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WITH THE NAME OF ALLĀH

MOST BENEFICIENT, MOST MERCIFUL

ABSTRACT

All praise be to Allāh, the Lord of the Worlds, and peace and blessings be upon Muḥammad ﷺ, the teacher of the Book and wisdom.

> The blind and the seeing are not alike; nor are the depths of Darkness and the Light; nor are the cooling shade and the scorching heat; nor are alike those that are living and those that are dead. God can make any that He wills to hear; but thou canst not make those hear that are (buried) in graves.
> (*Sūrah al-Fāṭir, 35: 19-22*)

Living is thinking and the dead are those that do not reflect. "*'Ilm* is Islam", remarks a leading orientalist, Franz Rosenthal. A civilization with knowledge as its foundation stone; with knowledge-seeking made obligatory on each of its members (even if it were to China); with immense stress laid on the contemplation and comprehension of the Universe; with the study and reflection upon other nations and civilizations urged and where wisdom is considered to be a gift from the Divine, must be a remarkably dynamic and overpowering civilization, not only in the field of knowledge and sciences but certainly, in every other field and aspect of human life. Indeed, this was so for Islam. Within a century, it had spread across the globe and dominated from Sindh in the East to Spain in the West, which was most of the known world at that time, the American continent had yet to be 'discovered'. Sciences were eminent right from the very beginning in this civilization and were actualized barely a century and a half later.

The same Islam, with the same basis and foundations does not, however, find in its members today, the same zeal and vigor for knowledge that had brought about the bloom of sciences in the 7th century. To understand both, how the sciences blossomed in Islam and why they no longer exist, we need to research the foundations of the science and also the development of the sciences specifically in the Islamic civilization. Exploring the philosophical background of Islamic science

will shed light not only on the above mentioned issue, but also on the philosophy of science in general as it will approach the subject from a different perspective than it has been so far. Further, it may also give us an insight into why there are no sciences today and how we can revive them.

We shall see in this study that Islam was inherently scientific and in fact, sciences could not but have emerged in this civilization. We will note that for the existence of sciences in society, there must be an inherent dynamism within that society, as sciences cannot flourish by being imported from without. We shall, therefore, identify this dynamism as intrinsically present in the epistemological foundation of science. For an exposition of the foundation of science and the emergence of a scientific tradition, we will primarily take Açikgenç's model for the emergence of sciences, as not much work has been done on the epistemological foundations of a science in the same manner as him.

By tracing the emergence of a scientific tradition, we will be able to see how and when it emerged in Islam and some of us may be surprised to learn that sciences exist inherently within the Islamic worldview more than any other civilization can claim. Therefore, it is lacking in sciences, not because of Islam, but rather because of its current followers. It will also be realized that borrowing the sciences from the Western or any other civilization cannot be a solution, as sciences must come from within. *Inshā' Allāh,* we will see that we have the foundation at home within ourselves and we have to revive it on our own. It is hoped that this work will help prompt some action in that direction. *Wa Allāhu 'a'lam bi al-ṣawāb.*

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INTRODUCTION

Can a civilization progress scientifically by borrowing sciences from another source foreign to it? This question has long been ignored, not because its significance is not realized but because its answer is, more often than not, presumed. It is presumed to be in the affirmative. This however, is a very grave mistake with far reaching consequences. The reason for this presumption is a lack of understanding of the epistemology of science. When we say 'epistemology of science', we are not referring to the method of science that discusses induction, deduction, falsification and the like[1], which is how it is usually understood. Rather, we are referring to what brings forth science. In other words, we are questioning, "what are its epistemological foundations?" Even in the language of the layman, we may ask, "Can just anyone do science or does science require a certain type of mindset?"; "What is required of a person or a society to do science?"; "What is the method of operation of the mind that renders a scientist to be doing science, rather than anything else?"; "What mental framework, if any, is necessary for the production of science?". If the answer is that anyone can do science and there are no special requirements for one to be a scientist, then we may say that an individual or a society may borrow sciences from another culture or civilization and do science. However, this is not so. Science by definition is creative and original, dynamic and innovative. If an individual or a society does not possess these same qualities, it cannot be inventive as science requires it to be and thus it cannot do science.

