Cosmographical Readings of the Qurʾan

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Abstract

The Qurʾan is the primary source of inspiration for Muslims across the ages. As Muslims, the task is to make the Qurʾan relevant to our own context. That task is however challenged every time the conception of the world changes. The change from a medieval Aristotelian to a modern heliocentric view of the world represented just such a challenge. But regardless of

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the differing worldviews, the Qurʾan's descriptions of natural phenomena remained relevant. Accordingly, the aim of this article is to demonstrate the correspondence between the Qurʾanic description of natural phenomena and various scientific paradigms. It claims that the Qurʾan is relevant to both past and present scientific paradigms, even if these paradigms conflict with one another. This claim is illustrated through the example of cosmographies. It shows that the Qurʾan's cosmographical verses can be read considering both ancient and modern paradigms. This multiplicity of correspondences is achieved: (1) by means of subjective descriptions, which are open to interpretation, (2) by means of negative affirmations, which allude to certain paradigms without fully endorsing them, and (3) through a silence about key elements that would unambiguously validate or refute a specific scientific paradigm. The Qurʾan's interpretatively open cosmographical verses also include particularly apt word choices and morphology when it comes to considering them in the light of modern scientific paradigms. The philosophical and theological consequences of this multiplicity of correspondence are also discussed.

The Qurʾan is regarded by Muslims as the words of God conveyed through the Archangel Gabriel to the Prophet Mohammed (PBUH). The Qurʾan is thus considered as the primary source of Divine knowledge. More specifically, the Qurʾan is regarded as a source of "guidance for all of mankind" (Qurʾan 2:185) that "contains no ambiguities" (Qurʾan 18:1). Hence, the Qurʾan is a guide for all people, including those that are scientifically inclined. People inclined to a scientific worldview can certainly relate to the few descriptions of natural phenomena that are recounted in the Qurʾan, and can read the text in the light of modern science. A reader can look for affinities between the Qurʾanic descriptions of the material world and modern scientific theories. These affinities make the text relevant: the more the reading of the verses reflect the reader's lived experiences and perception of the world, the more relevant the text becomes. However, to read the text considering modern science

poses the question of scientific realism: how can we be sure that the scientific paradigms endorsed today will endure? Left without answers, another question must be asked: how can the text stay scientifically relevant across the ages, while science itself is evolving? One could simply assume a non-overlapping magisterial position and claim that religion has nothing to do with science. But today, modern science is used to evaluate every aspect of our lives, including religion, and the possibility that a religion could withstand scientific scrutiny is significant. Indeed, the opportunity to reconcile a text that is more than fourteen hundred years old with sciences that were developed only in the last century would be a decisive argument in favour of one's faith.

Driven by the desire to reconcile their work with their beliefs, modern Muslim scientists have continuously revised their reading of the text. Within this lineage of modern scientists, the Professor M. Bucaille is to be acknowledged for being one of the most prominent figures with his comparative work titled *The Bible, The Qur'an and the Sciences*.[1] However, Bucaille was neither the first nor the last.[2] The Professor M. J. El-Fandy, for example, also belongs to this lineage.[3] The work of El-Fandy was written before the Big Bang theory was confirmed and before the geophysics of the earth crust was established. To be more specific, El-Fandy's universe was continually expanding because of the spontaneous production of hydrogen; and it was the slow rocking motion of the earth's tectonic plates that alternatively promoted their edges upward, forming mountains, and downward, resulting in deep oceans. It is important to note that these now-outdated conceptions were, at the time of El-Fandy, considered to be scientifically valid alternatives. In his work, El-Fandy was able to correlate Qurʾanic verses to these scientific paradigms that are now considered obsolete. While modern science has proven El-Fandy's conception of the cosmos false, it does not change the fact that he was able to relate his mistaken conception to the Qurʾan. Certainly, if an accusation is to be made, it is El-Fandy who should be accused of mistakenly interpreting the text, and not the text for having misguided El-Fandy. Nonetheless, as a believer, it was El-Fandy's duty to relate to the Qurʾan with whatever scientific conception he was holding to be true. And the Qurʾan's description of natural phenomena adequately enabled him to do so.

Science has evolved since the time of El-Fandy, and it has led to novel insights about the mechanics of the natural world. Later scientists have in turn taken the challenge of reconciling their updated scientific worldviews with the Qurʾan, and this approach has been, to some extent, successful. For example, Professor Z. El-Naggar[4] and Z. Naik[5] were both able to read in the Qurʾan elements of modern scientific theories, including allusions to the Big Bang theory and to modern geology. These correlations between the Qurʾan and modern scientific theories have been increasingly popular[6] and, as an example of their increasing popularity, these correlations are now appearing in appendices of translated copies of the Qurʾan.[7] But, regardless how sound these scientific conceptions are, these different works show that the Qurʾan can be successfully read in the light of various scientific conceptions.

The goal of the present study is to evaluate how the Qurʾan can be made relevant to various scientific conceptions, both past and present. In this aim, the first section describes why such a multiplicity in correspondences is in fact expected from the Qurʾan. Although this correspondence is expected with respect to all branches of sciences, the present study confines itself to cosmographies, as justified in the second section. The third section discusses this study's focus on the Qurʾan only, leaving the Hadith aside. The fourth section will evaluate the Qurʾan with respect to ancient cosmographies, then, in the fifth section, with respect to modern cosmography. Finally, the linguistic elements that allow for such a multiplicity of correspondence will be considered in a sixth section, along with a discussion of some of the theological and philosophical implications.

The Qurʾan's Eternal Correspondence

The objective of this section is to explain why a correspondence between the Qurʾan and scientific paradigms is to be expected. The goal is to be explicit about the different assumptions, theological and intellectual standpoints, and expectations that frame the present study.

The first assumption pertains to the correspondence between the Qurʾan and the material world. With respect to the Qurʾan, one of the primary objectives of revelation is to guide the believer toward God.

Indeed, the Qurʾan describes itself as a "Book, in which there is no doubt, a guide for those who are reverentially fearful of God" (Qurʾan 2:2). While the guidance mentioned in this verse is left open to interpretation, the subsequent verses indicate that it refers to religious guidance. However, the Qurʾan further specifies that knowledge (*ʿilm*), in itself, also guides toward God. Indeed, knowledge is supposed to make one fearful of God: "Only those who have knowledge, from among His servants, fear God." (Qurʾan 35:28). By extension, fearfulness of God implies consciousness of God, and, accordingly, the one who is more conscious of God is also closer to Him. Thus, the implication is that knowledge is also supposed to guide toward God. Although the word "*ʿilm*," when used in the Qurʾan, often alludes to religious knowledge or revelation, its meaning can encompass all types of knowledge, including that of the natural world.[8] Furthermore, the Qurʾan is presented as a "clarification for all things" (Qurʾan 16:89), and as a "register for all things" (Qurʾan 6:38), without restriction on what those "things" entail. The only condition to this extension of meaning, from religious to all types of knowledge, including scientific knowledge, is to view the world as an expression of God.[9] Accordingly, scientific knowledge becomes a mean to understand God through His creation. Scientific knowledge is thus expected to increase one's consciousness of God, and to bring one closer to Him. Therefore, believers are presented with two guides, both leading to God: revelation and knowledge of the material world. Interestingly, both revelation and the material world are intertwined given that the revealed Qurʾan describes aspects of the material world. Although the Qurʾan is not a book of science, it does contain descriptions of natural phenomena. Hence, if we agree that both revelation and this material world have the ability to guide toward God, then a divine agreement between the two is expected.

