

Fakhr al-Din al-Razi on physics and the nature of the physical world: a preliminary survey.

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Fakhr al-Din al-Razi's conception of physics and of the nature of the physical world is explored here through a preliminary survey of a number of his early and late works. Al-Razi defines the three grades of meanings of the term "nature". His definition is similar to the general consensus in Ash'arite kalam which rejects the Avicennan notion of *tabi'ah* as an effective causal principle inherent in natural phenomenal processes. He also explores the notion of the existence of a multiverse in the context of his commentary on the Qur'anic verse, All praise belongs to God, Lord of the Worlds. He raises the interesting question of whether the term "worlds" in this verse refers to multiple worlds within this single universe or cosmos, or to many other universes or a multiverse beyond this known universe. Based on primary classical Islamic source texts, this survey provides an insight into the classical Islamic view of nature as expressed by one of its most important representatives.

Keywords: Universe and multiverse; cosmic structure of the world; Fakhr al-Din al-Razi; al-mawjudat; al-ilm al-*tabi'i*; *tabi'ah*; alam; falsafah, hikmah; al-Razi's concept of nature; physics; nature; falak; harakah; sukun; *jism*; jawhar; arad.

Introduction

As D. E. Pingree and S. Nomanul Haq have shown in their learned article, "al-*tabi'a*", the original Aristotelian term [TEXT NOT REPRODUCIBLE IN ASCII.] in the literal sense of "nature" and in its functional Arabic equivalents of *tabi'ah*, *tiba* and *tab*, has accumulated complex, diverse, even mutually incompatible meanings in its long journey through the labyrinthal history of Islamic scientific, philosophical, and theological thought. (1) With the rise and dominance of peripatetic natural philosophy as represented by Ibn Sina (d. 1037 CE) and the philosophico-theological reactions it provoked, it was the Avicennan definition of the term that most attracted the critical attention of the *mutakallimun*, including Fakhr al-Din al-Razi (2) (d. 1209 CE) in a number of his works. Here we shall first explore his conception of *tabi'ah* in his late work *Sharh Uyun al-hikmah* (SUH) (3), his critical commentary on Ibn Sina's *'Uyun al-hikmah* (UH), (4) and then go on to some of his other early, middle-period and late works.

The Science of Physics (*ilm al-*tabi'ah**) Defined

Following the UH, the SUH is divided into three parts: logic (*mantiq*), which includes a long discussion of the ten Aristotelian categories of being; physics (*tabi'iyat*), which covers the traditional ground from space, bodies, time, and motion to meteorology and psychology; and metaphysics (*ilahiyat*), which includes discussion of matter and form, substance and accidents, and theology and

eschatology. The physics part begins with a long introduction to philosophy (al-hikmah), its meaning and its division into the theoretical and the practical sciences. The latter (al-hikmah al- amaliyyah) includes the three basic sciences of politics (hikmah madaniyyah), household management (hikmah manziliyyah), and ethics (hikmah khuluqiyyah). The former (al-hikmah al-nazariyyah) includes the three basic sciences of physics (hikmah tabi'iyah), mathematics (hikmah riyadiyyah), and metaphysics (falsafah ilahiyyah). (5) In commenting on this tripartite division of theoretical philosophy, al-Razi clarifies further the relation of physics (i.e., natural sciences or sciences of nature) to mathematics and metaphysics:

If the quiddity of a thing (al-mahiyyah) is in need of matter (al-maddah) for [realising] its external (al-khariji) and mental (fi al-dhihn) existence, then it is [included in] the science of physics (al- ilm al- tabi i), which is the lowest science (al-'ilm al-asfal). If the quiddity [of a thing] is in need of matter for [realising] its external existence, but is independent of matter for its mental existence in the sense that the mind can grasp it without considering its materiality (maddatiha), then it is [included] in the science of mathematics (al- ilm al-riyadi), which is the intermediate science (al- ilm al-awsat). If the quiddity is independent of matter for [both] its external and mental existence, then it is [included in] the highest science (al ilm al-a la) and the first philosophy (al-falsafat al-ula). (6)

Thus the science of nature for al-Razi (as for Ibn Sina) is the science which studies existents (al-mawjudat) that are constituted of matter (al-maddah). At another place, he defines physics as that science whose subject matter is the body (al-jism) insofar as it undergoes change (al-taghayyur), and is in motion (yataharrak) and repose (yaskun). (7) Hence, physical or natural science is the study of material bodies that undergo change and are either in motion or repose. On the principles of this science, al-Razi follows Ibn Sina in saying that the principles constituting the bases of demonstrations in physics are derived not from physics itself but from metaphysics, and elaborates at some length on this point. (8)

Nature (Tabi ah) Defined

In al-Mabahith al-Mashriqiyyah, an early work, al-Razi explains that the term tabi ah has three grades of meanings: the generic (al umum), the specific (al-khass) and the more specific (al-akhass). Generically tabi ah refers to the essence of a thing; specifically it refers to the constitutive element (muqawwim) of the essence of a thing; and more specifically it refers to the constitutive element which is the principle of motion (harakah) and repose (sukun). (9) This last meaning is the most relevant in the context of this study of his physics. Thus in the SUH, al-Razi comments on the Avicennan distinction between the two basic (internal) principles of motion, namely tabi ah and nafs (nature and soul), in which the former is defined as:

