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BOOK REVIEW

S M Razaullah Ansari (ed.), ***Science and Technology in the Islamic World*** (Proceedings of the XXth International Congress of History of Science, Vol. XXI), BREPOLS, 271 pages, Belgium, 2002.

The present volume is based on the papers presented in the two symposia organised under IUHPS by Professor S M R Ansari (India), J. P. Hogendijk (The Netherlands), Y. Dold-Samplonius (Germany) and A Allard (Belgium) on behalf of the XXth International Congress of History of Science in Liege on 20-26 July 1997. The volume has 19 papers in all covering various aspects of Islamic activities in Science and Technology in the pre-Renaissance period starting from 7-8 century AD onwards. The first four papers are quite general in nature. The first paper in this group is by Alparslan Acikgenc (Malaysia) who deals with the social and epistemological aspects and identifies several frameworks towards emergance of Islamic scientific tradition. But his assertion that it is based on a scientific conceptual scheme is not very convincing. Cemil Akdogan (Malaysia) summarizes the work of al-Ghazālī (11-12 century A.D.) and emphasizes his role in the emergence of modern science, and in the process described al-Ghazālī's criticism of Aristotelian natural philosophy nurtured by al-Farabi and Ibn Sina, belief in atomism (*mutakallimum*), conception of the universe working like a machine, identification of matter with energy, keeping stability of nature, etc. For five centuries after al-Ghazālī, there were current various other reactionary speculative philosophies, viz.platonism, pythagoreanism, scepticism, oculticism and animism (the universe is an organism). Only in the 17^{th} century, al-Ghazālī found a major exponent in Descartes of the Renaissance period who while underscoring the complexity of nature, supported the mechanical concept of universe as a perfect clock, ineffecting God's power over nature, accepting human soul and body as two different identities and rejecting all authorities in philosophy. The parallelism found in al-Ghazālī and Descartes' concepts, though forcefully placed has many holes in social situations and social perspectives in associating al-Ghazālī with the emergence of modern science. The paper by C,E. Rodenas and J.M. Quesada (Spain) underlines the intellectual activities of the Spanish muslims in different regions of Cordoba, Toledo, Algeciras, Seville, Elvira, Pechina, Tudmir, Valencia etc. during 8-15th century A.D. The paper by E. S. Kennedy (USA) emphasizes on the utility part of the computer applications for a data base on bibliography, dictionary, horoscope, tables (zies) and others for the reconstruction of medieval exact science.

