I. Light, The Human Visual System and Color

AP 187 Color Science Lectures

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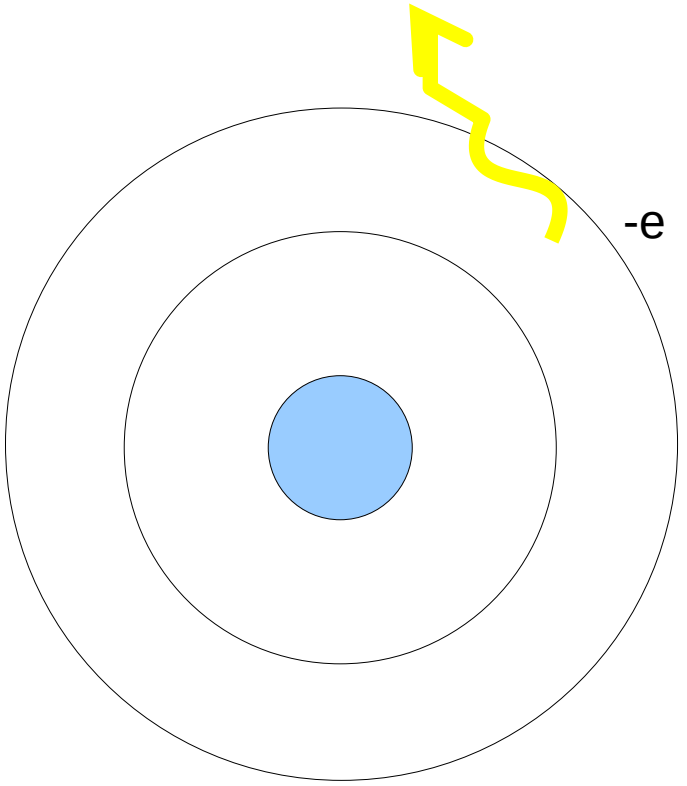
Outline

- Mechanism of Light Production
- Anatomy of the Human Eye
- Color and Spectra
- The Sensor Model
- Optical Laws
- Activity