... the faculty (quwwah) existing in the body (al-jism) which has no consciousness (shu ur) of whatever that proceeds from it (ma sadara anhu), and that which proceeds from it [the body] is a single effect occurring in a single manner (atharan wahidan waqi an ala nahjin wahidin). (10)

An aspect of this *tabi'ah* is the earthly nature (*al-tabi'ah al-ardiyyah*) which he describes as:

... requiring settledness (*al-istiqrar*) but on the condition that this [earthly] body (*al-jism*) is found existing in its natural place (*makanihi al-tabi'i*) which is the earth (*al-ard*), while the motion [of this body] toward it [the earth] is on the condition that this body is outside its [natural] place. The existing faculty (*al-quwwah al-mawjudah*) for this effect (*al-athar*) [whether of settledness or motion] is a faculty having neither consciousness nor apprehension (*idrak*) at all of the effect, and furthermore this effect is a single effect (*athar wahid*) occurring in a single manner (*waqi'an ala tariqatin wahidatin*). (11)

By this definition and example, *tabi'ah* is differentiated from the soul (*al-nafs*), which, as a motive principle (*mabda al-harakah*), is divided into three classes: the vegetative soul (*al-nafs al-nabatiyyah*), the corporeal celestial soul (*al-nafs al-falakiyyah al-jismaniyyah*), and the animal soul (*al-nafs al-hayawaniyyah*). The vegetative soul, though unconscious, produces various actions (*af'alan mukhtalifatan*) which cause increase in the length (*tul*), breadth (*ard*) and depth (*umq*) of the bodily organs (*al-a'da*), and give rise to various forms (*suwaran mukhtalifatan*) and distinct shapes (*ashkalan mutabayinah*) such as flesh (*lahm*), heart (*qalb*), and brain (*dimagh*). The corporeal celestial soul, though producing only a single effect that occurs in a single manner, possesses consciousness; this soul is the faculty which is the immediate cause for setting into motion the celestial spheres (*al-quwwah al-mubashshirah li al-tahrik al-falaki*). As for the animal soul that subsists (*hallah*) in the bodies of animals found in this world, it is a faculty that is both conscious of the effects issuing from it; these effects are diverse (*atharan mukhtalifatan*) and occur in diverse manners (*manahija mukhtalifatin*). (12)

It is clear from the above that the principle by virtue of which a moving body actually moves is conceived as something distinct from the body itself. If the motive principle is intrinsic to the body then the motion is either due to nature (*tabi'ah*) or due to a soul (*nafs*); but if the motive principle is extrinsic to the body then the motion is imposed or coerced (*harakah qasriyyah*). So it seems that altogether there are three basic principles or causes of motion, namely, one external coercive principle, and two internal, namely, nature and soul. In brief, these three principles may be referred to respectively as the coercive (*qasriyyah*), the natural (*tabi'iyah*), and the animate (*nafsiyyah*) principles of motion.

Haq has also noted in the article mentioned above that "al-Razi does not admit of *tabi'a* in inanimate objects, and this clearly means that he is thinking of it exclusively in psychological terms; for him, *tabi'a* was a faculty which necessarily implied volition, and this was certainly not Aristotle's [TEXT NOT REPRODUCIBLE IN ASCII.] (13) This view of *tabi'ah* is certainly in accord with the general consensus in Ash'arite kalam on the rejection of the Avicennan notion of *tabi'ah* as an effective causal principle inherent in natural phenomenal processes. (14) This is also al-Razi's stand in another late work of his, the *Mafatih al-Ghayb*, (15) where, in the long commentary on the verse, "And He (Who) has caused water to pour down from the sky, thereby producing fruits as food for you," (16) he rejects the view that God creates in the water an effective nature (*tabi'ah mu'aththirah*) and in the earth a receptive nature (*tabi'ah qabilah*) by which nature's fruits are produced for humankind. On the contrary, he says that it is totally within the power of God to produce the fruits from the very beginning without recourse to the intermediary means of water and earth. Like al-Ghazali (d. 1111 CE), al-Razi considers intermediary means or causes such as water and earth not

as real effective causes but as manifestative of divine custom (al- adah or sunnatuLlah)) in the phenomenal regularity of the physical world. (17) In a sense, the perceived causal regularity in natural processes is, as it were, an intellecto-spiritual test for humankind, for as the saying goes, "Were it not for the causes the doubter would not have doubted!" (18)

Therefore, the tabi ah in inanimate things as a principle of motion and transformation has to be taken, in the case of al-Razi, in the metaphorical (majazi) sense, in the sense of adah, (19) that is, not in the sense of a real effective causal principle independent of God. Al-Razi is also quite explicit in the al-Matalib al- Aliyyah, yet another late work, in rejecting the ascription of effective causal agency to other than God, thus he says, for example:

