terms and names, and a last index of titles mentioned in the study. Finally, the book reproduces a selection of 18 original plates courtesy of the Chester Beatty Library in Dublin and the Institut für Geschichte der Naturwissenschaften in Frankfurt am Main.

Charette's book, aimed at historians of science and specialists in scientific instruments, is an ambitious research project that uses the edition of a practical treatise of instruments as the basis for an enormous historiographical work. The instruments cited are so numerous and so varied, and the information provided by the text is so limited, that it is quite understandable that the profundity of the analysis varies widely. The specialist reader will be encouraged to pursue the study of several of the instruments described here.

Roser Puig

Ekmeleddin İhsanoğlu, *Science, Technology and Learning in the Ottoman Empire. Western Influence, Local Institutions and the Transfer of Knowledge.* Variorum Collected Studies Series: CS773. Ashgate, Aldershot, 2003. XI + 352 pp.

The volume reprints twelve papers by Ekmeleddin İhsanoğlu, previously published in different Journals, Proceedings and Collective Books between 1987 and 2002. The author has added a short introduction (5 pp.) as well as a complete index (17 pp.). The bulk of the papers, as the author states, deal with cultural, intellectual and scientific aspects of the Ottoman Empire history (1299-1923), subjects which until now have been somehow neglected or studied under a "negative" outlook, in the author's own words. The book shows the relationship between Ottoman and Arabic and European science and culture. In fact, it is clear all around the book that many of the features of Ottoman Science are strongly related to the characteristics of other parts of the

Muslim World, where science and culture were at their higher level at the end of the 13th century, although there are also some important differences. It is also evident the active relationship that from the 16th century the Ottomans have with the European countries, where modern science developed taking the torch of the Arabic Science.

Broadly speaking, the topics can be grouped into three main subjects, which are Western and Eastern tradition, Learning, and Modern Science. The first group contains 3 papers (I, II, III). The second, 4 papers (VI, VII, VIII, IX). And the third group, 5 papers (IV, V, X, XI, XII).

In conclusion, the book presents a new viewpoint in the field of Ottoman science and deserves to be read by scholars and people interested not only in Ottoman Science, who can also consult the *History of Ottoman State, Society and Civilization* (Istanbul, 2202), but also in Arabic and European Science.

Mercè Comes

Lorch, Richard: *Thābit ibn Qurra On the Sector-Figure and Related Texts Edited with Translation and Commentary by* ... "Islamic Mathematics and Astronomy", 108. Institute for the History of Arabic-Islamic Science, Frankfurt 2001. 461 pp.

The calculation of the sizes of circular arcs on the surface of a sphere (the celestial sphere or the earth) involves the use of spherics. It was the Greeks who first investigated the geometry of the surface of the sphere; among others, Autolykos and Menelaus wrote treatises on the subject. In Menelaus' work *Sphaerica*, a spherical triangle is defined as the area enclosed by the arcs of (three) great circles on a sphere, each arc being smaller than a semicircle. In Book III of the *Sphaerica* we find the first theorem of spherical trigonometry, known

as Menelaus' theorem. This was the only theorem in that science known to the Greek writers. Often a certain amount of ingenuity is required to complete a few given arcs so as to obtain a configuration to which the theorem can be applied; a single triangle would be much easier to find.

This theorem was considered difficult, partly because it involved the composition of ratios. It was the object of numerous explanations and discussions in the ancient and medieval world. In the Almagest, Ptolemy used Menelaus' theorem to determine the various celestial arcs and angles and until about 1000 AD it was regularly demonstrated and applied in Arabic spherical astronomy, where it was also known as the "sector-figure" (*shakl al-qattā'*). From there it passed into the Latin world, where it was known as "figura cata".

Although the Arab-Islamic mathematicians devised new theorems to deal with spherical arcs of the sphere, Menelaus' theorem remained one of the favorit topics in theoretical mathematics until a much later date: indeed, in the 13th century al-Ṭūsī wrote a study of it, entitled the *Taḥrīr* of Menelaus' *Sphaerica*. This interest was also reflected by Thābit ibn Qurra who, at the beginning of his treatise on the sector-figure, notes the intense activity occasioned by this theorem due to its usefulness in spherics. But, despite this interest, historians have not as yet attempted to deal with it in a comprehensive way. This situation began to change with the publication of Richard Lorch's book in 2001, and some other papers on this topic published since then, among them "Le traité de Thābit ibn Qurra sur la figure secteur" in *Arabic Sciences and Philosophy*, vol. 14 (2004) pp. 145-168, by Hélène Bellosta, and "Thābit ibn Qurra et la composition des rapports" also in *Arabic Sciences and Philosophy*, vol. 14 (2004) pp. 175-211, by Pascal Crozet.

