

BOOK REVIEW

Prof. O. P. Jaggi, *Medical Education and Research: Western Medicine in India* (History of Science, Technology and Medicine in India Series, Vol. 13), Atma Ram & Sons, Delhi, Lucknow, 1979, pp. xiv+335, Rs. 150/-.

This book is one of a series of books on History of Science, Technology and Medicine in India, by one of our foremost historians of Science. A brief introduction of Medical Education in ancient and medieval India, as also in China, Japan and Britain provides a background to the introduction and evolution of Western medicine. Beginning with the establishment of the first medical school in India to teach Western medicine started by the Portuguese at Goa in 1703, located at the Royal Hospital founded by Albuquerque in 1510, the book takes one through nearly 250 years of historical developments upto the time of India's independence.

The book is divided in two parts. Part One deals with Medical Education and describes the establishment and evolution of various medical Schools and Colleges, in their historical perspective. Starting with the Portuguese Medical School at Goa, the first Medical School in British India, the first Medical Schools at Calcutta, Madras, Bombay, Agra, Lahore, Indore, *etc.* to progressive conversion or *de novo* initiation of Medical Colleges in various parts of the country are described. Medical Education for Women, Registration of Medical Degrees, the Bengal, Bombay and All India Medical Acts leading to the evolution of the Indian Medical Council and its relationship to General Medical Council of Great Britain give an idea of the administrative pattern guiding the standardisation of medical education in the country.

Besides education of the medical practitioners, training in nursing, pharmacy, and of para-medical subjects receives separate attention in individual chapters.

There is a brief chapter on developments in Medical Education after 1947.

Part Two of the book deals with Medical Research. Following a brief review of organisation of medical research, historical events leading to the creation of various Medical Research Institutes (upto 1947), Haffkine Institute at Bombay, the Kings Institute at Guindy, the Central Research Institute at Kasauli, Pasteur Institutes at Coonoor and Shillong, *etc.*, have been individually described. This is followed by description of developments in different disciplines like *Materia-Medica* and Pharmacology, Surgery, Anatomy, Physiology, *etc.* Historical evolution of some of the earlier Medical Journals and Medical Societies is also included. Some of the developments in Medical Research after 1947, primarily the Bhore Committee Report and the Indian Council of Medical Research bring one to the present era.

I must say that it was a real pleasure for me to go through this very comprehensive account of 250 years of development of Medical education and research in India by a very competent historian. The wealth of information, including abstracts from the original documents, narrated in the background of the prevailing socio-economic, administrative and cultural milieu, makes a fascinating reading. I marvel at the wealth of the resource material at the command of the author and his ability to synthesise, classify and organise it in a manner which makes the book not only an interesting reading but one that whets the appetite to know more. It is in this connection that a suggestion is made, which may add to the value of such works in future. The author has given a large number of references, but in such historical material, it is not easy for one to locate the original source, if one wishes to know more. I wonder if an appendix could be added to such works, giving information as to where one could find the original material referred to for further study.

This book should be available in the libraries of all medical education and research Institutions including those of Nursing and Pharmacy. All those involved in medical education and research will find lot of interesting material, to guide them in their current and future efforts to tackle some of the problem of making medical education and research relevant to the needs of the socio-economic and cultural milieu of the country. Even if one does not wish to go through all the details (which I would strongly recommend), there is enough which would interest anyone directly or indirectly concerned with medical and health fields.

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Kennedy, E. *et al.*, *Studies in Islamic Exact Sciences*. American University of Beirut, Lebanon, 1985, pp. 771. (An Essay Review)

Islamic sciences were transmitted into Europe as early as 12th century, when a number of standard Arabic texts were translated into Latin. Constantinus Africanus (*d.*1085) of Carthage was the first translator of Graeco-Arab medical works, and so also the Englishman Adelhard of Bath (flourished in the beginning of 12th century) first translated from Arabic the Euclid's *Elements*, al-Kh_wārizmī's (783-850) astronomical tables and his book on Arithmetic, and also Abū Ma'shar's (786-886) introduction to astronomy. Then in the following centuries the translation activity gathered enormous momentum throughout Europe. An idea of its vigour can be gauged from the number of translations, about 76, which a single scholar Gerhard of Cremona