Invalid is the claim (batala al-qawl) for the existence of an effective agent (mu'aththir) other than God, whether called planet (kawkab), celestial sphere (falak), intelligence (aql), soul (nafs), lofty spirit (ruh ulwiyy), or lowly spirit (ruh sufliyy)." (20)

So for al-Razi even the animate soul, like inanimate nature, is an effective cause only in a derived metaphorical sense, in the sense of manifest divine custom according to which things in the world are regulated as they are. That al-Razi rejects the notion of nature or tabi ah as a causal principle independent of God is also evident in his commentary on the verse: "And We have created above you seven paths, and We are never unmindful of creation." (21) He says that this verse:

... indicates the fallacy of the belief in nature (al-tabi ah) for if one of those features (al-sifat) had come about by nature then it would have necessarily persisted and not undergone change. And if you say that those features have only changed due to change in nature, then this nature is itself in need of a creator and an originator (mujid). (22)

Difference Between Tabi ah, Tab and Tiba

In the Sharh al-Isharat wa al-Tanbihat, an early work, al-Razi makes a distinction between the terms al-tabi ah and al-tab:

The difference between al-tabi ah and al-tab is well known. And this [difference] is that al-tabi ah is a principle of motion of that [thing] in which it inheres without consciousness, whereas al-tab is a principle in the unqualified sense whether or not it [the thing in which the principle inheres] has consciousness. Therefore al-tab is more general than al-tabi ah. (23)

Another meaning of tab is in the sense of khatm (seal, stamp), which in the Qur'anic context refers to God setting a seal on the hearts of obstinate, evil people such that they never believe. Thus in the Mafatih al-Razi comments:

You have known that al-tab and al-khatm according to us refer to the occurrence of a strong motivation (al-da iyyah

al-qawwiyyah) for disbelief which hinders the occurrence of belief. This is so because action without any motivation whatsoever is impossible. Hence when there arises a firmly grounded and strong motivation for disbelief, the heart becomes as if stamped with disbelief. Now, as for the occurrence of this motivation, if it is from the servant, an infinite regress (tasalsul) would ensure, but if it is from God, then the point is achieved (fa al-maqsud hasil). (24)

As in his understanding of tabi'ah as 'adah, al-Razi also shows himself, in this comment, to be an Ash'arite in theology, for the Ash'arites believe that all actions of human beings are, in the final analysis, created by God. (25)

The World in the Totality of Being

In the Matalib, (26) al-Razi divides the existent (al-mawjud) or being into three basic divisions: (1) the space-occupying (mutahayyizan), (2) that which subsists (hallan) in the space-occupier (al-mutahayyiz), and (3) that which is neither space-occupying nor subsisting in a spaceoccupier. A space-occupier is either divisible (qabilan lil-qismah), in which case it is a body (jism), or indivisible, in which case it is an atomic substance (jawhar fard). As for that which subsists in the space-occupier, these are the accidents (al-a rad) which subsist in both bodies (al-ajsam) and atoms (al-jawahir). (27)

According to the philosophers, with whom al-Razi seems to concur, the accidents are of nine kinds (ajnas tis ah), which, together with the category of substance (jawhar), constitute the ten Aristotelian categories of being (al-maqulat al- ashri lil-wujud). In the Mabathith (28) and SUH (29), al-Razi gives a fuller account of these nine categories of accidents, namely, the accidents of quantity (kamm), quality (kayf), relation (mudaf, idafah), where or place (ayna), when or time (mata), situation or posture (mawdu', wad'), possession (milk, an yakuna lahu), acting, doing what (fi l, an yaf al), and being affected or acted upon (an yanfa il, infi al). (30)

Al-Razi makes it clear that the first two main divisions of being constitute the world (al- alam), which he defines in the Muhassal, a middle-period work, for instance, as "every existent other than God Most High," (31) and which is "either substances (jawahir) or accidents (a rad)." (32) Also for al-Razi the world is contingent (mumkin), i.e., "not necessary in its essence (laysa bi wajibin li dhatihi)," (33) and incipient (muhdath), i.e., "preceded by non-existence (masbuqan bil- adam)." (34) He also conceives of alam epistemologically as a means for knowing God, thus he says:

The world (al- alam) is an expression (ibarah) for every thing other than God Most High, and this is so because [the term] al- alam is derived, as previously shown, from al- ilm (ishtiqaq al- alam ala ma taqaddama min al- ilm); and everything that is [providing] knowledge (ilman) of God and [providing] evidence (dallan) of Him is an alam. There is no doubt that every incipient thing (muhdath) is evidence for God Most High (dallan ala Allah Ta ala). Hence every incipient thing is a world. (35)

As for the third of the three divisions of being, namely, the existent that is neither space-occupying

nor subsisting in a space-occupier, al-Razi affirms, based on certain, sound proofs (al-dala il al-yaqiniyyah), that God is such a being. (36) As he has clarified earlier, this means that God is not in space, nor is He a body or a substance and neither is He infinite space. (37) He however then raises the question whether or not an existent (mawjud) from among the contingents (mumkinat), in contrast to God the necessary being, can belong to this third division? (38) In other words, can a contingent being, like the necessary being, be neither space-occupying nor subsisting in a space-occupier? To this question, al-Razi gives an interesting reply that provokes in him (and in those of us who care to read him) a profound rethinking of the perennial problem of the incipience versus eternity of the world:

