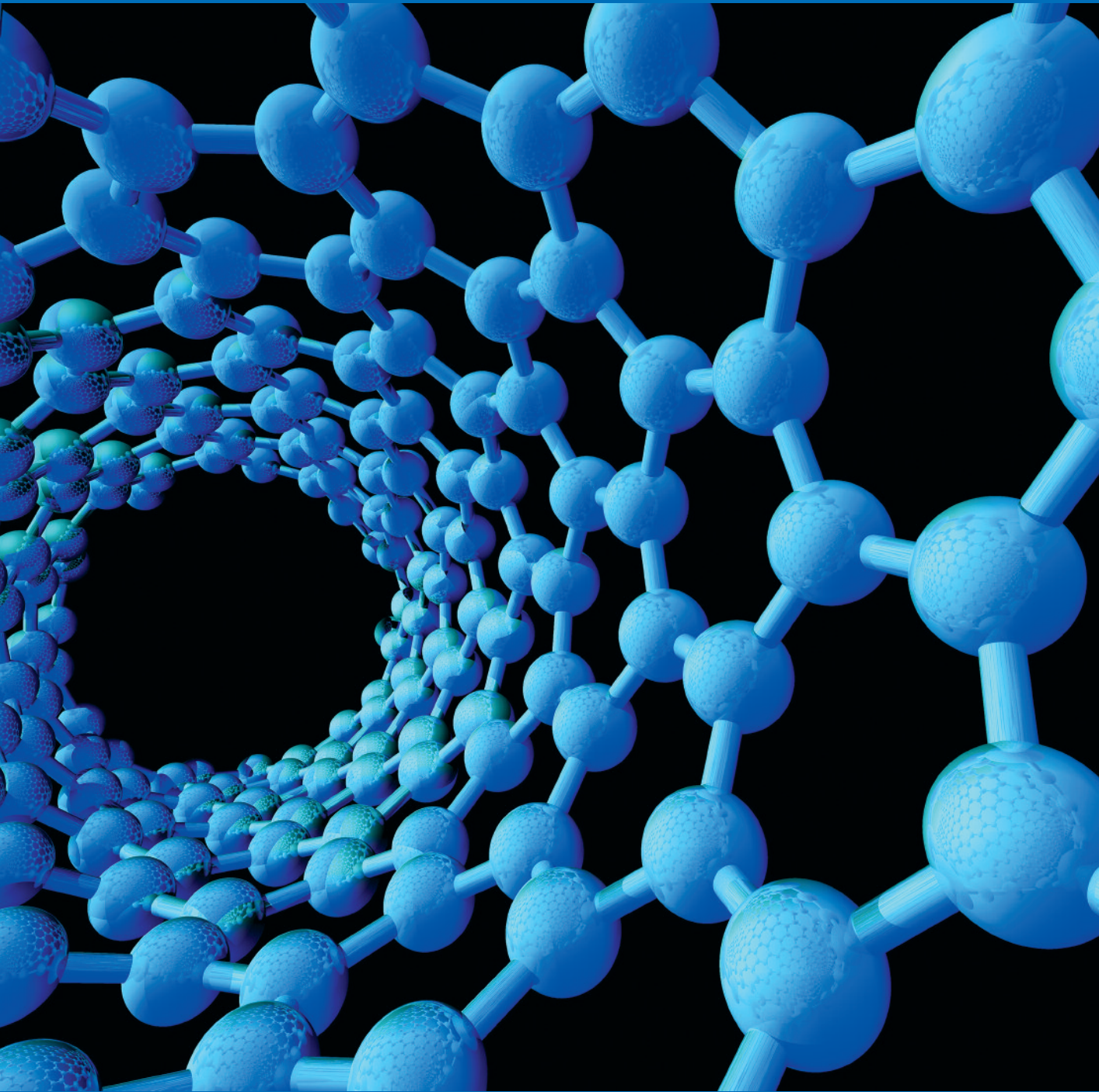


# Kalam's Necessary Engagement with Modern Science

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BY NIDHAL GUESSOUM



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# Kalam's Necessary Engagement with Modern Science

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## Introduction: Definitions, Principles, and Fundamental Issues

**W**HEN the question of the relationship that may or should exist between religion and science is raised, Muslim interlocutors often insist that Islam has never had a problem with science, that the question only poses itself in western culture due to the Church's old suspicion towards, and oppression of, science (the Galileo affair). Muslims invariably cite many Qur'anic verses to support the idea of Islam's encouragement of science, starting with the very first word revealed to Prophet Muhammad, *Iqra'* ('Read/Recite!', Qur'ān 96:1) to '*Truly fear Allah those among His Servants who have knowledge*' (35:28).

This typical, widespread, and instinctive reaction, however, betrays a number of misunderstandings: (a) most, if not all, of the Islamic references in this regard are about 'knowledge', *ilm*, a term which has been understood in many different ways, including 'religious knowledge', 'knowledge of God', and sometimes 'science' (in a general sense); (b) there are a number of current conflicts between some traditional Islamic views and modern science, including the question of biological and human evolution (Darwin's theory), on divine action, and miracles, and of course one cannot simply pretend that Islam 'has no problem with (modern) science'; (c) exploring and discussing the interaction between Islam and modern science can be beneficial to Islam as well as to science, so brushing the topic aside is not a productive move; (d) the engagement of Islam with modern science is important and crucial to issues related to theology (*Kalām*)—hence the subject and title of this piece—as well as on the more practical and applied issues of genetic engineering, end-of-life medicine, and such.

In this overview, I will focus solely on the conceptual, philosophical, metaphysical, and theological questions raised by natural science in its modern form. The practical issues are left for further review and discussion.

The definition and characteristics of modern science are at the heart of the matter. From that, one understands why the relation between Islam and modern science is not, and cannot be, trivial, and why the engagement of Kalam with modern science is necessary and important.

Ziauddin Sardar defines modern science as 'an organized, systematic and disciplined mode of inquiry based on experimentation and empiricism that produces repeatable and

applicable results universally, across all cultures.’<sup>1</sup> This definition has the virtue of emphasizing the characteristics of objectivity (repeatability, universality) and testability (experimentation, empiricism); it also indirectly refers to the *process* of science (the ‘scientific method’), and incorporates Karl Popper’s ‘falsifiability’ criterion (‘testability’), which declares as non-scientific any proposed explanation that will not present ways of checking it (the explanation), in the aim of either confirming it or rejecting it as incorrect. Sardar’s definition, however, does not mention, at least not clearly, what in my view is the fundamental characteristic of *modern* science, namely the principle of ‘methodological naturalism’, which insists that science only admit explanations of natural phenomena that rely solely on natural causes and leave out entirely any appeal to supernatural agents, be they spirits, angels, demons, or indeed God. Moreover, modern science has largely banished from its mode of thinking any teleological considerations (evolution toward a goal or a target) and particularly the concept of purpose—a highly important and sensitive issue for theists.

This concept of methodological naturalism (MN) is a crucial and largely under-appreciated one in the discussions of science and Islam/religion—let me therefore elaborate further.

