

Reviews

Lirola Delgado, Jorge and Puerta Vélchez, José Miguel (Dir. and eds.): *Biblioteca de al-Andalus*. Vol. III: Ibn al-Dabbāg – Ibn Kurz. Vol. IV: Ibn al-Labbāna – Ibn al-Ruyūlī. Fundación Ibn Tufayl de Estudios Árabes. Almería, 2004 & 2006. 791 pp. & 670 pp.

The need for an authoritative, extensive and updated reference work on Andalusī writers and writings has long been felt. In the fourth volume of this journal, when reviewing an earlier version of the work discussed here (*Suhayl* 4, 2004, pp. 403-404) M. Marín pointed out that the project undertaken by J. Lirola Delgado and J. M. Puerta Vélchez was much more than just an effort to bring up to date the *Ensayo bibliográfico sobre los historiadores y geógrafos árabe-españoles* by Francisco Pons Boigues, first published in 1898 and, for many years, the most important reference work on Andalusī authors, their lives and works. In fact, she accurately compared the interest of such enterprise for Andalusī studies with the role played by the works of Brockelmann and Sezgin for Islamic studies in general. The present author would like to add that, although slightly different in nature, the *Biblioteca de al-Andalus* can also be considered a specialized supplement of the *Encyclopaedia of Islam*, since, as far as Andalusī scholars are concerned, after the dramatic increase of research in this field over the last twenty years, many new entries would need to be added and, more importantly, a good many of the extant ones would need to be thoroughly updated; and yet, this

authoritative work is still an indispensable reference in recent scholarly publications. Therefore, the *Biblioteca de al-Andalus* must be wholeheartedly welcomed by a wide range of potential readers.

As stated by the editors, and as a first stage of a wider enterprise, this reference work seeks to analyse and systematize the vast intellectual production of al-Andalus by means of an alphabetic catalogue and a study of virtually all those authors who left a trace in the sources; that is, more than 1600 authors and more than 10.000 works covering the most varied fields of knowledge. Students and the general public seeking to approach a particular author, work, or aspect from al-Andalus will find a wealth of information and a most complete bibliography. Researchers and specialized scholars will meet with a doubly indispensable tool containing, on the one hand, a detailed biography based on a number of new available sources, often written by a specialist in the Andalusī author described; on the other, as the *Biblioteca de al-Andalus* draws on works such as those by F. Sezgin and C. Brockelmann –or M. Ullmann, in the case of medicine and allied sciences— researchers and specialists will also find here a thorough and up-to-date report of all the works attributed to a given author, the description of the preserved ones, the list of extant manuscripts, bibliography for each title (sources as well as secondary literature), and a well-balanced discussion regarding the “state-of-the-art” when appropriate. Additionally, lesser known Andalusī authors have been incorporated,

even if they are only shadowy figures vaguely quoted in disparate sources. The full commitment and strong scholarly background of J. Lirola and J.M. Puerta Vilchez (originators of the idea and directors of the project) mean that volumes appear at a good pace, so that the whole work will hopefully be available in four or five years, which, in comparison with the second English edition of the *Encyclopaedia of Islam*, is splendid news.

Obviously, it is not usual policy to start an encyclopaedia with the third volume as in this case. The *Biblioteca de al-Andalus* has had its particular history in which not only the complex coordination of a large number of contributors was involved. Originating with another title and publisher, its development was halted after the publication of the first volume in 2002, reviewed by M. Marín in *Suhayl* 4. Only two years later, the project reappeared with its aims strengthened, its contents improved, and its physical aspect renovated. The bio-bibliographical studies have been revised and often expanded, and a number of new Andalusī authors have been incorporated, as well as illustrative texts, maps, plates, and genealogical trees. In general, with regard to the disciplines developed by a given author, well-balanced information is to be found within each biography, since the directors have done their best to commission particular sections of each entry to specialized scholars. This reference work, a true encyclopaedia in its own right, will also be helpful to avoid the confusion amongst figures of similar names or amongst members of long-standing families, since specific entries have been devoted to each person and the onomastic chain carefully noted. Multiple indexes (of biographies, of authors' *nisba*, *nasab*, *laqab*, and *shuhra*, of places, work titles, subject-matter, genealogical trees, illustrations, and even of contributors) facilitates the location of entries in each volume.

