Morocco through Italy. Article [XI], co-authored with Gerard L'E. Turner, describes the astrolabe dedicated in 1462 by Regiomontanus to his patron, the Cardinal Bessarion. This astrolabe, presented in the context of a group of other German astrolabes from 15th-century, is qualified by King as "the most important and the most historically interesting instrument of the Renaissance". It raised a number of questions to which King-Turner had no answers in 1994, although they have been exhaustively answered by King in his later book *Astrolabes and Angels, Epigrams and Enigmas*, Stuttgart: Franz Steiner Verlag, 2007, 348 pp., with a shorter version at: web.uni-frankfurt.de/fb13/ign/Code.htm.

The last article of the book is, as we noted above, a first publication of a list of European astrolabes to ca. 1500, arranged chronologically by their region of origin, and classified according their morphology. This list was generated as a table of contents of the European astrolabe in an as yet unfinished catalogue of medieval instruments (to *ca.* 1500). A complementary list of Islamic instruments up to *ca.* 1500 is to be found in King's *In Synchrony with the Heavens – Studies in Astronomical Timekeeping and Instrumentation in Islamic Civilization*, vol. 2: *Instruments of Mass Calculation*. Studies X-XVIII, Leiden & Boston: Brill, 2005, lxxvi +1066 pp. All this enormous corpus of medieval astronomical instruments is the result of a project carried out by King in the 1990s at the Institute for the History of Science at Frankfurt University, funded by the German Research Council; even though it has not been updated, it constitutes a stimulating legacy for researchers interested in the topic.

The articles in the book are illustrated with excellent photographs. The content of each one is completed with a comprehensive bibliography. I liked the book and I strongly recommend it. Its reading, though not easy, is indispensable to those who want to unravel the secrets of astronomical instruments. Professor King gives us a taste of how we can do so.

Roser Puig

Ahmed Djebbar & Marc Moyon, *Les sciences arabes en Afrique. Mathématiques et astronomie IX^e – XIX^e siècles. Suivi de la* Nubdha fī ʿilm al-ḥisāb *d'Aḥmad Bābir al-Arawānī*. Grandvaux – Vecmas. Brinon sur Sauldre, s.a (2011). 191 pp.

The purpose of the present book is to give an outline of the astronomical and mathematical works in Arabic, produced or circulated in Egypt, the Maghrib and Subsaharan Africa (see p. 9). The project is welcome given the fact that, while the development of the Exact Sciences in Egypt is fairly well known, we know little about the Maghrib and practically nothing about the Arabic scientific manuscripts extant in the libraries of Subsaharan Africa, even

though since 1995 catalogues of several libraries in Timbuktu, Ghana, Niger, Chenguiti, Wadan and Ségou have been published, by the al-Furqān Foundation, in London, and by the Bibliothèque Nationale in Paris (cf. pp. 106-107). We should add that one of the authors, Ahmed Djebbar, is the great international authority in the field of Maghribī mathematics and to be able to read a summary of his research, and that of his collaborators, is indeed a great privilege.

The book is divided into three parts in which the authors deal with 1) Egypt (pp. 19-57), 2) the Maghrib (pp. 59-91) and 3) Subsaharan Africa (pp. 93-136). The weakest part is, obviously, the third one, but it contains an interesting analysis of the commercial routes that linked this part of Africa with the Maghrib and the East and facilitated the diffusion of knowledge (pp. 93-99). There is also a useful list of mathematical and astronomical works extant in libraries of Subsaharan Africa, obtained from the catalogues mentioned above (pp. 107-136). This is followed by an edition and French translation of the extant part (ms. Aḥmad Bābā, Timbuktu, no. 3027) of the *Nubdha fī ʿilm al-ḥisāb* by Aḥmad Bābir al-Arawānī (d. 1997, see p. 110). This is an extremely elementary treatise on Arithmetic which deals with addition, subtraction and (incomplete) multiplication, showing the survival of very old teaching techniques and giving information about the sources used by the author (pp. 137-155).

The first two parts are very fine surveys of the evolution of mathematics in Egypt and the Maghrib, including references to astronomy. Some of the ideas presented deserve special mention. On p. 27, for example, the authors refer to the delay in assimilating the knowledge developed in the centre of the Islamic Empire: while Arabic translations of Indian and Greek mathematical works begin towards the end of the 8th c., no names of active Egyptian mathematicians appear before the middle of the 9th c. In fact this gap increases to one century if we consider the case of al-Andalus, where the first productive mathematicians and astronomers begin to appear towards the middle of the 10th c. It is difficult to apply this line of reasoning to the Maghrib due to the almost total lack of information concerning the development of science before the 11th c. (see p. 64): before that date we only have the references found in biographical dictionaries which contain the names of scientists and other historical information related, for example, to the existence of a *Bayt al-ḥikma* in Qayrawān, founded by the Aghlabī Ibrāhīm II (875-902). To this one should add the belief of the authors (shared by the present reviewer) in the importance of Qayrawān as a centre of diffusion of the new scientific information arriving from the Mashriq: I am absolutely convinced that a good deal of Eastern knowledge which arrived in al-Andalus in the first half of the

10th c. actually came from Qayrawān.

