

From: Thomas Hockey et al. (eds.). *The Biographical Encyclopedia of Astronomers*, Springer Reference. New York: Springer, 2007, pp. 357-359

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science+business media

[http://dx.doi.org/10.1007/978-0-387-30400-7\\_439](http://dx.doi.org/10.1007/978-0-387-30400-7_439)

## Fārisī: Muḥammad ibn Abī Bakr al-Fārisī

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Died **circa 1278/1279**

Fārisī was a scholar of wide learning and the author of some nine works on medicine, music, magic, and astronomy, which give us substantial information on both religious and mathematical astronomy. Little is known of Fārisī's life. His father appears to have emigrated from Persia, hence the name Fārisī. He was born in Aden and worked there at the Rasulid court of Sultan al-Muẓaffar Yūsuf (1249?-1295), the father of **Ashraf**. He probably died in 1278/1279. There is some confusion in the Arabic historical and the modern biobibliographical sources concerning him, possibly due to the subsuming of two different persons under one and the same name.

The confusion concerning the biographical dates of Fārisī is also reflected by the treatises attributed to him. Here only the astronomical treatises that we can most probably ascribe to Fārisī will be mentioned. The *Tuḥfat al-rāghib wa-turfat al-ṭālib fī taysīr al-nayyirayn wa-ḥarakāt al-kawākib* is a treatise on folk astronomy in 12 chapters, preserved in Milan and Berlin, which deals with chronology and calendars, the zodiacal signs and the lunar mansions, the determination of the position of the Moon and the Sun, timekeeping, the determination of the prayer times, reckoning twilight by the lunar mansions, finding the ascendant, lunar crescent visibility, and the *qibla*, i. e., the sacred direction of Islam towards Mecca. The latter is needed for religious obligations such as the five daily prayers of Islam. This treatise provides particularly interesting and important information for the history of Islamic astronomy and its connection with the religion of Islam. Fārisī mentions the definitions of the five daily prayers, using a simple shadow scheme and a list of the values for the midday shadows at Aden for timekeeping by day, and using the lunar mansions as a star clock for timekeeping by night and for the determination around the morning twilight. The *Tuḥfa* contains three schemes; these organize the known inhabited world around the Kaaba, the focus of Muslim worship in Mecca, to determine the *qibla* by means of the winds and the risings and settings of the fixed stars and the Sun.

Fārisī also wrote an astronomical handbook with tables in the mathematical tradition of Islamic astronomy, known as *al-Zīj al-mumtaḥan al-muẓaffarī* (probably also known as *al-Zīj al-mumtaḥan al-khazā'inī*). It is dedicated to Fārisī's patron, al-Muẓaffar Yūsuf and written for the sultan's treasury (*al-khazā'in*). In the introduction to *al-Zīj al-mumtaḥan al-'arabī*, a recension of Fārisī's *Zīj* preserved in Cambridge, the anonymous author characterizes Fārisī's *Zīj* as the most elegant work that has been prepared on astronomy according to the longitude of Yemen. Fārisī bases his *Zīj* mainly on the observations of al-Fahhād (*circa* 1150) because, as he says in the introduction, the accuracy of the calculations and the demonstrations on which they are founded are superior to any that had done before, and because, more than any other *zīj*, it was compiled closer in time to the observations on which it was based. The 40 chapters and the extensive tables of Fārisī's text contain the standard

information of a medieval *zīj*, such as calendars and chronology, planetary and spherical astronomy, timekeeping, and trigonometric procedures. Fārisī probably computed the spherical astronomical tables as well as the mean motions of the planets and the equations of their apogees, starting on 10 January 1262, using 63° 30' for the geographical longitude and 14° 30' for the geographical latitude, corresponding to Yemen or possibly Aden. In contrast to his folk astronomical treatise, he uses in his *Zīj* geometrical procedures for the determination of the *qibla*. The tables of Fārisī's handbook were widely employed in Yemen for several centuries and were adapted by later Yemeni astronomers. Various compilers of agricultural almanacs have copied from this *zīj* the coordinates for the asterisms of the lunar mansions and the *anwā'* (star groupings used for weather prognostication), and the times for their risings and settings throughout the year. Fārisī makes critical annotations to 28 other *zījes*, including those of **Kūshyār ibn Labbān**, **Ibn Yūnus**, **Yaḥyā ibn Abī Maṣṣūr**, **Battānī**, and **Abū Ma'shar**. Most of the treatises mentioned by Fārisī are no longer extant, and *al-Zīj al-mumtaḥan al-muḥaffarī* is the only source providing us material about them. This *zīj* is a particularly rich source for al-Fahhād, for it names six *zījes* by this author, none of which are extant. One of these is based on observations made in 1176 and mentions an observation of a conjunction of Saturn and Jupiter on 10 December 1166.

Also compiled for the Sultan's treasury was Fārisī's *Nihāyat al-idrāk fī asrār 'ulūm al-aflāk*, a treatise on astrology in three sections that is preserved, among other places, in Cairo. The first two sections of the *Nihāya* contain information on the *ikhtiyarāt* (elections), the third section on the 12 astrological houses. Dates of completion are garbled; a possible date is 1262. In the introduction, three other works by Fārisī, that he wrote for his patron's treasury, are mentioned. One of them deals with sundials (*al-Risāla al-zilliyya* or *Risālat al-zill al-mabsūt*); another contains an eclipse computer (*al-Risāla al-muḥaffariyya fī al-'amal* (or *bi-'l-āla?*) *al-musammā bi-'l-ṣafīḥa al-jawzahariyya*); the third treatise mentioned may be Fārisī's *Zīj*. The first two works are no longer extant. The *Nihāya* was known outside Yemen.

Also known outside Yemen was Fārisī's *Kitāb Ma'ārij al-fīkr al-wahīj fī ḥall mushkilāt al-zīj*. It is also preserved, among other places, in Cairo and deals with a discussion of the standard topics of planetary and spherical astronomy that one will find in the introductions of *zījes*.

For the sake of completeness, mention is made of an Arabic translation made by Fārisī of an astrological treatise written by Jāmāsp, a contemporary of Zarathustra; it is preserved in a single copy in Milan.

Fārisī is significant for a number of reasons. By writing treatises both in the popular tradition of astronomy (his *Tuḥfa*) and in the mathematical tradition (his *Zīj* as well as his *Ma'ārij* and his *Nihāya*), he brings together in a single person two different traditions that are often seen in opposition: "religious astronomy," represented in folk astronomical treatises with their discussions of prayer times, the *qibla* and the lunar crescent visibility, and mathematical traditions of astronomy and astrology inherited from the ancients. Fārisī is also significant because of the substantial information he records of both traditions. In his *Zīj*, he mentions numerous scholars and their treatises, most of them not preserved, as we have seen in the case of al-Fahhād and his observations. Besides Byzantine texts, this is the most important source on this astronomer. In his *Tuḥfa*, Fārisī explains the astronomical alignment of the Kaaba in Mecca and elucidates the principle behind the *qibla* schemes, schemes that are part of a tradition representing the Kaaba as the center of the world.

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