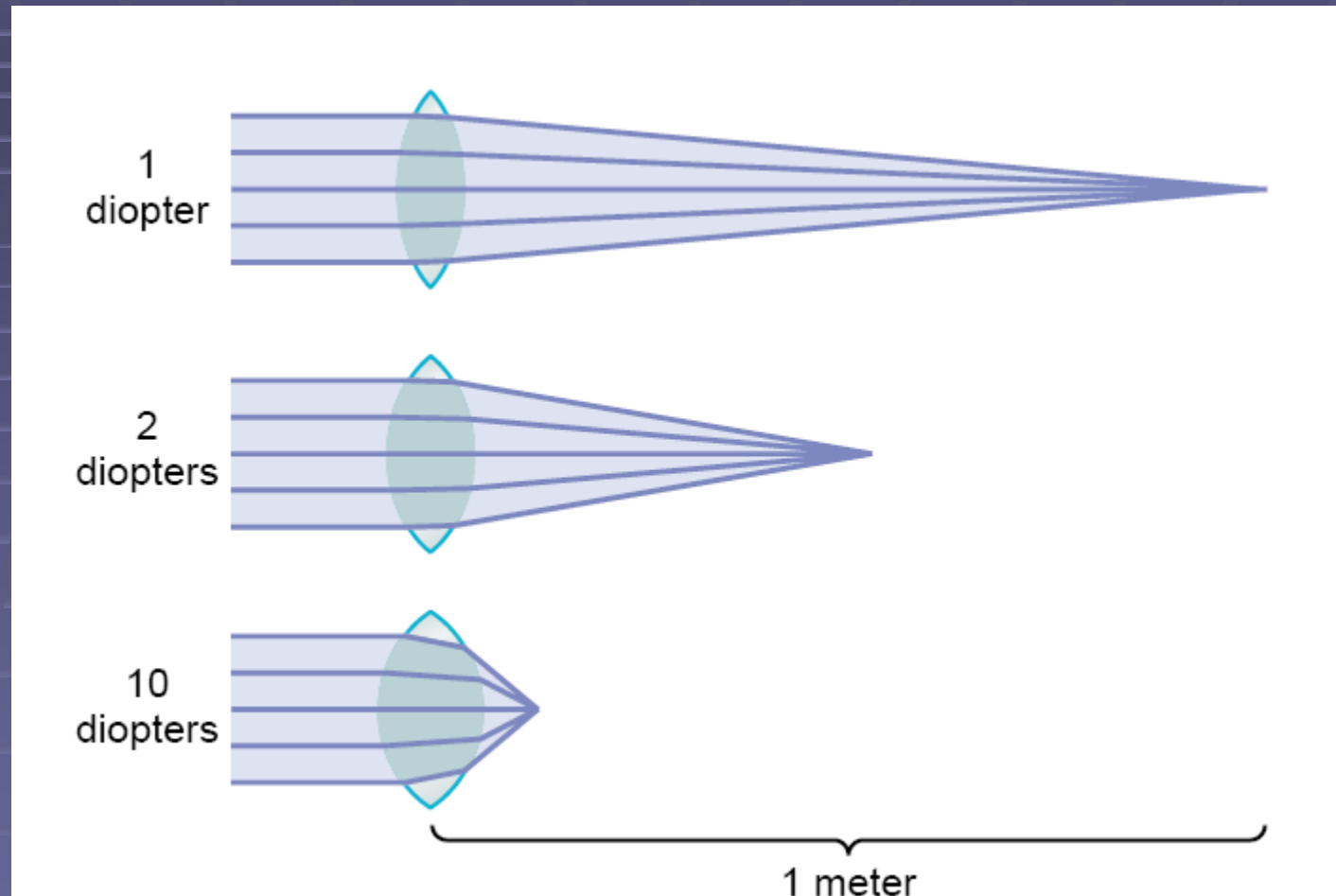
Light
refraction



Optics of Vision

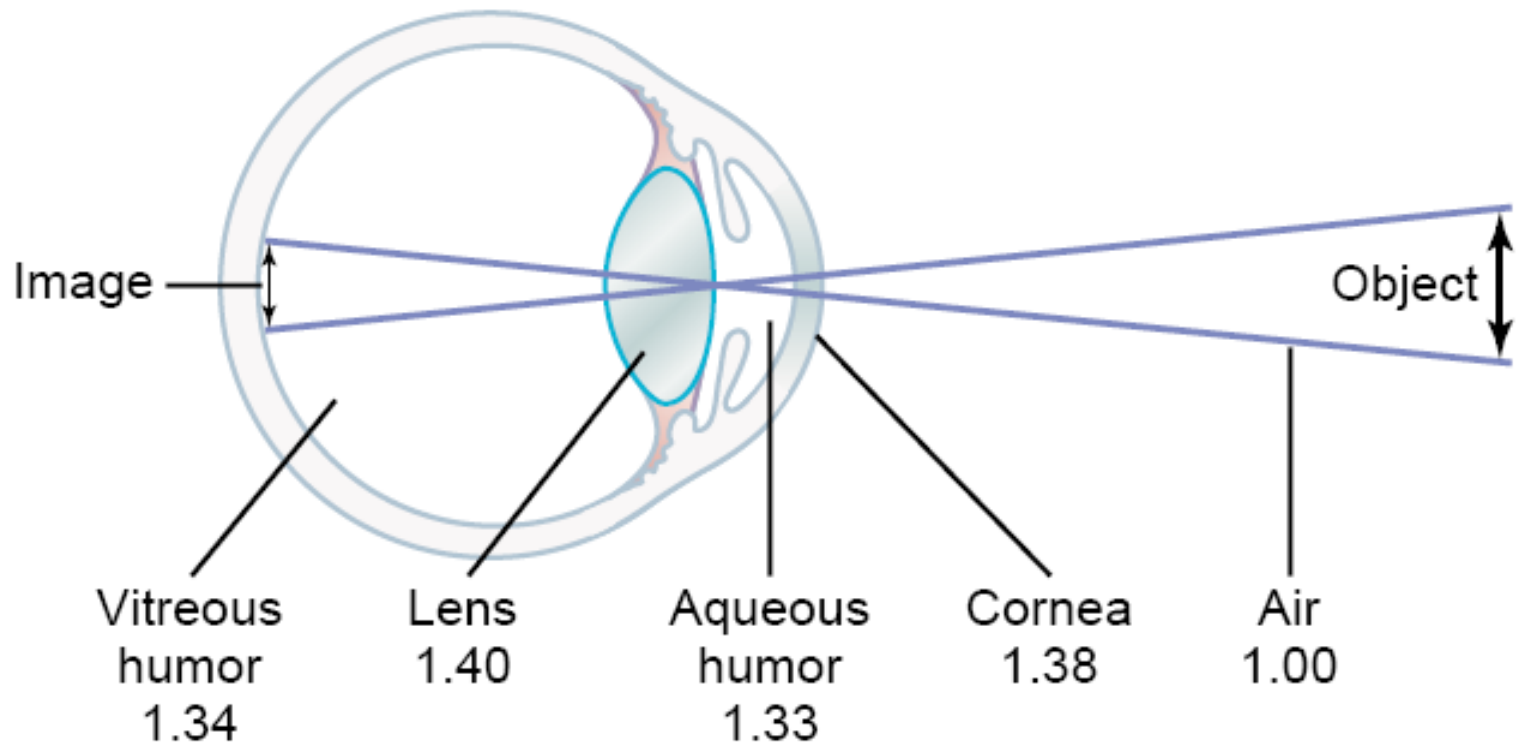


Optics of Vision

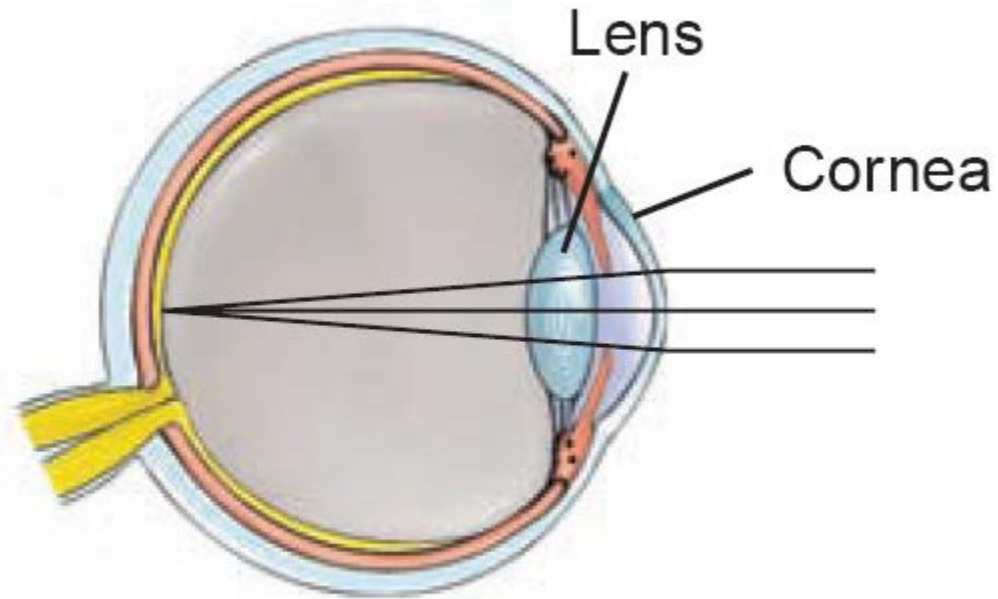


Refraction power a lens "Diopter" = $1 \text{ m} / \text{focal length}$

Optics of Vision

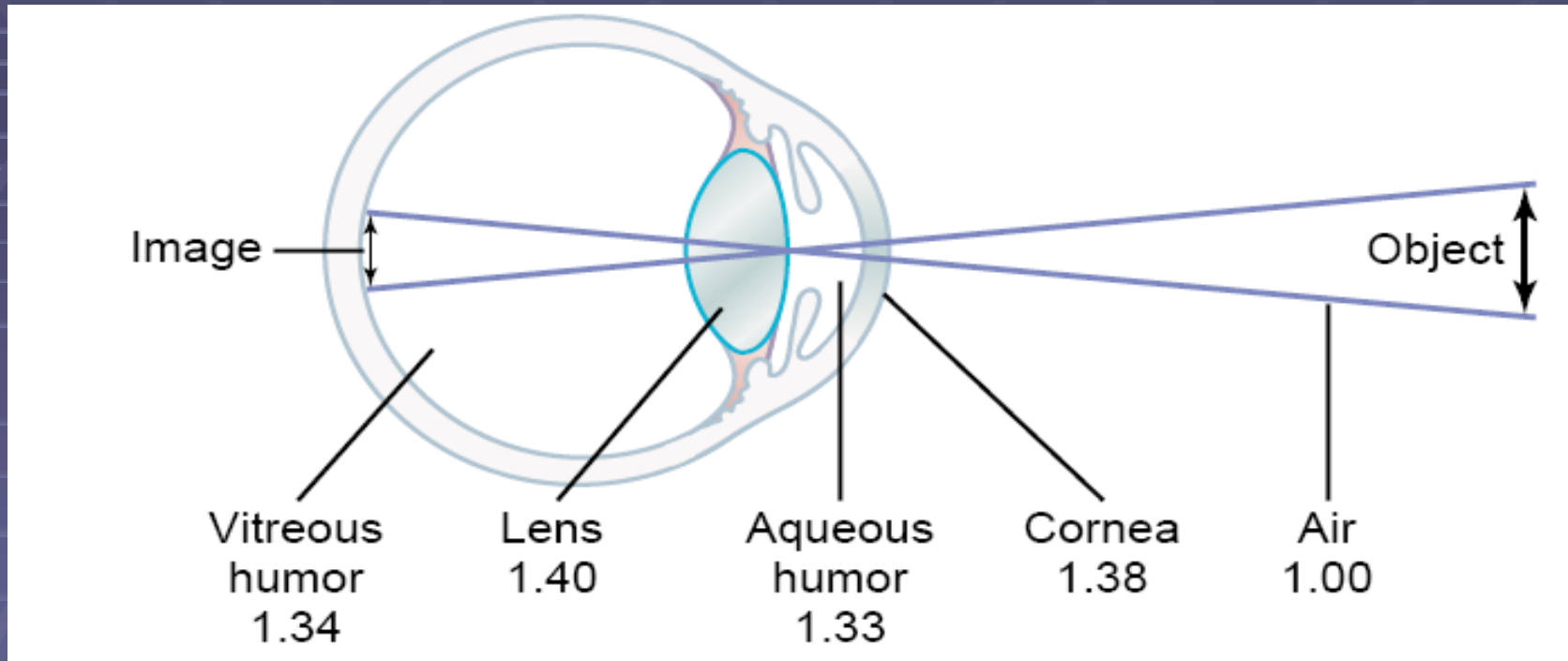


Optics of Vision



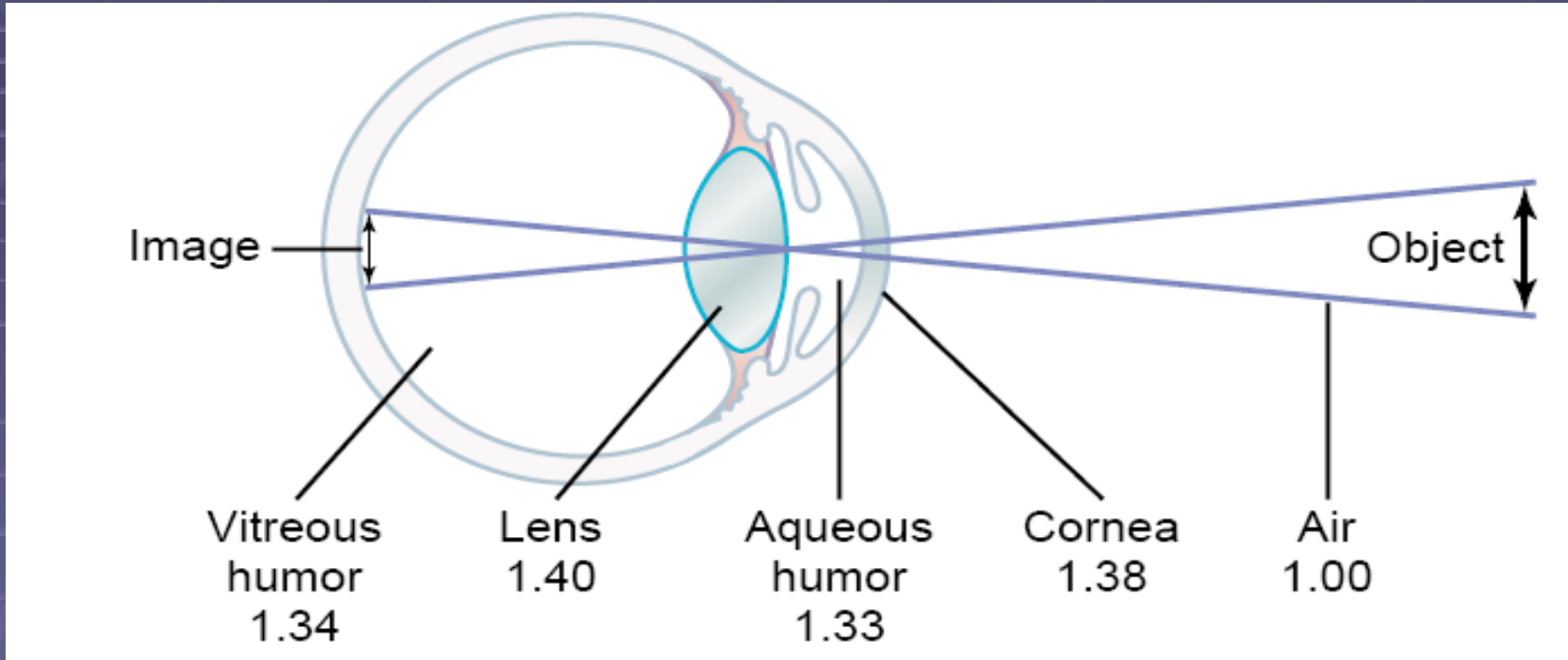
(a) Normal (emmetropic) eye

Picture Formation



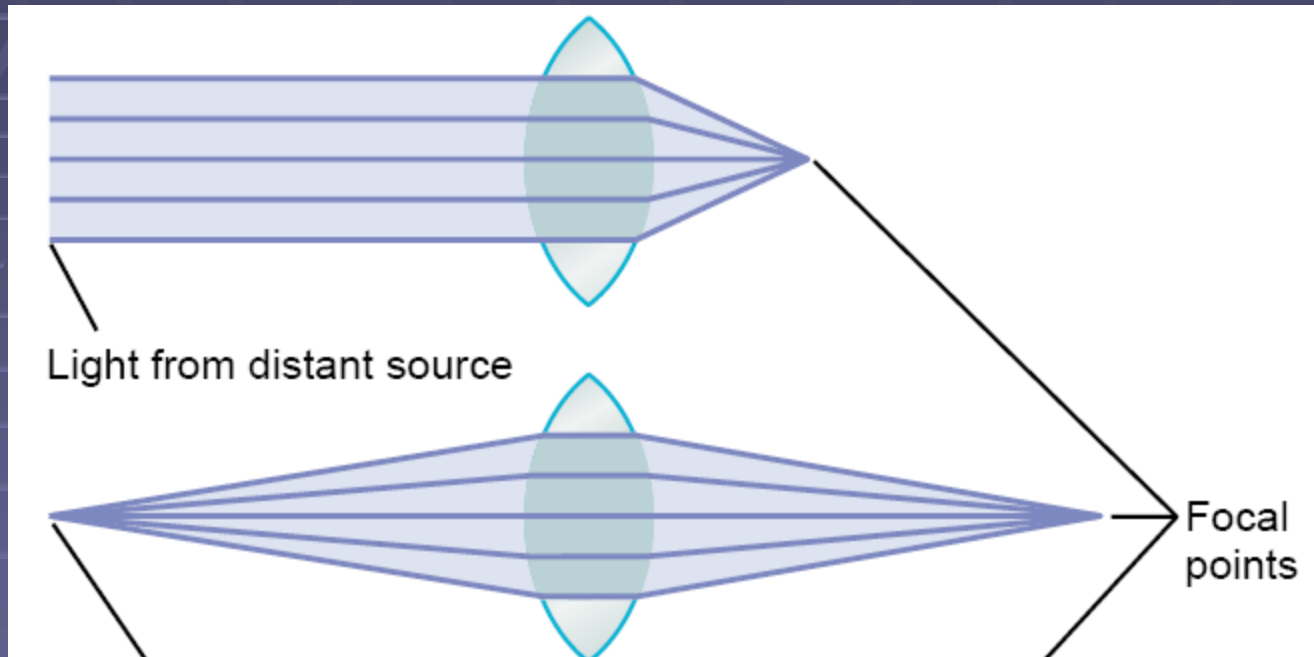
cataracts (opacities in the lens)

