

3 ISLAMIC COSMOLOGY: BASIC TENETS AND IMPLICATIONS, YESTERDAY AND TODAY

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Before beginning a discourse on Islamic cosmology, it is necessary to state that the meaning of the term cosmology in Islamic and other traditional contexts differs profoundly from the meaning

given to it in the context of modern science. This difference is of such a nature that one could consider the word "cosmology" to have become a polysemic term since the development of modern cosmology. Traditional cosmologies deal with cosmic reality in its totality, including the intelligible or angelic, the imaginal or psychic, as well as the physical domains. They are applications of metaphysical principles to the cosmic realm.¹ Modern cosmologies, in contrast, despite all the recent changes in modern science and attempts by a number of scientists and philosophers to go beyond the dualism of Descartes, are still based essentially on the Cartesian bifurcation, with the concomitant reduction of cosmic reality to *res extensa* and pure quantity. The result is that the qualitative aspects of the cosmos are reduced to the subjective pole and relegated to the domain of Galileo's secondary qualities where they are considered to be cosmically "unreal" and ultimately reducible to quantity. The consequence of this perspective is that modern cosmologies, which are in reality extrapolations of physics, either exclude the other realms of cosmic reality or consider them to be unreal and reducible to the quantitative, or what can be treated mathematically.

As for Islamic cosmology, needless to say, the many different schools of Islamic thought have produced different cosmological schemes² similar in a certain sense to the situation of modern science in which, on the basis of a single philosophy of nature going back to Galileo and Descartes,

there is not just one but many cosmological schemes, as a cursory study of the history of modern cosmology reveals. The various Islamic cosmological schemes also all function within a single *welianschawung* derived from the Islamic revelation and based upon the doctrine of unity (*al-tawhid*). On the basis of this fundamental philosophy of the nature of things in relation to the Divine Principle and to each other, Islamic thought integrated elements of Greco-Hellenistic, pre-Islamic Persian, and Indian cosmological ideas into its unitary perspective. By the tenth century A.D., Islam had developed the cosmologies which for the past millennium have been essential to its understanding of the cosmos in its totality. By this time it had also constructed the framework for the development of the Islamic sciences of nature and diverse views concerning time, space, motion, cause, finality, purpose, etc.³ In later Islamic history other notable cosmologies developed, especially that of Ibn 'Arabi and his school⁴ which has had great metaphysical and mystical significance during the past few centuries; but as far as the sciences of the cosmos are concerned, the earlier cosmological schemes that received their definitive formulations in the tenth century have remained seminal until today, despite many later reformulations and modifications.

In this summary essay we shall confine ourselves to four major topics elaborated in Islamic cosmology but that are also central to current discussions of cosmology in the West: cosmogenesis, cosmic hierarchy and its relation to vertical and horizontal causality, time and the meaning or purpose of creation, and the processes of nature.

Those who were concerned with Islamic cosmology were naturally also drawn to the question of cosmogenesis and the relation between the cosmos and the Divine Principle with which so many verses of the Quran deal. The Sacred Scripture of Islam, like the Bible, states categorically that God is the creator of the cosmos, as when it states that God is "creator or originator [*fatir*] of the Heavens and the earth" (VI: 14). Moreover, the act of creation is identified in the Quran, again as in the Bible and especially in the Gospel of John, with the Word of God. As the Quran states, "when He [God] decrees something He saith [*yaqizil*] to it 'Be', and it is" (II, 117), the creative act being associated with the verb "say" and hence with the Word.⁵

On the basis of the Quran and numerous sayings of the Prophet of Islam or *Hadith* dealing with cosmogenesis, Islamic thought developed a vast doctrine, or rather sets of doctrines, dealing with the origination of the cosmos. In fact, a subtle vocabulary was developed in Arabic and Persian that corresponded with the different meanings of cosmogenesis, meanings that are all incorporated under the single English word

"creation." Was creation in time or beyond time? Was it an ordering or reordering of a previously existing *matter* or did it come from nothing? And if it came from nothing, what does "nothing" mean in this context? These and many other questions caused a nuanced vocabulary to be developed for the discussion of the subject. The lack of similar nuance in the West has certainly contributed to the confusions present in some of the recent discussions on the theological significance of the Big Bang theory.