Another interesting point is the transmission of scientific knowledge from the Mashriq to al-Andalus: in the chapter on Egypt, Djebbar and Moyon underline the importance of two 10th century mathematicians Aḥmad ibn Yūsuf ibn al-Dāya and Abū Kāmil (pp. 28-32). The scientific production of these two authors was transmitted to the Maghrib and al-Andalus and some of their works were translated into Latin or exerted a clear influence on the beginnings of European Science. It is interesting to see that this is, practically, the only reference in the whole book to this diffusion from East to West, in spite of the fact that the communication between Egypt and the Maghrib became easier with the establishment of the Fāṭimid Caliphate in Egypt (969-1169). I do not know exactly what happened in the Maghrib but, concerning al-Andalus, I am absolutely sure that the communication with the East was all but interrupted towards the end of the 10th c. There are some exceptions, one of them being Ibn Muʿādh al-Jayyānī (d. 1093) whose works seem to have been influenced by scientists like al-Bīrūnī and his contemporaries: interestingly, on p. 39, Djebbar and Moyon consider Ibn Muʿādh to be a disciple of Ibn Yūnus although I do not know the source of this information. In any case it seems clear that from the 11th c. onwards the only references I find in the book are related to the arrival in Egypt and the Mashriq of scientific works produced in the West (see, for example, pp. 46, 50).

As for the rest, one can only thank the authors for their splendid synthesis of the mathematical research made in the Maghrib by authors who lived between the 12th and the 14th c.: al-Qurashī, al-Ḥaṣṣār, Ibn al-Yāsamīn, Ibn Munʿim (pp. 68-77) and Ibn al-Bannā' (pp. 78-82). The pages dedicated to these mathematicians are mainly the result of research made by Djebbar and his school during the last twenty-five years, corresponding to the most brilliant period of the history of Maghribī mathematics.

Any excellent book like this one has, inevitably, a few shortcomings and I will try to summarize here three passages with which I do not agree (all of them related to astronomical matters):

On p. 36 Djebbar and Moyon mention a reference derived from Ibn Khallikān to a chandelier clock (*thurayyā*) designed by Ibn Yūnus (fl. 930). Many years ago, in 1969, E.S. Kennedy and W. Ukashah studied the Arabic text describing this clock, which had been preserved in a Beirut manuscript and had been edited by L. Cheikho in 1914. The two authors concluded that the instrument was based on a Babylonian zig-zag function and that it was too crude to be the work of Ibn Yūnus. More recently, M. Comes (1993) found an almost identical description of another instrument, also called a *thurayyā*, in the *Kitāb al-hay'a* by the Andalusian Qāsim b. Muṭarrif al-Qaṭṭān (fl.

ca. 950). Interestingly, the description of Qāsim's *thurayyā* explicitly mentions the length of the longest night (the winter solstice) in Ifrīqiya and calculates it for a latitude of some 33º; this does not fit any city in al-Andalus but corresponds well to Qayrawān and to Baghdad. We have here an example of the role of Qayrawān as a link in the chain of transmission between East and West.

On p. 64 the authors ascribe a Latin translation of Ibn Abī l-Rijāl's famous *al-Kitāb al-bāriʿ fī aḥkām al-nujūm* to Constantine the African. To the best of my knowledge this book was first translated into Castilian by Alfonso X in 1254 and the Castilian version was translated twice into Latin.

The third debatable point appears on p. 67 where the authors deal with Maghribī astronomical tables of the 12th – 14th c. and mention three authors: Ibn al-Kammād, Ibn Isḥāq and Ibn al-Raqqām. As regards Ibn al-Kammād (fl. 1116), there is no evidence of any connection of his with the Maghrib, and his *al-Zīj al-Muqtabas* (extant only in a Latin translation by Johannes de Dumpno) is calculated for the coordinates of Cordova; he is also the author of two other non-extant *zīj*es named *al-Kawr ʿalā l-Dawr* and *al-Amad ʿalā l-Abad*. As for the second author, Ibn Isḥāq (fl. Tunis and Marrākush ca. 1193-1222) left an unfinished *zīj* containing numerical tables but not canons, which was the object of five recensions: one of them, by an anonymous Tunisian astronomer, is extant in ms. Hyderabad Andra Pradesh State Library 298; another one is Ibn al-Bannā's *Minhāj*; finally, Ibn al-Raqqām (fl. Tunis, Bijāya and Granada, d. 1315) compiled three different recensions of Ibn Isḥāq's *zīj*, all of which are extant: *al-Zīj al-Mustawfī*, *al-Zīj al-Shāmil* and *al-Zīj al-Qawīm*.

These shortcomings do not detract in any way from the value of the book. I would be most grateful if Prof. Djebbar or any of his disciples could write a more detailed survey of the history of Mathematics in the Maghrib and al-Andalus, a task for which they are the only competent scholars alive today.

Julio Samsó

Sonja Brentjes, *Travellers from Europe in the Ottoman and Safavid Empires, 16th-17th centuries. Seeking, Transforming, Discarding Knowledge*, Variorum Collected Studies Series, Ashgate-Variorum, 2010, 350p.

First of all, we should welcome the apparition of this volume, which is an important contribution to Arabic and Islamic studies. There are number of reasons supporting this statement. On one hand, the choice of the topic and, specially, the period of time considered are truly attractive. Whereas cultural interchanges between Islamic countries and Europe in Medieval or Contemporary times had been a subject of many essays, the 16th and the 17th centuries were almost forgotten by most of scholars. When, in 1999, the