

A Walk through the Iranian Heavens: Spherical and NonSpherical Cosmographic Models in the Imagination of Ancient Iran and Its Neighbors by Antonio C. D. Panaino

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A Walk through the Iranian Heavens: Spherical and Non-Spherical Cosmographic Models in the Imagination of Ancient Iran and Its Neighbors by Antonio C. D. Panaino

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A Walk through the Iranian Heavens is an innovative and focused study by the well-known scholar Antonio Panaino. This monograph looks at cosmography in ancient Iran and adjacent cultures, with attention to the problem of sphericity in antiquity. We might take for granted that the Greeks, after a point, operated with the model of a spherical Earth, but what about Iran, which had its own Mazdean mythology and worldview but was still influenced by Hellenic culture? At what point did ancient Iran become exposed to and/or adopt a spherical Earth as well as the model of a cosmic sphere? How did this model of the universe affect the Zoroastrian worldview? These are the questions that come to mind when approaching *A Walk through the Iranian Heavens*.

One of the main and most important conclusions of this monograph is that the image of an Iranian world placed at the margins of “higher” civilizations in a provincial condition in which scholarly controversies about cosmology, cosmography and uranography were minimal and devoid of dialectic complexity becomes unsound. [151]

The challenge, then, is to demonstrate that the Iranian world of late antiquity did, in fact, engage in complex intellectual and theological discussions about these topics, just as we see in the Greek, Indian, and Chinese realms. *A Walk through the Iranian Heavens* competently takes on this challenge and offers a perspective that provides a truly transcultural view of ancient Iran

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and demonstrates that scholars can, and ought to, extend their surveys to surrounding cultures in late antiquity in order to grasp the realities of intercultural exchanges fully. This intellectual exercise is, I believe, well executed by Panaino, and others would do well to emulate his methodology. At the start of the study, before turning to the evolution of the sphere in Greek cosmologies, some discussion is afforded to the difficulties in framing the cosmological model of the Mesopotamians, particularly whether sphericity was ever a part of Mesopotamian cosmology. In the past, some scholars proposed that Mesopotamians ought to have conceived of a cosmic sphere because of their documented use of circular models for some celestial motions; but Panaino states, “The crude inference that a circular model implies a spherical system is groundless, and its application very risky” [23]. He also points out the problem of identifying any cosmic spherical model in ancient Egyptian cosmology, which conceived of the sky as a flat roof. Vedic cosmology in India similarly did not conceive of a celestial sphere, though “the images of a bowl (*kapāla*-), a vault or an egg (*aṇḍa*-) did occur” [24].

Panaino’s discussion of these various traditions is thoughtful and gives due consideration to the voices of multiple scholars, past and present. I might also add that Indian Buddhist cosmology (which is related but not identical to Vedic cosmology) also displays no awareness of cosmic spheres or a spherical model of any sort, since Buddhists believed the physical world was composed of Mount Meru (or Sumeru) and the Four Continents, all of which were situated atop a disk covered with vast oceans. This type of cosmology was described in the earliest extant Buddhist literature, such as the *Āgamas*, and restated in major treatises of later periods, such as the *Abhidharmakośa-bhāṣya*. There is no evidence in any Indian Buddhist text of which I am aware that conceived of a spherical Earth or celestial sphere, even though Indian astronomy after the fourth or fifth century certainly knew that the Earth is (roughly) spherical [see [Kotyk 2021](#)].

Comparing cosmologies is indeed a challenging endeavor, in part because we often have to rely on fields and experts external to our own area of study to carry out such research adequately. There are frequently extended arguments over historical connections between cultures in which either unidirectional or multidirectional influences are argued. I believe that Panaino navigates these issues well in the book at hand. He also focuses on specific aspects of Iranian cosmography and identifies foreign components and origins, whether they be Greek or even Mesopotamian, with plenty of reference to earlier solutions proposed by other scholars. The breadth of secondary scholarship considered in this process is immense.

The chief concern of *A Walk through the Iranian Heavens* is Iranian cosmography. The sources used for this are diverse, ranging from the Avesta to the *Bundahišn*, and include reference in particular to primary sources in Greek. There are numerous theses that must be addressed, and Panaino engages in a diplomatic discussion with past scholars. Some of the issues at stake are not exclusively unidirectional in terms of cultural transmissions either. For instance, Panaino writes, “I must observe that Charles Kahn’s attempt at rejecting any Iranian influence on Anaximander’s cosmic system is completely unacceptable on methodological grounds” [99]. These sorts of concern are inevitably contentious, but the book negotiates them well.