Picture Formation

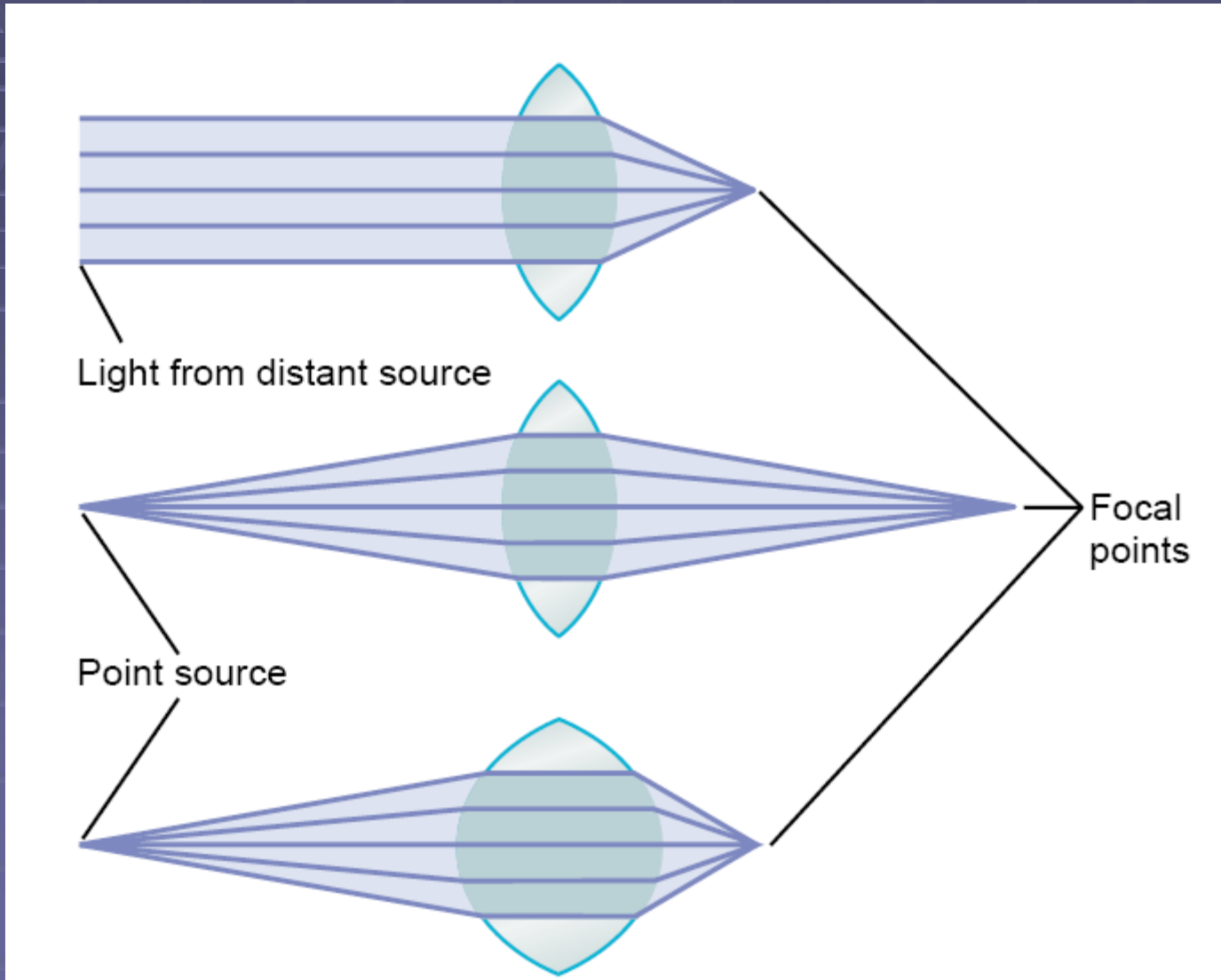


- Lens accommodation
- Pupil adjustment
- Fusion of the two eyes

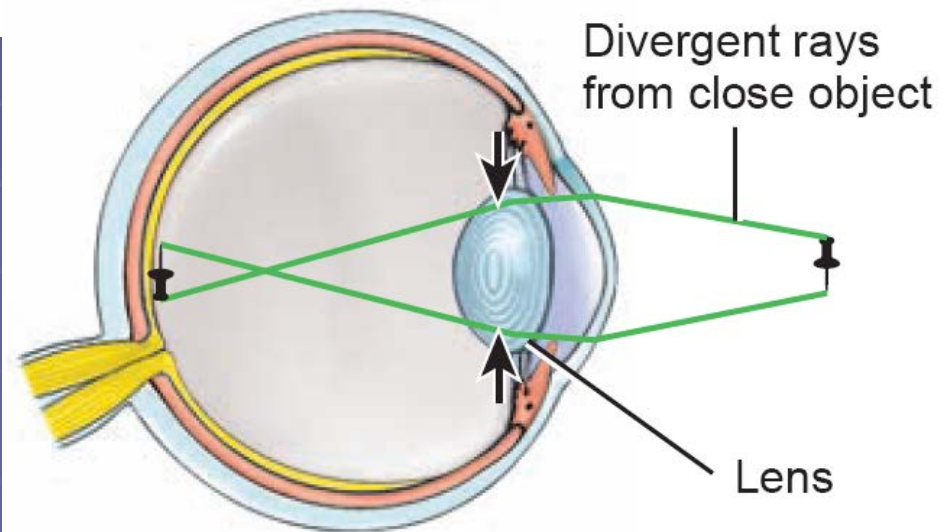
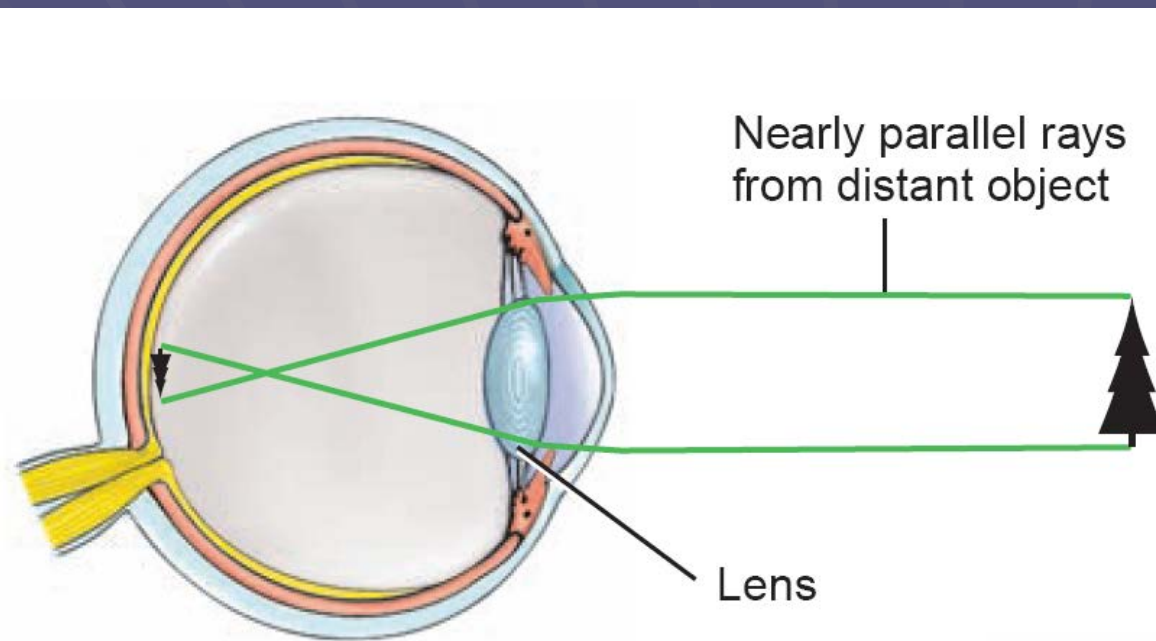
Optics of Vision



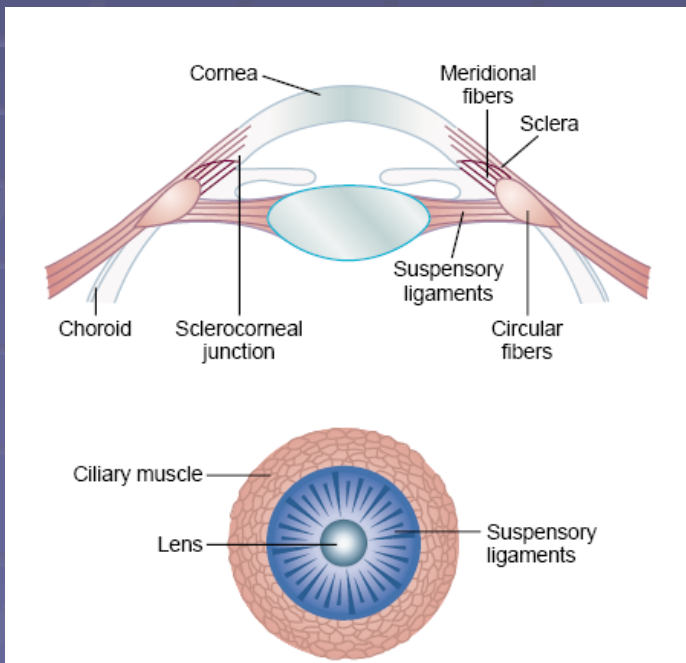
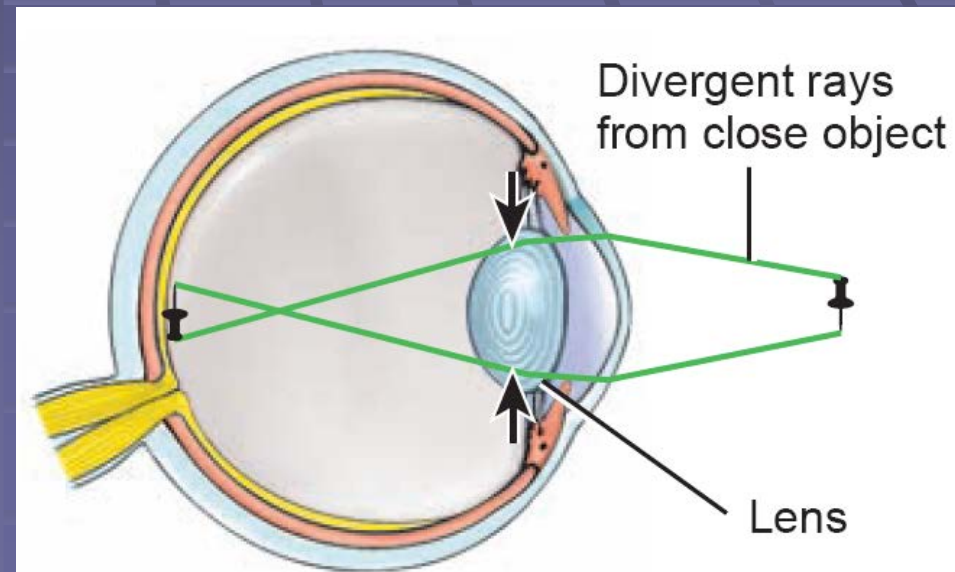
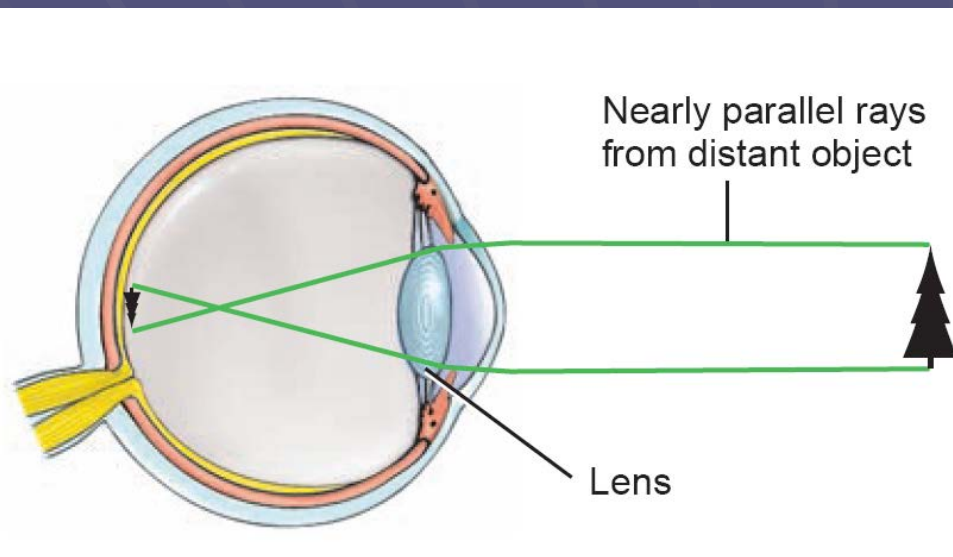
Optics of Vision



Accommodation

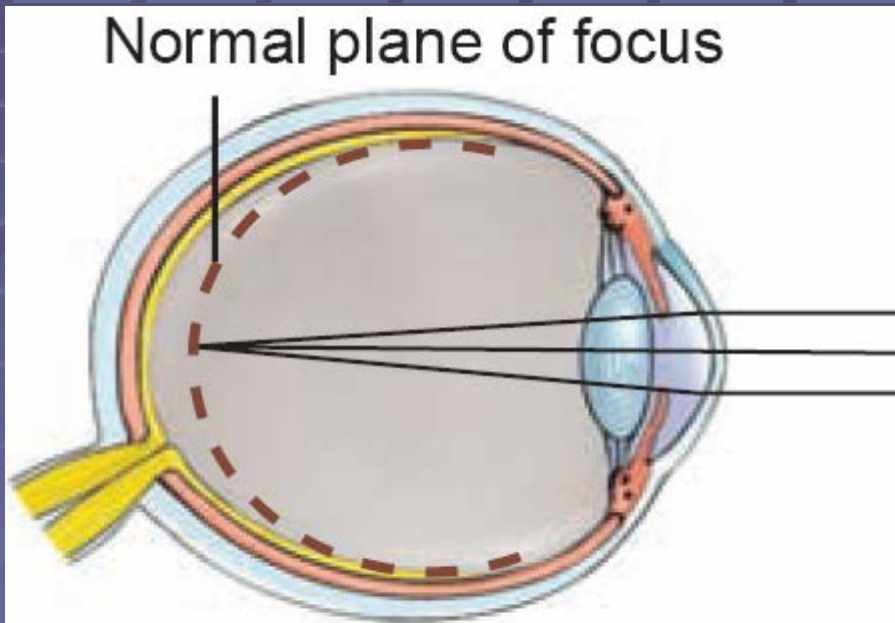


Accommodation

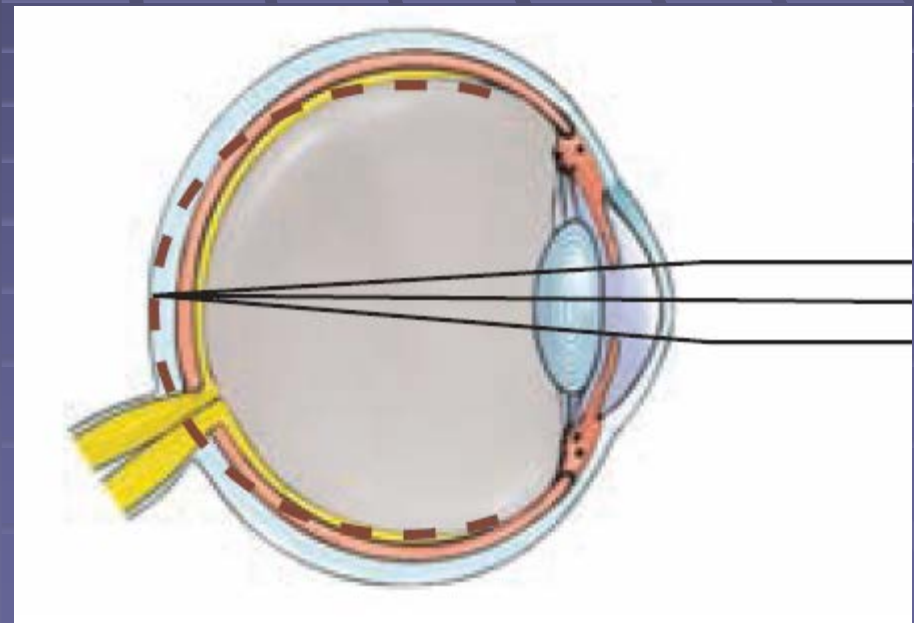


Vision problems

Ametropia: refraction error, inability of properly focusing light on the retina, a frequent reason for reduced visual acuity