The philosophers (al-hukama') affirm it [i.e., affirm a contingent being neither space-occupying nor subsisting in a space-occupier] while the rationalist theologians (al-mutakallimun) deny it, even though the mutakallimun have no proof (dalil) showing the fallacy (fasad) of this division. Their proof for the incipience (huduth) of the world (alam) deals only with the space-occupiers and the accidents subsisting in them, but not with this third division. Because of this, their claim that all that is other than God is incipient (muhdath) can only be completely argued for either by invalidating this third division, or, granted its existence, by stating a proof showing the incipience of this third division. And since they did not state anything in these two contexts, their discourse has not completely achieved its aim (wa lamma lam yadhkuru shay an fi hadhayni al-maqamayni kalamuhum ghayru tammin fi al-maqsudi). (39)

With this statement, al-Razi seems to be pointing out that the mutakallimun, in arguing for the incipience of the world, have not sufficiently taken into account a class of beings that, while still contingent, are not atoms nor bodies nor accidents, i.e., not physical in nature but spiritual. This is borne out in his commentary on the verse All praise belongs to God, Lord of the worlds, (40) in which he specifies these contingent but non-physical entities:

As for the third [division of being], namely the contingent that is neither space-occupying nor an attribute of a space-occupier, it is the spirits [al-arwah], and these are either lowly (sufliyyah) or lofty (ulwiyyah). As for the lowly spirits, these are either good (khayrah), and they are the pious among the jinn, or wicked and evil, and they are the rebellious satans (maradat al-shayatin). The lofty spirits are either connected (muta alliqah) to bodies, and these are the souls of the celestial spheres (al-arwah al-falakiyyah), or not connected to bodies, and these are the purified, sanctified souls (al-arwah al-mutahharah al-muqaddasah). (41)

If this is the case, then, strictly speaking, instead of three there are altogether four basic divisions of being, namely, the three divisions of contingent beings: (1) the space-occupiers which are either atoms or bodies, (2) the accidents which subsist in the space-occupiers, (3) that which is neither space-occupying nor subsists in the space-occupiers; and (4) the one division of necessary being. These four divisions can be further reduced to two more fundamental ones: (1) contingent beings, and (2) the one necessary being. These four, ultimately reducible to two, divisions of being, are

borne out also in the same context of his commentary on the verse, All praise belongs to God, Lord of the worlds, only the context is now cited at length:

Know that the existent [or being = al-mawjud] is either necessary in its essence (wajiban li dhatihi) or contingent in its essence (mumkinan li dhatihi). As for the necessary in its essence, it is God Most High only. As for the contingent in its essence, it is every thing other than God Most High, and it is the world. This is because the rationalist theologians (al-mutakallimin) say, "the world is every existent other than God (al-alamu kullu mawjudin siwa Allahi)." The reason for the naming of this division (of being) as alam is that the existence of every thing other than God indicates the existence of God Most High. Thus for this reason every existent other than God is named alam. When you know this then we say: every thing other than God is either space-occupying or an attribute of the space-occupier, or neither space-occupying nor an attribute of a space-occupier. These then are the three divisions [of being].

As for the first division, the space-occupier, it is either receptive to division or it is not; if it is receptive to division then it is a body; if it is not like that then it is an atomic substance. As for the body, it is either from among the lofty bodies (al-ajsam al-ulwiyyah) or the lowly bodies (al-ajsam al-sufliyyah). As for the lofty bodies, these are the celestial spheres (al-aflak) and the planets [or stars] (al-kawakib). And the revealed law (al-shari ah) has established the existence of other entities apart from these two divisions, such as the throne (al-arsh), the chair (al-kursiyy), the lote-tree of the outermost boundary (sidrat al-muntaha), the tablet (al-lawh), the pen (al-qalam), and the garden (al-jannah).

As for the lowly bodies, these are either simple (basitah) or compound (murakkabah). As for the simple bodies these are the four elements (al-anasir al-arba ah). The first of these [four] is the sphere of the earth (kurrat al-ard) together with whatever within it including the deserts (al-mafawiz), the mountains (al-jibal) and the inhabited lands (al-bilad al-ma murah). The second of these is the sphere of water (kurrat al-ma), and it is the encompassing ocean (al-bahr al-muhit) and these great seas [or lakes] (al-abhur al-kabirah) that are found in this inhabited quarter [of the world] (hadha al-rub al-ma mur) together with whatever is within it [this quarter] including the great rivers (al-awdi ah al-azima) the number of which none knows except God Most High. And the third of these is the sphere of air (kurrat al-hawa); and the fourth of these is the sphere of fire (kurrat al-nar). As for the compound bodies (al-ajsam al-murakkabah), these are the plants (al-nabat), the minerals (al-ma adin), and the animals (al-hayawan) in all their numerous divisions and diverse kinds.