Many entries constitute virtual monographs on Andalusī authors who, even

if known and studied for many years, have seldom deserved such a systematic and comprehensive bio-bibliographical approach in any reference work. This is particularly important with regard to Andalusī science and medicine, since works such as the *Dictionary of Scientific Biography* (ed. by Ch. C. Gillispie, 10 vols. New York: Charles Scribner's Sons, 1981), the *Medieval Science, Technology and Medicine: An Encyclopaedia*, (ed. by T. Glick, F. Wallis, S. Livesey. London and New York: Routledge, 2005), or the forthcoming *Dictionary of Medical Biography* (ed. by W.F. and H. Bynum in 5 vols.), however useful, do not include as many Andalusī scientists, and its bio-bibliographical studies are not as exhaustive as in the work under discussion. This aspect becomes evident when we look at the number and names of the Andalusī scholars who specialized in -or wrote treatises on- scientific matters (medicine, pharmacology, dietetics, astronomy, astrology, mathematics, arithmetic, veterinary medicine, etc...). In the third volume, they are the following: Abū Muḥammad Ibn al-Dhahabī, Abū Bakr Ibn al-Farrā', Aḥmad b. Fāris al-Munajjim, Abū l-Walīd b. al-Fatḥ, Abu Ishāq b. Fattūḥ, Manāḥim b. al-Fawwāl, 'Abbās b. Firnās, Ibn Galinduh, Marwān b. Gazwān, 'Abd al-Malik b. Ḥabīb, Abū l-Taqī b. Ḥaḍram, Ibn al-Hā'im, Ibn al-Hannāt, Ishāq b. al-Ḥasan al-Zayyāt, Abū l-Faḍl b. Ḥasday al-Saraqusfī, Abū Ja'far Ibn Ḥasday, Abū l-'Alā' b. Ḥassān al-Quḍā'ī, Abu Ja'far b. Ḥassān al-Quḍā'ī, 'Abd al-Raḥmān b. al-Haytham, al-Ḥusayn b. Ḥayy, Yahyā b. al-Ḥājī al-Ma'āfirī, Ibn Ḥajjāj, Ibn Ḥazm al-Qurtubī, Ibn Hishām al-Lakhmī, Ibn Hudhayl, Ibn Idrīs al-Qalalūsī, Yahyā b. Ishāq, Ibn Ishāq al-Ya'murī, Ibn Khalaf al-Istijī, Ibn Khalaf al-Murādī, Ibn Khalaf al-Ṣaydalānī, Ibn Khalaf al-Umawī, Abū 'Umar b. Khalīl al-Sakūnī, Muḥammad b. Khalṣūn, Ibn al-Khaṭīb, Ibn Khātima, Abū Bakr 'Azīz b. al-Khaṭṭāb, Abū Bakr Ibn al-Khayyāṭ, Ibn al-Kammād, and Abū 'Abd Allāh Ibn al-

Kattānī. With regard to the fourth volume, the Andalusī authors to be found are: Ibn al-Lūnq (Ibn al-Lūnquh), Ibn Luyūn, Abū ‘Amr Muḥammad b. Mañzūr, Mūsā b. Maymūn, Ibn Mu‘ādh al-Jayyānī, Ibn al-Mu‘allim al-Yahūdī, Ibn Mun‘im al-‘Abdarī, Abū ‘Abd Allāh b. al-Munāṣif, Ibn Muraṭayr, Abū Bakr b. al-Murkhī, Abū ‘Imrān Ibn Mūsā, Ibn Mūsā al-Ilbīrī, Ibn Muṭarrif al-Qaṭṭān, ‘Abbās b. Nāṣih, Aḥmad b. Naṣr, Abū l-Qāsim b. Qarlumān, Ibn Qaṣṭār, Ibn al-Qaṭṭān, Ibn al-Raqqām, Ibn Rashīq al-Taghlibī, Ibn Razīn al-Tujībī, Abū Bakr b. Rifā‘a, Khālid b. Rūmān, Ibn al-Rūmiyya, Abū l-Walīd b. Rushd al-Ḥafīd, and his son Abū Muḥammad ‘Abd Allāh b. Abī l-Walīd b. Rushd.