When we consider the conception of the Earth and sky in ancient Iranian myth, it is Ahura Mazdā who is credited with the design of both. In one instance, the Earth is conceived of as round, likened to a wheel, whereas the sky is associated with the shape of a chariot. Panaino cautions us not to imagine anything based on this myth prematurely:

It would be a great mistake to conclude that the Iranians had already developed a categorization of the cosmic sphere, imagining it as a real mundus or as a globus with two superimposed and symmetric hemispheres, with the earth exactly located at the center. [34–35]

This is an important point to be kept in mind when evaluating premodern cosmologies from any culture, since roundness or a circularity does not necessarily imply or require a sphericity, particularly since, as Panaino quoting Cullen points out, the simile of the chariot and wheel is also seen in ancient China [36–37]. As the investigation of the Iranian sources progresses, Panaino draws attention to *Yašt* 13.2, an early text which posits a cosmic egg and a concave sky, none of which presumes sphericity [40–41].

A Walk through the Iranian Heavens focuses on the evolution of Iranian cosmography, in particular when it comes to the Sasanian period (AD 224–651) and the years following the collapse of this dynasty. Panaino demonstrates that

the Mazdean astronomers/astrologers, while adopting a Ptolemaic spherical model, did not avoid the incorporation of earlier traditions, whose core was based on the presence of three (or multiple) layers of the sky (later eventually reshaped even into a seven levels system). [101]

Thus, we have to consider multiple contexts in order to grasp the significance of Hellenistic cosmography (specifically that of the astronomer Claudius Ptolemy) as it interacted with earlier Iranian traditions, an interaction that resulted in a unique development:

Although the Sasanian astronomical model was based on the knowledge of a spherical system, whose structure was certainly of Greek origin, because the texts refer to clear Ptolemaic concepts, its final shape, at least in the framework of a cosmological text like the *Bundahišn*, was the fruit of a strong theological mediation with a traditional inherited scheme. [107]

Panaino's conclusion illustrates that, although scientific input from other cultures is certainly evident, we must still consider how it was received through the lens of Zoroastrian theologians. Much of the relevant content is indeed described in the *Bundahišn*, so readers unfamiliar with this text and its language might wish to read this great work on late Zoroastrian cosmology in a new English translation in [Agostini and Thrope 2020](#).

Panaino draws attention to the absence of “an epistemologically technical treatment concerning the shape of the Mazdean cosmic models” in modern scholarship, which has tended to engage in linguistic analysis, rather than engage with scientific technicalities [43]. This is a critical methodological consideration, since linguistic or philological analysis alone might not be sufficient to grasp how the Earth and cosmos were shaped according to the imagination of ancient Iranians.¹ To this end, Panaino deploys a number of tools to describe at length, and in fine detail, ancient Iranian cosmography as well as uranography. I found these detailed descriptions intriguing for my own purposes, since I often look at Buddhist cosmology, and since there was evidently a common Indo-European heritage underlying the Iranian and Indian models.

One important observation in this study is that “there is no reason to presume that the idea of sphericity was present in Iran before a, reasonably later, probably post-Achaemenid, Greek influence” [54]. This positions the concept of sphericity in a critical multicultural context. Moreover, Panaino notes that

it would be peculiar to presume knowledge of this concept in Iran before in Mesopotamia [*sic*], and that it would be even more farfetched to ascribe its elaboration to the Proto-Iranian phase, as if it were an ancestral datum belonging to the early Aryan heritage. [54]

¹ I believe this observation is applicable to fields outside Iranology, particularly the study of historical astrology, in which it is insufficient to merely understand the vocabulary involved. One must also understand the technicalities of horoscopic charts and observational astronomy as premodern people did. In this sense, scholars must “step into the shoes” of the subjects we research, as best we can, and attempt to reconstruct their worldview based on the available evidence.

Indeed, if cosmic sphericity could be traced back to some early Aryan heritage, we would expect the Vedic materials to display such a concept, but they do not.

