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An Analytical Study of Historical Contribution of Muslims Scientists in the Field of Sciences and its Applications as Practical Knowledge during 680-1000 A.D: A Review

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Abstract

The paper primarily deals with Muslim's contribution in Science. As Islam declared education as a religious obligation and Islam also proved itself as a torch bearer of knowledge of the world after its advent in Arabia and extended its boundaries from Arabia to the edge of Asia and Africa. The Muslim rulers were the great patronage of modern sciences i.e., Physics, Mathematics, Chemistry, Astrology and Medicine. Among the different Muslim Scientists Prince Khalid, Imam Jafer Sadiq, Jabir Bin Hayayn, Abu Ali Seena, Abul Qaim Zaharavi, Abu Rehan Al-Baironi, Muhammad Bin Yahaya Idreesi, Muhammad Bin Zikriya Al-Razi, Ibn-ul-Haitha, Abu Nusa AL-Khuarzami, Ibn-e-Nafees and many other were very important. The Muslim Scientists were the followers of practical knowledge, and they always propagate the application of knowledge as practical rather than oral or theoretical. This paper highlights the role and contribution of Muslim Scientists in the field of Science while it also explores that Muslims were the founder of scientific knowledge in the world.

Keywords: Islam; Knowledge; Science; Education; Obligation; Practical

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1. Introduction:

Muslims always considered the great patronage and custodians of sciences in their entire history and the promoted scientific knowledge. The common perception about the Muslim is not based on reality that Muslims only promoted religious education and traditional knowledge (Hitti, 2002). They have no role in the uplift of modern and scientific knowledge, it seems to be an exaggeration only While Muslims are considered as the founders and architects of science. There is no denying the services and achievements of Muslims in the field of science. Muslims are the inventors of science who not only laid the foundation of science but also nurtured it (Siddiqui, 2008). Be it mathematics or physics, biology or botany and medicine or history, Muslims became educators. But in modern times, their decline and the supremacy of the West have eclipsed their supremacy, which has led to the extinction of their achievements. Today, the proud intellectuals of Europe, who were extremely backward in terms of knowledge in the Middle Ages, have become educators of knowledge and have forgotten the services of Muslims. So, this article is actually a brief introduction to the scientific services of Muslims which not only mirrors the past of Muslims but will be helpful in inspiring guidance of today's students and researchers. Through this research paper, an attempt has been made to highlight the significant deeds of Muslims (Siddiqui, 2008).

1.1. Objectives:

- This paper highlights the role and contribution of Muslim Scientists in the field of Science.
- While it also explores that Muslims were the founder of scientific knowledge in the world.

1. 2. Research Methodology:

The research paper primarily deals with the historical knowledge as a title Muslim contribution in the field of Science therefore historic method of research based on qualitative approach has used with the help of documentary sources i.e., books, articles, essays (Hitti, 2002).

1.3. Review of Literature:

Literature is very important component of research and for this research paper the most relevant has been used including primary and secondary books i.e., History and Philosophy of Science, The Outline of History, The Scientific Outlook, The Making of Humanity, Islam and Evolution of Science, Quranic Concept of History, A Short History of Science, Makers of Chemistry, Introduction to the History of Science and Musilman Sainsdan.

2. Discussion on Topic:

Science is one such knowledge of the system of nature which is derived from observation and experience. The Greeks have a place in human world history in recognizing the importance and usefulness of science by adopting a serious attitude towards science while establishing a formal opinion about science with natural phenomena and facts (Hitti, 2002). The Greeks had no value in science in the ancient time. But it was the Greeks who understood science and began it regularly -The Greeks put the ideas of science first. He took the path of curiosity and reflection but did not attach much importance to experiments. That is why they could not make any significant progress in the experimental sciences, i.e., Physics, chemistry, medicine, biology and botany. They introduced mathematics and geometry to the