As for the second division (of being) it is the contingent (al-mumkin) which is the attribute (sifat) of the space-occupiers, and this [division] is [that of] the accidents (al-a'rad). The rationalist theologians have mentioned close to forty kinds of accidents. As for the third [division of being], namely the contingent that is neither space-occupying nor an attribute of a space-occupier, it is the spirits (al-a rad), and these are either lowly (sufliyyah) or lofty (ulwiyyah). As for the lowly spirits, these are either good (khayrah), and they are the pious

among the jinn, or wicked, evil, and they are the rebellious satans (maradat al-shayatin). The lofty spirits are either connected (muta aliqah) to bodies, and these are the souls of the celestial spheres (al-arwah al-falakiyyah), or not connected to bodies, and these are the purified, sanctified souls (al-arwah almutahharah al-muqaddasah). (42)

At another place, al-Razi also includes time (al-zaman) and place (al-makan) among the alamin = all existents other than God; thus he says:

And included in the totality of what is other than God are place and time, for place refers to open space (al-fada), spatial domain (al-hayyiz) and the extended void (al-faragh al-mumtadd), whereas time refers to the duration (al-muddah) by virtue of which priority (al-qabliyyah) and posteriority (al-ba diyyah) occur. His (God's) verse: "Lord of the worlds" shows that He is Lord of place and time, their Creator (khaliqan) and their Originator (mujidan). (43)

Cosmic Structure of the World

Concerning the cosmic structure of the world, al-Razi says in the Matalib:

The world as a whole (jumlat al-alam) is constituted by eleven spheres (kurrah), five of which constitute the celestial sphere of the sun (falak al-shams), and these [five] are the sphere[s] of Mars (al-mirrikh), Jupiter (al-mushtari), Saturn (zahal), the sphere of the fixed stars (falak al-thawabit) and the Great Sphere (al-falak al-a zam). The other five [spheres] are within the sphere of the sun, and these are the sphere[s] of Venus (al-zuharah), Mercury (utarid), the Moon (al-qamar), then the sublime sphere (al-kurrah al-latifah) of fire (al-nar) and air (al-hawa'), and the gross sphere (al-kurrah al-kathifah) of water (al-ma') and earth (al-ard). And since the sun is like the king of the world of bodies (sultan 'alam al-ajsam), it is not inappropriate that it should be located in the center among the spheres of the world (fi wasat kurrah al-alam). (44)

Commenting on the verse: They [the sun and moon] float each in an orbit, al-Razi gives an interesting interpretation of the meaning of falak (celestial sphere or orbit) and its relation to the movement of the celestial bodies, for it is quite clear to him, following the Qur'an, (45) that the stars, planets, sun and moon are distinct from their respective spheres or orbits (aflak) in which they move:

The falak, what is it? We say [that it is] the round body or the round surface or the circle, for the lexicographers (ahl al-lughah) agree that the whorl of the spindle (falakah al-mighzal) is named falakah due to its roundness, and the falakah of the tent is the wooden circular plate that is fixed to the head of the tent-pole so that the pole will not tear the tent, and it is a rounded sheet. If this is so, then it follows that the sky is circular, but most of the exegetes

agree that the sky is spread out without having extremities [resting] on mountains, and it is like a flat roof; and this is indicated by the verse of the Most High: And the raised roof [al-Tur: 5]. We say that there is nothing in the [Sacred] texts that indicates categorically that the sky is spread out and not circular whereas the evidence of the senses (al-dalil al-hissi) shows that it is circular, hence it is imperative to accede to it. (46)

This is followed by a long and elaborate argument to prove the curvature and circular shape of the sky, after which he goes on to say:

This [verse] shows that for each planet an orbit (falakan).... As for the seven itinerants [i.e., sun, moon, Jupiter, Saturn, Mars, Venus, Mercury], they each have an orbit, and as for the other planets [i.e., the fixed stars=alkawakib] it is said that they have collectively an orbit. (47)

This followed by a long discussion on the question of the physical structure of the spheres or orbits and their relation to the motion of the stars and planets in it. (48) Earlier he has discussed the same question in the context of his commentary of another, similar verse. (49) Are the spheres or orbits to be considered as real, concrete physical bodies or are they merely the abstract circles in the heavens traced out year in and year out by the various stars and planets? Al-Razi relates that some people like Dahhak say that the falak is not a body but merely the abstract orbit traced by the stars. (50) Most of the learned, like the astronomers (arbab al-hay'ah or ahl al-hay'ah) say that the falak are the bodies (i.e., solid spheres) on which the stars turn (hiya ajسامun taduru al-nujum alayhi), and this view is closer to the apparent sense of the Qur'anic verses regarding the celestial orbits. (51) The solid star-carrying sphere is likened by al-Razi to a hollowed out globe in which inner wall a nail is implanted, and so when the globe is rotated the nail is seen by an observer at the center of the globe to be in circular motion about the center. (52) Another possibility that al-Razi considers is that of four parallel circular planes encompassed within a sphere and on which planes the stars are positioned and put into orbital motion when the sphere is turned. (53) Quite obviously, both the sphere and the planes have to be totally transparent to the sight in order for the stars embedded therein to be observable. But ultimately, al-Razi seems to be undecided as to which celestial models, concrete or abstract, most conform with external reality, for he says: "In truth, there is no way to ascertain the characteristics of the heavens except by authority [of divine revelation or prophetic traditions] (al-khabar)." (54) Thus it seems that for al-Razi (and for others before and after him), astronomical models, whatever their utility or lack thereof for ordering the heavens, are not founded on sound rational proofs, and so no intellectual commitment can be made to them insofar as description and explanation of celestial realities are concerned. (55)

