

From: Thomas Hockey et al. (eds.). *The Biographical Encyclopedia of Astronomers*, Springer Reference. New York: Springer, 2007, pp. 739-740

Courtesy of  Springer
science+business media

http://dx.doi.org/10.1007/978-0-387-30400-7_905

Marrākushī: Sharaf al-Dīn Abū ‘Alī al-Ḥasan ibn ‘Alī ibn ‘Umar al-Marrākushī

François Charette

Flourished (Egypt), second half of the 13th century

Marrākushī was one of the major astronomers in 13th-century Egypt. As his name indicates, he was originally from Maghrib, but his major astronomical activities took place in Cairo during the second half of the 13th century. It is not too surprising, given the turmoil affecting al-Andalus and Maghrib at that time, that a scholar from the westernmost part of the Islamic world would decide to emigrate to Egypt, whose capital Cairo was already established as the major cultural center of the Arab-Islamic world. Unfortunately, Marrākushī does not figure in any biographical sources, so we must rely on the scanty evidence provided by his own work in order to shed some light on his life.

Marrākushī is best known for his remarkable *summa* devoted to spherical astronomy and astronomical instrumentation, entitled *Jāmi‘ al-mabādi’ wa-l-ghāyāt fī ‘ilm al-mīqāt* (Collection of the principles and objectives in the science of timekeeping), which is intended as a comprehensive encyclopedia of practical astronomy. This work is the single most important source for the history of astronomical instrumentation in Islam. It was the standard reference work for Mamluk Egyptian and Syrian, Rasūlid Yemeni, and Ottoman Turkish specialists of the subject.

This voluminous work (most complete copies cover 250 to 350 folios of text, diagrams, and tables) has occasionally been qualified as a mere compilation of older sources without original contents. While it is true that this synthetic work heavily depends upon the works of predecessors, it is definitively original and without any precedent. In fact, no single part of the work can be proven to reproduce the words of an earlier author, except for the few sections where Marrākushī clearly states from whom he is quoting. In those occasional cases where an earlier source is mentioned, Marrākushī's text always turns out to be either a major rewriting of the original or an independent paraphrase.

The *Jāmi‘ al-mabādi’ wa-l-ghāyāt* is well written and logically organized, and employs a relatively literate style that is unusual for a work on technical topics. The author is clearly a very competent astronomer and also occasionally displays his knowledge of ancillary disciplines such as philosophy.

The *Jāmi‘* is made up of four books on the following topics:

- (1) On calculations, in 67 chapters. This book gives exhaustive calculatory methods (without

proofs) concerning chronology, trigonometry, geography, spherical astronomy, prayer times, the solar motion, the fixed stars, gnomonics, *etc.*

- (2) On the construction of instruments, in seven parts. The first part concerns graphical methods in spherical astronomy and gnomonics. The second through the seventh parts then treat the construction of portable dials, fixed sundials, trigonometric and horary quadrants, spherical instruments, instruments based upon projection, and observational and planetary instruments.
- (3) On the use of selected instruments, in 14 chapters.
- (4) The work ends with a “quiz” - *i.e.*, a series of questions and answers - in four chapters, whose aim is to train the mental abilities of the students.

An interesting confirmation of Marrākushī's Maghribi origin is provided by his geographical table: 44 of the 135 localities featured in the list of latitudes are written in red ink to indicate that the author visited these places personally and determined their geographical latitude *in situ* through observation. These 44 locations begin along the Atlantic coast of today's western Sahara, include numerous cities and villages in the Maghrib, two cities in al-Andalus (Seville and Cádiz), and continue along the Mediterranean coast *via* Algiers, Tunis, and Tripoli to end up in Alexandria, Cairo, Minya, and Tinnis. Marrākushī's western Islamic heritage is also apparent in the fact that his chapters on precession and solar theory depend upon the works of Zarqālī and Ibn al-Kammād.

Marrākushī appears to have written his major work in Cairo during the years 1276-1282. First, a solar table is given for the year 992 of the Coptic calendar (Diocletian era), corresponding to the years 1275/1276. Also, some examples of chronological calculations are given for the year 1281/1282, and his star table in equatorial coordinates is calculated for the end of the same year.

The arrival of Marrākushī in Cairo coincided with the establishment of the first offices of *muwaqqits* (timekeepers) in Egyptian mosques. His work can thus be seen as fulfilling a specific demand of Mamlūk Egyptian society (more specifically, the mosque administration, the muezzins and *muwaqqits*, instrument-makers, interested students, *etc.*). But the lack of any reference to the profession of the *muwaqqit* or to the milieu of the mosque would seem to indicate that Marrākushī was an independent scholar without institutional affiliation. The motive he gives for writing his *magnum opus* is the inadequate education of instrument-makers and their methodological failures. His introduction suggests that his target audience was instrument-makers, *i.e.* artisans and practitioners of applied science, who were not professional astronomers. However, this is somewhat contradicted by the technical level of the book, which certainly assumes the reader to know at least the basics of arithmetic, geometry, spherics, algebra, and trigonometry. Thus the *Jāmi' al-mabādi' wa-'l-ghāyāt* seems more likely to be a comprehensive reference work of intermediate to advanced level intended for active and apprentice *muwaqqits*, and for specialists of timekeeping and instrumentation who were associated with them.