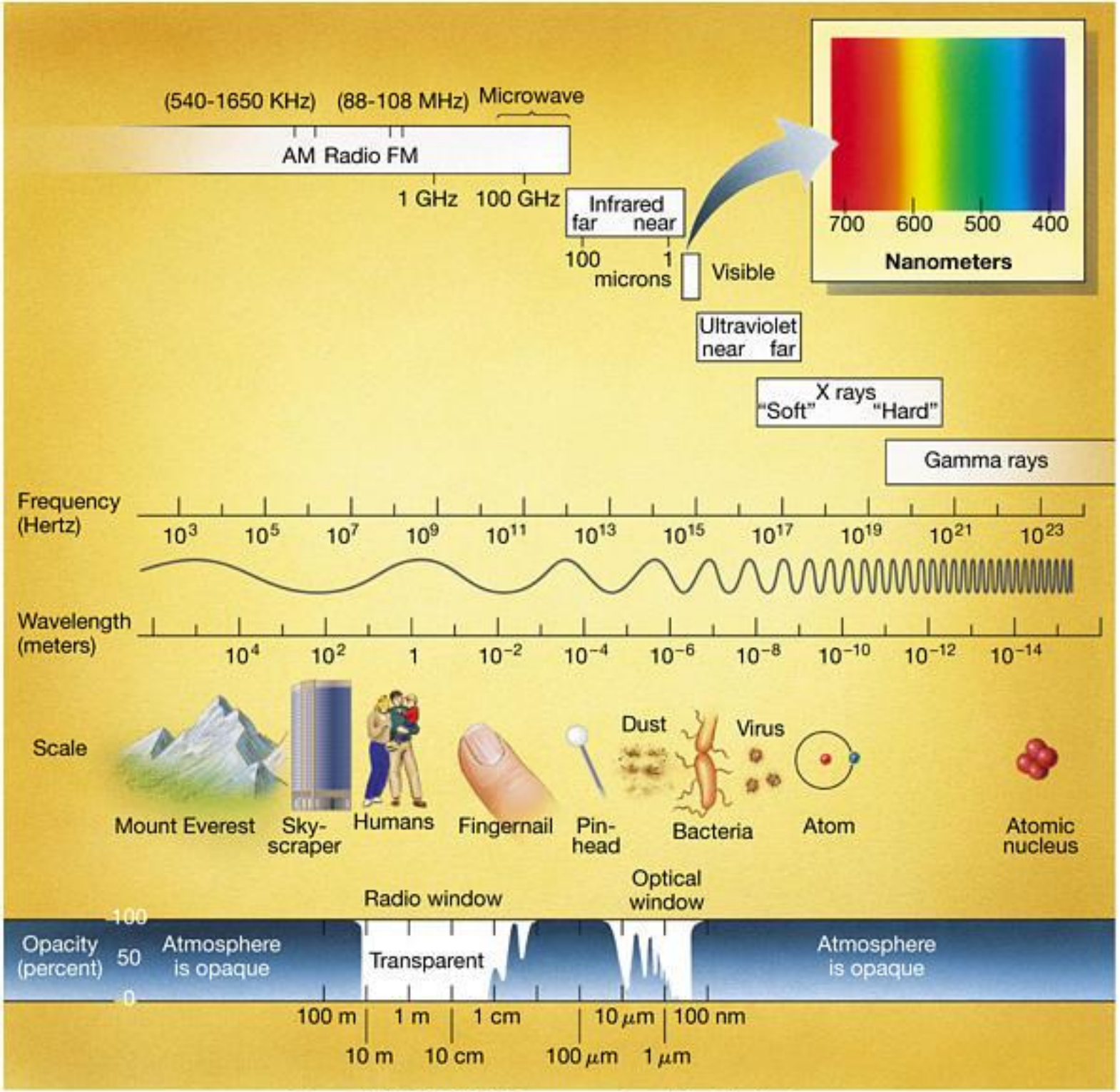
A. Mechanism of Light Production

- Moving electrons that slow down emit radiation



Electromagnetic Radiation

- Energy from the movement of charged particles.
- Gamma Rays, X-rays, Microwave, Ultraviolet, Visible Light, Infrared, Heat, etc,



EM Wave

- Wavelength
- Frequency
- Speed of light
- Speed of light in different media
- Power