Already a thousand years ago Ibn Sīnā distinguished between four terms dealing with cosmogenesis:

1. *ihdāt*, meaning the bringing into being of contingent beings (*mumkināt*), whether they be temporal or eternal. Here, contingency and lack of necessity concerning the ontological status of an existent are emphasized. This distinction is different from the division between temporal and eternal, as the latter term was understood by Ibn Sīnā and other Islamic philosophers and scientists.

2. *ibdā'*, meaning the bringing into being without any intermediary of incorruptible and eternal beings, whether these beings be corporeal or not.

3. *khalq* (*āfartīnīsh* in Persian), the most common term used for "creation." Technically, it means "bringing into being," whether with or without intermediaries, and whether the beings it brings into being are corporeal or not.

4. *lakūn*, the bringing into being of corruptible beings through intermediaries.⁶

Thus clearly defined, these terms became central in the discussion of cosmogenesis, but they were not the only terms of significance. Other schools of thought, especially later Sufism, used alternative terms such as theophany (*tajalīf*) and effusion (*fayḍ*) to denote the concept of creation. It is not possible here to discuss the subtle differences among all these diverse concepts of creation and the terms used to denote them. These terms are mentioned here only to demonstrate how Islamic thought has been concerned in the deepest sense with the meaning of cosmogenesis. In light of the present discussion, the various concepts denoted by these terms can be reduced to four main views within which there have been numerous variations and diverse formulations:

1. The view that to assert that God is the creator of the world means that He is its ontological Principle and that the world is contingent and derives its reality from God.

2. The view that to say that God created the world means that He created the world "in time" from nothing.

3. The view that creation means not a single act, whether it be the bestowing of reality along with time and space or "in time." Rather, there is continuous creation (*creatio continua*) that came to be known as *layḍā al-ḥalq fi kullī anāṭ*.

4. The view of trans-substantial motion (*al-ḥarakat al-jaubarīyyah*), according to which at every moment everything in the cosmos is renewed by new forms being added to already existing objects that then act as matter for the new forms.

The first of these views was defended for the most part by the Islamic Peripatetic (*masbā'ī*) philosophers, the second by those called (in the West) theologians (*mutakallimūn*) and doctors of the Divine Law, the third by the Sufis, and the fourth by Ṣadr al-Dīn Shīrāzī (*Mullā Ṣadrā*) and the followers of his school known as *al-bīkmat al-muta'āliyah* ("transcendent theosophy").

Much of early Islamic thought was dominated by the debates between the Peripatetics such as al-Fārābī, Ibn Sīnā, and Ibn Rushd on the one side, and the *mutakallimūn* such as al-Ghazzālī and Fakhr al-Dīn al-Rāzī on the other, concerning the meaning of the creation of the world. This question in Islamic philosophy is known technically as that of *hudūth wa qidam*. The *mutakallimūn* were on the side of *hudūth*, claiming that God created the world "in time" from nothing, whereas the philosophers, most of whom were also outstanding scientists, claimed that time is one of the conditions of the existence of this world and therefore could not have had any reality before the existence of this world. They were therefore on the side of what came to be known as *qidam*, which means literally the oldness of the world. The philosophers also emphasized the contingent (*mumkin*) character of the universe.⁷ In opposition to them, the *mutakallimūn* believed that to point to anything as being *qadīm*, that is, not originated in time, is to detract from the nature of God as being alone *qadīm* in the metaphysical sense.⁸

