

From: Thomas Hockey et al. (eds.). *The Biographical Encyclopedia of Astronomers*, Springer Reference. New York: Springer, 2007, pp. 1054-1055

Courtesy of  Springer
science+business media

http://dx.doi.org/10.1007/978-0-387-30400-7_1273

Shīrāzī: Quṭb al-Dīn Maḥmūd ibn Mas‘ūd Muṣliḥ al-Shīrāzī

F. Jamil Ragep

Born Shīrāz (Iran), October/November 1236

Died Tabrīz (Iran), 1311

Quṭb al-Dīn al-Shīrāzī was one of the most prominent theoretical astronomers of the 13th century. Born into a family of physicians, he studied with his father Ḍiyā’ al-Dīn al-Kāzarūnī at the then new Muẓaffarī Hospital. When Shīrāzī was 14, his father died but even at that young age he was able to assume his father's position at the hospital. He continued his studies, at first with an uncle, also a physician, and later with two prominent teachers, Shams al-Dīn Kīshī and Sharaf al-Dīn Būshkānī. These studies included most prominently the “general principles” of **Ibn Sīnā**'s *Canon of Medicine* as well as Sufi mysticism, which had been another important part of his father's life. Uncharacteristic for someone of his talents and searching intellect, Shīrāzī remained in Shīrāz until the age of 24, most likely because of the turmoil in Iran brought on by the Mongol invasions.

But the Mongols also provided Shīrāzī with a unique opportunity, that of studying at the Marāgha Observatory with its director **Naṣīr al-Dīn al-Ṭūsī**. Though Shīrāzī was probably seeking to further his medical education, he soon turned to serious studies of philosophy and the mathematical sciences, especially astronomy, and would become Ṭūsī's most prominent student. In Marāgha, he also studied with the philosopher Najm al-Dīn al-Kātībī and with the renowned astronomer **Mu‘ayyad al-Dīn al-‘Urḏī**. Even though based in Marāgha, Shīrāzī seems to have traveled a great deal for both teaching and learning. Sometime in his mid-30s, before the death of Ṭūsī in 1274, he may have become estranged from his teacher and left Marāgha. Accounts vary, but this may have had to do with the secondary role he was assigned at the observatory, or to not being named by Ṭūsī in the *Īlkhānī Zīj*, the handbook with tables that was produced at Marāgha. **Wābkanawī** states that Shīrāzī, though asked by Ṭūsī's son Aṣīl al-Dīn to help revise the *Zīj*, did so only in a perfunctory way because of his sense of having been slighted.

Sometime after leaving Marāgha, Shīrāzī traveled to Anatolia and studied for a time in Konya, perhaps meeting the famous Sufi poet Jalāl al-Dīn al-Rūmī. He was appointed chief judge in Malatya and Siwās and began to take an active role in political affairs, including acting as an emissary from the Mongol court to the Mamluks in 1282. Sometime around 1290, Shīrāzī retired to the city of Tabrīz in Azerbaijan where the Mongol court was located. But because of a falling out with the chief minister, he seems to have retired from government service and devoted himself to writing and teaching. It is of some interest that Shīrāzī dedicated his major philosophical encyclopedia, the *Durrat al-tāj*, to the ruler of an independent principality in western Gilān in 1306; but later that year, the principality was brought under the control of the Mongols, and Shīrāzī was probably back in Tabrīz shortly thereafter.

Shīrāzī wrote three major works in theoretical astronomy - the *Nihāyat al-idrāk fī dirāyat al-aflāk* (The highest attainment in comprehending the orbs), dedicated to the Vizier Shams al-Dīn al-Juwaynī (who may have been responsible for his judgeship) and completed in November 1281; *al-Tuḥfa al-shāhiyya* (The imperial gift), dedicated to the Vizier Amīr Shāh ibn Tāj al-Dīn Mu‘tazz ibn Ṭāhir in Siwās in July or August 1285; and *Fa‘alta fa-lā talum* (You've done it so don't blame [me]), a supercommentary on the *Tadhkira fī ‘ilm al-hay‘a* by Ṭūsī. All

have the characteristic four-part division of a *hay'a* (theoretical astronomy) work: an introduction, a section on the structure of the celestial region, a section on the structure of the terrestrial region, and a section on the sizes and distances of the celestial and terrestrial bodies. The *Nihāya* is the longest of the works, at some 300 or more pages in manuscript. It tends to present more of the work of Shīrāzī's predecessors than does the *Tuḥfa*. *Fa'alta* is a peculiar work in that Shīrāzī is ostensibly commenting on the commentary of the *Tadhkira* by a certain al-Ḥimādhī; in reality, it is a harshly worded attack on this author who, according to Shīrāzī, has plagiarized his *Tuḥfa*. This makes it an interesting work for the history of the notion of intellectual property. In addition to these straightforward astronomical works, there are also large sections related to astronomy in two of Shīrāzī's Persian works - the *Durrat al-tāj* and his *Ikhtiyārāt-i Muẓaffarī*, which was dedicated to the local ruler of a small emirate in Kastamonu. Large parts of the latter seem to be translations from the *Nihāya*.