B. The Human Eye

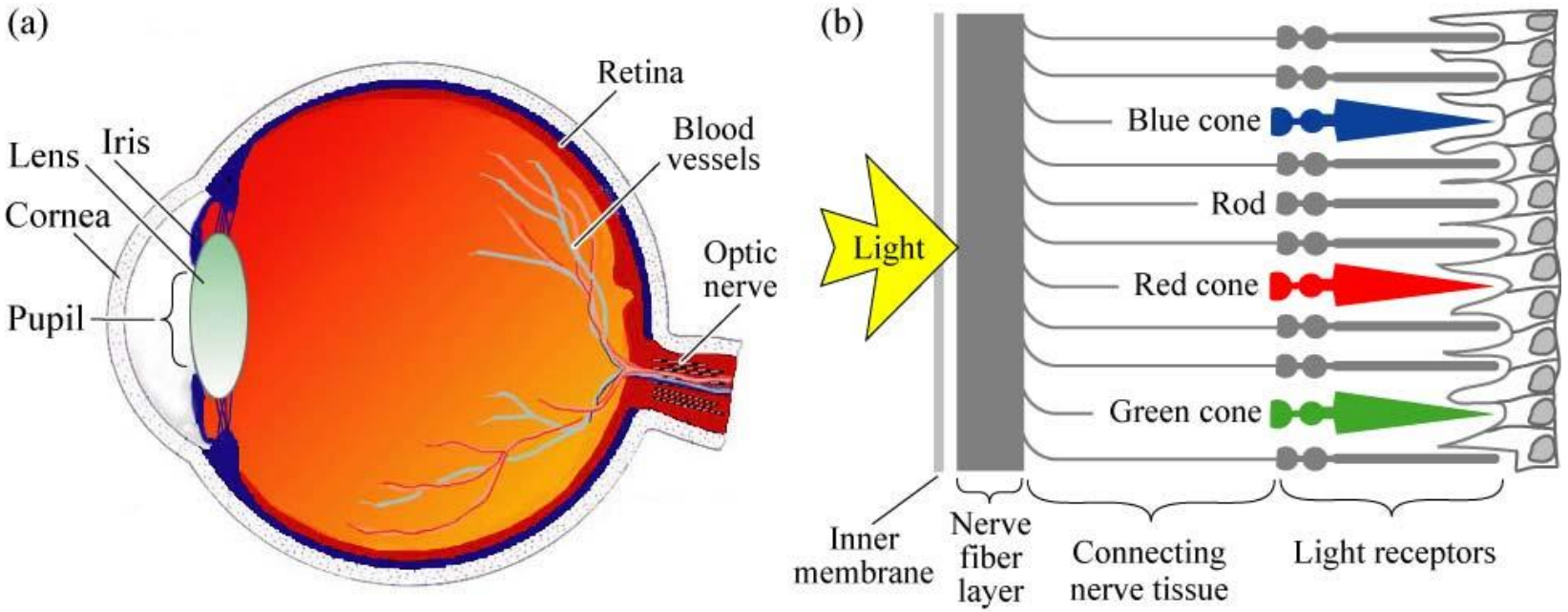
