



## **Islamic and Western Methodological Approaches towards the Study of Life Sciences**

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### **Abstract**

Life sciences in the contemporary world are fertile ground for religion and science contentions. It could be argued that developments in evolutionary biology in the last two centuries contributed much to the rise of New Atheism. On conducting a survey we find that the study of life sciences within the Islamic scientific tradition never inclined towards atheistic thought. A core characteristic of Islamic science was that rigorous scientific research was conducted within a predominantly Islamic intellectual milieu and a 'tawhidic' philosophical framework. The initial impetus to develop life sciences in the Muslim world came from religious injunctions from the Quran and Sunnah. Many scientists like Al Jahiz, Ibn Khaldun etc pursued a study of the biological world to understand divine wisdom at work in creation. The necessary starting point of all scientific enquiry in the Islamic world was a recognition of divine unity that is demonstrated best by cosmic unity. Because Islamic science sprang forth from an intellectual tradition rooted in religion and spirituality, the place of symbolism in all literature was inevitable. The work of Muslim Biologist, Al Jahiz is analysed and a comparison is drawn between the language employed by Muslim scientists and mystics in order to understand how Islamic perspectives of *Tawhid* and cosmic unity greatly intersected with and influenced the development of life sciences in the medieval Muslim world. Understanding this feature of Islamic science is crucial for various reasons like a historical survey of Islamic Science and contemporary efforts in the field of Islam and Science, particularly Evolution

**Keywords:** Zoology, Philosophy, al-Jahiz, Spirituality, Islamic Science.

### **Abstrak**

Sains hayat di dunia kontemporari adalah tanah yang subur untuk perbalahan agama dan sains. Boleh dikatakan bahawa perkembangan dalam biologi evolusi dalam dua abad yang lalu banyak menyumbang kepada kebangkitan Ateisme Baru. Semasa menjalankan tinjauan, kami mendapati bahawa kajian sains hayat dalam tradisi saintifik Islam tidak pernah cenderung kepada pemikiran ateistik. Ciri teras sains Islam ialah penyelidikan saintifik yang teliti dijalankan dalam lingkungan intelektual yang kebanyakannya Islam dan kerangka falsafah 'tauhid'. Dorongan awal untuk mengembangkan sains hayat di dunia Islam datang daripada perintah agama daripada al-Quran dan Sunnah. Ramai saintis seperti Al Jahiz, Ibn Khaldun dan lain-lain meneruskan kajian tentang dunia biologi untuk memahami kebijaksanaan ilahi yang bekerja dalam penciptaan. Titik permulaan yang diperlukan untuk semua siasatan saintifik di dunia Islam adalah pengiktirafan kesatuan ilahi yang paling baik ditunjukkan oleh kesatuan kosmik. Kerana sains Islam muncul daripada tradisi intelektual yang berakar pada agama dan kerohanian, tempat perlambangan dalam semua kesusasteraan tidak dapat dielakkan. Karya Ahli Biologi Muslim seperti Al Jahiz dianalisis dan perbandingan

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dibuat antara bahasa yang digunakan oleh saintis Muslim dan ahli mistik, untuk memahami perspektif dan Islam tentang Tauhid dan kesatuan kosmik dan mempengaruhi perkembangan sains hayat di dunia Islam zaman pertengahan. Memahami ciri sains Islam ini adalah penting untuk pelbagai sebab seperti tinjauan sejarah Sains Islam dan usaha kontemporari dalam bidang Islam dan Sains, khususnya Evolusi.

**Kata kunci:** Zoologi, Falsafah, al-Jahiz, Kerohanian, Sains Islam.

## **Introduction**

Science as it is understood today is defined as a study of the physical world utilizing certain methods and aiming at a coherent and objective understanding of the natural order, without resorting to any metaphysical explanation. (Okasha, 2002) By contrast, in the Muslim world, the word 'science' implied the more generic and all-inclusive Arabic word 'ulum' or knowledge. It meant all knowledge. There was a fundamental unity between the different religious, spiritual, physical, and mathematical sciences, as all sprung forth from the same Islamic intellectual milieu. Due to this inherent unity within these different fields, many times the same method of research was employed throughout these varied sciences. Therefore, we find the scientific spirit first being exhibited in the codification of religious sciences, especially the formulation of Fiqh. (Iqbal, 2002)

A question that may be asked is what is the reason behind this harmony between varied disciplines like philosophy, religion, and science in the Muslim world in comparison with the tension that exists between them in the western tradition? The answer is that Muslims of the medieval period viewed 'knowledge' as an integrated and holistic enterprise that emerged from a single source - God. The unity of all knowledge is possible only because all knowledge ultimately comes from God, who is All-Knowing. Thus man's scientific knowledge as well as knowledge pertaining to the spiritual realm is possible only because God has primordially enabled man to have access to these different sources of knowledge. (The Quran 2:31)

It was the experience of Divine unity or 'Tawhid', that was manifest at different levels of reality, namely, the physical, psychical and spiritual. When this unity

manifested in the physical world, the physical sciences studied it, when it manifested in the realm of reason, logic, and the mind, the Islamic intellectual tradition (Falsafa and Kalam) studied it and when this reality manifested in the realm of the heart and insight, the spiritual tradition of Islam (Sufism) studied it. In this sense, insofar as the Islamic intellectual revolution was concerned whichever way the seeker would look, they would find all knowledge pointing towards that one God. (Faruqi, 1982)