Another cause for this misunderstanding is that science is not differentiated from technology. If an individual or a society is using a certain technology, it is

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[1] David Papineau, "Philosophy of Science" in Nicholas Bunnin and E. P. Tsui-James, *The Blackwell Companion to Philosophy* (Oxford: Blackwell Publishers Ltd., 1996), 290ff.

sometimes considered that he or the society is a part of the science that created this technology. Again, it is a misleading conclusion We will here assert that science and its achievements may be used by all, but when it comes to doing science, not everyone can do science. Certain epistemological foundations are required for doing science.

This discussion is essential for us when studying the emergence of a scientific tradition in Islam. This is because the scientific tradition in Islam emerged remarkably fast, only a hundred, or at most, a hundred and fifty years after the *hijrah* Compared to the emergence of the Western tradition, that took over three hundred years to emerge fully, we see that the Islamic scientific tradition had even lesser raw material to emerge from. The Western civilization first inherited the entire Islamic heritage (and through that the Greek heritage), which it then actively translated into Latin over a period of four centuries (10th-13th century C.E. even though translations began in the 9th and continued until the 16th and 17th centuries), before it finally began to produce any original philosophers of its own [2] On the other hand, we see that the Islamic scientific tradition, contrary to popular belief, emerged before much contact was made with the Greeks Translations of Greek works, we know, began in the middle of the second century and we see that by then Islamic scholarship had reached a level where it could be labeled as scientific, and only within a few decades the actual sciences emerged. To cite but just one example from history would be Ibn Isḥāq's *Sīrah*, that Newby states is found " to be of

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[2] For details see Montgomery Watt, *The Influence of Islam on Medieval Europe* (Edinburgh Edinburgh University Press, 1972), 58ff, henceforth cited as *Influence of Islam*

enormous scope and rich color It is a well developed literary piece that culminates Umayyad scholarship."[3]

This is not very surprising because it was not like the natural rise and fall of a civilization that the Islamic civilization arose. Rather, it was a revolutionary emergence, brought about by the advent of the Prophet Muḥammad ﷺ and the coming of Islam. This explains why it differs from the emergence of the Western civilization, which arose in a natural manner with the natural decline of the Islamic civilization. The immediate cause for its momentous rise though, could be identified as the extreme and unprecedented importance that was given to knowledge and knowledge acquisition. Every civilization, society and culture respects and encourages knowledge and the knowledgeable, but Islam is unique in that it asks each one of its adherents to be a student and a teacher and leaves no excuse for ignorance[4] Not just does it propagate that but it practically helps implement it, as we shall see in Chapter 4, when studying the learning tradition in Islam

However, there is a tendency of some orientalists and many naive Muslims to look for the source of sciences in Islam from without. This is the context where the above discussion is relevant. When we look into the epistemology of science we will see that it is impossible to advance any sciences without an intrinsic dynamism and a scientific nature. It would be wrong if one were to hold that since the Western civilization inherited the sciences from the Muslims, all the progress that they have achieved until today is just an expansion on that inherited knowledge, with no initiative of the Western scientists themselves Such progress that the West has

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[3] G D Newby, *The Making of the Last Prophet* (Columbia University of South Carolina Press 1989), x This work is a translation of the first part of Ibn Ishāq's *Sīrah* that brings world history until the time of the Prophet Muhammad ﷺ

[4] Rosenthal draws a picture of the status given to knowledge in Islam See Rosenthal, *Knowledge Triumphant* (Leiden E J Brill, 1970)

achieved may no doubt have been initiated by the sciences that they inherited in the 10th-13th centuries, from the Muslims and it may also have been the initial raw material and in fact, the very stimulus that was needed to initiate the sciences and create a dynamism in them, but we may not say that until today all the progress is a mere expansion of the Muslim sciences. There is an inherent dynamism and an intrinsic scientific nature in the Western scientists, which is making this scientific advancement possible.