One of the main accusations of al-Ghazzālī against Ibn Sīnā in his critique of the master of Peripatetics in the former's *Tahāfut al-falāsīfah* ("Incoherence of the Philosophers") is that Ibn Sīnā believed in "the eternity of the world," and al-Ghazzālī went so far as to accuse Ibn Sīnā of heresy (*kufūr*) because of it.⁹ Likewise, Ibn Rushd devoted a good part of his *Tahāfut al-tabāfut* ("Incoherence of the Incoherence") to the refutation of al-Ghazzālī's views on this matter.¹⁰ The well-known debate involving Ibn Sīnā, al-Ghazzālī, and Ibn Rushd, not to speak of many other detailed disputations on this issue between the philosophers and theologians—as one finds in the works of Fakhr al-Dīn al-Rāzī and Naṣīr al-Dīn al-Ṭūsī—attest to the seriousness with which Islamic thought has

deliberated upon the meaning of "beginning" as far as the cosmos is concerned.

The current discussions among various modern cosmologists on this question, although held within a very different context, must ultimately deal with the same philosophical issues. The latter cannot be shunned by hiding behind the science involved, precisely because the question of "in the beginning" or *in principio* is not a scientific question as the term science is understood today. There is no way to treat $t = 0$ within the discipline of quantum mechanics except by referring to singularities and boundary conditions. The Islamic discussions on this subject therefore remain very pertinent today, despite the changes in scientific view over the past centuries. Among the most enduring of Islamic teachings is the distinction made by Islamic philosophers—going back to Ibn Sīnā, and not Aristotle, as some have claimed—between the contingent nature of the cosmos and the necessity of the Divine Principle, with only Pure Being having the characteristics of necessity (*wujūb*). Today this assertion of the contingency of the universe continues to occupy the attention of many Christian theologians who are also concerned with modern cosmology.

The notion of the renewal of creation at every instant has been cultivated most of all by the later Sūfīs. One of the earliest and most eloquent expositions of this doctrine is that of ‘Ayn al-Qudāt Hamadānī, the 12th century Persian Sūfī and philosopher,¹¹ although he did not use the technical term *tajdid al-khalq fi kulli anāq*, which owes its origin to Ibn ‘Arabī. According to this view, the universe is being destroyed and re-created at every moment by God. Like the two moments of breathing, there is a constant expansion (*basf*) and contraction (*qabḍ*) of the universe. At every moment everything returns to the Divine Principle and is then re-created, "returned" and remanifested, because left to themselves, contingent beings would immediately collapse into nothingness. Referring to Qurānic verses where there is reference to a new creation (as in Qurān, I, 15), expositors of this perspective believe that "new creation" does not refer *only* to God creating a new heaven and earth after the end of this world, but also to the truth that God renews creation at every instant.

There is therefore a *creatio continua*, but in a very different sense from the way in which process theology in the West defines this term. Each moment in the life of the universe is witness to a fresh and new cosmos, re-created by the Divine creative act that repeats itself at every moment. We observe continuity in the world only because of the rapidity of this renewal. But if this renewal were to cease, the cosmos would disappear in an instant. God is not only the originator and sustainer of the cosmos, but its constant creator. Creation is not confined to "the

beginning," if we may understand this term in a temporal sense, but applies to every present moment, to every now that is therefore also "in the beginning." Time and eternity meet at every present moment, the now being, in fact, the gate to the eternal. When one thinks of the instantaneous collapse of the state vector and desuperposition in quantum mechanics that accompany our observation and experience of a phenomenon empirically, one realizes how fecund such a view of creation is for those seeking to make philosophical sense of quantum mechanics beyond the speculative ambiguities and even apparent absurdities that have characterized so many of the interpretations of quantum mechanics since its inception.¹²