Dr. Osman Bakar commenting on this feature of the Islamic intellectual tradition says, "In Islam religious consciousness of Tawhid is the source of the scientific spirit in all domains of knowledge. Consequently, Islamic intellectual tradition does not entertain the idea of the natural sciences alone as being scientific or as being more scientific than the other sciences." (Bakar, 2000)

Muslim scientists and philosophers considered the natural world to be a 'sign' of divine existence. Just like the verses of the Quran are called the 'ayaat' (signs) of God, similarly, natural phenomena are also regarded as the 'ayaat' of God. In Islam, there was never a separation between the 'laws of nature' and the 'laws of God'. Moral laws as expounded in the Islamic Shariah as well as natural laws that a scientist's studies came from the same divine source. The Tawhid (divine unity) that the religious texts celebrate can be very well experienced through a rigorous scientific study of the cosmos. This is in sharp contrast with the reductionist and materialist appeal of modern science as it studies solely the physical aspect of nature, thereby denying, ignoring, and belittling the other aspects of nature namely the metaphysical, qualitative, spiritual, and aesthetic.

The all-pervasive philosophy of science today is naturalistic that ensures that all phenomena must be given 'natural' explanations only. The universe is understood to be functioning according to mechanistic laws and physical causes. Methodological Naturalism, which is the primary constituent of contemporary philosophy of science, holds that religious commitments have no relevance within science. Natural science itself requires no specific attitude to religion and can be practiced just as well by adherents of religious faiths as by atheists or agnostics. This is only possible when the 'divine hand' is systematically ignored in the study of physical phenomena.

Whereas for medieval Muslim scientists the question of excluding the 'divine hand' even for methodological reasons was unacceptable. The overwhelming influence of Tawhid ensured that all scientific research had divine unity and omnipotence as its starting point and methodological framework. (Faruqi, 1982) It is only due to this 'tawhidic' influence on Muslim scientific thought that many Muslim scientists would find inspiration for their scientific theories from particular Quranic verses, while others would embark on a scientific inquiry in order to prove the existence of God. (Husseini, 1961). Even the naturalistic Falasifah who were influenced by Greek Philosophy like Ibn Sina and Ibn Rushd make frequent mention of the divine providence at work in the cosmos, despite subscribing to a naturalistic causal theory. Muslims employed a kind of transcendental naturalism; wherein physical phenomena were understood as being the effects of some physical and non-physical causes. But at the same time, all causal power ultimately was attributed to God alone.

Another important aspect of Islamic Science was the extensive use of symbolic language. Nature was considered to be a book of symbols. The famous theologian al-Ghazzali says, "Everything that exists in the natural world is a symbol of something in the higher world." So physical objects were not just material realities but presented themselves as a reflection of a higher reality. For eg; water symbolizes knowledge, rain symbolizes revelation, a bird symbolizes a soul, and so on. The Islamic civilization showed how symbolic knowledge of natural things is not contradictory to scientific knowledge or irrelevant. Symbolic knowledge helped to reveal the metaphysical significance of scientific facts, something which is of great value in a religious culture.

Lastly, the Islamic scientific enterprise evolved out of the Islamic cosmological framework. Islamic cosmology differs significantly from modern Cosmology. Modern Cosmology is a quantitative analysis of a single aspect of the universe i.e. the physical. Thus it studies stars, planets, galaxies, and so on. Whereas traditional Cosmology dealt with the structure of the cosmos and its qualitative content. It is a science that provides the conceptual tools to understand how everything in the cosmos is perfectly interrelated. Herein, lies the great distinction between traditional and modern Cosmology. While the latter is moving towards the discovery of the interconnectedness of the universe, the former took this idea as the starting principle. Everything is interrelated because everything comes from the One God. The cosmos exists as a hierarchy of levels - physical, subtle, spiritual, and then the transcendent. In such a scheme the physical world cannot be treated as an autonomous domain, cut off from higher orders of reality. Thus, in such a

cosmological scheme, the question of life on earth cannot be resolved in terms of physical entities like cells and molecules alone. Life is essentially a non-physical entity that has penetrated the physical realm like an animating principle. (Bakar, 1990)

Thus in this paper, the scientific works of al-Jahiz and Damiri will be analyzed to recognize the distinctive theistic philosophy employed by Muslim scientists. The particular texts *Kitab al Hayawan* and *Hayat al Hayawan* are great biological treatises exhibiting both scientific objectivity and empirical inquiry. Despite the scientific rigor, the texts are rich with religious discussions, symbolic allusions, and poetry. This is what makes Islamic scientific literature different from modern scientific texts.

Consequently, throughout this paper, Islamic contributions to life sciences will be termed as 'Islamic' Biology or 'Islamic' Zoology, because the primary philosophy of science employed throughout the Islamic intellectual tradition was 'tawhidic' in nature, regardless of the religion of the individual scientists who worked in the particular fields. The Islamic intellectual revolution saw many non-Muslim scientists contributing towards science and philosophy. But it must be emphasized that the overarching philosophical framework was Tawhid and hence the prefix 'Islamic' is justified. (Bakar, 2000).