sciences. Because there was lacked experience- one of the writers said about ancient and initial stage of science. All this was truly scientific but the bare chronical of fact is only one side of science. There was no tendency to look for reason or to invent unifying theories (Hull, 1959). It is true that Greeks were limited to their region and the thought of Greeks was hampered by a want of knowledge that is almost inconceivable to us today. They had no knowledge of the past mankind at all; they had no knowledge of geography beyond the range of the Mediterranean basin and the frontiers of Persia (Wells, 1920). The Greeks observed the world as poets rather than as men of science said by Russell (1949). Similarly, the scientific method in the development of science, which has a prominent place in modern science and is considered to be the main axis of scientific progress and evolution, was invented by Muslim scientists. Scientific theories existed before the Muslims, but the Muslims introduced the criterion of assumption, observation and experience. Briffault believes that Muslims are part of the experiments in science as he said, what we call science arose in Europe as a result of a new spirit of inquiry, of new methods of investigation, of the method of experiment, observation, measurement, of the development of mathematics in a form unknown to the Greeks. That spirit and those methods were introduced into the European world by the Arabs (Briffault, 1991). Muslim studied particular facts on the basis of experiments and drew inferences in the form of general principles or scientific laws, in other words, the inductive method used to be employed (Saud, 1986).

Allama Iqbal also pointed out as, the first important point to note about the spirit of Muslim culture then is that, for purposes for knowledge, it fixed it gaze on the concrete, the finite. It is further clear that the birth of the method of observation and experiment in Islam was due not to a compromise with Greek thought but to a prolonged intellectual warfare with it. In fact, the influence of the Greek who, as Briffalult (1991) says, were interested chiefly in theory, not in fact, tended rather to obscure the Muslims' vision of the Quran, and for at least two centuries kept the practical Arab temperament from asserting itself and coming to its own (Iqbal, 1977). The science of chemistry has a special place in the scientific sciences. In the field of chemistry, Muslim scientists have worked with such skill and dedication that there is no precedent for it. Until the seventeenth century, Muslims held a degree in chemistry. Muslims founded experimental research. Thanks to which mathematics and chemistry got a special boost. The sciences that Muslims initially introduced or nurtured include zoology, botany, mathematics, chemistry, medicine, physics, and astronomy, and their services are invaluable (Siddiqui, 2008).

2.1. Chemistry

Khalid bin Yazid died in 83 AH was a master of scientific knowledge, especially in Chemistry. Khalid wrote many books (Zubair, 1978) on the knowledge of chemistry. Khalid was a great chemist. He was the first Muslim scientist to write a book on chemistry, which he named Al-Mara *'Al-Badi' Fi Fak Al-Ramz Al-Mani* Khalid also, claimed that he could not become caliph despite being a prince (Saleem, 1981). But he is proud of the fact that his scientific ability is second to none and he has brought chemistry to its peak. The famous historian Ibn Al-Nadeem believes that there was no chemist greater than Khalid at that time and that Khalid wrote more than a dozen books on alchemy (Al-Nadeem, 1986). Some of his few famous books were following.

1- کتاب المرالبدیع فی فک الرمز المنیع 2- کتاب الفردوس 3- کتاب العرارات

4- کتاب الصحیفۃ الکبیر 5- کتاب الصحیفۃ الصغیر 6- کتاب وصیۃ الی ابنہ فی الصنع

Before the advent of Islam in Arabia, there was a tradition to remember the ancestry or family tree and Arabs always felt proud on their memory. While Arabs emphasized on the great importance of the knowledge of genealogy. The Arabs had a historical consciousness, they continued the past by remembering the days of war with genealogy and documentation (Siddiqui, 2008). After Khalid, the

