

Sally P. Ragep. *Jaghmīnī's Mulakhkhaṣ: An Islamic Introduction to Ptolemaic Astronomy*. Springer, 2016. xii + 354 pages. ISBN: 9783319319926.

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The *hay'a* books (Configuration of the World) first began to appear in Islamic lands as a distinct genre of astronomical works characterized by a specific structure during the 6th/13th century. We could make a list of fourteen treatises on *hay'a* only from 526/1132, when al-Kharāqī (d. 553/1158) wrote his *Muntaha al-Idrāk*, the first comprehensive one, to 684/1285, when Quṭb al-Dīn al-Shīrāzī (d. 710/1311) finished his *al-Tuḥfa al-Shāhiyya*.¹ Regarding the large number of such treatises and their extant manuscripts, most historians believe that they were written for educational purposes. Another important witness for this claim is the books that are mostly short introductions to this particular topic. These short introductions were useful for students and anyone who wanted to study astronomy. *Al-Mulakhkhaṣ fī al-hay'a al-basīṭa*, written by Maḥmūd ibn Muḥammad ibn 'Umar al-Jaghmīnī (d. after 618/1221), is a sample of these introductions.

Now, with Sally P. Ragep's book, a critical edition and English translation of the *Mulakhkhaṣ*, along with a helpful introduction, is in our hands. The book has four main chapters: "Introduction"; "Editorial Procedures"; "Edition, Translation, and Apparatuses"; "Commentary on the Edition and Translation." Additionally, at the end of the book one finds two appendices, "Jaghmīnī's works" and "Works derivative from the *Mulakhkhaṣ*", as well as a glossary.

Jaghmīnī is known by his two compendium works, *al-Mulakhkhaṣ* and *Qānūnča* (in medical science). But some contemporary researchers believe that there were

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1 For a brief history of the *hay'a* texts see: F. J. Ragep, *Naṣīr al-Dīn al-Ṭūsī's Memoir on Astronomy* (New York: Springer-Verlag, 1993), 29-40; George Saliba, *A History of Arabic Astronomy* (New York: New York University Press, 1994), 15-39; Y. Tzvi Langermann, "Arabic Cosmology". *Early Science and Medicine* 2, no. 2 (1997): 185-213; Amir Mohammad Gamini, "Diversity and Variety of Hay'a Books in Islamic Civilization". *Tarikh-e Elm* 11, no. 2 (2014): 243-90 (in Persian).

two Jaghmīnis, one who lived in the late 6th/12th and early 7th/13th century and wrote *Mulakkkhaṣ*, and another one who lived in the first half of 8th/14th century and wrote *Qānūnča*. Ragep provides a short review on the literature of the two Jaghmīnis (8-15) and then concludes on basis of some new evidence that there was only one Jaghmīni “who wrote multiple scientific works” (5). In the first part of her introduction, she dates these two works based on newly discovered manuscripts and contends that the *Mulakkkhaṣ* was written in the early 7th/13th century and the *Qānūnča* in the late 6th/12th century.

Ragep confirms her claim about Jaghmīni’s biography on the basis of his works’ dedications. She talks about Badr al-Dīn al-Qalānisi (d. after 602-3/1205-6), to whom he dedicated the *Mulakkkhaṣ*, and Shihāb al-Dīn Abū Sa’d ibn ‘Imrān al-Khwārizmī al-Khīwaqī (d. after 615/1218), to whom he dedicated the *Fī quwa al-kawākib wa da’ fihā*. According to biographical references, both of these scholars lived during the late 12th and early 13th centuries (16-19; 21-24). By using this supporting evidence, she does her best to determine exactly when Jaghmīni lived.

The introduction also includes an account of the history of *hay’a* up to the composition of the *Mulakkkhaṣ*. Historians agree that Ptolemy’s *Planetary Hypotheses* was the principle source for *hay’a* works; however, we know almost nothing about Ptolemy’s predecessors and the Greek scholars after him who wrote similar works. Ragep provides a brief history of the scant historical evidence that introduces Ptolemy’s predecessors and successors in the Hellenistic world. This brief history was absent in previous works on the history of *hay’a*, and thus her account is quite helpful.