In addition, *A Walk through the Iranian Heavens* addresses the role of the planets and their introduction into the ancient Iranian worldview. This is an interesting question that crosses many ancient cultural boundaries, and so this monograph steps beyond its title and delves into planetary theories from an early period onward. Panaino notes:

The most archaic models of the universe [in Mazdean sources], in fact, ignore the existence of the planets as distinguished astral bodies, because only stars, Moon and Sun are clearly mentioned. [68]

This parallels what we observe in ancient India, where systematic knowledge of the planets (apart from phenomena such as the Evening Star) is not evident in either the Vedas or in early Buddhist texts. However, the planets in later Zoroastrian literature, as Panaino notes, are present, but “another bold contradiction emerges when we observe that the demonization of the planets excluded any direct description of their different spheres” [107]. The positioning of the planets in Iranian cosmography is, therefore, a complex matter (with several contradictory elements), and Panaino certainly explores this significance and the challenges posed by theological factors, especially the demonization of the planets, despite the fact that they are named after major divinities of the Zoroastrian pantheon, for example, Jupiter is Ohrmazd/Ahura Mazdā [142].

The planetary spheres in Hellenistic cosmology are another important aspect of research that Panaino addresses. He observes that

while the Sasanian scholars certainly knew of the existence of different Hellenistic models (and probably not only them, but also those modified in India), this evidence does not allow us to presume that they entirely accepted the “planetary hypotheses” described in these works as exactly representing the physics of the heavens. [110]

I think that the clear contrast and discussion of scientific and theological models, and the interaction between them, is executed well in the book, and that readers will appreciate the detailed discussion.

Another part of this work [120–131] addresses the ideological application of cosmology in the Sasanian political theater, most notably in the chamber of the royal throne from the late Sasanian period, as described in a number of non-Persian sources, which Panaino translates. This chamber contained a mechanical instrument propelled by hydraulics that made representations of the stars, Sun, and Moon all revolve around the Earth and accurately

reflect what is observed. This, of course, brings to mind the Antikythera mechanism from a much earlier century in the Mediterranean but also the hydraulic-powered armillary sphere produced in China in the eighth century, where such technology seems to appear quite suddenly.² The question of such transcultural transfers of technology in late antiquity affords many opportunities for research, so hopefully this part of Panaino's book prompts further studies of this sort.

We further read about the challenges of integrating scientific astronomical concepts into an earlier cosmos rooted in a religious imagination [139–150]. Panaino remarks that

theological scruples heavily interfered with the elaboration of a consistent cosmic model, and this phenomenon gives us just superficial ideas of the complexity emerging from the theoretical debate known by some levels of the Sasanian and post-Sasanian Mazdean society. [139]

Here the book extends outside Iran to figures such as Origen and others of the Hellenistic and Syriac worlds to highlight the contrasts and conflicts of cosmologies in antiquity, during which time scientific intellectual traditions and religious groups could mutually influence one another. The examples presented by Panaino are, I believe, also relevant to scholars in religious studies engaged in the ongoing discussion of science *versus* religion in pre-modern contexts. Panaino emphasizes the need to take into consideration the diverse philosophical and religious views present in Sasanian Iran and clearly states, “It would be a big mistake to underscore the importance of the philosophical and theological debates at the highest levels of the Sasanian society” [146]. This leaves open a lot of room for future discussion on intellectual competitions in late Sasanian Iran.

A Walk through the Iranian Heavens is important not only for those in the field of Iranian Studies but also for scholars involved in the histories of science and religion as well as the interface between science and religion. The primary challenge for many readers might be the religious and cultural background knowledge necessary to grasp the details of this book. Fortunately, a survey by Panaino on Zoroastrian cosmologies and astrology in *The Wiley Blackwell Companion to Zoroastrianism* [see [Panaino 2015](#)] can serve as a suitable introductory resource before delving into the monograph at hand.

² For discussion of this armillary sphere, see [Kotyk 2018](#), 8.

This book should, I think, be recommended reading for a graduate course in the history of science and naturally also in any program that deals with ancient Iran. Students would gain much from reading it and emulating some of the research methodologies explained in it, especially the focus on linguistic analysis of terms and the careful technical analysis of cosmographic, spatial, and astral concepts expressed in ancient literature. Panaino's research in this and other publications very carefully evaluates and examines fine details in the texts and other evidence at hand, exercising great precision in philology and iconography. This approach to research is taught less and less to students in the present day, particularly in North America; but the time spent in developing a solid scientific apparatus for the study of ancient texts and intellectual traditions is well worth the effort.

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