Similarly, were we to look at the history of the Islamic sciences with an unbiased eye, we would definitely reach the conclusion that the kind of scientific progress that was made by the Muslims from their *jāhiliyyah* stage to the heights of civilization, could not be just a mere advancement of the pre-Islamic Greek or Persian sciences with no initiative of their own. For eight hundred years (7th-16th century) and in fact even later, sciences flourished in the Muslim world. Not only were new sciences born out of already existing sciences (for instance, algebra) but entirely new sciences were invented to suit the new subject matters to be studied (for instance, *kalām* or philosophy, history, linguistic sciences such as *naḥw, ṣarf, bayān* and so on, *'ulūm al-ḥadīth, 'ulūm al-Qur'ān* and others[5]) This in itself shows the originality and creativity of the Islamic civilization. And of course, the knowledge that was inherited from the other civilizations was advanced scientifically to such an extent that it later took over five hundred years for the Western scholars to surpass it, for instance in medicine, Ibn Sīna's *Qānūn fī al-Ṭibb* was used for six hundred years as the main textbook of medicine

To uphold that the Muslims were mere transmitters, who had no initiative of their own, is to display ignorance concerning the very basis of science and the history

of the Islamic civilization. For whatever reason, this has been the attitude of many orientalists and also some Muslims. An example of this is Russell when he asserts.

> Its [the Muḥammadan civilization] importance, which must not be underrated is as a transmitter. Between the ancient and modern European civilization, the dark ages intervened. The Muḥammadans and the Byzantine, while lacking the intellectual energy for innovation, preserved the apparatus of civilization . . [6]

We would hardly call the progress made by the Muslims in sciences during the six hundred years of the so-called 'dark ages', preservation of the Greek thought - which he terms 'the apparatus of civilization'. In fact, in comparison to the Western civilization, the stimulus that set the Muslims thinking, the environment within which they did their sciences and the initial raw material that they used for the advancement of the sciences came from within themselves In the Western civilization, the stimulus that set them thinking, was the threat that came from the Muslim expansion in the South and the so-called barbaric Gothic tribes in the North The civilizational challenge they faced from a far superior civilization was threatening their very identity and they had to face up to this challenge, because of which, they were prompted into action and thinking.[7] The raw material that they used was also provided from the inherited knowledge of the Muslim civilization except for Porphyry's *Isagoge* and a few less significant books that had already been translated The environment, we may say, they had from the Christian thought - that is the Christian apologetics who wrote in Greek and Latin all the way from St Augustine (d.354), to John Scotus in the 9th century, who although a philosopher, was nevertheless a contributor to the environment of Western thought.

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5 The very fact that the names these sciences have are original Arabic is an indication that they are not borrowed from any other civilizatio n

6 Bertrand Russell, *A History of Western Philosophy* (New York Simm & Schuster, Inc , 1945), 427

In Islam on the other hand the dynamism was not prompted by an outside source, neither was the environment dictated by any other, nor was the base material foreign It is hence odd to assert that the Muslim civilization did nothing but transmitted the sciences of the Greeks. In this study we will see how, not only was this not the case, it is also epistemologically impossible for such a situation to exist, whereby a civilization can make scientific progress and do sciences without an internal scientific nature and dynamism from within. This is why we decided to look into what really is needed for sciences to emerge and develop in a civilization and further, whether or not those requirements could be borrowed or imported from outside This led us to the study of the epistemology of science. It is surprising that not many scholars have actually looked into the cognitive basis of science, which is in fact, its epistemology. Açikgenç is one of the exceptions who has outlined the cognitive process of how science is done and what is required for the emergence of science in a society We will therefore, primarily be taking his model for the epistemological foundation of science.

In fact, we will be dealing with two relatively new topics in the philosophy of science The first, as mentioned, is the epistemology and the second is the sociology of science, whereby we will be examining the relatively new concept of a scientific community and then trace the development of a scientific tradition Therefore, from this we will be able to discern what the foundations of a science are, and we will then be capable of examining the same in the context of the Islamic civilization However, before we embark on any of this, we are faced with one fundamental issue and that is the question, "What is science?"