The second assumption pertains to the notion of incommensurability of scientific paradigms. This notion, initially developed by Professor T. Kuhn,[10] implies that scientific concepts, once they are grounded in experimentation and accepted by a community, become the frame through which the members of the scientific community, and by extension the wider society, see, interact with, and value the world. In other words,

this scientifically based worldview becomes a paradigm. Kuhn also suggests that the scientific endeavour develops as a succession of scientific paradigms. Hence, a novel scientific paradigm does not emerge from an older one, but rather it replaces the previous one. Kuhn calls these shifts of paradigms "revolutions" because each new paradigm is based on a different set of values that overthrow the previous set. The term "values" means that a theory should, for example, be explanatory, accurate in its predictions, consistent, simple, socially beneficial, etc. Different set of values means that even if most values are shared, they will not be hierarchised in the same way. And consequently, if two competing paradigms are valued differently, there is no common ground upon which to compare them. Typically, the two competing paradigms remain valid until one of them is proven to be superior through practice. It is said that the paradigms are incommensurable because proponents of each do not talk to each other's but talk through each other's. The present work endorses and extends this notion of incommensurability by using a post-modern approach to review scientific realism. Post-modern, here, implies that our experience of the material world is mediated by instruments and ultimately, by our senses. Our experience of the material and its interpretation are thus subjective and influenced by pre-conceived ideas and contexts. Scientific realism refers to the belief that current science corresponds to the – true – description of the world.[11] Merging these different notions together results in the idea that each scientific paradigm has a relative truth value, even if these different paradigms contradict one another. In other words, at any given point in time, the scientific paradigm that is endorsed corresponds to the truth through which people experience their world. And by extension, at any given point in time, the endorsed scientific paradigm is the truth through which the scriptures are read. According to this notion of contextual scientific truths and, given that the Qurʾan is a perpetual source of guidance, both outdated and currently upheld paradigms must be considered when looking at a scientific correspondence between the Qurʾan and the material world.

The third assumption pertains to the context of revelation. It is assumed that it would have been counterproductive for the Qurʾan to directly contradict the worldly perception of the contemporaries of the

Prophet (PBUH). For example, if the Qurʾan were explicit about the earth revolving around a central Sun at a speed far greater than that of an arrow, this statement would have been a clear contradiction to the contemporaries of the Prophet (PBUH), who used to uphold a totally different view. As a direct consequence, such a contradiction would have cast doubt over the entire message of the Qurʾan. It would have jeopardized the main objective of revelation, which is to correct people's belief and morals. This assumption would have been all the more relevant in the initial stages of Prophethood, when hearts and minds were to be gained. The Prophet's (PBUH) Night Journey from Mecca to Jerusalem, and beyond, illustrates this argument.[12] Because such travel was materially impossible, people doubted him, and his opponents took it as an opportunity to defame him. Defamation lasted until he was able to give a full description of Jerusalem. The Prophet's (PBUH) description of Jerusalem (and of the incoming caravans) became the supporting argument for his truthfulness. Because the Night Journey was contrary to people's lived experiences, they were not ready to accept it without proof. It is worth mentioning that the correspondence between revelation and scientific paradigms is only required for those elements that are part of people's worldly material perception. For example, the Qurʾan also talks about Angels and other elements from the unseen world about which, science had, and still has, no say (e.g., Paradise, the Pen, the Throne). Hence, the correspondence between revelation and the material world only refers to descriptions of material objects and physical phenomena that are perceived and are integral to a specific scientific paradigm.

Following this assumption, one could further argue that revelation is contextual, meaning that it speaks only to the people to whom it was revealed. Such views have been suggested regarding the Old and New Testament and their cosmological descriptions.[13] According to these views, the correspondence between the scriptures and science should be restricted to ancient scientific paradigms that were contemporary of the prophets and/or of the scriptures' authors. Consequently, only the moral teachings would remain relevant across the ages. However, such a view is not satisfying with respect to the Qurʾan. Indeed, the Qurʾan explicitly describes Islam as the ultimate version of God's revealed religions: "This

day, I have perfected your religion for you, completed My favour upon you, and have chosen for you Islam as your religion" (Qur'an 5:3). From a theological point of view, the Qur'an is the direct words of God, and not only a Divine inspiration translated and phrased by the messenger to make it comprehensible to his followers. Accordingly, it is to be expected that all descriptions of natural phenomena remain relevant across the ages.

From this last argument follows the fourth assumption, which pertains to the timelessness of the Qur'an. It appears that the Qur'anic verses previously mentioned regarding the guiding abilities of the Qur'an and the guiding abilities of knowledge are written in an authoritative and atemporal style that implies perpetual validity. Furthermore, from a thematic point of view, the affirmations in Qur'an 2:2 and Qur'an 35:28 mentioned above are not linked to any specific stories about past communities. Hence, there is no direct element that would require these verses to be restricted to their context of revelation. Additionally, from a grammatical point of view, Qur'an 2:2 is a nominal sentence and Qur'an 35:28 is written in the imperfect tense. Thus, both verses imply that the statements made are continuously valid and not bound to the past. Accordingly, if a Divine agreement is expected between the Qur'an descriptions of material phenomena and the ancient scientific paradigms, then a similar agreement is to be expected with modern and future scientific paradigms.

In summary, if the Qur'anic descriptions of natural phenomena are expected to correspond to modern scientific paradigms, then ancient scientifically minded people must have had the same expectations with respect to their, now outdated, scientific paradigms. Hence, a Divine agreement between the Qur'an and both, past and present scientific paradigms is expected, even if these paradigms contradict each other's. This multiplicity of correspondences will be illustrated through the specific example of cosmography, as justified subsequently.

The Specific Case of Cosmography

Having justified and framed the expectations that underpin the claim for correspondences, the objective here is to illustrate this multiplicity

of correspondences. For this purpose, the present study focuses on cosmography. Cosmography deals with the present features of the universe. Here, cosmography is distinguished from cosmogony, which deals with the coming into being of the universe. Together, cosmogony and cosmography form cosmology, which refers to the general study of the universe (i.e., its origins and present features).[14] This choice lies in the fact that most of the Qurʾanic descriptions of natural elements pertain to this field. Furthermore, cosmography (and its parent-discipline cosmology) is one of the fields along with mathematics and anatomy, for example, that reached the status of mature science early in antiquity, if not before. According to Kuhn, a mature science is defined as a field which is dominated by a theory that is widely accepted within a community and upon which subsequent practitioners rely to build their specialisations.[15] By contrast, pre-mature sciences are characterised by a lack of standards, where each practitioner is developing the field anew from its foundations. Following this definition, examples of pre-mature sciences include alchemy, before the advent of chemistry, or electricity, before the eighteenth century. By following Kuhn's classification of mature versus pre-mature sciences, the goal is not to devalue knowledge that is developed subjectively (like spirituality, which requires every individual to start from its foundations) but only to benefit from the existence of a restricted body of literature that serves as foundation. Such reference manuals include, for example, Newton's Mathematical Principles of Natural Philosophy in the field of classical mechanics,[16] or Einstein's Special and General Theory in the field of relativity.[17] These reference manuals provide a concise source of information, which greatly facilitates the study of each of these fields. Accordingly, ancient and modern cosmographies are described in great detail in both primary and secondary sources, which in turn facilitates the aim of this work, that is, evaluating the material correspondence of the Qurʾan with past and modern cosmographies.

With respect to modern literature, the study of the cosmographical relevance of the Qurʾan has garnered interest in recent decades. However, most recent works take a Bucaillist approach. Although Bucaille's work[18] is not the first work of its kind, it is by far the most popular book in the field of Islam and science. This approach typically seeks to demonstrate

the divine nature of the Qurʾan by claiming that modern theories have their root in the Qurʾan. However, such works often lack the critical depth required for modern scientific enquiry and lack a holistic reading of all the related verses.[19] But, the literature also includes more academic pieces, which can be classified into two broad categories: that which is produced by authors who consider the Qurʾan an historical account, and those who acknowledge its divine nature.