Once the *Biblioteca de al-Andalus* is completed, a whole picture of Andalusī culture and -for what we are concerned here- Andalusī science will, for the first time, be available to a much wider audience in the academic community, both to specialists in medieval Islamic science and Muslim Spain, within and abroad Spanish borders. The author of this review endorses M. Marin’s words about the great service done by Jorge Lirola and José Miguel Puerta to the scientific community, not only with their own contribution as editors and coordinators of this ambitious collective project, but also as originators of an endeavour which certainly deserves to become as indispensable and authoritative as other well-known reference works.

Cristina Álvarez Millán

Richard Lorch, *Al-Farghānī, On the Astrolabe. Arabic Text Edited with Translation and Commentary by ...*
Munich, Franz Steiner Verlag, 2005.

The book under review presents the first known description of the construction of the astrolabe produced in Arabic, namely the text written around 856-857 AD by al-Farghānī, known as *al-Kāmil*. The author of

the edition, translation and study of this text is a specialist on the field who has produced a number of excellent studies on this topic, including the one carried out together with Kennedy and Kunitzsch on the melon-shaped astrolabe, a particular variant of the same instrument.

Al-Farghānī’s *al-Kāmil* has raised the interest of several specialists. F. Charette studied the tables included in the treatise (“Al-Farghānī’s Tables for Constructing Astrolabes” *Jubilee Symposium on al-Farghānī*, Uzbek Academy of Sciences, Samarqand and Fergana, Uzbekistan, September 1998), although his study is still unpublished, and Lorch presented an overview of the contents of this treatise at the 7th *Maghribi Colloquium on the History of Arabic Mathematics* held in Marrakech in 2002 (Cf. R. Lorch, “Al-Farghānī’s Treatise on the Astrolabe” *Actes du Tème Colloque Maghrébin sur l’Histoire des Mathématiques Arabes*. Marrakech, 2005. vol. 1 pp. 263-270).

The importance of this treatise is that it seems to be the first of this kind. In the introduction to his *al-Kāmil*, al-Farghānī says that, although some scholars had provided guidelines for making the astrolabe, nobody before him had laid down the principles of construction and use of the instrument in a book. Al-Farghānī’s aim in *al-Kāmil* was to describe the theoretical basis of the instrument as well as the practical details.

The book starts giving information on the characteristics of the astrolabe, and on al-Farghānī’s life and works and, especially, on the treatise under study here, *al-Kāmil*. We also find information on the vocabulary used by al-Farghānī in the text and the value ascribed by him to the obliquity of the ecliptic ($\epsilon = 23;33^\circ$), probably taken from Yaḥyā ibn Abī Mañṣūr, and the precession of the equinoxes that seems to be of 1° in 100 years, following Ptolemy’s value. Finally some information is given on two texts based on *al-Kāmil*: an anonymous sum-

mary preserved in Tunis and an extension of it carried out by al-Bakhāniqī in the 14th century.

There are nine known manuscripts of the work, which the author of the study has used to carry out the edition of the text. Three of them are preserved in the Staatsbibliothek in Berlin, two are in Teheran, and the rest are in Meshhed, London, Kastamonu, and Paris. There are also some fragments which have not been used in the edition. Most of them are in Cairo.

The edition of the Arabic text and the English translation are found on facing pages (from p. 21 to 377) which facilitates the reading of the text.

The treatise studied here is divided into seven chapters, three of them presenting the theory of projection, one giving tables for the construction of the astrolabe, and three giving the practical elements for the construction of the astrolabe.

The first chapter, very short, presents the mathematical preliminaries and begins with a lemma about subcontrary sections of a cone which is equivalent to the one to be found in Apollonius on the subject (*Conics*, 15). It follows that circles on the sphere are projected into circles on the plane, which is the fundamental theorem of stereographic projection. The chapter is completed with a proof that the line through the pole of projection and through the centre of a circle on the sphere does not meet the plane at the centre of the image of the circle.