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[7] Watt puts it that it was the allaying of fear of the Muslims which the West had, by the capture of Toledo that made the West devote attention toward lea rning from the Arabs See Watt, *Influence of Islam,* 58

In this study, we will therefore, first, need to define science. To come up with a working definition of science is extremely important for us, as we will be tracing the epistemology of science and will require the complete understanding of what is essential for science to be made possible, which cannot be achieved without a thorough understanding of what is meant by science in our context. Now, since our study is trans-civilizational, and not just a study within one civilization, we will naturally need to have an understanding of science that will transcend civilizational barriers. This is indeed not an easy task. The concepts of science have varied vastly, covering a widespread spectrum of meanings, which makes it almost impossible to converge them all and unify them, to come up with one clear and transparent definition. Thus, we will not claim or attempt to do so. However, what we must do for the sake of our study is, come up with a *working definition* that is not a general definition of science, but a definition that is adequate for us to be able to discern from it, the foundations of science, such that we may be able to apply the entire model to the Islamic civilization.

The course we have chosen for this is a favorable and appropriate one for the purpose of this study, though we may not say for defining science in itself, which would take a much more extensive study than what we can allow for our dissertation. Hence, we will be looking into the definition of science over the ages, and from there will identify the common elements of all, which are in fact, what makes them all to be science. This we shall accomplish in Chapter 1.

Once, we know what the concept of science involves, we will look into what its foundations must be. Therefore, Chapter 2 will be an elaboration of the two fold foundations of science: the epistemological and the sociological foundations. These will be the two dimensions of the science, the inner or the cognitive dimension and

the outer or the normative dimension. The epistemological foundation will be seen to be the worldview and the scientific conceptual scheme that find their base in the mind of the individual and the society The worldview will be seen to be not any worldview, but a dynamic and a transparent one, which would lead to the formation of a scientific community that would be the composer of the scientific conceptual scheme. Chapter 2 will hence, describe both these foundations and elaborate on how they act as foundations for science.

The sociological foundations will be identified as the scientific community and the scientific tradition, tracing the latter of which is our purpose in this dissertation. Here again, we will examine the role of the scientific community in the emergence of sciences and how it acts as a foundation for science The establishment of a scientific community will bring about the emergence of a learning tradition, whereby the dissemination of knowledge and scientific information will be assured Once this learning tradition is established within a scientific community and the society in general, a scientific tradition is established Thus, within the sociological foundation we will be examining the formation and the nature of the scientific community and the emergence of the scientific tradition.

In Chapter 3 and 4, we will finally apply the already outlined theory of emergence of the scientific tradition to Islam. We will begin by saying how the foundations, examined in Chapter 2, fit into the emergence of the scientific tradition and then move on to examine how and when the entire process occurred in the Islamic civilization. Chapter 3 will be looking into the epistemological foundation of the worldview and scientific conceptual scheme, whereas Chapter 4 will look into the sociological foundation, culminating with the emergence of the scientific

tradition. At the end of the work, we will hope to have elaborated how and when the scientific tradition in Islam emerged.

This study does not extend to the period when the sciences themselves emerged, with their individual specific scientific conceptual schemes, but rather will stop at the emergence of the scientific tradition. This is because, as will be seen in the work, once the scientific tradition is established and it has an inherent dynamism with an established learning tradition, sciences are bound to follow. Therefore, a scientific tradition is not a static conglomeration of ides and theories, but rather a growing organic body of dynamic knowledge Some sciences within such a tradition may then emerge sooner than others and have their own processes of establishment of their specific scientific conceptual schemes, but we will not venture into that. We consider there to be sciences once the scientific tradition is established This is because the most difficult part in the emergence of the sciences is the establishment of a transparent worldview, as it is here that the entire process has to be set into motion, from a so far stagnant phase. The other steps come relatively easier and finally, after the scientific tradition is established, the sciences are bound to follow Therefore, if we can prove that the scientific tradition was established, we can be sure that the sciences were quick to follow suit. In reality, this was the case; most of the sciences in Islam emerged in the second half of the first century or the first half of the third

We hope that this study will spark more interest in the field of the emergence of the sciences especially with reference to the cognitive aspect which has not been intellected upon deeply enough as yet It may also give us some insight as to why the scientific ability, that was the unique feature of the Islamic civilization, is missing in it today. This may even further help us to look into how we can once

again revive our sciences. In fact, it will show us that the key to the revival of sciences in Islam is to bring back the dynamism that it came with. Once the dynamism is instilled, the worldview will change and the process will be set in motion. It is not possible for sciences to be revived by merely importing them from the Western civilization. One may participate in the scientific activities of another civilization, but cannot do science unless one has scientific qualities and dynamism intrinsically within oneself.