First, it is important to distinguish it from ‘philosophical naturalism’, which is the atheistic claim of non-existence of supernatural entities altogether; this is synonymous to, and often referred as, ‘philosophical materialism’ or ‘metaphysical materialism’. This is a position that many philosophers and a number of scientists adopt, but it is *not* a principle of science. As Phil Stilwell states in a recent paper:

Most academics stipulate that MN, also known as scientific naturalism, does not deny the possibility of supernatural entities ... MN is a provisional epistemology and ontology that provides a framework upon which to do science. These parameters are merely provisional. MN does not entail philosophical naturalism, but instead entails out of pragmatics and precedent that science begin each particular inquiry with the assumption that any explanation will fall within the existing matrix of established material definitions and law ... MN also implies that, if a natural explanation does not immediately emerge from the inquiry, we do not default to a declaration of a supernatural cause.<sup>2</sup>

But how and why did methodological naturalism become a pillar of modern science? As a number of philosophers, including Michael Martin and Massimo Pigliucci (both atheists) have insisted, the main reason is pragmatism and efficacy: this approach has proved itself efficient in advancing scientific exploration and discoveries, and it is a reasonable, minimalist assumption, in accord with ‘Occam’s razor’ or ‘the principle of parsimony’—the principle by which scientists always adopt the explanation with simpler and fewer assumptions. With this philosophy, then, why call upon supernatural agents when material causes can explain the phenomenon? Indeed, during the emergence of modern science, the assumption of supernatural factors as explanations was quickly identified as a ‘science

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<sup>1</sup> Ziauddin Sardar, ‘Islamic Science: The Way Ahead’, in Ehsan Masood (ed.), *How Do You Know?*, Pluto Press, London, 2006, p.181.

<sup>2</sup> Phil Stilwell, ‘The Status of Methodological Naturalism as Justified by Precedent’, *Studies in Liberal Arts and Sciences*, Tokyo University of Science, no.41, 2009, pp.229–247. See also: Massimo Pigliucci, *Nonsense on Stilts: How to tell Science from Bunk*, The University of Chicago Press, Chicago and London, 2010, pp.178–180; Barbara Forrest, ‘Methodological Naturalism and Philosophical Naturalism: clarifying the connection’, *Philo* 3, 2000, pp.7–29.

stopper’, an end to the explanatory process and thus a non-productive (or even counter-productive) approach to progress (progress in finding further truths about nature and devising useful applications). For example, if a doctor explains some mental disorder as the work of demons, s/he will not be able to understand the deeper brain processes at work, nor will any medication be found, one which will alleviate the troubles of the patient.

Clearly such a framework for science poses a challenge to at least some Islamic conceptions of the world and nature, as often Muslims claim and insist that God acts physically and directly in the world, in cases of miracles (see later) or in everyday events, either on large scales (earthquakes, floods, etc.) or small, individual, personal scales (in responses to prayers, in particular). It also has serious implications on the explanations that one may propose to certain phenomena around us, ranging from volcano eruptions to sudden deaths or illnesses suffered by various people, especially sinners. Indeed, as ancient Christian apologists got burned with their insistence that lightning was a bolt of hellfire directed at those with whom God is angry (an explanation later shown to be false and replaced by a simple electrostatic model), Muslim preachers may wish to reconsider their explanation of some mental disorders as demon possessions, and so on. In fact, explanations that include the ‘sin’ factor, for instance, can be falsified (in the Popperian sense) by looking for statistical correlations (or lack thereof) between the sample of afflicted individuals and their religious beliefs and behaviors.

This is therefore the first area of challenge, contention, and friction between modern science and theology (Islamic, or theistic, more generally): how to reconcile a naturalistic study and explanation of the world/nature and the belief in a present/personal God. Does He act in the world and, if so, does this conflict with modern science; or does He not act (at least not physically) in the world? There have been proposals by (western) theologians arguing for one or the other positions; I personally tend to uphold the ‘spiritual action only’ position, but clearly this is far from a trivial or settled question, and Muslim theologians are invited to enter into dialogue with scientists, philosophers, and thinkers from various corners in order to present coherent views on the question.

The theological implications that may be drawn from the scientific (rigorous, systematic, methodical) study of nature have been referred to as natural theology. This can be described as an area of theology that is based on reason and knowledge/experience/appreciation of nature. Thus it is distinguished from revealed theology, which is based on the analysis of scriptures and religious experiences of various kinds. In particular, natural theology attempts to argue for the existence of God from ‘objective’ sources (reason and nature), not from revealed sources.

One of natural theology’s main streams of argumentation is the ‘design’ that can be perceived in the world—to what extent it is an objective inference and can constitute strong proof for the existence, power, and attributes of God, the Creator. This ‘argument from design’ or ‘teleological argument’ has been known at least since the Greeks, was largely discussed by Muslim scholars (though this is rarely realized and appreciated), and reached its peak in 1802 when William Paley published *Natural Theology; or Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature*, in which he presented his famous ‘watchmaker analogy’.<sup>3</sup>

Nine centuries earlier, the illustrious astronomer Al-Battānī had insisted that: ‘By

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<sup>3</sup> Here is how William Paley presents his watchmaker metaphor at the very beginning of his book: ‘In crossing a heath, suppose I pitched my foot against a *stone*, and were asked how the stone came to be there; I might possibly answer, that, for

focusing attention, observation, and extensive thought on astronomical phenomena, one is able to prove the unicity of God and to recognize the extent of the Creator's might as well as His wide wisdom and delicate design.<sup>4</sup> Indeed, the Qur'an itself had repeatedly drawn the attention of humans to the fact that nature and the cosmos do, in their perfection, point towards the Creator and Designer: 'Do they not look at the sky above them, how We have made it and adorned it, and there are no flaws in it?' (50:6); 'Those who remember Allah standing and sitting and lying on their sides and reflect on the creation of the heavens and the earth: Our Lord! Thou hast not created this in vain! Glory be to Thee' (3:191); and other verses, sometimes ending with 'Is there a god besides Allah?'

This 'argument from design' later became a popular theme among Christian naturalists, as evidenced by a series of publications in the nineteenth century, such as the 'Bridgewater Treatises'.<sup>5</sup> It has remained a very popular argument and has widely held premise among Muslim scholars and writers until today.

This line of thinking, however, was severely criticized on philosophical grounds by David Hume in his *Dialogues Concerning Natural Religion*, and shaken on scientific grounds by Charles Darwin who, through his theory of evolution, showed that complex, apparently designed organisms could be explained by means of transformations and natural selection over very long periods of time. Modern philosophers of religion, however, showed that Hume's critique was only of limited potency, as it applied mostly to design arguments of analogical nature.