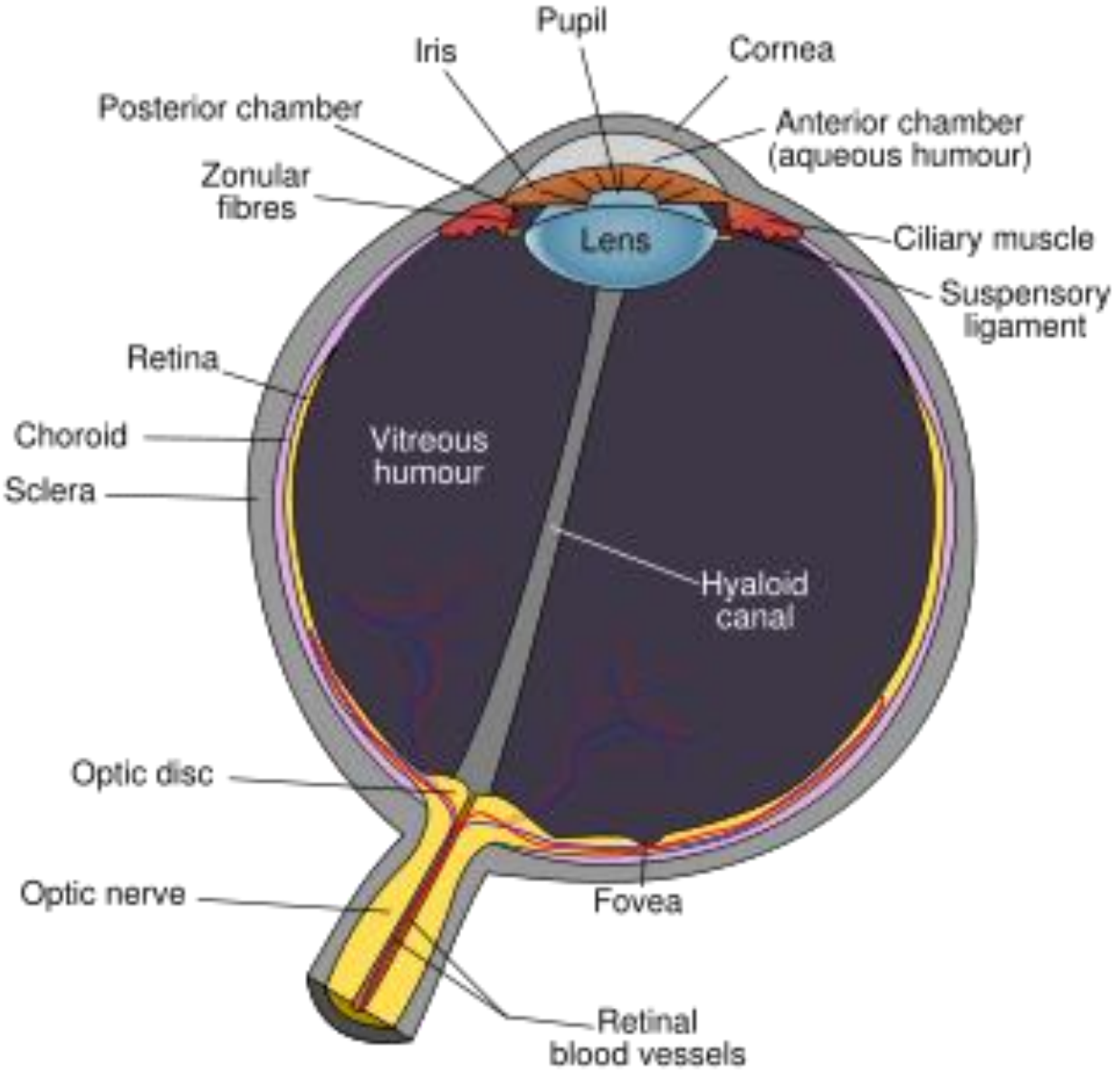