CHAPTER 1

THE CONCEPT OF SCIENCE: A WORKING DEFINITION

The term science, and what has been translated as science from Greek and Muslim thought, has always seemed to command importance and respect in human civilization through the ages and has always been considered at a higher level than most other forms of non-science. However, what was meant by the term *science* not only varied from one age to another, but also from one thinker to another within the same age. Surprisingly enough, even with all the varying definitions or explanations it still sits in the highest seat of knowledge. This may be explained by one of two ways. One would be that whatever discipline or study was most respectful at a certain age was termed by scholars of that time, or translated by later scholars, as science. This would mean that the term science in itself is a special, because of which whatever discipline is most important takes this name and the term itself has no connotations. Thus, potentially, there maybe no connection or common characteristics between the 'sciences' of two different times. However, we know that there is no magic in this term itself because of which every age would like to name its most important activity or discipline as science. Thus, this explanation cannot be valid.

The second and more reasonable explanation would be that there must be a certain concept that is science, and it is just perceived and explained differently by different communities at different times, probably according to the different environmental contexts. Thus, science would have some characteristics of its own that would enable thinkers of different times to attach the term to certain disciplines or activities. We must accept this explanation as the valid one.

As the term science belongs to modern western science certain scholars are

against calling anyone a 'scientist' before the 17th century when modern science became established. Thus, they would maintain that there was no science before modern science. Others would accept anything that fit the definition of science as science.[1] David Hull poses the question, "Does "science" refer to a particular sort of activity regardless of when and where it is conducted, or is it a tradition with a beginning in time and a continued development through time?"[2]. We would tend to agree with the first interpretation. The reason for this is that if we took different terms to refer to a single entity in different times, it would get too confusing to the human mind.

An iron used to iron out wrinkles in clothes has changed many forms. It used to run on coal that was placed inside it and was very heavy and bulky; then it started to work on electricity; then lighter and more efficient irons came where the temperature could be adjusted; then it started to have a built-in thermostat; now we have steam irons and so on. Now if at each stage we would rename the iron, it would be difficult to keep track of things in this world and would create much confusion. As long as the purpose is the same, the name is maintained even though it works in different ways and looks and feels totally different. However, certain basic principles or characters would have to remain the same. Now, if there were a machine used to iron out or rather to remove wrinkles from clothes by putting them into a container with steam, that may not be called an iron, but as long as it is something that we hold and move over the cloth it is an iron.

Hence, we take science to have certain characteristics or properties and as

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1 A lengthy discussion on this issue can be found in David L. Hull, *Science as a Process* (Chicago: The University of Chicago Press, 1988), 75 -81, henceforth cited as *Science.*

2 Ibid., 76.

long as anything satisfies that we will not hesitate to call it science. Michael Reiss would affirm this when he states, "What is of significance for science education is that there can be no single, universal, acultural science. Rather every sort of science is an ethnoscience"[3] and further "all sciences are equal."[4]

So what is it? What is this science? In this chapter we will try to identify the characteristics of science and *inshā' Allāh* come up with at least a working definition of science, such that it accommodates the concepts of science at all times. Thus, we shall begin with the Greek Civilization. We shall then move on to the Islamic civilization, where we shall study the two main concepts of science, the *Mashā'ī* and the original Muslim based concept and finally, we shall move on to the present civilization, where we will look at the current trend in understanding of science. This will give us a fair start and based on this, we can identify certain fundamental characteristics that make up science.

It maybe however noted that to define science as explained above, we will be looking for those characteristics that are common and may be, are responsible for its taking the position of the highest form of knowledge in all ages, and this is what will be used in defining it, including the factors without which it cannot be termed a science. These will be the characteristics by virtue of which sciences of different ages were called science and thus are the unifying characteristics of the different concepts of science.