With respect to authors who consider the Qurʾan an historical account, their approach often consists in relating the Qurʾan to previous paradigms. The work of D. Janos or T. Tesei, for example, provide a detailed comparison between the Qurʾan's cosmographical elements and Babylonian, Judean, and Christian conceptions, as well as with local folklores.[20] Their aim is to establish a lineage between the Qurʾan and previous cosmographies. In these works, similarities between successive cosmographies are explained following a syncretic approach. Accordingly, the similarities are interpreted in terms of inherited traits instead of proof for a common divine origin. But regardless of the truth value of these different interpretations, these works demonstrate that the Qurʾan can be made relevant to pre-Islamic cosmographical paradigms.

With respect to authors who hold the Qurʾan as sacred, their work often focuses on the purpose rather than on the physical nature and dynamics of the celestial and terrestrial elements. The work of M. Iqbal, for example, takes such a teleological approach.[21] In his works, the emphasis is given to elements of the unseen world (the Throne, the Footstool, the Tablet, the Pen) and to the metaphysical dimensions and purpose of the visible/material elements (e.g., the symbolism and role of the mountains, stars, winds, water). Understandably, the cosmographical elements are described in relation to God, with little discussion about their relevance to science. But, when material elements are discussed in relation to sciences, it is with the tacit assumption that modern scientific paradigms are closer to the truth than ancient ones. Such work reinforces the idea that the Qurʾan can be made relevant to modern science.

Although the vast majority of published work adopts one of the three approaches (Bucaillist, syncretic, or teleological), the work of M.A. Tabatabaʾi and S. Mirsadri is unique in the sense that it aims at

establishing the distinctiveness of the Qurʾan with respect to older cosmographies.[22] Accordingly, the authors seek to recreate a cosmography solely based on Qurʾanic descriptions. The assumption is that a unique cosmography can be derived from the "literary meaning" of a unique text. In other words, the assumption is that most cosmographical descriptions can be understood without context. However, the very existence of "literary meaning" is a challenged notion, especially with respect to ancient texts.[23] Indeed, the present study will demonstrate that context is essential when trying to derive the shape or the nature of every cosmographical element reported in the Qurʾan. Another assumption made by the authors is that "every single word in the Qurʾan is chosen with intended caution as to repudiate, endorse, or modify the existing ideas and/or ideologies of the sociocultural environment in which it appeared."[24] While this claim is true with respect to the theological and moral teachings of the Qurʾan, it is not necessarily true with respect to other topics. The in-depth discussion presented by Tabatabaʾi and Mirsadri about the shape of the universe, contrary to the authors' standpoint, demonstrates that the Qurʾanic cosmographical descriptions are ambiguous. Their work thus indirectly reinforces the idea that some verses can be interpreted in multiple ways.

In summary, much work has already been done in evaluating the Qurʾan's correspondence with both ancient and modern cosmological paradigms. However, each analysis has focussed either on ancient or modern paradigms but never evaluated both simultaneously. The present study builds upon these previous works and proposes a new outlook by revising the Qurʾan's relevance to both ancient and modern cosmological paradigms. Interestingly, most of these works restrict their evaluations to the Qurʾan only, and leave the Hadith corpus aside. Similarly, before discussing the Qurʾan's relevance to specific cosmographies, the following section justifies why this study also focuses on the Qurʾan.

Evaluating the Relevance of the Qurʾan Only

Both the Qurʾan and the Hadith together form the central Islamic scriptures and, with respect to cosmography, the Hadith corpus provides us

with more numerous and more detailed descriptions than the few given in the Qurʾan. The compilation of al-Suyuti, for example, in his "Radiant Cosmography" provides us with thorough descriptions of the shape, nature and function of the different cosmic elements.[25] The decision to leave these descriptions aside stems from the differences in nature and objectives of the Qurʾan and of the Hadith. With respect to the Qurʾan, it was previously argued that the Qurʾan is a perpetual source of guidance that can be directly applied in all contexts. By contrast, the Hadith, and more specifically, the actions and sayings of the Prophet (PBUH), correspond to the contextual application of these Qurʾanic teachings. Hence, while the Qurʾan provides us with general guidelines, the Prophet (PBUH) embodied the Qurʾan by putting it into practice in his specific environment.[26] To illustrate this point, the Prophet (PBUH) was known for his intelligibility,[27] which implies that he spoke at the level of understanding of his interlocutors. This care for intelligibility also implies that the Prophet (PBUH) took into consideration the paradigms in which his interlocutors were living. Moreover, when it comes to ancient cosmographical paradigms, as pointed out by Walton with respect to the Hebraic and Christian scriptures,[28] and by Chittick with respect to the Islamic sources,[29] the main objective was not to render a factual account of the shape of the universe. Instead, the primary concern was to put into perspective the relationship between the human, the cosmos, and God. Accordingly, these descriptions focus on metaphysical elements and allegories, with little concern about their correspondence with the material world. Hence, while the cosmographical Hadith are more numerous and more detailed than their Qurʾanic counterparts, they pertain to a domain that is beyond the limited scope of the present study.

The Qurʾan and Past Cosmographies

Having clarified all assumptions and restrictions, we can now evaluate the Qurʾan's correspondence with particular scientific paradigms. This section is dedicated to evaluating the relationship between the Qurʾan's description of physical elements and ancient paradigms. The term ancient paradigm here corresponds to the cosmographical paradigms

that were contemporary of the Prophet (PBUH) and the area in which he lived. Accordingly, the present study will not cover the illustrious ancient Indian and Chinese paradigms, as well as the many African cosmographical conceptions, since they are assumed to have had limited influence in the Meccan region at the time of the Prophet (PBUH). The first step, then, is to ascertain which were the prevalent cosmographies in sixth century Arabia. Unfortunately, little is known about cosmographies in the Meccan region at that time. This region was, from a scientific point of view, literally ostracized by the neighbouring Byzantine, Sassanid, and Aksumite empires. However, the Qurʾan does provide us a couple of clues. In verse 17:92, according to exegetes, it is reported that the Meccans challenged the Prophet (PBUH) by asking him to make the sky fall upon them in pieces.[30] Furthermore, in verse 42:5 the Heavens are described as almost breaking apart from their uppermost part. Accordingly, this community saw the sky as a hard shell. Such a belief coincides with ancient Mesopotamian and Egyptian cosmographies[31] as well as with Hebraic,[32] Zoroastrian,[33] Christian,[34] and Manichean ones.[35] In all these cosmographies, the sky was a solid metallic or stone-like roof or dome. It either served as the support for the stars, as illustrated by the Egyptian goddess Nut,[36] protecting the earth from the cosmic water, as in the Old Testament's firmament,[37] or simply represented the boundary between the heavenly bodies and the divine realm, as in the Mesopotamian,[38] Zoroastrian,[39] and Manichean cosmographies.[40] The Sun and the Moon were described as evolving in this interstitial space until they reached the horizon where they would then plunge into the underworld, either in the waters or underneath the Earth. The Earth itself was a vast plane centred on the people's respective kingdom and floating or surrounded by waters. It is worth noting for later discussion that in Zoroastrian cosmology, the mountains had roots, like plants, and grew via a deep-rooted rhizome-like system.[41]