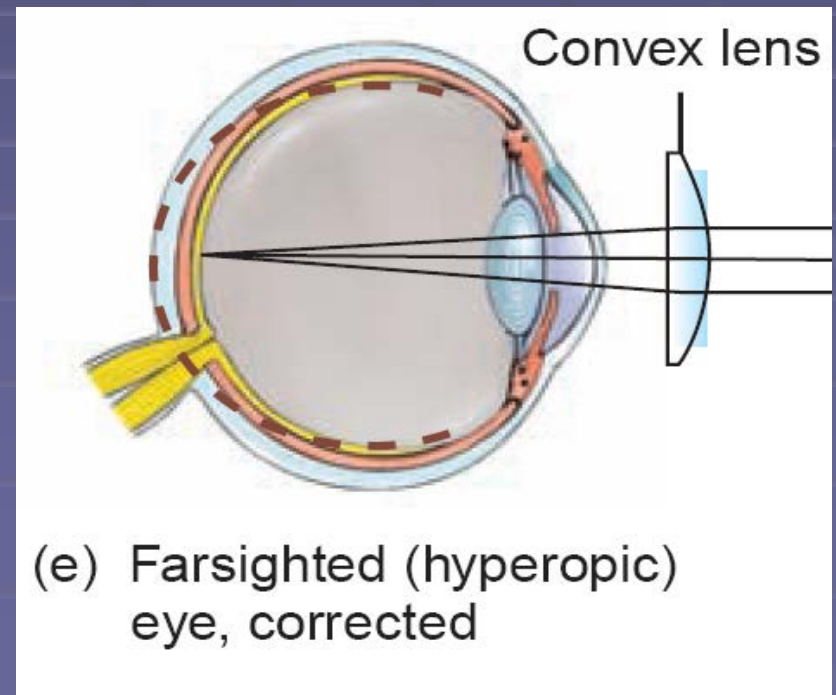
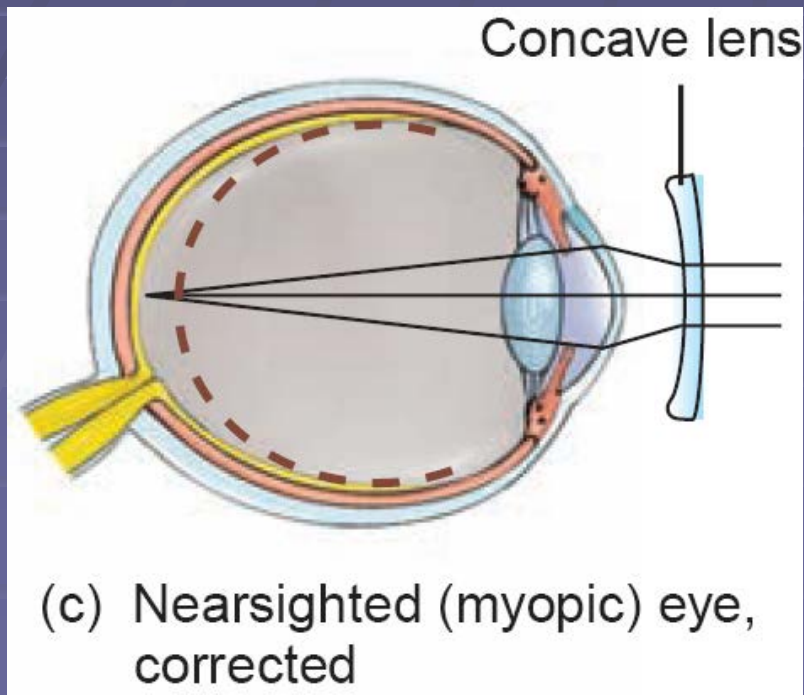
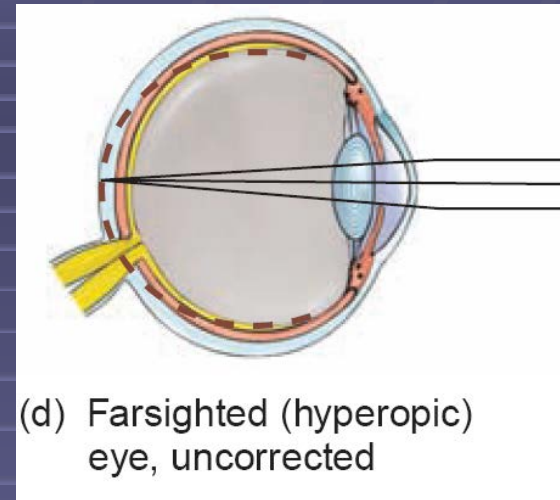
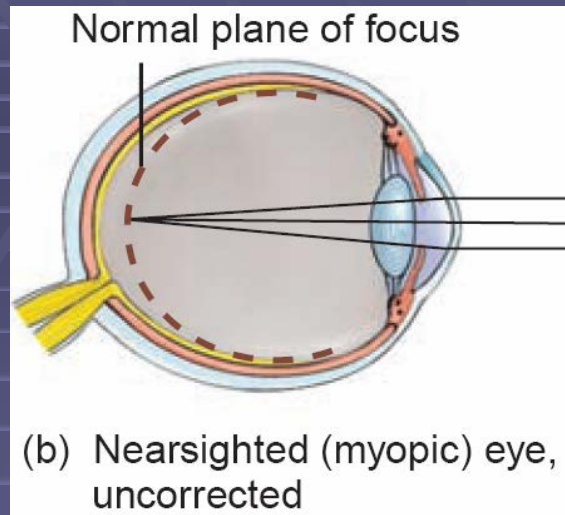


(b) Nearsighted (myopic) eye, uncorrected



(d) Farsighted (hyperopic) eye, uncorrected

Vision problems



Visual acuity

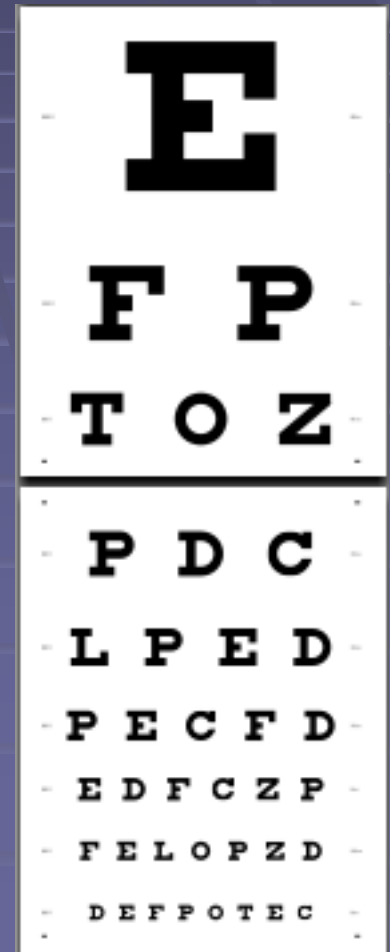
- Ability to separate contours that are approximately 1.75 mm apart

Visual acuity

- Ability to separate contours that are approximately 1.75 mm apart

snellen eye chart

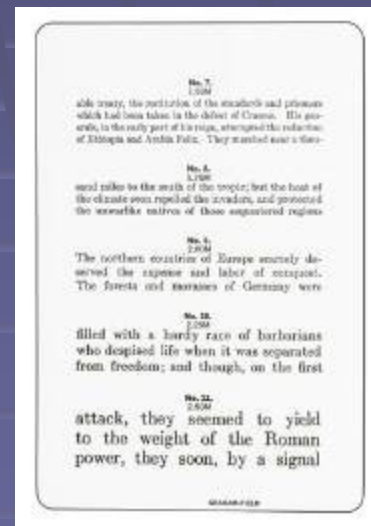
Jaeger eye chart



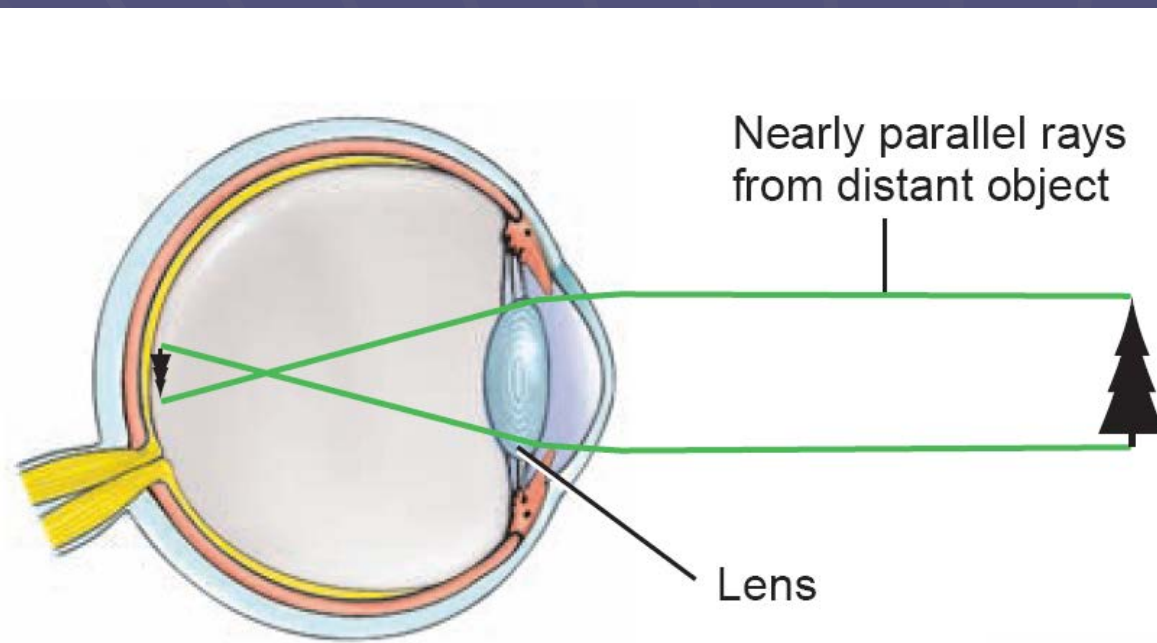
Visual acuity

- Ability to separate contours that are approximately 1.75 mm apart

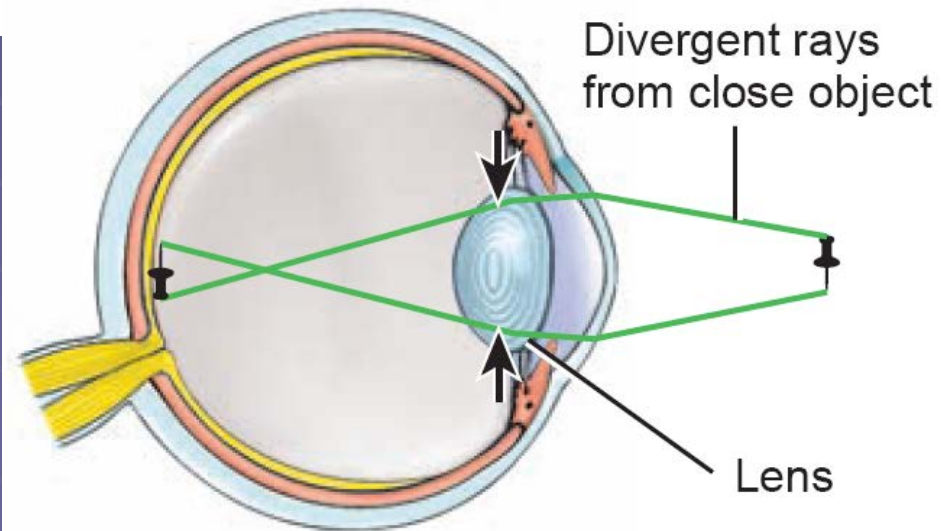
Jaeger eye chart



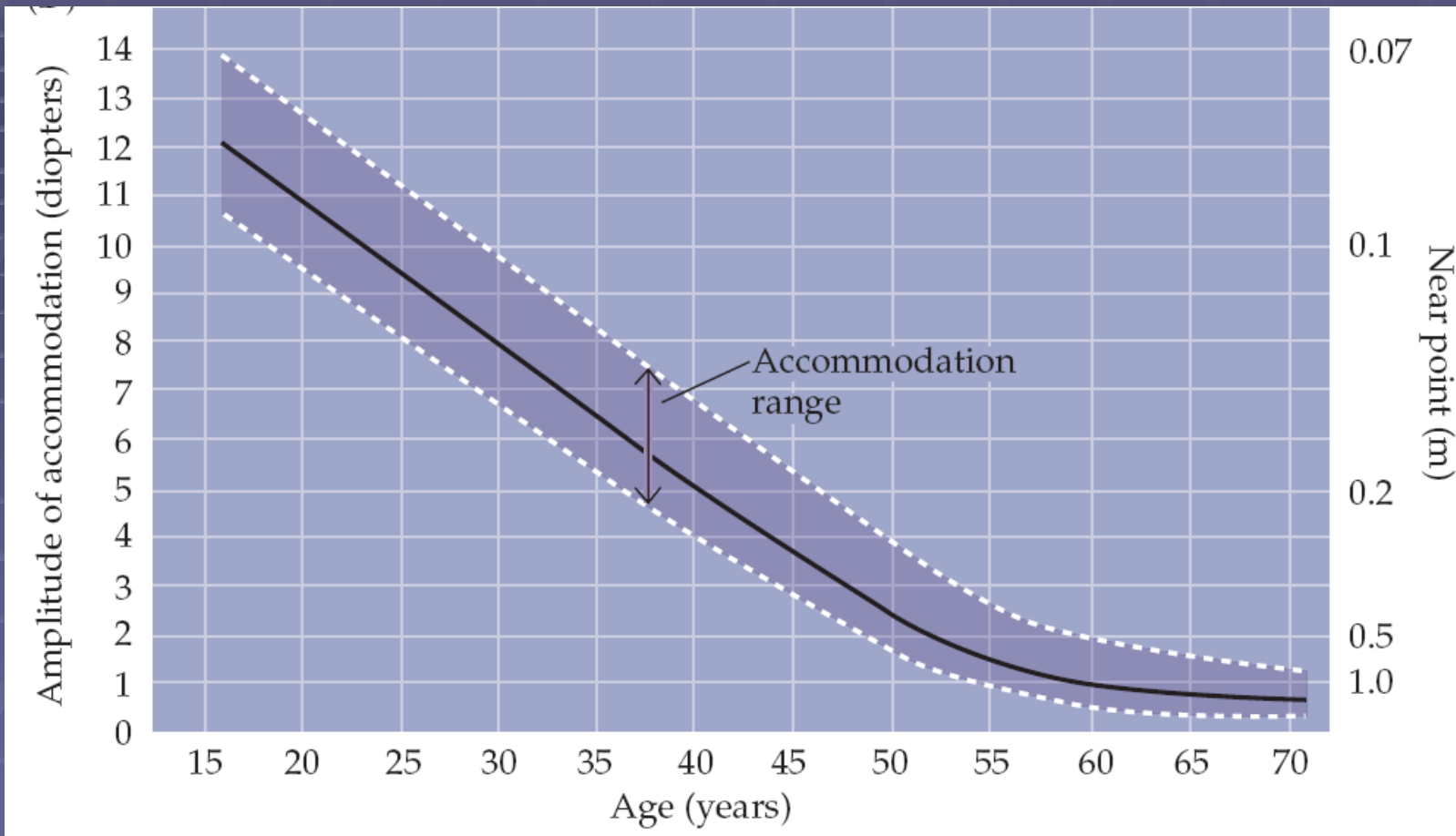
Accommodation



Presbyopia: Loss of accommodation by the lens



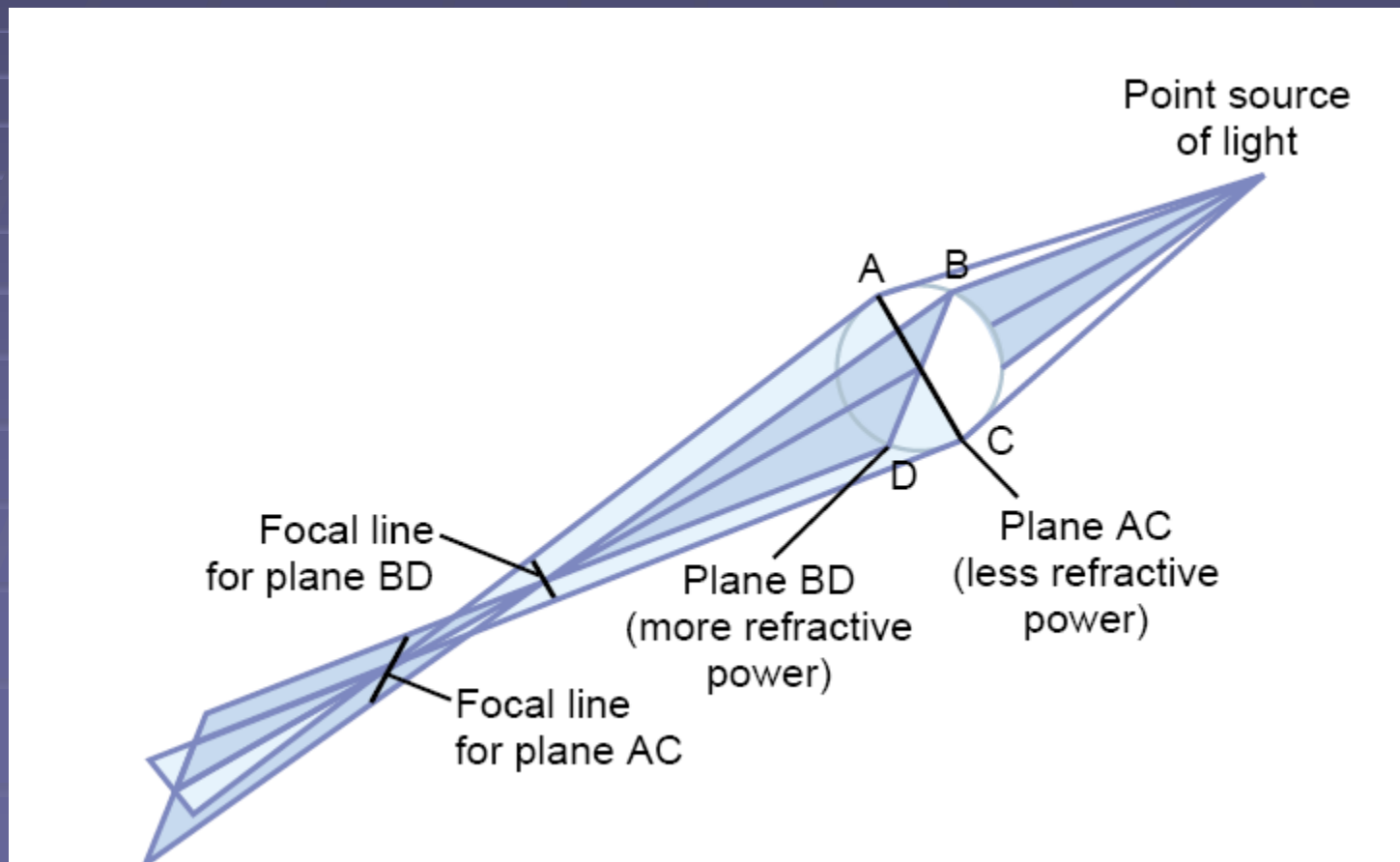
Accommodation



Presbyopia: Loss of accommodation by the lens

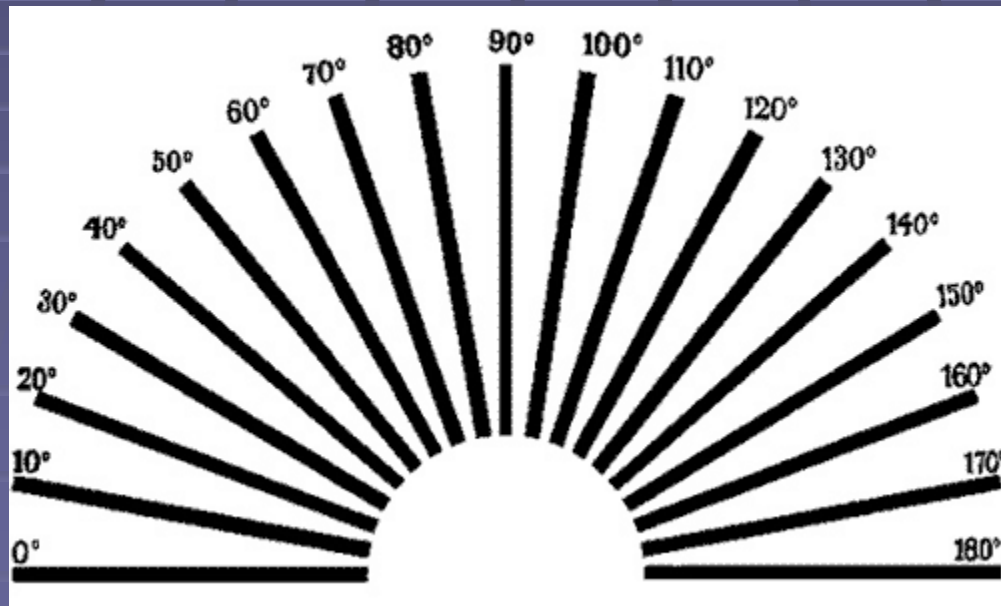
Vision problems

Astigmatism : irregular curvature of either the cornea or the lens, which lead to blurred or distorted vision due to parts of the image are out of focus.