In volume four of the Matalib, al-Razi devotes a twenty-page section to elaborating further on the nature of this cosmic structure and of celestial entities like the sun, moon and stars therein and their beneficial influences on terrestrial life. (56) There is also a thirty page section in the al-Mabahith on the benefits of celestial bodies for the elementary world. (57)

Universe (alam) or Multiverse (alamin, awalim)?

Alamin (in the genitive case as in rabb al- Alamin = Lord of the worlds) and awalim are plural forms of alam = world. As in the case of the singular, the plural form of the word, i.e., al-amin, is defined as "an expression for every existent other than God Most High." (58) Both forms are used to refer to both the physical and the spiritual worlds of contingent beings. An instance of al-Razi's use of 'awalim to refer to the spiritual world is as below:

Know that the worlds of the divine disclosures (awalim al-mukashafat) have no terminal limit (la nihayata laha), because these worlds represent the mind's journey (safar al-aql) into the stations of God's majesty (maqamat jalal Allah), the gradations of His greatness (madarij azamatihi) and the mansions of the marks of His grandeur and sanctity (manazil athar kibriya'ihī wa qudsihi). And just as there is no terminal limit for these stations (al-maqamat), so there is no terminal limit for the journey into these stations. (59)

In the context of his commentary on the verse All praise belongs to God, Lord of the worlds, al-Razi raises the interesting question of whether the term "worlds" (al-amin) refers to multiple worlds within this single universe or cosmos, or to many other universes or a multiverse beyond this known universe. In other words, is al-amin to be understood intracosmically or extracosmically? In clarification of this question, he says:

It is established by evidence that there exists beyond the world a void without a terminal limit (khala' la nihayata laha), and it is established as well by evidence that God Most High has power over all contingent beings (al-mumkinat). Therefore He the Most High has the power (qadir) to create a thousand thousand worlds (alfa alfi 'awalim) beyond this world such that each one of those worlds be bigger and more massive than this world as well as having the like of what this world has of the throne (al-arsh), the chair (al-kursiyy), the heavens (al-samawat) and the earth (al-ard), and the sun (al-shams) and the moon (al-qamar). The arguments of the philosophers (dala'il al-falasifah) for establishing that the world is one are weak, flimsy arguments founded upon feeble premises. (60)

So it is quite clear that al-Razi rejects the Aristotelian and Avicennan view of the impossibility of multiple universes. (61) In a short three-page section of volume six of the Matalib, he overviews the main Aristotelian arguments against the existence of multiple universes and points out their weaknesses and refutes them. (62) This rejection naturally follows from his affirmation of atomism which entails the existence of vacant space in which the atoms move, combine and separate. Al-Razi takes up the issue of the void in greater detail in volume five of the Matalib. (63)

Al-Razi's Symbolic Understanding of Nature

The physical world can be studied on its own quite apart from the obvious fact of its ontic and causal dependence on the Creator, but it is clear in al-Razi's physics, as shown above, that the world is to be studied symbolically. This means that knowing the world is an integral aspect of knowing the Creator of the world, and so the world is not to be studied and known for its own sake but for the

sake of knowing some aspects of the divine as manifested in the phenomenal entities, structures, and processes of the world. For al-Razi this symbolic view of nature is borne out by the fact that the world is not self-explanatory, i.e., the diverse physical features and characteristics of the world are not explainable by reference to processes within the world itself, but by reference to what transcends the world, thus he says in the *Mafatih*:

The bodies of the world are homogenous (*mutasawiyah*) with respect their essential corporeality (*mahiyyat al-jismiyyah*) whereas they are different (*mukhtalifah*) with respect to their characteristics (*al-sifat*), which are their colours (*al-alwan*), places (*al-amkinah*), and modes of being (*al-ahwal*). It is impossible that each body's specificity (*ikhtisas*) with regard to a particular characteristic be due to its corporeality per se or to the concomitants (*lawazim*) of corporeality, otherwise the bodies will all be homogenous (*husul al-istiwa*). Thus it is necessary that this specificity be due to the specifying act (*takhsis*) of a specifier (*mukhassis*) and the organization of an organizer (*tadbir mudabbir*). And this specifier, if it is a body, then the above will again be said of it (*ada al-kalamu fihi*); but if it is not a body, then that is the required point (*al-matlub*).

