From: Thomas Hockey et al. (eds.). *The Biographical Encyclopedia of Astronomers*, *Springer Reference*. New York: Springer, 2007, pp. 362-363

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http://dx.doi.org/10.1007/978-0-387-30400-7_443

Fazārī: Muḥammad ibn Ibrāhīm al-Fazārī

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Born **possibly (Iraq), 8th century**

Died **possibly Baghdad, (Iraq), early 9th century**

Fazārī played a pivotal role in the initial development of the Arabic astronomical tradition from Indian, Sasanian, and Greek sources, but almost nothing of his own works remains with us. Not even his identity is entirely certain: there was some ambiguity among medieval biographers as to whether "Ibrāhīm ibn Ḥabīb al-Fazārī" and "Muḥammad ibn Ibrāhīm ibn Ḥabīb al-Fazārī" were two different people, namely father and son. It is now assumed, however, that the various references to the astronomer Fazārī mean the same individual.

This individual was apparently a descendant of an old family in Kūfa (near Najaf in modern Iraq) and worked on astronomy and astrology – particularly the composition of astronomical handbooks with tables for computing celestial positions (*zīj*es) – at the court of al-Manṣūr (reigned: 754–775) and later ʿAbbāsid caliphs. He helped supervise the casting of the horoscope that selected the auspicious date for the founding of Baghdad in 762. In the early 770s, at the caliphʿs request, he collaborated in the translation of a Sanskrit astronomical text brought to Baghdad by an Indian astronomer. Fazārī based his *Zīj al-Sindhind al-kabīr* (Great astronomical tables of the *Sindhind*; from Sanskrit siddhānta, "system" or "treatise") on that work. Probably a decade or so later, he wrote another *zīj* entitled *Zīj ʿalā sinī al-ʿArab* (Astronomical tables according to years of the Arabs). Fazārī also composed – apparently in imitation of the style of Sanskrit technical treatises in metrical verse – a long poem on astronomy and/or astrology, *Qaṣīda fī ʿilm* (or *hayʾat*) *al-nujūm* (Poem on the science [or configuration] of the stars). Some scattered remarks on these works, with occasional citations from them, are found in the works of later authors.

Also ascribed to Fazārī, but known only from their titles, are *Kitāb al-Miqyās li-ʾl-ẓawāl* (Book on the measurement of noon), *Kitāb al-ʿAmal bi-ʾl-asṭurlāb wa-huwa dhāt al-ḥalaq* (Book on the use of the armillary sphere), and *Kitāb al-ʿAmal bi-ʾl-asṭurlāb al-musaṭṭaḥ* (Book on the use of the astrolabe). Fazārī was said to have been the first Muslim to construct a plane astrolabe; indeed, according to several biographers, he was a pioneer and positively unrivaled in his mastery of the astral sciences. The 11th-century astronomer **Bīrūnī** (from whom comes most of our knowledge of details of Fazārīʿs astronomy) is somewhat more critical, especially about probable mistakes of Fazārī and his colleague **Yaʿqūb ibn Ṭāriq** in interpreting the terms or techniques of the Sanskrit astronomical work they translated.

Although, as noted above, Fazārī based his first *zīj* primarily upon this Sanskrit text (probably

entitled *Mahāsiddhānta* or Great Siddhānta), he seems to have added to it a good deal of material from other sources. The *Mahāsiddhānta* apparently belonged to the Indian astronomical tradition associated with the 7th-century *Brāhmasphuṭasiddhānta* of **Brahmagupta**, but the features ascribed in the comments of later authors to the *Zīj al-Sindhind al-kabīr* are an eclectic (and sometimes flatly contradictory) mix, including parameters and procedures derived not only from rival Indian schools, but also from the Sasanian Persian astronomical tradition, with a little Ptolemaic influence as well.

Fazārī is credited with the innovation of converting the Indian planetary longitude computus involving billions of revolutions (suffering, as **Hāshimī** remarked, from "the length of its operations in multiplication and division and the tedious nature of the computations") into ones using sexagesimal values of mean motions. (In fact, Indian astronomers too had tabulated and used sexagesimal mean motions.) His second *zīj*, according to its title and a surviving table copied from it into later works, was designed to enable the user to find the desired positions for dates in the Arabic calendar. Even these fragmentary references suffice to show that Fazārī's contributions had a significant impact on nascent Arabic astronomy, although his work as a whole did not withstand competition from later (and presumably better-organized) treatises.

Selected References

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Pingree, David (1970). "The Fragments of the Works of al-Fazārī." *Journal of Near Eastern Studies* 29: 103–123. (The extant information about Fazārī's writings are collected herein; few additional details have come to light since.)

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