### **Methods used**

The primary method utilized in this paper is the analytical method. One of the primary zoological texts from the Islamic world, *Kitab al Hayawan*, or the *Book of Animals* by al-Jahiz will be analyzed. The content, theme, and language employed will be analyzed to identify the common thread that gives this encyclopedic text its dynamism. Then a comparative analysis will be

undertaken with Islamic mystical literature in order to identify the common ideological framework that was employed by both scientists and religious groups in their respective texts. The analysis will help us conclude that using symbolism and the practice of according symbolic significance to physical phenomena was not limited to mystical and religious texts alone. Even scientific texts employed similar language. Such eclectic themes never compromised the scientific value of the texts; instead, they were representative of the harmonious relationship between religion and science that characterized the Islamic civilization.

### **Significance of this study**

This study is significant for several reasons. Firstly, the present study gives insight into the philosophy that characterized Islamic Science. This is a much-needed study as it uncovers how the doctrine of Tawhid was a central framework within which the Islamic intellectual tradition thrived.

Secondly, the present study aims to dispel myths and misconceptions that have plagued the study of the Islamic scientific tradition since the birth of modern science. Because the focus of this paper is on Zoology, thus we will concentrate on how Muslim contributions towards the development and growth of Zoology have been ignored by some western historians of science and even misunderstood by certain Muslim academics. The religio-spiritual nature of Islamic science especially in the domain of life sciences has led some historians of science to completely disregard the significant role Islamic Zoology played in the development of modern Zoology and label the former as pseudoscientific. An example is Ernst Mayr, a historian of biology who comes to this misinformed conclusion that *"The Arabs, so far I can determine, made no important contributions to biology—this is even true for two Arab*

*scholars, Avicenna and Averroes, who showed a particular interest in biological matters; it was, however, through Arab translations that Aristotle again became known to the Western world—this was perhaps the greatest contribution that the Arabs made to the history of biology."* (Mayr, 1982).

Moreover, many Muslim academics also exhibit similar misconceptions regarding Islamic scientific texts on Zoology. Because they evaluate Islamic zoological treatises from the contemporary reductionist and naturalistic paradigm, on encountering religious discussions or metaphysical and spiritual symbolism in the texts, they erroneously conclude that the texts have minimal scientific content to offer and have more in common with metaphysical frameworks like the Neoplatonic Great Chain of Being (GCB). The fact is that the presence of religious/spiritual observations and insights in Islamic scientific texts does not reduce the scientific value of the text. That is just indicative of the philosophical premise within which this scientific research is being conducted. Contemporary scholarship to do justice to the Islamic scientific tradition must not view them from their scientific paradigms. This paradigmatic bias of contemporary scholarship has resulted in sectioning out great Islamic works in the field of Chemistry and Biology, thus creating severe gaps in the study of the history of science.

While Islamic Life Sciences differ greatly from current materialistic and reductionist Evolutionary Biology, the differences are primarily philosophical. Understandably so, as the Islamic scientific tradition was birthed by a religious outlook and modern science is secular. The main constituents of a scientific inquiry i.e objectivity, classification, empiricism, ratiocination, and experimentation, characterized Muslim

works on Zoology. Thus, their scientific value is uncontested. To still label these Islamic scientific texts as anything other than scientific is due to a complete unfamiliarity with the nature and philosophy of Islamic Science and the style of writing of Islamic scientific texts. Take the case of Elshakry who considers Al Jahiz's text 'not so much a zoological treatise as ... its emphasis was on philosophical and religious edification. (Elshakry, 2014 ) Or what is argued by Malik in Islam and Evolution, 'he (Jahiz) believed in the fixation of species which is an immediate indication that he developed or adopted a version of the Great Chain of Being. This is further substantiated by his inclusive mention and discussion of metaphysical entities.' (Malik, 2021) Such a view is incorrect as Jahiz was among the Mu'tazilite Mutakallimun who subscribed to creation ex nihilo which happens to be a revolt against Neoplatonic emanationism that supplements the doctrine of the Great Chain of Being. All Muslim scientific works made room for metaphysical discussions. The mere mention of metaphysical entities does not take al Jahiz's work out of the fold of science and into metaphysics. If such a criterion would be applied on to the Islamic scientific tradition, every text would be dismissed as metaphysics.

Thirdly, this research will help promote further study of Islamic contributions in Life sciences. As this study will make evident that the presence of theological, symbolic, and metaphysical discussions does not reduce the scientific value of the texts, it will assist in understanding the worldview in which Muslim scientists produced their research. In his book *Maqala fi Dawl al Qamar*, Ibn al Haytham uses a Quranic verse to express his opinion regarding the nature of the moon's light. (Chaudri, 1969) But such an inference does not reduce the scientific value of his texts. Similar is the

case with Muslim chemist Jabir bin Hayyan who is credited with inventing scientific chemistry. (Mathe, 1980) Most of his texts have a deeply religious and mystical character. (Hussain, 2001). In the case of biological texts, input from scripture, metaphysics, and mysticism will be greater than what one would find in quantitative sciences like physics, mathematics, and engineering. This must not be viewed from the current reductionist and physicalist paradigm as the result would be great incommensurability between these two separate paradigms- the western and the Islamic. To consider only a reductionist and naturalistic view on life which developed in the last two centuries alone to be 'scientific' is to ignore a great chunk of the history of biological sciences. Keeping the religious and mystical nature of Islamic Biology in mind, would then help towards an unbiased and comprehensive study of the history of Life Sciences and facilitate a better understanding of Islamic science itself.