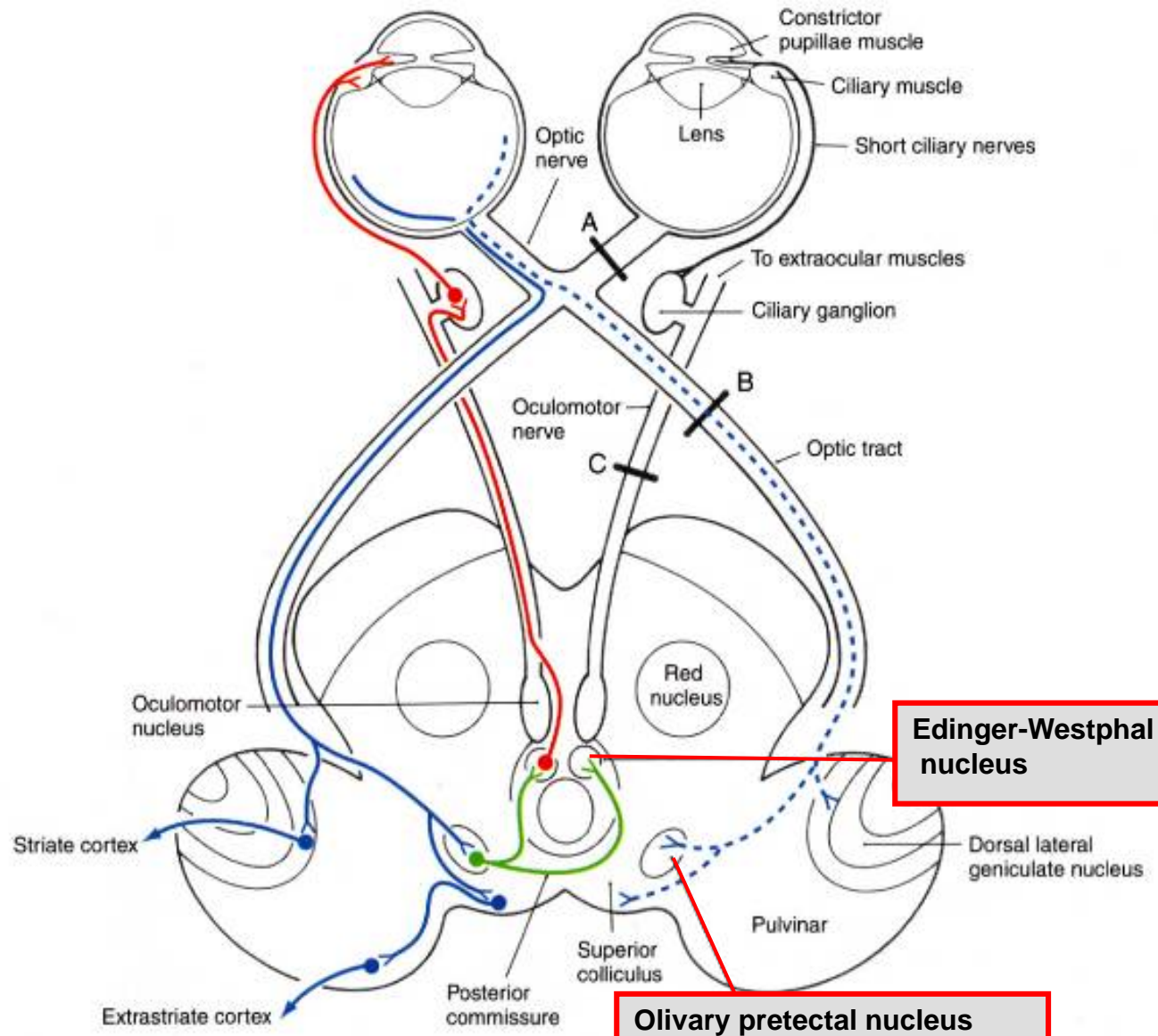


Vision problems

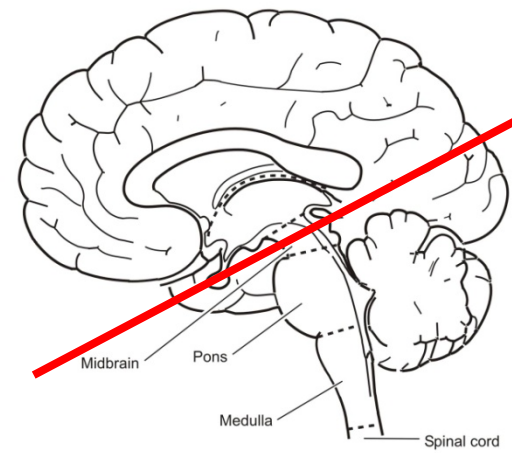
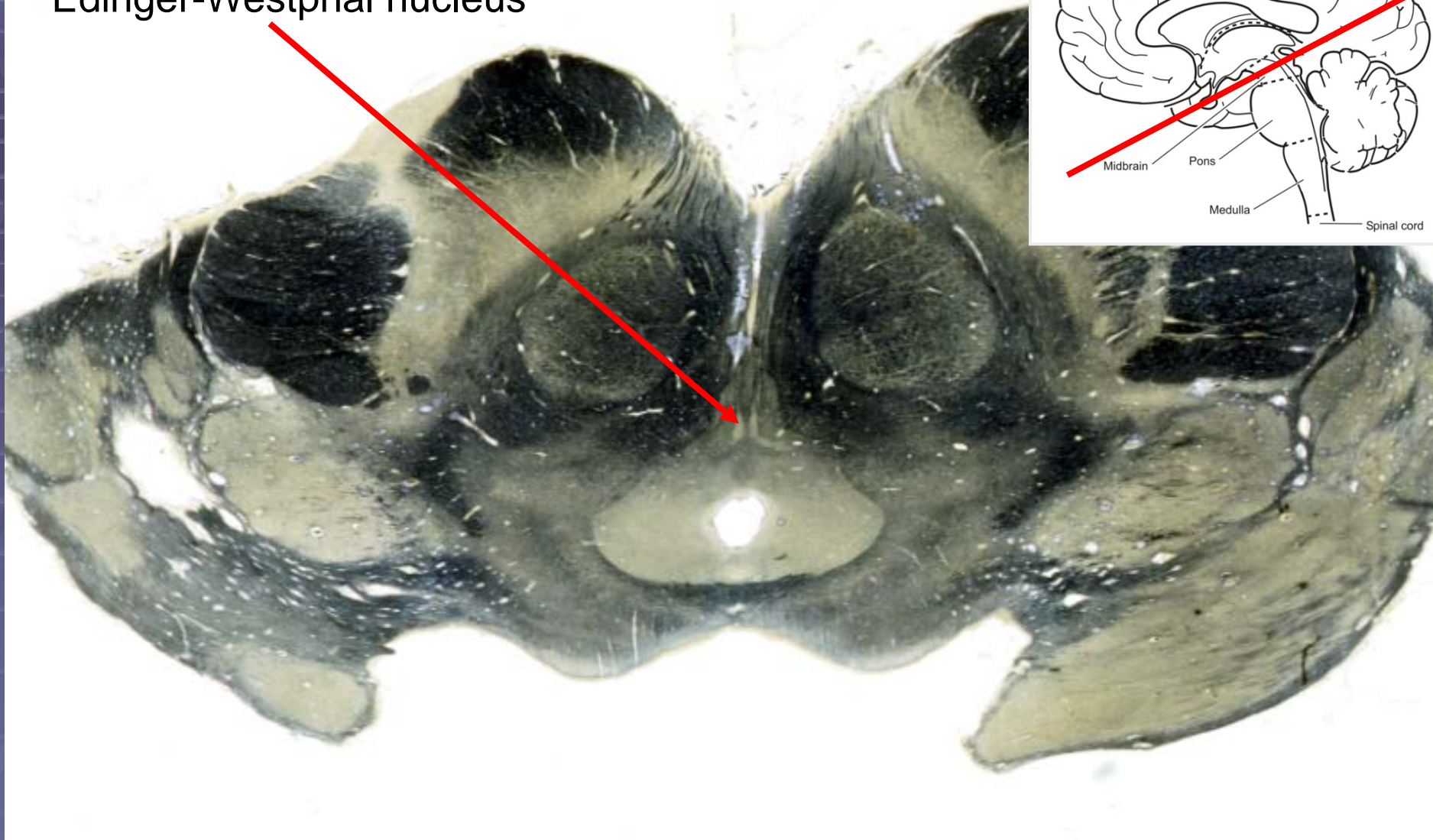
Astigmatism : irregular curvature of either the cornea or the lens, which lead to blurred or distorted vision due to parts of the image are out of focus.

