From: Thomas Hockey et al. (eds.). *The Biographical Encyclopedia of Astronomers*, *Springer Reference*. New York: Springer, 2007, pp. 33-34

http://dx.doi.org/10.1007/978-0-387-30400-7_35

ʿAlī al-Muwaqqit: Muṣliḥ al-Dīn Muṣṭafā ibn ʿAlī al-Qusṭanṭīnī al-Rūmī al-Ḥanafī al-Muwaqqit

İhsan Fazlıoğlu

Born **probably Istanbul, (Turkey)**

Died **Istanbul, (Turkey), 1571**

Muṣṭafā ibn ʿAlī was one of the most important figures of 16th-century Ottoman astronomy. He was nicknamed *al-muwaqqit* (the timekeeper) because of his theoretical and practical studies of astronomical timekeeping (*ʿilm al-mīqāt)* and work on astronomical instruments, and is considered to be the founder of the Ottoman tradition of *ʿilm al-mīqāt* and practical astronomy. To a great extent Muṣṭafā ibn ʿAlī continued the movement of the Turcification of Graeco–Hellenic and classical Islamic astronomy literature that was started by **Muḥammad al-Qunawī**. He also wrote books in the field of mathematical geography.

Born in Istanbul in the early 16th century, Muṣṭafā ibn ʿAlī was educated in the wake of the reigns of Sultan Mehmet the Conqueror and Sultan Bāyazīd II (reigned: 1481–1512), during which time the sciences were nurtured. He took courses from the leading scholars of the time, including **Mīram Čelebī** who continued the tradition of astronomy established by his great grandfather **ʿAlī Qūshjī**, his friends, and students. In addition, Muṣṭafā ibn ʿAlī inherited the previous achievements of *ʿilm al-mīqāt* (timekeeping) from Muḥammad al-Qunawī, who had relied upon the work of **Khalīlī**, and **Ibn al-Shāṭir** before him. As the *muwaqqit* (timekeeper) of the Sultan Selīm I Mosque in Istanbul, Muṣṭafā ibn ʿAlī came to be known as the *Koca Saatçi* (grand timekeeper). His precise calculations for determining time were accepted as a primary source not only within the Ottoman State but also, according to Ewliyā čelebi, in Western Europe. After 1560, he was appointed *Müneccimbası* (head astronomer), replacing Yusūf ibn ʿUmar, and thus became well known as "Müneccimbası Muṣṭafā čelebi." Upon his death in 1571, Muṣṭafā ibn ʿAlī was replaced by **Taqī al-Dīn**.

It is evident from the prefaces of his books that Muṣṭafā ibn ʿAlī began writing at a rather early age during his tenure as timekeeper of the Yavuz Sultan Selīm Mosque. One of his early works was *Iʿlām al-ʿibād fī aʿlām al-bilād* (in Turkish) on mathematical geography. Written in 1525, it was presented to Sultan Süleymān I and included astronomical and geographical information such as the distances to Istanbul (as the crow flies) of 100 major cities stretching from China to Morocco, their longitudes and latitudes, their *qibla*s (directions toward Mecca), and their shortest and longest days. It is clear from the introduction that the author regarded Istanbul as the center of the world, and that he chose cities that were along the lines of the Ottoman army conquest from Istanbul. Given that the book was presented to Sultan Süleymān, it could well be that it was

produced for practical needs of the state. There are over 30 copies of the work in the Istanbul manuscript libraries, so it must have been widely read. (Süleymaniye Library, Hacı Mahmud MS 5633 is the author's copy.)

Muṣṭafā ibn ʿAlī's second work on geography, entitled *Tuḥfat al-zamān wa-kharīdat al-awān* (in Turkish), deals with cosmography, astronomy, and geography; a distinguishing feature of the work is its extensive application of mathematics to geography. Also written in 1525, it is clearly meant to complement his *Iʿlām al-ʿibād fī aʿlām al-bilād*. The Introduction provides general information about the science of geography and its sources. Chapter One offers detailed information about planetary orbs (*falak*s), planets, and stars; Chapter Two deals with the Earth, seas, islands, rivers, and mountains; Chapter Three takes up the seven climes as well as distances, longitudes, and latitudes of 150 cities within these seven climes; and Chapter Four discusses *zawāl* time. Muṣṭafā ibn ʿAlī relied on earlier Islamic works, namely **Jaghmīnī**'s *al-Mulakhkhaṣ fī ʿilm al-hayʾa al-basīṭa* (An introduction to astronomy), **Qāḍīzāde al-Rūmī**'s commentary on Jaghmīnī's work, Damīrī's (died: 1405) para-zoological encyclopedia *Ḥayāt al-ḥayawān*, and Qazwīnī's (died: 1283) cosmological work *ʿAjāʾib al-makhlūqāt*.

The fact that Muṣṭafā ibn ʿAlī dedicated most of his important books to Sultan Süleymān and his grand viziers, and that he wrote almost all his works on astronomy and geography in Turkish rather than Arabic, indicate that he took the needs of the Ottoman state bureaucracy and society into account. A vast amount of the Graeco–Hellenic and Islamic astronomical corpus was transferred into Turkish. Indeed, Muṣṭafā ibn ʿAlī made a conscious effort to transform Turkish into a language of science. Out of his 24 astronomical works, 21 are in Turkish and the other three in Arabic. (See *OALT*, Vol. 1, pp. 177–179.) By writing in Turkish he was able to reach a greater audience (*i. e.*, beginning students of astronomy and timekeepers) as indicated by the number of extant manuscripts and late copies. Using Turkish was also an advantage when referring to Ottoman geographical locations, especially in Istanbul, the Balkans, and Anatolia.