Interestingly, though, natural theology has recently been making a comeback among western theistic thinkers, mainly on the basis of the Anthropic Principle, or more precisely the 'fine-tuning' observed in the universe, which is a deeper, more striking version of the argument from design, as I will mention later. More general and fundamental issues of relation between theology and science have been explored by John C. Polkinghorne, the physicist-turned-priest, most directly in his book, *One World: The Interaction of Science and Theology*.<sup>6</sup>

Another important issue at the intersection of natural science and theology is the question of the 'laws of nature', as the scientists usually refer to them, or the 'laws of God' (pertaining to nature), as believers refer to them. The first problem that poses itself is: are there 'primordial' laws (in the Platonic sense) according to which nature functions, laws we

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any thing I knew to the contrary, it had lain there for ever: nor would it perhaps be very easy to show the absurdity of this answer. But suppose I had found a *watch* upon the ground, and it should be inquired how the watch happened to be in that place; I should hardly think of the answer which I had before given, that, for any thing I knew, the watch might have always been there. Yet why should not this answer serve for the watch as well as for the stone? Why is it not as admissible in the second case, as in the first? For this reason, and for no other, *viz.* that, when we come to inspect the watch, we perceive (what we could not discover in the stone) that its several parts are framed and put together for a purpose, e.g. that they are so formed and adjusted as to produce motion, and that motion so regulated as to point out the hour of the day; that, if the different parts had been differently shaped from what they are, of a different size from what they are, or placed after any other manner, or in any other order, than that in which they are placed, either no motion at all would have been carried on in the machine, or none which would have answered the use that is now served by it' (*Natural Theology; or, Evidences of the Existence and Attributes of the Deity*, 1809, p.1)

<sup>4</sup> M. Mujahed, *Usūs al-Manhaj al-Qur'āniyy fī Bahth al-'Ulūm al-Ṭabī'īyya (The Bases of the Qur'anic Methodology in the Study of the Natural Sciences)*, Dar as-Su'ūdiyya li n-Nashr wa t-Tawzi', Jeddah, 2nd edition, 2004, p.100.

<sup>5</sup> See W. Whewell, *Astronomy and General Physics Considered with Reference to Natural Theology*, Bridgewater Treatises, reissued by Cambridge University Press, [1833] 2009; W. Prout, *Chemistry, Meteorology, and the Function of Digestion Considered with Reference to Natural Theology*; Bridgewater Treatises, reissued by Cambridge University Press, [1834] 2009; and P. M. Roget, *Animal and Vegetable Physiology: Considered with Reference to Natural Theology*; Bridgewater Treatises, reissued by Cambridge University Press, [1834] 2009.

<sup>6</sup> John C. Polkinghorne, *One World: The Interaction of Science and Theology*, Templeton Foundation Press, West Conshohocken, PA, 1986 and 2007.



are striving to discover, or are the ‘laws’ we formulate—and find to be largely correct—only a representation of our own understanding of nature, to be perhaps rewritten in different forms later? Do intelligent beings elsewhere (if they exist) extract the same laws for nature as we do, or do they describe phenomena very differently, if perhaps equally or more or less effectively? Secondly, are those laws fixed in time and space, or do they (have they) change(d)?

On the Islamic side, we may mention Muzaffar Iqbal who stresses that ‘God’s ways and laws are unchanging,’ citing the Qur’anic verse *‘That was the way of Allah in the case of those who passed away of old, and you will not find for the way of Allah any changes’* (33:62), and adds: ‘thus the entire world of nature operates through immutable laws that can be discovered through the investigation of nature.’<sup>7</sup>

Previous Muslim thinkers had considered some issues related to the questions of laws, though often from a different angle, focusing more on the very fact that there seem to be laws according to which natural phenomena always occur. For instance, Qāḍī ‘Abd al-Jabbār (the important Mu‘tazilite theologian, d. ca. 1024) held that God operates according to rational laws.<sup>8</sup>

The question of whether scientific discoveries are human (or even social) constructs has also lately been the subject of the famous ‘science wars’ (between the scientists and hard philosophers and the post-modernists and relativists). No one denies the human role in this great scientific adventure, though one would be blind not to see the universal aspects of many/most discoveries (repeatable, independent of individuals), and yet the question remains: are we merely constructing a human perception of the world, one which could be quite different, or one which may be largely overhauled in the future? Wasn’t Einstein’s description of gravity completely different from Newton’s? Isn’t Quantum Mechanics radically different from Classical Mechanics? Not quite, although this issue is largely beyond the scope of this paper, and I have discussed the question of the universality, objectivity, relativity of scientific theories in another paper,<sup>9</sup> which I invite the reader to consult.

Very briefly, one may characterize the debate by the two extreme positions (and the more nuanced views in between): on the one hand, some post-modernists claim that science, and indeed all human ‘knowledge’, represent constructs of the human mind that do not reflect the world as it ‘really is’; on the other hand, extreme realists hold that the world is exactly how it appears to us. For those in the subjectivist camp, human language, concepts, and culture determine not only how the world appears to us, but how it *is* for us. For those in the (extreme) realist camp, phenomena are independent of our observations (as Einstein famously asked: ‘Is the moon there when no one is looking at it?’), and science is our attempt at describing that ‘reality’. As explained in the paper referred to above, the truth, of course, is somewhere in between: science, using empirical data, develops models that *approximate the truth* to greater degrees of accuracy over time; however, it must also be emphasized that subjective factors play a role both with respect to the concepts we use in theories, and with respect to how we weigh and evaluate evidence for or against theories.

To illustrate this dual nature of our description of physical phenomena, I would like to refer to an interesting idea presented by Ronald Giere<sup>10</sup> and explained simply by Massimo

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<sup>7</sup> Muzaffar Iqbal, *Science and Islam*, Greenwood Press, Westwood, CT, 2007, p.6.

<sup>8</sup> M. Campanini, ‘Qur’an and Science: A Hermeneutical Approach’, *Journal of Qur’anic Studies*, 7(1), 2005, pp.54–55.

<sup>9</sup> Nidhal Guessoum, ‘Science, Religion, and the Quest for Knowledge and Truth: An Islamic Perspective’, *Cultural Studies of Science Education*, no. 5, 2009, pp.55–69.

Pigliucci<sup>10</sup>—‘perspectivism’, which combines the objectivity intrinsic in the natural world that one is studying, and the subjectivity inherent in the humans who construct the descriptions and explanations of the natural phenomena, where the analogy with ‘colours’ is particularly illuminating: colours are both human (subjective) perceptions and objective realities that can be characterized rather precisely, by the dominant wavelength in the spectrum of the light emitted or reflected by the colourful object.

### Topics of Engagement for Kalam with Modern Science

There are a number of important subjects and areas where Muslim theologians should engage in dialogue with scientists, philosophers, and thinkers to a greater extent than has occurred until now. Such issues include: the concept of creation (of time and space, of the world/universe/multiverse, of life, of humans); the question of evolution (of life, of humans, of intelligence, of consciousness, of morality), and God’s role in it; the place of humans in the universe; divine action in the world; the question of miracles; extra-terrestrial life and intelligence; artificial intelligence; and so on.

In what follows I will present overviews of some of these issues, with a goal of inciting Muslim thinkers to discuss them in a constructive and fruitful manner; we will see, through the references I will provide, that western, mainly Christian, thinkers have been tackling these difficult questions, and Muslim voices have unfortunately been mostly absent from the discussions, at least at the global level.

#### 1. *Creation of the World/Universe/Multiverse*

Islamic scholars, particularly the interpreters of the Qur’an, today take it for granted that the Qur’an refers to the creation of the universe as an *ex-nihilo* act (by God). In doing so, they base themselves on the latest scientific knowledge to interpret the story of the creation that one reads in the verses dealing with the topic. That identification is today complete, showing the influence that modern science has already had at least on this theological issue.

In previous times, Muslim philosophers and theologians held various conceptions on this question. Al-Kindī adhered to the doctrine of creation *ex nihilo*, but most later Muslim philosophers, Al-Fārābī and Ibn Rushd in particular, came to reject the concept.