most successful in the field of alchemy is Jabir bin Hayyan, a famous Muslim scientist of the Abbasi era. He had a privileged position in chemistry. It was Jaber who first used not only metals but also successfully converted low-cost metals into precious metals such as gold. He had the honor of discovering many chemical compounds. And these compounds have been successfully used. In which he succeeded in protecting iron from rust and painting glass, for this Jaber made varnishes to dye clothes and protect iron from rust and successfully tested manganese dioxide for the first time to make glass (Singer, 1948). That is why in Arabia, Jabir Ibn Hayyan is called the father of alchemy. He performed many experiments in science. He introduced new rules and ideas for the first time in chemistry. Jaber made new history by developing chemistry on a scientific basis and by developing an experimental basis. He also successfully experimented with blowing the essence of objects through the process of refining (Singer, 1948). The first essential in chemistry is that should perform practical work and conduct experiments, for he who performs not practical work nor makes experiments will never attain to the least degree of mastery. But thou, O my son, do thou experiment so that may acquire knowledge. Scientists delight not in abundance of material; they rejoice only in the excellence of their experimental methods (Holmyard, 1931). Jaber thinks that the most important thing in chemistry is experience, and if you want to get the right knowledge, then get knowledge from experiments. Authenticate knowledge gained in the light of experience by relying on experience, taking practical steps, Jaber set up a laboratory in the light of scientific methods, experiments for chemical processes in it. Jaber set up this laboratory at Kufa in Iraq, a minimalist laboratory with scientific equipment for experiments in chemistry, which has long been the center of scientific activity. The laboratory was built in Kufa with the Damascus Gate. It was here that Jaber performed chemical experiments to produce various acids, as well as a piece of gold from a chemical process that remained in the same laboratory for two years (Holmyard, 1931).

Neutral people in the West believe that Jabir was a complete scientist who was familiar with the process of dissolution, distillation, distillation, and making acid. The most famous alchemist of Islam, Jabir-Ibn-Hayyan, seems to have a good experimental knowledge of a number of chemical facts. "He was acquainted with crystallization, calcination, solution, sublimation, etc., and attempted to explain their nature. He described methods of preparing steel and other metals; dyes for cloth, leather, and hair; varnishes for water-proofing cloth and protecting iron; and substitutes for inks containing gold. He knew the use of manganese dioxide in glassmaking. He was familiar with citric acid and knew how to concentrate acetic acid by distillation of vinegar, and he discovered nitric acid (Sarton, 1976). Abu Bakar Razi was perhaps the first to criticize Aristotle's first figure. It is a mistake to suppose that the experimental method is a European discovery. Europe has been rather slow to recognize the Islamic origin of her scientific method. But full recognition of the fact has at last come (Iqbal, 1977).

2.2. Physics

Like chemistry, Muslims have made unforgettable achievements in the field of physics. Dr. on the experimental path out of the ideological influence of the Greeks. Ibn al-Hathem is credited with experimenting in physics. Ibn al-Hashim provided the basis for this knowledge. He developed the laws of light with regard to physics and wrote a famous book on it called Kitab-ul-Manazir. In it, he has copied his own research based on observation and experiments. This book consists of 1500 pages, and he discussed the rules and laws of physics This book is one his masterpiece (Zubair, 1978). It was generally thought by the Greek, Roman and Muslim scientists that rays are emitted from the eyes towards the objects seen. Plato suggested that there was another set of rays which emanated from the object seen. Ibn-al-Haithum changed the traditional view by putting forward the theory that the objects are seen by the rays passing from them towards the eye and not by the opposite process (Saud, 1986).

His foundation study on the Burning-Spheres represents a real scientific advance and exhibits a profound and accurate conception of the nature of focusing, magnifying and inversion of the image, and of formation of rings and colors by experiments. This work is for beyond anything of its kind produced by the Greeks (Singer, 1948).

2.3. Mathematics

Born in 736, Yaqub Ibn Tariq was the leading mathematician of his time who changed the concept of the Hindu cooker according to which he divided the circle into 96 parts. He wrote several magazines in Arabic on the subject. Three of which were as Appearance Tables, Spherical digits, curves (Siddiqui, 2008). Muhammad Ibn Musa al-Khwarizmi had a long history of mathematics. For the first time, he introduced the equation of algebra. His book Algebra Al-Maqbalah is very famous and his dozens of books in mathematics make him immortal. This book has been read in Europe for centuries-He also prepared tables on trigonometry and astrology. A person who born in Kufa in the ninth century, Yaqub ibn Ishaq al-Kandi was a mathematician. He authored 34 books on mathematics and geometry, including 22 books on physics, and 241 books on the scientific sciences and social sciences. The book Fi Al-Khatwut Al-Zarb and Al-Adal Al-Ashir are famous (Hitti, 2002).