(d. 1187) turned out. The most important mathematical-astronomical Arabic works he translated, were by al-Khwarizmi (his *Algebra*), Thabit Ibn Qurra (836-901) al-Farghānī (9th century), al-Fārābī (d. 950) al-Zarqālī (11th century), Jābir Ibn Aflāh (12th century) and of course Ptolemy's *Almagest*, to name a few. It is said that by 1250 A.D. the main works in Greek and Arabic on mathematics, philosophy, astronomy, and medicine were already available in Latin translations. The significance of these translations has been very well understood by Bernal, who considered them as the prerequisite for "the revolution in attitude and ideas" during renaissance and "as the first phase of scientific revolution".

In modern Europe the French Orientalists were the first who began translating Islamic Exact Sciences into French during 19th century. We may recall here some important works, for instance by

- (i) J. B. Delambre (1749-1822): *Histoire de l'astronomie du Moyen Age*, (Paris, 1819),
- (ii) Franz Woepeke (1826-1864), on Arab mathematics, particularly by 'Umar al-Khayyām (1048-1131), al-Karkhī (d. 1139) and Abul Wafā' (940-998),
- (iii) L. A. Sédillot (1808-1875), on al-Marrākushī's (d. 1262) treatise on astronomical instruments and the preface of Ulugh Beg's (1394-1449) astronomical tables,
- (iv) B. Carra de Vaux (1867-1952), on Arabic version of *Almagest* by Abul Wafā' and the astronomy of al-Tūsī (1201-1274).

Here we may also add that the Arabic text of al-Battānī's (850-929) astronomical tables was translated into Latin (and later into Italian) by the Italian C.A. Nallino (1872-1938), to name only the most important Italian scholar of Islamic astronomy. The French and Italian contributions to Islamic exact sciences could be considered as some what culminating in the publication by the Italian Aldo Mieli's (1879-1850) *La Science Arab*, (Leiden), 1938, reprinted 1966. Evidently, the German counterpart of these French and Italian historians of Islamic exact sciences could not remain uninfluenced by the afore-mentioned translations and/or researches. The German *Orientalistik* was quite developed by the middle of 19th century. And therefore already in the last quarter of that century E. Wiedemann (1852-1928) started working on Arab science in general; physics, astronomy, and mathematics in particular. We may recall here also Heinrich Suter (1848-1922), Julius Ruska (1867-1949), Carl Schoy (1877-1925), and Paul Lucky (1888-1949), who promoted enormously the study of Islamic mathematics and astronomy. The culmination of the work of that school of historians was in a way Suter's Bio-bibliography: *Die Mathematiker*

und Astronomen der Araber und ihre Werke, (Leipzig, 1900; Amstardam, 1981). As a matter of fact both French and German historians of Islamic exact sciences contributed by various types of writings, namely, bio-bibliographical essays, French and German translations of Arabic texts, and also *Problemgeschichte*. In this context of European studies in Islamic exact sciences, one has to appreciate Edward Kennedy's in-depth topical studies and text editions, and also those of his school in Islamic mathematics and astronomy. To our knowledge, Kennedy is the pioneer in USA in the field of history of Islamic exact sciences which he undertook, already in the middle of forties. At that time George Sarton (1884-1956), who published in 1948 his last volume of *Introduction to History of Science*, was the only internationally known historian of science in USA. Kennedy was then professor of elementary mathematics at the American University of Beirut. His first work was on al-Kāshī's (d. c. 1436) *Plate of Conjunction* (published in *Isis* in 1947). It is an excellent work on a scientific instrument.

The volume under review is a collection of 69 articles (pp. 771), out of which 52 written by Kennedy with or without collaboration. 17 papers are by his students alone. The subject-wise break-up of the various articles are: General Survey—2, Mathematical Astronomy—31, Astronomical Instruments—8, Mathematics—12, on al-Birūnī's works—8, and Miscellaneous—8, which deal with mathematical geography, calendars, etc. Three very important indexes, namely, of decimal and sexagesimal numerical parameters, and of cited manuscripts are included in the collection. The author and subject (rather key-word) index is naturally also in the collection. That all the Arabic-Persian words/terms along with their English equivalents are included in the latter, makes this master index a very useful glossary at the same time. Further, all papers are beautifully reprinted by photo-offset technique along with a continuous pagination. The American University of Beirut should be congratulated for such an excellent publication.