Ibn Sīnā (Avicenna) divided the creation process into different operations, distinguishing between four kinds of creations:

*Iḥdāth*: Creation of nature’s creatures, both temporary and eternal;

*Ibdā’*: Creation—without intermediary—of eternal non-decaying creatures;

*Khalq*: Creation through other agents;

*Takwīn* (formation): Creation through worldly, decaying, temporary agents.

Modern cosmology, however, changed the terms of the discourse on the topic, by bringing new methodologies and establishing new results (or ‘facts’). Paul Davies has remarked that ‘ten years of radio astronomy have taught humanity more about the creation and organization of the universe than thousands of years of religion and philosophy.’<sup>12</sup>

Through its discoveries, cosmology has thus set the following constraints to the discussions:

<sup>10</sup> See Ronald N. Giere, *Scientific Perspectivism*, The University of Chicago Press, Chicago and London, 2006.

<sup>11</sup> See Pigliucci, *Nonsense on Stilts*.

<sup>12</sup> Paul A. W. Davies, *Space and Time in the Modern Universe*, Cambridge University Press, Cambridge, 1977, p.211.

1. Far from being static or eternal, the universe started and evolved from the time of its creation (or emergence) from a ‘singularity’, a point of infinite density, energy, and temperature (this is the now-established Big Bang theory).

2. The universe has been expanding and seems (for almost certain now) to be accelerating, due to some ‘dark energy’ which stretches space-time as if some internal repulsion was pulling the fabric apart. As it expanded, the universe produced particles, then nuclei, atoms, and structures (stars, galaxies, solar systems, etc.).

3. Only 4% of the universe is made of the ‘ordinary’ matter that we know; an additional 25% (of the matter-energy content) is in the form of ‘dark matter’; and 70% is the ‘dark energy’ that we have come to accept as an important feature of our strange universe.

4. The age of the universe (since its creation/emergence) can now be determined quite precisely (13.7 billion years); this automatically gives us the size of the *observable* universe.

The ‘question of cosmogenesis’, was recently addressed by the Muslim philosopher Seyyed Hossein Nasr. One must recall that Nasr is an advocate of the perennial philosophy school; he believes in the unity of knowledge, tradition, and the cosmos (with its physical and metaphysical parts, including the divine). In his 2006 article titled ‘The Question of Cosmogenesis’,<sup>13</sup> Nasr states that the cosmos is a legitimate field of study in Islam; indeed, he points to Qur’anic verses that emphasize both the divine creation aspect of the cosmos and its intelligibility. He remarks, for example, the etymological relation between the Arabic term for knowledge (‘*ilm*’) and the one for the world/universe (‘*‘alam*’). He goes on to insist, however, that cosmogenesis is a religious and metaphysical question, ‘the answer to which comes from the truth of revelation, and not simply from an extension and extrapolation of the sciences of the natural and physical order.’ In his view, ‘[t]he Islamic attitude to this question stands therefore at the antipode of the modern Western scientific view ...’ He goes even further and finds fault in cosmology’s ‘extrapolation’ of time ‘across vast periods of the past and future’ and in the changing nature of cosmology and its results (‘Many scientists now speak of the big bang theory while yesterday they spoke of something else, and tomorrow they will point to other theories.’) I have elsewhere expressed my disagreements with this line of thinking and argumentation, but I am happy to witness a serious discussion of cosmology and cosmogenesis from at least one Islamic perspective.<sup>14</sup>

## 2. *The Place of Man in the Universe*

I have mentioned above the importance that the Argument from Design once held within natural theology. In the Islamic tradition, one finds it ubiquitous in the literature of philosophers, theologians, and exegetes. It is interesting that one of its earliest and most important versions relates the design of the cosmos to the needs of humans; indeed, Al-Kindī refers to the argument as ‘*dalīl al-ināya*’ (argument of ‘providence’ or ‘benevolence’), proclaiming that ‘the orderly and wonderful phenomena of nature could not be purposeless and accidental.’<sup>15</sup> The prominent classical Ash‘arite theologian and jurist Al-Bāqillānī expressed the argument in ‘simple analogy’ form: the world must have a Maker

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<sup>13</sup> Seyyed Hossein Nasr, ‘The Question of Cosmogenesis—The Cosmos as a Subject of Scientific Study’, *Islam & Science*, vol.4, Summer 2006, p.43.

<sup>14</sup> Nidhal Guessoum, *Réconcilier l’Islam et la Science Moderne: l’esprit d’Averroès*, Presses de la Renaissance, Paris, 2009; also *Islam’s Quantum Question: Reconciling Muslim Tradition and Modern Science*, IB Tauris, London, 2010.

<sup>15</sup> M.A. Aftab, ‘Groundwork on Islamic Philosophy’, *Meteorite* (the student journal of philosophy from the University of Michigan), 1999, <http://www.meteoritejournal.com/pdfs/2.Groundwork.Islamic.Philosophy.pdf>, citing Al-Kindī without reference.

and a Fashioner (*muhdith wa musawwir*) ‘just as a written piece must have a writer, a picture must have a painter and a building a builder.’<sup>16</sup>

One must also refer to al-Ghazālī, in particular, who expounded on the argument in a largely unknown book of his titled *Al-ḥikma fi makhlūqat-i-llāh* (‘The wisdom in God’s creation/creatures’), a book edited and published for the first time in 1978, which is fully devoted to exploring the world and finding insights into its workings as well as its utility and adequacy for human life.<sup>17</sup> In the introduction he writes: ‘Do know, [dear reader,] May God Bless you, that if you contemplate this world, you will find it like a house where everything needed has been placed, for the heavens are raised like the ceiling, the earth is extended like a carpet, the stars are hung like lamps [...], and man is like the master of the house, who has prerogatives to rule over it, where vegetation is made for his needs, and various animal species are subjected to his exigencies ...’ He adds: ‘These are clear arguments which point toward their maker, their masterly and eternal design point to the extent of knowledge of their creator, and their arrangement aspects point to the intentions of their producer.’<sup>18</sup> In the book’s various chapters, each devoted to one creature/body in nature, Al-Ghazālī cites Qur’anic verses to support his teleological, anthropic principle. Finally, he draws a general design conclusion: ‘All of these [examples] are different testimonies and mutually consolidating proofs, eloquent signs with regard to their creator, speaking clearly for the perfection of His powers and the wonder in His wisdom [...] It is the work of the Omnipotent, the Guardian and Mighty.’<sup>19</sup>

It is always interesting and instructive to find similarities and reverberations in opinions and writings of thinkers from different cultures and across the ages. Indeed, echoing Al-Ghazālī, we find the clergyman-naturalist John Ray (six centuries later) writing: ‘There is no greater, at least no more palpable and convincing argument of the Existence of a Deity than the admirable Art and Wisdom that discovers itself in the Make and Constitution, the Order and Disposition, the End and uses of all the parts and members of this stately fabric of Heaven and Earth.’<sup>20</sup>

In our times, we find the biologist Michael Denton echoing further: ‘It is the sheer universality of perfection, the fact that everywhere we look, to whatever depth we look, we find an elegance and ingenuity of an absolutely transcending quality, which so mitigates against the idea of chance.’<sup>21</sup>

Ibn Rushd explicitly made the design argument a *bona fide* proof for the existence of the Maker: ‘The way the artifact proves the existence of the artisan (craftsman) is in the existence in the artifact of an order in its parts [...] and the way that the whole has been made adequate for the intended usage of this artifact.’ Note that Ibn Rushd also insists that the recognition of design (‘the existence in the artifact of an order in its parts’) is a greater channel of knowledge of God than the mere belief that objects have been ‘made’.