2.4. Biology

Abu Jafar Ahmad Ibn Muhammad, while collecting the trees of Spain and Africa, first suggested their Arabic, African and Latin names. His most famous book is Al-Adwiya Al-Mufrida (Khaldon, 1985). Abdul Malik Asmi was also other important scientist who worked on different animals and his famous books are Kitab-ul-Wahoosh, Kitab-ul-Abil, Kitab-ul-Khail, Kitab-ul-Shat (Siddiqui, 2008).

2.5. Medicine

Muslim played a progressive role in the foundation of Medicine. In Islamic history medicine also popularly called as Tibb-i-Yunani. But before the Muslims medicine had not been properly studied and the material for the early period is scanty. But after it would be useful to refer to available accounts, as the history of medicine is linked up with the development of medieval science and provides a good index of during Muslim contribution (Siddiqui, 2008). The proper, regular, and formal study and foundation of medicine was laid during the Abbasid period. Haroon and his son Mamoon were the great patronage of knowledge and scholars, and they called the various doctors from India were invited to Baghdad. Similarly, in the reconstruction of medicine and the art of surgery, Muslim scientists worked hard and provided the basis for progress. The Arabs did not blindly imitate the Greeks, but acted with great understanding (Saleem, 1996). However, on a more careful study of Arabic manuscripts and of Arabic medical literature, we find that they did contribute to our knowledge of Anatomy in several ways- Farther, the Arabs were not blind followers (Amin, 1946). One of these breathers is named Abu al-Qasim al-Zahrawi, whom Europeans remember as Abulcasis. Al-Zahrawi was the founder of surgery. He is considered to be the inventor of modern surgical science and the greatest medieval surgeon (Hitti, 2002). Sarton paid homage to Al-Zahrawi in these words, Abu-l-Qasim (Abulcasis) was the greatest Muslim surgeon; he exerted a very deep influence upon the development of European surgery down to the Renaissance (Sarton, 1976).

Abu al-Qasim al-Zahrawi's special achievements include the treatment of cataracts, the prevention of bleeding with cold water, and the discovery of anesthesia before surgery. At Bait-ul-Hikmah the important Sanskrit works translated into Arabic was undertaken. After that, the first

detailed reference to the subject is by Barani who gives details prominent physicians of the reign of Balban. Foremost in the latter reign were Maulana Badar-ud-din and Maulana Hamid Mutris, both from Damascus. They were not only practicing physicians but were also good teachers and taught Standard works on medicine to aspiring students (Hitti, 2002). One of the important names among Muslim scientists is Abu Bakar Muhammad Ibn Zakariya al-Razi. About whom Anan was an expert in medicine. Europeans also consider him the ruler of the medical world. The Arabs write about them with pride as one of the historians said about his status that he was not only famous in Arabs also his books were the part of curricula in Europe.

هوا ابو بکر محمد بن زکریا الرازی ولد فی ا العراق سنۃ 420 ھجری واھتم بدراسۃ الطب والصیدلۃ فی کتب الیونان والھنود ولم یکتف بالقراءۃ بل کان یعتمد فی طبہ علی التجربۃ والوصف الشامل لاسباب المرض وعلامتہ وطرق علاجہ وکان یجربہ الادویۃ علی الحیوانات قبل ان یعالج بھا الانسان تبلغ مولفاتہ مائتین واربعۃ عشر کتابا اعتمد علیہا الطب ففی اوربا منذ القرن السابع عشر۔

Al-Razi received a degree in medicine, and his research reached European educational institutions. And Europeans began to use it, relying on his research (Siddiqui, 2008).

2.5.1 Ibn-e-Nafees

Another name in the field of medicine is Muhammad Ibn Ali Ibn Abi al-Hazzam, who lived in Damascus in the early seventh century. He gained access to medicine. During his stay in Cairo, he conducted extensive experiments on the circulatory system. And discussed the cardiovascular system. He wrote more than a thousand books and journals on medicine as Barni said about him;

وقد اکتشف الدورۃ الدمویۃ وتجویف اللقلب والف کتبا کثیرۃ فی الطب کانت مرجعا۔

Bin Nafees also mastered medicine and other sciences, as it is said that he wrote thousands of books on hadith, jurisprudence, and grammar (Hitti, 2002).