Lorch's book is devoted in the first place to the study of these two texts by Thābit b. Qurra, the first of them on the sector-figure and the second on the composition of ratios, which is also used in the sector-figure. But the book contains considerably more than this, and provides a comprehensive study of a variety of texts dealing with these two matters throughout the Middle Ages.

The book is divided into three parts. The first part outlines Thābit's life and stresses his decisive role in the transmission of Hellenistic sciences to Arabic, especially mathematics and astronomy, and also as a transmitter of Arabic science into Latin Europe through the translations of his works into Latin. Next, there is an exhaustive description of the Menelaus' theorem, or sector-figure, the description of Thābit's concept of ratio, which appears in the first chapter of his text on the composition of ratios, and a comparison of this concept with Euclid's definition in the Elements in the translation revised by Thābit himself. From this comparison it is clear that Thābit's concept has the same import but is expressed in a different way. There are no indications of the circumstances in which the text on the composition of ratios was produced but Lorch suggests that it was written after the sector-figure. Furthermore, the detailed analysis of this definition in a variety of texts leads Lorch to the conclusion that the transmission of mathematical texts was more uneven than was previously supposed. The remaining chapters centre on the contents of the manuscripts used in the edition of Thābit's texts which have not been previously described, and on the manuscripts containing the Latin translation of Thābit's text.

The second part of the book is devoted to the edition of these Arabic and Latin texts, together with their English translations. The first is the edition of the Arabic text of Thābit's treatise on the sector-figure (pp. 41-123) which is based on nine manuscripts now preserved in Paris, Istanbul, Damascus, Cairo, El Escorial, Algiers and also a private manuscript

formerly in the H. P. Kraus collection. The Arabic edition and English translation are given on facing pages, allowing easy comparison of the two versions. Appendices are added in some of these manuscripts; in the Escorial ms, for instance, we find Maslama's proof of Ptolemy's treatment of the sector-figure, which Lorch includes as an appendix in the edition.

Next we find the edition of what is considered a *Grecisicing* Latin translation from four manuscripts in Paris, London, Vatican, Oxford. This translation does not include Maslama's proof. It follows a Latin translation beginning: "Inter universas geometrice speculationis…" from a manuscript preserved in London which contains a translation of Maslama's note. After these editions there is a mathematical summary in which the mathematical contents of Thābit's text are discussed with reference to the corresponding paragraph in the Arabic text.

There is also a description of the edition of a Latin translation, preserved in four manuscripts, in Paris (2), Naples, and Erfurt, published in 1924 together with a German translation. Although the name of the translator does not appear, the author was probably Gerard of Cremona. Lorch gives several reasons for this assumption. The Maslama appendix is included in this edition.

On Thābit's *Composition of ratios* we find the edition of the Arabic text with an English translation (pp.167-307) based on three manuscripts preserved in Paris and Istanbul (2) and followed by a mathematical summary, as in the case of the text on the sector-figure. Here the concept of ratio is given and the different kinds of ratios are described, analysed and classified depending on the number of quantities involved and the number of them that are equal.

Finally, the last section of the book is devoted to what Lorch calls "Towards a history of the Sector-Figure" from the earlier versions of Menelaus' *Sphaerica,* in

which the sector-figure first appeared, to the practical applications in Arabic as well as in Latin. Since Menelaus's *Sphaerica* is lost in Greek, versions of Arabic translations and derivative Latin and Hebrew texts are the primary sources for this study. The first texts described and discussed in this part are al-Harawī's edition of al-Māhānī's version of an unknown translation as well as the "improvement" *(islāḥ)* of Menelaus' text, by Abū Naṣr Manṣūr ibn ʿAlī ibn ʿIrāq, which is the most complete.