Fourthly, such a study is critical in efforts to revive Islamic Science again in the Muslim world. The need for the revival of Islamic science is more than ever today, mainly because of the detrimental impact that secular and naturalistic sciences have on the psyche of young Muslims and the proliferation of ideologies like materialism and scientism that are antithetical to a spiritual worldview. A revival of Islamic science essentially is a revival of the Tawhidic philosophy of science that was employed in the Islamic intellectual revolution. The present study helps the contemporary Muslim to contrast between how life sciences are studied today and how they were studied in the Islamic scientific tradition. Contemporarily, atheistic thought is strongly premised on developments in life sciences. On the contrary, developments in life sciences within the Islamic scientific

tradition never favored atheism. The difference lies in the perspective and the underlying philosophical framework in which the science is conducted, not in the 'science' per se. It is not that science today has somehow 'discovered' the nonexistence of god as assumed by new atheists. Rather, the way scientific research is conducted today takes this statement as its first assumption and presupposition. What this necessitates is a reformation in how science is developed and taught in Muslim societies.

Fifthly, this study will help shape the Islam and Evolution discourse. An insight into Islamic life sciences would aid contemporary Muslim philosophers and theologians to tackle the question of 'Islam and Evolution' in a historically and scripturally accurate way. The basic philosophical implication of Evolutionary Biology and even Scientific Cosmology is that all of life and creation was a unified whole at a point in time. This is reconcilable with Islamic theories on life and cosmology. (Iqbal, 1930/2007) In this study, we will discover how the interconnectedness of life was an overarching principle in Islamic Biology. In fact, cosmic unity was essentially a demonstrable proof of Divine unity. There are two broad categories of academics in the Muslim world today with regards to the 'Islam and Evolution' debate - the creationists who base their opinions on a classical and sometimes literal interpretation of the scripture and the other category is of the Evolutionists who go with a symbolic and non-literal interpretation of the Quran and Hadith with regards to verses about Adam's creation. Both categories will benefit from learning how Muslim thinkers regardless of their affiliations to the Sufi or the Kalam tradition, viewed life as a unity. However because this idea arose from a religious worldview, it cannot be reduced to mere reductionist scientific propositions. So,

questions like whether Muslims foreshadowed Darwin (Shanavas 2010) or not (Braterman, 2017) (Malik, 2021) will lead to incommensurability, a communication breakdown resulting from a comparison of two completely different paradigms. Nevertheless, it must be noted that Muslim scientists discussed many contemporary concepts like natural selection, adaptation, heredity, ancient earth, and common ancestry, all of which are intrinsic to contemporary biology (Malik et al., 2017) and will enrich the dialogue.

However recent fringe efforts to label Muslim biological theories as varied forms of neo-platonic metaphysics (Malik 2021) and dismiss their relevance to the contemporary Islam and Evolution debate are misleading and unproductive. Two issues with this fringe view are that firstly all of Islamic science functioned in a metaphysical framework. So, to dismiss Islamic scientific views as mere metaphysics because they were heavily premised and intertwined with metaphysical perspectives is an error built on an ignorance of the Islamic scientific tradition. Secondly, few people today realize that the idea of Evolution originally belonged to metaphysics. But in nineteenth-century Europe, metaphysical ideas, including the idea of Evolution, had all been emptied of their true metaphysical content through a long process of secularization and naturalization. The evolutionary chain of living organisms in post-Darwinian biology is none other than the secularized and temporalized version of the traditional metaphysical doctrine of gradation or the "great chain of being" of the Western tradition (Shuoun, 1982).

Lastly, this study will be of great benefit in solving current scientific conundrums namely, the need to reconcile physics with

biology in fields like Biophysics and Quantum Biology. A revival of Islamic Science is not just a need for the Muslim intellectual community. But it will have benefits for the global scientific enterprise. Because Islamic Science possesses a deeply integrated and interconnected view of existence, the subject matter of physics and biology will coincide at a deeper level. Quantum Biology has faced much pessimism because of the dichotomous view of Modern science that demarcates between life and non-life. However, such a dichotomy would never be present in the Islamic scientific enterprise. Even the question of whether consciousness and physics can be reconciled would be dealt with differently within an Islamic scientific paradigm. In the last half of the twentieth century, due to the paradigm shifts brought about by Quantum Physics, there were calls to incorporate a pluralistic methodology into science that accepts even traditional opinions from sacred scriptures. (Feyerabend, 1982) Famous physicists like R Oppenheimer, Schrodinger, Fritjof Capra, and Von Neumann have turned to Oriental doctrines in the hope of finding solutions to scientific dilemmas. (Schrodinger,1964) (Capra, 1975).

Why Islamic Science is the most suitable for this project is because Islamic science, while being religious and spiritual in its core philosophy, was a rigorously scientific enterprise, unlike Buddhist metaphysics, for instance. Moreover, Islamic science is the immediate predecessor and major contributor to modern science.