2.5.2. Al-Idreesi

Another important name among the eminent Muslim scientists is Muhammad Ibn Abdullah Ibn Idrees, who belonged to the Maghreb Arabs. In addition to geography, the planet, the judges worked on plants, animals and medicine, and his famous book on this is Nazhat al-Mushtaq which is being taught in Europe and in Ilam-ul-Ulama it said about this book - This is a book full of medical virtues. Never before has such a detailed book been written on the subject of medicine (Siddiqui, 2008). Even in Subcontinent Muslim Physicians did not ignore the study and work on medicine and they continue it during the entire sultanate period. Firuz Shah promoted medical works composed in his reign was Tibb-t Firuz named after him. Rahat al-Insan, a work on popular medicine composed 778/1376, was also dedicated to him (Siddiqui, 2008). Muslim scientists worked on medicine and its sources practically from the beginning, and there is an important link in this chain. The important medieval work of this type was Madan al-Shifa-i Sikandar Shahi, also known as Tibb-i Sikandari. This was completed in 919 AH during the reign of Sikandar Lodi, by his court physician, Mian Bhowa. The brief account given above is enough to show that the study practice of medicine was not neglected during the early Muslim era and other spheres, material available in past as well as classical Islamic was utilized (Hitti, 2002).

3. Conclusion

There is no doubt that after the Greeks, Muslims were the most prominent nation who played the most splendid role in the dispensation of scientific knowledge all over the world without any partiality and discrimination. They started practical knowledge and set laboratories in different areas

as compared to Greeks who emphasized on theoretical knowledge. If we look at the development of Europe and the West in the field of science today, remember it carefully that these are the effects that were observed by the people of the West in Spain in the Middle Ages, and then known as Andalus. It was the research and experience of the Muslims that the West borrowed and attributed to them their achievements, forgetting the deeds of the Muslims. While denying the knowledge of Muslims by classifying them as ignorant people of the third world. Orientalists in particular used misleading propaganda against Muslims. If we talk about Islam and science, it is as clear as day that Islam has made the acquisition of knowledge a religious duty and has emphasized research. The teachings of Islam were rationally developed by Muslim scientists and in a short time they achieved perfection in the scientific sciences. Under the patronage of the rulers in the Islamic Empire, an atmosphere of science and research was established in which people from different countries came to Baghdad and Cordoba to acquire knowledge. He began researching scientific theories through practical experiments. The Arabs enlightened the world by providing new foundations for science. He changed the nature of knowledge and placed it in front of new generations. These sciences included chemistry, physics, medicine, mathematics, astronomy, history, geography, geology, biology. The purpose was not only to reform the Greeks in all fields of science and art, but also to work for the development of the sciences. Similarly, it is clear that research and experiments were formally initiated by the Arabs, which was previously limited to observations. By becoming a pioneer of research based on experiments with Arab observations, not only did they take the lead in the world, but the process of making laws from observations and experiments also created confidence in parliamentarians. Similarly, Muslims continued to pursue science and research. And for a long time, he was known as the master and educator of non-scientific sciences and his research became the first step in the development of the European education system. And from here the West was introduced to the scientific endeavors of Muslims. And he became aware of the works of scholars such as Jabir Ibn Hayyan, Bu Ali Seena, Ibn al-Hashim, Abu al-Qasim al-Zahrawi, Abu Bakar al-Razi, Idreesi, al-Khwarizmi, al-Biruni and Ibn Khaldon. So, in contrast to the prejudiced attitude, the Orientalists and the West have to accept that the progress of science cannot be considered the success of any other nation without involving the struggle of the Muslims. Without Muslims, science and research will remain an incomplete chapter in history. This research paper will be helpful for the students not only but for the researchers who are interested the topic Islam and Science.

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