Mullā Sadrā's theory of trans-substantial motion, in a manner similar to the already discussed views of the Sūfīs, conceives of cosmogenesis in relation to every moment in the life of the cosmos rather than to a single "in the beginning," without denying a beginning and end to the existence of the corporeal universe.¹³ There is a major difference between the view of Mullā Sadrā and that of Sūfīs such as ‘Ayn al-Qudāt Hamadānī. While for the latter at every moment the universe is renewed and re-created, for Mullā Sadrā each state of the cosmos at a particular moment itself becomes matter for new forms that are imposed upon it from above. In the language of Islamic thought, the view of the Sūfīs is called *labs ba'd al-khalq*, or "dressing [with form] after undressing." The Sadrīan doctrine, on the other hand, is called *labs ba'd al-labs*, or "dressing after dressing." Mullā Sadrā's doctrine thus relates each moment of the cosmos to what was there before—through substantial motion. This means that in a sense the cosmos is *hādith*, or created at every moment, because at any given moment it does not exist in the state that it did a moment earlier. This doctrine may therefore in fact be considered once again as a particular version of *creatio continua*. The doctrine of trans-substantial motion also emphasizes the dynamic nature of the cosmos and its constant becoming, without denying either teleology in the cosmic realm or the immutable archetypes manifested in the cosmic domain.

There have been some independent Islamic philosophers, such as Muḥammad ibn Zakariyyā' al-Rāzī and his teacher Abū'l-‘Abbās al-Fānshahrī, who have emphasized several eternal "principles" (*qudamā*), including time, in their cosmology and have envisaged the cosmogenic process primarily as a demiurgic one, as in one of the two versions of Plato's cosmology. Such views, however, remained marginal. The major schools of Islamic thought, in contrast, have rejected the idea of time as an "eternal principle." Instead, they have all spoken of the genesis of the cosmos as resulting from the act of a Metacosmic Principle beyond the cosmos and time, whether this genesis be seen "in time" or in principle.

What is important to note is that the four major perspectives stated above, with their numerous variations and interpretations, provide a remarkably rich body of the most perceptive and acute metaphysical, philosophical, and cosmological speculation concerning cosmogenesis, dealing with issues and holding positions all of which are very much alive in current discussions on cosmology.

The contrast of these schools to many contemporary views comes from the fact that the mainstream Islamic cosmologies all agree upon the basic doctrine of a Metacosmic Principle as the originator of the cosmos of which the latter is the creation or manifestation. Or, to put it another way, the cosmos is ontologically dependent upon a Reality beyond itself and is neither *sui generis* nor self-sustained. Other than that, they differ among each other concerning such basic issues as the meaning of the act of creation in regard to time and the very meaning of "in the beginning."

These cosmologies also differ from each other concerning the revealed doctrine that God created the world from nothing, that is, *ex nihilo* or *min al-ʿadam*. Like certain Jewish and Christian metaphysicians such as the Kabbalists and Meister Eckhart, certain Muslim metaphysicians such as Ibn ʿArabi consider the *nihil* or *ʿadam* to lie above existence rather than below it. For the Sufis, *ʿadam* refers to the celestial archetypes upon which God "breathed" the Breath of Compassion (*nafas al-Rahman*) by virtue of which these archetypes became existentiated in outward forms.¹⁴ One could therefore speak in the context of Islamic, as well as Jewish and Christian cosmologies of a more esoteric nature, not only of creation by God but also creation *in* God. In this view the substance of the cosmos "flows" from the Divine Reality without either affecting that Reality or casting a shadow upon its transcendence *vis-à-vis* the cosmos, while that Reality is also present within every grain of sand by virtue of the existence of that grain.¹⁵ However one may conceive the meaning of *nihil* or *ʿadam* or "in the beginning," there is no doubt that the dominating schools of Islamic cosmology remain united in their assertion that the Ultimate Reality lies beyond the cosmos that it generates and sustains, and under no condition would any of these schools accept the reduction of all reality to the cosmos, and especially to its empirically and experimentally verifiable dimensions.

The second tenet of Islamic cosmology to which we wish to turn is that of hierarchy. Etymologically, hierarchy (*hierro-arche*) means sacred or divine origin, and the term demonstrates by its very linguistic structure the truth that the doctrine of cosmogenesis on the basis of creation by a Divine Agent necessarily implies hierarchy. It is not therefore accidental that various Islamic cosmological doctrines, as is the case with other

traditional cosmologies, are based on the notion of hierarchy, so neglected by the mainstream of Western philosophy since Leibnitz, and denied of necessity in its metaphysical sense by the modern natural sciences, based as they are on the study of a single level of existence, the physical.¹⁶ Hierarchy implies that there are distinct levels of existence or ontological levels in the cosmos and that some are higher than others, higher being determined by closeness to the Source of all being and all qualities.