### **Difference between the Islamic and Contemporary Scientific tradition**

The Islamic scientific tradition regarded nature as a divine revelation or a 'book' of Allah's signs, and a source for gaining knowledge of God's wisdom. The human

intellect was regarded as an instrument to study not only the divine revelation but also the 'revelation of Allah' in the physical world. Thus, a fundamental unity between the physical world, the human intellect, and divine revelation was the primary presupposition in the development of the various fields and sciences (Attas, 1995). Muslim scientists firmly believed that God's wisdom is reflected in innumerable ways in His creation. They studied such things as natural forms, forces, energies, laws, and rhythms not only to gain scientific knowledge merely to further the Baconian quest of an ever-increasing mastery over nature, subsequently to serve corporate interests but to arrive at a better understanding of divine wisdom. This distinctive feature of Islamic science has been well described by William Chittick who writes, *"Up until recent times, Islamic thought was characterized by a tendency toward unity, harmony, integration, and synthesis. The great Muslim thinkers were masters of many disciplines, but they looked upon them as branches of the single tree of 'Tawhid'. There was never any contradiction between astronomy and zoology, physics and ethics, mathematics and law, or mysticism and logic. Everything was governed by the same principles because everything fell under God's all-encompassing reality."* (Chittick, 2007).

Comparing this Muslim scientific perspective with the modern perspective on science, we find a stark difference. For modern science, the physical world has been demystified and robbed of the harmonious and unifying feature that gave meaning to its different parts. Therefore, modern science insists on studying nature by breaking it down into smaller parts rather than recognizing its inherent unity and uniformity. Contemporary scientists put all their attention on the pixel and ignore the full picture. This is not by accident, instead,

it is a fundamental method used in science today called Reductionism.

One of Dr. Muhammad Iqbal's great insights was his view that modern science, by definition, yields disunity and dissonance. He wrote, *"We must not forget that what is called science is a mass of sectional views of Reality. [T]he various natural sciences are like so many vultures falling on the dead body of nature, and each running away with a piece of its flesh. Nature as the subject of science is a highly artificial affair, and this artificiality is the result of that selective process to which science must subject her in the interests of precision"* (Iqbal, 1930/2007).

Modern science in order to achieve "precision" compromises on the overall harmonious view of nature and reduces phenomena to disconnected parts for the purpose of study. Such an approach results in a disconnect not only within different branches of study like the humanities and sciences or psychology and physics. But this approach yields discord even within a single field, like in the case of the irreconcilability of the General Theory of Relativity and Quantum Mechanics.

What needs to be emphasized is that in the Islamic Scientific tradition the demarcation between science and non-science was not as sharp and impervious as it is today. There were several reasons for this. Firstly, religious and physical sciences were developed in a shared intellectual milieu and within a common philosophical framework. Secondly, the physical sciences did not enjoy a degree of superiority over the other sciences, thus the need for a strict demarcation was never felt. Thirdly, the end goal of all the sciences was primarily a better understanding of the divine, the place and purpose of humanity, and the means to achieve that purpose.

Thus, in the Islamic scientific tradition, rigorous empirical and experimental science was developed in close association with religious and spiritual insights on the subject. There were several imports from the religious texts into the scientific traditions as well as inroads from the scientific works into religious treatises, this being something critically different from contemporary science.

Contemporary science, on the other hand, has evolved and developed out of a philosophy that since its earliest periods affirmed the coming into being of things out of each other. The world seen from this perspective is an independent, eternal universe, a self-subsisting system evolving according to its own laws. The denial of the reality and existence of God is already implied in this philosophy (Attas, 1995). In order to understand the methodological and philosophical differences between Islamic and Modern Science holistically, we will take the history of Zoology and its socio-cultural impact as our case study. The impact of life sciences on popular culture and the psyche differs greatly when the two traditions (Islamic and western) are compared.

On the one hand, we see that the most critical development in the history of Atheism in modern Europe was facilitated by Charles Darwin's seminal work, *On the Origin of Species*, in which he accumulated his insights on natural selection, evolution, animal behavior, habitat, and adaptation. Even today Evolution enjoys wide currency among new atheists who use it persistently in their arguments against religion. On the other hand, the scientific study of life was usually conducted by religious scholarship in Islam and even regarded as a branch of Islamic studies. The Muslim world was unique in that for the first time in history a type of science developed that was

rigorously scientific due to its emphasis on empiricism and the experimental method. But at the same time, it was not divorced from a spiritual perspective on the universe. Thus, it can be concluded that the primary distinguishing factor between Islamic Science and modern science is the spiritual and metaphysical outlook and the philosophy that was employed in the former.

### **The Qur'an and the development of Islamic Zoology**

In this section, we will discuss how the Quran inspired the development and growth of Zoology during the Islamic intellectual period. Firstly, the Quran gives clear injunctions regarding dietary prohibitions related to certain animals. This factor greatly inspired the study of animals from a religious and juridical perspective in the Islamic world. Muslim scholars expanded the domain of their inquiry as they embarked on a scientific study of animals with diverse ends in mind. There was first of all the scientific study of the anatomy and classification of animals. Muslim classifications of animals were based on numerous criteria such as the nature of their habitats, methods of reproduction, and the way they organize their defense from external attacks. The primary motivation for the scientific study of animals was to rationally and empirically justify religious dietary prohibitions.