Shīrāzī's works have not received the study they deserve, which is unfortunate since they promise to shed much light on the so called Marāgha school. Kennedy (1966) noted a number of innovative astronomical models in the *Nihāya* and the *Tuḥfa*, but Saliba showed that many of these models were due to Mu'ayyad al-Dīn al-'Urḍī. Shīrāzī should still be credited with new models for the Moon and Mercury (both in the *Tuḥfa*). He creatively uses what are now known as the 'Urḍī lemma and the Ṭūsī couple to achieve combinations of uniform, circular motions (as required by ancient physics for motions in the heavens) that resolve the irregular motions resulting from [Ptolemy's](#) equant for Mercury and from his choice of the center of the universe as the reference point of motion for the Moon's eccentric orb.

Shīrāzī gives high praise to astronomy in his introduction to the *Nihāya* and echoes Ptolemy who, in his introduction to the *Almagest*, referred to physics and theology as guesswork as opposed to the true knowledge offered by the mathematical sciences. Indeed, it would seem that Shīrāzī somewhat disagreed with his mentor Ṭūsī on this point. This manifested itself in the question of the Earth's motion - Ṭūsī had held that the matter had to be left to the natural philosophers since there was no decisive observational or mathematical proof, whereas Shīrāzī, not wishing to leave such an important matter to "guesswork," insisted that there could be devised an observational test. This test took the form of two rocks of different weights thrown straight up in the air; Ṭūsī had said that in such a case a rotating Earth could carry the air and whatever was in it at the same speed, but Shīrāzī thought that objects of different weights would be carried with different speeds. Since we do not observe such an effect, the Earth must be at rest.

Shīrāzī's influence in astronomy was widespread. His words were copied and studied for several centuries. Often referred to simply as 'Allāma (supremely learned), one finds citations to him by almost all later Islamic theoretical astronomers. In medicine, he was known for his extensive commentary on the first book of Ibn Sīnā's *Canon*, and he was to have a major influence on optics by recommending that his student Kamāl al-Dīn al-Fārisī undertake a study of [Ibn al-Haytham's](#) *Kitāb al-manāẓir*.

Selected References

Kennedy, E. S. (1966). "Late Medieval Planetary Theory." *Isis* 57: 365-378. (Reprinted in E. S. Kennedy, et al, *Studies in the Islamic Exact Sciences*, edited by David A. King and Mary Helen Kennedy, pp. 84-97. Beirut: American University of Beirut, 1983.)

Morrison, Robert (2005). "Qutb al-Dīn al-Shīrāzī's Hypotheses for Celestial Motions." *Journal for the History of Arabic Science* 13: 21-140.

Ragep, F. J. (1993). *Naṣīr al-Dīn al-Ṭūsī's Memoir on Astronomy (al-Tadhkira fī 'ilm al-hay'a)*. 2 Vols. New York: Springer-Verlag.

——— (2001). "Freeing Astronomy from Philosophy: An Aspect of Islamic Influence on Science." *Osiris* 16: 49-71.

——— (2001). "Ṭūsī and Copernicus: The Earth's Motion in Context." *Science in Context* 14: 145-163.

Saliba, George (1979). "The Original Source of Qutb al-Dīn al-Shīrāzī's Planetary Model." *Journal for the History of Arabic Science* 3: 3-18.

——— (1996). "Arabic Planetary Theories after the Eleventh Century AD." In *Encyclopedia of the History of Arabic Science*, edited by Roshdi Rashed, pp. 58-127. London: Routledge.

Walbridge, John (1992). *The Science of Mystic Lights: Quṭb al-Dīn al-Shīrāzī and the Illuminationist Tradition in Islamic Philosophy*. Cambridge, Massachusetts: Harvard University Press. (Excellent source for Shīrāzī's life and works.)

Wiedemann, E. (1986). "Quṭb al-Dīn Shīrāzī." In *Encyclopaedia of Islam*. 2nd ed. Vol. 5, pp. 547-548. Leiden: E. J. Brill. (Important for a listing of Wiedemann's articles on Shīrāzī.)