Fig. 16.1. (a) Cross section through a human eye. (b) Schematic view of the retina including rod and cone light receptors (adapted from Encyclopedia Britannica, 1994).


Pupil
Iris
Cornea
Posterior chamber
Anterior chamber
(aqueous humour)
Zonular
fibres
Lens
Ciliary muscle
Suspensory
ligament
Retina
Choroid
Vitreous
humour
Sclera
Hyaloid
canal
Optic disc
Optic nerve
Fovea
Retinal
blood vessels

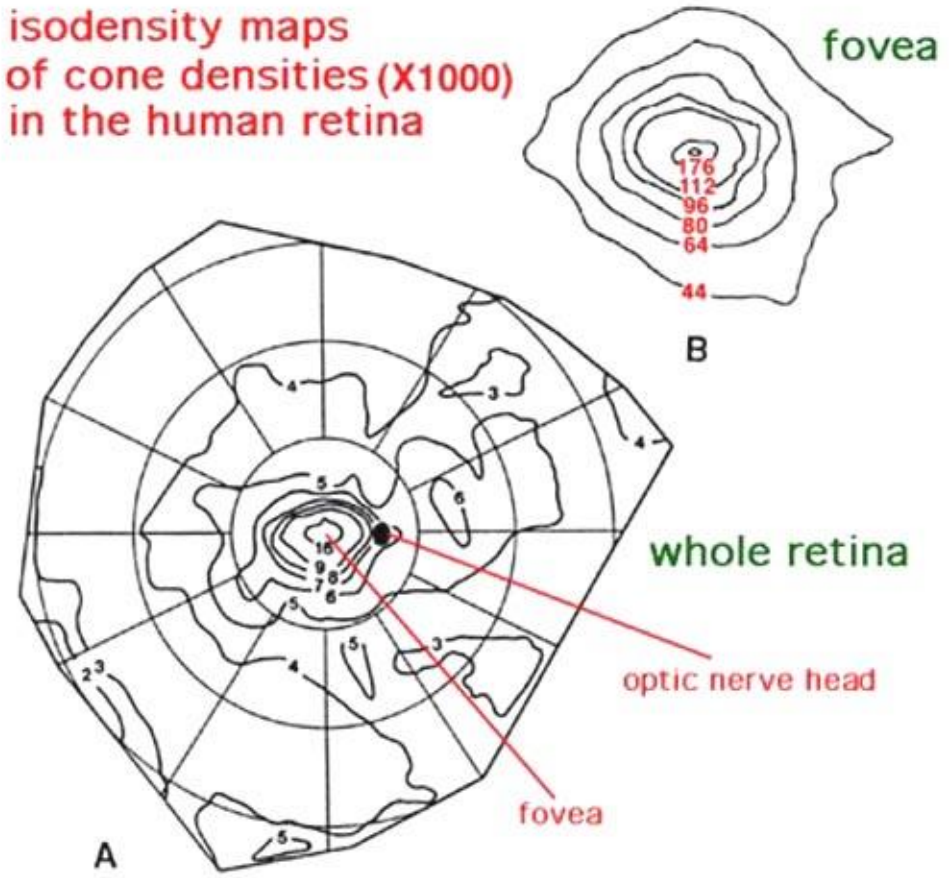
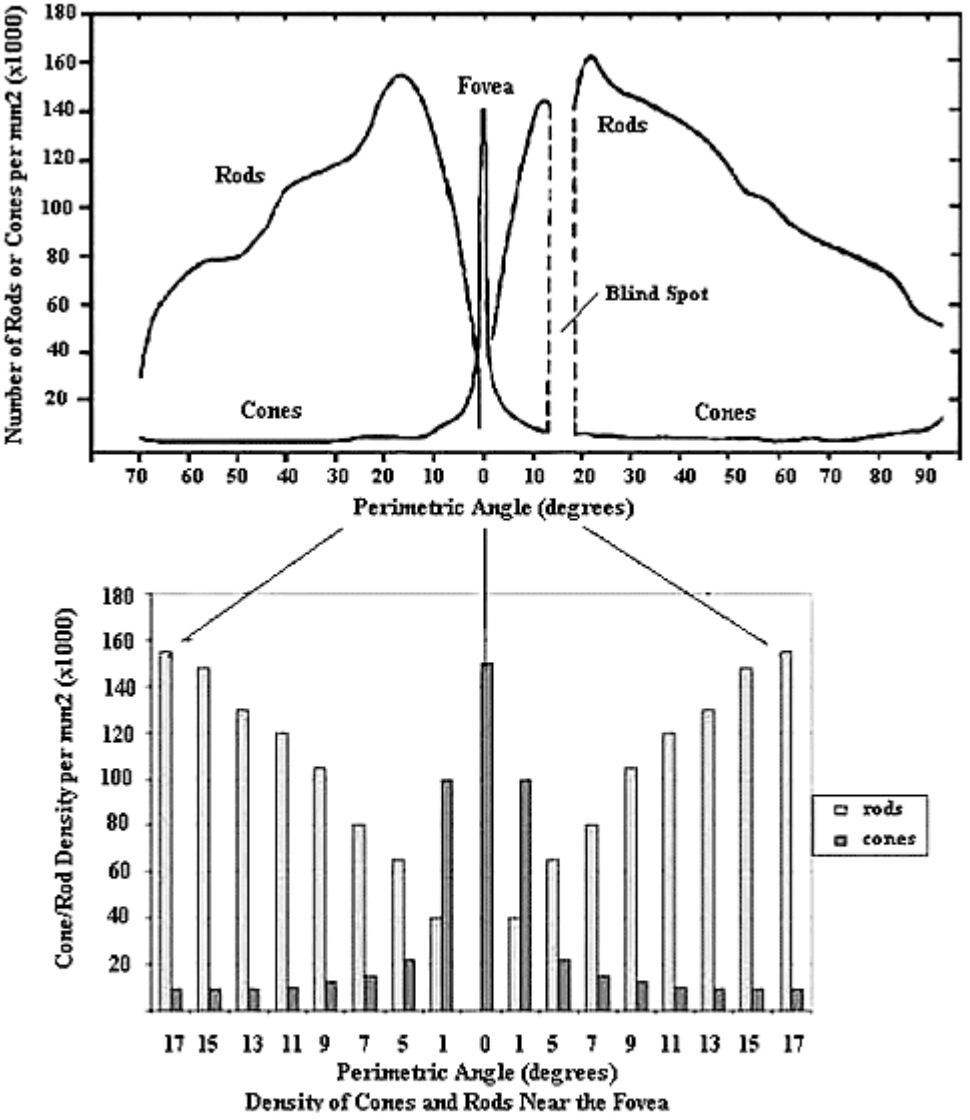


Fig. 21. Cone densities in human retina as revealed in whole mount. The foveal area is enlaged in B. (from Curcio et al., 1987).