Secondly, the Quran mentions many animals like camels, ants, bees, spiders, birds, and dogs as an exposition of certain moral and spiritual lessons. Animals, much like all other creatures, are manifest signs of God, the study of which yields a better understanding of divine action in the world. Therefore, we see in the Islamic intellectual period, animal behavior, traits and psychology were subject to scientific study, in order to facilitate an in-depth understanding of the Quranic symbolism

that pertains to particular animal species. What is interesting to note is that this rigorously scientific study was also coupled with the Muslim zoologist concern with the spiritual, symbolic, and moral significance of animals. (Bakar, 1990) For e. g. In the Quran a dog symbolically represents a particular human trait. (The Quran 7:176) Muslim zoologist al Jahiz presents a lengthy scientific discussion on dog behaviour and psychology in order to facilitate a better understanding of this Quranic symbolism. Lastly, a scientific study of animals also found its inspiration from the need to advance the field of medicine. The Quran and the Prophet (s. a. w.) encouraged the pursuit of beneficial knowledge even from non-Muslim sources. Thus, we see Muslim scientists were open to accept Greek and Indian scientific texts to further their understanding. Nonetheless, the acceptance was not free from critical analysis and appraisal. Muslim Zoologists derived much benefit from Aristotle's zoological treatise. But they were critical of his views as well. (Mansur, 1969) Therefore, we conclude that Islamic Zoology represents the synthesis of the spiritual and the scientific study of the world and this is something that distinguishes it from contemporary Zoology.

### **Al Jahiz- The Muslim Zoologist**

‘Amr ibn Baḥr al Jahiz (776-868 AD) was an influential figure during the Islamic scientific revolution. He is famous for his seven-volume encyclopedic book *Kitab al Hayawan* or *The Book of Life* or the *Book of Animals*, which became the most celebrated Arabic work on zoology. It is a unique text that contains linguistic, literary, theological, sociological, and philosophical discussions intertwined with a zoological study. (Nadim, 1970) Al Jahiz's anthology is a significant contribution in the history of Life Sciences, although its eclectic nature makes it a difficult read, especially for

modern secular academics. There are two emphatic themes in the text. One is the view that the created world is the most manifest sign of the wisdom and providence of God. Dr. Osman Bakar writes, "According to al Jahiz, the primary goal of the study of zoology is the demonstration of the existence of God and the wisdom inherent in His creation. Al Jahiz treated zoology as a branch of religious studies." (Bakar, 1990).

Second is that all creation is deeply interconnected. Some novel scientific ideas discussed in *Kitab al Hayawan* are embryonic theories, food chains, evolution, adaptation and natural selection, influence of climate and environment on life, and animal psychology. (Malik, Ziermann & Diogo, 2017) Some of these ideas were not developed up until the nineteenth century. Because Al Jahiz was a Mu'tazilite theologian and a student of Nazzam, this text is a demonstration of how religion, science, and philosophy were harmonized in early Muslim thought. By bringing together insights from theology, physics, zoology, and philosophy, al-Jahiz demonstrates the unity of knowledge, a core feature of Islamic thought. He discusses in detail how a scientific observation of animal life demonstrates Divine Unity (Tawhid) and how the intrinsic interrelatedness of life demonstrates Divine Justice (A'dl). Thus, in his world-view God is the efficient cause of the world, the world is the final object or purpose of God and a scientific study of the world enlightens the intellect with certitude regarding God's existence and wisdom. (Mansur, 1969)

Al-Jahiz refutes arguments of heretics and non-Muslims regarding the Quranic verses that deal with animals. This constitutes the theological content of *Kitab al Hayawan*. The scientific content is distinguished from theological and philosophical discussions as

he employs an empirical study and a modern style of classification of the animal kingdom. He mentions his travels and observation of animal behaviors and records the observations of others.

For instance, he discusses the bee that in spite of its size, it is richer in evidence of God's wisdom. Then he undertakes a zoological discussion on how the bee navigates and produces honey. He marvels at how God taught it to store its food supply and identify the right flowers. He similarly discusses locusts. He takes up Quranic passages like the power of Prophet Sulaiman to communicate with ants. He criticizes those who reject this Quranic claim of the communication of ants using a scientific observation of how ants on finding an object heavy, communicate with other ants to assist them in lifting the object. (Mansur,1969). Now, we need to dwell into the discussion of how Islamic Biology and Al Jahiz's text is of significance to contemporary Muslims.

Firstly, the contribution of Jahiz as a Muslim scientist and theologian has critical methodological, philosophical and pedagogical significance for the Muslim world today that finds itself at crossroads at times between scientific progress as envisioned in Western nations and religious ethics as the Quran demands. There needs to be a wide recognition that the current (i.e western) philosophy of science with its emphasis on naturalism, reductionism, secularism and utilitarian ethics is non-conducive to the Muslim faith that deems divine unity and divine power at work in the cosmos as non-negotiable first principles. The core philosophical framework that Jahiz works within is that the universe is an interconnected unity and this unity and its individual operations are a manifest proof of God. This is the philosophy of science that was employed throughout the Islamic

scientific revolution. This philosophy of science needs to replace the contemporary philosophy of science in the Muslim world. The Islamic principle of Tawhid must impact how science is developed, taught and communicated in the Muslim world if we are to progress as a religious and scientifically advanced global community.