Now, in recent times, scientists have found the Universe to be astoundingly ‘fine-tuned’ to our existence, or to the emergence and evolution of life, more generally. Indeed, if the parameters which define the physical cosmos had been drawn at random, the probability

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<sup>16</sup> Majid Fakhry, ‘The Classical Islamic Arguments for the Existence of God’, *The Muslim World*, 47, 1957, pp.133–145, available at <http://www.muslimphilosophy.com/ip/pg1.pdf>, citing Al-Bāqillānī from his *Tamhīd*, Cairo, 1947, p.45.

<sup>17</sup> Abū Ḥāmid Al-Ghazālī, *Al-ḥikma fi makhlūqāt-i-llāh*, Dār Ihyā’ al-‘Ulūm, Beirut, 1978.

<sup>18</sup> *Ibid*, pp.15–16 (my own translations).

<sup>19</sup> *Ibid*, p.35.

<sup>20</sup> M. Ruse, ‘The Argument from Design: A Brief History’, in W. A. Dembski and M. Ruse (eds.), *Debating Design: From Darwin to DNA*, Cambridge University Press, Cambridge, 2004, p.17.

<sup>21</sup> Michael Denton, *Evolution: A Theory in Crisis*, Adler & Adler, Bethesda, 1985, p.342.

that they would have values allowing for life and intelligence to appear (at some point in time and space) would be ridiculously small, one in billions of billions of billions.

There are many examples for this state of affairs, including the fact that our universe has three dimensions (nothing else would have worked), and that the values of the speed of light, the expansion rate of the universe, and others are constrained to unimaginable precisions—sometimes to 1 in  $10^{120}$ ! (In his 2006 book, titled *The Goldilocks Enigma: Why is the Universe Just Right for Life?*, Paul Davies estimates the number of such finely tuned parameters at around 30.) The universe is indeed very delicately *balanced*, and without that, life, intelligence, consciousness, and humans would not have appeared.

Needless to say, many scientists and philosophers saw in these observations and considerations an attempt to bring back the Designer, insisting that science had got rid of such ‘teleological’ (‘final cause’ or purpose-type) thinking, and that giving Man any special importance in the universe is scientifically heretical. After all, they say, Man may not be the epitome of evolution, and our universe may not even be the only one ‘there’. And so, the holders of the materialistic (they would call it ‘naturalistic’) philosophy/science came up with the idea of the ‘multiverse’: that there must be zillions of universes ‘out there’, separated by voids and thus impossible to detect, much less contact, all different in their physical parameters and laws, with our universe being one of the ‘good ones’. And so, they say, there is no wonder that we find ourselves in a universe so hospitable to life. One of the ‘tickets’ had to be the winning one in the grand cosmic lottery!

I should note that there are many opponents to this multiverse idea, from those who find it totally unscientific (not only does it have little supportive evidence, it is not clearly provable or falsifiable), to those who consider it a purely ad-hoc ‘explanation’, a materialistic cop-out. But, surprisingly, a majority of cosmologists today subscribe to it.

And this is how scientists, philosophers, and theologians have found themselves implicated in fascinating discussions recently, with scientific papers, semi-philosophical books, and theological arguments being contributed almost every month. Davies refers to the anthropic principle as ‘nothing less than a revolution in scientific thinking’.<sup>22</sup>

Muslims, however, were very slow to react to this important development. There are, in my view, several reasons for this. First, Muslims, as I have explained, have always subscribed to the ‘Design Argument’, and so for them the fine-tuning of the universe is nothing new. Secondly, many (most) Muslims, including the educated elite, frown at any scientific paradigm that is based on an evolutionary scheme—and the anthropic principle certainly espouses evolution at every level and every stage, from the Big Bang to planets (physical evolution), and from mud to man (biological evolution).

This is not to say that no Muslim intellectual has presented a positive Islamic position with regard to the anthropic principle. In fact, several writers<sup>23</sup> have focused on the Qur’anic word/concept ‘*taskhīr*’ (subservience), such as in the Qur’anic verse, ‘*Do you not see that Allah has made what is in the heavens and what is in the earth subservient to you, and He loaded you with His favors outwardly and inwardly?*’ (31:20) From this, many authors, from classical to contemporary, have constructed an ‘argument of providence’ (*dalil al-‘inaya*), emphasizing how God has made nature so adequate for humans that this is both a sign of His intention and love toward us and an indication of our obligation of

<sup>22</sup> Paul Davies, *The Goldilocks Enigma: Why is the Universe Just Right for Life?*, Allen Lane, London & NY, 2006, p.x.

<sup>23</sup> Adi Setia, ‘*Taskhīr*, Fine-Tuning, Intelligent Design and the Scientific Appreciation of Nature’, *Islam & Science*, vol.2, Summer 2004, no.1, pp.7–32; also M. B. Altaie, ‘The Anthropic Principle’, n.d., <http://www.cosmokalam.com/general/articles/anthropic.doc>

thanks and submission to Him. Ibn Rushd notes that all that exists is in harmony with humans, and this can only be the result of an Agent who wants it so. The night and the day, the sun and the moon, and all other bodies, have been subjected to us, and it is through the order and design the Creator has put in their properties that our existence and that of things ‘down here’ is maintained—so much so that if one of them were to be removed or given another position, dimension, or speed, then beings on the surface of Earth would not be able to exist.

From my reading of the Qur’an, I think one can perhaps note the existence of references to the fine tuning of the cosmos, not from ‘*taskhīr*’ but rather from the concepts of ‘*taqdīr*’ (ordering in proportion), e.g. ‘*It is He who created all things and ordered them in due proportions*’ (25:2) and ‘*And everything with Him is (duly) measured*’ (13:8), as well as the idea of ‘*mizān*’ (balance): ‘*And the heaven He raised it high, and He has set the Balance*’ (55:7).

Clearly this fine-tuning of the universe, what some have described as ‘the cosmic code’, is a hugely important discovery. No less significant are the two main responses that have been formulated from it: the anthropic principle and the multiverse. It is telling that while the anthropic principle generally states that the universe from the beginning contained features that would, sooner or later and at least somewhere, allow for the emergence of complexity, life, intelligence, and consciousness, it has been given a name that not only refers to human but seems to place them at the centre of things. (This has infuriated many scientists who saw a return to a pre-Copernican worldview.) In fact, there are several formulations of the ‘anthropic principle’, some much more anthropic than others, with several giving no significance to humans whatsoever. Likewise, the proponents of the multiverse ‘solution’ have been accused of ideological motives, since it would make our amazing universe nothing more than one in a zillion universes, many much more complex than ours, with certainly creatures much more intelligent and advanced than us. (Note that the existence of creatures much more intelligent and advanced than us could still occur in our universe even if it is the only one, but in a multiverse this would be near certain.)