The first survey article deals with the history of trigonometry in which the initial use of chords and later introduction of trigonometric functions have been treated in sufficient details. The title of the second article is "The Arabic Heritage in the Exact Science". Three other excellent survey articles of Prof. Kennedy—"The Exact Sciences in Iran During the Abbasid Period under the Suljuqs, Mongols, and in Timurid Iran" (published in *The Cambridge History of Iran*, Vol. IV, V and VI)—have not been included in this collection, as a supplement to the "The Arabic Heritage".

Papers on astronomical instruments deal with al-Kāshī's small general tract (*Risālah dar Sharḥa ālāt-i raṣād*), al-Ṣūfī's (903-986) treatise on astrolabe, al-Kāshī's "Plate of Conjunction" (*Ṭabaq al-manāṭiq*) and the equatorium of Abū al-Ṣalt al-Andalūsī (1068-1134), to list the most important ones.

Prof. Kennedy is presently the only living expert on al-Bīrūnī in the Western World, besides B. A. Rosenfeld (Moscow), and P. G. Bulgakov (Tashkent). Whereas his papers on al-Bīrūnī's treatment of solar equation and the problem of meridian are mathematically very satisfying, his two articles on al-Bīrūnī's *Qānūn al-Mas'ūdī* and *Maqālīd 'ilm al-hay'a* are rather listing of their contents only. One would have wished for the inclusion of Kennedy's review of the Russian translation of al-Bīrūnī's *Qānūn*, if any.

Papers dealing with mathematical astronomy are on topics such as planetary theory (particularly those of Ibn al-Shāṭir) and its transmission to Europe, planetary and lunar visibility, eclipses, parallaxes, planetary distances, spherical astronomy, astronomical time-keeping, and computational techniques of solar, lunar and planetary longitudes and latitudes. This section is the most important of the whole collection. Kennedy and his school can hardly find their equal therein, as far as the clarity and rigorous treatment of Islamic mathematical astronomy are concerned. It may be noted that whereas the European historians of exact sciences investigated the works of early Islamic astronomers and mathematicians, Kennedy and his school concentrated on the *late* Islamic scholars like Naṣīruddīn al-Ṭūsī (1201-1274), Quṭbuddīn al-Shīrāzī (1236-1311), and Ibn al-Shāṭir (1304-1375). As a matter of fact, that work of Kennedy's school opened a new vista in the problem of Islamic antecedents of Copernicus' works. Further, it showed that Marāgha School propounded a non-Ptolemaic model of planetary motion in which the hypothesis of eccentric orbit and equant was abandoned. Their model was based essentially on the linkage of constant-length vectors rotating with constant angular velocity. A detailed analysis of the texts of Marāgha school and that of Ibn al-Shāṭir yielded the conclusion that Copernicus' lunar and Mercury models are identical with those of Ibn al-Shāṭir, besides Copernicus used the Ṭūsī's device of a rolling circle in another.

This collection of papers and articles covered a period of about 30 years (1947-1978). All papers, articles, book-reviews, talks, *etc.* by Edward Kennedy could not have been included in one such volume. We hope that the editors, David King and Mrs. Mary Helen Kennedy, will embark on another commendable venture, *i.e.*, the "Collected Works of E. Kennedy" just like those of E. Wiedemann (Hildesheim, Frankfurt) and Willi Hartner: *Oriens-Occidens* (Hildesheim). The usefulness of such a publication for the students of Islamic exact sciences can hardly be stressed.

Finally, we wish for Professor Kennedy a long life, full of health, vigour and work, so that not only he could revise his "Survey of Islamic Astronomical Tables" (Philadelphia, 1956) but also his life-long analytical study of al-Kāshī's *Zīj-i-Khāqanī* could see the light of the day.

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