To see the sky as a hard shell also corresponds to the latest development of Greek scientific thoughts in classical antiquity, which culminated with Ptolemy's mathematical model of the universe.[42] Although the Greeks provided various alternatives (from Aristarchus's heliocentrism to Epicurus's infinite universe), Ptolemy's paradigm is

taken as representative of that of the Greeks, unless specified otherwise. Indeed, Ptolemy's work crystalizes Aristotle's conception of the world, and became the point of reference for most early Muslim astronomers.[43] For Aristotle, the universe was spherical and centred around a spherical Earth.[44] The sub-lunar (the Earth and atmosphere) was the realm of change, imperfection, and corruption. It was comprised of four elements: earth, water, air and fire.[45] This was in opposition to the celestial spheres that were seen as perfect, incorruptible, immutable, and made of aether.[46] According to this school of thought, the Moon, the Sun, and the different planets were all held by crystalline spheres rotating around the Earth, and the whole universe was encapsulated by the outer sphere of the stars. It is noteworthy for the later discussion that, across the different sixth century empires, the cycles of the stars, the Sun and the Moon were already well calculated. They were the source for the different calendars, were commonly used for navigation and, most importantly, for astrology. The trajectories and cycles of the planets, on the other hand, remained problematic (until Kepler's advances in the seventeenth century) and subject to constant adjustments. Because of the planets' unwillingness to conform to any mathematical models, they were called the "wanderers."[47]

We can now read the Qurʾan in the light of these ancient cosmographies and evaluate its relevance. Starting with the sub-lunar realm, the Qurʾan mentions on multiple occasions that God had spread the earth[48] and made it as a cradle.[49] Such descriptions intuitively correspond to a flat Earth. The conception of a flat Earth coincides with all ancient cosmographies, except that of the Greeks, at least after the fifth century BC.[50] But, the Qurʾan does not explicitly state that the Earth is flat, nor does it state that it possesses edges, limits, or a centre. For example, in the story of *Dhū al-Qarnayn* it is mentioned that he first "reached the setting" before reaching "the rising of the Sun,"[51] which could be interpreted as referring to each end of the world. However, those verses do not give any indications about what lies beyond that natural barrier, and as a result, does not provide any specific indications about the overall shape of the Earth. Hence, while it alludes to the flatness of the Earth, the Qurʾan is silent about its actual shape. Through this silence, these verses can also be adequately read in relation to the Greek's spherical Earth.

Within the terrestrial realm, the Qurʾan also mentions fresh and salty bodies of water.[52] These verses are commonly read as referring to the earthly fresh and salty waters, because food and ornaments can be extracted from each.[53] However, other interpretations exist. These same verses have also been interpreted, considering the Book of Genesis, as referring to the distinction between the cosmic (fresh) waters above the firmament and the terrestrial (salty) waters below the firmament.[54] The latter interpretation suggests a possible correspondence between the Qurʾanic, Hebraic and Christian cosmographies. This opposition between fresh and salty waters also echoes the Greek myth of Alpheus who crossed the Ionian (salty) sea by transmuting into sweet water.[55] Obviously, from an Islamic perspective, the world cannot be read as being the playfield of different gods. Nevertheless, the myth indicates that coexisting bodies of sweet/fresh and salty water was already part of the Greek imaginary. As such, the Qurʾan can be read as correcting the theology while alluding to elements of Greek imaginary.

With respect to the mountains, the Qurʾan mentions that they have been implanted in the earth, like pegs,[56] firmly anchored,[57] in a way that stabilizes the earth.[58] This imagery brings to mind the Zoroastrian conception of the mountains, which grew out of the earth like plants, firmly rooted in the soil.[59] Indeed, if the roots of plants can hold the soil steady and prevent it from eroding, it would have been intuitive to imagine that the mountains' roots are similarly keeping the earth steady. Accordingly, these verses can be read as referring to the Zoroastrians' plant-like mountains. However, while the Qurʾan alludes to a part of the mountain that extends beneath the surface, it is silent about the mountain's actual nature, shape and coming into being.

Progressing toward the celestial realm, the Qurʾan describes the Sun and the Moon as being subservient to a continuous rule.[60] It is commonly understood that this subjugation corresponds to their trajectories.[61] The Qurʾan further alludes to the regularity of the Sun's and Moon's cycles for calendar and time keeping purposes.[62] The stars also are described as being subservient,[63] and the regularity of the stars' cycle is implied when the Qurʾan points to their use for navigation in land and sea.[64] In contrast to the explicitly mentioned trajectories of the Sun, Moon and

stars, the Qur'an is silent about the possible motion of the Earth. The Qur'an thus alludes to a geocentric model of the universe in which the Earth is fixed at the centre. This reading of the verses is in agreement with all major ancient cosmographies. It is recorded that heliocentric models of the universe existed since Aristarchus of Samos in antiquity. However, heliocentrism remained marginal until the seventeenth century. Heliocentrism remained marginal because it was considered unnecessarily complicated compared to the more intuitive and equally accurate geocentric model.[65] The correspondence between the Qur'an and heliocentrism will be discussed later when comparing the Qur'an and modern paradigms.

It is worth emphasizing that the planets are not explicitly mentioned in the Qur'an,[66] although their existence was well known in the sixth century. The planets Mercury, Mars, Venus, Jupiter, and Saturn played significant roles in astrology, and astrology was a valued science at that time.[67] The contrast created between the elusive mention of the planets and the explicit precision and regularity of the Sun and the Moon's cycles can be read as referring to the difficulties faced by all ancient paradigms in accurately modelling the planets. Accordingly, the silence about the planets can be read as referring to the impossibility of properly modelling the planets' trajectories while using a geocentric model of the universe. Hence, this silence further alludes to geocentrism. It is also interesting to note that the Qur'an does not endeavour to give any precision about the relative locations of the Sun, the Moon, nor the stars with respect to the Earth. Therefore, it can also be read relation to the Zoroastrian and Manichean cosmographies, in which the stars were located below the Sun and the Moon.[68]

With respect to the shape of the sky, the Qur'an refers to it as a canopy[69] that was built[70] and raised.[71] More precisely, the sky is described as having been "raised without pillars that you can see."[72] The reference to pillars reminds us of the Egyptian's conception of the four pillars of the Earth,[73] as well as the Hebraic, Christian, and Manichean conception of a temple-like universe sustained by pillars and/or walls.[74] However, because the verse uses the word "without" (*bi-ghayr*), it raises the following question: are there invisible pillars; or no pillars at all?

Hence, the verse can also be read in the light of the Greek conception of the celestial spheres that are not directly supported by pillars. The sky is also described as being retained from falling onto the Earth.[75] The Qurʾan further mentions that God could have made fragments fall from the sky,[76] and that the sky has no cracks.[77] All these descriptions allude to a hard-shell sky. To picture the sky as a solid vault or roof agrees with most ancient cosmologies. The only exception being the Epicurean sphere-less universe which was mostly empty and infinite.[78] However, similar to the mention of the pillars, the mention of a solid sky is only suggested but never explicitly stated. Accordingly, the related verses permit the following question: Does God retain the sky from falling by making it solid, or by making it diffuse? Does the fact that God could have made fragments fall from the sky imply that the sky is currently not fragmentable? Does the affirmation that the sky has no cracks imply that it is not a solid shell, but something fluid like air or simply empty? Accordingly, the verses can also be read in the light of the Epicurean worldview and its mostly empty and infinite universe. The conception of a boundless universe could come into conflict with the mention of the "ceiling of the sky."[79] But, the Qurʾan uses the same word "sky" (*samāʾa*) to refer to the lower and higher atmospheres, that is, to the space that contains the stars as well as to the six other skies which we apparently do not perceive. Hence, by not specifying which sky it refers to, the verse is justifiably open to interpretations. Interestingly, when the word "sky" is used in the singular form it refers most often to the part from which rain comes, that is, the lower atmosphere, or troposphere in today's classification. Consequently, the ceiling can readily refer to the clouds themselves, as it is commonly used to in today's aviation. To raise the "ceiling of the sky" would thus mean that the clouds are generally out of reach from a human perspective. With respect to the six other skies mentioned in the Qurʾan, if they are understood as being material, then a material boundary between them is implied. Such boundary would conflict with the Epicurean infinite universe. However, the Qurʾan does not detail the nature of these six other skies. Hence, if the six other skies belong to different dimensions, then the potential conflicts with Epicurean, and more generally with the Greek worldviews, are avoided.

