

## Ibn Ishāq: Abū al-‘Abbās ibn Ishāq al-Tamīmī al-Tūnisī

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### *Flourished* **Tunis (Tunisia) and Marrakech (Morocco), circa 1193-1222**

Ibn Ishāq was a Tunisian astronomer who left an unfinished *zīj* (an astronomical handbook with tables) with a few canons and instructions for their use; this marked the first of a family of Maghribī astronomical works of this kind. The *zīj* was heavily influenced by the Toledan astronomer **Ibn al-Zarqālī**, and therefore characteristically contained sidereal mean motion tables, a model for the trepidation of the equinoxes, a solar model with variable eccentricity, and Zarqālī's correction of the Ptolemaic lunar model as well as some of his parameters. Before Ibn Ishāq, we only know for the Maghrib that at the beginning of the 11th century the famous astrologer Ibn Abī al-Rijāl al-Qayrawānī composed a *zīj*, which, unfortunately, has been lost.

Until recently the only known references to Ibn Ishāq were from:

- (1) the famous historian Ibn Khaldūn (1332-1382), who says, in his *Muqaddima*, that he was an astronomer at the beginning of the 13th century who composed his *zīj* using (his own) observations as well as the information he obtained through correspondence with a Sicilian Jew who was competent in astronomy and a good teacher; and
- (2) **Ibn al-Bannā' al-Marrākushi** (1256-1321) who states in his *Minhāj al-ṭālib fī ta'dīl al-kawākib* that Ibn Ishāq made observations in Marrakech, that his book was written on cards or independent sheets (*baṭā'iq*), and (in one manuscript) that some of his tables were calculated for the year 1222.

Much more information on Ibn Ishāq has been gathered due to the discovery, by David A. King, of Hyderabad, Andhra Pradesh State Library MS 298, copied in Homs (Syria) in 1317, which contains the most important collection of materials derived from Ibn Ishāq as well as from other (mainly Andalusian) sources. This compilation was made by an anonymous Tunisian astronomer who flourished *circa* 1267-1282. It contains a strange table with the names and dates of astronomers who established, purportedly by observation, the position of the solar apogee and the obliquity of the ecliptic. One of them is Ghiyām ibn Rujjār in 1178, who can be identified as William II (who reigned in Sicily between 1166 and 1189), the son of William I and grandson of Roger II. William II is undoubtedly the patron of the unnamed Jewish astronomer mentioned by Ibn Khaldūn. Another of the "observers" is Ibn Ishāq himself, and the date given is 1193. The date (1222) mentioned in one manuscript of Ibn al-Bannā's *Minhāj* is confirmed by Ibn Ishāq's table of the solar equation that reaches a maximum value of  $1^{\circ} 49' 7''$ . This amount can be calculated (using Ibn Ishāq's own tables based on a Zarqālian solar model with variable eccentricity) precisely for the year 1222.

Ibn Ishāq seems to have left only one set of numerical tables (nos. 6-58 of the Hyderabad manuscript) for the computation of planetary longitudes, eclipses, equation of time, parallax and, probably, solar and lunar velocity. These tables were not accompanied by an elaborate collection of canons, although they contained instructions of some kind for the use of a few tables. His *zīj*, therefore, was unfinished and not ready to be used. This is why the

anonymous compiler of the Hyderabad manuscript tried to finish this work and to “edit” Ibn Ishāq's *zīj* by adding both canons and numerical tables. The whole constitutes an impressive collection of materials in which the predominant influence is clearly Andalusian, but we do not know yet to what extent Ibn Ishāq's contributions are original. His solar tables are clearly Zarqālian in origin; the maximum equations of the center for the planets are Ptolemaic for Mars, Mercury, and the Moon; and the case of Venus ( $1^\circ 51'$ ) may derive from a new computation of the solar eccentricity using Zarqālī's solar model with variable eccentricity. On the other hand, the values for Saturn ( $5^\circ 48'$ ) and Jupiter ( $5^\circ 41'$ ) seem new.

This unknown Tunisian compiler was not the only “editor” of the tables of Ibn Ishāq. Two other contemporaries prepared “editions” of the same work. One of them was Ibn al-Bannā' who wrote his *Minhāj* with the same purpose. The other was [Muhammad ibn al-Raqqām](#) of Tunis and Granada, who is the author of three different versions of Ibn Ishāq's *zīj*.

The *zījes* derived from Ibn Ishāq were used in the Maghrib until the 19th century, for they allowed the computation of sidereal longitudes that were used by astrologers. We have a limited amount of information about the observations made in the Maghrib in the 13th and 14th centuries, which established that precession exceeded the amounts fixed in Andalusian trepidation tables and that the obliquity of the ecliptic had fallen below the limits of Zarqālī's model and tables. This explains the introduction of eastern *zījes* in the Maghrib from the 14th century onward: Those of [Ibn Abī al-Shukr al-Maghribī](#) and [Ibn al-Shātir](#) were known in the late 14th century, while the *Zīj-i jadīd* of [Ulugh Beg](#) did not reach the Maghrib until the end of the 17th century. In them, mean motions were tropical and constant precession was used instead of trepidation, and there were no tables to compute the obliquity of the ecliptic. They were used by astronomers while astrologers stuck to Ibn Ishāq's tradition.

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