The next group of twelve papers contains various aspects of mathematical, astronomical and physical reconstruction of Greek initiatives by Arab scholars. In two separate papers, Helene Bellosta (Syria) and Gregg De Young (Egypt) have dealt on the nature of commentary and super commentary on Euclid's *Elements*. The former brought fourth the merit of the work, *La Kitāb al-mafruḍāt* of Thābit Ibn Qurra (d. 901 A.D.), an Arabic commentary on the hypothesis of Euclid's work, dealing with 36 propositions (12 on constructions, 2 on theorems, 1 on terminology, 2 on resolutions of the systems, 8 on problems relating to triangles, 5 on quadrilaterals, and 6 on circles). The four propositions are discussed in detail in order to assess Thabit's nature of treatment showing distinctly a tradition based on early geometerical hypothesis and mathematical practices influenced by al-Khwarizmī and others. The latter analyzes the nature of super-commentary on 35 propositions by al-Rumi (d. 1436 A.D.) on Samarkandi's commentary (*Ashkāl al-Ta'sis*, 13th century) of Euclid's *Elements*. Rumi took free access in adding from different sources including from those of Samarkandi and Nasir-al-Din's redaction of *Elements*. Irina Luther (Russia) attracts notices to the Arabic attempt by Ibrahim Ibn Sinan (908-946), as to how to construct a tangent to three given circles. The work includes 41 problems on the constructions using mainly, the method of Euclid's *Elements* and Apolloniaus's *Conics*. Many Arabic scholars between 16-19th century gave a thorough knowledge of the problem. Roshdi Rashed (France) takes the case of parabolic mirror, which was supposed to be used in the temples for lighting on the occasion of some festivals or for observation of gnomon shadow. He considered the transmission and technical aspects of the reconstruction of the mirror. A parabolic mirror was first referred to by Diocles (12 century B.C.), Archimedes and others. Arabic scholars, al-Kindi (9th century A.D.) and Qustā Ibn Luqā (10th century) give details of the mirror. Ibn Sahl (10th century), the first known mathematician has elaborated the geometrical theory of lens and formulated the laws of reflection and refraction, not dealt by al-Kindi and Ibn Luqā. Ibn Sahl examined the properties of the parabolic mirror with the help of focus and directrix . He fabricated at the end a mechanical machine in order to trace the continuity of the three centuries of knowledge in conics. Rashed's explanation are extremely interesting and establishes the two steps in transmissions from 9th century through critical and innovative writing, and from 12th century through apprentiship and research. Emilia Calvo (Spain) deals with al-Kammād's knowledge (c. 1116 A.D.) on solar year, trepidation and time-keeping as referred to in *al-Zij al-Kâmil fi-l-Ta'ālim* of Ibn al-Hâ'im (13th century A.D.). Merce Comes (Spain) also analysizes some astrological Maghribi sources (12-16 centuries) dealing with trepidation. The theory of trepidation having a forward and backward motion of equinocitial points effecting the value of the precession of equinoxes in positive or negative, is perhaps influenced by Greek or Indian school of thoughts. Even though the knowledge passed on to Latin Europe from Muslim Spain, the theory had a death signal with new observations, construction of models and analysis in the 17th century. Ibn Kammâd has also given several values of lengths of solar year and formulae which is Indian in origin for measuring time relating altitude of the Sun from hour and vice-versa. Monica Rius (Spain) gives a list of seven solar and two lunar eclipses, four comets, two events of supernovae and Aurora Borealis (*humra)* as per Ibn Abi Zar's work, *Rawḍ al-qirṭās* (c. 1326 A.D.), not discussed before. Though there was always a small error of date or hour, absence of name of weekday, he examined a probable date for each of these events. The compilation according to author was made since the events were associated with signs of bad omen and people's worship in mosques. Mashallah Ali-Ahyaie (Iran) underlines the problem of finding the first sighting of the new moon which depends on both physical factors and human error in sighting, since Lunar or Hijra month starts or ends in the evening of the first sighting of the youngest lunar crescent. A large number of construction with respect to past and present dates are examined from tables and models. M.M. Rozhanskaya (Russia) raises three types of problems in mechanics viz the notion of gravity, force and moments of a force, the problems of balance and solutions of related equations and the problems of weighing as per Thābit b. Qurra, Ibn al-Haitham, al-Khwārizmī and other sources. Some aspect of transmission problem from 9th century A.D. to the stage of classical mechanics in Europe are discussed. A. Komilov (Tajikistan) while criticizing the modern of book of history for not covering medieval muslim contribution presents in a nutshell physical ideas of Ar-Razi (865-965) and Ibn Sina (980-1037) on structure of matter, space, propagation of light and mechanism of vision, origin of thunder including velocity of light and sound, acoustics, phenomena, emergence of echo, etc. The works of both the authors were available in translation in many languages which according to Komilov, might have influenced the medieval science. P. Lettinck (Malaysia) tries to identify the types and nature of works on meteorology written by medieval muslim authors based on Aristotle's *Meteorology*, and underlines differences in interpretation of Ibn al-Bitriiq from other versions of al-Kindi, Ibn Ruṣd, ar-Râzi etc. P.G. Schmidl (Germany) traces the use of magnetic compass in some of the Arabic sources of al-Ashraf (c. 1290), Ibn Simun (c. 1300) and their setting in astronomical instruments. The compass, according to him, used to find sacred direction of Qibla towards Mecca, and emphasized on the continuous tradition of compass-making (photographs supplied) from 13th century A.D. onwards.