Now, shouldn’t Muslim theologians engage with these issues? Shouldn’t they discuss the various cases: humans (or at least life and consciousness) being central to the universe’s characteristics, humans being insignificant compared to other, alien creatures in this universe, this universe being a trivial one among a near-infinity of other universes, and so on?

### **3. Creation/Evolution of Life and Humans**

The idea of the evolution of humans, in particular, and of biological organisms, in general, from previous ‘lower’ species constitutes a major blockage in today’s Muslim culture. Even highly educated Muslims expound negative views toward Evolution, both the concept and the theory (Darwin’s) purporting to explain it. Indeed, a number of surveys have recently shown this situation among Muslims (from general-public groups to university students and faculty).<sup>24</sup>

In my view, there are two main reasons for this generally negative attitude: (a) a literalistic reading of the Qur’anic verses relating the story of Adam’s creation; (b) a widespread ignorance or at least misunderstanding of Evolution by educated Muslims, who

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<sup>24</sup> See references in Guessoum’s *Réconcilier l’Islam et la Science Moderne*, as well as more recent results of surveys conducted by the British Council and by the McGill-Harvard Project, through the *Education, Evolution, Creation Center*, which set to explore the understanding of evolution by Muslim scientists, teachers, and students in 6 countries (Egypt, Indonesia, Kazakhstan, Lebanon, Pakistan, and Turkey).

most often not only are woefully unaware of the strong evidence supporting Evolution, but very frequently do not even distinguish between the facts of evolution and the theory(ies) that try to explain them.

Adam is the central issue for Muslims with regard to evolution—at least nowadays. Most contemporary religious scholars find it so impossible to conceive of a pre-Adam species or even of a possible multiplicity of Adams, lineages that ended up disappearing (like Neanderthals, Java Men, etc.) that they are willing to reject the theory of evolution wholesale for that reason.

Muslims did not always reject evolution; in previous times, until the modern era (early twentieth century), they by and large accepted biological evolution and even welcomed it, as long as it did not present itself in purely materialistic, atheistic garb, even though the question of human evolution did often constitute a sore point.

The literalist mindset has led to a simplistic conception of the creation of Man, and sometimes of animals, a ‘creationist’ conception which insists that humans and animals were created in roughly the forms they presently have, that they have undergone little or no evolution. (A somewhat more ‘intelligent’ variant of this is the ‘micro-evolution’ standpoint, which accepts the evolution of species as species, but no transformation from one into another.)

Creationism is a literalistic religious movement purporting to describe the creation of humans, animals, life, and the world as direct acts of God with no intermediate stages; it is strong in the United States and in the Muslim world; it is virtually inexistent anywhere else. However, unlike the situation in America, where creationism is widespread in the general (religious) public, and where only a tiny fraction of the highly educated segment of society holds such views, in the Muslim world creationism is quite equally present among the elite as among the less educated public.

The placing of humans as a central and separate species is known today as ‘human exceptionism’, and it can be found in other religious and cultural circles, and not just Muslim ones. In Christianity, one can understand why such exceptionism can be upheld and defended; after all, Man is believed to have been created by God in His image, and unless this idea is given up or largely reinterpreted, one cannot conceive of Man having been ‘created’ as a primitive unicellular organism that evolved, over billions of years, to produce this intelligent, conscious, God-oriented creature. In Islam, of course, no such idea exists, but the concept of *khilāfa* (stewardship) on Earth is strongly upheld. This, in my view, however, does not constitute nearly as large an obstacle for the acceptance of Evolution, for *khilāfa* could be understood to have been bestowed upon Man only when he crossed the threshold of God-awareness (spirituality). In fact, as some Muslim authors have shown, a number of verses in the Qur’an, if correctly understood, produce a nice description of Man’s evolutionary history (standing up of hominids, development of language, learning of burial, sacrifice/offering, spiritual development, clothing/covering oneself, discovery of fire, divine revelation).

Finally, many western thinkers have raised ‘the problem of evil’ as the greatest challenge that the whole evolutionary scenario of nature has posed to the religious conception of creation as having been ordered and at least guided by God. Why then, they ask, is there so much evil in nature (various species, including humans through most of their history, violently engaged in mutual killing and destruction), and why, they add, was it necessary to produce zillions of species over the past few billion years, only to make 99% of them go extinct? Why so much waste? Why so much destruction?

Such questions need coherent answers from theologians, and Muslim voices have been conspicuously silent (for the most). And if we have such serious difficulties coming to terms with Evolution (of humans and of all biological organisms), though it can be conceived theistically as God's way of bringing about creatures, what will be the attitude of Muslims when science comes up with a theory for explaining the appearance of life out of inert matter? Likewise for the question of morality, on which scientists (anthropologists, psychologists, neurologists, socio-biologists, and others) are earnestly working and making progress.

Such important developments, indeed, may not be too far into the future, when Muslim scholars (theologians in particular) will be better able to prepare coherent and meaningful positions to reconcile the Islamic dogmas with such scientific discoveries, in order to prevent another wave of rejectionism and conflict with science, which in the west had led many to embrace full-fledged materialism and atheism. In the Muslim world, bright and well-read students may take that route if they find no intelligent alternative provided by Muslim thinkers on these issues.

#### 4. *Divine Action in the World*

This fundamental issue has focused many thinkers' attention lately. One must refer, first, to the volume of contributions titled *The God Who Acts: Philosophical and Theological Explorations*, edited by Thomas F. Tracy and initially published in 1994.<sup>25</sup> The latest opus has come from Keith Ward, the Oxford theologian, who published *Divine Action: Examining God's Role in an Open and Emergent Universe* in 2007. Two years earlier, John Polkinghorne, the physicist-theologian, published *Science and Providence: God's Interaction with the World*. Numerous scholarly articles have also been written lately;<sup>26</sup> among them (to cite just a few recent ones): R. J. Berry's 'Divine Action: Expected and Unexpected';<sup>27</sup> Ross L. Stein's 'The Action of God in the World—A Synthesis of Process Thought in Science and Theology';<sup>28</sup> Alvin Plantinga's 'Divine Action in the World';<sup>29</sup> Edward L. Schoen's 'Divine Action and Modern Science';<sup>30</sup> Michael Epperson's 'Divine Action and Modern Science';<sup>31</sup> Larry Chapp's 'Divine Action and Modern Science'.<sup>32</sup>

Theologians and scholars of science and religion have suggested a variety of ways to conceptualize (if not explain) God's action in the world. Many, such as Polkinghorne, Russell, and Gregersen, have focused squarely on physical processes: quantum mechanics, chaos, or both effects in tandem. Others, like Arthur Peacocke, have suggested some kind of holistic information flow, through which God acts on the whole world, with a trickle-down effect then leading to results at specific points.

On the Muslim side, there have been very few, if any, proposals for explaining God's action in the world.<sup>33</sup> (It is indeed a very sensitive issue, and one runs the risk of diverting

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<sup>25</sup> T. F. Tracy, *The God Who Acts: Philosophical and Theological Explorations*, The Pennsylvania University Press, University Park, PA, 1994.

<sup>26</sup> A search for 'Divine Action' in the title of academic papers through the university's electronic library database turned up 34 references.

<sup>27</sup> *Zygon*, vol. 37, no. 3, September 2002, p. 717.

