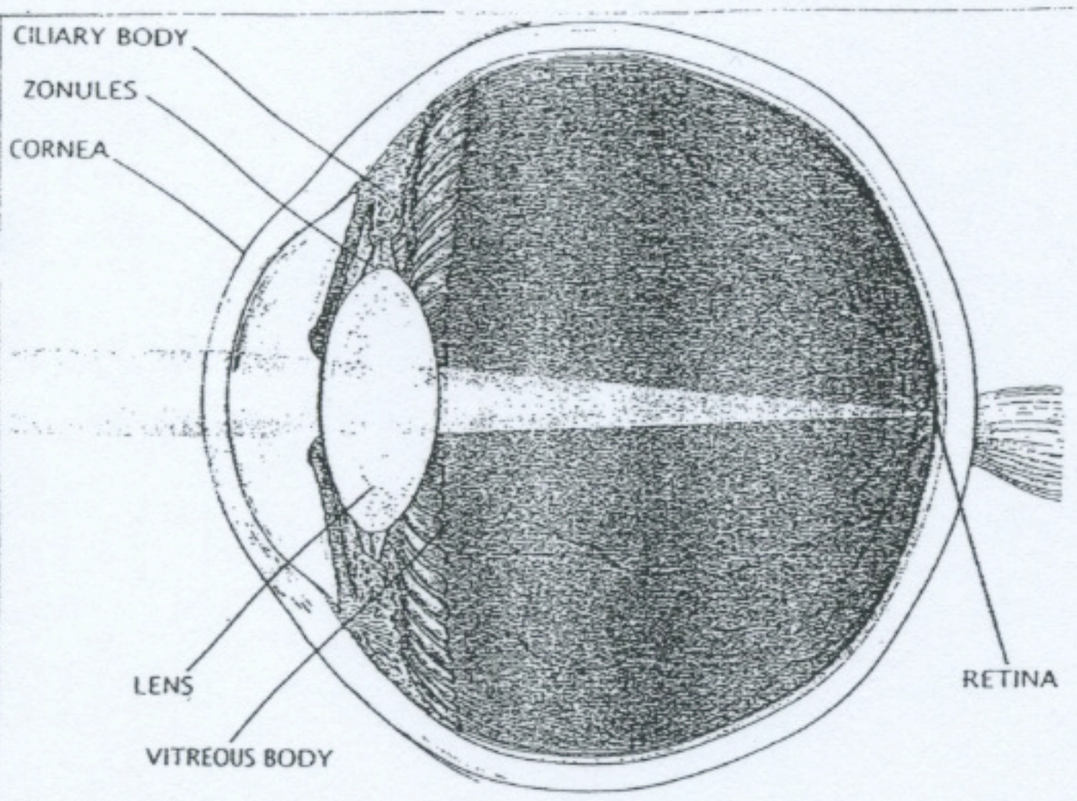
15a

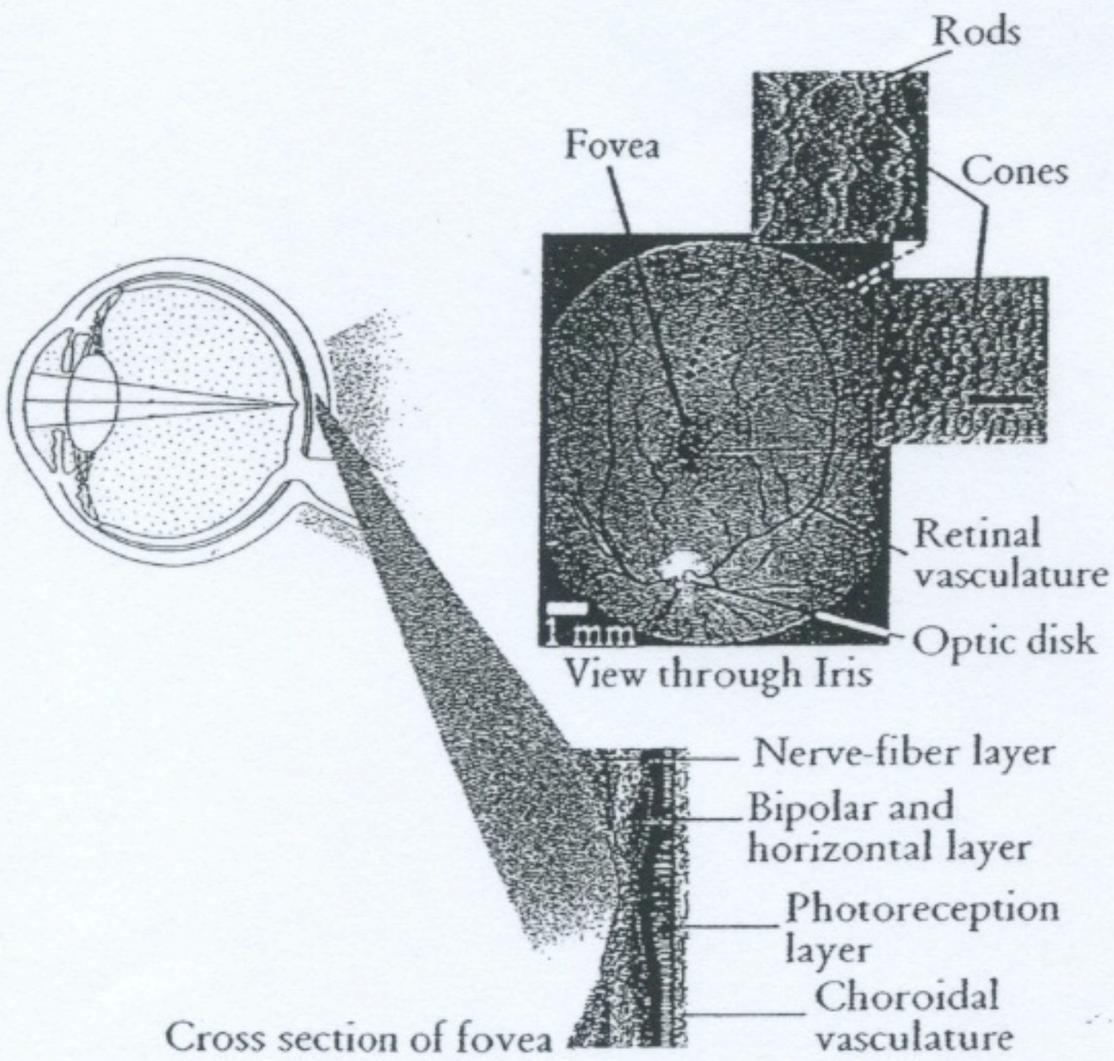
The Human Eye

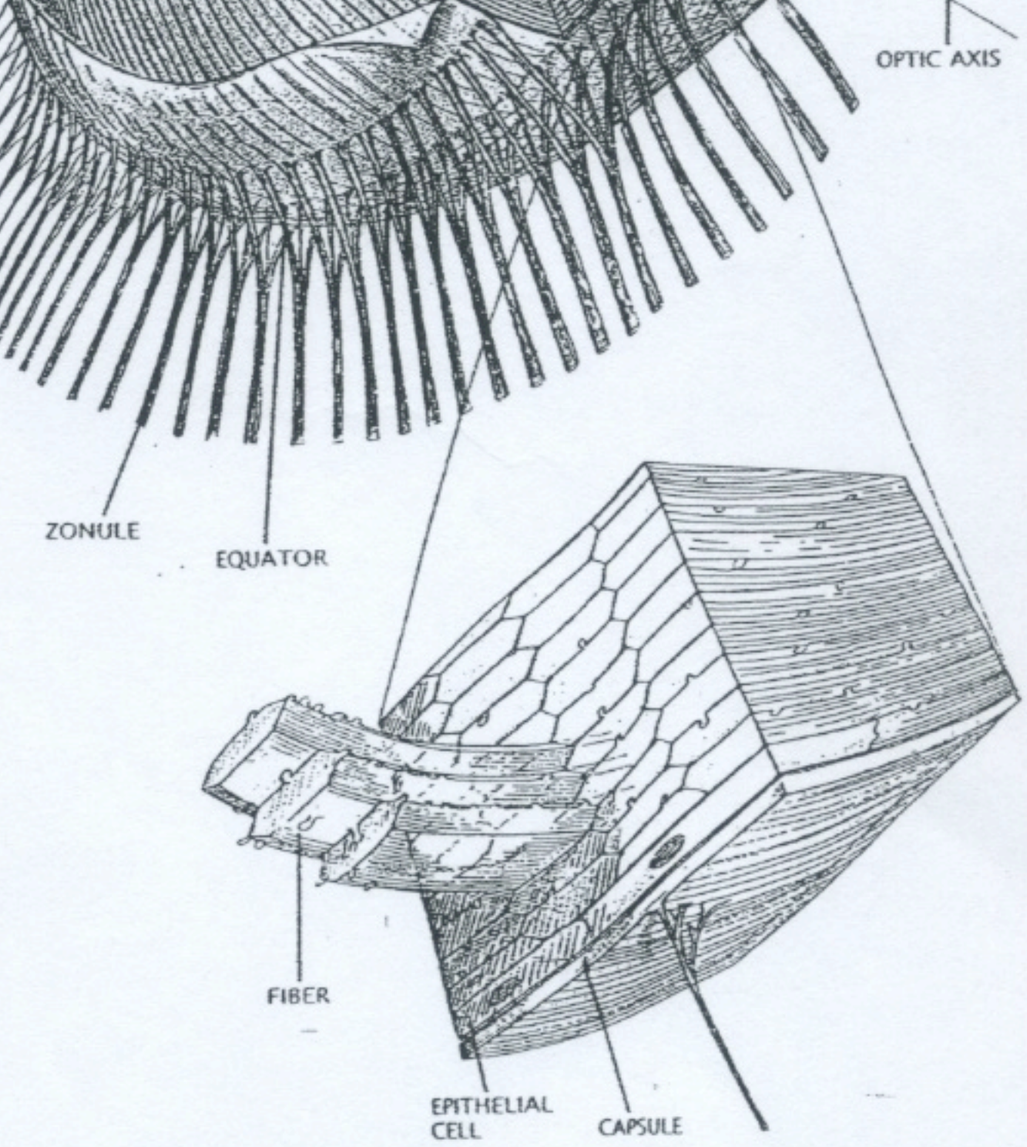
Optics



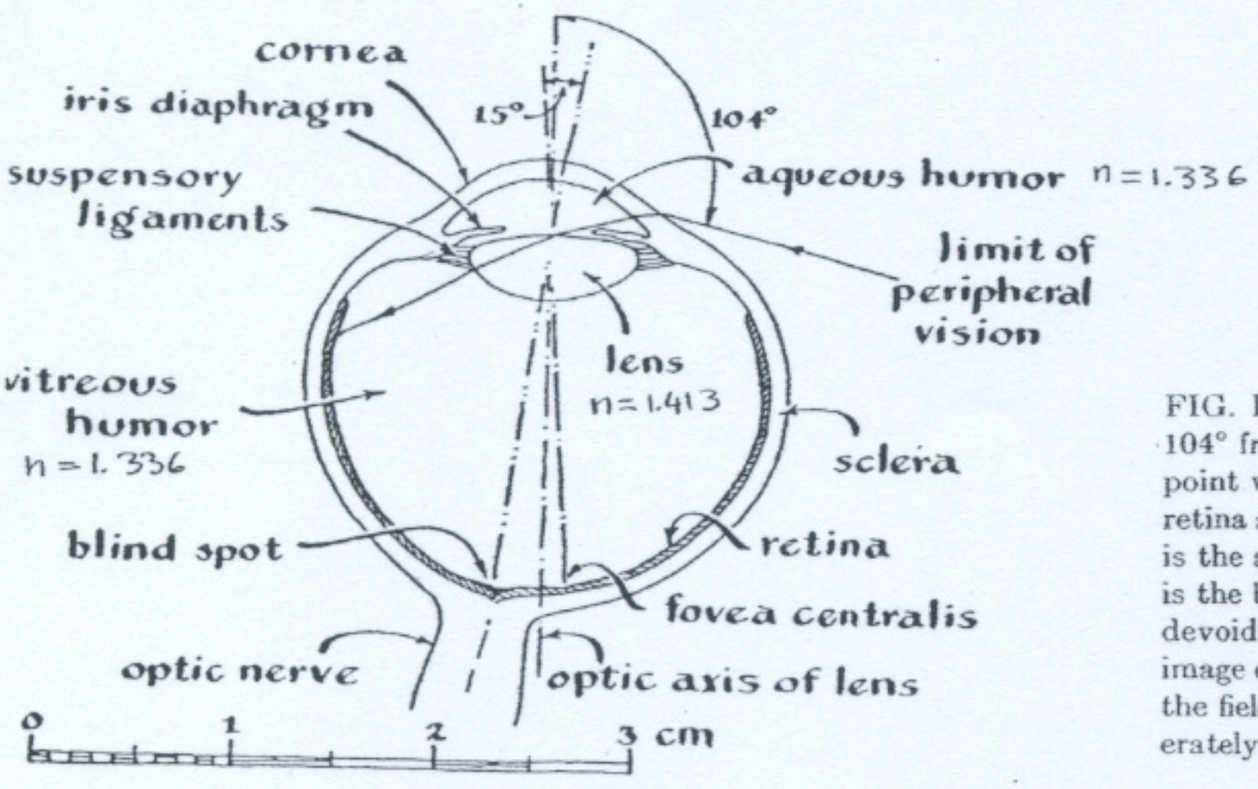

EYE FOCUSES on an object by refracting, or bending, the light (*cone*) reflected from the object so that the light rays converge on the retina. Nerve cells in the retina transform the light into electrical signals that are transmitted to the brain for interpretation. Light is bent at the front and back surfaces of both the cornea and the lens, but only the lens can accommodate. Excessive refraction causes light to converge in front of the retina and thus impairs distance vision, whereas insufficient refraction causes light to converge behind the retina and impairs near vision. A progressive decrease in the refractive nature of the lens and in the ability of the lens to accommodate is thought to undermine near vision in middle age.








Gullstrand's eye model.

FIG. I-8 Horizontal section of right human eye. The limit of peripheral vision is 104° from the optic axis of the lens system. The image is in sharpest focus near the point where the optic axis intersects the retina and deteriorates as the edges of the retina are approached. The fovea centralis, near the optic axis intercept on the retina, is the area of greatest sensitivity and resolution. About 15° away from the optic axis is the blind spot of the retina. This is the point of entry for the optic nerve, and it is devoid of any light-sensitive receptors. The iris diaphragm attempts to maintain an image of uniform brightness on the retina by opening and closing as the brightness of the field of view varies. It operates only at fairly high brightness and is then only moderately successful.