Secondly al-Jahiz' text is of great significance for the religion and science debate within the Muslim world. What makes Jahiz critically relevant to our times is that unlike other theologians (Mutakallimun) he was a naturalist. He subscribed to the Theory of Kumun which held that all things in the universe have inherent natures and they function according to their essences and natures. (Fakhry, 2004) This is essentially a theory of causality which states that the causal action and power resides in the object itself. However, the great difference between his naturalism and contemporary naturalism is that he considered this property of creation to be the greatest evidence of Tawhid. According to him the fact that each and every object in the universe has an essence inherent to it and it produces the effects due to its essence is a proof of Divine wisdom at work. He presents a form of a 'quranic' design argument. His theological leanings can be seen when he discusses the negative aspects in creation that we perceive like a deformity in a creature or the hunting of animals by other animals, through the lens of divine wisdom. He uses the Mu'tazilite doctrine of 'Aslah' (good) and considers everything that happens in creation to be a manifestation of that good, as nothing evil can come from God, even though humans in their limited intellect may not understand it and that is what necessitates the existence of an afterlife which will clarify all things.

Lastly, Islamic sciences in general and Life Sciences in particular are of great significance in the field of bioethics. Life was considered a unified 'whole' in the overall cosmological framework that Muslim scientists including al-Jahiz functioned in. The entire universe was intricately connected and everything, including the smallest organism, has its place in the world and must be respected as an essential part of life. Again, this idea is of critical importance for our age of genetic engineering. Debates on bioethics concerning technologies like Gene Drive where an entire species can be modified by introducing or editing a gene would be dealt with very differently in the Islamic scientific enterprise that viewed life as an organismic whole. Changing one part will have irreversible effects on other parts of the whole. In order to get a deeper insight into how Muslim thinkers viewed life we will present two more scientists.

#### **Kamal al Din al Damiri (1341-1405)**

Another 14th Century Muslim zoologist also represents this trend of unified scientific and spiritual knowledge in the Muslim world. Like most Muslim scientists, he was primarily an Islamic scholar of the Shafi' school and wrote two famous works on jurisprudence, a commentary on Sunan ibn Majah and another work on the Minhaj of Nawawi. In his famous work on Zoology, *Hayat al Hayawan* (The Great Book of the Life of Animals), he discusses animals and organizes the text in an alphabetical order. (Hussain, 1961)

In his work again, we witness this harmonious combination of spiritual, moral, religious, juridical, literary, scientific and medical perspectives in studying animals. Al-Damiri even dealt with the significance of animals in the interpretation of dreams, a discipline which is inseparable from spiritual knowledge. The work is primarily

inspired by the Quranic injunctions regarding dietary habits. (Bakar, 1990).

#### **Ibn Khaldun (1332-1406)**

The great Muslim sociologist, philosopher and historian left deep insights on this subject of the origin of species and common ancestry of all life. He says, *"One should then look at the world of creation. It started out from the minerals and progressed, in an ingenious, gradual manner, to plants and animals. The last stage of minerals is connected with the first stage of plants, such as herbs and seedless plants. The last stage of plants, such as palms and vines, is connected with the first stage of animals, such as snails and shellfish which have only the power of touch. The animal world then widens, its species become numerous, and, in a gradual process of creation, it finally leads to man, who is able to think and to reflect. The higher stage of man is reached from the world of the monkeys, in which both sagacity and perception are found, but which has not reached the stage of actual reflection and thinking. At this point we come to the first stage of man after (the world of monkeys). This is as far as our (physical) observation extends."*

What is interesting to note is that while this above discussion is a result of an empirical examination of the physical world, the actual subject matter is the spirit and its function in the material world. This can be seen in the succeeding passage.

*"... All this is evidence of the fact that there is something that exercises influence and is different from bodily substances. This is something spiritual...."* (Ibn Khaldun, 2005)

Again, it would be erroneous to dismiss the scientific value of this 'observation' (Malik 2021) just because a metaphysical entity is eventually discussed in the passage. For Muslim scientists the mechanics of the material world were not disconnected from

the spiritual realm like their Christian contemporaries envisioned. To brand the above passage as pure metaphysics devoid of any scientific content is a conjecture built on a deep misunderstanding of the Islamic scientific tradition.

### **Mystics and theologian's view on life**

Now after covering the views of Muslim scientists, we need to make a comparative analysis of the cosmological frameworks in mystical and theological texts. The purpose of this section is to bring to the fore the common philosophical and cosmological framework in which these various groups functioned. The two main themes of the interrelatedness of life and the cosmos being a manifest proof of Divine unity (Quranic Design argument) are equally present in scientific as well as religious literature of the time. Here we present the examples from the writings of a mystic like Rumi and a theologian like Jurjani. In both these texts we find the same all pervasive religious character as was seen earlier in al-Jahiz, Damiri and Ibn Khaldun. The conclusion that needs to be drawn from this congruence is that science developed in a religious society like the Islamic world projects the overall religious cosmological outlook without compromising on the scientific value of the research.