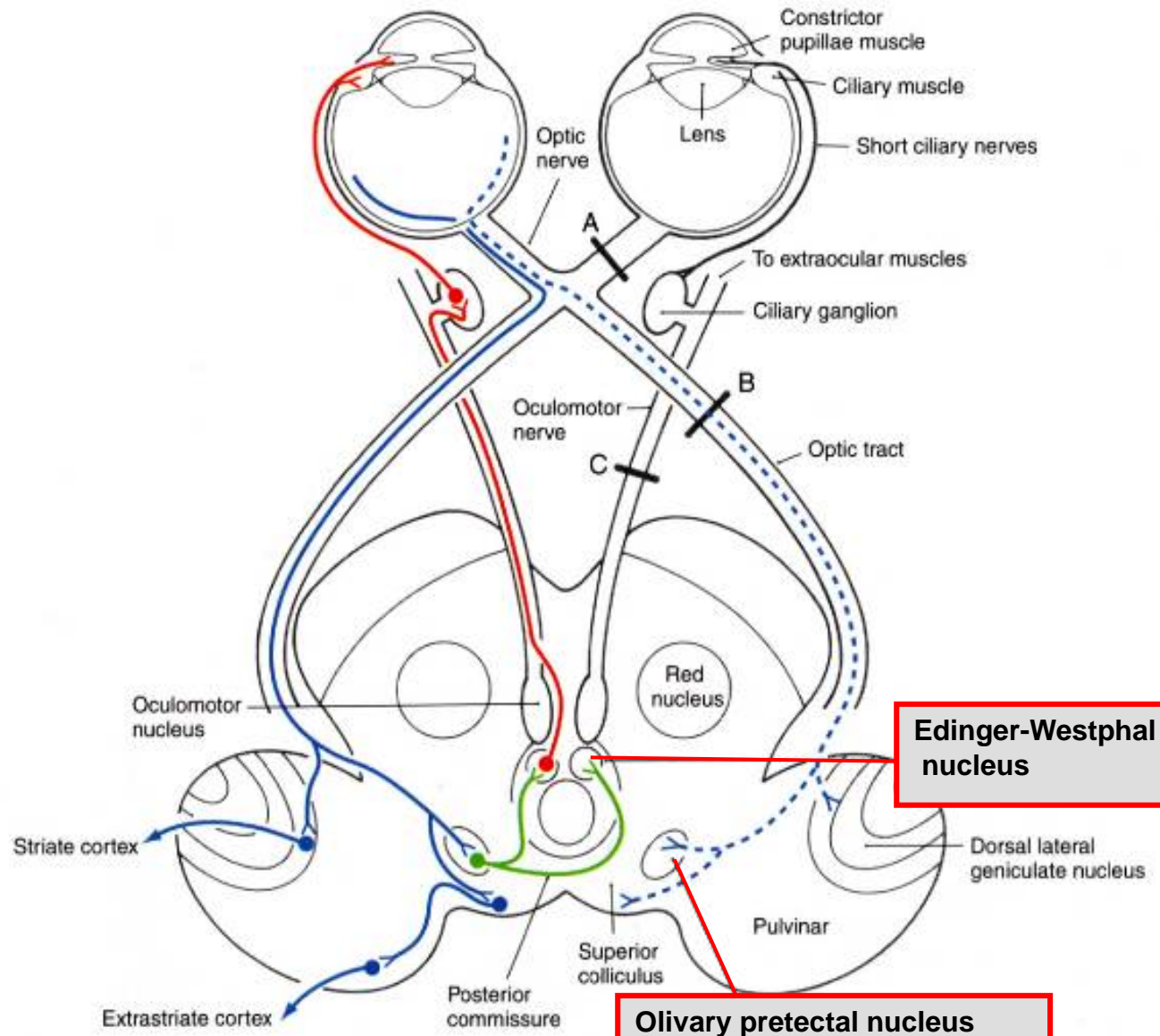


Pupillary Light Reflex



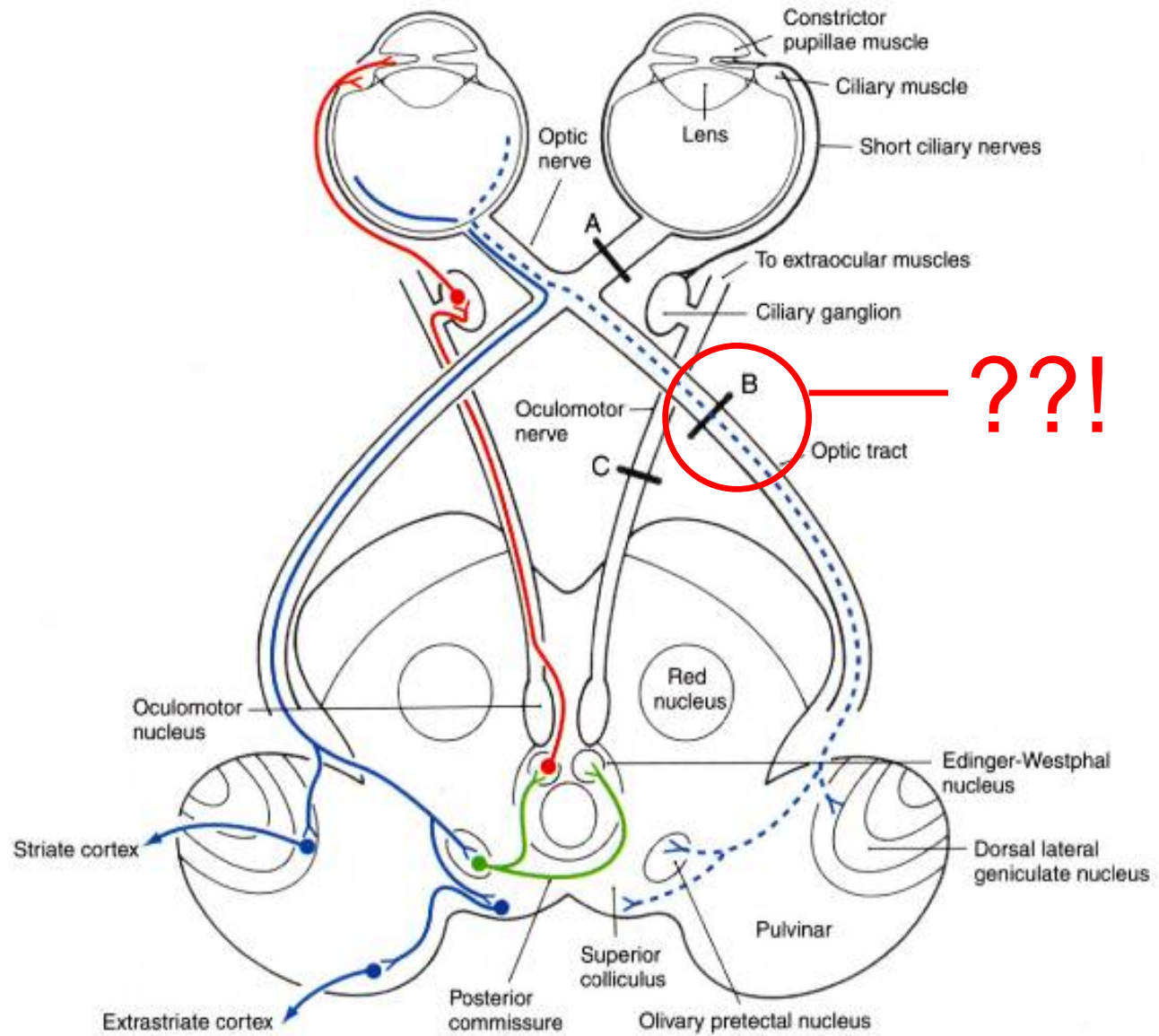
Edinger-Westphal nucleus





Edinger-Westphal nucleus

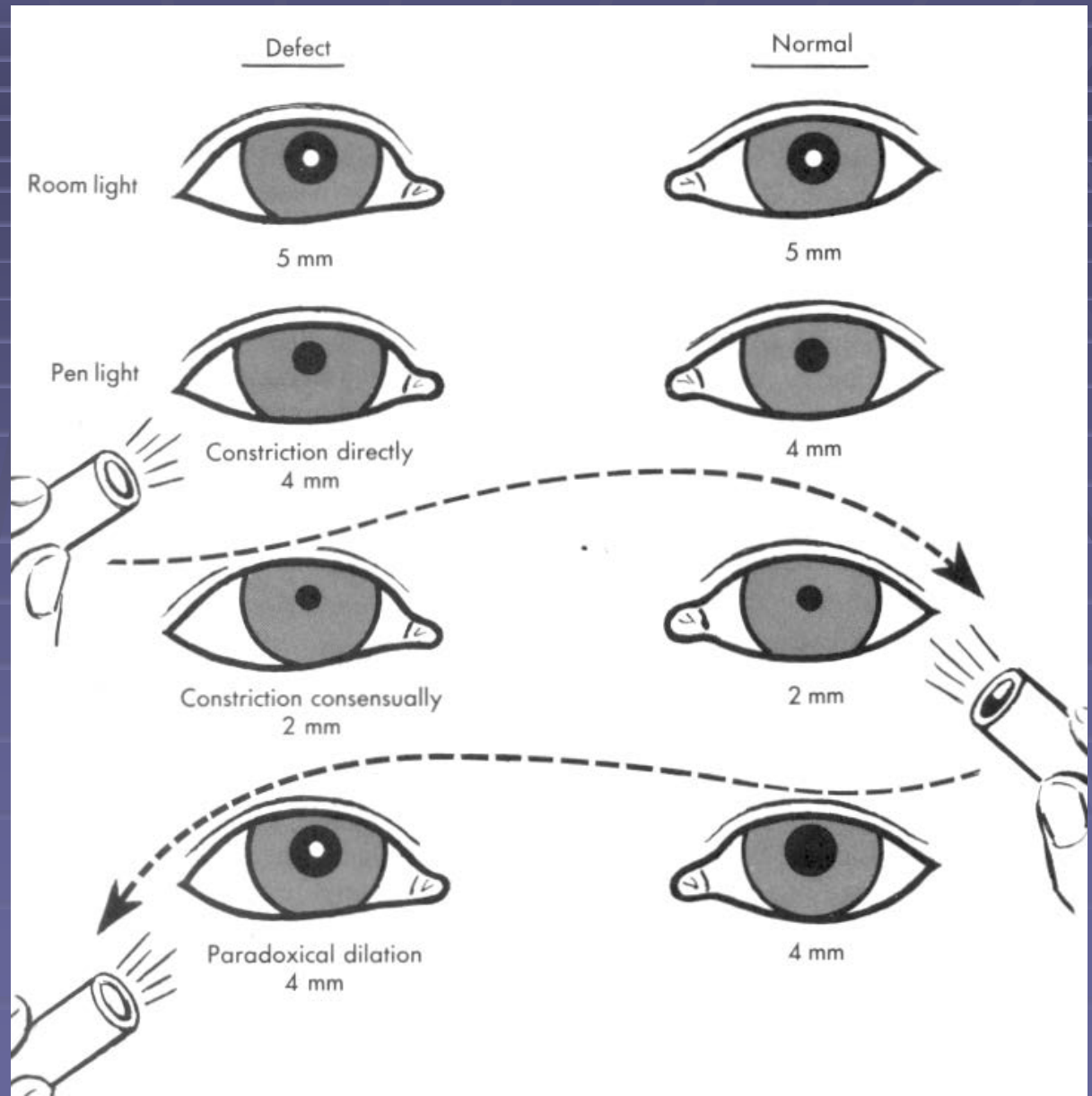
Olivary pretectal nucleus



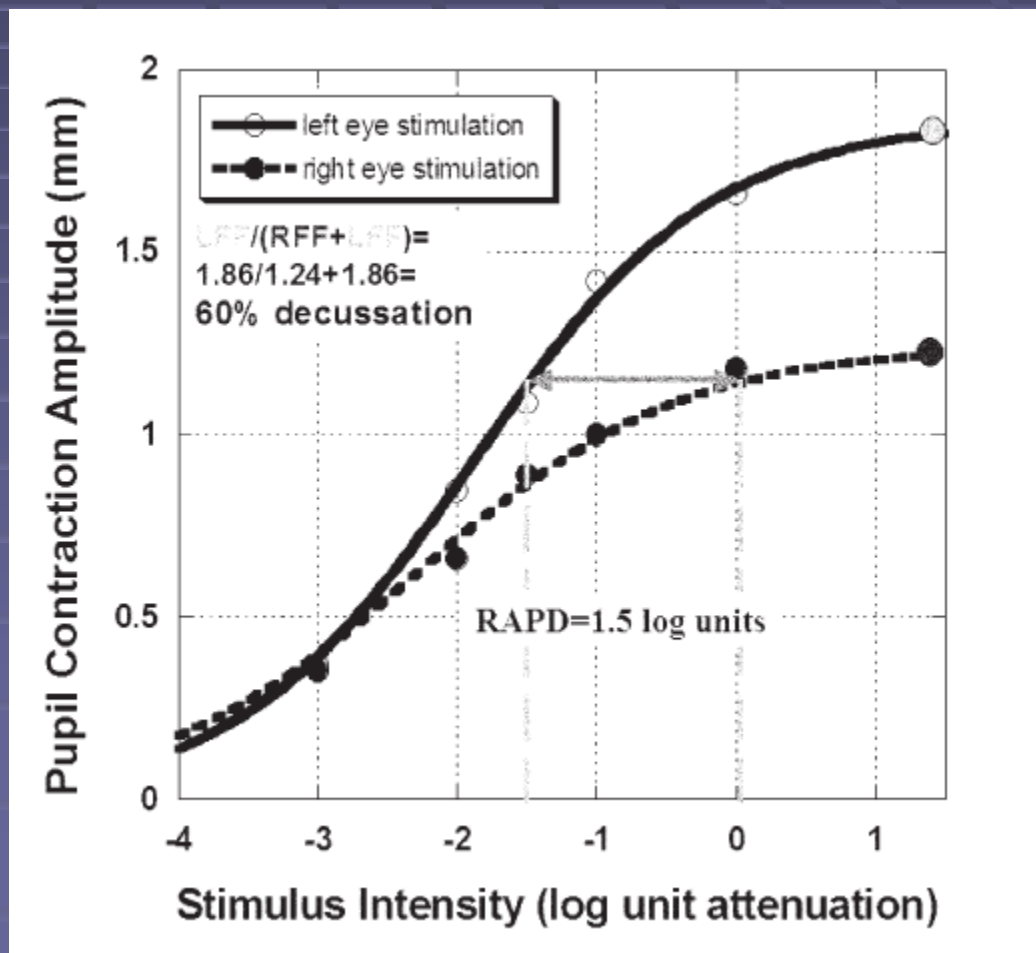
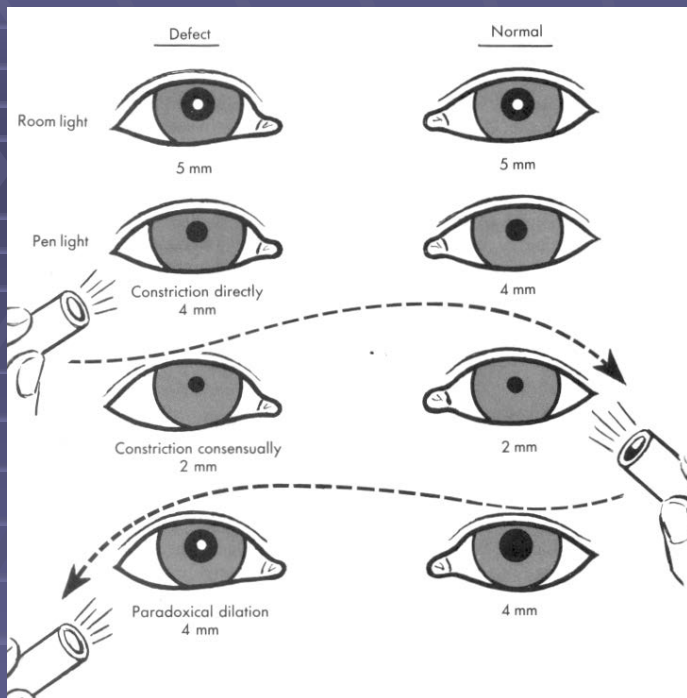
relative afferent pupillary defect
(RAPD)

relative afferent pupillary defect (RAPD)

swinging-flashlight test



relative afferent pupillary defect (RAPD)

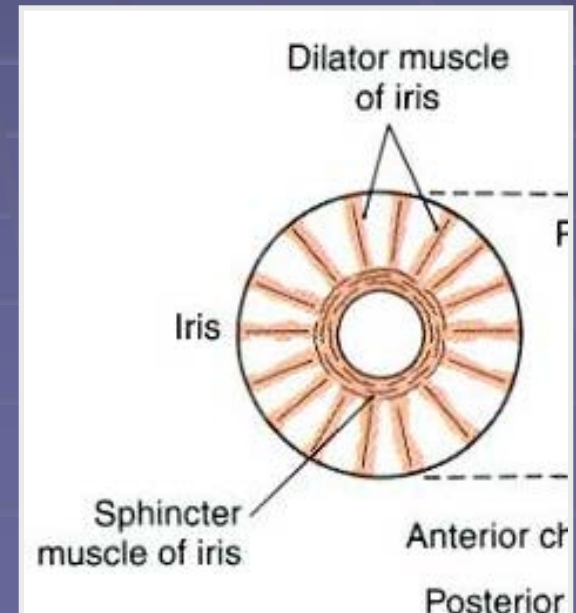
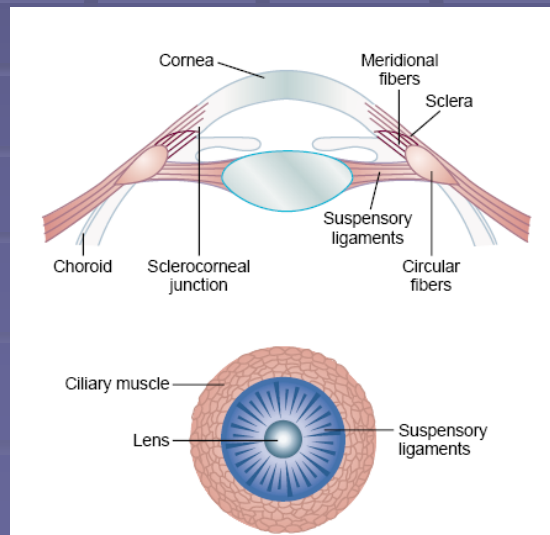
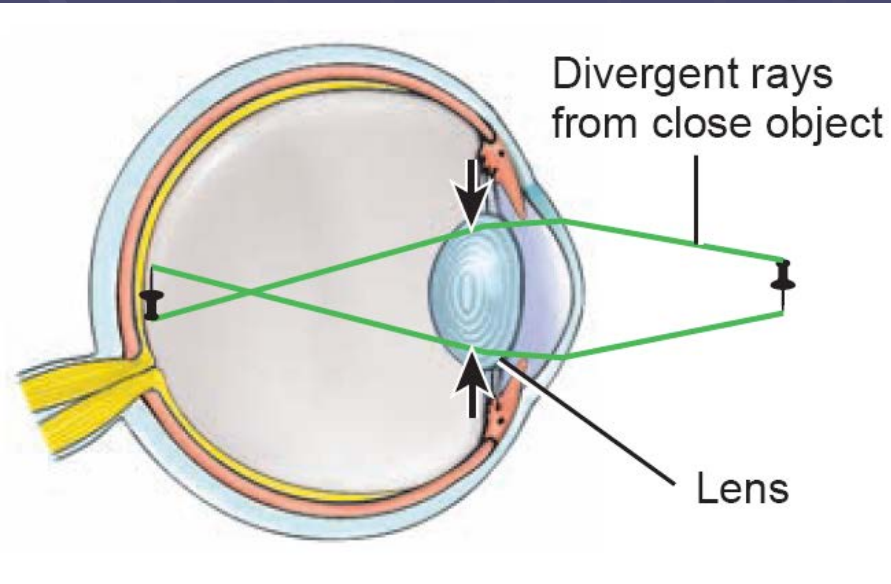


relative afferent pupillary defect (RAPD)

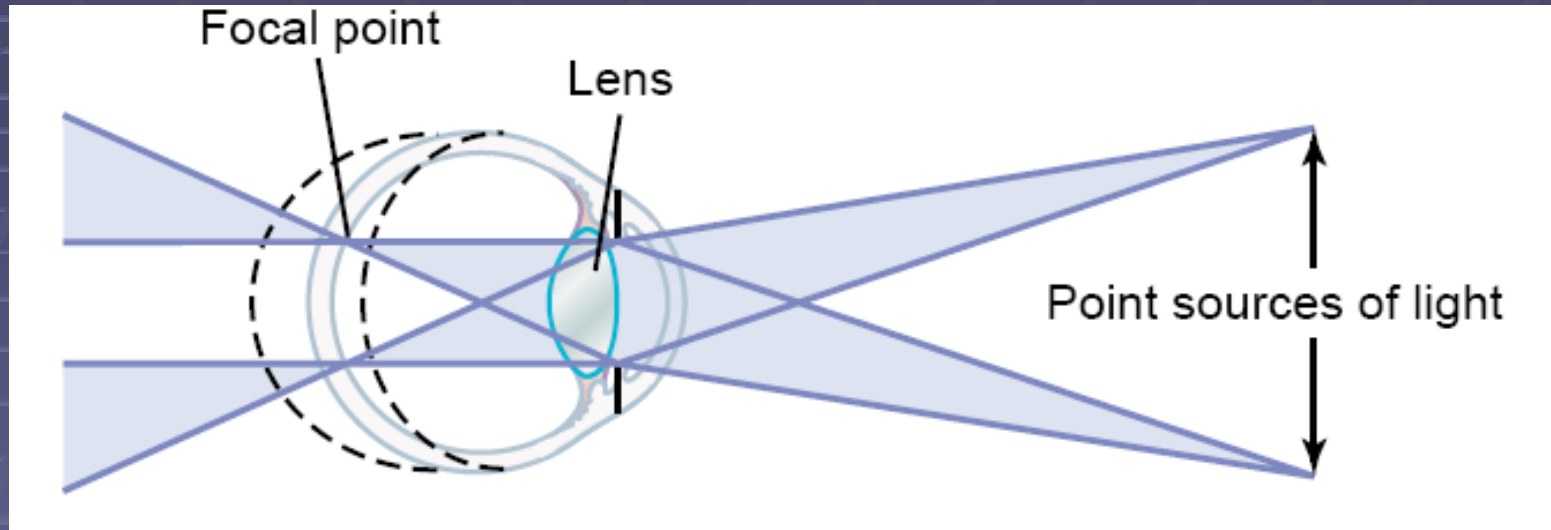
- Usually before the chiasm problem
 - Retinal detachment
 - Ischemic retina
 - Optic nerve : ischemia ,compression neuritis , recovered neuritis ... etc
 - diabetic retinopathy
 - Demyelination (MS)
- Unilateral Optic track lesion
- Unilateral mid brain lesion

Accommodation and parasympathetic

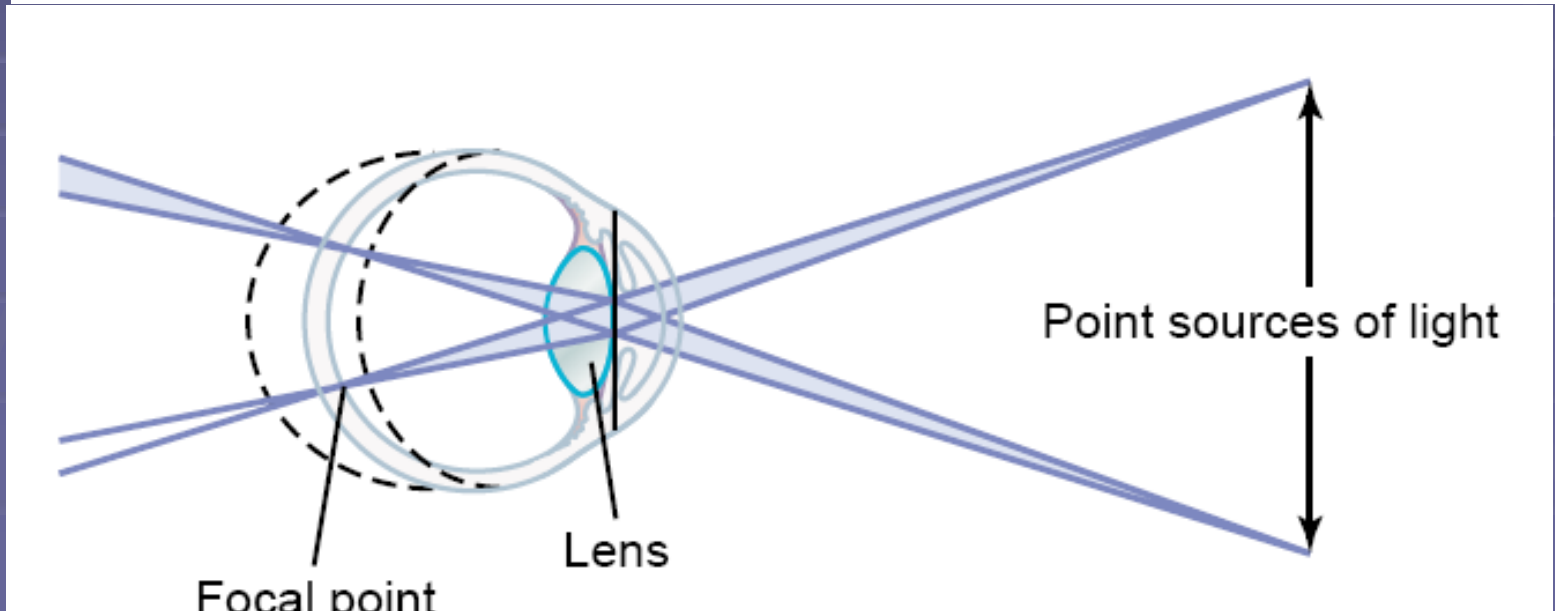
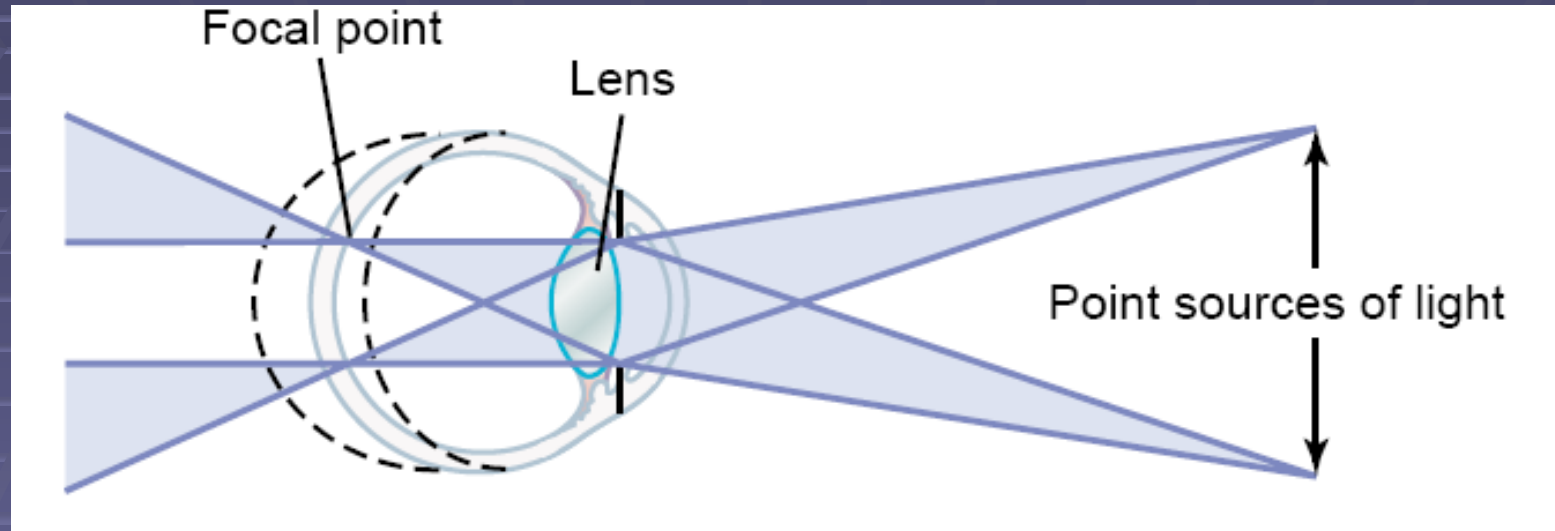
The pupil near reflex