Now an objection may be raised that if science is a 17th century concept, what authority do we have to 'redefine' it taking the previous sciences into

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3 Michael J. Reiss, *Science Education for a Pluralist Society* (Buckingham: Open University Press, 1993), 24, henceforth cited as *Science Education.*

4 Ibid., 25.

consideration. We agree that if there were a unanimously agreed upon definition of science today and it was a fixed concept like the color white, we may be doing an injustice by trying to 'redefine' a clearly defined concept. However this is not so. Even today's scholars are not clear on the concept of science. Chalmers remarks:

> In the light of this, I suggest that the question that constitutes the title of this book is a misleading and presumptuous one.[5] It presumes that there is a single category "science", and implies that various areas of knowledge. Physics, Biology, History, Sociology and so on, either come under that category or do not. I do not know how such a general characterization of science can be established or defended. Philosophers do not have resources that enable them to legislate on the criteria that must be satisfied if an area of knowledge is to be deemed acceptable or "scientific". . . From this point of view we do not need a general category "science" with respect to which some area of knowledge can be acclaimed as science or denigrated as non-science.[6]

Feyerabend, on the other hand, poses the question, "*What is science?* how does it proceed, what are its results, how do its standards, procedures, results, differ from the standards, procedures, results of other fields?" He admits that this question:

> . . . has not one answer, but many. Every school in the philosophy of science gives a different account of what science is and how it works . . . We are not far from the truth when saying that the nature of science is still shrouded in darkness.[7]

The concepts range from the above to the empiricists who limit science to information obtained through sense perception alone. The truth lies in the simple fact that science varies in different cultures and times. This is a very natural phenomenon for any similar concept. Hence, until now we have not been able to come up with an absolute concept or definition and most probably there will never be one. As Reiss puts it:

> The notion as to what constitutes science differs over time and between cultures (Hiatt and Jones, 1988; Brooke 1991). Attempts by certain

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5 The title of Chalmer's book is *What is This Thing Called Science*?

6 A. F. Chalmers, *What is This Thing Called Science?* (Buckingham: Open University Press, 1982), 166, henceforth cited as *What is This Thing Called Science?*

7 Paul Feyerabend, *Science in a Free Society* (London: Versa Editions, 1978), 73, henceforth cited as *Free Society.*

> historians and philosophers of science to identify a distinctive 'scientific method' which demarcates science absolutely from other disciplines have not proved successful. Though certain principles, such as testability and repeatability, may be central to modern science, it is now widely held that the question 'what is science?' can only be answered 'that which is recognised as such by a scientific community'.[8]

We shall see below that it is the scientific community that determines what a science is. However, this study demands that the concept of science may not be left unclear. Therefore, we need to come up with our own working definition of science. We shall achieve that by examining the concepts of science in all major civilizations and see what the essence or the most basic, common elements of these concepts are. That is what pure science, unclothed with all different civilizational and contextual colors would be.

The term 'science' comes from its Latin root *scientia*, which literally refers to 'an organized body of knowledge'. However, it is used as a translation of certain terms from other languages that were used prior to its actual coinage. When dealing with the Greek and Arabic portions of our study, the terms translated as science, i.e., *episteme, 'ilm, fiqh* and so on, will be taken to mean science.

1. THE NATURE OF SCIENCE AMONG THE GREEKS

The terms *philosophia* (love of wisdom), *episteme* (knowledge by demonstration[9]), *theoria* (contemplation, speculation) and *peri physeos historia* (inquiry concerning nature) have been in certain particular texts of the Greek, translated as science. Thus G. E. R. Lloyd summarizes 'Greek Science' as:

> . . . a shorthand expression to refer to certain ideas and theories in the ancient writers, and it does not presuppose any particular view concerning the status

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8 Reiss, *Science Education,* 26.

9 For a full definition of *episteme,* see G. E. R. Lloyd, *Early Greek Sciences: Thales to Aristotle,* (New York: W. W. Norton & Company, 1970), 99, henceforth cited as *Early Greek Sciences.*