The last group of three papers deals with the nature and status of medical works in the hands of muslim scholars. N. Stephan (France) outlines a few medical works of al-Kindi (9th century AD) and examines his nature of application of mathematics for assessing degree and quality of medical compounds. The Latin version of the texts have also been compared with the Arabic original. His theory of pharmacology follows a dilectic research and is based on primary active quality like heat or coldness and some passive primary quality like dryness or humidity. Al-Kindi also followed Nicomacus, the follower of Pythagorianism in respect of the use of proportions in preparation of medical compounds. M.K.Safadi (France) reports that al-Rāzi (c.865-925 A.D.) made a strong plea to separate pharmacy from medicine in his work, *Kitāb al-ḥāwi fi al-tibb*, and underlined the major frontiers between these two professions. That these two professions have been established as two different disciplines is also emphasized by al-Birūnī (d. 1048 A.D.) in his introduction of *Kitāb al-ṣaydala fi al-tibb*. A. Touwaide (Spain) has shown how 9th century Arabic *Materia Medica* has influenced Byzantium knowledge in the 11th century. The Arabic Materia Medica of course is based on the *Materia Medica* of Dioscordies (1st century AD) which is available in several versions. Dioscorides' version as edited by G. Christodoulou (known as Atho Ms), according to Touwaide is a revised manuscript and compiled on the basis of several sources. The work has supplied data like synonyms of plants/drugs, preparation of medical products, properties and sources, the illustrative drawing of plants etc. The plants/drugs as depicted in the Arabic and Byzantium manuscripts show that the creation of black human figures in the manuscript is possibly work of mid Byzantium period. The Byzantium copy of the Autho manuscripts has 13 illustrations in which 5 are connected with black peoples. Touwaide has expressed concern regarding gaps between present oriental drugs in western recipe books and their availability in the market. He perhaps correctly surmizes that regarding transfer of data from one culture to other, the analysis should be based on two major paradigms, whether practaice preceded written records or practice followed written records, then only the cultural interdependence could be correctly assessed.

The volume, one the whole, is a welcome addition in the existing literature of Islamic history of science. There is no denying the fact that new insights are available on the status and orientation of knowledge in the field of emergence of Islamic Science, activities of spanish muslims, nature of commentary and super commentary on Euclid's *Elements,* problems of tangent, construction of parabolic mirror, problems of medieval mechanics, propagation of light, mechanism of vision, use of composite nature of works on meteorology, preparation of medical compounds, materia medica and others. It is not really clear why there is no coverage on the contributions of al-Khwarizmi , Abul-Wefa, al-Birūnī, Ibn Sātir, Nasir-al Din al-Ṭūsī, Ulug Beg and many others who made considerable impact in the world of Islamic Science.

It is a fact that there existed two hostile schools of Greek and Indian thoughts in science and philosophy in Baghdad, Cordoba and other cities. Inspite of rivalry, the islamic scholars made a synthesis of the creative endeavour of both the schools which flourished and made positive contributions in the knowledge of world civilization. There are many such areas where work and analysis are very much needed. While the work of Greek school of thought has been widely reflected, the role of Indian school find almost no place, even if the main organiser cum-editor is from India. The editor could have taken little more care to include his own article or assessment. There is no doubt that the projection is one sided and possibly intentional.

The proper reviewing of the volume of course has become difficult, since it involves articles in different languages. The task on the whole has become more difficult since the volume is without any genesis or foreword. The use of the word 'technology' in the cover page is also not very much appropriate since there is not much coverage on the topic. The quality of editing, printing and binding is satisfactory. The volume also includes a complete list of other 21 volumes printed on the basis of XXth International Congress of History of Science along with author's index by the International Academy of History of Science (Paris) which deserves our thanks for presentation of such a scholarly work.

A. K. Bag