Editorial

Volume 10 Number 2, December 2011

Abū ‘Alī al-Hasan ibn al-Hasan ibn al-Haytham

Abū ‘Alī al-Hasan ibn al-Hasan ibn al-Haytham is also known as Alhacen or Alhazen was a Muslim scientist and a mathematician. He was born and educated in Basra in Iraq (circa 965) but spent some time in Cairo, Egypt until he died at the age of 76. When he was there, the ruler Al-Hakimi bi-Amr Allah ordered Al Haytham to regulate the scourge of the Nile, but unfortunately the complexity of the job and the necessary technology were beyond him, and led him to feign madness in fear of the ruler’s wrath. As a result, he was put under house arrest but that period of confinement led him to produce his most monumental work on optics, Kitab al-Manazir or the Book of Optics.[1]

Al Haytham was an extremely important scientist. Although his main contribution was in the field of optics but he also wrote articles and commentaries on physics, astronomy, mathematics, ophthalmology, philosophy, visual perception, and was the pioneer of the modern scientific methodology. Such was his fame and reputation he was called Ptolemy the Second. He also produced enlightening commentaries on works by Aristotle, Ptolemy, and Euclid.

His greatest work however was on optics with the completion of his masterpiece Kitab al-Manazir or the Book of Optics. Before his time, two theories on vision prevailed, the emission theory and the theory of intromission. Using experimentation, he proved that both were wrong and instead put forth his own that vision resulted from rays of light that entered the eyes. His combination of geometrical optics and philosophical physics is the basis of modern physical optics today. He also experimented a lot with lenses, mirrors, refraction and reflection with his discovery that light rays traveled in straight lines. Al Haytham was instrumental in correctly explaining camera obscura and pinhole camera that had eluded his predecessors. The Book of Optics was also instrumental in the early development of the field of physiological optics.[1]

Al-Haytham was unique in that he used a lot of experiments to verify his hypotheses and substantiate his conjectures. For this approach he is regarded as the pioneer of the modern scientific method.[2,3] One instance where he performed controlled scientific testing to verify theoretical hypotheses was related to his optical research. He relied on the methodology of experimentation (i’tibar) and controlled testing in his scientific inquiries. He combined classical physics (‘ilm tabi’i) with mathematics (ta’alim; geometry in particular) to devise a hypothetico-deductive procedure in scientific research. This mathematical-physical approach to experimental science supported most of his propositions in the Book of Optics and grounded his theories of vision, light and colour, as well as his research in catoptrics and dioptrics.

Al Haytham possessed many characters of an honest scientist seeking the truth in his pursuit of knowledge. He criticized many of Ptolemy’s works, including the Almagest, Planetary Hypotheses, and Optics, pointing out various contradictions he found in these works. The criticisms were based on empirical, observational and experimental grounds, such as Ptolemy’s use of conjectural undemonstrated theories in order to “save appearances” of certain phenomena, which he objected due to his insistence on scientific demonstration. Unlike others who criticized the Ptolemaic model on the grounds of being incompatible with Aristotelian natural philosophy, Al Haytham was mainly concerned with empirical observation and the internal contradictions in Ptolemy’s works.[2] In his Aporias against Ptolemy, Al Haytham commented on the challenges of attaining scientific knowledge:

Truth is sought for itself [but] the truths, [he warns] are immersed in uncertainties and the scientific authorities (such as Ptolemy, whom he greatly respected) are not immune from error...[2]

Al Haytham wrote more than 200 books but only a fraction has been properly studied, many have been lost and among those in existence only about half have been carefully looked at. Despite his immense knowledge in science, Al Haytham was also well versed in Islam and a devout Muslim. Although his exact denomination is not certain but he contributed some writings on theology and wrote a book on finding the Qiblah direction for prayers. More importantly he was keenly aware that knowledge could lead him to appreciate the absolute truth and the owner of the truth that is Allah swt. He wrote:

I constantly sought knowledge and truth, and it became my belief that for gaining access to the effulgence and closeness to God, there is no better way than that of searching for truth and knowledge.[4]

I wish to briefly highlight two points in this short biography. Al Haytham was a devout Muslim and a brilliant scientist who altruistically expanded the frontiers of knowledge in so many different fields. It is a challenge to even understand his wide ranging contribution let alone attempt to replicate. It is not too much to say that it would be quite hard to imagine another individual who is able to reproduce

such immense contribution in many areas of science and human activities. This is judging by the way knowledge in one specific area is developing within its own distinct and demanding sphere of specialization. It is very hard or even impossible for one person to become expert in multiple fields. Perhaps such scientific greatness is a thing of the past.

The other, the life of Al Haytham illustrated the state of mind of a Muslim scientist. There was no antagonism between science and revealed knowledge (wahy'). Acceptance of one does not mean the rejection of the other, Muslim scientists do not view science as antithesis to wahy' but rather it strengthens one's conviction to the existence of truth, as God is the eternal and absolute source of scientific knowledge. Science leads to realization of the absolute truth and recognition of the greatness of Allah swt. In 1011, or a millennium ago, Ibnu Al Haytham did just that and his legacy has made such an impact on all of us today.

Professor Dr Mohammed Fauzi Abdul Rani
Dean, Kulliyyah of Medicine,
International Islamic University Malaysia

REFERENCES

1. Alhazen. In: From Wikipedia, the free ency clopedia [online]. Available at: http:// en.wikipedia.org/wiki/Alhazen. Accessed October 22, 2011
2. Sabra AI. Ibn al-Haytham: Brief life of an Arab mathematician. Harvard Magazine (October–December 2003). Available at: http://harvardmagazine.com/2003/09/ibn-al-haytham-html. [serial online] Accessed October 30, 2011
3. Gorini, Rosanna. Al-Haytham the man of ex perience. First steps in the science of vi sion. Journal of the International Society for the History of Islamic Medicine 2003; 2(4):53–55
4. Plott C. Global History of Philosophy: The Period of Scholasticism. Pt II: Motilal Banar sidass, 2000