<sup>28</sup> *Theology and Science*, vol. 4, no. 1, March 2006, p. 51.

<sup>29</sup> *Ratio*, vol. 19, no. 4, December 2006, p. 495.

<sup>30</sup> *International Journal for Philosophy of Religion*, vol. 57, no. 1, February 2005, p. 67.

<sup>31</sup> *The Journal of Religion*, vol. 84, no. 4, October 2004, p. 648.

<sup>32</sup> *Modern Theology*, vol. 20, no. 4, October 2004, p. 613

<sup>33</sup> A search through the aforementioned electronic library database for 'divine action' and 'Islam' or 'Islamic' in the title turned up no results.



too much from the orthodoxy and thus being labeled a heretic, hence the dearth of writings on the topic.)

One recent article which addressed the subject, albeit not from a modern or contemporary viewpoint, is Rahim Acar's 'Avicenna's Position Concerning the Basis of the Divine Creative Action'.<sup>34</sup> In it the author considers Avicenna's views and concludes that the great philosopher and polymath regarded God's creative action as similar to the action of natural things. He built on his principle that the universe is necessary and concluded that creation (initial or continuous) is more of a natural than a voluntary action.

A similar article, though a much wider one in scope, is Abdelhakim Al-Khalifi's 'Divine Action between Necessity and Choice'.<sup>35</sup> This author addressed the same subject as Acar but enlarged his investigation from the classical philosophers (Al-Fārābī and Avicenna) to the important theological schools of Mu'tazilism and Ash'arism. In particular, he contrasts the Ash'arites' (orthodox) views that God's action is totally free and unconstrained with the Mu'tazilites' (rational theology) position that God's act of creation was free (contrary to Avicenna's view), but that God has constrained himself by the principles of pushing only toward goodness and rewarding/punishing for following/disobeying divine directives to that effect.

I would thus express my hope that Muslim thinkers in the future will focus greater attention to the central religion-science issue of divine action, with various possibilities and proposals.

### 5. *The Question of Miracles*

When I recently surveyed a number of professors and students at my university on science and religion issues, one of the questions I asked was: 'Do you believe in miracles?' It was interesting that a good number of the non-Muslim professors wrote 'define' next to the word 'miracles', or underlined it and added a question mark. None of the Muslim respondents, professors or students, did any such thing.

Indeed, the definition of miracles is crucial to the discussion, and much of the debate—and the positions adopted by various theologians, thinkers, and scientists who have commented on it—rests on how the concept is defined. Let me here define miracles as 'phenomena which seem to contradict nature's laws or course' (something that would imply divine action or intervention), not phenomena which cannot be explained by science today. For example, if you let go of an object in your hand and, instead of dropping to the ground, it hangs in the air or even moves upward, the well-established course of nature (downward motion under gravity) will have been 'violated'. The idea of 'violation of the laws of nature' was how David Hume defined miracles, and this led him to declare them impossible; needless to say, this reasoning was attacked by numerous thinkers in more recent times, essentially judging it as circular thinking.<sup>36</sup> While the definition of miracles still gets no consensus, which leads to a great difficulty in identifying a 'miracle', the discussion goes beyond the limits set by Hume with his 'violation of the laws of nature' criterion.

Indeed, the question is often more complicated than that. What about spontaneous remission, the sudden shrinking and disappearance of a well-developed or advanced cancer

<sup>34</sup> *The Muslim World*, vol.94, no.1, January 2004, p.65.

<sup>35</sup> A. Al-Khalifi, 'Al-Fi'l al-Ilahiy bayna al-Wujūb wa-l-Ikhtiyār' ('Divine Action between Necessity and Choice'), paper delivered at the Third International Conference on Islamic Philosophy at Cairo University in 1998; only its abstract is available through BiblioIslam.net (<http://www.biblioislam.net/ar/ELibrary/Abstract.aspx?tblid=3&id=648>).

<sup>36</sup> For examples, see T. L. Nichols, 'Miracles in Science and Theology', *Zygon*, vol.37, no.3, September 2002, pp.703–715; Keith Ward, 'Believing in Miracles', *Zygon*, vol.37, no.3, September 2002, pp.741–750.

tumor—does that contradict the course of nature, is that a miracle? Probably not, for one may still explain it away as some physical (natural) process we have yet to understand. Then what about Jesus curing a man of his blindness by simply rubbing some mud over his eyes and asking him to wash it in some water source; does that contradict the laws of nature; is that a miracle (as it has always traditionally been declared)? How does one then declare an event to be a miracle? Again, this is a grey area.

The question of miracles constitutes perhaps the clearest bone of contention between science and religion today, and it will still be for some time, until scientists have developed a better understanding of many such occurrences (especially in the area of medicine), and theologians have developed a reasonable standpoint on the concept. In September 2002, *Zygon* (the premiere academic journal of religion and science issues) devoted a whole issue to miracles; in December 2004, a poll<sup>37</sup> among 1,100 physicians in the U.S. found that 74 percent of them believe in miracles;<sup>38</sup> in September 2006, the French popular science magazine *Science et Vie* (known for its rationalist approach) published a special issue fully devoted to the question.

Christian theologians (such as Terrence Nichols and Keith Ward) have proposed interesting ideas in addressing the question of miracles. Nichols suggests two approaches for dealing with miracles: a) the phenomenon may be an extreme, singular case of natural processes, akin to black holes (with gravity) and superconductivity (with electricity); b) the event can only be explained by divine action/intervention, and for this he invokes either the indeterminacies of quantum mechanics or chaos theory.<sup>39</sup>

Keith Ward takes a similar stand. He suggests that ‘laws of nature ... are best seen not as exceptionless rules but as context-dependent realizations of natural powers.’<sup>40</sup> But he leaves open the possibility that miracles may not ‘fall under formulable scientific laws’; he adds that ‘there is every reason for a theist to think that there are higher principles than laws of nature.’ He concedes, however, that ‘it is for competent scientists in the appropriate field to say whether a given event transcends the normal operation of the laws of nature. If it does not, however statistically improbable the event may be, it is not a miracle.’

In Islam, the existence and nature of miracles is a question on which schools of thought differ. One of the most common positions declares that only the Qur’an and possibly a few events in Prophet Muhammad’s life constitute miracles, though the latter events could be explained otherwise. Another frequent position is the belief that only prophets, being inspired, supported, and possibly empowered by God, could produce miracles, but not ‘regular’ humans. A third position one encounters, especially among Sufis, is that miracles are reserved to prophets, but ‘saints’ (*awliyā*) are given ‘gifts’ by God (*karāmāt*), divine largesses which allow the saint to minister largesses onto others. It should be noted, however, that hagiographic accounts of the saints abound with the most astounding events and feats that can only be defined as miracles according to our discussion above.

Absar Ahmed, a contemporary Pakistani philosopher, has reviewed the Muslim positions on miracles and presented his own views as well.<sup>41</sup> He starts by dismissing Sir Syed Ahmad Khan’s denial of miracles; the knighted Indian Muslim reformer of the late nineteenth century had in fact argued that the laws of nature were ‘a practical promise of God

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<sup>37</sup> Poll conducted by HCD Research and the Louis Finkelstein Institute for Religious and Social Studies of the Jewish Theological Seminary in New York, December 2004.