It is worth recalling that the objective here is not to evaluate the superiority of one interpretation over another. Rather, it is to show the possible correspondences between the Qurʾanic cosmographical descriptions and ancient paradigms.

Continuing with the descriptions of the universe, the Qurʾan often refers to "the skies and the Earth." This sentence construction echoes the idiom "Heaven and Earth" which is common in Mesopotamian[80] as well as Hebraic and Christian[81] scriptures. This idiom alludes to a sharp distinction between the earthly and the heavenly regions and echoes the Greek distinction between the sub-lunar and celestial realms. Furthermore, while the Qurʾan is explicit about the Earth's corruption,[82] it only hypothesizes that of the skies: "But if the Truth had followed their inclinations, the Heavens and the Earth, and whoever is in them would have been corrupted."[83] In that verse, the conditional statement alludes to the current perfection of the skies. This distinction between the corrupted Earth and the apparently pristine skies corresponds to the Aristotelian view of the universe described earlier. Accordingly, these verses can be read in the light of Aristotelian science. But again, the incorruptibility of the Heavens is only alluded to, rather than stated explicitly. Consequently, these verses can also be read in relationship to all other cosmographies which are not as explicit about the Heavens' incorruptibility. For example, the lower sections of the Manichean firmaments contain imprisoned demons.[84] However, it is not clear whether these corrupted beings influence the firmaments in any way.

Regarding the elements that compose the universe, the Qurʾan refers to earth, water, wind, and fire, which again echoes the Greeks' categorization of earth, water, air, and fire. And all the Greeks' cosmographies, except that of the Epicureans, describe the celestial realm as being made of aether, the fifth and purest element.[85] However, on the nature of the skies the Qurʾan is silent. It only mentions the light of the Sun and the Moon,[86] which as a result are filling the space between Earth and the lowest sky. Similarly, the Qurʾan does not discuss the nature of any of the celestial bodies, nor does it detail the nature of that interstitial space. Consequently, the Qurʾan avoids any direct conflict with all aether-based cosmographies.

In summary, these examples demonstrate that the Qurʾanic descriptions of the material world can be adequately read in relation to all the ancient cosmographies selected here. Furthermore, these descriptions allude to elements that are specific to some of these cosmographies (e.g., the flattening of the Earth, the roots of mountains, the pillars of the sky). However, these references remain mere insinuations. In each case, interestingly, the Qurʾan stays silent on details that would indisputably endorse or refute one or the other cosmographies (e.g., the shape and trajectory of the Earth, the nature of the seven skies). Accordingly, these descriptions can be read in relation to multiple ancient cosmographies without resulting in direct conflicts with any of them.

The Qurʾan and Modern Cosmography

This section evaluates the correspondence between the Qurʾan and modern conceptions of the universe. The first step is to describe modern cosmography. Today, the Earth is pictured as a rugged sphere slightly flattened at the poles. Human life developed on the Earth's crust and more specifically on the surface of continental lithospheres that are slowly drifting on top of the Earth's mantle.[87] The mountains correspond to either uplifted parts of lithospheres or have volcanic origins.[88] Above the surface, the Earth's atmosphere is differentiated in multiple layers, each characterised by a specific composition, temperature, and pressure.[89] The Earth, along with other planets (and their trojans) revolve around the Sun. The solar system itself moves through the local interstellar medium of our galaxy. Our galaxy rotates on itself and is part of the Laniakea supercluster, which, along with other superclusters, forms the observable universe.[90] In terms of the nature of the universe, it is mostly empty from visible matter, but "filled" with radiations, dark matter, and dark energy.[91]

Here, the second step is to read the Qurʾan in relation to this modern cosmographical paradigm. Starting with the firmly anchored mountains,[92] current scientific models agree that the bulk of the mountains are an integral part of the lithosphere. More specifically, most mountains, with the exception of volcanoes, correspond to uplifted parts of

continental lithospheres.[93] The Qur'anic description of peg-like mountains thus agrees with current models in the sense that mountains are integral to the landmass. The stabilization effect of the mountain, however, deserves further discussion. The Qur'an explicitly states that mountains have been cast into the ground "lest it would shake or swing, and the people with it."[94] Intuitively, this notion of shaking and swinging, designated by the verb *māda*, could refer to earthquakes. But in modern science, mountains are almost always associated with zones of higher seismic activity. Consequently, the description of mountains as inherently preventing earthquakes would be contradictory. Interestingly, the Qur'an refers to physical earthquakes by using a different word.[95] Hence, the shaking and swinging that is prevented by mountains could be of another kind, potentially slower and larger in amplitude. It is worth recalling that most mountains are an integral part of the continental lithospheres, and continental lithospheres distinguish themselves by their longevity, dating back a few billion years; the Earth being about 4.5 billion years old.[96] This longevity contrasts with the oceanic lithospheres, which are continuously produced at the mid-ocean ridges and recycled at the subduction zones. Consequently, oceanic lithospheres are no more than 200 million years old. The exceptional longevity of the continental lithospheres (in contrast to oceanic ones) can be explained in terms of their specific physical and mechanical properties, such as density and viscosity.[97] These same properties, along with tectonic considerations, are currently the only explanations for the uplift of mountains. Accordingly, even if modern geology did not assign specific functions to the mountains, the mountains are inherently linked, through their physical and mechanical properties, to the longevity of continental lithospheres. Reading the Qur'an in the light of modern geology would imply that the swinging of the earth mentioned in the verses corresponds to the plate tectonics. If this were the case, then the Qur'an rightly links the presence of mountains to the stability and longevity of continental lithospheres.

With respect to the shape of the Earth, we have seen that, while flatness is implied,[98] the actual shape of the Earth is not specified. Consequently, all allusions to flatness can be read as referring to a subjective description of a local perception of the Earth. Indeed, looking

from the hill-top toward the horizon, the Earth looks flattened. These verses can therefore be taken as referring to the relative smoothness of the Earth's surface.

Taking a closer look at the Qurʾan's syntax, when the Qurʾan describes the Earth as being wide,[99] the past tense is used. The past tense implies that the act of spreading took place in the past. The Qurʾan further specifies that the Earth is potentially in the process of reducing in size.[100] The description of an Earth that has already reached its maximum size, and that it is now potentially decreasing is in agreement with current scientific models.[101] Furthermore, God calls Himself "the Preparer" or "the One who makes even" (*al-māhidūn*).[102] The word used is an active participle, which is not bound to specific time (past-present-future). Therefore, the use of the active participle implies that the Earth is continuously smoothened. It is thus possible to interpret this verse, in relation to modern geology, as referring to the continuous erosion and renewal of the lithosphere.

