

7.8 Al-Hasan Ibn al-Haytham Develops Scientific Methodology (c. 1028)

Source: Smith, A. M. (2001). *Alhacen's Theory of Visual Perception*, v. 91, pt. 4 (Philadelphia, PA: American Philosophical Society).

Background: The European Renaissance, Scientific Revolution, and Enlightenment are usually credited with establishing modern scientific methods and understanding. However, modern science probably had its roots in the Mediterranean region Islamic civilization. Al-Hasan ibn al-Haytham of Cairo, Egypt (965 – 1037 AD) systematically described the physical world, tested explanations with experiments, and developed a scientific approach to learning more than 200 years before European scholars learned of it from his work. These selections are from his *Book of Optics* (c. 1028). In this study, he describes both the impact of light on vision and the structure and function of the eye (343-344, 349). As a result of his observations and experiments, ibn al-Haytham was able to explain how sight was caused by light travelling into the eye. His conclusions replaced an explanation proposed by Plato and Ptolemy that light was somehow emitted from the eye. In its own way, his work was as revolutionary as the development of the heliocentric view of the solar system. Examine excerpts A – C and answer questions 1 – 4.

A. We find that when an observer stares at a pure white body illuminated by sunlight, and keeps staring for awhile, then shifts his focus from it to a dark, dimly lit location, he can scarcely make out the visible object at that location. Instead, it will seem to him as if there were a screen between himself and them. Then, after awhile his vision will clear up and return to normal state.

B. We see the stars at night but do not see them in daylight; and the only difference between the two times is that the intervening air between our eyes and the sky is illuminated during the day and dark at night. Hence, while the air is dark, we see the stars; but when the intervening air between our eyes and the stars is illuminated, the stars will be invisible to us.

C. The eye is in fact composed of various membranes and bodies, and its origin and wellspring lie at the front of the brain. For two matching hollow nerves emerge from the front [of the brain], each arising from a spot on one of the two sides of the anterior part of the brain . . . In the center of both of these eyesockets lie two openings of equal size, each one similarly disposed in relation to the common nerve . . . A serous, white, clear, transparent humor fills the hollow of the uvea [middle layer of the eye], . . . like the white of an egg in its fluidity, whiteness, and transparency.

Questions

1. What happens to someone who stares at a light source?
2. What does this suggest about the operation of the eye?
3. In your opinion, why does Ibn al-Haytham study both light and the structure of the eye?
4. In your opinion, how did the work of Ibn al-Haytham contribute to the development of scientific method?