<sup>38</sup> In fact, 55% of the doctors said ‘they have seen treatment results in their patients that they would consider miraculous’ ([http://www.worldnetdaily.com/news/article.asp?ARTICLE\\_ID=42061](http://www.worldnetdaily.com/news/article.asp?ARTICLE_ID=42061)).

<sup>39</sup> See Nichols, ‘Miracles in Science and Theology’.

that something will happen so, and if we say it can happen otherwise we are accusing Him of going against His promise, and this is inconceivable.<sup>42</sup> Khan insisted that his rejection of miracles was not because they were irrational, but because God (in the Qur'an) tells us otherwise. Absar Ahmed rejects this position, for in his view God must not be limited; He can certainly rise above the laws of nature. The Pakistani philosopher goes on to distinguish between 'natural miracles', which are described as portents or signs (*ayat*) in the Qur'an, and between 'supernatural miracles', the historical ones (by the various prophets) and the revelation itself (the process and the Book), which are called *āyāt bayyinat* by the Qur'an. In fact, the Qur'an, like the Bible, never uses the term 'miracle'; instead, it is always 'signs', by which God draws people's attention or makes some point. The first category, which he characterizes as 'micro-miracles', can be regarded as God's action in the world, i.e. in the ordinary affairs of life; he explains those as being similar to normal actions, since God through the mind-body connection is present at all times. The 'macro-miracles', however, he considers to be totally beyond any naturalist interpretation; these are not, he insists, 'a matter of cognition, [...] a matter of sense-based limited rationality.'

Finally, Mehdi Golshani adopts the viewpoint of the respected Shi'a scholar Murtada Mutahhari (1919–1979) and considers the divine 'patterns' (laws) of nature as invariable; however, miracles may occur and should not be viewed as exceptions but rather as part of the more extensive pattern, the whole of which we may not have uncovered yet.<sup>43</sup>

The question of miracles is an obvious area of dialogue between science and theology. It is hoped that other serious Muslim investigations and positions can be made and presented to the world, joining those of the Christian thinkers who have been struggling with the topic in recent times.

### Concluding Remarks

The dialogue and engagement of religion with science has become a serious field of academic exploration and discourse. Illustrious universities, including Cambridge and Oxford, have set up centres for this field of intellectual investigation; in some cases endowed chairs of professorships have been established.<sup>44</sup>

High-level academic journals have also now appeared for scholars to address the relationship between science and religion; those include *Zygon: Journal of Religion & Science*, *Theology and Science*, and *Islam and Science*.

Finally, one may also mention the existence of a high-level lecture series broadly dealing with science and religion as well as a prestigious prize: the Gifford Lectures were established (by Adam Lord Gifford) to 'promote and diffuse the study of Natural Theology in the widest sense of the term' ('natural theology' as used by Gifford means theology supported by science and not dependent on supernatural sources); the Templeton Prize, which was originally titled 'Templeton Prize for Progress in Religion', then from 2002 to 2008 'Templeton Prize for Progress Toward Research or Discoveries about Spiritual Realities', is often viewed as a prize in religion and science.

<sup>40</sup> See Ward, 'Believing in Miracles'.

<sup>41</sup> Abrar Ahmed, 'Miracles—A Philosophical Analysis', *Science-Religion Dialogue*, Fall 2003/Spring 2004, available at: <http://www.hssrd.org/journal/fallsummer2003-2004/english/miracles.htm>

<sup>42</sup> S. A. Khan, 'Tafsir-ul-Qur'an', volume III, p.28, cited in Ahmed, 'Miracles'.

<sup>43</sup> Mehdi Golshani, *The Holy Qur'an and the Sciences of Nature: A Theological Reflection*, Global Scholarly Publications, New York, 2003, pp.309–310.

<sup>44</sup> Institutions largely devoted to dialogue between science and religion include the Faraday Institute at Cambridge University, the Ian Ramsey Center at Oxford University, the Center for Theology and the Natural Sciences in Berkeley (U.S.), the Center for Islam and Science (Canada), and the Institute on Religion in an Age of Science, which has existed since 1954.

All these developments clearly show the extent to which religion(s), particularly theology(ies), have established a serious engagement with modern science. Islam, through its contemporary scholars, has made only small steps in this regard. It is hoped that new efforts, starting with modest overviews like this one, can help bring about a renewed and rich discourse that will benefit both the Islamic culture and the global discussions and exchanges. There is indeed much need and expectation for such discourse, particularly among the educated segments of the Muslim society, where conflicts between the modern and the traditional have often led to schizophrenic attitudes. It is hoped that this introduction can be a positive door-opening contribution both for the scholars (Muslim theologians in particular) and for the larger educated class of Muslims today.

Last but not least, science has also lately become a field of inter-religious dialogue. Science is a universal endeavour, to which many peoples and civilizations have contributed and continue to do so; discoveries have universal validity; phenomena occur in the same patterns regardless of the observer or investigator; mathematics is a universal language of nature. Science is thus a common denominator for all humans, and it often raises similar challenges to cultures and religions that can be very diverse, whether on fundamental, conceptual ‘worldview’ issues, or on practical issues of ethical application of scientific knowledge (such as, for example cloning, stem-cell research, genetic manipulation, and abuse of nature).

With Christian thinkers in particular, Muslim scholars can also contribute to the discussions pertaining to the history of the relation between science and religion: exposing the ‘conflict’ myth; exploring the ‘religious origins of modern science’ thesis; and a host of other issues.

There is indeed much to be gained for Muslim theologians, scholars, and thinkers in undertaking this serious engagement with modern science. ❁





## PROFESSOR NIDHAL GUESSOUM

Professor Nidhal Guessoum is an Algerian Astrophysicist who received his M.Sc. and Ph.D. degrees from the University of California at San Diego and spent two years as a researcher at NASA's Goddard Space Flight Center. His research focuses on gamma radiation, mainly from the Milky Way Galaxy, but lately from other sources in the Universe as well; he has had an ongoing collaboration with colleagues at the Centre d'Etude Spatiale des Rayonnements in Toulouse, France. For the past decade he has been at the American University of Sharjah, UAE, where he chaired the Physics Department and presided over the Faculty Senate. In addition to his technical papers, he has published dozens of articles on general science issues, and co-authored two general public books, *The Determination of Lunar Crescent Months and the Islamic Calendar* (two editions) and *The Story of the Universe* (three editions), both in Arabic. Lately, Professor Guessoum has been active in the area of the Islam-Science interface. Professor Guessoum has long had an interest in the questions at the interface between science and religion in general, and science and Islam in particular. His co-authored book on the *Story of the Universe* featured chapters on humanity's old historical, cultural, and religious views of the cosmos, and he has often lectured on the historical and philosophical nature of the relation between science (in its ancient and modern versions) and Islam. In recent years, that interest has been molded into a serious endeavour: Professor Guessoum was a member of Paris-based 'Science and Religion in Islam' project; he took an active part in the 2008 conference on 'Science, Cultures and the Future of Humanity', which was held in Doha, Qatar; and he has also published a number of articles and book reviews in the field. His most recent work is *Islam's Quantum Question: Reconciling Muslim Tradition and Modern Science* (I.B. Tauris, 2010). ❁





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