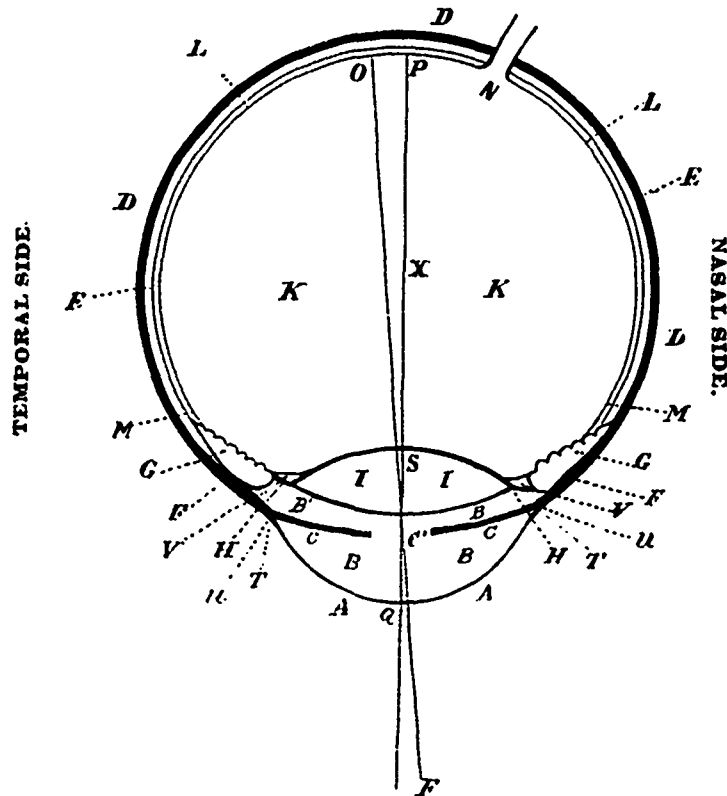


The Science of Optics.

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Horizontal Section of the Eye.

AA—Cornea. BB—Anterior chamber of the aqueous humor. BB'—Posterior chamber of the aqueous humor. CC—Iris. C—Pupil. DDD—Sclerotic. EE—Choroid. FF—Ciliary muscle and ligament. GG—Ciliary process. HH—Suspensory ligament of the lens. II—Crystalline lens. KK—Vitreous humor. LL—Retina. MM—Ora serrata, where the retina terminates. N—Blind spot; entrance of the optic nerve into the globe. O—Yellow spot—Macula lutea. P—The posterior pole. Q—The anterior pole. PQ—Imaginary line from back of eye through the centre of the cornea, called the optic axis. OR—Imaginary line from the macula lutea to the object looked at, called the visual axis. S—Nodal point, near the back of the crystalline lens, where the visual and optic axes cross each other. TT—The sclero-corneal margin. UU—The canal of Schlemm. VV—The canal of Petit. X—The centre of rotation.

Elementary Anatomy of the Eye.

The eyeball is almost a perfect sphere, with a segment of a smaller sphere projecting from it in front. The length, when normal, is nearly one inch. It is located in an orbit which is almost square, and about $1\frac{1}{2}$ inches deep. The orbit is thickly coated with a fatty tissue, which forms a cushion, against which the globe lies. The globe weighs about $\frac{1}{3}$ of an ounce.

COATS OF THE EYE.

DDD The sclerotic or white coat is a very tough membrane, which covers $\frac{2}{3}$ of the globe. It is perfectly opaque, and serves to keep the interior portions of the eye in place, and maintain the shape of the globe. The blood vessels of this coat are very small and scattered. The continuation of the sclerotic in front is

AA The cornea, which is round, perfectly transparent, covers the remaining $\frac{1}{3}$ of the globe, and is united with the sclerotic just as a watch-glass is let into the bezel of a watch, at the sclero-corneal margin TT. It consists of five layers—

the conjunctival epithelium, the anterior elastic, the true corneal, the posterior elastic, and the internal lining. The true cornea is itself formed of several laminae. The elastic layers seem to serve the purpose of preserving the proper curvature of the cornea. There are no blood vessels in this coat. The sclerotic is the wall, and the cornea is the window of the eye, and they constitute together the first tunic.

EE The choroid lines the inside of the sclerotic. It is a pigmented, extremely dark brown or black coat, and is thickly overlaid with blood vessels. It absorbs superfluous rays of light, and serves as a bed, on which lies the retina. It consists of three layers—the external or venous, the middle or arterial, and the internal or pigmented. In front the choroid branches into two, the continuation of the external layer being the ciliary muscle and iris, while the middle and internal layers become the ciliary processes.

FF The ciliary muscle forms a circular yellowish white fibrous band continuous with the choroid, and joining that coat to the iris at the sclero-

corneal margin. It lies over the processes, and consists of two sets of muscles,—anteriorly, the radiator or straight, and, posteriorly, the sphincter or circular. At the junction of the iris and ciliary, cornea and sclerotic is the canal of Schlemm.

GG The ciliary processes, 70 or 80 in number, lie behind the ciliary muscle, and consist of the fluting of the internal and middle layers of the choroid. They surround the crystalline lens, but are not attached to it. Within their folds and corresponding to them is the ciliary zone, or suspensory ligament of the lens.

CC The iris has two muscular layers—the dilator, which consists of radiating or straight fibres in front, and the sphincter, which consists of circular fibres behind. In the centre is a round opening called the pupil, C. The posterior layer is dark purple, and the anterior is of almost any color, from intensely dark brown to very light gray, and from this the name, which, means a rainbow, is derived. The iris is the curtain of the eye. The choroid, ciliary body, and iris, sometimes called the uveal track, constitute the second tunic.

LL The retina is a fine gray-colored tunic, which, although only $\frac{1}{2}$ th in. at its thickest, and $\frac{1}{10}$ th in. thick at its thinnest part, consists of seven layers. One of these layers is a direct continuation of the optic nerve, which enters the eye at N. Another, called Jacob's membrane, is arranged in rods and cones; this is the true perceptive part of the retina. The cones are thickest at O, the macula lutea, which is the most sensitive point of vision, and then gradually thin down until where the retina terminates at MM, the ora serrata, they are extremely scanty. The point N, where the optic nerve enters the eye, is devoid of rods and cones, and is insensitive to light, and so is called the blind spot. The retina is the third tunic of the eye.

HUMORS OF THE EYE.

BB B'B' The aqueous humor divided by the iris into the anterior and posterior chambers. This humor is so called because it is watery in its consistency, and freely gives to the iris, which expands and contracts within it, also to the encroachment of the crystalline lens when accommodating.

K The vitreous humor occupies the greater part (four-fifths) of the eyeball, and derives its name from glass. It is a comparatively hard and jelly-like substance, which does not alter its shape, and it keeps the eye in its spherical form. It is enclosed in a capsule called the hyaloid membrane, which gives off as a branch the suspensory ligament of the lens.

I The crystalline lens is situated behind the iris and between the aqueous and vitreous humors. It is very transparent, and is formed in concentric layers, somewhat like an onion; these are at the centre considerably harder than on the outside. The lens has a spring-like tendency enabling it to alter its form, which