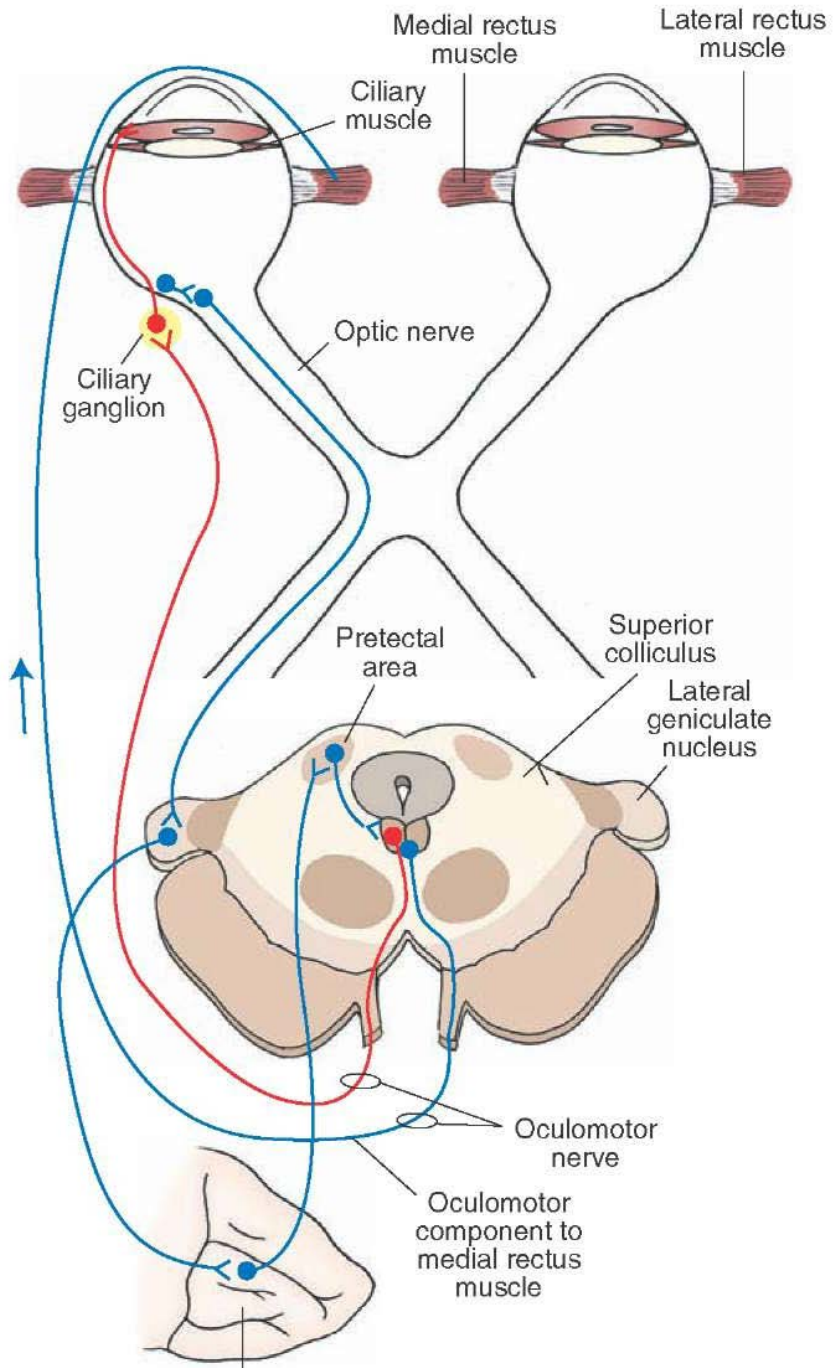


Pupillary Adjustment



Pupillary Adjustment





extrastriatal Visual cortex

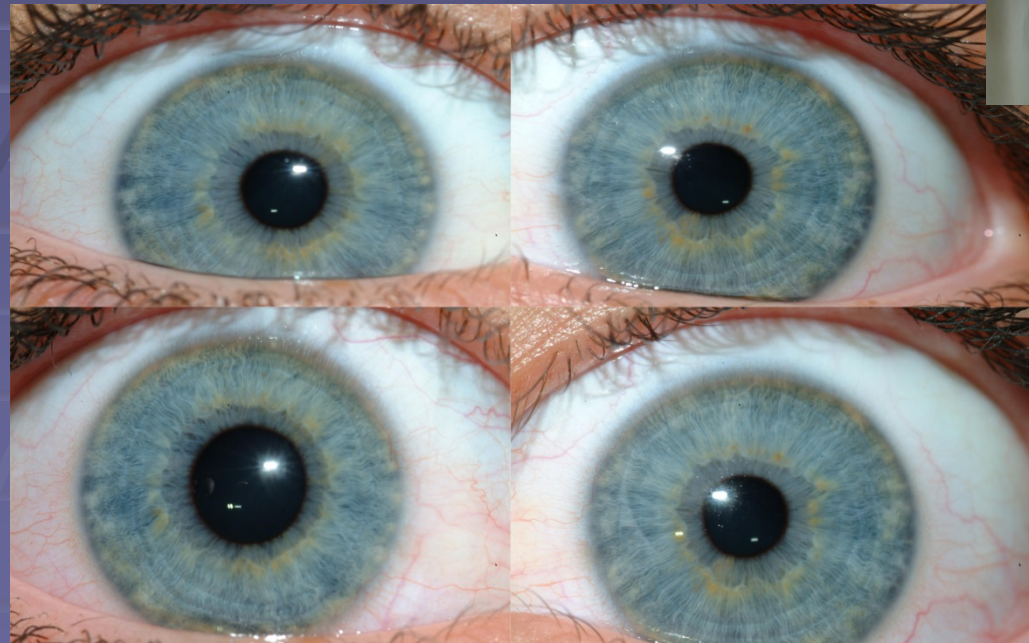
light-near dissociation

light-near dissociation

- Adie's tonic pupil
- Damage to the dorsal mid-brain (tectal area) around the cerebral aqueduct "but not the E W nucleus"
 - Stroke
 - Meningitis
 - Tumor
 - Neurosyphilis
 - Diabetic neuropathy
 - Demyelination (MS)
- Dorsal midbrain syndrome
(Parinaud's Syndrome)



Anisocoria

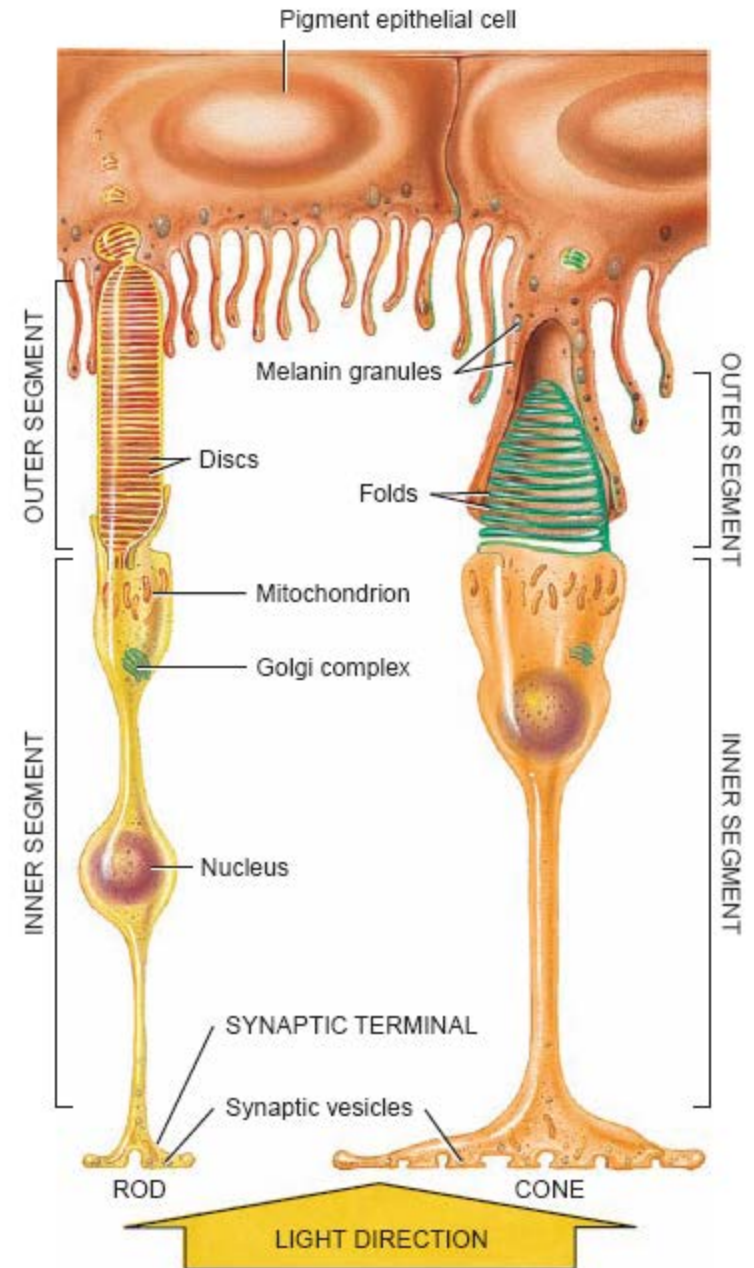


Anisocoria

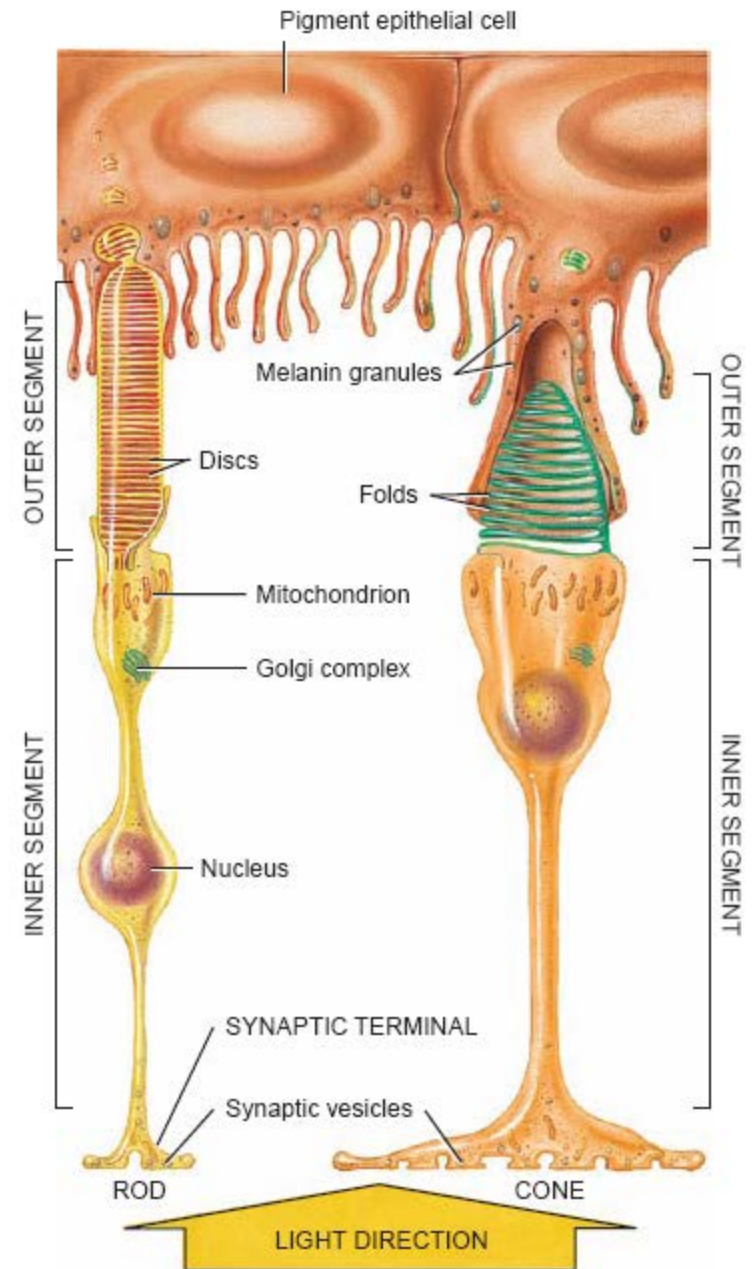
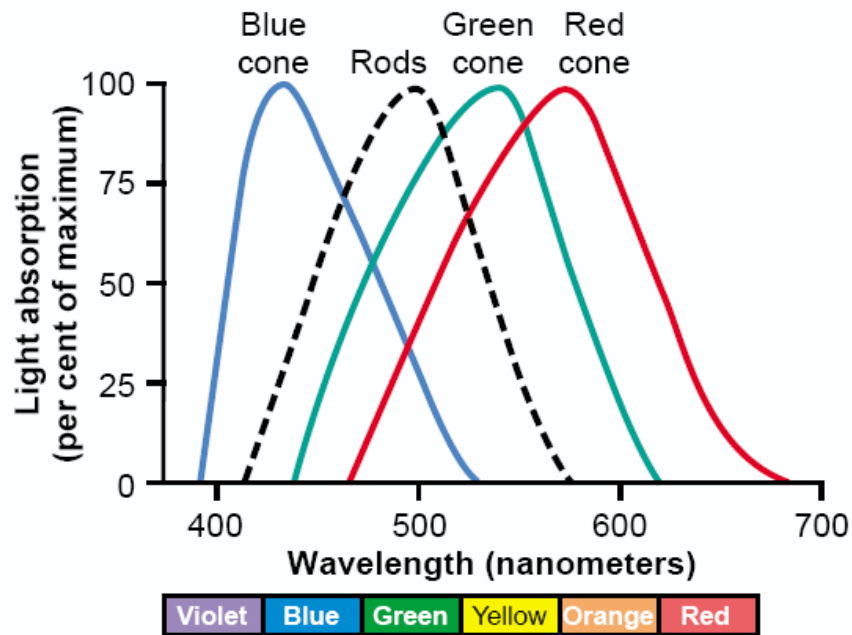
- Efferent pathway or the eye it self
- Adie's tonic pupil
- One side Dorsal midbrain syndrome
- Horner syndrome

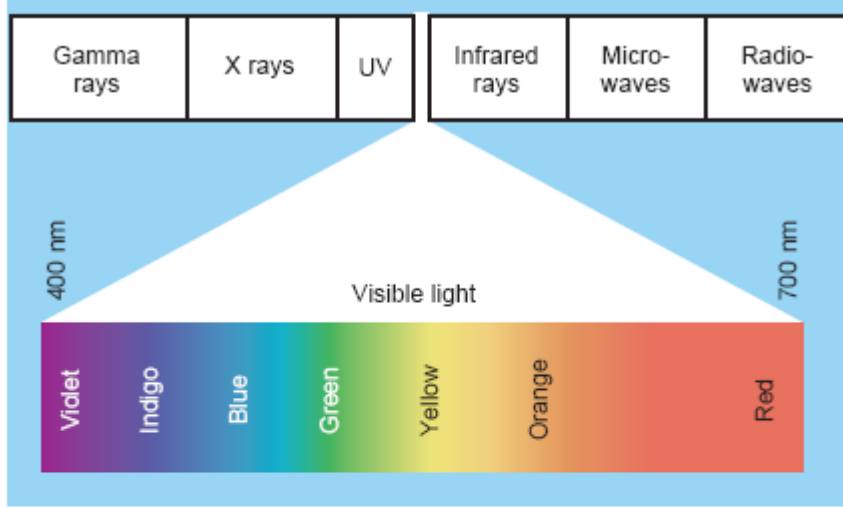
Photoreceptors

- Cones
- Rods

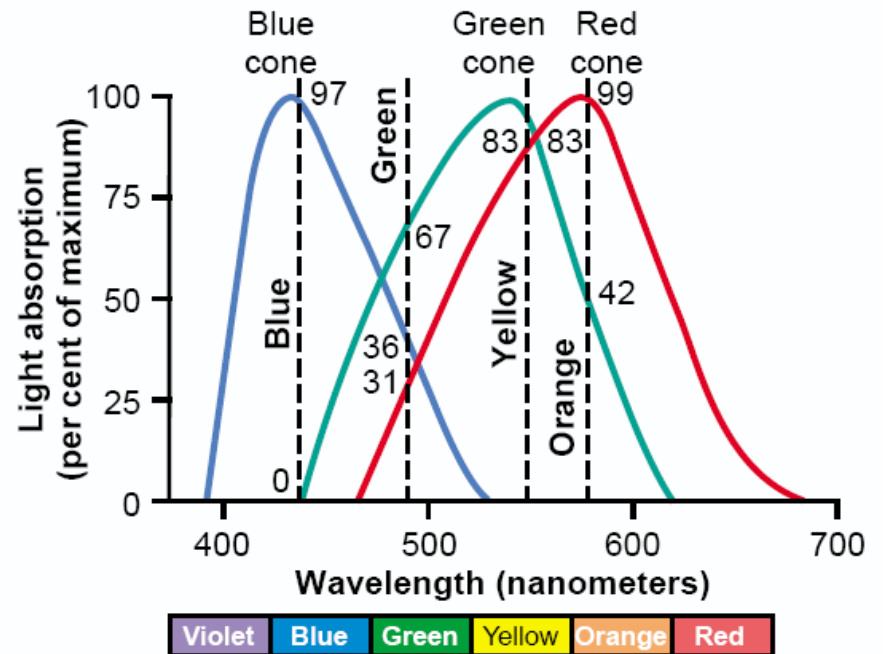
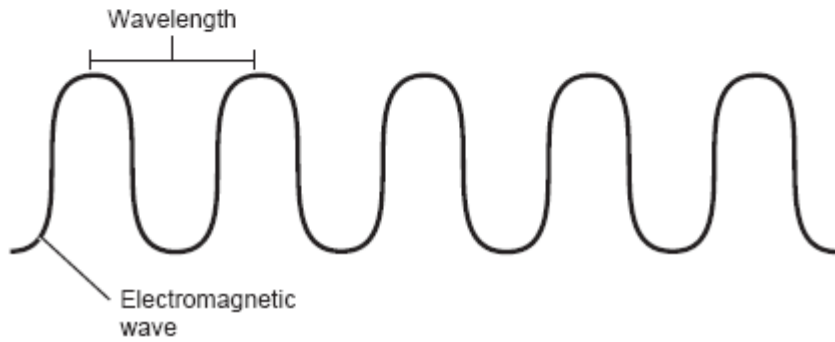


Photoreceptors


































(a) Electromagnetic spectrum



Color names if
you're a girl...

Maraschino		Red
Cayenne		
Maroon		Purple
Plum		
Eggplant		
Grape		
Orchid		Pink
Lavender		
Carnation		
Strawberry		
Bubblegum		
Magenta		
Salmon		Orange
Tangerine		
Cantaloupe		
Banana		Yellow
Lemon		
Honeydew		Green
Lime		
Spring		
Clover		
Fern		
Moss		
Flora		Blue
Sea Foam		
Spindrift		
Teal		
Sky		
Turquoise		

Color names if
you're a guy...