Some Islamic cosmological schemes, all of which simply reaffirm the Quranic doctrine of universal hierarchy, conceive this "great chain of being," to use the well-known image of Arthur Lovejoy,¹⁷ in ontological terms. Accordingly, God is Pure and Absolute Being, and cosmic beings are so many rungs of the ladder leading to that Absolute Reality. Here Islamic thought is similar to that of Christian theologians and philosophers such as St. Thomas. In fact, Ibn Sina, called the "first philosopher of being," was instrumental in systematizing the great chain of being in terms of an ontology that was to influence many of the Schoolmen. Other Islamic thinkers conceived the hierarchy in terms of numerical symbols in a Pythagorean manner, as seen in the *Rasaʾil* ("Treatises") of the Ikhwan al-Safaʾ, and still others in terms of degrees of light and darkness, as seen in the teachings of the Master of Illumination (*al-Isḥraq*), Shihāb al-Dīn Suhrawardī.

Whatever language and type of symbolism is used, the metaphysical reality is the same. This reality confirms that below the Divine Order there exists the cosmos, which is itself comprised of states of reality standing one "over" the other in a hierarchic fashion. Islamic metaphysics was fully aware that the Ptolemaic model of the world was in fact a visible symbol of this reality and not the *basis* of this reality. Therefore, with the destruction of the Ptolemaic view there was no reason in the Islamic mind for the destruction of the hierarchy, which Ptolemaic astronomy symbolized, in contrast to what one can observe in the West during the Renaissance and the 17th century. In any case, metaphysical principles and the Quranic revelation that contains those principles in revealed form require that below the Divine Essence there be the supreme archetypical world of Divine Names and Qualities. The latter are the principles of the archetypes of all things in the cosmos, and below these falls the intelligible world identified with the angelic world of revelation, itself possessing a vast hierarchy. Below those worlds lies the imaginal world associated also with the psychological realm, and below it is the corporeal itself, consisting of form and matter—this latter term not to be confused with the modern notion of matter, which is quite distinct from the Aristotelian *materia*.

In addition, it is important to mention that the refusal to reduce time to pure quantity possessing uniformity that can be measured by purely quantitative means has a major implication for cosmology. Rejection of a uniform and purely quantitative time means the rejection of the idea of uniformitarianism and what is called the theory of nomological universality in modern cosmology. It is totally irrelevant to Islamic cosmology whether the rejection of this claim makes the pursuit of cosmological studies possible or not. What matters is whether this theory is true or not. Islamic doctrines would answer this question in the negative, stating that, in fact, the conditions in various periods in the life of the cosmos differ as does the flow of time and its qualitative effect and significance. They reject extrapolating from knowledge of a small point of the spatio-temporal sequence to encompass vast times and spaces beyond the boundaries of what is known. They would question even the meaning of the phrase "billions of years" and would ask exactly what assumptions one must make about the nature of reality in order to speak of the word "year" in that phrase, and to define it exactly as one does in astronomy for the present period in the life of the cosmos.

Islamic cosmology asserts that one has to prove the hypothesis of nomological universality first, and only then apply it, rather than applying it without validation with the excuse that if we do not do so we cannot study cosmology in the modern scientific sense. There are major philosophical, theological, and scientific issues involved in this issue. These need to be studied and clarified so that one can understand exactly what it is that modern cosmologists are discussing, why there are so many differences of opinion among them, and why views and even accepted models are discarded so rapidly. The insistence of Islamic and other traditional cosmologies upon the qualitative nature of time and cosmic history may in fact be considered a positive challenge to Western cosmologists, and even to certain modern Christian theologians concerned with cosmology, to reexamine and elucidate in all honesty and clarity the assumptions that are made about the nature of cosmic reality upon which they base their speculations, extrapolations, and calculations about the vast expanses of time and space.