### **Jalal ad Din Rumi (1207-1273AD)**

For a mystic like Rumi the interconnectedness and ultimate unity of all creation is the conclusion that can be drawn from a reflection on nature. Here are lines of his poetry:

*First man appeared in the class of inorganic things,  
Next, he passed there from into that of plants.  
For years he lived as one of the plants*

*And when he passed from the vegetative to the animal state*

*He had no remembrance of his state as a plant*

*Again, the great Creator drew man out of the animal into the human state*

*Thus, man passed from one order of nature to another*

*Till he became wise and knowing and strong as he is now.*

*And at the next stage he shall pass from this too*

*He will soar and lift his head among the angels*

*Then he will escape even from that phase too*

*Everything is perishing except His Essence.*  
(Rumi, 2008)

### **Al Sayid al Sharif al Jurjani (1314-1413 AD)**

Jurjani, the theologian discusses creation in order to highlight the notion of 'possibility' that compliments everything in existence and God's supreme wisdom and providence behind the world, that chooses from these inherent possibilities. (Koca, 2020). He says, "When one contemplates the wonders among the animals and plants these cannot be attributed to blind forces, whether they be simple or composite. This is especially so with respect to what happens in the wombs of animals, which includes planning, measurements, and best choices. Again, someone who sees this knows without doubt that these acts can only be attributed to someone who knows comprehensively, knows all of the hidden secrets, and acts with wisdom and power. And the book of God says, "It is He who forms those in the wombs." When the Agent Willer (Allah) (al-Fa'il al-Mukhtar) is accepted and everything is traced back directly to Him, one finds great benefit." (Jurjani, 2012).

### **Animal Consciousness- the Muslim and the Western perspective**

A discussion on the philosophy and history of Zoology is incomplete without a reference to its implications especially regarding animal consciousness. It can be said that throughout Islamic history there was a consensus regarding animal consciousness. Muslim thinkers were unanimous in holding that all life possesses consciousness, albeit in a rudimentary form. Numerous verses from the Quran and statements of the Prophet Muhammad (*s. a. w.*) point towards how the world is teeming with life and consciousness. In sharp contrast Western medieval thinkers notably Rene Descartes, the father of modern philosophy, regarded animals to be non-conscious machines. (Cartmill, 2000).

This was something that came under criticism as zoology was further developed in Europe through the 18th and 19th centuries. Works of biologists like Darwin and Romanes empirically proved that animals possess some form of intelligence, learning and communication skills, all indicative of conscious behaviour. (Darwin, 1881) Animal consciousness is intimately related to ethics of animal utilization in agriculture and industry. (Bentham, 1948) The advent of the Industrial revolution in Europe in the 19th century saw a rapid increase in animal use for mass production of goods. Industrialization of agriculture and transformation of husbandry into industry led to exploitation and abuse of animals. With such a model came the irrelevance of animal consciousness, thoughts and pain. Another setback for research on animal consciousness came with the excessive use of animals in medical and cosmetic research. The Cartesian model of animals as non-conscious biological machines contributed significantly to the morally relevant fact of denying pain felt by animals. When the

study of psychology took the ‘behaviorist turn’ and contented itself with the study of stimulus and response, habit formations and integrations, the knowability of animal consciousness was doubted. (Watson, 1913). This overarching influence of behaviorism on the study of mind, coupled with the mechanistic interpretation of the entire scientific enterprise put a stronger case for animals as non-conscious organic automata. Animal welfare suffered an irreparable setback with these perspectives. However, what needs to be noted is that within an Islamic scientific framework such exploitation and abuse of animals by the most developed and educated societies would have been completely avoided. Throughout the Islamic scientific revolution, legal rulings (*fatwa*) were passed that protected animal rights especially in the field of medical research. The exploitation of animals and resources just to serve corporate interests would be a completely alien phenomenon in a religious-spiritual society. Thus, the catastrophic ecological crisis that faces the world today would be avoided. Understanding this core difference between Islamic science and western contemporary science is crucial for Muslim thinkers, scientists, theologians and philosophers. A serious effort to revive the Islamic philosophy and methodology of scientific research will have positive effects for the Muslim Ummah. Firstly, the environment-friendly character of Islamic Science will help preserve the ecology. Secondly, the ‘tawhidic’ philosophy of science is more suited to a Muslim’s pursuit of science instead of the materialistic philosophy of science. And lastly, this effort will greatly benefit and enrich the global ‘Islam and Science’ debate.

### **Conclusion**

This paper was a brief survey of the philosophy and methodology of Life

Sciences in general and Zoology in particular as developed in the Islamic world during the 9th to 17th centuries. The initial impetus came from religious injunctions from the Quran and Sunnah. The Islamic doctrine of Tawhid greatly influenced the development of life sciences in the medieval Muslim world. The methodological and philosophical framework was predominantly 'Tawhidic'. This is the primary distinguishing factor between Islamic Science and Contemporary Science. Because Islamic science sprang forth from an intellectual tradition rooted in religion and spirituality, the place of symbolism in all literature was inevitable. This mystical-spiritual character of Islamic science is at serious odds with the current naturalistic and materialistic philosophy of contemporary science that studies just the physical aspect of nature, and denies the other aspects of nature namely the metaphysical, qualitative, spiritual and aesthetic.

A comparative analysis was conducted between scientific texts of al-Jahiz, al Damiri and Ibn Khaldun on the one hand and mystical and religious texts on the other, to identify the common ideological framework that was employed extensively throughout the Islamic intellectual tradition. The analysis helped us to conclude that use of symbolism and the presence of religious and theological discussions were not limited to mystical and religious texts alone. Even scientific texts employed similar language.

What is most critical to understand for contemporary students and enthusiasts of Islamic Science is that these religious and metaphysical frameworks and discussions never compromised on the scientific value of the texts; instead, they were representative of the harmonious relationship between religion and science that characterized the Islamic civilization. Understanding the religious and spiritual feature of Islamic science is crucial for

various reasons like understanding the history of science, conducting an uncompromised and comprehensive historical survey of Islamic Science and assisting in contemporary efforts in the field of Islam and Science, particularly Evolution.

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