This potentially shrinking Earth contrasts greatly with the sky. The Qurʾan describes the sky as being vast, also using an active participle the "Expender" (*mūsiʿūn*).[103] Being freed from time, the active participle alludes not only to the current state of affairs (i.e., that the sky is vast) but to the continuous expandability of the sky. Accordingly, it is possible to interpret this verse as signifying that, in accordance with modern astronomy, the universe is expanding. Continuing with the description of the Heavens, the Qurʾan states that the Sun and Moon are "swimming in an orbit."[104] However, by being silent about the centre of these orbits, these verses are open to interpretation. Consequently, the text can be read in accordance with modern heliocentrism, since both the Sun and the Moon are known to have their own trajectories.[105] Note that the verb *yasbaḥūn*, which translates as "swimming" or "sailing without full immersion,"[106] implies the stability of an object whose density is between that of water and air. In today's cosmology, there is no such interface through which the Sun and the Moon travel. However, a "stable" orbit (or more durable orbit) implies constraints on the mass-speed ratio of the celestial bodies. In other words, the orbital stability of celestial bodies depends upon the bodies' intrinsic physical characteristics, in the same manner that the

floating ability of a boat also depends upon its intrinsic physical characteristics. While a relation between the physical characteristics of an object and its behaviour might seem evident today, the establishment of a relation between the celestial bodies' intrinsic physical properties and their trajectories is one of the major achievements of the seventeenth century.[107] Accordingly, through the use of the word "swimming," these verses can be taken as referring to a region of space that allows a stable orbit, and which is directly related to the intrinsic physical characteristics of both the Sun and the Moon.

The Qurʾan further describes the Heavens as being "raised without pillars that you can see,"[108] and as being devoid of any cracks.[109] It has been shown in the previous section that these verses could be read considering an Epicurean universe, which is mostly empty. Similarly, the same verses can be read in the light of modern astronomy since both the Epicurean and the standard model agree on a mostly empty universe. Alternatively, the pillars can be read metaphorically as something that holds the universe together. The pillars can thus be taken as referring to gravitational forces. Indeed, gravitational forces are invisible to the human eye, and they are currently believed to govern the universe at the cosmic scale. The lack of "crack" would then refer to the smooth and continuous gravitational force field that governs the universe. Accordingly, these verses can also be read in relation to modern gravitational physics. In summary, the Qurʾanic descriptions of the material world can be effectively read considering modern cosmography without direct conflict. More specifically, the word choice, morphology, and syntax used in each description can be adequately linked to modern scientific concepts.

Literary Devices used and their Consequences

The above discussion demonstrated that the Qurʾan can be read through multiple ancient and modern cosmographical paradigms without resulting in any direct contradictions, even if these paradigms conflict with one another. The objective of this last section is to rehearse the methods used to achieve this multiplicity of readings, as well as to discuss some of the philosophical and theological implications of this approach.

Understandably the Qurʾan, because it speaks to a diverse audience, most of whom are not scientists, often describes nature and natural phenomena from the perspective of a common human being living on Earth. For example, to see the Sun and the Moon rotating around the Earth is evident, and in the Qurʾan, the Sun and the Moon are rightly described as having cyclic motions. Contrastingly, to imagine the Earth moving around the Sun at high speed might be scientifically correct but is counter intuitive. The first literary method, then, is to describe the world from a subjective point of view, and these subjective descriptions often resonate with ancient paradigms. The second method is to describe nature by what it is not, thereby alluding to certain paradigms without giving them explicit credit. For example, to describe the sky as being supported without visible pillars, nor having any cracks, alludes to a solid dome supported by pillars. However, the verses in question make no claim about the actual nature or shape of the sky. By describing the world through its opposites, the Qurʾan here alludes to certain paradigms without specifically endorsing them. The third method is to be silent about key elements that would distinguish between competing paradigms. For example, the Qurʾan does not state the actual shape of the Earth nor the centre of rotation of the Sun and Moon. This silence leaves room for multiple interpretations, and as a result the verses can be read considering multiple paradigms.

These three methods could suggest that the Qurʾan only contains vague and evasive descriptions of natural phenomena. However, one can appreciate the aptness of these descriptions when it comes to reading the Qurʾan with respect to modern paradigms. Indeed, the nuances implied by the chosen words and their morphology can be aptly related to modern scientific notions. To allow multiple readings, however, implies that the Qurʾan cannot be the source of scientific knowledge. The Qurʾan can certainly guide and inspire scientists, but given the multiple levels of interpretations allowed, it can hardly be taken as an argument in support for specific scientific theories. Hence, one must be cautious to speak of miracles as soon as a verse can be read in the light of modern science. The fact that a verse can be better read in relation to current paradigms is not a scientific proof for the verse's divine origin. Instead, to look

for correlations between the verses and modern science is a subjective endeavour. Another problem with this approach to miracles is that it ultimately lends to contemporary science the authority to define what is and is not a miracle, and science is unfit to deal with the supernatural. Nevertheless, the fact that the Qurʾan has remained relevant across the ages by allowing multiple readings, is in itself a literary feat that deserves awe.

The fact that the cosmographical Qurʾanic descriptions allow for multiple readings suggests that other topics might also be susceptible to the same interpretative moves. This assumption is relevant for all topics about which the Qurʾan is ambiguous, and more specifically topics that were once part of historical norms and are now challenged in modern societies. For example, the Qurʾan is ambiguous about the role of women in society. The Qurʾan is equally ambiguous about how proactively one should call others to the faith or invest oneself in this world. The Qurʾan is not explicit about the organisation of the state nor about the definitions of masculinity and femininity. Because these topics are liable to interpretation, their implementation is likely to differ for every individual. Although this variability can be seen as departure from an idealised Islam (i.e., that of the Prophet PBUH in his lifetime) it allows for the core theological message to be shared more effectively. Indeed, the more the verses can reflect the reader's lived experiences and perception of the world, the more relevant the message becomes.

Conclusion

The present study demonstrates that the Qurʾan can be read with respect to multiple cosmographical paradigms, past and present. In so doing, the assumption is that each scientific paradigm forms a relative truth through which a community experiences their world and reads their scriptures. Accordingly, the more relevant the scripture is to the lived experiences of an individual, the more effective are its teachings. The fact that the Qurʾan can be made relevant to multiple conflicting scientific paradigms is achieved by using specific literary methods. First, the Qurʾanic descriptions of natural phenomena are often written from a

subjective point of view, and as such, they are intuitively open to interpretation. Reading these subjective descriptions in their most evident or usual meanings often corresponds to the more intuitive and ancient paradigms. The second method is to describe phenomena through negative affirmations. Hence, by mentioning what does not exist, the Qurʾan alludes to specific paradigms without endorsing them. The third method is to be silent about key elements that would unambiguously differentiate between conflicting paradigms. All three literary devices could leave the Qurʾan with only elusive descriptions of natural phenomena. However, this elusiveness is promptly brushed away when it is read in the light of modern sciences. Indeed, the nuances that emerge from the word choice and morphology of the Qurʾan's descriptions can all be made relevant to modern scientific paradigms. One major consequence of this multiplicity of readings is that the Qurʾan cannot be taken as the source of scientific knowledge; at least not in the field of cosmography. It will thus be interesting to pursue similar evaluations on the origin and formation of the universe, and about the origins and development of humans. Beyond the physical sciences, it will be also be valuable to pursue similar evaluations on topics that are today socially relevant such as gender, nationalism, and activism.

Endnotes

1 Maurice Bucaille, *La Bible, Le Coran Et La Science: Les Écritures Saintes Examinées À La Lumière Des Connaissances Modernes* (Paris: Seghers, 1976).

2 Sheikh Jawahir Tantawi could be described as having produced the first reading the Qur'an in the light of modern science. However, as a non-scientist, his understanding of the sciences is superficial and erroneous at times. For example, in his tafsir of verse 27:88 with respect to Einstein's theory of relativity, when alluding to mountains being mere oscillations, he does not seem to differentiate between the distinct nature of sound waves, of electromagnetic waves, and the De Broglie wavelength of moving objects. M. Daneshgar, *Tantawi Jawhari and the Qur'an: Tafsir and Social Concerns in the Twentieth Century* (London: Routledge, 2017), 159-161.

