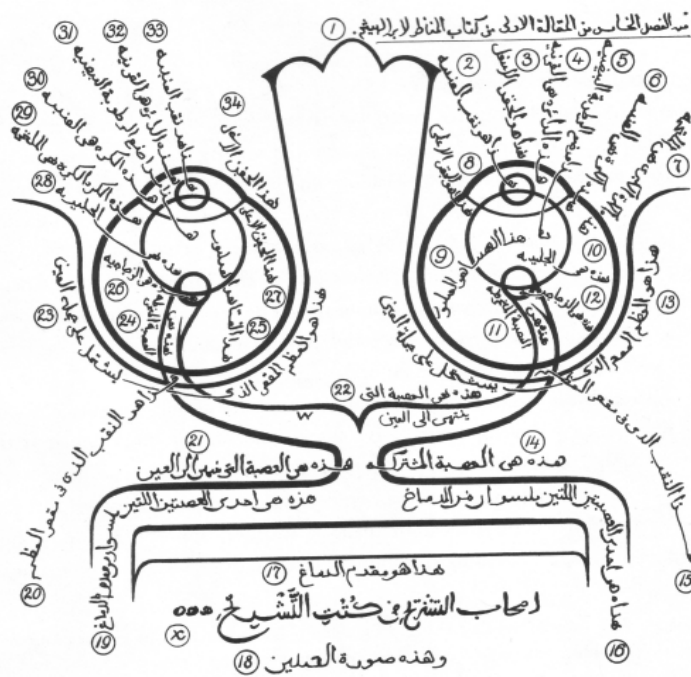


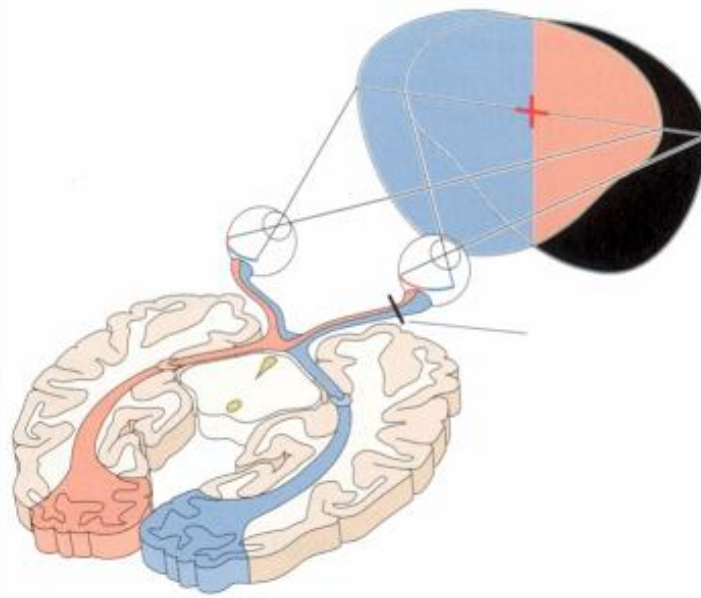
## Ibn al-Haytham and Eye Optics

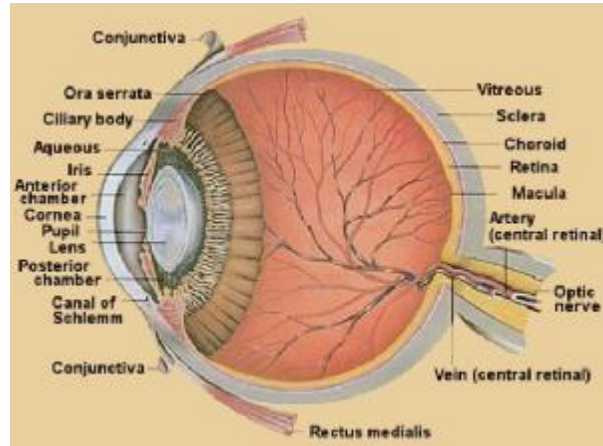
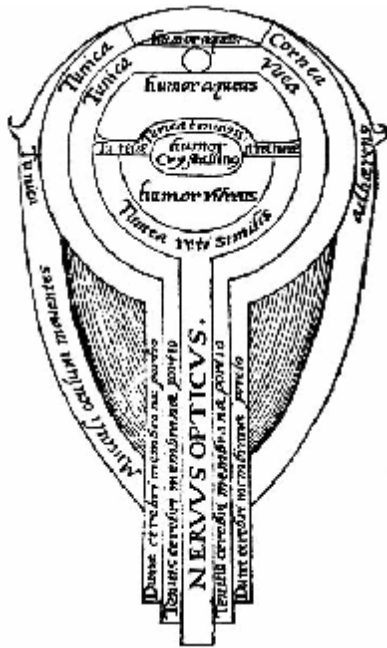
Ibn al-Haytham (965-1040) is sometimes called al-Basri. He seems to have written around 92 works of which, remarkably, over 55 have survived. The main topics on which he wrote were optics, including a theory of light and a theory of vision, astronomy, and mathematics, including geometry and number theory. A seven volume work on optics, *Kitab al-Manazir*, is considered by many to be Ibn al-Haytham's most important contribution. It was translated into Latin as *Opticae thesaurus Alhazeni* in 1270. Ibn al-Haytham gave:

*... experimental proof of the specular reflection of accidental as well as essential light, a complete formulation of the laws of reflection, and a description of the construction and use of a copper instrument for measuring reflections from plane, spherical, cylindrical, and conical mirrors, whether convex or concave.*



Ibn al-Haytham's Optics, written in Egypt in the first half of the 11th Century, represented a theory of vision that went beyond Galen, Euclid and Ptolemy. This diagram of the two eyes seen from above, shows the principal tunics and humours and the optic nerves connecting the eyeballs to the brain (above). Modern optic nerves representation (below).





From a scientific point of view, the *Kitab al-Manazir* presents a radically new approach to the studies of optics in the Middle Ages, starting from the basic physiological principle according to which, “Sight (*al-basar*) is composed of various layers, coats and bodies, its principle and origin lying in the frontal part of the brain.” Thus, Ibn al-Haytham provided an important analysis on the physical process of sight, based on his observation of the functioning of light and colour:

*Sight perceives (yuhiss) the light and the colour existing on the surface of the contemplated object (mubsar), thanks to the shape that expands from the light and the colour existing on the surface of this object through an intermediary diaphanous body (al-jism al-mushiff al-mutawassit) between vision and its object. Vision perceives necessarily all the objects through supposed straight lines [i.e. lines of perspective] that spread themselves between the object and the central point of the sight (markaz al-basar).*

## Reference

Ibn Haytham, *The Optics*, ed. and tr. A.I. Sabra (Kuwait, 1983; London, 1989).