Now this being, if it is not living, knowing and having power but whose efficacy (*ta'thiruhu*) is due rather to emanation (*fayd*) and nature (*tabi ah*), then the same problem of homogeneity is again entailed; but if it is living, knowing and having power, then that is the point. Once you realised this then it will be manifest that each one of the particles (*dharrat*) of the heavens and the earth is a truthful witness (*shahid sadiq*) to and an articulate informer (*mukhbir natiq*) of the existence of the powerful, wise and omniscient God.

And my father the shaykh, al-Imam Diya' al-Din Umar, may Allah have mercy on him, used to say: "That [this witnessing and informing] is so, because it is possible for every atomic substance to occur, alternatively (*ala al-badl*), in an infinite number of places, and it is also possible for it to be characterized, alternatively, by an infinite number of characteristics. And each of these postulated situations (*al-ahwal al-muqaddarah*), supposing they occur, points to their dependence [for their occurrence] on the existence of the Merciful and Wise Fashioner (*al-Sani al-hakim, al-Rahim*)."
Thus it is established by what we have said that this domain of investigations has no terminal end. As for the realisation of guidance by way of spiritual exercise and purification, this way is an ocean having no shore. And for each wayfarer to God his peculiar route and his particular drinking place, as indicated in His verse: And for each a course he travels by. (64)

Conclusion

The foregoing preliminary survey of al-Razi's thoughts on the nature of the physical world shows that he sees physical nature to be worthy of humankind's intellectual reflection and investigation, for it is

through nature that the reality of divine providence and wisdom is manifested. Contrary to popular modernist presumption, belief in a creative God of knowledge, will, and power does not put premature limits to the scientific curiosity innate in every human being, but rather it guides that curiosity toward genuinely fruitful ends and in fact opens up new horizons of understanding of nature. The way before us, Muslims and non-Muslims alike, in modern science now is either God of the gaps or Chance of the gaps, for whether we like it or not, there is always an explanatory gap, however small, between what we term as cause and what we term as its effect, and our actual, practical jump across that gap is always an act of personal commitment--a personal commitment either to the god of wisdom or to the god of chance. The choice before believers is obvious, for we know that in science nothing, absolutely nothing happens by chance, for chance is merely a convenient euphemism for ignorance, but ignorance can never be a productive, creative principle. Everything happens by intelligence, and the gaps in our scientific knowledge are merely reflective of the realms of infinite intelligence we have yet to explore and the pages in the never ending story of creation we have yet to read. (65)

And if all the trees in the earth were pens,
and the sea, with seven more seas to help it, (were ink),
the words of Allah would never be exhausted.
Lo! Allah is Mighty, Wise. (66)

(1.) Encyclopedia of Islam, new edition (EI2), article "tabi a."

(2.) For a concise account of his life and works, see EI2, article "Fakhr al-Din al-Razi" by G. C. Anawati who cites the relevant classical biographical sources. A critically comprehensive account of al-Razi's life and works is Muhammad Salih al-Zarkan, *Fakhr al-Din al-Razi wa Ara uhu al-Kalamiyyah wa al-Falsafiyyah* (Beirut: Dar al-Fikr, 1963), 8-36 passim; henceforth cited as Zarkan. An interesting nuanced reinterpretation is Tony Street, "Concerning the Life and Works of Fakhr al-Din al-Razi" in *Islam: Essays on Scripture, Thought and Society*, a Festschrift in honour of Anthony H. Johns (Leiden: Brill, 1997), 135-46.

(3.) Ed., Ahmad Hijazi al-Saqa, 3 vols. in 1 (Tehran: Mu'assasah al-Sadiq, 1415H?).

(4.) Ed. Abd al-Rahman al-Badawi (Beirut: Dar al-Qalam, 1980).

(5.) SUH, 2: 16ff. Words in round brackets are al-Razi's, either translated or transliterated, whereas those in square brackets are my contextual clarifications of the text.

(6.) SUH, 2: 16ff.

(7.) SUH 2: 19.

(8.) SUH 2: 19ff.

(9.) *Al-Mabahith al-Mashriqiyyah*, ed., Muhammad al-Mu tasim biLlah al- Baghdadi, 2 vols. (Beirut: Dar al-Kitab al- Arabi, 1990), 1: 645; henceforth *Mabahith*.

(10.) SUH, 2: 29-30.

(11.) SUH, 2: 29.

(12.) SUH, 2: 29-30.

(13.) EI2, "tabi a," 26, citing al-Razi's ethical and psychological treatise *Kitab al-Nafs wa'l-Ruh*, ed. M. S. H. Ma sumi (Islamabad: Islamic Research Institute, 1968).

(14.) Ibid.

(15.) Muhammad b. Umar b. al-Husayn b. al-Hasan b. 'Ali al-Bakri al- Tabaristani Fakhr al-Din al-Razi, *al-Tafsir al-Kabir*, 32 vols. in 11 (Beirut: Dar Ihya al-Turath al- Arabi, 1996), 1 (2): 342ff. This work is also known as *Mafatih al-Ghayb*, which means Keys to the Unseen; henceforth *Mafatih*.

(16.) *al-Baqarah*: 22.

(17.) *Mafatih*, 1 (2): 343-44.

(18.) Ibid., 343 (*law la al-asbabu lama irtaba murtabun*).