Color Blindness

Color Blindness

- Red-green color blindness

Color Blindness

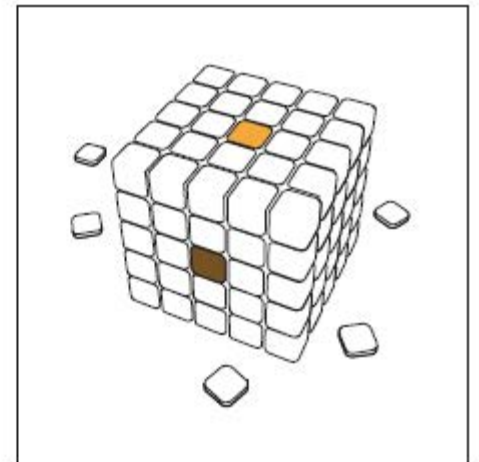
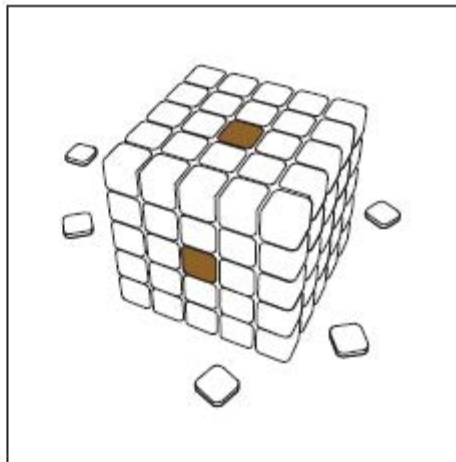
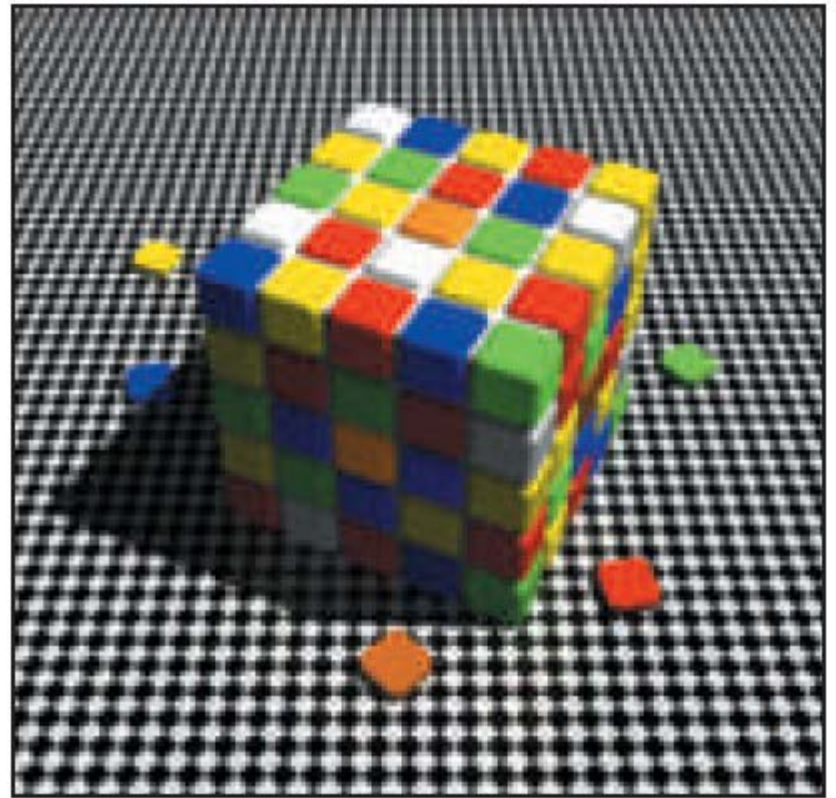
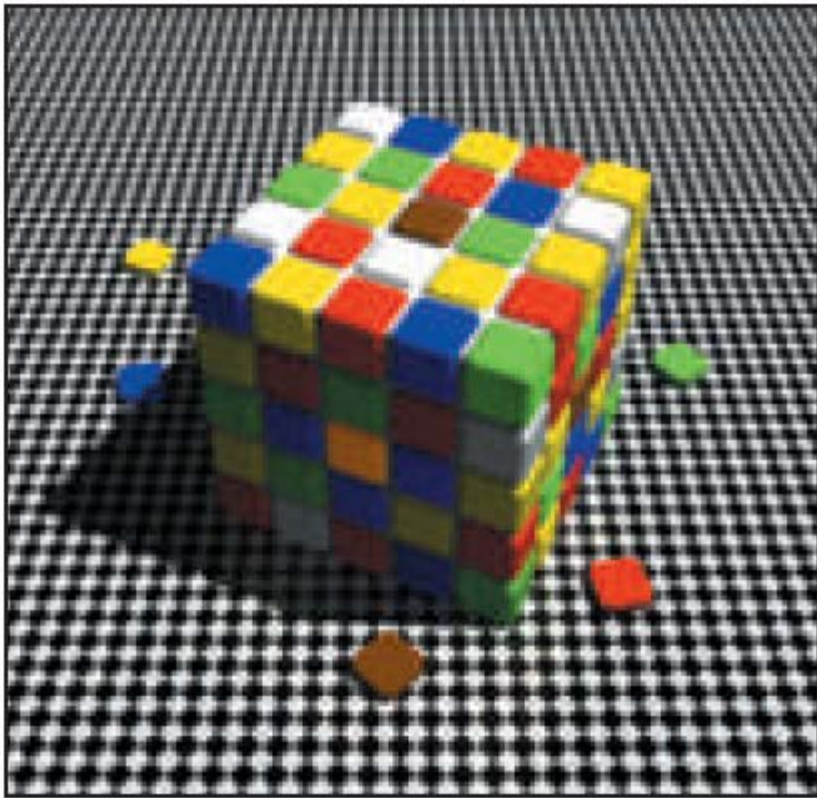
- Red-green color blindness
 - X linked

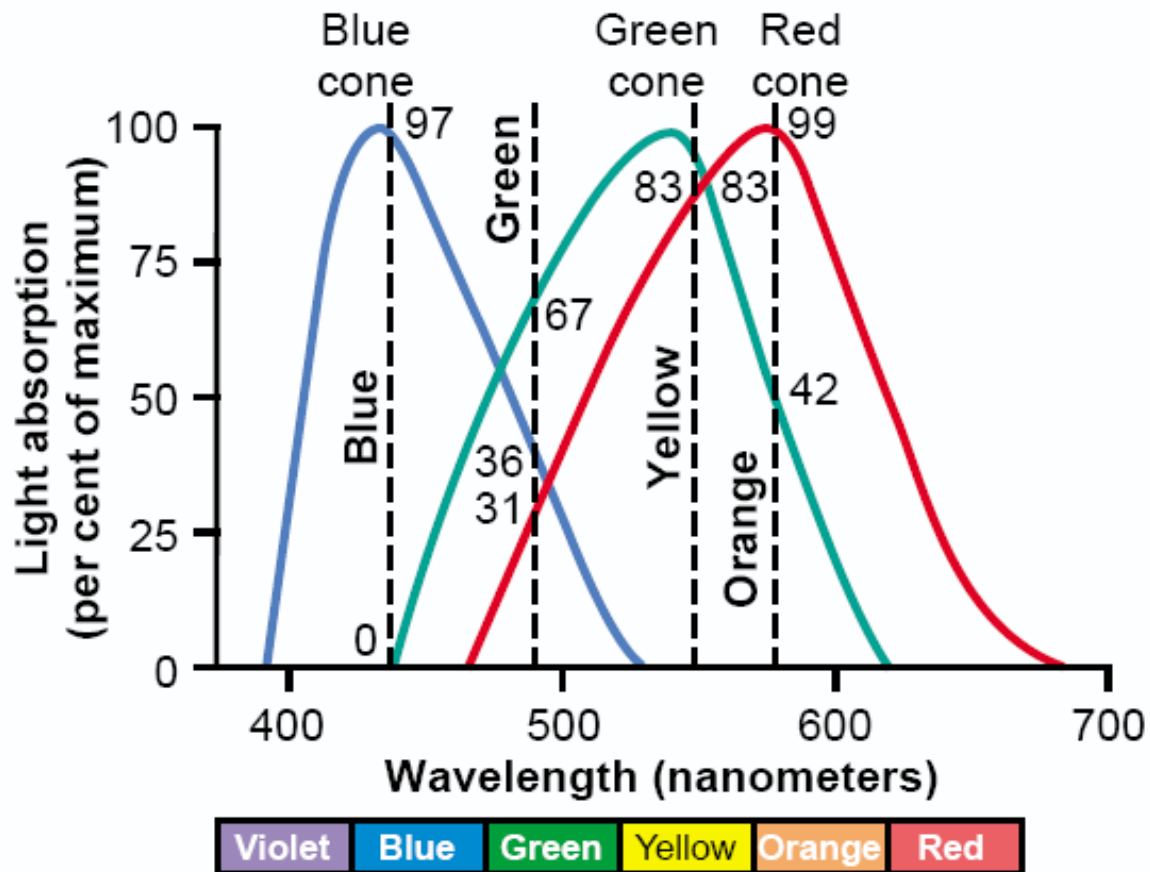
Color Blindness

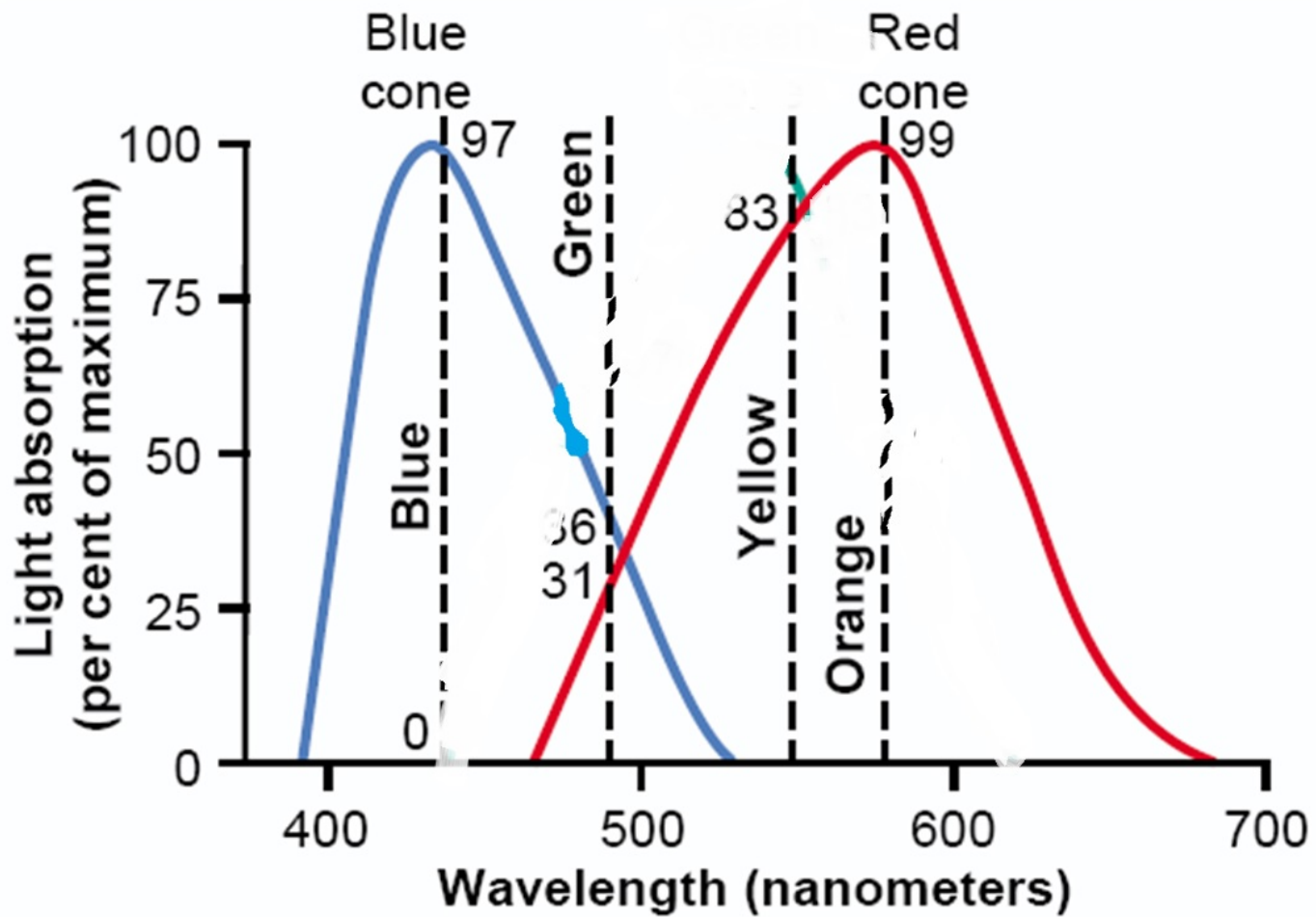
- Red-green color blindness
 - X linked
 - Deuteranope >>> green
 - Protanope >>> red

Color Blindness

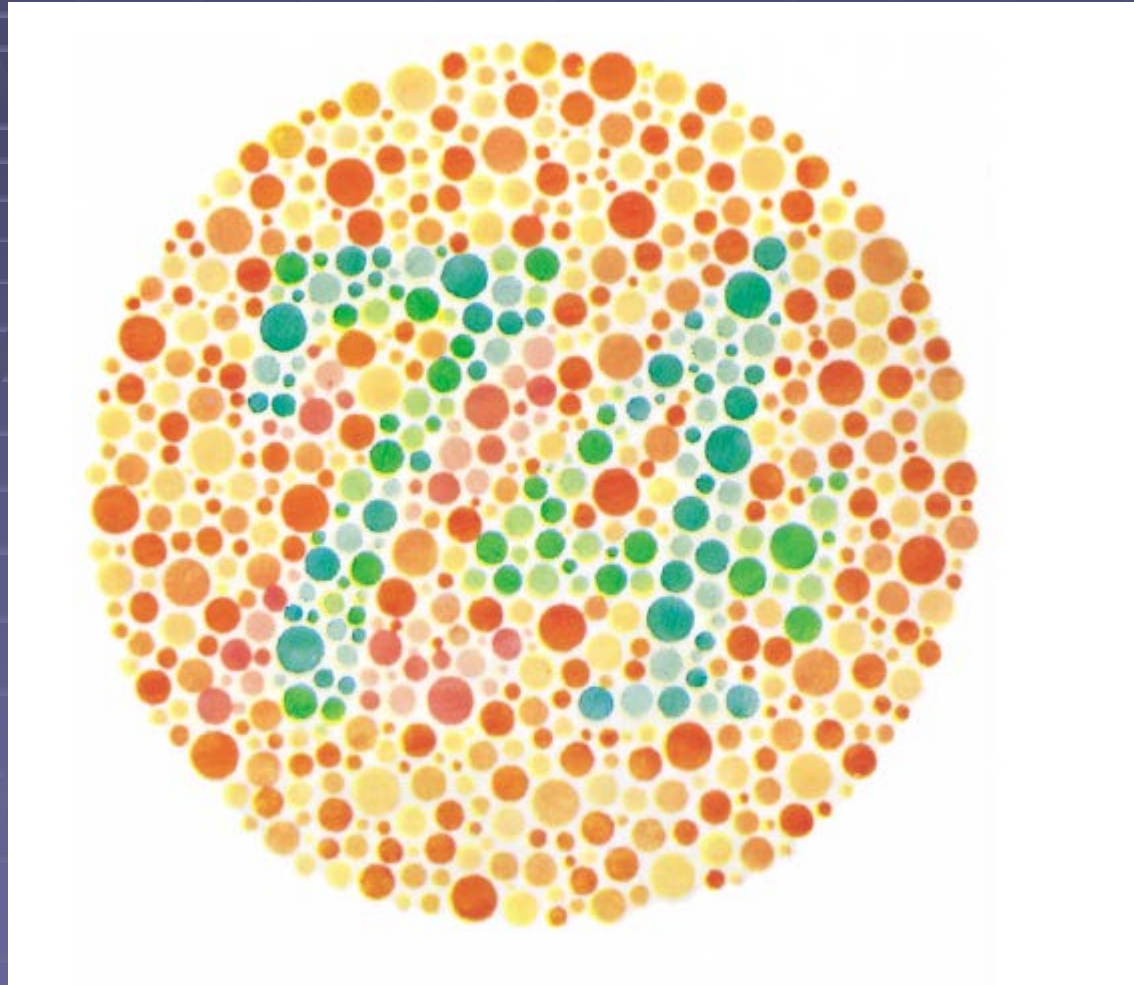
- Red-green color blindness
 - X linked
 - Deuteranope >>> green
 - Protanope >>> red
- Tritanopia >>> Blue Chromosome 7
- ***anomaly : shift in the spectrum of one of the proteins i.e. Deuteranomaly, Protanomaly, Tritanopia





