Ophthalmoscope Encyclopedia Article

Ophthalmoscope

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Ophthalmoscope

An ophthalmoscope enables a physician to examine the interior of the eye by directing a tiny beam of light through the pupil, the black "window" of the eye. Using the ophthalmoscope, the physician can look through the pupil to detect any abnormalities or pathological changes that could signal disease.

The first ophthalmoscope was invented by Charles Babbage, an English mathematician, in 1847. He gave the device to a physician for testing, but it was laid aside and forgotten. Four years later, German physician and physiologist **Hermann von Helmholtz** (1821-1894), unaware of Babbage's invention, developed his own version of the ophthalmoscope. Because he had better luck making his device known, Helmholtz is often credited as the sole inventor. Helmholtz's instrument operated by using a mirror to shine a beam of light into the eye. The observer would look through a tiny aperture attached to the mirror. Helmholtz eventually found that looking through the retina into the back of the eye only produced a red reflex; consequently, he attached a condenser lens to obtain an inverted image, which was then magnified five times. He called this combination of a mirror and condenser lens an indirect ophthalmoscope. It was used regularly for eye examinations until 1920. Helmholtz also invented the ophthalmometer, which was used to measure the curvature of the eye; studied color blindness; the speed of nervous impulses; and physiological acoustics; and wrote the classic *Handbook of Physiological Optics.* Swedish ophthalmologist, **Allvar Gullstrand**, who also studied physiological optics, developed another version of the ophthalmoscope and invented a slit lamp used with a microscope that enabled a physician to locate foreign bodies in the eye.

The modern ophthalmoscope is a hand-held instrument containing a small battery-powered lamp that directs the beam of light into the eye of a patient by way of a mirrored prism. The observer looks through a tiny hole in the prism and the instrument, which can be focused by a series of revolving lenses, magnifies the image. The lens needed to focus the image gives an approximation of the spectacle lenses needed to correct the patient's vision. A new type of ophthalmoscope that can project a laser beam is used in eye surgery to correct a detached retina. Another, larger type of ophthalmoscope, called the binocular ophthalmoscope, is used in clinical research and provides an image of the eye that is magnified fifteen times.