Rod and Cone Distribution

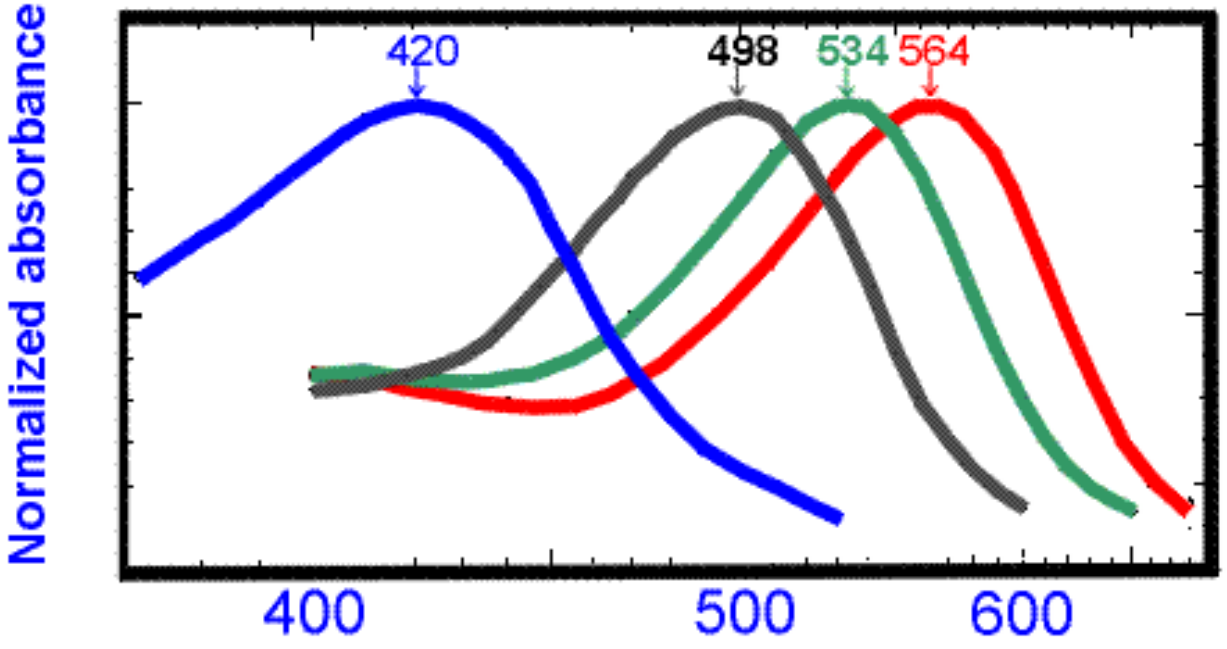


Distribution of Rods and Cones on the Human Retina

(From Osterberg,G."Topography of the Layer of Rods and Cones in the Human Retina", Acta Opthalmologica,Supplement, Vol. 6, 1-103, 1935)