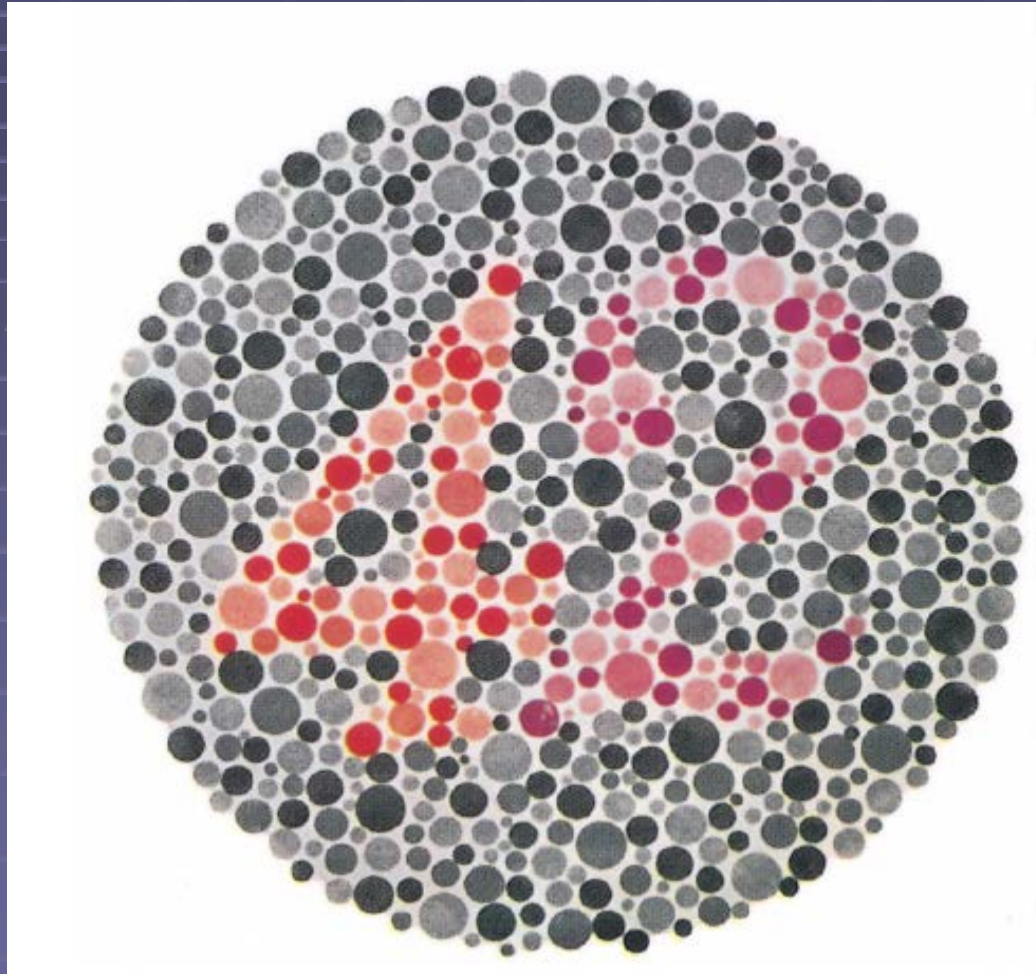


Color Test Chart



74 VS 21

Color Test Chart



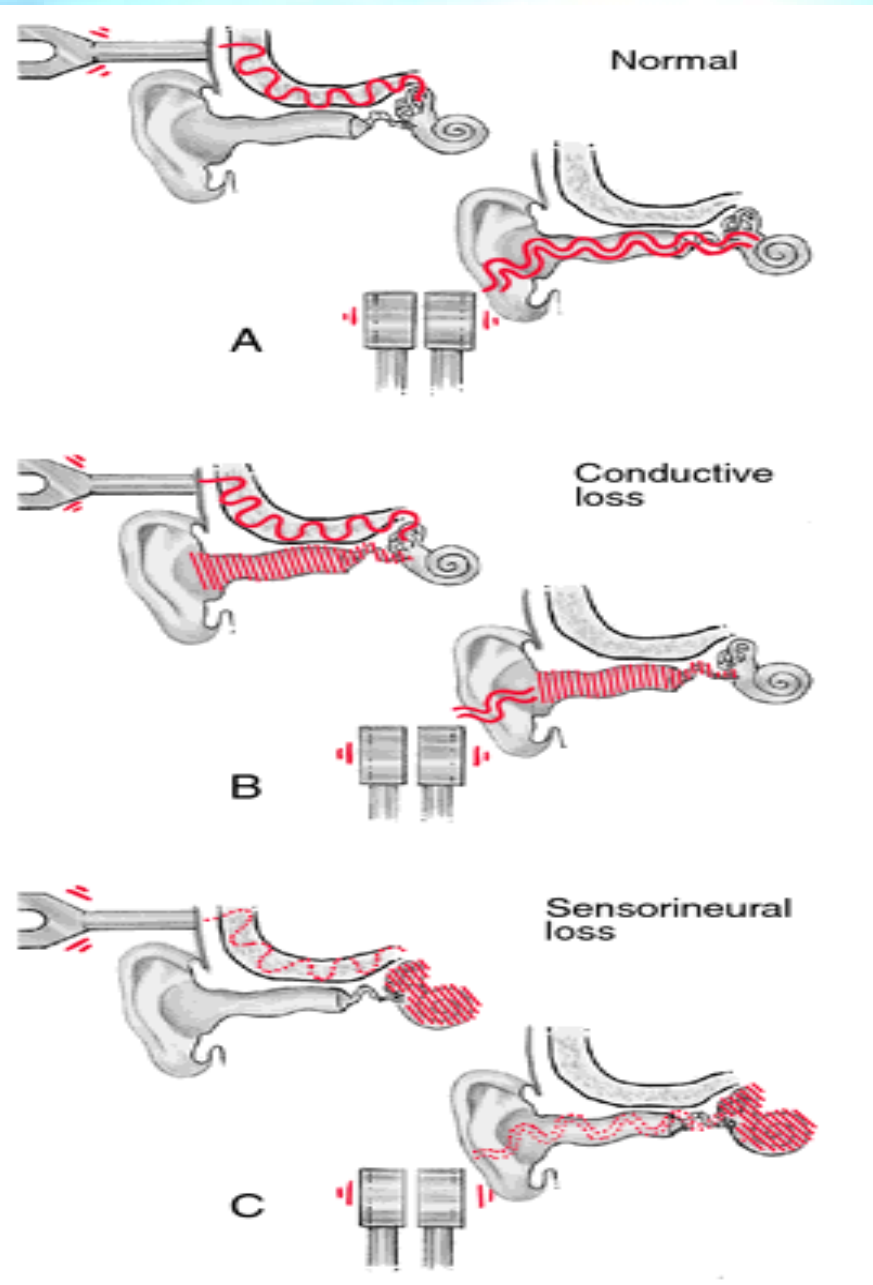
42 VS 4 "green" / 2 "red"

Color Blindness

Type	Prevalence
Deuteranomaly (green)	%4.63
Deuteranopia (green)	%1.27
Protanomaly (red)	%1.08
Protanopia (red)	%1.01
Tritanomaly (blue)	%0.02
Tritanopia (blue)	%0.03

Rinne and Weber Tests

Rinne's test



Weber's test

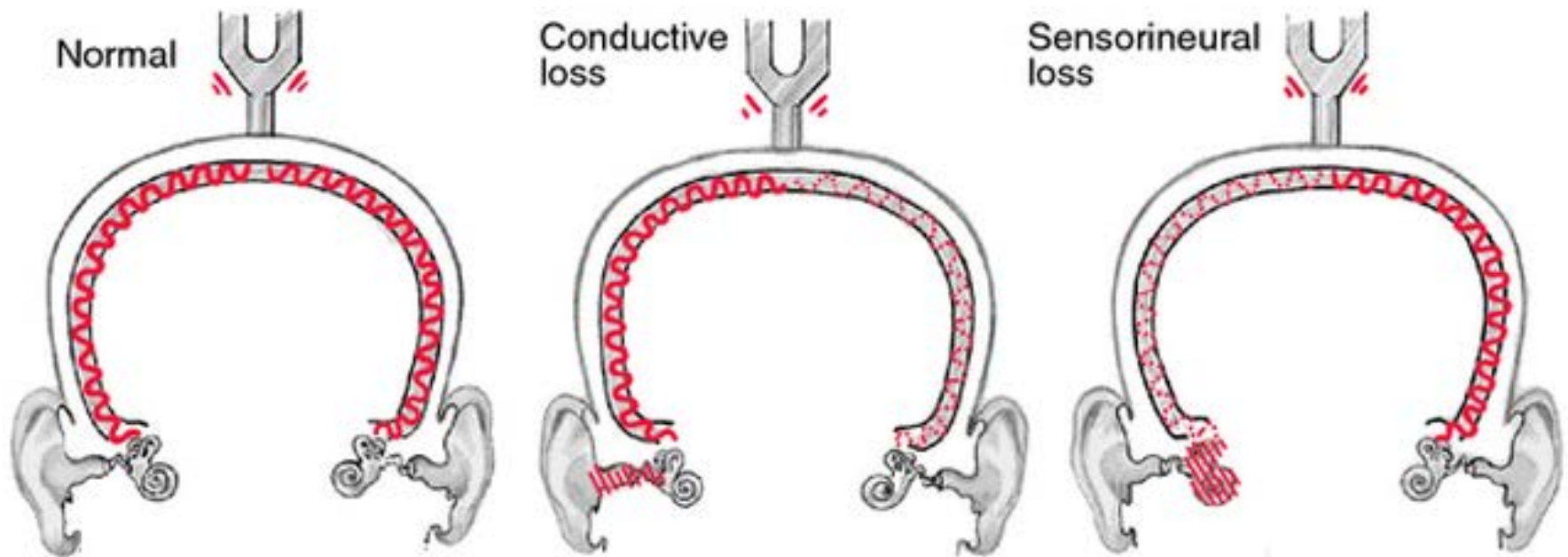
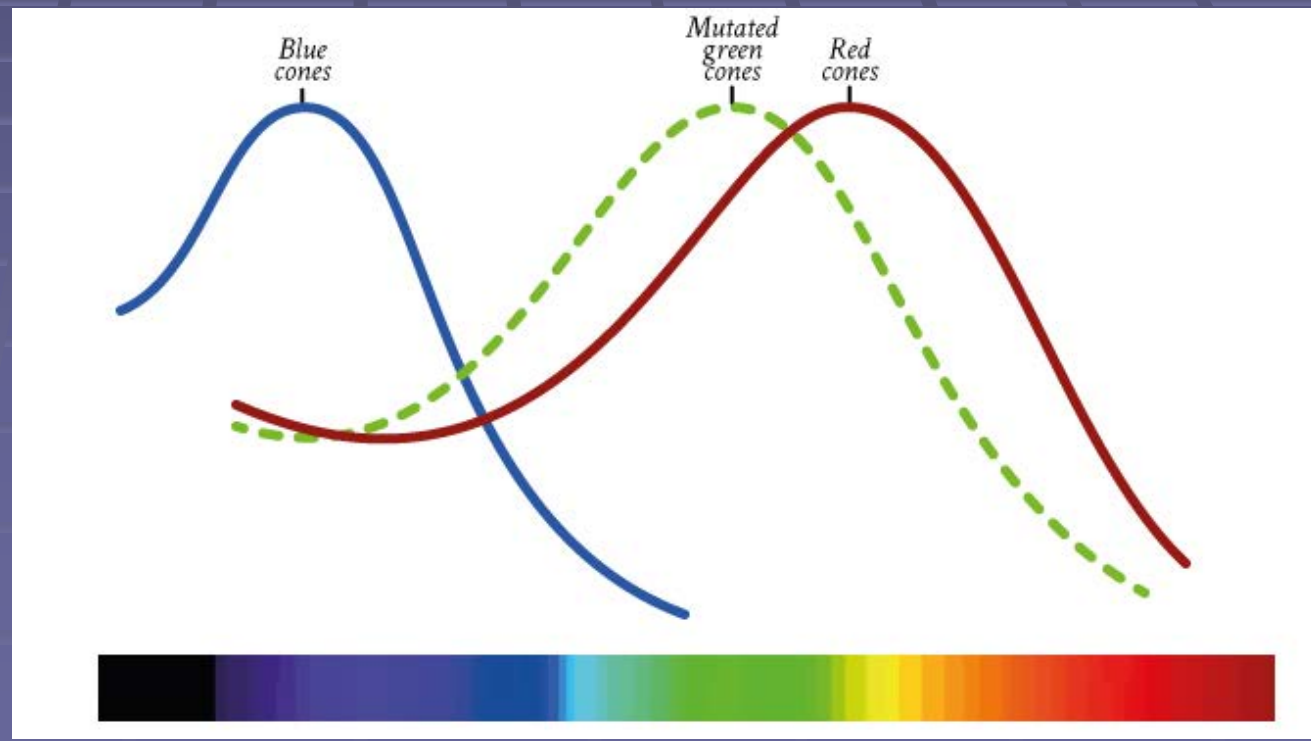
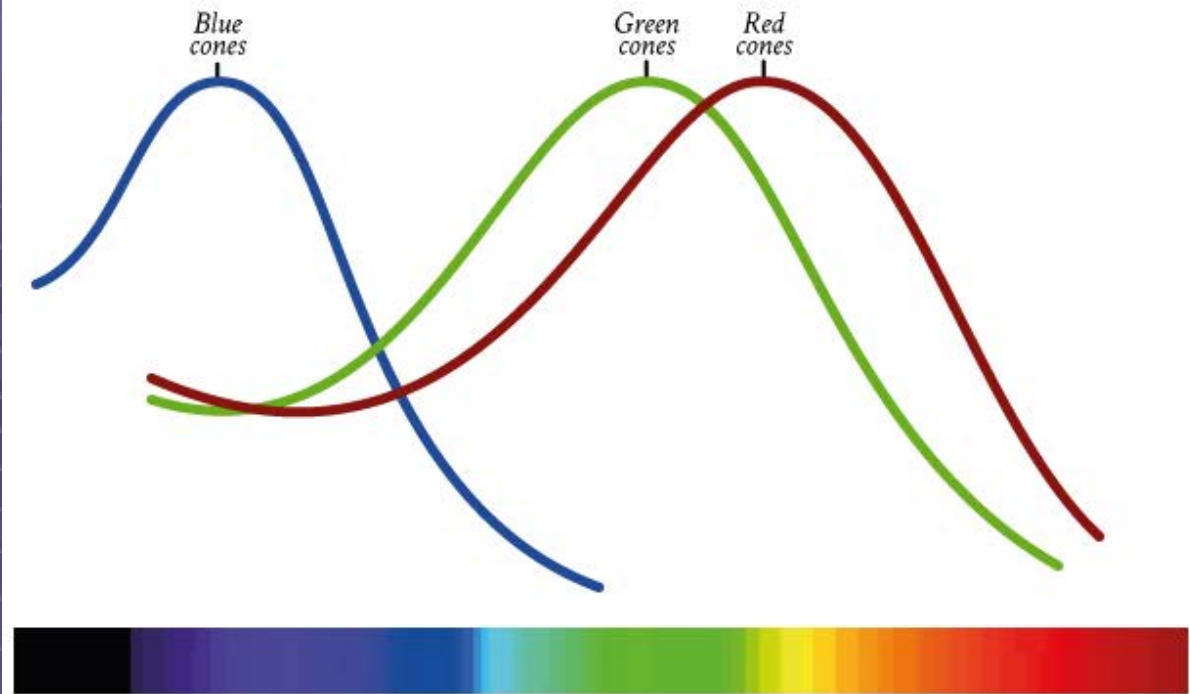
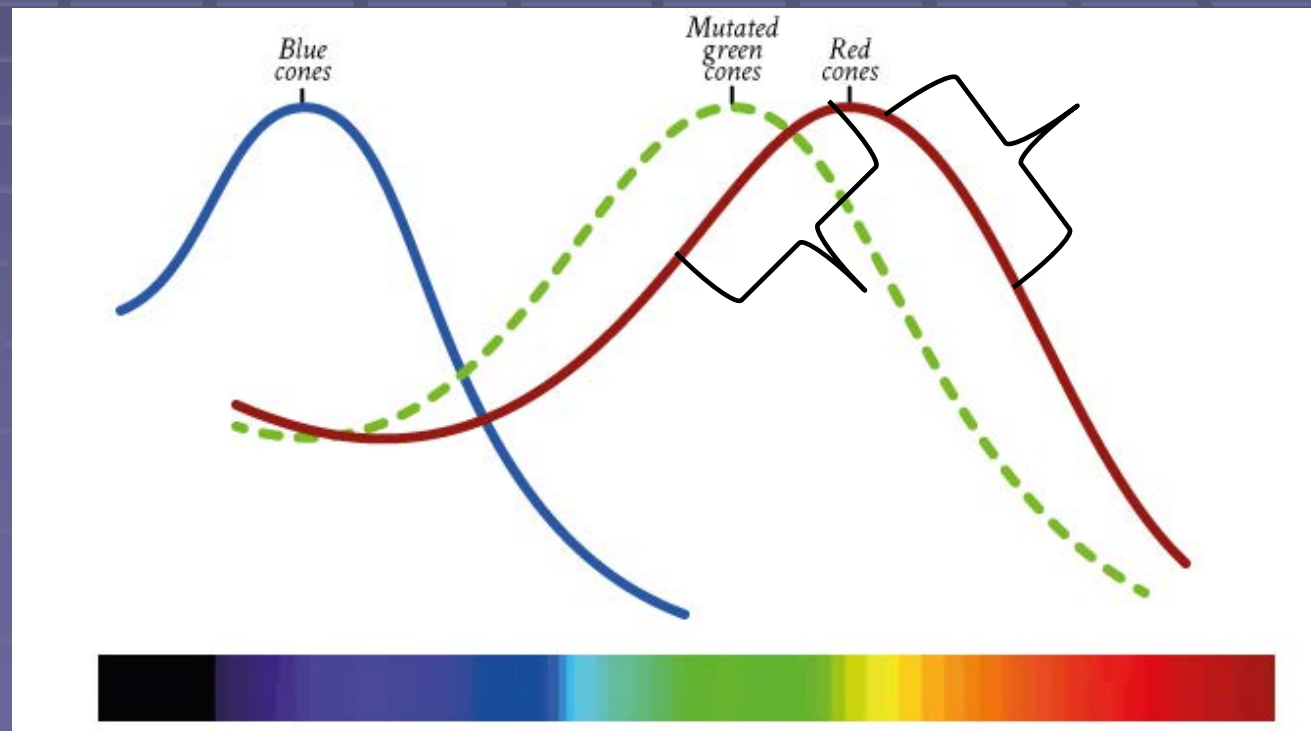
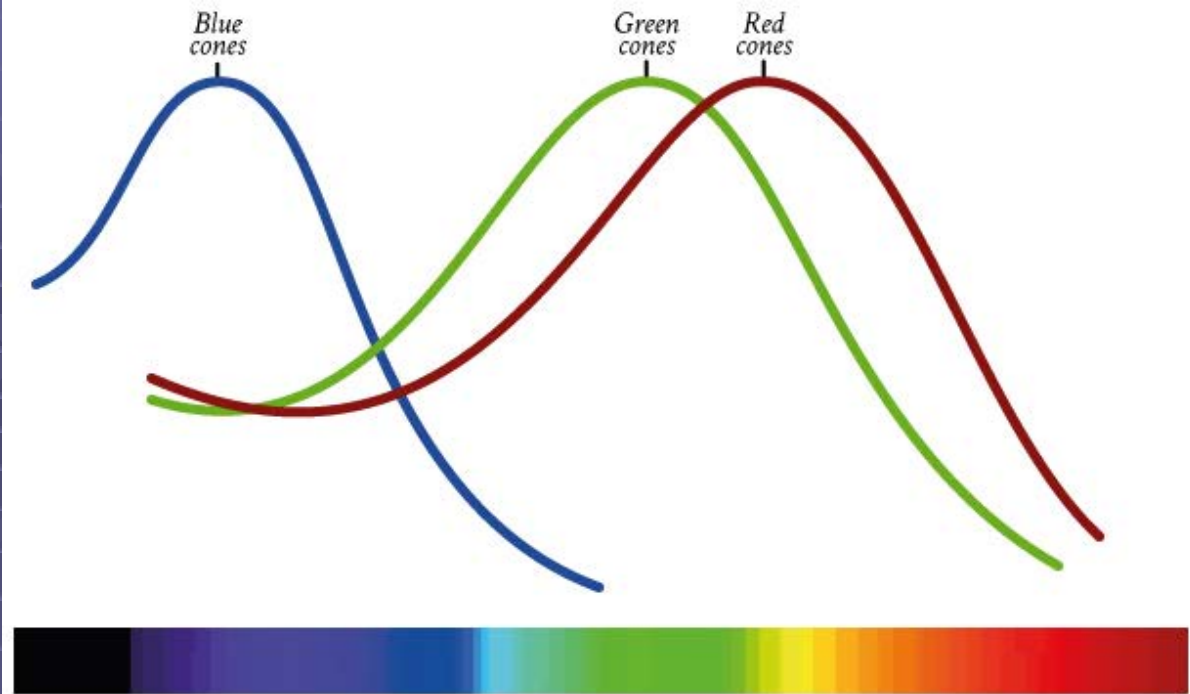


Table 13–1 Common Tests with a Tuning Fork to Distinguish between Sensorineural and Conduction Deafness.

	Weber	Rinne	Schwabach
Method	Base of vibrating tuning fork placed on vertex of skull.	Base of vibrating tuning fork placed on mastoid process until subject no longer hears it, then held in air next to ear.	Bone conduction of patient compared with that of normal subject.
Normal	Hears equally on both sides.	Hears vibration in air after bone conduction is over.	
Conduction deafness (one ear)	Sound louder in diseased ear because masking effect of environmental noise is absent on diseased side.	Vibrations in air not heard after bone conduction is over.	Bone conduction better than normal (conduction defect excludes masking noise).
Sensorineural deafness (one ear)	Sound louder in normal ear.	Vibration heard in air after bone conduction is over, as long as nerve deafness is partial.	Bone conduction worse than normal.





Type	Problematic colors
Deuteran (green)	Green/red, green/blue, green/gray, green/brown, blue/purple, orange/red, yellow/orange.
Protan (red)	purple/dark blue, orange/green, brown/dark green, red/brown, green/yellow, gray/purple
Tritan (blue)	blue/yellow, violet/yellow-green, red/red-purple, dark blue/black, yellow/white