Lorch also considers the treatment of the theorem in the commentaries on Ptolemy's Almagest, such as the one by Theon of Alexandria (4th c.) which was translated into Arabic. The author points to the many similarities between Theon's commentary on the Almagest and al-Kindī's. The study also examines several historical passages from Arabic writings on the theorem and gives a list of other commentaries and writings on the sector-figure, as explained by Ptolemy, in Arabic authors such as Ibn al-Haytham, Ibn Sīnā, al-Nasawī and Ibn Rushd. Next comes the edition of the text on the sector-figure in al-Nasawī's *al-Ishbāʿ fī sharḥ al-shakl al-qaṭṭāʿ,* as well as an extract from the *Almagestum parvum* in MS Toledo 98-22 and the description of the treatment of the sector-figure in Aḥmad ibn Yūsuf (9th c.), al-Sijzī (10th c.) and Jābir ibn Aflaḥ (12th c.). The history of this theorem is followed until the 13th century with an analysis of the works on this topic of two contemporaries which are dependent on Thābit's text, namely Naṣīr al-Dīn al-Ṭūsī's *Taḥrīr* and Campanus of Novara's *De figura sectore.* The edition of Campanus' text ends this third part.

The book is dedicated to P. Kunitzsch, with whom Lorch co-authored many very interesting studies in the past, such as the analysis of the melon-shaped astrolabe, published in 2001. It ends with an extensive bibliography, an index of names and an index of Arabic, Hebrew, Latin and Greek manuscripts.

There is one slight inaccuracy on page 29: although the study and Catalan translation of Ibn al-Samḥ's treatise on the astrolabe was published in 1986, the edition of the Arabic text is still unpublished. Evidently this is trifling point in such an impressive, wide-ranging study.

Emilia Calvo

Luis García Ballester, *Galen and Galenism. Theory and Medical Practice from Antiquity to the European Renaissance*. Ed. by J. Arrizabalaga, M. Cabré, L. Cifuentes, F. Salmón. Aldershot: Ashgate, 2002 (Variorum Collected Studies Series, CS710).

Little can be added to what has already been written about Luis García Ballester (1936-2000), either in obituaries or book-reviews concerning other posthumous publications, such as *Medicine in a Multi-cultural Society*, also edited by Variorum and reviewed by M. Forcada in the second issue of this journal. In the context of Spanish scholarship, perhaps it is worth noting that, for a long time before his disciples began to put into practice his teachings, Luis García Ballester was our most international scholar in the field of history of medicine. More importantly, as far as Islamic medicine is concerned, he was –and still is– the sole Spanish historian of medicine who has approached with scientific rigor a field of research primarily cultivated by philologists, physicians and native Arabic-speakers. In this particular area, he devoted himself to fill in the gap regarding Muslim and Jewish minorities in Spain, but his works on ancient and medieval medicine also contain a wealth of learned references to Islamic medicine, with which he always interacted when studying the Western medical tradition. Therefore, while regretting the loss of a scholar who constitutes a model for emulation, historians of medicine in general

–and historians of medieval Islamic medicine in particular– must celebrate the publication of this collection of essays on Galen and Galenism. Luis García Ballester pioneered research regarding subjects that had not been formerly studied in Spain, such as Galen, a medical author who attracted his attention for more than thirty years. Likewise, in tune with what was going on beyond our frontiers, he incorporated new approaches to, and new questions in, the history of medicine, which in the case of Galen mainly became a twofold aim: firstly, the effort to place the physician (and his scientific contributions) in historical context, and secondly, the purpose to explore his influence (the so-called Galenism) throughout time. This is what makes the book under review a particularly valuable reading for many historians of medieval Islamic medicine. On the one hand, it is an authoritative bibliography on Galen (the master-key for understanding Islamic medical theory and practice) and on Galenism (which cannot be understood without the role played by the Islamic medical tradition); on the other, it is also a source of inspiration, for our knowledge of medieval Islamic medicine would greatly benefit from an attempt to apply García Ballester's methodology and historiographic approaches.

The collection of essays is divided into two sections, devoted to Galen and Galenism respectively. The first work, *Galen's Medical Works in the Context of his Biography*, is a comprehensive chronological reconstruction of Galen's biography and literary production which comes out of –and summarizes– a lifetime of study. Starting with a well-reasoned synthesis about Galen's relevance and a description of his family background and beliefs, García Ballester offers a detailed survey of how Galen's ideas, discoveries and knowledge developed throughout his long life, and how the teachers he studied with, the medical schools of the time, the intellectual and professional context he met