Marrākushī must have died, most probably in Cairo, between the years 1281/1282 and *circa* 1320, since two early 14th-century sources refer to him as being deceased (an anonymous treatise on timekeeping entitled *Kanz al-yawāqīt*, datable to 723 H/1323 and preserved in MS Leiden Or. 468, f. 91r, and a treatise on instrumentation by Najm al-Din al-Misrī composed in Cairo *circa* 1330).

Selected References

Charette, François (2003). *Mathematical Instrumentation in Fourteenth-Century Egypt and Syria: The Illustrated Treatise of Najm al-Dīn al-Miṣrī*. Leiden: E. J. Brill.

Delambre, J. B. J. (1819). *Histoire de l'astronomie du moyen âge*. Paris. (Reprint: New York: Johnson Reprint Corp., 1965). (Delambre used the unpublished manuscript of J. J. Sédillot's translation of Marrākushī for his section on Islamic astronomy.)

King, David A. (1991). "al-Marrākushī, Abū 'Alī al-Ḥasan b. 'Alī." In *Encyclopaedia of Islam*. 2nd ed. Vol. 6, p. 598. Leiden: E. J. Brill.

——— "The Astronomy of the Mamluks." *Isis* 74 (1983): 531-555. (Reprinted in King, *Islamic Mathematical Astronomy*, III. London: Variorum Reprints, 1986; 2nd rev. edn., Aldershot: Variorum, 1993.)

——— (1993). *Astronomy in the Service of Islam*. Aldershot: Variorum.

——— (1996). "On the Role of the Muezzin and the Muwaqqit in Medieval Islamic Society." In *Tradition, Transmission, Transformation: Proceedings of Two Conferences on Pre-modern Science Held at the University of Oklahoma*, edited by F. Jamil Ragep and Sally P. Ragep, with Steven Livesey, pp. 285-346. Leiden: E. J. Brill.

——— (2004). In *Synchrony with the Heavens: Studies in Astronomical Timekeeping and Instrumentation in Medieval Islamic Civilization*. In *The Call of the Muezzin* (Studies I-IX). Vol. 1. Leiden: E. J. Brill.

Lelewel, Joachim (1850-1857). *Géographie du moyen-âge*. 5 Vols. and an atlas. Vol. 1, pp. 134-142 and atlas, plate 22. Brussels.

Mancha, J. L. (1998). "On Ibn al-Kammād's Table for Trepidation." *Archive for History of Exact Sciences* 52: 1-11.

Mercier, Raymond (1977). "Studies in the Medieval Concept of Precession (Part II)." *Archives internationales d'histoire des sciences* 27: 33-71.

Schmalzl, Peter (1929). *Zur Geschichte des Quadranten bei den Arabern*. Munich.

Schoy, Carl (1923). *Die Gnomonik der Araber*. Munich.

Sédillot, Jean-Jacques (trans.) (1834). *Traité des instruments astronomiques des Arabes*. 2 Vols. Paris. (Reprint, edited by Fuat Sezgin, Frankfurt an Main: Institut für Geschichte der Arabisch-Islamischen Wissenschaften). (Printed in two volumes under the editorship of his son L. A. Sédillot; French translation of the first half [Book 1 and the first three parts of Book 2] of Marrākushī's book. The rest of Book 2 was summarized in a rather inadequate fashion by L. A. Sédillot [see below]. The third and fourth books have never been investigated. This work represents one of the first Islamic astronomical texts to have been translated into a European language in the modern period and was given a prize by the Académie des inscriptions et belles-lettres in 1822.)

Sédillot, Louis-Amélie (1841). *Mémoire sur les instruments astronomiques des Arabes*. Paris. (Reprint, edited by Fuat Sezgin, Frankfurt an Main: Institut für Geschichte der Arabisch-Islamischen Wissenschaften, 1989.)

——— (1842). *Mémoire sur les systèmes géographiques des Grecs et des Arabes*. Paris.

Sezgin, Fuat (2000). "Geschichte des arabischen Schrifttums." In *Mathematische Geographie und Kartographie im Islam und ihr Fortleben im Abendland: Historische Darstellung*. Vol. 10, pp. 168-172.

Frankfurt an Main: Institut für Geschichte der Arabisch-Islamischen Wissenschaften.