3 Muhammad Jamaluddin El-Fandy, *On Cosmic Verses in the Quran*, ed. Shawski Sukkary, volume 3. (Cairo: The Supreme Council for Islamic Affairs, Ministry of Waqfs, 1961).

4 Zaghlul El-Naggar, *The Geological Concept of Mountains in the Quran* (n.p.: ScribeDigital.com, 1991).

5 Zakir Naik, *The Quran & Modern Science* (Riyadh: Darussalam Publishers, 2014).

6 A. Dallal, *Islam, science, and the challenge of history*. New Haven, NJ: Yale University Press, 2010 pp. 169-173.

7 The Qur'an Project, *The Qur'an: With Sūrah Introductions and Appendices*, ed. A.B. al-Mehri, (Birmingham: The Qur'an Project, 2017).

8 Sayyid Wahid Akhtar, "The Islamic Concept of Knowledge," *Al-Tawhid: A Quarterly Journal of Islamic Thought & Culture* 12, no. 3 (1997).

9 William C. Chittick, *Science of the Cosmos, Science of the Soul: The Pertinence of Islamic Cosmology in the Modern World* (London: Oneworld Publications, 2013) 55-57.

10 Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).

11 J. Quadri, *Transformations of tradition: Islamic law in colonial modernity* (Oxford: Oxford University Press, 2021) 155-156.

12 See in Sahih al-Bukhari 3886; In book ref.: Book 63, Hadith 226; USC-MSA ref.: Vol.5, Book 58, Hadith 226. https://sunnah.com/bukhari:3886.

13 Keith Augustus Burton, "The Faith Factor: New Testament Cosmology in Its Historical Context," *Journal of the Adventist Theological Society* 15, no. 1 (2004): 5; John H. Walton, *The Lost World of Genesis One: Ancient Cosmology and the Origins Debate* (Westmont, IL: InterVarsity Press, 2009) 14-15.

14 Note that cosmography includes geology, which corresponds to the study of the Earth, as well as astronomy, which corresponds to the study of what lies beyond the

Earth's atmosphere. This is not to be confused with astrology, which corresponds to the divinatory practice.

15 Kuhn, *Structure*, 13-14.

16 Isaac Newton, *Mathematical Principles of Natural Philosophy* (n.p.: A. Strahan, 1802).

17 Albert Einstein, *Relativity: The Special and General Theory, a Popular Exposition. Authorised Translated by Robert W. Lawson*, 3rd ed, (Mansfield Center, CT: Martino Publishing, 2010 [first published in 1920]).

18 Bucaille, *La Bible, Le Coran Et La Science.*

19 Stefano Bigliardi, "The "Scientific Miracle of the Qurʾan," Pseudoscience, and Conspiracism," *Zygon* 52, no. 1 (2017): 146-71; Nidhal Guessoum, *Islam's Quantum Question: Reconciling Muslim Tradition and Modern Science* (London: I.B. Tauris & Co Ltd., 2010) 161-164.

20 Damien Janos, "Qurʾanic Cosmography in Its Historical Perspective: Some Notes on the Formation of a Religious Worldview," *Religion* 42, no. 2 (2012): 215-31; Tommaso Tesei, "Some Cosmological Notions from Late Antiquity in Q 18:60-65: The Quran in Light of Its Cultural Context," *Journal of the American Oriental Society* 135, no. 1 (2015): 19-32.

21 Muzaffar Iqbal, "In the Beginning: Islamic Perspectives on Cosmological Origins-II," *Journal of Islamic Sciences* 4, no. 2 (2006).

22 Mohammad Ali Tabatabaʾi and Saida Mirsadri, "The Qurʾānic Cosmology as an Identity in Itself," *Arabica* 63, no. 3-4 (2016): 201-234.

23 Jonathan A.C. Brown, *Misquoting Muhammad: The Challenge and Choices of Interpreting the Prophet's Legacy* (London: Oneworld Publication, 2014), 89-91.

24 Tabatabaʾi and Mirsadri, "The Qurʾānic Cosmology," 201-234.

25 Anton M. Heinen, *Islamic Cosmology: A Study of as-Suyūṭī's Al-Hay'a as-Sanīya Fī L-Hay'a as-Sunnīya with Critical Edition, Translation, and Commentary* (Beirut: F. Steiner Verlag, 1982).

26 The following Hadith shows that the Prophet (PBUH) was known for embodying the teachings of the Qurʾan: "[…] [Hakim] said [to Aisha]: Mother of the Faithful, tell me about the character of the Messenger of Allah, peace and blessings be upon him. She said: Don't you read the Qurʾan? I said: Yes. Upon this she said: The character of the Messenger of Allah, peace and blessings be upon him, was the Qurʾan. […]." Sahih Muslim, 746a; In-book ref.: Book 6, Hadith 168; USC-MSA web ref.: Book 4, Hadith 1623. https://sunnah.com/muslim:746a.

27 As reported by Aisha: "The speech of Messenger of Allah, peace and blessing may be upon him, was so clear that all those who listened to it would understand it." In *Riyad as-Salihin*, 696; In book ref.: Book 1, Hadith 17. https://sunnah.com/riyadussalihin:696.

28 Walton, *Lost World,* 21-34.

29 Chittick, *Science of the Cosmos,* 5-8.

30 See the exegesis in Seyyed Hossein Nasr et. al., *The Study Quran: A New Translation and Commentary* (New York: HarperOne, 2015).

31 John Albert Wilson et. al., *The Intellectual Adventure of Ancient Man: An Essay on Speculative Thought in the Ancient near East* (Chicago: University of Chicago Press, 1948) 45-46.

32 Y. Tzvi Langermann, "Hebrew Astronomy: Deep Soundings from a Rich Tradition," in *Astronomy across Cultures: The History of Non-Western Astronomy*, eds. Helaine Selin and Sun Xiaochun (Dordrecht: Springer Netherlands, 2000), 555-584 (564).

33 Mary Boyce, *A History of Zoroastrianism: The Early Period*, Vol. 1, (Leiden: Brill, 1996), 132-133.

34 Walton, *Lost World*, 55-56.

35 Zsuzsanna Gulácsi and Jason Beduhn, "Picturing Mani's Cosmology: An Analysis of Doctrinal Iconography on a Manichaean Hanging Scroll from 13th/14th-Century Southern China," *Bulletin of the Asia Institute* 25 (2011): 55-105.

36 Wilson et. al., *Intellectual Adventure*, 45-48.

37 Walton, *Lost World*, 27-28.

38 Nicholas Campion, "Babylonian astrology: Its origin and legacy in Europe," in *Astronomy Across Cultures*, 509-553 (542).

39 Boyce, *History*, 141.

40 Gulácsi and Beduhn, "Mani's Cosmology," 55-105.

41 Boyce, *History*, 133.

42 Rosemary Wright, *Cosmology in Antiquity* (London: Routledge, 2013) 42-43.

43 Thomas Kuhn, *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought* (Cambridge, MA: Harvard University Press, 1957), 86-87; George Saliba, *Islamic Science and the Making of the European Renaissance* (Cambridge, MA: MIT Press, 2007), 131-135; Dallal, *Islam*, 54-89.

44 Wright, *Cosmology*, 241.

45 Ibid., 103.

46 Ibid., 114-115.

47 Kuhn, *Copernican Revolution*, 45.

48 The Qurʾan uses multiple synonyms for "spread", each having their own connotations. Broadly speaking, it refers to stretching, using *madda* in verse 13:3, *madadnā* in verses 15:19 and 50:7, and by using *ṭaḥā* in verse 91:6. It also refers to flattening, using *farashnā* and *al-māhidūna* in verse 51:48, using *mahhadttu* in verse 74:14, using *daḥāhā* in verse 79:30 and by using *suṭiḥat* in verse 88:20.