There is a famous sacred saying (*ḥadīth qudsī*) in which God speaks in the first person through the Prophet of Islam: "I was a hidden treasure; I wanted literally loved, *abbāḥūl* to be known; therefore I created the world so that I would be known." Islam therefore not only believes, as do Judaism and Christianity, that the universe has a purpose and is teleological, but asserts clearly that this purpose is associated with God's Self-knowledge. The purpose of the creation of the universe is the attain-

ment of that state of consciousness that knows God and that principal knowledge itself. Put otherwise, the purpose of the universe is in the deepest sense the attainment of an inner realization that would allow God within and at the center of our being to know Himself through His Self-manifestation. The universe is the Self-disclosure of God. It is a revelation to be understood, and has a meaning that can be "read" by those who possess the "literacy" necessary to read the verses (*āyāt*) of the "cosmic book."²⁶ From the Islamic point of view, teleological knowledge of the cosmos, far from being useless as claimed by modern science, is the most "useful" of all forms of knowledge of the cosmos because it concerns the very *raison d'être* of the cosmos and of our existence in it. It is a basic part of our vocation here on earth, since such a knowledge leads to the knowledge of God, which is humanity's highest end and *entelechy*.²⁷

Islamic cosmology, therefore, compares the cosmos itself with a revealed book. The science of the book dealing with its weight, size, and the composition of its ink and paper certainly tells us something about the book, but it cannot reveal to us the message written upon the pages of the cosmic text. Islamic cosmological sciences never excluded those types of study that dealt with the quantitative aspects and material analyses of this book, but they never accepted such depictions of the nature of the cosmic book as a complete account of cosmic reality. Its purpose can only be seen by our being able to read the message of the "cosmic text."

Islamic cosmology also emphasized the possibility of knowledge of the presence of purpose in what is observed in nature—not the grand and final purposes, but the more immediate goals and ends that natural processes reveal, especially those dealing with the domain of life. As for the grand purposes and aims of cosmic history, those details are known only to God. What is certain for Islam are two truths: the eschatological realities, which are beyond any form of observational science, and the basic metaphysical truth that God is the First and the Last, as the Quran states, or as Christ asserts in the Bible, "I am the alpha and the omega."

Since the time of Francis Bacon, the strong opposition to teleology in modern science has not shaken the faith of Muslims in a purposeful universe; and Islamic thinkers acquainted with modern science have usually been aware that the announcement of the rejection of all purpose in the cosmos by many scientists is in fact, not strictly speaking, a scientific statement but a statement of faith in a particular ideology. Islamic cosmology would add that the lack of purpose in nature claimed by so many modern scientists is due not simply to the fact that the whole of nature is being observed on the basis of a method that excludes the possibility of a teleological dimension to cosmic reality. Rather, it is the result of the

reduction of nature to quantity and the identification of a philosophy based on reductionism, materialism, and scientism with the whole philosophy of the natural world. The creeping back of certain forms of teleology into modern science itself, as, for example, in discussions of the anthropic principle, only confirms in the Muslim mind that even a science that limits itself to the quantitative aspect of cosmic reality will eventually confront the shadow of teleology. It will even show up in that remnant and residue of cosmic reality with which modern science has chosen to be concerned since the 17th century. Once honest science is saved from the prison of reductionist and materialistic ideological confinement, teleology has to be admitted as a reality.

There are many other basic tenets of Islamic cosmology that we do not address in this chapter. What has been said, however, is sufficient to indicate the fact that Islamic cosmology is concerned with issues that are very current for Muslim scientists and thinkers in general. These issues should also be of concern to others interested in the development of cosmology in a civilization such as the Islamic, which, although different from the West, possesses a religion belonging to the same family as Judaism and Christianity and was also heir to the Greco-Hellenistic philosophy and sciences, being itself moreover the generator and propagator of a long scientific tradition. Furthermore, the Islamic tradition is one in which the nexus between cosmology and metaphysics, understood as the supreme science of reality or *scientia sacra*, has never been severed and in which the Cartesian dualism and bifurcation has never taken root.