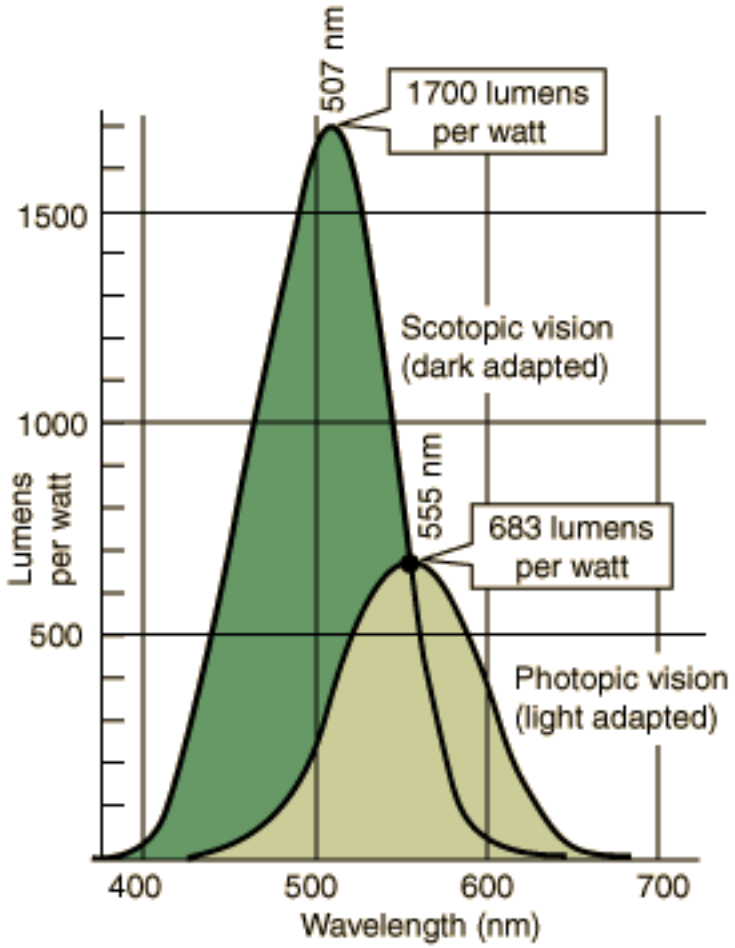
Figure 2

Spectral Sensitivity of Rods and Cones



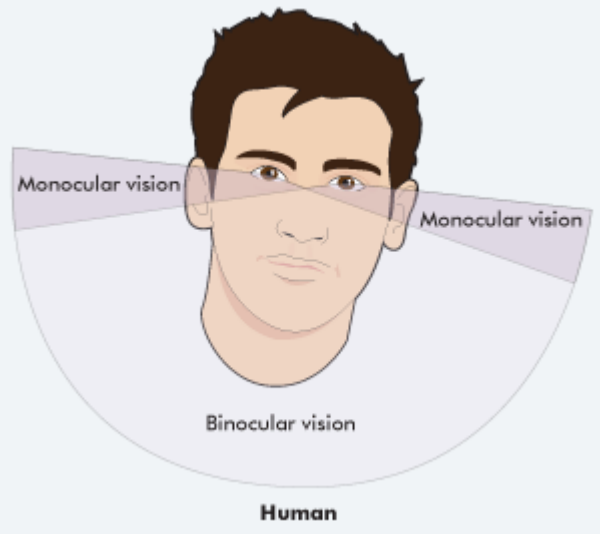
After Bowmaker & Dartnall, 1980

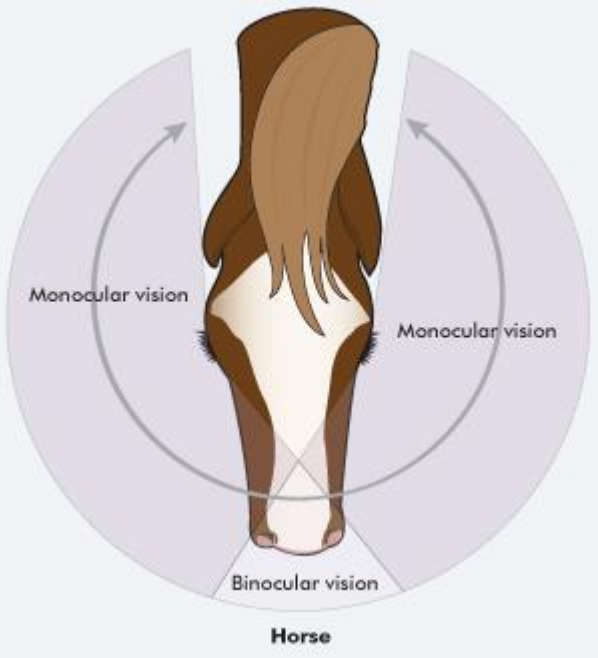
Photopic and Scotopic Vision



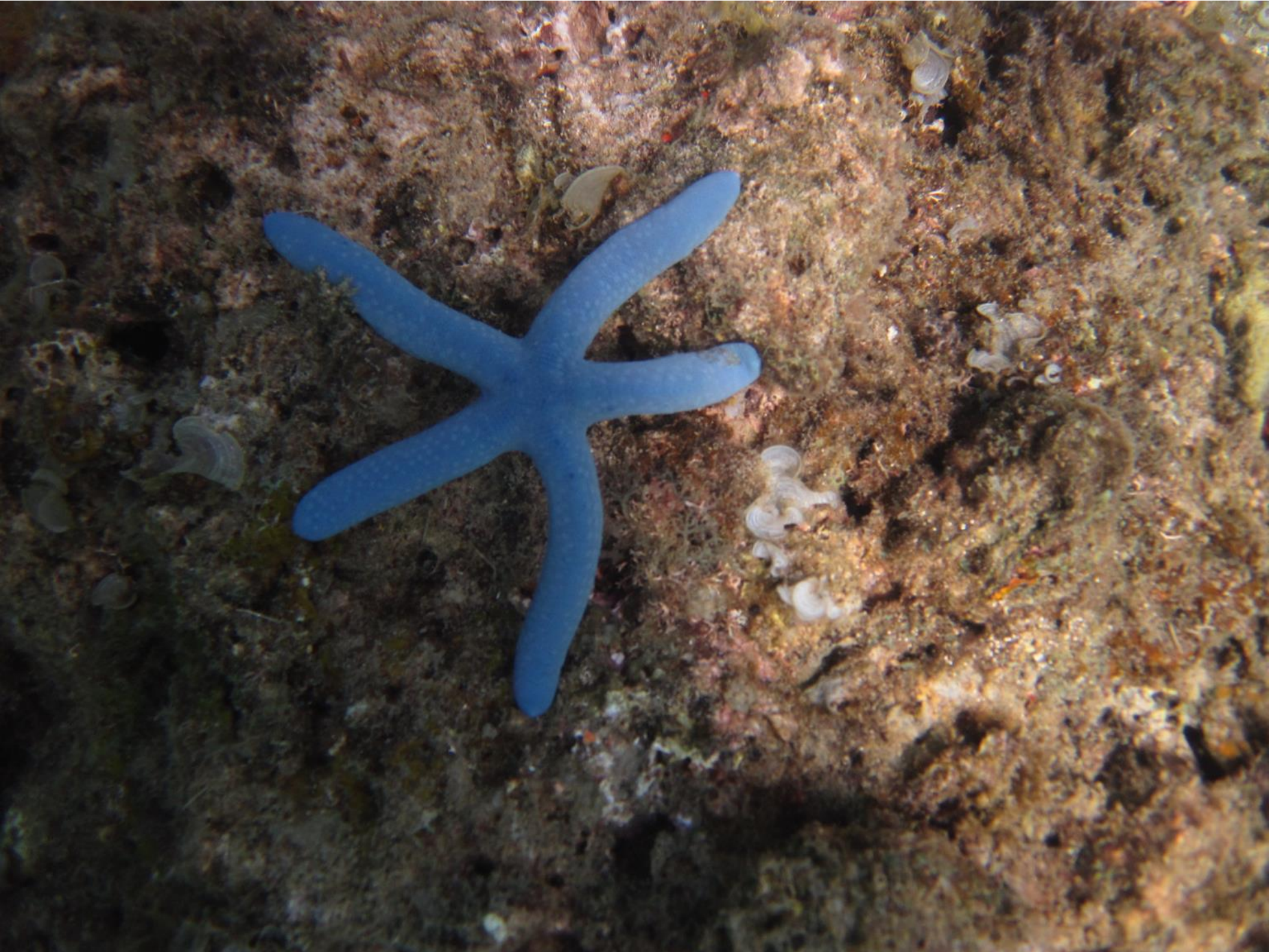
http://hyperphysics.phy-astr.gsu.edu/hbase/vision/bright.html

Binocular Vision





http://tle.westone.wa.gov.au/content/file/969144ed-0d3b-fa04-2e88-8b23de2a630c/1/human_b



Color and Spectra

- Color – sensation from visible radiation
- Spectrum – how much of each light wavelength is present.