49 The Qurʾan implies that the Earth was made flat and comfortable, using *firāshan* in verse 2:22, and using *farashnā* in verse 51:48; like a bed, using *mahdan* in verses

20:53 and 43:10, or a resting place using *mihādan* in verse 78:6; that is secured, using *qirāran* in verses 27:61 and 40:64.

50 Wright, *Cosmology*, 41.

51 See verse 18:86-90.

52 See verses 25:53, 27:61, 35:12 and 55:19.

53 See verse 35:12.

54 Tesei, "Some Cosmological Notions from Late Antiquity," 19-32.

55 Tomislav Bilić, "The Myth of Alpheus and Arethusa and Open-Sea Voyages on the Mediterranean—Stellar Navigation in Antiquity," *International Journal of Nautical Archaeology* 38, no. 1 (2009): 116-32.

56 The Qurʾan refers to pegs by using *awtādan* in verse 78:7.

57 The Qurʾan refers to the firmness of the mountain by calling them *rawāsiya* in verses 13:3, 15:19, 16:15, 21:31, 27:61, 31:10, 41:10, 50:7 and 77:27, as well as by using *arsāhā* in verse 79:32 and *nuṣibat* in verse 88:19.

58 See Qurʾan, verses 16:15, 21:31 and 30:10.

59 Boyce, *History*, 133.

60 The sun and the moon's subjugation are implied in the Qurʾan by using *sakhkhara* in verses 13:2, 16:12, 29:61, 31:20, 31:29, 35:13, 39:5, 45:13, and using *musakhkharāt bi-amrihi* in verses 7:54 and 16:12. The subjugation is further described as being continuous by using *dāʾibay* in verse 14:33.

61 The Qurʾan refers to the motion of the sun and moon by using *yasbaḥūna* in verses 21:33, 36:39, and 55:5 and by using *tajrī* in verse 36:38.

62 The use of the sun and moon for computational purposes is referred in the Qurʾan by using *ḥusbānan* in 6:96 and 55:5. It is then explicitly mentioned in 10:5 and 17:12.

63 The stars' subjugation is implied in the Qurʾan by using *sakhkhara* in verses 31:20 and 45:13, and by using *musakhkharāt bi-amrihi* in verses 7:54 and 16:12.

64 The Qurʾan explicitly refers to the stars' guiding ability in verses 6:97 and 16:16.

65 Kuhn, *Copernican Revolution*,42-43.

66 It is possible to read *al-khunnas* in verse 81:15, meaning "those who retreat," as a reference to the planets because of their disappearance during the day or because of their retrograde motion. See Nasr et. al., *The Study Quran*. However, this verse is also translated as referring to the stars, as in Sahih International's translation. Hence, the verse is prone to interpretations. If we interpret the verse as referring to the planets, the verse can be taken as an allusion to their deviation with respect to the ecliptic. This apparent unwillingness to conform to any geocentric models corresponds to ancient paradigms who were unable to accurately describe and predict the planets' trajectories.

67 Dallal, *Islam*, 114.

68 Boyce, *History*, 133-134; Gulácsi and Beduhn, "Mani's Cosmology".

69 The Qur'an refers to the sky as a protected ceiling, using *saqfan maḥfūẓan* in verse 21:32, but also refers to the ceiling of the sky, using *samkahā*, in verse 79:28.

70 The Qur'an refers to the sky as being built like a solid structure, using *binā'an* in verses 2:22 and 40:64, *banaynā* in verses 50:6, 51:47, 78:12 and *banā* in verses 79:27 and 91:5.

71 The Qur'an mentioned that the sky was raised using *rafa'a* in verses 13:2, 55:7, 79:28 and 88:18, and by using *marfū'* in verse 52:5.

72 See verses 13:2 and 31:10.

73 Wilson et. al., *Intellectual Adventure*, 46.

74 Edward Adams, "Graeco-Roman and Ancient Jewish Cosmology," in *Cosmology and New Testament Theology*, eds Jonathan T Pennington and Sean M McDonough, (London: T&T Clark International, 2008), 5-27 (20); Gulácsi and Beduhn, "Mani's Cosmology" .

75 See Qur'an 22:65.

76 See Qur'an 34:9.

77 See Qur'an 50:6 and 67:3-4.

78 Wright, *Cosmology*, 23.

79 See Qur'an 79:27-28.

80 Wayne Horowitz, *Mesopotamian Cosmic Geography* (n.p.: Eisenbrauns, 1998), xiv.

81 Joel White, "Paul's Cosmology: The Witness of Romans, 1 and 2 Corinthians, and Galatians," in *Cosmology and the New Testament Theology*, 90-106 (93-94).

82 See, for example, Qur'an 30:41.

83 See Qur'an 23:71.

84 Gulácsi and Beduhn, "Mani's Cosmology".

85 Wright, *Cosmology*, 114-115.

86 In Qur'an 71:16, a distinction in intensity is made between the light from the sun and that from the moon. This difference can be interpreted as a difference in the way each light is produced.

87 Edward J. Tarbuck et. al., *Earth: An Introduction to Physical Geology* (Upper Saddle River, NJ: Pearson Prentice Hall, 2005), 36-42.

88 Cliff Ollier and F. Colin Pain, *The Origin of Mountains* (London: Routledge, 2000)13-20, 186.

89 Roger Graham Barry and Richard J Chorley, *Atmosphere, Weather, and Climate* (London: Psychology Press, 2003), 32-37.

90 R. Brent Tully et. al., "The Laniakea Supercluster of Galaxies," *Nature* 513, no. 7516 (2014): 71-73.

91 Kenath Arun et. al., "Dark Matter, Dark Energy, and Alternate Models: A Review," *Advances in Space Research* 60, no. 1 (2017): 166-86.

92 See for example verses 78:6-7 and 16:15.

93 Ollier and Pain, *Origin*, 18-19.

94 The Qurʾan refers to the shaking and swinging of the earth by using *tamīda* in verses 16:15, 21:31, and 31:10.

95 The Qurʾan refers specifically to earthquakes by using *al-rajfah* in verses 7:78, 7:91, 7:155 and 29:37. In contrast, it refers to the emotional effect of earthquakes by using *zulzilū* in verses 2:214, 33:11 and 99:1.

96 Tarbuck et. al., *Earth*, 59.

97 Adrian Lenardic et. al., "Longevity and Stability of Cratonic Lithosphere: Insights from Numerical Simulations of Coupled Mantle Convection and Continental Tectonics," *Journal of Geophysical Research: Solid Earth* 108, no. B6 (2003).

98 See footnotes 48 and 49.

99 The Qurʾan alludes to a wide earth by using w*āsiʿah* in verses 4:97, 29:56 and 39:10.

100 The passage in Qurʾan 21:44 reads as follows: "[…] Do they not consider how We come upon the land, reducing it of its outlying regions? […]" This passage is commonly taken as referring to the loss of territory to an enemy, as well as to the loss of people of knowledge. See Nasr et. al., *The Study Quran.* However, when taken in its most evident meaning, the verse refers to the shrinking of landmasses.

101 With respect to the modern sciences, the shrinking of the earth could, for example, refer to the raising of sea levels, which started at the end of the last ice age.

102 See Qurʾan 51:48.

103 See Qurʾan 51:47.

104 See Qurʾan 21:33 and 36:40.

105 Tully et. al., "The Laniakea Supercluster of Galaxies," 71-73.

106 See Lane's *Lexicon.*

107 Kuhn, *Copernican Revolution*, 252-265.

108 See Qurʾan 13:2 and 31:10.

109 See Qurʾan 67:3.