As more and more philosophers, theologians, and to a certain extent physicists in the West began to seek a more integrated cosmology and question the Cartesian bifurcation, with its tendency to denude the "objective world" of all qualities, the significance of Islamic cosmology and its relevance for the reconstruction of a holistic cosmology will become more evident. For it can do justice to the full reality of the cosmos with its diverse levels of existence, and it can contribute to the creation of a science that would seek to understand the *esse* of things as well as their mathematical structure. As for the Islamic world, it is only in the context of this wider cosmology that modern Western science can be critically evaluated, transformed, and integrated into the Islamic intellectual universe without sacrificing its own integrity and authenticity.

Notes

1. For an in-depth understanding of the cosmological perspective in the traditional context, see T. Burchardt, *Mirror of the Intellect*, trans. and ed. W. Stoddart (Albany: State University of New York Press, 1987), pp. 13–16. See

- also S. H. Nasr, *Knowledge and the Sacred* (Albany: State University of New York Press, 1989), Chapter 6, "The Cosmos as Theophany," pp. 189–220.
2. On different schemes of Islamic cosmology see S. H. Nasr, "Cosmological Doctrines," in *Islamic Culture*, Vol. IV (Paris: UNESCO, in press). See also A. Bausani, "Cosmologia e religione nell'Islam," *Scientia*, 108, 1973, 723–67; and al-Suyuti, *Jalal al-Din Islamic Cosmology*, trans. A. M. Heinen (Wiesbaden: Steiner, 1982).
3. We have discussed these cosmologies in S. H. Nasr, *An Introduction to Islamic Cosmological Doctrines* (Albany: State University of New York Press, 1993).
4. On Ibn 'Arabi's cosmology, based on the primacy of the Divine Names the interplay of whose theophanies (*ta'aliyat*) constitute cosmic reality as such, see W. Chittick, *The Self-Disclosure of God—The Principles of Ibn al-'Arabi's Cosmology* (Albany: State University of New York Press, 1997).
5. On Qur'anic verses dealing with creation see F. Rahman, *Major Themes of the Qur'an* (Minneapolis: Bibliotheca Islamica, 1980).
6. See I. Gardet, *La Pensée religieuse d'Avicenne (Ibn Sina)* (Paris: J. Vrin, 1951), p. 65; and S. H. Nasr, *An Introduction to Islamic Cosmological Doctrines*, pp. 212–13.
7. Similar debates were to take place in Christianity going back to the attacks on the "eternity of the world" by John the Grammarian, who was also well known to Muslim authors, some of whom incorporated certain of his arguments into their writings.
8. There is a vast literature on this subject in both Islamic and European languages. For examples of works in European languages, see H. A. Davison, *Proofs for Eternity, Creation and the Existence of God in Medieval Islamic and Jewish Philosophy* (New York and London: Oxford University Press, 1987); H. A. Wolfson, *The Philosophy of the Kalam* (Cambridge: Harvard University Press, 1976); and D. B. Burrell and B. McGinn (eds.), *God and Creation* (Notre Dame: University of Notre Dame Press, 1990).
9. See al-Ghazali, *The Incoherence of the Philosophers (Taba'at al-falāsifa)*, trans. M. E. Marmura (Provo, Utah: Brigham Young University Press, 1997).
10. See Ibn Rushd, *Taba'at al-taba'at*, trans. S. van den Bergh (Cambridge: Gibb Memorial Trust, 1987), the first four discussions, pp. 1–170.
11. See T. Izutsu, "The Conception of Perpetual Creation in Islamic Mysticism and Zen Buddhism," in *Creation and the Timeless Order of Things* (Ashland, Oregon: White Cloud Press, 1994), pp. 141–73.
12. Wolfgang Smith has already dealt with this relation in his profound work, *The Quantum Enigma* (Peru, Illinois: Sherwood Sugden, 1995), especially Chapter 6, "In the Beginning," p. 99f.
13. On Mullā Sadra and the doctrine of trans-substantial motion see S. H. Nasr, *The Islamic Intellectual Tradition in Persia* (London: Curzon, 1996), pp. 271–303; and S. H. Nasr and O. Leaman (eds.), *History of Islamic Philosophy* (H. Zaid), Chapter 35, "Mullā Sadra: His Life and Works," pp. 635–42, and S. H. Nasr, Chapter 36, "Mullā Sadra: His Teachings," pp. 643–62.