(19.) For more on his conception of *adah*, see *Mafatih*, 1 (2): 342ff.

(20.) Cited in Zarkan, 356.

(21.) *al-Mu minun*: 17.

(22.) *Mafatih*, 8 (23): 267-68.

(23.) Cited in Samih Dughaym, *Mawsu at Mustalahat al-Imam Fakhr al-Din al-Razi* (Beirut: Maktabah Lubnan, 2001), 423, henceforth Dughaym.

(24.) *Mafatih*, 6 (16), 157 (commentary on *al-Tawbah*: 87); also cited in Dughaym, 423.

(25.) The problem of human freedom of action and hence moral responsibility before God in relation to divine knowledge, will, and power is a complex philosophico-theological issue which shall understandably not be dealt with here. It suffices here to say that the Ash'arites are neither fatalists since they believe in human choice and moral responsibility nor voluntarists since they believe in divine predestination, but are somewhere in between; however this paradox can only be resolved not at the discursive, theoretical level but at the level of intuitive spiritual experience.

(26.) *Al-Matalib al- Uliyyah min al- Ilmi al-Ilahi*, ed., Ahmad Hijazi al-Saqa 9, vols. in 5 (Beirut: Dar al-Kitab al-Arabi, 1987), 4: 9ff.

(27.) *Matalib*, 4: 9ff.

(28.) 1: 233ff.

(29.) 1: 95ff.

(30.) A concise account of the Arabic categories is J. N. Mattock, EI2, article "*al-makulat*."

(31.) *Mafatih*, 1 (2): 444.

- (32.) Muhassal Afkar al-Mutaqaddimin wa al-Muta akhkhirin min al- ulama' wa al-hukama wa al-mutakallimin (Beirut: Dar al-Fikr al-Lubnani, 1992), 109; also cited in Dughaym, 433.
- (33.) Sharh al-Isharat wa al-Tanbihat, cited in Dughaym, 433.
- (34.) Fakhr al-Razi, Kitab al-Arba in fi Usul al-Din (Hyderabad: Da'irah al-Ma arif al-Uthmaniyyah, 1934), 7; also cited in Dughaym, 685.
- (35.) Mafatih, 1 (2): 444; cited also in Dughaym, 433.
- (36.) Matalib, 4: 12.
- (37.) Matalib, 2: 8ff.
- (38.) Matalib, 4: 12.
- (39.) Matalib, 4:12. For a recent monograph on this issue, see Muammer Iskenderoglu, Fakhr al-Din al-Razi and Thomas Aquinas on the Question of the Eternity of the World (Leiden: Brill, 2002).
- (40.) al-Fatihah: 2.
- (41.) Mafatih, 1 (1): 198-99.
- (42.) Mafatih, 1 (1): 198-99.
- (43.) Mafatih, 1 (1): 163.
- (44.) Matalib, 4: 332; cited also in Dughaym, 433; Cf., W. Hartner, "al- Falak" and P. Kunitzsch, "al-Nudjum" both articles in EI2.
- (45.) al-Anbiya': 33; Ya Sin: 40.
- (46.) Mafatih 9 (26): 279-80.
- (47.) Ibid., 280-81.
- (48.) Ibid., 9 (26): 280-83.
- (49.) al-Anbiya': 33.
- (50.) Mafatih, 8 (22): 141.
- (51.) Ibid.
- (52.) Mafatih, 9 (26): 281.
- (53.) Ibid.
- (54.) Mafatih, 8 (22): 141.

- (55.) Cf. Anton M. Heinen, *Islamic Cosmology: A Study of As-Suyuti's al-Hay'a as-Saniya fi l-Hay'a as-Sunniya*, with critical edition, translation, and commentary (Beirut: Orient-Institut der Deutschen Morgenlandischen Gesellschaft, 1982), 181-82.
- (56.) *Matalib*, 4: 331-52.
- (57.) *Mabahith*, 2:103-138.
- (58.) *Mafatih*, 1 (1): 24; also cited in Dughaym, 436.
- (59.) *Lawami al-Bayyinat Sharh Asma Allah Ta ala wa al-Sifat* (Beirut: Dar al-Kitab al-Arabi, 1983), 138; also cited in Dughaum, 504.
- (60.) *Mafatih*, 1 (1): 24.
- (61.) Cf. Arif, *Ibn Sina's Cosmology*, 11-13, citing mainly the *Shifa'* and *al-'Iraqi*, 371-73.
- (62.) *Matalib*, 6: 193-95.
- (63.) *Matalib*, 5: 155-85; see chapters two and four.
- (64.) *Mafatih*, 1 (1): 26, commenting on *al-Baqarah*: 148.
- (65.) For more on al-Razi's scientific appreciation of nature, see my article in *Islam & Science*, Vol. 2 (2004) No. 1, 1-32.
- (66.) *Luqman*: 27. All translations of Qurbanic verses are based on Muhammad Marmaduke Pickthall, *The Meaning of the Glorious Qurban: Text and Explanatory Translation* (Mecca: Muslim World League, 1977).

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