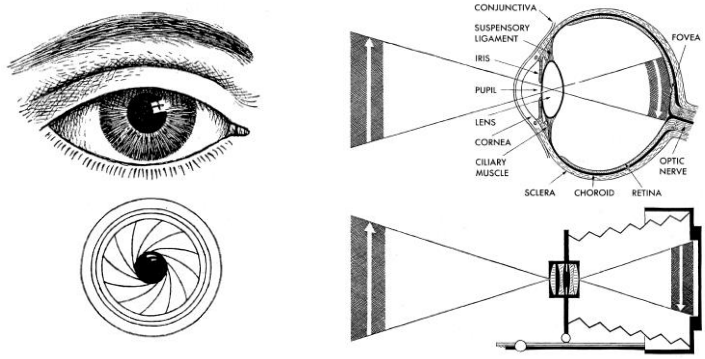
SIMILARITIES EXIST WITH EYE AND CAMERA

The mention of a pinhole camera was published in a series of manuscripts published about 1012 AD by al-Haythom (Alhazen) *"BOOK OF OPTICS"*. Alhazen became known as the father of modern optics. Other works were published in the 5th century of the effect of inverted forms projected through a pinhole. Misconceptions continually held back understanding of the eye and the pinhole camera. Understanding of their optics therefore followed completely independent paths of research and development into basic physics and chemistry.

In the 1930's understanding of vision and lighting for pilots in the cockpit for navigation was very limited. As aircraft became more sophisticated, the need for monitoring during poor weather and night time flying increased. The first significant lighting system consisted of ultraviolet (UV) light (also called black-light) used to reflect the luminescent paint of the indicia. During WWII the cabin of the aircraft would be darkened to cancel the planes presence to enemy forces while the UV light would show only the glow of the instrument panel indicia. This method was found to be unacceptable due to the type of luminescent paint used to mark the indicia of the control panel in the crew cabin that could cause a form of radiation sickness for pilots flying long missions of up to 15 to 20 hours.

Recommendations made by H.K. Hartline in the 1940's provided the research that proved that red-lighted instruments were readable in low-light levels and the human retina is almost totally insensitive to red. The red lighting became the standard for military aircraft and some nonmilitary aircraft until the introduction of night-vision goggles, multicolored CRT displays and active-matrix LCD displays. These are found to be incompatible with red lighting. Red lighting does not provide the adaptation for these new visual devices due to its color so pilots may have difficulty discriminating between some colors on the colored displays. Blue-white, blue-green lighting and white lighting is now recommended according to an early 1990's Aerospace Lighting Institute guideline for selecting lighting systems based on color. These new developments in lighting components are changing the way we see. www.rcavionics for all things, Avionics.

Nobel Prize recognition in 1967 was awarded to George Wald for his work on the biochemistry that allows eyes to see. Wald detected vitamin A in the retina of the eye and showed it to be a component of the rhodopsin pigment in the retinal photo-detectors called rods. This work provided information for Wald to measure which frequencies of light will energize each of the photo-detectors. Other receptors of the retina are cones. Cones are receptors that provide vision in bright light or color and rods provide vision in dim light. The single lens of the eye cannot bring light of all colors to a focus at the same point. The human eye can only see light in the spectrum of color 380nm to 750nm in wavelength. *Scientific America Nobel Prize III*

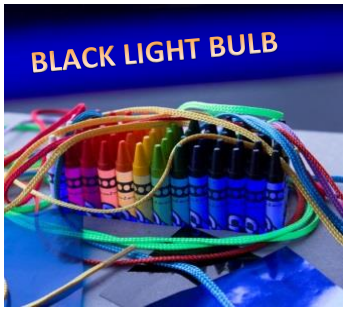


Relationship of the eye and the camera *has advanced far beyond optics of the simple pinhole camera device and inverted image in a dark chamber to an understanding of how the eye and its chemistry converts frequencies of light energy in the chamber of the eye with the use of a single lens and light receptors that detect images of the full human visual spectrum of color.*

BLACK LIGHT is a description of ultraviolet (UV) radiation of 10nm to 400nm wavelength, a range of electromagnetic waves and frequencies higher than those that humans identify as the color violet and invisible to humans.

Black light sources designed for industrial use are contained in a fluorescent bulb that has a dark purple filter on the bulb or in the bulb which blocks most of the visible light and allows UV through.

Natural day light, Camera setting: ISO-200, Exposure time 1/3 Seconds, f/4, Focal length 29 mm. Max. Aperture 2.875.



Night vision view using Black Light, Camera setting: ISO-200, Exposure time 1/3 Seconds, f/4, Focal length 29 mm, Max. Aperture 2.875.

Note: *the identical camera setting of the photo on the left during day-light and the photo on the right during night-time. The photo on the right shows more intensity of color of the paper jacket on the crayon due to dye saturation in manufactured paper products. Ask: Darrell Bolduc, about (UV) technology in metallurgy and non-destructive testing.* www.Bolducaviation.com *&* *Ridgewater College* wade.padrnos@ridgewater.edu