14. On the metaphysical significance of *ex nihilo* see F. Schuon, *The Play of Masks* (Bloomington, Indiana: World Wisdom Books, 1992), "Ex nihilo, in Deo", pp. 37-42. As for the concept of the "Breath of the Compassionate" in relation to the creation of the cosmos, see S. H. Nasr, *Science and Civilization in Islam* (Cambridge: Islamic Text Society, 1987, and New York: Barnes and Noble, 1992), p. 344ff.
15. For an extensive treatment of this subject see L. Schaya, *La création en Dieu* (Paris: Dervy-Livres, 1983).
16. On the centrality of this doctrine in traditional metaphysics and cosmology, see H. Smith, *Forgotten Truth* (San Francisco: HarperSanFrancisco, 1993), p. 34ff. On the role of this central doctrine in Western thought see P. G. Kuntz (ed.), *The Concept of Order* (Seattle and London: University of Washington Press, 1968), and H. Krings, *Ordo: Philosophische-historische Grundlegung einer abendländischen Idee* (Halle: M. Niemeyer, 1941).
17. See his classical work, *The Great Chain of Being* (Cambridge: Harvard University Press, 1936).
18. One can of course use the symbol of depth rather than height and speak of more inward rather than higher, ultimately considering the Divine Principle as the Immanent rather than the Transcendent. But if correctly understood, such an Immanent Reality cannot but also be the Transcendent. Without acceptance of the transcendent dimension, immanentism can become readily reduced to a philosophical pantheism, which can then easily "harmonize" itself with modern materialistic cosmologies, as can be seen in so many expressions of "New Age" religions.
19. For a discussion of diverse theories of time in both East and West, see K. Vatsyayan (ed.), *Concepts of Time—Ancient and Modern* (New Delhi: Indira Gandhi National Centre for the Arts, 1996). There are several articles in this work about the Islamic conception of time.
20. See L. Massignon, "Le temps dans la pensée islamique," *Erasmus Jahrbuch*, 20, 1952, 141-48.
21. For a masterly summary of this traditional doctrine see A. K. Coomaraswamy, *Time and Eternity* (New Delhi: Indira Gandhi National Centre for the Arts, 1990).
22. Some contemporary Islamic thinkers have been drawn to comparing this view with that of Einstein in his theory of relativity. See H. A. Rashid, *Daw' faysul-'i sharq wa gharb, Sadr al-mula' allihin wa Einstein* (Isfahan: Ta'rd Press, 1953/54).
23. See H. Corbin, *En Islam iranien*, Vol. I (Paris: Gallimard, 1971), p. 177ff.
24. See Abu Bakr Siraj ed-Din, "The Islamic and Christian Conceptions of the March of Time," *Islamic Quarterly*, 1, 1954, 229-35.
25. See H. Corbin, *Cyclical Time and Ismaili Gnosis*, trans. R. Mannheim and J. Morris (London: Kegan Paul International, 1983).
26. I have dealt with this issue in several of my books, such as *Science and Civilization in Islam*, p. 337ff.

27. A contemporary Christian theologian formulates the attitude of modern science toward teleology as follows: "For the most part scientific thought still avoids any suggestion that questions about the purpose of things lead us to true or useful knowledge." John F. Haught, *Science and Religion: From Conflict to Conversation* (New York: Paulist Press, 1995), p. 166. Traditional Islamic thought would respond that knowledge of final causes or purpose of things is true knowledge of the highest order as far as knowledge of the cosmos is concerned as well as being of the greatest "use" to man after knowledge of God which, as already stated, is the final purpose of the creation of the cosmos itself.