The second chapter demonstrates mathematically how all the celestial circles are projected as circles and straight lines on the plane. It describes the projection of the parallels to the equator as concentric circles, the meridian circles as radii, the zodiac (and its divisions), the horizon and *almucantars*, the azimuths and other circles. The author proves, for example, how the centres of the azimuths lie on the perpendicular bisector of the line joining the projections of the zenith and of the *naẓīr*, its opposite point.

The third chapter is devoted to the calculation of the positions of the centres of the celestial circles. In fact, the first proposition found in this chapter is fundamental for mapping the zodiac, the *almucantars* and the azimuths, and all the circles of the sphere. The calculation of the declination of the fixed stars is also explained. According to the author, the stars should be placed on the astrolabe according to their distances from the equator and their mediation. The procedure explained by al-Farghānī can be found in Ptolemy's *Almagest* (VIII, 5). In the first place the parallel circles are determined and, from them the diameters and centres of all the circles of the astrolabe can be found. Then, the zodiac and its divisions, next the fixed stars and, finally, the *almucantars* and azimuth circles are also determined.

One of the distinctive characteristics of this treatise is that the author compiled tables to enable the artificer to draw the various lines on the instrument. The fourth chapter, from page 116 to page 293, is devoted to the following five tables, as calculated by the methods of the previous chapter:

1. Table of radii of the course parallel to the equator i.e. distances from the centre of the plate for every degree from 1 to 180°, that is, from the South pole to the North pole.

2. Table of right ascensions, for every degree from 1 to 90°.

3. Table of Fixed Stars: this gives the longitude, latitude, distance from equator, *mediatio*, and distance from centre for 25 stars. The star table is dated 225 Yazdijird (856-7 AD) and is adapted from the table in *al-Zij al-Mumtaḥan* by adding 15' to the longitudes

4. Table of *almucantars* for the Equator and latitudes from 15 to 50°. The table gives the distance of the centre from the centre of the plate and the value of the radii.

5. Table of azimuths for 90 degrees of the first quadrant, also for latitudes 15 to 50°

Chapters 5 and 6 discuss how to delineate the northern and the southern astrolabes respectively, drawing the circles and placing the stars on them.

Finally, the last chapter contains a criticism of different types of astrolabe. In fact al-Farghānī maintains that no other type of astrolabe is possible and that none of the other proposed methods for making the astrolabe are correct.

Among the instruments criticised there is the melon-shaped astrolabe, which would later be described in detail by astronomers such as Ḥabash al-Ḥāsib (9c.) and al-Bīrūnī (d. 1037). In fact, it is perfectly possible to construct it, as Lorch, Kennedy and Kunitzsch demonstrated in their study (Cf. *The Melon-Shaped Astrolabe in Arabic Astronomy. Texts edited with translation and commentary* by E.S. Kennedy, P. Kunitzsch and R.P. Lorch. Franz Steiner Verlag, Stuttgart, 1999). Its principal disadvantage is that circles on the sphere do not become circles on the plane, meaning that a great deal of calculation and joining up of points is required. Al-Farghānī also

dismissed the astrolabe based on the orthographic projection, known after al-Bīrūnī as “cylindrical”.

The study includes an appendix with variant passages in three of the manuscripts including an extra table in one of them devoted to Southern almucantars of latitude 30°. There is a second appendix with titles and colophons in the manuscripts, and a third appendix including the edition and translation, also on facing pages (pp. 393-397), of an excerpt from the treatise “On Projection” by Ibn al-Ṣalāḥ (12c.), from the copies extant in two manuscripts in Istanbul, where the author criticises al-Farghānī’s work in a very intemperate way. According to the author of the study, this criticism does not seem justified. The study ends with a mathematical summary and a complete bibliography.

In sum, this excellent study provides a very valuable account of the early development in Arabic of scientific interest in astronomical instruments, and especially astrolabes.

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