Many of Muṣṭafā ibn ʿAlī's books deal with astronomical instruments. His *Faraḥ Fazā*, dedicated to Sultan Süleymān's Grand Vizier Ibrāhīm Pasha, examines the construction and use of the horary quadrant (*al-rubʿal-āfāqī*) that he claims as his invention (Veliyüddîn Efendi MS 2282/3). Muṣṭafā ibn ʿAlī's *Kifāyat al-qanūʿ fī al-ʿamal bi-ʾl-rubʿ al-maqṭūʿ* (On the quadrant, in Arabic) clarifies and makes accessible the *Iẓhār al-sirr al-mawḍūʿ* by the famous astronomer-*muwaqqit* **Sibṭ al-Maridīnī** (died: 1506) who incorporated the traditions of Khalīlī and Ibn al-Shāṭir.

In 1529, Muṣṭafā ibn ʿAlī wrote *Kifāyat al-waqt li-maʿrifat al-dāʾir wa- faḍlihi wa-ʾl-samt* (in Turkish). Some 120 copies of the work, also known as *Risāla fī al-muqanṭarāt*, are extant; it deals with various aspects of geometry, trigonometry, and astronomy and also mentions an astronomical instrument called *rubʿ al-muqanṭarāt* (astrolabic quadrant). Muṣṭafā ibn ʿAlī's *Tashīl al-mīqāt*, written in 1529, discusses mathematical and astronomical features of timekeeping and specifically the usage of the astronomical instrument *al-rubʿ al-mujayyab* (sine quadrant). The book has five separate versions indicating that this work was updated. If we consider all five redactions as one work, there are presently about 100 copies that were widely used.

Another work written in 1529 is Muṣṭafā ibn ʿAlī's *Risālah-i jayb-i āfāqī* (in Turkish) in which he mentions the construction, usage, and mathematical properties of an astronomical instrument called *al-mujayyab al-āfāqi*. There are currently 50 known copies. His *Ḥall dāʾirat muʿaddil al-nahār* (in Turkish), written in 1531 at the request of Grand Vizier Ayās Pasha, shows how to use this instrument according to the latitude of Istanbul (Nuruosmaniye MS 4891/4, author's copy). The *Risālat al-asṭurlāb al-Selīmī* (in Turkish), his most voluminous work, was written in 1544 and was based on the *Zīj* (astronomical handbook) of **Ulugh Beg**. In it, Muṣṭafā ibn ʿAlī examines the construction, mathematical properties, and usage of the astrolabe. His other works deal with

various other instruments and aspects of timekeeping.

In his astronomical corpus, Muṣṭafā ibn ʿAlī al-Muwaqqit utilized a high level of geometry, trigonometry (especially spherical trigonometry), and numerical analysis; however, he writes in a simple language and presents easy and practical solutions. These features were instrumental in his textbooks and handbooks being used over many years in *Muwaqqithânes* (timekeeping institutions attached to mosques) and *madrasa*s (schools) throughout a wide geographical area.

Selected References

Atâî, Nevi-zāde (1989). *Hadā'ik al-hakā'ik*. Istanbul, p. 286. Gag- ri Yayinlari.

Bağdadlı, İsmail, Pasa (1945). *Īḍāḥ al-maknūn*. Vol. 1. Istanbul: Milli Eg-itim Bakanlig-i Yayinlari, pp. 103, 203.

——— (1955). *Hadiyyat al-ʿārifīn*. Vol. 2. Istanbul: Milli Eg-itim Bakanlig-i Yayinlari, p. 435.

Brockelmann, Carl. *Geschichte der arabischen Litteratur*. 2nd ed. Vol. 2 (1949): 217; Suppl. 2 (1938): 216. Leiden: E. J. Brill.

Bursalı, Mehmed, Tahir (1923). *Osmanlı Müellifleri*. Vol. 3. Istanbul, 1342 H, pp. 300–301

İhsanoğlu, Ekmeleddin, *et al*. (1997). *Osmanlı Astronomi Literatürü Tarihi* (*OALT*) (History of astronomy literature during the Ottoman period). Vol. 1 (no. 82). Istanbul: *IRCICA*, pp. 161–179.

——— (2000). *Osmanlı Coğrafya Literatürü Tarihi (OCLT)* (History of geographical literature during the Ottoman period). Vol. 1. Istanbul: *IRCICA*, pp. 49–52.

Kātib Čelebī, *Kashf al-ẓunūn ʿan asāmī al-kutub wa-'l-funūn*. Vol. 1 (1941), cols. 118, 366, 407, 519; Vol. 2 (1943), col. 1501. Istanbul: Milli Eg-itim Bakanlig-i Yayinlari.

King, David A (1995). "Rubʿ" (quadrant). In *Encyclopaedia of Islam*. 2nd ed. Vol. 8, pp. 574–575. Leiden: E.J.Brill.

Taeschner, Franz (1923). "Die geographische Literatur der Osmanen." *Zeitschrift der Deutschen Morgenländischen Gesellschaft N. F.* 2, 77: 31–80, esp. 46.

Toderini, Giambatista (1789). *De la littérature des Turcs*. Translated into French from the Italian by l'abbé de Cournand. 3 Vols. Paris, Vol. 1, 145–146, 153. (Originally published as *Letteratura turchesca*. Venice, 1787.)