As mentioned before, the first *hay’a* books were written around the first half of the 6th/12th century. Nevertheless, we could address some works written during the early centuries of Islam that are similar to the subsequent *hay’a* works. We could call them “the predecessors of *hay’a* works”, like *Tarkīb al-aflāk* by Ya’qūb ibn Ṭāriq (fl. 2nd/8th century); *De Scientia Motus Orbis* by Māshā’allāh (d. ca. 200/815), which exists only in its Latin translation; and *Jawāmi’ ‘ilm al-Nujūm* by Farghāni (fl. 3rd/9th century). Ragep also mentions some other books in a section entitled “The Moderns.” The word “Moderns” is a translation of *al-muta’akkkhirūn* and, as she says, it “is not uncommon to find references in *hay’a* works referring to the opinions of the “Moderns”... which originally meant those Islamic scholars flourished in the ninth century (or later)...” (45).

Ragep shows that Jaghmīni referred to these “modern” works when reporting some new, improved parameters for planetary motions, like the inclination of the ecliptic and the movement of the Sun’s apogee, instead of Ptolemy’s “authority”.

Maybe this is why Ragep describes Jaghmini's *Mulakhkhaṣ* as "an Islamic Introduction to Ptolemaic Astronomy" in the book's title. But the title raises an interesting question: Did Muslim scholars have a different type of astronomy? The answer is not complicated. Before the Maragha School and the 13th century *hay'a* works, all of the works belonged to one literary tradition, to which the *Planetary Hypotheses* also belonged. While Muslim scholars did improve some parameters based upon their new observations, they also used solid spherical orbs instead of simple geometrical models (e.g., circles and points). However, as their configuration of the world remained similar to Ptolemy's, we could say that the *hay'a* works are "introductions to Ptolemaic astronomy".

The other section, "The Post-Moderns," refers to the authors who wrote their astronomical works after the 3rd/9th century and up until Jaghmini's time. In this class, Ragep mentions al-Birūnī's (d. after 442/1050) *Kitāb al-tafhīm*, Ibn al-Haytham's (d. ca. 432/1040) *al-Maqāla fī hay'at al-'ālam*, and Kharaqī's three astronomical works, namely, *Muntaha al-idrāk fī taqāsīm al-aflāk*, *al-Tabṣira fī 'ilm al-hay'a* and *'Umda*, and Qaṭṭān al-Marwazī's (d. 548/1153) *Gayhānshinākht*. Except for *Kitāb al-tafhīm*, an astrological course book that contains some subjects of *hay'a*, all of the others are important works in the *hay'a* tradition.

Ibn al-Haytham's book is the first one to consider spherical solid orbs, *Gayhānshinākht* is the first *hay'a* Persian book, and al-Kharaqī's works are the first samples that follow the order found in the *hay'a* books. Ragep emphasizes two points: the *hay'a* books were written in Arabic and Persian simultaneously, and there are two kinds of books: the comprehensives and the introductions. It is possible that an author would write both types of books or one in Arabic and the other in Persian. Al-Kharaqī, for example, wrote *Muntaha* as a comprehensive book, *al-Tabṣira* as an introduction in Arabic, and *'Umda* in Persian.

Ragep concludes the introduction by stating that Jaghmini's parameters are obviously extracted from Ptolemy's "authorities" and that al-Battānī (d. 317/929) and al-Kharaqī's *Tabṣira* (more than his *Muntaha*) are the other main sources of structure and material for him. Therefore, it was a very useful book for "Beginners" (63).

Finally, I would like to make some comments on Ragep's critical edition, for which she used five manuscripts. She emphasizes that the manuscripts of the *Mulakhkhaṣ* are not close to the original version and thus tried to provide a version as close as possible to the original (p. 69). The critical edition is well-prepared and the Arabic text (with an English translation) will be useful for researchers. The only shortcoming, if any, is that although it might seem easy to use, the text apparatus has been placed at the end of the critical edition. This makes it difficult to compare the established text with the text apparatus.